PowerXL™

DX-NET-SWD...
SmartWire-DT Interface Module for Variable Frequency Drive/ Variable Speed Starter PowerXL™

SmartWire-DT®
The easy way to connect

Powering Business Worldwide

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

Translation of the original operating manual
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Danger!
Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit the device.
- Cover or enclose any adjacent live components.
- Follow the engineering instructions (AWA/IL) for 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, PES) must be connected to the protective earth (PE) or the potential equalisation. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does 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 interface so that an open circuit on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the extra-low voltage of the 24 V supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, 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-stop devices must not cause a restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed and with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.
- 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-stop devices should be implemented.
- Wherever faults in the automation system may cause injury or material damage, 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.).
- Depending on their degree of protection, frequency inverters may contain live bright metal parts, moving or rotating components or hot surfaces during and immediately after operation.
- Removal of the required covers, improper installation or incorrect operation of motor or frequency inverter may cause the failure of the device and may lead to serious injury or damage.
- The applicable national accident prevention and safety regulations apply to all work carried on live frequency inverters.
- The electrical installation must be carried out in accordance with the relevant regulations (e. g. with regard to cable cross sections, fuses, PE).
- Transport, installation, commissioning and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations).
- Installations containing frequency inverters must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the frequency inverters using the operating software are permitted.
- All covers and doors must be kept closed during operation.
- To reduce the hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the drive (increased motor speed or sudden standstill of motor). These measures include:
  - Other independent devices for monitoring safety-related variables (speed, travel, end positions etc.).
  - Electrical or non-electrical system-wide measures (electrical or mechanical interlocks).
  - Never touch live parts or cable connections of the frequency inverter after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be live after disconnection. Fit appropriate warning signs.

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0 About this Manual

This manual contains specific information designed to enable you to connect a DX-NET-SWD1 or DX-NET-SWD3 SmartWire-DT interface module to a PowerXL variable frequency drive and to use the relevant parameters to configure the module according to your specific needs.

0.1 List of revisions

The following significant amendments have been introduced since previous issues:

Publication date	Page	Subject	New	Modification	Deleted
08/14		completely revised, DX-NET-SWD1 added		✓	
06/13		Initial issue			

0.2 Target group

This manual, MN04012009Z-EN, is intended for engineers, electricians, and automation technicians. Electrical engineering and physics-related knowledge and skills will be required in order to be able to commission the corresponding devices. In addition, readers must be familiar with how to use the SmartWire-DT system.

0.3 Further manuals for this device

Further information can be found in the following manuals:

On the topic "Variable frequency drive/Variable speed starter"

- DC1 – MN04020003Z-EN
- DA1 – MN04020005Z-EN
- DE1 – MN040011EN

On "SmartWire-DT":

- "SmartWire-DT The system" – MN05006002Z-EN
- "SmartWire-DT module" – MN05006001Z-EN
- "SmartWire-DT Gateways" – MN05013002Z-DE

→ The above mentioned manuals and further information can be found in the internet:
www.eaton.eu/powerxl

0.4 Sources

[1] Profile Drive Technology, PROFIdrive Technical Specification for PROFIBUS and PROFINET, Version 4.1, May 2006; Order No: 3.172

0.5 Writing conventions

Symbols used in this manual have the following meanings:

▶ Indicates instructions to be followed.

0.5.1 Hazard warnings of material damages

NOTICE
Warns about the possibility of material damage.

0.5.2 Hazard warnings of personal injury

CAUTION
Warns of the possibility of hazardous situations that may possibly cause slight injury.

WARNING
Warns of the possibility of hazardous situations that could result in serious injury or even death.

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

0.5.3 Tips

Indicates useful tips.

In order to make it easier to understand some of the images included in this manual, the housing of the variable frequency drive, as well as other safety-relevant parts, have been left out. However, it is important to note that the variable frequency drive must always be operated with its housing placed properly, as well as with all required safety-relevant parts.

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

0.6 Abbreviations

The following abbreviations are used in this manual.

dec	Decimal (base-10 numeral system)
DS	Default settings
EMC	Electromagnetic compatibility
FS	Frame Size
FWD	Forward run (clockwise rotating field)
GND	Ground (0-V-potential)
hex	Hexadecimal (base-16 numeral system)
ID	Identifier (unique ID)
LED	Light Emitting Diode (LED)
LSB	Least significant bit
MSB	Most significant bit
PE	Protective earth ⏚
PNU	Parameter number
REV	Reverse run (anticlockwise rotation field active)
ro	Read Only (read access only)
rw	Read/Write (read/write access)
SWD	SmartWire-DT
UL	Underwriters Laboratories

0.7 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 of measurement conversion examples

designation	US-American value	SI value	Conversion value	US-American designation
Length	1 in (‘‘)	25.4 mm	0.0394	inch
Power	1 HP = 1.014 PS	0.7457 kW	1.341	horsepower
Torque	1 lbf in	0.113 Nm	8.851	pound-force inches
temperature	1 °F (T_F)	-17.222 °C (T_C)	$T_F = T_C \times 9/5 + 32$	Fahrenheit
Speed	1 rpm	1 min^{-1}	1	Revolutions per minute
Weight	1 lb	0.4536 kg	2.205	pound
Flow rate	1 cfm	1.698 m^3/min	0.5889	cubic feed per minute

1 Device series

1.1 Checking the Delivery

The packaging must contain the following parts:

- A DX-NET-SWD1 or DX-NET-SWD3 SmartWire-DT interface module
- an instruction leaflet IL04012025Z or IL040008ZU.

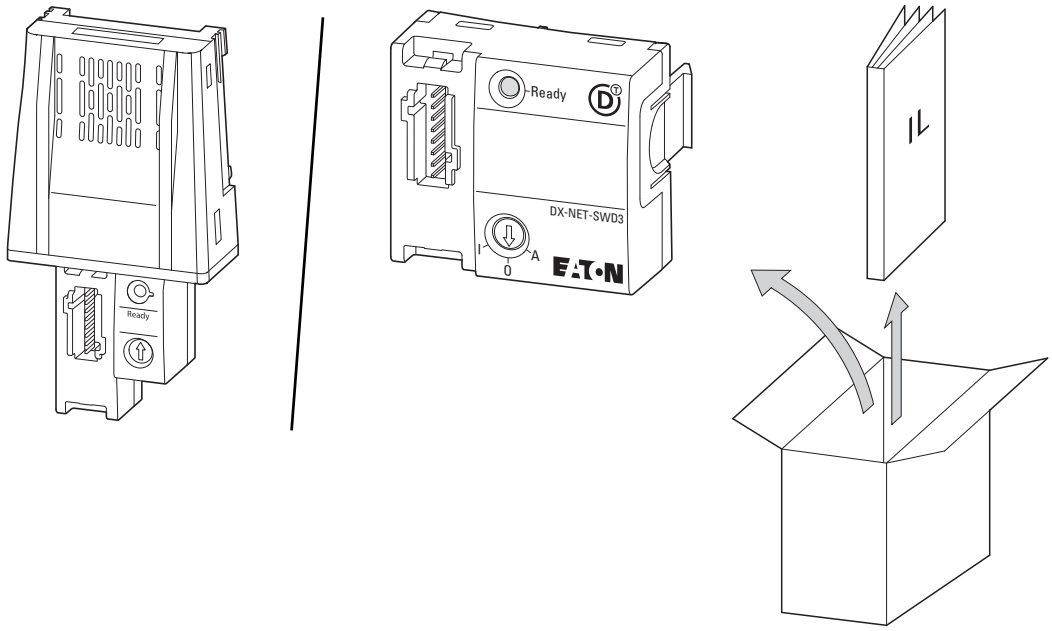


Figure 1: Equipment supplied with DX-NET-SWD1 (left) and DX-NET-SWD3 (right) interface modules

1.1.1 Key to part numbers

The catalog number selection and part no. for the DX-NET-SWD… interface module are made up of the following parts:

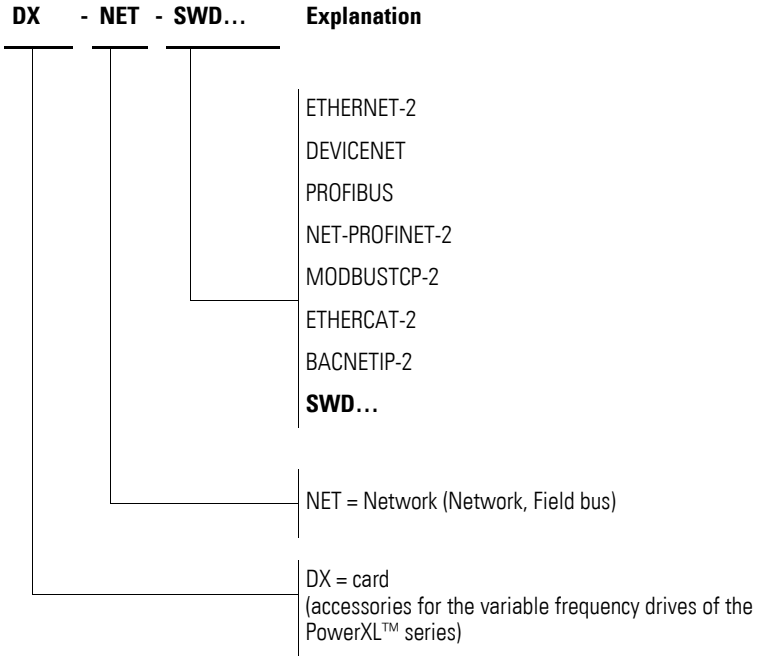


Figure 2: Catalog number selection for DX-NET-SWD… SmartWire-DT interface module

1.1.2 General rated operational data

Technical Data	Symbol	Unit	Value
General			
Standards			meets the requirements of the EN 50178 (standard for electrical safety)
Production quality			RoHS, ISO 9001
Environmental Conditions			
Operating Temperature	ϑ	?C	-40 (no hoarfrost) up to +70
Storage temperature	ϑ	?C	-40 - +85
Climatic proofing	p_w	%	< 95, relative humidity, no condensation permitted
Altitude	H	m	max. 1000
Vibration	g	m/s^2	5 – according to IEC 68-2-6; 10 - 500 Hz; 0.35 mm
SmartWire-DT			
interface			SmartWire-DT external device plug SWD4-8SF2-5
Transfer cable			SmartWire-DT ribbon cable
Baud rate		Kbit/s	125 - 250
max. current consumption	I	mA	24

→ The 24-V-SmartWire-DT control voltage U_{AUX} is not being used.

1.2 Designation at DX-NET-SWD1

The following drawing shows the DX-NET-SWD1 SmartWire-DT interface module:

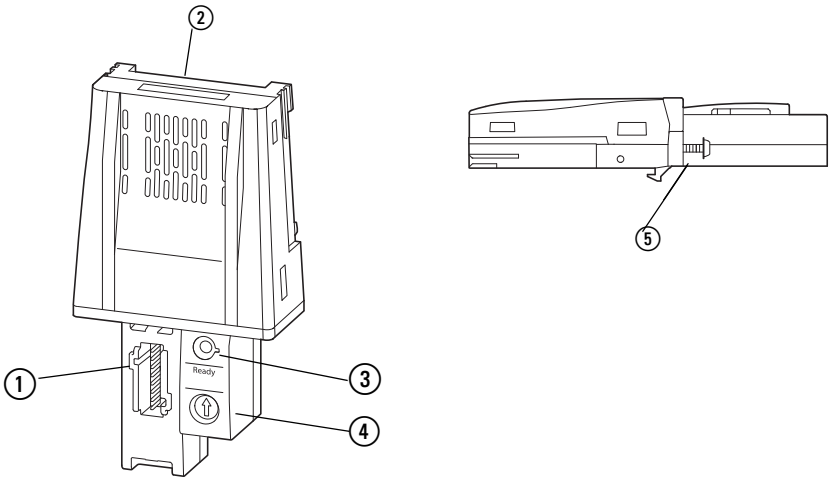


Figure 3: Designations at DX-NET-SWD1

① Connection of SmartWire-DT external device plug
② Adapter extension (50 pole)
③ SmartWire-DT diagnostics LED
④ Selector switch 1-0-A
⑤ Screws for securing variable frequency drive

1.3 Designation at DX-NET-SWD3

The following drawing shows the DX-NET-SWD3 SmartWire-DT interface module:

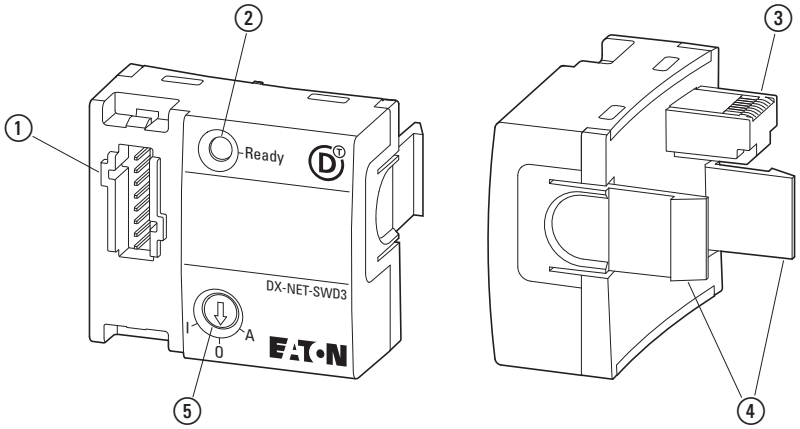


Figure 4: Designations at DX-NET-SWD3

① Connection of SmartWire-DT external device plug
② SmartWire-DT diagnostics LED
③ RJ45 plug
④ Clips for fixing the module on the variable frequency drive/variable speed starter
⑤ Selector switch 1-0-A

1.4 Proper use

The DX-NET-SWD… SmartWire-DT interface module is an electrical device that can be used to control PowerXL variable frequency drives/variable speed starters and connect them to a SmartWire-DT system. It is designed to be installed in a machine or assembled with other components in order to build a machine or system.

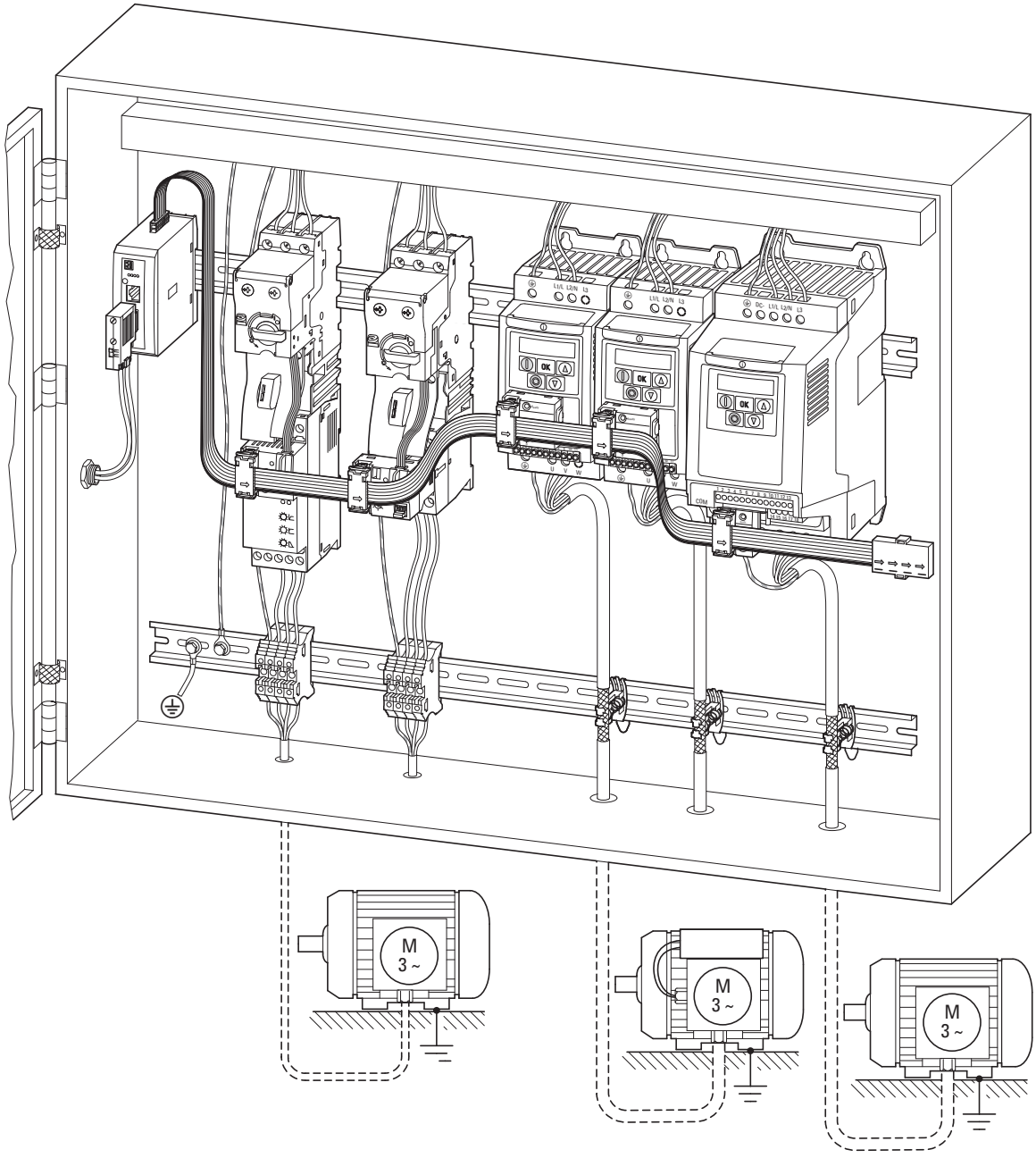


Figure 5: Flush mounting in control panel

The DX-NET-SWD… SmartWire-DT interface module is not intended for household use, and is instead designed exclusively for use in commercial applications.

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

1.5 Maintenance and inspection

The DX-NET-SWD… SmartWire-DT interface module will not require any maintenance if the general rated operational data, as well as all module-specific technical data, is observed. However, please note that external influences may have an impact on the module's operation and lifespan.

The DX-NET-SWD… SmartWire-DT interface module has not been designed in such a way as to make it possible to replace or repair it. If the module is ruined by external influences, it will not be possible to repair it!

1.6 Storage

If the DX-NET-SWD… interface module is stored before use, it will be necessary to ensure that the ambient conditions at the storage location are suitable for storage:

- Storage temperature: -40 - +85 °C,
- Relative average air humidity: < 95 %, no condensation permitted.

1.7 Service and warranty

In the unlikely event that you run into a problem with your Eaton DX-NET-SWD… SmartWire-DT interface module, please contact your local sales office.

When you call, have following data ready:

- the exact part no. (= DX-NET-SWD1 or DX-NET-SWD3),
- the date of purchase,
- A detailed description of the problem that occurred when running the DX-NET-SWD… SmartWire-DT interface module

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

24-hour hotline: +49 (0)1805 223 822

Email: AfterSalesEGBonn@Eaton.com

1.8 Disposal

The DX-NET-SWD… SmartWire-DT interface module can be disposed of as electronic waste in accordance with all currently applicable national regulations. Dispose of the device in accordance with the respectively applicable environmental laws and provisions for the disposal of electrical or electronic devices.

2 Engineering

2.1 SmartWire-DT

SmartWire-DT is an intelligent wiring system and makes the reliable and easy connection of switching devices, pilot devices and I/O components with overriding bus systems possible. The components that are connected with SmartWire-DT are linked, e.g. to PROFIBUS-DP or CANopen communication networks via gateways using SmartWire-DT masters.

With the SmartWire-DT system up to 99 modules can be connected to form a network. Modules can include SmartWire-DT I/O modules or SmartWire-DT modules for contactors, soft starters, drives or pilot devices. The electrical connection is effected via a special 8-pole connecting cable and the relevant plugs.

When equipped with a DX-NET-SWD… SmartWire-DT interface module, PowerXL variable frequency drives can be connected to a SmartWire-DT system and, as a result, to a higher-level PLC. SmartWire-DT can then be used to configure, control, and monitor these devices.

This chapter uses the original English terms that appear throughout a variety of specifications (e.g., SmartWire-DT, PROFIdrive).

2.2 LED (SmartWire-DT diagnostics LED)

Table 2: Status of the SmartWire-DT diagnostics LED

Color	Status	Meaning
Orange	Continuous light	Switching command for variable frequency drive via SmartWire-DT
	flashing	Switching command active, diagnostics available
Green	Continuous light	Device is ready, error-free

	Flashing (1 Hz)	• addressing process in progress
		  ◦ after gateway/control section power On
		  ◦ after actuation of the configuration button on the gateway/control section
		• Module not in current configuration
		• invalid type

	Fast flashing (3 Hz)	Incorrect position of the 1-0-A-switch

2.3 1-0-A switch

The 1-0-A switch's positions are as follows:

- 1: Variable frequency drive is activated
- 0: Variable frequency drive deactivated
- A: switching command via SmartWire-DT

Intermediate 1-0-A switch positions are not permitted, and will cause the device to stop and send an fault message.

2.4 Interoperability

2.4.1 Basic devices

The interface modules can be used with the following basic device firmware versions (and higher):

Table 3: Basic device firmware versions

Basic device	Firmware Version	Description
DA1	V 1.30	SmartWire-DT communication-capable
DC1	V 1.10	SmartWire-DT communication-capable
	V 1.20	Additional acyclical parameters
DE1	V 1.00	SmartWire-DT communication-capable

2.4.2 Gateways

The DX-NET-SWD… SmartWire-DT interface module's interoperability is guaranteed with the following SmartWire-DT gateway versions (and higher):

Table 4: Firmware versions of SmartWire-DT gateways

SmartWire-DT gateway	Firmware Version
EU5C-SWD-CAN	V 1.20
EU5C-SWD-DP	V 1.20

The firmware of the SmartWire-DT gateway can be updated using the SWD-Assist program. This program, as well as the required firmware versions, can be downloaded for free on the Internet at:
http://downloadcenter.moeller.net

2.4.3 Fieldbus description files

The DX-NET-SWD… SmartWire-DT interface module's interoperability is guaranteed with the following versions (and higher) of the fieldbus description file for the gateways listed below:

Table 5: Compatible field bus description files

SmartWire-DT gateway	Description file
EU5C-SWD-CAN	from EU5C-SWD-CAN_V130.eds
EU5C-SWD-DP (Intel-based CPU)	from Moed14.gsd (V. 1.08)
EU5C-SWD-DP (Motorola-based CPU)	from Moeld14.gsd (V. 1.08)
SWD master (i. e. XV100)	from V.1.02

These and other fieldbus description files can be found on the Internet at: http://downloadcenter.moeller.net

2.4.4 SWD-Assist

The SWD-Assist program provides valuable support in the engineering of your SmartWire-DT topology. SWD-Assist is software that runs under operating systems Windows 2000 (SP 4), Windows XP, Windows Vista (32-bit) or Windows 7 and relieves you of the planning work required for an SWD topology.

The DX-NET-SWD… SmartWire-DT interface module can be used in SWD-Assist version V 1.80 and higher.

The SWD-Assist program can be downloaded for free on the Internet at: http://downloadcenter.moeller.net

2.5 Compatible variable frequency drive

- The DX-NET-SWD1 SmartWire-DT interface module can be used with all DA1 variable frequency drives with an IP20 or IP55 degree of protection
- The DX-NET-SWD3 SmartWire-DT interface module can be used with all DC1 variable frequency drives and DE1 variable speed starters with an IP20 degree of protection.

2.6 Exchange of variable frequency drives

If you replace a DA1 or DC1 variable frequency drive or a DE1 variable speed starter in a supply system, you do not need to press the configuration button after replacing it and switching on the voltage!

The configuration button only needs to be pressed if you replace the interface module. Doing so will assign a new network address to the module.

DANGER

Before replacing a DA1 or DC1 variable frequency drive or a DE1 variable speed starter, make sure to switch off the voltage and the entire SmartWire-DT system!

NOTICE

When replacing a DA1 or DC1 variable frequency drive or a DE1 variable speed starter, the order of the SmartWire-DT modules must not be altered.

3 Installation

3.1 Introduction

This chapter explains how to install and electrically connect DX-NET-SWD1 and DX-NET-SWD3 SmartWire-DT interface modules.

→ Perform all installation work with the specified tools and without the use of excessive force.

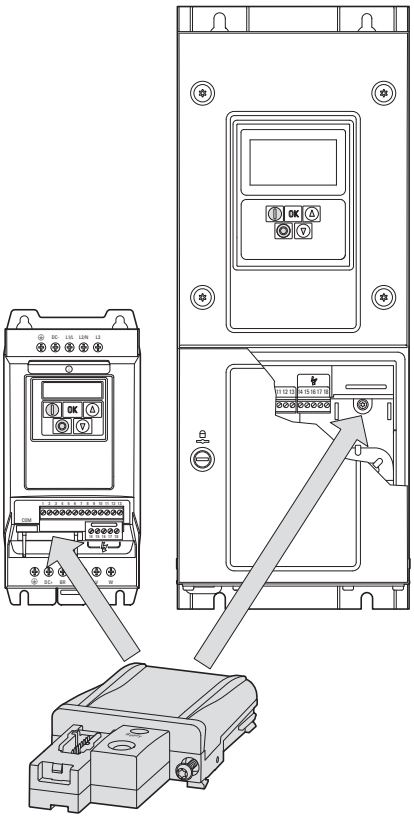


Figure 6: Installing a DX-NET-SWD1 connection in a DA1 device

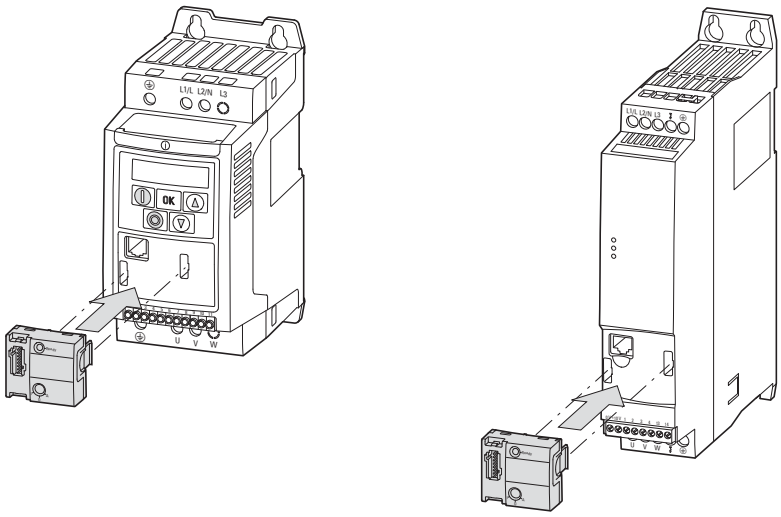


Figure 7: Installing a DX-NET-SWD3 connection on a DC1 (left) or DE1 (right) device

3.1.1 Notes on the documentation

Documentation for the installation:

- For DA1 variable frequency drive:
  - Instruction leaflet IL04020010Z for devices with FS2 and FS3 size with IP20 degree of protection,
  - Instruction leaflet IL04020011Z for devices of sizes FS4 to FS7 with an IP55 degree of protection
  - Instruction leaflet IL04020012Z for panel-version variable frequency drives of size FS8
- For DC1 variable frequency drive
  - Instruction leaflet IL04020009Z for devices with an IP20 degree of protection
  - Instruction leaflet IL04020013Z for devices with an IP66 degree of protection
- For DE1 variable speed starter:
  - Instruction leaflet IL040005ZU

These documents are available as PDF files on the Eaton Internet website. They can be quickly located at

www.eaton.com/moeller → Support

by entering the document number as the search term.

3.1.2 Notes on the mechanical surface mounting

DANGER

Make sure that the equipment is fully de-energized when performing the handling and installation work required to mechanically set up and install the DX-NET-SWD… SmartWire-DT interface module.

→ When installing the DX-NET-SWD… SmartWire-DT interface module, it will be necessary to open the variable frequency drive's housing. We recommend that this mounting work be carried out before electrically installing the variable frequency drive.

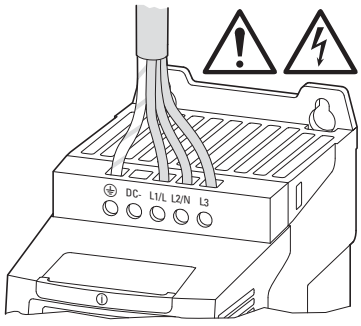


Figure 8: Perform mounting measures only in a de-energized state

3.2 Mounting

- DX-NET-SWD**1** modules can be installed in any DA1 variable frequency drive with an IP20 or IP55 degree of protection.
- DX-NET-SWD**3** modules can be installed on any DC1 variable frequency drive or DE1 variable speed starter with an IP20 degree of protection.

Module DX-NET-SWD2 is needed for all DA1 and DC1 variable frequency drives with an IP66 degree of protection.

3.2.1 Mounting of DX-NET-SWD1

DX-NET-SWD1 modules can be installed in any DA1 variable frequency drive with an IP20 or IP55 degree of protection.

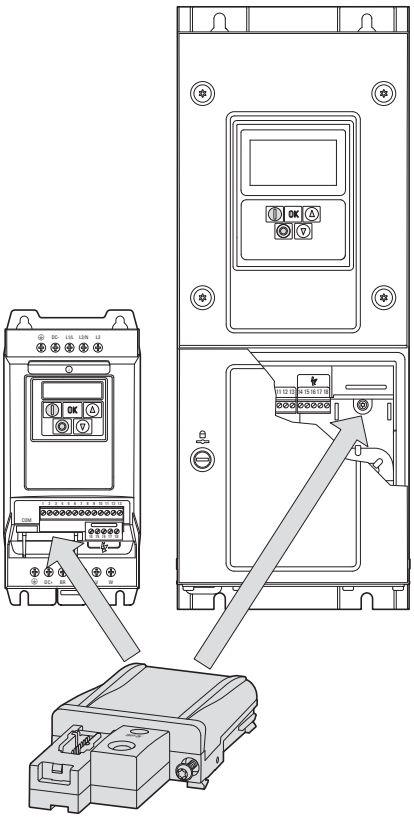


Figure 9: Installation in DA1 variable frequency drives (left: IP20; right: IP55)

Installing the module in DA1 devices with an IP20 degree of protection

In order to install a DX-NET-SWD1 module in a DA1 variable frequency drive with an IP20 degree of protection, the module needs to be inserted into the device from below. In order to do this, the cover on the variable frequency drive must first be removed with a flat-blade screwdriver.

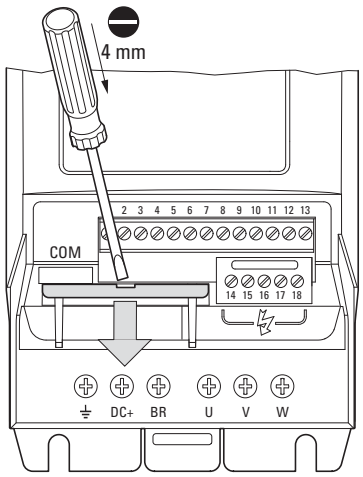


Figure 10:Remove the cover

Do not insert tools or other objects into the opened variable frequency drive.
Ensure that foreign bodies do not enter the opened housing wall.

Once you have removed the cover, you can slide the DX-NET-SWD1 interface module in from below and secure it with the two screws.

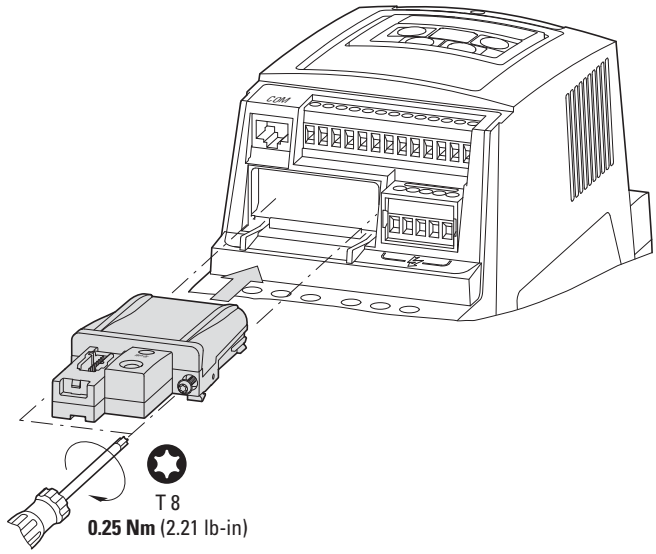


Figure 11:Sliding the DX-NET-SWD1 connection in

Installing the module in DA1 devices with an IP55 degree of protection

In order to install a DX-NET-SWD1 module in a DA1 variable frequency drive with an IP55 degree of protection, the module needs to be inserted into the device, next to the control signal terminals. In order to do this, the cover on the variable frequency drive must first be removed with a flat-blade screwdriver.

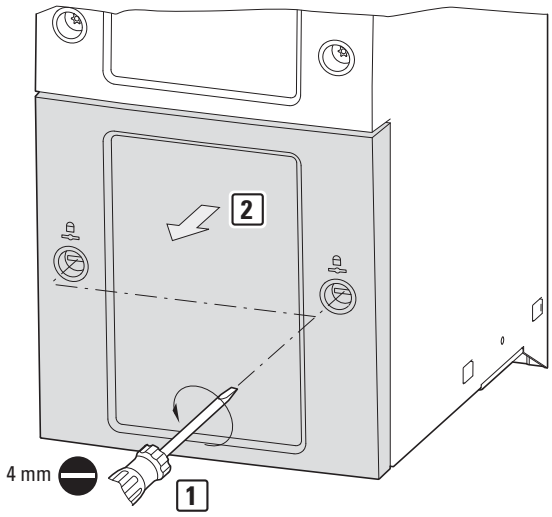


Figure 12:Removing the housing cover in sizes FS4 and FS5

→ Do not insert tools or other objects into the opened variable frequency drive.
Ensure that foreign bodies do not enter the opened housing wall.

Once you have removed the cover, you can slide the DX-NET-SWD1 interface module in from below and secure it with the two screws.

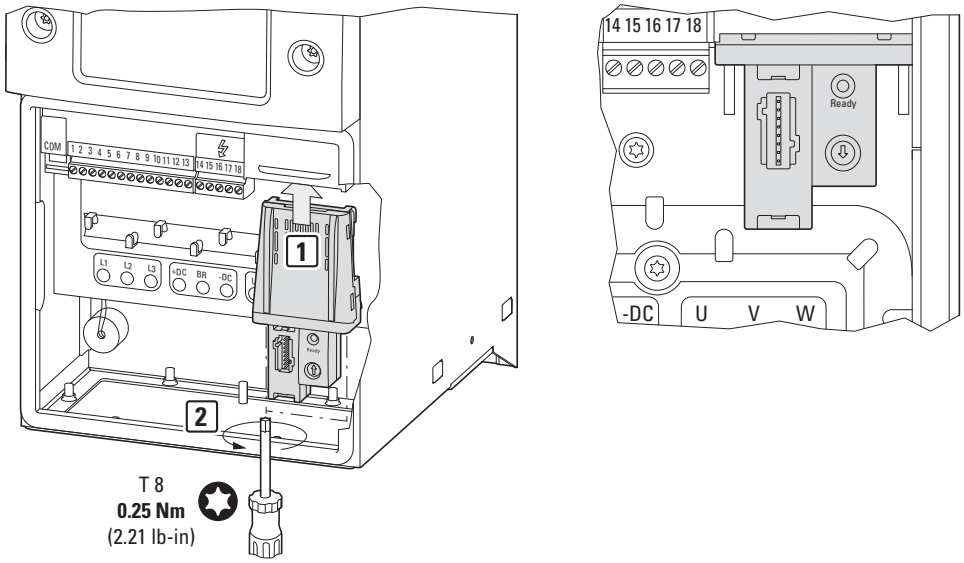


Figure 13:Sliding the DX-NET-SWD1 connection in

The SmartWire-DT ribbon cable is connected the same way for all modules (→ Section 3.3.1, "Mounting of SmartWire-DT flat cable", page 26).

In the case of DA1 variable frequency drives with an IP55 degree of protection, the cover needs to be secured again with a screwdriver once the SmartWire-DT cable has been connected.

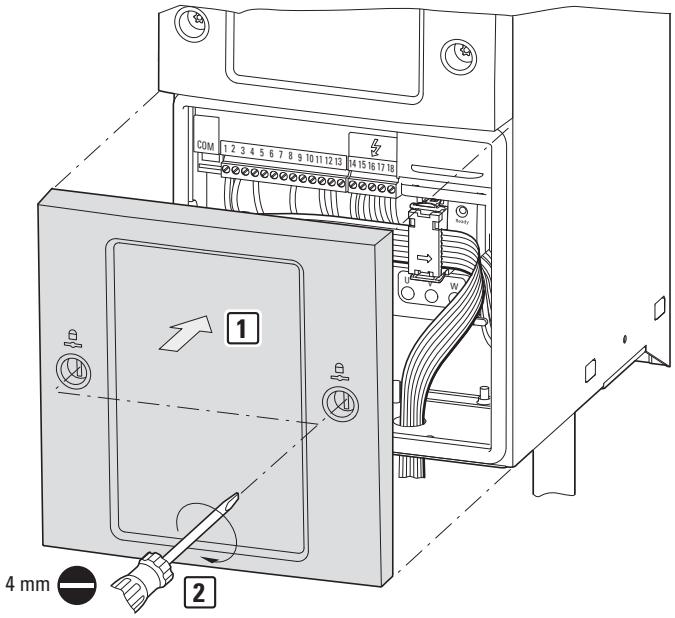


Figure 14:Securing the housing cover in DA1 variable frequency drives with a size of FS4 or FS5

3.2.2 Dismantling of DX-NET-SWD1

To remove a DX-NET-SWD1 interface module from a variable frequency drive:

- ▶ Use a screwdriver (just like for installation) to remove the front plate (on devices with an IP55 degree of protection only)
- ▶ Loosen the two screws on the module in order to release the locking mechanism. Then pull the module out from the slot.

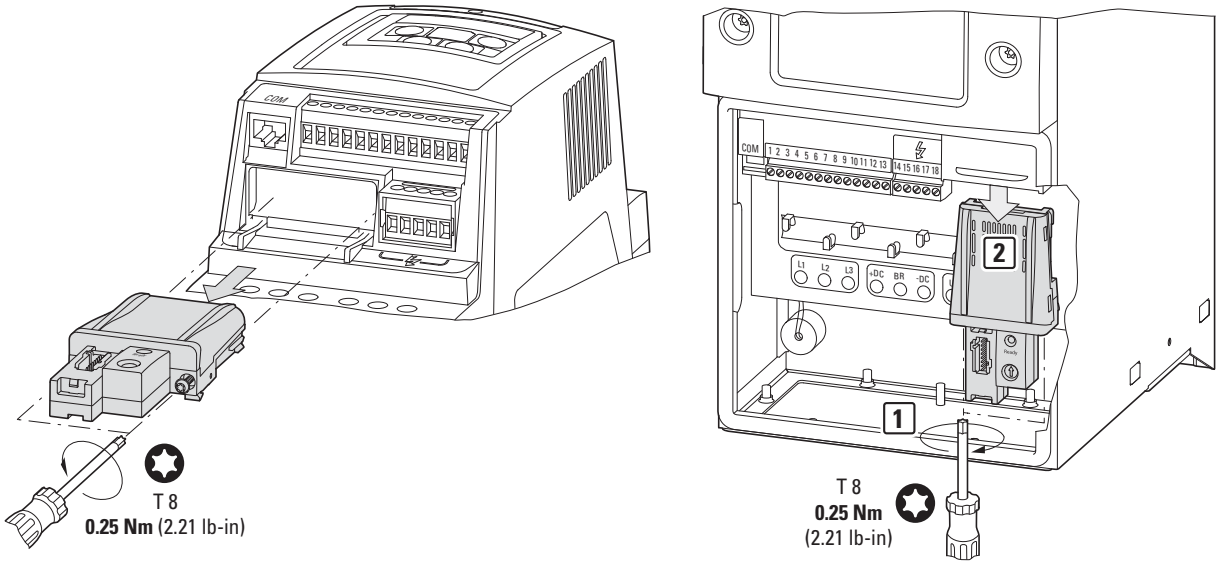


Figure 15:Removing a DX-NET-SWD1 interface module (left: IP20, right: IP55)

3.2.3 Mounting of DX-NET-SWD3

In order to install a DX-NET-SWD3 connection on a DC1 variable frequency drive or DE1 variable speed starter with an IP20 degree of protection, the module needs to be plugged into the front of the housing. In order to do this with DC1 variable frequency drives, the two cover plugs must first be removed with a flat-blade screwdriver.

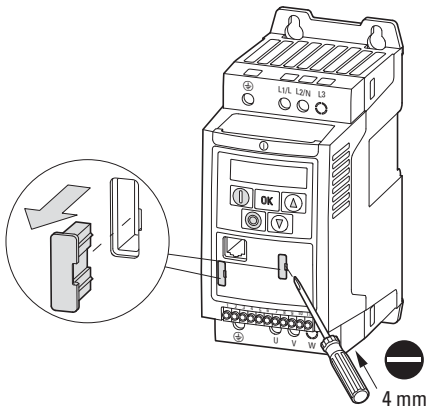


Figure 16:Removing the cover plugs on DC1 variable frequency drives

→ Do not insert tools or other objects into the opened variable frequency drive.
Ensure that foreign bodies do not enter the opened housing wall.

The DX-NET-SWD3 interface module can then be plugged in. The two clips on the module will make it snap into place on the basic device.

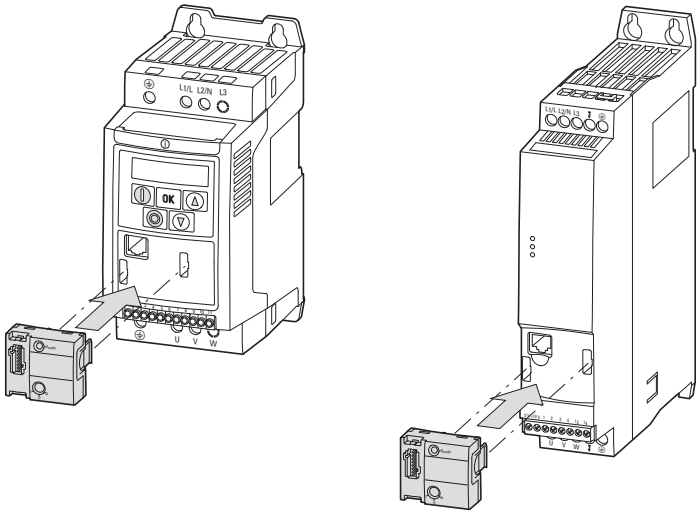


Figure 17:Plugging the DX-NET-SWD3 interface module in (left: DC1, right: DE1)

3.2.4 Dismantling of DX-NET-SWD3

To remove a DX-NET-SWD3 interface module from a variable frequency drive/variable speed starter:

- ▶ press on the left and right side of the fastening clips and pull this up carefully.
- ▶ Then re-insert both cover plugs.
  (in doing so, note that the cover plugs are not identical.)

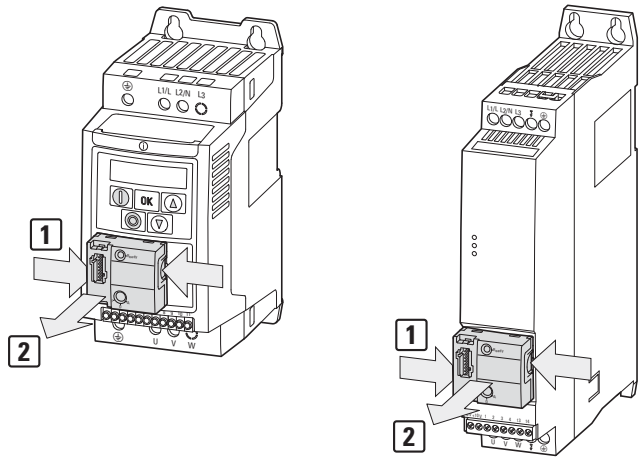
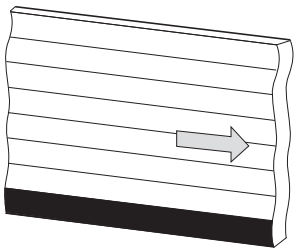


Figure 18:Removing a DX-NET-SWD3 interface module
(left: DC1, right: DE1)

3.3 Install SmartWire-DT connection

The connection of the SmartWire-DT is carried out via the 8-pin external device plug SWD4-8SF2-5.



	Meaning
+24 V DC	Contactor control voltage
Chassis ground	Contactor control voltage
GND	for device supply voltage and data cable
Data B	Data cable B
Data A	Data cable A
GND	for device supply voltage and data (data A, data B)
SEL	Select cable for automatic addressing of the SmartWire-DTmodules
+15 V DC	Device supply voltage

Figure 19:Configuration of the SmartWire-DT flat band conductor

3.3.1 Mounting of SmartWire-DT flat cable

Connect the SWD external device plug SWD4-8SF2-5 with the adapted SmartWire-DT ribbon cable.

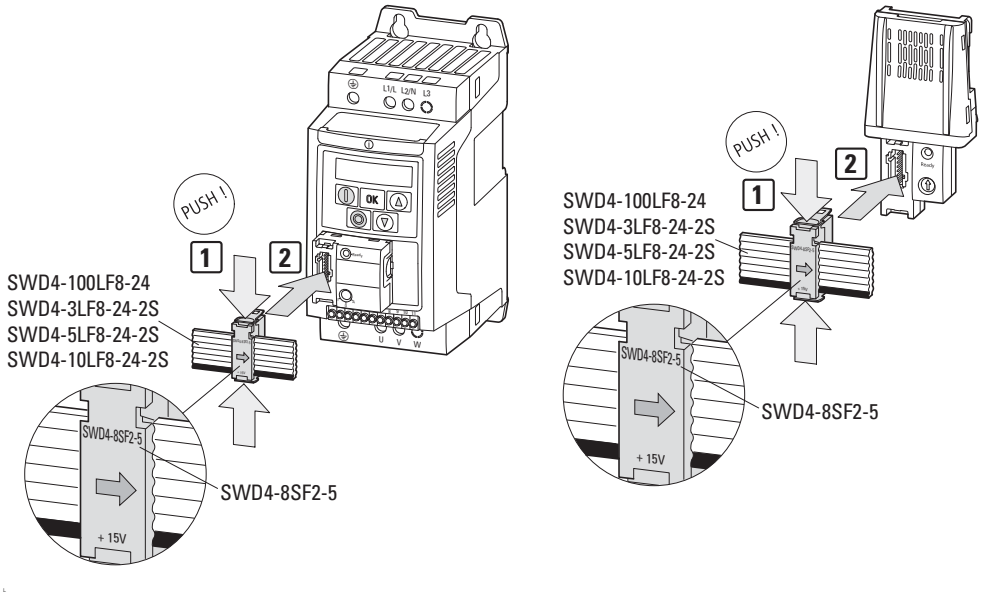


Figure 20:Connecting the SmartWire-DT external device plug with an adapted ribbon cable (left: DX-NET-SWD3, right: DX-NET-SWD1)

NOTICE

Do not install the SWD4-8SF2-5 SmartWire-DT external device plug without switching off the supply and control voltages first!

3.3.2 Dismantling of the SmartWire-DT flat cable

NOTICE

The dismantling must only be carried out with the supply and control voltage switched off!

In order to dismantle the SmartWire-DT flat cable from the variable frequency drive, press from the top and the bottom at the same time and carefully pull off.

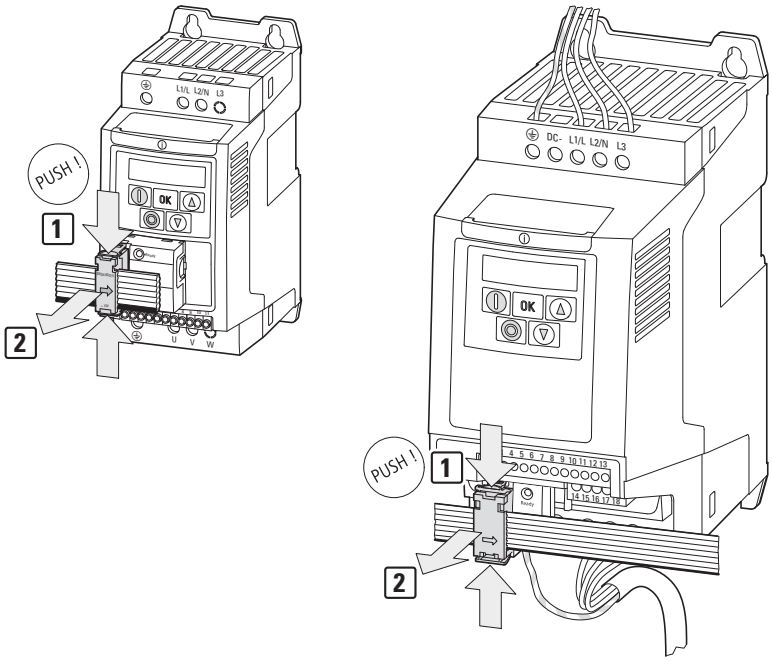


Figure 21:Disconnecting the SmartWire-DT ribbon cable
(left: DX-NET-SWD3, right: DX-NET-SWD1)

4 Commissioning

Carry out all the commissioning work for the variable frequency drive/variable speed starter as described in manual MN04020005Z-EN (for DA1), MN04020003Z-EN (for DC1), or MN040011EN (for DE1).

Check the settings and installations for the connection to the SmartWire-DT system which are described in this manual.

NOTICE

Make sure that starting the motor will not put anyone or anything in danger. Disconnect the driven machine if there is a danger in an incorrect operating state.

4.1 Hardware enable signal

When running in SmartWire-DT mode, every device needs a hardware enable signal. In order to provide this enable signal, a high signal must be applied at digital input 1.

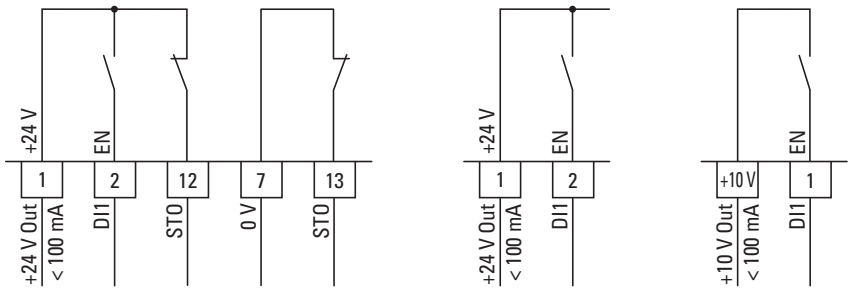


Figure 22: Hardware enable (left: DA1, center: DC1, right: DE1)

4.2 Parameter Sets

The following parameter settings listed below are required for operation with SmartWire-DT.

- For DA1 variable frequency drives: P1-12
- For DC1 variable frequency drives and DE1 variable speed starters: P12

Valule P-12	description
0	Control signal terminals
…	…
9	SmartWire-DT actuation with setpoint value via SmartWire-DT
10	SmartWire-DT actuation with local setpoint value
11	Local actuation with setpoint value via SmartWire-DT
12	Actuation via SmartWire-DT - depending on the settings with the loss in communication, automatic change to the local actuation
13	Actuation and setpoint value via SmartWire-DT with enable via terminal

Other parameters do not have to be set.

Further information about parameter P-12
→ Section 4.5.3.2, “PNU928 (ProcessData Access)“.

4.3 Programming

4.3.1 Introduction

Cyclic and acyclic data as well as diagnostic data can be transferred via the SmartWire-DT system. The number of cyclic data is variable and is defined with the aid of profiles.

The cyclical and acyclical data used by PowerXL variable frequency drivers has been designed in such a way as to match the following profiles and meet the following standards:

- the standard specified by SmartWire-DT,
- The PROFIdrive profile

The appropriate profile can be selected by the user.

4.3.2 State diagrams

The state diagrams used below correspond to PROFIdrive profile 4.1 and are adapted in line with the relevant profiles.

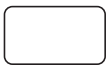
The grey boxes in the figures represent the current state (S = State) with the help of the input bytes. The white boxes represent the transition conditions with the help of the relevant output byte bits.

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

For the available parameter numbers (PNU)
→ Section 4.5, “Acyclic data“

State diagrams are displayed in the following. The images indicate the following states:

Variable frequency drive/variable speed starter state



Command (input) issued to variable frequency drive/
variable speed starter

4.3.2.1 Network – State diagram for profile 1

If the profile 1 with **PNU 928.0 = 1 - 5** is used then the general state diagram shown below will apply.

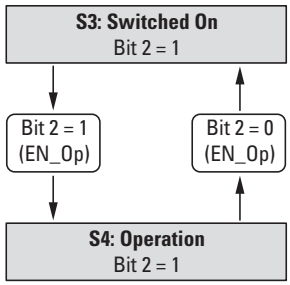


Figure 23: State diagram: Network (profile 1)

4.3.2.2 Network – S4: Operation, profile 1

If the profile 1 with **PNU 928.0 = 1 - 5** is used then the general state diagram shown below will apply. The transitions will take place when the state of the EN_Set bit is changed.

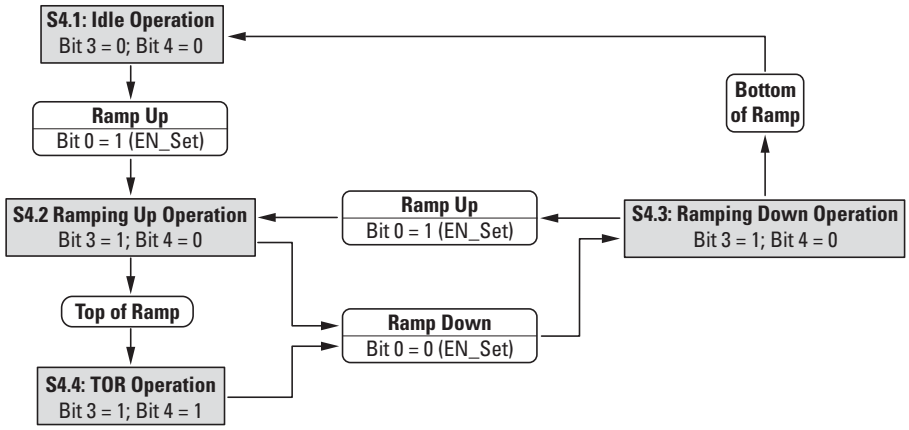


Figure 24: State diagram: Network – S4 (profile 1)

4.3.2.3 Network – State diagram for profile 2

If the profile 2 with **PNU 928.0 = 1 - 5** is used then the general state 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.

→ For more information on the Ctl_Req and Ctl_PLC bits, see → Section 4.4.4, "Profile 1 (8 bit): Inputs (status)".

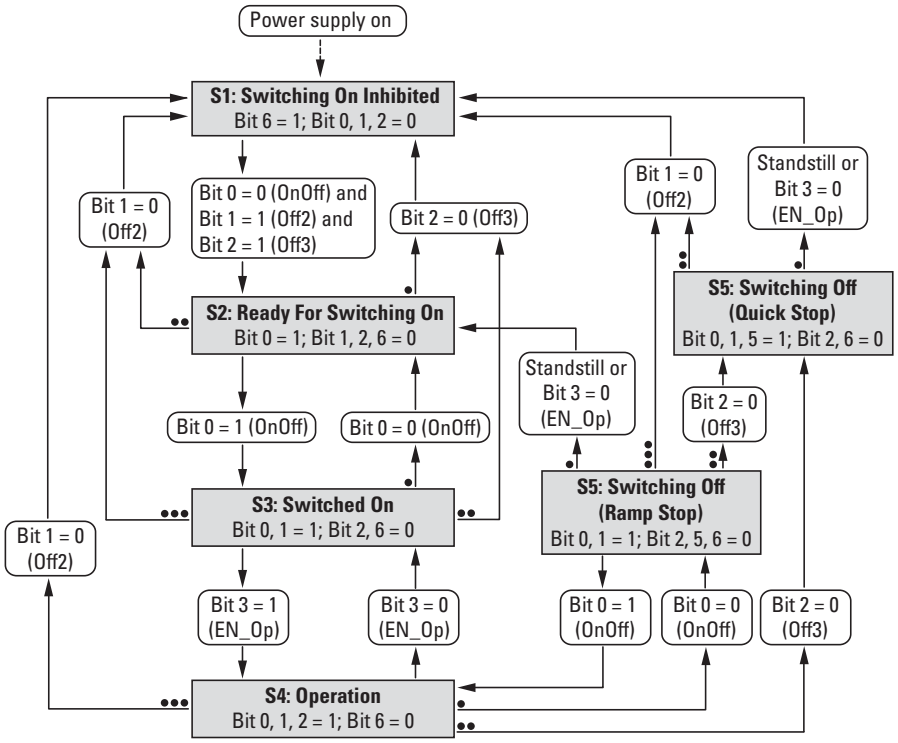


Figure 25: State diagram: Network (profile 2)

4.3.2.4 Network – S4: Operation, profile 2

If the profile 2 with **PNU 928.0 = 1 - 5** is used then the general state diagram shown below will apply. The transitions will take place when the corresponding bits' state is changed.

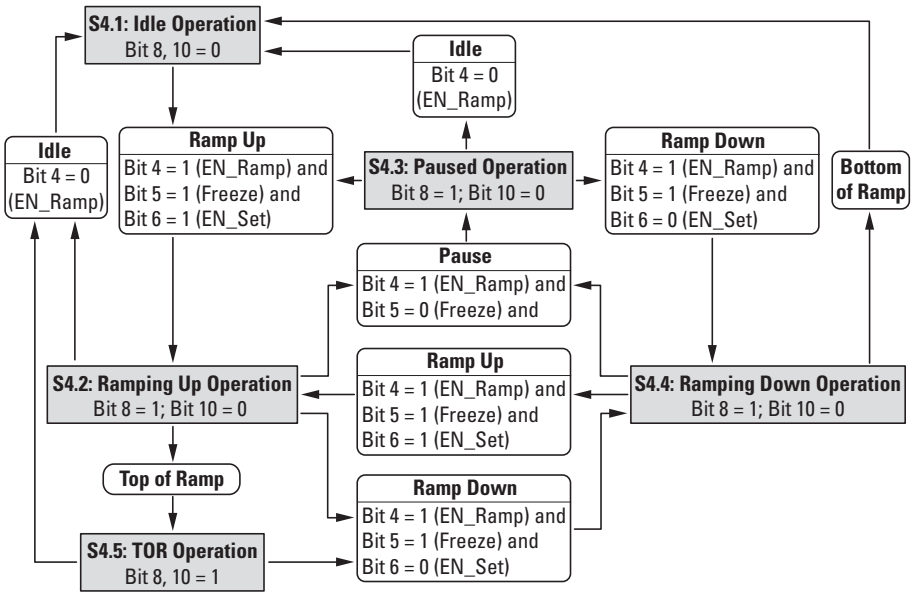


Figure 26: State diagram: Network – S4 (profile 2)

4.4 Cyclic data

4.4.1 Introduction

The amount of cyclical input/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. These profiles can be selected in the hardware/PLC configuration program (in the SWD-Assist program, for example).

Two cyclic profiles can be selected:

- Profile 1:
  Control and status data will be processed as per the I/O link profile.
- Profile 2:
  This group supplements the variable frequency drive profile with the PROFIdrive profile as the PNO has defined for the cyclic data-exchange with a drive. Control and status data will be processed according to the PROFIdrive profile.

Profile 2 is set in the default settings.

Table 6: Profiles

Profile		Input bytes (status)						Output bytes (control)					Bytes
No.	Name	0	1	2	3	4	Σ	0	1	2	3	Σ	Σ
1	DX-NET-SWD 8 bit	Smart Wire-DT	FU				1 + 1	Smart Wire-DT	FU			1 + 1	4
2	DX-NET-SWD PD 2 x 16-Bit	Smart Wire-DT	FU	FU	FU	FU	1 + 4	Smart Wire-DT	FU	FU	FU	4	9

VFD = DA1, DC1 variable frequency drive or DE1 variable speed starter

For information on the subject of the "cyclic data transfer", consult manual MN05013002Z-EN, "SmartWire-DT Gateways."

4.4.2 Simplified starting with profile 2

4.4.2.1 DOL starting in profile 2

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

Table 7: Starting

Value	description
16#0000	Voltage on device and connection present.
16#047E	This command changes the drive to Ready, but it is still at a standstill.
16#047F	This changes it from Ready to RUN and it starts to move if a setpoint value is set.

Table 8: Stop with ramp

Value	description
16#047F	Running in operation.
16#046F	Performs the ramp stop.
16#047F	This will cancel the ramp stop, and the variable frequency drive/ variable speed starter will keep running.

Table 9: Stop, with run-down

Value	description
16#047F	Running in operation.
16#047E	Performs the uncontrolled stop.
16#047F	This will cancel the ramp stop, and the variable frequency drive/ variable speed starter will keep running.

Table 10: Fault scenario

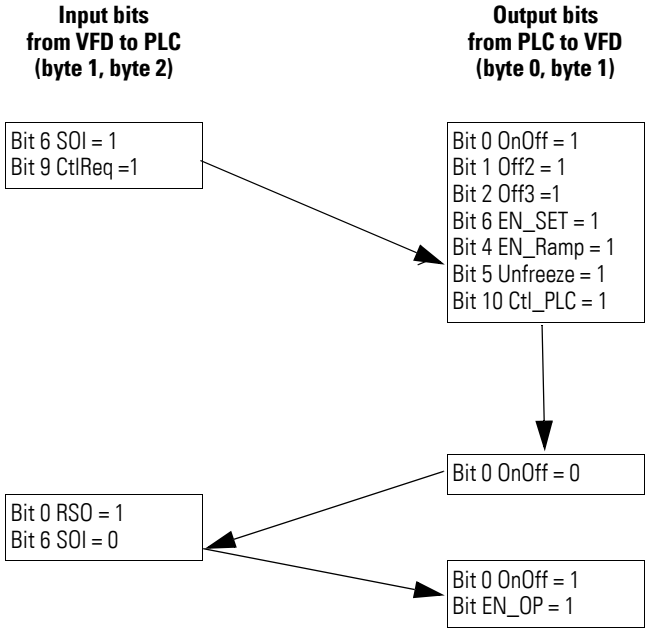
Value	description
16#047F	A fault occurs during ongoing operation.
16#0507	Resets the variable frequency drive/variable speed starter
16#047F	Start after troubleshooting

Setpoints set using output bytes 2 and 3 will be represented as integer values. 100% equals 4000_{hex}.

The operating direction is specified with a negative setpoint:
For example: -100% ≙ $C000_{hex}$

Actual values will be returned in the same format using input bytes 3 and 4.

4.4.3 Simplified starting with profile 2



During normal operation, bit 3 EN_OP is used to start the device.

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 set using output bytes 2 and 3 will be represented as integer values. 100% equals 4000_{hex}.

The operating direction is specified with a negative setpoint:
For example: -100% ≙ $C000_{hex}$

Actual values will be returned in the same format using input bytes 3 and 4.

4.4.4 Profile 1 (8 bit): Inputs (status)

Input bytes 0 and 1 (short) are mapped as follows on SmartWire-DT:

Table 11: Profile 1: input bytes 0 and 1

Byte:	BIT	Designation	Meaning
0	0, 1	–	Not used
	2, 3	A1, A2	**1-0-A switch on DX-NET-SWD** 00: not defined 10: Position A: Automatic (commands via SmartWire-DT/control signal terminal) 01: Position 0: variable frequency drive stop 11: Position 1: variable frequency drive operation
	4	DIAG	0: no diagnostic alarm 1: Diagnostic alarm present
	5	–	Not used
	6	PRSNT	0: Device not present 1: Device present
	7	SUBST	0: Configured module present 1: Universal module M22-SWD-NOP(C) present

Byte:	BIT	Designation	Meaning
1	0	ERR	**Error present** 0: no error 1: Error Indicates whether there is a variable frequency drive/variable speed starter fault. If there is one, the device will respond as configured in PNU 362.0.
	1	WARN	**Warning present** 0: no warning 1: Warning Indicates whether there is a variable frequency drive/variable speed starter warning.
	2	RDY	**Ready, switched on** 0: not switched on 1: switched on Indicates whether the variable frequency drive/variable speed starter is switched on.
	3	f = f-ref	**operation at setpoint** 0: Ref. frequency not reached 1: Ref. frequency reached As long as the slip compensation is lower than 5%, this parameter will have a value of 1. The bit's value will change to 0 for values higher than 5%. • DC1, DE1: The bit will have a constant value of 1. In the event of a fault, the value will change to 0. • DA1: If the slip frequency is lower than 5% ([(P0-63)-(P0-60))/(P0-63] < 5%), the value will be 1. Otherwise, the value will be 0.
	4	f-Level	**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, DE1: P00-03 ≧ P-19 • DA1: Depending on the operating mode: P0-60 or P0-25 ≧ P2-16
	5	Q 1	**Device Info Q1** The bit will have a value of 1 if the condition below is met; otherwise, it will have a value of 0. • DC1, DE1: The motor current is greater than the limit value – comparable to the relay function if P-18 = 5. • DA1: The motor's torque is greater than the limit value – comparable to the relay function if P2-16 = 6.
	6	Q2	**Device Info Q2** Reserved – not used as of this writing
	7	Q3	**Device Info Q3** Reserved – not used as of this writing

4.4.5 Profile 1 (8 bit): Outputs (control)

Output bytes 0 and 1 (Short) are mapped as follows on SmartWire-DT.

Table 12: Profile 1: Output bytes 0 and 1

Byte:	BIT	Designation	Meaning
0	0	FWD	**Start Reverse** A value of 1 will start the variable frequency drive/variable speed starter in the clockwise operating direction.
	1	REV	**Start anticlockwise operation** A value of 1 will start the variable frequency drive/variable speed starter in the anticlockwise operating direction.
	2	EN_Op	**Enable operation** 0: Stop (immediate disconnection of the output) 1: Operation If this bit has a value of 0, the variable frequency drive's/variable speed starter's output will be switched off directly. To start the device, this bit must be set to a value of 1 and the FWD or REV bit must be set to 1 as well.
	3	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.
	4	I1	**programmable input 1** Can be used to set one of four binary-coded fixed frequencies. → Table in I2
	5	I2	**programmable input 2** Can be used to set one of four binary-coded fixed frequencies. I1 / I2 / Fixed frequency 0 / 0 / FF1 1 / 0 / FF2 0 / 1 / FF3 1 / 1 / FF4
	6	I3	**programmable input 3** Can be used to switch the setpoint input from a fixed frequency to an analog input. 0: Setpoint provided with fixed frequency 1: Setpoint provided with analog input
	7	I4	**programmable input 4** Reserved – not used as of this writing
1	0 - 7	–	Reserved – not used as of this writing

Byte 1 is only needed for internal, SWD-specific functions.

4.4.6 Profile 2 (2 x 16 bit): Inputs (status)

Input bytes 0 to 4 are mapped as follows on SmartWire-DT:

Table 13: Profile 2: Input bytes 0 to 4

Byte	BIT	Designation	Meaning
0	0, 1	–	Not used
	2, 3	A1, A2	**1-0-A-switch on DX-NET-SWD3** 00: not defined 10: Position A: Automatic (commands via SmartWire-DT/control signal terminal) 01: Position 0: variable frequency drive stop 11: Position 1: variable frequency drive operation
	4	DIAG	0: no diagnostic alarm 1: Diagnostic alarm present
	5	–	Not used
	6	PRSNT	0: Device not present 1: Device present
	7	SUBST	0: Configured module present 1: universal module M22-SWD-NOP(C) present

Byte	BIT	Designation	Meaning
1	0	f = f-ref	**Operation at Setpoint** 0: Ref. frequency not reached 1. Ref. frequency reached As long as the slip compensation is lower than 5%, this parameter will have a value of 1. The bit's value will change to 0 for values higher than 5%. • DC1, DE1: The bit will have a constant value of 1. In the event of a fault, the value will change to 0. • DA1: If the slip frequency is lower than 5% ([(P0-63)-(P0-60))/(P0-63] < 5%), the value will be 1. Otherwise, the value will be 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 If the bit has a value of 1, the variable frequency drive/variable speed starter can be controlled with the help of a PLC. If the bit has a value of 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 control mode.
	2	f-Level	**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 set to 1. Otherwise, this bit will have a value of 0. • DC1, DE1: P00-03 ≧ P-19 • DA1: Depending on the operating mode: P0-60 or P0-25 ≧ P2-16
	3	Q 1	**Device Info Q1** The bit will have a value of 1 if the condition below is met; otherwise, it will have a value of 0. • DC1, DE1: The motor current is greater than the limit value – comparable to the relay function if P-18 = 5. • DA1: The motor's torque is greater than the limit value – comparable to the relay function if P2-16 = 6.
	4	Q2	**Device Info Q2** Reserved – not used as of this writing
	5	Q3	**Device Info Q3** Reserved – not used as of this writing
	6	Q4	**Device Info Q4** Reserved – not used as of this writing
	7	Q5	**Device Info Q5** Reserved – not used as of this writing

Byte	BIT	Designation	Meaning
2	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.
	1	RDY	**Ready to operate; switched on: S3** 0: not ready for operation 1: ready for operation If this bit has a value of 1, the variable frequency drive/variable speed starter is ready for operation and has status 3. This means that the device can be switched on immediately.
	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: Error Indicates whether there is a variable frequency drive/variable speed starter fault. If there is a fault, the variable frequency drive/variable speed starter will respond as configured in PNU 362.0.
	4	C_Stop	**Free run-down, output de-energized (coast stop)** 0: no free run-down 1: free run-down If this bit has 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: no quick stop 1: Quick stop If this bit has a value of 1, the variable frequency drive/variable speed starter is stopping with the shortest ramp and the output is not de-energized.
	6	SOI	**Reclosing lockout (switching on inhibited: S1)** 0: No switch-on inhibit 1: Switch-on inhibit If this bit has a value of 1, the variable frequency drive/variable speed starter is in reclosing lockout 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.
3, 4	0 – 15	ActSpeed	**actual speed** Provides the current speed as an integer value between -200% and 200%. 100 % ≙ 4000_{hex}

4.4.7 Profile 2 (2 x 16 bit): Outputs (control)

Output bytes 0 and 4 are mapped as follows on SmartWire-DT.

Table 14: Profile 2: Output bytes 0 and 4

<table>
<tr><th>Byte</th><th>BIT</th><th>Designation</th><th>Meaning</th></tr>
<tr><td>0</td><td>0</td><td>Jog 1</td><td>Jog with setpoint value 1
If this bit and byte 1, bit 0 (OnOff) are set to 1 after byte 0, bit 2 (Ctl_PLC); byte 1, bit 1 (Off2); byte 1, bit 2 (Off3); and byte 1, bit 3 (EN_OP) have been set to 1, the variable frequency drive/variable speed starter will start with fixed frequency 1 in the forward operating direction.</td></tr>
<tr><td></td><td>1</td><td>Jog 2</td><td>Jog with setpoint value 2
Not used.</td></tr>
<tr><td></td><td>2</td><td>Ctl_PLC</td><td>PLC assumes control (Control by PLC)
0: no control via PLC
1: Control via PLC
If this bit has a value of 1, the PLC will be able to control the variable frequency drive/variable speed starter. Before this, the variable frequency drive/variable speed starter will not carry out any commands it receives from the PLC. If the bit has a value of 0, the PLC will not be able to control the variable frequency drive.</td></tr>
<tr><td></td><td>3</td><td>I1</td><td>programmable input 1
Can be used to set one of four binary-coded fixed frequencies.
→ Table in I2</td></tr>
<tr><td></td><td>4</td><td>I2</td><td>programmable input 2
Can be used to set one of four binary-coded fixed frequencies.<table><tr><td>I1</td><td>I2</td><td>Fixed frequency</td></tr><tr><td>0</td><td>0</td><td>Setpoint via byte 2 and byte 3</td></tr><tr><td>1</td><td>0</td><td>FF1</td></tr><tr><td>0</td><td>1</td><td>FF2</td></tr><tr><td>1</td><td>1</td><td>FF3</td></tr></table></td></tr>
<tr><td></td><td>5</td><td>I3</td><td>programmable input 3
Can be used to switch the setpoint input from a fixed frequency to an analog input.
0: Setpoint provided with fixed frequency
1: Setpoint provided with analog input</td></tr>
<tr><td></td><td>6</td><td>I4</td><td>programmable input 4
Reserved – not used as of this writing</td></tr>
<tr><td></td><td>7</td><td>ExtFault</td><td>External Fault
If this bit is set, the variable frequency drive/variable speed starter will stop with a selected PNU 84029952 function. The behavior is the same as if there were a change from 1 → 0 in the Enable signal, with the exception that the variable frequency drive will switch to 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>

Byte	BIT	Designation	Meaning
1	0	OnOff	**On/Off** 0: Normal stop (with configured ramp time) 1: Operation This bit needs to be toggled once in order to start operation. This bit will not start or stop the device during normal operation.
	1	Off2	**Run-down (Coast Stop: Off 2)** 0: Coast stop (switch off output voltage) 1: no free run-down If this bit has a value of 0, the variable frequency drive/variable speed starter is coasting and the output is de-energized. If it has a value of 1, the variable frequency drive/variable speed starter is running normally. This bit will not start or stop the device during normal operation.
	2	Off3	**Quick Stop: Off3** 0: Quick stop (shortest ramp) 1: no quick stop If this bit has a value of 0, the device will be stopped with a quick stop with the shortest ramp time. If it has a value of 1, the variable frequency drive/variable speed starter is running normally. This bit will not start or stop the device during normal operation.
	3	EN_Op	**Operation released** 0: Stop 1: Operation If this bit has a value of 0, the variable frequency drive/variable speed starter will stop. If it has a value of 1, the variable frequency drive's/variable speed starter's output will be enabled. This bit will start and stop the device during normal operation.
	4	EN_Ramp	**Release ramp (Enable Ramp Generator)** 0: Reset ramp (setpoint value = 0) 1: Release ramp If this bit has a value of 0, the variable frequency drive/variable speed starter will remain stopped; the output will not be switched off. If it has a value of 1, the ramp enable signal will be activated and the device will start with the set ramp.
	5	Unfreeze	**Unfreeze ramp** 0: Freeze ramp (the ramp generator's current output value will be frozen) 1: Do not freeze ramp If this bit has 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. If the bit has 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 setpoint value 1: activate setpoint value If this bit has 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. If it has a value of 1, the setpoint will be 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.
2 - 3	0 - 15	Setpoint	**Setpoint as a percentage** The setpoint is specified as an integer value between -100 % and 100 %: 100 % ≙ 4000_{hex}

4.5 Acyclic data

For normal variable frequency drive operation the acyclic data is not required. This section therefore addresses programming experts.

4.5.1 Introduction

Acyclical 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 acyclical communications are independent from the selected profile.

In this case, the SmartWire-DT coordinator (client) communicates acyclically with the variable frequency drive/variable speed starter. Communications are always initiated by the client.

In order for acyclic data to be transmitted and diagnostic activities to be performed, the higher-level PLC must feature acyclic services.
The programmable EASY802-DC-SWD and EASY806-DC-SWD switchgear and controlgear do not feature acyclic services!

4.5.2 Data Types

There are special data types defined for PROFIdrive communications: PROFIdrive-specific and standard data types.

4.5.2.1 PROFIdrive specific

TimeDifference (13_{dec})

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

Data type	Code (dec)	Code (hex)	Bytes	Value Range	Resolution
TimeDifference	13	D	2	$0 \leqq i \leqq 4294967295$	$2^{-31} \triangleq 0.021$ ms

Example:

100 ms $\triangleq 4971_{dec} \triangleq 136B_{hex}$
86400000 ms (= 1 day) $\triangleq 4294967295_{dec} \triangleq FFFFFFFF_{hex}$

Normalised value: N2

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

Data type	Code (dec)	Code (hex)	Bytes	Value Range	Resolution
N2 Normalized value (16 Bit)	113	7 1	2	$-200\ \% \leqq i \leqq (200 - 2^{-14})\ \%$	$2^{-14} \triangleq 0.0061\ \%$

Conversion examples:

Unsigned bit:
$0_{dec} = 0x0000_{hex} \triangleq 0\%$
$1_{dec} = 0x0001_{hex} \triangleq 0.0061\%$
$16384_{dec} = 0x4000_{hex} \triangleq 100\%$
$32767_{dec} = 0x7FFF_{hex} \triangleq 199.99\%$

With a sign bit (bit 15):
$-1_{dec} = 0xFFF_{hex} \triangleq -0.0061\%$
$-16384_{dec} = 0xC000_{hex} \triangleq -100\%$
$-32768_{dec} = 0x8000_{hex} \triangleq -200\%$

Values are coded as follows: the most significant bit (MSB) comes directly after the SN bit (sign bit) in the first octet: SN = 0: positive numbers, including zero; SN = 1: negative numbers

Octet	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit3	Bit 2	Bit1
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: $115_{dec} = 73_{hex}$

Octet	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit3	Bit 2	Bit1
1	15	14	13	12	11	10	9	8
2	7	6	5	4	3	2	1	0

Time constant: D2

Values of time data type D2 always refer to a specific, constant scan time T_a. This time Ta is the shortest scan time (defined in PNU 962) and is required here in order to evaluate D2.

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

data type	Code (dec)	Code (hex)	Byte	Value Range	Resolution
D2 Time constant	120	7 8	1	$0 \leqq i \leqq (2 - 2^{-14}) \times T_a$	$2^{-14} \times T_a$

Time constant: T2

Values of time data type T2 are always relative to a specific constant scan time T_a. T_a is the shortest scan time (defined in PNU 962).

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

Data type	Code (dec)	Code (hex)	Byte	Value Range	Resolution
T2 Time constant (16 Bit)	118	7601	1	$0 \leqq i \leqq 32767 \times T_a$	T_a
T2 Time constant (32 Bit)	11 9	77	2	$0 \leqq i \leqq 4294967295 \times T_a$	T_a

Standard data types

Data type	Coding
Integer8	2
Integer16	3
Integer32	4
Unsigned16	6
Unsigned32	7
OctetString	10

→ More detailed information on the data types: IEC 61158-5: 2003

4.5.3 List of parameters

Table 15 below lists all the parameters that must be processed acyclically via SmartWire-DT.

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

Abbreviation	Meaning
PNU	Parameter number; parameter designation used by the drivesConnect parameter software and the external DX-KEY-LED keypad's display.
PNU Subindex	Parameter number subindex
RUN	Access rights to the parameters during operation (RUN)
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
DS	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 "Parameter number in specific device" column is subdivided into three sub-columns, one for each PowerXL device (DA1, DC1, DE1).

- 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 checkmark (✓) means that the corresponding parameter is available on the device but has no 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:

- DA1 variable frequency drive: MN04020005Z-EN
- DC1 variable frequency drive: MN04020003Z-EN
- DE1 variable speed starter: MN040011EN

Table 15: List of parameters

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
1	7601	✓	P00-03	P00-03	STOP	ro	N2	Frequency reference value	4000_{hex} = 100 % 100 % = 20.1
	7601	✓	–	–	STOP	ro	N2	Speed reference value	4000_{hex} = 100 % 100 % = 20.1
	3	P0-06	–	–	STOP	ro	N2	MotorPotentiometer setpoint	4000_{hex} = 100 % 100 % = 20.1
2	1	P0-05	–	–	STOP	ro	N2	Torque Reference	Torque control reference
5	1	P2-01	P-20	P-20	RUN	rw	N2	f-Fix1	Fixed frequency 1 4000_{hex} = 100 % 100 % = 20.1
	2	P2-02	P-21	P-21	RUN	rw	N2	f-Fix2	Fixed frequency 2 4000_{hex} = 100 % 100 % = 20.1
	3	P2-03	P-22	P-22	RUN	rw	N2	f-Fix3	Fixed frequency 3 4000_{hex} = 100 % 100 % = 20.1
	4	P2-04	P-23	P-23	RUN	rw	N2	f-Fix4	Fixed frequency 4 4000_{hex} = 100 % 100 % = 20.1
	5	P2-05	–	–	RUN	rw	N2	f-Fix5	4000_{hex} = 100 % 100 % = 20.1
	6	P2-06	–	–	RUN	rw	N2	f-Fix6	4000_{hex} = 100 % 100 % = 20.1
	7	P2-07	–	–	RUN	rw	N2	f-Fix7	4000_{hex} = 100 % 100 % = 20.1
	8	P2-08	–	–	RUN	rw	N2	f-Fix8	4000_{hex} = 100 % 100 % = 20.1
20	0	P1-02	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	P1-01	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
	2	P0-04	–	–	STOP	rw		f-PreRamp	Speed controller setpoint
	3	P0-63	–	–	STOP	rw		f-PostRamp	Speed reference value post ramp
21	0	P2-09	P-26	–	STOP	rw	U16	f-Skip1	3000 ≙ 50 Hz
22	0	P2-10	P-27	–	STOP	rw	U16	f-SkipBand1	3000 ≙ 50 Hz
23	0	P4-10	P-28	–	STOP	rw	U16	f-Umax	Details in Hz
24	0	P4-11	P-29	–	STOP	rw	U16	U-max	Details in Volt

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
25 - 500	0	P7-12	–	–	STOP	rw	U16	t-excitation-V/Hz	Magnetizing time U/f method
26	0	P7-11	–	–	STOP	rw	U16	Lower PWM limit	Minimum PWM pulse width
27	0	P1-11	P-11	P-11	STOP	rw	S16	Zero Frequency Voltage	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.
28	0	–	P-32	–	STOP	rw	U16	F-boost	Only available on AC DC1.
28	1	P0-61		–	STOP	rw		f-HoistBoost	Speed increase for hoisting gear
29	0	25 - 500	P-33	–	STOP	rw	U16	t-boost	Only available on AC DC1.
3 0	0	P4-08	–	–	STOP	rw	U16	Motor operation M-min	Minimum torque
	1	P4-07	–	–	STOP	rw	U16	Motoring Torque Limit	Maximum torque (motor)
3 1	1	P4-09	–	–	STOP	rw	U16	Regenerative M-max	Maximum torque (generator)
3 2	0	P7-14	–	–	STOP	rw	U16	Torque Boost	Torque boost
3 3	0	P7-15	–	–	STOP	rw	U16	Torque boost f-limit	Maximum frequency for torque boost
3 4	0	P6-08	–	–	STOP	rw	U16	MaxSetpoint freq	Input frequency at maximum speed
111	0	P1-03	P-03	P-03	RUN	rw	U16	t-acc	Used to set the acceleration 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
	3	P0-68	–	–	RUN	rw		t-accNetwork	Ramp time via field bus.
114	0	P1-04	P-04	P-04	RUN	rw	U16	t-dec	Used to set the deceleration 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
116	0	P2-25	P-24	–	RUN	rw	U16	t-QuickDec	250 ≙ 2.50 s
12 0	1	P8-01	–	–	RUN	rw	U16	t-accMulti1	Acceleration ramp 2
	2	P8-03	–	–	RUN	rw	U16	t-accMulti2	Acceleration ramp 3
	3	P8-05	–	–	RUN	rw	U16	t-accMulti3	Acceleration ramp 4

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
12 1	1	P8-02	–	–	RUN	rw	U16	n-accMulti1	Ramp 1-2 speed limit
	2	P8-04	–	–	RUN	rw	U16	n-accMulti2	Ramp 2-3 speed limit
	3	P8-06	–	–	RUN	rw	U16	n-accMulti3	Ramp 3-4 speed limit
12 2	1	P8-11	–	–	RUN	rw	U16	t-decMulti1	Deceleration ramp 2
	2	P8-09	–	–	RUN	rw	U16	t-decMulti2	Deceleration ramp 3
	3	P8-07	–	–	RUN	rw	U16	t-decMulti3	Deceleration ramp 4
12 3	1	P8-12	–	–	RUN	rw	U16	n-decMulti1	Ramp 2-1 speed limit
	2	P8-10	–	–	RUN	rw	U16	n-decMulti2	Ramp 3-2 speed limit
	3	P8-08	–	–	RUN	rw	U16	n-decMulti3	Ramp 4-3 speed limit
15 0	0	P2-23	–	–	RUN	rw	U16	ZeroSpeedHoldTime	Holding time for speed of zero
202	0	P0-29	P00-20	P00-20	STOP	ro	Octet[3]	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	SmartWire-DT interface hardware version
206	0	P0-28	P00-18	P00-18	STOP	ro	S16	System Version	103 ≙ 1.03
	1	P0-28	P00-18	P00-18	STOP	ro	U16	Application version	103 ≙ 1.03
20 7	0	P0-79	-	-	STOP	ro		System software version	
	1	P0-79	-	-	STOP	ro		Application software version	
209	0	-	P00-19	P00-19	STOP	ro	Octet[11]	Serial number	11 byte ASCII code
	1	P0-30	–	–	STOP	ro	Octet[11]	Serial number A	
	2	P0-30	–	–	STOP	ro	Octet[11]	Serial number B	
	3	P0-30	–	–	STOP	ro	Octet[11]	Serial number C	
	4	P0-30	–	–	STOP	ro	Octet[11]	Serial number D	
210	0	P1-08	P-08	P-08	STOP	rw	U16	Motor Nom Current	Adjusting the rated motor current setting will simultaneously adjust the motor protection function as required for the motor. The maximum value will depend on the basic device and is always specified with one decimal place. Example: 14 ≙ 1.4 A
211	0	P1-07	P-07	P-07	STOP	rw	U16	Motor rated 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
21 5	0	P4-05	–	–	STOP	rw	U16	Motor-CosPhi	

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
216	0	P1-09	P-09	P-09	-	rw	U16	Motor rated frequency	The motor's rated frequency. This is the frequency at which the output voltage will match the motor's rated operating voltage. Details in Hz
217	0	P1-10	P-10	P-10	STOP	rw	U16	Motor rated speed	Details in rpm
218	0	P7-01	–	–	STOP	rw	U16	Stator resistance	Motor stator resistance
219	0	P7-03	–	–	STOP	rw	U16	Stator inductance	Motor leakage inductance (d)
22 0	0	P7-06	–	–	STOP	rw	U16	Stator inductancePM	Motor leakage inductance (q)
221	0	P7-02	–	–	STOP	rw	U16	Rotor resistance	Rotor resistance
223	0	P7-04	–	–	STOP	rw	U16	Excitation current @M=0	Motor magnetizing current
224	0	P7-05	–	–	STOP	rw	U16	Air gap inductance	Motor leakage factor
226	0	P0-17	–	–	STOP	ro		Mutual inductance	Stator resistance (Rs)
227	0	P0-18	–	–	STOP	ro		Stator resistance Meas	Stator inductance
228	0	P0-19	–	–	STOP	ro		Stator inductance Meas	Rotor resistance
23 0	0	P7-16	–	–	STOP	rw		PM-MotorSignalIn	Enable signal injection
231	0	P7-17	–	–	STOP	rw		PM-MotorSignalInLevel	Signal injection level
240	0	P7-10	–	–	STOP	rw	U16	LoadInertiaFactor	Load inertia factor
241	0	P7-09	–	–	STOP	rw	U16	Overvoltage current limit	Overvoltage current limit
250	0	P0-29	P00-20	P00-20	STOP	ro	UInt8	FrameSize	Used to specify the basic device's size
	1	P0-29	P00-20	P00-20	STOP	ro	UInt8	NoOfInputPhases	The number of input phases for the basic device
	2	P0-29	P00-20	P00-20	STOP	ro	UInt8	kW/HP	1: kW 2: HP
251	0	P0-29	P00-20	P00-20	STOP	ro	UInt16	Device voltage	Device input voltage Value in volts
252	0	P0-29	P00-20	P00-20	STOP	ro	UInt32	Power@Ue	18500 ≙ 18.50
253	0	P0-70	–	–	STOP	ro		OptionID0	Module identification code
255	0	P4-01	–	–	STOP	rw	U16	Control mode	Used to select the motor control mode.
257	0	P0-71	–	–	STOP	ro		OptionSignature	Field bus module code

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
260	0	P2-30	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	P2-33	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	P2-31	P-35	P-17	RUN	rw	U16	AI1 Gain	Analog input scaling Output = Input x Scaling factor 100 ≙10.0 %
	1	P2-34	–	–	RUN	rw	U16	AI2 Gain	100 ≙10.0 %
262	0	P2-32	P-39	–	RUN	rw	S16	AI1 Offset	300 ≙30.0 %
	1	P2-35	–	–	RUN	rw	S16	AI2 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.
273	0	P2-12	–	–	RUN	rw	U16	AO1 SignalFormat	Analog output 1 format
	1	P2-14	–	–	RUN	rw	U16	AO2 SignalFormat	Analog output 2 format
274	0	P6-26	–	–	RUN	rw	U16	AO1 Scale	Scaling for analog output 1
275	0	P6-27	–	–	RUN	rw	S16	AO1 Offset	Offset for analog output 1
310	0	✓	✓	✓	STOP	ro	UInt16	UsedStateMachine	0: Communication lost 10: PROFIdrive profile 11: 8 bit profile
320	0	P1-14	P-14	P-14	RUN	rw	U16	Password	This parameter provides access to the extended parameter set.
	1	P2-40	P-37	P-38	RUN	rw	U16	Password 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.
	2	P6-30	–	–	RUN	rw	U16	Password Level3	Used to define the access code for parameter access.
322	0	P6-22	–	–	RUN	rw	WORD	Reset fan run-time	0: no Reset 1: Reset
	1	P6-23	–	–	RUN	rw	WORD	kWh meter reset	0: no Reset 1: Reset
	2	P6-25	–	–	RUN	rw	WORD	Reset ServiceIndicator	0: no Reset 1: Reset

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
331	0	-	P-48	–	RUN	rw	UInt16	t-Standby	Standby-time 0 = Disabled 150 ≙ 15.0 s
340	0	P4-02	–	–	RUN	rw	WORD	Motor identification	Auto-tune enable
361	0	P6-01	–	–	STOP	rw	U16	Enable FirmwareUpgrade	0: Lock 1: release
362	1	P6-24	–	–	STOP	rw	U16	Servicing interval time	The time for the variable frequency drive's/variable speed starter's maintenance interval
	2	P6-03	–	–	RUN	rw	U16	Auto Reset Delay	Wait time between a fault and an auto-reset
380	0	P2-22	–	–	RUN	rw	U16	DisplayScale source	Scaling factor for the display. For more information, please refer to the manual for the basic device.
381	0	P2-21	P-40	-	RUN	rw	U16	DisplayScaleFactor	Speed display scaling factor 1000 ≙ 0.10
382	0	P6-28	–	–	RUN	rw	U16	PointerToParameter	
	1	P0-80	–	–	STOP	ro		Value@pointer	
388	0	C-19	–	–	STOP	ro		EMCFilterType	
389	0	C-20	–	–	STOP	ro		PowerUnitSelection	
390	0	P2-24	P-17	P-29	STOP	rw	U16	Switching frequency	The power section's switching frequency. Higher values will reduce the motor noise caused by switching and improve the current's sine form. Drawback: Higher losses in the device
	1	P0-64	P00-14	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.

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
400	15	P9-08	–	–	RUN	rw		External fault source	Source for the external fault signal For more information, please refer to the manual for the basic device.
	2	P9-02	–	–	RUN	rw		Quick stop source	Source for the quick stop signal For more information, please refer to the manual for the basic device.
	3	P9-01	–	–	RUN	rw		Enable operation source	Source for the enable signal For more information, please refer to the manual for the basic device.
	7	P9-07	–	–	RUN	rw		FaultReset source	Source for the reset signal For more information, please refer to the manual for the basic device.
420	2	P4-06	–	–	RUN	rw	U16	M-setpoint source	Torque setpoint/limit For more information, please refer to the manual for the basic device.

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
421	0	P9-03	–	–	RUN	rw		FWD source	Control source for clockwise operation For more information, please refer to the manual for the basic device.
	1	P9-04	–	–	RUN	rw		REV source	Control source for anticlockwise operation For more information, please refer to the manual for the basic device.
	3	P9-09	–	–	RUN	rw		LocalRemote source	Control source for terminal control mode For more information, please refer to the manual for the basic device.
	4	P9-28	–	–	RUN	rw		MotorPotentiometer UP source	Control source - Up-pushbutton For more information, please refer to the manual for the basic device.
	5	P9-29	–	–	RUN	rw		MotorPotentiometer DWN source	Control source - Down-pushbutton For more information, please refer to the manual for the basic device.
	6	P9-30	–	–	RUN	rw		FWD speed limit source	Source for clockwise limit switch For more information, please refer to the manual for the basic device.
	7	P9-31	–	–	RUN	rw		REV speed limit source	Source for anticlockwise limit switch For more information, please refer to the manual for the basic device.
	8	P9-06	–	–	RUN	rw		REV enable source	Control source for anticlockwise operation enable signal For more information, please refer to the manual for the basic device.
422	0	P9-05	–	–	RUN	rw		Signal form	Control source for stay-put function For more information, please refer to the manual for the basic device.
423	0	P1-13	P-15	P-15	STOP	rw	U16	DI Config Select	This setting defines the control signal terminal configuration based on the setting in 928.0 For more information, please refer to the manual for the basic device.

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
424	0	P9-33	–	–	RUN	rw		PLC AO1	Functions for the PLC functionality in DA1 devices. For more information, please refer to the manual for the basic device.
	1	P9-34	–	–	RUN	rw		PLC AO2	
	2	P9-35	–	–	RUN	rw		PLC RO1	
	3	P9-36	–	–	RUN?	rw		PLC RO2	
	4	P9-41	–	–	RUN	rw		PLC RO3-5	
	5	P9-37	–	–	STOP	rw		PLC Scaling source	
	6	P9-38	–	–	STOP	rw		PLC PID1 setpoint source	
	7	P9-39	–	–	STOP	rw		PLC PID1 feedback source	
	8	P9-40	–	–	STOP	rw		PLC torque setpoint source	
430	0	P9-10	–	–	STOP	rw		SpeedSource1	
	1	P9-11	–	–	STOP	rw		SpeedSource2	
	2	P9-12	–	–	STOP	rw		SpeedSource3	
	3	P9-13	–	–	STOP	rw		SpeedSource4	
	4	P9-14	–	–	STOP	rw		SpeedSource5	
	5	P9-15	–	–	STOP	rw		SpeedSource6	
	6	P9-16	–	–	STOP	rw		SpeedSource7	
	7	P9-17	–	–	STOP	rw		SpeedSource8	
431	0	P9-18	–	–	STOP	rw		Speed selection B0	
	1	P9-19	–	–	STOP	rw		Speed selection B1	
	2	P9-20	–	–	STOP	rw		Speed selection B2	
432	0	P9-21	–	–	STOP	rw		f-fixed selection B0	
	1	P9-22	–	–	STOP	rw		f-fixed selection B1	
	2	P9-23	–	–	STOP	rw		f-fixed selection B2	
433	0	P9-24	–	–	STOP	rw		t-acc selection B0	
	1	P9-25	–	–	STOP	rw		t-acc selection B1	
434	0	P9-26	–	–	STOP	rw		t-dec selection B0	
	1	P9-27	–	–	STOP	rw		t-dec selection B1	
451	0	P2-15	P-18	–	RUN	rw	U16	RO1 function	Used to select the relay output function For more information on the available settings, please refer to the manual for the basic device.
	1	P2-18	–	–	RUN	rw	U16	RO2 function	Used to select the relay 2 output function For more information on the available settings, please refer to the manual for the basic device.

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
452	0	P2-16	P-19	–	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.
452	1	P2-19	–	–	RUN	rw	U16	RO2 upper limit	Limit value for relay output 2 For more information on the available settings, please refer to the manual for the basic device.
453	0	P2-17	–	–	RUN	rw	U16	RO1 lower limit	Lower limit value for relay output 1 For more information on the available settings, please refer to the manual for the basic device.
	1	P2-20	–	–	RUN	rw	U16	RO2 lower limit	Lower limit value for relay output 2 For more information on the available settings, please refer to the manual for the basic device.
454	0	P6-04	–	–	RUN	rw	U16	RO1 HysteresisWidth	Relay hysteresis band
460	0	P2-11	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.
460	1	P2-13	–	–	RUN	rw	U16	AO2 Function	Used to select analog output function 2 For more information on the available settings, please refer to the manual for the basic device
501	0	P0-11	P00-07	P00-07	STOP	ro	UInt16	Motor voltage	Current output voltage, in volts
	1	P0-20	P00-08	P00-08	STOP	ro	UInt16	DC link voltage	Current DC link voltage, in volts
502	0	✓	-	P00-06	STOP	ro		Output frequency	Current output frequency, in Hz
503	0	P0-25	-	-	STOP	ro		Motor speed	Calculated rotor speed
	1	P0-60	-	-	STOP	ro		n-slip	Calculated slip speed
504	0	✓	✓	P00-05	STOP	ro		Motor current	Current motor current, in amperes
505	0	P0-14	–	–	STOP	ro		Calculated excitation current	Magnetizing current (Id)
	1	P0-15	–	–	STOP	ro		Calculated I-rotor	Rotor current (Iq)
507	0	P0-12	–	–	STOP	ro		Motor torque	Motor torque

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
513	1	✓	–	–	STOP	ro		Rel motor output	
520	0	P0-26	–	–	STOP	ro		kWh meter	kWh counter, total since initial commissioning
	1	P0-26	–	–	STOP	ro		kWh counterR	kWh counter; the value can be reset
	2	P0-27	–	–	STOP	ro		MWh counter	MWh counter, total since initial commissioning
	3	P0-27	–	–	STOP	ro		MWh counterR	MWh counter, value can be reset
550	0	P0-03	–	P00-04	STOP	ro	Int8	DI1 Status	Digital input states
	1	✓	–	✓	STOP	ro	Int8	DI2 Status	
	2	✓	–	✓	STOP	ro	Int8	DI3 Status	
	3	✓	–	✓	STOP	ro	Int8	DI4 Status	
	4	✓	–	–	STOP	ro	Int8	DI5 Status	
	5	✓	–	–	STOP	ro	Int8	DI6 Status	
	6	✓	–	–	STOP	ro	Int8	DI7 Status	
	7	✓	–	–	STOP	ro	Int8	DI8 Status	
560	0	P0-01	P00-01	P00-01	-	ro		Analog input1	Magnitude of signal at analog input 1, taking scaling and offset into account
	1	P0-02	P0-02	–	STOP	ro		Analog input2	500 ≙ 50.0%
570	0	✓	–	–	STOP	ro		Analog output1	500 ≙ 50.0%
	1	✓	–	–	STOP	ro		Analog output2	500 ≙ 50.0%
615	2	P5-14	–	–	STOP	rw		NETInputPZD3	Input process data for field bus mode For more information, please refer to the manual for the basic device.
	3	P5-13	–	–	STOP	rw		NETInputPZD4	Input process data for field bus mode For more information, please refer to the manual for the basic device.
616	2	P5-12	–	–	STOP	rw		NETOutPZD3	Output process data for field bus mode For more information, please refer to the manual for the basic device.
	3	P5-08	–	–	STOP	rw		NETOutPZD4	Output process data for field bus mode For more information, please refer to the manual for the basic device.

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
620	0	P2-36	–	P-30	STOP	rw	U16	Start mode	Used to define the drive's behavior in relation to the enable signal and to configure automatic restarting after faults. For more information, please refer to the manual for the basic device.
	1	P1-05	P-05	P-05	STOP	rw	U16	Stop mode	Used to define the drive's behavior when the enable signal is removed. For more information, please refer to the manual for the basic device.
	2	P2-38	–	–	STOP	rw	U16	MainsLossStopControl	Stop mode in the event of a power failure. For more information, please refer to the manual for the basic device.
	3	P2-37	P-31	P-24	RUN	rw	U16	Digital Setpoint value 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.
624	0	P6-02	–	P-32	RUN	rw	WORD	Auto temperature 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	P2-39	P-38	P-39	RUN	rw	WORD	Parameter lock	Parameter set lock 0: Not locked. All parameters can be changed. 1: Locked. Parameter values can be shown, but cannot be changed. If a keypad is connected, it will not be possible to access the parameters
	1	P7-08	–	–	RUN	rw	WORD	ParameterAdaptation	Ability to adjust motor parameters 0: Deactivated 1: Activated

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
626	0	P7-07	–	–	RUN	rw	WORD	EnhancedGenerator Control	Advanced generator control 0: deactivated 1: activated
	1	P1-06	P-06	P-06	RUN	rw	WORD	EnergyOptimizer	If the energy optimization is activated, the output voltage will be adjusted automatically based on the load. This will result in a reduced voltage when operating within partial load ranges, reducing energy consumption levels. This operating mode is not suitable for dynamic applications with quickly changing loads.
	2	P6-10	–	–	RUN	rw	WORD	PLC operation enable	PLC operation enable 0: Deactivated 1: Activated
	3	–	–	P-31	RUN	rw		OvervoltageControl	The overvoltage control function prevents the drive from switching off when the motor is feeding regenerative power back. If the function is disabled, the drive will switch off when there is an overvoltage signal instead of automatically lengthening the ramp time.
627	0	C-18	–	–	RUN	rw		Fan Control	
630	0	P5-07	–	–	RUN	rw		FieldbusRampControl	Ramp via field bus 0: Deactivated 1: Activated
	1	P8-13	–	–	RUN	rw	WORD	Ramp mode	Ramp selection when there is a preset speed 0: Deactivated 1: Activated
634	0	P2-27	–	–	RUN	rw	U16	Standby mode	Standby time 0 = Disabled 150 ≙ 15.0 s
635	0	P2-26	P-33	–	RUN	rw	WORD	Spin start enable	Rotary start enable/DC injection at enable 0: Deactivated 1: Activated
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).

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
682	0	–	P-51	P-33	RUN	rw	UInt16	SwitchRemanentStorage	If this function is enabled, the computed thermal model for the motor will be automatically saved when the supply voltage is switched off. The stored values will then be used when it is switched back on. If the function is disabled, the "thermal memory" will be set to zero every time the supply voltage is switched back on.
751	0	✓	–	–	STOP	ro		RO1 LogicStatus	
	1	✓	–	–	STOP	ro		RO2 LogicStatus	
	2	✓	–	–	STOP	ro		RO3 LogicStatus	
	3	✓	–	–	STOP	ro		RO4 LogicStatus	
	4	✓	–	–	STOP	ro		RO5 LogicStatus	
811	0	P0-07	–	–	STOP	ro		Interface0 f-Reference	Current field bus speed reference value
812	1	P0-67	–	–	STOP	ro		Interface M-setpoint	Current field bus torque setpoint
813	0	P0-59	–	–	STOP	ro		f-setpointoffreq-setpoint	Frequency input setpoint
821	0	P0-31	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.
	1	P0-35	–	–	STOP	ro		Fan operating time R	Fan operating time – can be reset
	2	P0-65	–	–	STOP	ro		t-HoursPowerON	Number of drive power-on hours
	3	P0-34	P00-13	P00-13	STOP	ro	U32	t-HoursRunEnable	The drive's operating time since the most recent enable signal, in hours, minutes, and seconds.
	4	P0-35	–	–	STOP	ro		Fan operating time	Total fan operating time
	25 - 500	P0-32	P00-12	P00-12	STOP	ro	U32	RunSinceLastTrip	The drive's operating time since the most recent fault, in hours, minutes, and seconds.
	6	P0-24	–	–	STOP	ro		t-Run PCB in OT	The drive's operating hours at a temperature higher than 80 °C inside the housing
	7	P0-23	–	–	STOP	ro		t-Run IGBT in OT	The drive's operating hours at a heat sink temperature higher than 85 °C
	8	P0-73	–	–	STOP	ro		t-PowerOn	The drive's operating time
	9	P0-22	–	–	STOP	ro		TimeToNextService	Time to next service

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
822	25 - 500	P0-21	P00-09	P00-09	-	ro	S16	Actual Switching Frequency	Current heat sink temperature, in °C
	1	P0-72	–	–	STOP	ro		TempLevelHeatSink	Heat sink temperature
824	25 - 500	P0-74	–	–	STOP	ro		L1 input voltage	L1 input voltage
	1	P0-75	–	–	STOP	ro		L2 input voltage	L2 input voltage
	2	P0-76	–	–	STOP	ro		L3 input voltage	L3 input voltage
831	0	P0-16	–	–	STOP	ro		DC link voltage ripple	DC link voltage ripple
840	29952	P5-16	P-53	P-40	STOP	ro	UInt16	Action@communication loss	Behavior in the event of a loss of SmartWire-DT communication. The delay time after a loss of communication is set using 362.0.

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
841	12816	P0-42	–	–	STOP	ro		FaultCounter device overvoltage	Shows the number of overvoltage faults since the date of manufacture
	12832	P0-43	–	–	STOP	ro		FaultCounter device undervoltage	Shows the number of undervoltage faults since the date of manufacture
	16656	P0-46	–	–	STOP	ro		FaultCounter ambient overtemperature	Shows the number of ambient overtemperature faults since the date of manufacture
	16944	P0-44	–	–	STOP	ro		FaultCounter heat sink overtemperature	Shows the number of heat sink overtemperature faults since the date of manufacture
	22017	P0-47	–	–	STOP	ro		FaultCounter internal errors (IO)	Shows the number of internal control board communication faults since the last time the processor was started.
	22018	P0-48	–	–	STOP	ro		FaultCounter internal errors (DSP)	Shows the number of internal power board communication faults since the last time the processor was started.
	28946	P0-45	–	–	STOP	ro		FaultCounter braking chopper overcurrent	The number of braking chopper overcurrent faults since its date of manufacture
	29952	P0-49	–	–	STOP	ro		FaultCounter loss of communications	Number of Modbus RTU communication faults since the last time the processor was started.
	30000	P0-50	–	–	STOP	ro		FaultCounter CANopen COM interrupted	Number of CANopen communication faults since the last time the processor was started.
	30032	P0-69	–	–	STOP	ro		FaultCounter option COM interrupted	
	8736	P0-41	–	–	STOP	ro		FaultCounter overcurrent	Overcurrent counter since the date of manufacture
851	0	P0-38	P00-16	P00-16	STOP	ro	Int16	HeatSink0 log	Shows the last eight heat sink temperature values before the device was switched off due to a fault. Scan time: 500 ms
	1	P0-38	P00-16	P00-16	STOP	ro	Int16	Log HeatSink1	
	2	P0-38	P00-16	P00-16	STOP	ro	Int16	Log HeatSink2	
	3	P0-38	P00-16	P00-16	STOP	ro	Int16	Log HeatSink3	
	4	P0-38	P00-16	P00-16	STOP	ro	Int16	Log HeatSink4	
	5	P0-38	P00-16	P00-16	STOP	ro	Int16	Log HeatSink5	
	6	P0-38	P00-16	P00-16	STOP	ro	Int16	Log HeatSink6	
	7	P0-38	P00-16	P00-16	STOP	ro	Int16	Log HeatSink7	

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
852	0	P0-36	P00-15	P00-15	STOP	ro	U16	Log DCLink0	Shows the last eight DC link voltage values before the device was switched off due to a fault. Scan time: 256 ms
	1	P0-36	P00-15	P00-15	STOP	ro	U16	Log DCLink1	
	2	P0-36	P00-15	P00-15	STOP	ro	U16	Log DCLink2	
	3	P0-36	P00-15	P00-15	STOP	ro	U16	Log DCLink3	
	4	P0-36	P00-15	P00-15	STOP	ro	U16	Log DCLink4	
	5	P0-36	P00-15	P00-15	STOP	ro	U16	Log DCLink5	
	6	P0-36	P00-15	P00-15	STOP	ro	U16	Log DCLink6	
	7	P0-36	P00-15	P00-15	STOP	ro	U16	Log DCLink7	
853	0	P0-37	–	–	STOP	ro		Log DC link V ripple0	Shows the last eight DC link ripple values before the device was switched off due to a fault. Scan time: 20 ms
	1	P0-37	–	–	STOP	ro		Log DC link V ripple1	
	2	P0-37	–	–	STOP	ro		Log DC link V ripple2	
	3	P0-37	–	–	STOP	ro		Log DC link V ripple3	
	4	P0-37	–	–	STOP	ro		Log DC link V ripple4	
	5	P0-37	–	–	STOP	ro		Log DC link V ripple5	
	6	P0-37	–	–	STOP	ro		Log DC link V ripple6	
	7	P0-37	–	–	STOP	ro		Log DC link V ripple7	
855	0	P0-40	P00-17	P00-17	STOP	ro	U16	Log MotorCurrent0	Shows the last eight motor current values before the device was switched off due to a fault. Scan time: 250 ms 100 ≙ 10.0 A
	1	P0-40	P00-17	P00-17	STOP	ro	U16	Log MotorCurrent1	
	2	P0-40	P00-17	P00-17	STOP	ro	U16	Log MotorCurrent2	
	3	P0-40	P00-17	P00-17	STOP	ro	U16	Log MotorCurrent3	
	4	P0-40	P00-17	P00-17	STOP	ro	U16	Log MotorCurrent4	
	5	P0-40	P00-17	P00-17	STOP	ro	U16	Log MotorCurrent5	
	6	P0-40	P00-17	P00-17	STOP	ro	U16	Log MotorCurrent6	
	7	P0-40	P00-17	P00-17	STOP	ro	U16	Log MotorCurrent7	
859	0	P0-39	–	–	STOP	ro		Log AmbientTemp0	Shows the last eight ambient temperature values before the device was switched off due to a fault. Scan time: 30 ms
	1	P0-39	–	–	STOP	ro		Log AmbientTemp1	
	2	P0-39	–	–	STOP	ro		Log AmbientTemp2	
	3	P0-39	–	–	STOP	ro		Log AmbientTemp3	
	4	P0-39	–	–	STOP	ro		Log AmbientTemp4	
	5	P0-39	–	–	STOP	ro		Log AmbientTemp5	
	6	P0-39	–	–	STOP	ro		Log AmbientTemp6	
	7	P0-39	–	–	STOP	ro		Log AmbientTemp7	
860	0	✓	✓	✓	STOP	ro	UInt32	WarningWord	Shows the current device warning
918	0	P5-01	P-36	P-34	STOP	rw	Uint16	PDP address	The drive's unique address on a communication network

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
927	0	P5-15	P-52	P-41	STOP	rw	UInt16	ParameterAccess	0: All parameters can be changed from any source. 1: All parameters are locked and can only be changed via SmartWire-DT. . → Section 4.5.3.1, "PNU927", page 72
928	0	P1-12	P-53 (P1-12)	P-53 (P1-12)	STOP	rw	UIn16	ProcessDataAccess	→ Section 4.5.3.2, "PNU928 (ProcessData Access)", page 72
944	0	✓	✓	✓	STOP	ro	UInt16	PDPErrorCounter	Total number of errors occurred
947	0	P0-13	P-13	P-13	STOP	ro	UInt16	Last fault	PROFIDRIVE fault buffer
	1	P0-13	✓	✓	STOP	ro	UInt16	Last fault2	
	2	P0-13	✓	✓	STOP	ro	UInt16	Last fault3	
	3	P0-13	✓	✓	STOP	ro	UInt16	Last fault4	
	4	P0-13	✓	✓	STOP	ro	UInt16	Last fault5	
	5	P0-13	✓	✓	STOP	ro	UInt16	Last fault6	
	6	P0-13	✓	✓	STOP	ro	UInt16	Last fault7	
	7	P0-13	✓	✓	STOP	ro	UInt16	Last fault8	
950	0	✓	✓	✓	STOP	ro	UInt16	Max fault situations	
	1	✓	✓	✓	STOP	ro	UInt16	Faults per situation	
952	0	✓	✓	✓	STOP	ro	UInt16	Fault situation counter	
962	0	✓	✓	✓	STOP	ro	TimeDiff4	PSP scan time	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 NumberOfDOs	
965	0	✓	✓	✓	STOP	ro	Octet[2]	PDP ProfileNumber	
974	0	✓	✓	✓	STOP	ro	UInt16	PDP MaxBlockLength	Parameter channel description
	1	✓	✓	✓	STOP	ro	UInt16	PDP NoOfMultiparameters	
	2	✓	✓	✓	STOP	ro	UInt16	PDP MaxLatency	

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
975	0	✓	✓	✓	STOP	ro	UInt16	PDP DO manufacturer	
	1	✓	✓	✓	STOP	ro	UInt16	PDP DO device type	
	2	✓	✓	✓	STOP	ro	UInt16	PDP DOFW interface	xx.yy, decimal Syntax: 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 NumberOfDOs	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.
977	0	P6-29	–	–	STOP	rw	WORD	Save parameters	Save parameters as default 0: deactivated 1: activated
980	0	✓	✓	✓	STOP	rw	UInt16	PDP DefPara0	
2100	0	P3-01	P-41	–	RUN	rw	U16	PID1 Kp	The controller's Kp component 10 ≙ 1.0
2101	0	P3-02	P-42	–	RUN	rw	U16	PID1 Ti	The controller's integral component 10 ≙ 1.0
2102	0	P3-03	–	–	RUN	rw	U16	PID1 Kd	Derivative term 10 ≙ 1.0
2110	0	P3-05	P-44	–	RUN	rw	U16	PID1 setpoint 1 source	Used to select the setpoint source For more information, please refer to the manual for the basic device.
2111	0	P3-06	P-45	–	RUN	rw	U16	PID1 digital setpoint	Digital setpoint value 10 ≙ 1.0
2112	0	P3-10	P-46	–	RUN	rw	WORD	PID1 feedback 1 source	Used to select the process value source For more information, please refer to the manual for the basic device.
2113	0	P3-12	–	–	RUN	rw	U16	PID1 feedback 1 DispScale	Scaling factor for actual value display
2120	0	P3-08	–	–	RUN	rw	U16	PID1 Out lower limit	Lower PID output limit
2121	0	P3-07	–	–	RUN	rw	U16	PID1 Out upper limit	Upper PID output limit
2122	0	P3-09	–	–	RUN	rw	U16	PID1 OutCalc	Used to select the PID output limit
2123	0	P3-04	P-43	–	RUN	rw	WORD	PID1 Mode	Operation Mode 0: direct operation 1: Inverted operation

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
2130	0	P3-11	-	–	RUN	rw	U16	PID1 fault ramp	PID deviation from ramp activation
2131	0	P3-13	P-49	–	RUN	rw	U16	PID1 FeedbackWakeUp	Actual value wakeup level for controller 900 ≙ 90.0 %
2132	0	P3-18	–	–	RUN	rw	U16	PID1 ResetControl	PID reset control
2150	0	P0-08	–	–	STOP	ro		PID1 setpoint	PID setpoint value
2151	0	P0-09	–	–	STOP	ro		PID feedback 1	
2152	0	P0-10	–	–	-	ro		PID 1 OUT	
2200	0	P6-19	–	–	RUN	rw	U16	Braking resistance	Braking resistance
2201	0	P6-20	–	–	RUN	rw	U16	P braking resistance	Braking resistance output
2202	0	P6-21	–	–	RUN	rw	U16	Braking chopper DutyCycle	Braking chopper cycle in the event of excessively low temperature
2203	0	P6-17	–	–	RUN	rw	U16	Max torque timeout	Time at maximum torque after which a fault message will be sent
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	P6-18	–	P-27	RUN	rw	U16	DCBrakingVoltage	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	DCBraking	Used to define the operating states in which DC braking will be activated.
2223	0	–	–	P-28	RUN	rw		f-DC-Braking@Stop	Percentage of the maximum frequency at which DC braking will start during the deceleration phase.
2230	0	P6-11	–	P-26	RUN	rw	U16	SpeedHold release time	DC braking duration
2230	1	P6-12	–	–	RUN	rw	U16	SpeedHold inhibit time	Speed holding time in the event of inhibit
2250	0	P6-13	–	–	RUN	rw	U16	Brake release delay	Motor brake release time
	1	P6-14	–	–	RUN	rw	U16	Brake Apply delay	Motor brake engagement delay
2251	0	P6-15	–	–	RUN	rw	U16	Brake release M level	Minimum torque for releasing the brake
2252	0	P6-16	–	–	RUN	rw	U16	Brake timeout M level	Minimum torque –timeout
2300	0	P6-06	–	–	RUN	rw	U16	Encoder PPR	Encoder pulses per revolution
2301	0	P6-05	–	–	RUN	rw	WORD	Encoder actual value enable	Enable for encoder feedback

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
2302	0	P6-07	–	–	RUN	rw	U16	Speed error limit	Maximum speed deviation
2303	0	P0-77	–	–	-	ro		Encoder pulse counter	Encoder counter value
2304	0	P0-58	–	–	-	ro		Encoder speed	Measured encoder speed
2400	0	P4-03	–	–	RUN	rw	U16	MSC Kp	Speed controller proportional gain
2401	0	P4-04	–	–	RUN	rw	U16	MSC Ti	Speed controller integral time
2402	0	P7-13	–	–	RUN	rw	U16	MSC Kd	Speed controller differential term
250 0	0	P0-66	–	–	STOP	ro		UserProgramID	PLC program ID
250 1	0	✓	–	–	RUN	rw		UserRegister1	Variable frequency drive/ variable speed starter user register
	1	✓	–	–	RUN	rw		UserRegister2	
	1	✓	–	–	RUN	rw		UserRegister11	
	11	✓	–	–	RUN	rw		UserRegister12	
	12	✓	–	–	RUN	rw		UserRegister13	
	13	✓	–	–	RUN	rw		UserRegister14	
	14	✓	–	–	RUN	rw		UserRegister15	
	2	✓	–	–	RUN	rw		UserRegister3	
	3	✓	–	–	RUN	rw		UserRegister4	
	4	✓	–	–	RUN	rw		UserRegister5	
	5	✓	–	–	RUN	rw		UserRegister6	
	6	✓	–	–	RUN	rw		UserRegister7	
	7	✓	–	–	RUN	rw		UserRegister8	
	8	✓	–	–	RUN	rw		UserRegister9	
	9	✓	–	–	RUN	rw		UserRegister10	
2502	0	✓	–	–	RUN	rw		User f-setpoint	
	1	✓	–	–	RUN	rw		User f-setpoint IDL	
	2	✓	–	–	RUN	rw		User M-setpoint	
2503	0	✓	–	–	RUN	rw		User-t-acc	
	1	✓	–	–	RUN	rw		User-t-accModbus	
2504	0	✓	–	–	RUN	rw		User-DisplayScaling	
2510	0	P2-28	–	–	RUN	rw	U16	SlaveSpeedScalingControl	Used to select speed scaling
2511	0	P2-29	–	–	RUN	rw	S16	SlaveSpeedScalingFactor	Speed scaling factor
260 0	0	✓	–	–	STOP	ro		ScopeChannel1	Value for 1st scope channel
	1	✓	–	–	STOP	ro		ScopeChannel2	Value for 2nd scope channel
2601	0	✓	–	–	RUN	rw		ScopeChannel selection	Used to select the scope channel's content
2901	0	P6-09	–	–	RUN	rw	U16	DroopMax	Droop speed

PNU Index	PNU Subindex	Parameter number in specific device			Access right		Data type	Name	Description
		DA1	DC1	DE1	RUN/ STOP	ro/rw			
2901	1	P0-62	–	–	RUN	rw		DroopFeedback	Droop speed
3222	0	P5-03	P-36	P-35	RUN	rw		RS485-0 baud rate	Modbus Baud rate
3224	0	P5-04	–	–	RUN	rw		RS485-0 ParityType	Modbus RTU data format
3290	0	P5-05	P-36	P-36	RUN	rw		Modbus RTU0 COM timeout	Time between the moment communications are lost and the moment the device is switched off as a result.
3302	0	P5-02	P-50	–	RUN	rw		CAN0 baud rate	CANOpen Baudrate For more information, please refer to the manual for the basic device.

4.5.3.1 PNU927

Parameter 927 can be used to switch between parameter levels; the parameter can be set to a value of 0 or 1:

- 0: Parameters can be changed directly on the variable frequency drive/ variable speed starter and not via SmartWire-DT,
  with the exception of parameters 927 and 928.
- 1: Parameters can be changed via SmartWire-DT and not directly on the variable frequency drive/variable speed starter,
  with the exception of parameters 927 and 928.

4.5.3.2 PNU928 (ProcessData Access)

Parameter PNU 928 has the following options:

Value	Description
0	Control signal terminals (I/O) The variable frequency drive will respond directly to signals applied to the control signal terminals.
1	Control commands and setpoint via SmartWire-DT: DI1 = Hardware enable, P-15: No function
2	Control commands via SmartWire-DT: Local setpoint (P-15 for local settings)
3	Local control commands, setpoint values via SmartWire-DT (DI1 = Start / Stop)
4	Actuation via SmartWire-DT - depending on the settings with the loss in communication, automatic change to the local actuation
5	Control commands and setpoint via SmartWire-DT. Additionally via DI1 Enable and DI2 Enable Setpoint

This parameter does not exist in the basic devices' display. It behaves similarly to parameter P1-12 in DA1 variable frequency drives and parameter P-12 in DC1 variable frequency drives and DE1 variable speed starters:
It has an offset of 8, except for the 0 setting.

Value	Description
0	Control signal terminals (I/O) The variable frequency drive will respond directly to signals applied to the control signal terminals.
1 … 8	specific to the device For more information, please refer to the manual for the corresponding basic device.
9	Control commands and setpoint via SmartWire-DT: DI1 = Hardware enable, PNU 423 has no function
10	Control commands via SmartWire-DT: Local setpoint (PNU 423 for local settings)
11	Local control commands, setpoint values via SmartWire-DT (DI1 = Start / Stop)
12	Actuation via SmartWire-DT - depending on the settings with the loss in communication, automatic change to the local actuation
13	Control commands and setpoint via SmartWire-DT. Additionally via DI1 Enable and DI2 Enable Setpoint

Parameters 1 to 5 in PNU 928 are equivalent to parameters 9-13 in P1-12/ P-12. Parameter 0 in PNU 928 contains parameters 1 to 8 in P-12. This means that every value in P1-12 / P-12 between 0 and 8 looks like the value in 0 for PNU 928.

4.5.3.3 Fault numbers

Following is a list of all error numbers with the corresponding display texts.

Table 16: Fault numbers

Eaton Error Number [hex]	Value shown on display	Designation
0	no-FLt	no fault
7112	OI-b	Brake chopper overcurrent
7114	OL-br	Braking resistance overload
2220	O-I	Overcurrent
7131	I.t-trP	Thermal motor overload
5400	SAFE-I	power section
3210	O Volts	Device overvoltage
3220	U-volts	Device undervoltage
4230	O-t	Heat sink overtemperature
4220	U-t	Device undertemperature
6300	P-dEF	Default settings loaded
9000	E-tr iP	External fault
7510	SC-Obs	Local COM interrupted
5130	FLt-dc	DC ripple too large
3130	P-LOSS	Phase failure
2213	h O-I	Overcurrent@Acc
4231	th-FLt	Malfunctioning heat sink thermistor
560 1	dAtA-F	Internal error (IO)
7350	4-20 F	4-20mA fault
5602	dAtA-E	Internal error (DSP)
6301	U-dEF	User defaults loaded
7132	F-Ptc	Motor thermistor fault
7010	FAn-F	Replace device fan
4110	O-hEAt	Excessively high ambient temperature
8311	O-tor9	Overtorque
8321	U-tor9	Undertorque
5410	Out-F	End stages
A110	Enc-01	Encoder COM interrupted
7310	Enc-02	Speed error
A120	Enc-03	Wrong encoder PPR
A130	Enc-04	Encoder channel A fault

Eaton Error Number [hex]	Value shown on display	Designation
A131	Enc-05	Encoder channel B fault
A140	Enc-06	Encoder channel A&B fault
A150	Enc-07	
A151	Enc-08	
A160	Enc-09	
A170	Enc-10	
7140	AtF-01	Unequal stator resistance
7141	AtF-02	Stator resistance too high
7142	AtF-03	Choke too low
7123	AtF-04	Motor tilted
7144	AtF-05	Wrong motor data
7305	AtF-09	Malfunctioning encoder 1
2350	AtF-10	Phase failure output
7500	SC-F01	Communication loss
7530	SC-F02	CANopen COM interrupted
7531	SC-F03	Anybus COM interrupted
7550	SC-F04	Option COM interrupted
7552	SC-F05	BacNet Com-Loss
8910	OF-01	Malfunctioning link to option
8920	OF-02	Option: Unknown status
B110	PLC-01	Unknown PLC function
B120	PLC-02	PLC program too big
B121	PLC-03	PLC division by zero
B130	PLC-04	Lower limit higher than upper limit
B140	PLC-05	Function index too large
2330		U-V-W ground fault

4.5.4 Acyclic parameter channel for DX-NET-SWD...

4.5.4.1 Introduction

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

The following sections describe the parameter channel's functions.

4.5.4.2 Protocol

The most important task of the DX-NET-SWD… SmartWire-DT connection is to map the protocol in such a way that SmartWire-DT will be able to use the parameter channel in a fully transparent manner.

Regardless of whether data should be read or written, the first request from the coordinator will always be a write request. A parameter request is used to define whether the job is a read or a write job. After the write request is transmitted (contains read or write job), a write response without data will be expected. Then the coordinator poles through the read request of the variable frequency drive, prompted by the application of the higher level PLC. 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.

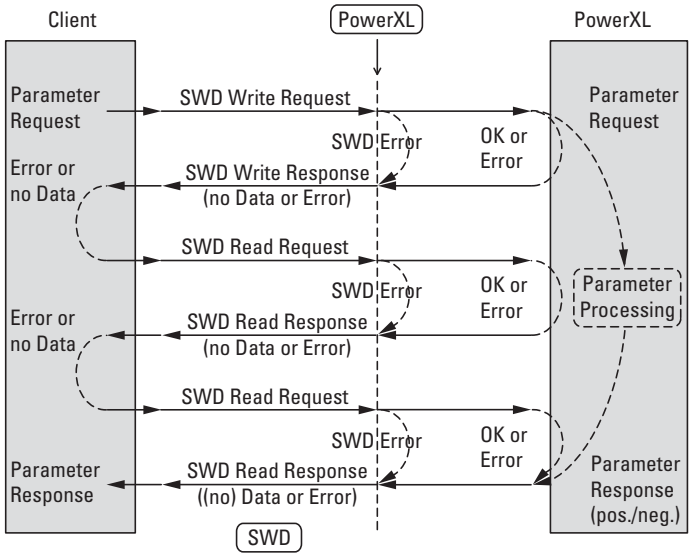


Figure 27: Acyclic parameter channel protocol

4.5.4.3 SmartWire-DT write request – Read job

Only individual parameter reading is supported (i.e., array and multiple parameter reading is not supported). The parameter request's frame length is set at 10 bytes.

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.

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 ten 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 request
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_{dez}): 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: 00_{hex} (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 0000hex - $FFFF_{hex}$ (i. e. 0dec - 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})

→ In this case, the number of bytes is always 10.

4.5.4.4 SmartWire-DT write request – Write job

Only individual parameter writing is supported (i.e., array and multiple parameter writing is not supported). The maximum parameter request frame length 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.

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 ten 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_{dez}): Value
5	No. of Elements	**Number of elements** Address of the parameter that should be accessed PNU 0 up to PNU 999: 00_{hex} (only for subindex 0) PNU 0 up 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.

4.5.5 SmartWire-DT write response

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

The following SmartWire-DT write responses are possible:

- SmartWire-DT write response(+) – Without data or errors if the DC1 variable frequency drive has understood the SmartWire-DT write request.
- SmartWire-DT write request(-) – Error. If an error has occurred, the write response will contain an error. These errors are bus-specific and are explained in the corresponding sections.

For possible errors → Section 4.5.6, "Acyclic data via PROFIBUS-DP".

4.5.5.1 SmartWire-DT read request

After receiving a positive SmartWire-DT write response, it is possible to start polling SmartWire-DT 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.

4.5.5.2 SmartWire-DT read response

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

The following SmartWire-DT read responses are possible

- SmartWire-DT 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
- SmartWire-DT read response(+) – Parameter channel error
  - If the error concerns the PROFIdrive parameter channel
- SmartWire-DT read response(+) – Without data
  - if the variable frequency/variable speed starter drive has determined the reply during a write order
- SWD read response(+) – with data
  - if the variable frequency drive/variable speed starter has determined the reply during a rad order.

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

SmartWire-DT read response(-) – Error

If an error has occurred, the read response will contain an error. These errors are bus-specific and are explained in the corresponding sections.

SmartWire-DT read response(+) – Parameter channel error

If there is an error in the parameter channel, a positive SmartWire-DT read response(+) – Parameter channel error will be generated. The error will be contained either in a write job or a read job.

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

The following table lists the PROFIdrive profile's parameter channel errors. The possible errors for the variable frequency drive/variable speed starter are marked (column „DA1, DC1, DE1").

Table 17: Parameter channel errors with PROFIdrive

Fault number [hex]	Designation	Description	Supplementary information	DA1 DC1 DE1
00	Invalid parameter number	Attempting to access a non-available 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 outside the value 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 access a parameter with a value not corresponding to the parameter's data type	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	✓

Fault number [hex]	Designation	Description	Supplementary information	DA1 DC1 DE1
0A	reserved	–	–	–
C0	No usage rights	Attempting to have write access without write permissions	0	✓
0C	reserved	–	–	–
0D	reserved	–	–	–
0E	reserved	–	–	–
0F	No text array available	Attempting to access a non-available text array	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.		✓
…-64	reserved	–		–
65-FF	manufacturer specific	–		–

SmartWire-DT 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 SmartWire-DT read response(+) – without data.

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

SmartWire-DT read response(+) – With data (all PNUs)

As soon as the variable frequency drive/variable speed starter has completed the response for a read job for the range PNU 0 – PNU 999 (without PNU 202), it will send a SmartWire-DT read response(+) – with data.

Byte	Designation	Description
0	Request Reference	Request identification: Is echoed
1	Response-ID	Response ID: 01_{hex}: Read job (+)
2	DO-ID	Drive-Object-ID: Is echoed
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 - 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–PNU 999 (without PNU 202)

SmartWire-DT 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 SmartWire-DT read response(+) – with data.

Byte	Designation	Description
0	Request Reference	Request identification: Is echoed
1	Response-ID	Response ID: 01_{hex}: Read job (+)
2	DO-ID	Drive-Object-ID: Is echoed
3	No. of Parameters	Number of Parameters: 01_{hex}
4	Format	Format: $0A_{hex}$ (= 10_{dez})
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

4.5.6 Acyclic data via PROFIBUS-DP

4.5.6.1 Introduction

Acyclic communications with a slave via PROFIBUS-DP can basically be established by a Class 1 master and a Class 2 master simultaneously. This means that the variable frequency drive/variable speed starter will need to handle acyclic requests and responses from/to both masters.

→ For more information on the subject of the transfer of acyclic data, consult the MN05013002Z-EN manual, "SmartWire-DT Gateways".

4.5.6.2 Addressing

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

The acyclic data objects of a slave are addressed via slots and indexes on the PROFIBUS. SWD maps the slot to the SWD module address. The parameter channel is always addressed with index 47.

4.5.6.3 Protocol

Acyclic services (index-based addressing and payload data) are mapped the same way on SWD by the PROFIBUS-DP gateway (EU5C-SWD-DP). As a result, the parameter channel can be used in a fully transparent manner by SmartWire-DT modules.

The following diagram illustrates the protocol between the PROFIBUS-DP master, PROFIBUS-DP gateway, and a variable frequency drive/variable speed starter.

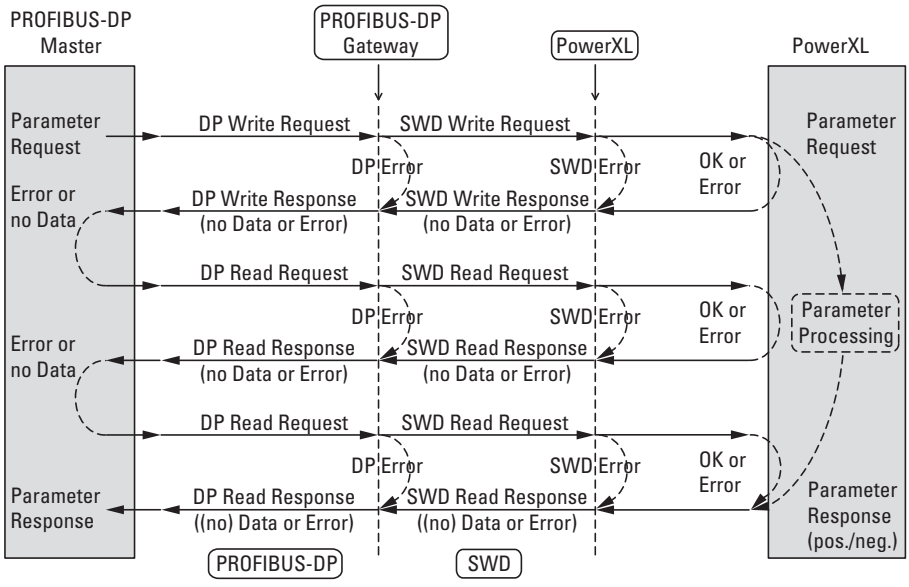


Figure 28: Acyclic PROFIBUS-DP parameter channel protocol

4.5.6.4 SmartWire-DT write response(-) – Error

This section shows the various possible device-specific errors that can occur during communications via the acyclic parameter channel with PROFIBUS-DP.

The following table describes the various possible errors that can be contained in the SmartWire-DT write response(-).

Error Type	Failure code	Description
Error_Code_1	$A1_{hex}$	Write error: Only reading allowed for indexes 1 – 3 (PKE motor-protective circuit-breaker).
Error_Code_1	$A2_{hex}$	DC1 variable frequency drive is not available.
Error_Code_1	$B0_{hex}$	There is no valid index.
Error_Code_1	$B1_{hex}$	Parameter request block too long.
Error_Code_1	$B5_{hex}$	Parameter access temporarily not permissible due to internal processes.

In the case of XSoft-CoDeSys, only failure code 54_{dec} (representing the errors listed above) can be output via function blocks XDPMV1_READ and XDPMV1_WRITE when using a PROFIBUS-DP master.

→ For more information, see → Section 4.5.4.2, "Protocol", page 76.

4.5.6.5 SmartWire-DT read response(-) – Error

This section shows the various possible device-specific errors that can occur during communications via the acyclic parameter channel with PROFIBUS-DP.

The following table describes the various possible errors that can be contained in the SmartWire-DT read response(-).

Error Type	Failure code	Description
Error_Code_1	$A1_{hex}$	Write error: Only reading allowed for indexes 1 – 3 (PKE motor-protective circuit-breaker).
Error_Code_1	$A2_{hex}$	DC1 variable frequency drive is not available.
Error_Code_1	$B0_{hex}$	There is no valid index.
Error_Code_1	$B5_{hex}$	Parameter access temporarily not permissible due to internal processes

In the case of XSoft-CoDeSys, only failure code 54_{dec} (representing the errors listed above) can be output via function blocks XDPMV1_READ and XDPMV1_WRITE when using a PROFIBUS-DP master.

→ For more information, see → Section 4.5.4.2, "Protocol", page 76.

→ For more information on the subject of transferring acyclical data, please consult manual MN05013002Z-EN, "SmartWire-DT Gateways".

4.6 SmartWire-DT diagnostics

The variable frequency drive/variable speed starter supplies diagnostic messages for itself and for the DX-NET-SWD… SmartWire-DT connection.

Basically, a distinction must be drawn between:

- Basic diagnostics (basic SmartWire-DT diagnostics)
- Advanced diagnostics (advanced SmartWire-DT diagnostics)
- PROFIdrive parameter channel diagnostics

PROFIdrive parameter channel diagnostics are shown with fault messages or warnings in the cyclic profile with PROFIdrive (profile 2).

4.6.1 Basic SWD 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 byte 0, bit 4 (DIAG). A device response, if any, will be described in the advanced diagnostics.

In addition, in all profiles, the following bits

- ERR (the variable frequency drive stops) or
- WARN (no reaction of the variable frequency drive)

in the corresponding input bytes are used to show whether there are any diagnostic alarms (i.e. errors or warnings).

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

- Profile: FaultAck = 1,
- 1-0-A switch in position 0.

Warnings (WARN) cannot be acknowledged, since they are simply messages without an ensuing response (the variable frequency drives/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 diagnostic alarms FaultBuffer:
PNU 947 sub-index 0 to 7

4.6.2 Advanced SmartWire-DT 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 18: Diagnostic alarms of the DC1 variable frequency drive

Value [hex]	Meaning	Remedy	Notes
14	Internal communication problem in the variable frequency drive/variable speed starter	• If the error continues, switch the supply voltage off/on • Check EMC • Replace the variable frequency drive/variable speed starter	
15	no unambiguous position of the 1-0-A switch for more than 4 seconds	Move the 1-0-A switch to one of the three defined positions.	Input byte 0, bit array 2..3 A1, A2 is used to signal a value of 00_{hex}. For more information, see below.
19	There is a warning at hand for 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 fault message	Corresponds to the ERR bit in the corresponding input byte.

Diagnostic alarm 15_{hex}

If the 1-0-A switch does not assume a clear position for longer than 4 seconds, the variable frequency drive/variable speed starter will be switched off and generate the following error messages:

- DIAG,
- ERR,
- Diagnostic alarm 15_{hex} (→ Table 18).

In addition, the SmartWire-DT diagnostic LED on the DX-NET-SWD…SmartWire-DT connection will flash green (frequency: 3 Hz).

4.6.2.1 Advanced SmartWire-DT diagnostics via PROFIBUS

→ For information on the subject of advanced diagnostics, consult manual MN05013002Z-EN, "SmartWire-DT Gateways".

For basic information on diagnostics via PROFIBUS-DP masters, consult manual MN05002002Z-EN, "XI/OC Signal Modules". The manual also contains explanations regarding the access of the diagnostic data of a PROFIBUS-DP slave module.

4.6.3 PROFIdrive diagnostics

Diagnostic data that corresponds to the PROFIdrive profile can be sent at any time regardless of the profile that has been chosen. It is provided via the acyclic parameter channel of the relevant bus system.

The ERR and WARN bits in corresponding input bytes 4 to 11 are used to show whether there are any diagnostic alarms present (i.e., errors or warnings).

You can acknowledge faults (ERR) as follows:

- Profile: 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 alarms (PNU 860.0 warnings and PNU 944 to PNU 952 faults)

5 Appendix

5.1 Dimensions

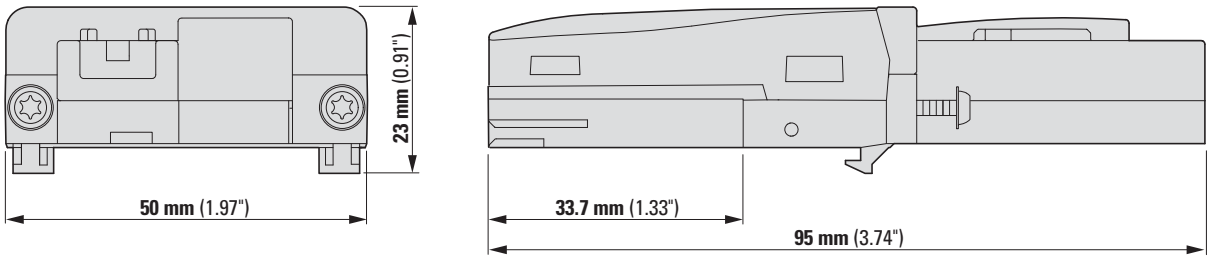


Figure 29: DX-NET-SWD1 interface

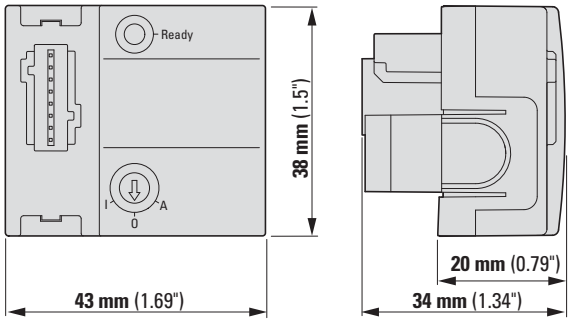


Figure 30: DX-NET-SWD3 interface

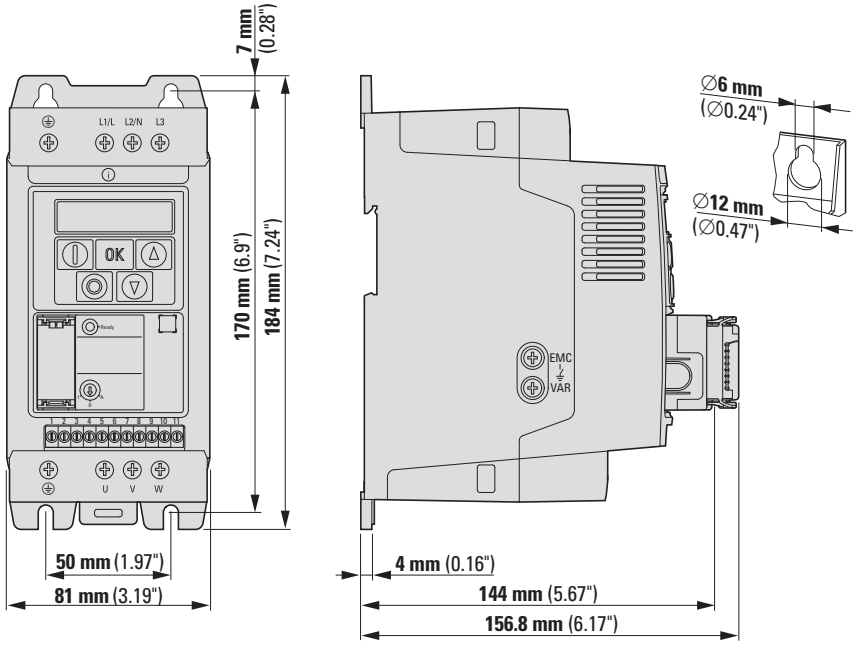


Figure 31: Variable frequency drive DC1 in FS1 with SmartWire-DT connection

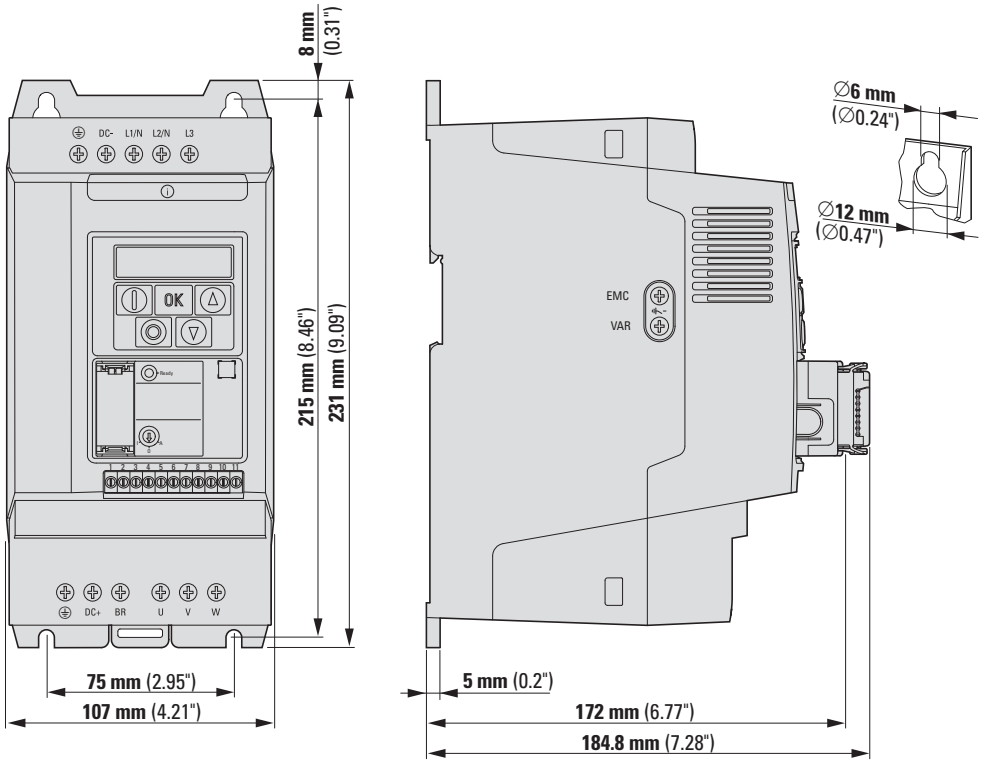


Figure 32: Variable frequency drive DC1 in FS2 with SmartWire-DT connection

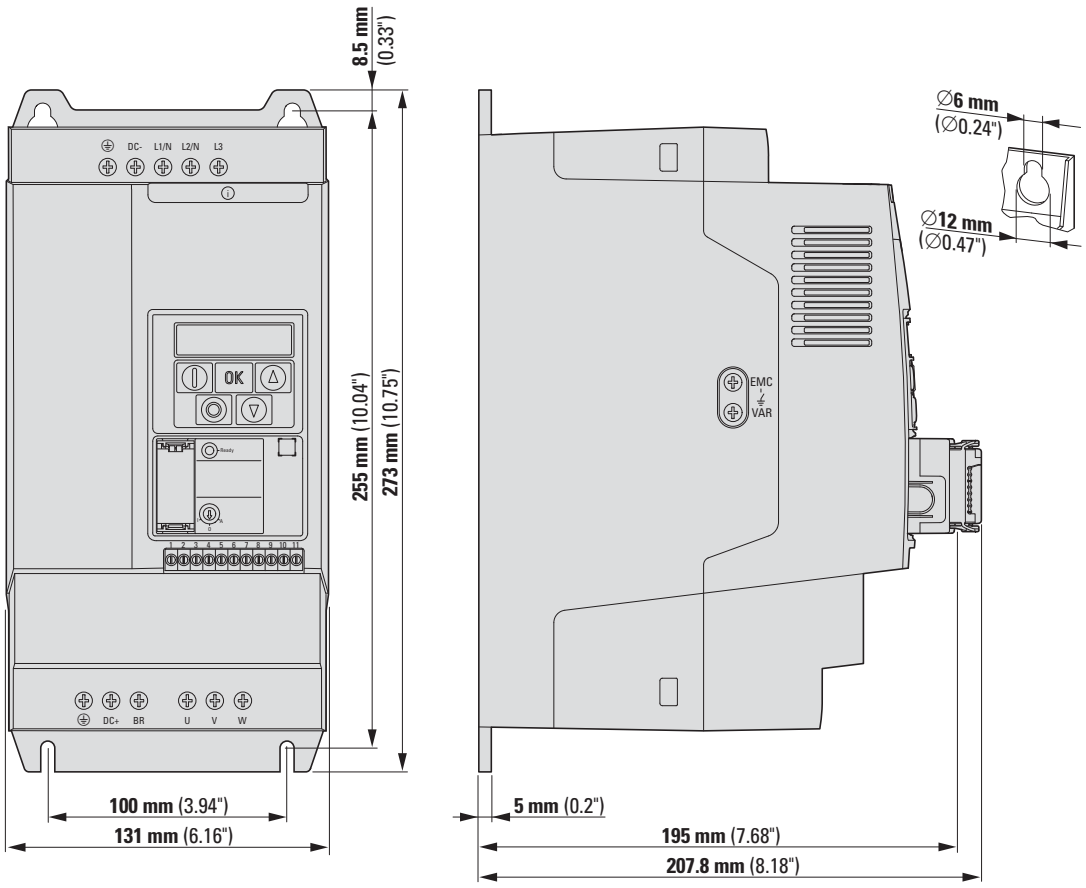


Figure 33: Variable frequency drive DC1 in FS3 with SmartWire-DT connection

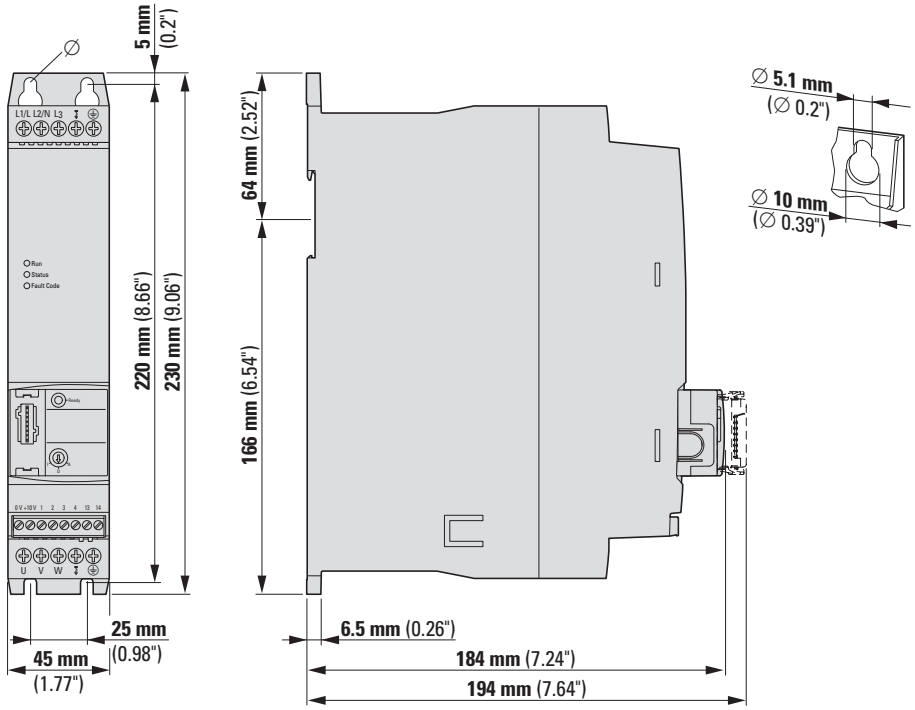


Figure 34: 45 mm DE1 variable speed starter with SmartWire-DT interface module

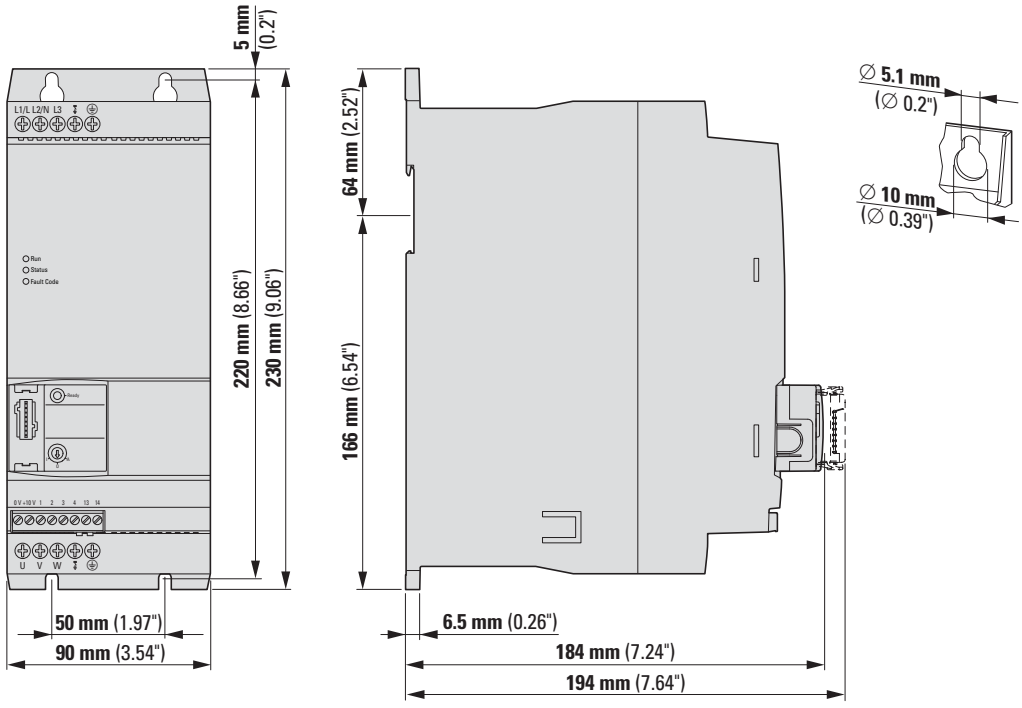


Figure 35: 90 mm DE1 variable speed starter with SmartWire-DT interface module

5.2 SmartWire-DT

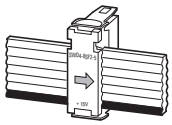


Figure 36: SmartWire-DT ribbon cable with SWD4-8SF2-5 external device plug

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