

static frequency inverter

DIETZ DSV 5452 / MX 2

**For infinitely variable speed control of
three-phase asynchronous motors**

Commissioning Instructions



05/07 Edition

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All previous editions of these instructions are hereby superseded.

DIETZ DSV 5453 LIFT

Dear customer / user,

The customer/user should read these instructions carefully and should have understood them before starting work.

The following products:

DSV 5445 ; DSV 5452 ; DSV 5453 ; DSV 5445/5453-Plus-series

KD 915 , KD 920 ; Fine HF-SET 93251340268 (DSV 5452 incl. movable cubicle) ;

Brake resistors 4...40 Ohm (Type Cressall, Frizlen, Danotherm),

comply with the following directives and standards:

Low voltages directive 73/23/EEG - amendment 93/68/EEG - EMC directive 89/336/EEG, amendments 92/31/EEG and 93/68/EEG, incl. actually EMC directive 2004/108/EG

including the appropriate amendment directives up to date of drawing.

The following standards are used:

EN 60204-1	1998-11	IEC 61000-3-2:	2002-12	EN 55011:	1998
EN 61800-3 pr A.1.1	1999	IEC 61000-3-2/A1:	1997	EN 55011/A1:	1999
EN 61800-3 pr A11 ;	1999	IEC 61000-3-2/A2:	1998	EN 55011/A2:	2000
EN 61800-3	2002-04	EN 61800-2	1999-08	EN 61800-4	2003-08
EN 12015	2004	EN 12016-08	1998	VDE 0660 Part 500 (IEC 439, EN 60439)	
EN 61800-6-3	2002-08	EN 55011B	(basic emission standards) incl. IEC801 Part 1-5		
VDE 0875 Part 11	2003-08	EN 61000-6-3/AA	2004-07	EN 61800-1	1999-08

Optional on request : EN 954-1 part EN 61508 (not for all products available).

The declaration covers the modules and units delivered by us, but the user must ensure that the machine complies with the directives applicable to the end product after mounting or installation.

Following the IEC915 directive line reactors of 4% uk minimum are needed, further information or special solutions will be projected and quoted on request.

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1 General notes

1.1 Selecting the assembly site

- ◆ The MAXIDRIVE DSV 5452 frequency inverter is designed for use indoors.
- ◆ When selecting your assembly site, make sure that there is adequate ventilation. A distance of at least 10 cm must be maintained for the top and bottom cover sheet.
- ◆ A distance of at least 1 cm must be maintained on units of size I-III and at least 10 cm on units of size IV. The specified installation position is vertical
- ◆ To ensure trouble-free operation of your installation, it is advisable to install the frequency inverter and ancillary equipment in a switch-cubicle of appropriate design, complying with the applicable EMC regulations.
- ◆ The ambient temperature for the standard design should not fall below 0 °C or exceed 60 °C.
From 35 °C, the power output should be reduced to 1.5 %/°C for sizes I - III and 5 %/°C for size IV.
- ◆ Do not install the unit where it will be exposed to direct sunlight.

1.2 Lines, cross-sections, fuses, relays

- ◆ All connecting lines and connections should be short and of adequate cross-section. Refer to our proposed sizes for cable sections in the corresponding section, together with the standards listed. Suitable cut-off devices (e.g. main switch, main fuse) should be provided in the mains feeder.
- ◆ Never lay signalling and control cables together with the mains or motor lines, or else maintain adequate spacing. Screened lines improve immunity to interference and should therefore be used for preferences.
- ◆ Contactor and relay coils with fuses must be used for the control system. Retrofit resistor-capacitance elements, varistors or diodes if necessary on existing installations. For new installations we recommend using 24 V DC relays for the control system.

See also: *Section Power circuit, Screening of lines*
 Section Power circuit, Radio interference

1.3 Applicable standards and safety provisions

Comply with the relevant standards and safety provisions governing your application on installation. The following standards apply in particular:

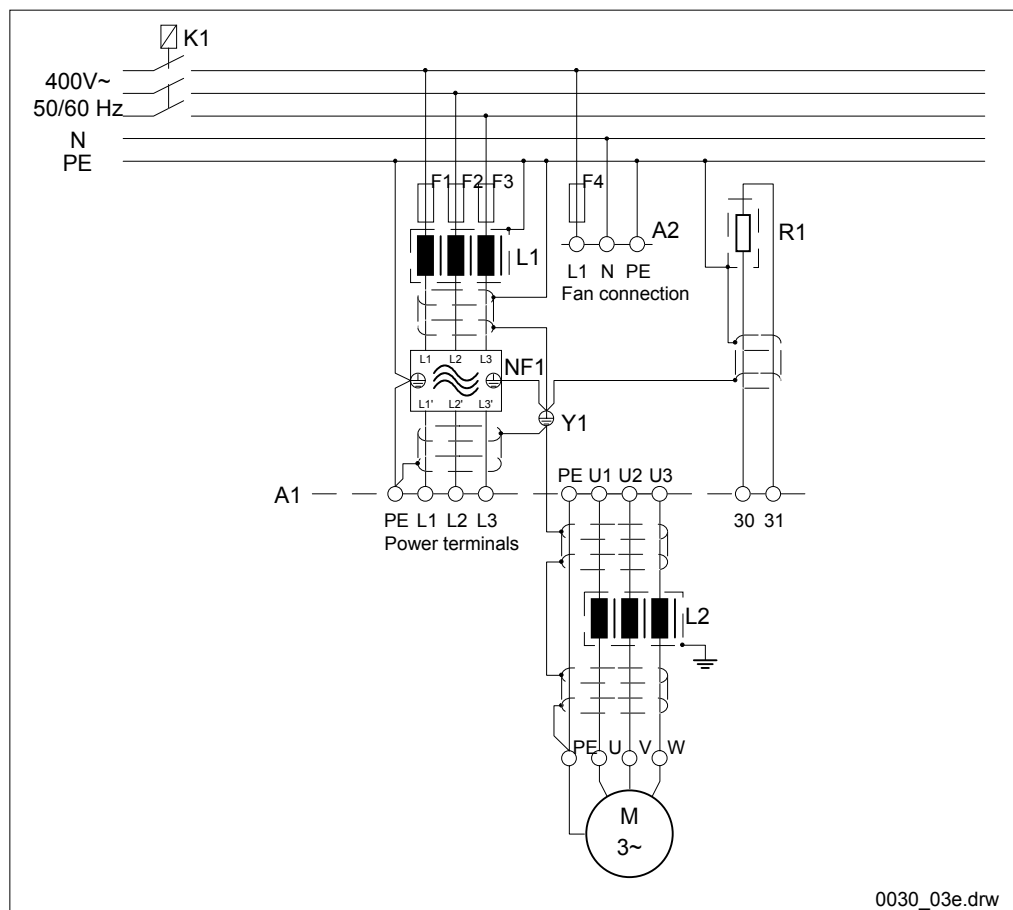
- ◆ DIN VDE 0100 Provisions for the erection of heavy power installations with rated voltages up to 1000 V
- ◆ DIN VDE 0113 Provisions for the electrical equipment of processing and machining equipment
- ◆ DIN VDE 0160 Equipment of heavy power installations with electronic operating resources

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2 Power circuit

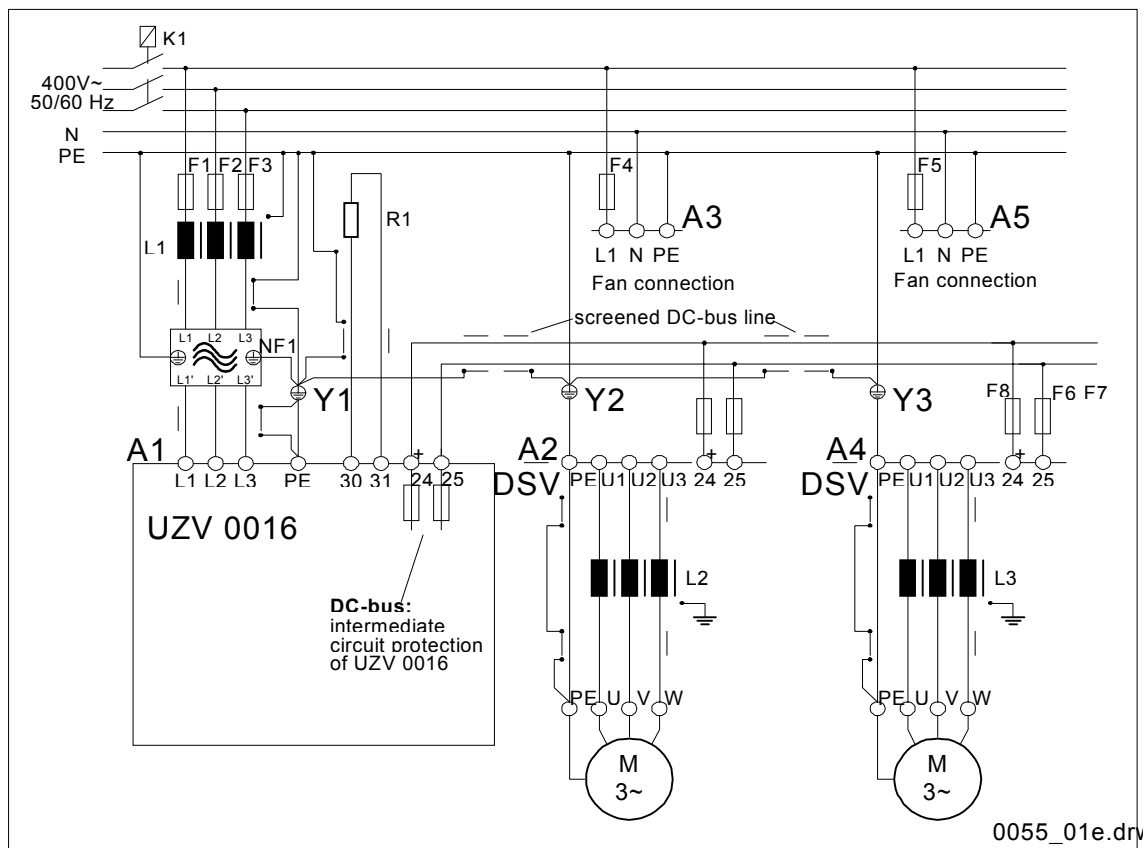
The power circuit of the MAXIDRIVE DSV 5452 contains a six-pulse bridge connection with DC voltage intermediate voltage and IGBT output stage. The output voltage is pulse-width modulated. The inverter outputs are earthing-, short-circuit- and idling-proof.

2.1 Power connection with external mains filter



- L1: Power choke
- L2: Motor choke (only for motor cable lengths > 15 m)
- A1: Power terminals (underside of unit)
- A2: Fan connection (top side of unit, size 4 only)
- E1: External braking resistance
- Y1: Equipotential bonding rails
- NF1: External mains filter

2.2 Multiple axis application with UZV 0016



- L1: Power choke
- L2, L3: Motor choke (only for motor cable lengths > 15 m)
- A1: Connection terminals of UZV 0016
- A2, A4: Connection terminals of frequency converters
- A3, A5: Fan connection (top side of unit, size 4 only)
- R1: External mains filter
- Y1, Y2, Y3: Equipotential bonding rails
- NF1: External mains filter
- F1...F3: Mains fuses
- F6...F9: External intermediate circuit protection

2.3 Mains connection

The MAXIDRIVE DSV 5452 inverter is designed for fixed connection to the 400 V AC 50/60 Hz AC network. Lines for the mains supply L1, L2 and L3 and the safety earth PE are located on the underside of the unit.

From size IV on, (MAXIDRIVE DSV 5452-46...130), the internal fan must have a separate supply. The power consumption is about 70 W. The corresponding connection terminals 1 AC 230 V (terminals L1 and N) are on the cover plate.

See also: *Section Power circuit, Earthing*
Section Power circuit, Mains fuses and Mains chokes
Section Power circuit, Mains filter

2.3.1 Mains fuses and power chokes

The unit feeder must be fused and fitted with power chokes to attenuate phase effects. The core of the power choke should be earthed.

The design of fuses and chokes should be determined on the basis of the table below. The minimum cross-section of the mains feeder is dictated by the mains fuse and type of installation.

Equipment designation	Mains fuse 3x (time-lag) [A]	Power choke 3x 4% u_k [mH] - [A]
DSV 5452-2..4	6	2,40 - 10
DSV 5452-8..10	16	2,40 - 10
DSV 5452-13..17	25	0,70 - 35
DSV 5452-23	35	0,70 - 35
DSV 5452-31	50	0,70 - 35
DSV 5452-43..46	63	0,50 - 50
DSV 5452-57	80	0,50 - 50
DSV 5452-71	100	0,30 - 80
DSV 5452-86	125	0,30 - 80
DSV 5452-110	160	0,25 -100
DSV 5452-130	200	0,20 -120

2.3.2 Operation with leakage current safety device

It is only possible to use leakage current safety devices (F1) in conjunction with frequency inverters in certain circumstances. Check national standards to see whether a leakage current safety device is admissible for your application. In the event of a fault, DC currents can occur on the mains side with frequency inverters. You should therefore only use leakage current safety devices suitable for DC leakage currents.

Mains filters under some operating conditions (e.g. failure of one phase) can cause high discharge current, resulting in spurious tripping of the safety device. Switching devices on the mains side, such as mains switch or fuse, must therefore switch symmetrically. Rotary switches are generally unsuitable for use with mains filters.

2.4 Motor connection

The motor phases U, V, W are connected to the terminals U1, U2, U3. The motor housing should be earthed. Make sure that the phase sequence is maintained for clockwise phase sequence, otherwise the motor will turn to the left for positive setpoint values. The line cross-sections of the motor feeder are dictated by the rated current of the frequency inverter. Only use screened motor feeders if no mains/motor filter is used.

Operating with low speeds and high motor currents causes serious overheating of the motor. It may be that self-cooling or self-ventilation are no longer sufficient. In this case the motor must be fitted with a temperature sensor (thermistor).

With parallel operation of several motors with one inverter, the cumulative motor current must not exceed the rated equipment current.

If the motor is operated above its rated frequency (standard 50 Hz motor), check the limit speed. Ask your motor manufacturer if in doubt.

2.4.1 Power chokes

Irrespective of EMC regulations, power chokes must be used for motor cable lengths of more than 15 m to limit the capacitive discharge current. The chokes also reduce the voltage rise velocity du/dt on the motor winding. We recommend an inductance value per phase as follows for choke inductance:

$$L = \frac{8000}{\text{Rated motor current [A]}} [\mu\text{H}]$$

The power chokes are to be designed for the inverter PWM frequency of 5 kHz. If our add-on filter option is used, power chokes will be required for cable lengths of 45 m and over.

With high-frequency motors, power chokes must in principle be incorporated irrespective of cable length, as, compared to standard motors, the harmonic content of the current and hence motor temperature rise are increased.

High frequency motors in this respect are motors with the following rated motor voltage to rated motor frequency value:

$$\frac{\text{Rated motor voltage}}{\text{Rated motor frequency}} \leq 1.5 \text{ Vs}$$

Example: Rated motor voltage $U_n = 380 \text{ V}$
Motor frequency $f_n = 300 \text{ Hz}$

$$\frac{U_n}{f_n} = \frac{380 \text{ V}}{300 \text{ Hz}} = 1,27$$

as $1.27 < 1.5$, power chokes must be used.

2.4.2 Thermistor

The motor temperature monitoring system protects the connected motor against thermal overload. In the event of excessive temperature rise in the winding, the inverter automatically cuts out. Connect the motor thermistor with a screened line to terminals 23 and 24 on the front panel. For motors without a thermistor, terminals 23 and 24 are to be bridged.

2.5 Earthing

Earthing consists of a safety earth and a functional earth. If earthing is inadequate or missing, this can cause malfunctions, or even damage the inverter. Particular care should therefore be taken with installation, noting the following points:

- ◆ Select the optimum earthing solution for integration (e.g. switch-cubicle mounting plate).
- ◆ Ensure that all metallically conductive housing components are connected with suitable lines of adequate cross-section.
- ◆ Ensure maximum contact surfaces of the components (skin effect). Remove any paint to ensure a sound, flat contact surface
- ◆ Identify a central earthing point, e.g. on a potential compensating rail. Start the earth from this in a star layout to the corresponding connections.
- ◆ Avoid earthing loops.
- ◆ Iron choke cores must be earthed.
- ◆ The motor housing must be included in the equipotential bonding.

2.6 Screening of lines

- ◆ Cables between the inverter output and the motor must be screened (if an output filter is not used). For long cables, the screen must in addition be earthed every 25 m.
- ◆ For digital transmission systems, connect the screen on both sides with the equipotential bonding.

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- ♦ For high impedance analog control lines the screen should be in contact on one side on the source side, as control signal effects due to the 50 Hz ripple current cannot be ruled out.
- ♦ All screen connections should have a large contact surface if possible with 360° contact to PE.

2.7 Radio interference suppression

Our inverters are set for radio interference suppression by means of a metal screen on the equipment itself. The unit complies with EN55011 Radio interference of electrical operating resources and installations, limit value class B, and EN50141 Radio interference suppression - Test intensity III taking into account the following sections:

Power circuit, Mains filter

Power circuit, Installation instructions for radio interference suppression

2.7.1 Mains filter

A mains filter or our add-on filter (optional) must be provided in the mains feeder between the power choke and unit input.

Make sure that, depending on type, the filter can produce discharge currents up to some 100 mA in the event of failure of one or two phases or major load unbalance in the AC current system. **Filters must therefore be earthed before switching on!!!**

The mains filters we recommend are given in the table below:

DSV 5452-	Rated Voltage	Rated Frequency	Rated Current Mains Filter
2...4/400	3 x 400 V	50/60 Hz	5 A
8...10/400	3 x 400 V	50/60 Hz	8 A
13...23/400	3 x 400 V	50/60 Hz	16 A
31/400	3 x 400 V	50/60 Hz	25 A
43...46/400	3 x 400 V	50/60 Hz	36 A
57/400	3 x 400 V	50/60 Hz	50 A
71...68/400	3 x 400 V	50/60 Hz	80 A
110...130/400	3 x 400 V	50/60 Hz	110 A

2.7.2 Installation instructions for radio interference suppression

- ♦ The unit, power chokes, filter and accessories must be incorporated in a metal switch-cubicle.
- ♦ The line lengths between external mains filter and unit input must not exceed 0.5 m. The line must be screened.
- ♦ Screened motor lines must be connected on both sides to the equipotential bonding. The total length of screening breaks (e.g. for power chokes, motor fuses) must not exceed 10 cm per phase.
- ♦ Control lines and mains feeders should be laid separately from the motor cables.
- ♦ Connecting cables for braking resistors and intermediate circuit connections, where applicable, must be screened.

2.8 Braking module (optional)

The units can be retro-fitted as a special design with a braking option to dissipate braking energy in fast braking operations or with large centrifugal masses. In addition, an external braking resistor with screen line must then be connected to terminals 30 and 31. The power loss of the braking resistor must, depending on braking frequency, be between 0.2 kW and 11.0 kW. In the case of assembly by customer, proper heat dispersal and safe contact protection must be ensured. We also recommend fitting the external braking resistor with a temperature monitoring facility, which cuts out the frequency inverter mains fuse if the braking resistor gets too hot.

The braking resistors we recommend are listed in the table below:

Equipment designation	Braking resistor [Ω]	Power loss S1 Standard [kW]	Cross-section Standard [mm²]	Power loss S1 Lifting system [kW]	Cross-section of lifting system [mm²]
DSV 5452-2..10	63,0	0,20	1,5	0,25	1,5
DSV 5452-13..17	41,0	0,30	1,5	0,33	1,5
DSV 5452-23	20,0	0,40	1,5	1,00	1,5
DSV 5452-31..46	18,8	1,00	1,5	2,00	2,5
DSV 5452-57..86	14,4	2,00	2,5	4,00	2,5
DSV 5452-110..130	13,0	4,00	2,5	6,50	4,0

2.9 Intermediate circuit coupling (optional)

On units of DC-bus 570 V design and external supply, several drives can be connected to one power supply unit. In this case connect terminals 24 (+UB) and terminals 25 (-UB) together on the underside of the unit.

Each intermediate circuit (+UB and -UB) must be protected against short-circuit separately. The DC connection installation between the individual units should be as short as possible and constructed with screened lines. Connections with polarity reversal on the intermediate circuit connections cause immediate damage to the units. Make sure that you check for the **correct polarity before switching on !**

Intermediate circuit protection

To ensure safe operation of the DSV 5452-2...130/570, we recommend using semi-conductor fuses as listed in the table below:

Equipment designation	ZK fuses 2x gR 660/690 V [A]	Minimum cross-section [mm²]
DSV 5452-2..8/570	25	4
DSV 5452-10..13/570	35	6
DSV 5452-17..23/570	50	10
DSV 5452-31..43/570	63	16
DSV 5452-46/570	80	25
DSV 5452-57..71/570	125	35
DSV 5452-86..110/570	160	50
DSV 5452-130/570	200	50

3 Control unit

All switching (digital) inputs and outputs relate to the external earth input (terminal 77). An external 24 V voltage supply is preferred for use with digital inputs and outputs and must be protected with a 1.5 AT fuse. This potential is separated galvanically from the inverter. The digital inputs require 15 - 24 V DC for switching on. The digital outputs are SPS-compatible, short-circuit proof and can supply a current of 100 mA.

The analog inputs and outputs and reference voltage source has voltage (electronic potential, separated galvanically from the power circuit) and relate to AGND (terminal 54).

The internal +15 V voltage supply relates to terminal 20 and can only be used for inverter inputs. Due to the risk of interference, no long cables should be connected or other assemblies supplied with this.

The following standard potentials are available for the connections:

Reference voltage	Pin numbers
Pin 20, GND Pin 54, AGND	Pin 19, +15 V Pin 23, Motor thermistor Pin 24, Motor thermistor Pin 55, +10 V Pin 57, -10 V Pin 75, - Setpoint value Pin 76, + Setpoint value Pin 80, Analog output 1 Pin 88, Analog output 2
Pin 77, external earth	Pin 53, External direction of rotation Pin 58, Digital input 3 Pin 61, Shutdown message Pin 62, Pulse enable Pin 70, Digital input 4 Pin 71, Frequency reached Pin 78, +24 V external Pin 92, Fast stop/DC braking Pin 93, Digital output 1 Pin 94, Digital output 2 Pin 95, Over-current Pin 98, Digital input 1 Pin 99, Digital input 2 Pin 90, Ready for operation 1, voltage-less relay contact Pin 96, Ready for operation 2, voltage-less relay contact

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The inverter has the following connections:

Terminal	Name	Function
19	+15 V	output +15 V (max. 70 mA)
20	GND	Reference voltage for +15 V supply
23 24	Motor thermistor Motor thermistor	Connections for motor temperature monitoring (by means of thermistor). With no thermistor both terminals must be bridged.
53	External direction of rotation	Change-over of direction of rotation
54	AGND	Reference potential for reference voltage and analog outputs
55	+10 V	Reference voltage for setpoint potentiometer
57	-10 V	-"
58	Digital input 3	Digital inputs 3 and 4 are used for data set change-over. Option of 4 different data sets
61	Shutdown message	Digital output, activated when motor stops
62	Pulse enable	Enables the inverter
70	Digital input 4	Digital inputs 3 and 4 are used for data set change-over. Option of 4 different data sets.
71	Frequency reached	Output set when setpoint frequency is reached
75	- Setpoint value	Differential input for analog setpoint
76	+Setpoint value	-"
77	External earth	Reference potential for digital signals and external supply
78	+24 V external	External supply to outputs
80	Analog output 1	Motor frequency (0 - 10 V correspond to 0 - Fmax, loading capacity 10 mA max.) in relation to pin 54
88	Analog output 2	Motor current (0 - 10 V correspond to 0 - $1.5 \times I_N$, loading capacity 10 mA max.) in relation to pin 54. The range 0 - $1.5 \times I_N$ cannot be altered.
90	Ready for operation	Ready for operation relay connection 1 (voltage-less relay contact, configurable via connector bridge in unit as make or break contact, standard setting: make contact) Contact load 0.5 A/24 V DC
92	Fast stop/ DC braking	On activation of the fast stop/DC braking input the drive moves to the programmed stop ramp to Fmin absolute. The DC braking is then activated for an adjustable time, sufficient for braking the drive till it stops. If required this function can also be triggered with deactivation of the input. This must be stated expressly on the order, however.
93	Digital output 1	First current threshold set if the motor current exceeds a preset value.
94	Digital output2	Second current threshold set if the motor current exceeds a preset value.
95	Over-current	Output showing overcurrent in equipment
96	Ready for operation	Ready for operation relay connection 2 (voltage-less relay contact, configurable via connector bridge in unit as make or break contact, standard setting: make contact) Contact load 0.5 A/24 V DC
98	Digital input 1	Digital inputs 1 and 2 change between either 4 fixed frequencies (setpoint type "FIXED FREQUENCY") or are used with the "INTERFACE" setpoint to increase or reduce the setpoint. Digital input 1 increases the setpoint value, input 2 reduces it. If a setpoint is specified in the "INTERFACE" setpoint type, this value is then used as the starting point for increasing or reducing via the two inputs.
99	Digital input 2	-"

3.1 Specified setpoint and selection of direction of rotation

The inverter is able to produce both a left and a right rotation phase sequence (direction of rotation of motor), depending on the selected setpoint. There is an option of four different setpoint types:

♦ **Analog setpoint with voltage:**

The setpoint for the motor is specified by a voltage between -10 and +10 V. The preceding sign for the input voltage then determines the direction of rotation of the motor. In parameter setting, the assignment can be determined between the polarity of the input voltage and the direction of rotation. The direction of rotation can also be influenced by the direction of rotation input (pin 53).

♦ **Analog setpoint with injected current:**

- 0 - 20 mA Connect power source to terminal 76 (input) and terminal 75 (0 V). Position bridge X2 on the side without the white marking
- 4 - 20 mA Available as special design. This requires consultation with head office.



See Section Appendix, Connections for examples of connection assignment for analog specified setpoints.

♦ **INTERFACE:**

With the "INTERFACE" setpoint type, the setpoint is specified directly, either by the FC CONTROL or by the PC. This setpoint is not stored when the inverter is switched off, so that when the system is switched on, the setpoint = 0 Hz. In addition, the setpoint can be increased with digital input 1 and reduced with input 2 (motor potentiometer function). The inverter changes its setpoint value according to the run-up or return ramps set.

♦ **FIXED FREQUENCY:**

One of 4 fixed frequencies can be selected via digital inputs 1 and 2. The value of the fixed frequency is freely selectable. The setpoint is given as an amount, and the direction of rotation is determined with the direction of rotation input (terminal 53).

Logic table for digital inputs 1 and 2:

Fixed frequency	D1	D2	
FF1	0	0	"0" corresponds to an unassigned input, "1" means voltage applied
FF2	1	0	
FF3	0	1	
FF4	1	1	

3.2 Use of data sets and data set transfer

The inverter uses the parameters of the active data set. The active data set can be selected manually or via digital inputs 3 and 4. For data set transfer, the inverter must be blocked (control enable not assigned). It is non-operational for a brief moment during transfer.

In parameter setting, only the active data set can be modified, so that the required data set must be selected via digital inputs 3 and 4 (see logic table).

Logic table for digital inputs 3 and 4:

Data set	D3	D4	
1	0	0	"0" corresponds to an unassigned input, "1" means voltage applied
2	1	0	
3	0	1	
4	1	1	

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3.3 Serial interface

The inverter has an RS485 and RS232 interface as standard (9-pole Sub-D connector, male).

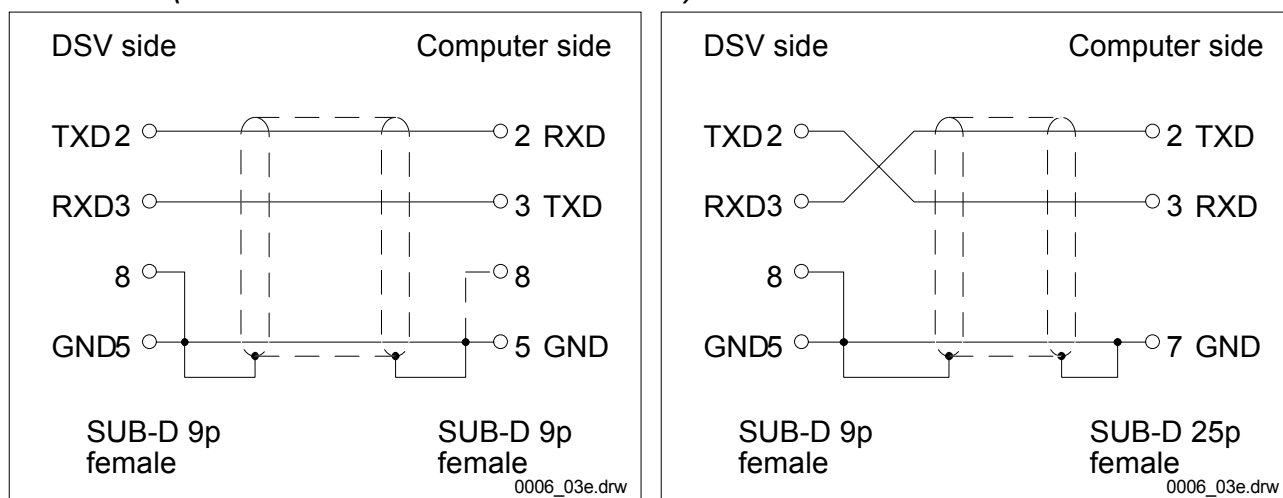
The serial interface is fixed at the following settings:

- 9600 Baud
- No parity
- 1 Stopbit

The pin assignment of the 9-pole Sub-D connector on the DSV and transfer between the RS485, RS232 and RS422 interfaces is given in the table below:

Pin	Function
1	TXD- of RS422
2	TXD of RS232 or TXD+ of RS422
3	RXD of RS232 or RXD+ of RS485 or RS422
4	RXD- of RS485 or RS422
5	GND
6	Operation is transferred from RS232 to RS485/RS422 operation, if this connection is linked to pin 5.
7	Operation is switched to addressed RS485 operation if this connection is linked with pin 5 (only together with pin 6)
8	Must be connected to earth (pin 5) on the MAXIDRIVE DSV 5452..
9	+5 V

RS232 cable (connection MAXIDRIVE DSV 5452 ↔ PC)



3.3.1 Addressed multi-axis operation

With addressed multi-axis operation, it is possible with the terminal program to operate up to 32 inverters. This is only possible with the RS485. To switch to this mode, pin 6, pin 7 and pin 8 must be connected to pin 5 in the connector. Before operation, the address must be input for the inverter concerned, either via the operator console or via the PC.

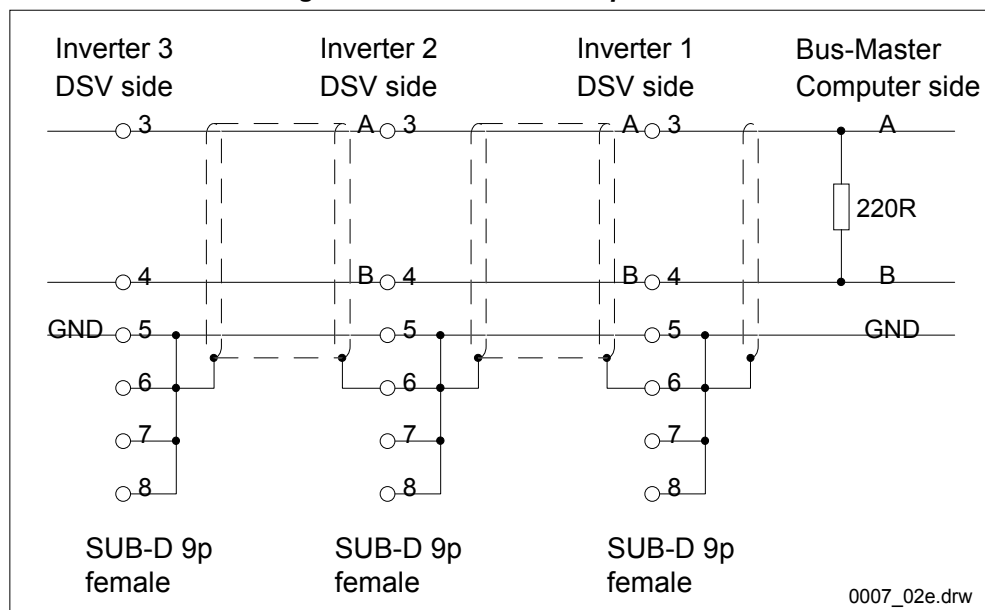
Avoid similar addresses. If an address is specified several times, this will not appear at the start of the terminal program.

The terminal program automatically tests after starting whether the inverter is connected in addressed multi-axis operating mode and which unit addresses are assigned.

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Wiring is as shown in the diagram below:

RS485 connection assignment with multi-axis operation



4 Operation

For standard applications, only the parameters in the short menu need to be set. The parameters should be set bottom-upwards for the first setting in the sequence specified in the short menu (see *section Appendix, Short menu*).

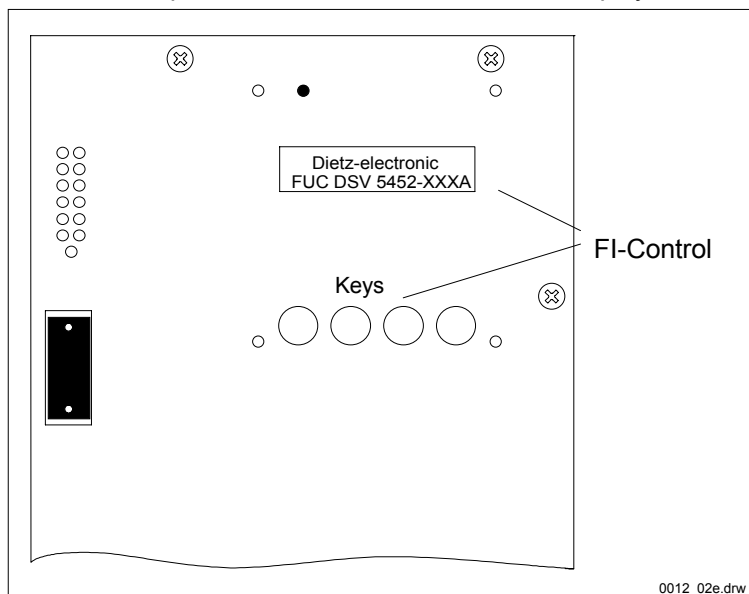
- Operator unit:
- ◆ simple 4-key control, 2-line LC display, 6 languages
 - ◆ 4 data sets selectable (characteristic curve, ramps, angular frequencies)
 - ◆ Actual value display.
 - ◆ Menu-controlled parameter-setting, mains failure saving of parameters.

Operation is possible via the integral operator unit or via a personal computer as well. An operating program (terminal program) is available for the personal computer mode. The unit also contains some LEDs for various elementary functions.

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4.1 Operation using internal operator unit

The internal operator unit consists of a two-line display with clear text display and 4 keys.

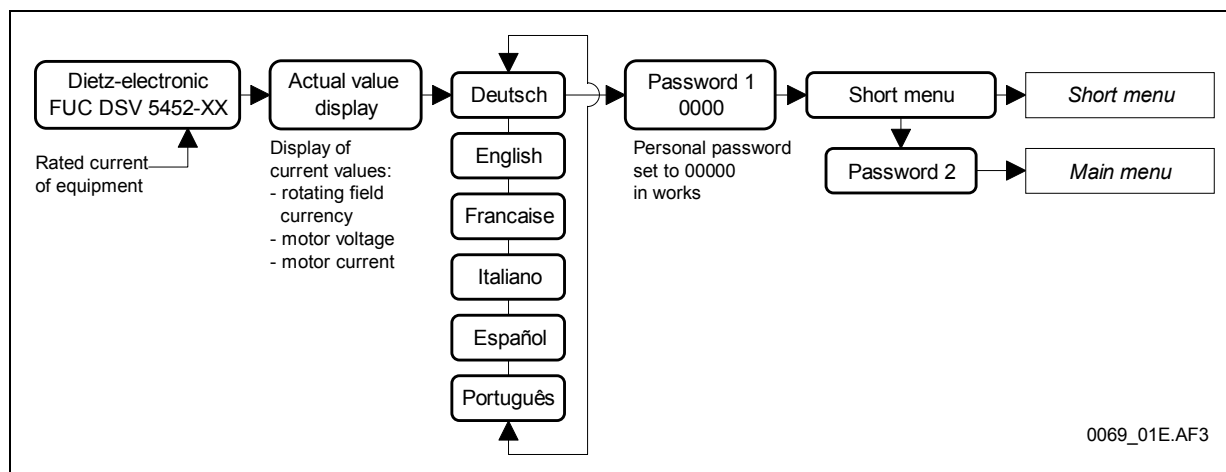


The four keys have the following function:

Key		Function
←	Left arrow key	Returns to a menu level or selects the previous figure of a number
↑	Up arrow key	Increase the number of a subroutine or parameter value
↓	Down arrow key	Decrease the number of a subroutine or parameter value
⇒	Right arrow key	Moves on a menu level, selects the next figure of a number or confirms the input (Enter key).
Edit a value		Once the parameter is selected, the right and left arrow keys can be used to position the cursor on the required position. The up/down arrow keys are used to change the number value. To accept a modified parameter value, press the right arrow key until the LCD display on the operator unit gives a "saved" message.

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The parameters are subdivided into different groups and identified by six-figure numbers.
The function of the parameter group or parameter and the number are shown in the display.
Operation and input of the required parameters is presented graphically in an easily understandable form (see *section Appendix, Short menu and Main menu*).



4.2 Terminal program

The terminal program can be run on IBM compatible computers with an MS-DOS or PC-DOS operating system, version 3.3 or later.

4.2.1 Calling in programs



Before starting the terminal program, the interface connection between the PC and DSV should be set up (check interface cable assignment). After making the connection, the FC Control switches and the following message appears in the display:

Ex. Interface
RS232-RS485

Insert the „Terminal programm – MAXIDRIVE DSV 5452“ floppy disk into the drive of your PC/laptop. Copy all files from the floppy disk into a sub-directory (e.g. terminal) of your choice on the hard disk. Change to the subdirectory:

Call in: TERM [-?] [-01234] [-DEF] [-USER] [-DONAU]

Explanation of options:

- ? Call in help function
- 1 COM1 used as RS232 interface (standard, not to input as extra)
- 2 COM2 used as RS232 interface
- 3 COM3 used as RS232 interface
- 4 COM4 used as RS232 interface
- D Deutsch
- E English
- F Francaise
- I Italiano
- P Português
- S Español
- 0 Simulation mode (operation without inverter)
- USER User-definable limitation of scope of function
- DONAU Must be input in unit with 12 MHz

Example of typical call-in:

1. Example: TERM standard values are used, i.e. COM1 interface used.

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- 2. Example: TERM -2 COM2 interface used.
- 3. Example: TERM -? displays help text showing all permitted options.

4.2.2 General operator functions

Explanation of operation:

Edit a value: the character under the cursor can be deleted with the "DEL" key. The left and right arrow keys can be used to position the cursor in the text. With editing, only valid values are permitted, i.e. the value must fall within the permitted limits, as displayed. If a value has an editing top and bottom limit, the top limit must be edited first.

Within the scroll box, the up and down keys are used to move the cursor bar. The PgUp and PgDown keys are used to move the cursor bar one page length on. Use the Home key to jump to the first position in the box. Use the End key to jump to the last position in the box.

The following key functions are available:

TAB, SHIFT TAB: This is used to switch between boxes.

ESC: This is used to leave the current menu or interrupt an editing process. The program is also exited with this function.

RETURN: End value input, i.e. the value in the input line is accepted by the system. The current adjusted value is accepted by means of a selection menu. If the marked line contains the menu designation, the system branches into a sub-menu.

F1: The available help functions are display, e.g. content-related.

F2: Parameter lists are saved, and the user can determine or specify the file-name himself. A warning is given in the event of file over-write.

F3: Parameter list loaded, plus the option of switching between boxes created here using the TAB key.

F5: Switching between different inverters in addressed multi-axis operation. Parameters read out once only per inverter and then stored in the PC.

F6: Calls in a sub-menu

F7: Display of stored actual value processes.

F8: Activates graphic actual value display. The setpoint and actual frequencies and the motor current are displayed. The recording time is freely adjustable. The current screen content can be saved.

4.2.3 Simulation mode

With option "-0", the terminal program can be called in without the connected inverter. It is then possible to represent the saved actual value curves on screen.

It is also possible to set parameters. For this, stored parameters can be read in and then saved again after editing. The terminal program needs the data of the inverter used for this..

4.2.4 Restriction of scope of function

With the "-USER" option, the scope of functions of the terminal program can be restricted for the end user. Only the required parameters are presented. This function enables, for example, the installer to change selected parameters only when in situ. The terminal program is invoked via a batch file with this option.

The terminal program also includes the file "TERM.CFG". It contains a list of all parameters. In the second column "JA" (YES) is entered if the corresponding parameter is to be displayed, or "NEIN" (NO) if not.

5 Faults

5.1 Some troubleshooting aids and answers to common questions

How to you identify a 12 MHz or 8 MHz CPU ?

- ◆ 8 Mhz: PWM selection 2, 4, 8 kHz possible/invoke terminal program TERM.EXE **without** „-DONAU“
- ◆ 12 Mhz: PWM selection 3, 6, 12 kHz possible/invoke terminal program TERM.EXE **with** „-DONAU“

Unable to set values in the required sectors :

- ◆ Frequencies: Wrong selection of limit frequencies Fmin (lower limit) and Fmax (upper limit).
- ◆ Limit frequencies Fmin and Fmax: For these two values, additional absolute limit values are provided. These are factory-set to order.
- ◆ Other values: The associated limit values are incorrectly set.

Overload current disconnection:

- ◆ Check wiring of motor lines for short-circuit and earth fault.

Motor will not start:

- ◆ Not ready for operation (e.g. phase failure, motor thermistor invoked). All faults must be acknowledged by mains reset apart from phase failure.
- ◆ No pulse enable.
- ◆ No setpoint value (with analog specification on input, with digital setpoint or fixed frequency specify speed zero)
- ◆ Wrong type of setpoint value
- ◆ Current limit selected too low (e.g. smaller than no-load current)
- ◆ FC-characteristic-line input with too low a rated voltage.
- ◆ Run up ramp set at 0 Hz/s

Motor will not start with high loading torque:

- ◆ Starting voltage (boost) too low
- ◆ Set suitable current limit
- ◆ Use I×R compensation if necessary
- ◆ FC-characteristic-line input with too low a rated voltage.

Additional remarks:

With a phase or mains failure, the inverter brakes the motor with the set return ramp until an undervoltage message is received. The motor then spins. Provided the ramp has been set steep enough, the inverter can then resupply. If the mains power returns, the inverter accelerates the motor automatically again to the required setpoint value, provided that enable is still active.

If this adjustable current limit is exceeded (maximum of 1.5 times the inverter rated current), the steepness of the ramp is reduced on acceleration or braking (if necessary to 0 Hz/s). With static speed, the output frequency is also reduced if necessary. This function is used to "capture" chopped motors.

Apart from phase failure, all faults are maintained and must be acknowledge by a mains reset.

5.2 LED

Abbreviations are printed on the front panel for LEDs. The meanings are as follows:

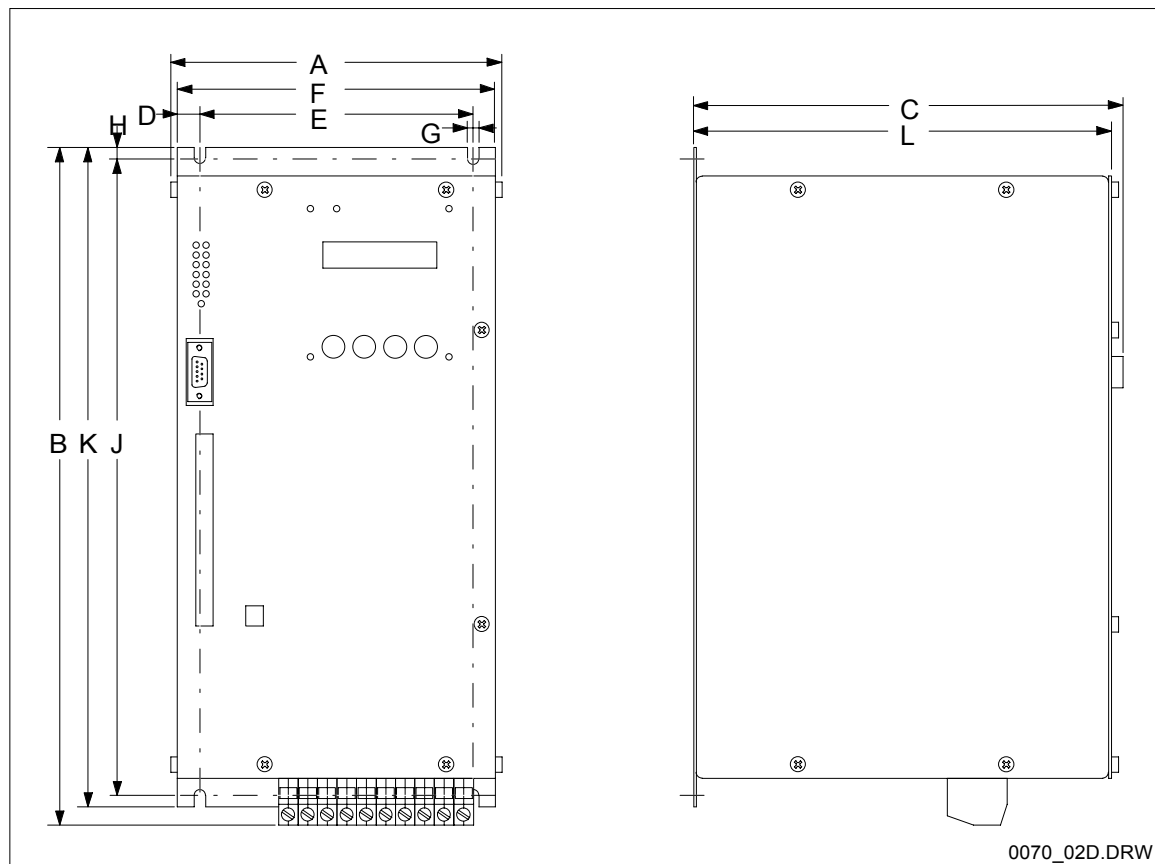
Number	Designation	Function
BB	Ready for operation	Unit ready for operation, i.e. there are no faults
FG	Enable	Pulse enable active (output stage enabled)
ST	Shutdown	Stop message, active when motor stops
S=l	Frequency reached	Setpoint frequency reached (end of ramp and not current limit reached)
I>	Overload current	Earth fault or short-circuit, hardware current limit exceeded
SG	Current limit	Unit working at current limit (reduction in ramp and if necessary output frequency). This is a message only -> not maintained
U<	Under-voltage	Under-voltage of intermediate circuit
U>	Over-voltage	Over-voltage of intermediate circuit
T>	Unit overheat	Excess temperature on cooling unit
KLT	Motor overheat	Excess temperature on motor (motor thermistor)
PH	Phase failure	Failure of one or more phases of power supply
MF	Module fault	The output stage module gives a fault message (overload current or over-heating in motor circuit or in brake). Message only active in units of 2-10 A.
BR	Braking resistor	Inverter brakes

6 Appendix

6.1 Overview of technical data

Connecting voltage	3-phase AC current 3 AC 400 V $\pm 10\%$ 50 / 60 Hz Special version 1/3 AC 230 V $\pm 10\%$ 50 / 60 Hz
Output voltage	Infinitely variable 0 to mains connection voltage, proof against short-circuit and earth fault.
Output current S1	PWM frequency up to 4 kHz, output frequency 0 - 300 Hz and input voltage 3AC 400 V $\pm 10\%$
Max. dynamic current	1.5 x rated current of unit for a maximum of 60 seconds once within 10 min.
Frequency range	0.5 Hz (2 Hz with analog specified setpoint) - 600 Hz (optional 1000 Hz)
Starting torque	Max. 120 % of rated torque.
FC-characteristic-line	Linear or parabolic with infinitely variable preselection of angular frequency (40 Hz to 600 Hz in 0.1 Hz steps). Raising characteristic curve 0 - 25 % in lower range. The characteristic curve can have a salient point
Ramps	0.1 Hz/s to 999.9 Hz/s, ramp return on overload current
Running cycle	PWM frequencies 2, 4, 8 kHz (8 MHz CPU) sinusoidal modulation PWM frequencies 3, 6, 12 kHz (12 MHz CPU) sinusoidal modulation IxR compensation (between 0.5 Hz and 40 Hz)
Ambient temperature	0 - 35 °C 35 .. 60 °C power reduction 1.5 % per °C at PWM frequency 2 kHz / 0.300 Hz, no direct sunlight
Humidity class	E (DIN 40040)
Installation height	Less than 1000 m above datum
Monitoring	Temperature monitoring of power supply unit and motor
Protection type	IP 10 to DIN 40050 (optionally higher) Leakage path and air gap in accordance with VDE 0110 and MIL STD B Test voltage as per VDE 0110
Power supply unit	Power supply of inverter from intermediate circuit
Loading circuit	Electronic smooth loading circuit.

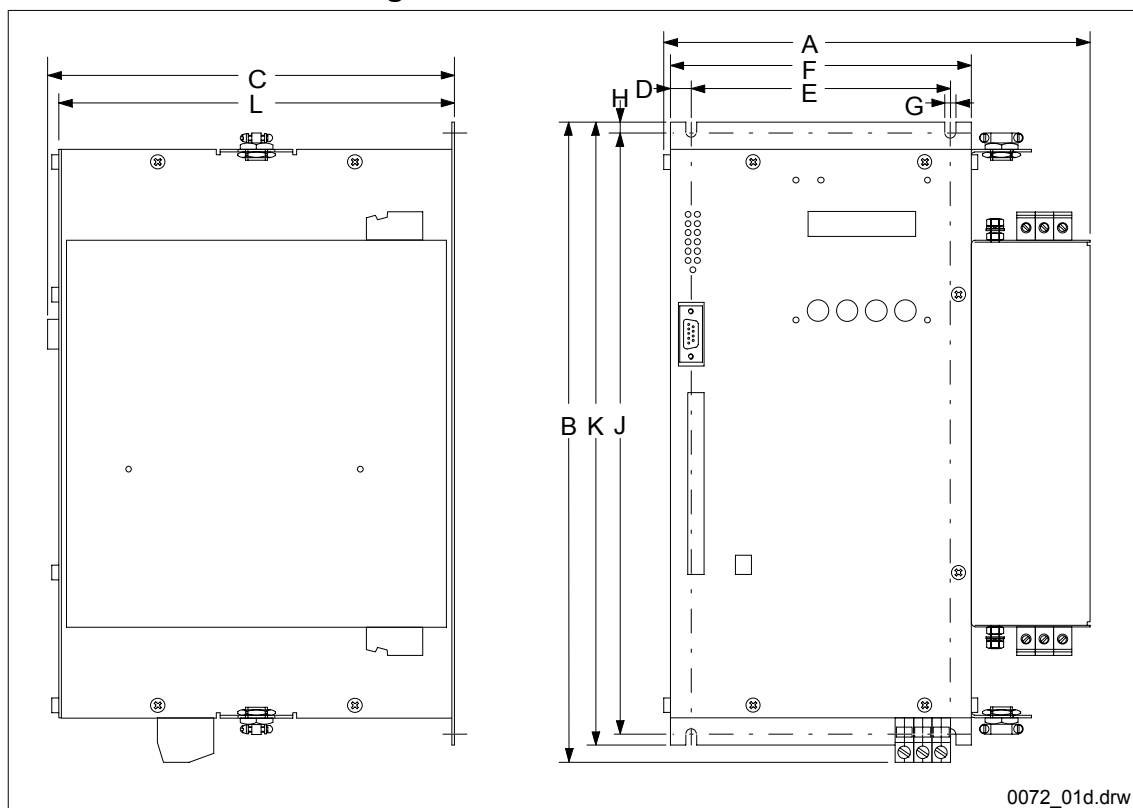
6.2 Dimensions and Weight



DSV 5452	Size	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	J [mm]	K [mm]	L [mm]	Weight [kg]
2 - 10 A	1	137	281	177	11,5	107	130	6	6	264	276	171	6,5
13 - 17 A	2	172	353	223	11,5	142	165	6	6	331	343	217	10,0
23 - 57 A	3	172	473	223	11,5	142	165	6	6	451	463	217	13,0
71 - 130 A	4	220	762	310	11,5	160	213	6,5	6	745	757	304	35,0

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6.3 Dimensions and Weight with add-on filter



DSV 5452	Size	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	J [mm]	K [mm]	L [mm]	Weight [kg]
2 - 10 A	1	193	281	177	11,5	107	130	6	6	264	276	171	10,5
13 - 17 A	2	234	353	223	11,5	142	165	6	6	331	343	217	16,5
23 - 57 A	3	234	473	223	11,5	142	165	6	6	451	463	217	24,0
71 - 130 A	4	295	762	310	11,5	160	213	6,5	6	745	757	304	52,0



Size 1, 2, 3 (57A) are supplied without internal FU-Control

6.4 Connections

Power supply unit:	Mains Motor Earth External braking resistor (optional)
Interface:	RS232 and RS485 (9600, 8 bit, no parity, 1 stopbit, fixed setting), RS422 optional
Analog inputs:	Frequency setpoint Motor thermistor
Digital inputs	Pulse enable Direction of rotation Fast stop / DC braking Two inputs for data set transfer Two inputs for setpoint transfer or to increase and reduce setpoint
Outputs:	Ready for operation Motor shutdown Frequency reached (setpoint = actual value) Digital motor frequency Overload current $I > 1.5 \times$ rated current Auxiliary voltages +/- 10 V and +15 V Analog outputs for motor frequency and single pole 0-10 V motor current

6.5 Power loss

The power consumption of the inverters (without motor connected) is 90 W. For power loss, 15 W per ampere of output current should be added to the relevant power consumption.

6.6 List of all parameters

Abbreviation	Meaning
Fmin	Lower user limit for frequency inputs
Fmax	Upper user limit for frequency inputs
Fmin_abs	Absolute lower user limit for frequency inputs, limit for Fmin
Fmax_abs	Absolute upper user limit for frequency inputs, limit for Fmax
F*	Variable setpoint value
FF1..FF4	Fixed frequencies
FIN	Setpoint value for motor, formed according to parameter setting.
MINAC	Minimum ramp
MAXAC	Maximum ramp
Un_max	Maximum rated voltage
UBM_max	Maximum braking voltage
In	Rated current

6.6.1 Parameter limit values

Designation	Function	1	2
Fmin abs	Lower limit for all frequency inputs	2 Hz	0...25.5 Hz
Fmax abs	Upper limit for all frequency inputs	120 Hz	Fmin abs....999.9 Hz
MIN AC	Lower limit for all ramps	1 Hz/s	0....MAX AC
MAX AC	Upper limit for all ramps	50 Hz/s	MIN AC....999.9 Hz/s
Un	Upper limit for rated voltage	400 V	0...415 V
UB1 MAX	Upper limit for starting voltage (boost)	10 % Un	0....25.5 % Un
UBM	Upper limit for braking voltage	20 V	0...415 V

Column 1: Limit values for standard inverter, modifiable in short menu.

Column 2: Limit values modifiable in main menu.

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6.6.2 Short menu

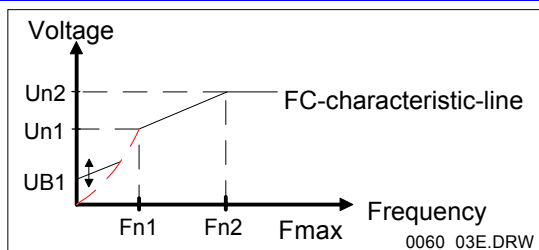
The short menu is used for fast setting of the parameters required for the inverter for standard applications. Some 80% of individual cases can be covered with this. There are four data sets with all parameters available in each. These can be switched manually or by means of digital inputs 3 and 4. The inverter is set for a 50 Hz motor in the standard setting.

6.6.2.1 Parameter

The "Std" column gives the default setting. There is only one possible selection between several options, the default setting is identified with "XX".

The following parameters are available:

Code	Designation	Std.	Meaning/Value range in short menu
000000	SHORT MENU		
010000	Fmax		Maximum frequency of inverter. The value is the upper limit for all other frequency values. The input for the analog setpoint value is scaled with Fmax (0 -10 V correspond to Fmin - Fmax, with an input voltage of 0V the motor stops). The maximum frequency can only be changed if there is no enable signal present (pin 62)
011000	Fmax = Hz value	50 Hz	Fmin...Fmax_abs,
020000	Fmin		Minimum rotation field frequency for inverter. This value is used as the lower limit for all other frequency values.
021000	Fmin = Hz value	2 Hz	Fmin_abs...Fmax, but not > 25.5 Hz
030000	FC characteristic		Characteristic curve of inverter. The data for the rated voltage and rated frequency can be read off the rating plate of the motor. The FC-characteristic-line has a salient point for exact adaptation to special motors. The rated frequency 1 (Fn1) must always be smaller than or the same as rated frequency 2 (Fn2) for this, and the rated voltage 1 (un1) must be smaller than or the same as the rated voltage 2 (un2). With standard application, both values are set the same, otherwise a steeper characteristic curve is generally set in the lower range. The rated frequency and rated voltage can be read off the type plate. Finally, the starting voltage (UB1 = Boost) should be increased sufficiently so that startup of the motor is ensured at full load.
031000	Linear	XX	
032000	Parabolic		
03X100	Rated frequency 1		Rated frequency 1 of motor.
03x110	Fn1 = Hz value	50 Hz	Fmin...Fmax abs
03x200	RATED VOLTAGE 1		Rated voltage 1 of motor
03x210	Un1 = V value	380 V	0...Un
03x300	STARTING VOLTAGE		FC-characteristic-line raised in lower speed range. Expressed in percentage rated voltage Un.
03x310	UB1 = % value	2 %	0...UB1_MAX
03x400	RATED FREQUENCY2		Rated frequency 2 of motor.
03x410	Fn2 = Hz value	50 Hz	Fn1...Fmax_abs
03x500	RATED VOLTAGE 2		Rated voltage 2 of motor
03x510	Un2 = V value	380 V	Un1...Un



Code	Designation	Std.	Meaning/Value range in short menu
040000	Ramps		Separate gradients can be parameter set for acceleration and braking of the motor. Separate ramps can be selected for left and right direction of rotation
041000	OPERATING MODE		
041100	RIGHT = LEFT	XX	Equal gradient for both directions of rotation
041110	RUN-UP RAMP		

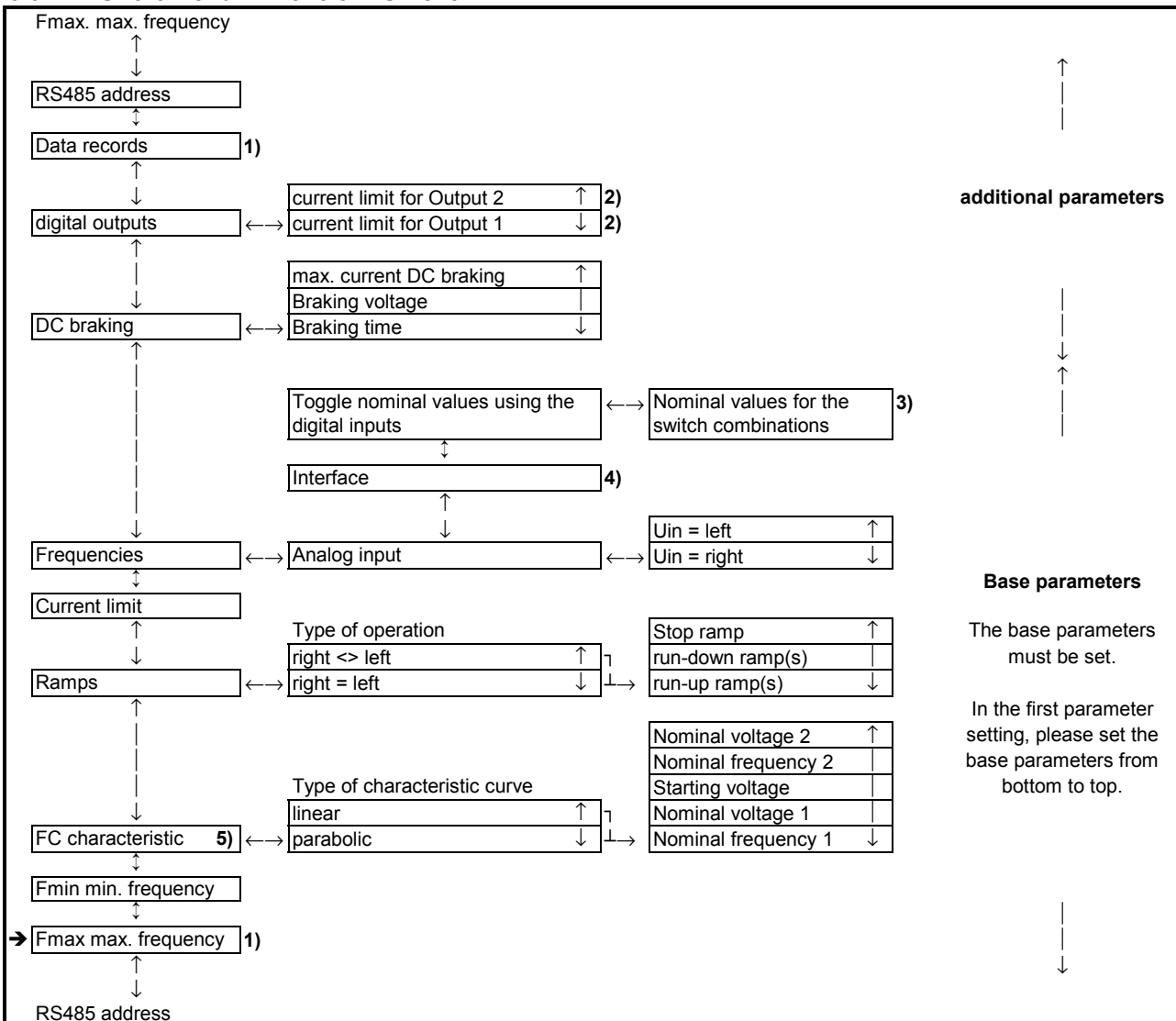
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Code	Designation	Std.	Meaning/Value range in short menu
041111	RUR=Hz/s value	10 Hz/s	(MINAC...MAXAC)
041120	RETURN RAMP		
041121	RR = Hz/s value	10 Hz/s	(MINAC...MAXAC)
041130	STOP RAMP		The stop ramp is used when input terminal 92 is used for "fast stop/DC braking". Braking is done up to minimum frequency Fmin. abs with the stop ramp; after this DC braking cuts in.
041131	RSTOP = Hz/s value	10 Hz/s	(MINAC...MAXAC)
041200	RIGHT <> LEFT		Different gradients for both directions of rotation
041210	RUN-UP RIGHT		
041211	RUR = Hz/s value	10 Hz/s	(MINAC...MAXAC)
041220	RETURN RAMP RIGHT		
041221	RRR = Hz/s value	10 Hz/s	(MINAC...MAXAC)
041230	RUN-UP LEFT		
041231	RUL = Hz/s value	10 Hz/s	(MINAC...MAXAC)
041240	RETURN RAMP LEFT		
041241	RRL = Hz/s value	10 Hz/s	(MINAC...MAXAC)
041250	STOP RAMP		
041251	RSTOP=Hz/s value	10 Hz/s	(MINAC...MAXAC)
050000	CURRENT LIMIT		Ramp limit if motor current exceeds input value.
051000	Yes	XX	
051100	MAX. CURRENT		This value is a usage limit for ramp reduction, Over I _{max} . the ramp gradient is reduced to guarantee heavy starting.
051110	I _{max} = Value A	In	With the default setting, the unit rated current is set at 0 - 1.5 In
052000	NO		With NO, 1.5 is automatically input as the current limit
060000	FREQUENCY		The required setpoint value type can be selected under this menu point. There are 3 options available
061000	ANALOG	XX	Setpoint value specified with analog input.
061100	+U _{in} = RIGHT	XX	A positive input voltage gives a right field of rotation
061200	+U _{in} = LEFT		A positive input voltage gives a left field of rotation
062000	INTERFACE		Setpoint value not specified with setpoint input, but input directly. With digital input 1, the setpoint can be increased and with input 2 decreased. If a setpoint is input, this setpoint serves as the starting point for motor potentiometer emulation. The run-up and return ramp 1 is used for motor potentiometer emulation. The "RIGHT = LEFT" option only should be used for ramp operating mode. After switching the inverter on again, a frequency of 0 Hz is input here (motor static).
062100	F*= value	0 Hz	Setpoint speed for this mode.
063000	FIXED FREQUENCY		Digital inputs switch between the different setpoint values. There is a choice of 4 different frequencies.
063100	COMBINATION 00		
063100	FF1 - Hz value	5 Hz	Fmin.....Fmax
063200	COMBINATION 01		
063200	FF2=Hz value	5 Hz	Fmin.....Fmax
063300	COMBINATION 10		
063300	FF3 = Hz value	5 Hz	Fmin.....Fmax
063400	COMBINATION 11		
063400	FF4 = Hz value	5 Hz	Fmin.....Fmax
070000	DC BRAKING		DC braking. DC braking is activated when the DC braking/fast stop input is activated. It is only activated below Fmin abs. The motor receives a DC voltage U _{hm} for the specified time. The current is limited to I _{rated} by the height of the voltage by the motor (safety function)
071000	BRAKING VOLTAGE		Voltage for DC braking
071100	UBM = V value	10 V	0.....UBM-MAX
072000	BRAKING TIME		Time in which DC current is applied to motor.
072100	TBM = sec. value.	1.0 sec	0.....99.9 sek.
073000	I _{rated}		Maximum motor current with DC braking (safety function)
073100	I _{rated} = value in A	0.5 × In	0.....1.25 In
080000	DIGITAL OUTPUTS		Outputs indicate when the motor current exceeds the input value
081000	CURRENT LIMIT 1		Current limit for digital output 1. If the input current is exceeded, the

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Code	Designation	Std.	Meaning/Value range in short menu
			corresponding output is set.
081100	Id = A value	In	0.....1.5 In
082000	CURRENT LIMIT 2		Current limit for digital output 2. If the input current is exceeded, the corresponding output is set.
082100	Id = A value	1,5 In	0.....1.5 In
090000	DATA SET		Transfer of active data set (see <i>section Control unit, Use of data sets and data set transfer</i>). Choice of 4 data sets. In order to be able to transfer data sets, "PULSE ENABLE" must be reset. The inverter runs an auto reset. Manual selection of a data set disconnects transfer via the two digital inputs.
091000	DATA SET 1	XX	
092000	DATA SET 2		All programmed the same in delivery state (standard version).
093000	DATA SET 3		
094000	DATA SET 4		
0A0000	RS485 ADDRESS	00	Inverter address for addressed multi-axis operation (via RS485). If only one inverter is in operation (e.g. with RS232), the input value has not meaning
0a1000	ADDRESS	00	0.....31

6.6.2.2 Short menu FI Control DSV 5452

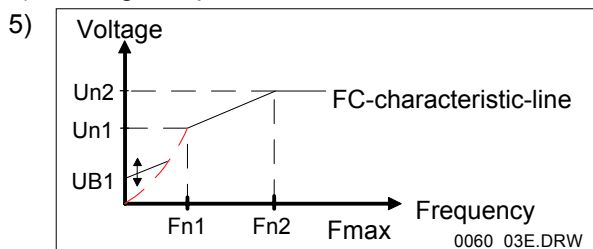


1) Warning: Alter the max. frequency and the data record only with entry reset.

2) Warning: Alter the entries for Output 1 and 2 only with entry reset.

3) The digital inputs toggles between 4 fixed frequencies.

4) The digital inputs 1 and 2 raise or lower the nominal value.



Fn1: Nominal frequency 1
Fn2: Nominal frequency 2
UB1: Starting voltage
Un1: Nominal voltage 1
Un2: Nominal voltage 2

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6.6.3 Main menu

The main menu is only accessible by means of a special password. If you need this password, please contact our head office in Neuffen (Tel. +49-7025/101-0). We recommend using our terminal program to change limit values in the main menu.

Selection of the reference value			
Code	Declaration	Company-Setting	Meaning
200000	Reference values		Subgroup with reference values
210000	Frequencies		
211000	Reference value type		Reference value digital or analog
211100	Analog input	XX	The analog input is used for the reference value
211110	+ Uin = right	XX	A positive input voltage results a clockwise rotary field
211120	- Uin = left		“ “ “ “ a anticlockwise rotary field
211200	Interface		Reference value, which is not given by the reference value input, but given directly. Via input 1 the reference value can be increased and via input 2 decremented. If a reference value is be set in such a way, the starting point for the motor potentiometer emulation is the reference value. The running up and return ramp 1 are used for the motor potentiometer emulation. For the ramp operation mode, the option “right = left” shall be used. After switch off/on of the inverter, a frequency of 0 Hz is be set.
211210	F* = value Hz	0 Hz	Fmin...Fmax
211300	Digital inputs		Affects, that the digital inputs 1 and 2 between the different fixed frequencies are changing. It can be selected between 4 different frequencies.
Frequency limits			
212000	Limit frequencies		Upper and/or lower limit of the frequency reference values.
212100	F-MIN		
212110	Fmin = value Hz	2Hz	Fmin_abs...Fmax
212200	F-MAX		Maximum frequency of the inverter. This value is the upper limit for all other frequency values. The input for the analog reference value will be scaled with Fmax (0..10V comply Fmin...Fmax, at a input voltage of 0V the motor stops. To change the maximum frequency, pin 62 (release input) must be set back.
212210	Fmax = value Hz	50Hz	(Fmin...Fmax_abs)

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Fixed frequency			
213000	Fixed frequencies		Possible direct retrievable fixed frequency reference values
213100	FF1		
213110	FF1 = Value Hz	5Hz	Fmin..Fmax
213200	FF2		
213210	FF2 = Value Hz	5Hz	Fmin...Fmax
213300	FF3		
213310	FF3 = Value Hz	5Hz	Fmin...Fmax
213400	FF4		
213410	FF4 = Value Hz	5Hz	Fmin...Fmax
213500	FF5		
213510	FF5 = Value Hz	5Hz	Fmin...Fmax
213600	FF6		
213610	FF6 = Value Hz	5Hz	Fmin...Fmax
Ramps			
220000	Ramps		For the acceleration and the braking of the motor are separated gradient parametrizable. For the left and the right direction of rotation are separated ramps selectable.
221000	Operation mode		
221100	Right = Left	XX	Acceleration for both directions of rotation are the same.
221110	Running up ramp		
221111	HLR = Value Hz/s	10Hz/s	MINAC...MAXAC
221120	Return ramp		
221121	RLR = value Hz/s	10Hz/s	MINAC..MAXAC
221130	Stop ramp		With the activation of the input "quick stop / DC braking, the stop ramp is used. It will be delayed with the stop ramp until the minimal frequency Fmin. Below of Fmin, the DC braking will be insert.
221131	Rstop = value Hz/s	10Hz/s	MINAC...MAXAC
221200	Right <> Left		Different gradients for both rotation directions. The running up and return ramp will be switchover.
221210	Run up r. right		
221211	HLRR=value Hz/s	10Hz/s	MINAC...MAXAC
221220	Return r. right		
221221	RLRR=value Hz/s	10Hz/s	MINAC...MAXAC
221230	Run up r. left		

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221231	HLRL=value Hz/s	10Hz/s	MINAC...MAXAC
221240	Return r. left		
221241	RLRL=value Hz/s	10Hz/s	MINAC...MAXAC
221250	Stop ramp		
221251	Rstop = value Hz/s	10Hz/s	MINAC...MAXAC
221300	Special 1		Below the with FF6 adjustable frequency limit, the first ramp record is used. Above, the second ramp record is used. The running up and return ramp will be switchover.
221310	Run up ramp 1		
221311	HLR1=value Hz/s	10Hz/s	MINAC...MAXAC
221320	Return ramp 1		
221321	RLR1=value Hz/s	10Hz/s	MINAC...MAXAC
221330	Run up ramp 2		
221331	HLR2=value Hz/s	10Hz/s	MINAC...MAXAC
221340	Return ramp 2		
221341	RLR2=value Hz/s	10Hz/s	MINAC...MAXAC
221350	Stop ramp		
221351	Rstop=value Hz/s	10Hz/s	MINAC...MAXAC
221400	Special 2		Below the with FF5 adjustable frequency limit, the first ramp record is used. Between FF5 / FF6 the second and above of FF6 the third is used. The running up and return ramp will be switchover.
221410	Run up ramp 1		
221411	HLR1=value Hz/s	10Hz/s	MINAC...MAXAC
221420	Return ramp 1		
221421	RLR1=value Hz/s	10Hz/s	MINAC...MAXAC
221430	Run up ramp 2		
221431	HLR2=value Hz/s	10Hz/s	MINAC...MAXAC
221440	Return ramp 2		
221441	RLR2=value Hz/s	10Hz/s	MINAC...MAXAC

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221450	Run up ramp 3		
221451	HLR3=value Hz/s	10Hz/s	MINAC...MAXAC
221460	Return ramp 3		
221461	RLR3=value Hz/s	10Hz/s	MINAC...MAXAC
221470	Stop ramp		
221471	Rstop=value Hz/s	10Hz/s	MINAC...MAXAC
Characteristic curve			
230000	Voltages		
231000	Character. U/F		Characteristic curve of the inverter. The data of the nominal voltage and the nominal frequency can be taken from the type shield of the particular motor. The U/F characteristic curve is for the exact accommodation of special motors with a break provided. The nominal frequency 1 must be ever lower or the same as the nominal frequency 2. The nominal voltage 1 must be ever lower or the same as the nominal voltage 2. at standard applications, both values will be adjusted as the same. Otherwise in the lower area will be a sharper characteristic curve adjusted. The nominal frequency and the nominal voltage can be taken from the type shield. Then the start voltage will be increase until the start of the motor at a full load torque is be assured.
231100	Linear	XX	
232200	Parabolic		
231x10	Nominal freq. 1		Nominal frequency 1 of the motor
231x11	Fn1 = value Hz	50Hz	
231x20	Nominal voltage 1		Nominal voltage 1 of the motor
231x21	Un1 = value V	380V	
231x30	Start voltage		Increase of the U/f characteristic curve in the lower speed range (Boost). Specification occurred in percent of the nominal voltage Un.
231x31	Ub1 = value %	2%	
231x40	Nominal freq. 2		Nominal frequency 2 of the motor
231x41	Fn2 = value Hz	50Hz	
231x50	Nominal voltage 2		Nominal voltage 2 of the motor
231x51	Un2 = value V	380V	
232000	DC bus comp.		Compensation of the changing of the DC bus voltage.
232100	Yes		
232200	No	XX	

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Brake operating			
234000	DC brake		Dc brake function. The DC braking works at the activation of the DC brake / quick stop inputs. It is only active below the minimal frequency. The motor will admit for the specified time with a DC voltage U_{bm} . The current will independent from the level of the voltage, through the motor on I_{nom} limited (Protection function).
234100	Brake voltage		
234110	$U_{BM} = \text{value V}$	10V	Voltage for DC braking
234200	Brake time		
234210	$T_{BM} = \text{value sec.}$	1.0sec	Time, which the motor admit with DC braking
234300	I_{nom}		
234310	$I_{nom} = \text{value A}$	$0,5 \cdot I_n$	Maximum motor current at the DC braking (Protection function).
Current values and current limits			
240000	Current values		
241000	Current limits		Limitation of the ramp, if the motor current exceeded the placed value. The current limit disabled the tilt of the motor at a high load and a sharp ramp.
241100	Yes	XX	
241110	Max. current		$0..1,5 \cdot I_n$. This value descriptions the task limit for the reduction of the ramp. Above of I_{max} the ramp will be reduce, to ensure a heavy starting.
241111	$I_{max} = \text{Value A}$	I_n	At the standard setting, the rated current of the device is adjusted.
241200	No		
242000	Leakage comp.		Increase of the motor frequency in dependence from the motor current. The generation of the leakage at the loading of the motor lead to a less motor speed. Through the leakage compensation the motor current will be proportional to the rated frequency increased. A increasing via F_{max} is not possible. The no load current and the U/F characteristic curve must be set right.
242100	Yes		
242110	No load current	0A	
242111	$I_0 = \text{value A}$		$0..1,5 \cdot I_n$
242120	Correction factor		This value must be empiric acquired, that at a loading of a motor no speed refused.
242121	$K_s = \text{value}$	0	Non integrated coefficient for the leakage compensation (0..25,5)

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242200	No	XX	
243000	IxR compensation		Compensate the voltage drop of the motor at low speed and high motor torque. A increasing of the motor current affects a increasing of the motor voltage. Use only at a speed above the leakage frequency (objective value 10Hz)
243100	Yes		
243110	Rs = value ohm	0	0...2.55
243200	No	XX	
Actual values			
300000	Actual values		
310000	Main value		
311000	Freq. ref. value		Motor reference frequency (e.g. end value at a ramp)
311100	F* = value Hz		
312000	Rotating frequency		Actual motor rotation speed
312100	FS = value Hz		
313000	Output voltage		Output voltage
313100	Um = value V		
314000	Output current		Output current
314100	Im = value A		
315000	DC bus voltage		Voltage of the DC bus voltage (Devices intern)
315100	Uz = value V		
320000	Other values		
321000	Status 1		The status values are only for the internal use
321100	Status 1 bin. value		
322000	Status 2		
322100	Status 2 bin. value		
323000	Status 3		
323100	Status 3 bin. value		
324000	Status 4		Optional
324100	Status 4 bin. value		
326000	Operating hour		Time, while the motor rotated (Pulse enable)
326100	Tbe = value H		
327000	Still stand hours		Time, for the operating device and the motor stops.
327100	Tss = value h		
328000	Version "number"		Shows the number of the version of the FU- Control.

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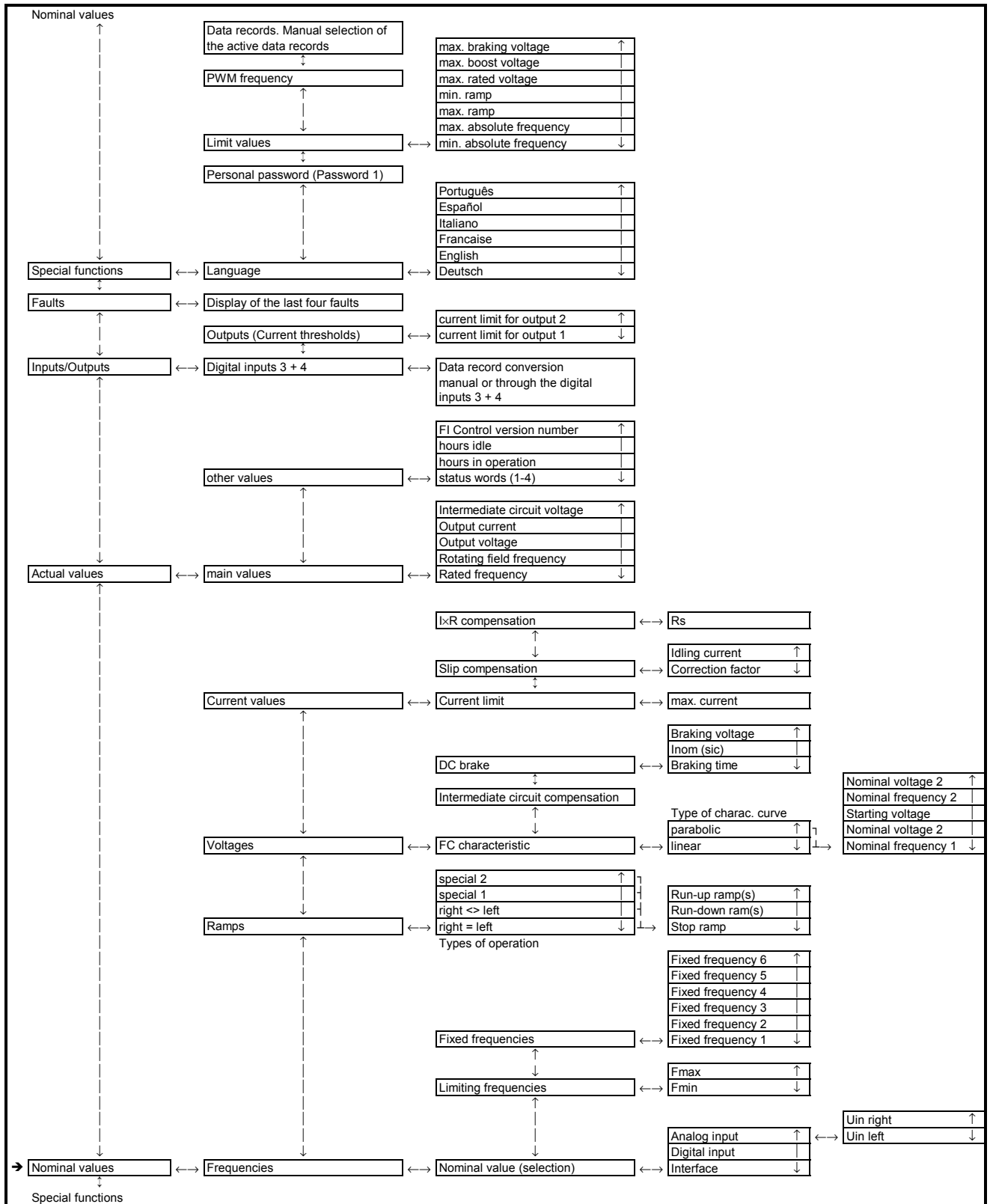
In and outputs			
400000	In and outputs		
410000	Digital inputs 3+4		With the digital inputs 3 and 4 it is possible to changeover the data records
411000	Data record		If the option "yes" is chosen, the inputs changeover between the data records (no manual changeover), with "no" it is only a manual changeover possible.
411100	Yes	XX	
411200	No		
420000	Digital outputs		The outputs report, if the motor current the set value in the following parameters exceed.
421000	Current limit 1		Current limit for digital output 1
421100	Id = value A	0A	
422000	Current limit 2		Current limit for digital output 2
422100	Id = value A	0A	
Error			
500000	Error		Error advice
510000	Last error		
520000	2. Last error		
530000	3. Last error		
540000	4. Last error		
Language			
600000	Special function		
610000	Language		Changeover the language
611000	German	XX	
612000	English		
613000	France		
Device data			
620000	Password 1		Password which gives you the possibility to enter the FUC The actual value on display is always available
621000	Psw2= value	00000	(0...65535)
630000	Limit value		
631000	Fabs- min		Absolute low limit for all frequency inputs. Are maximum output frequency over 300Hz required , a PWM frequency of 8kHz must used for.

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631100	Fmin_abs=value	2Hz	(0..25,5Hz)
632000	Fabs-max		Absolut low limit for all frequency inputs
632100	Fmax_abs=value	120Hz	(Fmin_abs..600Hz)
633000	Max drift ramp		High limit ramp inputs
633100	Maxac=value Hz/s	50Hz/s	(minac...999.9)
634000	Min drift ramp		Low limit ramp inputs
634100	Minac=value Hz/s	1Hz/s	(0..maxac)
635000	Un- max		High limit for nominal voltage
635100	Un=value v	400V	Maximum nominal voltage (0...475V)
636000	Ub1-max		High limit for boost voltage
636100	Ub1=value %	10%	(0...25,5%)
638000	Ubm-max		Maximum brake voltage
638100	Ubm=value v	20V	(0..475V)
640000	Pwm frequency		Are maximum output frequency over 300Hz required, a PWM frequency of 8kHz must used. If the PWM frequency is change, the inverter need to have a auto reset for internal calculations. Is the inverter programmed via FUC the menus are starting on the beginning. To change the PWM-frequency, pin 62 on the enable input must be set back
641000	F=8kHz		
642000	F=4kHz	XX	
643000	F=2kHz		
Data record selection			
650000	Data record		Changeover the activ data record. The manual changeover is only possible, if the menue item "In-and Outputs" is selected
651000	Data record1	XX	
652000	Data record2		
653000	Data record3		
654000	Data record4		

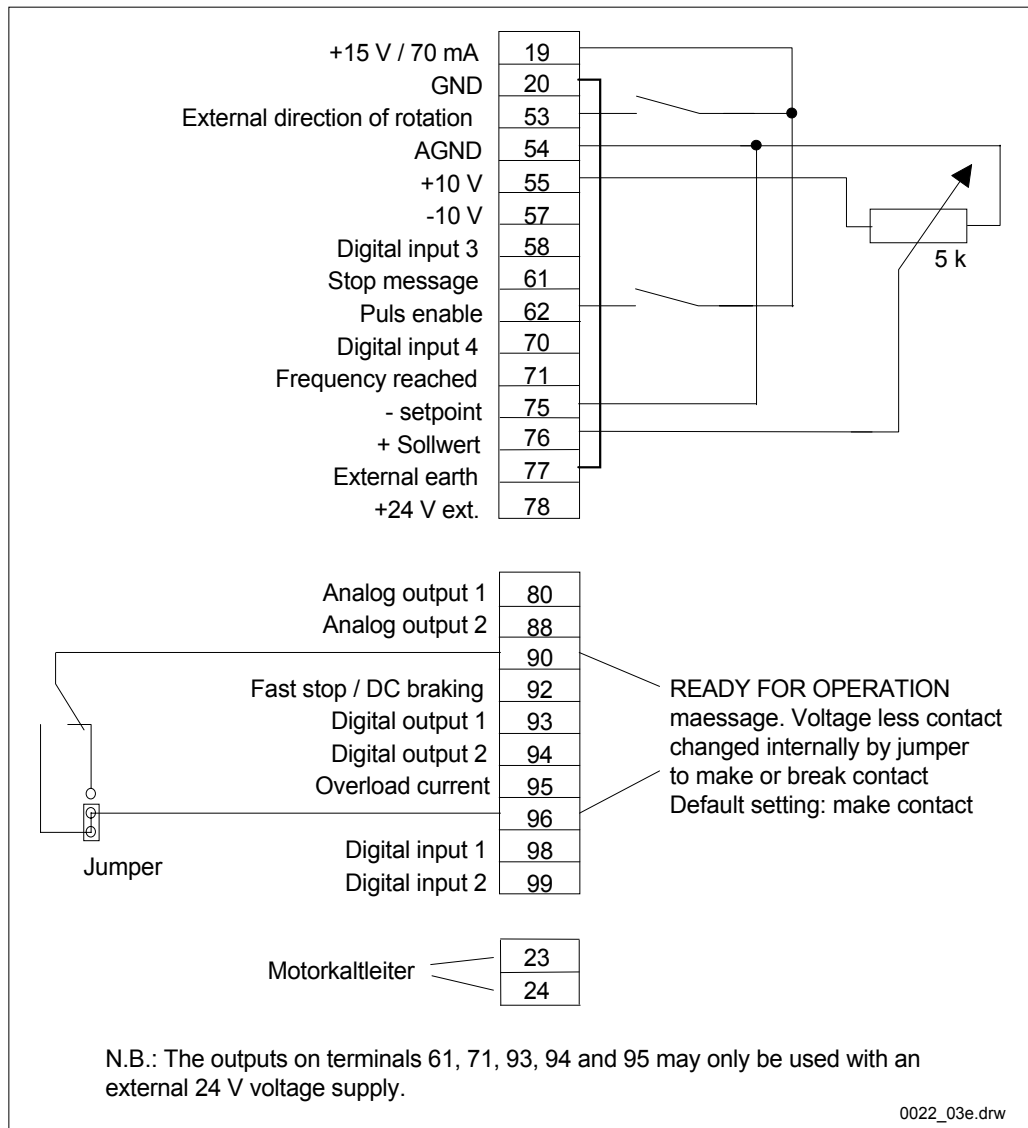
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6.6.3.1 Main menu FI Control DVS 5452



6.7 Terminal diagrams

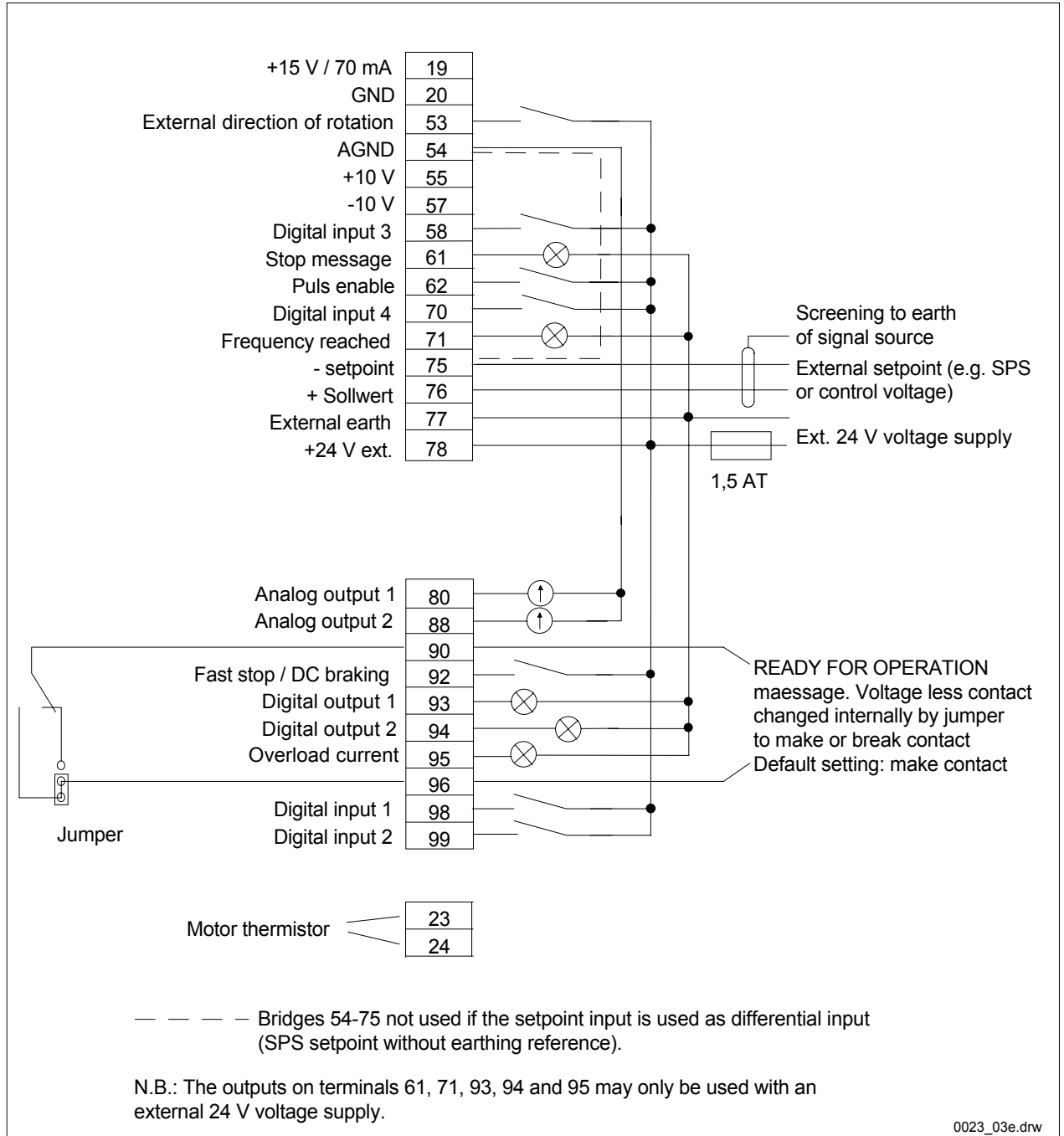
6.7.1 Minimum terminal assignment



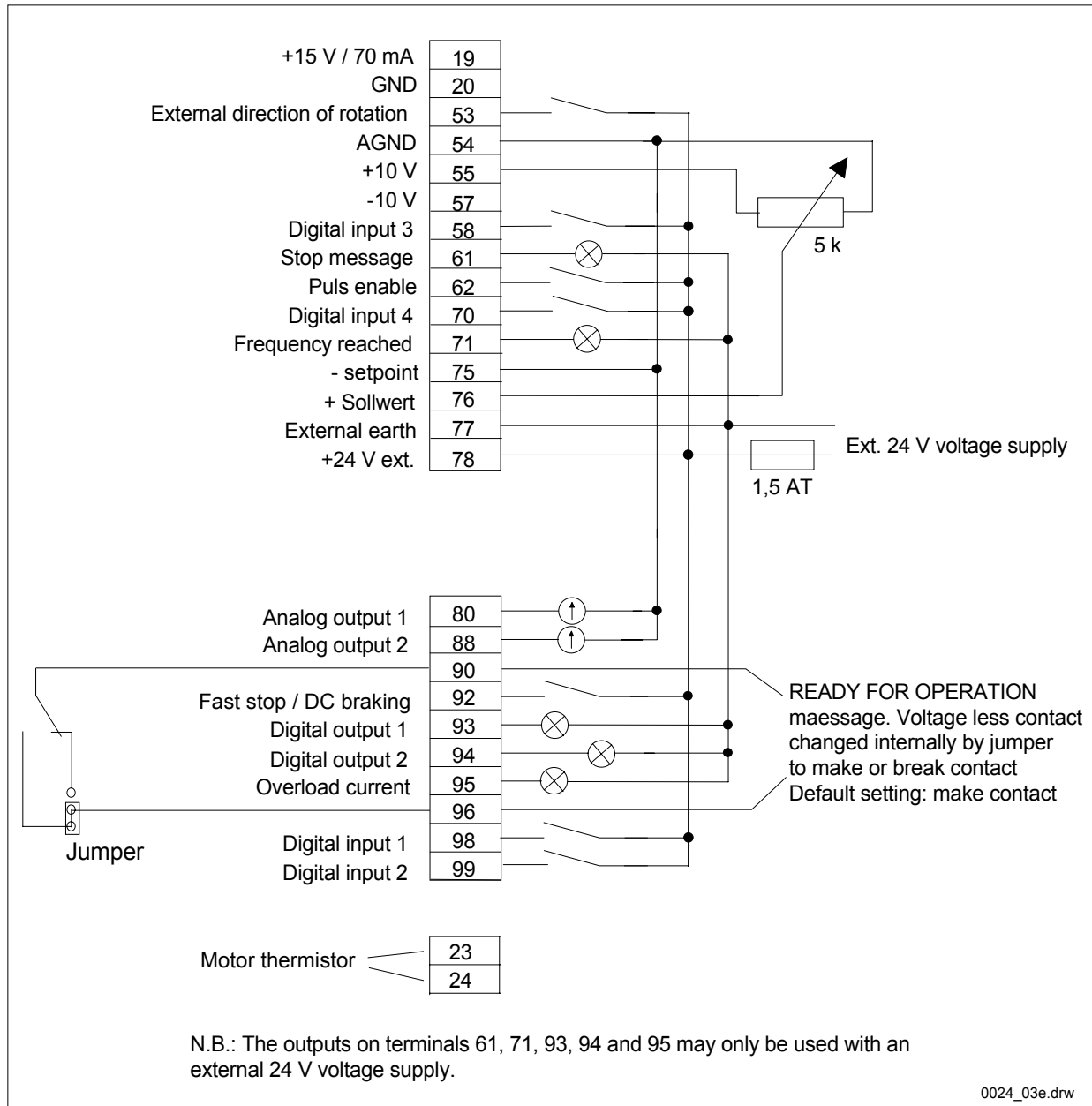
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6.7.2 External 24V voltage supply

6.7.2.1 with external analog specified setpoint (SPS or control voltage)



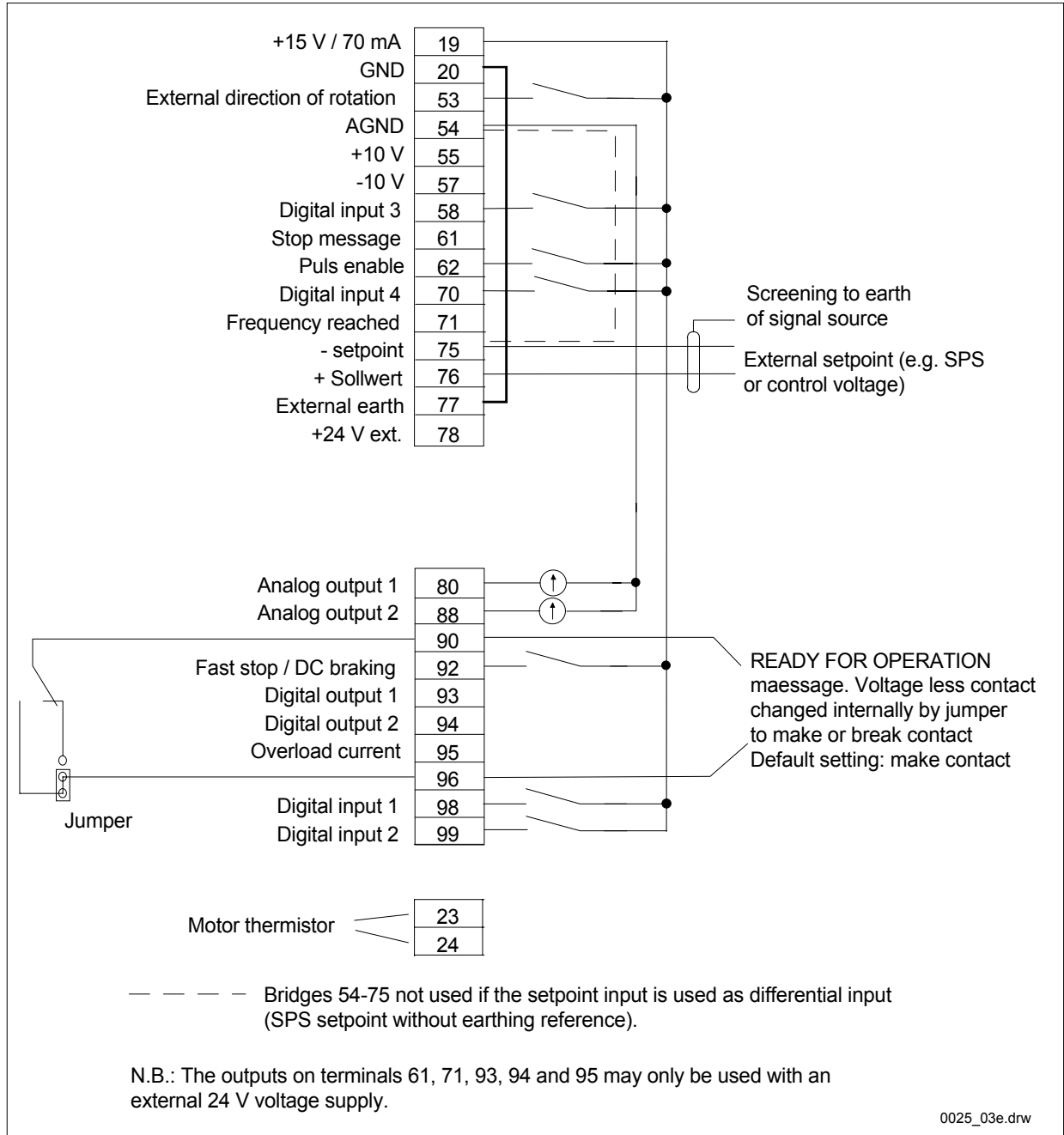
6.7.2.2 with analog specified setpoint by potentiometer



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6.7.3 Internal 15V voltage supply

6.7.3.1 with external analog specified setpoint (SPS or control voltage)



6.7.3.2 with analog specified setpoint by potentiometer

