DF51-...
Frequency Inverter

MOELLER

Think future. Switch to green.

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 does not impair the automation functions.

- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.

- Suitable safety hardware and software measures should be implemented for the I/O interface so that 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.).

Contents

1 About the DF51 series

System overview

Figure 1: System overview

① DF51-... frequency inverter
② DE51-LZ... RFI filters
③ Operator keypad with built-in interface
④ DEX-CBL-...-ICS connection cables
⑤ DEX-DEY-10 external keypad
⑥ DEX-DEY-61 external keypad
⑦ DEX-DEY-6 external keypad

Ratings and nameplate

The electrical connection ratings are printed on the terminal shroud.
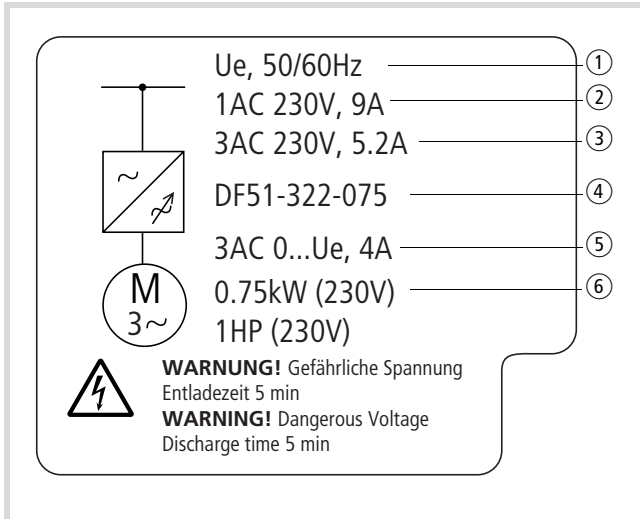
Figure 2:   Terminal shroud example

① Ue = rated voltage (mains supply voltage) 230 V
   50/60 Hz = mains frequency

② 9A = phase current at single-phase connection

③ 5.2A = phase current at three-phase connection

④ DF51-322-075 = part number

⑤ 3AC = three-phase output voltage in range from zero to mains supply voltage (Ue) rated current 4 A

⑥ 0.75 kW = assigned motor rating at rated voltage (230 V) or 1 HP (horse power)

The DF51's rating is recorded on the nameplate on the unit's side.
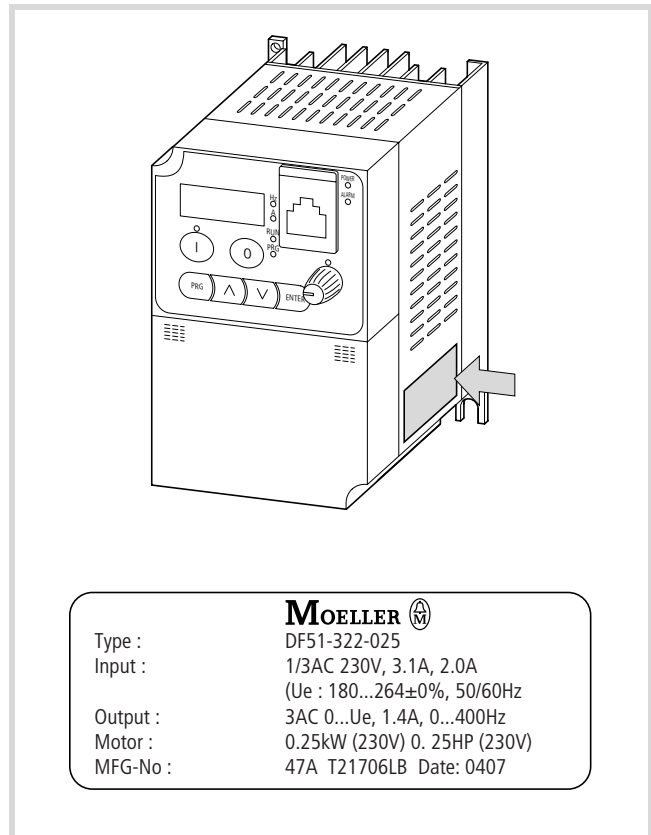
Figure 3:   Nameplate of DF51 frequency inverter

The labelling has the following meaning (example):

Type	Part number	DF51-322-025
Input	Mains input values: phases, rated voltage, phase current and permissible voltage range, mains frequency	1 AC 230 V, 3.1 A 3 AC 230 V, 2.0 A (Ue: 180–264 V±0 %, 50/60 Hz)
Output	Motor output values: phases, voltage range, rated current, frequency range	3 AC 0…Ue, 1.4 A, 0…400 Hz
Motor	Assigned motor rating at specified rated voltage	0.25 kW (230 V) 0.25 HP (230 V)
MFG-No	Manufacturer number and date	47AT21706LB Date: 0407

Layout of the DF51
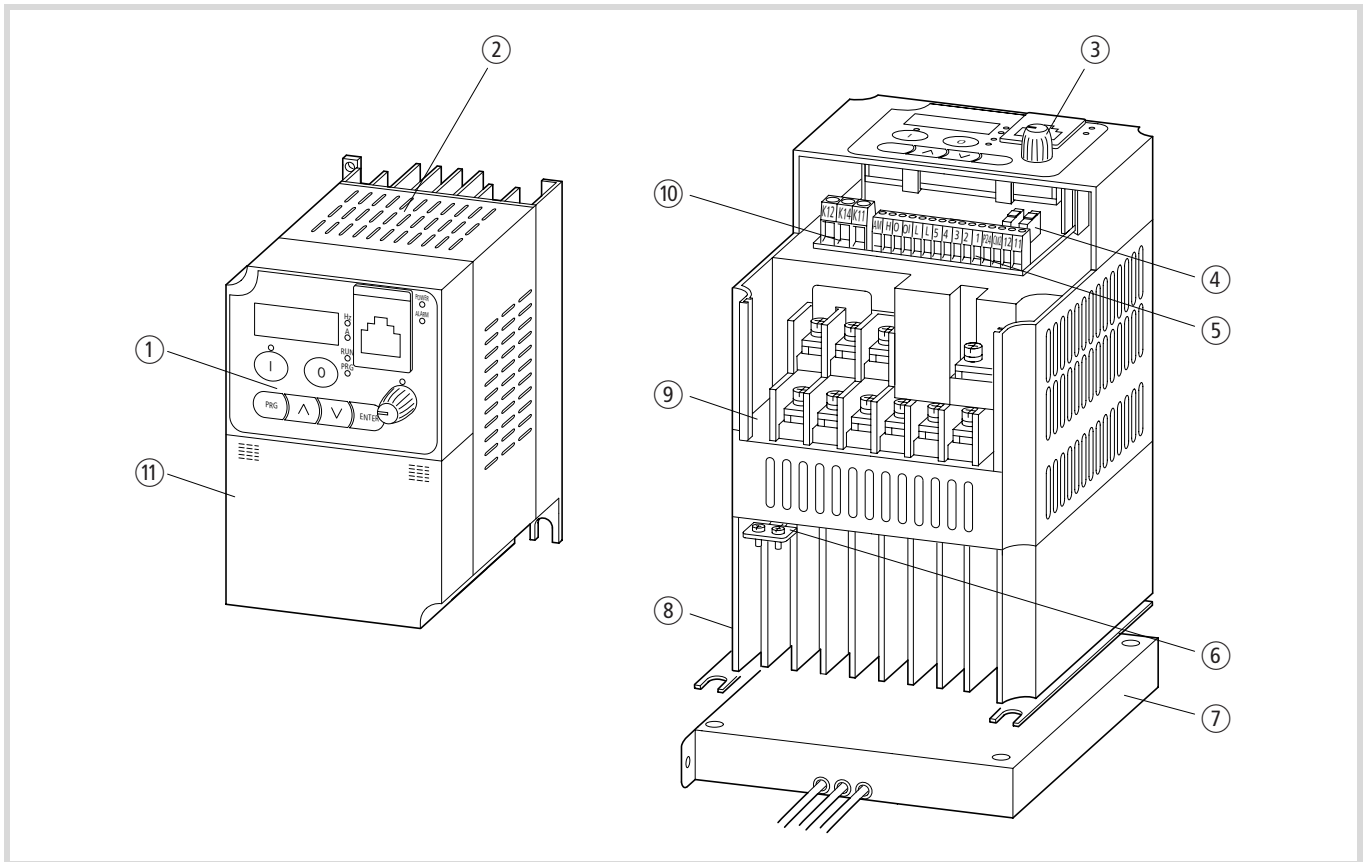
Figure 4:   Overview of the DF51

① LCD keypad with interface
② Device fan (DF51...1K5 to ...7K5 only)
③ RJ 45 communication interface (Modbus)
④ Microswitches
⑤ Control signal terminals
⑥ Earth connection (PE)

⑦ Optional radio interference filter
⑧ Heat sink
⑨ Power terminals
⑩ Signalling relay terminals
⑪ Terminal shroud (control section, power section)

2 Installation

Power terminals

Opening the terminal shroud

→ Complete the following steps with the tools stated and without the use of force.

To open the terminal shroud:

▶ Press down on the latches ①.
▶ Then pull the terminal shroud downwards ②.

On devices DF51-…-5K5 and DF51-…-7K5, the terminal shroud hinges downwards. and can be removed in its lowered position.
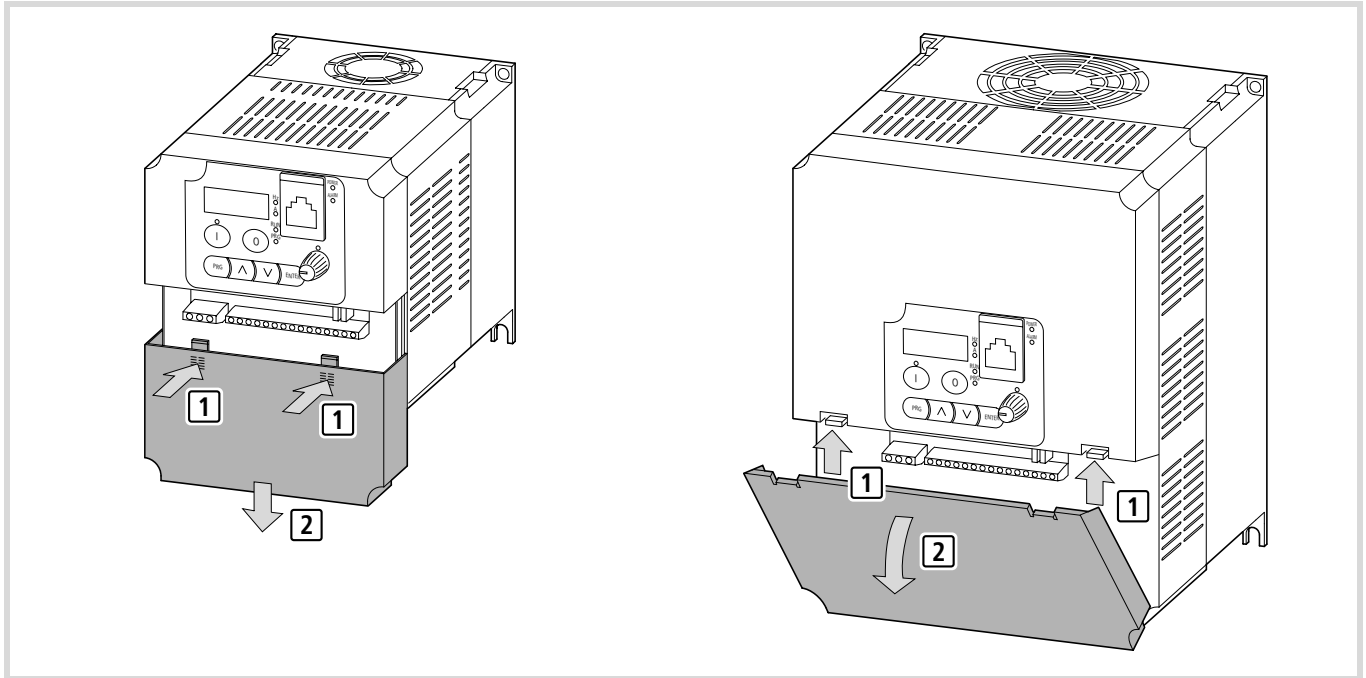
Figure 5: Opening the terminal shroud

Connecting the power terminals

⚠ **Warning!**
Select a frequency inverter that is suitable for the available supply voltage (→ section "Technical data", page 33):

- DF51-320: Three-phase 230 V (180 to 264 V ± 0 %)
- DF51-322: Single- or three-phase 230 V (180 to 264 V ± 0 %)
- DF51-340: Three-phase 400 V (342 to 528 V ± 0 %)

⚠ **Warning!**
Never connect output terminals U, V and W to mains voltage. Danger of electrical shock or fire.

⚠ **Warning!**
Each phase of the frequency inverter's supply voltage must be protected with a fuse (danger of fire).

⚠ **Warning!**
Ensure that all power cables are firmly secured in the power section.

⚡ **Warning!**
The frequency inverter must be earthed. Danger of electrical shock or fire.

⚡ **Warning!**
Do not connect any cables to unmarked terminals in the power section. Some of these terminals do not have a function (dangerous voltages) DF51or are reserved for internal use.

→ For detailed information about mounting and installation see the installation instructions (AWA8230-2146) enclosed with each device.

Arrangement of the power terminals

The arrangement of power terminals depends on the size of the
power section.

DF51-322-025   DF51-322-055
DF51-322-037

DF51-322-075   DF51-322-2K2
DF51-322-1K1   DF51-320-4K0

DF51-340-037   DF51-340-2K2
DF51-340-075   DF51-340-3K0
DF51-340-1K5   DF51-340-4K0

DF51-340-5K5   DF51-340-7K5
DF51-320-5K5   DF51-320-7K5
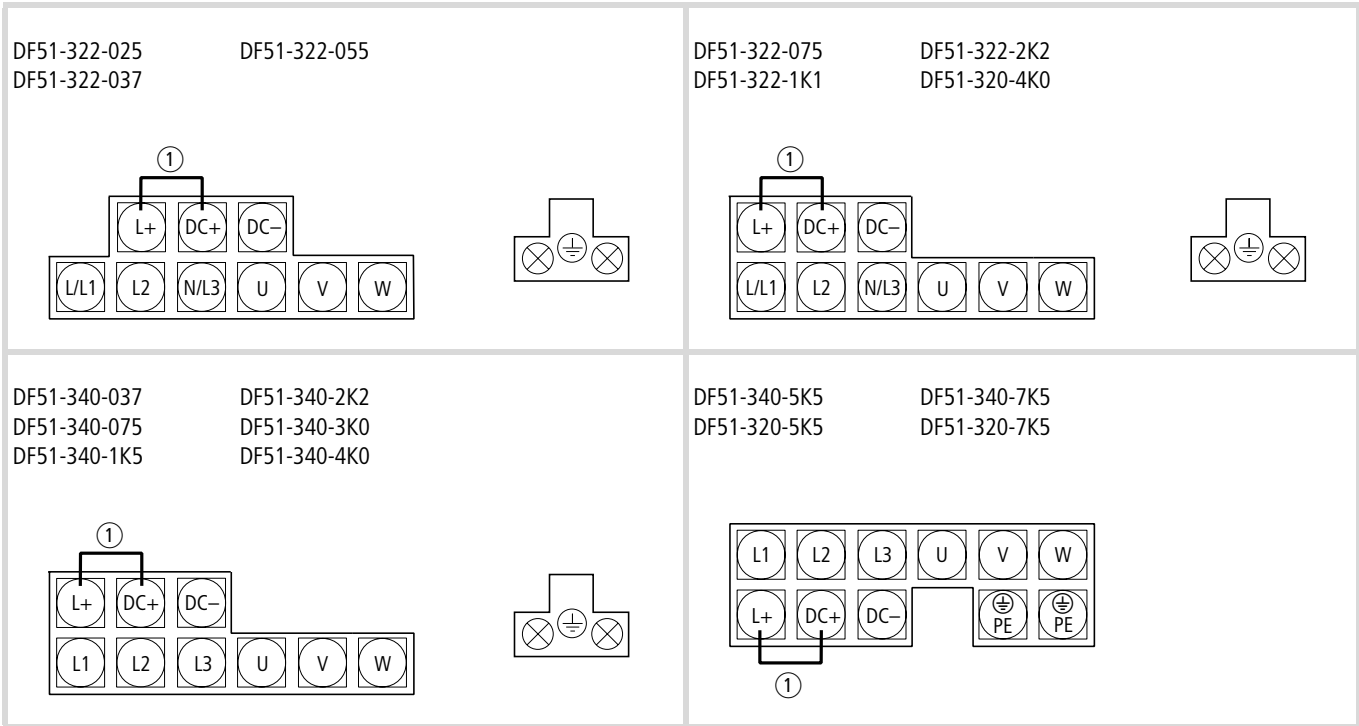
Figure 6:   Arrangement of the power terminals

① Internal connection. Remove if a DC link choke is used.

Table 1:   Description of the power terminals

Terminal designation	Function	Description	
L, L1, L2, L3, N	Supply voltage (mains voltage)	• Single-phase mains voltage: Connection to L and N • Three-phase mains voltage: Connection to L1, L2, L3	
U, V, W	Frequency inverter output	Connection of a three-phase motor	
L+, DC+	External direct voltage reactor	Terminals L+ and DC+ are bridged with a jumper. If a DC link choke is used, the jumper must be removed.	
DC+, DC–	Internal DC link	These terminals are used for connecting an optional external braking resistor and for DC linking and supplying DC to multiple frequency inverters.	
⏚, PE	Earthing	Enclosure earthing (prevents dangerous voltages on metallic enclosure elements in the event of a malfunction).	
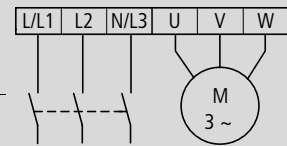
Control signal terminals

Connecting a signalling relay

The signalling relay consists of a floating contact (changeover switch). The contacts are connected to terminals K11, K12 and K14.

The illustration to the right indicates the position of the signalling relay terminals.
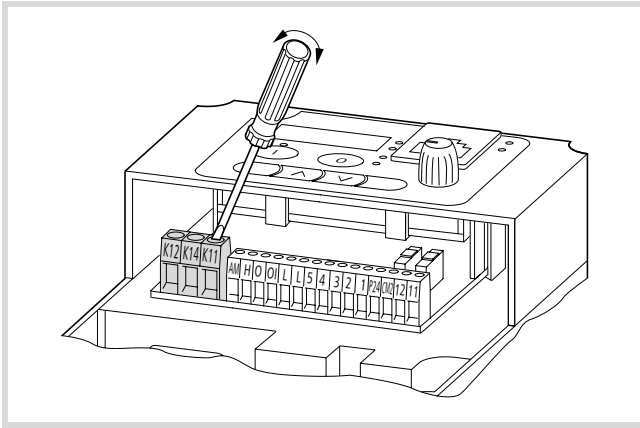
Figure 7:   Position signalling relay terminals

Table 2:   Description of the signalling relay terminals

Terminal designation	Description[1]
K11 K12 K14	Default settings: • Operating signal: K11-K14 closed. • Fault message or power supply off: K11-K12 closed Characteristics of the relay contacts: • Maximum 250 V AC/2.5 A (resistive) or 0.2 A (inductive, power factor = 0.4); minimum 100 V AC/10 mA • Maximum 30 V DC/3.0 A (resistive) or 0.7 A (inductive, power factor = 0.4); minimum 5 V DC/100 mA

1) You can assign the digital output functions to the signalling relay (PNU C021).

Connecting the control signal terminals

The control signal terminals are arranged in a single row.

Wire the control signal terminals to suit their application.

▽ **Caution!**
Never connect terminal P24 with terminals L, H, O, OI or AM.

Use twisted or screened cables for connecting to the control signal terminals. Earth the screen on one side with a large contact area near the frequency inverter. The cable length should not exceed 20 m. For longer cables, use a suitable signal amplifier.

ESD measures
Discharge yourself on an earthed surface before touching the control signal terminals and the circuit board to prevent damage through electrostatic discharge.

The illustration to the right shows the positions of the individual control signal terminals.

AM	h	O	OI	L	L	5	4	3	2	1	P24	CM2	12	11
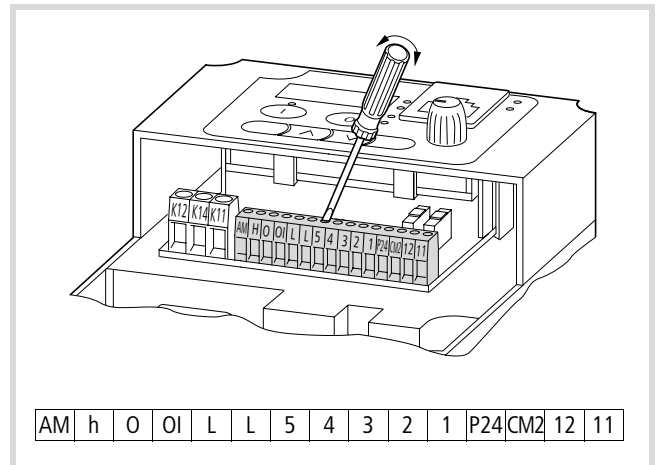
Figure 8:   Position of control signal terminals

Function of the control signal terminals

Table 3: Function of the control signal terminals

No.	Function	Level	DS	Technical data, description
L	Common reference potential	0 V	–	Reference potential for the internal voltage sources P24 and H
5	Digital input	HIGH = +12 to +27 V LOW = 0 to +3 V	Reset	PNP logic, configurable, R_i > 100 kΩ Reference potential: terminal L
4	Digital input		FF2 (FF3) = fixed frequency 2 (3)	PNP logic, configurable, R_i = 5,6 kΩ Reference potential: terminal L
3	Digital input		FF1 (FF3) = fixed frequency 1 (3)	
2	Digital input		REV = anticlockwise rotating field	
1	Digital input		FWD = clockwise rotating field	
P24	Output control voltage	+24 V	–	Supply voltage for actuation of digital inputs 1 to 5. Load carrying capacity: 30 mA Reference potential: terminal L
h	Output reference voltage	+10 V ⎓	–	Supply voltage for external reference value potentiometer. Load carrying capacity: 10 mA Reference potential: terminal L
O	Analog input	0 to +10 V ⎓	Frequency setpoint value (0 to 50 Hz)	R_i = 10 kΩ Reference potential: terminal L
OI	Analog input	4 to 20 mA	Frequency setpoint value (0 to 50 Hz)	R_B = 250 Ω Output: terminal L
L	Common reference potential	0 V	–	Reference potential for the internal voltage sources P24 and H
AM	Analog output	0 to +10 V ⎓	Frequency actual value (0 to 50 Hz)	Configurable, DC voltage, 0 to 10 V corresponds to set final frequency (50 Hz). Load carrying capacity: 1 mA Reference potential: terminal L
CM2	Reference potential, transistor output	Up to 27 V ⎓	–	Connection: Common reference potential (0 V, 24 V) of the external voltage source for the transistor outputs, terminals 11 and 12. Load carrying capacity: up to 100 mA (sum of terminals 11 + 12)
12	Transistor output	Up to 27 V = CM2	RUN (operation)	Configurable, open collector Load carrying capacity: up to 50 mA
11	Transistor output		Frequency setpoint reached	
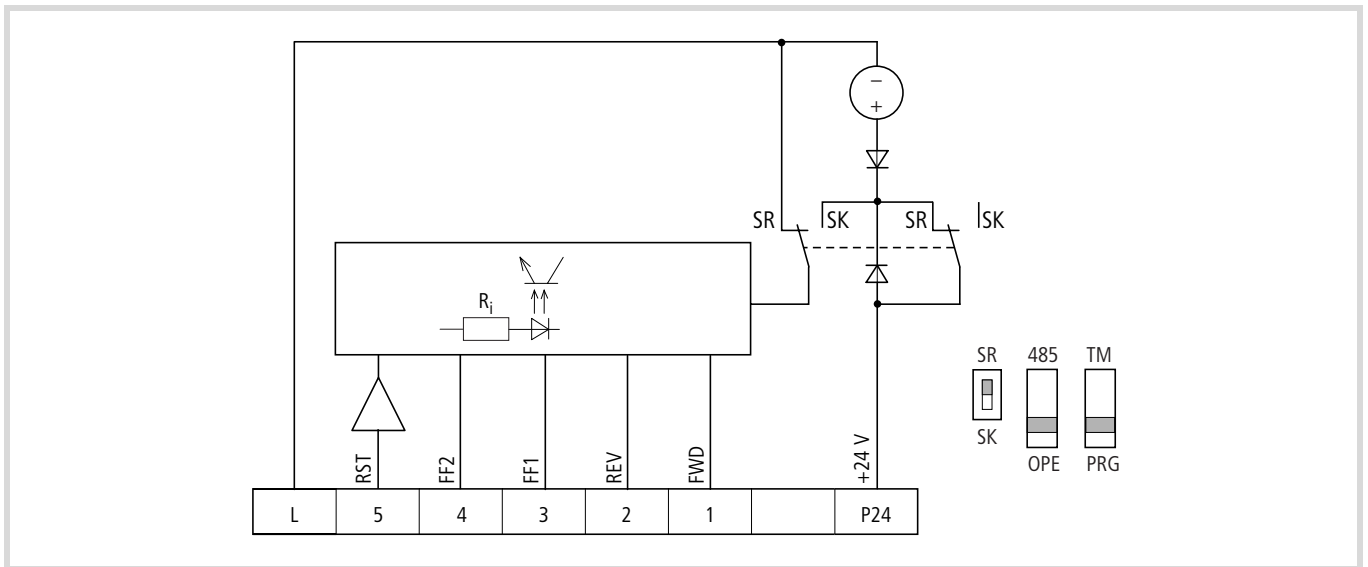
Figure 9:   Control signal terminal strip (part 1)

Inputs 1 to 5 all have the same function and mode of operation except for terminal 5, which can also be configured as thermistor input.

Inputs 1 to 5 are optically and electrically isolated from the built-in control section (CPU). They are actuated with +24 V, either using the device's internal control voltage at terminal P24 or an external voltage source.

You can configure the actuation of inputs 1 to 5 for special control circuits and national circuit types using the SR/SK microswitch as illustrated in Table 4. This switch is located to the right of the control signal terminals and has two positions:

• SR = source, positive switching logic (default settings)
• SK = sink, negative switching logic
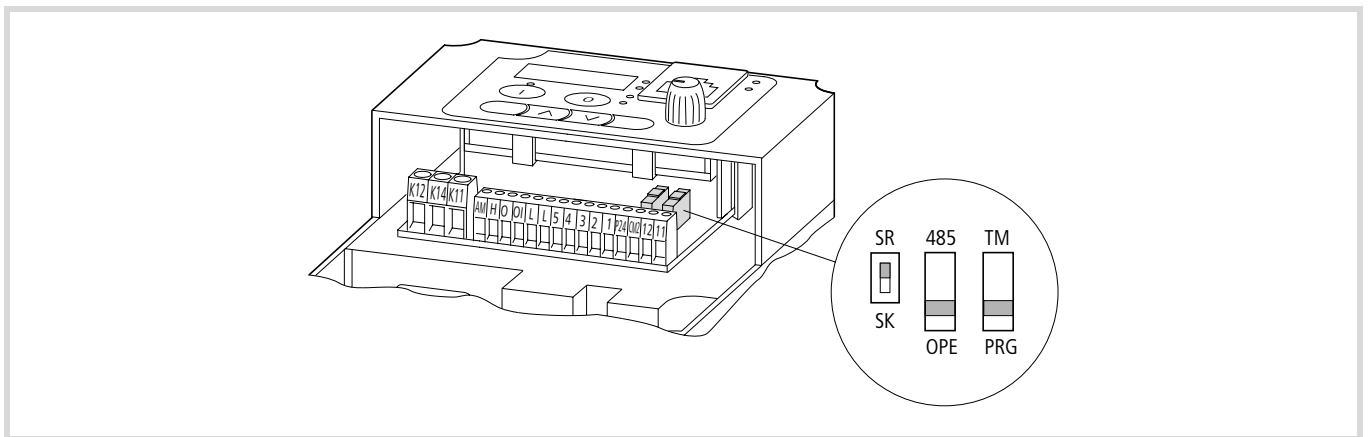
Figure 10: Position of microswitches

⚠ **Warning!**
Before you switch on the internal or external control voltage, check the position of the SR/SK switch. An incorrect setting can damage the control input.

Table 4: Actuation of inputs 1 to 5

Circuit example	SR/SK switch	Description
	SR	• Operation with internal control voltage • Standard circuit
	SR	• Operation with external control voltage +24 V) • Standard circuit • Reference point terminal L
	SR	• Operation with external control voltage from an electronic device (for example PLC, easy) • Reference point terminal L

Circuit example	SR/SK switch	Description
	SK	Operation with internal control voltage
	SK	• Operation with external control voltage +24 V) • Reference point terminal L ① If reference point L is connected with the 0 V potential of the external voltage source, the external 24 V potential should be decoupled through a diode.
	SK	• Operation with external control voltage from an electronic device (for example PLC, easy) • Reference point terminal L ① If reference point L is connected with the 0 V potential of the external voltage source, the external 24 V potential should be decoupled through a diode.

H	O	OI	L	AM	CM2	11	12
+10 V DC 10 mA VII	0...10 V DC R_i = 10 kΩ	4...20 mA R_B = 250 Ω	0 V	0...10 V DC 1 mA VII	100 mA VII	+27 V DC 50 mA VII	+27 V DC 50 mA VII
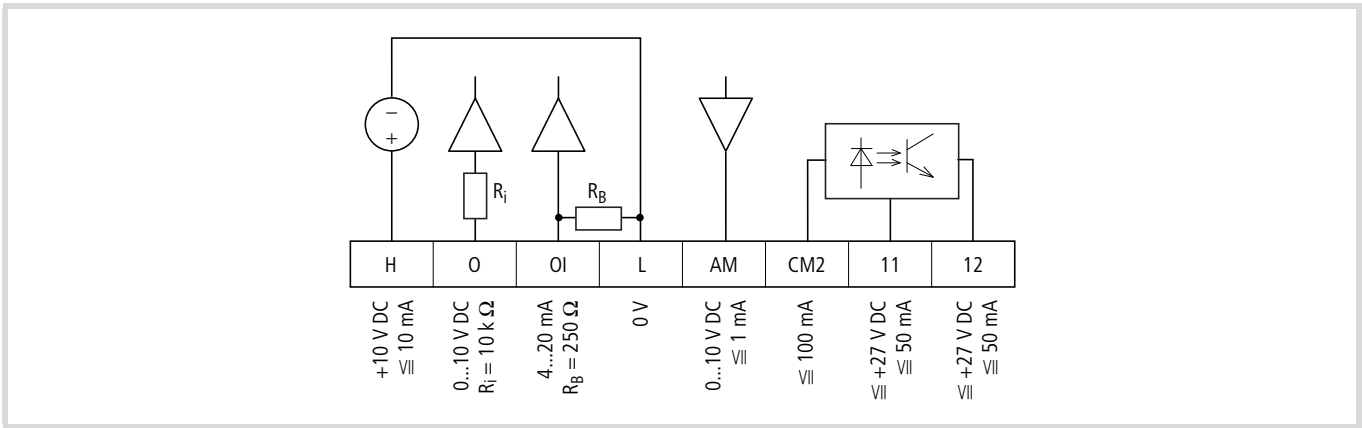
Figure 11: Control signal terminal strip (part 2)

→ All analog inputs and outputs use terminal L as reference potential and are therefore also connected to the reference potential of digital inputs 1 to 5.

Terminal H outputs +10 V (max. 10 mA) to provide the setpoint voltage for supplying an external potentiometer. Reference point is terminal L.

Table 5: Actuating the analog inputs

Circuit example	Description
	• Frequency reference input (default = 0 to 50 Hz) through an external potentiometer (recommended fixed resistance 1 to 5 kΩ). • Standard circuit
	• Frequency reference input (default = 0 to 50 Hz) through an external 4 to 20 mA current signal. • Standard circuit

→ At the default setting, the input signals at terminals O (0 to 10 V) and OI (4 to 20 mA) are added to the frequency reference input. You can select the reference source with parameter PNU A005 (AT selection) and activate it through a control signal terminal (PNU C00x = 16).

Terminal AM supplies an analog reference signal from 0 to +10 V (default = 0 to 50 Hz). The reference potential is terminal L. The analog signal can be configured with parameters PNU B080, C028 and C086.
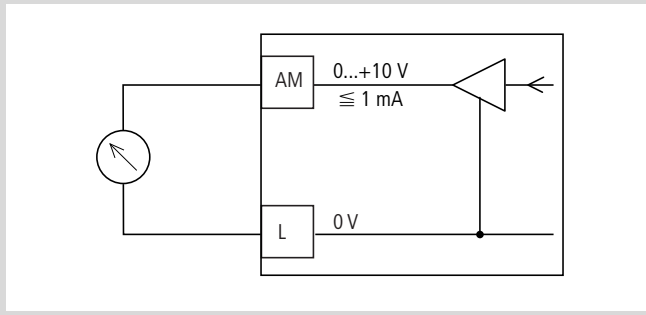
Figure 12: Example: analog measuring instrument

If a relay is connected to one of the digital outputs 11 or 12, connect a freewheel diode in parallel to the relay to prevent destruction of the digital outputs through the self-induced e.m.f. which results when the relay is switched off.
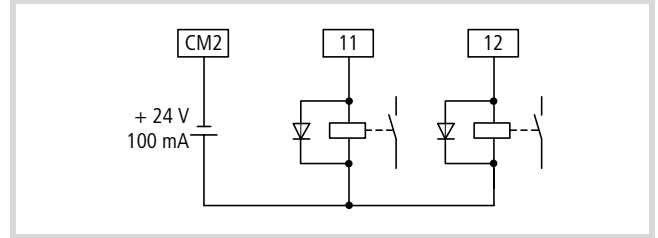
Figure 13: Relay with freewheeling diode (for example ETS-VS3)

→ Use relays that switch reliably at 24 V --- and a current of about 3 mA.

The two digital outputs 11 and 12 contain optically decoupled open-collector transistors. Up to 50 mA can be applied to each of them. Their common reference potential is terminal CM2 (max. 100 mA).
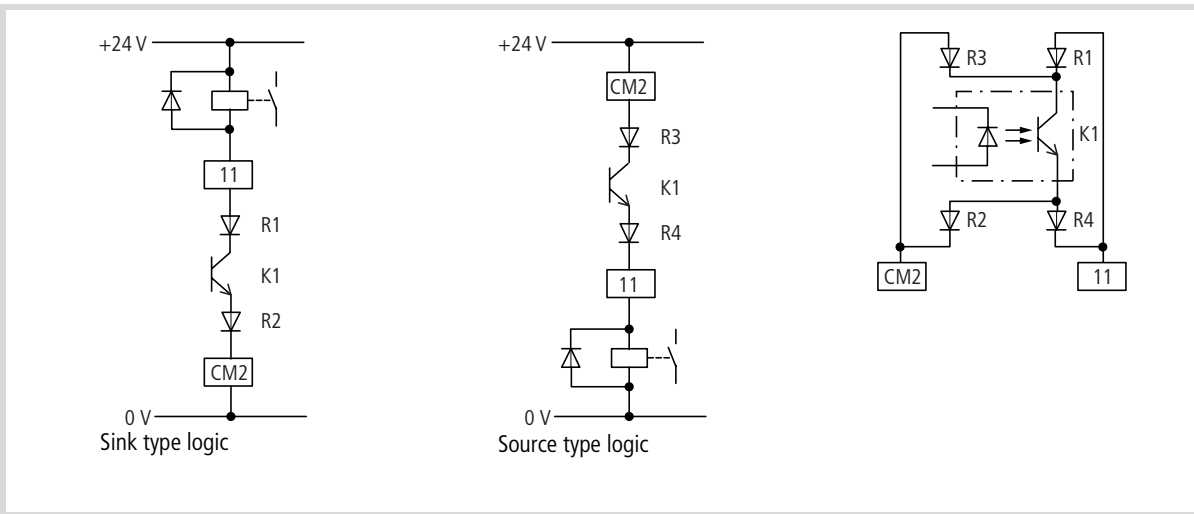
Figure 14: Digital outputs

Internal diode matrix R1 to R4 allows the connection in sink-type or source-type logic (→ fig. 14).

3 Using the DF51

This section describes how to take the DF51 frequency inverter into operation and what you should observe during its operation.

Operational warnings

Warning!
If the supply voltage recovers after an intermittent failure, the motor may restart automatically if a start signal is still present. If personnel is endangered as a result, an external circuit must be provided which excludes a restart after voltage recovery.

Warning!
If the frequency inverter has been configured so that the stop signal is not issued through the OFF key on the LCD keypad, pressing the OFF key will not switch off the motor. A separate Emergency-Stop switch must be provided in this case.

Warning!
Maintenance and inspection of the frequency inverter may only be undertaken at least 5 minutes after the supply voltage has been switched off. Failure to observe this point can result in electric shock as a result of the high voltages involved.

Warning!
Never pull on the cable to unplug connectors (for example for fan or circuit boards).

Warning!
If a reset is carried out after a fault, the motor will start again at once automatically if a start signal is applied simultaneously. To avoid the risk of serious or fatal injury to personnel, you must ensure that the start signal is not present before acknowledging a fault message with a reset.

Warning!
When the supply voltage for the frequency inverter is applied while the start signal is active, the motor will start immediately. Make sure therefore that the start signal is not active before the supply voltage is switched on.

Warning!
Do not connect or disconnect cables or connectors during operation while the supply voltage is switched on.

Caution!
To prevent a risk of serious or fatal injury to personnel, never interrupt the operation of the motor by opening the contactors installed on the primary or secondary side.

→ The START key is functional only if the corresponding parameters of the frequency inverter have been configured accordingly. This prevents the risk of damage and injury.

→ If motors are to be operated at frequencies above the standard 50 or 60 Hz, consult the motor manufacturer to make sure that the motors are suitable for operation at higher frequencies. The motors could otherwise incur damage.

Block diagram

The following block diagram shows all terminals of the DF51.
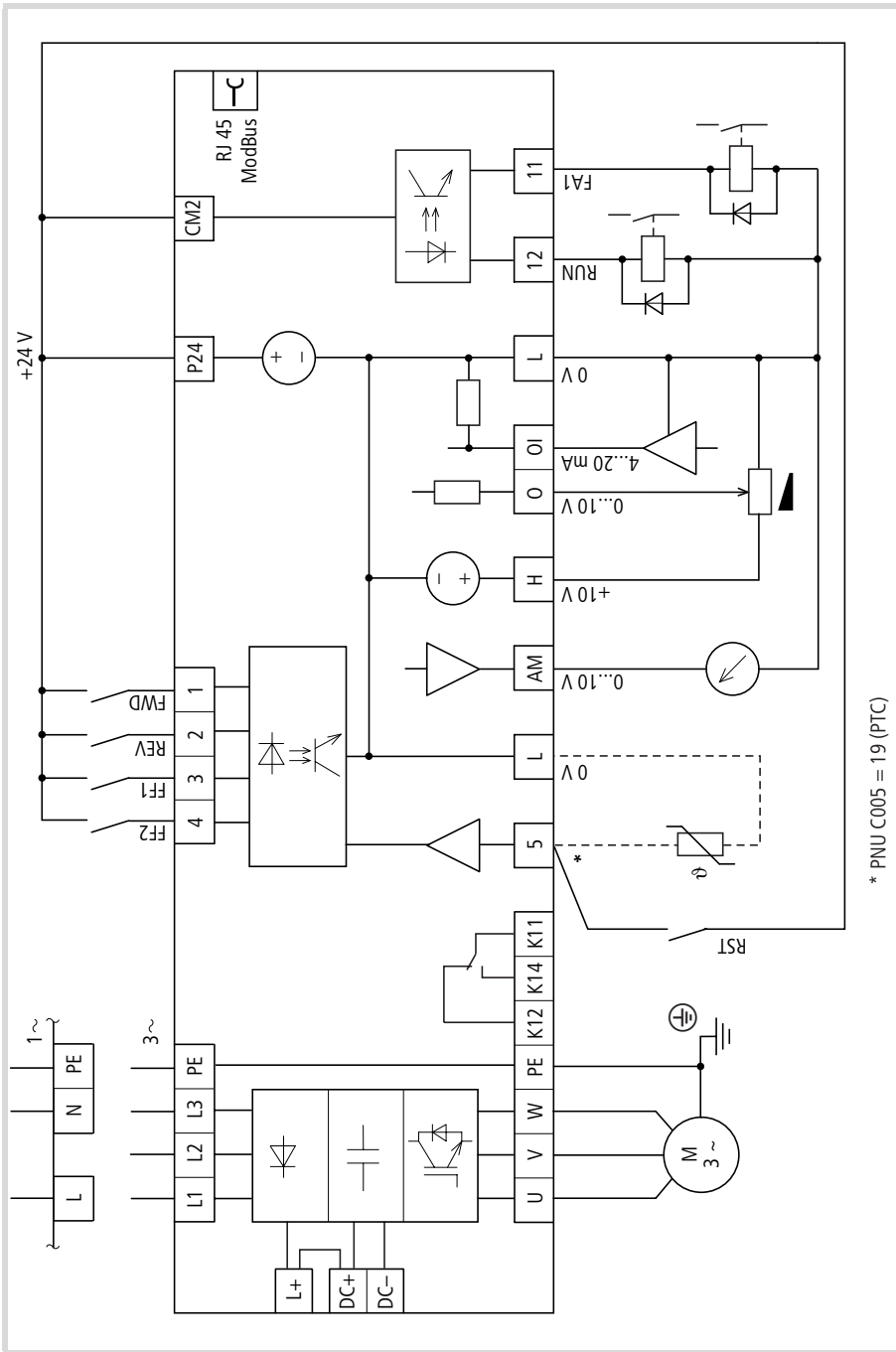
Figure 15: Block diagram, DF51

Power terminals		
L, L1, L2, L3, N	Supply (mains) voltage	
U, V, W	Frequency inverter output	
L+, DC+	External DC choke	
DC+, DC−	Internal DC link	
⏚, PE	Positive earth	
Control signal terminals		
P24	Control voltage output, +24 V	

1	Digital input	OI	Analog input, 4 to 20 mA
2	Digital input	AM	Analog output, 0 to 10 V
3	Digital input	K11	Signalling relay terminal
4	Digital input	K12	Signalling relay terminal (NC)
5	Digital input	K14	Signalling relay terminal (NO)
L	Common 0 V reference potential	CM2	Reference potential, transistor output
H	Reference voltage output, +10 V	12	Transistor output, max. 27 V
O	Analog input, 0 to +10 V	11	Transistor output, max. 27 V
		RJ 45	Interface connection for expansion

* PNU C005 = 19 (PTC)

Initial starting

Observe the following points before you take the frequency inverter into operation:

- The frequency inverter must be installed vertically on a non-flammable surface (for example a metal surface).
- Remove any residue from wiring operations – such as pieces of wire – and all tools from the vicinity of the frequency inverter.
- Ensure that all terminal screws have been tightened sufficiently.
- Make sure that the cables connected to the output terminals are not short-circuited or connected to earth.
- Make sure that the power lines L1 and N or L1, L2 and L3 and the frequency inverter outputs U, V and W are connected correctly.
- The earth terminal must be connected correctly.
- Only the terminals marked as earthing terminals must be earthed.
- The control lines must be connected correctly.

- Make sure that the frequency inverter and the motor are correct for the mains voltage.
- Check the position of the microswitches.
- Never operate the frequency inverter with opened power section covers (without fitted terminal shroud).
- The configured maximum frequency must match the maximum operating frequency of the connected motor.

▽ **Caution!**
Do not carry out h.v. tests as this could destroy the built-in overvoltage filters fitted between the mains voltage terminals and earth. which could be destroyed.

→ Sparkover voltage and insulation resistance tests (megger tests) have been carried out by the manufacturer.
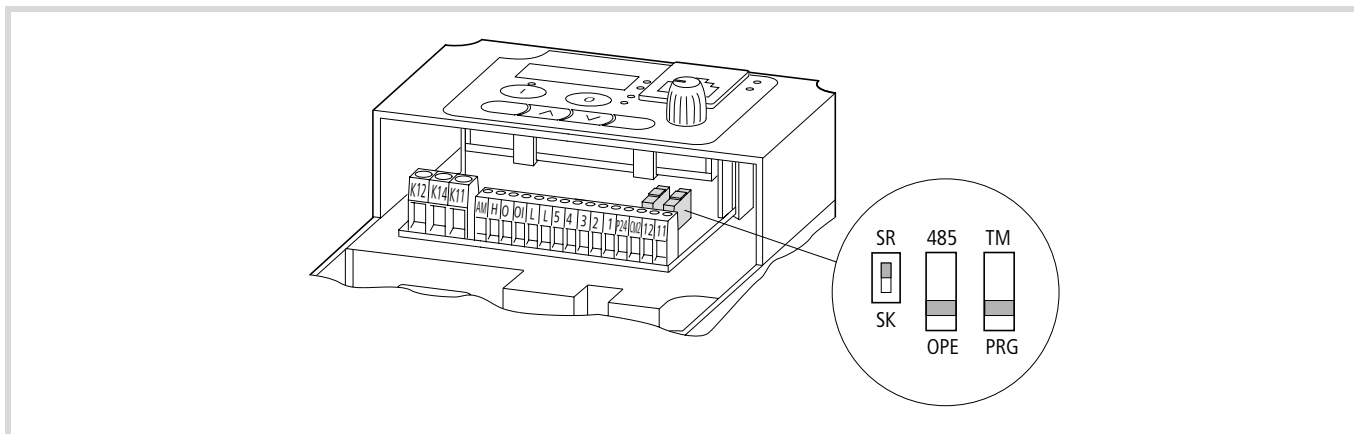
Figure 16: Default settings of microswitches

Table 6: Function of the microswitches

Switch	Function	Description, default setting
SR/SK	SR	SR = source, positive switching logic. Activate by applying control voltage (+24 V)
485/OPE	OPE	OPE = operator keypad (Optional: DEX-KEY-6…, DEX-KEY-10)
TM/PRG	PRG	PRG = program In this switch position, the control signal and reference value sources set with PNU A001 (A201) and A002 (A202) are taken into account. In the default configuration, these are input values at the control signal terminals. In switch position TM (= control terminals) only the reference value input through the control signal terminals is accepted, regardless of the value of PNU A001 and A002.

By default, the parameters of the DF51 frequency inverters are configured to fulfill the following requirements:

- Motor ratings: voltage, current and frequency of a normal, surface-cooled, four-pole three-phase asynchronous motor.
- Maximum speed: 1 500 r.p.m. at 50 Hz (DF51-320: 1 800 r.p.m. at 60 Hz).

- Acceleration and deceleration time = 10 seconds.

For settings for more complex applications, see the parameter list (page 37).

The basic versions of the DF51 frequency inverters contain an operating state LED.
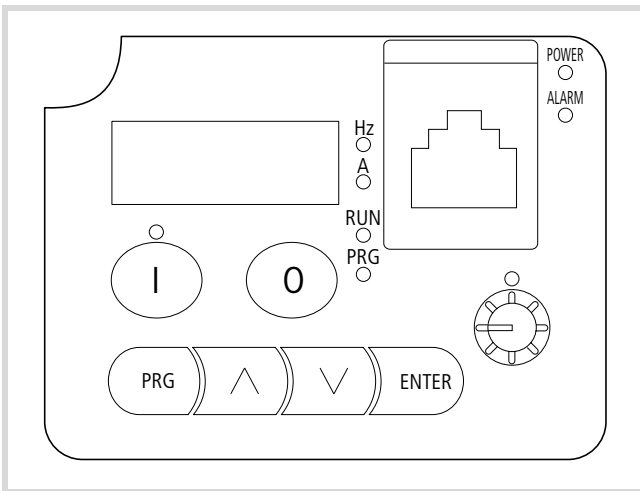
Figure 17: LCD keypad

Standard operation, actuation with default settings

Connect cables as shown below.
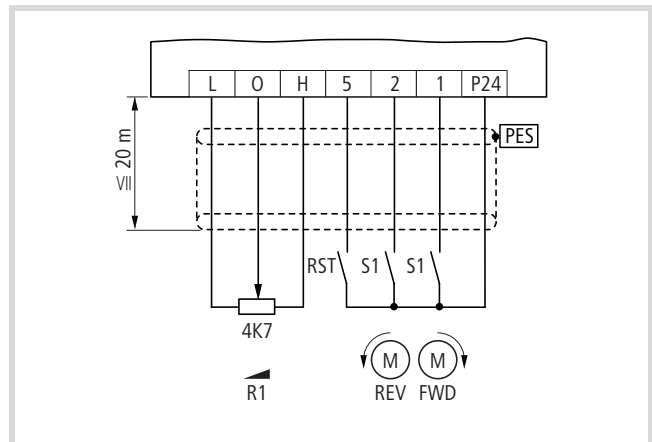
Figure 18: Active inputs at default setting

LED	Display	Explanation
POWER	Red	LED is lit when the frequency inverter has power.
ALARM	Red	LED is lit when an alarm message is issued.
RUN	Green	LED lit when frequency inverter operational (Enable signal for clockwise/anticlockwise operation, terminal 1 or 2) or running.

Table 7: Function of the inputs (→ fig. 18)

No.	Function	Level	DS	Technical data, description
L	Common reference potential	0 V	–	Reference potential for the internal voltage sources P24 and H
5	Digital input	HIGH = +12 … +27 V LOW = 0 to +3 V	Reset	PNP logic, configurable, R_i > 100 kΩ Reference potential: terminal L
2	Digital input		REV = anticlockwise rotating field	PNP logic, configurable, R_i = 5,6 kΩ Reference potential: terminal L
1	Digital input		FWD = clockwise rotating field	
P24	Output control voltage	+24 V	–	Supply voltage for actuation of digital inputs 1 to 5. Load carrying capacity: 30 mA Reference potential: terminal L
h	Output reference voltage	+10 V $\mathrm{-}$	–	Supply voltage for external reference value potentiometer. Load carrying capacity: 10 mA Reference potential: terminal L
O	Analog input	0 to +10 V $\mathrm{-}$	Frequency setpoint value (0 to 50 Hz)	R_i = 10 kΩ Reference potential: terminal L
L	Common reference potential	0 V	–	Reference potential for internal voltage sources P24, H and analog inputs

→ The Reset signal (RST) is also issued when you switch the supply voltage off (POWER LED off).

With the default settings ($\longrightarrow$ fig. 18) you can:

• start and stop the motor (S1 or S2),
• reverse the direction of rotation (S2 or S1),
• reset (RST) fault signals (ALARM),
• control the motor speed (0 to 50 Hz, or 0 to 60 Hz for DF51-320-…) with potentiometer R1 through the analog reference value input.

Switches and potentiometer are not included as standard with the frequency inverter.

▽ **Caution!**
During initial operation, check the following to prevent damage to the motor:

• Is the direction of rotation correct?
• Does a fault (ALARM LED) occur during acceleration or deceleration?
• Is the motor speed correct?
• Does any unusual motor noise or vibration occur?

▶ Switch on the supply voltage.

The POWER LED is lit.

▶ Close switch S1 (FWD = clockwise rotation).

The frequency inverter generates a clockwise rotating field and the motor, if connected normally, rotates in a clockwise direction.

▶ With potentiometer R1, you can change the frequency and therefore the motor speed.
▶ Open switch S1.

The motor speed is reduced to zero.

▶ Close switch S2 (REV = anticlockwise rotation).

The frequency inverter generates an anticlockwise rotating field and the motor, if connected normally, rotates in an anticlockwise direction.

▶ With potentiometer R1, you can change the frequency and therefore the motor speed.
▶ Open switch S2.

The motor speed is reduced to zero.

If both switches S1 and S2 are closed, the motor will not start. The motor speed reduces to zero during operation if you close both switches.

If a fault has occurred due to overcurrent or overvoltage, increase the acceleration or deceleration time. You can change the parameters through the built-in keypad, an optional external keypad (DEX-KEY-6…) or the Drive Soft parameterization software. The software is included on the CD-ROM supplied with the frequency inverter. To reset fault signals, close RST.

Output terminals

By default, the control signal outputs have the functions described below.
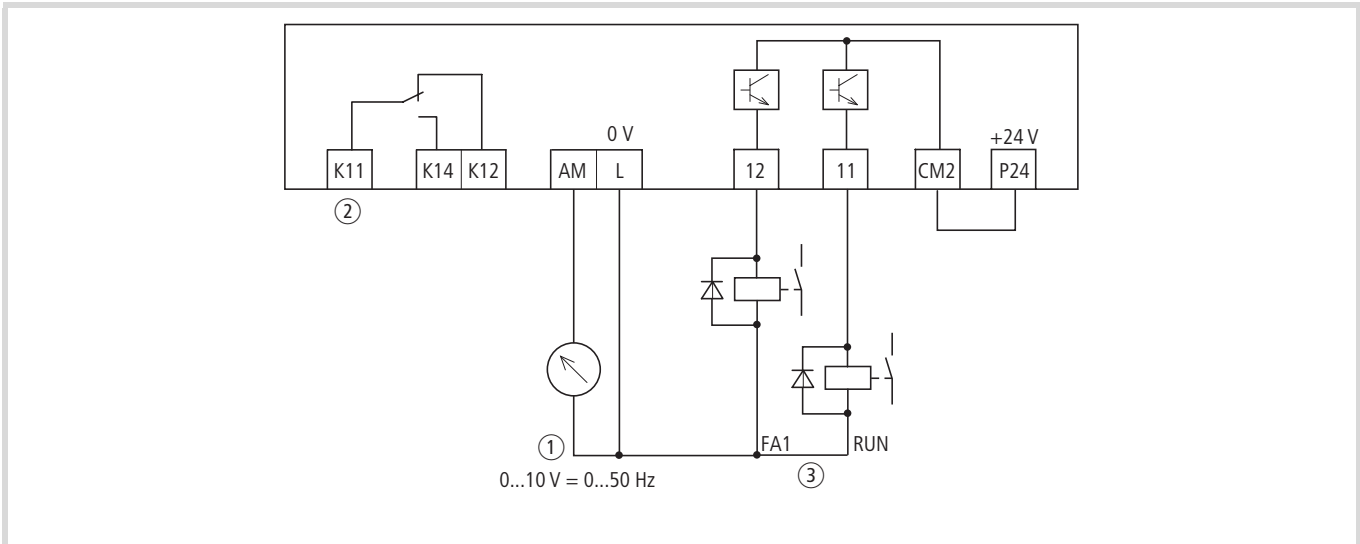
Figure 19: Active outputs with default settings

① Frequency indication, 0 to 10 V = 0 to 50 Hz
② AL fault message

③ FA1 = frequency reached (setpoint = actual value)
RUN = Run signal

→ Relay for direct connection to the digital outputs as shown in Figure 19, for example ETS-VS3.

Table 8: Function of the control signal terminals

No.	Function	Value	DS	Technical data, description
P24	Output control voltage	+24 V	–	Supply voltage Load carrying capacity: 30 mA Reference potential: terminal L
12	Transistor output	Up to 27 V = CM2	00 = RUN: Run signal	Configurable, open collector Load carrying capacity: up to 50 mA each
11	Transistor output		01 = FA1: Frequency achieved	
CM2	Reference potential, transistor output	0 V +24 V	–	Common reference potential for transistor outputs 11 and 12; max. load carrying capacity 100 mA (total of terminals 11 and 12) "Sink-type logic" connection: reference potential 0 V "Source-type logic" connection: reference potential +24 V (→ page15)
L	Common reference potential	0 V	–	Reference potential (0 V) for internal voltage source P24 and H, for analog inputs O and OI, and for analog output AM.
AM	Analog output	0 to +9.6 V	Frequency actual value (0 to 50 Hz)	Configurable DC voltage output, 10 V corresponds with the set end frequency (50 Hz). Accuracy: ±5 % from final value Load carrying capacity: 1 mA Reference potential: terminal L
K11	Relay contact	• Up to 250 V AC/2.5 A • Up to 30 V DC/3.0 A	05 = AL: Fault signal	• Operating signal: K11-K14 closed. • Fault message or power supply off: K11-K12 closed
K12	Break contact			
K14	Make contact			

LCD keypad

The illustration below shows the elements of the DF51's built-in keypad.
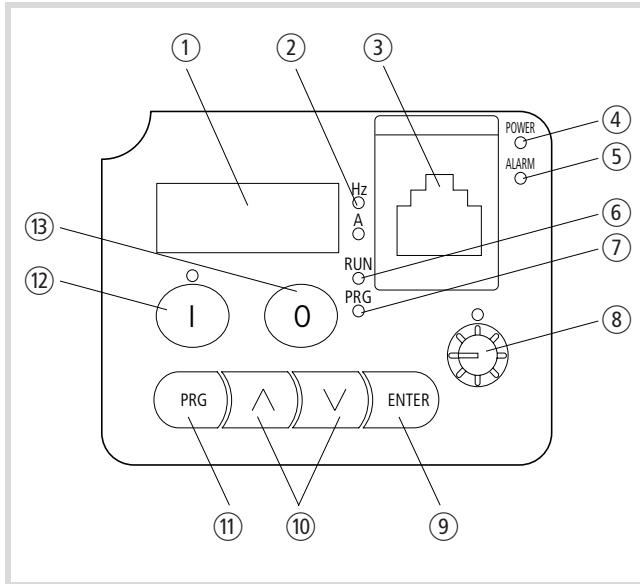
Figure 20: Keypad view

For an explanation of each of the elements, see Table 9.

Table 9: Explanation of the operation and display elements

Number	Name	Explanation
①	Four-digit digital display	Display for frequency, motor current, PNU, fault messages, etc.
②	LED: Hz or A	Display in ①: output frequency (Hz) ➞ PNU d001 (DS) or output current (A) ➞ PNU d002.
③	RS 485	Serial interfaces RS 485 and Modbus RT
④	POWER LED	LED is lit when the frequency inverter has power.
⑤	LED ALARM	LED is lit when a fault signal occurs.
⑥	RUN LED	LED lit in **RUN mode** when the frequency inverter is ready for operation or is in operation.
⑦	PRG LED	LED is lit when the input/change of parameter mode is active.
⑧	Potentiometer and LED	Frequency reference value setting LED is lit when the potentiometer is enabled ➞ PNU A001 = 00.
⑨	ENTER key	Saving entered or changed parameters values.

Number	Name	Explanation
⑩	Arrow keys	Selecting functions, changing numeric values ⌃ Increase ⌄ Reduce
⑪	PRG key	Programming mode. Selection and activation of the specified parameter (PNU)
⑫	START pushbutton and LED	Motor start with the selected direction; disabled by default. LED is lit when the pushbutton is enabled ➞ PNU A002 = 02
⑬	STOP key	Stop the running motor and acknowledge a fault signal (RST = Reset). Enabled by default, even when actuation is through terminals.

DS = default setting
PNU = parameter number

➞ The STOP pushbutton ⑬ is active in all operating modes (➞ PNU b087).

Use the PRG key to change the display between main menu, parameters and value range.

To scroll through the individual parameters, digits and functions, use the Up and Down arrow buttons.

➞ The changes you make remain saved in (non-retentive memory) as long as the frequency inverter DF51 is supplied with power (POWER LED is lit). The changes are saved permanently (in EEPROM) only when you press the ENTER key.

Menu overview

The following illustration shows the sequence in which the parameters appear on the display.
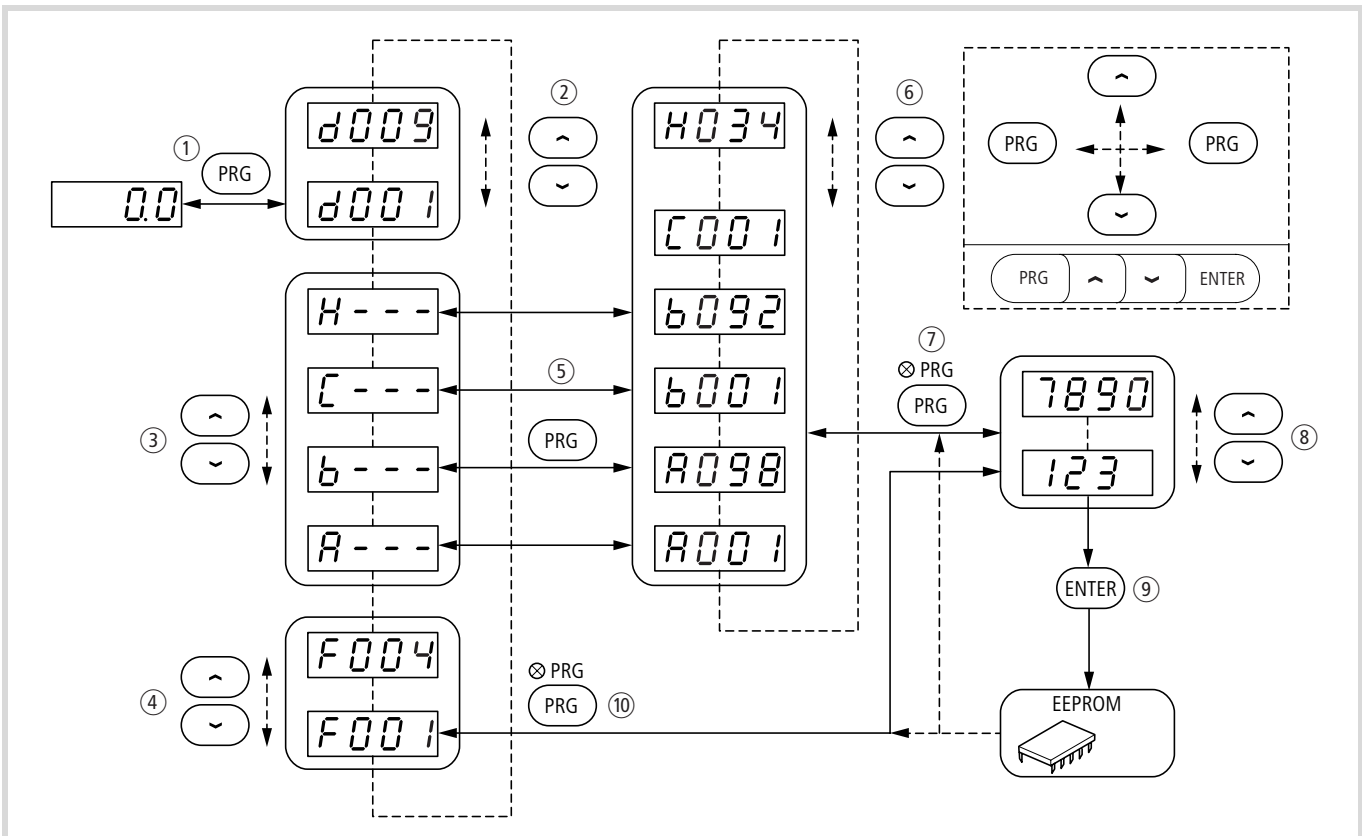
Figure 21: Navigation within the menu

① Change between the four-position digital display and the display parameters
② Select the display parameter
③ Selection in the main menu
④ Select the basic parameter
⑤ Change between main menu and the parameter level

⑥ Select a parameter (PNU)
⑦ Change between parameters (PNU) and value range
⑧ Select in value range (digits 0 to 9, functions)
⑨ Save values and return to parameter (PNU)
⑩ Return to main menu

→   The following example assumes the default settings.

Example for changing acceleration time 1: PNU F002
The frequency inverter is in display mode: LED POWER is lit and the display shows 0.0 Hz ①.

▶ Press the PRG key.

The display changes to d001.

▶ Press the DOWN key seven times until F002 appears on the display.
▶ Press the PRG key.

The PRG LED lights up.

The set acceleration time 1 in seconds appears on the display (default value: 10.00).

▶ With the UP and DOWN arrow buttons change the set values, for example to 5.00.

Hold the DOWN button to change the display value at logarithmically increasing step widths.

There are now two possibilities:

▶ Press the ENTER key to save the displayed value.
Press the PRG key to save the displayed value to non-retentive memory. When the power supply is switched off (LED POWER off), the value is lost.

F002 appears in the display and the PRG LED goes out.

▶ Press the UP button seven times until d001 appears.
▶ Press the PRG key.

The value 0.0 appears again in the display and the LED Hz lights up. You have reduced the acceleration time from 10 s to 5 s.
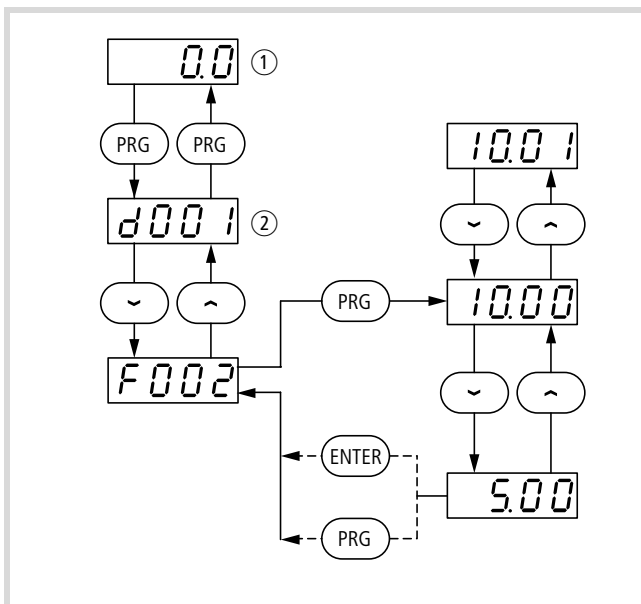
Figure 22: Change acceleration time 1

① Display value (default setting = 0.0 Hz)
② Parameter holding the displayed value ①

You can also change the parameter values of groups B and C and H as described in the example.

Example for changing the base frequency: PNU A004
▶ Press the PRG- pushbutton.
▶ Press the DOWN button until the main menu A--- shows in the display.
▶ Press the PRG key.

The display shows A001.

▶ Press the UP button until A004 shows in the display.
▶ Press the PRG key.

The PRG LED lights up. The value set under PNU A004 appears in the display (default value: 50).

▶ With the UP and DOWN arrow buttons change the set values, for example to 60 Hz.

As this is a limited operating parameter, you must press the ENTER key to accept it. If you press the PRG key, the new value is discarded.

The display shows A004.

▶ Press the PRG button until A--- shows in the display.
▶ Press the UP button until d001 shows in the display.
▶ Press the PRG key.

The frequency inverter changes to 0.0 Hz. You have changed the end frequency to 60 Hz, i.e. the previous reference value of 0 to 50 Hz now corresponds with 0 to 60 Hz. At 50 Hz (PNU A003) the

maximum output voltage is reached. Between 50 Hz and 60 Hz only the output frequency, and therefore the motor speed, changes.
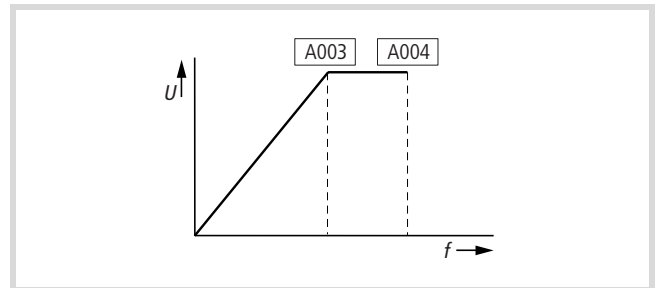
Figure 23: End frequency 60 Hz
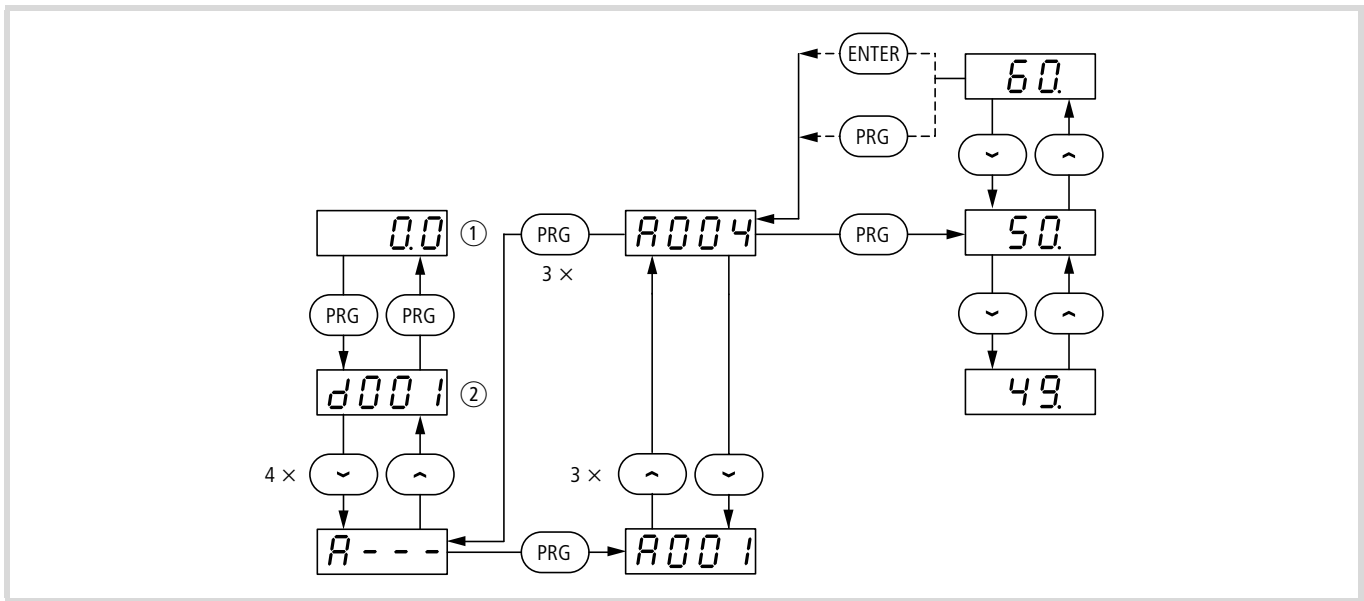
Figure 24: Change end frequency (example with default setting)

① Display value 0.0 Hz
② Parameter holding the displayed value ①

The chart below shows the programming steps required to enable the potentiometer and the start key on the keypad. The assigned green LED lights up to indicate activation.

→ Micro switch TM/PRG must be in the PRG position.

With these parameters the DF51 frequency inverter can be operated through the control signal terminals without commands.
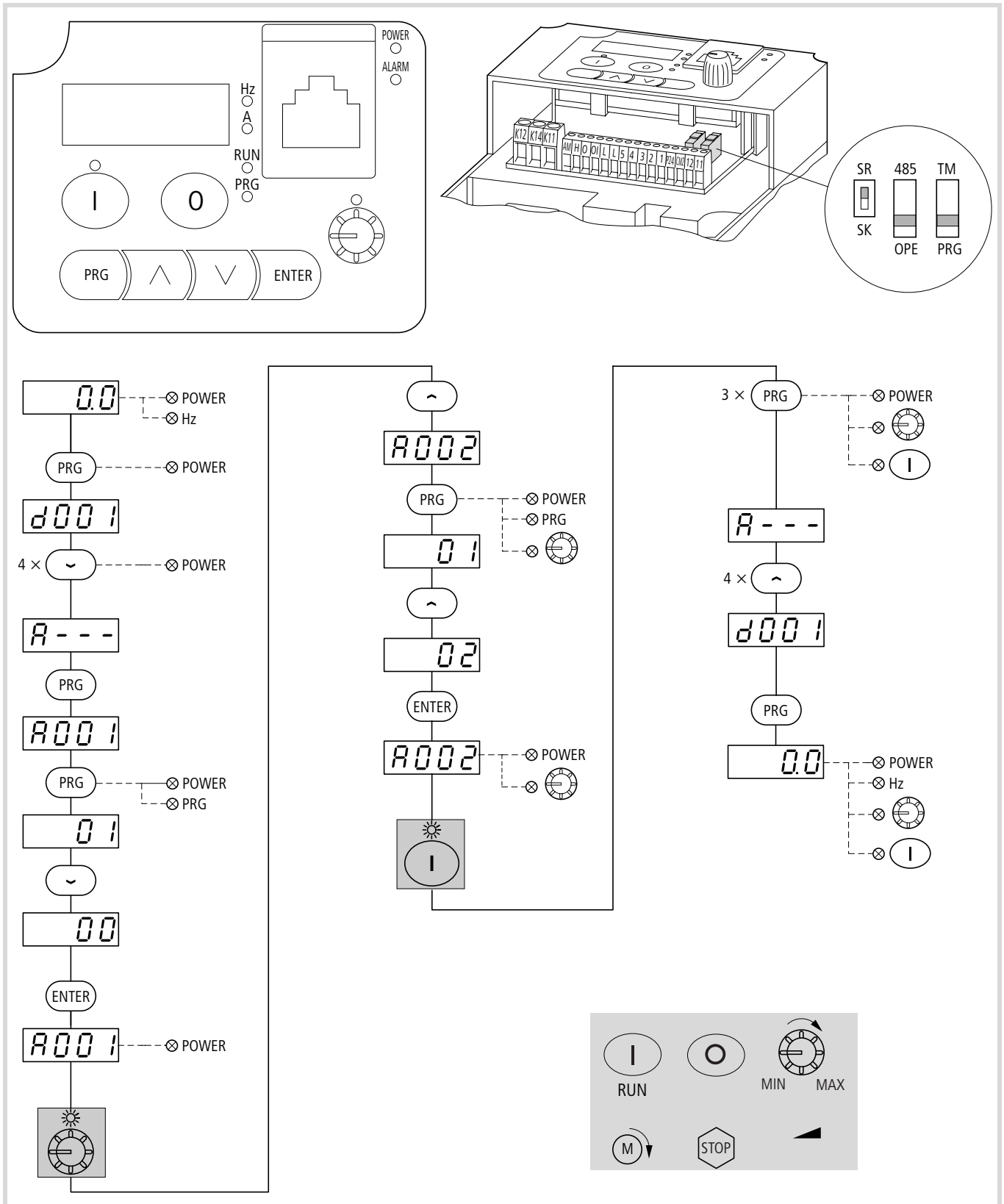
Figure 25: Reference values and control signals via keypad

4 Messages

This section lists the messages frequency inverter DF51 issues and explains their meaning.

Fault messages

Frequency inverter DF51 features several built-in monitoring functions. To protect against damage, the inverter is automatically inhibited when a fault signal is detected. The connected motor then coasts to a halt and the fault signal is indicated by the red ARLARM LED. DF51 remains inhibited until the fault signal is acknowledged. To acknowledge the fault signal:

• Press the STOP key,
• activate the digital input configured as RST,
• switch off the power supply.

Display	Cause	Description
E 01	Inverter overcurrent in static operation	In the following cases, the output current is too high: • The frequency inverter's output is short-circuited • The motor is blocked • An excessive load is suddenly applied to the output.
E02	Inverter overcurrent during deceleration	
E03	Inverter overcurrent during acceleration	
E04	Inverter overcurrent at standstill	
E05	Overload	The internal electronic motor protection has switched off the output voltage because of an overload.
E07	Overvoltage	Overvoltage in regenerative mode.
E08	EEPROM fault	The program memory is not operating reliably due to radio frequency interference, a control voltage short-circuit (P24–L) or excessive temperature. If the supply voltage is switched off while the RST input is active, an EEPROM fault may occur when the supply voltage is switched on again.
E09	Undervoltage	Insufficient DC voltage (error-free electronics function not possible; potential problems such as overheating of motor and insufficient torque).
E11	Processor malfunction	Processor is not working correctly, for example through RFI or excessive temperature.
E12	External fault message	An external fault signal is applied to a digital input configured as EXT input.
E13	Restart inhibit activated	The mains voltage was switched on or an intermittent interruption in the supply voltage has occurred while unattended start protection (input USP) was active.
E14	Ground fault	Earth faults between the U, V or W terminals and earth are being reliably detected. A protective circuit prevents destruction of the frequency inverter at startup, but does not protect the operating personnel.
E15	Mains overvoltage	The mains voltage exceeds the permissible value. Shutdown about 100 s after activation of power supply.
E21	Overtemperature	The built-in temperature sensor in the power section is measuring an operating temperature above the permissible limit value.
E23	Gate array fault	Internal communication error between CPU and gate array
E35	Thermistor fault signal	The resistance of the externally fitted PTC thermistor connected to the PTC input (digital input configured as PTC input) is too high.
E60	Communication fault	Communication with the frequency inverter timed out ⟶ PNU C076 and C077.

Fault message register

Frequency inverter DF51 possesses a fault register to which the three most recent fault messages are saved. You can retrieve these under PNU d081 to d083. PNU d081 shows the most recent fault message, PNU d082 last but one, etc. When a new fault occurs, it is saved to PNU d081 and all older faults are moved on by one PNU (PNU d081 → d082, PNU d082 → d083, etc.)
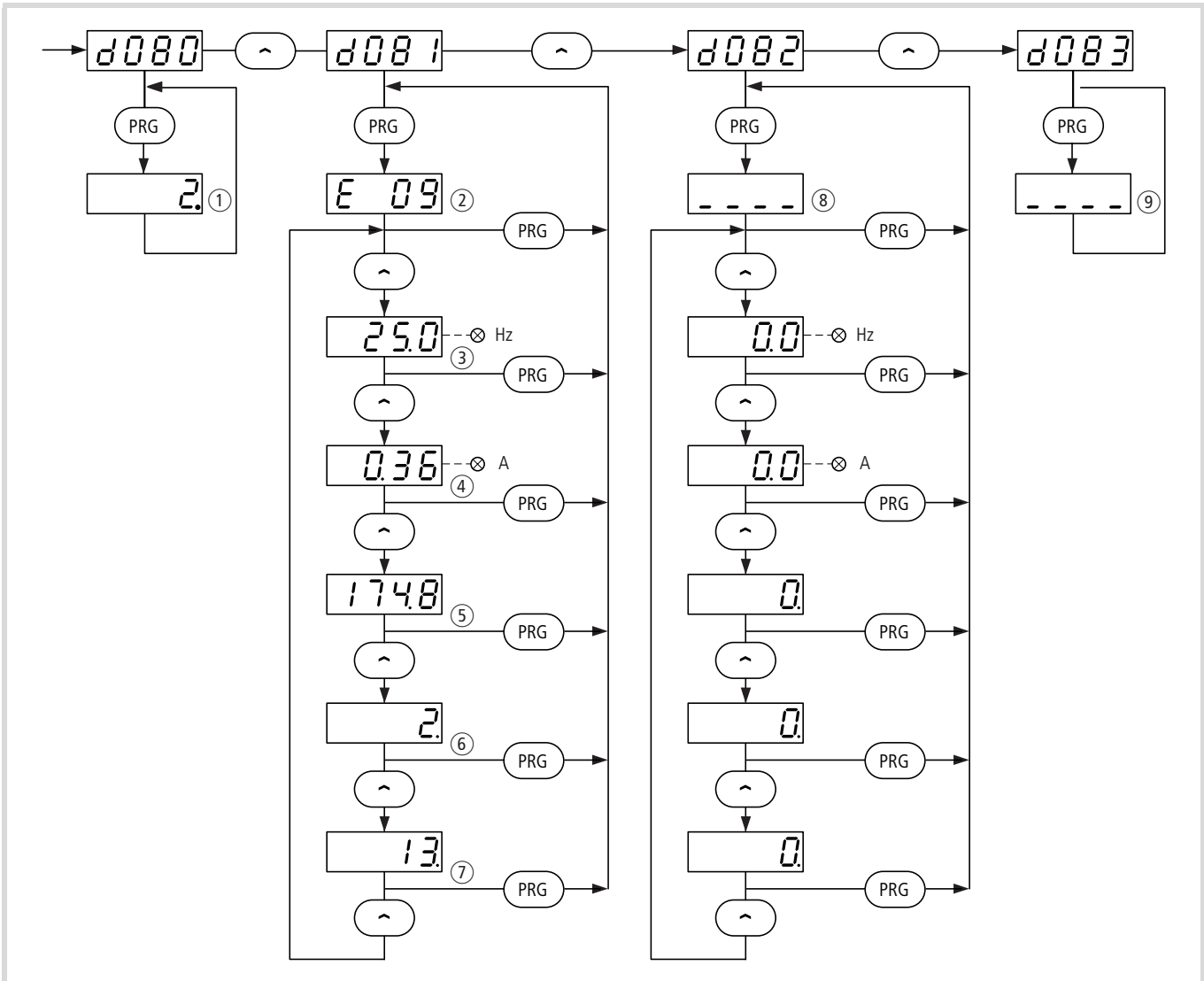
Figure 26: Data in the fault register at the time of the fault signal

① Total number of occurred faults
② Code of the current fault signal
③ Frequency in Hz
④ Output current in A
⑤ Internal DC link voltage in V

⑥ Total operating time in h in RUN mode up to the fault signal
⑦ POWER ON time in h, power supply switched on up to fault signal
⑧ Most recent fault signal (no fault indicated in example)
⑨ Last but one fault signal

→   You can clear the fault register under PNU b084 (00 or 02).

5 Troubleshooting

Fault	Condition	Possible cause	Remedy
The motor does not start.	There is no voltage present at outputs U, V and W.	Is voltage applied to terminals L, N and/or L1, L2 and L3? If yes, is the ON lamp lit?	Check terminals L1, L2, L3 and U, V, W. Switch on the supply voltage.
		Is the LED display on the keypad indicating a fault message (E …)?	Analyze the cause of the fault message. Acknowledge the fault message with the reset command (for example by pressing the STOP key).
		Has a start signal been issued?	Issue the start signal with the START key or through the FWD/REV input.
		Has a setpoint frequency been entered under PNU F001 (for control through operator panel only)?	Enter a setpoint frequency under PNU F001.
		Are the setpoint definitions through the potentiometer correctly wired to terminals H, O and L?	Check that the potentiometer is connected correctly.
		Are inputs O and OI connected correctly for external setpoint input?	Check that the setpoint signal is correctly connected.
		Are the digital inputs configured as RST or FRS still active?	Deactivate RST and/or FRS. Check the signal on digital input 5 (default setting: RST).
		Has the correct source for the setpoint frequency (PNU A001) been set? Has the correct source for the start signal (PNU A002) been set?	Correct PNU A001 accordingly. Correct PNU A002 accordingly.
	There is voltage present at outputs U, V and W.	Is the motor blocked or is the motor load too high?	Reduce the load acting on the motor. Test the motor without load.
The motor turns in the wrong direction.	–	Are output terminals U, V and W correctly connected? Does the connection of terminals U, V and W correspond with the direction of rotation of the motor?	Connect output terminals U, V and W correctly to the motor according to the required direction of motor rotation (generally the sequence U, V, W causes clockwise operation).
		Are the control signal terminals correctly wired?	Control signal terminal FW(D) for clockwise operation and REV for anticlockwise operation.
		Has PNU F004 been correctly configured?	Set the desired direction of rotation under PNU F04.
The motor will not start.	–	No setpoint value is applied to terminal O or OI.	Check the potentiometer or the external setpoint generator and replace if necessary.
		Is a fixed frequency accessed?	Observe the sequence of priority: the fixed frequencies always have priority over inputs O and OI.
		Is the motor load too high?	Reduce the motor load as the overload limit will prevent the motor reaching its normal speed if there is an overload.
The motor does not operate smoothly.	–	Are the load changes on the motor too high?	Select a frequency inverter and motor with a higher performance. Reduce the level of load changes.
		Do resonant frequencies occur on the motor?	Mask these frequencies with the frequency jumps (PNU A063 to A068) or change the pulse frequency (PNU b083).

Fault	Condition	Possible cause	Remedy
The drive speed does not correspond with the frequency	–	Is the maximum frequency set correctly?	Check the set frequency range or the set voltage/frequency characteristic.
		Are the rated speed of the motor and the gearbox reduction ratio correctly selected?	Check the rated motor speed or the gearbox reduction ratio.
The saved parameters do not correspond to the entered values.	Entered values have not been saved.	The supply voltage was switched off before the entered values were saved by pressing the ENTER key.	Re-enter the affected parameters and save the input again.
		After the supply voltage was switched off, the entered and saved values are transferred into the internal EEPROM. The supply voltage should remain off for at least six seconds.	Enter the data again and switch off the supply voltage for at least six seconds.
	The values of the copy unit were not accepted by the frequency inverter.	After copying the parameters of the external keypad DEX-KEY-10 into the frequency inverter, the supply voltage was left on for less than six seconds.	Copy the data again and leave the supply voltage on for at least six seconds after completion.
It is not possible to make any inputs.	The motor cannot be started or stopped or setpoint values cannot be set.	Are PNU A001 and A002 set correctly?	Check the settings under PNU A001 and A002.
	No parameters can be set or changed.	Has software parameter protection been activated?	To allow parameter changes, disable parameter protection with PNU b031.
		Has the hardware parameter protection been activated?	Disable the digital input configured as SFT.
The electronic motor protection activates (fault message E05).		Is the manual voltage boost set too high? Were the correct settings made for the electronic motor protection?	Check the boost setting and the electronic motor protection setting.

To be observed when saving changed parameters:

After saving changed parameters with the ENTER key, no inputs can be made using the frequency inverter's keypad of the for at least six seconds. If a key is pressed before this time elapses or if the reset command is issued or the frequency inverter is switched off, the data may not be correctly saved.

Appendix

Technical data

General technical data of the DF51

The table below contains the technical data for all DF51 frequency inverters.

		DF51
Protection class according to EN 60529		IP 20
Overvoltage category		III
Secondary side: Frequency range		0 to 400 Hz With motors which are operated at rated frequencies above 50/60 Hz, the maximum possible motor speed should be observed.
Frequency error limits (at 25 °C ±10 °C)		• Digital setpoint value: ±0.01 % of the maximum frequency • Analog setpoint value: ±0.1 % of the maximum frequency
Frequency resolution		• Digital setpoint value: 0.1 Hz • Analog setpoint value: Maximum frequency/1000
Voltage/frequency characteristic		Constant or reduced torque
Permissible overcurrent		150% for 60 seconds (once every 10 minutes)
Acceleration/deceleration time		0.1 to 3 000 s at linear and non-linear characteristic (applies also for second acceleration/deceleration time)
Inputs		
Frequency setting	LCD keypad	Setting through keys or potentiometer
	External signals	• 0 to 10 V⎓, input impedance 10 kΩ • 4 to 20 mA, load impedance 250 Ω • Potentiometer ≧ 1 kΩ, recommended 4.7 kO
Clockwise/anticlockwise operation (start/stop)	LCD keypad	START key (for Start) and OFF key (for Stop); default setting = clockwise operation
	External signals	Digital control inputs programmable as FWD and REV
Digital control inputs programmable as		• FWD: Start/stop clockwise rotating field • REV: Start/stop anticlockwise rotating field • FF1 to FF4: Fixed frequency selection • JOG: Jog mode • AT: Use setpoint value 4 to 20 mA • 2CH: Second time ramp • FRS: Free run stop • EXT: External fault message • USP: Unattended start protection • RST: Reset • SFT: Software protection • PTC: PTC thermistor input • DB: DC braking active • SET: Second parameter set active • UP: Remote control, acceleration • DWN: Remote access, deceleration

	DF51
Outputs	
Digital signalling outputs programmable as	• FA1/FA2: Frequency reached/exceeded • OL: Overload • AL: Fault • RUN: Motor operational • OD: PID deviation exceeded
Frequency and current monitoring	• Connection of an analog display device: 0 to 10 V⎓, up to 1 mA for frequency or current • Connection of a digital frequency meter
Signalling relay	Relay contacts as two-way switch
Further features (not a complete listing)	• Automatic voltage regulation • Unattended start protection • Variable amplification and output voltage reduction • Frequency jumps • Minimum/maximum frequency limitation • Output frequency display • Fault history register available • Freely selectable pulse frequency: 2 to 14 kHz • PID control • Automatic torque boost • On/OFF fan control • Second parameter set selectable
Safety features	• Overcurrent • Overvoltage • Undervoltage • Overtemperature • Earth fault (on Power On) • Overload • Electronic motor protection • Current transformer fault • Dynamic braking function (regenerative)
Ambient conditions	
Ambient temperature	−10 to +50 °C From about +40 to +50 °C, the pulse frequency should be reduced to 2 kHz. The output current should be less than 80 % of the rated current in this case.
Temperature/humidity during storage	−25 to 70 °C (for short periods only, for example during transport) 20 to 90 % relative humidity (non condensing)
Permissible vibration	Maximum 5.9 m/s^2 (= 0.6 g) at 10 to 55 Hz
Installation height and location	Maximum 1 000 m above sea level in a housing or control panel (IP 54 or similar)
Optional accessories	• Remote operating units DEX-KEY-10, DEX-KEY-6, DEX-KEY-61 • Line reactor to improve the power factor • RFI filters • Motor reactor • Sinusoidal filters

Specific technical data of the DF51-322

The table below contains the technical data specific to the single-
and three-phase 230 V series (current, voltage, torque values, etc.)

DF51-322-…		025	037	055	075	1K1	1K5	2K2
Maximum permissible active power of motor in kW; data for four-pole three-phase asynchronous motors		0,25	0,37	0,55	0,75	1,1	1,5	2,2
Maximum permissible apparent motor power in kVA	230 V	0,5	1,0	1,1	1,5	1,9	2,8	3,9
	240 V	0,5	1,0	1,2	1,6	2,0	2,9	4,1
Primary side: Number of phases		Single-phase/three-phase						
Primary side: Rated voltage		180 V ~ −0 % to 264 V ~ +0 %, 47 to 63 Hz						
Secondary side: Rated voltage		Three-phase 200 to 240 V ~ Corresponding to the primary side rated voltage If the primary voltage drops, the secondary voltage also drops.						
Primary side: Rated current in A	Single-phase	3,1	5,8	6,7	9,0	11,2	16,0	22,5
	Three-phase	1,8	3,4	3,9	5,2	6,5	9,3	13,0
Secondary side: Rated current in A		1,6	2,6	3,0	4,0	5,0	7,1	10,0
Torque during start		100 % from 6 Hz						
Braking torque								
With feedback to the capacitors		100 % at $f \leqq$ 50 Hz 50 % at $f \leqq$ 60 Hz					50 % at $f \leqq$ 60 Hz	20 % at $f \leqq$ 60 Hz
With DC braking		Braking occurs at frequencies below the minimum frequency (minimum frequency, braking time and braking torque are user-definable)						
	External signals	Digital control inputs programmable as FWD and REV						
Fan		–	–	–	–	–	–	✓

Specific technical data of the DF51-320

The table below contains the technical data specific to the three-phase 230 V series (current, voltage, torque values, etc.)

DF51-320-…		4K0	5K5	7K5
Maximum permissible active power of motor in kW; data for four-pole three-phase asynchronous motors		4,0	5,5	7,5
Maximum permissible apparent motor power in kVA	230 V	6,3	9,5	12,7
	240 V	7,2	9,9	13,3
Primary side: Number of phases		Three-phase		
Primary side: Rated voltage		180 V ~ −0 % to 264 V ~ +0 %, 47 to 63 Hz		
Secondary side: Rated voltage		Three-phase 200 to 240 V ~ Corresponding to the primary side rated voltage If the primary voltage drops, the secondary voltage also drops.		
Primary side: Rated current in A	Three-phase	20,0	30,0	40,0
Secondary side: Rated current in A		15,9	24,0	32,0
Torque during start		100 % from 6 Hz		
Braking torque				
With feedback to the capacitors		20 % at $f \leqq 60$ Hz		
With DC braking		Braking occurs at frequencies below the minimum frequency (minimum frequency, braking time and braking torque are user-definable)		
Fan		✓	✓	✓

Specific technical data of the DF51-340

The table below contains the technical data specific to the three-phase 400 V series (current, voltage, torque values, etc.)

DF51-340-…	037	075	1K5	2K2	3K0	4K0	5K5	7K5
Maximum permissible active power of motor in kW; data for four-pole three-phase asynchronous motors	0,37	0,75	1,5	2,2	3,0	4,0	5,5	7,5
Maximum permissible apparent motor power in kVA for 460 V	1,1	1,9	2,9	4,2	6,2	6,6	10,3	12,7
Primary side: Number of phases	Three-phase							
Primary side: Rated voltage	342 V ~ −0 % to 528 V ~ +0 %, 47 to 63 Hz							
Secondary side: Rated voltage	Three-phase 360 to 460 V ~ Corresponding to the primary side rated voltage If the primary voltage drops, the secondary voltage also drops.							
Primary side: Rated current in A	2,0	3,3	5,0	7,0	10,0	11,0	16,5	20,0
Secondary side: Rated current in A	1,5	2,5	3,8	5,5	7,8	8,6	13,0	16,0
Torque during start	100 % from 6 Hz							
Braking torque								
With feedback to the capacitors	50 % at $f \leqq 60$ Hz			20 % at $f \leqq$ 60 Hz	20 % at $f \leqq 60$ Hz			
With DC braking	Braking occurs at frequencies below the minimum frequency (minimum frequency, braking time and braking torque are user-definable)							
Fan	–	–	✓	✓	✓	✓	✓	✓

Table for recording user-defined parameter settings

Parameter list for DF51 frequency inverters.

For a detailed description of the parameters, see the specified page in the manual (AWB8230-1540G).

Frequency inverters DF51-322-… (single- and three-phase mains connection, rated voltage 230 V, 50/60 Hz) and DF51-340-… (three-phase mains connection, rated voltage 400 V, 50/60 Hz) work with the European operating system. The default settings are listed in the DS column. The DF51-320-… devices can be used only on three-phase AC mains (200/215/220/230/240 V, 50/60 Hz) and are supplied with the US version of the operating system. The default values that apply here are shown in curly brackets {xx}.

PNU = parameter number displayed on the LCD keypad.

RUN = access rights to parameters in RUN mode (RUN LED is lit):

b031 = 10 = extended access rights to parameters in RUN mode (RUN LED is lit):

- ✓ = enabled.
- − = disabled.

Enter your application-specific settings in the **User setting** column in the table below.

→ The parameters of the second parameter set (PNU **2**…) always have the figure "2" in the first place and a grey background in the table ▨. On keypad DEX-KEY-… they are displayed only when this function is enabled (→ PNU C001 = 08: SET).

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
A001	−	−	Frequency reference value source selection	00:	Potentiometer (keypad)	01		
				01:	Analog input O/OI			
				02:	Digital input (function PNU F001 or A020) and LCD keypad DEX-KEY-…			
				03:	Serial interface (Modbus)			
				10:	Calculated value			
A201	−	−	Frequency reference value source selection (second parameter set)	Value → PNU A001		01		
A002	−	−	Start signal source selection	01:	Digital input (FWD/REV)	01		
A202	−	−	Start signal source selection (second parameter set)	02:	START button (keypad)	01		
				03:	Serial interface (Modbus)			
				Value → PNU A002				
A003	−	−	Base frequency	30 − 400 Hz, up to value of PNU A004 [Hz]		50 {60}		
A203	−	−	Base frequency (second parameter set)	30 − 400 Hz, up to value of PNU A004 [Hz]		50 {60}		
A004	−	−	End frequency (f_{max})	30 − 400 Hz		50 {60}		
A204	−	−	End frequency (f_{max}) (second parameter set)	Values → PNU A004		50 {60}		
A005	−	−	Analog input − selection (AT)	On active AT signal (→ PNU C001 = 16) a changeover takes place between:		00		
				00:	analog inputs O and OI			
				01:	the locked range (PNU A011 to A015 or A101 to A105) and analog inputs O and OI			
				02:	analog input O and potentiometer (optional keypad DEX-KEY-6)			
				03:	analog input OI and potentiometer (optional keypad DEX-KEY-6)			
A011	−	✓	Analog input (O-L) − frequency at minimum reference value	0 − 400 Hz		0.0		

PNU	RUN	b031 = 10	Name	Value range	DS	Page	User setting
A012	–	✓	Analog input (O-L) – frequency at maximum reference value	0 – 400 Hz	0.0		
A013	–	✓	Analog input (O-L) – minimum reference value (offset)	0 – 100 %	0.0		
A014	–	✓	Analog input (O-L) – maximum reference value (offset)	0 – 100 %	100.		
A015	–	✓	Analog input (O-L) – selection of starting frequency applied to the motor at minimum reference value	00: Value of PNU A011 01: 0 Hz	01		
A016	–	✓	Analog input – filter time constant	1 – 8	8		
A020	✓	✓	Frequency reference input – reference value through keypad, PNU A001 must equal 02	0 – 400 Hz	0.0		
A220	✓	✓	Frequency reference input – reference value through keypad, PNU A001 must equal 02 (second parameter set)	0 – 400 Hz	0.0		
A021	✓	✓	Frequency reference input – fixed frequency (1)	0 – 400 Hz	0.0		
A022	✓	✓	Frequency reference input – fixed frequency (2)	0 – 400 Hz	0.0		
A023	✓	✓	Frequency reference input – fixed frequency (3)	0 – 400 Hz	0.0		
A024	✓	✓	Frequency reference input – fixed frequency (4)	0 – 400 Hz	0.0		
A025	✓	✓	Frequency reference input – fixed frequency (5)	0 – 400 Hz	0.0		
A026	✓	✓	Frequency reference input – fixed frequency (6)	0 – 400 Hz	0.0		
A027	✓	✓	Frequency reference input – fixed frequency (7)	0 – 400 Hz	0.0		
A028	✓	✓	Frequency reference input – fixed frequency (8)	0 – 400 Hz	0.0		
A029	✓	✓	Frequency reference input – fixed frequency (9)	0 – 400 Hz	0.0		
A030	✓	✓	Frequency reference input – fixed frequency (10)	0 – 400 Hz	0.0		
A031	✓	✓	Frequency reference input – fixed frequency (11)	0 – 400 Hz	0.0		
A032	✓	✓	Frequency reference input – fixed frequency (12)	0 – 400 Hz	0.0		
A033	✓	✓	Frequency reference input – fixed frequency (13)	0 – 400 Hz	0.0		
A034	✓	✓	Frequency reference input – fixed frequency (14)	0 – 400 Hz	0.0		
A035	✓	✓	Frequency reference input – fixed frequency (15)	0 – 400 Hz	0.0		

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
A038	✓	✓	Jog mode – jog mode reference value	0 – 9.99 Hz		1.00		
A039	–	✓	Jog mode – motor stop method	00:	Free coasting	00		
				01:	Deceleration ramp			
				02:	DC braking			
A041	–	–	Boost function	00:	Manual	00		
				01:	Automatic			
A241	–	–	Boost function (second parameter set)	Values ➝ PNU A041		00		
A042	✓	✓	Boost, manual voltage boost)	0 – 20 %		5.0		
A242	✓	✓	Boost – manual voltage boost (second parameter set)[1]	0 – 20 %		0.0		
A043	✓	✓	Boost, transition frequency for maximum voltage boost)	0 – 50 %		3.0		
A243	✓	✓	Boost, transition frequency for maximum voltage boost (second parameter set)[1]	0 – 50 %		0.0		
A044 A244	– –	– –	U/f characteristic U/f characteristic (second parameter set)	00:	Constant torque curve	02 02		
				01:	Reduced torque curve			
				Values ➝ PNU A044				
A045	–	–	U/f characteristic – output voltage	20 – 100 %		100		
A245	–	–	U/f characteristic – output voltage (second parameter set)	Values ➝ PNU A045		100		
A051	–	✓	DC braking	00:	OFF: Disabled	00		
				01:	ON: Enabled			
A052	–	✓	DC braking – starting frequency	0 – 60 Hz		0.5		
A053	–	✓	DC braking – waiting time	0 – 5 s		0.0		
A054	–	✓	DC braking – braking torque	0 – 100 %		0.		
A055	–	✓	DC braking – braking duration	0 – 60 s		0.0		
A056	–	✓	DC braking – behaviour on activation of the digital input (DB)	00:	Timed braking according to value of PNU A055	01		
				01:	Continuous operation			
A061	–	✓	Maximum operating frequency	0 – 400 Hz		0.0		
A261	–	✓	Maximum operating frequency (second parameter set)	0 – 400 Hz		0.0		
A062	–	✓	Minimum operating frequency	0.5 – 400 Hz		0.0		
A262	–	✓	Minimum operating frequency (second parameter set)	0 – 400 Hz		0.0		
A063	–	✓	Frequency jump (1)	0 – 400 Hz		0.0		
A064	–	✓	Frequency jump (1) – jump width	0 – 10 Hz		0.5		

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
A065	–	✓	Frequency jump (2)	0 – 400 Hz		0.0		
A066	–	✓	Frequency jump (2) – jump width	0 – 10 Hz		0.5		
A067	–	✓	Frequency jump (3)	0 – 400 Hz		0.0		
A068	–	✓	Frequency jump (3) – jump width	0 – 10 Hz		0.5		
A071	–	✓	PID control	00:	OFF: Disabled	00		
				01:	ON: Enabled			
A072	✓	✓	PID controller – P-component	0.2 – 5.0		0.1		
A073	✓	✓	PID controller – I-component	0.0 – 150 s		0.1		
A074	✓	✓	PID controller – D-component	0.00 – 100 s		0.01		
A075	–	✓	PID controller, actual value factor PV	0.01 – 99.99		1.00		
A076	–	✓	PID controller – actual value signal PV input	00:	Analog input OI	00		
				01:	Analog input O			
				02:	Serial interface (Modbus)			
				10:	Calculated value (PNU A143)			
A077	–	✓	PID controller – invert input signals	00:	OFF: Disabled	00		
				01:	ON: Enabled			
A078	–	✓	PID controller – output signal limit	0 – 100 %		0.0		
A081	–	–	Output voltage (AVR function)	00:	ON: Enabled	00		
				01:	OFF: Disabled			
				02:	DOFF: Disabled during deceleration			
A082	–	–	Output voltage (AVR motor rated voltage)	DF51-32…-…: 200, 215, 220, **230**, 240		230/400		
				DF51-340-…: 380, **400**, 415, 440, 460, 480				
				Default setting depends on series				
A092	✓	✓	Acceleration time 2	0.01 – 3000 s		15.00		
A292	✓	✓	Acceleration time 2 (second parameter set)	0.01 – 3000 s		15.00		
A093	✓	✓	Deceleration time 2	0.01 – 3000 s		15.00		
A293	✓	✓	Deceleration time 2 (second parameter set)	0.01 – 3000 s		15.00		
A094	–	–	Acceleration time, specify signal for changeover from acceleration time 1 to acceleration time 2	00:	Digital input (2CH)	00		
				01:	Frequency (PNU A095 or A096)			
A294	–	–	Acceleration time, specify signal for changeover from acceleration time 1 to acceleration time 2 (second parameter set)	00:	Digital input (2CH)	00		
				01:	Frequency (PNU A295 or A296)			
A095	–	–	Acceleration time, frequency for changeover from ramp time 1 to ramp time 2	0.0 – 400 Hz		0.0		

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
A295	–	–	Acceleration time, frequency for changeover from ramp time 1 to ramp time 2 (second parameter set)	0.0 – 400 Hz		0.0		
A096	–	–	Deceleration time, frequency for changeover from ramp time 1 to ramp time 2	0.0 – 400 Hz		0.0		
A296	–	–	Deceleration time, frequency for changeover from ramp time 1 to ramp time 2 (second parameter set)	0.0 – 400 Hz		0.0		
A097	–	–	Acceleration time, characteristic	00:	linear	00		
				01:	S curve			
A098	–	–	Deceleration time, characteristic	00:	linear	00		
				01:	S curve			
A101	–	✓	Analog input (OI-L), frequency at minimum reference value	0 – 400 Hz		0.0		
A102	–	✓	Analog input (OI-L), frequency at maximum reference value	0 – 400 Hz		0.0		
A103	–	✓	Analog input (OI-L), minimum reference value (offset)	0 – 100 %		0.		
A104	–	✓	Analog input (OI-L), maximum reference value (offset)	0 – 100 %		100.		
A105	–	✓	Analog input (OI-L), selection of starting frequency applied to the motor at minimum reference value	00:	Value from PNU A101	01		
				01:	0 Hz			
A141	–	✓	Calculator – select input A	00:	Keypad value	02		
				01:	Keypad potentiometer			
				02:	Analog input (O)			
				03:	Analog input (OI)			
				04:	Serial interface (Modbus)			
A142	–	✓	Calculator – select input B	Values ⟶ PNU A141		03		
A143	–	✓	Calculator – operation	00:	Addition (A + B)	00		
				01:	Subtraction (A – B)			
				02:	Multiplication (A × B)			
A145	✓	✓	Calculator – offset frequency	0 – 400 Hz		0.0		
A146	–	✓	Calculator – offset frequency, prefix	Value from PNU A145		00		
				00:	plus			
				01:	minus			
A151	–	✓	Potentiometer, start frequency	0 – 400 Hz		0.0		
A152	–	✓	Potentiometer, end frequency	0 – 400 Hz		0.0		
A153	–	✓	Potentiometer, Start point	0 – 100 %		0		
A154	–	✓	Potentiometer, end point	0 – 100 %		100		
A155	–	✓	Potentiometer, start frequency source	00:	Value from PNU A151	01		
				01:	0 Hz			

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
b001	–	✓	POWER, restarting mode after power supply interruption	00:	0 Hz Start	00		
				01:	Automatic restart at set starting frequency after expiry of time set with PNU b003.			
				02:	After the time set with PNU b003 has elapsed, the frequency inverter synchronizes to the current motor rotation speed and the motor is accelerated to the current reference value in the set ramp times.			
				03:	After the time set under PNU b003 has elapsed, the inverter synchronizes to the current motor rotation speed and the motor brakes to a stop in the set deceleration time. A fault message is then displayed.			
b002	–	✓	POWER, permissible power supply downtime	0.3 – 25 s		1.0		
b003	–	✓	POWER, waiting time before automatic restart after power supply failure	0.3 – 100 s		1.0		
b004	–	✓	POWER, generate undervoltage fault signal, direct de-energizing on power supply failure	00:	OFF: Disabled	00		
				01:	ON: Enabled			
b005	–	✓	POWER, number of automatic restarting attempts after undervoltage fault signal	00:	16 restarts	00		
				01:	No limit			
b012	–	✓	Thermal overload, tripping current	$0.2 – 1.2 \times I_e$ [A] Depending on frequency inverter's rated current (I_e)		xx		
b212	–	✓	Thermal overload, tripping current (second parameter set)	$0.2 – 1.2 \times I_e$ [A] Default, dependent on frequency inverter's rated current (I_e)		xx (I_e)		
b013	–	✓	Thermal overload, characteristic (torque curve)	00:	Reduced torque 1	01		
				01:	Constant torque			
				02:	Reduced torque 2			
b213	–	✓	Thermal overload, characteristic (torque curve) (second parameter set)	Values ➡ PNU b013		01		
b021	–	✓	Motor current limitation – function	00:	OFF: Disabled	01		
				01:	ON, enabled in acceleration phase and at constant speed			
				02:	Enabled only at constant speed			
b221	–	✓	Motor current limitation – function (second parameter set)	Values ➡ PNU b021		01		
b022	–	✓	Motor current limitation, tripping current	$0.1 – 1.5 \times I_e$ [A] Default, dependent on frequency inverter's rated current (I_e)		$I_e \times 1.5$		

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
b222	–	✓	Motor current limitation, tripping current (second parameter set)	Values ➔ PNU b022		$I_e \times 1.5$		
b023	–	✓	Motor current limitation, deceleration time constant	0.1 – 3000 s		1.0		
b223	–	✓	Motor current limitation, deceleration time constant (second parameter set)	0.1 – 3000 s		1.0		
b028	–	✓	Motor current limitation, limit current selection	00:	Value of PNU b022	00		
				01:	Analog input O-L			
b228	–	✓	Motor current limitation, limit current selection (second parameter set)	00:	Value of PNU b222	00		
				01:	Analog input O-L			
b031	–	✓	Parameter access inhibit (access rights)	00:	Access to all parameters blocked, except PNU b031, when digital input SFT is enabled (➔ PNU C001: 15)	01		
				01:	Access to all parameters blocked, except PNU b031 and F001, when digital input SFT is enabled (➔ PNU C001: 15)			
				02:	Access to all parameters blocked, except PNU b031			
				03:	Access to all parameters blocked, except PNU b031 and F001			
				10:	Extended access rights to parameters in RUN mode.			
b080	✓	✓	Analog output AM, gain factor	0 – 255		100		
b082	–	✓	Increased starting frequency (e.g. at high static friction)	0.5 – 9.9 Hz		0.5		
b083	–	–	Carrier frequency	2 – 14 kHz		5.0		
b084	–	–	Initializing – function	00:	Clear fault register	00		
				01:	Load default settings (DS)			
				02:	Clear fault register and load default settings (DS)			
b085	–	–	Initialization, country-specific default settings	00:	Japan	01 {02}		
				01:	Europe			
				02:	USA			
b086	✓	✓	Frequency indication scaling factor for value in PNU d007	0.1 – 99.9		1.0		
b087	–	✓	STOP key	00:	Enabled	00		
				01:	Disabled			
b088	–	✓	Motor restart after removal of the FRS signal	00:	Restart with 0 Hz	00		
				01:	Restart with the determined output frequency (current motor speed)			

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
b089	✓	✓	Indication, value on mains operation (RS 485)	01:	Output frequency	01		
				02:	Output current			
				03:	Direction of rotation			
				04:	Actual value (PV)			
				05:	State of digital inputs			
				06:	State of digital outputs			
				07:	Scaled output frequency			
b130	–	✓	Internal DC link, stop deceleration ramp on overvoltage in the internal DC link	00:	OFF: Disabled	00		
				01:	ON: Enabled			
b131	✓	✓	Internal DC link, switching threshold for stopping the deceleration ramp (PNU b130 = 01)	$330 - 395\ V\ (U_e = 230\ V)$		380/760		
				$660 - 790\ V\ (U_e = 400\ V)$				
				Default, dependent on rated voltage of DF51 (U_e)				
b150	–	✓	Clock frequency, automatic clock frequency reduction on overtemperature	00:	OFF: Disabled	00		
				01:	ON: Enabled			
b160	✓	✓	Inverter, reduce inverter's response time (RDY) to a control signal	00:	OFF	00		
				01:	On			

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
C001	–	–	Digital input 1 – function	00:	FWD: Clockwise rotating field	00		
				01:	REV: Anticlockwise rotating field			
				02:	CF1: Fixed frequency selection, bit 0 (LSB)			
				03:	CF2: Fixed frequency selection, bit 1			
				04:	CF3: Fixed frequency selection, bit 2			
				05:	CF4: Fixed frequency selection, bit 3 (MSB)			
				06:	JOG: Jog mode			
				07:	DB: DC braking			
				08:	SET: Select second parameter set			
				09:	2CH: Second time ramp			
				11:	FRS: Free run stop (free coasting, = controller inhibit)			
				12:	EXT: External fault message			
				13:	USP: Unattended start protection			
				15:	SFT: Parameter access inhibit			
				16:	AT: Change over to analog input OI			
				18:	RST: Reset fault signal			
				19:	PTC: PTC thermistor input (digital input 5 only)			
				20:	STA: Three-wire control start signal			
				21:	STP: Three-wire control stop signal			
				22:	F/R: Three-wire control, direction of rotation			
				23:	PID: Activate PID control			
				24:	PIDC: Reset integral component of PID control			
				27:	UP: Acceleration (motor potentiometer)			
				28:	DWMN: Deceleration (motor potentiometer)			
				29:	UDC: Motor potentiometer, reset saved value of motor potentiometer to 0 Hz			
				31:	OPE: Operator keypad			
				50:	ADD: Add value from PNU A145 to frequency reference value.			
				51:	F-TM: Digital input, increase priority (shorter response time).			
				52:	RDY: Inverter, reduce response time to control signals			
				53:	SP-SET: Second parameter set with special functions			
				255:	-- (no function)			
C201	–	–	Digital input 1 – function (second parameter set)	Values ➜ PNU C001		00		
C002	–	–	Digital input 2 – function	Values ➜ PNU C001		01		

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
C202	–	–	Digital input 2 – function (second parameter set)	Values → PNU C001		01		
C003	–	–	Digital input 3 – function	Values → PNU C001		02 {16}		
C203	–	–	Digital input 3 – function (second parameter set)	Values → PNU C001		02		
C004	–	–	Digital input 4 – function	Values → PNU C001		03 {13}		
C204	–	–	Digital input 4 – function (second parameter set)	Values → PNU C001		03		
C005	–	–	Digital input 5 – function	Values → PNU C001		18 {09}		
C205	–	–	Digital input 5 – function (second parameter set)	Values → PNU C001		18		
C011	–	–	Digital input 1 – logic	00:	High signal triggers switching	00		
				01:	Low signal triggers switching			
C012	–	–	Digital input 2 – logic	Values → PNU C011		00		
C013	–	–	Digital input 3 – logic	Values → PNU C011		00		
C014	–	–	Digital input 4 – logic	Values → PNU C011		00		
C015	–	–	Digital input 5 – logic	Values → PNU C011		00		
C021	–	–	Digital output 11 – signal	00:	RUN: In operation	01		
				01:	FA1: Reference frequency reached			
				02:	FA2: Frequency signal – output frequency exceeds value in PNU C042 (during acceleration ramp) or PNU C043 (during deceleration ramp)			
				03:	OL: Overload warning – motor current exceeds value in PNU C041.			
				04:	OD: PID controller deviation – reference/actual value differential exceeds signalling threshold in PNU C044.			
				05:	AL: Fault – fault/alarm message			
				06:	Dc: Warning – Reference value at input O (0 to +10 V) lower than value in PNU b082 or current signal at input OI below 4 mA.			
				07:	FBV: Warning – reference/actual value differential of PID controller exceeds the tolerance range in PNU C052/C053.			
				08:	NDc: Fault/warning dependent on PNU C077 – communication watchdog timer has expired: communications are interrupted.			
				09:	LOG: Shows result of logic link performed through PNU C143.			
				10:	ODc: Warning – reference value at input O (0 to +10 V) higher than maximum value or current signal at input OI above as 20 mA.			
C022	–	–	Digital output 12 – signal	Values → PNU C021		00		
C026	–	–	Relay K1 – signal	Values → PNU C021		05		

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
C028	–	–	Analog output AM, measured value indication selection	00:	f-Out: Current output frequency	00		
				01:	I-Out: Current output current			
C031	–	–	Digital output 11 – logic	00:	Normally open contact (NO)	01, 00		
				01:	Normally closed contact (NC)			
C032	–	–	Digital output 12 – logic	Values ➝ PNU C031		01, 00		
C036	–	–	Relay K1 (K11-K12) – logic	Values ➝ PNU C031		01		
C041	–	✓	Output function – warning threshold for overload signal (OL)	$0 - 2 \times I_e$ [A] Default, dependent on frequency inverter's rated current (I_e)		I_e		
C241	–	✓	Output function – warning threshold for overload warning (OL) (second parameter set)	$0 - 2 \times I_e$ [A] Default, dependent on frequency inverter's rated current (I_e)		I_e		
C042	–	✓	Output function – signalling threshold for frequency signal FA2 during acceleration	0 – 400 Hz		0.0		
C043	–	✓	Output function – signalling threshold for frequency signal FA2 during deceleration	0 – 400 Hz		0.0		
C044	–	✓	Output function – signalling threshold for maximum permissible PID controller deviation of actual value from reference value	0 – 100 %		3.0		
C052	–	✓	PID controller – switch-off threshold for second stage of PID controller	0 – 100 %		100		
C053	–	✓	PID controller – switch-on threshold for second stage of PID controller	0 – 100 %		0.0		
C071	–	✓	Communication – baud rate	04	4000 bit/s	06		
				05:	9600 bit/s			
				06:	19200 bit/s			
C072	–	✓	Communication – address	1 – 32		1		
C074	–	✓	Communication – parity	00:	None	00		
				01:	Even			
				02:	Odd			
C075	–	✓	Communication – stop bits	1:	1 bit	1		
				2:	2 bits			
C076	–	✓	Communication – behaviour of frequency inverter on communication errors	00:	Switch off on fault signal E60	02		
				01:	Decelerate to standstill at deceleration ramp and then switch off with error E60.			
				02:	No fault signal			
				03:	FRS: Free run stop (free coasting, = controller inhibit)			
				04:	DEC: Braking to 0 Hz at set deceleration ramp			

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
C077	–	✓	Communication – monitoring time (watchdog).	0 – 99.99 s		0.00		
C078	–	✓	Communication, waiting time (latency between request and response)	0 – 1000 ms		0		
C081	–	✓	Analog input O – reference value signal compensation	0 – 200 %		100		
C082	✓	✓	Analog input OI – reference value signal compensation	0 – 200 %		100		
C085	✓	✓	Thermistor compensation (digital input 5)	0 – 200 %		100		
C086	✓	✓	Analog output AM – offset compensation	0 – 10 V		0.0		
C091	✓	✓	Debug mode, view additional parameters	00:	Do not show parameter	00		
				01:	Show parameter			
C101	–	✓	Motor potentiometer – reference value for motor potentiometer after power supply interruption	00:	Clear last value and use default for PNU F001	00		
				01:	Use saved motor potentiometer value set with UP/DWN keys			
C102	–	✓	Reset function (RST) – response to a Reset signal	00:	On rising edge, reset fault and stop motor if in RUN	00		
				01:	On falling edge, reset fault and stop motor if in RUN			
				02:	On rising edge, reset fault only			

PNU	RUN	b031 = 10	Name	Value range		DS	Page	User setting
C141	–	–	Logic function – select input A	00:	RUN: In operation	00		
				01:	FA1: Reference frequency reached			
				02:	FA2: Frequency signal – output frequency exceeds value in PNU C042 (during acceleration ramp) or PNU C043 (during deceleration ramp)			
				03:	OL: Overload warning – motor current exceeds value in PNU C041.			
				04:	OD: PID controller deviation – reference/actual value differential exceeds signalling threshold in PNU C044.			
				05:	AL: Fault – fault/alarm message			
				06:	Warning: Reference value at input O (0 to 10 V) lower than value in PNU b082 or current signal at input OI below 4 mA.			
				07:	FBV: Warning – reference/actual value differential of PID controller exceeds the tolerance range in PNU C044.			
				08:	NDc: Fault/warning (dependent on PNU C076) – communication watchdog timer has expired: communications are interrupted.			
				10:	ODc: Warning – reference value at input O (0 to 10 V) higher than maximum value or current signal at input OI above as 20 mA.			
C142	–	–	Logic function – select input B	Values $\longrightarrow$ PNU C141		01		
C143	–	–	Logic function – select link [LOG]	00:	[LOG] = A AND B	00		
				01:	[LOG] = A OR B			
				02:	[LOG] = A XOR B			
C144	–	✓	Digital output 11 – deceleration time (On)	0 – 100 s		0.0		
C145	–	✓	Digital output 11 – deceleration time (Off)	0 – 100 s		0.0		
C146	–	✓	Digital output 12 – deceleration time (On)	0 – 100 s		0.0		
C147	–	✓	Digital output 12 – deceleration time (Off)	0 – 100 s		0.0		
C148	–	✓	Relay K1 – deceleration time (On)	0 – 100 s		0.0		
C149	–	✓	Relay K1 – deceleration time (Off)	0 – 100 s		0.0		

PNU	RUN	b031 = 10	Name	Value range	DS	Page
d001	✓	✓	Output frequency display	0.0 – 400.0 Hz (0.1 Hz)	–	
d002	✓	✓	Output current display	0.0 – 999.9 A (0.1 A)	–	
d003	✓	✓	Direction of rotation display	• F: Clockwise (forward) rotating field • O: STOP • R: Anticlockwise (reverse) rotating field	–	
d004	✓	✓	PID feedback display	• 0.00 – 99.99 (0.01 %) • 100.0 – 999.9 (0.1 %) • 1 000 – 9 999 (1 %)	–	
d005	✓	✓	Indication – status of digital inputs 1 to 6	–	–	
d006	✓	✓	Indication – status of digital outputs 11, 12 and K1	–	–	
d007	✓	✓	Indication – scaled output frequency	0.00 – 9 999 (0.01/0.1/1/10 Hz)	–	
d013	✓	✓	Indication – output voltage	0 – 600 V (1 V)	–	
d016	✓	✓	Indication – operation time counter	• 0 – 9 999 (1 h) • 10 000 – 99 990 (10 h) • 100 000 – 999 000 (1 000 h)	–	
d017	✓	✓	Indication – mains On time	• 0 – 9 999 (1 h) • 10 000 – 99 990 (10 h) • 100 000 – 999 000 (1 000 h)	–	
d080	✓	✓	Indication – total number of occurred faults	0 – 65 530	–	
d081	✓	✓	Indication – fault 1 (last fault signal)	Values at time of power Off: • Fault signal E… • Frequency (Hz) • Current (A) • Internal DC link voltage (VDc) • Total operating hours in RUN mode • Total Power On time, power supply connected (h)	–	
d082	✓	✓	Indication – fault 2	Values ➝ PNU d081	–	
d083	✓	✓	Indication – fault 3	Values ➝ PNU d081	–	

PNU	RUN	b031 = 10	Name	Value range	DS	Page	Reference value
F001	✓	✓	Reference frequency, input through keypad	0.0 – 400 Hz (0.1 Hz)	0.0		
F002	✓	✓	Acceleration time 1	• 0.01 – 99.99 (0.01 s) • 100.0 – 999.9 (0.1 s) • 1000 – 3000 (1 s)	10.00		
F202	✓	✓	Acceleration time 1 (second parameter set)	Values ➡ PNU F002	10.00		
F003	✓	✓	Deceleration time 1	• 0.01 – 99.99 (0.01 s) • 100.0 – 999.9 (0.1 s) • 1000 – 3000 (1 s)	10.00		
F203	✓	✓	Deceleration time 1 (second parameter set)	Values ➡ PNU F003	10.00		
F004	✓	✓	Direction of rotation – function of START key (keypad)	• 00: Clockwise rotating field (FWD) • 01: Anticlockwise rotating field (REV)	00		

PNU	RUN	b031 = 10	Name	Value range	DS	Page
H003	–	–	Motor – assigned rating [kW]/{HP} at rated voltage (U_e)	0.2; 0.4; 0.55; 0.75; 1.1; 1.5; 2.2; 3.0; 4.0; 5.5; 7.5; 11.0 {0.2; 0.4; 0.75; 1.5; 2.2; 3.7; 5.5; 7.5; 11.0} Default depends on rated voltage and type rating of DF51.	–	
H203	–	–	Motor – assigned rating [kW]/{HP} at rated voltage (U_e) (second parameter set)	Values ➡ PNU H003		
H004	–	–	Motor – number of poles	2, 4, 6, 8	4	
H204	–	–	Motor – number of poles (second parameter set)	Values ➡ PNU H004	4	
H006	✓	✓	Motor – stabilization constant	0 – 255	100	
H206	✓	✓	Motor – stabilization constant (second parameter set)	Values ➡ PNU F006	100	

Index