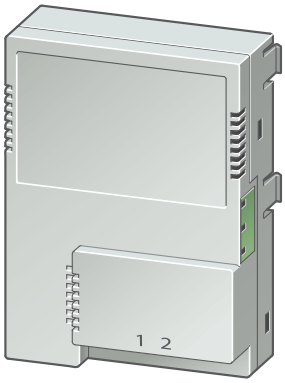
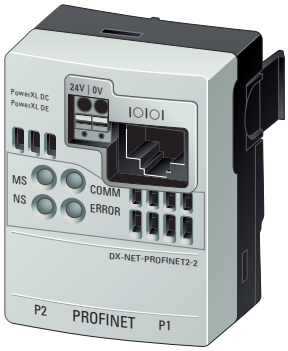
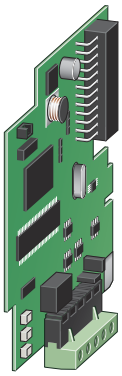
DX-NET-PROFINET2-2
DXG-NET-PROFINET
DXM-NET-PROFINET

PowerXL™ PROFINET communication interface for PowerXL™ DE1 variable speed starter and DC1, DG1, DM1 variable frequency drive







Powering Business Worldwide

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Drives Technical Resource Center

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(8:00 a.m. – 5:00 p.m. Central Time U.S. [UTC-6])
email: TRCDrives@Eaton.com
www.eaton.com/drives

Original operating manual
The German-language edition of this document is the original operating manual.

Translation of the original operating manual
All editions of this document other than those in German language are translations of the original operating manual.

1. Edition 2022, publication date 01/22
2. Edition 2022, publication date 04/22
See revision protocol in the "About this manual" chapter.

Authors: Mustafa Akel, Marcel Goerentz
Redaction: René Wiegand

Danger!
Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally retriggered.
- Verify isolation from the supply.
- Ground and short-circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (IL) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalizing. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O connection so that a cable or wire breakage on the signal side does not result in undefined states in the automation device.
- Ensure a reliable electrical isolation of the low voltage for the 24 V supply. Only use power supply units complying with IEC 60364-4-41 or HD 384.4.41 S2 (VDE 0100 part 410).
- Deviations of the mains voltage from the nominal value must not exceed the tolerance limits given in the technical data, otherwise this may cause malfunction and dangerous operation.
- Emergency-Stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency switching off devices must not cause restart.
- Built-in devices for enclosures or cabinets must only be run and operated in an installed state, desk-top devices or portable devices only when the housing is closed.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency switching off devices should be implemented.
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks, etc.).
- During operation, and depending on their degree of protection, variable frequency drives may have live, uninsulated, moving, and/or rotating parts, as well as hot surfaces.
- The impermissible removal of the required cover, improper installation or incorrect operation of the motor or variable frequency drive can cause the failure of the device and serious injury and/or material damage.
- Comply with all applicable national accident prevention regulations (e.g. BGV A3) when working with energized variable frequency drives.
- The electrical installation must be carried out in accordance with the relevant regulations (e.g. with regard to cable cross sections, fuses, PE).
- All transport, installation, commissioning and maintenance work must only be carried out by trained personnel (observe IEC 60364, HD 384 or DIN VDE 0100 and national accident prevention regulations).
- If applicable, systems in which variable frequency drives are installed must be equipped with additional monitoring and protective devices in accordance with the applicable safety regulations, e.g., the German Equipment and Product Safety Act, accident prevention regulations, etc. Making changes to the variable frequency drives by using the operating software is allowed.
- Keep all covers and doors closed during operation.
- When designing the machine, the user must incorporate mechanisms and measures that limit the consequences of a drive controller malfunction or failure (an increase in motor speed or the motor?9s sudden stop) so as to prevent hazards to people and property, e.g.:
  - Additional stand-alone devices for monitoring parameters that are relevant to safety (speed, travel, end positions, etc.)
  - Electrical and non-electrical safety devices (interlocks or mechanical locks) for mechanisms that protect the entire system
  - Due to the possibility of there being capacitors that are still holding a charge, do not touch live device parts or terminals immediately after disconnecting the variable frequency drives from the supply voltage. Heed the corresponding labels on the variable frequency drives

Content

0 About this manual

0.1 Subject

This manual MN040062EN ("DX-NET-PROFINET2-2 • DXG-NET-PROFINET • DXM-NET-PROFINET PowerXL™ PROFINET Communication interface for PowerXL™ DE1 variable speed starter and DC1, DG1, DM1 variable frequency drive") is the original operating manual and describes the communication interface (hereinafter referred to as PowerXL PROFINET communication interface for short)

- **DX-NET-PROFINET2-2** for DE1 variable speed starter and DC1 variable frequency drive,
- **DXG-NET-PROFINET** for DG1 variable frequency drive,
- **DXM-NET-PROFINET** for DM1 variable frequency drive.

The following chapters describe special information for project planning, installation, and operation of the communication interfaces DX-NET-ROFINET2-2, DXG-NET-PROFINET, and DXM-NET-PROFINET.

Special functions such as "Access to cyclic and acyclic data of the variable frequency drive and variable speed starter" are also described.

Unless otherwise described, DE1 is also used below as a proxy for DE11.

0.2 Target audience

This manual, MN040062EN, is intended for engineers, electricians, and automation technicians.

A thorough knowledge of the ProfiNet communication system and the programming of a ProfiNet master is required.
In addition, knowledge of handling the DE1 variable speed starter and the DC1, DG1, or DM1 variable frequency drive is required.

Please read this manual carefully before running the communication interface DX-NET-PROFINET2-2 or DXG-NET-PROFINET or DXM-NET-PROFINET.

We assume that you have a good knowledge of engineering fundamentals, and that you are familiar with handling electrical systems and machines, as well as with reading technical drawings.

CAUTION

Installation requires qualified electrician

0.3 List of revisions

The following significant amendments have been introduced since previous issues:

MODIFICATION OF THE MANUAL TITLE

Due to the admission of the additional DG1 and DM1 instrument series, the title of the manual in version 01/22 has been changed

from

DX-NET-PROFINET2-2

PROFINET communication interface for PowerXL™ DE1 variable speed starter and DC1 variable frequency drive

to

DX-NET-PROFINET2-2
DXG-NET-PROFINET
DXM-NET-PROFINET

PowerXL™ PROFINET communication interface for PowerXL™ DE1 variable speed starter and DC1, DG1, DM1 variable frequency drive

in version 04/22.

Protocol

Publication date	Page	Keyword	new	modified	deleted
04/22		Title (see special note above)		✓	
	various	Sections on DG1 and DM1 device series	✓		
	15	EMC standard EN 61800-3:2018-09		✓	
	15	Approbations / approvals	✓		
	–	Notes on mechanical surface mounting			✓
01/22		First edition	–	–	–

0.4 Writing conventions

0.4.1 Safety warning concerning property damage

WARNING

Indicates a potentially hazardous situation that may result in property damage.

0.4.2 Safety warning concerning personal injury hazards

CAUTION

Warns of hazardous situations that may cause slight injury.

WARNING

Warns of hazardous situations that could result in serious injury or death.

DANGER

Warns of hazardous situations that result in serious injury or death.

0.4.3 Hints

Indicates useful tips.

The housing, as well as other safety-relevant parts, has been left out in some of the figures in this manual in order to make the figures easier to understand. However, it is important to note that the components described in this manual must always be operated with their housing installed properly, as well as with all required safety-relevant parts.

Follow the installation instructions in the relevant instruction leaflets.

All the specifications in this manual refer to the hardware and software versions documented in it.

0.5 Additional information and documents

For more information on the series described in this manual, please visit the Eaton website.

www.eaton.com/Drives

Additional information can be found in the following documents:

Document	Type	Subject
Manuals		
MN040003EN	Manual	drivesConnect Parameterization software for PowerXL™ frequency converters
MN040059EN	Manual (installation manual)	DC1…20… and DC1…OE1 variable frequency drives
MN040058EN	Manual (Installation and parameter manual)	Variable frequency drive DC1-S...20, DC1-S...OE1
MN040011EN	Manual	DE1 variable speed starter Variable Speed Starter VSS DXE-EXT-SET configuration module
MN040002EN	Manual (installation manual)	DG1 variable frequency drive
MN040004EN	Manual (Operating manual)	DG1 variable frequency drive
MN040060EN	Manual (installation manual)	DM1 variable frequency drive
MN040049EN	Manual (Operating manual)	DM1 variable frequency drive
MN040013EN	Manual	Software "InControl"
Instruction leaflets		
IL04020009Z	Instruction leaflet	DC1 variable frequency drive with degree of protection IP20
IL040024ZU	Instruction leaflet	DC1 variable frequency drive with degree of protection IP20, frame size FS4
IL040005ZU	Instruction leaflet	DE1 variable speed starter
IL040016EN FS0-6	Instruction leaflet	DG1 variable frequency drive
PUB53675	Instruction leaflet	DM1 variable frequency drive
IL040045ZU	Instruction leaflet	DX-NET-ETHERNET2-2 DX-NET-PROFINET2-2
IL040062ZU	Instruction leaflet	DXG-NET-PROFINET DXM-NET-PROFINET
AP040189	Application Note	Notes on programming via Bluetooth
IL040025ZU	Instruction leaflet	DX-CBL-PC-3M0
IL04012020Z	Instruction leaflet	DX-KEY-LED2, DX-KEY-OLED
PU05907001Z	Manual	Safety manual
IL040051ZU	Instruction leaflet	DX-COM-STICK3-KIT

0.6 Terminology

The following abbreviations are used in this manual.

Abbreviations
When we refer to the **PowerXL PROFINET communication interface** as an abbreviation, this means the three variants

- DX-NET-PROFINET2-2
- DXG-NET-PROFINET
- DXM-NET-PROFINET

0.7 Abbreviations and symbols

The following abbreviations are used in this manual:

dec	decimal (number system based on 10)
EMC	Electromagnetic compatibility
FB	Field bus
FS	Frame size
GND	Ground (0 V potential)
GSD	Generic Station Description (electronic data sheet)
HEX	hexadecimal (number system based on 16)
LED	Light emitting diode (LED)
PC	Personal computer
PD	Process Data
PROFINET	Process Field Network
PLC	programmable logic controller
SW	Status Word
UL	Underwriters Laboratories

Symbols used in this manual have the following meanings:

▶ Indicates instructions to be followed.

Note on the application area

0.8 Units of measurement

Every physical dimension included in this manual uses international metric system units, otherwise known as SI (Système International d'Unités) units. For the purpose of the equipment's UL certification, some of these dimensions are accompanied by their equivalents in imperial units.

Table 1: Unit conversion examples

Designation	US-American Designation	Anglo American value	SI value	Conversion value
Length	inch	1 inch ('')	25.4 mm	0.0394
Output	horsepower	1 HP = 1.014 PS	0.7457 kW	1.341
Torque	pound-force inches	1 lbf in	0.113 Nm	8.851
Temperature	Fahrenheit	1 °F (T_F)	-17.222 °C (T_C)	$T_F = T_C \times 9/5 + 32$
Speed	revolutions per minute	1 rpm	1 min^{-1}	1
Weight	pound	1 lb	0.4536 kg	2.205

1 Series

1.1 Checking the delivery

Before opening the package, please check the nameplate on it to make sure that you received the correct connection.

The DX-NET-PROFINET2-2 or DXG-NET-PROFINET or DXM-NET-PROFINET communication interface is carefully packaged and shipped. The devices should be shipped only in their original packaging and using a suitable means of transportation.

Please take note of the labels and instructions on the packaging, as well as the manual for the unpacked device.

Open the packaging with suitable tools and inspect the contents immediately after receipt in order to ensure that they are complete and undamaged.

1.2 Equipment supplied

1.2.1 DX-NET-PROFINET2-2

The packaging must contain the following parts:

- A DX-NET-PROFINET2-2 communication interface
- an instructional leaflet IL040045ZU

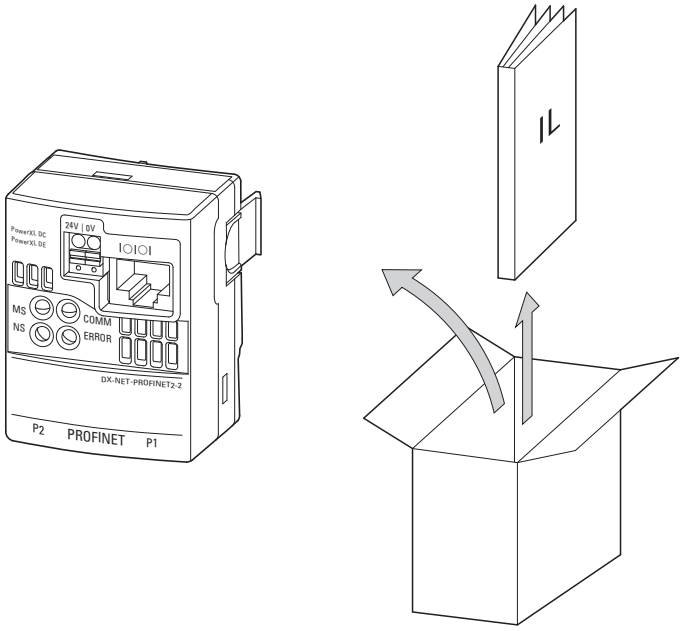


Figure 1: Scope of delivery for the DX-NET-PROFINET2-2 communication interface

1.2.2 DXG-NET-PROFINET

The packaging must contain the following parts:

- a DXG-NET-PROFINET communication interface
- an instructional leaflet IL040062ZU

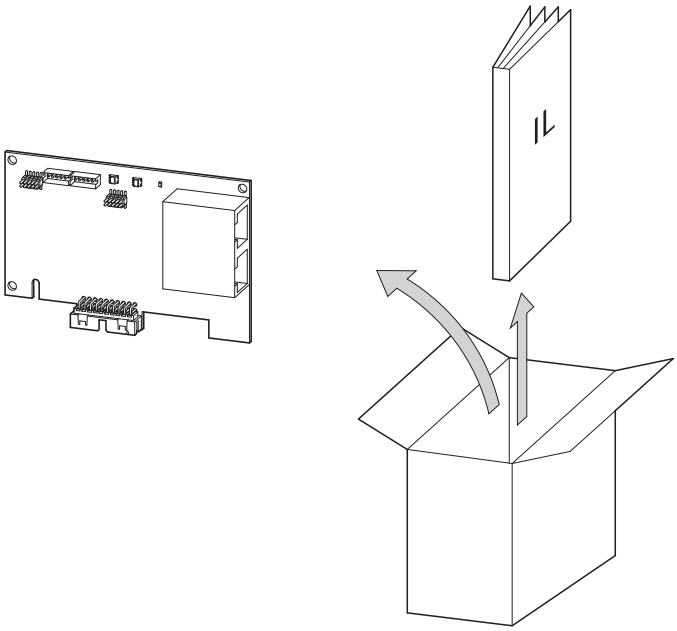


Figure 2: Scope of delivery for the DXG-NET-PROFINET communication interface

1.2.3 DXM-NET-PROFINET

The packaging must contain the following parts:

- a DXM-NET-PROFINET communication interface
- an instructional leaflet IL040062ZU

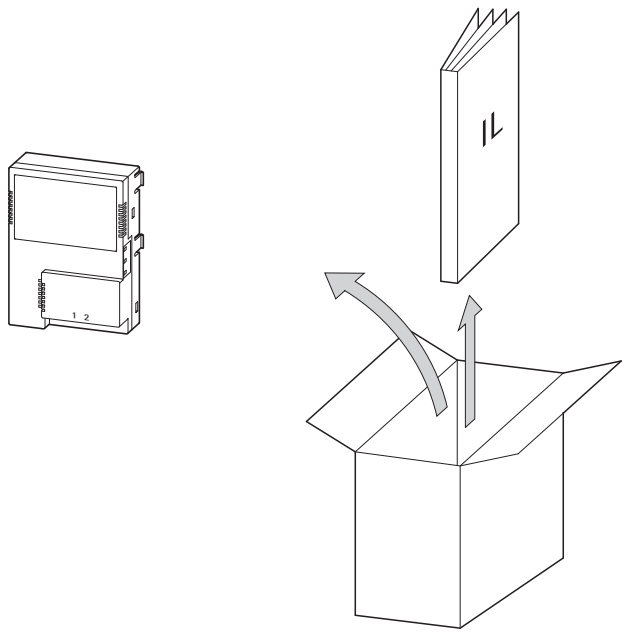


Figure 3: Scope of delivery for the DXM-NET-PROFINET communication interface

1.3 Type code

1.3.1 DX-NET-PROFINET2-2

The type code and type designation of the DX-NET-PROFINET2-2 communication interface are structured as follows:

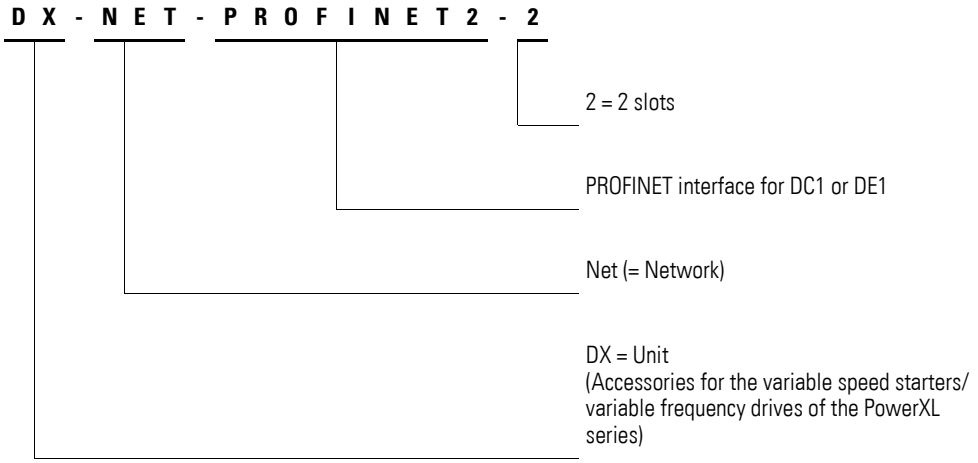


Figure 4: Type code of the DX-NET-PROFINET2-2 communication interface

1.3.2 DXG-NET-PROFINET

The type code and type designation of the DXG-NET-PROFINET communication interface are structured as follows:

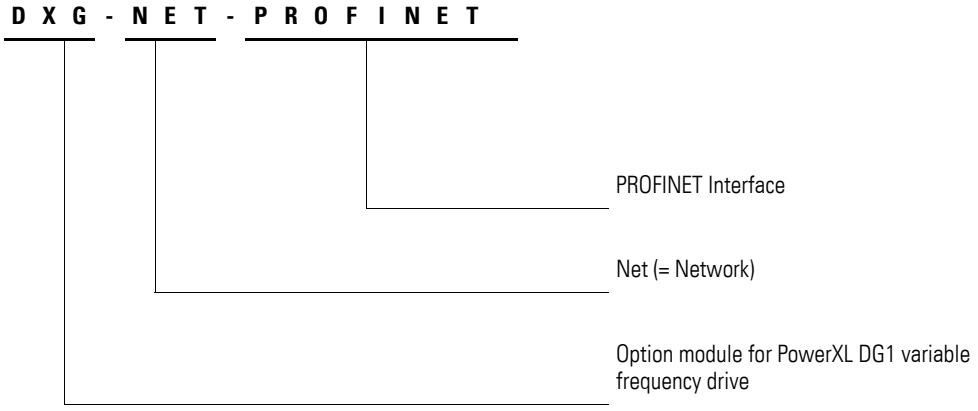


Figure 5: Type code of the DXG-NET-PROFINET communication interface

1.3.3 DXM-NET-PROFINET

The type code and type designation of the DXM-NET-PROFINET communication interface are structured as follows:

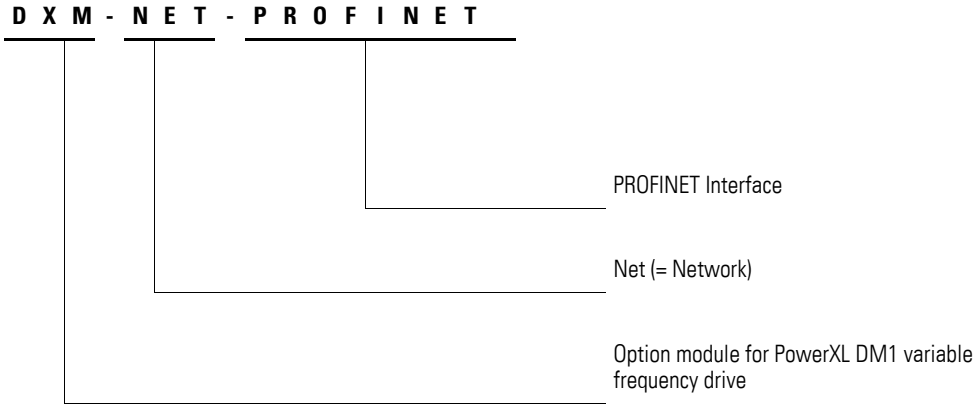


Figure 6: Type code of the DXM-NET-PROFINET communication interface

1.4 General rated data

Technical data	Value
Approbations / Approvals	
General information	The variable frequency drive/variable speed starter complies with the EMC standard EN 61800-3:2018-09
CE	• IEC/EN 61131-2 • IEC/EN 61800
UL/CSA	UL61800; CSA
PROFINET certification PROFIdrive certification	IEC/EN 61800-7, PNO documentation
RoHS	2011/65/EU
Reach	EG 1907/2006
WEEE	2012/19/EU
Installation	In RJ45 slot on the drive
Degree of protection	IP20
Connections	• RJ45 plug for variable frequency drive/variable speed starter • RJ45 plug for Ethernet
Power supply	• 20 - 28 V DC • 24 V DC 110 mA
Ethernet connection	
Compatible devices	Devices according to Ethernet standards IEEE 802.3 and IEEE 802.3u
Media	10BASE-TX or 100Base-TX with auto-negotiation and auto-MDIX (auto-crossover)
Cabling	• CAT5 UTP, CAT6 UTP • CAT5 FTP, CAT6 FTP • CAT5 STP, CAT6 STP
Terminals	RJ45
Termination	internal
Maximum segment length	100 m
Topology	Star or bus
Maximum number of nodes allowed	255
Data transfer rate	• 10 Mbps • 100 Mbps
Protocol	PROFINET IO

1.5 Pin assignment

1.5.1 PROFINET connection

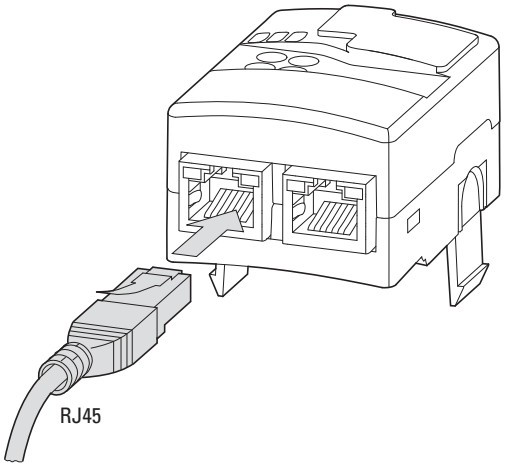


Figure 7: Connection of the RJ45 plug - for DX-NET-PROFINET2-2

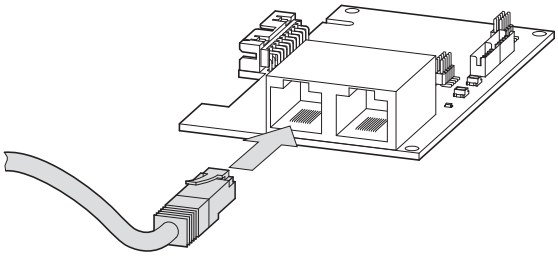


Figure 8: Connection of the RJ45 plug - for DXG-NET-PROFINET

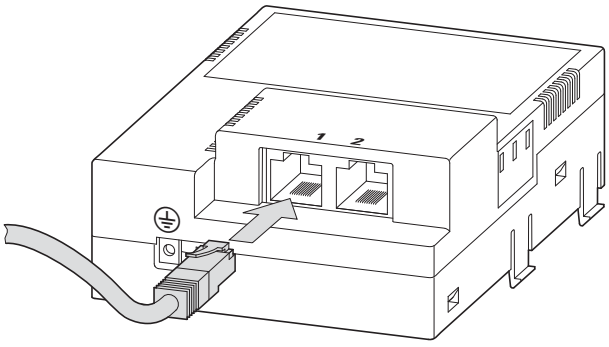
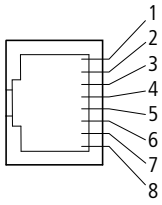


Figure 9: Connection of the RJ45 plug - for DXM-NET-PROFINET

The connection to the PROFINET field bus is established via an RJ45 plug in the lower area of the DX-NET-PROFINET2-2 communication interface. Generally, connection cables with RJ45 plugs for PROFINET are available as standard ready-for-use cables. They can also be prepared individually.

This will require the connections shown below (pin assignment).



PIN	Meaning
1	TD+
2	TD-
3	RD+
4	To GND via RC circuit
5	To GND via RC circuit
6	RD-
7	To GND via RC circuit
8	To GND via RC circuit

Figure 10: Pin assignment for RJ45 plugs (PROFINET connection)

1.5.2 Serial interface

1.5.2.1 DX-NET-PROFINET2-2

Changing the parameter values via drivesConnect or the control unit requires a connection to the RJ45 socket.
This is located on the front of the DX-NET-PROFINET2-2 communication interface.

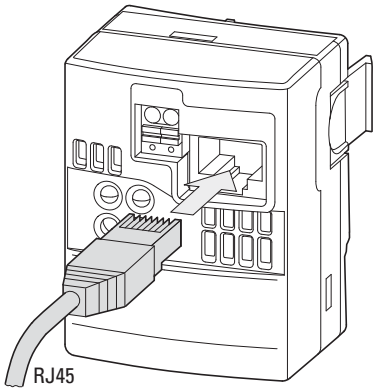


Figure 11: RJ45 interface

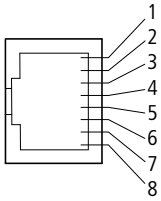
	PIN	Meaning
	1	–
	2	–
	3	0 V
	4	OP bus (operation bus) / External operating unit / PC connection -
	5	OP bus (operation bus) / External operating unit / PC connection +
	6	24 V DC power supply
	7	RS485-
	8	RS485+

Figure 12: Pin assignment for RJ45 plugs

1.5.2.2 DXG-NET-PROFINET

A modification of the parameter values via the "InControl" software or the operating unit requires a connection to the RJ45 socket of the DG1 basic device. This is located behind the keypad.

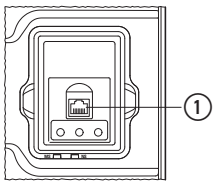


Figure 13: Interface

① RJ45 socket

Alternatively, the serial connection can be realized via terminals.

→ Further details on PIN assignment and addressing can be found in the MN040013EN manual - August 2015.

1.5.2.3 DXM-NET-PROFINET

A modification of the parameter values via the "InControl" software or the operating unit requires a connection to the RJ45 socket of the DM1 basic device. This is located under the cover housing.

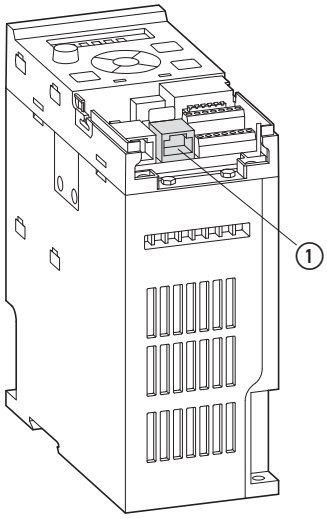


Figure 14: Interface

① RJ45 socket

Alternatively, the serial connection can be realized via terminals.

→ Further details on PIN assignment and addressing can be found in the MN040049EN manual.

1.5.3 External 24-V DC control voltage

If no mains supply is available, using an external 24 VDC voltage,

- communication to the PLC can be established,
- an IP address assigned,
- PROFINET network name assigned.

1.5.3.1 DX-NET-PROFINET2-2

The control section of the DX-NET-PROFINET2-2 communication interface must be supplied with an external voltage of 24 VDC via an external power supply unit.

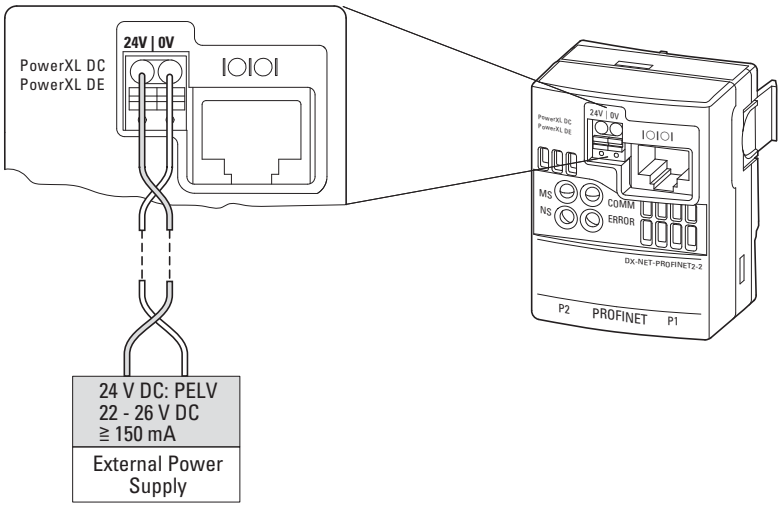


Figure 15: External power supply

→ The external control voltage (+24 VDC) must be able to handle a load of at least 150 mA.
The residual ripple of this external control voltage must be less than ±5 % $\Delta U_a/U_a$.

→ Parameterization of the basic device is not possible, since only the communication interface is supplied with voltage.

1.5.3.2 DXG-NET-PROFINET

The control section of the DG1 basic unit must be supplied with an external voltage of 24 VDC via an external power supply unit.

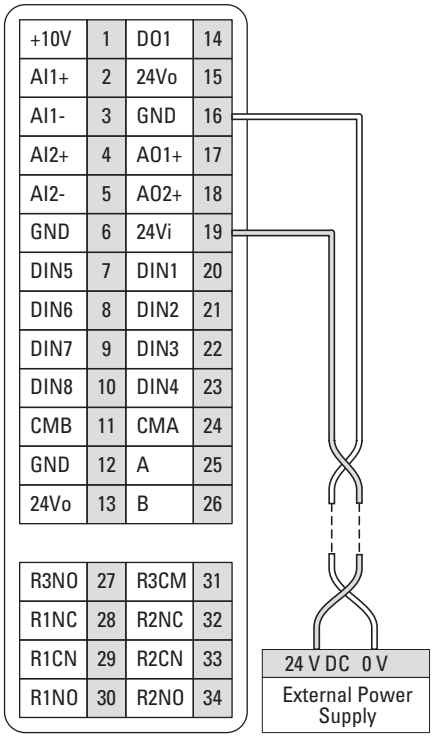


Figure 16: External power supply

1.5.3.3 DXM-NET-PROFINET

The control section of the DM1 basic unit must be supplied with an external voltage of 24 V DC via an external power supply unit.

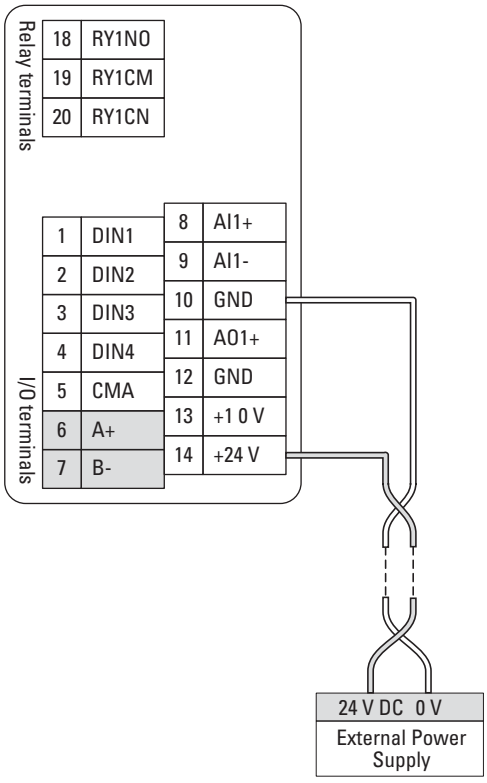


Figure 17: External power supply

→ Further details on the external 24 VDC supply can be found in the manuals:

DG1: Manual MN040002EN
DM1: Manual MN040060EN, "PowerXL PROFINET Interfaces"

1.6 Proper use

The PowerXL PROFINET communication interface is an electrical device for controlling and connecting the DC1, DG1, DM1 variable frequency drives or DE1 variable speed starter of the PowerXL product family to the standardized PROFINET field bus system.

It is intended to be installed in a machine or assembled with other components to form a machine or system.

The PowerXL PROFINET communication interface is not a household appliance, but is intended as a component exclusively for use for commercial purposes.

> *WARNING*
>
> Observe the technical data and connection requirements described in this manual.
> Any other usage constitutes improper use.

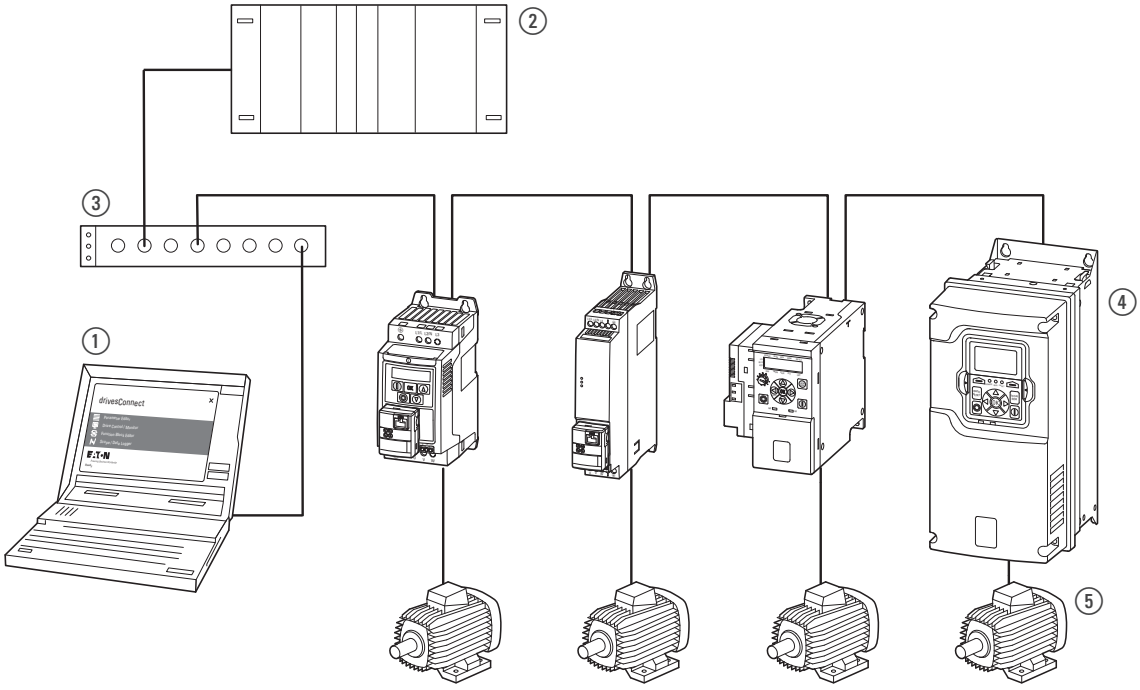


Figure 18: Integration of the PowerXL PROFINET communication interface into a PROFINET network

① PC
② Head-end controller (PLC)
③ Switch
④ Basic device:
DC1 variable frequency drive or DE1 variable speed starter with DX-NET-PROFINET2-2
DG1 variable frequency drive with DXG-NET-PROFINET
DM1 variable frequency drive with DXM-NET-PROFINET
⑤ Motor(s)

1.7 Maintenance and inspection

The PowerXL PROFINET communication interface is maintenance-free if the general rated operational data is observed and the technical data specific to PROFINET are taken into account.
However, external factors can influence the components's lifespan and function. We therefore recommend that you check the device regularly.

If the communication interface is damaged by external influences, repair is not possible. Replacement or repair of individual components of the communication interface is not intended.

1.8 Storage

If the PowerXL PROFINET communication interface is stored before use, the following ambient conditions must prevail at the storage location:

- Storage temperature: -40 °C to +85 °C
- relative average air humidity: < 95 %
- No condensation allowed

1.9 Service and warranty

If you have a problem with your PowerXL PROFINET device, please contact your local sales organization.

When you call, have following data ready:

- the exact type designation (e.g. DX-NET-PROFINET2-2),
- the date of purchase,
- a detailed description of the problem that occurred in connection with the device (e.g. DX-NET-PROFINET2-2).

Information concerning the warranty can be found in the Eaton Industries GmbH Terms and Conditions.

For service and support, please contact your local sales organization.

Contact info. Eaton.com/contacts

Service page: Eaton.com/aftersales

1.10 Disposal

The PowerXL PROFINET communication interface can be disposed of as electronic waste in accordance with the currently applicable national regulations. Dispose of the device according to the applicable environmental laws and provisions for the disposal of electrical or electronic devices.

2 Configuration

DANGER – CONTROL FAILURE

When engineering your control diagram, make sure to take all potential control path faults into account.

When it comes to critical control functions, make sure that a safe state can be reached after a control path fails.

Critical control function examples include:
- Emergency shutdown (emergency stop),
- Overtravel stop
- Power supply failure
- Restart.

Provide separate or redundant control paths.

Make sure that system control paths include communication connections.

Take the effect of unforeseen transmission delays and connection problems into account.

Carefully and individually test every implementation of a product before putting it into operation.

Observe all general accident prevention and local safety regulations.

Information for the USA:
For more information, please refer to the latest issue of NEMA ICS 1.1, "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control", and the latest issue of NEMA ICS 7.1, "Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable-Speed Drive Systems."

In addition to property damage, failure to observe the above instructions may result in serious bodily injury or even death.

2.1 Compatibility overview – hardware and firmware

The following shows the versions of the hardware and firmware with which the PowerXL PROFINET communication interface is compatible with the DC1, DG1, and DM1 variable frequency drives or DE1 variable speed starters.

Firmware

The PowerXL PROFINET communication interface can be used with firmware in the following cases:

Basic device	DC1	DE1, DE11	DG1	DM1
Firmware version	from V 2.10	from V 2.11	V 37.2	V 1.09

→ The firmware version of the DX-NET-PROFINET2-2 communication interface cannot be updated.

→ An update of the firmware version of the communication interface DXG-NET-PROFINET can be done via the Firmware Upgrade Tool (part of the software “InControl”).

→ An update of the firmware version of the communication interface DXM-NET-PROFINET can be done via the Firmware Upgrade Tool (part of the software “InControl”).

→ The firmware version of the basic device can be updated for the DC1 variable frequency drive or DE1 speed controller via the "drivesConnect" program or for the DG1 and DM1 variable frequency drive via the "InControl" software.

→ The software “drivesConnect” and “InControl” as well as the necessary firmware versions are available free of charge on the Eaton website at the following address:

Eaton.com/software

2.2 LEDs

The LEDs on the PowerXL PROFINET communication interface are used to indicate operating and network statuses and to allow rapid diagnostics of problems.

2.2.1 DX-NET-PROFINET2-2

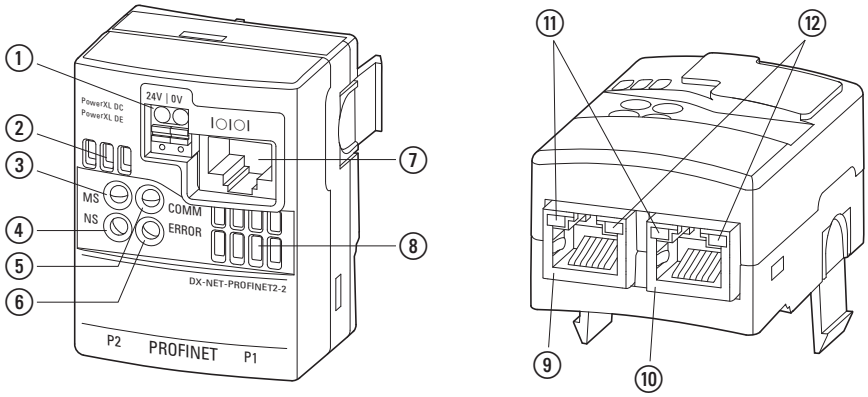


Figure 19: LEDs

① External 24-VDC supply voltage
② Air vents
③ "MS" LED - LED to indicate module status
④ "NS" LED - LED to indicate network status
⑤ "COMM" LED - LED to indicate the communication status to the basic unit (DC1/DE1)
⑥ "ERROR" LED - LED to indicate faults or error messages
⑦ RJ45 connection: Serial interface to the basic unit
⑧ Air vents
⑨ RJ45 connection – PROFINET
⑩ RJ45 connection – PROFINET
⑪ P1 LED – to indicate the Ethernet status
⑫ P2 LED – to indicate the Ethernet status

The following tables show the meaning of the LED indicators for communication via PROFINET.

NS

The **NS** LED (network status) is used to indicate network statuses.

LED status	Description
off	No supply voltage or no connection to the IO controller available
green flashing	Online, but no communication present
green illuminating	The connection to the PROFINET network has been established.
red flashing	Fault detected Flashes once: No station name assigned Flashes twice: No IP address assigned Flashes three times: Configuration error: Offline and online configurations do not match
illuminated red	Fatal error detected

MS

The MS LED (module status) indicates the status of the DX-NET-PROFINET2-2 communication interface.

LED status	Description
off	No supply voltage or device not turned on.
green flashing	Configuration error or module in standby mode.
green illuminating	The connection to the PROFINET controller has been established.
red flashing	A reversible error has occurred.
illuminated red	A fatal error has been detected.
green/red flashing	A firmware update is in progress. Do not switch off the device!

Reversible vs. non-reversible error

A reversible error can be cleared by a reset or by switching the supply voltage off and on.
In contrast, fatal errors can only be reset by power cycling the supply voltage or by changing the hardware configuration while the supply voltage is off.

P1, P2

The **P1** and **P2** LEDs indicate the status of general communication.

LED status	Description
off (green)	Port not connected
green flashing	Data transfer in progress and communication active
illuminated yellow	An Ethernet connection has been established and a data transfer is taking place. Port connected but no communication present.

COMM

The **COM** LED indicates the communication status between the variable frequency drive and the communication interface.

LED status	Description
off (orange)	There is no communication with the basic unit.
orange illuminating	Communication is actively taking place with the basic unit.

ERROR

The **ERROR** LED indicates the internal communication status with the basic unit.

LED status	Description
off (red)	No communication with the basic unit
on (red)	Communication error with the basic unit

2.2.2 DXG-NET-PROFINET

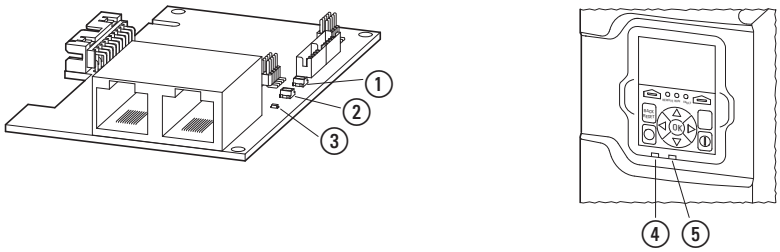


Figure 20: LEDs
① Power Status (MCU_LED)
② Bus Fault Status (MLED1)
③ System Fault Status (MLED0)
④ LED for displaying the module status
⑤ LED for displaying the network status

The following tables show the meaning of the LED indicators for communication via PROFINET.

MLED0

LED status	Description
Off	no diagnostic data Device functions properly
on	Diagnostic data available

MLED1

LED status	Description
Off	Network communications in order
on	Bus error

Module status LED

The module status LED indicates the status of the DXG-NET-PROFINET communication interface.

LED status	Description
off	**No power** The variable frequency drive is not supplied with power.
green illuminating	**Device pre-operational** The variable frequency drive is functioning properly.
green flashing (The display flashes once per second).	**Standby** The variable frequency drive has not been configured.
red flashing (The display flashes once per second).	**Minor fault** The variable frequency drive has detected a recoverable minor fault. **Note:** An incorrect or inconsistent configuration is considered a minor fault. Also check if the error is no longer displayed after troubleshooting.
illuminated red	**Serious fault** The variable frequency drive has detected an unrecoverable serious error.
green/red flashing	**Self-test** The variable frequency drive performs a self-test when it is powered up.

Network status LED

The network status LED indicates the network status.

LED status	Description
off	**Not switched on, no IP address** The variable frequency drive is switched off or on, but no IP address is configured (Interface configuration attribute of the TCP/IP interface object).
green illuminating	**Connected** At least one CIP connection (any transport class) has been made. The connection to the controller is not broken.
green flashing (The display flashes once per second).	**No connections** An IP address is configured, but no CIP connections have been established. The connection to the controller is not broken.
red flashing (The display flashes once per second).	**Connection time out** The variable frequency drive is switched on and the connection to the control is broken. Only lights up continuously green again when all broken connections to the controller have been restored.
illuminated red	**Duplicate IP address** The variable frequency drive has detected a duplicate IP address.
green/red flashing	**Self-test** The variable frequency drive performs a self-test when it is powered up.

2.2.3 DXM-NET-PROFINET

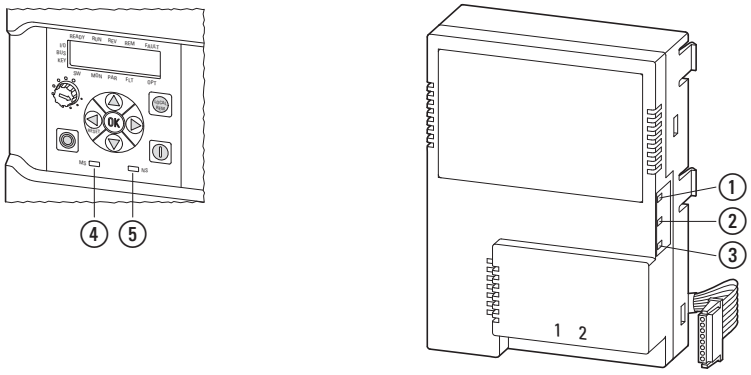


Figure 21: LEDs

① Power Status (MCU_LED)
② Bus Fault Status (MLED1)
③ System Fault Status (MLED0)
④ LED for displaying the module status
⑤ LED for displaying the network status

The following tables show the meaning of the LED indicators for communication via PROFINET.

MLED0

LED status	Description
off	no diagnostic data Device functions properly
on	Diagnostic data available

MLED1

LED status	Description
off	Network communications in order
on	Bus error

Module status LED

The module status LED indicates the status of the DXM-NET-PROFINET communication interface.

LED status	Description
0ff	**No power** The variable frequency drive is not supplied with power.
green illuminating	**Device pre-operational** The variable frequency drive is functioning properly.
green flashing (The display flashes once per second).	**Standby** The variable frequency drive has not been configured.
red flashing (The display flashes once per second).	**Minor fault** The variable frequency drive has detected a recoverable minor fault. **Note:** An incorrect or inconsistent configuration is considered a minor fault. Also check if the error is no longer displayed after troubleshooting.
illuminated red	**Serious fault** The variable frequency drive has detected an unrecoverable serious error.
green/red flashing	**Self-test** The variable frequency drive performs a self-test when it is powered up.

Network status LED

The network status LED indicates the network status.

LED status	Description
off	**Not switched on, no IP address** The variable frequency drive is switched off or on, but no IP address is configured (Interface configuration attribute of the TCP/IP interface object).
green illuminating	**Connected** At least one CIP connection (any transport class) has been made. The connection to the controller is not broken.
green flashing (The display flashes once per second).	**No connections** An IP address is configured, but no CIP connections have been established. The connection to the controller is not broken.
red flashing (The display flashes once per second).	**Connection time out** The variable frequency drive is switched on and the connection to the control is broken. Only lights up continuously green again when all broken connections to the controller have been restored.
illuminated red	**Duplicate IP address** The variable frequency drive has detected a duplicate IP address.
green/red flashing	**Self-test** The variable frequency drive performs a self-test when it is powered up.

3 Installation

3.1 Introduction

This chapter provides a description of the mounting and the electrical connection for the PowerXL PROFINET communication interface.

→ Perform all installation work only with the indicated, appropriate tools and do not apply any force.

Observe the following information when setting up the system.

DANGER

All handling and installation work relating to the mechanical surface mounting and installation of the PowerXL PROFINET communication interface may only be carried out in a voltage-free state.

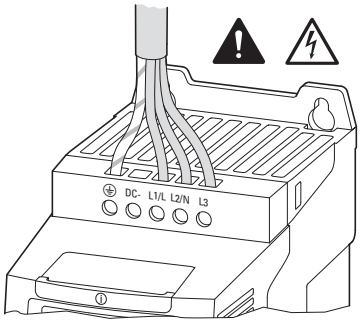


Figure 22: Only carry out installation work in a voltage-free state

3.2 Installation documents

The following documents provide information on installing a DC1, DG1, and DM1 variable frequency drive (with degree of protection IP20) or a DE1 variable speed starter:

Series	Document
DC1 variable frequency drive with degree of protection IP20	Instruction leaflet IL04020009Z
DC1 variable frequency drive with degree of protection IP20, frame size FS4	Instruction leaflet IL040024ZU
DE1 variable speed starter	Instruction leaflet IL040005ZU
DG1 variable frequency drive	Manual MN040002EN (Installation Manual)
DG1 variable frequency drive (PowerXL DG1 Option Cards)	Instruction leaflet IL040022EN
DM1 variable frequency drive	MN040060EN (Installation Manual)
DM1 variable frequency drive	Instruction leaflet PUB53683

3.3 Assembly

3.3.1 DX-NET-PROFINET2-2

The connection from the DX-NET-PROFINET2-2 communication interface to the PROFINET field bus is established via an RJ45 plug (see also → Section "1.5.1 PROFINET connection", Page 16).

The DX-NET-PROFINET2-2 communication interface is connected to the front of the DC1 variable frequency drive or DE1 variable speed starter.

To do this, remove the two cover plugs from the DC1 variable frequency drive using a flat-blade screwdriver.

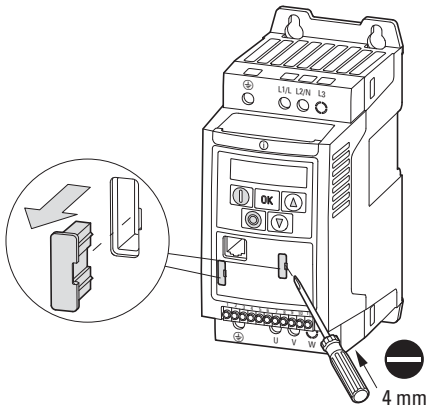


Figure 23: Removing the cover plugs

Surface mounting

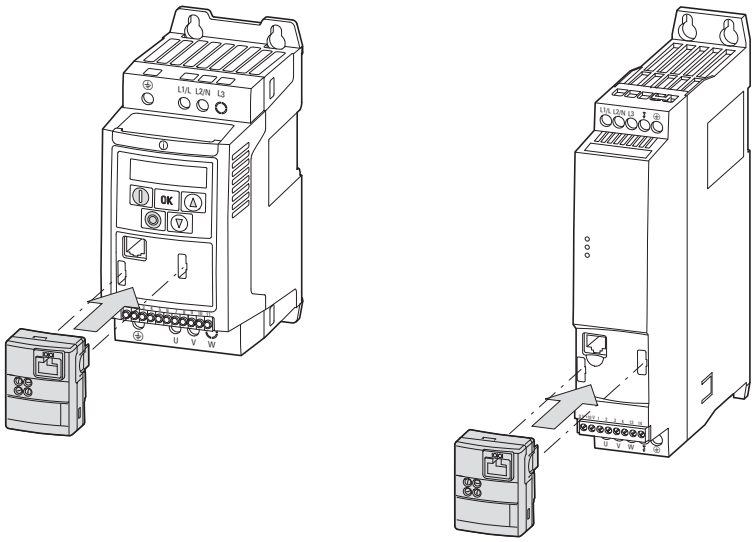


Figure 24: Surface mounting of the DX-NET-PROFINET2-2 communication interface on a DC1 variable frequency drive (left) or on a DE1 variable speed starter (right)

→ The DX-NET-PROFINET2-2 communication interface can be mounted on all DC1 variable frequency drives with degree of protection IP20 as well as on all DE1 variable speed starters.

The DX-NET-PROFINET2-2 communication interface **cannot**, however, be used for DC1 variable frequency drives with degree of protection IP66.

3.3.2 DXG-NET-PROFINET

The connection from the DXG-NET-PROFINET communication interface to the PROFINET field bus is made via an RJ45 plug.

The DXG-NET-PROFINET communication interface is plugged into an option slot on the front of the DG1 variable frequency drive. The option slots are located under the cover case.

To do this, the 4 or 6 screws (depending on the frame size) on the variable frequency drive must be opened using a screwdriver.

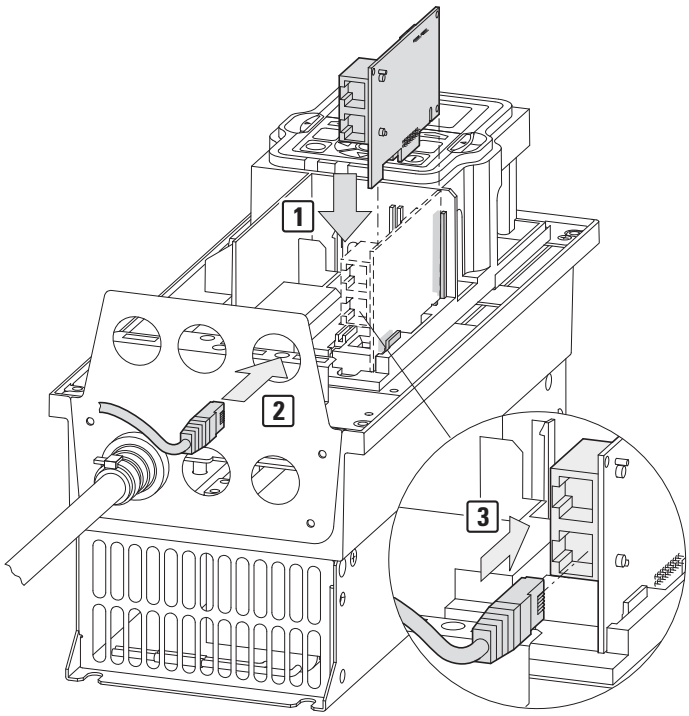


Figure 25: Plugging in the communication interface

→ Further details on installation and cable routing can be found in the MN040002EN manual (installation manual) and in the IL040022EN instruction leaflet.

3.3.3 DXM-NET-PROFINET

The connection from the DXM-NET-PROFINET communication interface to the PROFINET field bus is made via an RJ45 plug.

The DXM-NET-PROFINET interface is plugged in on the right side of the DM1 variable frequency drive.

The DXG-NET-PROFINET communication interface has an underground cable on the backside. The underground cable is plugged into an option slot on the front of the variable frequency drive DM1. To do this, the lower cover must be opened.

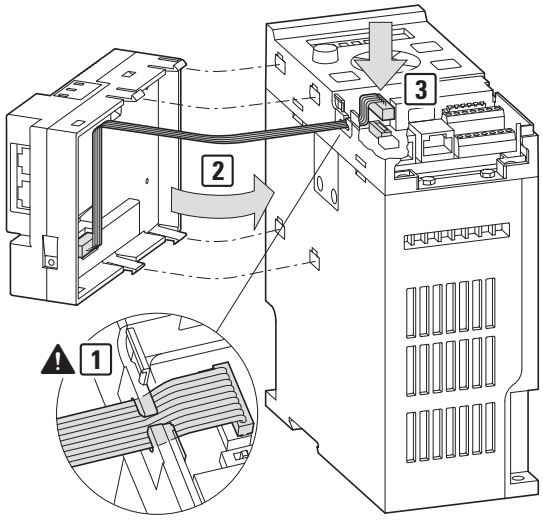


Figure 26: Plugging in the communication interface

→ Further details on installation and cable routing can be found in the MN040060EN manual (installation manual) and in the PUB53683 instruction leaflet.

3.4 Installing the field bus

Never lay the cable of a field bus system directly parallel to the energy carrying cables.

When installing the connection, make sure that the control and signal cables (0–10 V, 4–20 mA, 24 VDC, etc.), as well as the communication system's (PROFINET) connection cables, are not routed directly parallel to mains connection or motor connection cables conveying power.

With parallel cable routing, the clearances between control, signal and field bus cables ② and energy-carrying mains and motor cables ① must be greater than 30 cm.
All cables should always intersect at right angles.

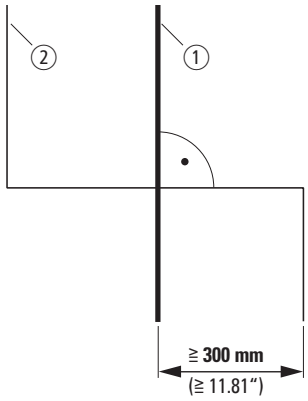


Figure 27: Routing cables for PROFINET ② and mains/motor cables ①

If the system requires a parallel routing in cable ducts, a partition must be installed between the fieldbus cable ② and the mains and motor cable ①, in order to prevent electromagnetic interference with the fieldbus cable.

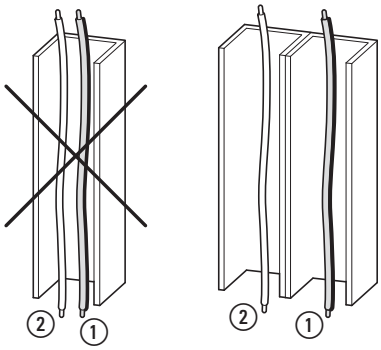


Figure 28: Separate routing in the cable duct
① Mains and motor connection cable
② PROFINET cable

In all cases only use approved PROFINET cables.

4 Commissioning

First, carry out all the measures for commissioning the variable frequency drive or variable speed starter as described in the relevant manual for the device.

Check the settings and installations for the switching on the PROFINET communication system that are described in this manual.

WARNING

Ensure that no danger will be caused by starting the motor. Disconnect the driven machine if there is a danger in an incorrect operating state.

4.1 GSDML file

The properties of a PROFINET card are described in a so-called GSDML file. This is required in order to integrate the PowerXL PROFINET communication interface into a PROFINET network.

You will find a suitable GSDML file on the Internet at:

Eaton.com/software

Enter the search term “GSDML”.

4.2 Addressing

Each device has a globally unique MAC address (6-byte Ethernet address): The first three bytes specify the ID, while the other three bytes specify the device's serial number, which is consecutive.

→ The MAC address will be printed on the name plate.
The DHCP function is disabled by default.

The PowerXL PROFINET communication interface has specific names so that each I/O device can be uniquely assigned/configured within a project.

A connection to the PLC configuration is only possible if a correct name assignment exists, as the PLC recognizes the I/O device in the network via its name.

→ The IP address can be configured using a network tool (e.g. STEP 7/HW configuration or IPconfig from HMS).

→ The configuration of the IP address is done in this manual with the help of the software "IPconfig".

The "IPconfig" software can be downloaded free of charge from the internet at the following address:

www.anybus.com

→ The communication interfaces DXG-NET... and DXM-NET... cannot be addressed via "IPconfig".

→ The IP address at DX-NET-PROFINET2-2: is 0.0.0.0.
The IP address at DXG-NET-PROFINET and DXM-NET-PROFINET is: 192.168.1.253

4.2.1 Configuration of the IP address of the communication interface DX-NET-PROFINET2-2

The following instructions explain how to configure the IP address for the DX-NET-PROFINET2-2 communication interface.

- ▶ Connect the communication interface to the basic unit on both the PC and network side.
- ▶ Switch on the basic unit (i.e. the variable frequency drive).
  The LED **MS** of the communication interface DX-NET-PROFINET2-2 must then light up.
- ▶ Open the **IPconfig** program and click on **Settings**.

Figure 29: "Settings" Tab

- ▶ Select the computer network adapter from the drop-down menu of the network interface.

Figure 30: Select the network adapter

The program then displays all available communication interfaces.

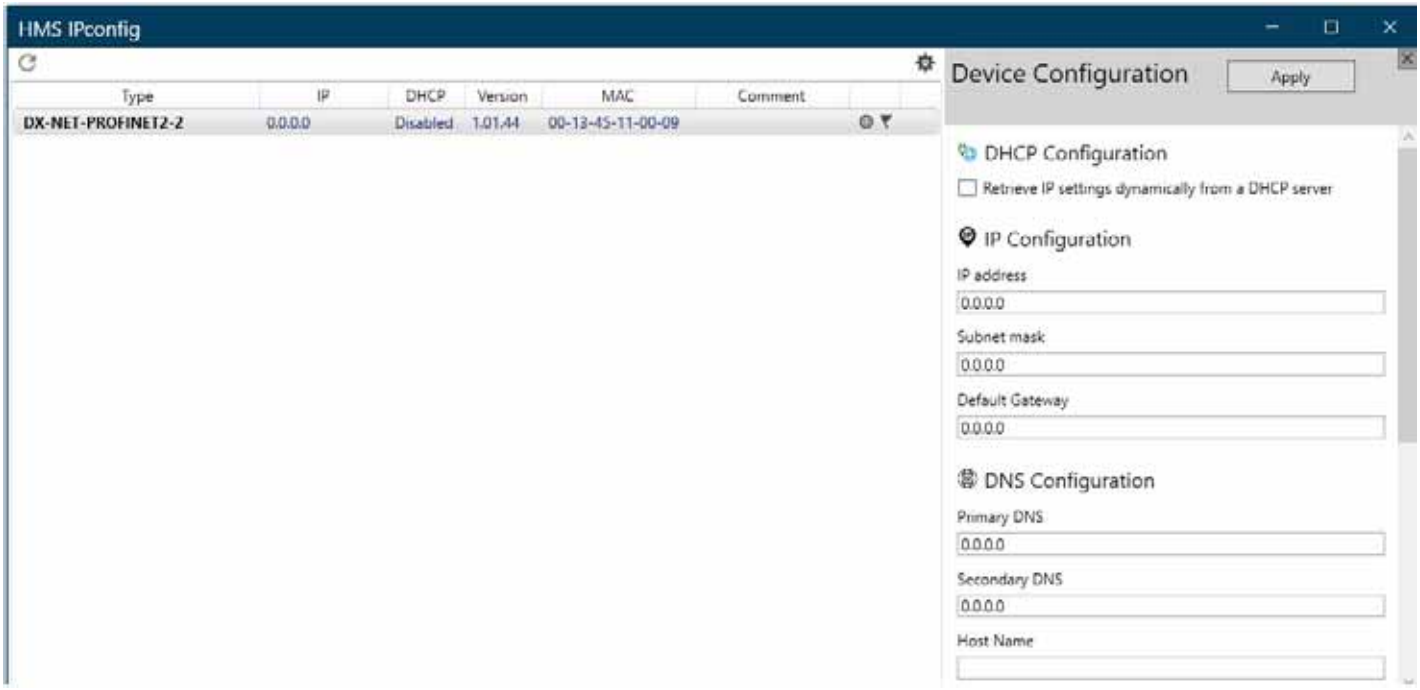


Figure 31: View of the available communication interfaces

- ▶ Select the **DX-NET-PROFINET2-2** interface and set the desired IP address on the right side.
- ▶ Click on **Apply**.

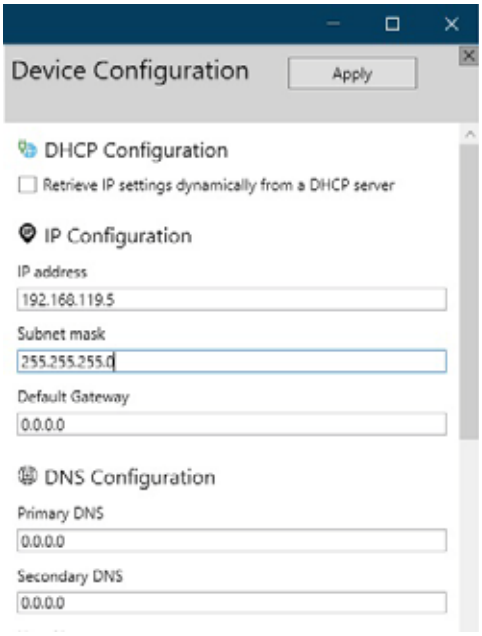


Figure 32: Setting the IP address

You will then see the assigned IP address under **IP**.

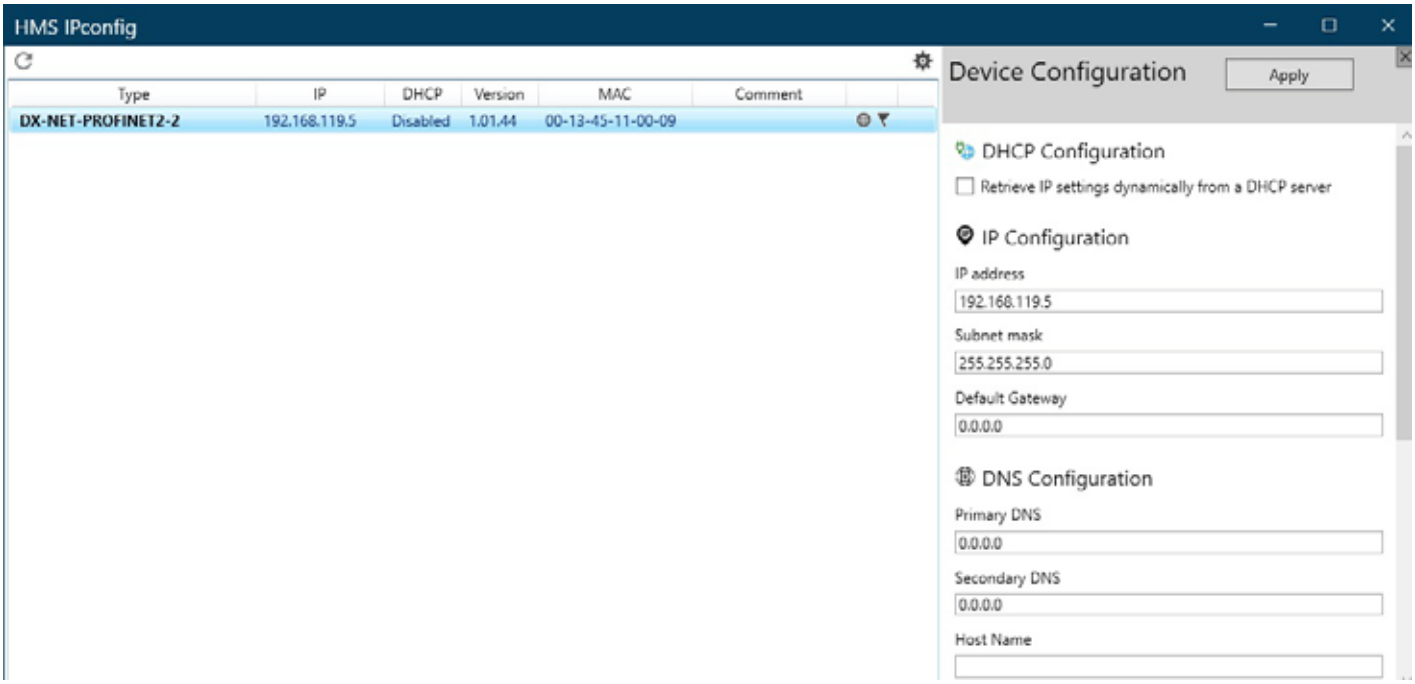


Figure 33: The DX-NET-PROFINET2-2 communication interface now has an IP address assigned.

Addressing is now complete.

4.2.2 Configuration of the IP address of the communication interface DXG-NET-PROFINET and DXM-NET-PROFINET

The configuration of the IP address of the PowerXL PROFINET communication interfaces DXG-NET-PROFINET and DXM-NET-PROFINET is done via board parameters.
The parameters can be accessed via the operating unit (keypad), WEB UI (Web User Interface), or via the InControl software.

The board parameters are divided into two groups

PROFINET

- Profinet monitor
- Profinet parameters

Part 1 PROFINET contains general communication settings like the IP address, the device name, and monitor values that represent the run status of the general communication.

Profile-specific information can be viewed under monitor parameters.

DM1

The IP address of the communication interface can be set in the parameter group B4 - B4.1.2.3.

In the following, you will find the board parameters if a communication interface DXM-NET-PROFINET is connected to the basic device.

If no DXM-NET-PROFINET communication interface is connected, these parameters will not be displayed in the InControl software or on the keypad.

Table 2: Parameter group B4 - B4.1.2.3

Parameter Number	Parameter Name	Meaning
B4.1.2.2	IP Address Mode	Defines the IP address configuration mode for the communication interface. 0 = Static IP 1 = DHCP
B4.1.2.3	Static IP Address	static IP address of the communication interface
B4.1.2.4	Static Subnet Mask	static subnet mask
B4.1.2.5	Static Default Gateway	static gateway address

→ The basic device DM1 has only one card slot (slot A).

→ The static IP address mode must be selected for PLC communication. The parameter B4.1.2.2 IP address mode is set to the value “Static IP”.

DG1

The IP address of the communication interface can be set in the parameter group B10 - B10.1.2.3 (Slot A) or under B20 - B20.1.2.3 (Slot B).

In the following, you will find the board parameters if a communication interface DXG-NET-PROFINET is connected to the basic device.

If no DXM-NET-PROFINET communication interface is connected, these parameters will not be displayed in the InControl software or on the keypad.

Table 3: Parameters for slot A

Parameter Number	Parameter Name	Meaning
B10.1.2.2	IP Address Mode	Defines the IP address configuration mode for the communication interface 0 = Static IP 1 = DHCP
B10.1.2.3	Static IP Address	static IP address of the communication interface
B10.1.2.4	Static Subnet Mask	static subnet mask
B10.1.2.5	Static Default Gateway	static gateway address

Table 4: Parameters for slot B

Parameter Number	Parameter Name	Meaning
B20.1.2.2	IP Address Mode	Defines the IP address configuration mode for the communication interface 0 = Static IP 1 = DHCP
B20.1.2.3	Static IP Address	Static IP address of the communication interface
B20.1.2.4	Static Subnet Mask	Static subnet mask
B20.1.2.5	Static Default Gateway	Static gateway address

The static IP address mode must be selected for PLC communication.
The parameter B10.1.2.2 or B20.1.2.2 IP address mode is set to the value “Static IP”.

The DG1 basic device has two card slots: Slot A and slot B. Depending on the slot, the parameter numbers may vary. For example, if the interface is plugged into slot A, the parameter number starts with B10.

The IP address of the basic device must be set under parameter group P20 communication (DG1) and parameter group P12 Ethernet communication (DM1).

The IP address of the basic device must not be identical to that of the communication interface.

The communication interfaces DXG-NET-PROFINET and DXM-NET-PROFINET have two ports (dual port), which have an internal switch function.
The Ethernet interfaces of the basic device (DM1 and DG1) do not have PROFINET functionality.
The DXG-NET-PROFINET and DXM-NET-PROFINET communication interfaces and the basic devices (DM1 and DG1) can be networked together or connected to a switch.

The DXG-NET-PROFINET and DXM-NET-PROFINET communication interfaces cannot be used for general parameterization of the basic device via InControl or WUI (web interface).

4.3 Parameter settings

The following parameter settings are required for cyclic operation with the PROFINET communication system.

For detailed information on the configuration of the parameters, please refer to the user manual of the respective basic device (variable frequency drive).

4.3.1 DX-NET-PROFINET2-2

Table 5: Parameter P-12

PNU 928 Subindex 0	P-12	Description
0	0	Local: Control and reference via terminals If the default settings are used, the DC1 variable frequency drive or DE1 variable speed starter reacts directly to signals that are applied at the control signal terminals. It is still possible to read out the data via the network.
1	9	Network: Control and reference via the network If parameter P-12 is set to 9, the system can only be operated via the network. The system is controlled and referenced only via the network. It is not possible to switch to another control level.
2	10	Control via PROFIdrive telegram – local setpoint If parameter P-12 is set to 10, the system can only be controlled via the network. The setpoint is specified via control terminals P-15.
3	11	Control via terminals – reference via PROFIdrive telegram If parameter P-12 is set to 11, the system can only be controlled via terminals (P-15). The setpoint is specified via the network.
4	12	Control and reference via PROFIdrive telegram If communication is interrupted, the system automatically switches to local control (P-12 = 0). If parameter P-12 is set to 12, the system can only be operated via the network. In the event of a loss of communication, there is an automatic switch to local control (P-15). As soon as communication is available again, a change back to the networked control system takes place.
5	13	Dual mode – Control and reference via PROFIdrive telegram – Enable via control signal terminal 1.

Please observe:

→ The PNU 928 parameter does not exist in the display of the basic devices (keypad or drivesConnect).
The parameter PNU 928 can be reached under the acyclic services (→ Section “4.12.0.2 PNU 928 Subindex 0”, Page 139).

4.3.2 DXG-NET-PROFINET

PNU 928 Subindex 0 (PNU 928.0)

For the process data level, modifications are only possible when the variable frequency drive is stopped.

PNU 928.0 = 0 – Local: Control and reference freely selectable

If the parameter PNU 928.0 is set to the value 0 (factory setting), operation via a parameterized source is possible.

If the default settings are used, variable frequency drive DG1 reacts directly to signals that are applied at the control signal terminals.

It is still possible to read out the data via the network.

Table 6: PNU 928.0 = 0

PNU 928.0 = 0	Parameter Number	Description
	P1.11	freely selectable
	P1.12	freely selectable
	P1.14	freely selectable
	P1.15	freely selectable

PNU 928.0 = 1 – Network: Control and reference via the network

If the parameter PNU 928.0 is set to 1, the system must be operated via the network. The system is controlled and referenced only via the network.

It is not possible to switch to another control level. The switching parameters and the remote button on the keypad are locked.

Table 7: PNU 928.0 = 1

PNU 928.0 = 1	Parameter Number	Description
	P1.11	Network
	P1.12	no function
	P1.14	no function
	P1.15	Network
	Remote tact switch	locked
	P3.23	locked

PNU 928.0 = 2 - Control via network - setpoint local

If the parameter PNU 928.0 is set to 2, the system must be controlled via the network. The setpoint is specified via control terminals, keypad, or the network.

Table 8: PNU 928.0 = 2

PNU 928.0 = 2	Parameter Number	Description
	P1.11	Network
	P1.12	no function
	P1.14	no function
	P1.15	freely selectable
	Remote tact switch	locked
	P3.23	locked

PNU 928.0 = 4 Control and setpoint via network - automatic change to local control in case of communication loss

If the parameter PNU 928.0 is set to 4, the system must be operated via the network.

If communication is interrupted, the system automatically switches to local control (PNU 928.0 = 0).

As soon as communication is available again, the system switches back to setting 4 (PNU 928.0 = 4).

For normal operation:

- The system is controlled and referenced only via the network.
- It is not possible to switch to another control level. The switching parameters and the remote button on the keypad are locked.

Table 9: PNU 928.0 = 4 - for normal operation

PNU 928.0 = 4	Parameter Number	Description
	P1.11	Network
	P1.12	no function
	P1.14	no function
	P1.15	Network
	Remote tact switch	locked
	P3.23	locked

In the event of a loss of communication:

- The system automatically switches to local control.

Table 10: PNU 928.0 = 4 - in case of communication loss

PNU 928.0 = 4	Parameter Number	Description
	P1.11	Terminal start 1
	P1.12	freely selectable
	P1.14	freely selectable
	P1.15	freely selectable
	Remote tact switch	locked
	P3.23	freely selectable

PNU 928.0 = 5 Dual Mode - Control and setpoint via network - Enable via control terminals

If the parameter PNU 928.0 is set to 5, the system can only be operated via the network if there is a control signal from the terminals.

To start the variable frequency drive, a start signal must be sent via the network and digital input 1 (WE for P3.2) must be enabled. As soon as this signal is withdrawn, the variable frequency drive switches off.

It is not possible to switch to another control level. The switching parameters and the remote button on the keypad are locked.

Table 11: PNU 928.0 = 5

PNU 928.0 = 5	Parameter Number	Description
	P1.11	Network
	P1.12	I/O Terminal Start 1/2
	P1.14	locked
	P1.15	Network
	Remote tact switch	locked
	P3.2	freely selectable
	P3.23	locked

Note:

Select the operating mode (B10.1.2.1 or B20.1.2.1) under “card setting”.

For Transparent Mode (telegram 999) the profile “Bypass Mode” must be selected.

Board Parameters

Table 12: B10 Slot A: ProfiNet

Parameter	Meaning
B10.1 ProfiNet	
B10.1.1 Monitor	
B10.1.1.1 Board Status	Status of the communication interface B0-DCOM Communication fault B1 board HW fault B2-IO1 24Volt overload fault B3 Profibus comm. Malfunction B4 field bus fault
B10.1.1.2 Firmware Version	This parameter specifies the firmware version of the installed communication interface in the slot.
B10.1.1.3 Protocol Status	Protocol Status. 0 = Waiting for Parameterization 1 = Fault during parameterization 2 = Waiting for configuration 3 = Fault in configuration 4 = Data Exchange
B10.1.1.4 PDP Telegram Selection	PNU 922 specifies the telegram selection for the application class
B10.1.1.5 MAC Address	MAC address of the communication interface
B10.1.1.6 Active IP Address	Active IP address of the communication interface
B10.1.1.7 Active Subnet Mask	Subnet mask of the communication interface
B10.1.1.8 Active Default Gateway	Default gateway of the communication interface
B10.1.2 Parameters	
B10.1.2.1 Operate Mode	Operating mode of PROFINET communication 1 = Echo 2 = Bypass
B10.1.2.2 IP Address Mode	IP address configuration mode for the communication interface 0 = Static IP 1 = DCP
B10.1.2.3 Static IP Address	Static IP address of the communication interface
B10.1.2.4 Static Subnet Mask	Static subnet mask
B10.1.2.5 Static Default Gateway	Static default gateway
B10.1.2.6 Station Name	PROFINET communication interface station name in the network

4.3.3 DXM-NET-PROFINET

PNU 928 Subindex 0 (PNU 928.0)

For the process data level, modifications are only possible when the variable frequency drive is stopped.

PNU 928.0 = 0 – Local: Control and reference freely selectable

If the parameter PNU 928.0 is set to the value 0 (factory setting), operation via a parameterized source is possible.

If the default settings are used, variable frequency drive DM1 reacts directly to signals that are applied at the control signal terminals.

It is still possible to read out the data via the network.

Table 13: PNU 928.0 = 0

PNU 928.0 = 0	Parameter Number	Description
	P1.11	freely selectable
	P1.12	freely selectable
	P1.14	freely selectable
	P1.15	freely selectable

PNU 928.0 = 1 – Network: Control and reference via the network

If the parameter PNU 928.0 is set to 1, the system must be operated via the network. The system is controlled and referenced only via the network.

It is not possible to switch to another control level. The switching parameters and the remote button on the keypad are locked.

Table 14: PNU 928.0 = 1

PNU 928.0 = 1	Parameter Number	Description
	P1.11	no function
	P1.12	no function
	P1.13	Network
	P1.14	Network
	Remote tact switch	locked
	P3.23	locked

PNU 928.0 = 2 - Control via network - setpoint local

If the parameter PNU 928.0 is set to 2, the system must be controlled via the network. The setpoint is specified via control terminals, keypad, or the network.

Table 15: PNU 928.0 = 2

PNU 928.0 = 2	Parameter Number	Description
	P1.11	no function
	P1.12	no function
	P1.13	Network
	P1.14	freely selectable
	Remote tact switch	locked
	P3.23	locked

PNU 928.0 = 4 -Control and setpoint via network - automatic change to local control in case of communication loss

If the parameter PNU 928.0 is set to 4, the system must be operated via the network.

If communication is interrupted, the system automatically switches to local control (PNU 928.0 = 0).

As soon as communication is available again, the system switches back to setting 4 (PNU 928.0 = 4).

For normal operation:

- The system is controlled and referenced only via the network.
- It is not possible to switch to another control level. The switching parameters and the remote button on the keypad are locked.

Table 16: PNU 928.0 = 4 - for normal operation

PNU 928.0 = 4	Parameter Number	Description
	P1.11	no function
	P1.12	no function
	P1.13	Network
	P1.14	Network
	Remote tact switch	locked
	P3.23	locked

In the event of a loss of communication:

The system automatically switches to local control.

Table 17: PNU 928.0 = 4 - in case of communication loss

PNU 928.0 = 4	Parameter Number	Description
	P1.11	freely selectable
	P1.12	freely selectable
	P1.13	Network
	P1.14	Network
	Remote tact switch	locked
	P3.23	freely selectable

PNU 928.0 = 5 - Dual Mode - Control and setpoint via network - Enable via control terminals

If the parameter PNU 928.0 is set to 5, the system can only be operated via the network if there is a control signal from the terminals.

To start the variable frequency drive, there must be a start signal from the network and digital input 1 (default setting for P3.2) must be enabled. As soon as this signal is withdrawn, the variable frequency drive switches off.

It is not possible to switch to another control level. The switching parameters and the remote button on the keypad are locked.

Table 18: PNU 928.0 = 5

PNU 928.0 = 5	Parameter Number	Description
	P1.11	Network
	P1.12	Network
	P1.13	locked
	P1.14	Network
	Remote tact switch	locked
	P3.2	freely selectable
	P3.23	locked

The PNU 928 parameter does not exist in the display of the basic devices (keypad or drivesConnect). The parameter PNU 928 can be reached under the acyclic services (→ Section “4.12.0.2 PNU 928 Subindex 0”, Page 139).

Select the operating mode under the card setting.

For Transparent Mode (telegram 999) the profile “Bypass Mode” must be selected.

Board Parameters

Table 19: B4 Slot A: ProfiNet

Parameter	Meaning
B4.1 ProfiNet	
B4.1.1 Monitor	
B4.1.1.1 Board Status	Status of the communication interface B0-DCOM Comm. Malfunction B1 board HW fault B2-IO1 24Volt overload fault B3 Profibus communication failure B4 field bus fault
B4.1.1.2 Firmware Version	This parameter specifies the firmware version of the installed communication interface in the slot.
B4.1.1.3 Protocol Status	Protocol Status 0 = Waiting for Parameterization 1 = Fault during parameterization 2 = Waiting for configuration 3 = Fault in configuration 4 = Data Exchange
B4.1.1.4 PDP Telegram Selection	PNU 922 specifies the telegram selection for the application class
B4.1.1.5 MAC Address	MAC address of the communication interface
B4.1.1.6 Active IP Address	Active IP address of the communication interface
B4.1.1.7 Active Subnet Mask	Subnet mask of the communication interface
B4.1.1.8 Active Default Gateway	Default gateway of the communication interface
B4.1.2 Parameters	
B4.1.2.1 Operate Mode	Operating mode of PROFINET communication 1 = Echo 2 = Bypass
B4.1.2.2 IP Address Mode	Defines the IP address configuration mode for the communication interface 0 = Static IP 1 = DCP
B4.1.2.3 Static IP Address	Static IP address of the communication interface
B4.1.2.4 Static Subnet Mask	Static subnet mask
B4.1.2.5 Static Default Gateway	Static default gateway
B4.1.2.6 Station Name	PROFINET communication interface station name in the network

4.3.4 Assignment of the control signal terminals

4.3.4.1 DX-NET-PROFINET2-2

The following control signal terminal configuration tables use the abbreviations and acronyms listed below:

Table 20: Abbreviations and acronyms for control signal terminals

Abbreviation	Meaning
AI1 REF	Analog input AI1 Used as a speed setpoint input
AI2 REF	Analog input AI2 Used as a speed setpoint input.
AI2 Torque REF	Analog input AI2 Used as a torque setpoint input.
DIR	Used to select an operating direction Used together with the START command. • Low = Forward (FWD) • High = Reverse (REV) **Note:** If there is a wire breakage and the REV operating direction is selected, this will cause the drive to reverse! Alternative: Use configuration with FWD/REV.
DOWN	Used to reduce the speed if a digital setpoint value is selected. Used together with the UP command.
ENA	Variable frequency drive enable signal (ENA = Enable) A start signal (START, FWD, REV) is additionally required for starting. If ENA is removed, the drive will coast.
EXTFLT	External fault
FWD	Used to start the drive in the forward direction (FWD = Forward)
INV	Change of rotation (INV = Inverse) The operating direction will be reversed as per the configured ramps. • High = invert • Low = Do not reverse
Pulse FWD (NO) Pulse REV (NO) Pulse STOP (NC)	Pulse control
REV	Used to start the drive in the reverse direction (REV = Reverse)
Select Quick-Dec	Quick stop
Select AI1 REF/AI2 REF	Used to select between the analog setpoint values on AI1 and AI2 • AI1 = Low • AI2 = High
Select AI1 REF/f-Fix	Used to select between analog speed reference values at analog input 1
Select AI1 REF/f-Fix1	Used to select between analog speed reference values at analog input 1
Select BUS REF/AI2 REF	Used to select between setpoint values
Select BUS REF/f-Fix	Used to select between setpoint values
Select BUS REF/f-Fix1	Used to select between setpoint values
Select DIG REF/AI2 REF	Used to select between the digital speed reference value (set with the keypad or with the UP and DOWN commands) and analog setpoint value AI2 REF

Abbreviation	Meaning
Select f-Fix Bit0 Select f-Fix Bit1 Select f-Fix Bit2	Used to select a fixed frequency with digital commands The fixed frequencies f-Fix1, ..., f-Fix4 are defined with the parameters P-20, ..., P-23. **Fixed** / **Bit 2** / **Bit 1** / **Bit 0** f-Fix1 (P-20) / 0 / 0 / 0 f-Fix2 (P-21) / 0 / 0 / 1 f-Fix3 (P-22) / 0 / 1 / 0 f-Fix4 (P-23) / 0 / 1 / 1 0 = Low; 1 = High
START	Used to start/stop the drive
UP	Used to increase the speed if a digital setpoint is selected Used together with the DOWN command.

Table 21: Parameter P-15 - for DC1

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	ENA	No function	No function	No function
1	ENA	No function	No function	No function
2	ENA	No function	No function	No function
3	ENA	Select BUS REF/f-Fix	EXTFLT	AI1 REF
4	ENA	No function	No function	No function
5	ENA	No function	Select f-Fix1 / f-Fix2	No function
6	ENA	Select BUS REF/AI REF	EXTFLT	AI1 REF
7	ENA	Select BUS REF/Keypad REF	EXTFLT	AI1 REF
8	ENA	No function	No function	No function
9	ENA	No function	No function	No function
10	ENA	No function	No function	No function
11	ENA	No function	No function	No function
12	ENA	No function	No function	No function
13	ENA	No function	EXTFLT	No function
14	ENA	No function	No function	No function
15	ENA	f-Fix1/Select BUS REF	Select Fire Mode/Normal OP	Pre-set speed 4/2
16	ENA	f-Fix4/Select BUS REF	Select Fire Mode/Normal OP	No function
17	ENA	Keypad REF/Select BUS REF	Select Fire Mode/Normal OP	No function

Table 22: Parameter P-15 - for DE1

P-15	DI1 (Terminal 2)	DI2 (Terminal 3)	DI3/AI2 (Terminal 4)	DI4/AI1 (Terminal 6)
0	ENA	ENA DIR	FF1	No function
1	ENA	ENA DIR	EXTFLT	No function
2	ENA	ENA DIR	FF1	FF2
3	ENA	FF1	EXTFLT	No function
4	ENA	UP	FF1	No function
5	ENA	UP	EXTFLT	DOWN
6	ENA	ENA DIR	UP	DOWN
7	ENA	FF1	EXTFLT	FF2
8	ENA	DIR	FF1	No function
9	ENA	DIR	EXTFLT	No function
10	ENA	TEM CTR	FF1	Ref

4.3.4.2 DXG-NET-PROFINET

The assignment of the control terminals can be freely defined in the variable frequency drive. The individual terminal assignments can be defined under parameter group P3.

Parameter PNU 928 defines under which conditions the terminals are active.

For a detailed description of PNU 928, refer to
→ Section “4.3.2 DXG-NET-PROFINET”, Page 51.

4.3.4.3 DXM-NET-PROFINET

The assignment of the control terminals can be freely defined in the variable frequency drive. The individual terminal assignments can be defined under parameter group P2.2.

Parameter PNU 928 defines under which conditions the terminals are active.

A detailed description of PNU 928 can be found in
→ Section “4.3.3 DXM-NET-PROFINET”, Page 55.

4.4 Operation

Please observe the following notes.

DANGER

Commissioning must only be carried out by qualified technicians.

DANGER – DANGEROUS ELECTRICAL VOLTAGE

The safety instructions on pages I and II of this manual must be followed.

4.4.1 Hardware enable

For PROFINET operation, the STO input must always be enabled.
Parameterization of the basic device is also possible when the STO is triggered.

4.4.1.1 DX-NET-PROFINET2-2

DC1

For PROFINET operation, a high signal must always be present at DI1.

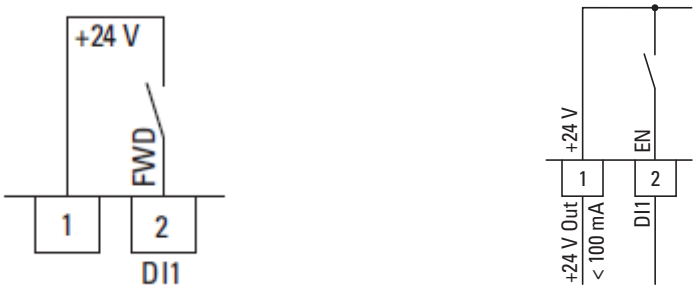


Figure 34: Enable signal for bus mode in DC1 variable frequency drives

DE1

For PROFINET operation, a high signal must always be present at DI1.

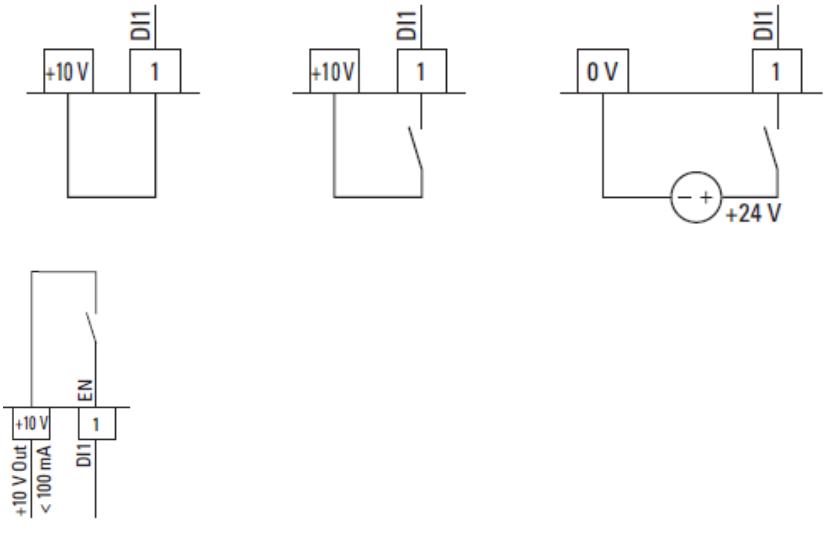


Figure 35: Enable signal for bus mode in DE1 variable speed starters

4.4.1.2 DXG-NET-PROFINET

For PROFINET operation, the STO input must always be enabled.

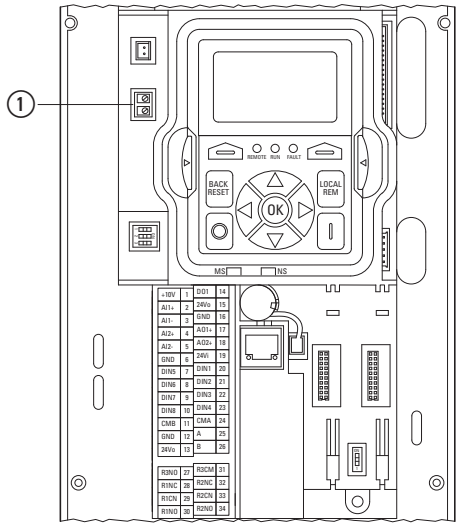


Figure 36: DXG-NET-PROFINET
① STO input

The STO terminal strip must be short-circuited by a jumper if the STO function is not required.

When the function is used, the STO terminal block must be connected to the emergency power-off switch, safety relay or PLC, etc.

The STO function must always be switched on in order to apply the closed-circuit principle.

Without the connection of a control voltage STO terminal block, the control section remains locked.

→ Further details on STO circuitry can be found in the MN040002EN manual.

4.4.1.3 DXM-NET-PROFINET

For PROFINET operation, the STO input must always be enabled.

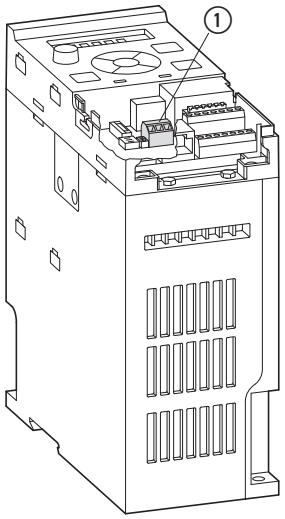


Figure 37: DXM-NET-PROFINET
① STO input

The STO terminal strip (15, 16, 17) must be short-circuited by a jumper if the STO function is not required.

When the function is used, the STO terminal block (15, 16, 17) must be connected to the emergency power-off switch, safety relay or PLC, etc.

The STO function must always be switched on in order to apply the closed-circuit principle.

Without the connection of a control voltage STO terminal block, the control section remains locked.

DANGER

In certain applications, additional measuring and monitoring equipment may be needed in order to meet the requirements of the system's safety function.
The STO function does not provide motor braking, and the inverter braking function alone cannot be claimed as a fail-safe method.
If a motor braking function is required, an appropriate safety relay and/or a mechanical braking system or a similar method must be used.

DANGER

The "STO wiring" must be protected against unintended short-circuits and unintended tampering and modifications.
It must be ensured that the STO input signal is in a safe operating state.

DANGER

Ensure proper grounding and select cables according to local legislation or regulations.
For application examples, refer to the Eaton Safety Manual PU05907001Z.

4.4.2 Specific settings for bus operation

4.4.2.1 DX-NET-PROFINET2-2

For full operation with PROFINET for the DC1 variable frequency drive and DE1 variable speed starter, parameter P-12 must be set to 9.

→ For more information on parameter P-12, see → Table 5, Page 50.

All other communication-specific parameters such as ModbusRTU are locked.

Changing the parameter values via drivesConnect or the control unit requires a connection to the RJ45 socket. This is located on the front of the communication interface.

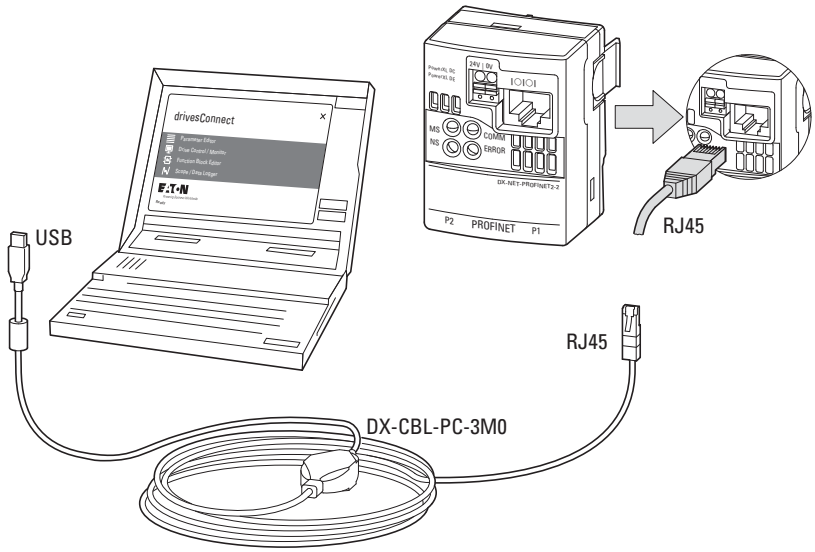


Figure 38: Parameterization via drivesConnect

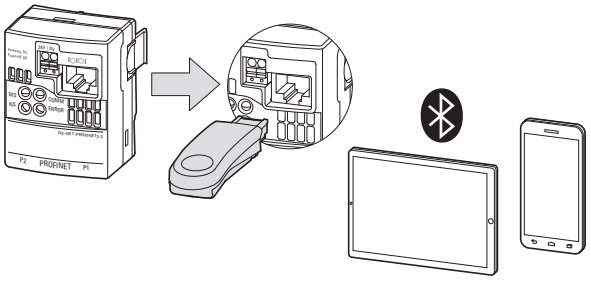


Figure 39: Parameterization via the operating unit

The value of parameter P-12 can also be changed via acyclic data.

→ For more information on acyclic data, see → Section “4.10 Acyclic data”, Page 99.

Parallel communication via PROFINET, keypad, DX-COM-STICK3, or a PC cable connection is always possible.

A real-time processing mode via drivesConnect is not, however, recommended, as this would overload the processor.

4.4.2.2 DXG-NET-PROFINET

For complete operation with PROFINET on the DG1 variable frequency drive, parameter P1-11 must be set to the value 1 (network), parameter P1-15 must be set to the value 7 (network setpoint) and the DG1 variable frequency drive must be set to remote operation.

Parallel communication via PROFINET, keypad, or a PC cable connection is always possible.

A modification of parameter values via InControl or the operating unit requires a serial (RS-485) or Modbus TCP connection.

However, realtime editing mode via InControl is not recommended, as this would overload the processor.

4.4.2.3 DXM-NET-PROFINET

For complete operation with PROFINET on the DM1 variable frequency drive, parameter P1-13 must be set to the value 1 (network), parameter P1-14 must be set to the value 7 (network setpoint) and the DM1 variable frequency drive must be set to remote operation.

Parallel communication via PROFINET, keypad, or a PC cable connection is always possible.

A modification of the parameter values via InControl or the operating unit requires a serial connection(RS-485) or a Modbus TCP connection.

However, a real-time editing mode via the InControl software is not recommended, as this would overload the processor.

Parameter PNU 928 has an important function with regard to the control and command signals.

→ You will find a detailed description of PNU 928
→ Section “4.3 Parameter settings”, Page 49.

4.5 Programming

4.5.1 Introduction

Cyclic and acyclic data as well as diagnostic data can be transferred via the PROFINET communication system.

The number of cyclic data is variable and is defined with the aid of profiles.

The cyclic and acyclic data have been designed in such a way as to match the following profiles and meet the following standards:

- Standard Telegram 1 = "PROFIdrive" (only for DX-NET-PROFINET2-2)
- Vendor specific 1000 = "PDShort"
- Vendor specific 999 = "Transparent Mode"

The appropriate profile can be selected by the user in the PLC.

Below is a brief description of the individual profiles.

4.5.2 Acyclic communication

Standard Telegram 1 = "PROFIdrive" (only for DX-NET-PROFINET2-2)

The profile corresponds to the standardized PROFIdrive profile version 4.2.

This group supplements the variable frequency drive profiles with the PROFIdrive profile, as defined by the PROFIBUS Nutzerorganisation e.V. (PNO) for cyclic data exchange with a drive. Control and status data will be processed as per the PROFIdrive profile.

The Standard Telegram 1 communication profile is used to exchange control commands (e.g.: control word, status word, setpoint and actual values).

Vendor specific 1000 = “PDShort”

Control and status data are processed as per the profile defined by the manufacturer (Eaton).

The profile corresponds to the standardized PROFIdrive profile version 4.2 with the difference that 2x16 bits of additional data are supplied in cyclic communication and the PROFIdrive mechanism for the control and status words is processed internally. This means the user does not have to carry out the process. The control word and status word are processed internally according to the PROFIdrive profile.

Vendor specific 999 = “Transparent Mode”

This is an Eaton-specific profile (manufacturer-specific telegram).

The internal communication is converted to PROFINET IO data.
Control and status data are processed as per the profile defined by the manufacturer (Eaton)

4.5.3 Acyclic communication

In addition to the cyclic data exchange, there is also an acyclic parameter channel for the exchange of parameters between the control/controller and drive units. Access to this data is not time critical.

Acyclic communication takes place via the PROFIdrive profile version 4.2.

4.5.4 Status diagrams for the “Standard Telegram 1” PROFIdrive profile

The status diagrams used below correspond to the PROFIdrive profile 4.2.

The grey boxes in the figures represent the current state (S = State) with the help of the input bytes.

The white boxes represent the transition conditions with the help of the relevant output byte bits.

Dots are used to indicate priority levels. The more dots a transition has, the higher its priority.

Status of the variable frequency drive/variable speed starter

Command issued to variable frequency drive/variable speed starter

Figure 40: Displays in the status diagrams

PROFIdrive – network status diagram

If PROFIdrive with PNU 928.0 = 1, …, 5 is used, the general status diagram shown below will apply.

In addition to the transition conditions shown below, the Ctl_PLC bit needs to be set in the output byte.

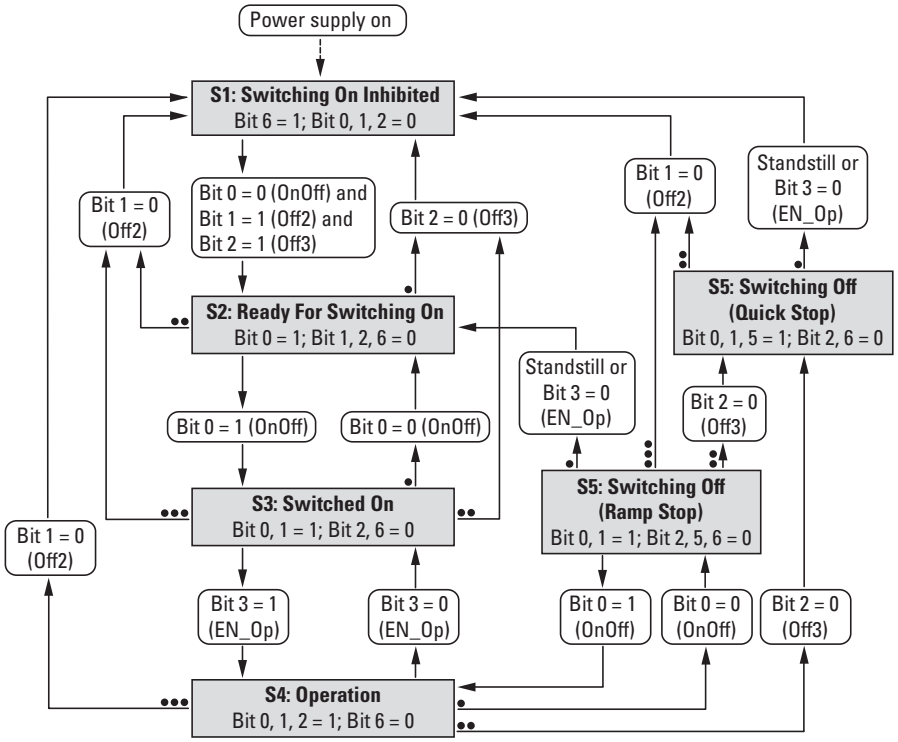


Figure 41: Network status diagram: PROFIdrive

Network control (S4: Operation)

If PROFIdrive with PNU 928.0 = 1, …, 5 is used, the general status diagram shown below will apply. The transitions will take place when the corresponding bits' state is changed.

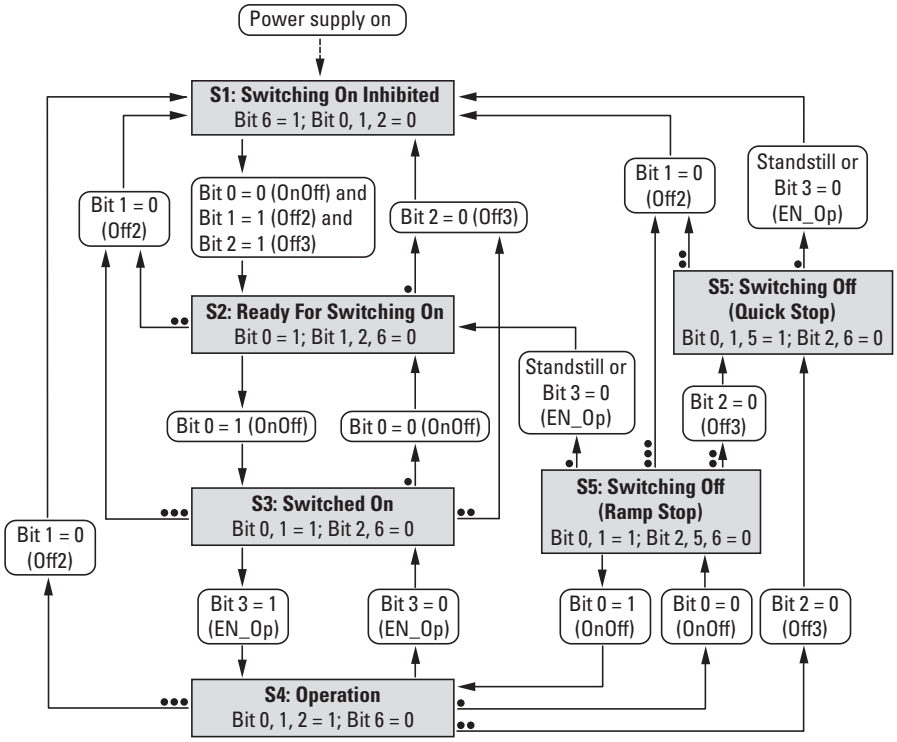


Figure 42: Network status diagram: PROFIdrive

4.6 Cyclic data

4.6.1 Introduction

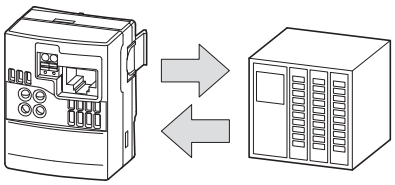


Figure 43: Data exchange of process data

The amount of cyclical input and output data (process data) for the variable frequency drive/variable speed starter can be adjusted as necessary for the application at hand by using the various profiles. The profiles are selected in the hardware/control configuration (e.g. in the TIA Portal program).

Table 23: Profile Overview

Telegram	Profile name	Data length
Standard Telegram[1)]	PROFIdrive	2 x 16-bit
Vendor specific 1000	PDShort	8-bit + 2 x 16-bit
Vendor specific 999	Transparent Mode	2 x 16-bit + 8 x 16-bit

1) Only for DX-NET-PROFINET2-2

Note the following special note to the terms "input data" and "output data".

NOTES ON NAMING CONVENTION USED THROUGHOUT THE PROGRAM

Input data are data that come from the control/PLC and enter the device, i.e. the variable frequency drive.
Specifically setpoints.

"Input…": PLC -> variable frequency drive/variable speed starter

Output data are data that come from the device, i.e. from the variable frequency drive (are "read out") and enter the control/PLC.
Specifically actual values and status values.
The same applies to input bytes or output bytes.

"Output…": Variable frequency drive/variable speed starter -> PLC

4.7 Input and output data of the cyclic profiles

4.7.1 Input data

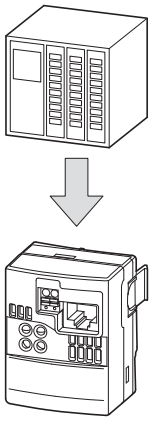


Figure 44: Input data (from the PLC to the variable frequency drive/variable speed starter)

Table 24: Control words for the profiles

Telegram	Profile name / data length	Input word (control) of PLC -> variable frequency drive/variable speed starter									
Standard Telegram [1]	PROFIdrive 2 x 16 bit	Control word 1 (FU control)	Control word 2 (FU frequency setpoint value)	–	–	–	–	–	–	–	–
Vendor specific 1000	PDShort 8-bit + 2 x 16 bit	Control word 1 (FU control)	Control word 2 (FU frequency setpoint value)	Control word 3 (reserved)	–	–	–	–	–	–	–
Vendor specific 999 [1]	Transparent Mode 4 x 16 bit	Control word 1 (FU control)	Control word 2 (FU frequency setpoint value)	Control word 3 (reserved)	Control word 4 (ramp time)	–	–	–	–	–	–
Vendor specific 999 [2]	Transparent Mode 2 x 16 bit + 8 x 16 bit	Control word 1 (FU control)	Control word 2 (FU frequency setpoint value)	FBData_In_1	FBData_In_2	FBData_In_3	FBData_In_4	FBData_In_5	FBData_In_6	FBData_In_7	FBData_In_8

1) Only for DXG-NET-PROFINET-2
2) Only for DXG-NET-PROFINET and DXM-NET-PROFINET

4.7.2 Output data

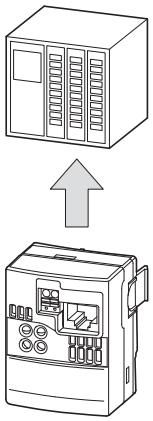


Figure 45: Output data (from the variable frequency drive/variable speed starter to the PLC)

Table 25: Status words for the profiles

Telegram	Profile name / data length	Output word (status) of variable frequency drive/variable speed starter -> PLC									
Standard Telegram [1]	PROFIdrive 2 x16 bits	Status word 1 (VFD status)	Status word 2 (VFD frequency actual value)	–	–	–	–	–	–	–	–
Vendor specific 1000	PDShort 8-bit + 2 x 16 bit	Status word 1 (VFD status)	Status word 2 (VFD frequency actual value)	Status word 3 (motor current)	–	–	–	–	–	–	–
Vendor specific 999 [1]	Transparent Mode 4 x 16 bits	Status word 1 (VFD status)	Status word 2 (VFD frequency actual value)	Status word 3 (motor current)	Status word 4 (motor torque)	–	–	–	–	–	–
Vendor specific 999 [2]	Transparent Mode 2 x 16 bit + 8 x 16 bit	Status word 1 (VFD status)	Status word 2 (VFD frequency actual value)	FBData_In_1	FBData_In_2	FBData_In_3	FBData_In_4	FBData_In_5	FBData_In_6	FBData_In_7	FBData_In_8

1) Only for DXG-NET-PROFINET-2
2) Only for DXG-NET-PROFINET and DXM-NET-PROFINET

The individual parts of the words are explained below.

4.8 Input and output data of the profile

4.8.1 "PDShort" profile

4.8.1.1 Control words

Three control words are available for the "PDShort" profile.

Table 26: Control words for the "PDShort" profile

Telegram	Profile name/ data length	Input word (control) of PLC -> variable frequency drive/variable speed starter		
Vendor specific 1000	PDShort 2 x 16 bit	Control word 1 (FU control)	Control word 2 (FU frequency setpoint value)	Control word 3 (reserved)

Table 27: Control word 1 – "PDShort" profile

<table>
<tr><th>Byte</th><th>Bit</th><th>Designation</th><th>Meaning</th></tr>
<tr><td>0</td><td>0</td><td>Start</td><td>Start
A value of 1 will start the variable frequency drive/variable speed starter.</td></tr>
<tr><td></td><td>1</td><td>EN_OP</td><td>Enable operation
0: Stop (immediate disconnection of the output)
1: Operation
With a value of 0, the output of the variable frequency drive/variable speed starter is immediately switched off. To start the device, the bit must be set to 1 and bit 0 must also be set.</td></tr>
<tr><td></td><td>2</td><td>2nd ramp</td><td>Moves 2nd Ramp
0: 1. ramp active (P-03)
1: 2. ramp active (P-24)
The device starts up with the ramp set in parameter P-24.
No function with DE1!</td></tr>
<tr><td></td><td>3</td><td>FaultAck</td><td>Fault Acknowledge
0: Do not acknowledge current fault
1: Acknowledge current fault (rising edge: 0 ? 1)
This bit can be used to reset a fault in the variable frequency drive/variable speed starter. The fault acknowledge function will only respond to a rising edge, i.e., to the value changing from 0 to 1.</td></tr>
<tr><td></td><td>4</td><td rowspan="2">f-Source</td><td rowspan="2">Setpoint source
The source for setpoint specification can be defined in binary code.<table><tr><td>Bit 4</td><td>Bit 5</td><td>Setpoint source</td></tr><tr><td>0</td><td>0</td><td>Network speed</td></tr><tr><td>1</td><td>0</td><td>Analog input</td></tr><tr><td>0</td><td>1</td><td>f-fix3</td></tr><tr><td>1</td><td>1</td><td>f-fix4</td></tr></table></td></tr>
<tr><td></td><td>5</td></tr>
<tr><td></td><td>6</td><td>Remote Output 0</td><td>Relay output (P-18 =12)
0: Do not activate output
1: Activate output
To use bit 6, P-18 must be set to 12.
Only then can the relay be activated remotely.
Only at DC1!</td></tr>
<tr><td></td><td>7</td><td>Ext Fault</td><td>External Fault
If the bit is set, the variable frequency drive/variable speed starter stops with a selected function for PNU 840.29952.
The behavior corresponds to a transition of 1 → 0 of the enable signal with the difference that the variable frequency drive goes into the "Error" status.
The external fault can be reset just like any other fault (with Fault acknowledge (bit 7) or by switching the supply voltage off and back on).
0: no external fault
1: external fault</td></tr>
</table>

CAUTION

When bit 0 and bit 1 are activated in input byte 0, the output of the variable frequency drive/variable speed starter is activated.

→ Bits 8 to 15 are not used.

Table 28: Control word 2 – "PDShort" profile

Byte	Bit	Designation	Meaning
1	0, …, 7 High	Setpoint	Setpoint as a percentage The setpoint is specified as an integer value between -100 % and 100 %: 100 % ≙ 4000_{hex} Frequency setpoint value 100 % ≙ 4000_{hex} 0 % ≙ $0x0000_{hex}$ Examples: 1. Min frequency (P-02 = 0 Hz) -> 0_{dec} = $0x0000_{hex}$ = 0 % -> The inverter moves to the value set under min frequency. 2. Max frequency (P-01 = 50 Hz) -> 16384_{dec} = $0x4000_{hex}$ = 100 % -> The inverter moves to the value set under min frequency. 3. -100 % ≙ $C000_{hex}$ -> Reverse operation with 50 Hz Data type N2
2	0, …, 7 Low		

Setpoints are displayed as integer values.

100 % ≙ 4000_{hex}.

The direction of rotation is specified with a negative setpoint:

Example: -100 % ≙ $C000_{hex}$

4.8.1.2 Status words

Three status words are available for the "PDShort" profile.

Table 29: Status words for the "PDShort" profile

Telegram	Profile name / data length	Status of variable frequency drive/variable speed starter -> PLC		
Vendor specific 1000	"PDShort" 8 bit + 2 x16 bit	Status word 1 (VFD status)	Status word 2 (VFD frequency actual value)	Status word 3 (motor current)

The individual parts of the words are explained below.

Table 30: Status word 1 – "PDShort" profile

Byte	Bit	Designation	Meaning
0	0	ERR	An error occurred 0: no error 1: Fault Indicates whether there is a variable frequency drive/variable speed starter fault. If this is the case, the device will respond as configured in PNU 362.0.
	1	RUN	Operation (output enabled) 0: Error present or no start signal generated 1: A start signal is present and there is no error. The output of the variable frequency drive/variable speed starter is active.
	2	RDY	Ready, switched on 0: Not switched on; mains voltage is missing or there is an error 1: Switched on and no error present Indicates whether the variable frequency drive/variable speed starter is switched on (mains side).
	3	FWD/REV	Direction of rotation 0: Clockwise rotating field (FWD) 1: Anticlockwise rotating field (REV)
	4	f_Limit	Actual speed is greater than the signalling threshold 0: Actual speed is less than or equal to the signaling threshold 1: Actual speed is greater than the signalling threshold If the actual speed is greater than the value set on relay output 1, the value will be 1. Otherwise, it will be 0. DC1: P-19 DE1: P-52
	5	I > Limit	Overcurrent The bit will have a value of 1 if the condition below is met; otherwise, it will have a value of 0. The motor current is greater than the limiting value - comparable to the relay function if P-18 = 5 (DC1) or P-51 = 5 (DE1).
	6	f = f-ref	Operation at reference frequency in stationary state 0: Ref. frequency not reached 1: Ref. Frequency reached
	7	Remote Input 1	Status of digital input 3 0: No voltage at DI3 1: 24 V DC present at DI3

→ Bits 8 to 15 are not used.

Table 31: Status word 2 – "PDShort" profile

Byte	Bit	Designation	Meaning
1	0, …, 7 High	ActSpeed	Frequency actual value (current speed in percent) 100 % ≙ 4000_{hex} 0% ≙ $0x0000_{hex}$ Examples: 1. f-min (P-02 = 0 Hz) -> 0_{dec} = $0x0000_{hex}$ = 0 % 2. f-max (P-01 = 50 Hz) - > 16384_{dec} = $0x4000_{hex}$ = 100 % 3. -100 % ≙ $C000_{hex}$ -> Reverse operation with 50 Hz Data type N2
2	0, …, 7 Low		

Table 32: Status word 3 – "PDShort" profile

Byte	Bit	Designation	Meaning
2	0, …, 7 High	Motor Current	Current motor current Data type N2
3	0, …, 7 Low		

4.8.2 "PROFIdrive" profile

4.8.2.1 Control words

Two control words are available for the PROFIdrive profile.

Table 33: Control words for the "PROFIdrive" profile

Telegram	**Profile name / data length**	**Input word (control) of PLC -> variable frequency drive/variable speed starter**	
Standard Telegram 1	"Profidrive" 2 x 16 bit	Control word (FU control)	Control word 2 (FU frequency setpoint value)

The individual parts of the words are explained below.

Table 34: Control word 1, Byte 0 – "PROFIdrive" profile

Byte	Bit	Designation	Meaning
0	0	OnOff	Switch on/off 0: Normal stop (with configured ramp time) 1: ready for operation In the case of a High signal, the variable frequency drive enables the output if the PROFIdrive mechanism is executed correctly.
	1	Off2	Coast Stop (Coast Stop: Off 2) 0: Coast stop (switch off output voltage) 1: no coast stop
	2	Off3	Quick Stop: Off3 0: Quick stop (shortest ramp) 1: no quick stop With a value of 0, a quick stop with ramp is performed.
	3	EN_Op	Operation released 0: Stop 1: Operation With a value of 0, the variable frequency drive/variable speed starter will stop.
	4	EN_Ramp	Release ramp (Enable Ramp Generator) 0: Reset ramp (setpoint = 0) 1: Enable ramp generator With a value of 0, the variable frequency drive/variable speed starter will remain stopped; the output will not be switched off. With a value of 1, the ramp enable is activated and the variable frequency drive/variable speed starter moves up with the set ramp.
	5	Unfreeze	Unfreeze ramp 0: Freeze ramp (the ramp generator's current output value will be frozen) 1: Unfreeze ramp With a value of 0, the variable frequency drive/variable speed starter will continue running with the most recently set frequency; the output will not be switched off. If this occurs after the ramp time elapses, this will have no effect until the next setpoint change. With a value of 1, the device will continue running along the set ramp all the way to the frequency setpoint.
	6	EN_Set	Enable Setpoint EN_Set enables the setpoint value and starts or stops the motor with the ramp function. 0: Do not activate the setpoint 1: Activate the setpoint With a value of 0, the variable frequency drive/variable speed starter will not receive a setpoint and will remain at the minimum frequency; the output will not be switched off. With a value of 1, the setpoint is activated.
	7	FaultAck	Fault Acknowledge 0: Do not acknowledge current fault 1: Acknowledge current fault (rising edge: 0 → 1) This bit can be used to reset a fault in the variable frequency drive/variable speed starter. The fault acknowledge function will only respond to a rising edge, i.e., to the value changing from 0 to 1.

Table 35: Control word 1, Byte 1 – "PROFIdrive" profile

<table>
<tr><th>Byte</th><th>Bit</th><th>Designation</th><th>Meaning</th></tr>
<tr><td>1</td><td>0</td><td>Jog 1</td><td>Setpoint 1
If this bit and byte 1 bit 0 OnOff is activated after byte 0 bit 2 Ctl_PLC, byte 1 bit 1 Off2, byte 1 bit 2 Off3, byte 1 bit 3 EN_OP have been activated, the variable frequency drive/variable speed starter starts up with fixed frequency 1 forward.</td></tr>
<tr><td></td><td>1</td><td>Jog 2</td><td>Setpoint 2
If this bit and byte 1 bit 0 OnOff is activated after byte 0 bit 2 Ctl_PLC, byte 1 bit 1 Off2, byte 1 bit 2 Off3, byte 1 bit 3 EN_OP have been activated, the variable frequency drive/variable speed starter starts up with fixed frequency 2 forward.</td></tr>
<tr><td></td><td>2</td><td>Ctl_PLC</td><td>The PLC assumes control (Control by PLC).
0: no control via PLC
1: Control via PLC
With a value of 0, the PLC does not control the variable frequency drive.
With a value of 1, the controller assumes control of the variable frequency drive/variable speed starter. Until then, no commands that the variable frequency drive/variable speed starter receives from the PLC are accepted.</td></tr>
<tr><td></td><td>3
4</td><td>f-Source</td><td>Setpoint source
The source for the setpoint can be defined in binary code.
<table>
<tr><td>Bit 4</td><td>Bit 5</td><td>Setpoint source</td></tr>
<tr><td>0</td><td>0</td><td>Network speed</td></tr>
<tr><td>1</td><td>0</td><td>Analog input</td></tr>
<tr><td>0</td><td>1</td><td>f-fix3</td></tr>
<tr><td>1</td><td>1</td><td>f-fix4</td></tr>
</table></td></tr>
<tr><td></td><td>5</td><td>Remote Output 0</td><td>Relay output (P-18 =12)
0: Do not activate output
1: Activate output

To use bit 6, P-18 must be set to 12.
Only then can the relay be activated remotely.
Only at DC1!</td></tr>
<tr><td></td><td>6</td><td>2nd ramp</td><td>Moves 2 ramp (only for DC1); no function for DE1!
0: 1. ramp active (P-03)
1: 2. ramp active (P-24)
The device starts up with the ramp set in parameter P-24 if bit 6 is set to 1.</td></tr>
<tr><td></td><td>7</td><td>ExtFault</td><td>External Fault
0: no external fault
1: external fault
If the bit is set, the variable frequency drive/variable speed starter stops with a selected PNU 840.29952 function. The behavior corresponds to a transition of 1 → 0 of the enable signal with the difference that the variable frequency drive goes into the Error status. The external fault can be reset just like any other fault (with Fault acknowledge (bit 7) or by switching the supply voltage off and on).</td></tr>
</table>

Table 36: Control word 2 – "PROFIdrive" profile

Byte	Bit	Designation	Meaning
0	0, …, 7 High	Setpoint	Setpoint as a percentage The frequency setpoint is specified as an integer value between -100 % and 100 %: 100 % ≙ 4000_{hex} 0 % ≙ $0x0000_{hex}$ Examples: 1. Min frequency (P-02 = 0 Hz) -> 0_{dec} = $0x0000_{hex}$ = 0 % -> The inverter moves to the value set under min frequency. 2. Max frequency (P-01 = 50 Hz) -> 16384_{dec} = $0x4000_{hex}$ = 100 % -> The inverter moves to the value set under min frequency. 3. -100 % ≙ $C000_{hex}$ -> Reverse operation with 50 Hz Data type: N2
1	0, …, 7 Low		

The setpoints are displayed as integer values.

100 % ≙ 4000_{hex}.

The direction of rotation is specified with a negative setpoint:

Example: -100 % ≙ $C000_{hex}$

4.8.2.2 Status words

Two status words are available for the "PROFIdrive" profile.

Table 37: Status words for the "PROFIdrive" profile

Telegram	Profile name / data length	Output word (Status) Variable frequency drive/variable speed starter -> PLC	
Standard Telegram 1	"Profidrive" 2 x16 bit	Status word 1 (VFD status)	Status word 2 (VFD frequency actual value)

The individual parts of the words are explained below.

Status word 1

Table 38: Status word 1 – "PROFIdrive" profile

Byte	Bit	Designation	Meaning
0	0	RSO	Ready For Switching On: S2 0: Not ready for switching on 1: Ready for switching on If this bit has a value of 1, the variable frequency drive/variable speed starter is ready to be switched on and has status 2. If the bit is not active, check the mains voltage. If no mains voltage is present, the bit is equal to 0.
	1	RDY	Ready to operate; switched on: S3 0: not ready for operation 1: ready for operation With a value of 1, the variable frequency drive/variable speed starter is ready for operation and has status 3. It can now be switched on. If the bit is not active, check the mains voltage. If no mains voltage is present, the bit is equal to 0.
	2	EN	Enabled; operation: S4 0: Stop 1: Operation If this bit has a value of 1, the variable frequency drive's/variable speed starter's power section (IGBTs) is active.
	3	ERR	Error present 0: no error 1: Fault Indicates whether there is a variable frequency drive/variable speed starter fault. If this is the case, the variable frequency drive/variable speed starter will respond as configured in PNU 362.0.
	4	C_Stop	coast stop, output de-energized (coast stop) 0: no coast stop 1: coast stop With a value of 1, the variable frequency drive/variable speed starter is coasting and the output is de-energized.
	5	Q_Stop	Quick stop, shortest ramp 0: Quick Stop not active 1: Quick Stop active With a value of 1, the variable frequency drive/variable speed starter stops with the shortest ramp and the output is not de-energized.
	6	SOI	Switching on inhibited: S1 0: No switching on inhibited 1: switching on inhibited With a value of 1, the variable frequency drive/variable speed starter is in switching on inhibited mode and cannot be started.
	7	WARN	Warning present 0: no warning 1: Warning Indicates whether there is a variable frequency drive/variable speed starter warning.

Table 39: Status word 1 – "PROFIdrive" profile

Byte	Bit	Designation	Meaning
1	0	f_Level	Operation at setpoint 0: The variable frequency drive does not follow the speed setpoint during the ramp 1: The variable frequency drive follows the speed setpoint during the ramp As long as the difference between the setpoint and actual value is less than 5 %, this parameter is equal to 1. For values greater than 5 %, the value of the bit is equal to 0.
	1	Ctl_Req	Control requested to PLC is set if PNU 928.0 = 1, …, 5. 0: Not ready for remote control 1: Ready for remote control With a value of 1, the variable frequency drive/variable speed starter can be controlled with the help of a PLC. If the value is 0, the variable frequency drive/variable speed starter is not ready to be controlled by a PLC. The variable frequency drive/variable speed starter may be in terminal mode.
	2	f-Limit	Size comparison actual value - signalling threshold 0: Actual speed is less than or equal to the signaling threshold 1: Actual speed is greater than the signalling threshold As soon as the actual speed is greater than the value set on relay output 1, the value will be equal to 1. Otherwise, this bit will have a value of 0. P00-03 ≧ P-19 (only for DC1) DC1: P-19 DE1: P-52
	3	I > Limit	Overcurrent The bit will have a value of 1 if the condition below is met; otherwise, it will have a value of 0. The motor current is greater than the limit value - comparable to the relay function if P-18 = 5 (DC1) P-51 (DE1).
	4	f = f-ref	Operation at reference frequency in stationary state 0: Ref. frequency not reached 1. Ref. Frequency reached
	5	Remote Input 1	Status of digital input 3 0: No voltage at DI3 1: 24 VDC present at DI3
	6	Remote Input 2	Status of digital input 4 0: There is no voltage at DI4 1: 24 VDC present at DI4 **Note:** Only at DC1!
	7	–	reserved

Status word 2

Table 40: Status word 2 – "PROFIdrive" profile

Byte	Bit	Designation	Meaning
0	0, …, 7 High	ActSpeed	Operation at setpoint 0: The variable frequency drive does not follow the speed setpoint during the ramp 1: The variable frequency drive follows the speed setpoint during the ramp As long as the difference between the setpoint and actual value is less than 5 %, this parameter is equal to 1. For values greater than 5 %, the value of the bit is equal to 0.
1	0, …, 7 Low		Control requested to PLC is set if PNU 928.0 = 1, …, 5. 0: Not ready for remote control 1: Ready for remote control With a value of 1, the variable frequency drive/variable speed starter can be controlled with the help of a PLC. If the value is 0, the variable frequency drive/variable speed starter is not ready to be controlled by a PLC. The variable frequency drive/variable speed starter may be in terminal mode.

4.8.2.3 Simplified start with the "PROFIdrive" profile

Use the following settings (as hexadecimal values) for the control word (output bytes 0 and 1):

Table 41: Starting

Value	Description
16#0000	Voltage present on device and connection.
16#047E	The variable frequency drive/variable speed starter switches to the "ready" status, however it is still stationary.
16#047F	The variable frequency drive/variable speed starter switches from the "ready" status to the RUN status and starts if a setpoint has been specified.

Table 42: Stop with ramp

Value	Description
16#047F	The variable frequency drive/variable speed starter is in operation.
16#046F	The variable frequency drive/variable speed starter executes the ramp stop.
16#047F	The ramp stop is canceled and the variable frequency drive/variable speed starter continues to run.

Table 43: Coast stop

Value	Description
16#047F	The variable frequency drive/variable speed starter is in operation.
16#047E	The variable frequency drive/variable speed starter executes the coast stop.
16#047F	The ramp stop is canceled and the variable frequency drive/variable speed starter continues to run.

Table 44: Fault scenario

Value	Description
16#047F	A fault occurs during ongoing operation.
16#0507	The variable frequency drive/variable speed starter is reset.
16#047F	The variable frequency drive/variable speed starter starts after troubleshooting.

4.8.2.4 Overview of "Simplified start with PROFIdrive"

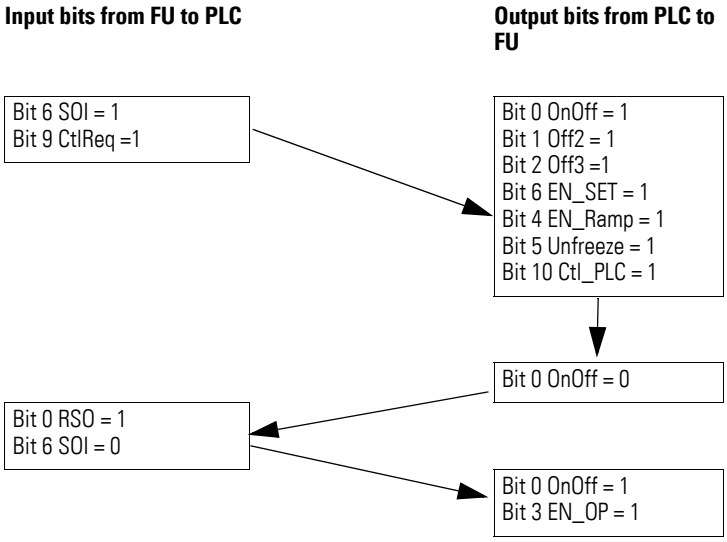


Figure 46: Sequence for simplified start

In normal operation, a start is executed with bit 3 EN_OP.

In the event of a fault, the variable frequency drive/variable speed starter will be set back two steps.
Once the fault is eliminated, it needs to be reset (Fault Ack).
The step sequence must then be repeated starting from there.

Setpoints via input bytes 2 and 3 are displayed as integer values.

100 % ≙ 4000_{hex}.

The direction of rotation is specified with a negative setpoint:

Example: -100 % ≙ $C000_{hex}$

Actual values are returned in the same format via output bytes 2 and 3.

4.8.3 "Transparent Mode" profile

Run status and control data in the "Transparent Mode" profile depend on the communication interface DX-NET-ETHERNET or DX-NET-PROFINET.

The individual data are listed separately below.

4.8.3.1 DX-NET-PROFINET2-2

Control words

There are four control words available for DX-NET-PROFINET2-2.

The control words are used to control the variable frequency drive/variable speed starter.

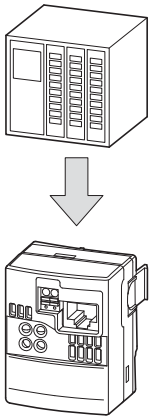


Figure 47: Input data

Table 45: Control words for the "Transparent Mode" profile

Telegram	**Profile name data length**	**Input word (control) of PLC -> variable frequency drive/ variable speed starter**			
Vendor specific 999	"Transparent Mode" 4 x 16 bit	Control word 1 (FU control)	Control word 2 (FU frequency setpoint value)	Control word 3 (reserved)	Control word 4 (ramp time)

Control word 1

These bits are used to control the variable frequency drive/variable speed starter.

The content can be adapted to your application and then sent as a control word to the variable frequency drive/variable speed starter.

Table 46: Control word 1 – "Transparent Mode" profile

Bit	Description	
	Value = 0	**Value = 1**
0	Stop	Operation
1	Clockwise rotating field (FWD)	Anticlockwise rotating field (REV)
2	No action	Fault Reset
3	No action	Coasting
4	Not used	Not used
5	No action	Quick stop (ramp 2)
6	No action	Fixed frequency FF1
7	No action	Overwrite setpoint value with 0

→ Bits 8 to 15 are not used.

CAUTION

When bit 0 and bit 1 are activated in input byte 0, the output of the variable frequency drive/variable speed starter is activated.

Control word 2

Table 47: Control word 2 – "Transparent Mode" profile

Byte	Bit	Designation	Meaning
1	0, …, 7 Low	Setpoint	Setpoint input The permissible values fall within a range of P-02 (minimum frequency) to P-01 (maximum frequency) In the application, the values will be scaled by a factor of 0.1.
2	8, …, 15 High		

Control word 3

Reserved

Control word 4

Table 48: Control word 4 – "Transparent Mode" profile

Byte	Bit	Designation	Meaning
1	0, …, 7 Low	Ramp time	Ramp time The permissible values range from 0 to 60000. In the application, the values will be scaled by a factor of 0.01, i.e., 300 ≙ 3 s. In this case, parameter P-12 must be set to 4 (only for the DC1 variable frequency drive).
2	8, …, 15 High		

4.8.3.2 Status words

There are four status words available for DX-NET-PROFINET2-2.

Table 49: Status words for the "Transparent Mode" profile

Telegram	**Profile name / data length**	**Output word (status) of variable frequency drive/variable speed starter -> PLC**			
Vendor specific 999	"Transparent Mode" 4 x 16 bit	Status word 1 (FU status and actual errors)	Status word 2 (VFD frequency actual value)	Status word 3 (motor current)	Status word 4 (motor torque)

Status word 1

Status word 1 – "Transparent Mode" – contains general status and error codes.

Device status and fault message information is provided in the status word (bit 0 to bit 7) and fault word (bit 8 to bit 15).

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
MSB															LSB
Fault word								Status word							

→ The error codes can be found in the chapter "Errors and diagnostics".

The following table shows the structure of status word 1.

Status word 1

Table 50: Status word 1 – "Transparent Mode" profile

Bit	**Description**	
	Value = 0	**Value = 1**
0	Drive not ready	Ready for operation (READY)
1	Stop	Running operation message (RUN)
2	Clockwise rotating field (FWD)	Anticlockwise rotating field (REV)
3	No fault	Fault detected (FAULT)
4	Acceleration ramp	Frequency actual value equals setpoint
5	–	Zero speed
6	Speed control deactivated	Speed control activated
7	Hardware enable signal not present	Hardware enable signal present

If bit 0 is not active, check the mains voltage.
If no mains voltage is present, the bit = 0.

Status word 2

Table 51: Status word 2 – "Transparent Mode" profile

Byte	Bit	Designation	Meaning
0		Frequency actual value	The actual speed of the variable frequency drive/variable speed starter ranges between P-02 (minimum frequency) and P-01 (maximum frequency). In the application, the values will be scaled by a factor of 0.1.
1			

Status word 3

Table 52: Status word 3 – "Transparent Mode" profile

Byte	Bit	Designation	Meaning
0	0, …, 7 Low	Motor Current	Current motor current The current is specified with one decimal place. Example: 34 ≙ 3.4 A
1	8, …, 15 High		

Status word 4

Table 53: Status word 4 – "Transparent Mode" profile

Byte	Bit	Designation	Meaning
0	0, …, 7 Low	Motor torque	Current motor torque The motor torque is specified with one decimal place. Example: 1,000 ≙ 100.0 %
1	8, …, 15 High		

4.8.3.3 DXG-NET-PROFINET and DXM-NET-PROFINET

To operate the DG1 and DM1 variable frequency drive in transparent mode, the drive must be switched to bypass mode. The setting can be made under "Card settings -> Operation mode", → Table 12 for DG1 and → Table 19 for DM1.
The control word and the status word used in transparent mode with one of the four modules follow the surface mounting defined in Modbus communication. Control word, status word, current speed, speed reference, and 8 process data are used for the input and output data respectively.

Table 54: Status words and process data outputs

Telegram	**Profile name / data length**	**Status words**			**Module 1**		**Module 2**		**Module 3**		**Module 4**	
Vendor specific 999	"Transparent Mode"	Status word 1	reserved	Actual Value	DataOut 1	DataOut 2	DataOut 3	DataOut 4	DataOut 5	DataOut 6	DataOut 7	DataOut 8
	6 Bytes + 4 Bytes per module	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes

Four modules are available for free use; they must be selected in the PLC program. The data to be supplied by the modules can be defined by the user in the "process data input" parameter in the user configurator.

Status word 1

Status word 1 contains general status information.

Table 55: Status word 1 – "Transparent Mode" profile

Bit	**Description**	
	Value = 0	**Value = 1**
0	Drive not ready	Ready for operation (READY)
1	Stop	Running operation message (RUN)
2	Clockwise rotating field (FWD)	Anticlockwise rotating field (REV)
3	No fault	Fault detected (FAULT)
4	no warning	Warning detected (WARNING)
5	Acceleration ramp	Frequency actual value equals setpoint
6	Bypass not enabled	Bypass enabled (Bypass RUN)
7	Speed control deactivated	Speed control activated
8	reserved	reserved
9	reserved	reserved
10	reserved	reserved
11	reserved	reserved
12	reserved	reserved

Bit	Description	
	Value = 0	Value = 1
13	reserved	reserved
14	reserved	reserved
15	reserved	reserved

Status word 2

"Transparent mode" contains the actual speed of the variable frequency drive DM1 or DG1.

Table 56: Status word 2 – "Transparent Mode" profile

Byte	Bit	Designation	Meaning
0		Frequency actual value	The actual speed of the variable frequency drive is in the value range between "minimum frequency" and "maximum frequency". In the application, the values will be scaled by a factor of 0.1.
1			

Process data outputs

Eight process data are available, which are to be selected under parameters P20.2 for DG1 and P10.2 for DM1.

Control words

Table 57: Control words

Telegram	Profile name / data length	Control words			Module 1		Module 2		Module 3		Module 4	
Vendor specific 999	"Transparent Mode"	Control word 1	reserved	Setpoint	DataIn 1	DataIn 2	DataIn 3	DataIn 4	DataIn 5	DataIn 6	DataIn 7	DataIn 8
	6 Bytes + 4 Bytes per module	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes	2 Bytes

Four modules are available for free use; they must be selected in the PLC program. The data to be supplied by the modules can be defined by the user in the "process data input" parameter in the user configurator.

Control word 1

The following bits are used to control the DM1 and DG1 variable frequency drives.

Table 58: Control word 1 – "Transparent Mode" profile (for DG1 and DM1)

Bit	Description	
	Value = 0	Value = 1
0	Stop	Operation
1	Clockwise rotating field (FWD)	Anticlockwise rotating field (REV)
2	No action	Fault Reset
3	FB INDATA1 Off	FB INDATA1 On
4	FB INDATA2 Off	FB INDATA2 On
5	FB INDATA3 Off	FB INDATA3 On
6	FB INDATA4 Off	FB INDATA4 On
7	Bypass Relay Disable	Bypass Relay Enable
8	Field bus control OFF	Field bus control ON
9	Field bus speed OFF	Field bus speed ON
10	reserved	reserved
11	reserved	reserved
12	reserved	reserved
13	reserved	reserved
14	reserved	reserved
15	reserved	reserved

FB INDATA1 to FB INDATA4 are the digital input configurations that can be made under the Realais or digital inputs/outputs. For this see e.g., parameter group 3 under DG1.

To be able to control the variable frequency drive, bit 8 and bit 9 must be enabled.

Table 59: Control word 2 – "Transparent Mode" profile

Byte	Bit	Designation	Meaning
0		Setpoint	Setpoint input The permissible values are in the range of P-02 (minimum frequency) and P-01(maximum frequency). In the application, the values will be scaled by a factor of 0.1.
1			

Process data inputs

Eight process data are available, which are to be selected under parameters P20.1 for DG1 and P10.1 for DM1.

4.9 Special features of the DG1 and DM1 variable frequency drives

4.9.1 Operating Mode

- 1 = Echo
- 2 = Bypass

The "BX.1.2.1 operating mode" parameter above defines how the input/ output data is handled on the option card.

4.9.2 Echo

The OUTPUT data written by the master is echoed back to the master in the INPUT field.

The data is not reflected in the variable frequency drive, but on the option card. This mode can be used when testing the function of the bus connection.

4.9.3 Bypass

The information of the process data field is transferred to the application interface without processing. The desired modules define the amount of data that will be transferred. As soon as the variable frequency drive is switched to bypass mode, it offers the possibility to set the desired module.

4.10 Acyclic data

This section is intended for programming experts.

In order for acyclic data to be transmitted and diagnostic activities to be performed, the higher-level PLC must feature acyclic services.

4.10.1 Introduction

Acyclic communications are used to read and write parameters and diagnostic data in the variable frequency drive/variable speed starter; they can take place at the same time as cyclical data is being transferred. This means that acyclic communications are independent from the selected profile.

In order for acyclic data to be transmitted and diagnostic activities to be performed, the higher-level PLC must feature acyclic services.

Thus, the parameter access consists of two elements.

- Write job (“Write data record”)
- Read request (“Read data record”)

The job can be sent via DPV1 master class 1 or master class 2.

For a DPV1 write job, slot 0, index 47 is used on the data block.

4.10.2 Data types

Several data types are defined for using PROFIdrive communication: PROFIdrive-specific data types as well as standard data types.

4.10.2.1 PROFIdrive-specific data types

TimeDifference

The value used for TimeDifference is stored in the "Sampling Time" (PNU 962) parameter.

Table 60: TimeDifference

Data type	Code [dec]	Code [hex]	Bytes	Value range	Resolution
TimeDifference	13	D	2	0 i ? 4294967295	2^{-31} ≙ 0.021 ms

Example:

100 ms ≙ 4971_{dec} ≙ $136B_{hex}$

86400000 ms (= 1 day) ≙ 4294967295_{dec} ≙ $FFFFFFFF_{hex}$

Normalized value N2

N2 is a normalized 16-bit value for relative scaling.
N2 falls within a range of -200 % to +200 %.

Table 61: Normalized value N2

Data type	Code [dec]	Code [hex]	Bytes	Value range	Resolution
Normalized value N2	113	71	2	-200 % ? i ? (200 - 2^{-14}) %	2^{-14} ≙ 0.0061 %

Conversion examples

Without sign bit:

0_{dec} = $0x0000_{hex}$ ≙ 0 %
1_{dec} = $0x0001_{hex}$ ≙ 0.0061 %
16384_{dec} = $0x4000_{hex}$ ≙ 100 %
32767_{dec} = $0x7FFF_{hex}$ ≙ 199.99 %

With sign bit (bit 15):

-1_{dec} = $0xFFF_{hex}$ ≙ -0.0061 %
-16384_{dec} = $0xC000_{hex}$ ≙ -100 %
-32768_{dec} = $0x8000_{hex}$ ≙ -200 %

For coding, the most significant bit (MSB) comes directly after the SN bit (sign bit) in the first octet:
SN = 0: Positive numbers, including 0
SN = 1: Negative numbers

Table 62: Octet structure

Octet	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
1	SN	2^{-0}	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}
2	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	2^{-12}	2^{-13}	2^{-14}
3	2^{-15}	2^{-16}	2^{-17}	2^{-18}	2^{-19}	2^{-20}	2^{-21}	2^{-22}
4	2^{-23}	2^{-24}	2^{-25}	2^{-26}	2^{-27}	2^{-28}	2^{-29}	2^{-30}

Bit sequence V2

In this bit string, 16 variables of type BOOLEAN are represented in two octets.

Code: $115_{dec} = 73_{hex}$

Table 63: Bit sequence V2

Octet	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
1	15	14	13	12	11	10	9	8
2	7	6	5	4	3	2	1	0

Time constant D2

The values of the time data type D2 always refer to a specific, constant sampling time T_a. This time T_a is the smallest sampling time (defined in PNU 962) and is required here to evaluate D2.

The value for D2 can be calculated as follows: $D2 = i \times T_a/16384$

Table 64: Time constant D2

Data type	Code [dec]	Code [hex]	Byte	Value range	Resolution
Time constant D2	120	78	1	$0 \leqq i \leqq (2 - 2^{-14}) \times T_a$	$2^{-14} \times T_a$

Time constant T2

The values of the time data type T2 always refer to a specific, constant sampling time T_a. T_a is the smallest sampling time (defined in PNU 962).

It is required here to calculate T2. The following applies: $T2 = i \times T_a$

Table 65: Time constant T2

Data type	Code [dec]	Code [hex]	Byte	Value range	Resolution
Time constant T2 (16 bits)	118	76	1	$0 \leqq i \leqq 32767 \times T_a$	T_a
Time constant T2 (32 bits)	119	77	2	$0 \leqq i \leqq 4294967295 \times T_a$	T_a

4.10.2.2 Standard data types

Table 66: Standard data types

Data type	Coding
Integer8	2
Integer16	3
Integer32	4
Insigned16	6
Unsigned32	7
OctetString	10

→ For more information about the data types, refer to the document IEC 61158-5-19.

4.11 Parameter list

The following table lists all parameters that must be processed acyclicly via PROFINET.

The abbreviations and acronyms used in the overview are defined below:

Table 67: Abbreviations

Abbreviation	Meaning
PNU	Parameter number, designation of the parameter in the parameter software and in the displays of the external operating unit.
PNU Subindex	Parameter number subindex
RUN	The parameter can be accessed during operation (Run signal)
STOP	The parameter can only be accessed in STOP mode
ro/rw	Parameter read and write permissions: ro = read only rw = read and write
Name	Short parameter name
Value	• Setting value of the parameter • Value range • Display value
Default	Default setting (the parameter's value when using the device's factory settings) The values in parentheses are the default settings when using a frequency of 60 Hz.

The column "Parameter number in the respective device" is divided into three sub-columns for the respective PowerXL devices.

When there is a parameter number in the sub-column for a device, this means that the parameter is available on that device. The parameter will have the exact same function on all device types.

A check mark ✓ indicates that this parameter is present in the device but does not have a parameter number.

A minus sign (–) means that the parameter is not available on the device.

For more detailed information on the individual parameters, please refer to the manuals for the corresponding basic devices:

4.11.1 Parameter list for devices DC1 and DE1

Table 68: Parameter list - parameters for DC1 and DE1

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
1	0	P00-03	P00-03	STOP	ro	N2	Frequency Reference	4000_{hex} ≙ 100 % 100 % ≙ 20.1
5	1	P-20	P-20	RUN	rw	N2	f-Fix1	Fixed frequency 1 4000_{hex} ≙ 100 % 100 % ≙ 20.1
	2	P-21	P-21	RUN	rw	N2	f-Fix2	Fixed frequency 2 4000_{hex} ≙ 100 % 100 % ≙ 20.1
	3	P-22	P-22	RUN	rw	N2	f-Fix3	Fixed frequency 3 4000_{hex} ≙ 100 % 100 % ≙ 20.1
	4	P-23	P-23	RUN	rw	N2	f-Fix4	Fixed frequency 4 4000_{hex} ≙ 100 % 100 % ≙ 20.1
20	0	P-02	P-02	STOP	rw	U16	f-min	Used to set the minimum output frequency; can be set to any value between 0 and f-max 3000 ≙ 50 Hz
	1	P-01	P-01	STOP	rw	U16	f-max	Used to set the maximum output frequency; can be set to any value between f-min and five times the motor's rated frequency 3000 ≙ 50 Hz
21	0	P-27	P-43	STOP	rw	U16	f-Skip1	3000 ≙ 50 Hz
22	0	P-26	P-42	STOP	rw	U16	f-SkipBand1	3000 ≙ 50 Hz
23	1	P-29	–	STOP	rw	U16		Details in Hz
24	1	P-28	–	STOP	rw	U16		Details in Volt
27	0	P-11	P-11	STOP	rw	U16	V-Boost	Motor voltage boost at low output frequencies in order to improve the starting torque and runout characteristics at low speeds. 100 ≙ 10 % The setting range will depend on the device type.
111	0	P-03	P-03	RUN	rw	T2	t-acc	Sets the acceleration ramp time in seconds. The time set here is the time for accelerating from a latching to the rated motor frequency set in P-09. 300 ≙ 3.00 s
114	0	P-04	P-04	RUN	rw	T2	t-dec	Sets the deceleration ramp time in seconds. The time set here is the time for decelerating from the motor's rated frequency to a full stop. 300 ≙ 3.00 s

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
116	0	P-24	–	RUN	rw	U16	t-QuickDec	Quick stop ramp In default the second deceleration ramp is activated by applying voltage to DI1 and DI2 (terminals 2 and 3) at the same time. 250 ≙ 2.50 s
202	0	P00-29	P00-20	STOP	ro	U16	DeviceType	String: e.g., "DC1"
203	0	✓	✓	STOP	ro	UInt16	HW Version Device	Variable frequency drive hardware version
	1	✓	✓	STOP	ro	UInt16	HW Version Interface	Hardware version of the interface
206	0	P00-28	P00-18	STOP	ro	S16	System Version	103 ≙ 1.03
	1	P00-28	P00-18	STOP	ro	U16	Application Version	103 ≙ 1.03
207	0	P00-50	–	STOP	ro	–	System Software Version	Version of the system software
	1	P00-50	–	STOP	ro	–	Application Software Version	Version of the application software
209	0	P00-30	P00-19	STOP	ro	Octet[11]	Serial Number	11 byte ASCII code
210	0	P-08	P-08	STOP	rw	U16	Motor Nom Current	By setting the "Motor Nom Current" in the drive, the motor overload protection is configured to match the motor rating. The maximum value will depend on the basic device and is always specified with one decimal place. Example: 14 ≙ 1.4 A
211	0	P-07	P-07	STOP	rw	U16	Motor Nom Voltage	Used to define the motor's rated operating voltage, e.g., the voltage on the motor when it is running at the rated frequency. Details in Volt
216	0	P-09	P-09	-	rw	U16	Motor Nom Frequency	The rated frequency of the motor. This is the frequency at which "Motor Nom Voltage" is applied to the motor. Details in Hz
217	0	P-10	P-10	STOP	rw	U16	Motor Nom Speed	Details in rpm
218	0	P-64	P-46	STOP	rw	U16	Motor Stator Resistance R1	Motor stator resistance
219	0	P-65	–	STOP	rw	U16	Motor Stator Inductance d-Axis	Motor leakage inductance (d)
220	0	P-66	–	STOP	rw	U16	Motor Stator Inductance q-Axis	Motor leakage inductance (q)
250	0	P00-29	P00-20	STOP	ro	UInt8	FrameSize	Specification of the frame size of the basic device
	1	P00-29	P00-20	STOP	ro	UInt8	NoOfInputPhases	Number of input phases of the basic device
	2	P00-29	P00-20	STOP	ro	UInt8	kW/HP	1: kW 2: HP
251	0	P00-29	P00-20	STOP	ro	U32	Device Voltage	Device input voltage Value in volts
252	0	P00-29	P00-20	STOP	ro	U16	Power@Ue	18500 ≙ 18.50
255	0	P-60	–	STOP	rw	U16	Motor Control Mode	Used to select the motor control mode.

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
260	0	P-16	P-16	RUN	rw	U16	AI1 Signal Range	Signal range for analog input, value range between 0 and 7. For more information, please refer to the manual for the basic device.
	1	P-47	–	RUN	rw	U16	AI2 Signal Range	Signal range for analog input, value range between 0 and 7. For more information, please refer to the manual for the basic device.
261	0	P-35	P-17	RUN	rw	U16	AI1 Gain	Analog input scaling Output value = Input value * Scaling. 100 ≙ 10.0 %
262	0	P-39	P-44	RUN	rw	U16	AI1 Offset	300 ≙ 30.0 %
267	0	–	P-18	RUN	rw		AI1 Invert	If this parameter is set to 1, the analog input will be inverted.
281	0	P-63	–				I-CurrentLimit	Current Limit
310	0	✓	✓	STOP	ro	UInt16	UsedStateMachine	0: Communication lost 10: PROFIdrive profile 11: 8-bit profile
320	0	P-14	P-14	RUN	rw	U16	Access Key	This parameter provides access to the extended parameter set.
	1	P-37	P-38	RUN	rw	U16	Access Key Level2	Used to define the access code that must be entered in P-14 or P1-14 in order to get access to the extended parameter set.
331	0	P-48	–	RUN	rw	U16	t-Standby	Standby-time 0 is disabled 150 ≙ 15.0 s
340	0	P-61	–	RUN	rw	WORD	Motor Identification	Auto-tune enable
381	0	P-40	–	RUN	rw	U16	Display Scale	Speed display scaling factor 1000 ≙ 0.100
390	0	P-17	P-29	STOP	rw	U16	Switching Frequency	Power stage switching frequency. Higher frequency reduces the audible 'ringing' noise from the motor, and improves the output current waveform. Disadvantage: Higher loss in the device
	1	P00-32	P00-14	STOP	ro	U16	Actual Switching Frequency	Current switching frequency. If the auto temperature management function is enabled, this value may be lower than the value set.
423	0	P-15	P-15	STOP	rw	U16	DI Config Select	The setting determines the configuration of the control signal terminals depending on the setting with 928.0. For more information, please refer to the manual for the basic device.
440	0	P-21	P-22	–			Input Data1 Value	Value InputData1
	1	P-21	P-22	–			Input Data2 Value	Value InputData2
	2	P-21	P-22	–			Input Data3 Value	Value InputData3
	3	P-21	P-22	–			Input Data4 Value	Value InputData4

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
451	0	P-18	P-51 (DE11)	RUN	rw	U16	RO1 Function	Selection of the relay output function For more information on the available settings, please refer to the manual for the basic device.
452	0	P-19	P-52 (DE11)	RUN	rw	U16	RO1 upper Limit	Limit value for relay output 1 For more information on the available settings, please refer to the manual for the basic device.
454	0	P-54	P-53 (DE11)	RUN	rw	U16	RO1 Hysteresis	Relay hysteresis band
457	0	P-55	P-54				RO1 Switch-On Delay	
460	0	P-25	–	RUN	rw	U16	AO1 Function	Used to select the analog output function For more information on the available settings, please refer to the manual for the basic device.
501	0	P00-07	P00-07	STOP	ro	U16	Motor Voltage	Current output voltage, in volts
	1	P00-08	P00-08	STOP	ro	U16	DC-Link Voltage	Current DC link voltage, in volts
502	0	–	P00-06	STOP	ro		Output Frequency	Current output frequency, in Hz
503	0	P00-25	–	STOP	ro	U16	Motor Speed	Calculated rotor speed
504	0	✓	P00-05	STOP	ro		Motor Current	Current motor current, in amperes
505	0	P00-31	–	STOP	ro	S16	Magnetizing current Id	Magnetizing current I_d
	1	P00-31	–	STOP	ro	S16	Torque current Iq	Rotor current I_q
520	2	P00-26	–	STOP	ro	U16	MWh Meter	MWh counter total since initial commissioning
550	0	P00-04	P00-04	STOP	ro	Int8	DI1 Status	Digital input states
	1	P00-04	P00-04	STOP	ro	Int8	DI2 Status	
	2	P00-04	P00-04	STOP	ro	Int8	DI3 Status	
	3	P00-04	P00-04	STOP	ro	Int8	DI4 Status	
560	0	P00-01	P00-01	-	ro	U16	Analog Input1	Level of the signal applied to analog input 1 after scaling and offsets have been applied.
	1	P0-02	–	STOP	ro	U16	Analog Input2	500 ≙ 50.0%
620	0	P-30	P-30	STOP	rw	U16	Start Mode	Defines the behavior of the drive relating to the enable and also configures the automatic restart after a fault. For more information, please refer to the manual for the basic device.
	1	P-05	P-05	STOP	rw	U16	Stop Mode	Determines the action taken by the drive in the event of the drive enable signal being removed. For more information, please refer to the manual for the basic device.
	3	P-31	P-24	RUN	rw	U16	Digital Reference Reset Mode	Used to define the drive's behavior when it is started and controlled using the keypad (P-12/P1-12 = 1 or 2) or when it is controlled using the UP and DOWN signals on the terminals.

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
624	0	–	P-32	RUN	rw	WORD	Auto Thermal Management	If this function is disabled, the drive will switch off when there is an overtemperature signal instead of automatically reducing the switching frequency when the heat sink becomes too hot.
625	0	P-38	P-39	RUN	rw	WORD	Parameter Lock	Determines whether to lock the parameters 0: Not locked. All parameters can be changed. 1: Locked. Parameter values can be displayed, but cannot be changed. If a remote keypad is connected, parameters cannot be accessed by the remote keypad if they are locked
626	1	P-06	P-06	RUN	rw	WORD	EnergyOptimizer	When energy optimization is activated, the motor voltage is dynamically varied, dependent on load. This results in reduced voltage being applied to the motor on light load, significantly reduce energy consumption. This mode of operation is less suitable for dynamic applications where the load conditions can suddenly increase significantly.
	3	–	P-31	RUN	rw		Overvoltage Control	"The over voltage control prevents the drive from tripping in case of regenerative energy feedback from the motor to the DC link. When disabled, the drive will trip "Over Voltage" instead of automatically increasing the motor ramp times when the drive is decelerating the motor too quickly.
635	0	P-33	–	RUN	rw	U16	Spin Start Enable	Rotary start enable/DC injection at enable 0: deactivated 1: activated
640	0	–	P-45				FireMode Function	
650	2	–	P-19	RUN	rw		DI3 Logic	DE1 only: This parameter defines the logic for input 3 when parameter P-27 is set to 1, 3, 5, 7, or 9 (external fault).
682	0	P-51	P-33	RUN	rw	U16	T-Memory Enable	When enabled, the motor thermal memory retention function will save the calculated motor thermal history on drive power down, using this saved value as the starting value on next power up. If this function is disabled, the motor thermal history is reset to zero on every power up.

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
821	0	P00-10	P00-10	STOP	ro	U32	t-Run	The drive's total operating time since the date of manufacture, in hours, minutes and seconds.
	3	P00-14	P00-14	STOP	ro	U32	t-HoursRun Enable	The drive's operating time since the most recent enable signal, in hours, minutes, and seconds.
	4	P00-27	–	STOP	ro		Fan Runtime	Total fan operating time
	5	P00-11	P00-12	STOP	ro	U32	t-Run since Trip	The drive's operating time since the most recent fault, in hours, minutes, and seconds.
	6	P00-24	–	STOP	ro	U16	t-Run PCB in OT	The drive's operating hours at a temperature higher than 80 °C inside the housing
	7	P00-23	–	STOP	ro	U16	t-Run IGBT in OT	The drive's operating hours at a heat sink temperature higher than 85 °C
	8	P00-43	–	STOP	ro		t-PowerOn	The drive's operating time
	11	P00-47	P00-22				t-FireMode Active	Run time in Fire Mode
822	0	P00-09	P00-09		ro	S16	Heatsink Temperature	Current heat sink temperature, in °C
	2	P00-20	–				T-Controlboard	Internal ambient temperature of the device, measured on the control board
831	0	P00-06	–	STOP	ro		DC-Link Voltage Ripple	DC link voltage ripple
840	29952	P-53	P-40	STOP	ro	U16	Action@Communication Loss	Device reaction after occuring of „Communication Loss". Possibilities device dependent
841	12816	P00-34	–	STOP	ro		FaultCounter DC-Overvoltage	Shows the number of overvoltage faults since the date of manufacture
	12832	P00-35	–	STOP	ro		FaultCounter DC-Undervoltage	Shows the number of undervoltage faults since the date of manufacture
	16656	P00-38	–	STOP	ro		FaultCounter Over-temperature Ambient	Shows the number of ambient overtemperature faults since the date of manufacture
	16944	P00-36	–	STOP	ro		FaultCounter Over-temperature Heatsink	Shows the number of heat sink overtemperature faults since the date of manufacture
	22017	P00-41	–	STOP	ro		FaultCounter Internal Fault (IO)	Shows the number of internal control board communication faults since the last time the processor was started.
	22018	P00-42	–	STOP	ro		FaultCounter Internal Fault (DSP)	Shows the number of internal power board communication faults since the last time the processor was started.
	28946	P00-37	–	STOP	ro		FaultCounter Overcurrent Brake Chopper	The number of braking chopper overcurrent faults since its date of manufacture
	29952	P00-39	–	STOP	ro		FaultCounter Communication Loss	Number of Modbus RTU communication faults since the last time the processor was started.
	30000	P00-40	–	STOP	ro		FaultCounter CANopen COM Loss	Number of CANopen communication faults since the last time the processor was started.
	8736	P00-33	–	STOP	ro		FaultCounter Overcurrent	Overcurrent counter since the date of manufacture

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
851	0	P00-16	P00-16	STOP	ro	U16	Heatsink0 Log	Displays the most recent 8 samples of the heat sink temperature prior to a drive trip condition occurring. The sample interval is 500 ms.
	1	P00-16	P00-16	STOP	ro	U16	Heatsink1 Log	
	2	P00-16	P00-16	STOP	ro	U16	Heatsink2 Log	
	3	P00-16	P00-16	STOP	ro	U16	Heatsink3 Log	
	4	P00-16	P00-16	STOP	ro	U16	Heatsink4 Log	
	5	P00-16	P00-16	STOP	ro	U16	Heatsink5 Log	
	6	P00-16	P00-16	STOP	ro	U16	Heatsink6 Log	
	7	P00-16	P00-16	STOP	ro	U16	Heatsink7 Log	
852	0	P00-15	P00-15	STOP	ro	U16	DC-Link0 Log	Displays the most recent 8 samples of the DC bus voltage prior to a drive trip condition occurring. The sample interval is 256 ms.
	1	P00-15	P00-15	STOP	ro	U16	DC-Link1 Log	
	2	P00-15	P00-15	STOP	ro	U16	DC-Link2 Log	
	3	P00-15	P00-15	STOP	ro	U16	DC-Link3 Log	
	4	P00-15	P00-15	STOP	ro	U16	DC-Link4 Log	
	5	P00-15	P00-15	STOP	ro	U16	DC-Link5 Log	
	6	P00-15	P00-15	STOP	ro	U16	DC-Link6 Log	
	7	P00-15	P00-15	STOP	ro	U16	DC-Link7 Log	
853	0	P00-18	–	STOP	ro	U16	DC-Link V-Ripple0 Log	Shows the last eight DC link ripple values before the device was switched off due to a fault. The sample interval is 20 ms.
	1	P00-18	–	STOP	ro	U16	DC-Link V-Ripple1 Log	
	2	P00-18	–	STOP	ro	U16	DC-Link V-Ripple2 Log	
	3	P00-18	–	STOP	ro	U16	DC-Link V-Ripple3 Log	
	4	P00-18	–	STOP	ro	U16	DC-Link V-Ripple4 Log	
	5	P00-18	–	STOP	ro	U16	DC-Link V-Ripple5 Log	
	6	P00-18	–	STOP	ro	U16	DC-Link V-Ripple6 Log	
	7	P00-18	–	STOP	ro	U16	DC-Link V-Ripple7 Log	
855	0	P00-17	P00-17	STOP	ro	U16	MotorCurrent0 Log	Displays the most recent 8 samples of the Motor current prior to a drive trip condition occurring. The sample interval is 250 ms. 100 ≙ 10.0 A
	1	P00-17	P00-17	STOP	ro	U16	MotorCurrent1 Log	
	2	P00-17	P00-17	STOP	ro	U16	MotorCurrent2 Log	
	3	P00-17	P00-17	STOP	ro	U16	MotorCurrent3 Log	
	4	P00-17	P00-17	STOP	ro	U16	MotorCurrent4 Log	
	5	P00-17	P00-17	STOP	ro	U16	MotorCurrent5 Log	
	6	P00-17	P00-17	STOP	ro	U16	MotorCurrent6 Log	
	7	P00-17	P00-17	STOP	ro	U16	MotorCurrent7 Log	

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
859	0	P00-19	–	STOP	ro	U16	AmbientTemp0 Log	Shows the last eight ambient temperature values before the device was switched off due to a fault. The sample interval is 30 ms.
	1	P00-19	–	STOP	ro	U16	AmbientTemp1 Log	
	2	P00-19	–	STOP	ro	U16	AmbientTemp2 Log	
	3	P00-19	–	STOP	ro	U16	AmbientTemp3 Log	
	4	P00-19	–	STOP	ro	U16	AmbientTemp4 Log	
	5	P00-19	–	STOP	ro	U16	AmbientTemp5 Log	
	6	P00-19	–	STOP	ro	U16	AmbientTemp6 Log	
	7	P00-19	–	STOP	ro	U16	AmbientTemp7 Log	
860	0	✓	✓	STOP	ro	U32	WarningWord	Shows the current device warning
918	0	P-36	P-34	STOP	rw	U16	PDP-Address	Unique drive address in a communication network.
927	0	P-52	P-41	STOP	rw	U16	ParameterAccess	0: All parameters can be changed by any source. 1: All parameters are locked and can only be changed via PROFINET.
928	0	P-53	P-53	STOP	rw	U16	ProcessDataAccess	
944	0	✓	✓	STOP	ro	U16	FaultcounterPDP	Total number of errors occurred
947	0	P00-13	P-13	STOP	ro	UInt16	Last Fault1 PDP	PROFIDRIVE fault buffer
	1	P00-13	✓	STOP	ro	UInt16	Last Fault2 PDP	
	2	P00-13	✓	STOP	ro	UInt16	Last Fault3 PDP	
	3	P00-13	✓	STOP	ro	UInt16	Last Fault4 PDP	
	4	P00-13	✓	STOP	ro	UInt16	Last Fault5 PDP	
	5	✓	✓	STOP	ro	UInt16	Last Fault6 PDP	
	6	✓	✓	STOP	ro	UInt16	Last Fault7 PDP	
	7	✓	✓	STOP	ro	UInt16	Last Fault8 PDP	
950	0	✓	✓	STOP	ro	UInt16	Fault Situations Max	
	1	✓	✓	STOP	ro	UInt16	Faults per Situation	
952	0	✓	✓	STOP	ro	UInt16	Fault Situation Counter	
962	0	✓	✓	STOP	ro	TimeDiff4	PDP-Cycletime	Fixed to 10 ms Basis for all T parameters
964	0	✓	✓	STOP	ro	UInt16	PDP-Manufacturer	
	1	✓	✓	STOP	ro	UInt16	PDP-Device Type	
	2	✓	✓	STOP	ro	UInt16	PDP-FW-Interface	
	3	✓	✓	STOP	ro	UInt16	PDP-FW-Year	
	4	✓	✓	STOP	ro	UInt16	PDP-FW-DayMonth	In decimal MM TT format
	5	✓	✓	STOP	ro	UInt16	PDP-NoOfDOs	
965	0	✓	✓	STOP	ro	Octet[2]	PDP-ProfilNumber	

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
974	0	✓	✓	STOP	ro	UInt16	PDP-MaxBlockLength	Parameter channel description
	1	✓	✓	STOP	ro	UInt16	PDP-NoOfMultiparameter	
	2	✓	✓	STOP	ro	UInt16	PDP-MaxLatency	
975	0	✓	✓	STOP	ro	UInt16	PDP-DO Manufacturer	Manufacturer
	1	✓	✓	STOP	ro	UInt16	PDP-DO Device Type	
	2	✓	✓	STOP	ro	UInt16	PDP-DO FW-Interface	xx.yy decimal: Notation: xx.yy
	3	✓	✓	STOP	ro	UInt16	PDP-DO FW-Year	Firmware year in decimal format
	4	✓	✓	STOP	ro	UInt16	PDP-DO FW-DayMonth	In decimal MM TT format
	5	✓	✓	STOP	ro	UInt16	PDP-DO NoOfDOs	1 Do not read-out
	6	✓	✓	STOP	ro	UInt16	PDP-DO Subclass	1
976	0	✓	P-37	STOP	rw	UInt16	Parameter Set	The default settings will be restored if this parameter is set to 1.
980	0	✓	✓	STOP	rw	UInt16	PDP-DefPara0	List of defined parameters
2100	0	P-41	–	RUN	rw	U16	PID1 Kp	The controller's Kp component 10 ≙ 1.0
2101	0	P-42	–	RUN	rw	U16	PID1 Ti	The controller's integral component 10 ≙ 1.0
2110	0	P-44	–	RUN	rw	U16	PID1 Set Point 1 Source	Used to select the setpoint source For more information, please refer to the manual for the basic device.
2111	0	P-45	–	RUN	rw	U16	PID1 Set Point Digital	Digital setpoint 10 ≙ 1.0
2112	0	P-46	–	RUN	rw	WORD	PID1 Feedback 1 Source	Selection of actual value source For more information, please refer to the manual for the basic device.
2123	0	P-43	–	RUN	rw	WORD	PID1 Mode	Operation Mode 0: direct operation 1: Inverted operation
2124	0	P00-05	–				PID1 Output	PI(D) controller 1 Output
2131	0	P-49	–	RUN	rw	U16	PID1 WakeUpLevel	Actual value wakeup level for controller 900 ≙ 90.0 %
2204	0	P-34	–	RUN	rw	U16	Brake Chopper	Brake chopper activation For more information, please refer to the manual for the basic device.
2220	0	–	P-27	RUN	rw	U16	DCBrakeVoltage	Used to define the DC voltage, as a percentage of the motor's rated voltage, that will be applied to the motor during DC braking.
2221	0	P-32	P-25	RUN	rw	U16	DCBrake	Used to define the operating states in which DC braking will be activated.
2222	1	P-32	P-26				t-DCBrake@Stop	Duration of DC braking at Stop and before Start. Setting 0 disables DC braking. The braking level is set with P-68.

PNU	PNU	Parameter Number		Access right		Data type	Name	Description
Index	Sub-index	DC1	DE1	RUN/ STOP	ro/rw			
2223	0	P-67	P-28	RUN	rw		f-DCBrake@Stop	Percentage of the maximum frequency at which DC braking will start during the deceleration phase.
2227	0	P-68	–				DC-Brake Current	
2408	0	P-62	–				MSC Gain	
3221		P-36	P-47				RS485-0 Address	
3222	0	P-36	P-35	RUN	rw		RS485-0 Baudrate	Modbus Baud rate
3224	0	P-56	P-48	RUN	rw		RS485-0 ParityType	Modbus RTU data format
3254	0	P-57	–				TCP Enable Service	
3255	0	P-58	–				TCP0 SecurityTimeout	
3290	0	P-36	P-36	RUN	rw	U16	Modbus RTU0 COM Timeout	Time between the moment communications are lost and the moment the device is switched off as a result.
3302	0	P-50	–	RUN	rw	U16	CAN0 Baudrate	CANopen Baudrate For more information, please refer to the manual for the basic device.
4211	0	P-13	–				Application Mode Macro	Influences multiple parameter values inside the drive and combines them to an application specific configuration.

4.11.2 Parameter list for DG1 and DM1 devices

Table 69: Parameter list - parameters for DG1 and DM1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
23710	0	M1	M1.1	UINT16	Output Frequency	0.01
3029	4	M10	M1.10	UINT16	Motor Temperature	0.1
4202	0	M11	–	INT16	Torque Reference	0.1
6319	0	M12	M2.1	INT16	Analog Input 1	0.01
6320	0	M13	–	INT16	Analog Input 2	0.01
7257	0	M14	M2.3	UINT16	Analog Output 1	0.01
7258	0	M15	–	UINT16	Analog Output 2	0.01
8810	0	M16	M2.4	UINT8	DI1, DI2, DI3	1
8811	0	M17	M2.5	UINT8	DI4, DI5, DI6	1
8812	0	M18	–	UINT8	DI7, DI8	1
11152	0	M19	M2.8	UINT8	DO1, Virtual RO1, Virtual RO2	1
4101	0	M2	M1.2	UINT16	Freq Reference	0.01
13380	0	M20	–	UINT8	RO1, RO2, RO3	1
4566	0	M21	–	UINT8	TC1, TC2, TC3	1
2506	0	M22	–	UINT8	Interval 1	1
2506	1	M23	–	UINT8	Interval 2	1
2506	2	M24	–	UINT8	Interval 3	1
2506	3	M25	–	UINT8	Interval 4	1
2506	4	M26	–	UINT8	Interval 5	1
4596	0	M27	–	UINT32	Timer 1	1
4596	1	M28	–	UINT32	Timer 2	1
4596	2	M29	–	UINT32	Timer 3	1
3005	0	M3	M1.3	UINT16	Motor Speed	0.1
16482	0	M30	M5.1	UINT32	PID1 Set Point	0.01
16598	0	M31	M5.2	UINT32	PID1 Feedback	0.01
16506	0	M32	M5.3	UINT32	PID1 Error Value	0.01
16440	0	M33	M5.4	UINT16	PID1 Output	0.01
16448	0	M34	M5.5	UINT8	PID1 Status	1
16483	0	M35	–	UINT32	PID2 Set Point	0.01
16599	0	M36	–	UINT32	PID2 Feedback	0.01
16507	0	M37	–	UINT32	PID2 Error Value	0.01
16441	0	M38	–	UINT16	PID2 Output	1
16449	0	M39	–	UINT8	PID2 Status	1
3021	0	M4	M1.4	UINT16	Motor Current	0.1
17541	0	M40	–	UINT8	Running Motors	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
16010	0	M41	–	INT16	PT100 Temperature	0.1
947	0	M42	–	UINT8		1
23549	0	M43	–	UINT8	RTC Battery Status	1
3028	0	M44	–	UINT32	Instant Motor Power	0.001
23726	0	M45	–	UINT32	Energy Savings	0.001
8470	0	M46	–	UINT16	Control Board DIDO Status	1
8471	0	M47	–	UINT16	SlotA DIDO Status	1
8472	0	M48	–	UINT16	SlotB DIDO Status	1
23505	0	M49	–	UINT16	Application Status UINT16	1
3023	0	M5	M1.5	INT16	Motor Torque	0.1
23504	0	M50	–	UINT16	Standard Status UINT16	1
23714	0	M51	–	UINT32	Output	0.01
23713	0	M52	–	UINT32	Reference	0.01
23718	0	M53	–	UINT32	Total MWh Count	0.0001
4580	0	M54	–	UINT16	Total Power Day Count	1
4568	0	M55	–	UINT32	Total Power Hr Count	1
23721	0	M56	–	UINT32	Trip MWh Count	0.0001
4581	0	M57	–	UINT32	Trip Power Day Count	1
4580	0	M58	–	UINT32	Trip Power Hr Count	1
4567	0	M59	–	UINT32	Total Run time Count	1
3028	1	M6	M1.6	UINT16	Motor Power	0.1
23724	0	M60	–	UINT32	Numbers Of Start	1
4572	0	M61	–	UINT32	Trip Run Time Count	1
23503	0	M62	–	UINT16	FB Status UINT16	1
24508	0	M63	–	UINT16	FB Ctrol UINT16	1
24509	0	M64	–	UINT16	FB Speed Reference	1
23703	0	M65	M9.1	UINT8	Multi-Monitoring	1
3002	0	M7	M1.7	UINT16	Motor Voltage	0.1
4758	0	M8	M1.8	UINT16	DC-link Voltage	1
5163	6	M9	M1.9	INT16	Unit Temperature	0.1
3930	0	P1.1	P1.1	UINT16	Min Frequency	0.01
551	0	P1.10	P4.1.6	UINT8	Power Up Local Remote Select	1
2610	0	P1.11	P1.13	UINT8	Remote Control Place (Remote 1 Control Place)	1
2609	0	P1.12	P1.11	UINT8	Local Control Place	1
535	0	P1.13	P4.1.7	UINT8	Bumpless Enable	1
2624	0	P1.14	P1.12	UINT8	Local Reference	1
2625	0	P1.15	P1.14	UINT8	Remote Reference (Remote 1 Reference)	1
2630	3	P1.16	P4.1.4	UINT8	Reverse Enable	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
4559	0	P1.17	–	UINT16	Run Delay Time	1
539	0	P1.18	–	UINT8	HOA Source	1
17569	0	P1.19	P9.2.5	UINT16	Minimum Run Time	0.1
3931	0	P1.2	P1.2	UINT16	Max Frequency	0.01
3972	0	P1.20	–	UINT16	Frequency reference upper limit	0.01
548	0	P1.21	–	UINT8	Frequency reference upper limit source	1
2997	0	P1.22	P1.5	UINT8	Motor Type Selection	1
5380	0	P1.3	P1.3	UINT16	Accel Time 1	0.1
5401	0	P1.4	P1.4	UINT16	Decel Time 1	0.1
2901	0	P1.5	P1.6	UINT16	Motor Nom Current	0.1
2908	0	P1.6	P1.7	UINT16	Motor Nom Speed	1
2906	0	P1.7	P1.8	UINT16	Motor PF	0.01
2902	0	P1.8	P1.9	UINT16	Motor Nom Voltage	1
2907	0	P1.9	P1.10	UINT16	Motor Nom Frequency	0.01
16410	0	P10.1	–	UINT16	PID1 Control Gain	0.01
16576	0	P10.10	–	UINT16	PID1 Dead Band Delay	0.01
16512	0	P10.11	–	UINT32	PID1 Keypad Set Point 1	0.01
16530	0	P10.12	–	UINT32	PID1 Keypad Set Point 2	0.01
16484	0	P10.13	–	UINT16	PID1 Ramp Time	0.01
16418	0	P10.14	–	UINT8	PID1 Set Point 1 Source	1
16508	0	P10.15	–	INT16	PID1 Set Point 1 Min	0.01
16510	0	P10.16	–	INT16	PID1 Set Point 1 Max	0.01
16454	0	P10.17	–	UINT8	PID1 Set Point 1 Sleep Enable	1
16470	0	P10.18	–	UINT8	PID1 Set Point 1 Sleep Unit Sel	1
16456	0	P10.19	–	UINT32	PID1 Set Point 1 Sleep Level	0.01
16412	0	P10.2	–	UINT16	PID1 Control ITime	0.01
16458	0	P10.20	–	UINT16	PID1 Set Point 1 Sleep Delay	1
16460	0	P10.21	–	UINT32	PID1 Set Point 1 Wake Up Level	0.01
16490	0	P10.22	–	UINT8	PID1 Set Point 1 Boost	0.1
16426	0	P10.23	–	UINT8	PID1 Set Point 2 Source	1
16526	0	P10.24	–	INT16	PID1 Set Point 2 Min	0.01
16528	0	P10.25	–	INT16	PID1 Set Point 2 Max	0.01
16462	0	P10.26	–	UINT8	PID1 Set Point 2 Sleep Enable	1
16472	0	P10.27	–	UINT8	PID1 Set Point 2 Sleep Unit Sel	1
16464	0	P10.28	–	UINT32	PID1 Set Point 2 Sleep Level	0.01
16466	0	P10.29	–	UINT16	PID1 Set Point 2 Sleep Delay	1
16414	0	P10.3	–	UINT16	PID1 Control DTime	0.01
16468	0	P10.30	–	UINT32	PID1 Set Point 2 Wake Up Level	0.01

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
16496	0	P10.31	–	UINT8	PID1 Set Point 2 Boost	0.1
16514	0	P10.32	–	UINT8	PID1 Feedback Function	1
16488	0	P10.33	–	INT16	PID1 Feedback Gain	0.1
16422	0	P10.34	–	UINT8	PID1 Feedback 1 Source	1
16516	0	P10.35	–	INT16	PID1 Feedback 1 Min	0.01
16518	0	P10.36	–	INT16	PID1 Feedback 1 Max	0.01
16428	0	P10.37	–	UINT8	PID1 Feedback 2 Source	1
16534	0	P10.38	–	INT16	PID1 Feedback 2 Min	0.01
16536	0	P10.39	–	INT16	PID1 Feedback 2 Max	0.01
16600	0	P10.4	–	UINT8	PID1 Process Unit	1
16540	0	P10.40	–	UINT8	PID1 Feedforward Func	1
16542	0	P10.41	–	INT16	PID1 Feedforward Gain	0.1
16544	0	P10.42	–	UINT8	PID1 Feedforward 1 Source	1
16546	0	P10.43	–	INT16	PID1 Feedforward 1 Min	0.01
16548	0	P10.44	–	INT16	PID1 Feedforward 1 Max	0.01
16554	0	P10.45	–	UINT8	PID1 Feedforward 2 Source	1
16556	0	P10.46	–	INT16	PID1 Feedforward 2 Min	0.01
16558	0	P10.47	–	INT16	PID1 Feedforward 2 Max	0.01
16564	0	P10.48	–	UINT8	PID1 Set Point 1 Comp Enable	1
16566	0	P10.49	–	INT16	PID1 Set Point 1 Comp Max	0.01
16602	0	P10.5	–	UINT32	PID1 Process Unit Min	0.01
16568	0	P10.50	–	UINT8	PID1 Set Point 2 Comp Enable	1
16570	0	P10.51	–	INT16	PID1 Set Point 2 Comp Max	0.01
16474	0	P10.52	–	UINT8	PID1 Wake Up Action	1
16494	0	P10.53	–	UINT32	FB PID1 Set Point 1	0.01
16500	0	P10.54	–	UINT32	FB PID1 Set Point 2	0.01
16504	0	P10.55	–	INT16	FB PID1 Feedback 1	0.01
16522	0	P10.56	–	INT16	FB PID1 Feedback 2	0.01
16552	0	P10.57	–	INT16	FB PID1 Feedforward 1	0.01
16562	0	P10.58	–	INT16	FB PID1 Feedforward 2	0.01
16476	0	P10.59	–	INT16	PID1 Sleep Boost level	1
16604	0	P10.6	–	UINT32	PID1 Process Unit Max	0.01
16478	0	P10.60	–	UINT16	PID1 Sleep Boost Max Time	1
16578	0	P10.61	–	UINT16	PID1 Low Feedback Level	0.1
16580	0	P10.62	–	UINT16	PID1 Low Feedback Time	1
24014	33285	P10.63	–	UINT8	PID1 Low Feedback Protection	1
16582	0	P10.64	–	UINT16	PID1 High Feedback Level	0.1
16584	0	P10.65	–	UINT16	PID1 High Feedback Time	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
24014	33286	P10.66	–	UINT8	PID1 High Feedback Protection	1
16586	0	P10.67	–	UINT16	PID1 Hysteresis Level	0.1
16588	0	P10.68	–	UINT8	PID1 Backup Feedback Source	1
16606	0	P10.7	–	UINT8	PID1 Process Unit Decimal	1
16572	0	P10.8	–	UINT8	PID1 Error Inversion	1
16574	0	P10.9	–	UINT32	PID1 Dead Band	0.01
16411	0	P11.1	–	UINT16	PID2 Control Gain	0.01
16577	0	P11.10	–	UINT16	PID2 Dead Band Delay	0.01
16513	0	P11.11	–	UINT32	PID2 Keypad Set Point 1	0.01
16531	0	P11.12	–	UINT32	PID2 Keypad Set Point 2	0.01
16485	0	P11.13	–	UINT16	PID2 Ramp Time	0.01
16419	0	P11.14	–	UINT8	PID2 Set Point 1 Source	1
16509	0	P11.15	–	INT16	PID2 Set Point 1 Min	0.01
16511	0	P11.16	–	INT16	PID2 Set Point 1 Max	0.01
16455	0	P11.17	–	UINT8	PID2 Set Point 1 Sleep Enable	1
16471	0	P11.18	–	UINT8	PID2 Set Point 1 Sleep Unit Sel	1
16457	0	P11.19	–	UINT32	PID2 Set Point 1 Sleep Level	0.01
16413	0	P11.2	–	UINT16	PID2 Control ITime	0.01
16459	0	P11.20	–	UINT16	PID2 Set Point 1 Sleep Delay	1
16461	0	P11.21	–	UINT32	PID2 Set Point 1 Wake Up Level	0.01
16491	0	P11.22	–	UINT8	PID2 Set Point 1 Boost	0.1
16427	0	P11.23	–	UINT8	PID2 Set Point 2 Source	1
16527	0	P11.24	–	INT16	PID2 Set Point 2 Min	0.01
16529	0	P11.25	–	INT16	PID2 Set Point 2 Max	0.01
16463	0	P11.26	–	UINT8	PID2 Set Point 2 Sleep Enable	1
16473	0	P11.27	–	UINT8	PID2 Set Point 2 Sleep Unit Sel	1
16465	0	P11.28	–	UINT32	PID2 Set Point 2 Sleep Level	0.01
16467	0	P11.29	–	UINT16	PID2 Set Point 2 Sleep Delay	1
16415	0	P11.3	–	UINT16	PID2 Control DTime	0.01
16469	0	P11.30	–	UINT32	PID2 Set Point 2 Wake Up Level	0.01
16497	0	P11.31	–	UINT8	PID2 Set Point 2 Boost	0.1
16515	0	P11.32	–	UINT8	PID2 Feedback Function	1
16489	0	P11.33	–	INT16	PID2 Feedback Gain	0.1
16423	0	P11.34	–	UINT8	PID2 Feedback 1 Source	1
16517	0	P11.35	–	INT16	PID2 Feedback 1 Min	0.01
16519	0	P11.36	–	INT16	PID2 Feedback 1 Max	0.01
16429	0	P11.37	–	UINT8	PID2 Feedback 2 Source	1
16535	0	P11.38	–	INT16	PID2 Feedback 2 Min	0.01

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
16537	0	P11.39	–	INT16	PID2 Feedback 2 Max	0.01
16601	0	P11.4	–	UINT8	PID2 Process Unit	1
16541	0	P11.40	–	UINT8	PID2 Feedforward Func	1
16543	0	P11.41	–	INT16	PID2 Feedforward Gain	0.1
16545	0	P11.42	–	UINT8	PID2 Feedforward 1 Source	1
16547	0	P11.43	–	INT16	PID2 Feedforward 1 Min	0.01
16549	0	P11.44	–	INT16	PID2 Feedforward 1 Max	0.01
16555	0	P11.45	–	UINT8	PID2 Feedforward 2 Source	1
16557	0	P11.46	–	INT16	PID2 Feedforward 2 Min	0.01
16557	0	P11.47	–	INT16	PID2 Feedforward 2 Max	0.01
16565	0	P11.48	–	UINT8	PID2 Set Point 1 Comp Enable	1
16567	0	P11.49	–	INT16	PID2 Set Point 1 Comp Max	0.01
16603	0	P11.5	–	UINT32	PID2 Process Unit Min	0.01
16569	0	P11.50	–	UINT8	PID2 Set Point 2 Comp Enable	1
16571	0	P11.51	–	INT16	PID2 Set Point 2 Comp Max	0.01
16475	0	P11.52	–	UINT8	PID2 Wake Up Action	1
16495	0	P11.53	–	UINT32	FB PID2 Set Point 1	0.01
16501	0	P11.54	–	UINT32	FB PID2 Set Point 2	0.01
16505	0	P11.55	–	INT16	FB PID2 Feedback 1	0.01
16523	0	P11.56	–	INT16	FB PID2 Feedback 2	0.01
16553	0	P11.57	–	INT16	FB PID2 Feedforward 1	0.01
16563	0	P11.58	–	INT16	FB PID2 Feedforward 2	0.01
16477	0	P11.59	–	INT16	PID2 Sleep Boost level	1
16605	0	P11.6	–	UINT32	PID2 Process Unit Max	0.01
16479	0	P11.60	–	UINT16	PID2 Sleep Boost Max Time	1
16579	0	P11.61	–	UINT16	PID2 Low Feedback Level	0.1
16581	0	P11.62	–	UINT16	PID2 Low Feedback Time	1
24014	332887	P11.63	–	UINT8	PID2 Low Feedback Protection	1
16583	0	P11.64	–	UINT16	PID2 High Feedback Level	0.1
16585	0	P11.65	–	UINT16	PID2 High Feedback Time	1
24014	332888	P11.66	–	UINT8	PID2 High Feedback Protection	1
16587	0	P11.67	–	UINT16	PID2 Hysteresis Level	0.1
16589	0	P11.68	–	UINT8	PID2 Backup Feedback Source	1
16607	0	P11.7	–	UINT8	PID2 Process Unit Decimal	1
16573	0	P11.8	–	UINT8	PID2 Error Inversion	1
16575	0	P11.9	–	UINT32	PID2 Dead Band	0.01
3910	1	P12.1	P2.3.1	UINT16	Preset Speed 1	0.01
3910	2	P12.2	P2.3.2	UINT16	Preset Speed 2	0.01

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
3910	3	P12.3	P2.3.3	UINT16	Preset Speed 3	0.01
3910	4	P12.4	P2.3.4	UINT16	Preset Speed 4	0.01
3910	5	P12.5	P2.3.5	UINT16	Preset Speed 5	0.01
3910	6	P12.6	P2.3.6	UINT16	Preset Speed 6	0.01
3910	7	P12.7	P2.3.7	UINT16	Preset Speed 7	0.01
4234	0	P13.1	–	UINT16	Torque Limit	0.1
4281	0	P13.10	–	UINT16	Window Neg Off Limit	0.01
4260	0	P13.11	–	UINT16	Torque Reference Filter TC	1
4212	0	P13.12	–	UINT16	Pull Out Torque	0.1
4553	0	P13.13	–	UINT16	Stop State Magentisation Time	1
4213	0	P13.14	–	INT16	FB Torque Ref	0.1
2616	0	P13.2	–	UINT8	Torque Ref Select	1
4203	0	P13.3	–	INT16	Keypad Torque Ref	0.1
4233	0	P13.4	–	INT16	Torque Ref Max	0.1
4232	0	P13.5	–	INT16	Torque Ref Min	0.1
3105	0	P13.6	–	UINT8	Speed Limiter Mode	1
4278	0	P13.7	–	UINT16	Window Pos Width	0.01
4279	0	P13.8	–	UINT16	Window Neg Width	0.01
4280	0	P13.9	–	UINT16	Window Pos Off Limit	0.01
17264	0	P14.1	P4.2.2	UINT16	DC-Brake Current	0.1
17261	0	P14.2	P4.2.3	UINT16	Start DC-Brake Time	0.01
17263	0	P14.3	P4.2.4	UINT16	Stop DC-Brake Frequency	0.01
17262	0	P14.4	P4.2.5	UINT16	Stop DC-Brake Time	0.01
17209	0	P14.5	–	UINT8	Brake Chopper Mode	1
17221	0	P14.6	P4.2.6	UINT8	Flux Brake	1
17222	0	P14.7	P4.2.7	UINT16	Flux Brake Current	0.1
16229	0	P15.1	P8.2.1	UINT8	Fire Mode Function	1
16225	0	P15.2	P8.2.2	UINT8	Fire Mode Ref Select Function	1
16205	0	P15.3	P8.2.3	UINT16	Fire Mode Min Frequency	0.01
16201	0	P15.4	P8.2.4	UINT16	Fire Mode Freq Ref 1	0.1
16202	0	P15.5	P8.2.5	UINT16	Fire Mode Freq Ref 2	0.1
16203	0	P15.6	P8.2.7	UINT16	Smoke Purge Frequency	0.1
16213	0	P15.7	P8.2.6	UINT8	Fire Mode Test Enable	1
2901	1	P16.1	–	UINT16	Motor Nom Current 2	0.1
2925	1	P16.10	–	UINT16	Excitation Current 2	0.1
2990	1	P16.11	–	UINT16	Motor Inertia2	0.001
2970	1	P16.12	–	UINT16	Second PM BEMF Voltage	0.1
2922	1	P16.13	–	UINT16	Second PM q-axis stator inductance	0.01

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
2921	1	P16.14	–	UINT16	Second PM d-axis stator inductance	0.01
2908	1	P16.2	–	UINT16	Motor Nom Speed 2	1
2906	1	P16.3	–	UINT16	Motor PF 2	0.01
2902	1	P16.4	–	UINT16	Motor Nom Voltage 2	1
2907	1	P16.5	–	UINT16	Motor Nom Frequency 2	0.01
2920	1	P16.6	–	UINT16	Stator Resistor 2	0.001
2923	1	P16.7	–	UINT16	Rotor Resistor 2	0.001
2926	1	P16.8	–	UINT16	Leak Inductance 2	0.01
2927	1	P16.9	–	UINT16	Mutual Inductance 2	0.1
17372	0	P17.1.1	–	UINT8	Bypass Enable	1
24016	17168	P17.1.10	–	UINT8	Motor OverTemp Bypass Enable	1
24016	28979	P17.1.11	–	UINT8	UnderLoad Bypass Enable	1
24016	36864	P17.1.12	–	UINT8	External Bypass Enable	1
24014	12849	P17.1.13	–	UINT8	Charge Switch Fault Bypass Enable	1
24016	29040	P17.1.14	–	UINT8	Saturation Trip Fault Bypass Enable	1
24016	17184	P17.1.15	–	UINT8	Under Temp Fault Bypass Enable	1
24016	21793	P17.1.16	–	UINT8	EEPROM Fault Bypass Enable	1
24016	21794	P17.1.17	–	UINT8	Control Board EEPROM Fault Bypass Enable	1
24016	24848	P17.1.18	–	UINT8	Watchdog Fault Bypass Enable	1
24016	28689	P17.1.19	–	UINT8	Fan Cooling Fault Bypass Enable	1
4586	0	P17.1.2	–	UINT8	Bypass Start Delay	1
24016	21264	P17.1.20	–	UINT8	Keypad Com Fault Bypass Enable	1
24016	35073	P17.1.21	–	UINT8	Option Card Fault Bypass Enable	1
24016	35344	P17.1.22	–	UINT8	RTC Clock Fault Bypass Enable	1
24016	16914	P17.1.23	–	UINT8	Ctrl Board OverTemp Fault Bypass Enable	1
24016	29953	P17.1.24	–	UINT8	Fieldbus Fault Bypass Enable	1
24016	21578	P17.1.25	–	UINT8	Op Cont Interlock Fault Bypass Enable	1
17373	0	P17.1.3	–	UINT8	Auto Bypass	1
4587	0	P17.1.4	–	UINT8	Auto Bypass Delay	1
24016	8736	P17.1.5	–	UINT8	OverCurrent Bypass Enable	1
24016	21521	P17.1.6	–	UINT8	IGBT Fault Bypas Enable	1
24016	29520	P17.1.7	–	UINT8	4mA Fault Bypass Enable	1
17378	0	P17.1.8	–	UINT8	UnderVoltage Bypass Enable	1
17379	0	P17.1.9	–	UINT8	OverVoltage Bypass Enable	1
17734	0	P17.2.1	–	UINT8	Redudant Drive Enable	1
17568	0	P17.2.2	–	UINT8	Drive ID	1
17735	0	P17.2.3	–	UINT8	Redudant Run Time Enable	1
17736	0	P17.2.4	–	UINT8	Redudant Run Time Reset	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
17737	0	P17.2.5	–	UINT32	Redudant RunTime Limit	0.1
17567	0	P18.1.1	P9.3.1	UINT8	Multi-pump Mode	1
403	0	P18.1.10	P8.1.3	UINT16	Damper Delay	1
17710	0	P18.1.11	P9.1.1	UINT8	Derag Cycles	1
17711	0	P18.1.12	P9.1.2	UINT8	Derag at Start/Stop	1
17713	0	P18.1.13	P9.1.3	UINT16	Deragging Run Time	1
17505	0	P18.1.14	P9.1.4	UINT16	Derag Speed	0.01
17712	0	P18.1.15	P9.1.5	UINT16	Derag Off Delay	1
17567	0	P18.1.16	–	UINT8	Multi-pump Mode 2	1
17568	0	P18.1.2	P9.3.3	UINT8	Drive ID	1
16409	0	P18.1.3	P9.3.5	UINT16	PID Bandwidth	0.01
17561	0	P18.1.4	P9.3.6	UINT16	Staging Frequency	0.01
17562	0	P18.1.5	P9.3.7	UINT16	De-Staging Frequency	0.01
17560	0	P18.1.6	P9.3.8	UINT16	Add/Remove Delay	1
17531	0	P18.1.7	P9.3.9	UINT8	Interlock Enable	1
2633	0	P18.1.8	P8.1.1	UINT8	Damper Start	1
4556	0	P18.1.9	P8.1.2	UINT16	Damper Time Out	1
17523	0	P18.2.1	–	UINT8	Operation Mode	1
17591	0	P18.2.2	–	UINT8	Multi-Pump Status	1
17592	0	P18.2.3	–	UINT8	Network Status	1
17529	0	P18.4.1	–	UINT8	Number of Pumps	1
17679	0	P18.4.10	–	UINT16	Pipe Fill Aux Pump Delay	0.1
17527	0	P18.4.2	–	UINT8	Include Freq Converter	1
17524	0	P18.4.3	–	UINT8	Auto-Change Enable	1
17508	0	P18.4.4	–	UINT16	Auto-Change Interval	0.1
17525	0	P18.4.5	–	UINT16	Auto-Change Freq Limit	0.01
17526	0	P18.4.6	–	UINT8	Auto-Change Pump Limit	1
17676	0	P18.4.7	–	UINT8	Pipe Fill Aux Pump Select	1
17677	0	P18.4.8	–	UINT16	Pipe Fill Aux Pump Run Time	0.1
17678	0	P18.4.9	–	UINT8	Pipe Fill Aux Pump Operation	1
17530	0	P18.5.1	P9.3.2	UINT8	Number of Drives	1
17732	0	P18.5.10	P9.3.16	UINT16	Master Fixed Speed	0.1
17733	0	P18.5.11	P9.3.17	UINT16	Master Fixed Speed Delay	0.1
667	0	P18.5.2	P9.3.4	UINT8	Regulation Source	1
17566	0	P18.5.3	P9.3.10	UINT8	Recovery Method	1
668	0	P18.5.4	–	UINT8	Callback Source	
17528	0	P18.5.5	P9.3.11	UINT8	Add/Remove Drive Selection	1
17563	0	P18.5.6	P9.3.12	UINT8	Run Time Enable	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
17564	0	P18.5.7	P9.3.13	UINT32	Run Time Limit	0.01
17565	0	P18.5.8	P9.3.14	UINT8	Run Time Reset	1
17731	0	P18.5.9	P9.3.15	UINT8	Master Drive Mode	1
17669	0	P18.6.1	P9.4.2	UINT8	Pipe Fill Loss Detection Method	1
17637	0	P18.6.10	P9.5.4	UINT16	Prime Pump Delay Time	0.1
17639	0	P18.6.11	P9.5.5	UINT16	Prime Pump Loss of Prime Level	0.1
17634	0	P18.6.12	P9.5.6	UINT32	Prime Pump Level 2	0.01
17636	0	P18.6.13	P9.5.7	UINT16	Prime Pump Frequency 2	0.01
17638	0	P18.6.14	P9.5.8	UINT16	Prime Pump Delay Time 2	0.1
17640	0	P18.6.15	P9.5.9	UINT16	Prime Pump Loss of Prime Level 2	0.1
24014	35590	P18.6.16	P9.6.1	UINT8	Broken Pipe Fault Response	1
17695	0	P18.6.17	P9.6.2	UINT32	Broken Pipe Level	0.01
17697	0	P18.6.18	P9.6.4	UINT16	Broken Pipe Delay	0.1
17696	0	P18.6.19	P9.6.3	UINT16	Broken Pipe Frequency	0.1
17670	0	P18.6.2	–	UINT16	Pipe Fill Loss Level	0.1
17650	0	P18.6.20	–	UINT8	Jockey Pump Enable	1
17651	0	P18.6.21	–	UINT32	Jockey Pump Start Level	0.01
17652	0	P18.6.22	–	UINT32	Jockey Pump Stop Level	0.01
17653	0	P18.6.23	–	UINT8	Lube Pump Enable	1
4602	0	P18.6.24	–	UINT16	Lube Pump Time	0.1
17673	0	P18.6.3	P9.4.7	UINT16	Pipe Fill Loss Time	1
17674	0	P18.6.4	–	UINT16	Pipe Fill Loss Frequency	0.01
24014	35588	P18.6.5	P9.4.1	UINT8	Pipe Fill Loss Response	1
24018	35588	P18.6.6	P9.4.8	UINT8	Pipe Fill Loss Attempts	1
17630	0	P18.6.7	P9.5.1	UINT8	Prime Pump Enable	1
17633	0	P18.6.8	P9.5.2	UINT32	Prime Pump Level	0.01
17635	0	P18.6.9	P9.5.3	UINT16	Prime Pump Frequency	0.01
2501	0	P19.1	–	UINT32	Interval 1 On Time	1
2505	1	P19.10	–	UINT8	Interval 2 Channel	1
2501	2	P19.11	–	UINT32	Interval 3 On Time	1
2502	2	P19.12	–	UINT32	Interval 3 Off Time	1
2503	2	P19.13	–	UINT8	Interval 3 From Day	1
2504	2	P19.14	–	UINT8	Interval 3 To Day	1
2505	2	P19.15	–	UINT8	Interval 3 Channel	1
2501	3	P19.16	–	UINT32	Interval 4 On Time	1
2502	3	P19.17	–	UINT32	Interval 4 Off Time	1
2503	3	P19.18	–	UINT8	Interval 4 From Day	1
2504	3	P19.19	–	UINT8	Interval 4 To Day	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
2502	0	P19.2	–	UINT32	Interval 1 Off Time	1
2505	3	P19.20	–	UINT8	Interval 4 Channel	1
2501	4	P19.21	–	UINT32	Interval 5 On Time	1
2502	4	P19.22	–	UINT32	Interval 5 Off Time	1
2503	4	P19.23	–	UINT8	Interval 5 From Day	1
2504	4	P19.24	–	UINT8	Interval 5 To Day	1
2505	4	P19.25	–	UINT8	Interval 5 Channel	1
4595	0	P19.26	–	UINT32	Timer 1 Duration	1
4597	0	P19.27	–	UINT8	Timer 1 Channel	1
4595	1	P19.28	–	UINT32	Timer 2 Duration	1
4597	1	P19.29	–	UINT8	Timer 2 Channel	1
2503	0	P19.3	–	UINT8	Interval 1 From Day	1
4595	2	P19.30	–	UINT32	Timer 3 Duration	1
4597	2	P19.31	–	UINT8	Timer 3 Channel	1
2507	0	P19.32	–	UINT8	Interval 1 Setting	1
2507	1	P19.33	–	UINT8	Interval 2 Setting	1
2507	2	P19.34	–	UINT8	Interval 3 Setting	1
2507	3	P19.35	–	UINT8	Interval 4 Setting	1
2507	4	P19.36	–	UINT8	Interval 5 Setting	1
2504	0	P19.4	–	UINT8	Interval 1 To Day	1
2505	0	P19.5	–	UINT8	Interval 1 Channel	1
2501	1	P19.6	–	UINT32	Interval 2 On Time	1
2502	1	P19.7	–	UINT32	Interval 2 Off Time	1
2503	1	P19.8	–	UINT8	Interval 2 From Day	1
2504	1	P19.9	–	UINT8	Interval 2 To Day	1
6002	0	P2.1.1	P2.1.1	UINT16	AI Ref Scale Min Value	0.01
6001	0	P2.1.2	P2.1.2	UINT16	AI Ref Scale Max Value	0.01
6100	0	P2.2.1	P2.4.1	UINT8	AI Mode (AI1 Mode)	1
6431	0	P2.2.10	P2.4.10	INT16	AI Joystick Offset	0.01
6010	0	P2.2.2	P2.4.2	UINT8	AI Signal Range (AI1 Signal Range)	1
6130	0	P2.2.3	P2.4.3	UINT16	AI Custom Min (AI1 Custom Min)	0.01
6160	0	P2.2.4	P2.4.4	UINT16	AI Custom Max (AI1 Custom Max)	0.01
6190	0	P2.2.5	P2.4.5	UINT16	AI Filter Time (AI1 Filter Time)	0.01
6220	0	P2.2.6	P2.4.6	UINT8	AI Signal Invert (AI1 Signal Invert)	1
6401	0	P2.2.7	P2.4.7	UINT16	AI Joystick Hyst	0.01
6461	0	P2.2.8	P2.4.8	UINT16	AI Sleep Limit	0.01
6491	0	P2.2.9	P2.4.9	UINT16	AI Sleep Delay	0.01
6100	1	P2.3.1	–	UINT8	AI2 Mode	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
6431	1	P2.3.10	–	INT16	AI2 Joystick Offset	0.01
6010	1	P2.3.2	–	UINT8	AI2 Signal Range	1
6130	1	P2.3.3	–	UINT16	AI2 Custom Min	0.01
6160	1	P2.3.4	–	UINT16	AI2 Custom Max	0.01
6190	1	P2.3.5	–	UINT16	AI2 Filter Time	0.01
6220	1	P2.3.6	–	UINT8	AI2 Signal Invert	1
6401	1	P2.3.7	–	UINT16	AI2 Joystick Hyst	0.01
6461	1	P2.3.8	–	UINT16	AI2 Sleep Limit	0.01
6491	1	P2.3.9	–	UINT16	AI2 Sleep Delay	0.01
6521	0	P2.4.1	–	UINT8	Fine Tuning Input	1
6522	0	P2.4.2	–	UINT16	Fine Tuning Min	0.1
6523	0	P2.4.3	–	UINT16	Fine Tuning Max	0.1
24510	0	P20.1.1	P10.1.1	UINT16	FB Process Data Input 1 Sel	1
24510	1	P20.1.2	P10.1.2	UINT16	FB Process Data Input 2 Sel	1
24510	2	P20.1.3	P10.1.3	UINT16	FB Process Data Input 3 Sel	1
24510	3	P20.1.4	P10.1.4	UINT16	FB Process Data Input 4 Sel	1
24510	4	P20.1.5	P10.1.5	UINT16	FB Process Data Input 5 Sel	1
24510	5	P20.1.6	P10.1.6	UINT16	FB Process Data Input 6 Sel	1
24510	6	P20.1.7	P10.1.7	UINT16	FB Process Data Input 7 Sel	1
24510	7	P20.1.8	P10.1.8	UINT16	FB Process Data Input 8 Sel	1
24504	0	P20.2.1	P10.2.1	UINT16	FB Process Data Output 1 Sel	1
24501	1	P20.2.10	P10.3.2	UINT8	Standard Status UINT16 Bit1 Function Select	1
24501	2	P20.2.11	P10.3.3	UINT8	Standard Status UINT16 Bit2 Function Select	1
24501	3	P20.2.12	P10.3.4	UINT8	Standard Status UINT16 Bit3 Function Select	1
24501	4	P20.2.13	P10.3.5	UINT8	Standard Status UINT16 Bit4 Function Select	1
24501	5	P20.2.14	P10.3.6	UINT8	Standard Status UINT16 Bit5 Function Select	1
24501	6	P20.2.15	P10.3.7	UINT8	Standard Status UINT16 Bit6 Function Select	1
24501	7	P20.2.16	P10.3.8	UINT8	Standard Status UINT16 Bit7 Function Select	1
24504	1	P20.2.2	P10.2.2	UINT16	FB Process Data Output 2 Sel	1
24504	2	P20.2.3	P10.2.3	UINT16	FB Process Data Output 3 Sel	1
24504	3	P20.2.4	P10.2.4	UINT16	FB Process Data Output 4 Sel	1
24504	4	P20.2.5	P10.2.5	UINT16	FB Process Data Output 5 Sel	1
24504	5	P20.2.6	P10.2.6	UINT16	FB Process Data Output 6 Sel	1
24504	6	P20.2.7	P10.2.7	UINT16	FB Process Data Output 7 Sel	1
24504	7	P20.2.8	P10.2.8	UINT16	FB Process Data Output 8 Sel	1
24501	0	P20.2.9	P10.3.1	UINT8	Standard Status UINT16 Bit0 Function Select	1
25001	0	P20.3.1.1	–	UINT8	RS485 Comm Set	1
25011	0	P20.3.2.1	P11.2.1	UINT8	Slave Address	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
25021	0	P20.3.2.2	P11.2.2	UINT8	Baud Rate	1
25131	0	P20.3.2.5	P11.2.5	UINT16	Comm Timeout Modbus RTU	1
24014	29953	P20.3.2.6	P11.2.6	UINT8	Modbus RTU Fault Response	1
27257	0	P20.3.3.1	P11.3.1	UINT8	MSTP Baud Rate	1
27254	0	P20.3.3.2	P11.3.2	UINT16	MSTP Device Address	1
27281	0	P20.3.3.3	P11.3.3	UINT16	MSTP Instance Number	1
27290	0	P20.3.3.4	P11.3.4	UINT16	MSTP Comm Timeout	1
24014	30066	P20.3.3.7	P11.3.7	UINT8	MSTP Fault Response	1
27299	0	P20.3.3.8	P11.3.8	UINT16	MSTP Max Master	1
927	0	P20.3.4.1	P11.5.1	UINT16	Parameter Access	1
928	0	P20.3.4.2	P11.5.2	UINT16	Process Data Access	1
952	0	P20.3.4.3	P11.5.3	UINT16	Fault Situation Counter	1
26720	0	P20.4.1	P12.1.1	UINT8	IP Address Mode	1
24014	30067	P20.4.10	P12.4.3	UINT8	Ethernet IP Fault Response (EIP Fault Response)	1
26660	0	P20.4.6	P12.1.6	ARRAY OF UINT8	Static IP address	1
26670	0	P20.4.7	P12.1.7	ARRAY OF UINT8	Static Subnet Mask	1
26680	0	P20.4.8	P12.1.8	ARRAY OF UINT8	Static Default Gateway	1
25847	0	P20.5.2	P12.3.3	UINT8	Modbus TCP Unit ID	1
25853	0	P20.5.3	–	UINT16	Comm Timeout Modbus TCP	1
24014	30065	P20.5.5	P12.3.5	UINT8	Modbus TCP Fault Response	1
26641	0	P20.5.6	–	UINT8	Modbus TCP Trusted IP Enable	1
26640	0	P20.5.7	P12.2.1	ARRAY OF UINT8	Trusted IP White List	1
24014	30075	P20.6.2	P12.6.2	UINT8	WebUI Fault Response	1
34800	0	P20.6.3	P12.6.3	UINT16	WebUI Communication Timeout	1
34801	0	P20.6.4	P12.6.4	UINT8	WebUI Enable	1
490	0	P21.1.1	P13.1.1	UINT8	Language	1
494	0	P21.1.10	P13.2.3	UINT8	Default Page	1
495	0	P21.1.11	P13.2.4	UINT16	Timeout Time	1
492	0	P21.1.12	P13.2.5	UINT8	Contrast Adjust	1
496	1	P21.1.13	P13.2.6	UINT16	Backlight Time	1
598	0	P21.1.14	P13.2.7	UINT8	Fan Control	1
415	0	P21.1.15	P13.2.8	UINT16	Keypad ACK Timeout	1
416	0	P21.1.16	P13.2.9	UINT8	Keypad Retry Number	1
493	0	P21.1.17	P13.1.9	UINT8	Startup Wizard	1
497	0	P21.1.18	–	UINT8	Jog Softkey Hidden	1
498	0	P21.1.19	–	UINT8	Reverse Softkey Hidden	1
405	0	P21.1.2	P13.1.2	UINT8	Application	1
23708	0	P21.1.20	P13.3.1	UINT8	Output Display Unit	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
23706	0	P21.1.21	P13.3.2	UINT32	Output Display Unit Min	0.01
23707	0	P21.1.22	P13.3.3	UINT32	Output Display Unit Max	0.01
976	0	P21.1.3	P13.1.3	UINT8	Parameter Sets	1
412	0	P21.1.4	P13.1.4	UINT8	Up To Keypad	1
413	1	P21.1.5	P13.1.5	UINT8	Down From Keypad	1
414	0	P21.1.6	P13.1.6	UINT8	Parameter Comparison	1
433	0	P21.1.7	P13.1.7	UINT16	Parameter Lock PIN (PassUINT16)	1
592	0	P21.1.8	P13.1.8	UINT8	Keypad Parameter Lock (Parameter Lock)	1
23702	0	P21.1.9	P13.5.2	UINT8	Multimonitor Set	1
31	2	P21.2.1	P13.4.1	UINT16	Keypad Software Version	1
22	0	P21.2.2	P13.4.2	UINT16	Motor Control Software Version	1
30	1	P21.2.3	P13.4.3	UINT16	Application Software Version	1
23569	0	P21.3.1	–	UINT8	Brake Chopper Status	1
23570	0	P21.3.2	–	UINT8	Brake Resistor Status	1
220	0	P21.3.3	–	UINT32	Serial Number	1
329	0	P21.4.1	–	UINT8	Real Time Clock	1
473	0	P21.4.10	–	UINT8	Clear Trip Power Count	1
791	0	P21.4.2	–	UINT8	Daylight Saving	1
474	0	P21.4.7	–	UINT8	Clear Trip MWh ount	1
474	0	P21.4.7	P13.6.6	UINT8	Clear Trip MWh Count	0.0001
2620	0	P3.1	P2.1.3	UINT8	IO Terminal Start Stop Logic (IO Terminal 1 Start Stop Logic)	1
4133	0	P3.10	–	UINT8	Preset Speed B0	1
4134	0	P3.11	–	UINT8	Preset Speed B1	1
4135	0	P3.12	–	UINT8	Preset Speed B2	1
16450	0	P3.13	–	UINT8	PID1 Control Enable	1
16451	0	P3.14	–	UINT8	PID2 Control Enable	1
5481	0	P3.15	–	UINT8	Accel/Decel Time Set	1
5474	0	P3.16	–	UINT8	Accel/Decel Prohibit	1
533	0	P3.17	–	UINT8	No Access To Param	1
5475	0	P3.18	–	UINT8	Accel Pot Value	1
5476	0	P3.19	–	UINT8	Decel Pot Value	1
2612	0	P3.2	–	UINT8	IO Terminal 1 Start Signal 1	1
2607	0	P3.20	–	UINT8	Reset Pot Zero	1
2608	0	P3.21	–	UINT8	Remote Control	1
2609	0	P3.22	–	UINT8	Local Control	1
538	0	P3.23	–	UINT8	Remote 1/2 Select	1
3001	0	P3.24	–	UINT8	Second Motor Para Select	1
17374	0	P3.25	–	UINT8	Force Bypass	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
17201	0	P3.26	–	UINT8	DC Brake Active	1
16215	0	P3.27	–	UINT8	Smoke Mode	1
16223	0	P3.28	–	UINT8	Fire Mode	1
16224	0	P3.29	–	UINT8	Fire Mode Ref 1/2 Select	1
2613	0	P3.3	–	UINT8	IO Terminal 1 Start Signal 2	1
16403	0	P3.30	–	UINT8	PID1 Set Point Select	1
16404	0	P3.31	–	UINT8	PID2 Set Point Select	1
2603	0	P3.32	–	UINT8	Jog Enable	1
4599	0	P3.33	–	UINT8	Start Timer 1	1
4599	1	P3.34	–	UINT8	Start Timer 2	1
4599	2	P3.35	–	UINT8	Start Timer 3	1
6310	0	P3.36	–	UINT8	AI Ref Source Select	1
17540	0	P3.37	–	UINT8	Motor Interlock 1	1
17540	1	P3.38	–	UINT8	Motor Interlock 2	1
17540	2	P3.39	–	UINT8	Motor Interlock 3	1
16007	0	P3.4	–	UINT8	Thermistor Input Select	1
17540	3	P3.40	–	UINT8	Motor Interlock 4	1
17540	4	P3.41	–	UINT8	Motor Interlock 5	1
24014	21121	P3.42	–	UINT8	Ext Fault-AR	1
24041	0	P3.43	–	UINT8	Bypass Overload	1
16227	0	P3.44	–	UINT8	Fire Mode Direction Invert	1
2620	0	P3.45	–	UINT8	IO Terminal 2 Start Stop Logic	1
2614	0	P3.46	–	UINT8	IO Terminal 2 Start Signal 1	1
2615	0	P3.47	–	UINT8	IO Terminal 2 Start Signal 2	1
24002	1	P3.48	–	UINT8	Ext. Fault 2 NO	1
24003	1	P3.49	–	UINT8	Ext. Fault 2 NC	1
2618	0	P3.5	–	UINT8	Reverse	1
24002	2	P3.50	–	UINT8	Ext. Fault 3 NO	1
24003	2	P3.51	–	UINT8	Ext. Fault 3 NC	1
24004	0	P3.52	P2.1.4	UINT8	Ext. Fault 1 Text	1
24004	1	P3.53	P2.1.5	UINT8	Ext. Fault 2 Text	1
24004	2	P3.54	P2.1.6	UINT8	Ext. Fault 3 Text	1
2606	0	P3.55	–	UINT8	Parameter Set1/2 Sel	1
17509	0	P3.56	–	UINT8	Deragging Enable	1
2605	0	P3.57	–	UINT8	HOA On/Off	1
17523	0	P3.58	–	UINT8	Multi-pump Mode 1/2 Select	1
17621	0	P3.59	–	UINT8	OP Cont Interlock NO	1
24002	0	P3.6	–	UINT8	Ext. Fault 1 NO	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
17620	0	P3.60	–	UINT8	OP Cont Interlock NC	1
17751	0	P3.61	–	UINT8	CP Interlock NC	1
24003	0	P3.7	–	UINT8	Ext. Fault 1 NC	1
2602	0	P3.8	–	UINT8	Fault Reset	1
2604	0	P3.9	–	UINT8	Run Enable	1
7100	0	P4.1	P3.3.1	UINT8	AO Mode (AO1 Mode)	1
7190	1	P4.10	–	UINT8	AO2 Minimum	1
7130	1	P4.11	–	UINT16	AO2 Filter Time	0.01
7040	1	P4.12	–	UINT16	AO2 Scale	1
7160	1	P4.13	–	UINT8	AO2 Inversion	1
7070	1	P4.14	–	INT16	AO2 Offset	0.01
7220	0	P4.2	P3.3.2	UINT8	AO Function (AO1 Function)	1
7190	0	P4.3	–	UINT8	AO1 Minimum	1
7130	0	P4.4	P3.3.3	UINT16	AO Filter Time	0.01
7040	0	P4.5	–	UINT16	AO1 Scale	1
7160	0	P4.6	–	UINT8	AO1 Inversion	1
7070	0	P4.7	–	INT16	AO1 Offset	0.01
7100	0	P4.8	–	UINT8	AO2 Mode	1
7220	1	P4.9	–	UINT8	AO2 Function	1
10010	0	P5.1	–	UINT8	DO1 Function	1
642	0	P5.10	–	UINT16	Freq Limit Supv Val 2	0.01
648	0	P5.11	P3.2.5	UINT8	Torque Limit Supv	1
643	0	P5.12	P3.2.7	INT16	Torque Limit Supv Val	0.1
645	0	P5.13	P3.2.9	UINT8	Ref Limit Supv	1
640	0	P5.14	P3.2.11	UINT16	Ref Limit Supv Val	0.01
17207	0	P5.15	–	UINT16	Ext Brake Off Delay	0.1
17206	0	P5.16	–	UINT16	Ext Brake On Delay	0.1
5182	1	P5.17	P3.2.13	UINT8	Temp Limit Supv	1
5161	0	P5.18	P3.2.15	INT16	Temp Limit Supv Val	0.1
649	0	P5.19	P3.2.17	UINT8	Power Limit Supv	1
12010	0	P5.2	P3.1.1	UINT8	RO1 Function	1
644	0	P5.20	P3.2.19	INT16	Power Limit Supv Val	0.1
6391	0	P5.21	P3.2.21	UINT8	AI Supv Select	1
6383	0	P5.22	P3.2.22	UINT8	AI Limit Supv	1
6382	0	P5.23	P3.2.24	UINT16	AI Limit Supv Val	0.01
16590	0	P5.24	P3.2.30	UINT8	PID Superv Enable (PID1 Superv Enable)	1
16592	0	P5.25	P3.2.32	UINT32	PID Superv Upper Limit (PID1 Superv Upper Limit)	0.01
16594	0	P5.26	P3.2.33	UINT32	PID Superv Lower Limit (PID1 Superv Lower Limit)	0.01

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
16596	0	P5.27	P3.2.34	UINT16	PID Superv Delay (PID1 Superv Delay)	1
16591	0	P5.28	–	UINT8	PID2 Superv Enable	1
16593	0	P5.29	–	UINT32	PID2 Superv Upper Limit	0.01
12010	1	P5.3	P3.1.4	UINT8	RO2 Function	1
16595	0	P5.30	–	UINT32	PID2 Superv Lower Limit	0.01
16597	0	P5.31	–	UINT16	PID2 Superv Delay	1
12620	0	P5.32	P3.1.2	UINT16	RO1 On Delay	0.1
12750	0	P5.33	P3.1.3	UINT16	RO1 Off Delay	0.1
12620	1	P5.34	P3.1.5	UINT16	RO2 On Delay	0.1
12750	1	P5.35	P3.1.6	UINT16	RO2 Off Delay	0.1
12620	2	P5.36	–	UINT16	RO3 On Delay	0.1
12750	2	P5.37	–	UINT16	RO3 Off Delay	0.1
13120	0	P5.38	–	UINT8	RO3 Reverse	1
3085	0	P5.39	P3.2.26	UINT8	Motor Current Supv (Motor Current 1 Supv)	1
12010	2	P5.4	–	UINT8	RO3 Function	1
3083	0	P5.40	P3.2.28	UINT16	Motor Current Supv Val (Motor Current 1 Supv Value)	0.1
3086	0	P5.41	–	UINT8	Motor Current 2 Supv	1
3084	0	P5.42	–	UINT16	Motor Current 2 Supv Value	0.1
6392	0	P5.43	–	UINT8	Second AI Supv Select	1
6383	1	P5.44	–	UINT8	Second AI Limit Supv	1
6382	1	P5.45	–	UINT16	Second AI Limit Supv Val	0.01
3087	0	P5.46	–	UINT8	Motor Current 1 Supv Hyst	0.1
3087	1	P5.47	–	UINT8	Motor Current 2 Supv Hyst	0.1
6393	0	P5.48	P3.2.25	UINT16	AI Supv Hyst	0.01
6393	1	P5.49	–	UINT16	Second AI Supv Hyst	0.01
15001	0	P5.5	P3.1.8	UINT8	Virtual RO1 Function	1
651	0	P5.50	–	UINT16	Freq Limit 1 Supv Hyst	0.01
652	0	P5.51	–	UINT16	Freq Limit 2 Supv Hyst	0.01
653	0	P5.52	–	UINT16	Torque Limit Supv Hyst	0.1
650	0	P5.53	P3.2.12	UINT16	Ref Limit Supv Hyst	0.01
5184	0	P5.54	P3.2.16	UINT16	Temp Limit Supv Hyst	0.1
654	0	P5.55	P3.2.20	UINT16	Power Limit Supv Hyst	0.1
15012	0	P5.56	–	UINT16	Virtual RO1 On Delay	0.1
15015	0	P5.57	–	UINT16	Virtual RO1 Off Delay	0.1
15012	1	P5.58	–	UINT16	Virtual RO2 On Delay	0.1
15015	1	P5.59	–	UINT16	Virtual IRO2 Off Delay	0.1
15001	1	P5.6	P3.1.9	UINT8	Virtual RO2 Function	1
646	0	P5.7	P3.2.1	UINT8	Freq Limit Supv (Freq Limit 1 Supv)	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
641	0	P5.8	P3.2.3	UINT16	Freq Limit Supv Val (Freq Limit 1 Supv Val)	0.01
642	0	P5.9	–	UINT8	Freq Limit 2 Supv	1
679	0	P6.1	–	UINT8	Logic Function Select	1
677	0	P6.2	–	UINT8	Logic Operation Input A	1
678	0	P6.3	–	UINT8	Logic Operation Input B	1
2611	0	P7.1	–	UINT8	Remote 2 Control Place	1
589	1	P7.10	P4.1.9	UINT8	Stop Mode	1
5360	0	P7.11	P4.1.10	UINT16	Ramp 1 Shape	0.1
5360	1	P7.12	P4.1.11	UINT16	Ramp 2 Shape	0.1
5381	0	P7.13	P4.1.12	UINT16	Accel Time 2	0.1
5402	0	P7.14	P4.1.13	UINT16	Decel Time 2	0.1
3967	0	P7.15	P4.3.2	UINT16	Skip F1 Low Limit	0.01
3968	0	P7.16	P4.3.3	UINT16	Skip F1 High Limit	0.01
3967	1	P7.17	P4.3.4	UINT16	Skip F2 Low Limit	0.01
3968	1	P7.18	P4.3.5	UINT16	Skip F2 High Limit	0.01
3967	2	P7.19	P4.3.6	UINT16	Skip F3 Low Limit	0.01
2626	0	P7.2	–	UINT8	Remote 2 Reference	1
3968	2	P7.20	P4.3.7	UINT16	Skip F3 High Limit	0.01
3969	0	P7.21	P4.3.1	UINT16	Skip Range Ramp Factor	0.1
604	0	P7.22	–	UINT8	Power Loss Function	1
404	0	P7.23	–	UINT16	Power Loss Time	0.1
23728	0	P7.24	P4.4.1	UINT8	Currency	1
23731	0	P7.25	P4.4.2	UINT16	Energy Cost	0.01
23729	0	P7.26	P4.4.3	UINT8	Data Type	1
23730	0	P7.27	P4.4.4	UINT8	Energy Savings Reset	1
5428	0	P7.28	P4.1.14	UINT16	2nd Stage Ramp Frequency	0.01
2998	0	P7.29	P4.1.5	UINT8	Change PhaseSequence Motor	1
4111	0	P7.3	P4.1.1	UINT16	Keypad Reference	0.01
602	0	P7.30	–	UINT8	Run Remove Stop Mode	1
2627	1	P7.4	P4.1.2	UINT8	Keypad/Drive Ref Pot Direction (Keypad Direction)	1
2629	1	P7.5	P4.1.3	UINT8	Keypad Stop	1
4112	0	P7.6	P2.3.8	UINT16	Jog Reference	0.01
5473	4	P7.7	P2.1.7	UINT16	Motor Pot Ramp Time	0.1
2622	0	P7.8	P2.1.8	UINT8	Motor Pot Ref Reset	1
588	0	P7.9	P4.1.8	UINT8	Start Mode	1
2996	0	P8.1	P5.1.1	UINT8	Motor Control Mode	1
517	0	P8.10	P5.1.10	UINT16	Switching Frequency	0.1
500	0	P8.11	P5.1.11	UINT8	Sine Filter Enabled (Sine Filter Enable)	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
597	3	P8.12	P5.1.12	UINT8	OverVoltage Controller (OverVoltage Control)	1
2645	0	P8.13	P5.1.14	UINT16	Load Drooping	0.01
499	0	P8.14	P5.1.16	UINT8	Identification	1
3945	0	P8.15	–	UINT32	Neg Frequency Limit	0.01
3944	0	P8.16	–	UINT32	Pos Frequency Limit	0.01
5435	0	P8.17	–	UINT16	Frequency Ramp Out FilterTime Constant	1
3104	0	P8.18	P5.2.1	UINT16	Speed Error Filter Time Constant	1
406	0	P8.2	P5.1.2	UINT16	Current Limit	0.1
1511	0	P8.20	P5.2.2	UINT16	Speed Control Kp1 (Speed Control Kp0)	0.1
1515	0	P8.21	P5.2.3	UINT16	Speed Control Ti1 (Speed Control Ti0)	1
1520	0	P8.24	P5.2.4	UINT16	Speed Control F1 (Speed Control F0)	0.01
1521	0	P8.25	P5.2.5	UINT16	Speed Control F2 (Speed Control F1)	0.01
1512	0	P8.26	P5.2.6	UINT16	Speed Control Kp2 (Speed Control Kp1)	0.1
1516	0	P8.27	P5.2.7	UINT16	Speed Control Ti2 (Speed Control Ti1)	0.1
4221	0	P8.29	–	UINT16	Motoring Torque Limit	0.1
1406	0	P8.3	P5.1.3	UINT8	V/Hz Optimization	1
4223	0	P8.30	–	UINT16	Generator Torque Limit	0.1
4235	0	P8.31	–	UINT16	Torque Limit Forward	0.1
4236	0	P8.32	–	UINT16	Torque Limit Reverse	0.1
407	0	P8.33	P5.2.12	UINT16	Motoring Power Limit	0.1
408	1	P8.34	P5.2.13	UINT16	Generator Power Limit	0.1
5492	0	P8.35	–	UINT16	Acc Compensation Time Constant	0.1
5493	0	P8.36	–	UINT16	Acc Compensation Filter Time Constant	1
2995	0	P8.37	P5.2.14	UINT16	Flux Reference	0.1
1407	0	P8.4	P5.1.4	UINT8	V/Hz Ratio	1
790	0	P8.43	P5.1.15	UINT16	Droop Control Filter Time Constant	1
2617	0	P8.44	–	UINT16	Startup Torque Selection	1
4210	0	P8.45	–	INT16	Torque Memory Start	0.1
4230	0	P8.46	–	INT16	Startup Torque Forward	0.1
4231	0	P8.47	–	INT16	Startup Torque Reverse	0.1
4561	0	P8.49	–	UINT16	Startup Torque Time	1
1401	0	P8.5	P5.1.5	UINT16	Field Weakening Point	0.01
2920	0	P8.50	P5.1.17	UINT16	Stator Resistor	0.001
2923	0	P8.51	P5.1.18	UINT16	Rotor Resistor	0.001
2926	0	P8.52	P5.1.19	UINT16	Leak Inductance	0.01
2927	0	P8.53	P5.1.20	UINT16	Mutual Inductance	0.1
2925	0	P8.54	P5.1.21	UINT16	Excitation Current	0.1
1414	0	P8.59	P5.1.27	UINT16	VF Stable Kd	0.1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
1403	0	P8.6	P5.1.6	UINT16	Voltage at FWP	0.01
1415	0	P8.60	P5.1.28	UINT16	VF Stable Kq	0.1
1408	0	P8.61	P5.1.29	UINT8	Overmodulation Enable	1
2990	0	P8.62	P5.1.22	UINT16	Motor Inertia	0.001
2970	1	P8.63	P5.1.23	UINT16	PM BEMF Voltage	0.1
2922	0	P8.64	P5.1.24	UINT16	PM q-axis stator inductance	0.001
2921	0	P8.65	P5.1.25	UINT16	PM d-axis stator inductance	0.001
2992	0	P8.66	P5.2.15	UINT8	PM Initial Selection	1
45563	0	P8.67	P5.2.16	UINT16	PM Initial Time	0.1
2993	0	P8.68	P5.2.17	UINT16	PM excited Current	1
2993	0	P8.69	P5.2.18	UINT16	PM excited Current off frequency	0.01
1402	0	P8.7	P5.1.7	UINT16	V/Hz Mid Frequency	0.01
2994	0	P8.70	P5.2.19	UINT16	Observer Kp	1
789	0	P8.71	P5.1.26	UINT16	Slip Compensation Coefficient	1
1404	0	P8.8	P5.1.8	UINT16	V/Hz Mid Voltage	0.01
4756	0	P8.9	P5.1.9	UINT16	Zero Frequency Voltage	0.01
24014	29520	P9.1	P6.2.3	UINT8	4mA Input Fault	1
24014	28963	P9.11	P6.1.6	UINT8	Stall Protection	1
626	0	P9.12	P6.1.7	UINT16	Stall Current Limit	0.1
627	0	P9.13	P6.1.8	UINT16	Stall Time Limit	0.1
628	0	P9.14	P6.1.9	UINT16	Stall Frequency Limit	0.01
24014	28979	P9.15	P6.1.10	UINT8	Underload Protection	1
630	0	P9.16	P6.1.11	UINT16	Underload Fnom Torque	0.1
631	0	P9.17	P6.1.12	UINT16	Underload F0 Torque	0.1
629	0	P9.18	P6.1.13	UINT16	Underload Time Limit	0.01
24014	28978	P9.19	–	UINT8	Thermistor Fault Response	1
4110	0	P9.2	P6.2.4	UINT16	4mA Fault Frequency	0.01
2635	0	P9.20	P6.2.1	UINT8	Line Start Lockout	1
24014	29953	P9.21	P6.3.1	UINT8	Fieldbus Fault Response	1
24014	35088	P9.22	P6.3.2	UINT8	OPTCard Fault Response	1
24017	16928	P9.23	P6.2.7	UINT8	Unit Under Temp Prot	1
24019	0	P9.24	P6.4.1	UINT16	AR Wait Time	0.01
24020	0	P9.25	P6.4.2	UINT16	AR Trail Time	0.01
24021	0	P9.26	P6.4.3	UINT8	AR Start Function	1
24018	12832	P9.27	P6.4.4	UINT8	Undervoltage Attempts	1
24018	12816	P9.28	P6.4.5	UINT8	OverVoltage Attempts	1
24018	8736	P9.29	P6.4.6	UINT8	OverCurrent Attempts	1
24014	36864	P9.3	P6.2.5	UINT8	External Fault	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
24018	29520	P9.30	P6.4.7	UINT8	4mA Fault Attempts	1
24018	28978	P9.31	P6.4.8	UINT8	Motor Temp Fault Attempts	1
24018	36864	P9.32	P6.4.9	UINT8	External Fault Attempts	1
24018	28979	P9.33	P6.4.10	UINT8	Underload Attempts	1
24014	35344	P9.34	–	UINT8	RTC Fault	1
24014	29536	P9.35	–	UINT8	PT100 Fault Response	1
24014	35345	P9.36	–	UINT8	Replace Battery Fault Response	1
24014	28688	P9.37	–	UINT8	Replace Fan Fault Response	1
24014	30070	P9.38	P6.3.3	UINT8	IP Address Confliction Resp	1
633	0	P9.39	P6.2.8	UINT8	Cold Weather Mode	1
24014	12592	P9.4	P6.2.2	UINT8	Input Phase Fault	1
634	0	P9.40	P6.2.9	UINT8	Cold Weather Volt. Level	0.1
635	0	P9.41	P6.2.10	UINT8	Cold Weather Time Out	1
24014	8480	P9.44	P6.1.3	UINT8	Ground Fault Limit	1
24014	21264	P9.45	P6.3.4	UINT8	Keypad Comm Fault Response	1
637	0	P9.46	P6.1.14	UINT8	Preheat Mode	1
639	0	P9.47	P6.1.15	UINT8	Preheat Control Source	1
5179	0	P9.48	P6.1.16	INT16	Preheat Enter Temp	0.1
5180	0	P9.49	P6.1.17	INT16	Preheat Quit Temp	0.1
24014	12576	P9.5	P6.2.6	UINT8	Uvolt Fault Response	1
638	0	P9.50	–	UINT8	Preheat Output Volt	1
24014	33283	P9.51	P6.2.12	UINT8	PID Feedback AI Loss Response	1
16612	0	P9.52	P6.2.13	UINT16	PID Feedback AI Loss Pre Freq	0.01
16613	0	P9.53	P6.2.14	UINT16	PID Feedback AI Loss Loss Pipe Fill Loss Level	0.1
16614	0	P9.54	P6.2.15	UINT16	PID Feedback AI Loss Loss PreFreq Timeout	1
24018	33283	P9.55	P6.4.11	UINT8	PID Feedback AI Loss Attempts	1
24014	21665	P9.56	P6.2.11	UINT8	STO Fault Response	1
24023	0	P9.57	P4.1.15	UINT8	Fault Reset Start	1
24040	0	P9.58	–	UINT8	Warning Operation Mode	1
599	0	P9.59	–	UINT8	Fan Protection	1
24014	9040	P9.6	P6.1.1	UINT8	Output Phase Fault	1
24001	0	P9.60	–	UINT16	Under Voltage Trip Level	0.1
17622	0	P9.61	–	UINT8	OP Cont Interlock Attempts	1
24014	21578	P9.62	–	UINT8	OP Cont Interlock Protection	1
24014	13569	P9.63	–	UINT8	CP Interlock Run Protection	1
24014	13570	P9.64	–	UINT8	CP Interlock Stop Protection	1
24044	0	P9.65	–	UINT8	CP Interlock Attempts	1
24014	9008	P9.7	P6.1.2	UINT8	Ground Fault	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
24014	17168	P9.8	P6.1.4	UINT8	Motor Thermal Protection	1
3054	0	P9.9	P6.1.5	UINT16	Motor Thermal F0 Current	0.1
25011	0	–	P11.1.1	UINT8	Serial Communication	1
25041	0	–	P11.2.3	UINT8	Parity Type And Stop Bit	1
34018	0	–	P11.6.1	UINT8	Blue Tooth Enable	1
34008	0	–	P11.6.2	UINT8	Blue Tooth Broadcast Mode	1
25853	0	–	P12.1.9	UINT16	EtherNet Communication Timeout	1
26641	0	–	P12.2.2	UINT8	Trusted IP Filter Enable	1
28097	0	–	P12.5.1	UINT8	BACnet IP UDP port number	1
28100	0	–	P12.5.2	UINT8	BACnet IP Foreign Device	1
28103	0	–	P12.5.3	ARRAY OF UINT8	BACnet IP BBMD IP	1
28106	0	–	P12.5.4	UINT8	BACnet IP BBMD Port	1
28111	0	–	P12.5.5	UINT16	BACnet IP Registration Interval	1
28040	0	–	P12.5.6	UINT16	BACnet IP Comm Timeout	1
28028	0	–	P12.5.8	UINT8	BACnet IP Fault Behavior	1
28031	0	–	P12.5.9	UINT16	BACnet IP Instance Number	1
26620	0	–	P12.7.1	UINT8	IOT Enable	1
494	0	–	P13.2.1	UINT8	Local Default Page	1
8010	0	–	P2.2.1	UINT8	DI1 Function	1
14002	0	–	P2.2.10	UINT8	Virtual RO1 invert	1
14001	1	–	P2.2.11	UINT8	Virtual RO2 input	1
14002	1	–	P2.2.12	UINT8	Virtual RO2 invert	1
8360	0	–	P2.2.2	UINT8	DI1 Invert	1
8010	1	–	P2.2.3	UINT8	DI2 Function	1
8360	1	–	P2.2.4	UINT8	DI2 Invert	1
8010	2	–	P2.2.5	UINT8	DI3 Function	1
8360	2	–	P2.2.6	UINT8	DI3 Invert	1
8010	3	–	P2.2.7	UINT8	DI4 Function	1
8360	3	–	P2.2.8	UINT8	DI4 Invert	1
14001	0	–	P2.2.9	UINT8	Virtual RO1 input	1
3974	0	–	P2.5.1	UINT16	Pot Costum Min	0.01
3975	0	–	P2.5.2	UINT16	Pot Custom Max	0.01
4585	0	–	P2.5.3	UINT16	Pot Filter Timer	0.01
13120	2	–	P3.1.7	UINT8	RO2 Reverse	1
4236	0	–	P5.2.10	UINT16	Motoring Torque Limit REV	0.1
16410	0	–	P7.1.1	UINT16	PID Control Gain	0.1
16412	0	–	P7.1.2	UINT16	PID Control ITime	0.1
16600	0	–	P7.1.3	UINT8	PID Process Unit	1

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
16602	0	–	P7.1.4	UINT32	PID Process Unit Min	0.01
16604	0	–	P7.1.5	UINT32	PID Process Unit Max	0.01
16572	0	–	P7.1.6	UINT8	PID Error Inversion	1
16574	0	–	P7.1.7	UINT32	PID Dead Band	0.01
16576	0	–	P7.1.8	UINT16	PID Dead Band Delay	0.1
16484	0	–	P7.1.9	UINT16	PID Ramp Time	0.1
16512	0	–	P7.2.1.1	UINT32	PID Keypad Setpoint 1	0.01
16530	0	–	P7.2.1.2	UINT32	PID Keypad Setpoint 2	0.01
16418	0	–	P7.2.2.1	UINT8	PID Set Point 1 Source	1
16454	0	–	P7.2.2.2	UINT8	PID Set Point 1 Sleep Enable	1
16458	0	–	P7.2.2.3	UINT16	PID Set Point 1 Sleep Delay	1
16460	0	–	P7.2.2.4	UINT16	PID Set Point 1 Wake Up Level	1
16490	0	–	P7.2.2.5	UINT8	PID Set Point 1 Boost	0.1
16456	0	–	P7.2.2.6	UINT32	PID Set Point 1 Sleep Level	0.01
16426	0	–	P7.2.3.1	UINT8	PID Set Point 2 Source	1
16462	0	–	P7.2.3.2	UINT8	PID Set Point 2 Sleep Enable	1
16466	0	–	P7.2.3.3	UINT16	PID Set Point 2 Sleep Delay	1
16468	0	–	P7.2.3.4	UINT16	PID Set Point 2 Wake Up Level	1
16496	0	–	P7.2.3.5	UINT8	PID Set Point 2 Boost	0.1
16464	0	–	P7.2.3.6	UINT32	PID Set Point 2 Sleep Level	0.01
16488	0	–	P7.3.1.1	INT16	PID Feedback Gain	0.1
16422	0	–	P7.3.2.1	UINT8	PID Feedback 1 Source	1
16516	0	–	P7.3.2.2	INT16	PID Feedback 1 Min	0.1
16518	0	–	P7.3.2.3	INT16	PID Feedback 1 Max	0.1
24014	28980	–	P8.3.1	UINT8	Broken Belt Protection	1
630	0	–	P8.3.2	UINT16	Broken Belt Fnom Torque	1
631	0	–	P8.3.3	UINT16	Broken Belt F0 Torque	1
629	0	–	P8.3.4	UINT16	Broken Belt Time Limit	0.1
17714	0	–	P9.1.6	UINT16	Derag Current	0.01
4559	0	–	P9.2.4	UINT16	Back Spin Delay	1
17671	0	–	P9.4.3	UINT16	Pipe Fill Loss Low Level	0.1
17674	0	–	P9.4.4	UINT16	Pipe Fill Loss Low Frequency	0.01
17672	0	–	P9.4.5	UINT16	Pipe Fill Loss High Level	0.1
17675	0	–	P9.4.6	UINT16	Pipe Fill Loss High Frequency	0.01

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
IO option board						
10020	0	B2.2.1	–	UINT8	DO1 Function	1
10020	1	B2.2.2	–	UINT8	DO2 Function	1
10020	2	B2.2.3	–	UINT8	DO3 Function	1
16005	0	B2.2.4	–	UINT8	Thermistor Config	1
6110	0	B3.2.1	–	UINT8	AI1 Mode	1
6020	0	B3.2.2	–	UINT8	AI1 Signal Range	1
6140	0	B3.2.3	–	UINT16	AI1 Custom Min	0.01
6170	0	B3.2.4	–	UINT16	AI1 Custom Max	0.01
6200	0	B3.2.5	–	UINT16	AI1 Filter Time	0.01
6230	0	B3.2.6	–	UINT16	AI1 Signal Invert	1
7110	0	B3.2.7	–	UINT8	AO1 Mode	1
7230	0	B3.2.8	–	UINT8	AO1 Function	1
7200	0	B3.2.9	–	UINT8	AO1 Minimum	1
7140	0	B3.2.10	–	UINT16	AO1 Filter Time	0.01
7050	0	B3.2.11	–	UINT8	AO1 Scale	1
7170	0	B3.2.12	–	UINT8	AO1 Inversion	1
6080	0	B3.2.13	–	INT16	AO1 Offset	0.01
7110	1	B3.2.14	–	UINT8	AO2 Mode	1
7230	1	B3.2.15	–	UINT8	AO2 Function	1
7200	1	B3.2.16	–	UINT8	AO2 Minimum	1
7140	1	B3.2.17	–	UINT16	AO2 Filter Time	0.01
7050	1	B3.2.18	–	UINT8	AO2 Scale	1
7170	1	B3.2.19	–	UINT8	AO2 Inversion	1
6080	1	B3.2.20	–	INT16	AO2 Offset	0.01
12020	0	B4.2.1	–	UINT8	RO1 Function	1
12020	1	B4.2.2	–	UINT8	RO2 Function	1
12020	2	B4.2.3	–	UINT8	RO3 Function	1
16002	0	B5.2.1	–	UINT8	PT100-3,2,1	1
16014	0	B5.2.2	–	INT16	PT100 Warning Limit	0.01
16017	0	B5.2.3	–	INT16	PT100 Fault Limit	0.01
10030	0	B11.2.1	–	UINT8	DO1 Function	1
10030	1	B11.2.2	–	UINT8	DO2 Function	1
10030	2	B11.2.3	–	UINT8	DO3 Function	1
16006	0	B11.2.4	–	UINT8	Thermistor Config	1
6120	0	B12.2.1	–	UINT8	AI1 Mode	1
6030	0	B12.2.2	–	UINT8	AI1 Signal Range	1
6150	0	B12.2.3	–	UINT16	AI1 Custom Min	0.01

PNU		Parameter Number		Data type	Parameter Name	Scaling
Index	Subindex	DG1 V37.02	DM1 V1.09			Value
6180	0	B12.2.4	–	UINT16	AI1 Custom Max	0.01
6210	0	B12.2.5	–	UINT16	AI1 Filter Time	0.01
6240	0	B12.2.6	–	UINT16	AI1 Signal Invert	1
7120	0	B12.2.7	–	UINT8	AO1 Mode	1
7240	0	B12.2.8	–	UINT8	AO1 Function	1
7210	0	B12.2.9	–	UINT8	AO1 Minimum	1
7150	0	B12.2.10	–	UINT16	AO1 Filter Time	0.01
7060	0	B12.2.11	–	UINT8	AO1 Scale	1
7180	0	B12.2.12	–	UINT8	AO1 Inversion	1
6090	0	B12.2.13	–	INT16	AO1 Offset	0.01
7120	1	B12.2.14	–	UINT8	AO2 Mode	1
7240	1	B12.2.15	–	UINT8	AO2 Function	1
7210	1	B12.2.16	–	UINT8	AO2 Minimum	1
7150	1	B12.2.17	–	UINT16	AO2 Filter Time	0.01
7060	1	B12.2.18	–	UINT8	AO2 Scale	1
7180	1	B12.2.19	–	UINT8	AO2 Inversion	1
6090	1	B12.2.20	–	INT16	AO2 Offset	0.01
12030	0	B13.2.1	–	UINT8	RO1 Function	1
12030	1	B13.2.2	–	UINT8	RO2 Function	1
12030	2	B13.2.3	–	UINT8	RO3 Function	1
16003	0	B14.2.1	–	UINT8	PT100-3,2,1	1
16015	0	B14.2.2	–	INT16	PT100 Warning Limit	0.01
16018	0	B14.2.3	–	INT16	PT100 Fault Limit	0.01

4.12 Further explanations

4.12.0.1 PNU927

Using parameter 927, the parameter access level can be changed.

0: The parameters can be changed directly on the variable frequency drive/ variable speed starter and not via PROFINET.

An exception here are the parameters 927 and 928.

1: The parameters can be changed via PROFINET and not directly on the variable frequency drive/variable speed starter.

An exception here are the parameters 927 and 928.

4.12.0.2 PNU 928 Subindex 0

See → Table 5, Page 50.

4.12.0.3 PNU 840

Action@Communication Loss

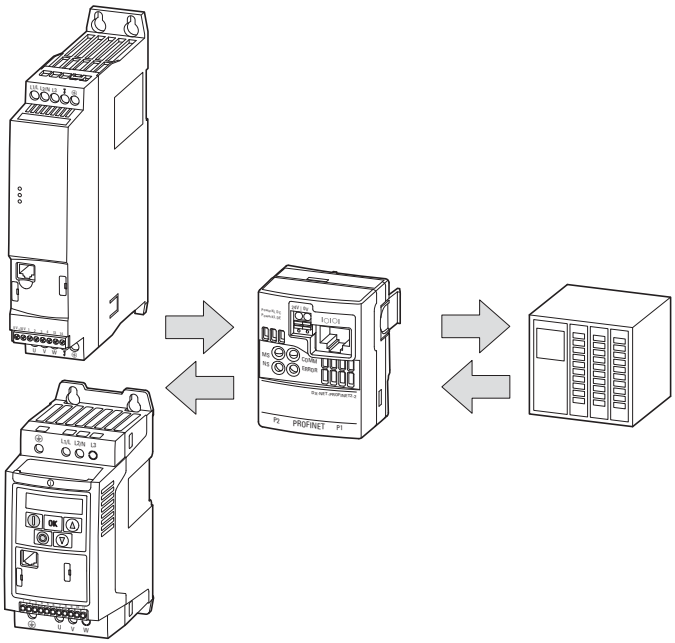


Figure 48: Normal operation

In the error-free state, the FU, the interface, and the PLC communicate without errors, as shown in the figure above.

In the error state, no communication takes place between the basic device, interface or PLC. In the event of an error, the reaction is defined via PNU 840.29952.

Some special cases are presented below:

DX-NET-PROFINET2-2

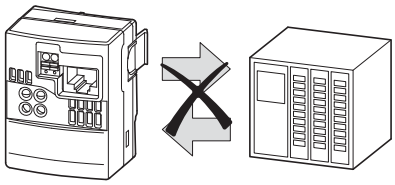


Figure 49: Communication failure between PLC and module

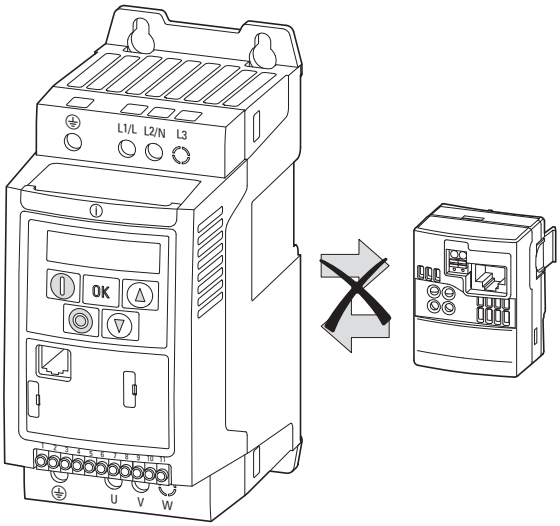


Figure 50: Communication failure between FU and module

The drive triggers SC-trP when a protection function is enabled.

Local control is only possible if:

- The drive was previously under network control,
- the connection to the PROFINET communication network is interrupted during operation,
- the digital input DigIN: 1 remains set to ON.

Network control is automatically restored when the connection is restored, provided DigIN: 1 remains ON.

Response to a loss of communication

The response to a loss of communication is as follows:

DC1

Relevant parameters:

- P-12 - Motor control mode
- P-36 - Timeout
- P-53 - Action@Communication Loss

The default setting of P-53 is 0 (“no response”), so the variable frequency drive does not respond to a loss of communication.

For P-36 = 0, the result is the same as for P-53 = 0: no response.

For the protection to work, P-36 must be greater than 0 and P-53 must be selected to “action”.

If P-12 is set to 12, the variable frequency drive does not switch off and only changes to local control. P-53 has no effect; P-36 determines the reaction time.

DE1

Relevant parameters:

- P-12 - Motor control mode
- P-36 - Timeout
- P-40 - Action@Communication Loss

The default setting of P-40 is 0 (“no action”), i.e., the drive does not react to a loss of communication.

Default setting of P-36 is 0 (“no action”).

Both parameters must be set to a value other than 0 to activate the protection.

For P-36 = 0, the result is the same as for P-40 = 0: no response.

For the protection to work, P-36 must be greater than 0, and action P-40 must be selected.

For P-12 = 12, the variable frequency drive does not switch off and only changes to local control. P-40 has no effect; P-36 determines the response time.

If communication between the PROFINET interface and the DE1 is interrupted (e.g., module DX_PROFINET2-2 removed from the drive), the drive will only respond according to the P-36 setting.

DG1

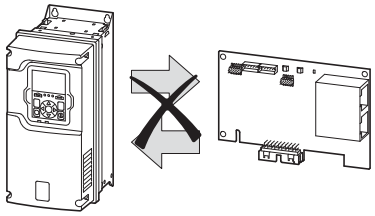


Figure 51: Communication failure between DG1 and the DXG-NET-PROFINET option board

DM1

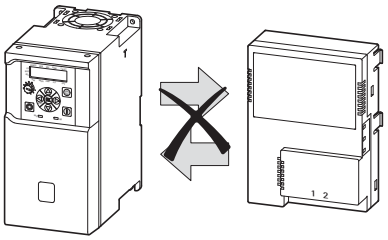


Figure 52: Communication failure between DM1 and the DXM-NET-PROFINET option board

Table 70: Reaction after a loss of communication

PNU	Name	Parameter	Explanation	r/w	Data type
840.29952	Action@Communication Loss	P-40 (DE1) P-53 (DC1)	Device-dependent reaction after a "Communication Loss" occurs The delay time after a loss of communication is set using P-36. 0: No reaction, drive continues to run 1: Output warning; drive continues to run 2: Stop if ramp active 3: Quick stop 4: Coast stop (= factory setting)	r/w	UINT16
24014.29953	Fieldbus Fault Response	P9.21 (DG1) P6.3.1 (DM1)	0: no action (DG1 and DM1) 1: Warning (DG1 and DM1) 2: Fault (DG1 and DM1) 3: Fault, Coast (DG1 and DM1) 4: Warning, Coast (DG1) 5: Warning, Auto Switch To Local (DG1) 6: Warning, Auto Switch To Preset Speed 1 (DG1)	r/w	UINT8

→ For all devices, the setting of PNU 928.0 (→ Section "4.3 Parameter settings", Page 49) applies in case of a communication loss.

4.12.0.4 PNU 840.29952 = 0 or = 1 (Fire Mode)

In fire mode, the variable frequency drive/variable speed starter will continue to run with the last valid command word.

The detected error is written to the error buffer, the error bit is set, the variable frequency drive/variable speed starter continues to run even if the error bit is set and waits for a reset command to reset the error bit; a restart is not required. The variable frequency drive/variable speed starter runs to the end or communication returns with valid commands.

4.12.0.5 PNU840.29952 = 2, = 3 or = 4 (stop with error)

In this case, bit 10 must be set with the error reset command. If not, the reset will not be carried out.

In the event of an internal error in the variable frequency drive/variable speed starter, the normal error reaction is executed.

In the error-free state, communication takes place between the basic device, interface, and PLC. In the event of an error, the variable frequency drive/variable speed starter continues to run, regardless of which communication path is interrupted.

In the error state, no communication takes place between the basic device, interface or PLC. In the event of an error, the reaction is defined via PNU 840.29952.

PNU 840.29952 = 0 or = 1 (Fire Mode)

In fire mode, the variable frequency drive/variable speed starter will continue to run with the last valid command word (bit 10 has the highest priority of all bits in the command word).

The detected error is written to the error buffer, the error bit is set, the variable frequency drive/variable speed starter continues to run even if the error bit is set and waits for a reset command to reset the error bit; a restart is not required. The variable frequency drive/variable speed starter runs to the end or communication returns with valid commands.

PNU840.29952 = 2, = 3 or = 4 (stop with error)

In this case, bit 10 must be set with the error reset command. If not, the reset will not be carried out.

In the event of an internal error in the variable frequency drive/variable speed starter, the normal error reaction is executed.

In the error-free state, communication takes place between the basic device, interface, and PLC. In the event of an error, the variable frequency drive/variable speed starter continues to run, regardless of which communication path is interrupted.

4.12.1 Acyclic parameter channel

The acyclic parameter channel is used in order to configure the parameters of the variable frequency drive/variable speed starter; it corresponds to the PROFIdrive profile.

Parameter channel

The parameter channel is embedded as a payload data block in the acyclic PROFINET write/read PDUs.

Acyclic data objects of a server are addressed in PROFINET via slot and index. The parameter channel is always addressed with index 47.

Protocol

The main task of the PowerXL PROFINET communication interface is to map the protocol in such a way that the parameter channel can be operated completely transparently by the PROFINET communication.

Regardless of whether data should be read or written, the first request from the client will always be a write request.

A parameter request will define whether the job is a read job or a write job. After the write request is transmitted (contains read or write job), a write response without data will be expected. Then, prompted by the application of the higher level PLC, the client polls the variable frequency drive with read requests. This keeps acknowledging the read request as negative (Error: State Conflict) until the read response has been completed and a reply (read order: with data / write request: without data) can be sent.

The following figure shows an example of the protocol between a PROFINET client, the PowerXL PROFINET communication interface, and a variable frequency drive/speed starter.

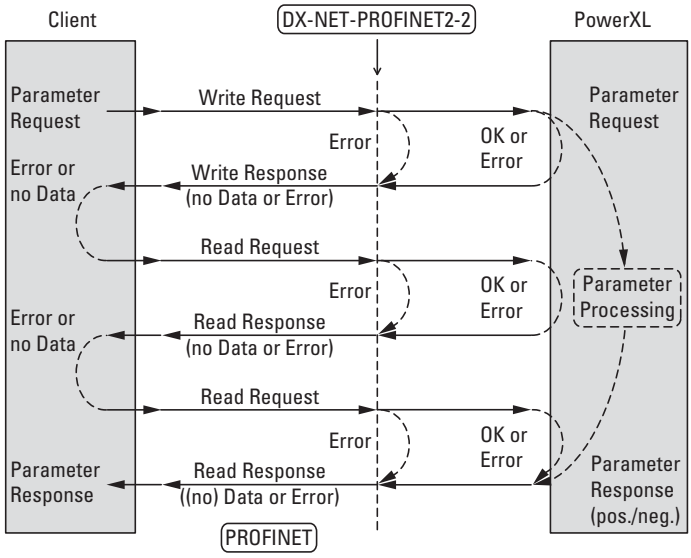


Figure 53: Acyclic parameter channel protocol

4.12.1.1 PROFINET write request/write response

Write request - read job

Various objects can be transmitted in the parameter channel – these objects are identified by what is referred to as a PNU (parameter number) and a subindex. The write request includes a declaration that specifies that the job is a read job.

Table 71: Write request

Byte	Designation	Description
0	Request Reference	Request identification Unique identification for a request/response pair for the master. The master can increment the identification number for each new request in the application. They are then mirrored by variable frequency drive/variable speed starter. 01_{hex} - FF_{hex} (i.e. 1_{dec} - 255_{dec})
1	Request ID	Request ID The type of request is specified here. 01_{hex}: Read job
2	DO-ID	Drive-Object-ID 00_{hex}
3	No. of Paramters	Number of parameters Only individual parameter processing is supported. 01_{hex}.
4	Attribute	Attribute Defines which object type should be accessed. 10_{hex} (16_{dec}): Value
5	No. of Elements	Number of elements Number of vector elements or length of the string being accessed. PNU 0 up to PNU 999: 00hex (only for subindex 0) PNU 0 to PNU 999 (without 202): 01_{hex}
6, 7	Parameter number	Parameter number (PNU) Address of the parameter that should be accessed 0000_{hex} - $FFFF_{hex}$ (i.e. 0_{dec} - 65535_{dec})
8, 9	Subindex	Subindex Address of the parameter's first field element or start of the text 0000_{hex} - $FFFF_{hex}$ (i.e. 0_{dec} - 65535_{dec})

Write request - write job

Only individual parameter writing is supported (i.e., array and multiple parameter writing is not supported). The maximum telegram length of the parameter request is set at 16 bytes. The maximum length of a writable parameter is one double word. Various objects can be transmitted in the parameter channel – these objects are identified by what is referred to as a PNU (parameter number) and a subindex. The write request includes a declaration that specifies that the job is a write job.

Table 72: Write request

Byte	Designation	Description
0	Request Reference	Request identification Unique identification for a request/response pair for the master. The master can increment the identification number for each new request in the application. They are then mirrored by variable frequency drive/variable speed starter. 01_{hex} - FF_{hex} (i.e. 1_{dec} - 255_{dec})
1	Request ID	Request ID Specifies the type of request. 02_{hex}: Write job
2	DO-ID	Drive-Object-ID 00_{hex}
3	No. of Paramters	Number of parameters Only individual parameter processing is supported. 01_{hex}
4	Attribute	Attribute Defines which object type should be accessed. $10h_{ex}$ (16_{dec}): Value
5	No. of Elements	Number of elements Number of vector elements or length of the string being accessed PNU 0 to PNU 999: 00_{hex} (only for subindex 0) PNU 0 to PNU 999: 01_{hex}
6, 7	Parameter number	Parameter number (PNU) Address of the parameter that should be accessed 0000_{hex} - $FFFF_{hex}$ (i.e. 0_{dec} - 65535_{dec})
8, 9	Subindex	Subindex Address of the parameter's first field element or start of the text 0000_{hex} - $FFFF_{hex}$ (i.e. 0_{dec} - 65535_{dec})
10	Format	Format 01_{hex} - $7C_{hex}$ (i.e. 01_{dec} - 124_{dec}): Data types
11	No. of Values	Number of values Number of values being accessed. 01_{hex}
12 - (15)	Value	Value The value of the parameter being accessed The length depends on the format and can be a maximum of 4 bytes. 00000000_{hex} - $FFFFFFFF_{hex}$ (i.e. 0_{dec} - 4294967295_{dec})

In this case, the number of bytes is variable (13, 14, or 16) and will depend on the selected format

Write response

The variable frequency drive/variable speed starter will respond to a received write request with a write response.

The following write responses are possible:

Write response – without data and errors if the write request was understood by the variable frequency drive/variable speed starter.

Write request - error. If an error has occurred, the write response will contain an error.

4.12.1.2 PROFINET read request/read response

Read request

After receiving a positive write response, it is possible to start polling read requests. If a write job has been transmitted previously, information regarding the write status will be requested; in the case of a read job, the data will be requested.

Read response

The read request will be acknowledged until there is a read response.

The following read responses are possible:

Read response - error

- If there is an error related to addressing (index)
- the variable frequency drive/variable speed starter is not available,
- if the response from the variable frequency drive/variable speed starter is still pending.

Read response - parameter channel error

- If the error concerns the PROFIdrive parameter channel

Read response – without data

- if the variable frequency/variable speed starter drive has determined the reply during a write order

Read response – with data

- if the variable frequency drive/variable speed starter has determined the reply during a read order.

The following sections go into the various possible read responses in greater detail.

Read response - error

- If an error has occurred, the read response will contain an error.

Read response - parameter channel error

If there is an error in the parameter channel, a positive read response – parameter channel error will be generated. The error will be contained either in a write job or a read job.

Table 73: Byte allocation

Byte	Designation	Description
0	Request Reference	Request identification: Is mirrored
1	Response-ID	Response ID: 81_{hex}: Read job(-); 82_{hex}: Write job(-)
2	DO-ID	Drive-Object-ID: Is mirrored
3	No. of Parameters	Number of parameters: 01_{hex}
4	Format	Format: 44_{hex}: Fault
5	No. of Values	Number of values: 01_{hex}
6, 7, 8, 9	Error Number	Error number: 00_{hex} - 23_{hex}

The following table lists the parameter channel errors of the PROFIdrive profile.

Table 74: Parameter channel errors with PROFIdrive

Error number [hex]	Designation	Description	Supplementary information
00	Invalid parameter number	Access to an unavailable parameter	0
01	Parameter value cannot be changed	Attempting to have write access to a parameter that cannot be modified	Subindex
02	Value below lower limit or above upper limit	Attempting to have write access with a value out of range	Subindex
03	Bad subindex	Attempting to access to a non-available subindex in a string or array parameter	Subindex
04	Not an array	Attempting to use a subindex in order to access a parameter without index	0
05	Incorrect data type	Attempting to have write access with a value not corresponding to the data type of the parameter	0
06	Setting not allowed	Write access with a non-zero value not allowed	Subindex
07	Description element cannot be modified	Attempting to have write access to a description element that cannot be modified	Subindex
08	reserved	–	–
09	No description data available	Attempting to access a non-available description. The value is not available.	0
0A	reserved	–	–
0B	No usage rights	Attempting to have write access without write permissions	0
0C	reserved	–	–
0D	reserved	–	–
0E	reserved	–	–

Error number [hex]	Designation	Description	Supplementary information
0F	No text array available	Attempting to access a text array that is not available	0
10	reserved	–	–
11	Request cannot be carried out due to operating status	Access is temporarily not possible	0
12	reserved	–	–
13	reserved	–	–
14	Value not permitted	Attempting to have write access with a value that is within the value range, but that is not permitted due to other reasons (parameter with defined values)	Subindex
15	Request too long for acyclic communication channel	The length of the current request exceeds the maximum permitted length of the acyclic communication channel.	0
16	Parameter address not permissible	Not permissible or non-supported value for attribute, No. of elements, parameter number, subindex, or a combination thereof	0
17	Format not permissible	Write request: Invalid format or format not permissible for this parameter	0
18	No. of values are not consistent	Write request: The number of values in the parameter data does not match the number of values for the parameter address.	0
19	DO does not exist	Attempting to access a non-existing drive object	0
20	Parameter text element cannot be changed	Attempting to have write access to a parameter text element without write permissions	Subindex
21	Not permissible request ID	unsupported service	
22	Response too long for parameter manager	The length of the current response exceeds the parameter manager's parameter processing capacity.	
23	Multiple parameter access not permissible	Is not supported.	
24, …, 64	reserved	–	
65, …, FF	manufacturer specific	–	

Read response without data

As soon as the variable frequency drive/variable speed starter has completed the response for a write job, it will send a read response without data.

Table 75: Read response without data

Byte	Designation	Description
0	Request Reference	Request identification: Is mirrored
1	Response-ID	Response ID: 02_{hex}: Write job (+)
2	DO-ID	Drive object ID: Is mirrored
3	No. of Parameters	Number of parameters: 01_{hex}

Read response with data (all PNUs - except PNU 202)

As soon as the variable frequency drive/variable speed starter has completed the response for a read request for the range from PNU 0 to PNU 999 (without PNU 202; see Table 77 below for this), it sends a read response with data.

Table 76: Read response with data

Byte	Designation	Description
0	Request Reference	Request identification: Is mirrored
1	Response-ID	Response ID: 01_{hex}: Read job (+)
2	DO-ID	Drive object ID: Is mirrored
3	No. of Parameters	Number of parameters: 01_{hex}
4	Format	Format: 01_{hex} - $7C_{hex}$ (i.e. 01_{dec} - 124_{dec})
5	No. of Values	Number of values: 01_{hex} : Value
6, 7, 8, 9	Value	Value: Specifies the value of the parameter being accessed. The length depends on the format and can be a maximum of 4 bytes. 00000000_{hex} - $FFFFFFFF_{hex}$ (i.e. 0_{dec} - 4294967295_{dec}) Content of PNU 0 to PNU 999 (without PNU 202)

Read response with data (PNU 202)

As soon as the variable frequency drive/variable speed starter has completed the response for a read job of the PNU 202, it will send a read response with data.

Table 77: Read response with data

Byte	Designation	Description
0	Request Reference	Request identification: Is mirrored
1	Response-ID	Response ID: 01_{hex}: Read job (+)
2	DO-ID	Drive object ID: Is mirrored
3	No. of Parameters	Number of parameters: 01_{hex}
4	Format	Format: $0A_{hex}$ (= 10_{dec})
5	No. of Values	Number of values: 01_{hex}: Value
6, …, 25	Value	Value: Specifies the value of the parameter being accessed The length depends on the format and can be a maximum of 20 bytes. Content of PNU 202

4.12.2 Errors and diagnostics

The variable frequency drive/variable speed starter provides diagnostic messages for itself as well as for the communication interface.

Basically, a distinction must be drawn between:

- basic diagnostics (PROFINET basic diagnostics),
- advanced diagnostics (advanced device diagnostics) and
- PROFIdrive parameter channel diagnostics

PROFIdrive parameter channel diagnostics are shown with error messages or warnings, as applicable, in the cyclic profile.

4.12.2.1 Basic diagnostics

A pending diagnostic alarm from the variable frequency drive/variable speed starter will be signaled as a collective diagnostic in the cyclic profile with input word 0, bit 4 (DIAG). A device response, if any, will be described in the advanced diagnostics.

In addition, in all profiles, the bits ERR (the variable frequency drive stops) or WARN (no response by the variable frequency drive) of the corresponding input bytes indicate whether diagnostic messages (i.e., errors or warnings) are present.

Error acknowledgment

“Transparent Mode” profile

Reset bit 2 (control word 1) error

After the cause of the fault is fixed, you can acknowledge a fault (ERR) as follows:

“PDShort” and “PROFIdrive” profiles

FaultAck (control word 1) = 1,

Basic unit digital input 1 = new edge

Warnings (WARN) cannot be acknowledged, since they are simply messages without an ensuing response from the variable frequency drive/variable speed starter.

The diagnostic data that corresponds to the PROFIdrive profile can be sent at any time regardless of the profile chosen. It is provided via the acyclic services of the relevant bus system.

For available FaultBuffer diagnostic messages: PNU 947 subindex 0 to 7

4.12.2.2 Advanced diagnostics

When there is a collective diagnostic (input byte 0, bit 4 (DIAG)), the variable frequency drive/variable speed starter will provide advanced diagnostic messages.

The following messages are generated by the variable frequency drive/ variable speed starter.

Table 78: Advanced diagnostic data

Value [hex]	Meaning	Corrective action	Note
19	There is a warning at hand on the variable frequency drive/variable speed starter.	Read warning PNU 860.0 and fix the cause.	Corresponds to the WARN bit in the corresponding input byte.
1A	There is a fault at hand on the variable frequency drive/variable speed starter.	• Read fault PNU 944 to PNU 952. • Fix the fault and acknowledge the error message.	Corresponds to the ERR bit in the corresponding input byte.

4.12.2.3 PROFIdrive diagnostics

The diagnostic data that corresponds to the "PROFIdrive" profile can be sent at any time, regardless of the profile chosen. They are made available via the acyclic parameter channel.

The ERR or WARN bits indicate whether diagnostic messages (i.e. errors or warnings) are present.

Error acknowledgment

You can acknowledge faults (ERR) as follows:

FaultAck = 1.

Warnings (WARN) cannot be acknowledged, since they are simply messages without an ensuing response (the variable frequency drives/variable speed starters).

Available diagnostic messages (PNU 860.0 warnings and PNU 944 to PNU 952 errors).

4.12.3 Error numbers

The error numbers are listed in the display with their associated display text.

→ For a detailed list of errors, refer to the application manual of the respective variable frequency drive.

4.12.3.1 DX-NET-PROFINET2-2

In the following the error numbers are listed, which are output by the profile "Tranparent Mode" under input byte (see section "Input data").
The last eight error codes can also be retrieved via PNU 947 subindex 0 to 7.

Table 79: Error numbers

Error no.		Series	Message (Shown on display)	Possible cause
dec	hex			
		DC1, DE1	Stop	There are no error messages present. There is no drive enable signal present.
00	00	DC1, DE1	no-Flt	Shown for P0-13 if there are no messages in the error register.
01	01	DC1, DE1	OI-b	Excessively high braking current
02	02	DC1, DE1	OL-br	Thermal overload on brake resistor.
03	03	DC1, DE1	O-I	Overcurrent at variable frequency drive output
04	04	DC1, DE1	I.t-trP	Motor overload.
05	05	DC1, DE1	PS-trp	Overcurrent (Hardware)
06	06	DC1, DE1	O.Volt	Overvoltage in DC link
07	07	DC1, DE1	VVolt	Undervoltage in DC link
08	08	DC1, DE1	O-t	Overtemperature at heat sink
09	09	DC1, DE1	V-t	Under-temperature
10	0A	DC1, DE1	P-dEf	The parameters' default settings have been loaded.
11	0B	DC1, DE1	E-trip	External fault
12	0C	DC1, DE1	SC-ObS	Communication error with an external operating unit or with a PC
13	0D	DC1, DE1	FIT-dc	Excessively high DC-Link voltage ripple
14	0E	DC1, DE1	P-LOss	Incoming power phase failure (only for devices with a three-phase power supply)
15	0F	DE1	h O-I	Overcurrent at output, DC1 motor pick-up control fault
16	0A	DC1, DE1	Th-flt	Malfunctioning heat sink thermistor.
17	11	DC1, DE1	dAtA-F	Error in internal memory
18	12	DC1, DE1	4-20 F	Input current of analog input is not within the specified range.
19	12	DC1…E1	dAtA-E	Error in internal memory
21	15	DC1…E1	F-Ptc	Motor PTC thermistor overtemperature
22	16	DC1…E1	FAn-F	The device's internal fan is experiencing a fault
23	17	DC1…E1	O-hEAt	The measured ambient temperature exceeds the specified value.
26	1A	DC1…E1	OUt-F	Device output fault
40	28	DC1…E1	AtF-01	Motor identification failed

Error no.		Series	Message (Shown on display)	Possible cause
dec	hex			
41	29	DC1…E1	AtF-02	Motor identification failed: The measured stator resistance is too large.
42	2A	DC1…E1	AtF-03	Motor identification failed: The measured motor inductance is too low.
43	2B	DC1…E1	AtF-04	Motor identification failed: The measured motor inductance is too high.
44	2C	DC1…E1	AtF-05	Motor identification failed: The measured motor parameters do not match.
49	31	DC1…E1	Out-Ph	A phase in the motor cable is not connected or has a discontinuity.
50	32	DC1…E1	Sc-FO1	No valid Modbus telegram was received within the specified time.
51	33	DC1…E1	Sc-FO2	No valid CANopen frame was received within the specified time.

4.12.3.2 DX...-NET-PROFINET

The following are the error numbers issued per PNU 947 subindex 0 through 7 for the last eight errors.

Table 80: Error numbers

Fault numbers		Series		Message (Shown on display)	Possible cause
dec	hex	DG1	DM1		
1	01	✓	✓	Overcurrent	The inverter has detected too high current
2	02	✓	✓	Overvoltage	The DC link voltage has exceeded the limiting value
3	03	✓	✓	Ground fault	The power measurement has determined that the sum of the motor phase current is not null
5	05	✓	✓	Charging switch	The charging switch is open, when the START command has been given
9	09	✓	✓	UnderVoltage Regular	The DC link voltage is below the defined voltage limits
10	0A	✓	✓	Input Phase Superv	Supply line phase failed
11	0B	✓	✓	Output Phase Superv	The power measurement has determined that one motor phase does not carry current
12	0C	✓	✓	Brake chopper	No brake resistor, brake resistor is defective, brake chopper fault
13	0D	✓	✓	Drive Under Temp	Too low measured Temp Limit Supv Val in the power section or card. Temp Limit Supv Val is under -10 °C
14	0E	✓	✓	Drive over temperature	Too high measured Temp Limit Supv Val in the power section or the card. Temp Limit Supv Val is above 90 °C
15	0F	✓	✓	Motor stalled	Motor is stalled
16	10	✓	✓	Motor Over Temp	The motor is too hot; based either on the calculation of the frequency converter or the temperature feedback
17	11	✓	✓	Motor Under Load	The state defined by parameter P9.15 - P9.17 was valid longer than the time defined by P9.18
18	12	✓	✓	IP Address Conflict	Incorrect IP setting
19	13	✓	✓	EEPROM fault power section	EEPROM fault in power section, memory content in EEPROM has been lost
20	14	✓	✓	FRAM Fault	FRAM data fault in FRAM memory.
21	15	✓	✓	S-Flash Fault	Fault in serial flash memory, the memory of the serial flash memory is defective.
22	16	✓	✓	Speed error	The estimated speed is greater than 115 % of the maximum operation frequency.
23	17	✓	✓	STO circuit fault	STO switch is defective; STO circuit defective.
25	19	✓	✓	MCU WatchDog Fault	Watchdog register overflows in MCU.
26	1A	✓	✓	Start-up Prevent	The time when the interlock signal was enabled is longer than the set time.
29	1D	✓	–	Thermistor fault	The thermistor resistance of the control unit or option board is greater than 4.7 k?
32	20	✓	–	Device fan error	The fan is defective or blocked.
36	24	✓	–	Compatibility Fault	The controller board does not match the power section.
37	25	✓	✓	Device change	Power unit or option board was changed
38	26	✓	✓	Device added	Power unit or option board added.

Fault numbers		Series		Message (Shown on display)	Possible cause
dec	hex	DG1	DM1		
39	27	✓	✓	Device removed	The option board has been removed from the slot or the power section has been removed from the controller board
40	28	✓	✓	Device unknown	Unknown device connected (power section/option board)
41	29	✓	✓	IGBT Over Temp	IGBT temperature is too high
50	32	✓	✓	AI < 4 mA	Analog input signal lost, dropped below 4 mA
51	33	✓	✓	External fault	The digital input is enabled as an external error input
52	34	✓	✓	Keypad communication error	The connection between keypad and variable frequency drive is interrupted
54	36	✓	✓	Option board fault	Defective option board or option board slot
56	38	✓		PT100 Fault	Temperature exceeds the sensitivity capacity of the PT100
57	39	✓	✓	Motor Ident. Fault	The execution of the engine parameters identification was not completed successfully.
58	3A	✓	✓	Current Measure Fault	Power measurement is out of range
59	3B	✓	–	Power Wiring Error	Power wiring connected to the output of the variable frequency drive
60	3C	✓	–	Control Board Overtemp	The temperature of the control board is above +85 °C or below -30 °C
61	3D	✓	–	Internal Control Supply	+24V port voltage is over 27 V or under 17 V
62	3E	✓	–	Speed Search Fault	Speed searching failed when performing flying start
64	40	✓	–	Replace Battery Fault Response	The battery voltage of the real-time clock (RTC) is too low
65	41	✓	–	Replace Fan Fault Response	Fan life is less than 2 months
66	42	✓	✓	System Stop	STO has been triggered and the STO input is open
67	43	✓	✓	Overcurrent	The output current has reached the current limit value
68	44	✓	✓	Over Voltage	The DC link voltage has reached its voltage limit value
69	45	✓	–	System fault	Thermistor SPI communication error
70	46	✓	✓	System fault	MCU sent wrong parameters to DSP
72	48	✓	–	EEPROM fault power section	Error in the EEPROM of the power section, the memory content of the EEPROM has been lost during the initialization of the drive
73	49	✓	–	FRAM Fault	FRAM chip is defective
74	4A	✓	–	FRAM Fault	CRC check fault when accessing FRAM data
75	4B	✓	–	EEPROM fault power section	EEPROM chip or I2c circuit is defective
76	4C	✓	–	EEPROM fault power section	CRC check fault when accessing EEPROM data
77	4D	✓	–	S-Flash Fault	External serial flash memory chip is defective
80	50	✓	✓	Fieldbus Fault	Transmission failure to BACnet MSTP and the network setpoint is the remote control setpoint OR the network control location is the remote control location.
81	51	✓	✓	Fieldbus Fault	SA bus network error
82	52	✓	–	Bypass OverLoad	Overload when the motor is in bypass mode
83	53	✓	✓	Fieldbus Fault	Transmission failure to Modbus RTU and the network setpoint is the remote control setpoint OR the network control location is the remote control location.

Fault numbers		Series		Message (Shown on display)	Possible cause
dec	hex	DG1	DM1		
84	54	✓	✓	Fieldbus Fault	Transmission failure to Modbus TCP and the network setpoint is the remote control setpoint OR the network control location is the remote control location
85	55	✓	✓	Fieldbus Fault	Transmission failure to BACnet and the network setpoint is the remote control setpoint OR the network control location is the remote control location and the fault protection is set to NO ACTION
86	56	✓	✓	Fieldbus Fault	Transmission failure to Ethernet/IP and the network setpoint is the remote control setpoint OR the network control location is the remote control location and the error protection is set to NO ACTION
87	57	✓	✓	Fieldbus Fault	Transmission failure to Profibus/CanOpen/Devicenet master at slot A and the network setpoint is the remote control setpoint OR the network control slot is the remote control slot and the fault protection is set to NO ACTION
88	58	✓	–	Fieldbus Fault	Transmission failure to Profibus/CanOpen/Devicenet master at slot B and the network setpoint is the remote control setpoint OR the network control slot is the remote control slot and the fault protection is set to NO ACTION
89	59	✓	–	Undervoltage stop	The DC link voltage has reached the undervoltage stop limit of the variable frequency drive
90	5A	✓	✓	Drive Under Temp	Cold weather mode is not activated and the unit temperature is below -10 °C, cold weather mode is activated and the error exceedance for undertemperature is not set, the unit temperature is below -30 °C
91	5B	✓	–	Option Card Fault	The external supply on the communication link of the DeviceNet is not present
92	5C	✓	✓	External Fault 2	The digital input is enabled as an external error input
93	5D	✓	✓	External Fault 3	The digital input is enabled as an external error input
97	61	✓	✓	Pipe Fill Loss fault	In single drive control mode of the MPFC, FC, interlock enable, and all interlock signals are lost; in single drive control mode of the MPFC, FC, interlock enable, and interlock 1 are lost; in multiple drive network mode of the MPFC, interlock enable and interlock 1 are lost.
98	62		✓	PID feedback AI fault	AI1 settings are outside the limits
100	64	✓	✓	Fieldbus Fault	SWD Bus fault
101	65	✓	✓	Option board fault	SWD hardware fault
102	66	✓	✓	External fault	SWD external fault
103	67	✓	✓	Warning overtemperature variable frequency drive	The temperature of the variable frequency drive is 10 °C away from the trip point of 90 °C
104	68	✓	–	Compatibility Fault	The DSP firmware is not compatible with the MCB firmware
105	69	✓	–	Compatibility Fault	The keypad firmware is not compatible with the MCB firmware
106	6A	✓	–	Compatibility Fault	The I01 card firmware is not compatible with the MCB firmware
107	6B	✓	–	Compatibility Fault	The I02 card firmware is not compatible with the MCB firmware
108	6C	✓	–	Compatibility Fault	The I03 card firmware is not compatible with the MCB firmware
109	6D	✓	–	Compatibility Fault	The I04 card firmware is not compatible with the MCB firmware
110	6E	✓	–	Compatibility Fault	The I05 card firmware is not compatible with the MCB firmware
111	6F	✓	✓	Compatibility Fault	The PROFIBUS card firmware is not compatible with the MCB firmware
113	71	✓	✓	Compatibility Fault	The CANOpen card firmware is not compatible with the MCB firmware

Fault numbers		Series		Message (Shown on display)	Possible cause
dec	hex	DG1	DM1		
114	72	✓	✓	Compatibility Fault	The SWD card firmware is not compatible with the MCB firmware
115	73	✓	✓	Fieldbus Fault	Ethernet/IP run error
117	75	✓	✓	Pump over cycle	During a given period, the times when the drive sleeps and wakes up exceed a user-configurable value
118	76	✓	✓	Broken Pipe Fault Response	Pipe fault error
125	7D	✓	✓	Freq. limit supv.	The output frequency exceeds the limiting value of the frequency monitoring.
133	85	✓	✓	Fieldbus Fault	WebUI fault

5 Application example

5.1 General

This chapter describes how communication is established between a Siemens PLC and the DX-NET-PROFINET2-2 via PROFINET.

The main section of this chapter describes how to access the process and parameter data of the variable frequency drive.

The description is intended for experienced drive specialists and automation technicians.
Basic knowledge of the PROFINET communication system and the programming of a PROFINET controller is required.
In addition, knowledge of handling the drive is required.
We also assume that you have a good knowledge of the technical basics and are familiar with the handling of electrical equipment and machines as well as reading technical drawings.

Please read this chapter carefully before installing and operating the PROFINET connection.

Please also observe the information in the operating instructions for the variable frequency drive/variable speed starter.

5.2 System overview

The following figure shows the DX-NET-PROFINET2-2 communication interface in a PROFINET communication network.

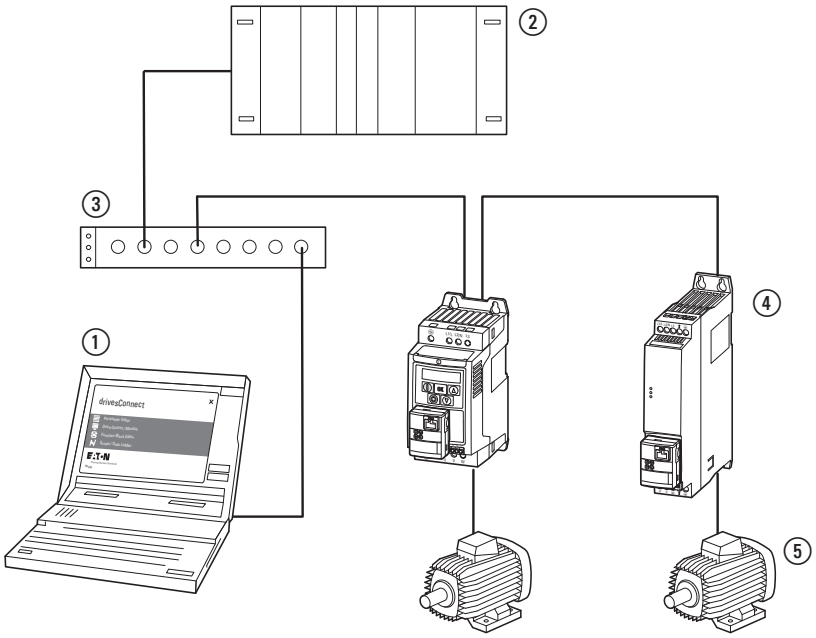


Figure 54: Integration of DX-NET-PROFINET2-2 into a PROFINET network

① PC with engineering tool
② I/O controller
③ Switch
④ DC1 variable frequency drive and DE1 variable speed starter with DX-NET-PROFINET2-2
⑤ Motor

5.3 Cyclic and acyclic communication with TIA Portal

The following Siemens function blocks are used in this chapter:

- SINA_SPEED – for cyclic communication
- FB286 – for acyclic communication

Cyclic communication: SINA_SPEED – process data access

The SINA_SPEED function block is used for cyclic communication with the variable frequency drive.

The SINA_SPEED block can be used to monitor the process data and to control the variable frequency drive. In addition, the communication status between the controller and the variable frequency drive is monitored and checked.

→ The SINA_SPEED function block can be called from a standard library in the TIA Portal.

Acyclic communication: FB286 – read or write several parameters

Function block FB286 is used for parameter access.

The parameters can be read and the values changed using the FB286 function block.

→ Function block FB286 is part of the TIA Portal software and can be called from a standard library in the TIA Portal.

5.4 Configuration of the IP address, peripheral addresses and device names

The TIA Portal software automatically assigns addresses and names for proper communication. These can be changed manually.

IP address

The address in the TIA Portal and the actual IP address of the DX-NET-PROFINET2-2 device must match.

▶ Follow the instructions described in → Section 4.2, "Addressing".

Peripheral addresses

The peripheral address ranges for the data to be exchanged between a Siemens controller and the DX-NET-PROFINET2-2 device are defined in the configuration.

The following section looks at these hardware addresses. If you change them, you will need to adjust the program accordingly.

Device names

If necessary, the device name is adjusted in the PLC configuration.

This is illustrated using the example below in the section "Access to cyclic process data".

5.5 Access to cyclic process data

In this example, "Standard Telegram 1" (PROFIdrive) is selected for cyclic communication between the PLC and the variable frequency drive.

The PLC sends the control word and the speed setpoint to the variable frequency drive using the SINA_SPEED function block. The variable frequency drive then sends the status word and the actual value (frequency) back to the PLC. Control and status data are thereby processed as per the PROFIdrive profile.

The following data exchange takes place in this example:

Input process data

Two input process data are available

- Control word
- Frequency reference

Output process data

Two output process data are available:

- Status word
- Actual frequency

5.6 Access to acyclic process data

In this example, function block FB 286 is used to read or change the parameters.

The corresponding index numbers can be found in
→ Section "4.11 Parameter list", Page 103.

The parameter table contains specific data for each parameter.

5.7 Example program – DX-NET-PROFINET2-2 with TIA Portal

The following chapter explains how to configure a program in the TIA Portal. The hardware and software requirements are listed in detail.
Basic programming and configuration steps are not described in this section. Detailed information can be found in the help tool of the TIA Portal.

5.7.1 Requirements for PLC control

In order to establish proper communication between a master (PLC) and the DX-NET-PROFINET2-2 communication interface (slave), certain hardware and software components are assumed to be present.

In this example, the following components are used:

- Configuration PC with engineering tool (TIA Portal V15.1)
- GSDML file for DX-NET-PROFINET2-2
- PLC – Siemens
- Switch (note: not mandatory)
- PROFINET cable
- DC1 variable frequency drive with DX-NET-PROFINET2-2 communication interface
- Motor

5.7.2 Parameter setting and hardware enable

In order to enable control via PROFINET, the hardware enable and remote access must be carried out via parameter P12.

→ Section 4.4.1, “Hardware enable” describes how to enable the variable frequency drive.

→ Section 4.3, “Parameter settings” describes how to enable the variable frequency drive for network communication.

5.7.3 Setting up the configuration in the TIA Portal

The steps below describe how to create a project for cyclic and acyclic communication.

Hardware configuration

▶1. Start the TIA Portal and create a new project.

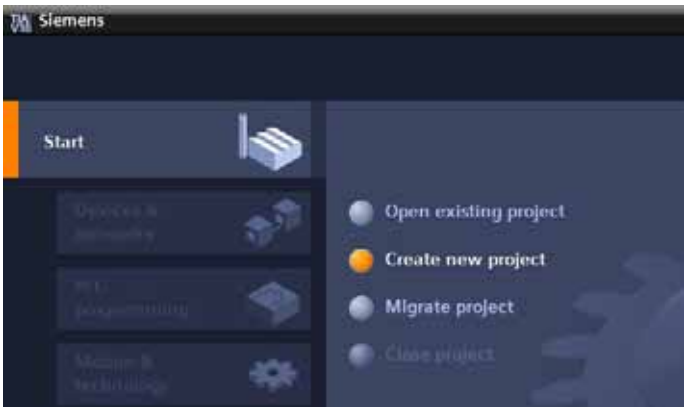


Figure 55: Creating a new project

▶2. Insert a CPU into the project.

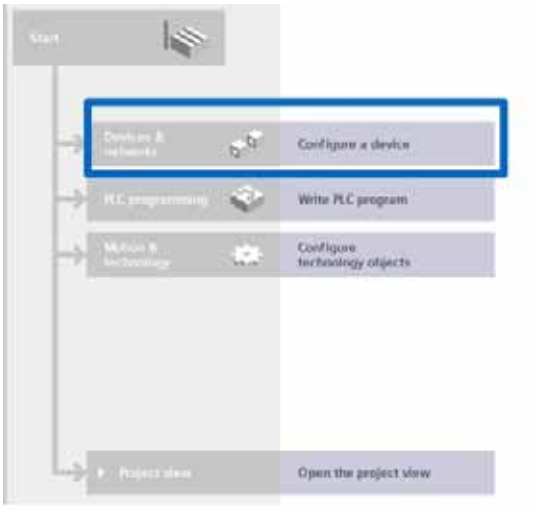


Figure 56: Configuring a device

▶3. Find a suitable CPU.

Figure 57: Integrating a CPU

▶4. Locate a device description file (GSDML file) for the DX-NET-PROFINET2-2 device.

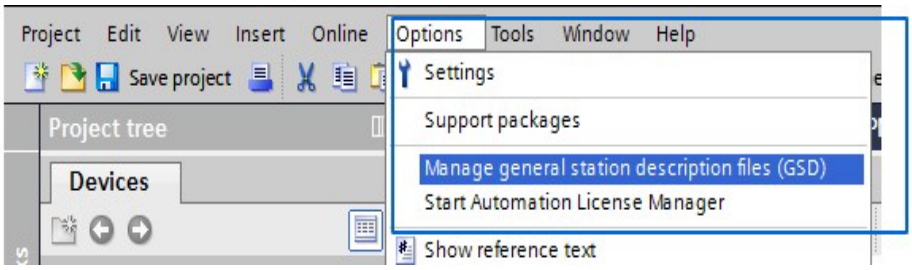


Figure 58: Managing device description files (GSD)

▶5. Install the device description file (GSDML file)

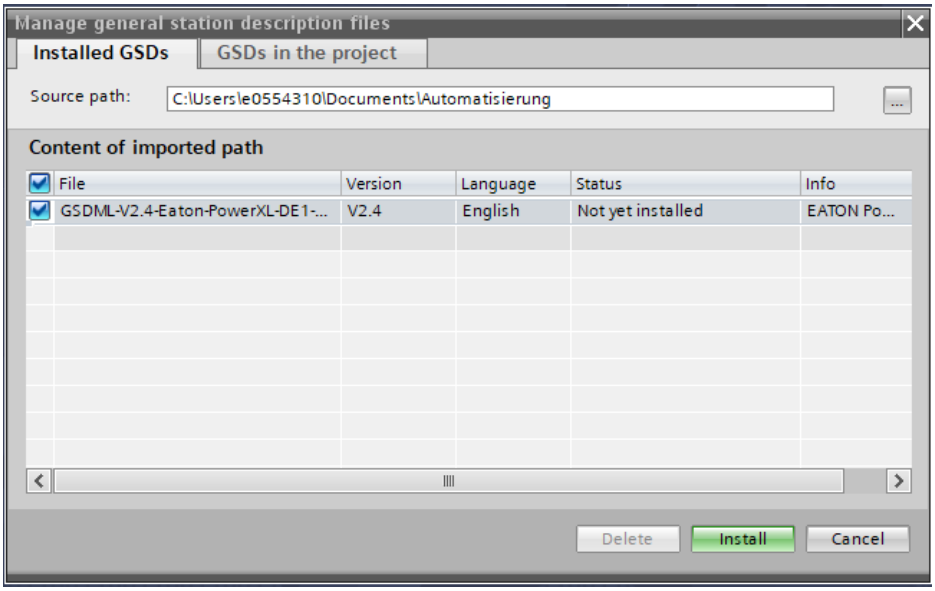


Figure 59: Installing the GSDML file

▶6. Drag and drop the DX-NET-PROFINET2-2 into the network.
Catalog -> Other PROFINET IO field devices -> Drives EATON Industries -> DX-NET-PROFINET2-2

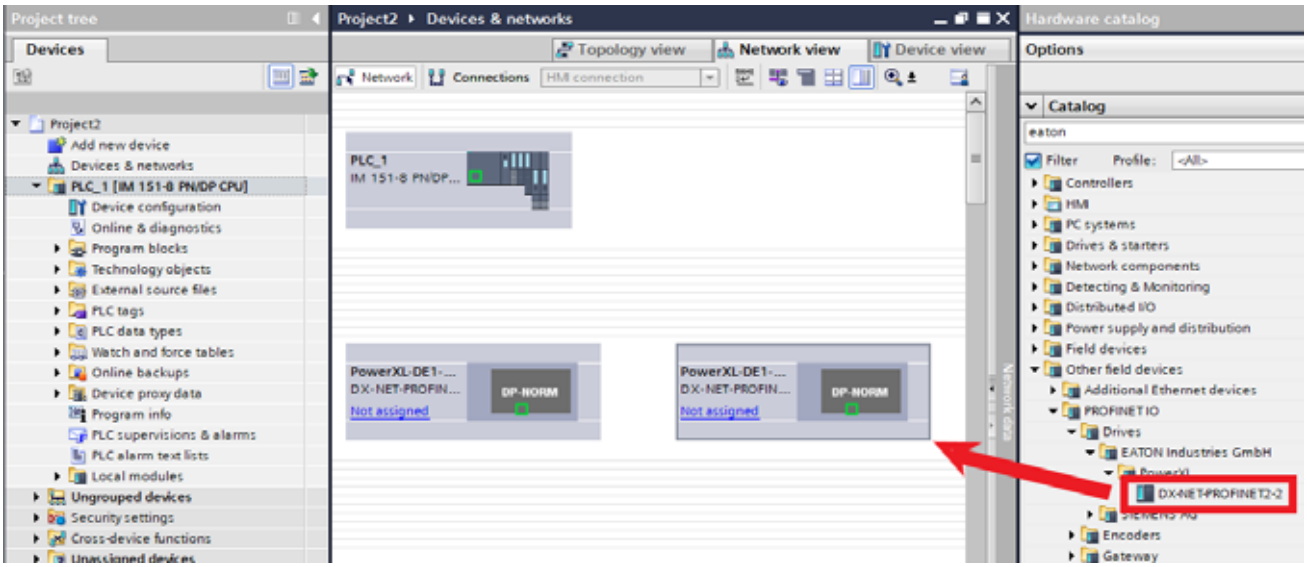


Figure 60: Integrating the DX-NET-PROFINET2-2 device into the network

▶7. Set the IP addresses.

First for the CPU:

- ▶ Open **Properties**.
- ▶ Select **Ethernet addresses**.
- ▶ Insert a new subnet.
- ▶ Enter the desired **IP address** and **subnet mask** in **the IP protocol** area.

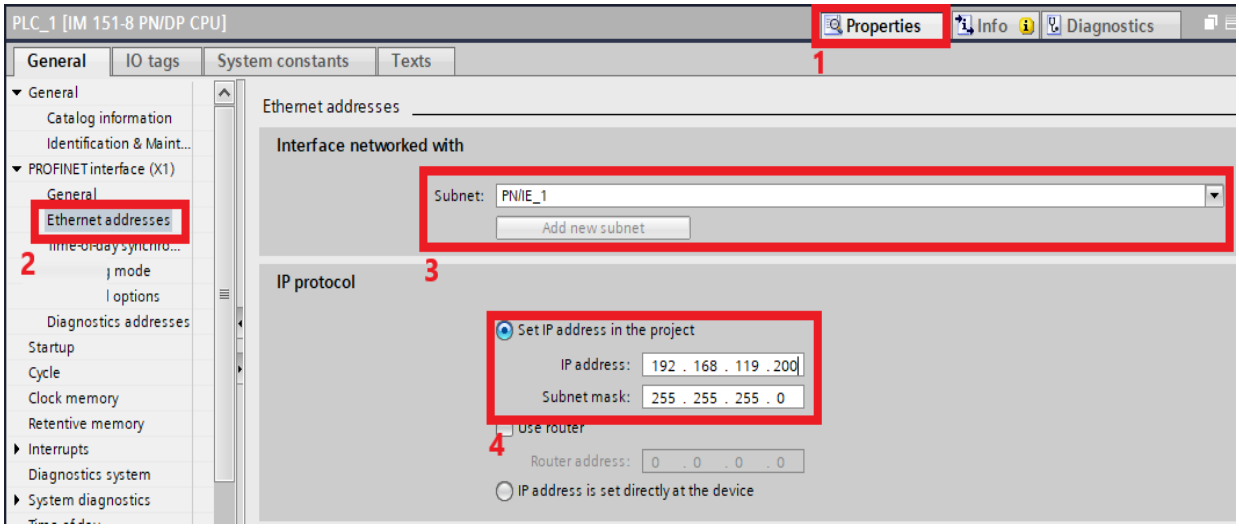


Figure 61: Entering the IP address for the CPU

Now for the DX-NET-ETHERNET2-2 device:

- ▶ Open **Properties**.
- ▶ Select **Ethernet addresses**.
- ▶ Insert a new subnet.
- ▶ Enter the desired **IP address** and **subnet mask** in **the IP protocol** area.

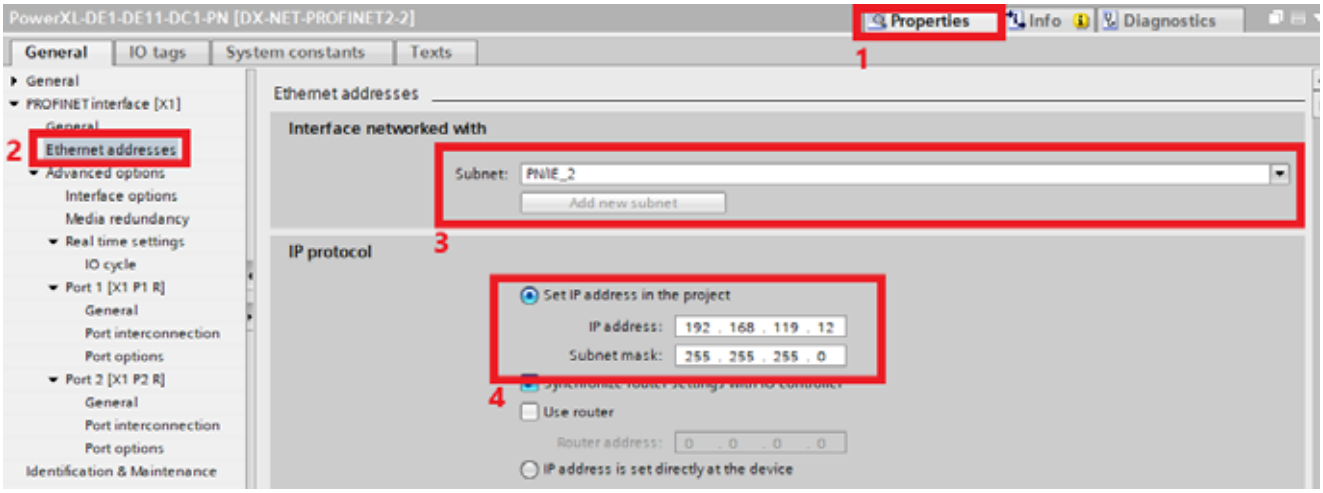


Figure 62: Entering the IP address for the communication interface

▶8. Assign the DX-NET-PROFINET2-2 device to the controller.
To do this, connect the Ethernet ports of the controller and the communication interface to one another.

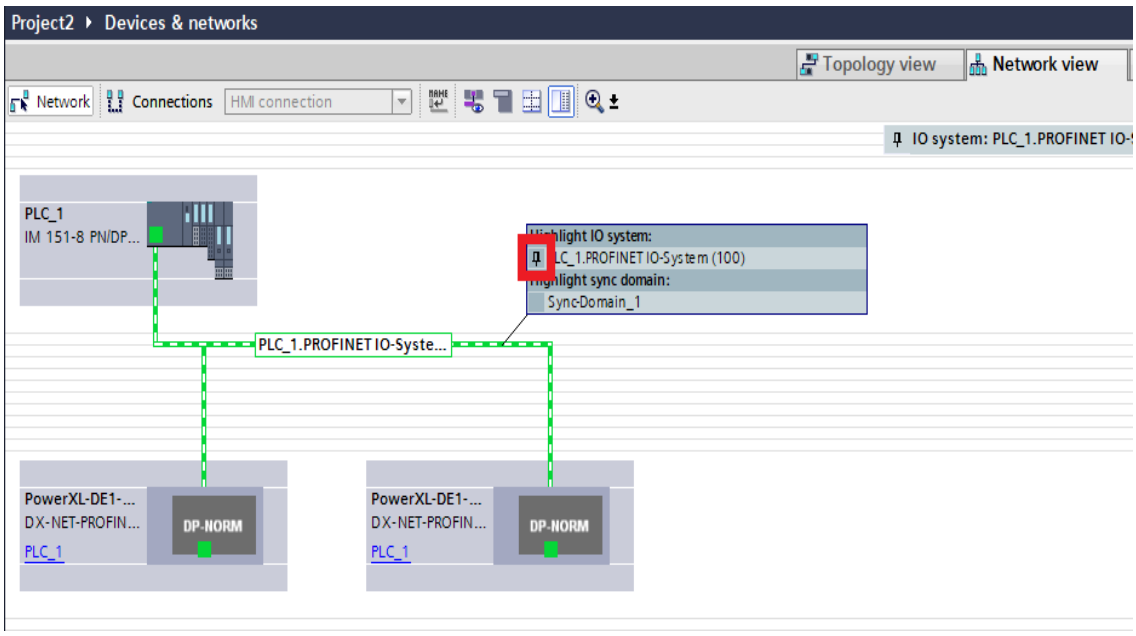


Figure 63: Connecting the ports

▶9. Assign a device name to the DX-NET-PROFINET2-2 communication interface.

The following procedure is used to assign names in this example.

The **Assign device name** option scans devices that are available online and then assigns names.

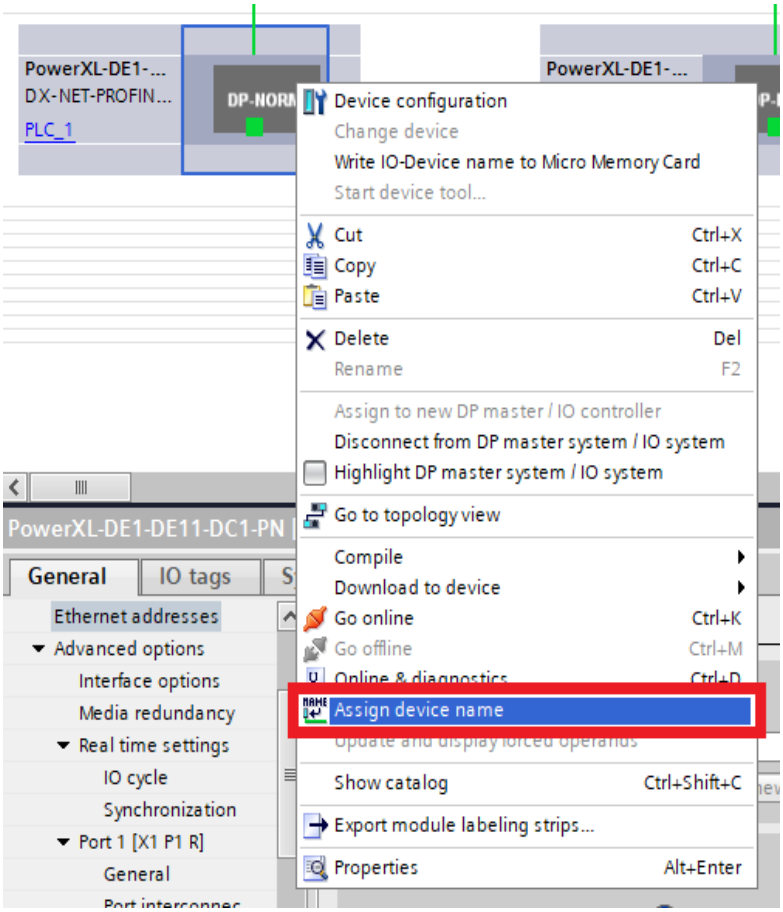


Figure 64: Assigning a device name

▶10. Select the properties of the DX-NET-PROFINET2-2 communication interface.
You can assign the IP address and the device name in the "PROFINET interface" settings. Then click **Assign name**.

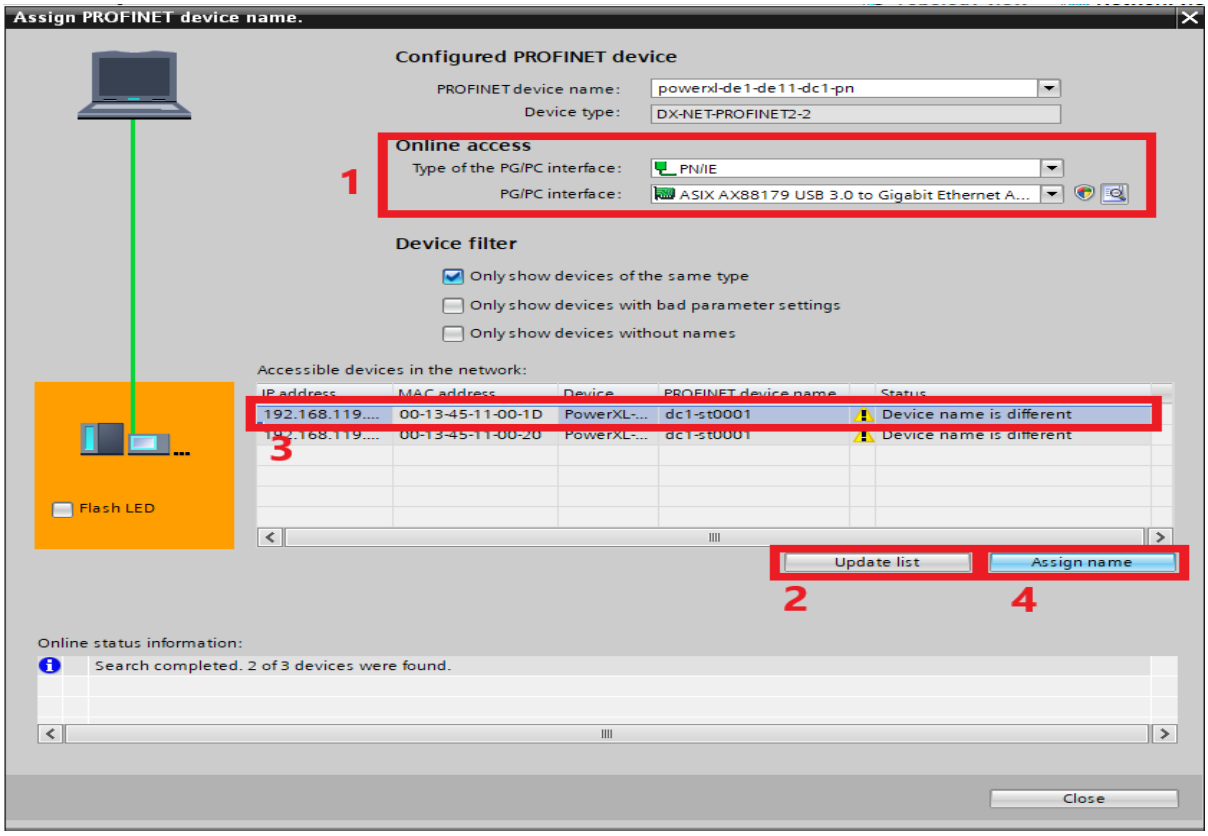


Figure 65: Assigning device names

▶11. Select the required telegram from the hardware catalog.
In this example, "Standard Telegram 1" is used.

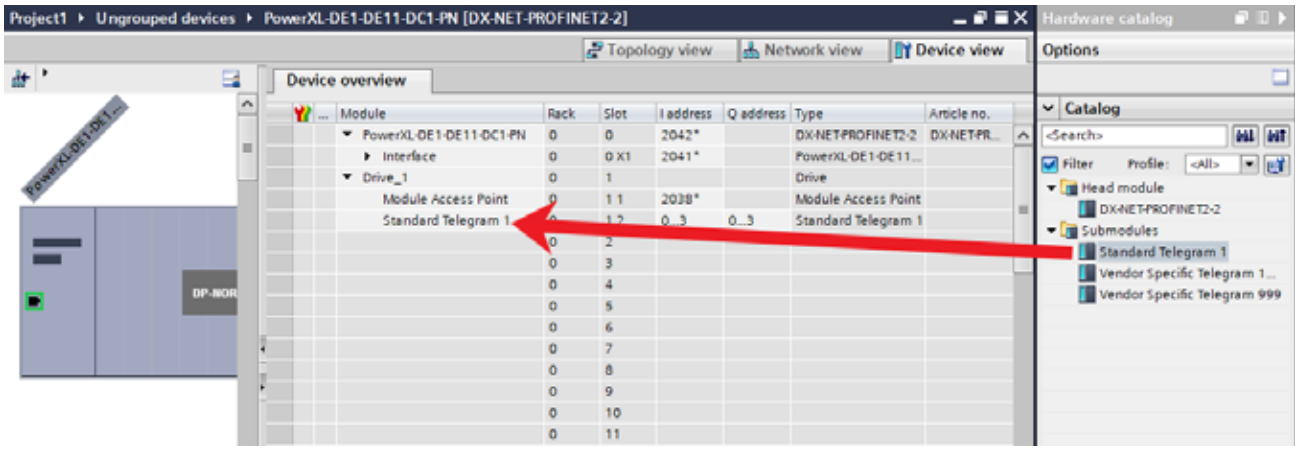


Figure 66: Selecting a telegram

Hardware and I/O address overview

The assignment of inputs and outputs for programming is highlighted below.

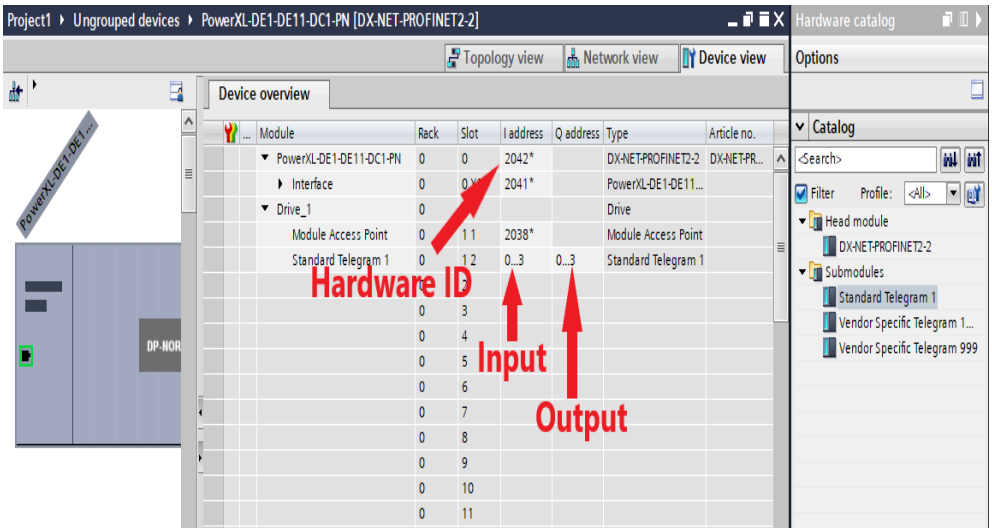


Figure 67: Assigning inputs and outputs

5.7.4 Software configuration – program for cyclic and acyclic communication

5.7.4.1 Acyclic communication

With the help of the Siemens SINA_SPEED block, the variable frequency drive can be controlled cyclically with the "Standard Telegram 1".

The SINA_SPEED function block must be created and then called in OB1.

The SINA_SPEED function block is available in the DriveLib library.

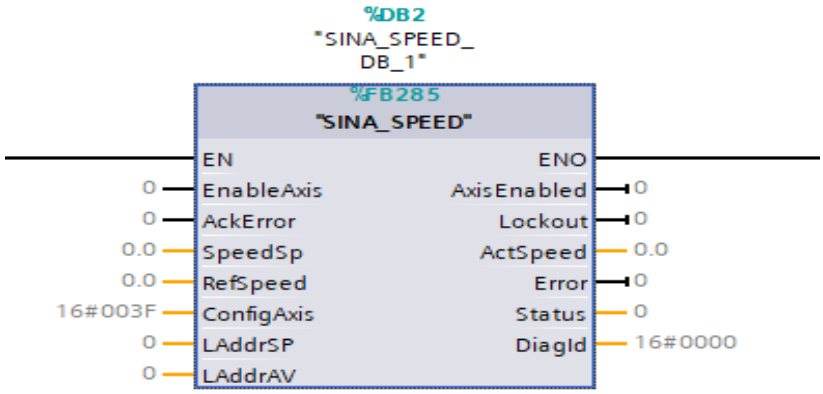


Figure 68: SINA_SPEED function block

For details on how the SINA_SPEED function block works, refer to the online help of the TIA Portal or the documentation for the "DriveLib" library.

Input and output parameters of the SINA_SPEED function block

The following tables list the input and output parameters of the SINA_SPEED function block.

Input parameters of the SINA_SPEED function block

Table 81: SINA_SPEED input parameters

Input signal	Type	Standard value	Description
EnableAxis	BOOL	0	1 = Switch on the drive
AckError	BOOL	FALSE	Acknowledgment of axis error -> AckFlt = 1
SpeedSp	REAL	0.0 [rpm]	Speed reference
RefSpeed		0.0 [rpm]	Rated speed of the drive -> p2000
ConfigAxis	WORD	3	ConfigAxis input
HWIDSTW	HW_IO	0	Symbolic name or HW ID on the SIMATIC S7-1200/1500 of the setpoint slot
HWIDZSW	HW_IO	0	Symbolic name or HW ID on the SIMATIC S7-1200/1500 of the setpoint slot

Table 82: SINA_SPEED output parameters

Output signal	Type	Standard value	Description
AxisEnabled	BOOL	0	Operating mode is executed or enabled
Lockout	BOOL	0	1 = closing lockout active
ActVelocity	REAL	0.0 [rpm]	Current speed (depending on the RefSpeed normalization factor)
Error	BOOL	0	1 = collective fault present
Status	INT	0	16#7002: No error - block is being processed 16#8401: Error in the drive 16#8402: Closing lockout 16#8600: DPRD_DAT error 16#8601: DPWR_DAT error
DiagID	WORD	0	Extended communication failure

Output parameters of the SINA_SPEED function block

The HWIDSTW and HWIDZSW block inputs must reference the hardware ID of "Standard Telegram 1".

Telegram slots

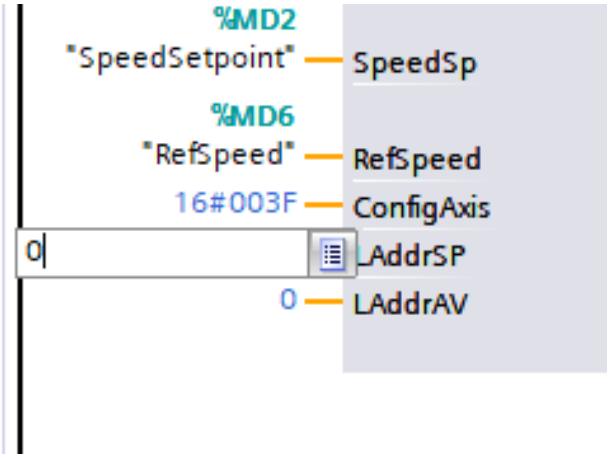


Figure 69: Definition of the slots

When using a PROFINET connection between the CPU and the DX-NET-PROFINET2-2 communication interface, the same hardware ID must be used for inputs HWIDSTW and HWIDZSW.

Specific information about the data block

The inputs of "Standard Telegram 1" can be accessed via the **InstSinaSpeed** data block.

The **InstSinaSpeed** data block contains the following information:

- Inputs of the function block (1)
- Outputs of the function block (2)
- "Standard Telegram 1" structure (3)

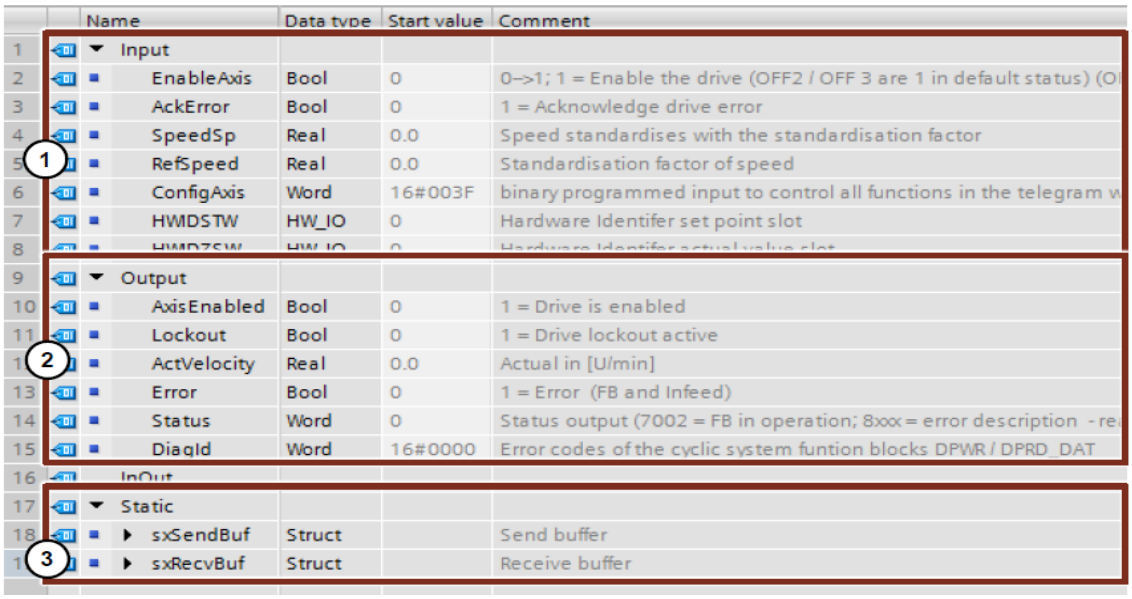


Figure 70: "InstSinaSpeed" data block

Configuration of the block

▶1. Open the SINA_SPEED block from the **Drive_Lib** library.

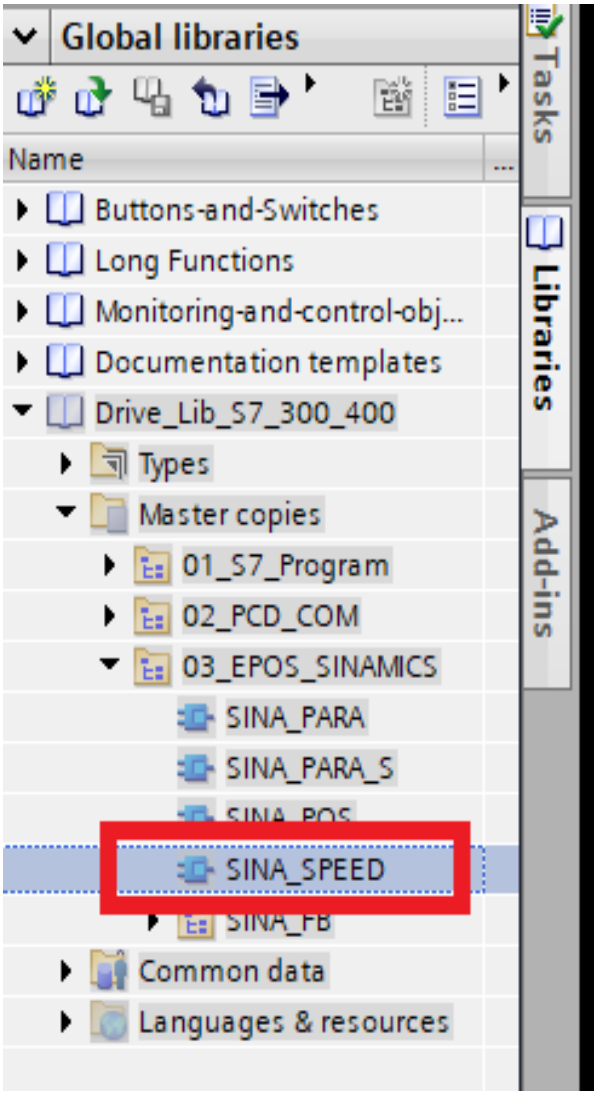


Figure 71: Selecting the SINA_SPEED block from the Drive_Lib library

▶2. Insert the SINA_SPEED block into the "Program blocks" folder.

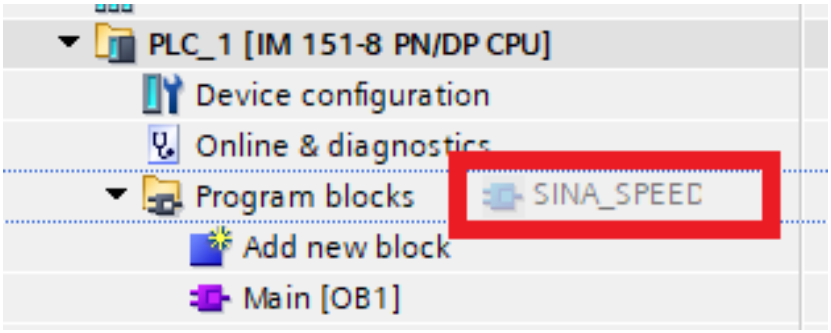


Figure 72: Inserting the SINA_SPEED block into the "Program blocks" folder

▶3. Call the SINA_SPEED block in the Main OB (OB1).
Assign a data block to the block.

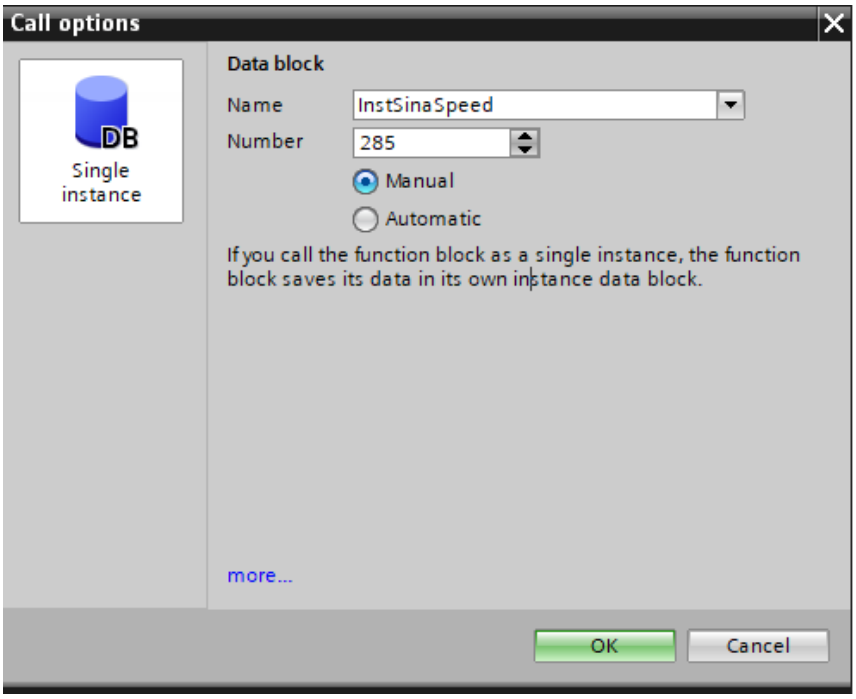


Figure 73: Call options

▶4. Declare inputs and outputs and call up addresses in OB1.

Default tag table

		Name	Data type	Address	Re
1		Enable	Bool	%M0.0	
2		Acknowledge	Bool	%M0.1	
3		SpeedSetpoint	Real	%MD2	
4		RefSpeed	Real	%MD6	
5					
6		AxisEnabled	Bool	%M0.2	
7		AxisLockout	Bool	%M0.3	
8		ActualVelocity	Real	%MD10	
9		Error	Bool	%M0.4	
10		Status	Word	%MW14	
11		DiagID	Word	%MW16	
12		<Add new>			

Figure 74: Standard variable table

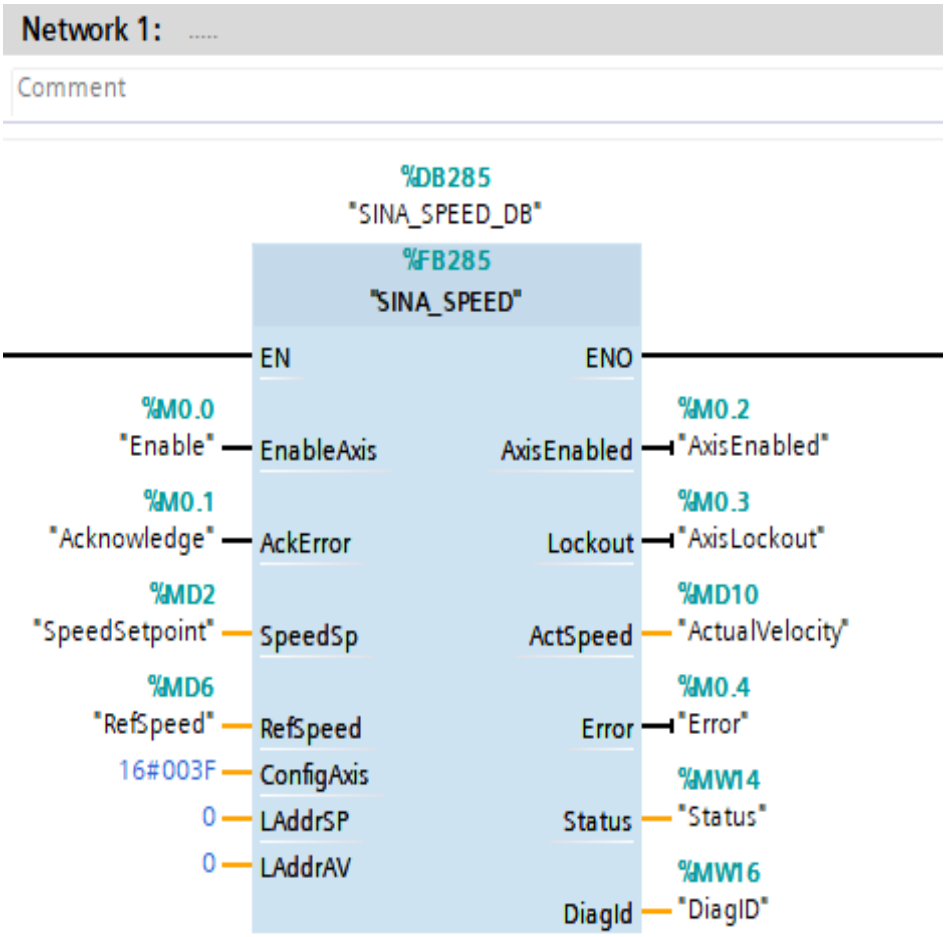


Figure 75: Network 1

Saving the project

▶5. Save the project and download it to the CPU.
To do this, click **Connect online**.

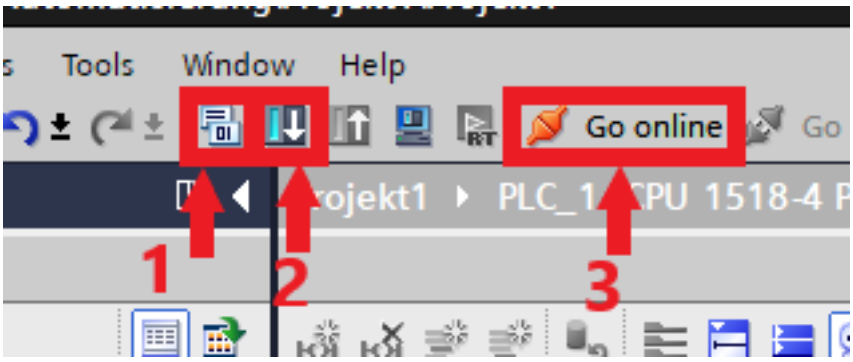


Figure 76: Connect online

Control and monitoring

In order to be able to control the variable frequency drive via the TIA Portal, the variables must be called in the monitoring table.

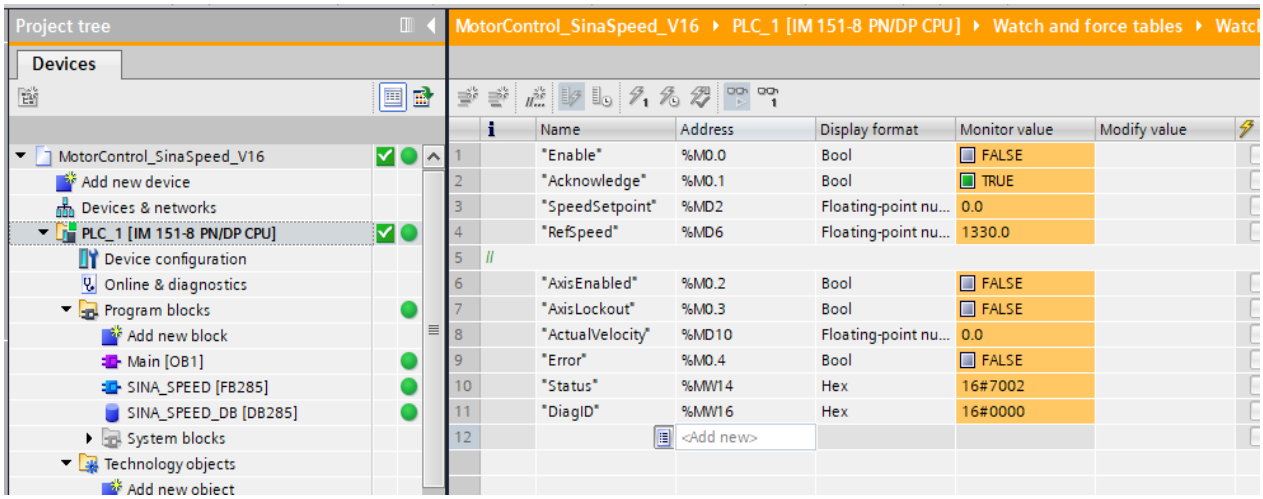


Figure 77: Settings in the monitoring table

The variable frequency drive can be started via the **EnableAxis** input.

The setpoint can be specified via the **xSendBuf.STW1** input.

5.7.4.2 Acyclic communication

For parameter access, an FB286 acyclic communication library must be added to OB1.
The following describes how read and write blocks can be called.

Block FB286 is assigned to SINA_PARA.

Acyclic communication is established according to the PROFIdrive profile via data block 47.

The FB286 acyclic communication block (SINA_PARA) provides the user with an interface for easy reading and writing of any 16 parameters. The user must specify the parameter numbers, an index and (for writing) a parameter value. The job is processed independently after the start of the job.

→ A description of the FB286 function block can be found in the TIA Portal.

The following steps show how to add an FB286 read and write block.

▶1. Add a function block.

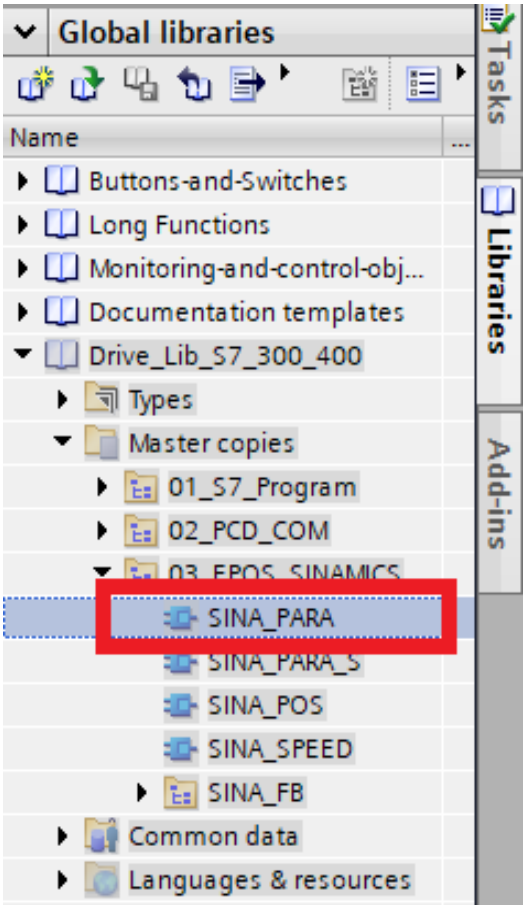


Figure 78: Adding a function block

▶2. Assign a name for the block.

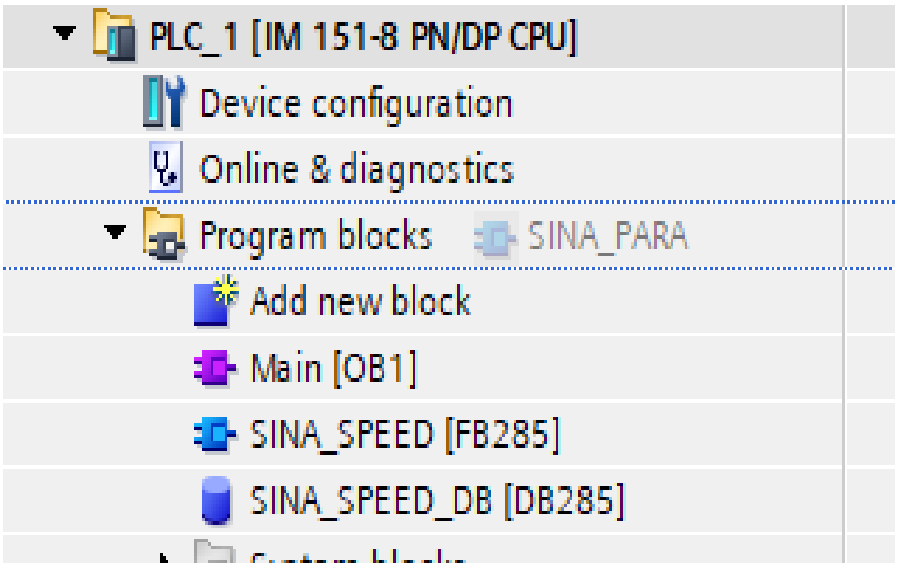


Figure 79: Assigning a name for the block

▶3. Drag and drop function block FB286 into the network.

→ The individual programming steps were skipped here.

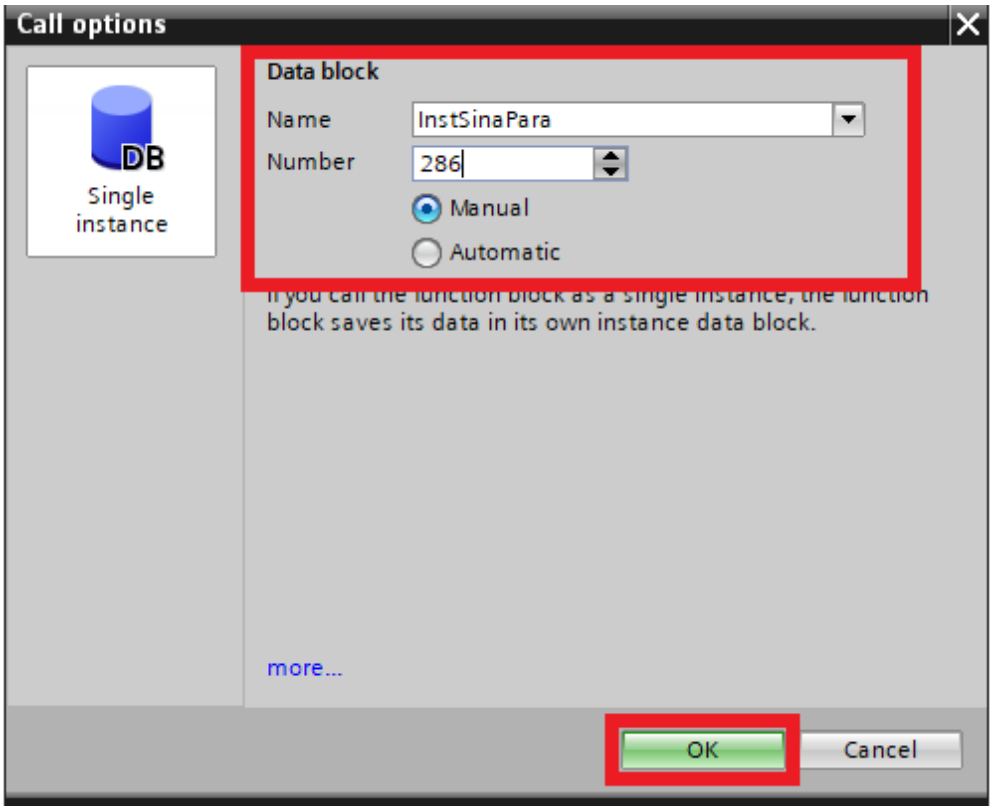


Figure 80: Call options

The following figure shows the FB286 function block with variables.

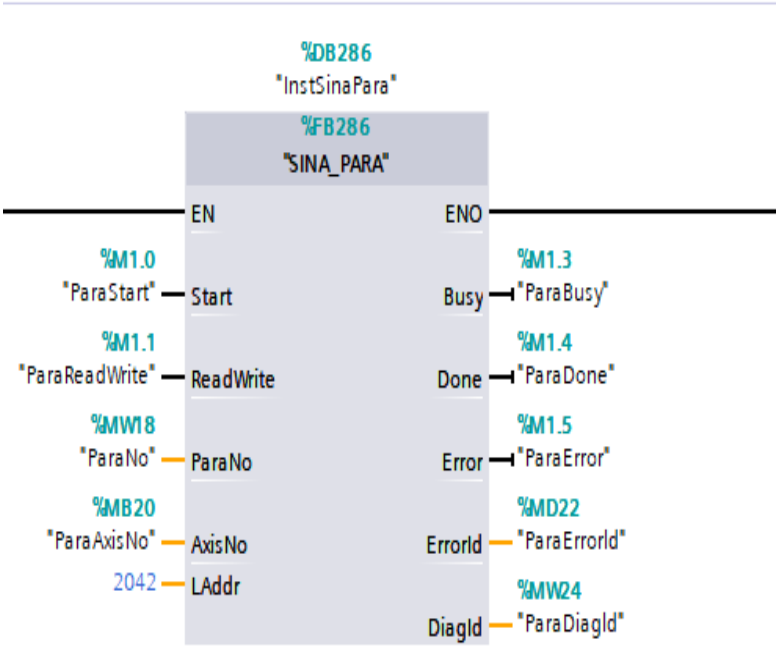


Figure 81: Function block FB286

The following figure shows the entry for the DX-NET-PROFINET2-2 communication interface

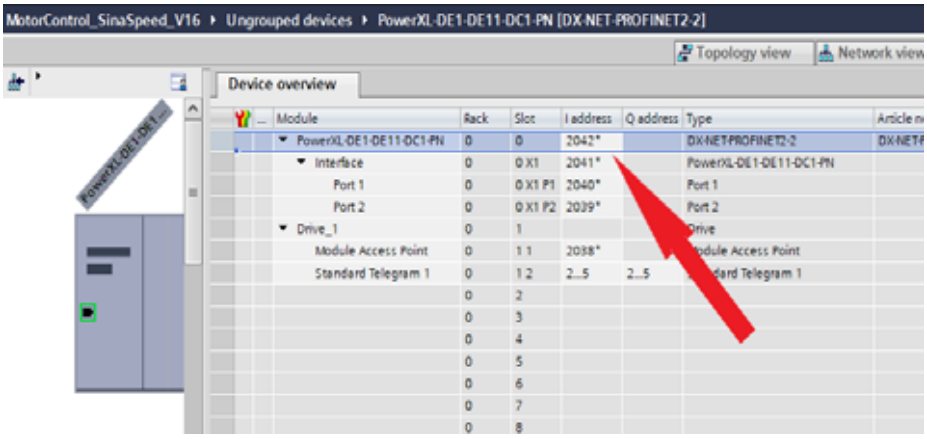


Figure 82: Entry for the DX-NET-PROFINET2-2 communication interface

Loading a project

▶4. Select the appropriate controller in the project tree.

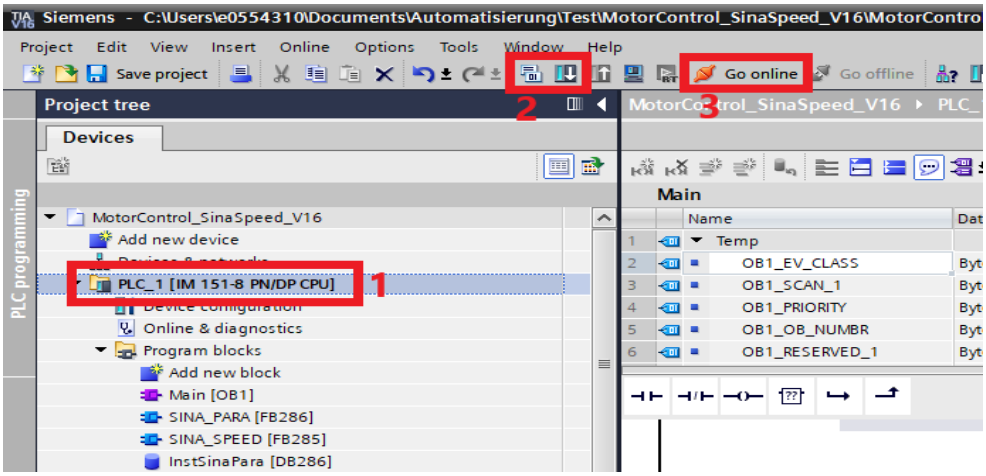


Figure 83: Selecting the controller

▶5. Then load the project.

5.7.4.3 Reading/writing parameters in online mode

Now you switch to online mode to record and write the parameter values.

→ You can find a description of the inputs and outputs of the block and how to fill in information about the data block in
→ Section “5.7.4.4 Input/output of the block”, Page 188.

Read

MotorControl_SinaSpeed_V16 ▸ PLC_1 [IM 151-8 PN/DP CPU] ▸ Watch and force tables ▸ Watch table 1

	Name	Address	Display format	Monitor value	Modify value
10	"Error"	%M0.4	Bool	FALSE	
11	"Status"	%MW14	Hex	16#7002	
12	"DiagID"	%MW16	Hex	16#0000	
13	// Sina Para				
14	"ParaStart"	%M1.0	Bool	FALSE	TRUE
15	"ParaReadWrite"	%M1.1	Bool	FALSE	FALSE
16	"ParaNo"	%MW18	DEC+/-	0	4
17	"ParaAxisNo"	%MB20	Hex	16#01	16#01
18					
19	"ParaBusy"	%M1.3	Bool	FALSE	
20	"ParaDone"	%M1.4	Bool	FALSE	
21	"ParaError"	%M1.5	Bool	TRUE	
22	"ParaErrorId"	%MD22	DEC	131072	
23	"ParaDiagId"	%MW24	Hex	16#0000	
24					
25	"InstSinaPara".sxParameter[1].siParaNo	%DB286.DBW430	DEC+/-	0	1
26	"InstSinaPara".sxParameter[1].siIndex	%DB286.DBW432	DEC+/-	0	0
27	"InstSinaPara".sxParameter[1].srValue	%DB286.DBD434	Floating-point nu...	0.0	
28	"InstSinaPara".sxParameter[2].siParaNo	%DB286.DBW446	DEC+/-	0	0
29	"InstSinaPara".sxParameter[2].siIndex	%DB286.DBW448	DEC+/-	0	1
30	"InstSinaPara".sxParameter[2].srValue	%DB286.DBD450	Floating-point nu...	0.0	
31	"InstSinaPara".sxParameter[3].siParaNo	%DB286.DBW462	DEC+/-	0	
32	"InstSinaPara".sxParameter[3].siIndex	%DB286.DBW464	DEC+/-	0	
33	"InstSinaPara".sxParameter[3].srValue	%DB286.DBD466	Floating-point nu...	0.0	
34	"InstSinaPara".sxParameter[4].siParaNo	%DB286.DBW478	DEC+/-	0	
35	"InstSinaPara".sxParameter[4].siIndex	%DB286.DBW480	DEC+/-	0	
36	"InstSinaPara".sxParameter[4].srValue	%DB286.DBD482	Floating-point nu...	0.0	
37		<Add new>			

Figure 84: Monitoring table for read parameters

Set the following data for the variables on the channels of function block FB286:

ReadWrite = 0, read request
ParaNo = 4, 4 parameters to be read

Set the following values for the variables of the instance database of function block FB286:

Frequency reference

SINA_PARA_DB.sxParameter\[1].siParaNo=1, (index number)
SINA_PARA_DB.sxParameter\[1].siIndex=0, (subindex)

Speed reference

SINA_PARA_DB.sxParameter\[2].siParaNo=0
SINA_PARA_DB.sxParameter\[2].siIndex=1

A rising edge at the start starts the read job.
As soon as the read job is completed, the "Done" bit is set.
The parameter values are displayed in .sxParameter\[x].srValue.

Write

To write parameters, set the following values for the variables in function block FB286.

P1-02 (f-max)

ReadWrite = 1, write request
ParaNo = 4, 4 parameters to be written

Set the following values for the variables of the instance database of function block FB286:

SINA_PARA_DB.sxParameter\[1].siParaNo=20 (index number)
SINA_PARA_DB.sxParameter\[1].siIndex=1 (subindex)
SINA_PARA_DB.sxParameter\[1].srValue=700 (parameter is changed to 70 Hz)

P1-01 (f-min)

SINA_PARA_DB.sxParameter\[2].siParaNo=20
SINA_PARA_DB.sxParameter\[2].siIndex=0
SINA_PARA_DB.sxParameter\[2].srValue=100, (parameter is changed to 10 Hz)

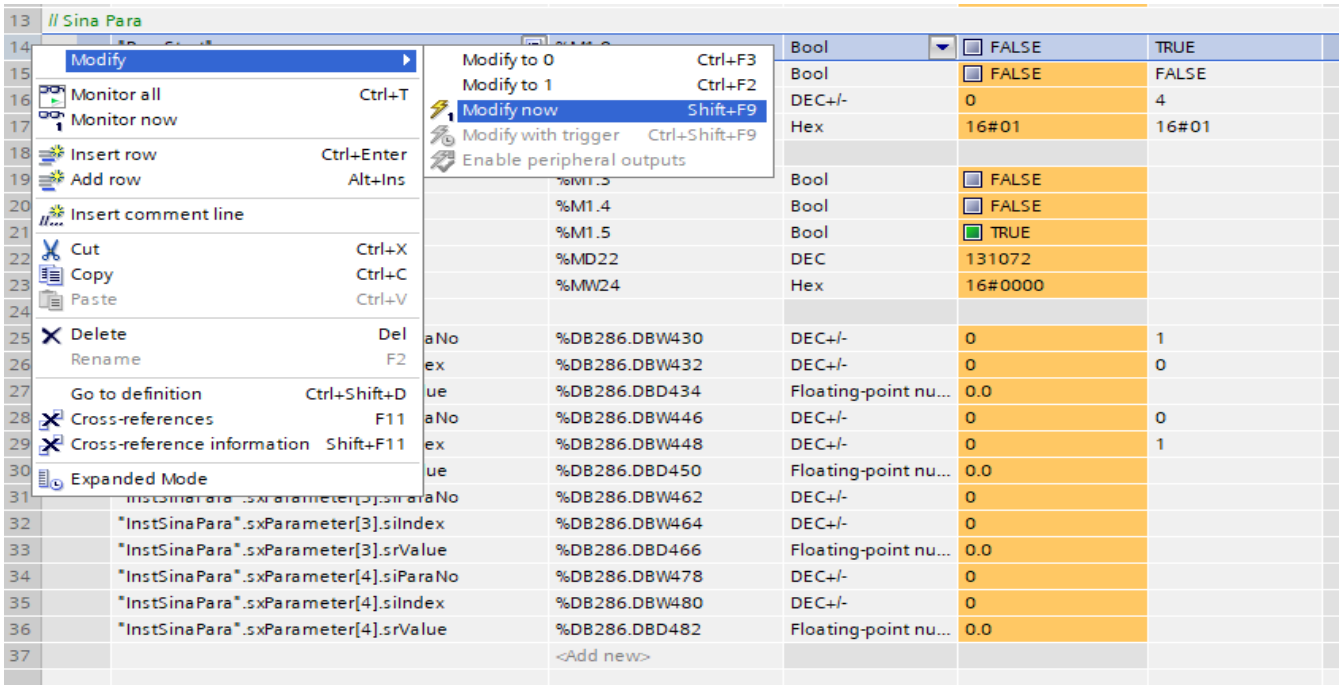


Figure 85: Monitoring table for write parameters.

A rising edge at the start input starts the write job.
When the write job is complete, the Done bit is set.
The changed parameter values are saved in the variable frequency drive.

Changed parameter values

The changed parameter values are shown below.

19	// Sina Para					
20	"ParaStart"	%M100.0	Bool	TRUE	TRUE	
21	"ParaReadWrite"	%M100.1	Bool	TRUE	TRUE	
22	"ParaNo"	%MW16	DEC	4	4	
23						
24	"ParaReady"	%M100.5	Bool	FALSE		
25	"ParaError"	%M100.2	Bool	TRUE		
26	"ParaErrorId"	%MD18	Floating-point nu...	16#0001_0000		
27	"ParaBusy"	%M100.3	Bool	FALSE		
28	"ParaDone"	%M100.4	Bool	FALSE		
29	"ParaDiagId"	%MW20	Hex	16#0000		
30						
31	"InstSinaPara".sxParameter[1].siParaNo		DEC+/-	20	20	
32	"InstSinaPara".sxParameter[1].siIndex		DEC+/-	1	1	
33	"InstSinaPara".sxParameter[1].srValue		Floating-point nu...	700.0	700.0	
34						
35	"InstSinaPara".sxParameter[2].siParaNo		DEC+/-	20	20	
36	"InstSinaPara".sxParameter[2].siIndex		DEC+/-	0	0	
37	"InstSinaPara".sxParameter[2].srValue		Floating-point nu...	100.0	100.0	
38						
39	"InstSinaPara".sxParameter[3].siParaNo		DEC+/-	0		
40	"InstSinaPara".sxParameter[3].siIndex		DEC+/-	0		

Figure 86: Changed parameter values

To change an individual parameter, the parameter value is written in the block in online mode.

The block data record is explained in the following section.

5.7.4.4 Input/output of the block

Inputs

Parameter	Type	Default setting	Description
Start	BOOL	0	Start of the job 0 = No job or cancel job 1 = Start and execute the job
ReadWrite	BOOL	0	Type of job 0 = Read 1 = Write
ParaNo	INT	1	Number of parameters (1 to 16)
AxisNo	BYTE	16#01	Axis number/axis ID in the case of a multiple system
HardwareId	HW IO	0	Hardware ID of the module access point/actual value telegram slot of the axis or drive

Outputs

Parameter	Type	Default setting	Description
Ready	BOOL	0	Feedback signal for connection in LacyCom environment 1 = Job completed or job aborted (one cycle)
Busy	BOOL	0	Job in progress if "Busy" = 1
Done	BOOL	0	Job completed: Edge change from 0 to 1
Error	BOOL	0	Collective fault active: "Error" = 1
Status	DWORD	0	1. word: binary-coded specification of the parameter access that has been disturbed 2. word: Type of fault
DiagId	WORD	0	Extended communication failure -> Error during SFB call

Source: DriveLib – Siemens: Post ID: 109475044
Version dated 10/2021

Hardware ID for LAddr: The hardware ID of the drive must be assigned to the LAddr input.

REQ activates the read block, then the value appears in Value.

A detailed description of the programming steps is not provided at this point.
You can find further information in the help for the TIA Portal.

The **Write** action first reads the parameter value and format of the set parameter from the variable frequency drive and writes it to the parameter structure. After successful reading, the parameter value of the corresponding job field set by the user is then transferred to the variable frequency drive. During this process the Busy bit is set to the value 1.

The **Read** action reads the parameter value and format of the set parameter from the SINAMICS drive and writes it to the parameter structure. The value of the corresponding job field to be read is then stored in the structure.

5.7.4.5 General information about the data block

Data structure of **sxParameter**:

sxParameter[x].siParaNo := parameter number
sxParameter[x1].siIndex := parameter index
sxParameter[x].srValue := (value range ±1.175 495 x 10^{-38} to ±3.402823 x 10^{38}) – is filled when the block is read
sxParameter[x].sdValue := (value range -214748364810 (= -2^{31}) to +214748364710 (= 2^{31})
sxParameter[x].syFormat := parameter format
sxParameter[x].swErrorNo := parameter error number

→ The above job fields are automatically assigned by the block.

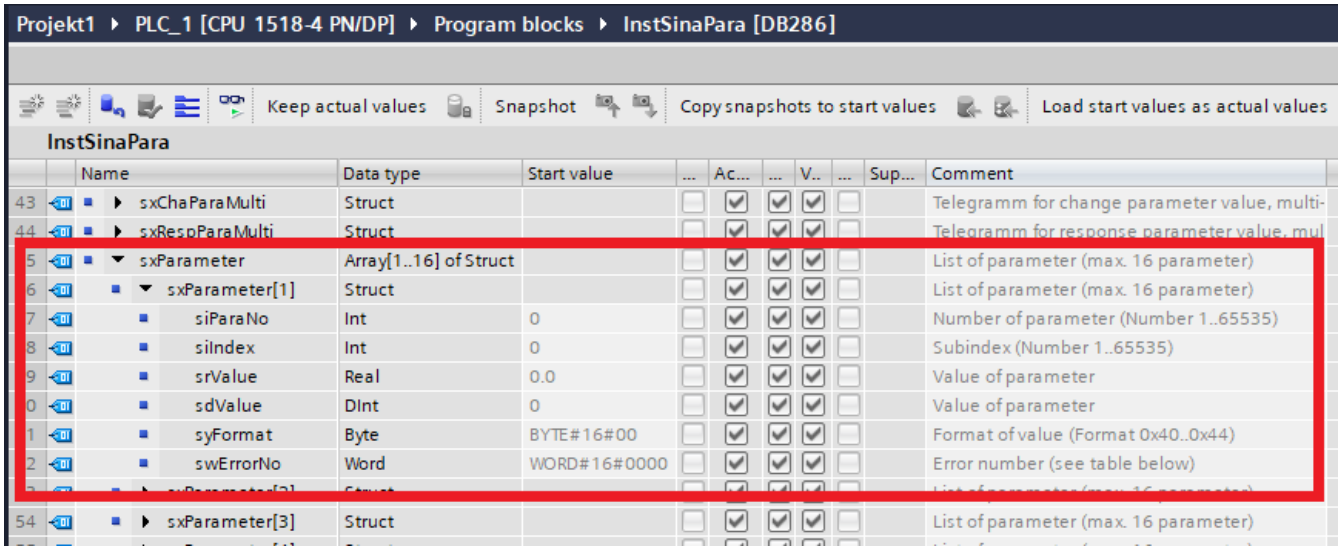


Figure 87: InstSinaPara program block

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