E3D inverter

frequency converters
instruction manual 0,55 – 4 kW

from software version V164

procon
HAJTÁSTECHNIKA

Since 1984

▸ **TABLE OF CONTENTS**

Dear Customer!

Thank you for having decided in favour of PROCON Ltd's frequency converter.

This Instruction Manual contains all information necessary for starting up and operating the frequency converter. Read this manual before installing the frequency converter.

Follow all safety measures, warnings and instructions described in this manual.

The manufacturer bears no responsibility for any personal injury and/or material damage arising from not taking into consideration the warnings in this manual.

At receiving the frequency converter, please check up followings:

- Make sure that the frequency converter is not damaged. If you detect any damage of the frequency converter contact the manufacturer.
- Check the data plate of the device to make sure that you received the ordered model. If not, please contact the manufacturer

Following graphic symbols will be used in this manual:

⚡ This symbol is used for those instructions whose negligence could cause electric shock, severe injury or even death.

🔥 This symbol is used for those instructions whose negligence could cause fire and injury.

⚠ This symbol is used for those instructions whose negligence could cause personal injury, damage in the equipment and property damage.

ℹ Important information

▸ **APPLICATION**

The E3D series frequency converters are digitally programmable appliances.

They are suitable for the near loss-free regulation of the rotation speed of any type of three-phase asynchronous motors with squirrel-cage rotor from 0.55 kW to 11 kW power ratings, at 400 V.

The converters comply with the requirements of the standards relating to control devices for use in the electric industry.

▸ **GENERAL FEATURES**

Line voltage	3 x 380 ÷ 440 V AC ± 10 %
Line frequency	50 ÷ 60 Hz (sine wave)
Motor voltage	3 x 0 ÷ actual value of the input voltage (PWM modulated sine wave)
Motor frequency	0 ÷ 400 Hz (free programmable)
Protection grade	IP20 (optionally IP54)
Line filter	built-in RF filter at the input side
Ambient temperature	0°C ÷ +40 °C
Relative humidity	maximum 90 % (non-condensing)
Storage temperature	-20 °C ÷ +60 °C
Requirements for the place of the installation	Install the drive in an area free from: ▪ oil, oil mist, dust, metal shavings, water or other foreign materials, ▪ combustible materials (e.g., wood), ▪ harmful gases and liquids, ▪ excessive vibration, ▪ chlorides, ▪ direct sunlight
Orientation	The frequency converter must always be mounted in vertical position, with provision for the ventilation requirements.

▸ FUNCTIONING

The alternating voltage from the power line is rectified by a line diode bridge, then electrolytic capacitors smooth out the pulsating voltage. The intelligent IGBT end stage, driven with sinusoidal modulated pulses, delivers to the motor a voltage of variable amplitude and frequency. Up to the nominal speed of the motor the voltage vs. frequency is constant.

At low frequencies the ohmic resistance of the motor winding can be compensated (U boost).

Below the nominal revolution the frequency converter is capable of delivering nominal torque; beyond it the converter delivers constant power.

The converter can be equipped with an optional braking resistor.

▸ DECLARATION OF CONFORMITY

The frequency converters have been manufactured with considering following directives:

Frequency converters	E3D
Machinery directive	2006/42/EK
Low voltage directive	2014/35/EU
Electromagnetic Compatibility (EMC) directive	2014/30/EU
Applied standards	EN 13849-1:2008 EN 61800-5-2:2016 EN 60034-1:2017 EN 61800-5-1:2007 EN 60664-1:2008 EN 61800-3:2017

| ⚠ CAUTION |
|---|
| **These products serve for being mounted into machineries.**
These products are allowed to be put into service only after the machinery comprising the product was found to comply with the above directives about machineries. |
| According to the directions on electromagnetic compatibility (EMC) the listed products are not considered as products which can be operated alone. The electromagnetic compatibility can only be evaluated after the product was incorporated in the whole system. Certification of this evaluation refers not to the stand-alone product but to the complete machinery. |

▸ MECHANICAL INSTALLATION

The appliance belongs to protection class IP-20 and is allowed to be operated as a built-in unit only.

Should the appliance need increased protection due to the conditions (water, dust, aggressive materials), use at least protection IP-54. If the appliance is installed by the user, the issues cooling and arranging the cables need to be consulted with the manufacturer.

⚠ CAUTION
The manufacturer takes no responsibility for damages caused by incorrect installation.
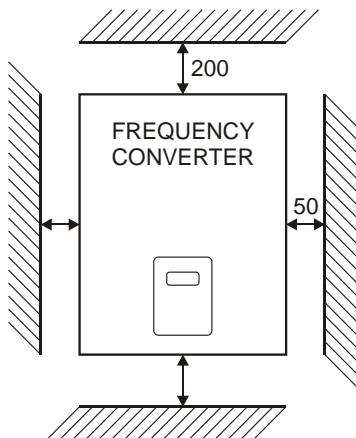
- Beside the side walls at least 50mm, below and above the unit at least 200 mm free space must be provided.
- If the device is built in closed control cabinet, overheating of the inside room must be prevented with proper ventilation!
- The slots for fresh air and used air must be held free to assure proper ventilation. The filters of the slots must be cleaned regularly!
- At IP54 versions the cooling is facilitated with heatsinks of increased size that must be placed outside the cabinet, with maintaining the IP54 protection!
- On demand the manufacturer builds the equipment in a cabinet of proper size.
- At types with forced ventilation the inlet openings should be on the bottom side, the ventilated outlets on the upper side (possible diagonally)

▸ **TEST RUN**

In the course of the installation and test run the manufacturer's attached wiring instructions and the instructions of the effective standards must be complied with.

⚠ **CAUTION**
Test run, maintenance, repair and component replacement in the frequency converter are allowed to be performed by authorized specialist only!

⚡ **WARNING**
ELECTRICAL SHOCK HAZARD Negligence of these warnings could cause severe injury or even death!
Prior to the total discharge of the capacitors the terminal blocks of the motor must not be touched! Prior to wiring the connectors of the device switch off the whole power supply of the device! The internal capacitor remains in charged state even after switching off the power supply. Installation is allowed to be started if the power LED has ceased lighting.
When taking the equipment from could environment to the place of installation vapour may condense. Prior to installation wait until the temperature of the equipment equalizes with that of the environment and the device becomes totally dry.
The appliance must not be put into operation in humid environment.
The circuitries of the frequency converter must not be modified or changed.
In switched-on state the covering of the device must not be removed and any part of it must not be touched!
The appliance must be earthed according to the standards.

⚠ **CAUTION**
DANGER OF UNEXPECTED STARTING Negligence of this warning could cause injury and property damage!
On switching the line power to the frequency converter, the device depending on its setting may unexpectedly start the motor. Prior to powering the frequency converter make sure that nobody stays near to the motor and the machine and all coverings, mechanical connections, wedges, bolts and machine load are properly fastened!

⚠ **WARNING**
FIRE HAZARD Negligence of this warning could cause fire and injury!
The power line cable must not be connected to the output motor connections of the frequency converter! Connecting the power line to the output connections could cause severe damage in the device.
Tighten all terminal screws to the specified tightening torque. Loose electric connections may overheat.

Terminal Size	M3	M4	M5
Tightening Torque [Nm]	0.8 ÷ 1.0	1.2 ÷ 1.5	2.0 ÷ 2.5

⚠ **CAUTION**
EQUIPMENT HAZARD Negligence of this warning could cause total damage to the device.
The device is not waterproof! Prevent the interior of the appliance from the penetration of water!
Take care that no external object (e.g. small metal part, metal powder) or liquid can get inside the device.
Avoid short circuit or ground fault at the output terminal blocks.
It is forbidden to connect any capacitor to the output. Regarding other filters, please ask the manufacturer's opinion.
Avoid using contactor at the output because the frequency converter may stop working due to switch-on overcurrent. If for other reasons using a contactor is necessary (e.g. switch-over between motors), the switchover of the output of the frequency converter during operation must be prevented by latching.
Use the shortest possible earthing conductor and avoid earth loops.
Earthing conductors common with machines of higher power (e.g. welding machine, machine tool) must not be used.
For wiring the control unit use shielded cable. Use shielded twisted wires, and connect the shielding to the reference point of the inputs.
Observe proper electrostatic discharge procedures (ESD) when handling the frequency converter. Failure to comply may result in ESD damage to the drive circuitry.
Do not operate the device with any visible damage on it or if its any part is missing.
Do not modify the circuitry of the frequency converter to avoid damages and expiring of the warranty.
Check all the wiring to ensure that all connections are correct after installing the frequency converter and connecting other devices.

- **Cables and fuses**

   At connecting the frequency converters use mains fuses and wires with cross-section as given in the table.

TYPE	Minimum fuse value (F) [A]	Recomm. cable [mm²]
E3D 0.55	6.3	0.75 ÷ 1
E3D 0.75	6.3	1 ÷ 1.5
E3D 1.1	6.3	1 ÷ 1.5
E3D 1.5	10	1.5 ÷ 2.5
E3D 2.2	10	1.5 ÷ 2.5
E3D 3	16	2.5 ÷ 4
E3D 4	16	2.5 ÷ 4

- **Main and Control Circuit Wiring**

- *Connecting the power line*

  At connecting the power line comply with following safety measures:
  - Use only circuit breakers that have been designed specifically for frequency converters.
  - If an input switch is used, it is allowed to be used not more than once in every 30 minutes.
  - Use an AC reactor on the input side of the drive:
    - to suppress harmonic current,
    - to improve the power factor on the power supply side,
    - when using an advancing capacitor switch.

- *Connecting the motor*

  At connecting the motor comply with following safety measures:
  - The output of the frequency converter has to be loaded with a three-phase motor. In case of any other load consult with the manufacturer!
  - Never connect a power source to the drives output.
  - Never short or ground the output terminals.
  - Do not use phase correction capacitors.
  - If using a contactor between the drive and motor, it should never be operated when the drive is outputting a voltage. Operating while there is voltage output can cause large peak currents, thus tripping the over current detection or damage the drive.
  - For connecting the output it is recommended to use shielded cable with earthing at both ends.
  - With an output cable of longer than 30 meters, an output choke coil has to be used. If the cable length exceeds 200 meters, the output choke coil is not enough, because of the excessive capacitive load. In this case, a sine filter has to be used. Regarding the output choke coil or the sine filter, please ask the manufacturer's opinion.

- *Connecting the protective earth*

  At connecting the earthing of the frequency converter comply with following safety measures:
  - Never share the ground wire with other devices such as welding machines, etc.
  - Always use a ground wire that complies with electrical equipment technical standards. Keep ground wires as short as possible. Leakage current is caused by the drive. Therefore, if the distance between the ground electrode and the ground terminal is too long, potential on the ground terminal of the drive will become unstable.
  - When using more than one frequency converter, do not to loop the ground wire.
  - Use earth cable of same cross-section as that of the phase conductors.

- *Connecting the control circuitry*

  At connecting the control circuitry comply with following safety measures:
  - Separate control circuit wiring from main circuit wiring and other high-power lines.
  - The connections of the SR connectors of the control circuitry (digital output) have to be separated from other connectors of the control circuitry, unless they are used for control purposes.
  - In order to avoid operation errors use twisted pair or shielded twisted pair cables for connecting the control circuitry.
  - Be sure to earth the shielding with the largest possible contact area between shielding and earth connection.
  - The shieldings have to be earthed at the frequency converter side of the cables.

▸ **PUTTING IN OPERATON THE FREQUENCY CONVERTER FOR THE FIRST TIME**
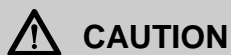
| ⚠ CAUTION |
|---|
| **Prior to put in operation the frequency converter read through thoroughly the description below!** |
| **Follow all safety measures, warnings and instructions described in this manual!** |
| **Heed the safety messages in this manual.**
The operating company is responsible for any injuries or equipment damage resulting from failure to heed the warnings in this manual. |

- Check up the operational data of the frequency converter to be put in operation.
  → *page 4. - General features*

- Install the device according to the instructions.
  → *page 5. - Mechanical installation*

- Study the safety measures to be complied with.
  → *page 6. - Test run*

- Connect the cables of the power line, the motor and the control elements to the corresponding terminal blocks.
  → *page 10. - Assignment and connection of the E3D terminal block*

- If the device is equipped with brake check up the value and the placing of the brake resistor.
  → *page 16. - Selection of the brake resistors at dynamic braking*

- Switch the line power to the device.

- At devices without controlling terminal the motor can be started with the device's control elements according to the default setting (or the required setting).

- At devices with controlling terminal check up and if necessary modify the preset parameters (rising times and fall times, minimum and maximum frequency etc.)

- If possible, perform a trial start with unloaded motor:
  - inspect the operation of the motor,
  - in case of opposite direction of rotation interchange both phase wires of the motor to achieve the right basic direction of rotation,

i	Interchanging the phase wires at the mains side does not influence the direction of rotation!

  - with changing the reference signal (e.g. potentiometer) scan the operating frequency band,
  - try the functioning of the other controls (e.g. reversing)

- Let the motor run with load!

- If necessary modify the parameters (rising times and fall times, minimum and maximum frequency etc.)

- In regulating mode tune the PI parameters (17.PropG, 18.IntTm)

▸ **ASSIGNMENT AND CONNECTION OF THE E3D TERMINAL BLOCK**
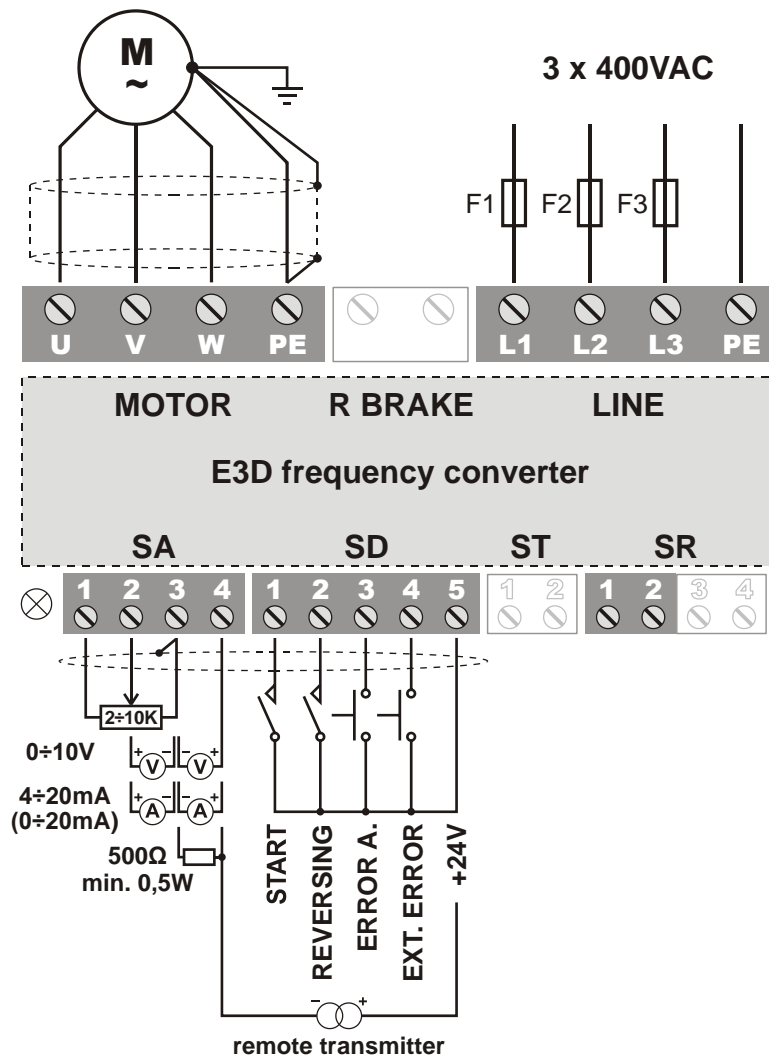
⊗	Three-colour LED (*green:* **On**, *yellow:* **Operate**, *red:* **Error,** *flashing yellow:* **Waiting**)

SA1	+10V potentiometer driving output (max. 6 mA)
SA2	Analogue input 1 (reference signal): potentiometer (2÷10 kΩ), 0÷10 V, 4÷20 mA (0÷20 mA) *
SA3	GND (reference point of the inputs)
SA4	Analogue input 2 (feedback signal): 0÷10 V, 4÷20 mA (0÷20 mA) *

SD1	Digital input 1 (factory setting: **start switch**)
SD2	Digital input 2 (factory setting: **reversing switch**)
SD3	Digital input 3 (factory setting: **error acknowledgement**)
SD4	Digital input 4 (factory setting: **external error**)
SD5	+24V/D supply voltage output (max. 100 mA) (for digital inputs, remote transmitter)

ST1
ST2 } Spare

SR1
SR2 } Digital output 1 ** (factory setting: **ready** - closing **/ error** - opening)

SR3
SR4 } Option (Digital output 2 **) (factory setting: **operate** - closing **/ stop** - opening)

* *Current inputs (4÷20 mA, 0÷20 mA) have to be terminated with a 500 Ω resistor. (1 %, 0,5÷1 W)*

** *Digital outputs: relay (max. 250 V AC / 1 A or 30 V DC / 0,5 A) or optocoupler (optional) (max. 30 V DC / 10 mA)*
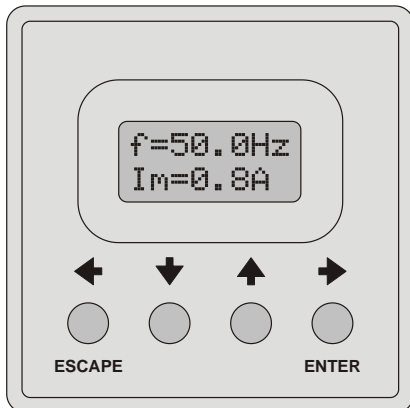
‣ OPERATING THE CONVERTER

The source of the reference signal can be:
- external or front panel potentiometer,
- 0÷10 V,
- 4÷20 mA (0÷20 mA),
- front panel controlling terminal,
- motor potentiometer

The source of the logical control signals can be:
- terminal blocks

- **Controlling terminal**

- **This terminal allows programming, displaying 2 parameters and reference signal generation.**

- Equipped with a 2x8 character display and 4 push buttons.

- Reading in display mode: first row – frequency, second row – other measured variables (e.g. voltage, current), which can be scrolled with the ▲ ▼ arrows.

- Reading in programming mode: first row – name of the parameter along with its serial number in the menu (e.g. **21.TRUp**), second row – the actual value of the parameter (e.g. **5,00s**) that can be modified with the push buttons.

- The terminal can be used built in the front panel of the frequency converter only!

- *Functions of the push buttons*

◀ (Escape)
- Change between display mode and programming mode
- Parameter setting mode: shift the cursor to the left
- Repeated push: exit parameter setting mode without saving (until the cursor blinks)
- At error display: displaying the cause of the error

▼
- Display mode: scrolling the displayed variables downward
- Programming mode: moving in the menu downward
- Parameter setting: decreasing the value or scrolling the selector switches downward
- With selected terminal motor potentiometer: decreasing the reference signal
- With enabled motor potentiometer start / stop: Stop

▲
- Display mode: scrolling the displayed variables upward
- Programming mode: moving in the menu upward
- Parameter setting: increasing the value or scrolling the selector switches upward
- With selected terminal motor potentiometer: increasing the reference signal
- With enabled motor potentiometer start / stop: Start

▶ (Enter)
- Programming mode: starting the parameter setting
- Parameter setting mode: shift the cursor to the right
- Repeated push: save parameter value (until the cursor blinks)
- Acknowledgement at error

‣ **PROGRAMMING**

```
11. CRef
    1.0Hz
```

• **Programming procedure**

← (Escape)	▪	Changing from display mode to programming mode
↓ ↑	▪	Moving between the menu items
→ (Enter)	▪	Starting parameter setting
← ↓ ↑ →	▪	Parameter setting
→ (Enter)	▪	Repeated push: save parameter value (until the cursor blinks)
or		
← (Escape)	▪	Repeated push: exit parameter setting mode without saving (until the cursor blinks)

• **Menu system**

Submenu	Description, further submenus	Value, range	Default setting	Unit
11. CRef Control reference	Value of the output frequency in control mode, with the terminal as reference signal source.	0,1 - 400,0	1,0	Hz
12. RRef Regulation ref.	Value of the reference signal in regulation mode, with the terminal as reference signal source.	0,00 - 100,00	0,00	%
13.OpMod Operation mode	Selecting the operation mode Normal: increasing frequency to incr. error signal, Inverse: decreasing frequency to incr. error signal, Signed: normal regulation with change of the direction of rotation.	Control Normal regulation Inverse regulation Signed regulation	Control	-
15.CRefS Control reference source	Selecting the source of the control reference signal.	Analogue In 1 Terminal Term. motor pot. Motor pot.	Analogue In 1	-
16.RRefS Regulation reference source	Selecting the source of the regulation reference signal.	Analogue In 1 Terminal Term. motor pot. Motor pot.	Analogue In 1	-
17.PropG Proportional gain	Regulation parameter.	0,00 - 19,00	0,50	-
18.IntTm Integration time	Regulation parameter. With IntTm=N proportional regulation can be performed.	N 1 - 20000	1000	ms
19.DZone Dead zone	With signed proportional regulation, if the error signal is within the dead zone, the output frequency is zero.	N 0,01 - 100,00	N (0,00)	%
21.TRUp Run-up time	Run-up time of the frequency from 0 Hz to fmax in both the control and the regulation process.	0,05 - 3276,7	5,00	s
31.TRDwn Run-down time	Run-down time of the frequency from fmax to 0 Hz in both the control and the regulation process.	0,05 - 3276,7	5,00	s
32.StopM Stop mode	Stopping can be made with run-out, normal braking and DC braking. With free run, the converter accepts a new start command after the run-down time. With DC braking, duration of the brake operation equals to the run-down time, during this time a new start command can be sent out. With mixed braking (normal + DC), switch-over frequency is 1Hz, DC braking time 2 s. Resistor brake can be enabled for each stop mode.	Free run Free run + R br. Normal brake Normal + R brake DC brake DC + R brake Mixed brake Mixed + R brake	Normal brake	-

Submenu	Description, further submenus	Value, range	Default setting	Unit
41.AnIn1 Analogue input 1 (Reference signal)	Programming the lower value and the function of the reference signal (stop band, 0V/mA, 4mA). The stop band is active in control mode only (indicated by flashing yellow LED). With regulation, 0V/mA will be interpreted by the program.	Stop band 0V/mA 4mA	0V/mA	-
42.AnIn2 Analogue input 2 (Feedback signal)	Programming the lower value of the feedback signal. When selecting Umotor, the motor voltage can be steadily varied between the actual value and its 50%.	0V/mA 4mA Umotor	0V/mA	-
43.DgIn1 Digital input 1	Special function for selecting the commands!	*Special functions*	Start switch	-
44.DgIn2			Reversing switch	
45.DgIn3	(Setting identical with that of **43**.**DgIn1**)		Error ack.	-
46.DgIn4			External error	

- *Description of the special functions available at the digital inputs (43 to 46)*

Start switch: Continuous start command. If more than one input is programmed for start switch, they are in logical AND relation. All of them must be true for effecting a start command.

Start push button: Pulse type start command. If more than one input is programmed for start push button, they are in logical OR relation. If any of them is true start command will be sent out.

Reversing switch: Activating the input results in a reversing command. If more than one input is programmed for reversing switch, then activating each further input results in reversing the direction of the rotation. Example: with two digital inputs programmed for reversing switch, activating both inputs results in reversing command, that is, the original direction will be valid.

Jogging: Usually used for adjusting the machinery, starts the motor with the frequency set in menu **83.FJog**. Active is from stop state only.

External error: Causes the appliance to stop with running out on error message (e.g. motor thermal switch, emergency off, etc.)

Error acknowledgement: Acceptance of the error messages, removal of the disable state.

Stop closing: With closing contact causes the motor to stop according to the preset stopping mode.

Stop opening: With opening contact causes the motor to stop according to the preset stopping mode.

Free run: Causes the motor to stop with running out. When activated, the frequency converter allows the motor to stop freely.

DC brake: Causes the motor to stop with DC braking. When activated in stop state, the resulting standing torque permits achieving hold function.

F fixed: The appliance goes to the frequency preset in menu **84.FFix** according to the actual run-up and run-down value.

Motor potentiometer up: With motor potentiometer reference signal, input for increasing the reference signal.

Motor potentiometer down: With motor potentiometer reference signal, input for decreasing the reference signal.

Control/Regulation: Dynamic changeover of the operation modes.

Analogue input swap: Swaps the analogue inputs with each other.

Submenu	Description, further submenus	Value, range	Default setting	Unit
47. MP 0 Motor potentiom. reference signal zero set	Selects zero set of the motor potentiometer reference signal.	None At switch-on On start At dir. change.	None	-
48. MPSP Motor potentiom. start/stop	In Stop state pushing the ⬆ button **once** results in starting and going to minimum frequency. After that the requested frequency can be set with the ⬆ and ⬇ push buttons. In Start state at minimum frequency pushing the ⬇ button **once** results in stopping.	No Yes	No	-
51. DgO1 Digital output 1	Selecting the function of the relay or optocoupler output. <u>Error signal < 1%</u>: Display of having reached the preset value.	Ready to operate Error signal < 1% Operation Forward F max F min Error	Ready to operate	-
52. DgO2 Digital output 2	At models E1D 1.5 to 2.2 and E3D 0.37 to 4 only. (Setting identical with that of **51.DgO1**)			
61. PMot Nominal power	Identification of the motor used with the frequency converter. Setting this parameter is very important for the precise motor protection!	0.10 - 4.00	Depending on type	kW
62. ILim Current limit	Limitation of the motor current not to exceed the preset value.	0.5 - 15.0	Depending on type	A
63. FMot Nominal frequency	Frequency belonging to the nominal motor voltage. This value sets the upper frequency corner point of the U vs. f characteristics.	0,1 - 400,0	50,0	Hz
64. UMot Nominal voltage	Nominal line voltage of the motor. This is the voltage the motor obtains at f ≥ fmot (Menu item **63**). This value sets the upper voltage corner point of the U vs. f characteristics.	100,0 - 400,0	Depending on type	V
65.CoolM Cooling mode	With prolonged use below 15 Hz forced cooling must be set or used.	Internal External	Internal	
71.Boost Starting voltage	The initial voltage the standing motor starts from. Serves compensating the ohmic losses.	0.0 - 60.0	Depending on type	V
81. FMax Max. frequency	The highest frequency the motor can be fed with. It has priority over the maximum frequency. **Even if the frequency reference signal is set higher, fmax will be valid.** ** default setting is 100,0Hz for frequency converters without operating terminal*	0,1 - 400,0	50,0	Hz
82. FMin Min. frequency	The lowest frequency the motor can be fed with, except for the starting and stopping process. **Even if the frequency reference signal is set lower, fmin will be valid.**	0,1 - 399,9	1,0	Hz
83. FJog Jogging frequency	Low frequency periodical mode usually used for adjusting the machinery. Activation can occur from stop state only!	0,1 - 100,0	5,0	Hz
84. FFix Fixed frequency	In start state, with the activated digital input set to FFix, this frequency will be valid independently of the reference signal source and the operation mode.	0,1 - 400,0	1,0	Hz
99. ErrL Error list	After pushing the ➡ (Enter) button the last four errors can be displayed, using the ⬆ ⬇ buttons.			

- **Parameter values in the display**

Row	Values	Short
First row (fix)	Actual frequency	f
Second row The values can be scrolled with the ↑ ↓ arrows	Motor current	Im
	Control reference signal	Cr
	Regulation reference signal	Rr
	Feedback signal	Fs
	Line voltage	Ul
	DC voltage	U+
	Motor voltage	Um
	Heat sink temperature	Th
	„Total" operating hour counter	O1
	„Run" operating hour counter	O2

- **Error List**

Display	Description of the error	Troubleshooting
Cleared	No more error in the error log. (Display in basic state)	
Ext.Err	Digital input programmed to external error activated.	Inspect the device causing the external error.
L.Ph.Err	Line phase error. (at E3D series models)	Inspect the presence of all 3 phases.
Rippled	DC voltage rippled. (at E3D series models)	
I Meas	Current measuring error. (e.g. broken or shorted signal wire)	Internal error. Troubleshooting to be done by the manufacturer.
Mot.Hot	In the actual mode the motor would probably be overheated. Probably too low frequency or overloaded operation.	Effecting forced cooling, and then in menu item **65.CoolM** setting the forced cooling to the necessary value or decreasing the load.
BrakeErr	Load of the brake resistor too high.	Increase the run-down time in menu item **32.StopM**.
Over Cur	The current developed through the motor exceeded the maximum value.	Decrease the load of the motor.
DC High	The DC voltage in the intermediate circuit exceeded the permitted limit.	With power factor corrector in front of the appliance: ▪ insert line choke in front of the appliance. If occurs during the stopping process: ▪ increase the run-out time in menu item **32.StopM**
Hs.Hot	Heatsink temperature too high.	▪ At device equipped with built-in ventilator checking up of its rotation beyond 45°C, ▪ at device built in cabinet checking up the ventilation of the cabinet, ▪ checking up the extent of the loading of the device.
IGBT Err	The IGBT module signalized error. Typical effect in case of an output short circuit.	Checking up the wiring and connections between the device and the motor.
MemWrErr	Memory writing error.	After acknowledgment of the error, if the converter is in Stop state, try to set the parameters once again.
DataStE	Error in the stored data.	Disconnect the converter from the line. If the LEDs do not light anymore, the appliance can be restarted.
CHKSUM	Checksum error.	
IIC Err	Internal communication error.	
COM PWM	Internal communication error.	
COM IO	Internal communication error.	
UnknErr	Unknown error.	

If the error cannot be removed with applying the troubleshooting guide and acknowledgement, contact the manufacturer.

▸ DRIVING TECHNOLOGY SUPPLEMENTS

• Potentiometer (2 ÷ 10 kΩ, linear)

Bekötés:

Frequency conv. terminal blocks	Potentio-meter
SA 1	1
SA 2	2
SA 3	3

1 2 3

• Selection of the brake resistors at dynamic braking

The power on the brake resistor depends on the braking time and the duty factor. (Pnominal / 50 ÷ Pnominal)
The necessary power is determined by the braking time and the duty factor.

Frequency converter type	Resulting resistance
E3D 0.55 ÷ 1.1	≥ 200 Ω
E3D 1.5 ÷ 4	≥ 100 Ω

- ▪ 100 W wire-wound resistors (50÷200 Ω)
- ▪ 500 W wire-wound resistors (50÷100 Ω)
- ▪ 2÷4 kW cased brake resistor modules (12,5÷100 Ω)

⚠ CAUTION

The brake resistors are imposed to high voltages of 660 V DC.

The appliance must be installed and wired very carefully because of heat developing and for proper electric shock protection.

For wiring use cables with heat-resisting coating.

▸ MAINTENANCE

At normal operation the device needs no maintenance. Depending on the surroundings inspect regularly the ventilators, and at models built in cabinet also the condition of the filter cartridge.

Inspect the screwed fastenings according to the local maintenance regulations, but at least once a year.

▸ GUARANTEE AND REPAIR

The products come with a guarantee period of 24 months.

⚠ CAUTION

The guarantee covers normal operation only.
In case of improper storage, improper use or unauthorized intervention the guarantee terminates.

Repair will be accomplished both within the guarantee period and after in the manufacturer's premises, the appliance has to be transported there by the user.

▸ **FREQUENCY CONVERTER SELECTION GUIDE**

0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110	132	160	200	250	(kW)

E3D

| *V3D* | *VLD* | *VHD* |

TYPE	Output power [kW]	Nominal current [A]	Peak current [A]	Mass [kg]	Physical dimensions [mm]				Fastening screws
					Width	Length	Height	Fastening	

Three phase, 3 x 380 ÷ 440 V AC input

TYPE	Output power [kW]	Nominal current [A]	Peak current [A]	Mass [kg]	Width	Length	Height	Fastening	Fastening screws
E3D 0.55	0.55	1.7	2.3	1.5	100	220	107	70 x 210	4 x M4
E3D 0.75	0.75	2.6	4	1.5	100	220	107	70 x 210	4 x M4
E3D 1.1	1.1	3.2	5	2	100	240	144	70 x 230	4 x M4
E3D 1.5	1.5	4.2	6	3	100	240	144	70 x 230	4 x M4
E3D 2.2	2.2	6	9	3	100	240	144	70 x 230	4 x M4
E3D 3	3	8	12	4	100	270	176	70 x 260	4 x M4
E3D 4	4	10	14	4	100	270	176	70 x 260	4 x M4
E3D 5.5	5.5	14	19	6	128	290	220	105 x 280	4 x M5
E3D 7.5	7.5	18	30	8	128	390	220	105 x 380	4 x M5
E3D 11	11	26	37	8	128	390	220	105 x 380	4 x M5

▸ PERIPHERAL EQUIPMENT SELECTION GUIDE

ITEM	E3D	V3D	VLD	VHD
3 x 400 V line voltage	●	●	●	●
Built-in mains noise suppressor	●	●	●	●
IP20 cabinet	●	●	●	●
IP54 cabinet	○	○	○	○
Analogue input 1 - 2	●	●	●	●
Analogue input 3 - 4	–	○	○	○
±10V analogue input	–	–	○	○
Analogue output 1 - 2	–	○	●	●
Digital input 1 - 4	●	●	●	●
Digital input 5 - 6	–	○	●	●
Digital input 7 - 8	–	–	○	○
Digital output 1	●	●	●	●
Digital output 2	○	○	●	●
Digital output 3	–	–	○	●
RS-485 serial line 1 (Terminal)	–	●	●	●
RS-485 serial line 2 (System)	–	○	○	○
USB / RS 485 interface	–	○	○	○
RS 485 / 485 interface (optical light cable type)	–	○	○	○
USB / RS 485 interface (optical light cable type)	–	○	○	○
CAN bus 1	–	○	○	○
CAN bus 2	–	–	○	○
Reception of incr. rotation speed encoder 1	–	○	○	○
Reception of incr. rotation speed encoder 2	–	–	○	○
Built-in dynamic brake	○	○	○	○
Brake resistor	○	○	○	○
Mains (input) choke	○	○	○	○
Output (motor) choke	○	○	○	○
Stand-alone programming terminal (4 x 16)	–	○	○	○
Built-in programming terminal	–	–	–	○
Stand-alone operating terminal (2 x 16)	–	○	○	○
Built-in operating terminal	–	–	–	○
External operating terminal	–	○	○	○
Built-in controlling terminal (2 x 8)	○	○	●	●
Built-in display (4 x 16)	–	–	–	○
External display	–	○	○	○
Built-in potentiometer	○	○	○	○
External potentiometer	○	○	○	○

Markings	● Basic configuration	○ Option	– Not applicable

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