

*Keine Power*

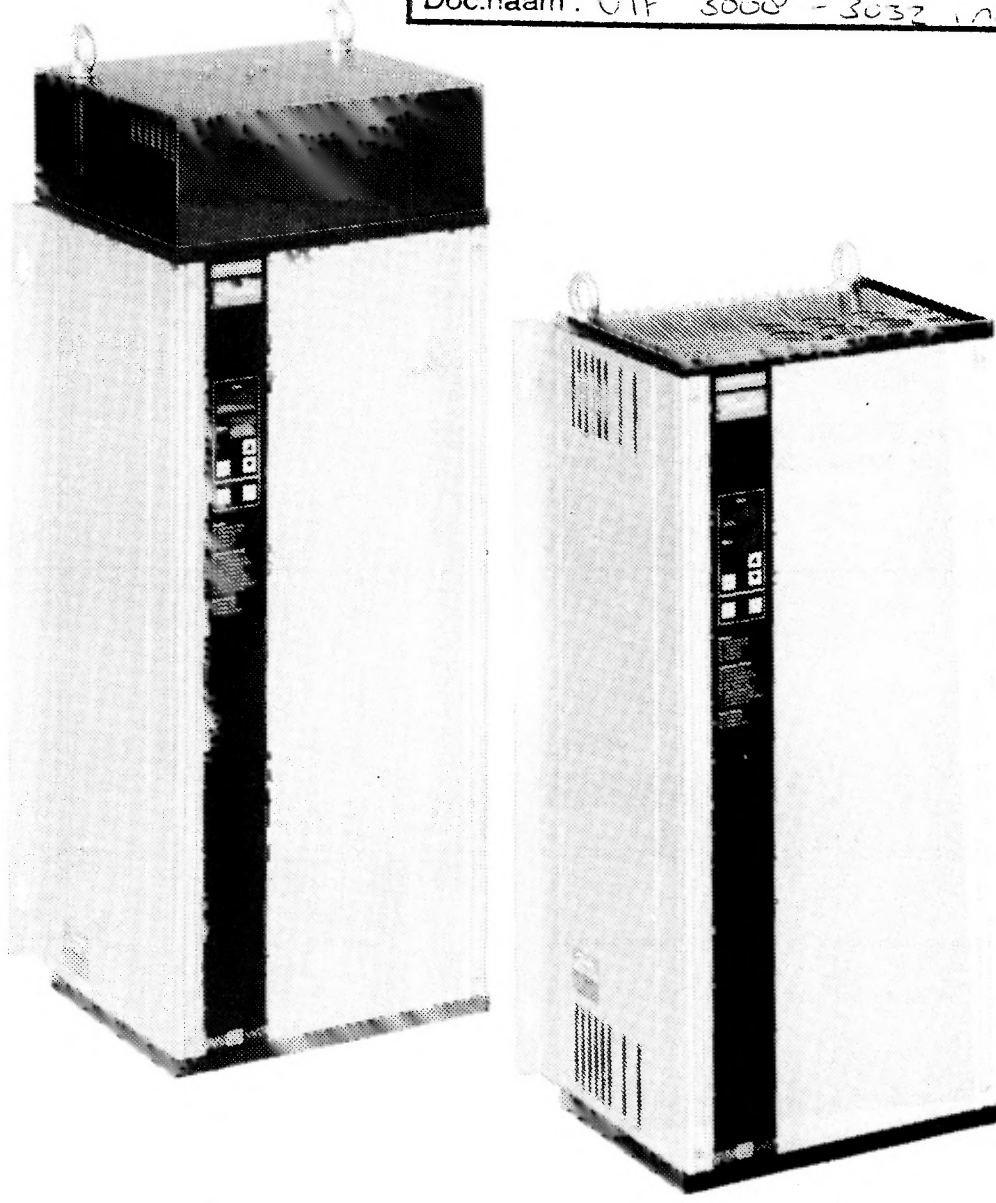


VLT® type 3008 - 3032  
Extended control 380/415 V

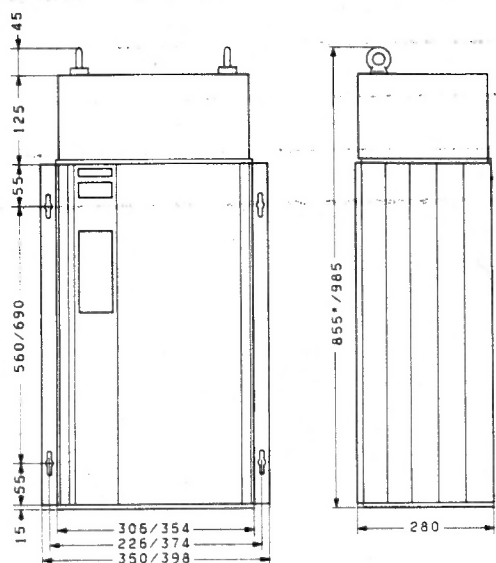
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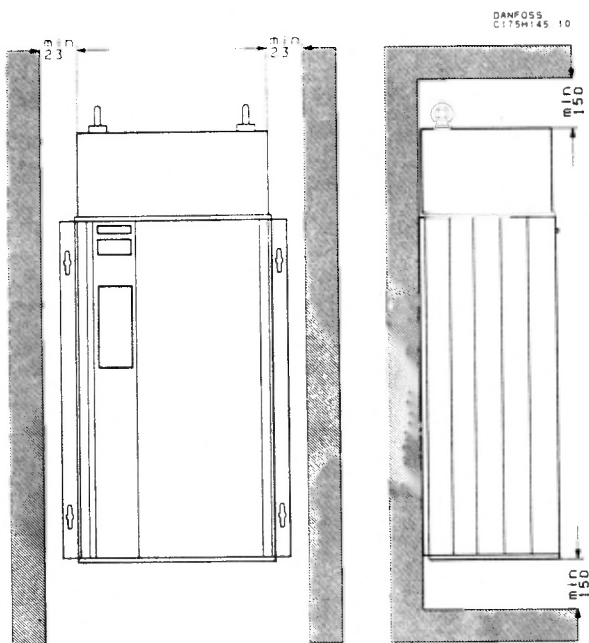
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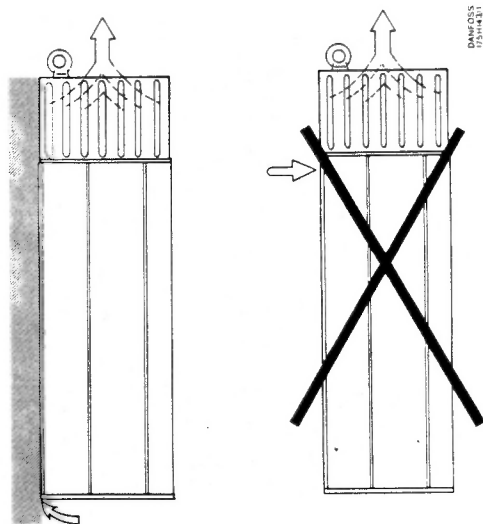
DANFOSS  
C175H144.11

VLT® type : (3008,3011,3016) / (3022,3032)  
 \* VLT® type 3008 and 3011, IP21 = 735 mm

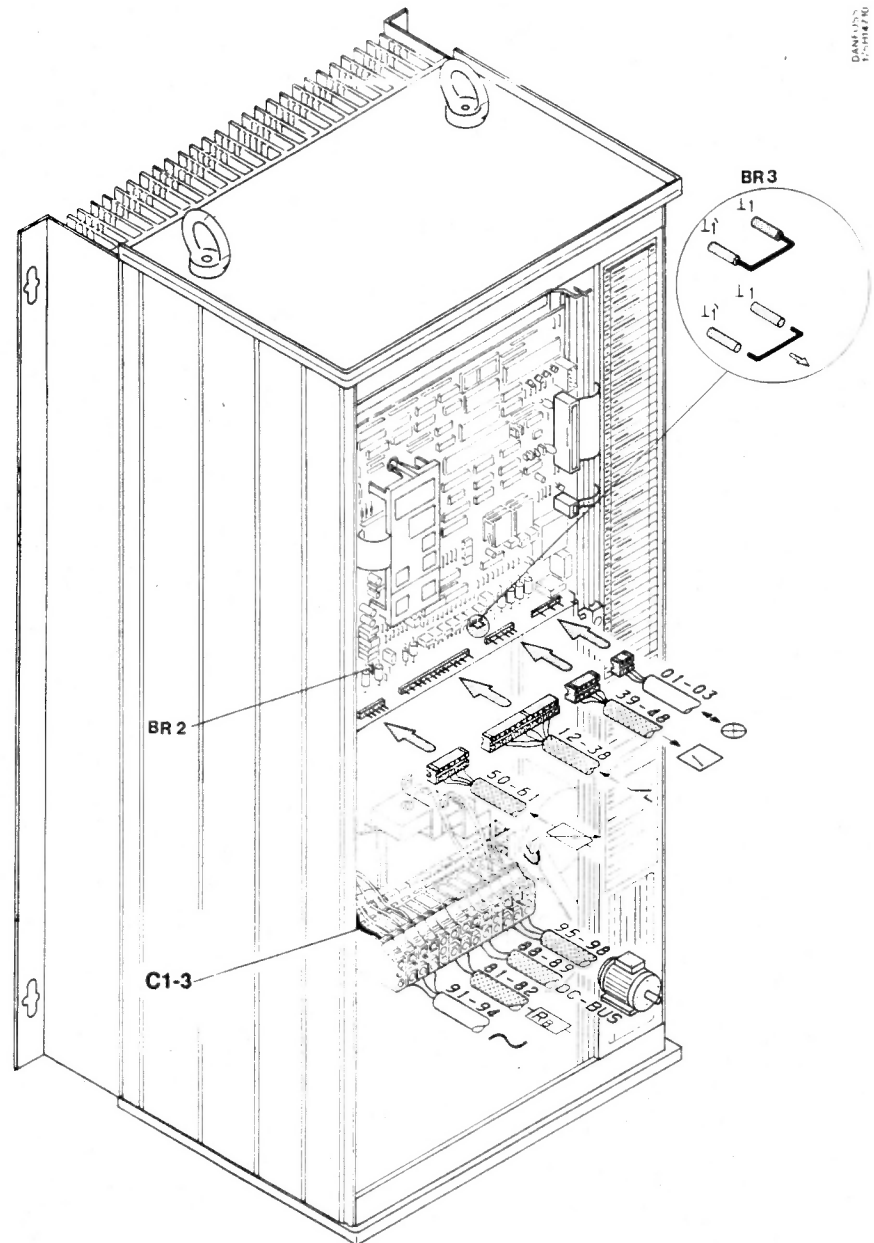
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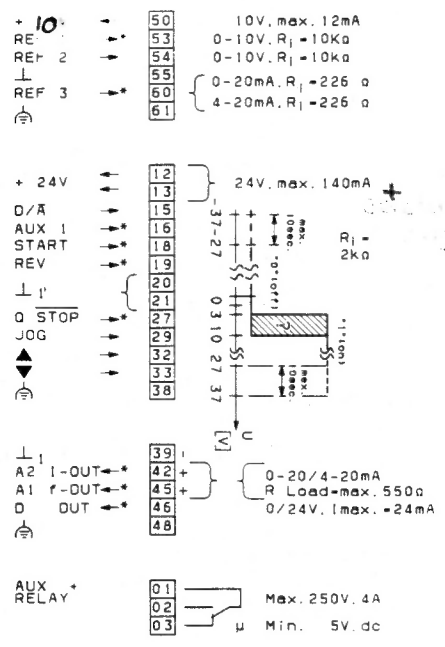
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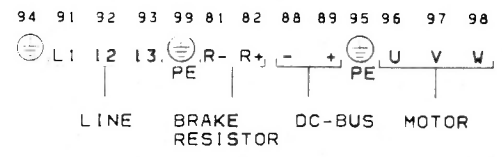
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1



2



3

Brake resistor table:

VLT® type	3008	3011	3016	3022	3032
[ $\Omega$ ]	40	30	20	15	10

4

**Warning:**

- 1) Do not touch the electrical parts of the frequency converter when the supply voltage is connected and when the supply voltage has been disconnected wait at least four minutes before touching it.
- 2) When repairs are undertaken the power supply to the frequency converter must be disconnected. This is to prevent the motor starting without warning.
- 3) The pushbutton "Stop" (see page 29 fig. 2 pos. 2) does not disconnect the supply mains.

**Introduction**

The static VLT® frequency converters type 3008-3032 from Danfoss is an electronic unit for infinite control of the standard three phase asynchronous motor.

The frequency converter is available in the following versions:

- IP21 enclosure, with or without brake option
- IP54 enclosure with or without brake option

**The instruction contains the following main points:**

- Control signals
- Mechanical assembly
- Electrical connection
- Operation
- Basic settings
- Fault indication

**Control signals**

This section describes the connection possibilities of the frequency converter control card.

The control card is divided up into 4 groups, see page 3 Fig.1 and 2:

- 1) Analog input from reference source.
- 2) Digital input for sequence control.
- 3) Analog and digital output for monitoring.
- 4) Relay contact that can be used for an alarm function.

When programming, signal adjustment or function selection can be made on terminals marked with an \*. (See section on basic settings).

**Analog inputs****Terminals 50-61**

The frequency converter registers the sum of the signals received on reference inputs 53, 54 and 60 and a reference frequency is calculated (see below). Voltage output terminal 50 can supply the potentiometer (min. 1 kΩ). (See connection example page 32 Fig.2).

**Terminals 53/54: voltage reference**  
Normal 0 - 10 V.

With a programmed ±10 V reference (menu 05) negative voltage results in reversing.

The signal level of terminal 53 can be changed from 0-10 V to for instance 0-20 V by inserting a resistor into the control card instead of jumper "BR2", see page 3, fig. 1. Value: 1 kΩ for every 1 Volt by which the upper limit of the signal is to be changed: a resistor of 5 kohm gives a signal level of 0-15 V, 10 kΩ a signal level of 0-20 V.

**Terminal 60: Current reference**

Can be programmed for either 0-20 mA or 4-20 mA signal in menu 24.

**Digital inputs****Terminals 15 - 38**

The frequency converter registers the digital signals as "on" with voltages higher than 10 V, and as "off" with voltages lower than 3 V (24 V PNP logic). If voltages from 27 to 37 or from -27 to -37 V are applied, they must not be connected for more than 10 seconds, see page 3 fig. 2.

The digital inputs can be supplied via the voltage output of terminal 12 or 13.

**Terminal 15: Switching between digital or analog reference operation.**

If the input is registered "on", it changes from running with the analog reference operation to running with the digital reference operation. When changing, the actual motor speed is kept but can subsequently be changed with the digital operation on terminals 32 and 33. When changing from digital to analog reference, the motor speed will be changed to the set analog reference value.

**Terminal 16: The reset function (Aux1).**

The pulse signal is used to reset after a "trip".

There is a choice between different methods of connection. See menu 22.

**Terminal 18: Motor start.**

To start, set the input to "on". There is a choice between different methods of connection. See menu 22.

**Terminal 19: Reversing of motor.**

To reverse set the input to "on". There is a choice between different methods of connection. See menu 22.

**Terminal 27: Quick stop.**

The input must be set to "on" during operation. If this connection is interrupted the motor stops without ramp operation. See stop possibilities in menu 23.

**Terminal 29: Jogging speed.**

To change to jogging speed, set the input to "on".

The jogging function can start the motor without "start" being activated. (It then runs without ramp operation).

**Terminals 32/33: Digital speed changes.**

This function is only used with digital reference changes (when terminal 15 is "on").

"On" on 32 gives higher motor speed.

"On" on 33 gives lower motor speed.

If "on" is kept on one of the inputs, the motor speed will be max. speed (menu 9), or min. speed (menu 8).

See page 32 Fig. 1.

**Output signals****Terminals 39-48.****Terminal 42: Motor current.**

A 0-20 mA or a 4-20 mA signal can be supplied.

(See menu 28 for selection possibilities).

**Terminal 45: Motor frequency.**

A 0-20 mA or a 4-20 mA signal can be supplied.

(See menu 27 for selection possibilities).

**Terminal 46: Digital output signal 0/24V**

The following information can be programmed for display: Ready, trip, run, current warning, frequency warning or thermal motor protection. (See menu 26).

**Relay function****Terminals 01 - 03**

The relay contact can be activated by the signals: Ready, trip, run, current warning, frequency warning or thermal motor protection.

(See menu 25).

$$f_{REF} = \frac{\text{Actual reference X } (f_{MAX} - f_{MIN})}{\text{Max. reference (10 V or 20 mA)}} + f_{MIN}$$

## Frame references

Terminals 55, 20, 21 and 39

The frame for the digital inputs, digital outputs and analog outputs (20, 21 and 39) are galvanically isolated from the other functions of the control card by means of opto-couplers.

Furthermore the frame for the digital inputs (20 and 21) can be separated from the frame for the digital and analog outputs by removing the connection "BR3" shown on page 3, fig. 1

## Mechanical installation

The frequency converter is mounted direct on a wall or into a rack. It must be mounted direct on a flat wall or plate, otherwise the air flow of the fan cannot follow the cooling ribs of the frequency converter. See page 2 fig. 3.

The frequency converter must be able to get rid of its surplus heat. Therefore air must pass freely under and over the rear wall ribs. The minimum distance to the surroundings appears from fig. 2 on page 2.

The maximum heat dissipation from the frequency converter  $\Phi_{VLT}$  is:

VLT* type	$\Phi_{VLT}$ CP	$\Phi_{VLT}$ VT
3008	200 [ W ]	280 [ W ]
3011	340 [ W ]	500 [ W ]
3016	450 [ W ]	660 [ W ]
3022	720 [ W ]	1050 [ W ]
3032	950 [ W ]	1350 [ W ]

CP: Constant load torque or - power

VT: Quadratic load torque

Currents of the heat dissipations are shown on page 30 fig 1.

## Electrical connection

(The electrical connection to be made according to national rules and regulations).

- The connection plugs are removable. (Page 3 Fig. 1).
- The control signals are connected as shown on page 3 Fig.1 and 2. The function of the control signal has been described in the section 'control signals'.
- The supply mains and the motor are connected as shown on page 3 Fig. 1 and 3.

Four connection examples are shown on page 32.

- 1) Electronic motor potentiometer control
- 2) Simple analog control using VLA 10
- 3) PLC control with internal supply
- 4) PLC control with external supply

*Note: Cables to the control signal and the motor must be screened in order to comply with radio noise regulations in accordance with VDE 0875, EEC directive 82/499 and EMC specifications.*

*The motor cable screen is connected to the earth in the frequency converter and in the motor.*

*The control cable screen is connected to a screened earth in the frequency converter. (Connection terminals 38, 48 or 61).*

*If unscreened cables are used, the control inputs can, occasionally be subject to signal disturbances. Normally such a disturbance will not effect the frequency converter.*

### Note:

#### High voltage test

With a high voltage test: disconnect the filter capacitors at the mains input (yellow/green wire) see page 3 fig.1, and terminals U, V, W, L1, L2 and L3 must be short circuited.

#### Extra protection

An ELVB, neutral earthing or earthing can be used as extra protection. Due to rectified load, the ELCB must not be used with the frequency converter.

## Operation

Use the keyboard of push buttons to operate and programme. The start and stop buttons (page 29, fig. 1, pos. 1 and 2) overrides remote control.

Remove the "programming key" if you do not want to operate and programme via the pushbuttons (see page 29 fig. 2).

The frequency converter has about 40 menus, each one connected to a set of data. The "arrow up" and "arrow down" buttons are used to change between menus. "Data" always displays the value for that actual menu and it is always this data value that is used when regulating. The values can be changed by using the "arrow up" or "arrow down" buttons when the "data" button is pushed in.

The data field will flash when an attempt is made to change data to an undefined area or if an attempt is made to change the data value of menus 5, 14, 15 and 16 without stopping the motor first.

The menu field will flash when the frequency converter is stopped by activating the pushbutton "stop". The frequency converter cannot be restarted via the external start functions.

## Basic setting

Output and setting functions are divided into four groups:

- 1) Output function. Here the actual values for operation can be read out.
- 2) Application setting. The frequency converter controls according to the recorded data.
- 3) Motor data and motor compensations
- 4) Special functions. Used for controlling and monitoring

Factory values have been recorded into the frequency converter. These can be changed as required. The factory values are given on page 33 in the column entitled "Typical value".

In most cases you can use the factory values.

It might be necessary to change the recorded values for single menus in the group "application setting" (menu 5-13). The menus of "motor data and motor compensations" (see page 13) must only be changed when the size of the motor used is different from the size of motor recommended for the frequency converter.

If the recorded factory data values have been changed it is a good idea to enter the new values in the form at the back of the instructions. This information will be very useful in connection with any re-programming.

### Display indication

#### Menu 00

Customer selected display indication  
The reference value received from the remote control or via the keyboard can be seen on the display.

Setting of display with application rate factor, see menu 17 and below.

#### Menu 17

You can make an input of an application rate factor to be read out in menu 00. The value can be set from 0.1 to 999. Example: Motor data = 50 Hz, 1500 RPM and input data value of 100: At synchronous motor speed (50 Hz) the figure 100 can be seen on the display. At a 50% motor speed the figure on the display is 50.

#### Menu 01

Readout the frequency converter output frequency in [Hz].

#### Menu 02

Readout the current motor voltage in [V]. (Measuring of motor voltage on the motor will be inaccurate due to high frequency switching).

$$\text{Menu 00} = \frac{\text{Actual reference frequency X Display constant (menu 17)}}{\text{Rated motor frequency (menu 16)}}$$

#### Menu 03

Readout the actual motor current in [A].

#### Menu 04

Readout the current motor torque in %.  
The output is proportional to the motor efficiency current. 100% is the equivalent of the recorded nominal motor current. The motor torque is a calculated value where the magnetising current (menu 42) appears.

Note : Actual motor torque can be read out at a set constant torque in menu 5 only.

#### Application setting

##### Menu 05

Set of load torque characteristic.  
The motor voltage/frequency ratio is set by selecting from the following functions:

##### Constant torque/power output CP:

Data value:

- 0: No slip compensation, reversing via terminal 19 (100)
- 1: Slip compensation active, reversing via terminal 19 (101)
- 2: No slip compensation, reversing when the reference voltage is negative (102)
- 3: Slip compensation active, reversing when the reference voltage is negative (103).

*If a brake option is used: Set the data value from 100-106 (The last digit follows the above)*

##### Quadratic torque applications VT:

(e.g. centrifugal pumps and fans)  
An oversize motor can yield nominal torque.

You can choose among 3 factory programmed pump characteristics. However, here you may only use a motor size that can be programmed in menu 14, see "Motor data and motor compensations".

Data value:

- 4: Pump application 1. Optimised efficiency, low breakaway torque and low motor noise level.
- 5: Pump application 2. Optimised efficiency and medium breakaway torque.
- 6: Pump application 3. Optimised efficiency and high breakaway torque.

##### Menu 06

Set the operating location

Data value:

- 0: Local reference  
Set the reference value in menu 07.
- 1: Remote control reference  
Analog remote control reference:  
(Connection terminal 15 is "off")  
The reference value is received via the analog input terminal or on the "jog speed" input.

Digital remote control reference:

(Connection terminal 15 is "on")

The reference value is received via the digital input "arrow up" and "arrow down" or on the "jog speed" input.

See page 3 Fig.2.

Note:

Local control:

To make the motor start set menu 23 for 0 or make a connection between terminals 12/13 and 27

##### Menu 07

Local reference [Hz]

Changes are only possible if the data value in menu 06 is 0.

If the mains supply is disconnected the reference value is 0.

##### Menu 08

Set the min. speed [Hz]

The value is recorded between 0 and max. speed (menu 09).

##### Menu 09

Set the max. speed [Hz]

The value is recorded between min. speed (menu 08) and 120 Hz.

##### Menu 10

Set the jogging speed [Hz]

The value is recorded between 0 and 120 Hz but the motor speed cannot exceed the max. speed.

The jogging speed can be lower than the min. speed.

##### Menu 11

Set the ramp-up time [s]

Set the ramp time between 0.1 and 360 seconds.

The ramp time indicates the acceleration time from 0 Hz to rated motor frequency (menu 16) provided that the current limit of the frequency converter is not activated.

##### Menu 12

Set the ramp-down time [s]

Set the ramp time between 0.1 and 360 seconds.

The ramp time indicates the deceleration time from rated motor frequency (menu 16) to 0Hz, provided that the overvoltage limit of the frequency converter is not active.

With high braking power it can be necessary to install a brake module.

##### Menu 13

Set the current limit [A]

The factory set value in menu 13 is the equivalent to a load of 160% torque. Values of 1,05 to 1,6 is only for intermittent operation

It is possible to set a lower current limit. The motor will not start if the value is too low.

see page 30 fig 1

#### Motor data and motor compensations

The settings of the menus 14, 15, 16, 18, 19, 20, 21, 41 and 42 vary according to the motor. The frequency converter is optimised on the basis of the three recommended motor sizes (see menu 14). In most applications the frequency converter can therefore control these motors without any problems. The menus 14, 15, 16 and 41 must only be set for the rated values of the motor. Set therefore first menus 14, 15, 16 and 41 as indicated below and pass over menus 18, 19, 20, 21 and 42. For the connection between the values see page 31, fig. 3. Curve 1 is for no load operation and curve 2 is for loaded operation.

Menus 18, 19, 20, 21 and 42 to be set according to the guide lines given below in the following cases:

- The motor size used cannot be programmed in menu 14
- The starting torque of the practical operation is extremely low, unstable speed, motor operates in jerks etc.

1: Read the data value in menu 19 and note down the value. Set then menu 19 for 0.

2: Start the motor unloaded and read the motor current in menu 03 at an output frequency of 5 Hz, 10 Hz, 25 Hz and 50 Hz. The measured current is the no-load current of the motor and the normal measuring result will be that the current is a little higher at high frequencies than at low frequencies.

3: If the currents deviate by more than 10% from each other the no-load characteristics of the motor is not typical and menus 18 and 21 must be set as follows:

- a) If the current is too low at low frequencies: increase the start voltage in menu 18. The typical setting is 10% of rated motor voltage.
- b) If the current is too high at high frequencies: reduce the voltage/frequency ratio in menu 21. The typical setting is 10% lower than the ratio between mains voltage and mains frequency.

4: Set menu 42 for a value being higher than the highest current measured.

5: Set then menu 19

Set this menu for the original value

6: Adjust menu 19 if the dynamic torque is insufficient  
menu 20 if the speed is unstable or if the load is varying.



#### Menu 14

Set the motor size [kW]

Read off the nominal power of the motor and record the value in kW. For a motor of 7.5 kW, record "7.5".

It is possible to make an input of three motor sizes: an under-size, a nominal size or an over-size.

On a frequency converter type 3011 (7.5 kW motor) there is thus a choice between data values 5.5, 7.5 or 11.

#### Menu 15

Set the motor voltage [V]

Record the motor nominal voltage with data values 380, 400, 415 or 440.

#### Menu 16

Set the motor frequency [Hz]

Record the motor nominal frequency (break frequency) with data values 50, 60, 87 or 100.

#### Menu 17

See "display indications", page 12.

#### Menu 18

Start voltage [V]

Setting range 0 to 99.9

No-load voltage at 0,1 X motor nominal voltage.

To be set when several motors are operating in parallel and when the starting torque is insufficient. See introduction to "Motor data and motor compensations", page 13. In applications where several motors are operating in parallel the start voltage must normally be raised.

NOTE: If the set value for starting voltage is too high the frequency converter will operate in the current limit and then trip out.

#### Menu 19

Start compensation [V/A]

Setting range 0 to 99.9.

Must only be set if the dynamic torque is insufficient. See introduction to "Motor data and motor compensations", page 13.

For parallel operation of several motors set menu 19 for 0.

NOTE: If the set value for start compensation is too high the frequency converter will work in the current limit and then trip out.

#### Menu 20

Slip compensation [%]

Setting range 0 to 200.

The recorded value is in % of the nominal value.

Must only be set if the speed is unstable and if the load is varying.

See introduction to "Motor data and motor compensations", page 13.

Set menu 20 for 0 at parallel operation of several motors.

#### Menu 21

Voltage frequency ratio [V/Hz]

Setting range 0 to 20.

Must only be set in special cases. See introduction to "Motor data and motor compensations", page 13.

#### Special functions

##### Menu 22

Set the start, stop, reset and reversing functions.

There are four different methods of connection for input terminals "AUX 1", "START" and "REV". See page 31 Fig.1

Select the current connection and set the data value to the applicable value.

Data value:

0: Start and reversing activated with make contacts.

Reversing is made with a make contact.

1: Motor speed is in the same direction as the switch is activated. Use the pulse switch to reset after trip.

2: The pulse switch is used to start/stop/and reset (stop and reset with break function). Use the switch to reverse.

3: The pulse switch is used for all functions (stop and reset with break function).

##### Menu 23

Set the quick stop, freewheeling stop or change of current limit function. (See page 31 fig 2).

For input terminal "Q-STOP", there are two ways to stop the motor.

Data value:

0: When the input cuts out, the motor brakes as fast as the motor and frequency converter permits..

1: When the input cuts out, the frequency converter "slips" the motor. The stop time depends on the inertia and friction of the system.

2: Change of current limit. When the quick stop input cuts in the current limit entered by the customer in menu 13 is cancelled.

The current limit now applicable is the maximum permissible for the frequency converter (factory entered value in menu 13). This function does not give stop.

##### Menu 24

Set the analog reference input.

The reference signal "REF3", which can be received on terminal 60, can be registered in four ways.

The following are input signals with speed from min. frequency to maximum frequency.

Data value:

0: 0 - 20 mA

1: 4 - 20 mA

2: 20 - 0 mA

3: 20 - 4 mA

#### Menu 25

Set the relay function.

The relay, which is mounted on terminals 1, 2 and 3, is activated when the following is present.

Data value:

0: "Ready" signal.

1: "Trip" signal

2: "Run" signal

3: Current warning: Motor current is higher than the recorded value in menu 33.

4: Current limit. Motor current is higher than the recorded value in menu 13.

5: Frequency warning: Motor frequency is higher than the recorded value in menu 32.

6: Thermal overload: Based on time, current, voltage and frequency, the frequency converter calculates whether the motor thermal conditions are critical.

7: The frequency converter is "Ready" and the motor temperature is not critical (see "0" and "6").

8: As 7 and remote control is possible

#### Menu 26

Set the digital output function.

The output on terminal 46 changes from 0 to 24 V when the following are present:

Data value:

0: "Ready" signal

1: "Trip" signal

2: "Run" signal

3: Current warning: Motor current is higher than the recorded value in menu 33.

4: Current limit: Motor current is higher than the recorded value in menu 13.

5: Frequency warning: Motor frequency is higher than the recorded value in menu 32.

6: Thermal overload: Based on current, voltage and frequency, the frequency converter calculates whether the motor thermal conditions are critical. (Value of menu 29 has to be 1 or 2)

7: The frequency converter is "Ready" and the motor temperature is not critical (see "0" and "6").

8: As 7, and remote control is possible

#### Menu 27

Set the analog output function A1.

The selected data value will affect output terminal 45 as follows:

Data value:

- 0: 0 - 20 mA for frequency = 0 - 100 Hz.
- 1: 4 - 20 mA for frequency = 0 - 100 Hz
- 2: 0 - 20 mA for frequency = 0 - max. frequency
- 3: 4 - 20 mA for frequency = 0 - max. frequency
- 4: 0 - 20 mA for received reference signal (see menu 00)
- 5: 4 - 20 mA for received reference signal (see menu 00)
- 10: "20" mA when the frequency warning appears (menu 32)
- 11: "20" mA when the motor frequency is equal to the set reference.

#### Menu 28

Set the analog output function A2.

The selected data value will affect output terminal 42 as follows:

Data value:

- 0: 0 - 20 mA for motor current = 0 - I<sub>max</sub>. (160% torque)
- 1: 4 - 20 mA for motor current = 0 - I<sub>max</sub>. (160% torque)
- 2: 0 - 20 mA for motor current = 0 - current limit in menu 13
- 3: 4 - 20 mA for motor current = 0 - current limit in menu 13
- 4: 0 - 20 mA for motor torque = 0 - max. (160%)
- 5: 4 - 20 mA for motor torque = 0 - max. (160%)
- 10: "20" mA when current warning appears (menu 33)
- 11: "20" mA when the motor current is equal to the current limit set in menu 13.

#### Menu 29

Thermal motor protection

The frequency converter calculates on the basis of voltage, current, frequency and time if the motor temperature exceeds the permissible limits.

The cut-out curve is sketched on page 30 fig. 2. Warning and trip are indicated by code 85 in the menu display. Programme menus 25 and 26 for remote indication.

You can choose between the following reactions to a too high motor temperature:

Data value:

- 0: No warning, no trip
  - 1: Warning, no trip
  - 2: Warning and trip.
- Warning and trip is shown on menu 85.

#### Menu 30

Set the method of reset after trip.

If trip is registered there is a choice between manual or automatic reset (fault entry).

If the cause of the error has gone, automatic reset is attempted after 5 seconds. If the cause of the error has not gone, manual reset must be used. (5 successive automatic resets, within 20 min. are permissible)

Data value:

- 0: Manual reset. The fault code is remembered with mains drop out.
  - 1: Automatic reset. The fault code is not remembered with mains failure.
- Warning: The frequency converter can start without warning.

*Manual restart done in the following ways:*

- 1) activate the "AUX1" input (see menu 22) or
  - 2) press the stop and start button of the keyboards of the frequency converter
- In special cases it may be necessary to disconnect and reconnect the supply voltage (see also menu 84)*

#### Menu 31

Set the trip delay time [s]

When the frequency converter registers that it is running in the current limit (menu 13) it will await a trip command. Set the time between 0 and 60 s (whole seconds) or on 999 (the equivalent of infinitely)

The trip is not activated if the time the frequency converter runs in the current limit is within the time set.

#### Menu 32

Set the frequency warning.

For the monitoring function, record a frequency value which, if exceeded, will set off an alarm signal (menus 25, 26 and 27).

Record the value between "min. speed" menu 08 and "max. speed" menu 09.

#### Menu 33

Set the currentwarning.

For the monitoring function, record a current value which, if exceeded, will set off an alarm signal (menus 25, 26 and 27).

Record the value between 0 and I<sub>max</sub>. This is the equivalent of 160% torque.

#### Menu 34

Set the DC braking time [s].

The DC braking is connected with stop, and when the frequency is down to 1 Hz. Set the time where the DC braking is activated between 0 and 15 s.

#### Menu 40

To re-programme the factory recorded data values.

**Warning: All customer programmed data will be erased.**

If factory recorded data values are required, use the following procedure:

- 1: Set the data value on 1 and change to the previous menu, or wait 15 s.
- 2: Disconnect the mains supply to the frequency converter. Wait 5 seconds and start up again.

#### Menu 41

Rated motor current [A].

Used for thermal motor protection and the torque display in menu 4. Enter the value from the motor nameplate.

#### Menu 42

Motor magnetising current [A].

Used for motor compensation and torque display

The setting must only be changed if the the motor cannot be compensated correctly, see introduction to "Motor data and motor compensation", page 13. If the set value is too low the output frequency will typically increase when the motor load is reduced at low frequencies.



## Fault indication

To help troubleshooting, the frequency converter is fitted with LED indications and display fault indications.

### LED indications (see page 29 fig 3)

The LED's shows:

- Inverter current limit <sup>2)</sup>
- Inverter OK <sup>2)</sup>
- Earth /Overcurrent <sup>2)</sup>
- Temperature warning in converter <sup>3)</sup>
- Over voltage <sup>1)</sup>
- Under voltage <sup>1)</sup>
- Switch mode power supply <sup>1)</sup>
- Inverter fault <sup>1)</sup>

- 1) The failure reason is stored until it is reset or until the frequency converter is disconnected
- 2) The failure reason is not stored
- 3) Can not be reset

### Display fault indications

Menu 80-99 and an applicable data value is recorded when the frequency converter registers a fault.

The menu shows the registered fault. The data value indicates what the frequency converter has done and what to do to start the motor again.

#### Menu 80

Current limit

Data value

00: The frequency is regulated down

01: The frequency is regulated down to 0 Hz. Reset occurs automatically or manually (see menu 30).

02: Delayed trip (menu 31). Reset manually.

The fault can be caused by:

- an overloaded or stalled motor
- a ramp time that is too short
- start voltage set too high.
- start compensation set too high
- Motor magnetising current set to low

#### Menu 81

Overvoltage

Data value:

00: Ramp operation stops

11: Inverter stop. Reset either automatically or manually (see menu 30).

12: Inverter stop. Reset manually.

The fault can be caused by:

- over voltage at the supply mains
- ramp down time too short
- regenerative operation
- is a brake option used, menu 05 has to be set between 100 - 106

#### Menu 82

Undervoltage

Data value:

00: Warning.

11: Inverter stop. Reset either automatically or manually (see menu 30).

12: Inverter stop. Reset manually

The fault can be caused by:

- under voltage on the supply mains
- voltage drop on the supply mains

#### Menu 83

Internal voltage monitoring.

Data value:

11: Inverter stop. Reset either automatically or manually (see menu 30).

12: Inverter stop. Reset manually.

The fault is caused by

- defective frequency converter

#### Menu 84

Inverter overload.

Data value:

02: Cut out due to high motor current for longer than permitted. Reset manually. (see page 30 fig 1)

11: Inverter stop. Reset either automatically or manually (see menu 30).

12: Inverter stop. Reset manually.

The fault can be caused by:

- motor short circuiting
- earthing
- too short ramp up time
- thermal overloaded of the frequency converter
- other faults in the power section.

*Warning: Interrupt always the supply voltage after short-circuit, earthing or thermal overload cut-out.*

#### Menu 85

Thermal motor protection.

see page 30 fig.2

Data value:

00: Warning of high motor temperature

02: Trip because of too high motor temperature. Reset manually.

#### Menu 86

Indication of motor current and motor torque is cancelled if the output frequency exceeds 120 Hz.

#### Menu 99

Unit fault.

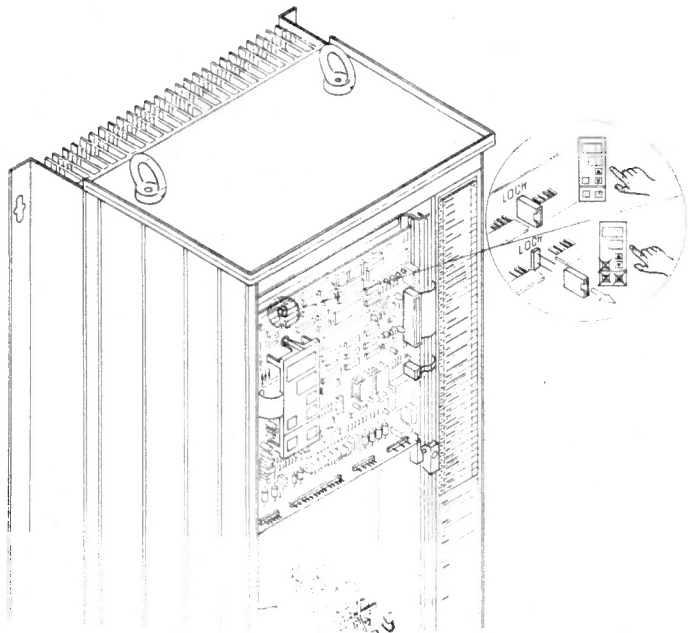
1: Check if the current supply to the external function is overloaded (terminals 50, 12 and 13)

2: Defective control card. Call service .

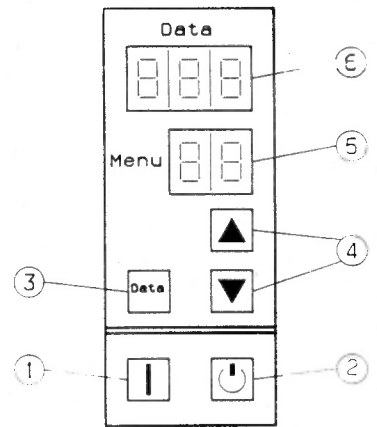
### No light in display

The fault can be caused by:

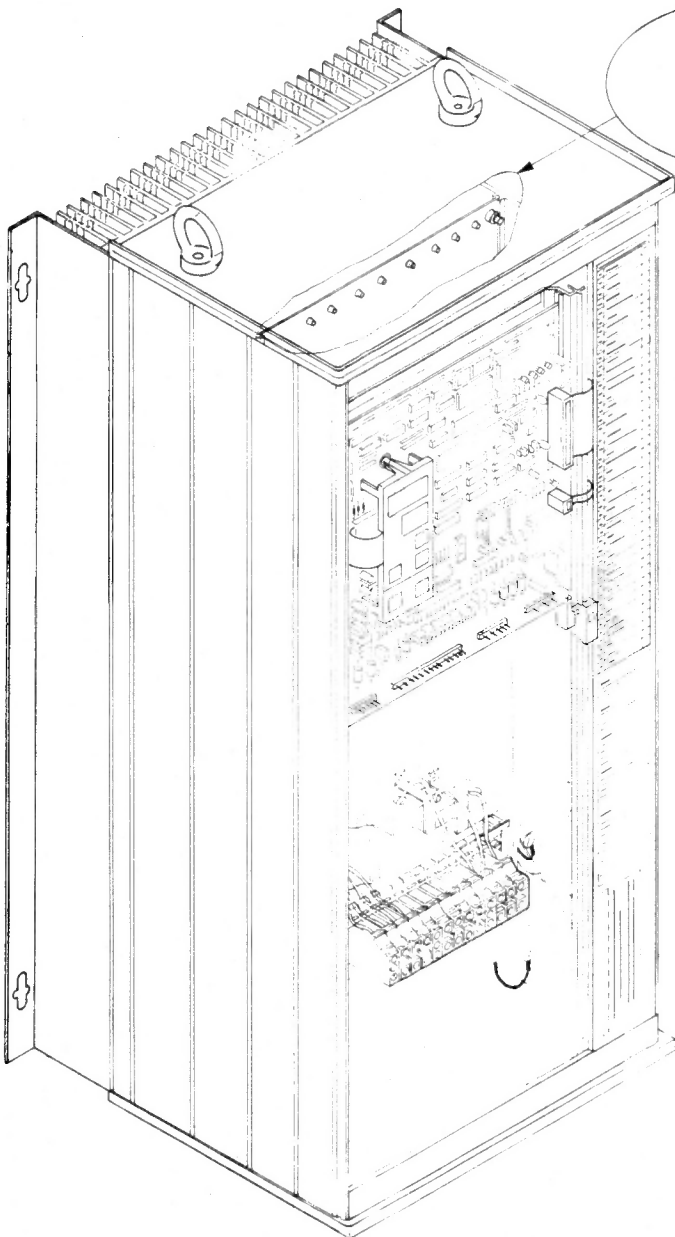
- Missing phase
- Undervoltage
- Defective fuse. The built in fuses are placed as shown on page 4 fig 2.



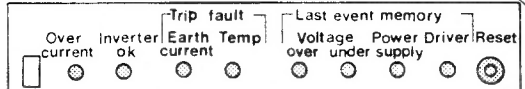
1

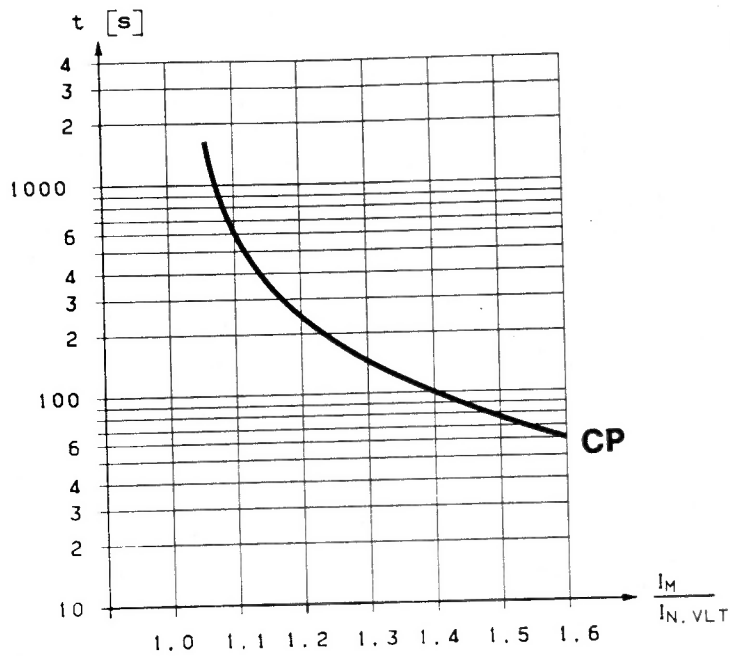


2



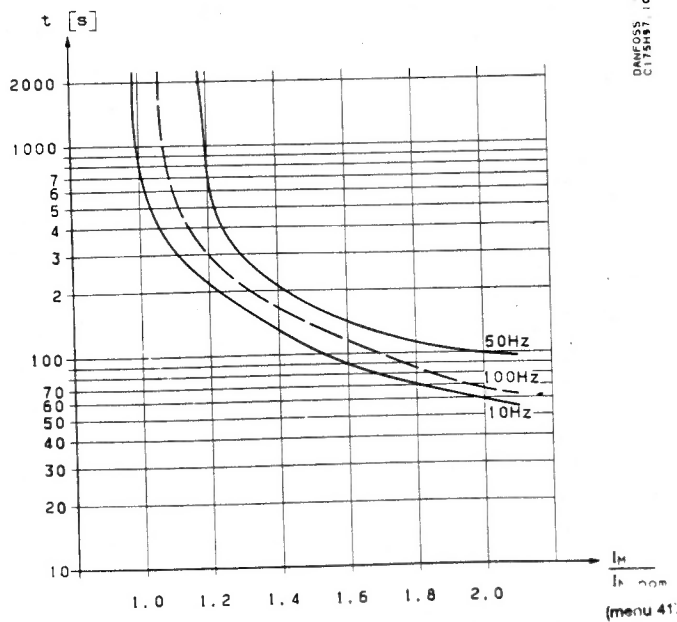
3





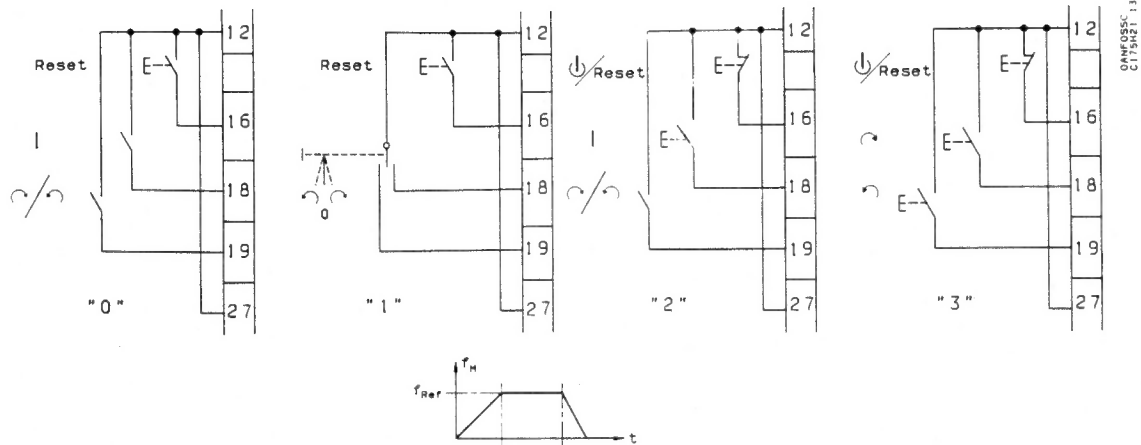
VLT®		type 3008	type 3011	type 3016	type 3022	type 3032
$I_{N,VLT}$	CP -1	13,0 A	16,0 A	24,0 A	32,0 A	44,0 A
	VT CONT	16,0 A	24,0 A	32,0 A	44,0 A	61,0 A
$I_{MAX}$ intermittend		20,8 A	25,6 A	38,4 A	51,2 A	70,4 A

1



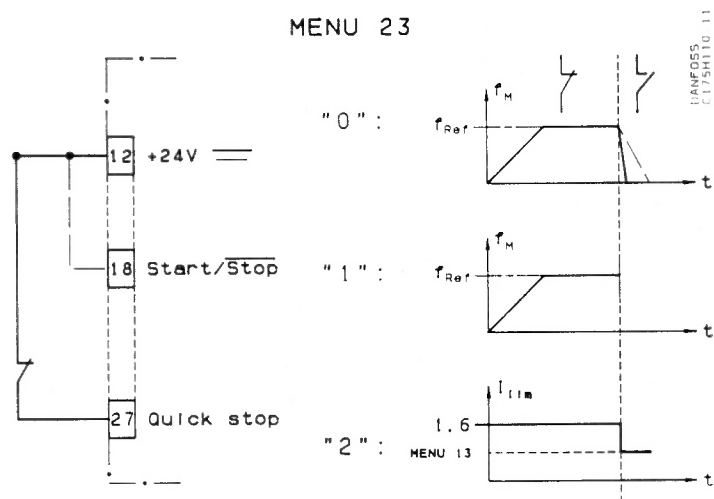
2

MENU 22

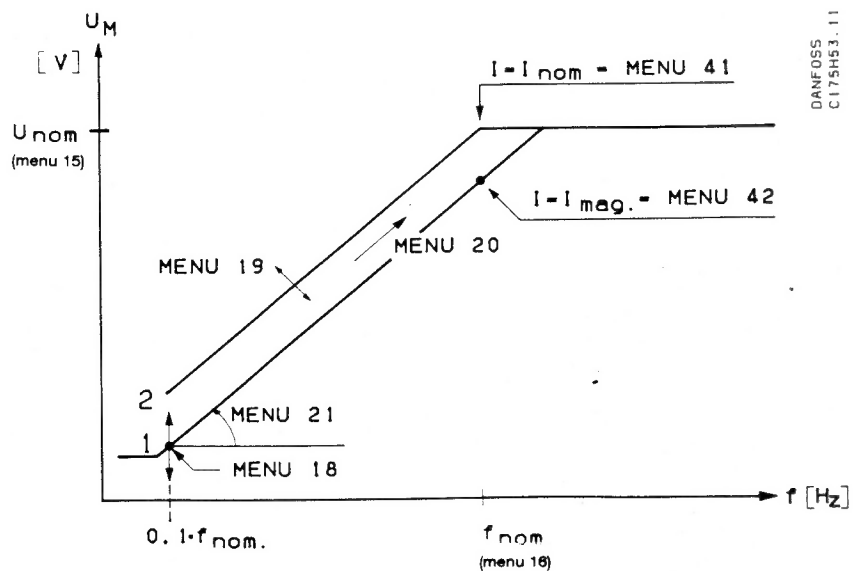


1

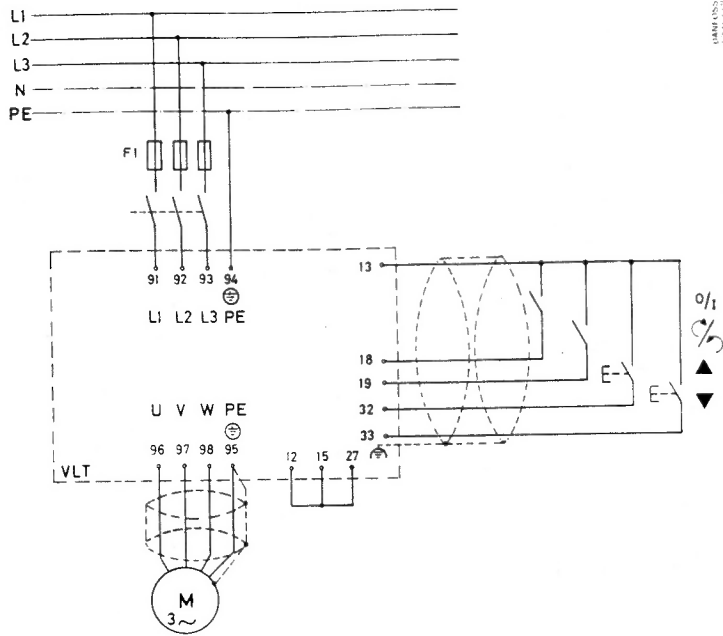
MENU 23



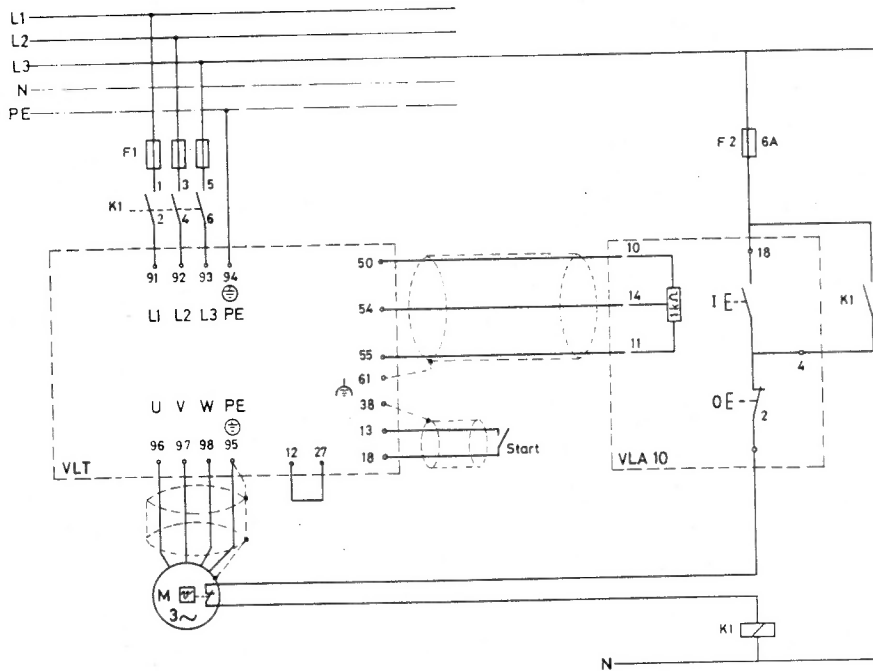
2



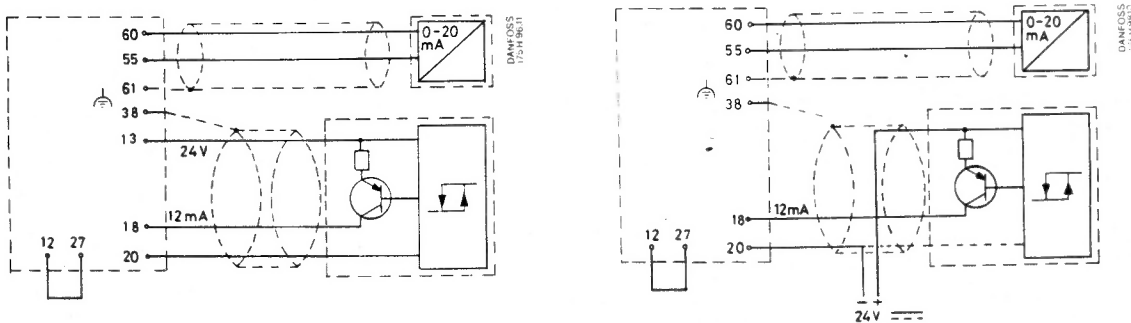
3



1 Electronic motor potentiometer control



2 Analog VLA 10 control



3 + 4 PLC control (internal - / external supply)

Menu outline	Typical value	Customer setting	NOTES
00 Application rate	-		
01 Frequency [Hz]	-		
02 Voltage [V]	-		
03 Current [A]	-		
04 Torque [%]	-		
05 Basic set up	1		
06 Local / remote (0/1)	1		
07 Local reference [Hz]	0.0		
08 Min. Speed [Hz]	0.0		
09 Max. Speed [Hz]	50.0		
10 Jogging speed [Hz]	10.0		
11 Ramp time up [s]	10/ 10/ 10/ 15/ 15		
12 Ramp time down [s]	10/ 10/ 10/ 15/ 15		
13 Current limit [A]	20.8/25.6/38.4/51.2/70.4		
14 Motor power [kW]	5.5/7.5/11.0/15.0/22.0		
15 Motor nominal voltage [V]	380		
16 Motor nominal frequency [Hz]	50		
17 Application rate factor	100		
18 Start voltage [V]	37.3/37.0/36.8/36.7/36.7		
19 Start compensation [V/A]	1.60/1.19/0.70/0.46/0.28		
20 Slip compensation [%]	100		
21 U/f - ratio [V/Hz]	7.1/ 7.2/ 7.2/ 7.3/ 7.3		
22 Start / stop mode	0		
23 Digital input select	1		
24 Analog input select	0		
25 Relay output select	7		
26 Digital output select	0		
27 Analog output 1 select (frequency)	2		
28 Analog output 2 select (current)	0		
29 Thermal motor protection	1		
30 Trip reset mode	0		
31 Trip delay time [s]	999		
32 Warning frequency [Hz]	130		
33 Warning current [A]	20.8/25.5/38.4/51.2/70.4		
34 DC braking time [s]	0		
40 Restore factory settings	0		
41 Motor nominal current [A]	12.2/15.8/22.8/31.1/42.8		
42 Motor magnetization current [A]	4.6/5.42/8.6/10.2/13.1		
80-99 Fault indications	-		

NOTE : The values refer to the VLT® types : 3008/ 3011/ 3016/ 3022/ 3032 respectively