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Hardware and Engineering

DE4-NET-K-F
Interface Module for Suconet K

03/01 AWB8240-1359GB

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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 construction and functions of the DE4-NET-K-F interface module and handling of the DV4KF Sucosoft S40 function block.

With this function block, which is included with Sucosoft S40, the parameters of the frequency inverter can be reliably exchanged with the master PLC.

In the appendix from Page 76 onwards, all the DV4 frequency inverter parameters are additionally listed. For a detailed description, see manual "AWB8230-1340".

Abbreviations and symbols

The following abbreviations and symbols are used in this manual:

ESD:	ESD (**E**lectro **s**tatic **d**ischarge)
PAR:	**Par**ameter set
PES:	**PE** (positive earth) connection of the **s**creen
PNU:	**P**arameter **nu**mber
DS:	**D**efault **S**etting

▶ Indicates actions to be taken

↑ Provides useful tips and additional information

Important!
Indicates risk of light material damage.

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

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

For greater clarity, the name of the current chapter is shown in the header of the left-hand page and the name of the current section in the header of the right-hand page.

1 About the Module

System overview

The interface module has the following type code:

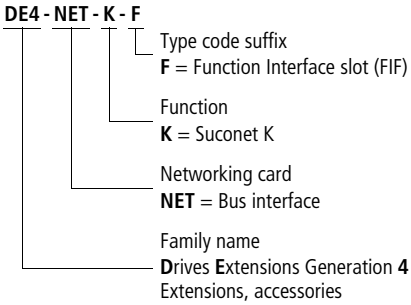


Figure 1: Type code for Suconet K interface

The DE4-NET-K-F interface module connects the DV4-... frequency inverter to the Suconet K fieldbus, allowing its simple integration in an automation system. Through the interface, you can access all parameters of the frequency inverter from any Suconet K master.

Features of the DE4-NET-K-F

The key features of the DE4-NET-K-F interface module are:

Installation	Plug-in
Degree of protection	IP20
Bus connection	Plug-in terminal strip with built-in T connector (5-pole)
Digital inputs	Plug-in terminal strip (8-pole)
Interface	RS 485
Switches	Bus terminating resistors
Data transfer rate	187.5 Kbit/s with 600 m data cable 375 Kbit/s with 300 m data cable
Processing time in frequency inverter:	Parameter data and process data are not interdependent
Parameter data	30 ms + 20 ms tolerance
Process data	3 ms + 2 ms tolerance
Baud rate detection	automatic
Diagnostic LEDs	2
Power supply	From the frequency inverter
In the Suconet K line	Slave
Process data exchange	Cyclic
Access to all parameters	Through parameter channel
Number of stations	Depends on master used

Package contents

On delivery, immediately check that you have received all items listed in the shipping papers. Moeller does not accept liability for items that are subsequently reported missing.

The package contents of the interface module are:

- the DE4-NET-K-F interface module with enclosure (degree of protection IP20)
- installation kit
- installation instructions AWA8240-1730

Immediately notify

- the supplier of any identifiable transport damage;
- the responsible Moeller organization of any identifiable faults/missing items

Setup

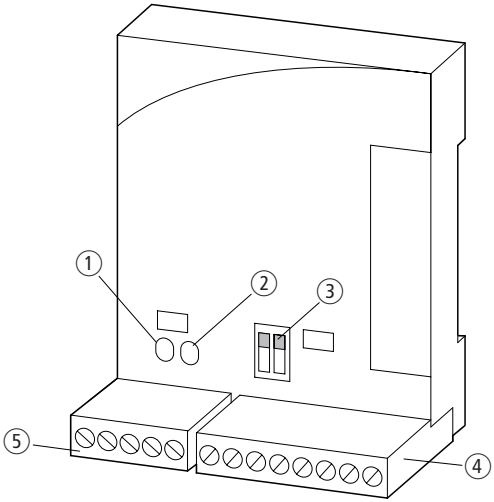


Figure2: Setup of the DE4-NET-K-F interface

① Yellow Bus LED indicates bus operation
② Yellow Local LED indicates terminal operation
③ Coding switch
S1, S2 = bus terminating resistors on/off
④ Plug-in screw terminal for the digital inputs
⑤ Plug-in screw terminal for Suconet K connection

Manufacturer's declaration

In industrial use, the DE4-NET-K-F electronic interface module is termed "device" or "module". It is not, however, a ready-to use or ready-to connect device or machine as defined by the "Machinery Safety Act", the "EMC Act" or the "EC Machinery Safety Directive", but merely a component. Its mode of operation is defined only through its integration in the user's system.

The user is responsible for ensuring that the system into which the device is incorporated complies with the applicable legal requirements.

Intended use

The DE4-NET-K-F interface module must be used only as an accessory for the DV4-... frequency inverter.

The DE4-NET-K-F interfaces the DV4-... frequency inverters as slaves to higher-level PLCs through Suconet K.

Use the interface module only in perfect working condition.

Changes to or modification of the interface module are prohibited.

The interface module is designed for use in industrial power installations. The interface module must have an electrical connection to the frequency inverter, so that its function can be fulfilled in error-free operation and no risk of personal injury arises.

In addition, all measures specified in the frequency inverter's operating instructions must be taken.

The DE4-NET-K-F interface module must be used only under the specified operational conditions, as described in this manual.

The manual must always be kept complete and in a clearly readable condition.

During operation, make sure that this manual is always accessible near the interface module.

The manual must be available to all persons that work with the DE4-NET-K-F interface module.

Before commencing work, carefully read the manual and observe the relevant details and notes.

Take appropriate measures to ensure that no personal injury or material damage can arise if the interface module fails.

Any other usage constitutes improper use.

Persons responsible for safety

At the time of delivery, the interface module corresponds with the latest state of technology and is considered to be safe in its operation.

The interface module can present a hazard if

- it is handled and operated by unqualified persons,
- it is used in ways or for purposes other than those intended by the manufacturer.

Operator

An operator is any natural or legal person who uses the interface module or by whose authority the interface module is used.

The operator must ensure that

- all standards, notes and laws are adhered to,
- the interface module is handled and operated only by qualified persons,
- the manual is available to all persons working on or with the interface module,
- unauthorized persons cannot access or carry out work on or with the interface module.

Qualified personnel

Qualified persons are persons with the required education, training, experience and knowledge of applicable standards and regulations, accident prevention regulations and operating conditions, who have been authorized by the person responsible for the system's safety to carry out the required work and are able to recognize and avoid any dangers (definition of skilled personnel from VDE 105 or IEC 364).

If you have any questions or problems, please contact your Moeller dealership.

Disposal

The DE4-NET-K-F interface module consists of a variety of materials.

The following materials can be recycled:

- Plastic
- Assembly instructions

The equipped circuit boards are made from materials that must be disposed of separately.

2 Engineering

↑ The technical procedures and circuit examples contained in the manual are provided as suggestions only. It is up to the user to verify that they can be applied to specific applications.

Caution!
Take appropriate measures to ensure that no personal injury or material damage can arise if the interface module fails.

Connecting digital inputs

Use the 8-pole plug-in screw terminals to connect the digital inputs of the interface module.

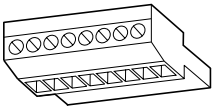


Figure 3: Terminals of the digital inputs

Name	Function
7	Reference potential of the internal voltage source
20	DC voltage output for driving the digital inputs
28	Digital "Controller inhibit input"
E1	Digital input E1
E2	Digital input E2
E3	Digital input E3
E4	Digital input E4
39	Reference potential for digital signals

Connecting Suconet K

Use the 5-pole plug-in screw terminals to connect the interface module with the Suconet K fieldbus system. You can connect additional Suconet K slaves by using the plug-in screw terminal as a T connector.

↑ The continuing bus system is not interrupted if the screw terminal is removed from the frequency inverter.

The data cable is a symmetrically twisted, screened pair (2×0.5 mm^2). The surge impedance must be in the range 100 to 130 Ω.

Equipotential bonding

The data ground (zero potential) of the RS-485 interface drivers must not exceed ±7 V between the Suconet K stations. If this is not possible, you must use a data cable with at least one additional core for equipotential bonding.

Terminal assignment

With the 5-pole plug-in screw terminal, you can operate the Suconet K interface (RS-485).

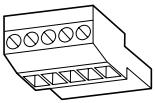


Figure 4: Terminals for Suconet K

Name	Function
A	RS 485 Suconet K (TA/RA)
B	RS 485 Suconet K (TB/RB)
GND	Zero potential above 100 Ω for equipotential bonding
A'	RS 485 Suconet K (TA/RA)
B'	RS 485 Suconet K (TB/RB)

Networking several frequency inverters

If you have installed several frequency inverters in a system, you can network these using the Suconet K interface.

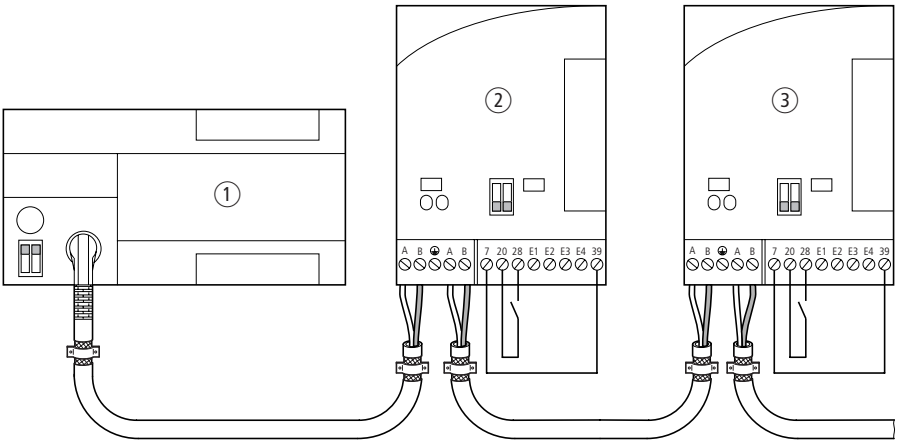


Figure 5: Networking through RS-485 interfaces

① Any Suconet K master, e.g. PS4, PS416

② First DE4-NET-K-F interface module

③ Second DE4-NET-K-F interface module

↑ Control signal terminal 28 (Controller Enable) is always active and must carry a High signal during operation. Otherwise the frequency inverter cannot be enabled through Suconet K.

Screening

Screening on mounting plate

With the DV4-... series frequency inverters, you can screen the data cable on the mounting plate.

↑ If you are using mounting plates with an insulating coating (painted or anodized aluminium), remove the insulating layer where you want to make the contact with the data cable screen.

▶ Connect the data cable screen to the mounting plate with the supplied contact clamps.

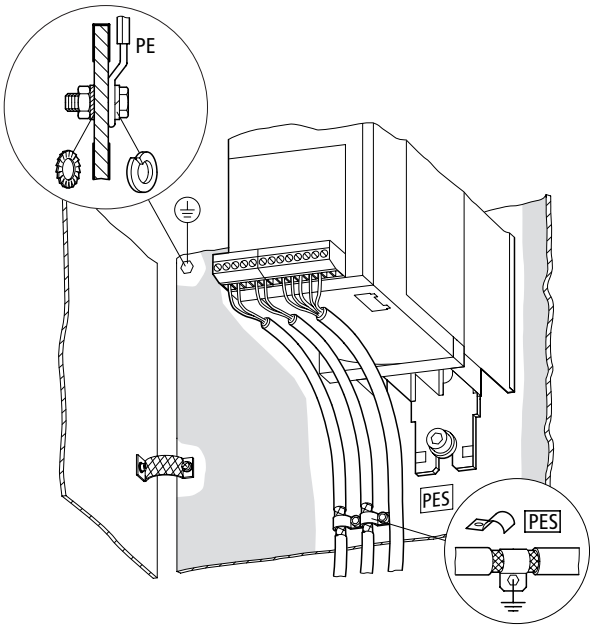
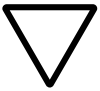


Figure 6: Screening Suconet K on mounting plate

↑ Use only screened, twisted-pair cables.

Preventing faults

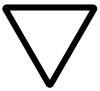
Cabling test and wiring



Important!
In order to prevent capacitive and inductive coupling, lay the control, signal and power cables as far apart as possible.

Electromagnetic interference can affect the communication of the DV4-... frequency inverters. To ensure reliable communication,

- ▶ keep the connection between the screen earth point and the interface module as short as possible;
- ▶ avoid routing data and power cables in parallel for long distances;
- ▶ maintain a minimum distance of 30 cm between data cable and power cables.



Important!
If adjacent devices experience interference, this can be minimized by using screened control cables.

3 Mounting

Fitting the DE4-NET-K-F to the 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.

To fit the interface module to the frequency inverter,

- ▶ first remove the blanking cover and the FIF protective cover from the frequency inverter;
- ▶ plug the module into the front of the frequency inverter and secure it.

Caution!
The DV4 DE4-NET-K-F interface module must be connected to or removed from the FIF interface only when the DV4 is voltage-free.

Important!
Do not use force to connect or remove the interface module.

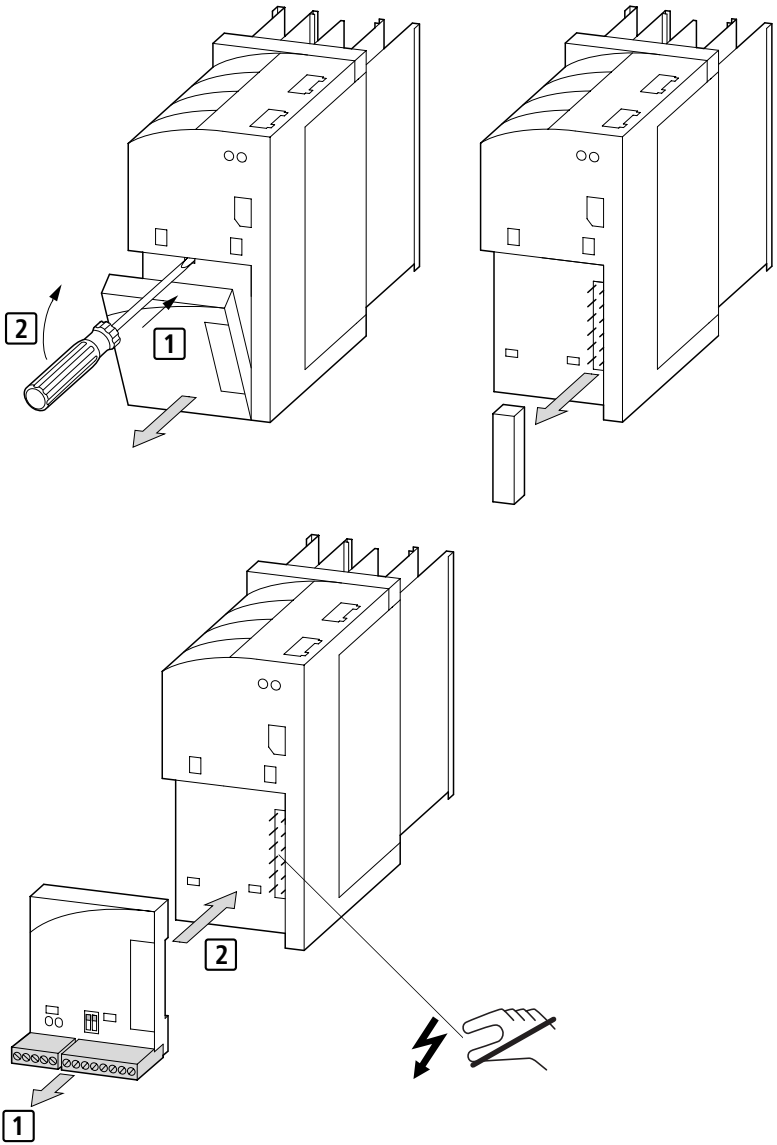


Figure 7: Fitting the DE4-NET-K-F

4 Wiring

To connect the cables to the interface module,

- ▶ insert the stripped cable strands into the plug-in screw terminals and secure them;
- ▶ press the plug-in screw terminals onto the interface module.

You should hear them clicking into place.

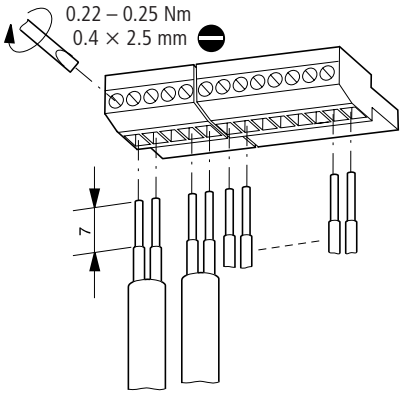


Figure 8: Interface module connections

n	mm²	mm²	AWG	mm²	mm²
1 ×	0.14 to 1.5	0.14 to 1.5	28 to 16	0.25 to 0.5	0.25 to 1.5
2 ×	0.14 to 0.75	0.14 to 0.5	–	TWIN 0.5	0.25 to 0.34

Power supply of the digital inputs

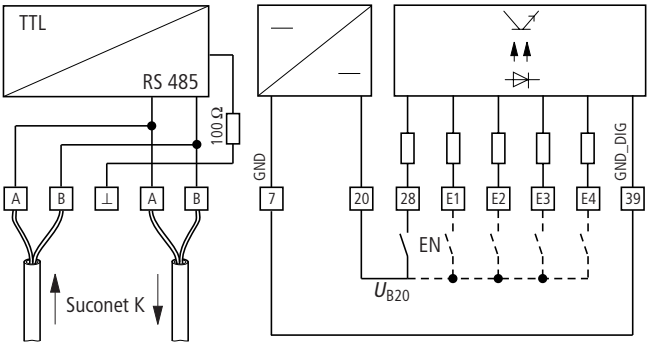


Figure 9: Connection with built-in power supply (default)

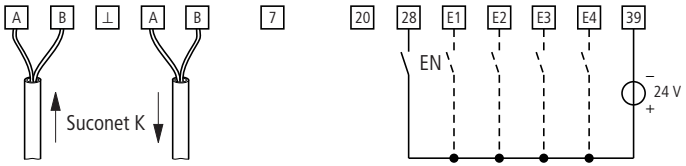


Figure 10: Connection with external power supply

Using the Bus terminating resistor

The bus terminating resistor prevents signal interference caused by reflections at the end of the bus cables.

The bus terminating resistor must be activated if the interface module is physically located at the beginning or end of the line.

Important!
Make sure that both switches are set to "ON". Otherwise the bus terminating resistor is switched on for only one cable of the data bus, and only on e cable is protected from interference.

Important!
For interface modules that are not positioned at the ends of the data lines, the bus terminating resistor must be disabled (S1 and S2 in "OFF" position). Otherwise the signals in the bus cable are weakened.

Important!
The switch for the bus terminating resistors may not be removed, as otherwise they cannot be switched-in.

On delivery of the interface module, the default switch setting of the bus terminating resistors is ON.

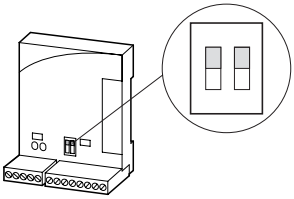


Figure 11: Delivery state of the switches

5 Operating principle

Important!
When the interface module is energized (i.e. the frequency inverter is switched on), the interface module sets all parameter sets of the interface module to FIF interface operation (PNU 0005, 2005, 4005, 6005 = 3). In this mode, the frequency inverter can be fully controlled and configured through the FIF interface. During communication with Suconet K, this mode must not be changed.

The DE4-NET-K-F can be used to connect all devices of the DV4 series of frequency inverters through Suconet K. In addition, the interface contains four digital inputs, through which the frequency inverter can be operated locally, for example in emergencies or for setting up.

Bus operating mode

By default, the interface module is set up for operation through Suconet K (PNU 1520 = 1). Digital inputs E1 to E4 are not active. In normal operation, they can be activated through Suconet K with the bus/local changeover fuction. In Bus mode, the parameters of the DV4 can only be read, not changed. In addition, the interface module can automatically change to Local mode if the communication connection fails (PNU 1522).

Control signal terminal 28 (Controller Enable) is always active and must carry a High signal during operation. Otherwise the frequency inverter cannot be enabled through Suconet K.

Local operating mode

In Local operating mode, (PNU 1520 = 0), only the digital inputs are active. The frequency inverter can then not be controlled or configured through Suconet K. Bus mode can be selected only with the DE4-NET-KEY3 keypad.

6 Parameters

Setting parameters

The parameters can be configured either with the DE4-KEY-3 or keypad or directly through the fieldbus. The keypad is available as an accessory.

Once the mains power is switched on and the keypad connected, the initialization phase begins. Initially, the USER menu is active. When used together with the interface module, the DV4 frequency inverters have an additional "FUnc1" menu, which contains new parameters, with which you can customize the interface module for your applications.

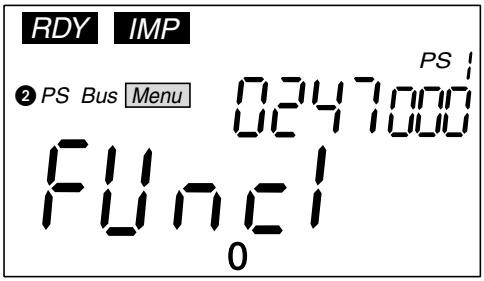


Figure 12: FUnc1 menu display

Setting and saving values

		Key-strokes	Display	Explanation	Example
1.	Connect keypad		Disp XX.XX Hz	Memory location 1 of the USER menu (parameter value of the function defined in PNU 0517/001) is displayed:	

		Key-strokes	Display	Explanation	Example
2.	Select the FUnc1 menu	1↔2	②	Function bar 2 is active	
3.		⏮ ⏭	*Menu*	Menu is selected	
4.		▲ ▼	FUnc1	Change between USER, ALL and FUnc1 menu Select FUNc1 menu	
5.		1↔2	①	Confirm selection Switch to function bar 1	
6.	Setting parameters	⏮ ⏭	*Code*	The selected parameter number flashes	Assign value 3 to station address PNU 1509
7.		▲ ▼	XXXX	Select parameter number	1509
8.		⏭	*Para*	Switch to parameter value	
9.		▲ ▼	XXXXX	Set parameter value In the example, parameter value 3 (station address = 3)	3
10.		ENTER	STORE	When ◈ flashes: Confirm the change with ENTER	
11.		⏮	*Code*	The selected parameter number flashes	
12.				To modify further parameters, repeat from 7.	
13.		⏮	*Disp* XX.XX Hz	End parameter input	

→ The settings described in the following sections can be made only with the keypad or directly through the Suconet K fieldbus.

User functions

Suconet K station address

If several stations are connected to each other through Suconet K, each station on the line is assigned a unique address, which you can specify here.

PNU	Name	Value	Function	DS
1509	Station address	2 to 31	To allow targetted addressing of stations, you must assign a unique address to each station on the bus.	2

Operating mode

With the operating mode, you specify, how the interface module will work. By default, Bus mode is selected. In this operating mode, only the commands transmitted through Suconet K are executed. Except for the Enable signal, (terminal 28), the terminals are not active. In Local mode, commands can not be received through Suconet K; only the terminals are active.

The operating mode can also be changed from Bus to Local through Suconet K, but not back to Bus from Local. This can be done only with the keypad.

PNU	Name	Value	Function	DS
1520	Operating mode	0	Local (terminals)	1
		1	Bus (Suconet K)	

Changeover behaviour

Here, you specify how the module is to be changed over from Bus to Local mode when Bus mode is active. With the default setting (0), the changeover can be made directly with the corresponding bit in the command. If 1 is selected, the changeover can be made only if the changeover command is applied to Suconet K and a digital input. The digital input is selected with PNU 1531 to PNU 1534.

PNU	Name	Value	Function	DS
1521	Changeover behaviour	0	Through Suconet K	0
		1	Through Suconet K and terminal	

Behaviour on bus failure

With PNU 1522, you can set the following drive behaviour after a bus failure:

PNU	Name	Value	Function	DS
1522	Behaviour on bus failure	0	Controller inhibit (motor coasts to halt)	0
		1	Quickstop (ramp time adjustable with PNU 0105)	
		2	Last speed is maintained	
		3	Changeover to Local/Quickstop mode (ramp time adjustable with PNU 0105)	
		4	Changeover to Local/last speed is maintained	

In settings 3 and 4, a changeover to Local mode first takes place. If you do not specify a different behaviour through the digital inputs, a qickstop is initiated or the last speed is maintained until a new command is issued through the terminals.

Behaviour on return of bus function

With PNU 1523, you can influence the drive's behaviour when the bus connection is reestablished after a failure.

PNU	Name	Value	Function	DS
1523	Behaviour on return of bus function after failure	0	No automatic field bus activation after return of bus function. Activation through hardware enable (terminal 28)	0
		1	Automatic field bus activation after return of bus function.	

Motor potentiometer function

Here, you can specify which reference source is active in Bus mode. By default, the reference value is 1 and the additional frequency is active. After the changeover, these reference values have no effect and the speed can be specified only with the motor potentiometer function.

PNU	Name	Value	Function	DS
1525	Motor potentiometer function	0	Reference values active	0
		1	Motor potentiometer active	

→ In the "Motor potentiometer active" setting, you must assign two digital inputs (PNU 1531 to 1534) to functions UP (7) and DOWN (8).

Motor potentiometer starting value
With PNU 1527, the starting value for the motor potentiometer at power-on can be defined.

PNU	Name	Value	Function	DS
1527	Starting value for motor potentiometer	0	Starting value = actual value on Mains Off Automatic starting on Mains On	2
		1	Starting value = f_{min} (PNU 0010) Automatic starting on Mains On	
		2	Starting value = 0 Hz After Power On, the starting value is 0 Hz	
		3	Starting value = actual value on Mains Off Starting after "UP"	
		4	Starting value = f_{min} (PNU 0010) Starting after "UP"	

Free terminal configuration, digital inputs E1 to E4

The digital inputs of the interface module can be freely configured. This configuration is implemented with PNU 1531 to 1534 by assigning a function (subindex) to one of the control signal terminals E1 to E4. The parameter value corresponds with the function number.

Example:
The external error function EF (11) is to be mapped to digital input E3.

▶ To achieve this, enter "11" in PNU 1533.

The digital inputs can be inverted with PNU 0114. The new values take effect after a power reset (mains power Off/On).

PNU	Name	Value	Function			DS
1531 1532 1533 1534	Free configuration of digital inputs	0 to 23	Digital input E1 Digital input E2 Digital input E3 Digital input E4			1 2 3 15
	NOP	0	No function			
	FF1/FF3 FF2/FF3	1 2	Fixed frequency 1/3 (in combination with FF2 also FF3) Fixed frequency 2/3 (in combination with FF1 also FF3)			
			PNU 153x/1	PNU 153x/2	Active value	
			LOW	LOW	PNU 0046	
			HIGH	LOW	FF1	
			LOW	HIGH	FF2	
			HIGH	HIGH	FF3	
	R/L	3	Direction preselection			
			LOW	Clockwise		
			HIGH	Anticlockwise		
	QSP	4	LOW	Quickstop		
	RFG1-STOP	5	Stopping the ramp generator for the main reference value			
	RFG1-0	6	Set ramp generator input for main reference value to 0			
	UP	7	Motor potentiometer, increase value			
	DOWN	8	Motor potentiometer, reduce value			
	Reserved	9				
	CINH	10	LOW	Controller inhibit		
	EF	11	LOW	External error		
	TRIP-RESET	12	Reset error			

PNU	Name	Value	Function			DS
1531 1532 1533 1534	PAR2/4 PAR3/4	13 14	Parameter set selection (only when PNU 0988 = 0)			
			PNU 153x/13	PNU 153x/14	Active value	
			LOW	LOW	PAR1	
			HIGH	LOW	PAR2	
			LOW	HIGH	PAR3	
			HIGH	HIGH	PAR4	
	DCB	15	DC injection braking			
	Reserved	16				
	BUS/LOCAL	17	Bus/terminal operation changeover			
	DIS-I	18	Deactivate I-component of PID controller			
	DIS-PID	19	Deactivate PID controller			
	Reserved	20				
	FREEZE-PID	21	Freeze PID controller output at current value			
	QSP/R	22	LOW	Quickstop		
			HIGH	Clockwise		
	QSP/L	23	LOW	Quickstop		
			HIGH	Anticlockwise		
	Reserved	24				
	Reserved	25				
	Relay	26	Energize relay K1			
	Reserved	27 to 32				

Enable process data words

With this function, the process data words "PID actual value" and "Torque reference value" can be enabled.

To use the built-in PID regulator or the torque setpoint input with Suconet K, you have to configure additional parameters in the DV4. You can find this information in the description of the basic unit (AWB8230-1340...)

PNU	Name	Value	Function	DS
1775	Enable process data word 5	0	PID actual value inhibited	0
		1	PID setpoint enabled	
1776	Enable process data word 6	0	Torque setpoint inhibited	0
		1	Torque setpoint enabled	

Status indication of the digital inputs

With PNU 1790, you can read the current state of digital inputs E1 to E4 in Bus mode.

To transmit external signals to the PLC through inputs E1 to E4, you should set these with PNU 153x = 0 (no function).

PNU	Name	Value	Function	DS
1790	Status indication of digital inputs E1 to E4	0 to 15	Bit 0 = E1 Bit 1 = E2 Bit 2 = E3 Bit 3 = E4 Bit 4 to bit 15 = no function	

Special DV4 parameters

Here, DV4 parameters are listed, which are especially important when using the DE4-NET-K-F.

For a detailed description, see manual AWB8230-1340.

Loading defaults

PNU	Name	Value	Function	DS
0002	Parameter set transfer		Overwrite parameter set (FPAR) of the DE4-NET-K-F with the default values.	0
		31	Overwrite FPAR with default values	

Saving parameters

Caution!
If you intend to make frequent (cyclic) changes to parameters through the parameter data channel (e.g. adapting the current limit I_{max}), set Parameter PNU 0003 to "0". Otherwise the EEPROM will be destroyed after only a short time.

PNU	Name	Value	Function	DS
0003	Do not save parameters in volatile memory	0	Parameters are not saved in the EEPROM. Data loss on Power Off	1
		1	Parameters are saved in the EEPROM Cyclic changing of parameters via bus module is not permitted	

Selecting the signal channel

During operation of the DE4-NET-K-F, PNU 0005 must always be set to 200 (FIF interface operation). This happens automatically when the frequency inverter is switched on with the interface connected (in all parameter sets). During communication with Suconet K, this setting must not be changed.

PNU	Name	Value	Function	DS
0005	Signal channel configuration	0	Reference value via terminal 8	0 (200)
		200	All digital and analog input signals supplied to the FIF by the PROFIBUS, Suconet K or INTERBUS function module.	

Level inversion, digital inputs E1 to E4

The level of digital inputs E1 to E4 can be inverted with PNU 0114. The binary value determines the inputs' level pattern. A change only becomes effective after the voltage has been switched "off/on".

The input value is the corresponding decimal value.

PNU	Name	Value	E4 2^3	E3 2^2	E2 2^1	E1 2^0	DS
0114	Level inversion, digital inputs	0	0	0	0	0	0
		1	0	0	0	1	0 = input not inverted when HIGH is active 1 = input inverted when LOW is active
		2	0	0	1	0	
		3	0	0	1	1	
		to	1)	1)	1)	1)	
		15	1	1	1	1	

1) Terminal assignment depends on value

Communication behaviour

PNU	Name	Value	Function	DS
0126	Communica-tion behaviour	0	No response on communication error between frequency inverter and interface on the AIF	2
			No response on communication error between frequency inverter and function module on the FIF	
		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.	

Selecting the PID reference source

With PNU 0145 you determine the setpoint value source of the PID control. By default, the total frequency (ReferenceFrequency + AdditionalFrequency) is active. When PNU 0145 = 1, PNU 0181 is the reference source. This value can be specified through the keypad or the parameter channel. With PNU 0145 = 2 the setpoint value is always "0".

PNU	Name	Value	Function	DS
0145	PID reference source	0	Total reference frequency (ReferenceFrequency + AdditionalFrequency)	0
		1	Reference input via PNU 0181	
		2	Setpoint value = 0	

Error messages

The four most recent error messages from the frequency inverter are stored in PNU 0161 to PNU 0164.

Error number	Error code	Error
0	---	No error
11	OC1	Short circuit
12	OC2	Earth fault
13	OC3	Inverter overload (during acceleration) or short-circuit
14	OC4	Inverter overload (during deceleration)
15	OC5	Overload in steady-state operation
16	OC6	Motor overload (I^2t overload)
32	LP1	Fault in motor phase (TRIP)

Error number	Error code	Error
50	OH	Heatsink overtemperature (> +85 °C)
53	OH3	PTC monitoring (TRIP), motor overtemperature
54	OH4	Overtemperature of drive controller interior
61	CE0	Communication error at AIF
71	CCr	System fault
72	Pr1	Error in parameter transmission, parameter set PAR1 transmitted incorrectly
73	Pr2	Parameter set PAR2 transmitted incorrectly
75	Pr	Error in parameter transmission, all parameter sets transmitted incorrectly
76	rST	Fault on AUTO TRIP RESET, more than 8 error messages in 10 minutes
77	Pr3	Parameter set PAR3 transmitted incorrectly
78	Pr4	Parameter set PAR4 transmitted incorrectly
79	Pr5	Internal error
81	PT5	Timeout error during parameter set transfer
85	Sd5	Open circuit at analog input, current loop interrupted at setpoint range 4 to 20 mA, setpoint current < 4 mA
91	EEr	External error
105	H05	Internal CPU error (checksum error)
140	Id1	Incorrect motor parameter identification
182	LP1	Fault in motor phase (warning)
203	OH51	PTC monitoring (warning), no PTC thermistor connected
1020	OU	Internal DC link overvoltage (message only)
1030	LU	Internal DC link undervoltage (message only)

7 Data exchange through Suconet K

For networked frequency inverters, data that is to be transmitted is divided into process data and parameter data.

Process data

Process data is the time-critical data of a process. It is highly dynamic and always up to date. Process data is continually transmitted between the master PLC and the frequency inverters without having to be requested with a read or write job. The following process data is transmitted within a message:

Process output data is data sent to the drive:

- Command 1
- Command 2
- Reference frequency 1
- Additional frequency
- PID actual value
- Torque setpoint value

Process input data is data from the drive:

- Status word 1
- Status word 2
- Output frequency
- Apparent motor current
- PID reference frequency
- Inverter load

The Process data channel uses the first six words of the I/O data in the transmission protocol.

Parameter data

Parameter data is used to set and monitor the frequency inverter. In contrast to the process data, it is sent only when requested. Nearly all of the frequency inverter's parameters can be sent through this parameter channel, except for those that are assigned to the process data.

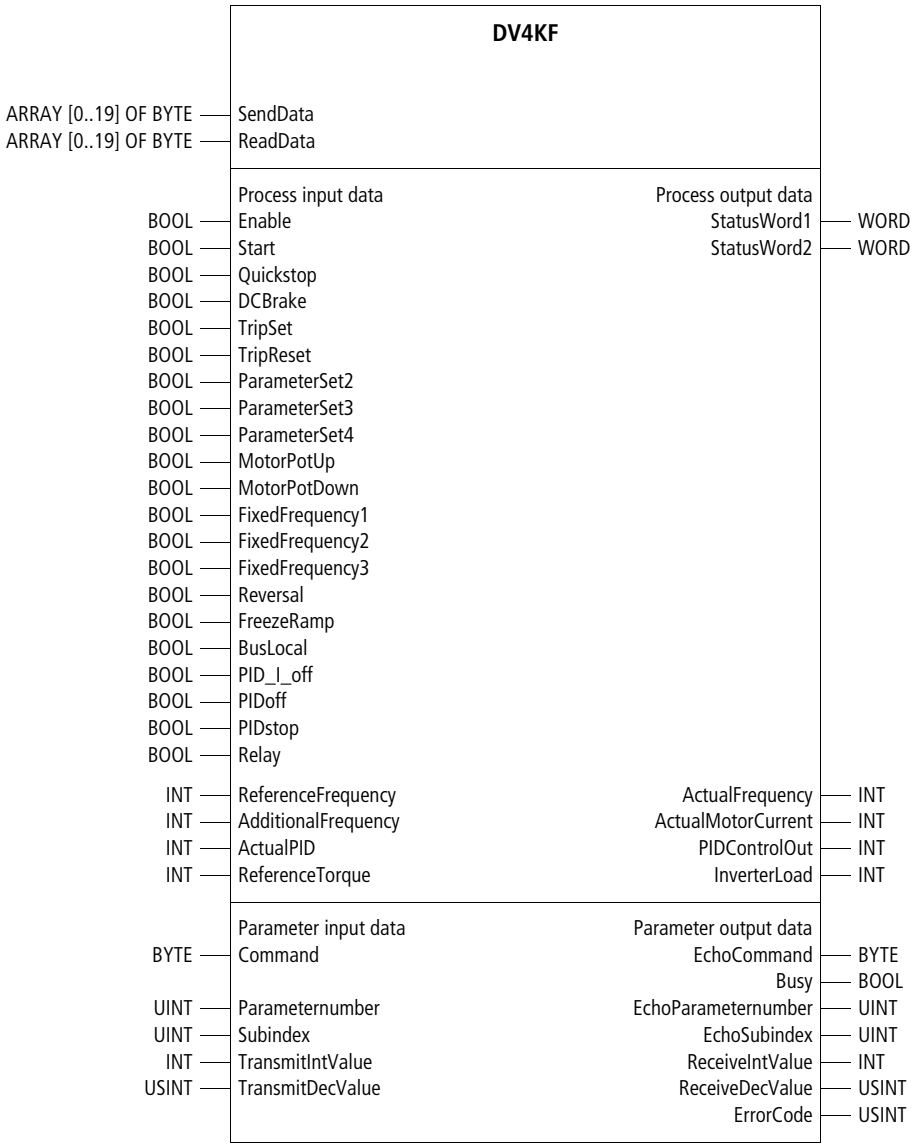
DV4KF manufacturer's function block

The user program uses a manufacturer's function block to access the objects of the DE4-NET-K-F. This function block is called:

DV4KF

Important!
Use only one manufacturer's function block per object.

As soon as communication between the PLC and the DV4 is established, the process data is transmitted continually; no further programming is required. If you want to change any further parameters of the DV4 through Suconet K, use the parameter data.


DV4KF
ARRAY [0..19] OF BYTE
SendData
ARRAY [0..19] OF BYTE
ReadData
Process input data
Process output data
BOOL
Enable
StatusWord1
WORD
BOOL
Start
StatusWord2
WORD
BOOL
Quickstop
BOOL
DCBrake
BOOL
TripSet
BOOL
TripReset
BOOL
ParameterSet2
BOOL
ParameterSet3
BOOL
ParameterSet4
BOOL
MotorPotUp
BOOL
MotorPotDown
BOOL
FixedFrequency1
BOOL
FixedFrequency2
BOOL
FixedFrequency3
BOOL
Reversal
BOOL
FreezeRamp
BOOL
BusLocal
BOOL
PID_I_off
BOOL
PIDoff
BOOL
PIDstop
BOOL
Relay
INT
ReferenceFrequency
ActualFrequency
INT
INT
AdditionalFrequency
ActualMotorCurrent
INT
INT
ActualPID
PIDControlOut
INT
INT
ReferenceTorque
InverterLoad
INT
Parameter input data
Parameter output data
BYTE
Command
EchoCommand
BYTE
Busy
BOOL
UINT
Parameternumber
EchoParameternumber
UINT
UINT
Subindex
EchoSubindex
UINT
INT
TransmitIntValue
ReceiveIntValue
INT
USINT
TransmitDecValue
ReceiveDecValue
USINT
ErrorCode
USINT

SendData
Operator list for the Send register (%SDBx.y.0.0) which is written to by the function block. In the Variable Editor, the first Send data byte must be assigned to the array. The next 19 bytes are automatically declared by the array.

Example:

```
SDB_S1T2 AT %SDB1.2.0.0 : ARRAY [0..19] OF BYTE;
```

ReadData
Operator list for the Receive register (%RDBx.y.0.0) which is read by the function block. In the Variable Editor, the first Receive data byte must be assigned to the array. The next 19 bytes are automatically declared by the array.

Example:

```
RDB_S1T2 AT %RDB1.2.0.0 : ARRAY [0..19] OF BYTE;
```

Important!
In order to avoid misoperations, the data send and receive areas occupied by the arrays in the user program, may not be written to directly. They are used for internal data processing operations in the function modules.

Process input data

Enable

Value	Use
0	The frequency inverter is not active
1	Activating the frequency inverter Control commands are accepted.

During operation, a signal change from "1" to "0" results in the motor coasting to a halt.

Start

Value	Use
0	The regulator is not active
1	Activates the regulator The output frequency is regulated to the defined reference frequency with the set time behaviour (PNU 0012).

A change from "1" to "0" regulates the output frequency to "0" with the defined time behaviour (PNU 0013).

Quickstop

Value	Use
0	Quickstop is not active
1	Activates Quickstop The frequency inverter operates at its output frequency with the "Quick-Stop ramp" to "0". The ramp time can be defined with PNU 0105.

DCBrake

Value	Use
0	DC braking not active
1	Activate DC braking The motor is decelerated to standstill.

Caution!
DC braking remains active as long as a "1" signal is applied. This can result in thermal destruction of the motor. The time can be set using PNU 0107 (factory setting = 999 s).

TripSet

Value	Use
0 → 1	A signal change from "0" to "1" triggers the frequency inverter's "External error (EEr)" message.

TRIP-RESET

Value	Use
0 → 1	A signal change from "0" to "1" resets the frequency inverter's current error.

ParameterSet2

Value	Use
0	Parameter set 2 not active
1	Parameter set 2 active when "ParameterSet3" and "ParameterSet4" not active

ParameterSet3

Value	Use
0	Parameter set 3 not active
1	Parameter set 3 active when "ParameterSet4" not active

ParameterSet4

Value	Use
0	Parameter set 4 not active
1	Parameter set 4 active

MotorPotUp

Value	Use
0	Reference frequency increase not active
1	Activate reference frequency increase (only when PNU 1525 = 1 active) The reference frequency is increased as long as signal status "1" is applied and the output frequency does not exceed the maximum output frequency.

MotorPotDown

Value	Use
0	Reference frequency reduction not active
1	Activate reference frequency reduction (only when PNU 1525 = 1 active) The reference frequency is reduced as long as signal status "1" is applied and the minimum output frequency has not yet been reached.

FixedFrequency1

Value	Use
0	Fixed frequency 1 not active
1	Fixed frequency 1 active when "FixedFrequency2" and "FixedFrequency3" not active The value of fixed frequency 1 is specified by PNU 0037 (default = 20 Hz).

FixedFrequency2

Value	Use
0	Fixed frequency 2 not active
1	Fixed frequency 2 active when "FixedFrequency3" not active The value of fixed frequency 2 is specified by PNU 0038 (default = 30 Hz).

FixedFrequency3

Value	Use
0	Fixed frequency 3 not active
1	Fixed frequency 3 active The value of fixed frequency 3 is specified by PNU 0039 (default = 40 Hz).

Reversal

Value	Use
0 → 1 1 → 0	Each signal state change reverses the motor's current direction of rotation.

FreezeRamp

Value	Use
0	Ramp function generator ramp active
1	Freeze ramp function generator ramp

BusLocal

Value	Use
0	Signal source "Bus" (Suconet K) active
1	Signal source "Local" (terminals) active

PID_I_off

Value	Use
0	I-component of PID controller active
1	I-component of PID controller not active

PIDoff

Value	Use
0	PID controller active
1	PID controller not active The process controller's output value is "0".

PIDstop

Value	Use
0	PID controller active
1	Stop PID controller The process controller's output value is frozen.

Relay

Value	Use
0	Relay output K1 not switched
1	Relay output K1 switched

ReferenceFrequency

Reference frequency for the desired motor speed. The actual output frequency is limited by the f_{max} setting. Positive values result in clockwise rotation, and negative values in anticlockwise rotation. "ReferenceFrequency" can have a value between +4800 and –4800 (corresponds to ±480.0 Hz).

AdditionalFrequency
Additional frequency for specifying the desired motor speed, which results from the sum of "ReferenceFrequency" and "AdditionalFrequency". The actual output frequency is limited by the f_{max} setting. Positive values result in clockwise rotation, and negative values in anticlockwise rotation. "AdditionalFrequency" can have a value between +4800 and –4800 (corresponds to ±480.0 Hz).

ActualPID
Actual value for the process controller. The actual value can lie between +4800 and –4800 (corresponds to ±480.0 Hz). "ActualPID" must be enabled with PNU 1775, "Enable process data word 5".

ReferenceTorque
Torque setpoint input. The setpoint value can lie between 0 and 1000 (corresponds to 0 to 100.0 % of the motor's rated-load torque M_N). "ReferenceTorque" must be enabled with PNU 1776, "Enable process data word 6".

Process output data

StatusWord1

Bit	Use
0	0 – Parameter set 1 or 3 active (see bit 0 in "StatusWord2") 1 – parameter set 2 or 4 active (see bit 0 in "StatusWord2")
1	Impulse inhibit (IMP) 0 – Inverter enabled 1 – Inverter inhibited
2	0 – Operation below current limit 1 – current limit reached
3	0 – Output frequency ≠ reference frequency 1 – Output frequency = reference frequency

Bit	Use				
4	Ramp function generator (RFG) 0 – RFG input ≠ RFG output 1 – RFG input = RFG output				
5	0 – Output frequency has not reached signalling threshold ($f_2 < f_1$) 1 – Output frequency has reached signalling threshold ($f_2 \geqq < f_1$)				
6	0 – Output frequency is not "0" 1 – Output frequency is "0"				
7	0 – Controller is enabled 1 – Controller is inhibited				
8, 9, 10, 11	Bit 11	Bit 10	Bit 9	Bit 8	Device status
	0	0	0	0	Device initialization
	0	0	0	1	Autostart lock
	0	0	1	1	Operation inhibited
	0	1	0	0	Flying restart circuit active
	0	1	0	1	DC brake active
	0	1	1	0	Operation enabled
	0	1	1	1	Status signal active
	1	0	0	0	Error active
12	0 – Heatsink temperature is below warning threshold 1 – Heatsink temperature warning threshold reached (ϑ_{max} –10 °C)				
13	0 – No overvoltage in internal DC link 1 – Overvoltage in internal DC link				
14	0 – Clockwise rotation 1 – Anticlockwise rotation				
15	0 – Not ready for operation (fault) 1 – Ready for operation (no fault)				

StatusWord2

Bit	Function
0	0 – Parameter set 1 or 2 active (see bit 0 in "StatusWord1") 1 – Parameter set 3 or 4 active (see bit 0 in "StatusWord1")
1	0 – No error message (TRIP) or $f_2 > f_1$ or impulse inhibit 1 – Error message (TRIP) or $f_2 > f_1$ or impulse inhibit active
2	0 – No PTC warning 1 – PTC warning active
3	0 – Apparent motor current (PNU 0054) ≧ current threshold (PNU 0156) 1 – Apparent motor current (PNU 0054) < current threshold (PNU 0156)
4	Apparent motor current (PNU 0054) < current limit (PNU 0156) and $f_2 > f_1$ threshold reached 0 – False 1 – True
5	Apparent motor current (PNU 0054) < current limit (PNU 0156) and ramp function generator input (NSET1-RFG1-IN) = 0 0 – False 1 – True
6	0 – LP1 warning (fault in motor phase) not active 1 – LP1 warning (fault in motor phase) active
7	0 – Current rotating field (f) ≧ minimum rotating field (f_{min}) 1 – Current rotating field (f) < minimum rotating field (f_{min})
8	0 – Error message (TRIP) not active 1 – Error message (TRIP) active
9	0 – Motor not running 1 – Motor running
10	0 – Motor not rotating clockwise 1 – Motor rotating clockwise
11	0 – Motor not rotating anticlockwise 1 – Motor rotating anticlockwise
12	0 – Relay output K1 not active 1 – Relay output K1 active

Bit	Function
13	0 – Digital output A1 not active 1 – Digital output A1 active
14	Apparent motor current (PNU 0054) > current limit (PNU 0156) and ramp function generator input (NSET1-RFG1-IN) = 0 0 – False 1 – True
15	0 – No reference value input through keypad or PC (PNU 0003 ≠ 3) 1 – Reference value input through keypad or PC (PNU 0003 = 3)

ActualFrequency
Output frequency of frequency inverter. The actual value can lie between +4800 and –4800 (corresponds to ±480.0 Hz).

ActualMotorCurrent
Actual value of the apparent motor current. The actual value can be between 0 and 2000 (corresponds to 0 to 200 % of the rated current of the device).

PIDControlOut
Output value from the PID process controller. The actual value can have a value between +4800 and –4800 (corresponds to ±480.0 Hz).

InverterLoad
Current inverter load. The actual value can be between +2000 and –2000 (corresponds to ±200 % of the motor's rated-load torque).

Parameter input data

Command
Command to be executed:
0 – No command
1 – Read parameters
2 – Write parameters

Parameter number
Parameter number to be read or written to. All available parameter numbers that can be transmitted are listed in Section "Parameter list of the frequency inverter" in the appendix from Page 76 and in the operator manual for the frequency inverter.

To change parameters in parameter sets 2, 3, or 4, add the following offset to the parameter numbers:

Parameter set 2: Offset = 2000
Parameter set 3: Offset = 4000
Parameter set 4: Offset = 6000

Example:
The acceleration time in parameter set 3 is to be changed.

▶ Enter 4012 in "Parameter number".

Subindex
Subindex of the parameter that is to be read or written to; see "Parameter number".

TransmitIntValue
Integer part of the parameter value to be written. For the possible value range (depending on the parameter number), see Section "Parameter list of the frequency inverter" in the appendix from Page 76 and in the operator manual of the frequency inverter.

TransmitDecValue
Decimal places of the parameter value to be written. Two decimal places are always sent. Values between 0 and 99 are possible.

Parameter output data

EchoCommand
Executed command:
0 – No command
1 – Read parameters
2 – Write parameters

Busy
Signal state "1" indicates that a command is being processed. Once processing has been completed, the signal state changes to "0".

EchoParameternumber
Parameter number that was read or written to. The value range is divided up as follows:

Parameter set	Value range
1	0 to 1999
2	2000 to 3999
3	4000 to 5999
4	6000 to 7999

EchoSubindex
Subindex of the parameter number to be read or written to.

ReceiveIntValue
Integer part of the parameter value that has been read.

ReceiveDecValue
Decimal places of the parameter value that has been read.

ErrorCode
Error message during parameter data transmission

Code	Error type
0	No error
1	Invalid command
4	Invalid subindex
5	Invalid parameter number
6	Impermissible command parameter
9	Parameter is read-only
10	No access rights
13	Outside value range
14	Limit value violation
254	Timeout (response time of a command > 5 s)

Reading parameter data

Do the following:

- ▶ In the "parameter number" field, enter the parameter number.
- ▶ In the "Subindex" field, enter the subindex.
- ▶ In the "Command" field, enter a "1".

"Busy" automatically changes its state from "0" to "1".

- ▶ Wait until "Busy" has changed from "1" to "0".
- ▶ Compare the "ErrorCode" field.

If "ErrorCode" equals "0":

- ▶ Accept "ReceiveIntValue" and "ReceiveDecValue".

If "ErrorCode" is not equal to "0":

- ▶ The command was not carried out successfully; evaluate "ErrorCode".
- ▶ In the "Command" field, enter a "0".

The next command can be started.

Writing parameter data

Do the following:

- ▶ In the "parameter number" field, enter the parameter number.
- ▶ In the "Subindex" field, enter the subindex.
- ▶ In the "TransmitIntValue" and "TransmitDecValue" fields, enter the parameter value.
- ▶ In the "Command" field, enter a "2".

"Busy" automatically changes its state from "0" to "1".

- ▶ Wait until "Busy" has changed from "1" to "0".
- ▶ Compare the "ErrorCode" field.

If "ErrorCode" equals "0":
Command was carried out successfully.

If "ErrorCode" is not equal to "0":

- ▶ The command was not carried out successfully; evaluate "ErrorCode".
- ▶ In the "Command" field, enter a "0".

The next command can be started.

→ Parameters that are sent through the process data channel must not also be written to through the parameter channel.

8 Commissioning/Operation/ Diagnostics

Commissioning

Important!
Use the interface module only in perfect working condition.

Caution!
Before switching on the mains voltage, inspect all wiring for short circuits, earth faults and to make sure that it is complete.

Commissioning should be carried out in the following order:

- ▶ Configure the master PLC with the Suconet K station.
- ▶ Make sure
  - – that the interface module is fitted and connected correctly,
  - – that a unique address has been assigned to each frequency inverter with the keypad,
  - – that the bus terminating resistors are set correctly.
- ▶ Switch the frequency inverter on.

The frequency inverter's operating status indicator (green LED) and the interface module's yellow bus LED must flash. If they do not, see → Section "Diagnostics" from Page 61.

- ▶ With the keypad, assign a unique station address to each frequency inverter (PNU 1509).
- ▶ Make sure that the signal channel is configured for FIF interface operation (PNU 0005 = 200).
- ▶ To start the PLC program, set the master PLC to "Run" mode.

The yellow bus LED is lit. Communication with the master is active. Control and parameter data can now be transmitted.

- ▶ Enable the frequency inverter through terminal 28 (Controller Enable).
- ▶ Assign a reference frequency to the "ReferenceFrequency" input of the S40 manufacturer's function block with a reference value (50.0 Hz ≙ 500 dec).
- ▶ Assign a"1" to the "Enable" and "Start" inputs of the S40 manufacturer's function block.

The drive is now running.

Operation

Important!
To ensure safe operation, observe the guidelines in the user manuals of the master PLC and the frequency inverter.

Control signal terminal 28 (Controller Enable) is always active and must carry a High signal during operation. Otherwise the frequency inverter cannot be enabled through Suconet K.

Diagnostics

LED display

The interface module contains two LEDs, which indicate its operating status.

Yellow (bus)	Yellow (local)	Operating status
Flashing	Off	Bus operation active, the interface module is not being addressed by the master.
On	Off	Bus operation active, communication with master active and error-free
Off	On	Local operation active, frequency inverter can be controlled only through digital inputs E1 to E4.
Flashing	On	Local operation active after bus error (PNU 1522 = 3 or 4), interface module is not addressed by master.

Error messages and remedies

No communication with the frequency inverter	
Cause	**Remedy**
The frequency inverter is switched off • Operating status indicators for frequency inverter are not lit	Connect power to frequency inverter (see frequency inverter manual)
Local operating mode selected (PNU 1520 = 0) • Yellow Local LED is lit; yellow bus LED is not lit	Select Bus mode • Set PNU 1520 to 1
Local operation after bus fault • Local operation active after bus fault (PNU 1522 = 3 or 4)	Remedy bus fault • PNU 1523 = 0 activation through hardware enable (terminal 28) • PNU 1523 = 1 automatic activation
A data transmission error has occurred • Yellow bus LED flashes	Switch master PLC on • Check station addresses • Check wiring to the master PLC
Frequency inverter is not receiving messages • Yellow bus LED flashes	Master PLC is in "Halt" state • Switch master PLC to "Run" state

Appendix

Technical Data	General
Interface	RS 485
Bus	Suconet K
Operating mode	Slave
Network topology	In-line
Data transfer rate	187.5 or 375 Kbit/s
Data cable length	600 m for 187.5 Kbit/s; 300 m for 375 Kbit/s (without repeater)
Ambient temperature	
Operation	0 to +55 °C
Transport	–25 to +70 °C
Storage	–25 to +70 °C
Humidity	Relative humidity max. 80 %, non-condensing
Power supply	From the frequency inverter
Power dissipation	1.5 W
Isolation voltage	
RS 485 ↔ built-in system bus	1.65 kV AC or 2.3 kV DC
Digital inputs ↔ built-in interface	1.65 kV AC or 2.3 kV DC
RS 485 ↔ digital inputs	0.35 kV AC or 0.5 kV DC
RF interference class	DIN EN 61800-3, first environment
Immunity against fast transients	DIN EN 61000-4-4, severity 4
Degree of pollution	VDE 0110 Part 2, pollution degree 2
Protection class	IP20

Networking

Bus	Suconet K
Number of terminals	5
Terminal cross-section	1 × 0.25 to 1.5 mm^2 or 2 × 0.25 to 0.34 mm^2 with ferrules
Terminals	Plug-in screw terminal

Digital inputs

Number	5
Rated voltage U_e	
Nominal value	24 V DC
Maximum ripple	< 5 %
For "0" signal	≦ 5 V DC, limit value type 1
For "1" signal	≧ 15 V DC, limit value type 1
Rated current I_e	
With "1" signal	Typically 6 mA at 24 V DC
Isolation	Yes
Isolation of inputs from each other	No
Terminal cross-section	1 × 0.25 to 1.5 mm^2 or 2 × 0.25 to 0.34 mm^2 with ferrules
Terminals	Plug-in screw terminal

Internal supply voltage of digital inputs

Rated voltage U_e	20 V DC
Total maximum current for: $I_{E1} + I_{E2} + I_{E3} + I_{E4} + I_{terminal\ 28}$	40 mA at 20 V DC
Terminal cross-section	1 × 0.25 to 1.5 mm^2 or 2 × 0.25 to 0.34 mm^2 with ferrules

External supply voltage of digital inputs

Rated voltage U_e	24 V DC (+12 V – 0 % to +30 V + 0 %)
Total maximum current for: $I_{E1} + I_{E2} + I_{E3} + I_{E4} + I_{terminal\ 28}$	40 mA
Terminal cross-section	1 × 0.25 to 1.5 mm^2 or 2 × 0.25 to 0.34 mm^2 with ferrules

Dimensions

DE4-NET-K-F interface module

All dimensions in mm

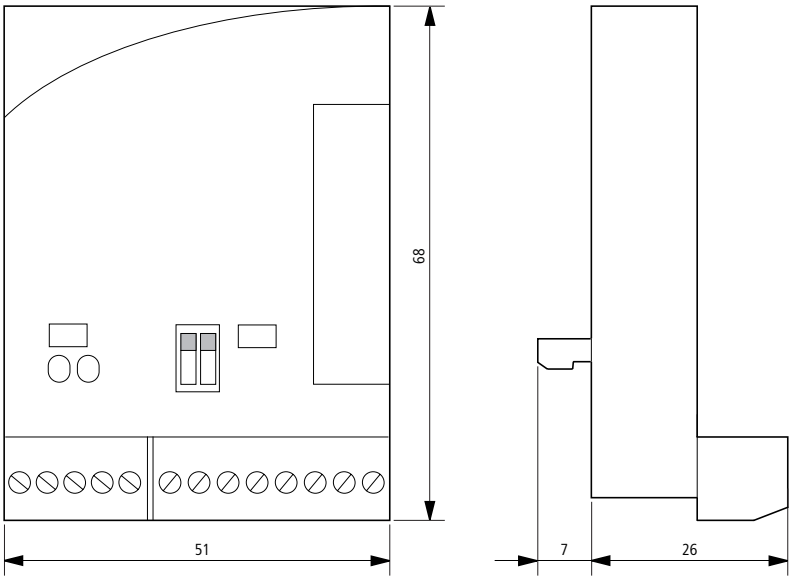


Figure 13: Front and side view

Accessories

The accessories for the DE4-NET-K-F are not included as standard. They can be ordered separately. For technical specifications of the accessories, please contact your local sales office.

Suconet K data cable	
Cable cores	Double twisted, insulated, screened
Core cross-section	0.5 mm^2
Order code	Moeller LT 309.096
PROFIBUS data cable (only required with additional equipotential bonding)	
Cable cores	Four-fold twisted, insulated, screened
Core cross-section	0.56 mm^2
Order code	Moeller LT 309.099.1
S40 function block DV4KF	
This function block is included with the Sucosoft S40 programming software. For information about the currently available versions and their ordering codes, please contact your local sales office.	

Interface module parameter list

The following pages list the parameters of the DE4-NET-K-F in numeric order.

Abbreviation	Use
PNU	Parameter number
PNU XXXX*	The value of the parameter is the same in all parameter sets.
ONLINE	Direct 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 is read/write
ro	Parameter is read-only

Parameter types

The following parameter types are defined:

Model	Use
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)

Parameter (numeric listing)

PNU	Subindex	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Acceptance	DS	→ Page
1500*		Software product code	Output as string			ro			
1502*		Software product code	Output as string in four parts			ro			
	1	Part 1	Internal manufacturer's information						
	2	Part 2							
	3	Part 3							
	4	Part 4							
1503*		Software creation date	Output as string in four parts			ro			
	1	Part 1	Internal manufacturer's information						
	2	Part 2							
	3	Part 3							
	4	Part 4							
1509*		Suconet K station address	To allow targetted addressing of stations, each station on the bus must receive a unique station address.	2 to 31	FIX32	rw	ENTER	2	29
1520*		Operating mode		0 Local (terminals)	FIX32	rw	ENTER	1	29
				1 Bus (Suconet K)					
1527		Starting value, motor potentiometer	Behaviour after mains On	0 Starting value = actual value on mains Off Automatic starting	FIX32	rw	ENTER	2	32
				1 Starting value = f_{min} Automatic starting					
				2 Starting value = 0 Hz					
				3 Starting value = actual value on mains Off Starting after "UP"					
				4 Starting value = f_{min} Starting after "UP"					

PNU	Subindex	Name	Notes, internal designations, etc.	Value range		Data type	Access rights	Acceptance	DS	→ Page
1521*		Changeover behaviour	Possibility of Bus to Local changeover in Bus mode	0	Changeover through the fieldbus (command 2)	FIX32	rw	ENTER	0	30
				1	Changeover through the fieldbus (command 2) and a digital input (PNU 1531 to PNU 1534)					
1522*		Behaviour on bus failure		0	Controller inhibit (motor coasts to halt)	FIX32	rw	ENTER	0	30
				1	Quickstop					
				2	Last speed is maintained					
				3	Changeover to Local/Quickstop mode					
				4	Changeover to Local mode/last speed is maintained					
1523*		Behaviour on return of bus function after failure		0	No automatic field bus activation after return of bus function. Activation through hardware enable (terminal 28)	FIX32	rw	ENTER	0	31
				1	Automatic field bus activation after return of bus function.					
1525*		Motor potentiometer function	Selection of reference source in bus operation	0	Reference values active	FIX32	rw	ENTER	0	31
				1	Motor potentiometer active					

PNU	Subindex	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	→ Page
1531*		Free terminal configuration	Configuration for digital input E1	0 to 32	FIX32	rw	ENTER	1	33
1532*			Configuration for digital input E2		FIX32	rw	ENTER	2	
1533*			Configuration for digital input E3		FIX32	rw	ENTER	3	
1534*			Configuration for digital input E4		FIX32	rw	ENTER	15	

0	No function
1	FF1/FF3
2	FF2/FF3
3	R/L
4	QSP
5	RFG1-STOP
6	RFG1-0
7	UP
8	DOWN
9	Reserved
10	CINH
11	EF
12	TRIP-RESET
13	PAR2/4
14	PAR3/4
15	DCB
16	Reserved
17	Bus/local
18	DIS-I
19	DIS-PID
20	Reserved
21	FREEZE-PID
22	Reserved
23	Reserved

PNU	Subindex	Name	Notes, internal designations, etc.	Value range	Data type	Access rights	Accept-ance	DS	→ Page
				24 Reserved					
				25 Reserved					
				26 Relay_Bus					
				27 to 32 Reserved					
1775*		Enable process data word 5	PID actual value	0 Disabled	FIX32	rw	ENTER	0	35
				1 Enabled					
1776*		Enable process data word 6	Torque setpoint value	0 Disabled	FIX32	rw	ENTER	0	35
				1 Enabled					
1790*		Display of digital inputs E1 to E4	Bit 0 = E1 Bit 1 = E2 Bit 2 = E3 Bit 3 = E4 Bit 4 to bit 15 = no function	0 to 15	FIX32	ro	DISPLAY		35

Parameter list of the frequency inverter

→ For a detailed description of the parameters, see the DV4 frequency inverter manual AWB8230-1340...

PNU	Parameter number
SUB	Subindex
●	Parameter can only be read
PNU XXXX*	The value of the parameter is the same in all parameter sets.
DS	Defaults for DV4
Device	Depends on DV4 type

PNU	Sub-index	Name	Value range	DS	Remark
0001		Operating mode	0 to 3	0	Through DE4-NET-K-F all sets automatically set to "3"
0002*		Loading defaults	0 to 80	0	
0003*		Saving parameters	0 to 1	1	In bus mode, "1" is not allowed
0004*		Bar graph display	0 to 988	0	No function for DE4-NET-K-F
0005		Configuration of input signals	0 to 200	0	Through DE4-NET-K-F, all sets automatically set to "200"
0007		Terminal configuration	0 to 255	0	No function for DE4-NET-K-F
0008		Function relay K1	0 to 24	1	

PNU	Sub-index	Name	Value range	DS	Remark
0009*		Device address	1 to 99	1	No function for DE4-NET-K-F
0010		Minimum output frequency	0.00 to 480.0 Hz	0.00 Hz	
0011		Maximum output frequency	7.50 to 480.0 Hz	50.00 Hz	
0012		Acceleration time	0.00 to 1300.00 s	5.00 s	
0013		Deceleration time	0.00 to 1300.00 s	5.00 s	
0014		Operating mode	2 to 5	2	
0015		*U*/*f* nominal frequency (transition frequency)	7.50 to 960.0 Hz	50 Hz	
0016		Voltage increase	0.00 to 40.00 %	0 %	Device
0017		Frequency message $f_2 > f_1$	0.00 to 480.0 Hz	0 Hz	
0018		Operating frequency	0 to 3	2	
0019		Response threshold AutoDCB	0.00 to 480.0 Hz	0.1 Hz	
0021		Slip compensation	–50.0 to 50.0 %	0.0 %	
0022		Current limit (drive)	30 to 150.0 %	150.0 %	
0023		Current limit (regenerative)	30 to 150.0 %	150 %	
0026*		Offset, analog input	–200.0 to 200.0 %	0.0 %	No function for DE4-NET-K-F
0027*		Gain, analog input	–1500 to 1500.0 %	100.0 %	No function for DE4-NET-K-F

PNU	Sub-index	Name	Value range	DS	Remark
0034*		Setpoint input range	0 to 4	0	No function for DE4-NET-K-F
0035*		DCB braking	0 to 1	0	
0036		Voltage for DCB	0.00 to 150.00 %	Device	
0037		Fixed frequency 1	–480.0 to 480.0 Hz	20.0 Hz	
0038		Fixed frequency 2	–48 to 480.0 Hz	30 Hz	
0039		Fixed frequency 3	–480.00 to 480.0 Hz	40 Hz	
0040*		Controller Enable	0 to 1	0	Process data
0043*		TRIP-RESET	0 to 1	0	Process data
0044*		Reference frequency 2	–480.00 to 480.00		No function for DE4-NET-K-F
0046*		Reference frequency 1	–480.00 to 480.0	0	Process data
0047*		Torque setpoint/ limit value	0 to 400 %		Process data
0049*		Additional frequency	–480.0 to 480.00		Process data
0050*		Output frequency f_2	–480.0 to 480.00		●
0051*		Output frequency f_2 with slip	–480.0 to 480.00		●, process data
0052*		Motor voltage	0 to 1000 V		●
0053*		Internal DC link voltage	0 to 1000 V		●
0054*		Apparent motor current	0 to 400 A		●, process data

PNU	Sub-index	Name	Value range	DS	Remark
0056*		Inverter load	–255 to 255 %		●, process data
0061*		Heatsink temperature	0 to 255 °C		●
0070		P-component	0 to 300.00	1.00	
0071		I-component	10 to 9999	100	
0072		D-component	0 to 5.0	0.0	
0074		Effect of PID controller	0 to 100.0 %	0.0 %	
0077*		Gain I_{max}-controller	0 to 16.00	0.25	
0078*		Reset time I_{max}-controller	12 to 9990 ms	65 ms	
0079		Oscillation damping	0 to 80	Device	
0080		Service code		0.02 Hz	Adjustments only by Moeller service!
0084		Motor stator resistance	0 to 64.000 Ω	0.0 Ω	
0087		Rated motor speed	300 to 16000 RPM	1390 RPM	
0088		Rated motor current	0.0 to 480.00	Device	
0090		Rated motor voltage	50 to 500 V	Device	
0091		Motor power-factor	0.40 to 1.00	Device	
0092		Motor stator inductance	0.0 to 2000.0 mH	0.0 mH	
0093*		Device ID		Device	●
0094*		User password	0 to 9999	0	

PNU	Sub-index	Name	Value range	DS	Remark
0099*		Software version		Device	●
0105		Quickstop ramp time	0.00 to 1300.00 s	5.00 s	
0106		Hold time for auto DCB	0.00 to 999.0 s	0.50 s	
0107		Time for external DCB	0.0 to 999.00 s	999.00 s	
0108*		Gain, analog output	0 to 255	213	No function for DE4-NET-K-F
0109*		Offset, analog output	–10.00 to 10.00 V	0.00 V	No function for DE4-NET-K-F
0111		Monitor signal	0 to 32	0	No function for DE4-NET-K-F
0113	1 to 24	Free configuration of digital inputs	1 to 255		No function for DE4-NET-K-F
0114		Level inversion of digital inputs	0 to 15	0	
0117		Function of transistor output A1	0 to 24	0	No function for DE4-NET-K-F
0119		Function of PTC input	0 to 5	0	
0120		I^2t disconnection	0 to 200 %	0 %	
0125*		Baud rate	0 to 4	0	No function for DE4-NET-K-F
0126*		Behaviour on communication error	0 to 3	0	
0127		Reference value input selection	0 to 1	0	For function block, setting = 0 required

PNU	Sub-index	Name	Value range	DS	Remark
0135		Control word			Process data
0138*		Reference value indication	–480.0 to 480.00		●
0140*		Additional frequency	–480.0 to 480.00		Process data
0141*		Reference value, normalized	–100 to 100.00%		
0142		Start condition	0 to 3	1	
0143*		Selection of flying restart procedure	0 to 3	0	
0144		Operating frequency reduction	0 to 1	1	
0145*		PID reference source	0 to 2	0	
0148*		Motor parameter identification	0 to 1	0	
0150		Status word			●, process data
0156*		Current threshold	0 to 150 %	0 %	
0161*		Current error			●
0162*		Previous error			●
0163*		Second from last fault			●
0164*		Third from last error			●
0168 *		Current error			●
0170		Error reset selection	0 to 3	0	
0171		Delay for AUTO-TRIP-RESET	0.00 to 60.00 s	0 s	
0174*		Switching threshold of the braking transistor	78 to 110 %	100 %	

PNU	Sub-index	Name	Value range	DS	Remark
0178*		Operating time meter			●
0179*		Power On time meter			●
0181*		Input, digital PID reference frequency	–480.0 to 480.00 Hz	0.00 Hz	
0182*		Integration time for S-ramp	0 to 50.00 s	0.00 s	
0183*		Diagnostics	0 to 250		●
0184*		Integral component active	0.0 to 25.0 Hz	0.0 Hz	
0185*		Switching window	0 to 80 %	0 %	
0196*		Activation of automatic DCB	0 to 1	0	
0220*		Acceleration time, additional frequency	0 to 1300.00 s	5.00 s	
0221*		Deceleration time, additional frequency	0 to 1300.00 s	5.00 s	
0238		Frequency precontrol	0 to 2	2	
0239		Lower frequency limit	–480.0 to 480.00 Hz	–480.00 Hz	
0265*		Starting value, motor potentiometer	0 to 5	3	No function for DE4-NET-K-F
0372*		FIF identification	0 to 10		●
0416		Level inversion, digital outputs	0 to 3	0	No function for DE4-NET-K-F
0425		Configuration, E1	0 to 4	2	No function for DE4-NET-K-F
0426		Gain, E1	–1500 to 1500.0 %	100 %	No function for DE4-NET-K-F

PNU	Sub-index	Name	Value range	DS	Remark
0427*		Offset E1	–100 to 100.0 %	0.0 %	No function for DE4-NET-K-F
0469*		Function Stop key	0 to 2	1	
0500*		Display factor, process variable Numerator	1 to 25000	2000	
0501*		Display factor, process variable Denominator	1 to 25000	10	
0517*	1 to 10	User menu	2 to 50		
0597*		Configuration of motor phase failure recognition	0 to 2	0	
0599*		Current limit, motor phase failure	1 to 50 %	5 %	
0625*		Blocking frequency 1	0 to 480.00 Hz	480.00 Hz	
0626*		Blocking frequency 2	0 to 480.00 Hz	480.00 Hz	
0627*		Blocking frequency 3	0 to 480.00 Hz	480.00 Hz	
0628*		Suppression bandwidth	0 to 100.00 %	0.00 %	
0988*		DC threshold for parameter set changeover	0 to 200.00 %	0 %	

→ Do not write to the parameters marked "Process data" through the parameter data channel. These parameters are continually being exchanged through the process data channel.

→ To transmit the parameters of parameter sets 2, 3 or 4, add an offset of 2000, 4000 or 6000 to the respective PNU. Parameters marked with a * symbol are the same in all parameter sets.

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