MOELLER

Hardware and Engineering

DE4-IOM-APP-F
Application Module

03/01 AWB8240-1358GB

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Warning!
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.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (AWA) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalisation. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 volt supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD 384.4.41 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 restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed 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 damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).
- According to their degree of protection frequency inverters may feature during operation live, bright metal, or possibly moving, rotating parts or hot surfaces.
- The impermissible removal of the necessary 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 relevant national 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).
- All work relating to transport, installation, commissioning and maintenance must only be carried out by qualified personnel. (IEC 60364 and HD 384 and national work safety regulations).
- Installations fitted with frequency inverters must be provided with additional monitoring and protective devices in accordance with the relevant safety regulations etc. Modifications to the frequency inverters using the operating software are permitted.
- All shrouds and doors must be kept closed during operation.
- In order to reduce hazards to persons 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 related measures (interlocks or mechanical interlocks).
  – Live parts or cable connections of the frequency inverter must not be touched after it has been disconnected from the power supply due to the charge in capacitors. Appropriate warning signs must be provided.

Contents

About This Manual

This manual describes the DE4-IOM-APP-F application module. The purpose of this application module is the digital and analog control of the DV4 frequency inverter on all functional levels.

The manual contains information required for configuring, installing and operating the DV4 frequency inverters. It provides a detailed description of the properties, parameters and functions, with examples of key applications. All information applies to the specified hardware and software versions.

The following abbreviations and symbols are used in this manual:

AIF:	**A**utomation **i**nter**f**ace (interface for communication modules)
EMC:	**E**lectro**m**agnetic **c**ompatibility
ESD:	**E**lecro**s**tatic **d**ischarge)
FIF:	**F**unction **i**nter**f**ace (built-in interface for function modules)
PES:	**PE** (positive earth) **s**creen connection
PNU:	**P**arameter **nu**mber

For greater clarity, the name of the current chapter is shown in the header of every left-hand page and the name of the current section in the header of every right-hand page (except for the section title pages and the blank pages at the end of each section).

Provides useful tips and additional information

Caution!
Indicates risk of light material damage.

Warning!
Indicates risk of serious material damage and slight injury.

Warning!
Indicates risk of serious material damage and serious or fatal injury.

Read this manual thoroughly before installing and commissioning the frequency inverters. It is assumed that you have a basic knowledge of physics and are familiar with handling electrical systems and interpreting technical drawings.

1 About The Devices

System overview

The illustration overleaf provides an overview of the available devices.

Legend to Figure 1:

① DE4-KEY-3 LCD keypad
② DV4... frequency inverter
③ DE4-IOM-STD-F, DE4-IOM-APP-F I/O module
④ LCD keypad DE4-KEY-H3

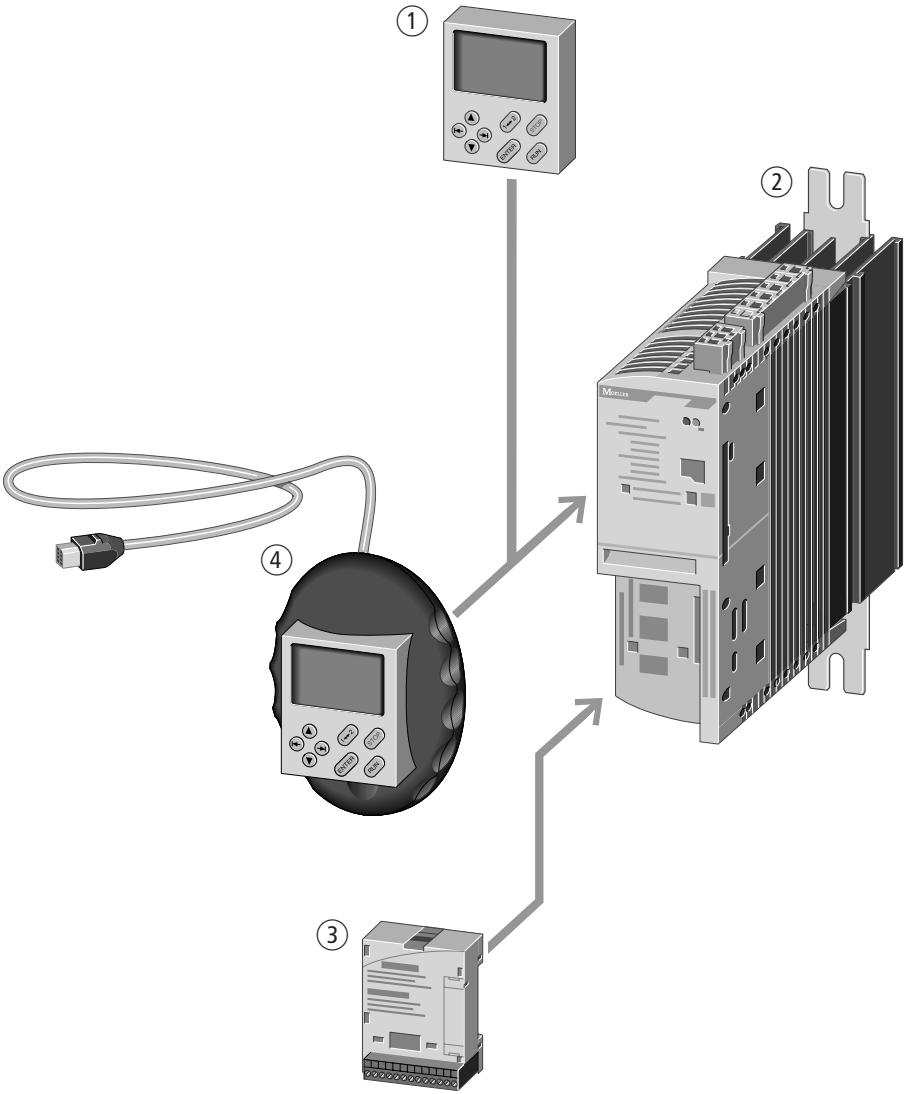


Figure 1: System overview

2 Functional Description

Basic DV4 unit

Connection and installation of the DV4 frequency inverter according to local installation regulations and as described in the "Engineering" section of manual AWB8230-1340, "Hardware and Engineering, DV4 Frequency Inverter".

ESD measures
Discharge yourself on an earthed surface before touching the frequency inverter and its accessories.

This prevents damage to the devices through electrostatic discharge.

Automation and function interface

The DV4 frequency inverters each have two interfaces for plug-in modules:

- AIF (automation interface), open interface,
- FIF (function interface), internal interface.

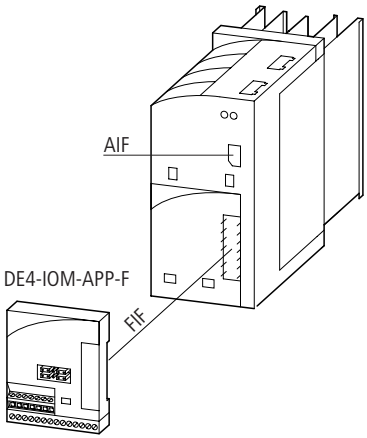


Figure 2: AIF and FIF

The DE4-IOM-APP-F application module is designed for installation on the built-in FIF and allows the frequency inverter to be operated through control signal terminals.

The built-in FIF connects the DE4-IOM-APP-F with the central processing unit (CPU) of the DV4. When it is switched on, voltage at mains potential is applied to the FIF. In the basic version of the DV4, the FIF is covered with two plastic caps. The inside cover contains a jumper which enables operation without control terminals.

Warning!
The interface module must be connected to or removed from the FIF only when the frequency inverter is voltage-free. This also applies for removing the plastic covers on the basic version.

Operation of the DV4 frequency inverter with open FIF is not permissible.

Note that the DV4 and the FIF can still carry dangerous voltages up to three minutes after power is disconnected.

Work on the FIF must be carried out only by qualified personnel.

Internal power feed

DV4 frequency inverters are supplied internally by the DC link via a switched-mode power supply. This power is supplied to the DE4-IOM-APP-F application module through the built-in FIF.

The FIF has a floating power supply which is double insulated from the internal DC link voltage.

Warning!
Beside the floating supply voltage, the FIF also carries voltage at mains potential.

DE4-IOM-APP-F application module

The DE4-IOM-APP-F application module enables digital and analog control of the DV4 frequency inverter. It contains 21 terminals for the following functions:

- Two analog voltage inputs:
  - 0 to +5 V,
  - 0 to +10 V,
  - (–10) to +10 V
- Two analog current inputs:
  - 0 to 20 mA,
  - 4 to 20 mA,
  - 4 to 20 mA, open-curcuit monitored
- Two analog outputs:
  - 0 to +10 V,
  - 0 to 20 mA,
  - 4 to 20 mA
- Seven digital inputs
- Three digital outputs (transistor)
- Voltage outputs:
  - +5.2 V (supply voltage for setpoint potentiometer),
  - +20 V (control voltage)

The analog and digital inputs and outputs are galvanically isolated. Their functions can be individually defined with parameters.

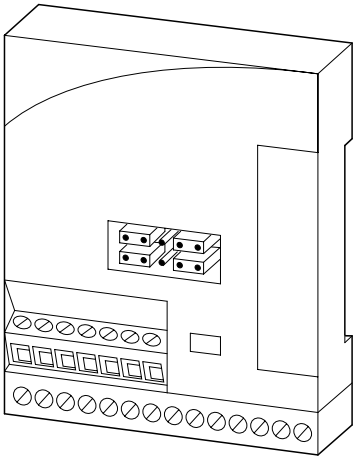


Figure 3: Application module

Type code

DE4 - IOM - APP - F

- Type code suffix
  F = **f**unction interface (FIF) slot
- Counter, version, technical specifications
  APP = application
- Type code
  IOM = **I/O m**odule, application module
- Family name:
  Drives **E**xtension unit, generation **4**

Connecting the DE4-IOM-APP-F application module

Warning!
The DV4 DE4-IOM-APP-F application module must be connected to or removed from the FIF only when the DV4 is voltage-free.

Remove the outer protective cover with the enclosed screwdriver and keep it in a safe place.

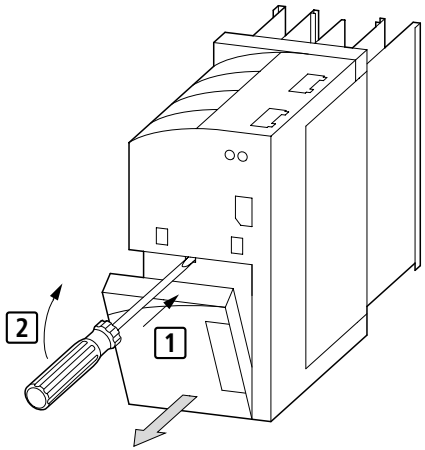


Figure 4: Removing outer protective cap

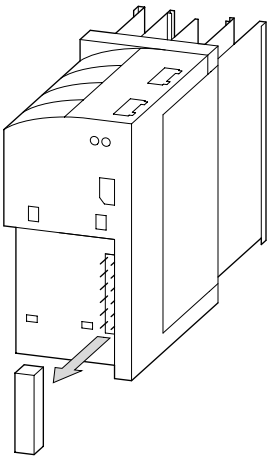


Figure 5: Removing inner protective cap

Remove the inner protective cap for the FIF and keep it in a safe place.

Connect the DE4-IOM-APP-F to the FIF slot.

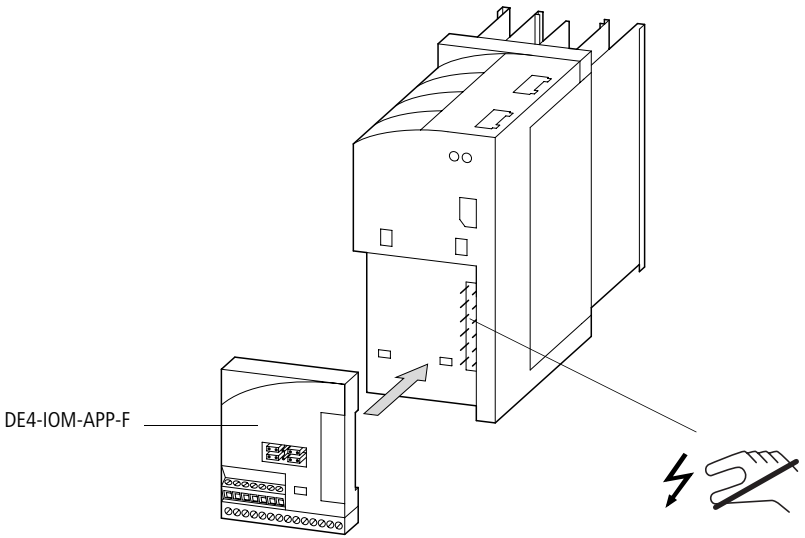


Figure 6: Connecting the module

Terminal assignment

The external connection of the DE4-IOM-APP-F is made with the two screw terminal strips. The terminals are floating and galvanically isolated from each other.

The following function blocks can be accessed through the I/O terminals:

- Analog/digital converter
- Internal device voltage supply
- Digital control inputs
- Transistor output

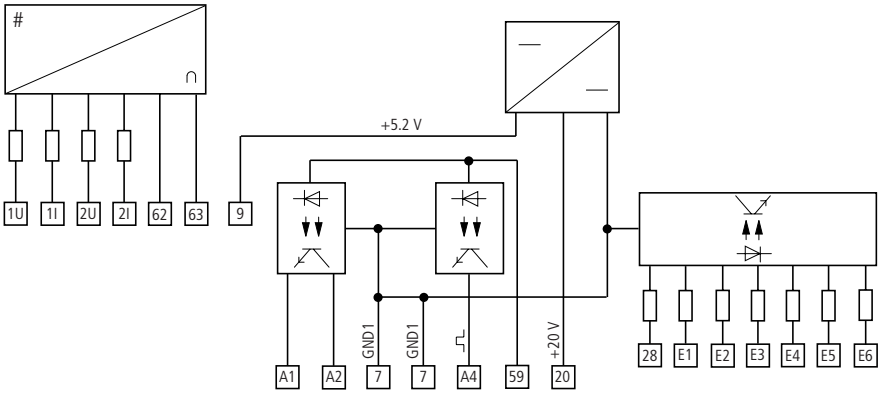


Figure 7: Terminal assignment

No.	Function	Name	Level	Default setting	Technical data, notes
7	Reference potential	GND1	0 V	–	
9	Output, stabilized DC voltage source for setpoint potentio-meter	U_{REF}	+5.2 V	–	Load rating: Max. 10 mA Reference: Terminal 7 (GND1)
20	Output, DC voltage source for controlling digital inputs and outputs	U_{B20}	+20 V	–	Load rating: Max. 70 mA = ΣI Reference: Terminal 7 (GND1) $\Sigma I = I_{E1} + I_{E2} + I_{E3} + I_{E4} + I_{E5} + I_{E6} + I_{28} + I_{59}$
28	Digital input	EN	HIGH = +12 to +30 V, LOW = 0 to +3 V		Controller inhibit, EN = Enable, HIGH = Start, R_i = 3.3 kΩ
59	Input, DC supply for A1		0/+20 V 0/+24 V	–	20 V from terminal 20 or 24 V from external source
62	Analog outputs	AOUT1	0 to +10 V 0 to +20 mA 4 to +20 mA	Output frequency	Load carrying capacity ≦ 2 mA, R_L ≦ 500 Ω Resolution: 10 bit, Linearity error: ±0.5 %, Temperature dependency: 0.3 % (0 to 60 °C)
63		AOUT2		Motor current	

No.	Function	Name	Level	Default setting	Technical data, notes
A1	Digital outputs	DIGOUT1	0/U_{59}	Ready for operation	U_{59} = +20 V with DC supply from terminal, 20 max. 10 mA, U_{59} = +24 V with external DC supply, max. 50 mA
A2		DIGOUT2		–	
A4		DFouT1	0 to 10 kHz HIGH = +18 to +24 V (HTL) LOW = 0 V	Internal DC link voltage	Frequency output Load carrying capacity ≦ 5 mA
E1	Digital input	DIGIN1	HIGH = +12 to +30 V, LOW = 0 to +3 V	FF1 (FF3)	PLC signal level, HTL, R_i = 3k3, HIGH = DCB = DC braking (**DC**-**B**rake) HIGH = CCW = counterclockwise rotation, CW = clockwise rotation, direction reversal
E2		DIGIN2		FF2 (FF3)	
E3		DIGIN3		DCB	
E4		DIGIN4		CW/CCW	
E5		DIGIN5		–	Not prewired
E6		DIGIN6		–	
1U	Analog voltage inputs	AIN1	0 to +5 V 0 to +10 V –10 to +10 V	0 to +10 V	Voltage input: R_i ≧ 50 kΩ Current input: R_B = 250 Ω (load) Input current: ≦ 2 mA Resolution: 10 bit Linearity error: ±0.5 % Temperature dependency: 0.3 % (0 to 60 °C) Range changeover with jumper and PNU 0034
2U		AIN2			
1I	Analog current inputs	AIN1	0 to 20 mA 4 to 20 mA 4 to 20 mA (open-curcuit monitored)	–	
2I		AIN2			

Screw terminal connections

n	mm²	mm²	AWG	mm²	mm²
1 ×	0.14 to 1.0	0.14 to 1.5	26 to 16	0.25 to 0.5	0.25 to 0.5
2 ×	0.14 to 0.2	0.14 to 0.5	–	–	–

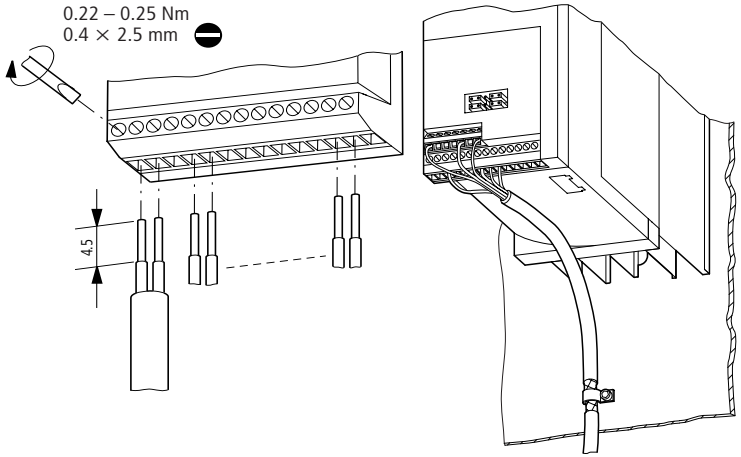


Figure 8: Control signal terminal connections

Control voltages

The DE4-IOM-APP-F application module provides two control voltages:

- Terminal 9 – for analog setpoint input (supply voltage for potentiometers)
- Terminal 20 – for Enable signals (control signal inputs) and for the transistor outputs
- Terminal 7 – the zero potential for both voltages

Terminal	Output voltage	Load rating
9	+5.2 V	Max. 10 mA
20	+20 V	max. 70 mA $= \Sigma I = I_{E1} + I_{E2} + I_{E3} + I_{E4} + I_{E5} + I_{E6} + I_{28} + I_{59}$

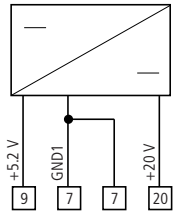


Figure 9: Terminal assignment

Grounding the zero potentials

To increase protection against interference during operation, it is advisable to ground the zero potentials. Use a cable with a cross-section of at least 1.5 mm^2 for this connection.

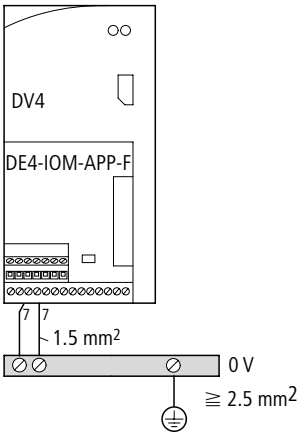


Figure 10: Connection for the 0 V terminal

If you are using several frequency inverters or PLCs in an installation, the zero potentials of each device must be interconnected point-to-point in a star configuration. Each of the devices must have a common ground at the "weakest" element, e.g. a PLC.

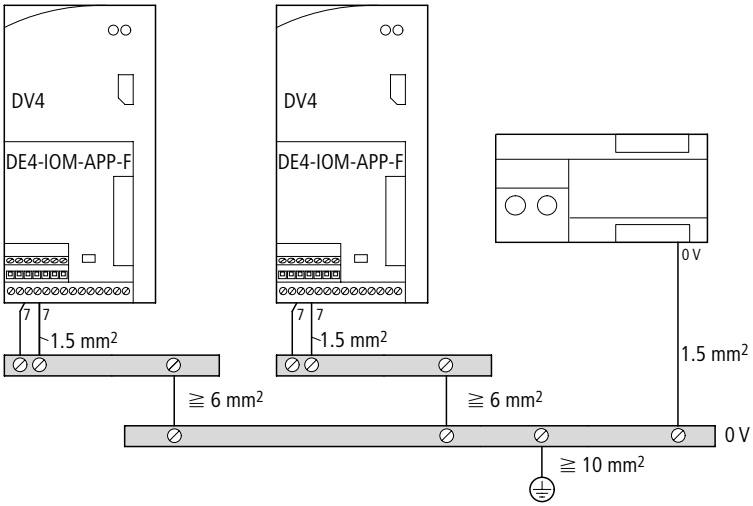


Figure 11: Grounding with star arrangement

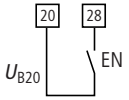
Required minimum wiring for frequency inverter operation

DV4 frequency inverters are only operational when a HIGH level (+12 to +30 V) is applied to terminal 28 of the DE4-IOM-APP-F application module. The reference point for terminal 28 is terminal 39 (GND2).

Possible controller enable through terminal 28 (EN = Enable):

- of the internal control voltage of terminal 20 (+20 V)
- with an external control voltage (+24 V)

Internal control voltage (+20 V)



External control voltage (+24 V)

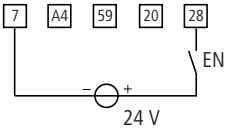


Figure 12: Required minimum wiring with internal or external control voltage

Digital inputs, PLC interconnection

The digital inputs of the DE4-IOM-APP-F (DV4) application module allow a direct connection with a programmable logic controller (PLC). To increase interference immunity, it is advisable to earth the zero potential (terminal 7) through a non-polarized capacitor (0.1 µF, 250 V DC).

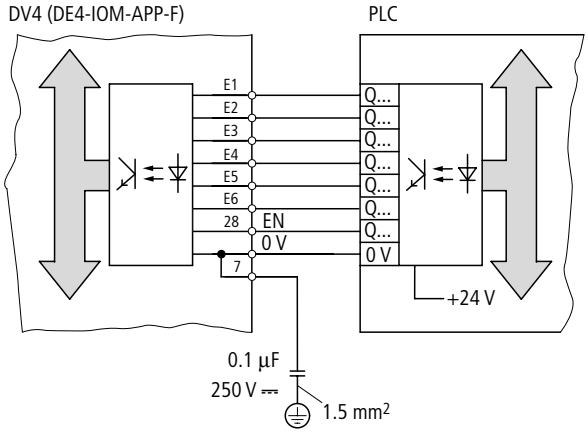


Figure 13: Connection for PLC coupling

If several frequency inverters in an installation are to be controlled by one PLC, the zero potentials of each device must be interconnected point-to-point in a star configuration. The devices must have a common ground at the "weakest" element, i.e. the PLC. In addition, terminal 7 must be capacitively grounded at each frequency inverter. The zero potential of the PLC can be directly grounded.

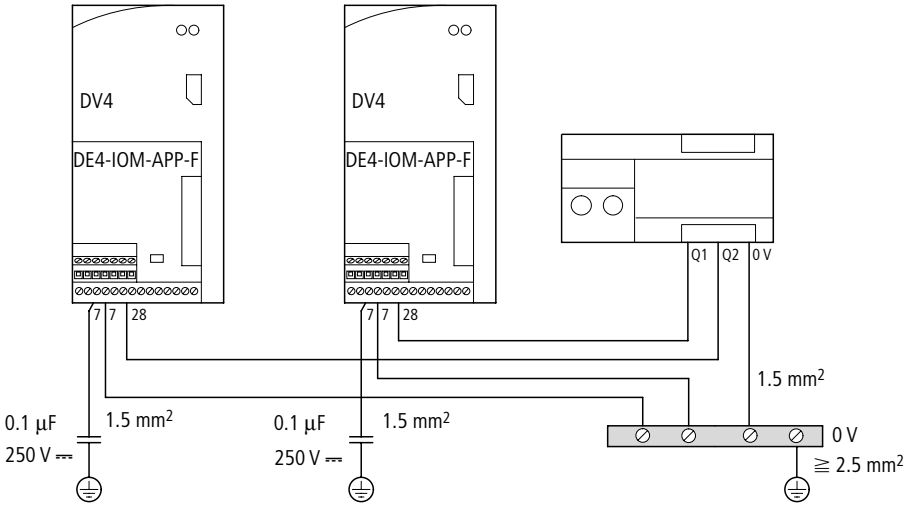


Figure 14: Grounding for PLC coupling

Frequency inputs E1 and E2

Digital inputs E1 and E2 of the DE4-IOM-APP-F can be used as frequency inputs. The function must be activated with PNU 0113/024 or 0007 (f-In) and PNU 0005 (setpoint value, actual value). The input frequency (0 and 100 kHz) can be set with PNU 0425. Here, the configuration (single- or dual-channel) is also defined.

The applied frequency signals must fulfill the following requirements:

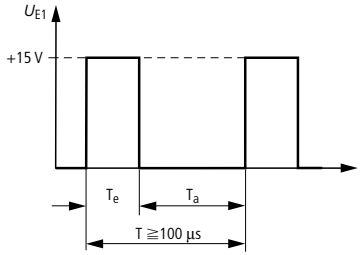


Figure 15: Permissible pulse shape

T_e = HIGH: +12 to +30 V

T_a = LOW: 0 to +3 V

Pulse ratio: T_e : T_a = 1 : 1 to 1 : 5

Speed control (frequency input E1, E2)

Speed control for correcting load-dependent speed deviations (in drive mode and regenerative).

→ Select the number of pulses per revolution to obtain the highest possible output frequency. Sufficiently dynamic control is achieved when the output frequency of the pulse generator (f_{actual}) is greater than 0.5 kHz.

Determining the actual frequency (output frequency of the encoder):

$$f_{act} = \frac{z \times n}{60}$$

z = number of pulses per revolution (generator cams)

n = Speed of the detector [min^{-1}]

f_{actual}= output frequency of detector [Hz]

Example:
Speed control with a 3-wire sensor (Moeller ATI). DC supply from terminal 20 (DE4-IOM-APP-F). Observe the maximum load applied at terminal 20.

Recommendation: Current consumption of sensor less than 20 mA.

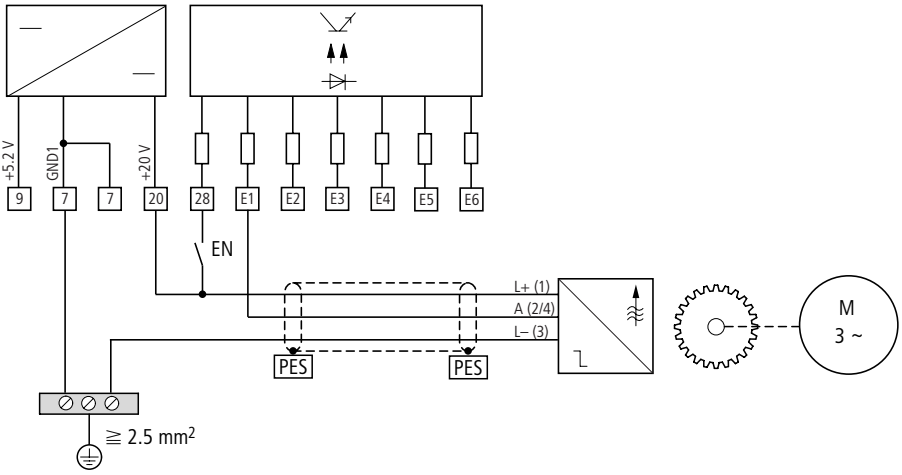


Figure 16: Speed control with a 3-wire sensor

Example:
Pulse generator with external power supply (≦ 24 V)

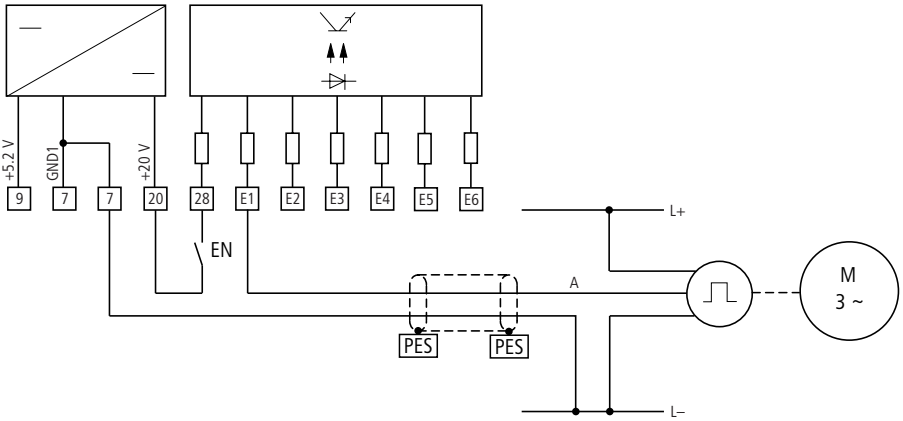


Figure 17: Speed control with encoder

Analog setpoint input

Analog setpoint values can be sent through terminals 1U, 2U, 1I and 2I of the DE4-IOM-APP-F. The reference value is provided by terminal 7. The analog setpoint voltage range must be specified through the plug-in jumpers.

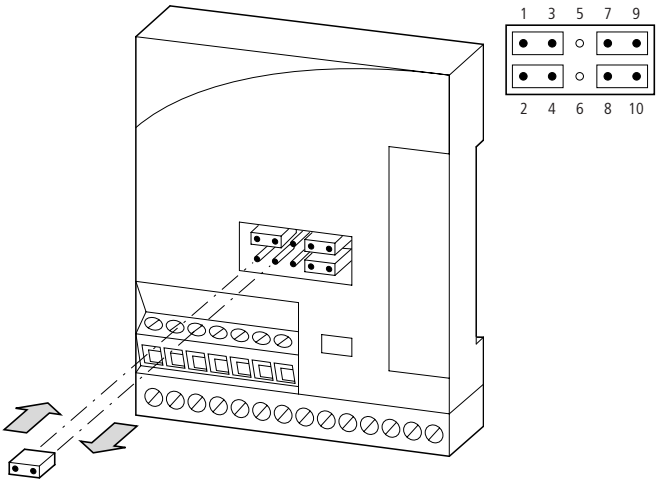
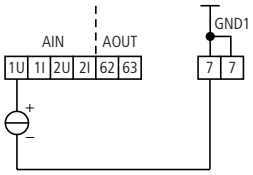
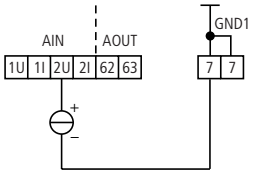


Figure 18: Fitting and removing jumpers

The module is supplied with all four jumpers in place, and therefore all default settings active.

The analog setpoint and actual voltages (1U/2U) are matched with the jumpers and with PNU 0034 (see DV4 manual AWB8230-1340)

Wiring diagram	Jumper	PNU 0034	Level	Remark
		1 = 0	0 to +10 V	Default setting
		1/1	–10 to +10 V	
		1 = 0	0 to +5 V	
		2 = 0	0 to +10 V	Default setting
		2 = 1	–10 to +10 V	
		2 = 0	0 to +5 V	

Parameter 0034 and the jumpers must be set to the same range for every analog input, otherwise the frequency inverter misinterprets the analog input signal.

The range and function of the analog input can be freely configured (PNU 0005 and 0034).

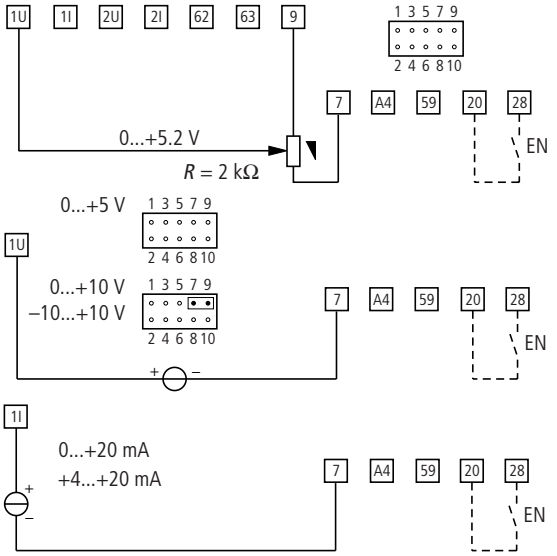


Figure 19: Wiring example: Analog setpoint input

To increase interference immunity, all analog signal cables should be screened and the screen should be grounded with a large surface-area connection near the setpoint source at one cable end.

The analog setpoint and actual currents (1I/2I) are matched only with PNU 0034; they are independent of the jumper settings.

Reference variable for several drives

Example: analog setpoint voltage

- Preferred value for external potentiometer: 2 kΩ
- Load rating of terminal 9 (DE4-IOM-APP-F): max. 10 mA
- Max. input current per device: about 1 mA (R_i > 50 kΩ)

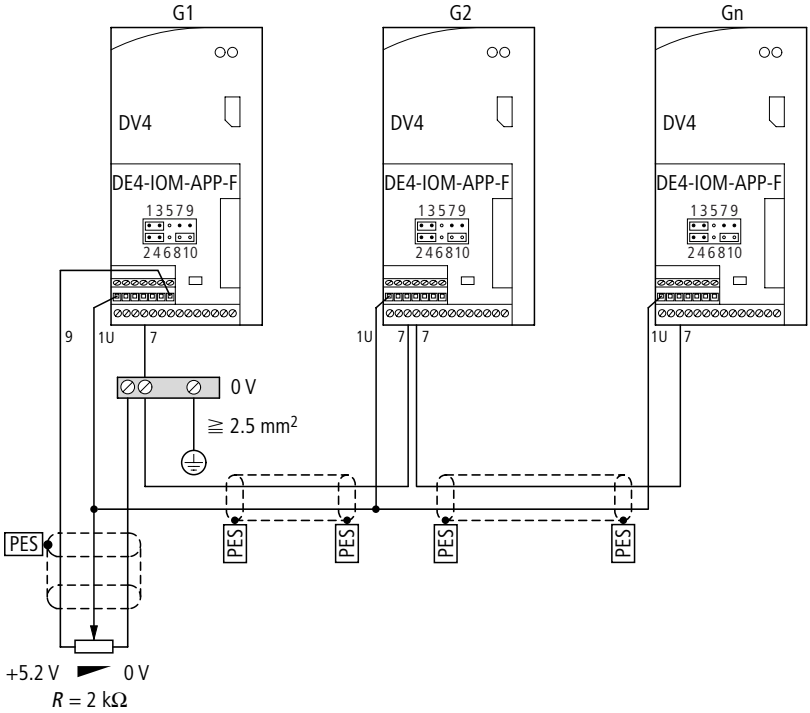


Figure 20: Analog setpoint voltage

Example: setpoint current (4 to 20 mA)

- Internal load resistance of the DE4-IOM-APP-F: 250 Ω

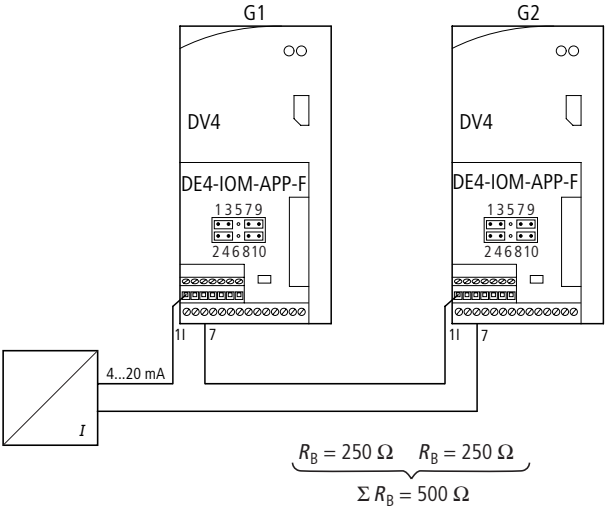


Figure 21: Setpoint current

→ Observe the maximum permissible load resistance of the current source.

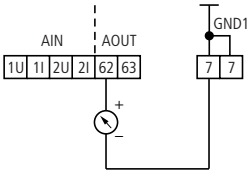
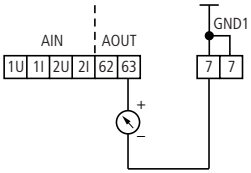
Warning!
The zero potential (terminal 7) of the DE4-IOM-APP-F must not be earthed in this device arrangement. It may be necessary to galvanically isolate the setpoint current.

Analog outputs (62, 63)

At terminals 62 and 63 of the DE4-IOM-APP-F, analog signals from 0 to +10 V and 0 to 20 mA are available. Terminal 7 is the reference point.

Signal selection is defined by the jumper settings.

Matching the analog output signals

Wiring diagram	Jumper	Level	Remark
		0 to +10 V	Default setting
		0 to +20 mA	
		0 to +10 V	Default setting
		0 to +20 mA	

Terminals 62 and 63 enable the direct connection of analog measuring instruments. The output signals can be user-configured with PNU 0110, 0111 and 0112.

By default,

- terminal 62 carries a signal proportional to the output frequency: 0 to +10 V corresponds to 0 to 50 Hz (f_{max});
- terminal 63 carries a signal proportional to the apparent motor current: 0 to +3 V.

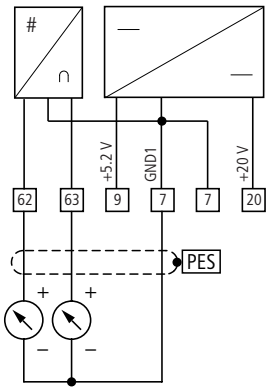


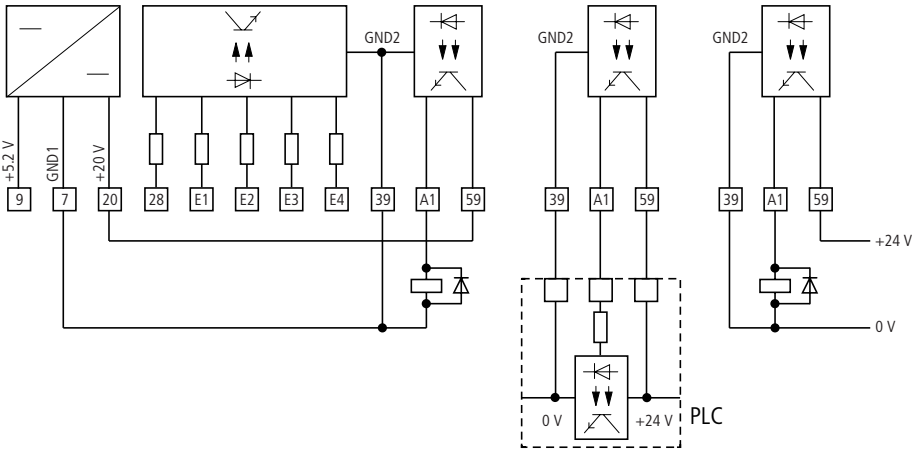
Figure 22: Monitor signal

Digital outputs (A1 and A2)

The digital transistor outputs (terminals A1 and A2) of the DE4-IOM-APP-F allow direct application of the control signal to a PLC input or an external relay. The possible current load depends on the voltage source used at terminal 59:

- ≦ 10 mA at +20 V for the internal voltage source (terminal 20). Reference point: GND1 (terminal 7).
- ≦ 50 mA at +24 V for an external voltage source. Reference point GND1 (terminal 7) must be connected to zero potential of the external source.

The function of the digital output is freely programmable (PNU 0117 and 0416). The default is fault message TRIP (DCTRL-TRIP).



Internal voltage source

External voltage sources

Figure 23: Digital output

3 Setting Parameters

This manual is a supplement to the parameter description for the basic DV4. Only the additional functions of the DE4-IOM-APP-F module are described here.

The parameter descriptions for the basic unit are listed in AWB 8230-1340GB, "Hardware and Engineering, DV4 Frequency Inverter").

The parameters that are specific to the DE4-IOM-APP-F are indicated with (APP) in this manual.

To simplify use of this manual, the chapter headings are the same and follow the same order as those in the manual for the basic DV4.

Parameter set transfer, extended parameter set tansfer

PNU 0002 is used to manage the parameter sets of the basic unit (PAR), (PNU 0002 = 0 to 20) and the expansion modules (FPAR) (PNU 0002 = 31 to 80).

These parameter sets can be overwritten either in groups or individually and transferred from or to the DE4-KEY-3 keypad.

The parameter sets can then be transmitted to other DV4 devices.

The parameter sets of the basic unit and the DE4-IOM-APP-F expansion module should always be transferred together.

PNU 0002 = 0 to 20:
These settings apply only to the parameter sets of the basic unit.

PNU 0002 = 31 to 34:
The selected parameter set of the expansion module is overwritten with the default settings (DS in the following tables).

PNU 0002 = 40 to 44:
All parameter sets (or one parameter set) of the expansion module are overwritten with the information from the keypad.

PNU 0002 = 50:
All parameter sets of the expansion module are copied to the LCD keypad.

PNU 0002 = 61 to 64:
One parameter set of the basic device and expansion module is overwritten with the default settings.

PNU 0002 = 70 to 74:
All parameter sets (or one parameter set) of the basic unit and the expansion module are overwritten with the information from the keypad.

PNU 0002 = 80:
All parameter sets of the basic unit and the expansion module are copied to the LCD keypad.

PNU 0002	Name	Value	Function	DS
	Parameter set transfer	0	Function executed	0
		Parameter set transfer only for the basic unit		
		1	Overwrite PAR1 with default setting	
		2	Overwrite PAR2 with default setting	
		3	Overwrite PAR3 with default setting	
		4	Overwrite PAR4 with default setting	
		10	Overwrite all parameter sets (PAR1 to PAR4) with data from LCD keypad	
		11	Overwrite PAR1 with data from LCD keypad	
		12	Overwrite PAR2 with data from LCD keypad	
	Parameter set transfer	13	Overwrite PAR3 with data from LCD keypad	0
		14	Overwrite PAR4 with data from LCD keypad	
		20	Copy all parameter sets (PAR1 to PAR4) from basic unit to LCD keypad	

PNU 0002	Name	Value	Function	DS
		Parameter set transfer only for the expansion module on the FIF		
(APP)		31	Overwrite FPAR1 with default setting	
(APP)		32	Overwrite FPAR2 with default setting	
(APP)		33	Overwrite FPAR3 with default setting	
(APP)		34	Overwrite FPAR4 with default setting	
(APP)		40	Overwrite all parameter sets (FPAR1 to FPAR4) with data from LCD keypad	
(APP)		41	Overwrite FPAR1 with data from LCD keypad	
(APP)		42	Overwrite FPAR2 with data from LCD keypad	
(APP)		43	Overwrite FPAR3 with data from LCD keypad	
(APP)		44	Overwrite FPAR4 with data from LCD keypad	
(APP)		50	Copy all parameter sets (FPAR1 to FPAR4) of the expansion module to the LCD keypad	
		Parameter set transfer for the basic unit **and** the expansion module on the FIF		
(APP)		61	Overwrite PAR1 and FPAR1 with default setting	
(APP)		62	Overwrite PAR2 and FPAR2 with default setting	
(APP)		63	Overwrite PAR3 and FPAR3 with default setting	
(APP)		64	Overwrite PAR4 and FPAR4 with default setting	
(APP)		70	Overwrite all parameter sets (PAR1 to PAR4 and FPAR1 to FPAR4) with data from LCD keypad	
(APP)		71	Overwrite PAR1 and FPAR1 with data from LCD keypad	
(APP)		72	Overwrite PAR2 and FPAR2 with data from LCD keypad	
(APP)	Parameter set transfer	73	Overwrite PAR3 and FPAR3 with data from LCD keypad	0
(APP)		74	Overwrite PAR4 and FPAR4 with data from LCD keypad	
(APP)		80	Copy all parameter sets (PAR1 to PAR4 and FPAR1 to FPAR4) to the LCD keypad	

User-definable terminal configuration, digital inputs E1 to E6

DV4 frequency inverters also allow the digital inputs to be freely configured. This configuration is implemented with PNU 0113/xxx by assigning a function (subindex) to one of the control signal terminals E1 to E6. The parameter value corresponds with the number of the input terminal.

Example:
You want to assign the function External Fault (EF) to digital input E5.

To do this, enter a 5 in PNU 0113/011.

Settings already made under PNU 0007 are automatically copied into the corresponding sub-parameter of PNU 0113/xxx.
If PNU 0113 has been user-configured, this is indicated by a 255 in PNU 0007.

With PNU 0007, you can configure only inputs E1 to E4 (see table in the basic unit description).

The digital inputs can be inverted with PNU 0114.

PNU 0113/ sub-index	Name	Value	Function	DS
	Free configuration of digital inputs	E1 = 1 E2 = 2 E3 = 3 E4 = 4 E5 = 5 E6 = 6 Note: • 0 = not assigned • 255 = not assigned • 1 to 6 = digital inputs E1 to E6		
/001	FF1		Fixed frequency 1 (in combination with FF2 and FF3) Subindex of PNU 0113: /001 /002 active value LOW LOW PNU 0046 HIGH LOW FF1 LOW HIGH FF2 HIGH HIGH FF3	1
/002	FF2		Fixed frequency 2 (in combination with FF1 and FF3)	2
/003	R/L		Combined direction preselection PNU 0113/003 Active value LOW Clockwise HIGH Anticlockwise	4
/004	QSP		Quickstop, when PNU 0113/004 = LOW	255
/005	RFG1-STOP		Stopping the ramp generator for main setpoint	255
/006	RFG1-0		Reset ramp generator input for main setpoint to 0	255
/007	Reserved		Reserved	255
/008	Reserved		Reserved	255
/009	Reserved		Reserved	255
/010	CINH		Controller inhibit, when PNU 0113/010 = LOW	255
/011	EF		External fault, when PNU 0113/11 = LOW	255
/012	TRIP-RESET		Trip reset	255

PNU 0113/ sub-index	Name	Value	Function	DS
/013	PAR2/4		Parameter set selection (only when PNU 0988 = 0) Subindex of PNU 0113 /013 /014 active value LOW LOW PAR1 HIGH LOW PAR2 LOW HIGH PAR3 HIGH HIGH PAR4	255
/014	PAR3/4		Parameter set selection (only when PNU 0988 = 0)	255
/015	DCB		DC injection braking	3
(APP) /016	RFG2-PID		The PID actual value is applied to the PID ramp generator	255
/017	RA/MO		Changeover, remote access/manual operation	255
/018	DIS-I		Deactivate I-component of PID regulator	255
/019	DIS-PID		Deactivate PID regulator	255
/020	Reserved		Reserved	255
/021	FREEZE-PID		Freeze PID regulator output at current value	255
/022	R/QSP		Clockwise rotation, quickstop on error	255
/023	L/QSP		Anticlockwise rotation, quickstop on error	255
/024	f-In		Digital 0 to 100 kHz frequency input	255
/025 (APP)	FOLL1-0		Run follow-up controller to 0 Hz at reset ramp (PNU 0193)	255
/026 (APP)	Reserved		Reserved	255
/027 (APP)	Reserved		Reserved	255
/028 (APP)	Reserved		Reserved	255

PNU 0113/ sub-index	Name	Value	Function	DS
/029 (APP)	FADING-PID		Disable PID fading	255
/030 (APP)	INVERT-PID		Invert PID output	255
/031 (APP)	NADD-OFF		Deactivate additive setpoint (PCTRL1-NADD)	255
/032 (APP)	RFG2-0-PID		Run PID ramp generator (PCTRL1-RFG2) to 0 at ramp PNU 0226	255

Level inversion, digital inputs E1 to E6

The level of digital inputs E1 to E6 can be inverted with PNU 0114. The binary value determines the level pattern of the inputs.

The input value is the corresponding decimal value.

PNU 0114	Name	Value	E6 2^5	E5 2^4	E4 2^3	E3 2^2	E2 2^1	E1 2^0	Default setting
	Level inversion, digital inputs	0	0	0	0	0	0	0	0 0 = output not inverted when HIGH is active 1 = output inverted when LOW is active
		1	0	0	0	0	0	1	
		2	0	0	0	0	1	0	
		3 to 15	0	0	0	0	1	1	
			1)	1)	1)	1)	1)	1)	
			0	0	1	1	1	1	
(APP)		63 to 16	0	1	0	0	0	0	
(APP)			1)	1)	1)	1)	1)	1)	
(APP)			1	1	1	1	1	1	

1) Terminal assignment depends on value

Configuration, frequency inputs E1/(E2)

Digital inputs E1 and E2 can also be used as frequency inputs, for example for connecting a rotary transducer.

Function [f-In] must be assigned to input E1 under PNU 0113/024 or 0007 for this purpose. The parameter values 0 to 7 in PNU 0425 are intended for single-channel evaluation.

When you select one of the parameter values 10 to 17 in PNU 0425, digital input E2 is automatically interpreted as a frequency input.

To the additional input E2, a second rotary transducer channel can be connected. The built-in edge recognition function then uses this input to determine the direction of rotation.

The maximum input frequency for each of the two inputs is 100 kHz.

In PNU 0005 (values 1, 2, 3, 5, 6, 7), you define how the resulting signal (DFIN1-OUT) from the two inputs is to be processed.

With the following parameters, you can configure or calibrate the frequency inputs. The set frequency internally corresponds to f_{max} (PNU 0011).

The specified maximum frequency value is the maximum frequency that the inputs can process. If the input frequency is exceeded, it can be proportionally readjusted with PNU 0426. The gain always has the same effect on the offset and the signal. (PNU 0427). A setting of 100 % corresponds to a gain factor of 1.

PNU 0425	Name	Value	Frequency	Resolution	Sampling rate	Max. frequency	DS
	Configuration of frequency input	0	100 Hz	1/200	1 s	300 Hz	2
	E1, single-channel	1	1 kHz	1/200	100 ms	3 kHz	
		2	10 kHz	1/200	10 ms	10 kHz	
		3	10 kHz	1/1000	50 ms	10 kHz	
		4	10 kHz	1/10000	500 ms	10 kHz	
(APP)		5	102.4 kHz	1/400	2 ms	100 kHz	
(APP)		6	102.4 kHz	1/1000	5 ms	100 kHz	
(APP)		7	102.4 kHz	1/2000	10 ms	100 kHz	
(APP)		8	Reserved				
(APP)		9	Reserved				
(APP)	E1, E2 dual-channel	10	100 Hz	1/200	1 s	300 Hz	
(APP)		11	1 kHz	1/200	100 ms	3 kHz	
(APP)		12	10 kHz	1/200	10 ms	10 kHz	
(APP)		13	10 kHz	1/1000	50 ms	10 kHz	
(APP)		14	10 kHz	1/10000	500 ms	10 kHz	
(APP)		15	102.4 kHz	1/400	2 ms	100 kHz	
(APP)		16	102.4 kHz	1/1000	5 ms	100 kHz	
(APP)		17	102.4 kHz	1/2000	10 ms	100 kHz	

PNU	Name	Value	DS
0426	GAIN, gain E1/E2	–1500.0 to 1500.0 %	100
0427	Offset E1/E2	–100.0 to 100.0 %	0.0

Setpoint input

With PNU 0034, you can set the setpoint input value.

The DE4-IOM-APP-F module has two analog inputs. For the analog setpoint input, terminal(s) 1U/1I or 2U/2I are used. The "U" in this terminal designation stands for voltage, the "I" for current. The reference point for the inputs is terminal 7.

With PNU 0005, you can configure the two inputs, for example as setpoint and actual value channels for PID regulator operation.

Depending on the signal range, you need to set the jumpers on the module front and select the corresponding parameter values in PNU 0034/00x.

With subindices x = 1 or 2 of PNU 0034/00x, you can also change the configuration of the two inputs (for current, voltage, etc.)

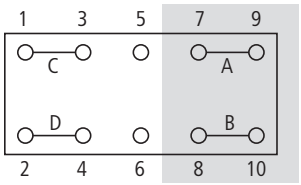


Figure 24: Jumper positions

Jumpers A and B determine the signal range of the analog inputs (terminals 1U and 2U). The position of these jumpers has no effect on the current inputs. These settings are made with PNU 0034. Jumpers C and D are used for selecting the signal ranges of the analog outputs (terminals 62 and 63). For information about setting the signal range of the analog outputs, see Section "Matching the analog output signals", Page 31.

PNU 0034/ subindex (APP)	Setpoint input range	Input	Pin position, jumper A	Pin position, jumper B
/001 = **0**	0 to 5 V	Terminal 1U	Remove	–
/002 = **0**		Terminal 2U	–	Remove
	0 to 10 V (default setting)	Terminal 1U	**7 and 9**	–
		Terminal 2U	–	**8 and 10**
/001 = 1	–10 V to +10 V Reversal on polarity change, f_{min} (PNU 0010) has no effect!	Terminal 1U	7 and 9	–
/002 = 1		Terminal 2U	–	8 and 10
/001 = 2	0 to 20 mA	Terminal 1I	Signal range selection is independent of the jumper pin position. It can be made only with PNU 0034	
/002 = 2		Terminal 2I		
/001 = 3	4 to 20 mA	Terminal 1I		
/002 = 3		Terminal 2I		
/001 = 4	4 to 20 mA Open-curcuit monitoring active, fault message: Sd5, at $I < 4$ mA	Terminal 1I		
/002 = 4		Terminal 2I		

Additional analog input signal matching can be implemented. Both setpoint inputs can be configured independently of each other with the subindices of PNU 0413.

PNU	Name	Value	Function	DS
0413/xxxx (APP)	OFFSET, analog inputs	–200.0 to 200.0 %		
/001			Offset, analog input terminal(s) 1U/1I PNU 0413/1 = PNU 0026	0.0
/002			Offset, analog input terminal(s) 2U/2I	0.0

PNU	Name	Value	Function	DS
0414/xxx (APP)	GAIN, analog inputs	–1500.0 to 1500.0 %		
/001			Gain, analog input terminal(s) 1U/1I PNU 0414/1 = PNU 0027	100.0
/002			Gain, analog input terminal(s) 2U/2I	100.0

With parameters PNU 0413/001 and 002, you can offset the signal characteristic.

The values in PNU 0413/001 and PNU 0026 have a reciprocal effect. Changes made in one of these two parameters are automatically copied to the other parameter.

The maximum value for the setpoint range from PNU 0034 corresponds to 100 %. In combination with PNU 0239 (lower frequency limit), a setpoint value dead zone can also be set up.

PNU 0414/001 and /002 affect the gradient of the signal characteristic curve. The values in PNU 0414/001 and PNU 0027 have a reciprocal effect. Changes made in one of these two parameters are automatically copied to the other parameter.

The gain always has the same effect on the offset and the setpoint signal. A setting of 100 % corresponds to a gain factor 1. A negative gain and a negative offset result in an inverted setpoint input. The setpoint signal is processed only within the setpoint range specified in PNU 0034, independently of the specified gain.

The minimum output frequency f_{min} (PNU 0010) corresponds to 0 % setpoint signal. If the offset is not 0 % and/or the setpoint input is inverted, a value below f_{min} is also possible.

Points P1 and P2 represent any position of the signal line. They are calculated with the equations below, whereby the point coordinate prefixes must be taken into account.

Example:
The setpoint value (0 to +10 V) is to be inverted and should have a dead zone of +2 V (= 20 % of the maximum setpoint value).
A rising setpoint value results in a reversal, and at +10 V setpoint, the now negative output frequency should be 30 % of the maximum frequency.

The gain (PNU 0414/xxx) and offset (PNU 0413/xxx) are calculated as follows:

$$\text{PNU 0414/xxx} = \frac{f(P2) - f(P1)}{U(P2) - U(P1)} \times 100\,\% = \frac{(-30\,\%) - 100\,\%}{100\,\% - 20\,\%} \times 100\,\% = -162.5\,\%$$

$$\text{PNU 0413/xxx} = \frac{f(P2)\,\%}{\text{PNU 0414 [\%]}} \times 100\,\% - U(P2)\,[\%] = \frac{-30\,\%}{-162.5\,\%} \times 100\,\% - 100\,\% = -81.5\,\%$$

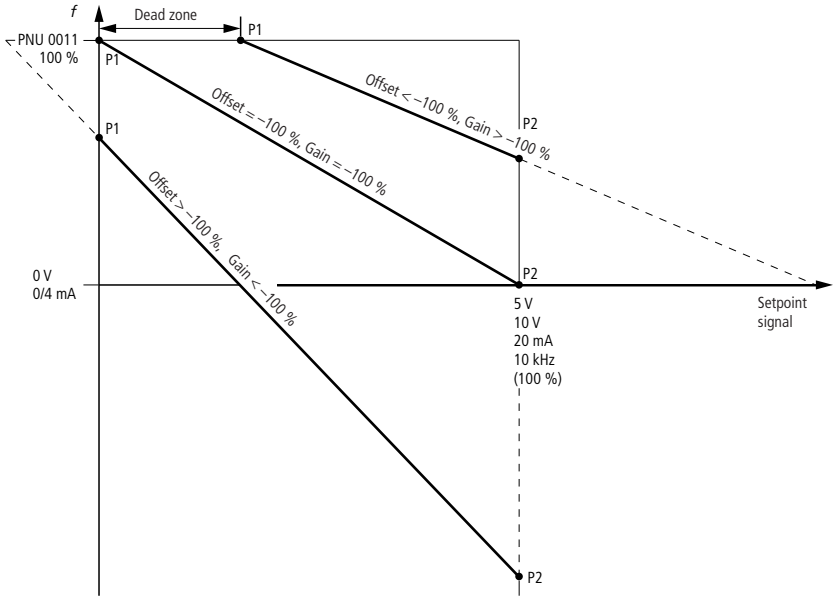


Figure 25: Setpoint inversion

Selecting the signal channel

With parameter values 8 and 9 of PNU 0005, you can configure the two analog inputs 1U/1I and 2U/2I.

PNU 0005 = 8:
The setpoint value at terminal 1U/1I is added to the setpoint value at terminal 2U/2I to form a total setpoint value.

PNU 0005 = 9:
In PID regulator mode, the setpoint value at terminal 1U/1I and return signal at terminal 2U/2I is input.

PNU 0005	Name	Value	Function	DS
	Configuration of analog input signals	0	Setpoint value through terminal 1U/1I	0
		1	Setpoint value through terminal 1U/1I with setpoint addition through frequency input E1	
		2	Setpoint value through frequency input E1 with setpoint addition through terminal 1U/1I	
		3	Setpoint value through frequency input E1 and torque limitation through terminal 1U/1I (load regulation) (**not** with PNU 0014 = 5)	
		4	Setpoint for sensorless torque regulation via terminal 1U/1I and speed limitation via PNU 0011 (only for PNU 0014 = 5, torque input)	
		5	Setpoint for sensorless torque regulation via terminal 1U/1I and speed limitation via frequency input E1 (only for PNU 0014 = 5, torque input)	
		6	Operation with PID regulator: • Setpoint value through terminal 1U/1I (analog) • Actual value through frequency input E1 (digital)	
		7	Operation with PID regulator: • Setpoint via frequency input E1 (digital) • Actual value through terminal 1U/1I (analog)	
(APP)		8	Setpoint via terminal 1U/1I with setpoint addition via terminal 2U/2I	
(APP)		9	Operation with PID regulator: • Setpoint value through terminal 1U/1I (analog) • Actual value via terminal 2U/2I (digital)	
		200	All digital and analog input signals supplied to the FIF by function module PROFIBUS, Suconet K or INTERBUS	

Linking the main and additive setpoints

With PNU 0190, the main (NSET1-NOUT) and additive (PCTRL1-NADD) setpoints can also be linked mathematically.

To the additive setpoint, you can also add the output signal (PCTRL1-FOLL-OUT) of the follow-up controller (see circuit diagram in the appendix, Page 152). The following mathematical functions are available:

PNU	Name	Value	Function		DS
0190 (APP)	Linking of main and additive setpoint	0	X + 0	Linking the setpoint channels with mathematical functions: X = NSET1-NOUT = main setpoint Y = PCTRL1-NADD = additive setpoint	1
		1	X + Y		
		2	X – Y		
		3	X × Y		
		4	X/Y		
		5	X/(1 – Y)		

Follow-up controller

The DE4-IOM-APP-F module is equipped with a follow-up controller, PNU 0189, 0191 to 0195. This compensates gradually generated errors that are caused, for example, by nonlinearity in ultrasound sensors.

The lower or upper threshold of the follow-up controller is set with parameters PNU 0194 and 0195 respectively. If these thresholds are exceeded, the controller becomes active and ramps down to the frequency specified with PNU 0011 in the time specified with PNU 0191 or PNU 0192, until the frequency lies below the threshold value again.

The function PNU 0193, "Reset follow-up controller", can be activated and deactivated with one of the user-programmable, digital input terminals. To do this, assign function [FOLL1-0] to a terminal with PNU 0113/25.

When the follow-up controller is reset, the counter value is reset to zero.

The follow-up controller is also reset when the mains power is switched off and on.

PNU	Name	Value	Function	Default setting
0189 (APP)	Output signal, follow-up controller	–480.00 to +480.00 Hz	This PNU shows the output signal (PCTRL1-FOLL-OUT) from the follow-up controller	Display only
0191 (APP)	$+a_{follow-up}$	0.00 to 1300.00 s	Acceleration time, follow-up controller Time from 0 Hz to f_{max} (PNU 0011)	5.00 s
0192 (APP)	$-a_{follow-up}$	0.00 to 1300.00 s	Deceleration time, follow-up controller Time from f_{max} (PNU 0011) to 0 Hz	5.00 s
0193 (APP)	Reset follow-up controller	0.00 to 1300.00 s	Time in which the follow-up controller ramps down to zero Activation is by applying function PNU 0113/ 25 [FOLL1-0] to one of the control signal terminals	5.00 s
0194 (APP)	Lower threshold, follow-up controller	–200.00 to +200.00 %	% relative to PNU 0011. Below PNU 0194: controller runs towards (–0011) at 0191 or 0192	–200.00 %
0195 (APP)	Upper threshold, follow-up controller	–200.00 to +200.00 %	% relative to PNU 0011. PNU 0195 exceeded: controller runs towards (+0011) at 0191 or 0192	+200.00 %

PID regulator, add-on functions

The DE4-IOM-APP-F module adds special-purpose regulator functions to the basic unit's PID regulator: PNU 0225 to 235 and 0241 to 0244. The PID setpoint channel is equipped with an additional ramp function generator (PCTRL1-RFG2) with separately adjustable acceleration and deceleration times.

The PID output signal can be inverted or changed with an inversion characteristic curve with adjustable offset.

With the fading function, the PID output can influence the regulated process with adjustable times.

In addition, a signal (PCTRL1-SET=ACT) can be output, which indicates the deviation between setpoint and actual value.

Addressing of the outputs can, in addition be delayed for some signals. The additive setpoint channel (PCTRL1-NADD) can also be deactivated if required.

PNU	Name	Value	Function	Default setting
0225 (APP)	$a_{\text{PID setpoint}}$	0.00 to 1300.00 s	Acceleration time of PID setpoint frequency from 0 Hz to f_{max}. The setpoint signal loops through the ramp function generator PCTRL1-RFG2.	0.00
0226 (APP)	$-a_{\text{PID setpoint}}$	0.00 to 1300.00 s	Deceleration time of PID setpoint frequency from f_{max} to 0 Hz. The setpoint signal loops through the ramp function generator PCTRL1-RFG2.	0.00
0228 (APP)	Fade-in time, PID regulator	0.000 to 32.000 s	The PID regulator output is faded in at the set time. PNU 0228 = 0.000 s, direct switching of PID output	0.000
0229 (APP)	Fade-out time, PID regulator	0.000 to 32.000 s	The PID regulator output is faded out at the set time. PNU 0229 = 0.000 s, direct switching of PID output	0.000
0230 (APP)	Lower limit, PID output	–200.00 to +200.00 %	The PID regulator output is limited to the lower value. The limit value is a percentage of the value in PNU 0011. When PNU 0230 is breached, the digital signal PCTRL1-LIM = HIGH is set. With PNU 0233, you can also set a deceleration time. Configure parameters as follows: PNU 0230 < PNU 0231	–100.00

PNU	Name	Value	Function	Default setting
0231 (APP)	Upper threshold, PID output	–200.00 to +200.00 %	The PID regulator output is limited to the upper value. The limit value is a percentage of the value in PNU 0011. When PNU 0231 is breached, the digital signal PCTRL1-LIM = HIGH is set. With PNU 0233, you can also set a deceleration time. Configure parameters as follows: PNU 0230 < PNU 0231	+100.00
0232 (APP)	OFFSET for inverse characteristic, PID	–200.0 to +200.0 %	The PID output can be influenced with an offset. The value is a percentage of the value in PNU 0011.	0.00
0233 (APP)	Deceleration time for PCTRL1-LIM signal	0.000 to 65.000 s	The digital signal PCTRL1-LIM activates a programmable output when the value in PNU 0230 or 0231 is still exceeded after the time specified here. The changeover from HIGH to LOW is not delayed.	0.000
0234 (APP)	Deceleration time for signal PCTRL1-SET = ACT	0.000 to 65.000 s	The digital signal PCTRL1-SET = ACT activates a programmable output when the difference between the actual and setpoint PID frequencies is still within the threshold set with PNU 0235 after the time specified here. The changeover from HIGH to LOW is not delayed.	0.000
0235 (APP)	Response threshold, PID setpoint = actual value (PCTRL1-SET=ACT)	0.00 to 480.00 Hz	If the difference between the PID actual value and the PID setpoint value lies within he threshold specified here, signal PCTRL1-SET= ACT is active. After the time in PNU 0234 has expired, the specified output is set with this signal.	0.00

PNU	Name	Value	Function	Default setting
0240 (APP)	Invert PID output INVERT-PID		The PID output is inverted by setting parameter PNU 0240. With PNU 0113/030, the function can also be programmed to be executed by setting a digital input.	0
		0	PID output is not inverted	
		1	PID output is inverted	
0241 (APP)	Fade in PID regulator FADING-PID		The PID output is faded in or out with parameter PNU 0241. With PNU 0113/029, the function can also be programmed to be executed by setting a digital input. The fade-in and fade-out times are specified with PNU 0228 and 0229.	0
		0	PID regulator is faded in	
		1	PID regulator is faded out	
0242 (APP)	PID inverse regulation		When parameter value 1 is selected, an inverse characteristic is applied to the PID output. The offset for this characteristic can be defined with PNU 0232.	0
		0	A rising actual value results in a falling output frequency	
		1	A rising actual value results in a rising output frequency	
0243 (APP)	Deactivate additive setpoint NADD-OFF		With this function, you can also deactivate the PCTRL1-NADD additive setpoint channel. With PNU 0113/031, the function can also be programmed to be executed by setting a digital input.	0
		0	Additive setpoint channel PCTRL1-NADD is active	
		1	Additive setpoint channel PCTRL1-NADD is inactive	

PNU	Name	Value	Function	Default setting
0244 (APP)	PID root function		With PNU 0244, you can apply the root function to the PID actual value (PCTRL1-ACT): 1. The signal prefix is saved internally 2. The root of the value is calculated 3. The result is then multiplied again with the prefix	0
		0	Root function not active	
		1	$\sqrt{\lvert PCTRL1 - ACT \rvert}$ active	

Add-on functions for limiting and regulating torque

PNU 0014, 0245, 0250, 0252, 0254

The analog signal channel MCTRL1-MSET can, depending on the control mode setting (PNU 0014) or the configuration of the analog input signals (PNU 0005), be interpreted as follows:

Function MCTRL1-MSET signal	Configuration of analog input signals	Motor control mode
Torque limit value	PNU 0005 = 3	PNU 0014 = 2, 3, 4
Torque setpoint value	PNU 0005 = 4, 5	PNU 0014 = 5

The signal source for MCTRL1-MSET is specified with parameters 0001, 0005 and 0007 (see appendix "Selection table, DE4-IOM-APP-F signal channels", Page 144).

With the functions listed below, you can select a comparison value for the MCTRL1-MSET signal for the torque limitation or sensorless torque regulation mode.

When this comparison (threshold) value is reached, the MSET1=MACT signal (torque threshold reached) becomes active and can be applied to one of the user-programmable outputs.

PNU	Name	Value	Function	DS
0245 (APP)	Selection of torque comparison value for MSET1 = MACT		Here, you select the source of the torque comparison value for activating the MCTRL1-MSET1 = MACT signal.	0
		0	Analog MCTRL1-MSET signal	
		1	Value from parameter PNU 0250	
0250 (APP)	Torque threshold	–200.00 to +200.00 %	Instead of the analog MCTRL1-MSET signal (PNU 0245 = 0) as torque threshold value, another value can be specified here as a percentage of the rated motor torque. To activate this parameter, PNU 0245 must be set to 1.	0.0
0252 (APP)	Differential threshold for MSET1 = MACT	0.0 to 100.0 %	In control mode PNU 0014 = 4 or 5 the MCTRL1-MACT signal corresponds with the calculated current torque actual value as a percentage of the motor's rated torque. This signal can be compared with the applied torque setpoint value (MCTRL1-MSET) or the value from PNU 0250 (MCTRL1-MSET1). If the determined difference lies within the threshold specified here, the MCTRL1-MSET1 = MACT signal is active. After the time in PNU 0254 has expired, the specified output is set with this signal.	0.0
0254 (APP)	Deceleration time for signal MSET1 = MACT	0.000 to 65.000 s	The digital signal MCTRL1-SET = MACT activates a specified output when the determined difference is still within the threshold set with PNU 0252 after the time specified here. The changeover from HIGH to LOW is not delayed.	0.000

Analog outputs/ frequency output (terminals 62, 63, A4)

You can program these outputs with PNU 0111, 0110 and 0112. The following programmable outputs are available:

Output (designation)	Type/terminal no., reference terminal	Configuration with ...	Default setting
62	Analog output /62, 7	PNU 0111	0
63	Analog output/63, 7	PNU 0110 (APP)	2
A4	Frequency output/A4, 7	PNU 0112 (APP)	3

To monitor the frequency inverter, various process variables can be output independently of each other as normalized voltages or currents at the analog outputs (terminals 62 and 63). Whether a voltage or current signal is output is determined by the jumper settings on the front of the module.

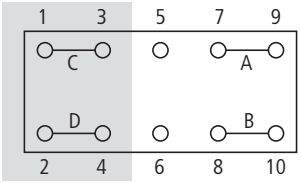


Figure 26: Jumper positions

Under PNU 0424/001 or /002, you must set the appropriate parameter value.
The following configurations are possible:

Parameter setting	Analog output signal range	Output	Pin position, jumper C	Pin position, jumper D
PNU 0424/001 = 0	**0 to 10 V (default setting)**	Terminal 62	**1 and 3**	–
PNU 0424/002 = 0		Terminal 63	–	**2 and 4**
PNU 0424/001 = 0	0 to 20 mA	Terminal 62	3 and 5	–
PNU 0424/002 = 0		Terminal 63	–	4 and 6
PNU 0424/001 = 1	4 to 20 mA	Terminal 62	3 and 5	–
PNU 0424/002 = 1		Terminal 63	–	4 and 6

You can configure frequency output A4 with the same process variables as the two analog outputs. Unlike the latter, the frequency output issues a proportional frequency signal in the range 0 to 10 kHz. The following process variables can be used for configuring outputs 62, 63 and A4:

PNU	Name	Value	Function
0110 (APP), 0111, 0112 (APP)	Output frequency f_2	0	10 V/20 mA/9.75 kHz correspond to value in PNU 0011
	Inverter load	1	5 V/10 mA/4.875 kHz correspond to rated motor torque for PNU 0014 = 4, 5 (vector control) or the device's rated current (active current/PNU 0091) when PNU 0014 = 2, 3
	Apparent motor current	2	5 V/10 mA/4.875 kHz correspond to device's rated current
	DC link voltage	3	10 V/20 mA/9.75 kHz correspond to 1000 V (400 V mains) 10 V/20 mA/9.75 kHz correspond to 380 V (230 V mains)
	Motor rating	4	5 V/10 mA/4.875 kHz correspond to motor rated power

PNU	Name	Value	Function
0110 (APP), 0111, 0112 (APP)	Motor voltage	5	8 V/16 mA/7.8 kHz correspond to motor rated power
	1/output frequency f_2	6	3.3 V/6.6 mA/3.218 kHz correspond to value in PNU 0050 = 0.4 × PNU 0011
	Output frequency f_2 within set limits	7	0 V/0 mA/4 mA/0 kHz correspond to f_{min} (PNU 0010) 10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	Operation with PID regulator (PNU 0238 = 0.1): PID actual value Operation without PID regulator (PNU 0238 = 2): Output frequency without slippage	8	10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	Inverter ready to operate	9	Parameter values 9 to 25 correspond to the functions under (K1) PNU 0008 , (A1) PNU 0117 or (A2) PNU 0118 (digital outputs, parameter values 0 to 16) According to their logical condition, they can also be mapped to the analog output with the following levels: • LOW = 0 V/0 mA/4 mA/0 kHz • HIGH = 10 V/20 mA/10 kHz • For drive belt monitoring: – Apparent motor current = PNU 0054 – Current threshold = PNU 0156 (in % relative to I_N frequency inverter) – $f_2 > f_1$ = PNU 0017
	TRIP signal	10	
	Motor running	11	
	Motor running clockwise	12	
	Motor running anticlockwise	13	
	Output frequency $f_2 = 0$	14	
	Frequency setpoint $f_{Setpoint}$ reached	15	
	$f_2 > f_1$ threshold reached	16	
	I_{max} limit reached For PNU 0014 = 5: torque setpoint reached	17	
	Overtemperature (ϑ_{max} – 5 °C)	18	
	TRIP or $f_2 > f_1$ or IMP active	19	
	PTC warning	20	

PNU	Name	Value	Function
0110 (APP), 0111, 0112 (APP)	Belt drive monitoring: apparent motor current < current threshold	21	Parameter values 9 to 25 correspond to the functions under (K1) PNU 0008 , (A1) PNU 0117 or (A2) PNU 0118 (digital outputs, parameter values 0 to 16) According to their logical condition, they can also be mapped to the analog output with the following levels: • LOW = 0 V/0 mA/4 mA/0 kHz • HIGH = 10 V/20 mA/10 kHz • For drive belt monitoring: – Apparent motor current = PNU 0054 – Current threshold = PNU 0156 (in % relative to I_N frequency inverter) – $f_2 > f_1$ = PNU 0017
	Apparent motor current < current threshold and $f_2 > f_1$ reached	22	
	Apparent motor current, current threshold and ramp generator 1: input = output	23	
	Motor phase failure warning	24	
	Minimum output frequency f_{min} (PNU 0010) reached	25	
	Reserved	26	
	output frequency without slippage	27	10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	PID actual value	28	10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	PID setpoint	29	10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	PID output	30	10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	Ramp generator input	31	10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	Ramp generator output	32	10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	PID output, direct	33	10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	PID output before addition point	34	10 V/20 mA/9.75 kHz correspond to f_{max} (PNU 0011)
	1U/1I with GAIN and OFFSET	35	Input signal at terminal 1U/1I, evaluated with GAIN (0027, 0414/001) and OFFSET (0026, 0413/001)
	f-In with GAIN and OFFSET	36	Frequency signal (f-In) evaluated with GAIN (0426) and OFFSET (0427)

PNU	Name	Value	Function
	Motor potentiometer output	37	Mapping of motor potentiometer output
	2U/2I with GAIN and OFFSET	38	Input signal at terminal 2U/2I, evaluated with GAIN (0414/002) and OFFSET (0413/002)

For parameter values 0035, 0036 and 0038, observe the following:
Depending on the configuration of the outputs, the maximum value of the analog 5 V, 10 V, 20 mA or 10 kHz input signal corresponds to an output signal of 10 V/20 mA or 9.75 kHz. Set the gain of the analog inputs (PNU 0414/00x) or the frequency inputs (PNU 0426) as follows:

$$\text{GAIN, analog inputs [\%]} = \text{PNU 0414/00x} = \frac{20}{\text{Value from PNU 0011}} \times 100\ \%$$

$$\text{GAIN E1, E2 [\%]} = \text{PNU 0426} = \frac{20}{\text{Value from PNU 0011}} \times 100\ \%$$

OFFSET, analog outputs (terminals 62, 63)

You can also match the analog outputs, terminals 62 and 63, individually during operation with the corresponding subindices of the gain (PNU 0420) or offset (PNU 0422) parameters.

The gain setting in PNU 0420/001 is equivalent to the setting in PNU 0108. The values in these two parameters are always synchronized automatically. A value of 128 corresponds to a gain factor of 1. The offset setting in PNU 0422/1 is equivalent to the setting in PNU 0109. The values in these two parameters are always synchronized automatically.

PNU/ subindex	Name	Value	Function	Default setting
0420/xxx (APP)	GAIN, analog outputs			
/001		0 to 255	Terminal 62 (gain to PNU 0111) 0420/001 = PNU 0108	213 (corresponds to 10 V)
/002			Terminal 63 (gain to PNU 0110)	213 (corresponds to 10 V)
0422/xxx (APP)	OFFSET analog outputs			
/001		–10.00 to +10.00 V	Terminal 62 (OFFSET to PNU 0111) 0422/001 = PNU 0109	0.00 V
/002			Terminal 63 (OFFSET to PNU 0110)	0.00 V

GAIN frequency output (terminal A4)

The frequency output, terminal A4, can still be matched during operation with the gain setting in **PNU 0428**.

PNU	Name	Value	Function	DS
0428 (APP)	GAIN A4, frequency output	0.0 to 1500.0 %	Gain, frequency output A4	100 %

Absolute indication of process variables

With PNU 0502, you can assign the following rotating field frequency related parameters to a process variable unit, e.g. time.

- PNU 0037
- PNU 0038
- PNU 0039
- PNU 0044
- PNU 0046

- PNU 0049
- PNU 0051
- PNU 0138
- PNU 0139
- PNU 0140
- PNU 0181

To also display the selected unit, first carry out process variable matching with PNU 0500 or 0501.

These parameters then indicate both the value of the process variable and the selected unit.

The following parameters relating to the rotating field frequency are always displayed in Hertz:

- PNU 0010
- PNU 0011
- PNU 0017
- PNU 0019
- PNU 0050
- PNU 0239
- PNU 0625
- PNU 0626
- PNU 0627

PNU	Name	Value				Function	DS
0502 (APP)	Unit of process variable	0: _ 1: ms 2: s 4: A 5: V	6: rpm 9: _C 10: Hz 11: kVA 12: Nm	13: % 14: kW 15: N 16: mV 17: mW	18: W 19: hex 34: m 35: h 42: mH	The process value is displayed on the selected device	0

Digital outputs, terminals K1, A1, A2

The DE4-IOM-APP-F module provides three digital outputs. Parameters PNU 0008, 0117 and 0118 are used to configure these outputs.

Various switching conditions can be independently assigned to each of the digital outputs (see table).

The function selection procedure is the same for each output.

Output (designation)	Type/terminals, reference terminal	Configuration with ...	DS
K1	Relay output/changeover switch K11, K12, K14	PNU 0008	0
A1	Transistor output/A1, 59	PNU 0117	1
A2	Transistor output/A2, 59	PNU 0118 (APP)	0

PNU	Name	Value	Function of K1, A1, A2
0008, 0117, 0118 (APP)	Inverter ready to operate	0	Supply on, no trip
	TRIP signal	1	Trip
	Motor running	2	$f_2 > 0$ Hz
	Motor running clockwise	3	Change of direction, $f_2 > 0$ Hz
	Motor running anticlockwise	4	Change of direction, $f_2 > 0$ Hz
	Output frequency $f_2 = 0$	5	Output frequency is 0 Hz
	Frequency setpoint $f_{Setpoint}$ reached	6	f_2 has reached setpoint
	$f_2 > f_1$ threshold reached	7	Value of PNU 0017 exceeded
	I_{max} limit reached For PNU 0014 = 5: torque setpoint reached	8	Motor current has reached limit value in PNU 0022 (I_{max} motor.) or 0023 (I_{max}-gener.) reached
	Overtemperature (ϑ_{max} – 5 °C)	9	Max. heatsink temperature – 5 °C reached
	TRIP or $f_2 > f_1$ or IMP active	10	Error message if PNU 0017 exceeded, or impulse disable active

PNU	Name	Value	Function of K1, A1, A2
0008, 0117, 0118 (APP)	PTC warning	11	Motor overtemperature
	apparent motor current < current threshold	12	For drive belt monitoring • Apparent motor current = PNU 0054 (indicated) • Current threshold = PNU 0156 (in % relative to I_N frequency inverter) • Setting the value for frequency signal $f_2 > f_1$ with PNU 0017
	Apparent motor current < current threshold and $f_2 > f_1$ reached	13	
	Apparent motor current < current threshold and ramp function generator 1: input = output	14	
	Motor phase failure warning	15	Motor phase absent or interrupted
	Minimum output frequency f_{min} reached	16	Speed of f_{min} (PNU 0010) reached
	PAR2/PAR4 active	17	Parameter set PAR 2 or PAR 4 active
	Impulse disable, IMP active	18	
	Ramp function generator 1: input = output	19	
	Controller inhibit, CINH active	20	
	Overvoltage in internal DC link	21	
	PID input = PID output	24	
	DCTRL1-(IMOT>ILIM)-RFG-I = 0	25	For overload monitoring: Apparent motor current = PNU 0054 (indication) Current threshold = PNU 0156 (in % relative to $I_N$frequency inverter) Apparent motor current > current threshold and ramp function generator 1: input = output
	MSET1 = MACT	26	Torque threshold reached
	PCTRL1-LIM	27	PID output limitation reached
	E1	28	Mapping of input terminal E1
	E2	29	Mapping of input terminal E2

PNU	Name	Value	Function of K1, A1, A2
0008, 0117, 0118 (APP)	E3	30	Mapping of input terminal E3
	E4	31	Mapping of input terminal E4
	E5	32	Mapping of input terminal E5
	E6	33	Mapping of input terminal E6

Level inversion, digital outputs

The level of digital outputs K1, A1 and A2 can be inverted with PNU 0416. The binary value determines the outputs' level pattern. The input value is the corresponding decimal value.

PNU	Name	Value	A2 2^2	A1 2^1	K1 2^0	Default setting
0416	Level inversion, digital outputs	0	0	0	0	0 0 = output not inverted when HIGH is active 1 = output inverted when LOW is active
		1	0	0	1	
		2	0	1	0	
		3	0	1	1	
(APP)		4	1	0	0	
(APP)		5	1	0	1	
(APP)		6	1	1	0	
(APP)		7	1	1	1	

Delay, digital outputs

With PNU 0423, the digital outputs can be "debounced". To do this, the response times for outputs K1, A1 and A2 can be set individually with the corresponding subindices.

If the switching condition is still active after the specified time has expired, the output is switched. Resetting of the outputs is not delayed.

PNU/ subindex	Name	Value	Function	DS
0423/xxx (APP)	Delay, digital outputs	0.000 to 65.000 s	The corresponding output is activated with a delay	
/001			Relay output K1	0.000 s
/002			Digital output A1	0.000 s
/003			Digital output A2	0.000 s

Appendix

Parameter

List of all parameters in numerical order.

Some of the following parameters and functions can be addressed only with expansion modules.

Equipment

Abbreviation	Function
PNU	Parameter number
PNU XXXX*	The value of the parameter is the same in all parameter sets.
PNU XXXX (EXP)	This parameter or parameter value is available only when an expansion module (e.g. DE4-IOM-APP-F) is connected to the FIF
PNU XXXX (APP)	This parameter or parameter value is available only when a DE4-IOM-APP-F expansion module is used
ONLINE	Immediate transfer of values
ENTER	Values accepted when ENTER is pressed
ENTER + IMP	Values accepted when controller inhibit active and ENTER is pressed
DISPLAY	The parameter value is for display only and cannot be changed
rw	Parameter has read/write access
ro	Parameter is read-only

Parameter types

The following parameter types are defined:

Model	Function
Fix32	The parameter value is a 32 bit value with prefix, decimal with 4 decimal places
Bit16	The information is 16 bits long and encoded bitwise (status bits, control bits)
VS	String format
VH	ASCII hexadecimal format

Parameters (numeric listing)

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0001		Setpoint input (operating mode)	Setpoint input, control always possible via terminals and LCD keypad/PC (AIF)	0	Via terminal 8, 1U/1I (analog input AIN1)	Fix32	rw	ENTER	0	
				1	Via LCD keypad or parameter channel of an AIF bus module					
				2	Via terminal 8, 1U/1I (analog input AIN1)					
				3	Via process data channel of an AIF bus module					
0002*		Parameter set transfer	Selected parameter set(s) (PARx) of frequency inverter:	0	Transfer completed	Fix32	rw	ENTER + IMP	0	
			Overwrite with default setting	1	Overwrite PAR1 with default value					
				2	Overwrite PAR2 with default value					
				3	Overwrite PAR3 with default value					
				4	Overwrite PAR4 with default value					
			Overwrite with data from LCD keypad	10	Overwrite all parameter sets (PAR1 to PAR4) with data from LCD keypad					
				11	Overwrite PAR1 with data from LCD keypad					
				12	Overwrite PAR2 with data from LCD keypad					
				13	Overwrite PAR3 with data from LCD keypad					
				14	Overwrite PAR4 with data from LCD keypad					
			Copy to LCD keypad	20	Copy all parameter sets (PAR1 to PAR4) from frequency inverter to LCD keypad					

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0002* (EXP)			Selected parameter set(s) (FPARx) of expansion module to FIF:		Parameter set transfer for expansion module on FIF only (does not apply to DE4-IOM-STD-F)					34
			Overwrite with default setting	31	Overwrite FPAR1 with default value					
				32	Overwrite FPAR2 with default value					
				33	Overwrite FPAR3 with default value					
				34	Overwrite FPAR4 with default value					
			Overwrite with data from LCD keypad	40	Overwrite all parameter sets (FPAR1 to FPAR4) with the data from the LCD keypad					
				41	Overwrite FPAR1 with data from LCD keypad					
				42	Overwrite FPAR2 with data from LCD keypad					
				43	Overwrite FPAR3 with data from LCD keypad					
				44	Overwrite FPAR4 with data from LCD keypad					
			Copy to LCD keypad	50	Copy all parameter sets (FPAR1 to FPAR4) of the expansion module to the LCD keypad					
			Selected parameter set(s) (PARx and FPARx) of frequency inverter and expansion module to FIF:		Parameter set transfer for frequency inverter and expansion module to FIF. During operation with the DE4-IOM-APP-F, always transfer the parameter sets for frequency inverter and module together. (Does not apply to DE4-IOM-STD-F)					
			Overwrite with default setting	61	Overwrite PAR1 and FPAR1 with default values					
				62	Overwrite PAR2 and FPAR2 with default values					
				63	Overwrite PAR3 and FPAR3 with default values					
				64	Overwrite PAR4 and FPAR4 with default values					

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0002* (EXP)			Overwrite with data from LCD keypad	70	Overwrite all parameter sets (PAR1 to PAR4 and FPAR1 to FPAR4) with the data from the LCD keypad					34
				71	Overwrite PAR1 and FPAR1 with data from LCD keypad					
				72	Overwrite PAR2 and FPAR2 with data from LCD keypad					
				73	Overwrite PAR3 and FPAR3 with data from LCD keypad					
				74	Overwrite PAR4 and FPAR4 with data from LCD keypad					
			Copy to LCD keypad	80	Copy all parameter sets (PAR1 to PAR4 and FPAR1 to FPAR4) to the LCD keypad					
0003*		Do not save parameters in volatile memory		0	Parameters are not saved in the EEPROM: Data loss on power off	Fix32	rw	ENTER	1	
				1	Parameters are saved in the EEPROM. Cyclic changing of parameters via bus module is not permitted					
0004*		Bar graph display	Graphic display of operating data	56	All code positions possible 56 = device utilization (PNU 0056) Bar graph display shows selected variable in % after Power On Range –180 to +180%	Fix32	rw	ENTER	56	

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0005		Configuration of analog input signals		0	Setpoint via terminal 8, 1U/1I	Fix32	rw	ENTER	0	46
				1	Setpoint via terminal 8, 1U/1I with setpoint addition via frequency input E1					
				2	Setpoint via frequency input E1 with setpoint addition via terminal 8, 1U/1I					
				3	Setpoint via frequency input E1 and torque limitation via terminal 8, 1U/1I (load regulation) (not possible if PNU 0014 = 5)					
				4	Setpoint for sensorless torque regulation via terminal 8, 1U/1I and speed limitation via PNU 0011 (only when PNU 0014 = 5, torque input)					
				5	Setpoint for sensorless torque regulation via terminal 8, 1U/1I and speed limitation via frequency input E1 (only when PNU 0014 = 5, torque input)					
				6	Operation with PID regulator: • Setpoint via terminal 8, 1U/1I (analog) • Actual value via frequency input E1 (digital)					
				7	Operation with PID regulator: • Setpoint via frequency input E1 (digital) • Actual value via terminal 8, 1U/1I (analog)					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0005 (APP)				8 Setpoint via terminal E1 with setpoint addition via terminal 2U/2I 9 Operation with PID regulator: • Setpoint value through terminal 1U/1I • Actual value via terminal 2U/2I 200 All digital and analog input signals supplied to the FIF by function module PROFIBUS, Suconet K or INTERBUS					46
0007		Terminal configuration, digital inputs	Fixed configuration, digital inputs E1 to E4		Fix32	rw	ENTER	0	

FF1 = fixed frequency 1
FF2 = fixed frequency 2
FF3 = fixed frequency 3
DCB = DC injection braking
R/L = combined selection of direction
PAR = parameter set selection (1/2)
QSP = quickstop
EF = external fault
DOWN = motor potentiometer, reduce value
UP = motor potentiometer, increase value
R/QSP = clockwise rotation, quickstop on error
L/QSP = anticlockwise rotation, quickstop on error
RA/MO = remote/manual changeover
DIS-I = disable I-component of PID regulator
DIS-PID = disable PID regulator
f-In = Digital frequency input, 0 to 10kHz

	E1	E2	E3	E4
0	FF1, FF2, FF3		DCB	R/L
1			PAR	
2			QSP	
3	FF1	DCB	PAR	
4		PAR	QSP	
5		EF	DCB	
6			PAR	
7	EF	DCB		
8		PAR	QSP	
9	FF1	EF		
10	DOWN	UP	EF	
11			DCB	
12			PAR	
13			QSP	

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range					Data type	Access rights	Accept-ance	DS	See page
0007				14	FF1	DCB	R/QSP	L/QSP					
				15		PAR							
				16	FF1, FF2, FF3								
				17	DCB	PAR							
				18	EF								
				19		DCB							
				20	FF1	EF							
				21	DOWN	UP							
				22	FF1								
				23	DOWN		R/L	RA/MO					
				24			PAR						
				25			DCB						
				26			FF1						
				27			EF						

PNU	Sub-index	Name	Notes, internal designations, etc.
0007			

Value range					Data type	Access rights	Accept-ance	DS	See page
	E1	E2	E3	E4					
28	f-In	DIS-I	FF1, FF2, FF3						
29			DCB	FF1					
30			QSP						
31				DCB					
32				EF					
33			PAR	QSP					
34			L/QSP	R/QSP					
35		PAR	FF1, FF2, FF3						
36			QSP	DCB					
37				FF1					
38		EF	PAR						
39			FF1, FF2, FF3						
40			QSP	FF1					
41			DCB						
42				QSP					
43			QSP	R/L					
44		PAR	DOWN	UP					
45			QSP	R/L					
46	FF1	QSP	PAR	RA/MO					
47		RA/MO	L/QSP	R/QSP					
48	f-In	DIS-I	DCB	DIS-PID					
49		QSP	FF1						
50		DIS-I							
51			PAR	DCB					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0007				52 to 249	Reserved					
				255	PNU 0113 was freely configured Display only Do not change PNU 0007, since settings in PNU 0113 could be lost					
0008		Relay output K1 (configuration)	K1		Configuration of relay output K1	Fix32	rw	ENTER	0	62
			DCTRL1-RDY	0	Inverter ready to operate					
			DCTRL1-TRIP	1	TRIP signal					
			DCTRL1-RUN	2	Motor running					
			DCTRL1-RUN-R	3	Motor running clockwise					
			DCTRL1-RUN-L	4	Motor running anticlockwise					
			DCTRL1-NOUT=0	5	Output frequency $f_2 = 0$					
			MCTRL-RFG1=NOUT	6	Frequency setpoint, $f_{setpoint}$ reached					
			PCTRL1-F2>F1	7	$f_2 > f_1$ threshold reached					
			MCTRL1-IMAX	8	I_{max} limit reached For PNU 0014 = 5: torque setpoint reached					
			DCTRL1-OH-WARN	9	(Heatsink temperature ϑ_{max}) – 5 °C					
			DCTRL1-IMP	10	TRIP or $f_2 > f_1$ or IMP active					
			DCTRL1-PTC-WARN	11	PTC warning					
			DCTRL1-IMOT<ILIM	12	Apparent motor current < current threshold					
			DCTRL1-(IMOT<ILIM)-F2>F1	13	Apparent motor current < current threshold and $f_2 > f_1$ reached					
			DCTRL1-(IMOT<ILIM)-RFG1=0	14	Apparent motor current < current threshold and ramp function generator 1: input = output					
			DCTRL1-LP1-WARN	15	Motor phase failure warning					

PNU	Sub-index	Name	Notes, internal designations, etc.
0008			PCTRL1-NMIN
			DCTRL1-PAR-B0
			DCTRL1-IMP
			NSET1-RFG1=0
			DCTRL1-CINH
			DCTRL1-OV
			DCTRL1-L
			DCTRL1-PAR-B1
			PCTRL1-SET=ACT
0008 (APP)			DCTRL1-(IMOT>ILIM)-RFG-I=0
			MSET1=MACT
			PCTRL1-LIM
			E1
			E2
			E3
			E4
			E5
			E6
0009*		Device address	
0010		Minimum output frequency	No effect for bipolar setpoint input
0011		Maximum output frequency	
0012		+a Acceleration time, main setpoint	Frequency change 0Hz to PNU 0011
0013		–a Deceleration time, main setpoint	Frequency change PNU 0011 to 0Hz

Value range		Data type	Access rights	Accept-ance	DS	See page
16	Minimum output frequency f_{min} reached					62
17	PAR2/PAR4 active					
18	Impulse disable, IMP active					
19	Ramp generator 1: input = output					
20	Controller inhibit, CINH active					
21	Overvoltage in internal DC link					
22	Anticlockwise					
23	PAR3/PAR4 active					
24	PID input = PID output					
25	Apparent motor current > current threshold and ramp function generator 1: input = output					62
26	Torque threshold reached					
27	PID output limitation reached					
28	Mapping of input terminal E1					
29	Mapping of input terminal E2					
30	Mapping of input terminal E3					
31	Mapping of input terminal E4					
32	Mapping of input terminal E5					
33	Mapping of input terminal E6					
1 to 99	Only for RS 232/485, PROFIBUS-DP interface module on the AIF	Fix32	rw	ENTER	1	
	0.00 to 480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	0.00	
	7.50 to 480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	50.00	
	0.00 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	5.00	
	0.00 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	5.00	

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0014		Motor control mode		2	Linear characteristics with constant V_{min} pull-up (V/f = const.)	Fix32	rw	ENTER	2	
				3	Quadratic characteristic with constant V_{min} pull-up ($V \sim f^2$)					
			Motor identification in PNU 0148 required	4	Vector control					
				5	Sensorless torque regulation with speed limitation Torque setpoint according to setting in PNU 0005					
0015		V/f rated frequency	Characteristic transition frequency		7.50 to 960.00Hz, (0.02Hz)	Fix32	rw	ONLINE	50.00	
0016		V_{min} pull up			0.00 to 40.00%, (0.2%) Device-dependent default	Fix32	rw	ONLINE		
0017		Frequency message $f_2 > f_1$	Response threshold $f_2 > f_1$, reference setpoint value		0.00 to 480.00Hz, (0.02Hz) Threshold (PCTRL1-NOUT)	Fix32	rw	ONLINE	0.00	
0018		Operating frequency		0	2kHz	Fix32	rw	ENTER	2	
				1	4kHz					
				2	8kHz					
				3	16kHz					
0019		Response threshold for auto DCB			0.00 to 480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	0.1Hz	
0021		Slip compensation			–50.0 to +50.0%, (0.1%)	Fix32	rw	ONLINE	0.0%	
0022		I_{max} limit, drive mode			30.0 to +150.0%, (1%)	Fix32	rw	ONLINE	150%	
0023		I_{max} limit, regenerative	PNU 0023 = 0 and PNU 0014 = 2, 3, function inactive		30.0 to +150.0%, (1%)	Fix32	rw	ONLINE	150%	
0026*		OFFSET Analog input	Offset, analog input trm. 8, 1U/1I (AIN1-OFFSET)		–200.0 to +200.0%, (0.1%)	Fix32	rw	ONLINE	0.0%	
0027*		GAIN Analog input	Gain, analog input trm. 8, 1U/1I (AIN1-GAIN)		–1500 to +1500.0%, (0.1%)	Fix32	rw	ONLINE	100%	

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0034*		Setpoint input range Terminal 8	Observe function module switch position PNU 0010 has no effect when PNU 0034 = 2	0	0 to 5V, 0 to 10V, 0 to 20mA	Fix32	rw	ENTER	0	42
				1	4 to 20mA					
				2	–10 to +10V					
			Fault message Sd5	3	4 to 20mA, open-circuit monitored					
				4 to 13	Reserved					
0034* (APP)	001	Setpoint input range Terminal 8, 1U/1I Observe jumper settings of the DE4-IOM-APP-F expansion module!		0	0 to 5V, 0 to 10V					42
			PNU 0010 has no effect	1	–10V to +10V					
				2	0 to 20mA					
				3	4 to 20mA					
			Fault message Sd5	4	4 to 20mA, open-circuit monitored					
	002	Setpoint input range Terminal 8, 2U/2I Observe jumper settings of the DE4-IOM-APP-F expansion module!		0	0 to 5V, 0 to 10V					
			PNU 0010 has no effect	1	–10V to +10V					
				2	0 to 20mA					
				3	4 to 20mA					
			Fault message Sd5	4	4 to 20mA, open-circuit monitored					
0035*		DCB braking	Selection of DCB	0	Braking voltage specified with PNU 0036	Fix32	rw	ENTER	0	
				1	Braking current specified with PNU 0036					
0036		Level of braking voltage or braking current	DCB voltage/current		0 to 150%, (0.02%) Device-dependent default	Fix32	rw	ONLINE		
0037		Fixed frequency 1	FF1		–480.00 to 480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	20.00Hz	
0038		Fixed frequency 2	FF2		–480.00 to 480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	30.00Hz	
0039		Fixed frequency 3	FF3		–480.00 to 480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	40.00Hz	
0040*		Controller inhibit	CINH	0	Controller inhibit active	Fix32	rw	ENTER		
				1	Controller inhibit not active, controller enabled					
0043*		TRIP-RESET	Reset fault	0	Reset fault by entering 0	Fix32	rw	ENTER		
				1	Fault has occurred					
0044*		Setpoint 2	NSET1-N2		–480.00 to 480.00Hz, (0.02Hz)	Fix32	ro	DISPLAY		

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0046*		Setpoint 1	NSET1-N1	–480.00 to 480.00 Hz, (0.02 Hz)	Fix32	ro	DISPLAY		
0047*		Torque setpoint or torque limit value	MCTRL1-MSET	0 to 400 % PNU 0014 = 5: torque setpoint value PNU 0014 = 2, 3, 4: torque limit value	Fix32	ro	DISPLAY		
0049*		Additive setpoint	PCTRL1-NADD	–480.00 to 480.00 Hz, (0.02 Hz)	Fix32	ro	DISPLAY		
0050*		Output frequency f_2	MCTRL1-NOUT	–480.00 to 480.00 Hz, (0.02 Hz)	Fix32	ro	DISPLAY		
0051*		Output frequency f_2 with slip compensation	Output frequency with slip compensation (MCTRL1-NOUT+SLIP) or for PNU 0238 = 0, 1: Process controller actual value (PCTRL1-ACT)	–480.00 to 480.00 Hz, (0.02 Hz)	Fix32	ro	DISPLAY		
0052*		Motor voltage	MCTRL1-VOLT	0 to 1000 V	Fix32	ro	DISPLAY		
0053*		DC link voltage	MCTRL1-DCVOLT	0 to 1000 V	Fix32	ro	DISPLAY		
0054*		Apparent motor current	MCTRL1-IMOT	0 to 400 A	Fix32	ro	DISPLAY		
0056*		Inverter load	MCTRL1-MOUT	–255 to 255 %	Fix32	ro	DISPLAY		
0061*		Heatsink temperature		0 to 255 °C	Fix32	ro	DISPLAY		
0070		P-component	Gain	0.00 to 300.00, (0.01) 0.00 = P-component not active	Fix32	rw	ONLINE	1.00	
0071		I-component	Reset time	10 to 9999 s, (1 s) 9999 = I-component not active	Fix32	rw	ONLINE	100	
0072		D-component	Differential component	0.0 to 5.0, (0.1) 0.0 = D-component not active	Fix32	rw	ONLINE	0.0	
0074		Effect of PID regulator	PID control	0.0 to 100.0 %, (0.1 %)	Fix32	rw	ONLINE	0.0 %	
0077*		Gain, I_{max} controller	Behaviour at current limit	0.00 to 16.00, (0.01) 0.00 = P-component not active	Fix32	rw	ONLINE	0.25	
0078*		Reset time, I_{max} controller		12 to 9990 ms, (1 ms) 9990 = I-component not active	Fix32	rw	ONLINE	65 ms	
0079		Oscillation damping		0 to 80, (1) Device-dependent default	Fix32	rw	ONLINE		
0080		Service code		Adjustments only by Moeller service!	Fix32	rw	ONLINE	0.02 Hz	
0084		Motor stator resistance		0.000 to 64.000 Ω, (0.001 Ω)	Fix32	rw	ONLINE	0.000	
0087		Rated motor speed		300 to 16000 rpm, (0.001 rpm)	Fix32	rw	ONLINE	1390 rpm	

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0088		Rated motor current		0.0 to 480.0 A, (0.1 A) Device-dependent default, 0.0 to 2.0 × output current of frequency inverter	Fix32	rw	ONLINE		
0089		Rated motor frequency		10 to 960Hz, (1Hz)	Fix32	rw	ONLINE	50Hz	
0090		Rated motor voltage		50 to 500V, (1V) Device-dependent default	Fix32	rw	ONLINE		
0091		Motor cos φ		0.40 to 1.0, (0.1) Device-dependent default	Fix32	rw	ONLINE		
0092		Motor stator inductance		0.0 to 2000.0 mH, (0.1 mH)	Fix32	rw	ONLINE	0.0 mH	
0093*		Device ID		XXXY	Fix32	ro	DISPLAY		
0094*		User password	Free access only to USER menu	0 to 9999, (1) 0 = password protection disabled	Fix32	ro	ENTER	0	
0099*		Software version		X.Y	Fix32	ro	DISPLAY		
0105		Quickstop ramp	Deceleration time for QSP	0.0 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	5.00 s	
0106		Time for auto DCB	Stop time, auto DCB when below PNU 0019	0.0 to 999.00 s, (0.01 s) 0.00 s = auto DCB disabled 999.00 s = ∞	Fix32	rw	ONLINE	0.50 s	
0107		Time for external DCB	Stop time for DCB when triggered via terminal/ control word	0.0 to 999.00 s, (0.01 s) 999.00 s = ∞	Fix32	rw	ONLINE	999.00 s	
0108*		GAIN Analog output, terminal 62	AOUT1-GAIN	0 to 255, (1)	Fix32	rw	ONLINE	213	
0109*		OFFSET Analog output, terminal 62	AOUT1-OFFSET	–10.00 to 10.00 V, (0.01V)	Fix32	rw	ONLINE	0.00V	
0110 (APP)		Configuration, analog output terminal 63	AOUT2-IN	0 to 38 Output of analog signals at terminal For configuration possibilities, see PNU 0111 below 2 = apparent motor current	Fix32	rw	ONLINE	2	55

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0111		Configuration Analog output, terminal 62	AOUT1-IN Output of analog signals at terminal Parameter values from 9 to 25 correspond with the digital functions of relay output K1 (PNU 0008) or digital output A1 (PNU 0117) (0 to 16): LOW = 0 V/0 mA/4 mA/0 Hz, current signal (output A14) available only with DE4-IOM-APP-F HIGH = 10 V/20 mA/9.75 kHz, current or frequency signal (output A4) available only with DE4-IOM-APP-F			Fix32	rw	ENTER	0	55
			MCTRL1-NOUT+SLIP	0	Output frequency f_2 10 V/20 mA/9.75 kHz correspond to value in PNU 0011					
			MCTRL1-MOUT	1	Inverter load 5 V/10 mA/4.875 kHz correspond to rated motor torque for vector control (PNU 0014 = 4), otherwise rated device current (active current/PNU 0091)					
			MCTRL1-IMOT	2	Apparent motor current 5 V/10 mA/4.875 kHz correspond to inverter rated current					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0111			MCTRL1-DCVOLT	3	DC link voltage 10V/20mA/9.75kHz correspond to • DC 1000V (400Vmains) • DC 380V (240Vmains)					55
				4	Motor rating 5V/10mA/4.875kHz correspond to motor rated power					
			MCTRL1-VOLT	5	Motor voltage 8V/16mA/7.8kHz correspond to motor rated voltage					
			MCTRL1-1/NOUT	6	1/output frequency (1/PNU 0050) 3.3V/6.6mA/3.218kHz correspond to PNU 0050 = 0, 4 × PNU 0011					
			NSET1-PNU 0010 to PNU 0011	7	Output frequency within set limits 0V/0mA/4mA/0kHz correspond to $f = f_{min}$ (PNU 0010) 10 V/20 mA/9.75 kHz correspond to $f = f_{max}$ (PNU 0011)					
			PCTRL1-ACT MCTRL1-NOUT	8	PID actual value Operation with PID regulator (PNU 0238 = 0, 1) Operation without PID regulator (PNU 0238 = 2): output frequency without slippage 10V/20mA/9.75kHz correspond to PNU 0011					

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0111			DCTRL1-RDY Parameter values 9 to 25 correspond to functions of K1 (PNU 0008) or A1 (PNU 0117) (0 to 16)	9	Inverter ready to operate					55
			DCTRL1-TRIP	10	TRIP error message					
			DCTRL1-RUN	11	Motor running					
			DCTRL1-RUN-R	12	Motor running clockwise					
			DCTRL1-RUN-L	13	Motor running anticlockwise					
			DCTRL1-NOUT=0	14	Output frequency $f_2 = 0$					
			MCTRL1-RFG1=NOUT	15	Frequency setpoint, $f_{setpoint}$ reached					
			PCTRL1-F2>F1	16	$f_2 > f_1$ threshold reached					
			MCTRL1-IMAX	17	I_{max} limit reached PNU 0014 = 5: torque setpoint reached					
			DCTRL1-OH-WARN	18	(Heatsink temperature ϑ_{max}) – 5 °C					
			DCTRL1-TRIP-F2>F1-IMP	19	TRIP or $f_2 > f_1$ or impulse inhibit (IMP) active					
			DCTRL1-PTC-WARN	20	PTC warning					
			DCTRL1-IMOT<ILIM	21	Apparent motor current < current threshold for belt monitoring Apparent motor current = PNU 0054 Current threshold = PNU 0156					
			(DCTRL1-(IMOT<ILIM)-F2>F1)	22	Apparent motor current < current threshold and $f_2 > f_1$ threshold reached					
			(DCTRL1-(IMOT<ILIM)-RFG-I=0)	23	Apparent motor current < current threshold and ramp function generator 1: input = output					
			DCTRL1-LP1-WARN	24	Motor phase failure warning					
			PCTRL1-NMIN	25	Minimum output frequency (PNU 0010) reached					
				26	Reserved					
			MCTRL1-NOUT	27	output frequency without slippage					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0111			PCTRL1-ACT	28	PID actual value					55
			PCTRL1-SET	29	PID setpoint					
			PCTRL1-OUT	30	PID output					
			NSET1-RFG1-IN	31	Ramp generator input, frequency					
			NSET1-NOUT	32	Ramp generator output, frequency					
0111 (APP)			PCTRL1-PID-OUT	33	Direct PID output signal					55
			PCTRL1-NOUT	34	PID output signal before addition point					
			AIN1-OUT The following applies for the settings: 0027 = 0414/001 or 0026 = 0413/001	35	Input signal at terminal 1U/1I, evaluated with GAIN (0027, 0414/1) and OFFSET (0026, 0413/1)					
			DFIN1-OUT	36	Frequency signal f-In evaluated with GAIN (0426) and OFFSET (0427)					
			MPOT1-OUT	37	Mapping of motor potentiometer output					
			AIN2-OUT	38	Input signal at terminal 2U/2I, evaluated with GAIN (0414/2) and OFFSET (0413/2)					
0112 (APP)		Configuration, frequency output Terminal A4	DFOUT1-IN	0 to 38	Output of frequency signal to terminal For configuration possibilities, see PNU 0111 3 = internal DC link voltage	Fix32	rw	ENTER	3	55

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0113		Free configuration of digital inputs		Assign functions to control signal terminals E1 to E4 (DE4-IOM-STD-F) or E1 to E6 (DE4-IOM-APP-F)	Fix32	rw	ENTER		36
	001		NSET1-FF1/3	FF1: fixed frequency 1 (in combination with FF2 also FF3)				1	
	002		NSET1-FF2/3	FF2: fixed frequency 2 (in combination with FF1 also FF3) PNU 0113/001 / PNU 0113/002 / Active value LOW / LOW / PNU 0046 HIGH / LOW / FF1 LOW / HIGH / FF2 HIGH / HIGH / FF3				2	
	003		DCTRL1-R/L	R/L combined direction preselection, CW/CCW rotation				4	
	004		DCTRL1-QSP	QSP Quickstop				255	
	005		NSET1-RFG1-STOP	RFG1-STOP Ramp generator 1 stop for main setpoint				255	
	006		NSET1-RFG1-0	RFG1-0 Set ramp generator input 1 for main setpoint to 0				255	
	007		Reserved	Reserved				255	
	008		Reserved	Reserved				255	
	009		Reserved	Reserved				255	
	010		DCTRL1-CINH	CINH Controller inhibit				255	
	011		DCTRL1-TRIP-EF	EF External fault				255	

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0113	012		DCTRL1-TRIP-RESET	TRIP-RESET Trip reset				255	36
	013		DCTRL1-PAR2/4	PAR2/4 Parameter set selection (only when PNU 0988 = 0)				255	
	014		DCTRL1-PAR3/4	PAR3/4 Parameter set selection (only when PNU 0988 = 0) PNU 0113/013 / PNU 0113/014 / Active value LOW / LOW / PAR1 HIGH / LOW / PAR2 LOW / HIGH / PAR3 HIGH / HIGH / PAR4				255	
	015		MCTRL1-DCB	DCB DC injection braking				3	
0113 (APP)	016		PCTRL1-RFG2-LOADI	The PID actual value is applied to the PID ramp generator (PCTRL1-RFG2)				255	36
0113	017		DCTRL1-RA/MO	RA/MO Remote/manual changeover				255	
	018		PCTRL1-I-DIS-I	DIS-I Disable I-component of PID regulator				255	
	019		PCTRL1-PID	DIS-PID Disable PID regulator				255	
	020		Reserved	Reserved				255	
	021		PCTRL1-FREEZE	FREEZE-PID Freeze PID regulator output at current value				255	
	022		DCTRL1-R/QSP	R/QSP Clockwise rotation, quickstop on error				255	
	023		DCTRL1-L/QSP	L/QSP anticlockwise rotation, quickstop on error				255	

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0113	024		DFIN1-f-In	f-In Digital frequency input 0 to 10 kHz				255	
0113 (APP)	025		PCTRL1-FOLL1-0	Run follow-up controller to 0 Hz at reset ramp (PNU 0193)				255	36
	026			Reserved				255	
	027			Reserved				255	
	028			Reserved				255	
	029		PCTRL1-FADING	Disable PID fading				255	
	030		PCTRL1-INV-ON	Invert PID output				255	
	031		PCTRL1-NADD-OFF	Deactivate additive setpoint (PCTRL1-NADD)				255	
	032		PCTRL1-RFG2-0	Run PID ramp generator (PCTRL1-RFG2) to 0 at ramp PNU 0226				255	
0114		Level inversion, digital inputs E1 to E4 (DE4-IOM-STD-F) or E1 to E6 (DE4-IOM-APP-F)	DIG-IN	The decimal selection digit determines the inputs' level patterns: 0: Ex is not inverted (HIGH active) 1: Ex is inverted (LOW active)	Fix32	rw	ENTER	0	
0114 (APP)				...					39
0117		Transistor output A1 (configuration)	DIGOUT1	The same functions 0 to 24 or to 33 (APP) from PNU 0008 are available 1 = TRIP message	Fix32	rw	ENTER	1	62

	E6 2^5	E5 2^4	E4 2^3	E3 2^2	E2 2^1	E1 2^0
0	0	0	0	0	0	0
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
...	...	...	...	...	...	...
15	0	0	1	1	1	1
...	...	...	...	...	...	...
63	1	1	1	1	1	1

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0118 (APP)		Transistor output A2 (configuration)	DIGOUT2		The same functions 0 to 33 (APP) from PNU 0008 are available 0 = ready for operation	Fix32	rw	ENTER	0	62
0119		PTC input (configuration)		0	PTC input inactive Ground fault detection OC2 active	Fix32	rw	ENTER	0	
				1	PTC input active Ground fault detection OC2 active TRIP triggered					
				2	PTC input active Ground fault detection OC2 active Warning issued					
				3	PTC input inactive Ground fault detection OC2 active Warning issued					
				4	PTC input active Ground fault detection OC2 disabled TRIP triggered and controller inhibit is set					
				5	PTC input active Ground fault detection OC2 disabled Warning issued					
0120		I^2t-shutdown	Temperature monitoring		0 to 200%, (1%) 0 = I^2t-shutdown disabled	Fix32	rw	ONLINE	0%	
0125*		Baud rate	Baud rate for RS 232/485 interface on AIF	0	9600 baud	Fix32	rw	ENTER	0	
				1	4800 baud					
				2	2400 baud					
				3	1200 baud					
				4	19200 baud					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0126*		Communication behaviour	Behaviour on communication fault	0	No response on communication error between frequency inverter and interface on the AIF No response on communication error between frequency inverter and function module on the FIF	Fix32	rw	ONLINE	2	
				1	On communication error between frequency inverter and interface on the AIF, disconnection with CE0 error message. No response on communication error between frequency inverter and function module on the FIF					
				2	No response on communication error between frequency inverter and interface on the AIF On communication error between frequency inverter and function module on the FIF, disconnection with CE0 error message.					
				3	On communication error between frequency inverter and interface on the AIF, disconnection with CE0 error message. On communication error between frequency inverter and function module on the FIF, disconnection with CE0 error message.					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0127		Setpoint input selection	For bus operation	0	Setpoint input, absolute value in Hz via PNU 0046 or process channel	Fix32	rw	ENTER	0	
				1	Setpoint input, normalized value, via PNU 0141 (0 to 100 %) or process channel (16384 = PNU 0011)					
0135		Control word	For interface/bus operation only		Control through parameter channel	Bit16	ro			
			NSET1-FF1/3	0	Bit 0/1 00 = frequency setpoint (PNU 0046) active 10 = fixed frequency 1, [FF1] (PNU 0037) active 01 = fixed frequency 2, [FF2] (PNU 0038) active 11 = fixed frequency 3, [FF3] (PNU 0039) active					
			NSET1-FF2/3	1						
			DCTRL1-R/L	2	[R/L] 0 = clockwise rotation 1 = anticlockwise rotation					
			DCTRL1-QSP	3	[QSP] 0 = do not enable quickstop 1 = enable quickstop					
			NSET1-RFG1-STOP	4	[RFG1-STOP] 0 = enable ramp generator 1 = pause ramp generator					
			NSET1-RFG1-0	5	[RFG1-0] 0 = do not set ramp generator input to 0, but enable 1 = set ramp generator input to 0 and run ramp –a (PNU 0013) to zero setpoint					
			MPOT1-UP	6	[UP] 0 = do not activate motor potentiometer UP 1 = activate motor potentiometer UP					

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
135			MPOT2-DOWN	7	[DOWN] 0 = do not activate motor potentiometer DOWN 1 = activate motor potentiometer DOWN	Bit16	ro			
				8	Reserved					
			DCTRL1-CINH	9	[CINH] 0 = controller enable 1 = controller inhibit					
			DCTRL1-TRIP-EF	10	[EF] 1 = external error (frequency inverter indicates external error, EEr) 0 = reset external error (a TRIP RESET must be carried out to acknowledge the error)					
			DCTRL1-TRIP-RESET	11	[TRIP-RESET] Edge from 0 to 1 triggers TRIP-RESET					
			DCTRL1-PAR2/4 DCTRL1-PAR3/4	12 13	Bit 12/13 00 = parameter set 1, [PAR1] active 10 = parameter set 2, [PAR2] active 01 = parameter set 3, [PAR3] active 11 = parameter set 4, [PAR4] active					
			MCTRL1-DCB	14	[DCB] 0 = do not activate DC braking 1 = activate DC braking					
				15	Reserved					
0138*		Indication of setpoint PCTRL1-SET1	PCTRL1-SET1		–480.00 to +480.00 Hz, (0.02 Hz) Indication of frequency setpoint via internal PID setpoint channel (PCTRL1-SET1), (PNU 0145 = 2)	Fix32	ro	ENTER		
0140*		Additive frequency setpoint (f_{set})	NSET1-NADD		–480.00 to +480.00 Hz, (0.02 Hz) Direct input via keypad	Fix32	rw	ENTER		
0141*		Setpoint, normalized	Only for bus operation and PNU 0127 = 1		–100.00 to +100.00 %, (0.01 %) Reference is PNU 0011	Fix32	rw	ENTER		

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0142		Start condition		0	Automatic start disabled, flying restart circuit inactive	Fix32	rw	ENTER	1	
				1	Automatic start if terminal 28 = HIGH, flying restart circuit inactive					
				2	Automatic start disabled, flying restart circuit activated					
				3	Automatic start if terminal 28 = HIGH, flying restart circuit inactive					
0143*		Selection of flying restart procedure	The motor speed is determined in the specified range	0	The motor speed is determined in the range from f_{max} (PNU 0011) to 0Hz	Fix32	rw	ENTER	0	
				1	The motor speed is determined in the range from the most recent output frequency to 0 Hz					
				2	On controller enable, the current frequency setpoint is applied to the motor					
				3	After controller enable, the PID regulator actual value is applied to the motor as specified in PNU 0005					
0144		Operating frequency reduction		0	No operating frequency reduction	Fix32	rw	ENTER	1	
				1	Automatic operating frequency reduction at (heatsink temperature $\triangleq_{max}$) – 5°C					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0145*		PID setpoint source	PCTRL1-SET3	0	Total setpoint (main setpoint plus additive setpoint)	Fix32	rw	ENTER	0	
			PCTRL1-SET2	1	Digital setpoint input (LCD keypad) Input in PNU 0181					
			PCTRL1-SET1	2	Setpoint input in FIF operation (PNU 0005 = 200) via internal PID setpoint channel					
0148*		Motor parameter identification	Determination of motor data	0	0 = identification not active (completed)	Fix32	rw	ENTER + IMP	0	
				1	1 = Identification active (start identification)					
0150		Status word	For interface/bus operation only		Frequency inverter status via parameter channel	Bit16	ro			
			DCTRL1-PAR-B0	0	Bit 0 0 = parameter set 1 or 3 active 1 = parameter set 2 or 4 active					
			DCTRL1-IMP	1	0 = power outputs enabled 1 = IMP active, power outputs inhibited					
			MCTRL1-IMAX	2	0 = current limit not reached 1 = current limit reached (for PNU 0014 = 5: torque setpoint reached)					
			MCTRL1-RFG1=NOUT	3	0 = output frequency $f_2 \neq$ frequency setpoint 1 = output frequency $f_2 =$ frequency setpoint					
			NSET1-RFG1=0	4	0 = ramp function generator, input ≠ output 1 = ramp function generator, input = output					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0150			PCTRL1-F2>F1	5 0 = $f_2 \neq f_1$ 1 = $f_2 = f_1$	Bit16	ro			
			DCTRL1-NOUT=0	6 0 = output frequency $f_2 \neq 0$ 1 = output frequency $f_2 = 0$					
			DCTRL1-CINH	7 0 = controller inhibit active 1 = controller inhibit not active (enabled)					
			Device status	8					
				9 Bit 11 10 9 8					
				10 0 0 0 0 = Initialization phase					
				11 0 0 0 1 = Autostart inhibit					
				0 1 1 1 = Operation inhibited					
				0 1 0 0 = Flying restart circuit active					
				0 1 0 1 = DCB, DC brake active					
				0 1 1 0 = Operation enabled					
				0 1 1 1 = Signal active					
				1 0 0 0 = TRIP, trip active					
			DCTRL1-OH-WARN	12 0 = no warning 1 = (heatsink temperature ϑ_{max}) – 5 °C reached					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0150			DCTRL1-0V	13	0 = no overvoltage 1 = overvoltage					
			DCTRL1-L	14	0 = clockwise rotation 1 = anticlockwise rotation					
			DCTRL1-RDY	15	0 = not ready for operation (trip) 1 = ready for operation (no trip)					
0156*		Current threshold			0 to 150%, (1%) % relative to I_e frequency inverter	Fix32	rw	ONLINE	0%	
0161*		Current fault	Fault code		Display contents of the trip memory Signal on breach of threshold value. Can be configured with PNU 0008, 0117 or 0118	Fix32	ro	DISPLAY		
0162*		Previous fault				Fix32	ro	DISPLAY		
0163*		Second from last fault				Fix32	ro	DISPLAY		
0164*		Third from last fault				Fix32	ro	DISPLAY		
0168*		Current fault	Error number of the current error			Fix32	ro	DISPLAY		
0170		TRIP-RESET procedure		0	Manual TRIP-RESET, no AUTO-TRIP-RESET	Fix32	rw	ENTER	0	
				1	As 0 but with additional AUTO-TRIP-RESET (time in PNU 0171)					
				2	TRIP-RESET by switching power supply, terminal 28 or through function module or communication module; no AUTO-TRIP-RESET					
				3	TRIP-RESET only by switching power supply					
0171		Delay for AUTO-TRIP-RESET	Time until AUTO-TRIP-RESET takes place		0.00 to 60.00 s, (0.01 s)	Fix32	rw	ONLINE	0.00 s	
0174*		Switching threshold V_{DC} of the braking transistor	Active only on 400 V inverters		78 to 110%, (1%) 100% = switching threshold 780V 110% = braking transistor switched off	Fix32	rw	ENTER + IMP	100%	
0178*		Operating time meter	Total time for which device was enabled (CINH = HIGH)		(h)	Fix32	ro	DISPLAY		
0179*		Power On time meter	Total time for which the power supply was on		(h)	Fix32	ro	DISPLAY		
0181*		Input, digital PID setpoint	PCTRL1-SET2 Input of PID setpoint via LCD keypad		–480.00 to +480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	0.00Hz	

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0182*		Integration time for S-ramp			0.00 to 50.00 s, (0.01 s) PNU 0182 = 0.00, linear ramp	Fix32	rw	ONLINE	0.00 s	
0183*		Diagnostics		0	No fault	Fix32	ro	DISPLAY		
				102	TRIP active					
				104	"Overvoltage" (OU) or "Undervoltage" (LU) signal active					
				142	IMP, impulse disable					
				151	QSP, quickstop active					
				161	DCB, DC brake active					
				250	WARN, warning active					
0184*		Disable integral component via frequency threshold			0.0 to 25Hz, (0.1Hz) PNU 0184 = 0.0Hz function not active Switches I-component off at output frequency < PNU 0184 Threshold (PCTRL1-NOUT)	Fix32	rw	ONLINE	0.0Hz	
0185*		Switching window	Switching window for "frequency setpoint reached" (MCTRL1-NOUT) or "Ramp generator 1: input = output" (NSET1-RFG1-I=0)		0 to 80%, (1%) Window at PNU 0185 = 0%: ± 0.5% relating to value in PNU 0011 Window at PNU 0185 > 0%: ± PNU 0185 relating to value at ramp function generator input 1 (NSET1-RFG1-IN)	Fix32	rw	ONLINE	0%	
0189* (APP)		Output signal Follow-up controller	PCTRL1-FOLL1-OUT		–480.00 to +480.00Hz, (0.02Hz)	Fix32	ro	DISPLAY		49

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0190* (APP)		Linking of main and additive setpoint	PCTRL1-ARITH1		Linking with mathematical functions: X = NSET1-NOUT = main setpoint Y = PCTRL1-NADD = additive setpoint	Fix32	rw	ENTER	1	48
				0	X + 0					
				1	X + Y					
				2	X – Y					
				3	X × Y					
				4	X / Y					
				5	X / (1 – Y)					
0191 (APP)		$+a_{follow-up}$ Acceleration time of follow-up controller	Time from 0Hz to f_{max}		0.00 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	5.00 s	49
0192 (APP)		$-a_{follow-up}$ Deceleration time, follow-up controller	Time from f_{max} to 0Hz		0.00 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	5.00 s	49
0193 (APP)		Reset follow-up controller	Time from f_{max} to 0Hz Run follow-up controller to 0		0.00 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	5.00 s	49
0194 (APP)		Lower threshold, follow-up controller	% relative to PNU 0011. Lower limit of PNU 0194 breached: controller runs towards –0011 at 0191 or 0192		–200.00 to +200.00 %, (0.01 %)	Fix32	rw	ONLINE	–200.00%	49
0195 (APP)		Upper threshold, follow-up controller	% relative to PNU 0011. PNU 0195 exceeded: controller runs towards +0011 at 0191 or 0192		–200.00 to +200.00 %, (0.01 %)	Fix32	rw	ONLINE	200.00%	49
0196*		Activation of automatic DCB	PCTRL1-SET3 = total setpoint	0	Auto DCB active at PCTRL1-SET3 < PNU 0019	Fix32	rw	ENTER	0	
			NSET1-RFG1-IN = setpoint at ramp generator input 1	1	Auto DCB active at PCTRL1-SET3 < PNU 0019 and NSET1-RFG1-IN < PNU 0019					
0200*		Software ID number			Display at PC only	VS	ro	PC DISPLAY		
0201*		Software creation date			Display at PC only	VS	ro	PC DISPLAY		

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0220*		$+a_{Additive}$ Acceleration time, additive setpoint	PCTRL1-NADD = additive setpoint Time from 0Hz to f_{max}	0.00 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	5.00 s	
0221*		$-a_{Additive}$ Deceleration time, additive setpoint	PCTRL1-NADD = additive setpoint Time from f_{max} to 0Hz	0.00 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	5.00 s	
0225 (APP)		$a_{PID\ setpoint}$ Acceleration time PID setpoint value	PID setpoint Time from 0Hz to f_{max} for PCTRL1-RFG2	0.00 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	0.00 s	49
0226 (APP)		$-a_{PID\ setpoint}$ Deceleration time, PID setpoint	PID setpoint Time from f_{max} to 0Hz for PCTRL1-RFG2	0.00 to 1300.00 s, (0.02 s)	Fix32	rw	ONLINE	0.00 s	49
0228 (APP)		Fade-in time, PID regulator	0.000 = pass through PID output unchanged	0.000 to 32.000 s, (0.001 s)	Fix32	rw	ONLINE	0.000 s	49
0229 (APP)		Fade-out time, PID regulator	0.000 = pass through PID output unchanged	0.000 to 32.000 s, (0.001 s)	Fix32	rw	ONLINE	0.000 s	49
0230 (APP)		Lower limit, PID output	PID output limitation % relative to PNU 0011	–200.00 to +200.00 %, (0.01 %)	Fix32	rw	ONLINE	–100%	49
0231 (APP)		Upper threshold, PID output	PID output limitation % relative to PNU 0011	–20.000 to +20.00 %, (0.01 %)	Fix32	rw	ONLINE	100.00%	51
0232 (APP)		OFFSET for inverse characteristic, PID	% relative to PNU 0011	–200.0 to +200.0%, (0.1 %)	Fix32	rw	ONLINE	0.00%	51
0233* (APP)		Deceleration time for PCTRL1-LIM signal	Debouncing time for digital output	0.000 to 65.000 s, (0.001 s)	Fix32	rw	ONLINE	0.000 s	51
0234* (APP)		Deceleration time for signal PCTRL1-SET = ACT	Debouncing time for digital output	0.000 to 65.000 s, (0.001 s)	Fix32	rw	ONLINE	0.000 s	51
0235* (APP)		Response threshold PID setpoint = actual value	PCTRL1-SET=ACT	0.00 to 480.00 Hz, (0.01 Hz)	Fix32	rw	ONLINE	0.00Hz	51

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0238		Frequency precontrol		0	No precontrol Only the process controller output is active Process controller has full effect	Fix32	rw	ENTER	2	
				1	Precontrol (total setpoint + process controller) Process controller has limited effect					
				2	No precontrol Only the total setpoint is active Process controller has no effect (inactive)					
0239		f_{unt}, lower frequency limit	Absolute limit, irrespective of setpoint		–480.00 to +480.00 Hz, (0.02 Hz)	Fix32	rw	ONLINE	–480.00 Hz	
0240 (APP)		Invert PID output	PCTRL1-INV-ON via LCD keypad/PC or parameter channel	0	Do not invert PID output	Fix32	rw	ENTER	0	52
				1	Invert PID output					
0241 (APP)		Enable PID regulator	PCTRL1-FADING via LCD keypad/PC or parameter channel	0	Enable PID	Fix32	rw	ENTER	0	52
				1	Disable PID					
0242 (APP)		PID inverse control	PCTRL1-NADD-OFF via LCD keypad/PC or parameter channel	0	Output frequency falls as the actual value increases	Fix32	rw	ENTER	0	52
				1	Output frequency rises as the actual value increases					
0243 (APP)		Deactivate additive setpoint		0	Additive setpoint active	Fix32	rw	ENTER	0	52
				1	Additive setpoint not active					
0244 (APP)		PID root function	Link PID actual value with root function	0	Root function not active	Fix32	rw	ENTER	0	53
				1	Root function $\sqrt{\text{PCTRL1-ACT}}$ active					
0245* (APP)		Selection of torque comparison value for MSET1=MACT		0	Value of signal source at MCTRL1-MSET (depending on PNU 0001, 0005, 0007)	Fix32	rw	ENTER	0	54
				1	Value from PNU 0250					
0250* (APP)		Torque threshold	MCTRL1-MSET1		–200.00 to +200.00 %, (0.1 %)	Fix32	rw	ONLINE	0.0%	54
0252* (APP)		Differential threshold for MSET1 = MACT			0.0 to 100.0 %, (0.1 %)	Fix32	rw	ONLINE	0.0 %	54
0254* (APP)		Deceleration time for signal MSET1 = MACT	Debouncing time for digital output		0.000 to 65.000 s (0.001 s)	Fix32	rw	ONLINE	0.000 s	54

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Accept-ance	DS	See page
0265*		Starting value, motor potentiometer		0	Starting value = actual value at Power Off is saved and approached again on Power On	Fix32	rw	ENTER	3	
				1	Starting value = PNU 0010 f_{min} is approached on Power On					
				2	Staring value = 0Hz After power on, the starting value is 0 Hz					
				3	Staring value = Power Off UP/DOWN = LOW, deceleration at QSP ramp PNU 0105 to 0Hz					
				4	Staring value = PNU 0010 UP/DOWN = LOW, deceleration at QSP ramp PNU 0105 to 0 Hz					
				5	Staring value = 0Hz UP/DOWN = LOW, deceleration at QSP ramp PNU 0105 to 0 Hz					
0372*		Function module identification		0	No function module	Fix32	ro	DISPLAY		
				1	DE4-IOM-STD-F					
				6	DE4-IOM-APP-F, DE4-NET-K-F, DE4-NET-DP-F					
				10	No valid ID					
0395		LONGWORD	Process input data		Only for bus operation, The control word and main setpoint are transferred to the frequency inverter in a telegram Bit 0 to 15: Mapping of control word PNU 0135 Bit 16 to 31: Mapping of setpoint 1 (NSET1-N1, PNU 0046)	B32	ro			

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0396*		LONGWORD	Process output data	Only for bus operation, The control word and main setpoint are transferred from the frequency inverter in a telegram Bit 0 to 15: Mapping of status word PNU 0150 Bit 16 to 31: Mapping of output frequency f_2 (MCTRL1-NOUT, PNU 0050)	B32	ro			
0413* (APP)	001	OFFSET Analog inputs	1U/1I (AIN1-OFFSET)	–200.0 to +200.0%, (0.1%) The following applies for the settings: PNU 0413/1 = PNU 0026	Fix32	rw	ONLINE	0.0	43
	002		2U/2I (AIN2-OFFSET)	–200.0 to +200.0 %, (0.1 %)					
0414* (APP)	001	GAIN Analog inputs	1U/1I (AIN1-GAIN)	–1500.0 to +1500.0%, (0.1%) The following applies for the settings: PNU 0414/001 = PNU 0027	Fix32	rw	ONLINE	100.0	44
	002		2U/2I (AIN2-GAIN)	–1500.0 to +1500.0%, (0.1%)					
0416		Level inversion, digital outputs A2 available only with DE4-IOM-APP-F		The decimal selection digit determines the outputs' level patterns: 0: Output not inverted (HIGH is active) 1: Output is inverted (LOW active)	Fix32	rw	ENTER	0	64

	A2	A1	Relay K1
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

PNU	Sub-index	Name	Notes, internal designations, etc.
0416 (APP)			

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PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0420* (APP)	001	GAIN, analog outputs	Trm. 62 (AOUT1-GAIN)	0 to 255, (1) The following applies for the settings: PNU 0420/001 = PNU 0108	Fix32	rw	ONLINE	213	60
	002		Trm. 63 (AOUT2-GAIN)	0 to 255, (1)					
0422* (APP)	001	OFFSET Analog outputs	Trm. 62 (AOUT1-OFFSET)	–10.00 to 10.00V, (0.01V) The following applies for the settings: PNU 0422/001 = PNU 0109	Fix32	rw	ONLINE	0.00	60
	002		Trm. 63 (AOUT2-OFFSET)						
0423* (APP)	001	Deceleration, digital outputs	Relay output K1	0.000 to 65.000 s, (0.001 s) Debouncing the digital outputs	Fix32	rw	ONLINE	0.000	65
	002		Digital output A1 (DIGOUT1)						
	003		Digital output A2 (DIGOUT2)						
0424* (APP)	001	Analog output signal range Observe jumper settings of the expansion module!	Trm. 62 (AOUT1)	0 0 to 10 V, 0 to 20 mA 1 4 to 20 mA	Fix32	rw	ONLINE	0	56
	002		Trm. 63 (AOUT2)	0 0 to 10 V, 0 to 20 mA 1 4 to 20 mA					

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range					Data type	Access rights	Accept-ance	DS	See page
0425*		Configuration, frequency-input E1 (single-channel evaluation, DFIN1)	"Frequency" = corresponds to internal f_{max} (PNU 0011) "Max. frequency" = maximum frequency that the input can process		Fre-quency	Reso-lution	Scan rate	Max. fre-quency	Fix32	rw	ENTER	2	41
				0	100 Hz	1/200	1 s	300 Hz					
				1	1 kHz	1/200	100 ms	3 kHz					
				2	10 kHz	1/200	10 ms	10 kHz					
				3	10 kHz	1/1000	50 ms	10 kHz					
				4	10 kHz	1/ 10000	500 ms	10 kHz					
0425* (APP)				5	100 kHz	1/400	2 ms	100 kHz					
				6	100 kHz	1/1000	5 ms	100 kHz					
				7	100 kHz	1/2000	10 ms	100 kHz					
		Configuration, frequency input E1, E2 (two-channel evaluation, DFIN1)		10	100 Hz	1/200	1 s	300 Hz					
				11	1 kHz	1/200	100 ms	3 kHz					
				12	10 kHz	1/200	10 ms	10 kHz					
				13	10 kHz	1/1000	50 ms	10 kHz					
				14	10 kHz	1/ 10000	500 ms	10 kHz					
				15	100 kHz	1/400	2 ms	100 kHz					
				16	100 kHz	1/1000	5 ms	100 kHz					
				17	100 kHz	1/2000	10 ms	100 kHz					
0426*		GAIN E1, E2 (APP)	Total gain, frequency inputs E2 available only with DE4-IOM-APP-F	–1500.0 to +1500.0 %, (0.1 %)					Fix32	rw	ONLINE	100 %	
0427*		OFFSET E1, E2 (APP)	Total offset, frequency inputs E2 available only with DE4-IOM-APP-F	–100.0 to +100.0 %, (0.1 %)					Fix32	rw	ONLINE	0.0 %	
0428* (APP)		GAIN A4, frequency output	DFOUT1-OUT	0.0 to +1500.0 %, (0.1 %)					Fix32	rw	ONLINE	100 %	60
0469*		STOP key function	Specifies the function to be performed when the key is pressed	0	Key disabled				Fix32	rw	ENTER + IMP	1	
				1	CINH, controller inhibit is set								
				2	QSP, run down at quickstop ramp								

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0500*		Display factor for processing speed, numerator	Matching of phase-sequence-related parameters to a process variable to be controlled, e.g. speed	1 to 25000, (1)	Fix32	rw	ONLINE	2000	
0501*		Display factor for processing speed, denominator		1 to 25000, (1)	Fix32	rw	ONLINE	10	
0502* (APP)		Unit of process variable	The process value is displayed on the selected device	0: _ / 6: rpm / 13: % / 18: W 1: ms / 9: _C / 14:kW / 19:hex 2: s / 10:Hz / 15: N / 34: m 4: A / 11: kVA / 16: mV / 35: h 5:V / 12: Nm / 17: mW / 42:mH	Fix32	rw	ONLINE	0	60
0517*		USER-MENU		All parameters of the basic unit can be addressed for indication andaccess	Fix32	rw	ENTER		
	001		Memory location 1	Current output frequency f_2				50	
	002		Memory location 2	Setpoint input range				34	
	003		Memory location 3	Digital inputs				7	
	004		Memory location 4	Minimum output frequency				10	
	005		Memory location 5	Maximum output frequency				11	
	006		Memory location 6	Acceleration time				12	
	007		Memory location 7	Deceleration time				13	
	008		Memory location 8	"Transition frequency" of the *U*/*f* characteristic				15	
	009		Memory location 9	Pull up of motor voltage				16	
	010		Memory location 10	Parameter set transfer				2	
0597*		Configuration of motor phase failure recognition		0 Disabled 1 TRIP error message 2 Warning	Fix32	rw	ENTER	0	
0599*		Current limit value of motor phase failure recognition	Response threshold; reference is the frequency inverter's rated current	1 to 50%, (1%)	Fix32	rw	ENTER	5%	
0625*		Blocking frequency 1		0.00 to 480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	480.00Hz	
0626*		Blocking frequency 2		0.00 to 480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	480.00Hz	

PNU	Sub-index	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	See page
0627*		Blocking frequency 3		0.00 to 480.00Hz, (0.02Hz)	Fix32	rw	ONLINE	480.00Hz	
0628*		Suppression bandwidth	Applies to PNU 0625, 0626, 0627	0.00 to 100.00%, (0.01%)	Fix32	rw	ONLINE	0.00%	
0988*		Voltage threshold of internal DC link for parameter set changeover	Changeover of parameter set PAR1 or PAR2 depending on the internal DC link voltage	0.00 to 200% (1%) PNU 0988 = 0% changeover deactivated When PNU 0988 > 0, a parameter set changeover through the terminal is not possible	Fix32	rw	ONLINE	0%	

Signal channel selection table

Combination possibilities without motor potentiometer function

Parameter	Parameter value(s)
PNU 0007	**0** to **9**
	14 to **20**
	28 to **43**
	43 to **51**

		PNU 0001		
	Parameter value	2/0	1	3
PNU 0005	0	NSET1-N1 = AIN1-OUT NSET1-N2 = AIN1-OUT	NSET1-N2 = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT
	1	NSET1-N1 = AIN1-OUT NSET1-N2 = AIN1-OUT PCTRL1-NADD = DFIN1-OUT	NSET1-N2 = AIN1-OUT PCTRL1-NADD = DFIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT PCTRL1-NADD = DFIN1-OUT
	2	NSET1-N1 = DFIN1-OUT NSET1-N2 = DFIN1-OUT PCTRL1-NADD = AIN1-OUT	NSET1-N2 = DFIN1-OUT PCTRL1-NADD = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = DFIN1-OUT PCTRL1-NADD = AIN1-OUT
	3	NSET1-N1 = DFIN1-OUT NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT
	4	MCTRL1-MSET = AIN1-OUT	MCTRL1-MSET = AIN1-OUT	MCTRL1-MSET = AIN1-OUT

	Parameter value	PNU 0001 2/0	1	3
PNU 0005	**5**	NSET1-N1 = DFIN1-OUT NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT
	6	NSET1-N1 = AIN1-OUT NSET1-N2 = AIN1-OUT PCTRL1-ACT = DFIN1-OUT	NSET1-N2 = AIN1-OUT PCTRL1-ACT = DFIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT PCTRL1-ACT = DFIN1-OUT
	7	NSET1-N1 = DFIN1-OUT NSET1-N2 = DFIN1-OUT PCTRL1-ACT = AIN1-OUT	NSET1-N2 = DFIN1-OUT PCTRL1-ACT = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = DFIN1-OUT PCTRL1-ACT = AIN1-OUT
	8 (APP)	NSET1-N1 = AIN1-OUT NSET1-N2 = AIN1-OUT PCTRL1-NADD = AIN2-OUT	NSET1-N2 = AIN1-OUT PCTRL1-NADD = AIN2-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT PCTRL1-NADD = AIN2-OUT
	9 (APP)	NSET1-N1 = AIN1-OUT NSET1-N2 = AIN1-OUT PCTRL1-ACT = AIN2-OUT	NSET1-N2 = AIN1-OUT PCTRL1-ACT = AIN2-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT PCTRL1-ACT = AIN2-OUT
	200	NSET1-N1 = FIF-IN NSET1-N2 = FIF-IN PCTRL1-NADD = FIF-IN PCTRL1-SET1 = FIF-IN PCTRL1-ACT = FIF-IN MCTRL1-MSET = FIF-IN	NSET1-N1 = FIF-IN NSET1-N2 = FIF-IN PCTRL1-NADD = FIF-IN PCTRL1-SET1 = FIF-IN PCTRL1-ACT = FIF-IN MCTRL1-MSET = FIF-IN	NSET1-N1 = FIF-IN NSET1-N2 = FIF-IN PCTRL1-NADD = FIF-IN PCTRL1-SET1 = FIF-IN PCTRL1-ACT = FIF-IN MCTRL1-MSET = FIF-IN

Combination possibilities with motor potentiometer function, without RA/MO changeover

Parameter	Parameter value(s)
PNU 0007	**10** to **13**
	21 to **22**
	44

		PNU 0001		
	Parameter value	2/0	1	3
PNU 0005	**0**	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT	NSET1-N2 = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT
	1	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT PCTRL1-NADD = DFIN1-OUT	NSET1-N2 = AIN1-OUT PCTRL1-NADD = DFIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT PCTRL1-NADD = DFIN1-OUT
	2	NSET1-N1 = MPOT1-OUT NSET1-N2 = DFIN1-OUT PCTRL1-NADD = AIN1-OUT	NSET1-N2 = DFIN1-OUT PCTRL1-NADD = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = DFIN1-OUT PCTRL1-NADD = AIN1-OUT
	3	NSET1-N1 = MPOT1-OUT NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT
	4	MCTRL1-MSET = AIN1-OUT	MCTRL1-MSET = AIN1-OUT	MCTRL1-MSET = AIN1-OUT

	Para-meter value	PNU 0001 2/0	1	3
PNU 0005	**5**	NSET1-N1 = MPOT1-OUT NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT
	6	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT PCTRL1-ACT = DFIN1-OUT	NSET1-N2 = AIN1-OUT PCTRL1-ACT = DFIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT PCTRL1-ACT = DFIN1-OUT
	7	NSET1-N1 = MPOT1-OUT NSET1-N2 = DFIN1-OUT PCTRL1-ACT = AIN1-OUT	NSET1-N2 = DFIN1-OUT PCTRL1-ACT = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = DFIN1-OUT PCTRL1-ACT = AIN1-OUT
	8 (APP)	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT PCTRL1-NADD = AIN2-OUT	NSET1-N2 = AIN1-OUT PCTRL1-NADD = AIN2-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT PCTRL1-NADD = AIN2-OUT
	9 (APP)	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT PCTRL1-ACT = AIN2-OUT	NSET1-N2 = AIN1-OUT PCTRL1-ACT = AIN2-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = AIN1-OUT PCTRL1-ACT = AIN2-OUT
	200	NSET1-N1 = FIF-IN NSET1-N2 = FIF-IN PCTRL1-NADD = FIF-IN PCTRL1-SET1 = FIF-IN PCTRL1-ACT = FIF-IN MCTRL1-MSET = FIF-IN	NSET1-N1 = FIF-IN NSET1-N2 = FIF-IN PCTRL1-NADD = FIF-IN PCTRL1-SET1 = FIF-IN PCTRL1-ACT = FIF-IN MCTRL1-MSET = FIF-IN	NSET1-N1 = FIF-IN NSET1-N2 = FIF-IN PCTRL1-NADD = FIF-IN PCTRL1-SET1 = FIF-IN PCTRL1-ACT = FIF-IN MCTRL1-MSET = FIF-IN

Combination possibilities with motor potentiometer function and RA/MO changeover

Parameter	Parameter value(s)
PNU 0007	**23** to **27**

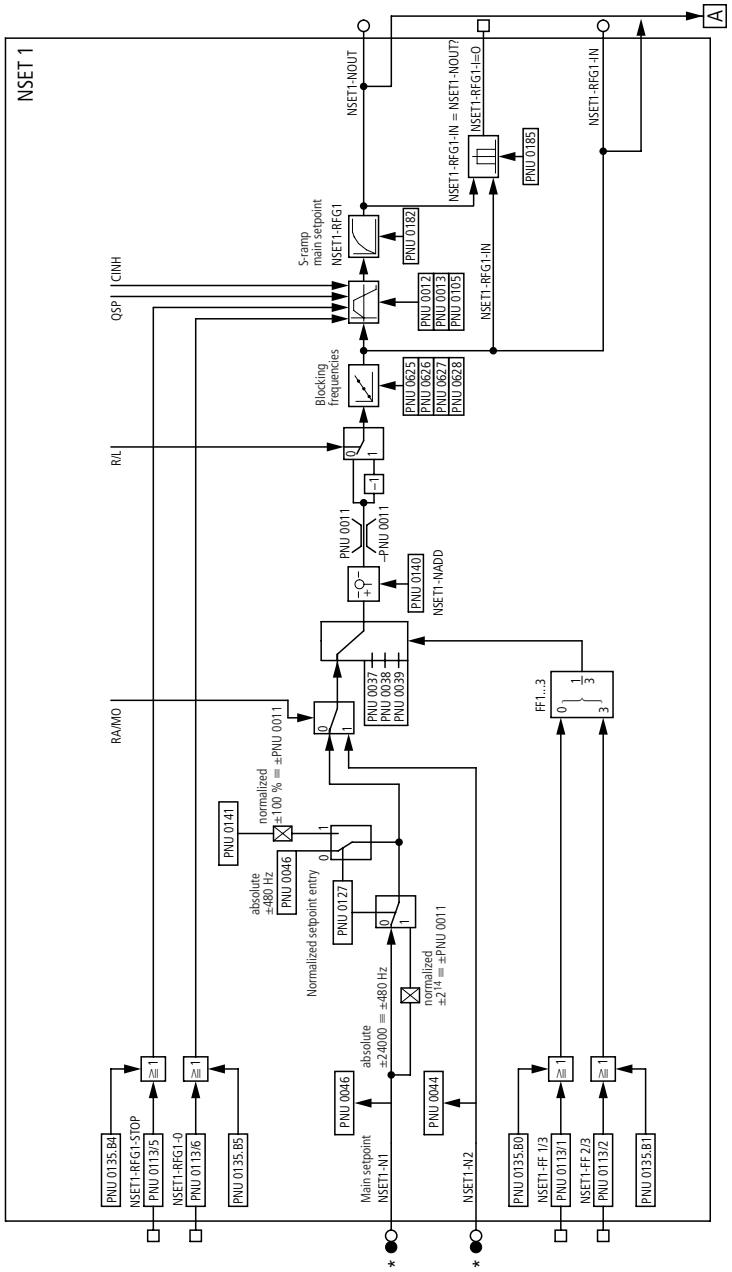
		PNU 0001		
	Parameter value	2/0	1	3
PNU 0005	**0**	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT	NSET1-N2 = MPOT1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = MPOT1-OUT
	1	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT PCTRL1-NADD = DFIN1-OUT	NSET1-N2 = MPOT1-OUT PCTRL1-NADD = DFIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = MPOT1-OUT PCTRL1-NADD = DFIN1-OUT
	2	NSET1-N1 = MPOT1-OUT NSET1-N2 = DFIN1-OUT PCTRL1-NADD = AIN1-OUT	NSET1-N2 = MPOT1-OUT PCTRL1-NADD = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = MPOT1-OUT PCTRL1-NADD = AIN1-OUT
	3	NSET1-N1 = MPOT1-OUT NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N2 = MPOT1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = MPOT1-OUT MCTRL1-MSET = AIN1-OUT
	4	MCTRL1-MSET = AIN1-OUT	MCTRL1-MSET = AIN1-OUT	MCTRL1-MSET = AIN1-OUT

	Parameter value	PNU 0001 2/0	1	3
PNU 0005	**5**	NSET1-N1 = MPOT1-OUT NSET1-N2 = DFIN1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N2 = MPOT1-OUT MCTRL1-MSET = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = MPOT1-OUT MCTRL1-MSET = AIN1-OUT
	6	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT PCTRL1-ACT = DFIN1-OUT	NSET1-N2 = MPOT1-OUT PCTRL1-ACT = DFIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = MPOT1-OUT PCTRL1-ACT = DFIN1-OUT
	7	NSET1-N1 = MPOT1-OUT NSET1-N2 = DFIN1-OUT PCTRL1-ACT = AIN1-OUT	NSET1-N2 = MPOT1-OUT PCTRL1-ACT = AIN1-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = MPOT1-OUT PCTRL1-ACT = AIN1-OUT
	8 (APP)	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT PCTRL1-NADD = AIN2-OUT	NSET1-N2 = MPOT1-OUT PCTRL1-NADD = AIN2-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = MPOT1-OUT PCTRL1-NADD = AIN2-OUT
	9 (APP)	NSET1-N1 = MPOT1-OUT NSET1-N2 = AIN1-OUT PCTRL1-ACT = AIN2-OUT	NSET1-N2 = MPOT1-OUT PCTRL1-ACT = AIN2-OUT	NSET1-N1 = AIF-IN.W1 NSET1-N2 = MPOT1-OUT PCTRL1-ACT = AIN2-OUT
	200	NSET1-N1 = FIF-IN NSET1-N2 = FIF-IN PCTRL1-NADD = FIF-IN PCTRL1-SET1 = FIF-IN PCTRL1-ACT = FIF-IN MCTRL1-MSET = FIF-IN	NSET1-N1 = FIF-IN NSET1-N2 = FIF-IN PCTRL1-NADD = FIF-IN PCTRL1-SET1 = FIF-IN PCTRL1-ACT = FIF-IN MCTRL1-MSET = FIF-IN	NSET1-N1 = FIF-IN NSET1-N2 = FIF-IN PCTRL1-NADD = FIF-IN PCTRL1-SET1 = FIF-IN PCTRL1-ACT = FIF-IN MCTRL1-MSET = FIF-IN

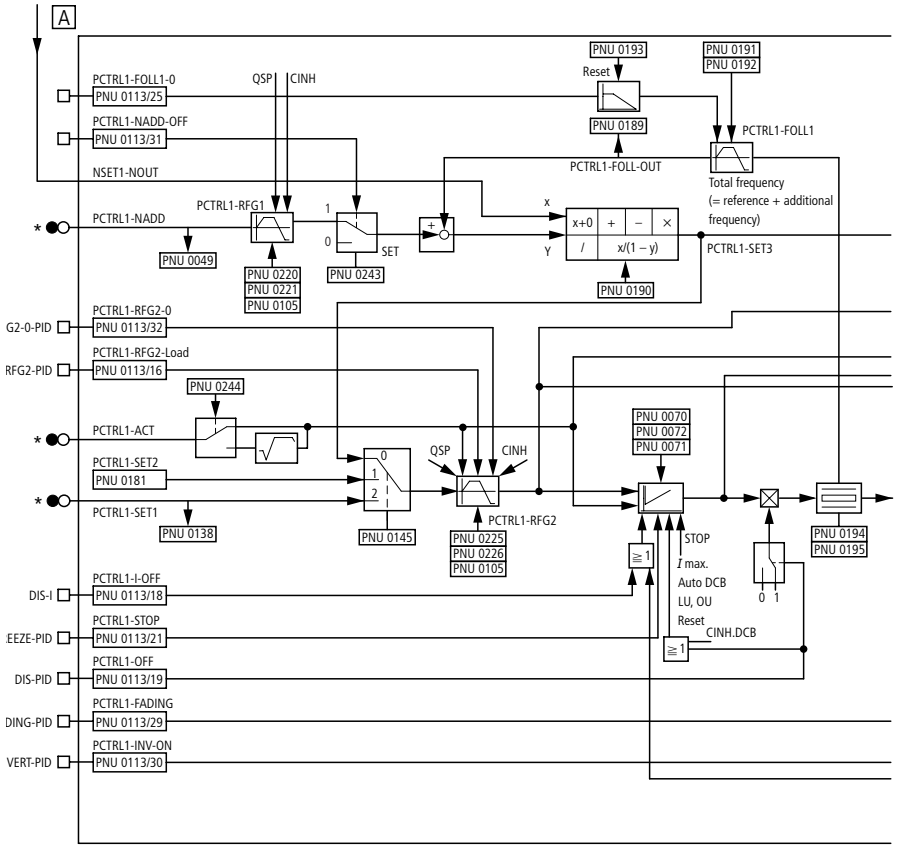
Block diagrams

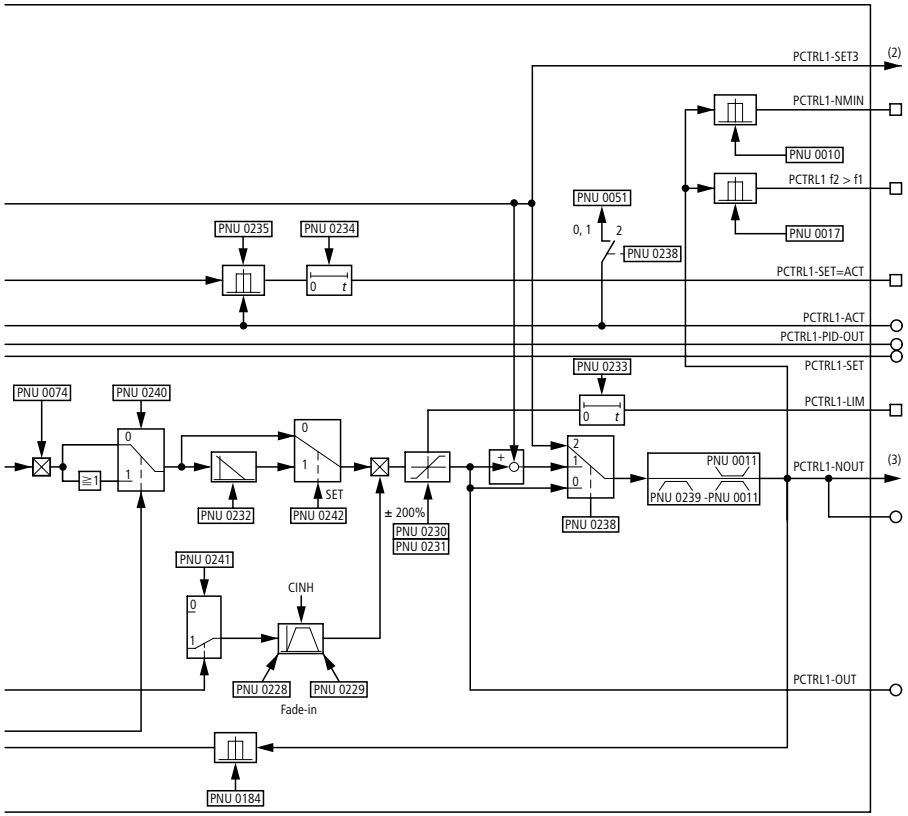
The following block diagrams show the signal flow inside the device. Use them when selecting signal sources. The link between the digital inputs/outputs and the internal function blocks is also shown.

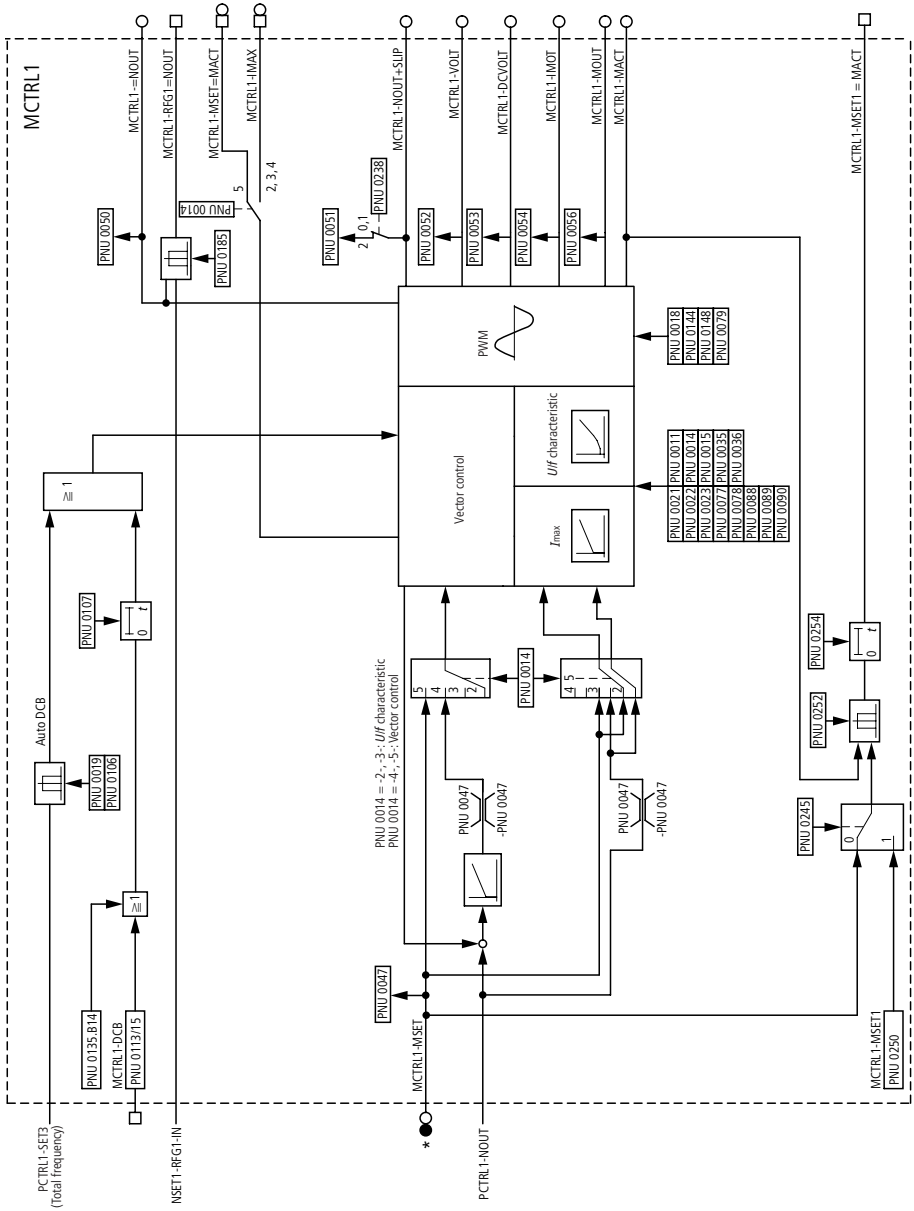
Symbol	Function
⋆○●	Analog signal source, assignment dependent on PNU 0001, 0005, 0007. See Page 144
—□	Digital output
□—	Digital input
—▶	Permanent signal interconnection
—○	Analog output signal


NSET 1
A
NSET1-NOUT
NSET1-RFG1-IN = NSET1-NOUT?
NSET1-RFG1-I=O
PNU 0185
NSET1-RFG1-IN
S-ramp main setpoint NSET1-RFG1
PNU 0182
CINH
QSP
PNU 0012
PNU 0013
PNU 0105
NSET1-RFG1-IN
Blocking frequencies
PNU 0625
PNU 0626
PNU 0627
PNU 0628
R/L
PNU 0011
-PNU 0011
PNU 0140
NSET1-NADD
PNU 0037
PNU 0038
PNU 0039
RA/MO
normalized ±100 % = ±PNU 0011
FF1...3
PNU 0141
absolute ±480 Hz
PNU 0046
Normalized setpoint entry
PNU 0127
normalized ±2^14 = ±PNU 0011
absolute ±24000 = ±480 Hz
PNU 0046
Main setpoint NSET1-N1
PNU 0044
NSET1-N2
PNU 0135.B4
NSET1-RFG1-STOP
PNU 0113/5
NSET1-RFG1-0
PNU 0113/6
PNU 0135.B5
PNU 0135.B0
NSET1-FF 1/3
PNU 0113/1
NSET1-FF 2/3
PNU 0113/2
PNU 0135.B1

03/01 AWB8540-1358GB






MCTRL1
MCTRL1-=NOUT
MCTRL1-RFG1=NOUT
MCTRL1-MSET=MACT
MCTRL1-IMAX
MCTRL1-NOUT+SLIP
MCTRL1-VOLT
MCTRL1-DCVOLT
MCTRL1-IMOT
MCTRL1-MOUT
MCTRL1-MACT
MCTRL1-MSET1 = MACT
PNU 0050
PNU 0185
PNU 0014
2, 3, 4
PNU 0051
PNU 0238
PNU 0052
PNU 0053
PNU 0054
PNU 0056
PWM
Vector control
U/f characteristic
Imax
PNU 0018
PNU 0144
PNU 0148
PNU 0079
PNU 0021
PNU 0022
PNU 0023
PNU 0077
PNU 0078
PNU 0088
PNU 0089
PNU 0090
PNU 0011
PNU 0014
PNU 0015
PNU 0035
PNU 0036
PNU 0107
Auto DCB
PNU 0019
PNU 0106
PNU 0135.B14
MCTRL1-DCB
PNU 0113/15
PNU 0014 = -2-, -3-: U/f characteristic
PNU 0014 = -4-, -5-: Vector control
PNU 0014
PNU 0047
-PNU 0047
PNU 0254
PNU 0252
PNU 0245
MCTRL1-MSET
MCTRL1-MSET1
PNU 0250
PCTRL1-SET3
(Total frequency)
NSET1-RFG1-IN
PCTRL1-NOUT

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