Servodyn-G

Operation, commissioning Servodyn-G

Version 102

BOSCH
Automationstechnik

Servodyn-G

Operation, commissioning Servodyn-G

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Digital inverter system Servodyn – G

1 Safety instructions

This manual contains information which is required for properly operating the products described here.

It is intended for technically qualified personnel who have been specifically trained in or who have relevant knowledge of measuring technology and automatic control engineering.

1.1 Markings on components

The following symbols are found on various components and are used as warnings to point out possible danger, or to call your attention to important information:

Danger due to high voltage

Electrostatically sensitive components!

PE conductor

Screen

1.2 Hazard warnings in the manual

Observe and comply with the safety notes and danger warnings given in this manual (“DANGER”, “CAUTION”, and the highlighted information provided under “Note”) in order to avoid serious injury and property damage.

All safety instructions are numbered sequentially in accordance with the chapter in which they appear, for example 1.1. The Appendix provides translations of the safety instructions in all official EC languages.

1.3 Qualified personnel

1.1

! DANGER !

Maintenance and installation of the components to be carried out only by suitably qualified personnel under observation of the accident prevention regulations (UVV VBG4, VDE 100, VDE 105) and installation regulations (EN 60204-part1, prEN 50178).

Tampering with the drive components, ignoring warning signs attached to the components, or noncompliance with the warning notes given in this manual can result in serious bodily injury or property damage.

For this reason, only qualified personnel may perform the procedures as authorized in this manual.

Such personnel are

- **planning and design personnel** who are familiar with safety guidelines relevant to measuring technology and automatic control engineering;
- **operating personnel** who have been instructed in the proper use and handling of devices common to measuring technology and automatic control engineering, and who are familiar with the contents of this manual as they relate to the devices described here; and
- **commissioning and service personnel** who are authorized to earth, mark, and put electric circuits of components/systems into operation in accordance with recognized safety standards.

Please consult our comprehensive training program. You will find an overview of our seminar program on the inside back page.
Our training centre will be pleased to provide you with further information.

1.4 Proper use

The products described in this manual have been developed, produced, tested, and documented in accordance with relevant safety norms. These products pose no danger to persons or property if they are used in accordance with the handling stipulations and safety notes prescribed for their configuration, mounting, and proper operation.

! DANGER !

The safe and reliable operation of this product requires its proper transport, storage, set-up, and assembly as well as conscientious operation and use.

1.2

1.5 Installation

Comply with local, system-specific regulations and requirements as well as with the relevant standards, stipulations and accident prevention regulations.

All lines between the power connections and earth and the dc link connections and earth may be live and extremely dangerous.

When the supply voltage is present, the power connections as well as the DC link connections must be made inaccessible.

After the drive has been disconnected from the mains, up to 3 minutes may pass until high voltages have reduced to safe levels.

! DANGER !

Before working on power terminals, wait for a discharge time of 3 minutes and be sure to check that there is no voltage present!

1.3

The power electronics of inverter modules are electrically connected to the mains.

! DANGER !

The module must be disconnected from the mains in the event of a fault. See prescribed Ready wiring!

1.4

Measuring DC link voltages and other high voltages during commissioning procedures is not necessary.
When making measurements at the dc link, note the following:

- ❑ Multimeter:
  - □ Input voltage range $\geq$ 1000 V
  - □ Use only electrically isolating measuring transducers when measuring currents in the DC link or motor lines.
- ❑ Oscilloscopes, recorder, etc.
  - □ Voltage measurements must only be made via a differential input. Input voltage range $\geq$ 1000 V:
  - □ Because of the harmonic component in the power circuit, precise measurements require measuring systems capable of processing effective values of at least 9 kHz.
- ❑ Simultaneously measuring high voltages and control or logic signals with one measuring device is only permitted with measuring devices specifically designed for this purpose.

Module installation

Verify that all drive assembly components and their allocation are correct.

- ○ Compliance with installation instructions
- ○ Allocation according to rating plate

See manual no. 23.

1.5

! DANGER !

Use the manufacturer's circuit diagram to check the wiring.
Check the EMERGENCY-STOP chain before switching on!

2 Operating the inverter system

2.1 Supply module VM

With the exception of the presettings required for operations from the mains and for the braking resistor as described in manual no. 23, no additional commissioning steps are required.

2.2 Servo module SM

The servo module is optimized **for analog operations and for operations with the CAN bus** with a Bosch commissioning disk.
The Bosch commissioning disk is a 3.5” disk and runs on any IBM compatible PC on MS-DOS.

This disk allows you to perform the following individual tasks:

- Setting up and changing parameters
- Diagnostic and status interrogation tasks

RS 232

Every SM is equipped with an RS 232 interface on the front panel.
It is used to optimize and commission each module.

RS 485

The RS 485 interface, designated X6, is located on the bus board around the VM slot.
The CAN bus is connected via the RS 485.

2.3 Switching on

2.1

! DANGER !

Only switch on system voltage after connecting and testing the voltage supply and the starting circuit in accordance with manual no. 23!

For the initial start-up operation, switch on only the 24 V supply; a primary control should be disconnected.

Switching on the drive

○ Switching on the 24 V module supply.
The green "±15V" and "+5V" LEDS light up on the VM../E−G.
The green "L2 (OK)" LED lights up on the VM../BE_G.

The red LED **flashes** on the SM: " ✍ ":

- □ During initial start-up, the LED flashes until initialization of the SMs is concluded.
- □ When drives which have already been initialized are switched on, the LED flashes only until the parameter set from the EEPROM has been loaded.

Starting the program

○ Switch on the PC.
The Bosch commissioning program is called up via the DOS operating system. If the disk is, for example, in drive A, the program is started with:

```
A:BOSCHTRM
```

The following main menu is displayed along with the version no. and date of issue of the commissioning program:

```
Return to Continue
C to Configure Emulator
ESC to Exit
```

☞ **Note** **The connection to the drive is tested when the Return key < ↵ > is pressed. If the result of the test is positive, the screen mask for parameter entry will appear.**
A faulty connection is indicated by merely the parameter overview and no command line (left-hand side of screen remains empty).

Commissioning interface

Press “C” to configure the interface.
The commissioning disk supports both available interfaces. Commissioning does, however, take place solely via the RS 232.

```
Select a mode.
1. RS232 mode. (Default)        [Standard setting]
2. RS485 RTS Active mode        [RS232/RS485 converter with
                                 active Clear To Send signal]
3. RS485 RTS Inactive mode      [Special adapter]
  (Grabau RS232/485 converter)
Enter selection “1”
```

☞ **Note** **Proceed to default settings by pressing the Return key (= <CR>, <↵ >)**

PCs are normally equipped with at least 2 serial interfaces. These interfaces are designated COM1 and COM2. Enter the interface which is connected by the cable to the SM module.

```
Serial port
1. COM1. (Default)
2. COM2.
Enter selection
```

Data transmission rate

Data transmission at the PC should take place at a rate of 9 600 baud.

Setpoint interface

The following auxiliary menu appears only during the initial start-up operation or when the interface is been incorrectly commissioned.

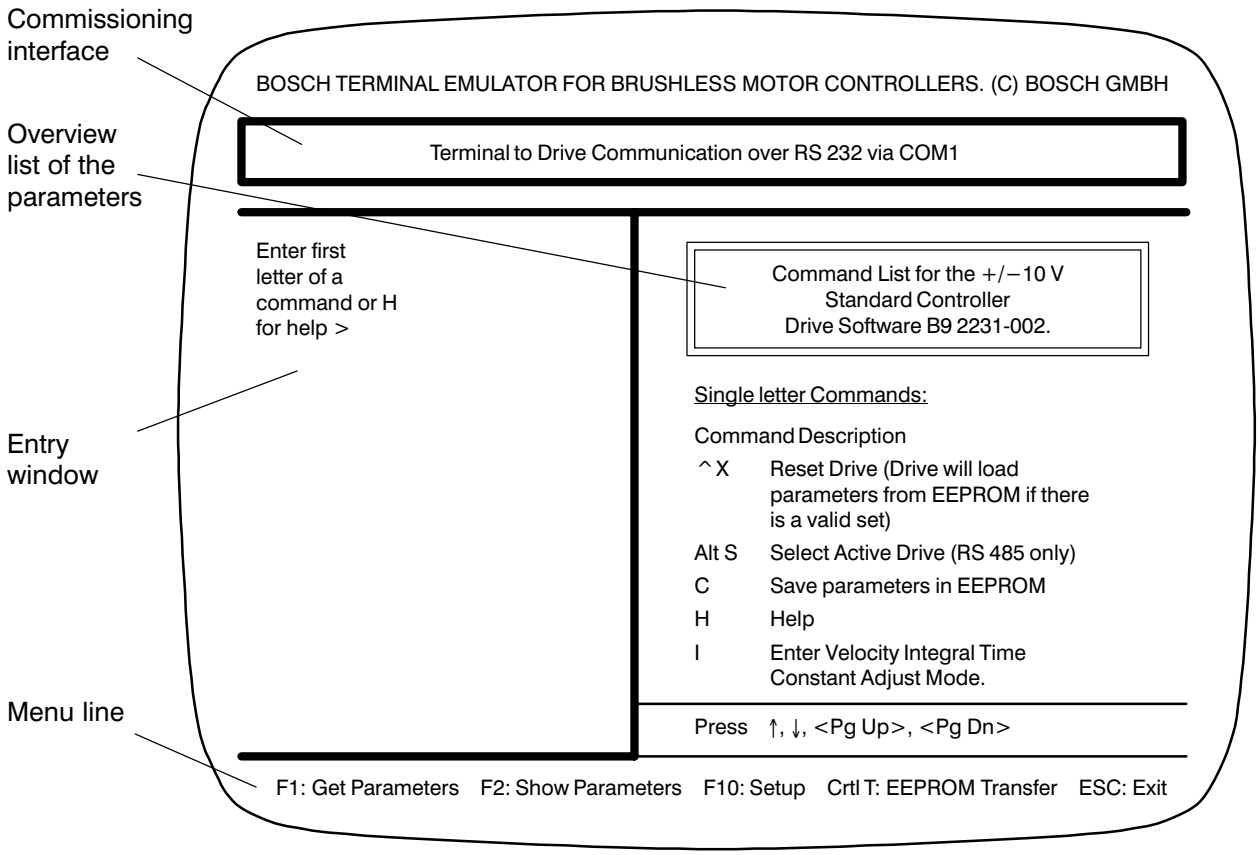
```
Check Drive/Master
Interface Type!
1. IQ120 CAN Interface
(Default)
2. IQ140/RHO3 CAN Inter-
face
3. +/-10V Interface
Enter Selection “3”
```

☞ **Note** **The menu is also used to select the parameter overview on the right-hand side of the screen (see section 2.4.1). This occurs automatically after the initial start-up operation.**
The wrong overview list is only active if the wrong interface was selected and the drive switched on afterwards. In this case, the interface can be rerequested using F10.

2.4 Communication with the drive

2.4.1 General notes

The appearance of the following screen mask indicates that parameter entry can begin:



- Parameters or values are entered after the following prompt:

```
Enter first
letter of
command or H
for help >
```

- Inputs always come after the prompt sign “>”.
  In the manual, the prompt appears in bold print.
- A list of available commands is shown in the right-hand half of the screen. Use the <Pg Up> and <Pg Dn> keys and the ↑ and ↓ keys to scroll through the commands a page or a line at a time respectively.

- The commands consist of two or three letters, for example “**SP**”. The first letter refers to a set of parameters which determine the desired action. The second letter specifies the exact parameter. See overview list in section 2.4.2.

- The help function consists of plain text user prompts, for example:

```
Enter first
letter of
command or H
for help > S
Enter second
letter of
command or H
for help > > P
```

  When there is no help text on the screen, only the prompt sign appears, and a command is entered immediately after the prompt without a space, for example:

  > **SP**

- In addition to the preceding help texts, the command **“H”** is a help function which can be called up as the first character and often as the second character while not interfering with an ongoing operation, and provides a description of the available commands for the current input.

- When “–more–” appears, press any key to continue (for example Return).

- Number values can be up to 6 digits long, and both decimal and scientific-technical expressions can be used. Commas must be entered as full stops.

- Number values are always shown as scientific-technical expressions.

- The number of parameters which can be entered is limited. If a value is entered which falls below or exceeds this limit, the limit value of the respective motor/module combination is automatically taken as the valid value without the user being informed.

- If an illegal symbol is entered, the old value remains valid.

- The function key **“F1”** stores all parameters under a freely definable file name. The file automatically receives the ending “.prm”. When working directly from the commissioning disk, the file is stored on the disk as well. The function can be interrupted with the “Esc” key.

- The function key **“F2”** calls up the parameters stored in a file and lists them on the right-hand side of the screen. The file name should be entered without an ending. The function can be interrupted with the “Esc” key. You can switch back to the help text with “F2” (show help file).

- The function key **"F10"** can now be used to call up the set-up program in order to make changes to the interface configuration. The current screen mask is overwritten; all inputs until this point are not stored.

- The key combination **"Ctrl T"** reads the drive parameters in and out.
  "U": Up-load of the parameters from the drive into a file for which the ending ".PRS" was set up.
  "D": Down-load of the parameters from a PRS file to the drive, i.e. the file must first be created with an Up-load.
  The function can be interrupted with the "Esc" key.

- The **"Esc"** key is used to interrupt the commissioning program and return to DOS level, although without saving entries made up to that point.

- The key combination **"CTRL X"** restarts the system, as does switching the voltage supply on and off.
  Restarting the system loads the status most previously stored in the EEPROM, and any changes which were not stored with **"C"** are lost.

- All data in the EEPROM are stored with the **"C"** command.

2.2

! DANGER !

The drive will not receive any commands while sending data to the terminal. For this reason, the motor has also to be switched off via a hardware switch in the event of an emergency.

2.4.2 Overview list of the commands

General commands

Ctrl X Reset drive
The drive loads the data stored in the EEPROM; changes which have not been stored are lost.

C Store all parameters in the EEPROM

H Help function, overview of the available commands

Help text for command entry

+ Show help text

– Remove help text from screen

Requesting and editing parameters

The commands differ only in the first letter for setting (S) or listing (L). The second letter determines the parameter.

S_ Set parameter
L_ List parameter

- ***** All parameters
- **E** Emergency-off delay
- **H** Help function, overview of commands
- **I** Integral-action component, speed controller
- **J** Inertia observer
- **L_** Max. speed
  - **A** Automatic mode
  - **M** Manual mode
- **M** Motor type/motor parameter (SM = initialize drive!)
- **N** Max. speed for 10 V setpoint
- **P** P-component of speed controller
- **R** Position scaling (number of absolute revolutions for 10 V signal at testpoint)
- **T_** Max. current
  - **A** Automatic mode
  - **M** Manual mode
- **W** Width of filter band for P-component of speed controller
- **Z** Filter damping for P-component of speed controller

L_ Request parameter

- **–** Set motor-module combination
- **D** Ident. no. of the axis
- **V** Software version

Controller adjustment

P P-component of speed controller

- **D** = reduce gain by 5%
- **H** = auxiliary function, overview of commands
- **L** = display current value
- **Q** = leave adjustment mode
- **S** = enter value
- **U** = raise gain by 5%
- **Z** = set gain to 0

I integral-action component, speed controller

- **D** = reduce integral action by 5% (increase time)
- **H** = auxiliary function, overview of commands
- **L** = display current value
- **Q** = leave adjustment mode
- **S** = enter value
- **U** = raise integral action by 5% (shorten time)
- **Z** = set value to 0

J inertia observer

- **D** = reduce moment of inertia by 5%
- **H** = auxiliary function, overview of commands
- **L** = display current value
- **Q** = leave adjustment mode
- **S** = enter value
- **U** = raise moment of inertia by 5%
- **Z** = set value to 0

Motor commands

M_

- **B** disengage/engage holding brake
- **I** enable drive (brake is disengaged)
- **O** disable drive
- **V** activate speed controller P-gain
- **T** 1:1 P-gain of the speed controller

Optional commands

OA Switch the setpoint filter on/off

OD Switch off the motor temperature monitoring.
Only for test purposes, may not be used during operation!

OC_ Switch gain of the speed controller

- **1** Gain 1:1 (torque mode)
- **2** PI-gain (speed mode)

OE_ Initialize simulation board encoder

- **L** Enter number of lines
- **A** Zero shift
- **O** Switch off encoder simulation

OF_ Switch the function generator on/off
- **N** Amplitude and offset for speed setpoint
- **T** Amplitude and offset for torque setpoint
- **P** Period and duty cycle

OH Help function, overview of commands

OI Offset adjustment manual (≦ 300 mV)

OL Switch the limit switch inputs on/off

OM Switch X5.15 on and off for manual mode

OO Switch the observer on/off

OR_ Switch setpoint source
- **1** analog setpoint input
- **2** function generator

OZ Offset adjustment, automatic

Programmable analog output/testpoint

OTA_ Output A (XA..F 5.3), testpoint TP10

OTB_ Output B (XA..F 5.4), testpoint TP3
- **0** Zero shift
- **1** Torque setpoint
- **2** Speed setpoint
- **3** Actual speed
- **4** –
- **5** Actual position
- **6** –
- **7** Filtered actual speed
- **8** Observer speed
- **9** Observer position error
- **H** Help function, overview of commands

OTH Help function, overview of commands

Current operating data

?_ Query
- **B** Heat sink temperature SM
- **F** Current faults
- **H** Help function, overview of commands
- **L** Limit values for current
- **M** Motor temperature
- **P** Resolver zero point
- **S** Current SM status
- **V** Average motor speed

2.4.3 Drive initialization

If the drive is used for the first time or another motor has been connected, the drive must be initialized; this means that the connected motor type must be entered.

☞ **Note** **Initialization deletes all previously stored data!**

The module type is automatically recognized; the motor type is entered with the **"SM"** command. Initialisation begins immediately and without warning:

```
Enter first
letter of
command or H
for help > S
```
Enter "S"

```
Enter second
letter of
command or H
for help > > M
```
Enter "M"

```
Motor:-
e.g.
SG-B0.014.058
? SG-B0.007.070
```
Enter type

Motor type SG–B0.007.070 is merely given as an example for the type code.
When the last character has been entered, the motor-module data are loaded from an internal table. The red LED on the SM flashes:

```
Wait...

MCO Link should
be between
2 and 3!

Defaults Set
```

☞ **Note** **Some motor-module combinations require a different position for the MCO jumper. See manual no. 23, section 5.3 concerning jumper position.**

The drive is initialized, but not yet optimized.

3 Commissioning

Enter all commands in accordance with the following basic structure:

```
Enter first
letter of
command or H
for help > S
Enter second
letter of
command or H
for help >> P
```

Or without help text:

> **SP**

3.1 Defaults

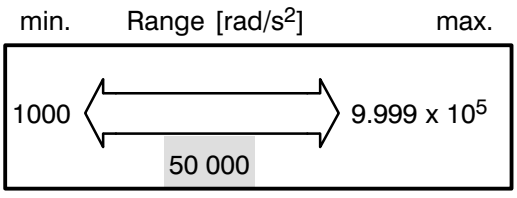
3.1.1 Limit switches

OL **Switching the limit switch inputs XA..F5.6/7 on and off**

```
Disable Limit
Switches
(Y/N) ?
```

SE **Braking ramp for limit switch (emergency-off delay)**

```
Emergency Decel
5.000E 4
[Rad/Sec.Sec]
?                    Enter value <↵ >
```



Default setting

3.1.2 Limit values, automatic/manual mode

A 24 V signal to X5.15 switches between the parameter set for “automatic” and the parameter set for “manual mode”. If this terminal is not wired, it must be deselected in the following.

☞ **Note** **The manual mode described here is not the “Safe set-up” mode. Safe set up is only possible with power tapping. See manual no. 23.**

OM **Switching X5.15 on and off**

```
Disable Manual
Mode
(Y/N) ?
```

Yes: The drive always works in automatic mode; the terminal X5.15 is switched off and is not wired.

No: The terminal X5.15 must be wired:

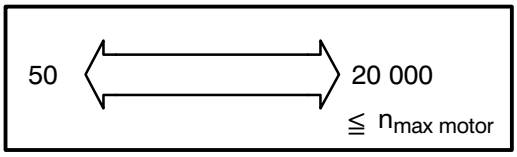
- □ 24 V = automatic mode
- □ 0 V = manual mode

SLA **Max. speed in automatic mode**

```
Automatic Mode
Velocity Limit
1.150E 4 [RPM]
?
```

Enter value <↵>

min. Range [min^{-1}] max.



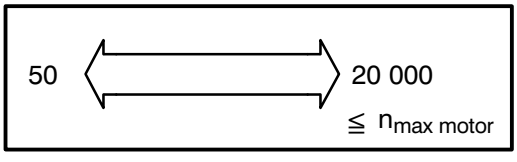
Default setting: $n_{max\ motor}$

SLM **Max. speed in manual mode**

```
Manual Mode
Velocity Limit
1.150E 3 [RPM]
?
```

Enter value <↵>

min. Range [min^{-1}] max.

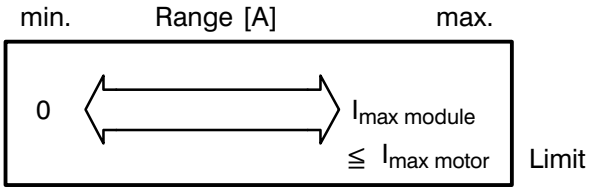


Default setting: 10 % $n_{max\ motor}$

STA **Max. current in automatic mode**

Limit constraints are only effective in automatic mode.

```
Automatic Mode
Current Limit
1.900E 0 [A]
?                          Enter value <↵ >
```

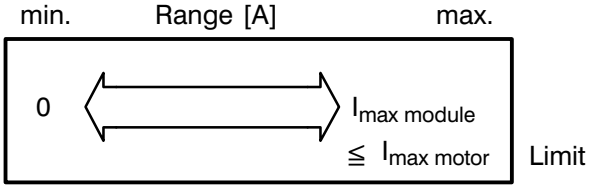


Default setting: $I_{max\ motor}$ or $I_{max\ module}$ (smaller value)

STM **Max. current in manual mode**

Limit constraints are only effective in manual mode.

```
Manual Mode
Current Limit
1.900E-1 [A]
?                          Enter value <↵ >
```



Default setting: 10% $I_{max\ motor}$ or 10% $I_{max\ module}$ (smaller value)

3.2 Commissioning

3.1

! DANGER !

Only switch on system voltage after connecting and testing the voltage supply and the starting circuit in accordance with manual no. 23!

The motor shaft must be able to rotate freely without mechanical connection to the machine before initial start-up.
A primary control unit should likewise be switched off.

3.2

CAUTION !

The system voltage at the supply module may only be switched on if a 24 V supply is already connected. The supply module may be damaged if the 24 V supply is not switched on.

There should be a pause of 5 seconds between switching the system voltage off and on.

To turn on the system voltage, press down the “MAINS ON” button until the green “ ⚠ ” LED lights up. The dc link voltage is ready.

3.2.1 Setpoint adjustment

The maximum setpoint differential voltage must be ± 10 V.

SN **Speed setpoint adjustment (maximum speed)**

Motor speed is established for a setpoint voltage of ± 10 V.

```
Vel. Scaling
1.150E 4
[RPM at 10V]
RPM ?                    Enter value <↵ >
```

min.	Range [min^{-1}]	max.
100	⟷	20 000

Default setting: $n_{N\ motor}$

OZ **Offset adjustment, automatic**

Procedure:

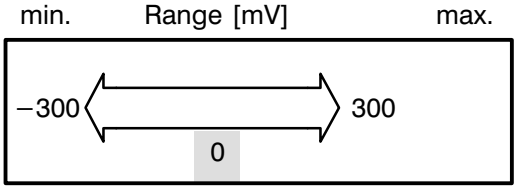
- The SM..−G is switched on.
- Do not give an enable command!
- Specify a voltage value for **n = 0** on the terminal strip XA..F5.19/20.
- Enter the command “OZ”.
  Adjustment is made without a check-back signal.

OI **Offset adjustment, manual**

As opposed to the automatic offset adjustment procedure, you can also manually enter a value.

```
Input Offset
(0.0)  [mV]
?
```

Enter value <↵>



Default setting

☞ **Note** **The offset adjustment must be stored with “C”.**
There will be no more offset if the offset adjustment has been carried out when the warm-up phase is complete.

3.2.2 Function generator

An integrated function generator can be used as an aid during the commissioning procedure, the setpoint terminals being switched off.
The function generator generates a rectangular signal as a setpoint to drive the motor in idle mode and adjust the transient response.

OR **Switching the function generator on/off**

When the function generator is switched on, all setting menus appear without a command being entered. Use individual commands to make any changes later.

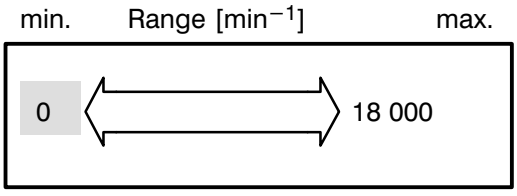
```
Command
Reference
Initialization
Sure (Y/N)? Y          Enter "Y"

Options:-
1 Analog Ref
2 Function Gen
? (1/2) >> 2           Enter no.
```

If you enter "**1**", the setpoint terminals remain active and the function generator is switched off.

OFN **Amplitude and offset for speed setpoint**

Set the amplitude so that a rectangular signal of ±1 V is yielded for I_{norm}.

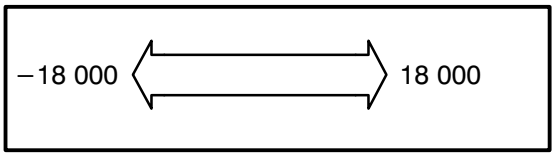
```
Func. Generator
Speed Amplitude
(0.0) [RPM]
?                      Enter value <↵>
```



Default setting

```
Func. Generator
Speed Offset
(0.0) [RPM]
?
```
Enter value <↵>

min. Range [min^{-1}] max.

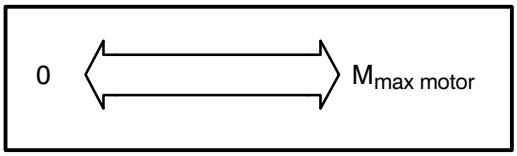


OFT **Amplitude and offset for torque setpoint**

Set the amplitude so that a rectangular signal of ±1 V is yielded.

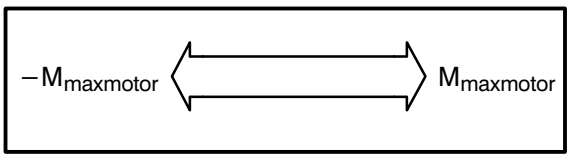
```
Func. Generator
Torq. Amplitude
(0.0) [Nm]
?
```
Enter value <↵>

min. Range [Nm] max.




```
Func. Generator
Torque Offset
(0.0) [Nm]
?
```
Enter value <↵>

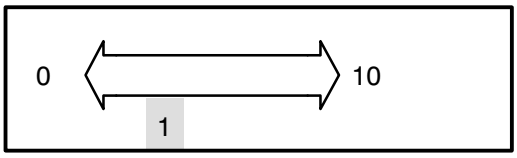
min. Range [Nm] max.



OFP **Period and duty cycle**

```
Func. Generator
Period
1.000E 0 [s]
?                    Enter value <↵ >
```

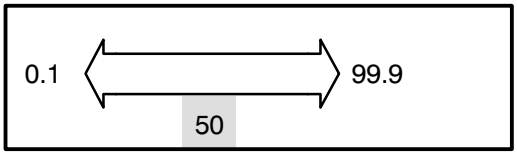
min. Range [sec] max.



Default setting

```
Func. Generator
Duty Cycle
5.000E 1 [%]
?                    Enter value <↵ >
```

min. Range [%] max.



Default setting

The following message appears at the conclusion of the switching-on procedure of the function generator (red LED on SM flashes):

```
Function
Generator
Initialization
```

3.2.3 Motor commands

Use the following commands to control the motor for commissioning:

MO **Disable motor**

If a 24 V enable signal is present, the motor can be switched off.

MI **Enable motor**

If a 24 V enable signal is present, the motor can be started.

☞ **Note** **Motor start-up always requires a positive enable slope, either by entering the command "MI" or by switching off the 24 V enable signal and then switching it on again.**
Motor operation with the function generator is only possible with the "MI" command.

(MB **Holding brake control)**

Function is not possible, as the brake relays for the holding brake are installed externally.

MT **n-controller 1:1**

For commissioning purposes, the speed controller of the SM can be switched to a 1:1 gain.
This setting is temporary and cannot be stored. For storable switch-over operations, see section 3.2.8.

MV **Switching n-controller back to normal**

This switches back the n-controller from 1:1 to PI gain; cannot be stored.

3.2.4 Programmable analog output

Level: 0 ... ±10 V,
10 V ≙ Maximum value
as related to the specified motor-module combination

OTA **Analog output assignment A (XA..F5.3) / TP10**

The following appears when **"OT"** is entered:

```
A = TP10
B = TP3
H = Help>> A          Enter "A" for analog output A

Option >>>            Enter number
```

Testpoint TP10 and analog output A are identical and can be assigned the following signals:

0 Zero shift
1 Current setpoint I_{DC}
2 Speed setpoint
3 Actual speed
4 –
5 Position actual point (adjust with **"SR")**
6 –
7 Filtered actual speed
8 Observer Estmated speed
9 Observer position error

OTB **Analog output assignment B (XA..F5.4) / TP3**

Testpoint TP3 and analog output B are identical and can be assigned the same signals, such as analog output A /TP10.

SR **Position scaling**

Scaling for the analog output assigned with the position actual value:
The number of absolute revolutions for a 10 V signal is determined at the output.

```
Posn. Scaling
1000E 0
[Revs/10V]
R ?                   Enter value <↵ >
```

3.2.5 Adjusting the speed controller

3.3

CAUTION !

The limit switches of the machine must be connected to the limit switch inputs of the drive, in order to ensure that the motor will stop and the relevant direction of rotation disabled when a limit switch is reached.

You can directly enter new loop gain and integral time constant values for the speed controller:

SP **Loop gain n-controller**

```
Vel. Loop Gain
9.999E-3
[Nm/(Rad/sec)]
P?                    Enter value <↵ >
```

☞ **Note** **The nominal speed will not be reached if the loop gain is too small.**

SI **Integral time constant n-controller**

```
Integral Time
Const
1.000E-2 [s]
Ti?                   Enter value <↵ >
```

Procedure

However, it is simpler to determine the optimum speed controller setting by using the following commands.

- Switch on SM and do **not** issue an enable command.
- Activate P-gain with **"OC2"** (spindle speed mode):
- Activate automatic mode by applying 24 V to X5.15 (VM):
- The speed controller is set by means of a step answer.
  The rectangular signal wave for the command speed can be either created with an external analog function generator (analog input of SM) or using the built-in software function generator, as described below.
- Switch over setpoint input with **"OR2"** to function generator.
  Set function generator to:

  "**OFN"** speed amplitude = 10 % nominal speed,
  speed offset = 0

  "**OFP"** period = 1 sec
  duty cycle = 50 %
- The speed amplitude should be just large enough that no limitation of the torque occurs.

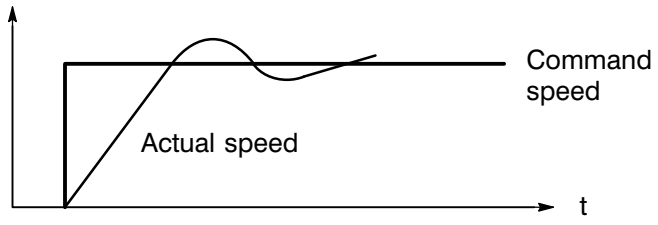
- The d.c. current signal I_{DC} equivalent to the torque can be issued at one of the programmable outputs and displayed with the oscilloscope ("**OTA**" or **"OTB"** command). If the torque reaches the limitation (10 V on the oscilloscope), either the speed amplitude of the function generator must be reduced or the current limit of the SM raised.
- The actual speed is sent to the second programmable analog output and displayed with an oscilloscope.
  The oscilloscope should initially be set to the following values:
  Time base: 20 ms/unit
  Voltage: 1 V/unit

3.4

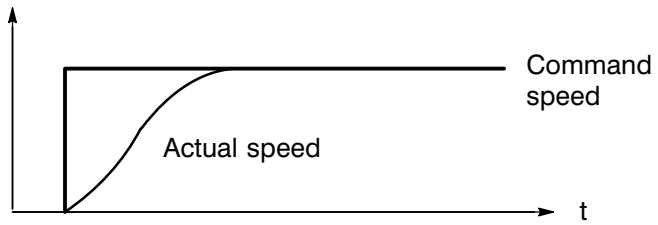
CAUTION !

You should ensure that no damages to the machine result due to the setpoint of the frequency generator.

- First set the P-gain, then set the integral-action component to 3 sec with **"SI".**
- Give the enable command with the 24 V signal slope, or with the "MI" command if a 24 V signal is present.
- The proportional component is changed in small steps with **"PU"** and **"PD"**:
  - First raise the proportional gain with **"PU"** until the motor begins to rotate. Then continue to raise the gain until a small overshoot in the speed appears on the oscilloscope:



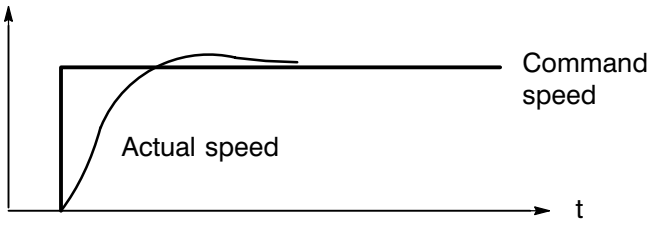
  - Finally, reduce the gain again with **"DU"** until the overshoot has just disappeared:



  - Leave setting mode for loop gain with **"Q".**
- Switch over to setting mode for integral-action component with **"IU"** and raise the integral component (corresponds to a reduction in the

integration time constant) until a small overshoot in the speed appears.onszeitkonstanten).

- ○ Leave setting mode for integral-action component with **“Q”.**
- ○ Then, switch back over to proportional component setting mode with **“PU”** and carry on raising the component in order to raise the steepness of the step response. Below is a representation of a step response for an ideally set speed controller:



- ○ Store the controller setting in EEPROM with **“C”.**

☞ **Note** **Before storing controller parameters, the function generator must be switched off and switched to an external setpoint source. Otherwise, every time the drive is turned on, the function generator will also be switched on.**

P Adjusting loop gain

```
Gain Adjust
Mode
H for Help
P >>                    Enter letter
```

You can use the following commands:

U Each “U” entered increases the loop gain by 5 percentage points until the loop gain is approximately doubled (up).

D Each “D” entered decreases the loop gain by 5 percentage points until the loop gain reaches zero (down).

L Indicates the current loop gain value (list).

S Allows you to directly enter a value (set).

Z Loop gain is set to zero (zero).

Q Quits the adjustment mode (quit).

H Description of commands possible “P..” (help)

I Adjusting the integral time constant

```
Gain Adjust
Mode
H for Help
I >>                    Enter letter
```

You can use the following commands:

- **U** Each “U” entered increases the integral action (= shorter integral time) by 5 percentage points (up).
- **D** Each “D” entered reduces the integral action (= longer integral time) by 5 percentage points.
- **L** Indicates the current value of the integral time constant (list).
- **S** Allows you to directly enter a value (set).
- **Z** The integral action is set to zero.
- **Q** Quits the adjustment mode (quit).
- **H** Description of the commands possible “I..” (help)

3.2.6 Selecting a filter

OA **Switching the setpoint filter on/off**

A fixed, preset filter can be activated in the setpoint input in order to smooth setpoint peaks.

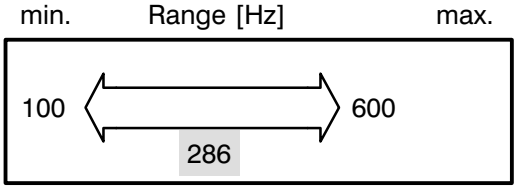
```
Enable Analog
Filter on
Reference
Input (Y/N)?
```

SW **Width of filter band for P-gain of speed controller**

A 2nd order corner filter frequency can be set for the proportional gain of the speed controller.

```
2nd Order
Filter Freq.
2.864E 2 [Hz]
Wn?
```

Enter value <↵ >



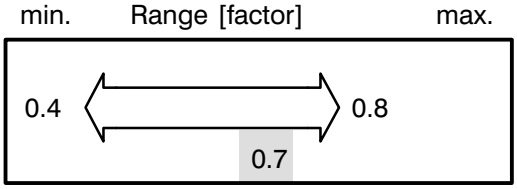
Default setting

SZ **Filter damping for proportional gain, n-controller**

A 2nd order damping filter can be set for the proportional gain of the speed controller.

```
Filter Damping
7.000E-1
Zeta ?
```

Enter value <↵ >



Default setting

☞ **Note** **The default setting for band width and damping has proven itself in practice. We recommend you do not change the values.**

3.2.7 Adjusting the observer

A speed observer can be activated in order to improve drive behaviour in case of low load moment of inertia.

Precondition:

- Load moment of inertia ≦ motor moment of inertia
- Constant inertia, i.e. a rigid connection to the load

The observer allows higher control loop gain as well as a higher speed controller band width, meaning that the drive speed increases more quickly and with a smaller overshoot.

The observer uses a model of the system (motor and load) to calculate the observer actual speed. The observer moment of inertia must be matched to the actual moment of inertia.

Procedure

- Switch on SM..−G
- Optimize the speed controller of the SM..−G.
- On an oscilloscope, record the “position deviation observer” output signal at the programmable analog output XA..F5.3 (command “**OTA9**”).
- Switch on the function generator.
- Give the enable command with the 24 V signal slope, or with the “MI” command if a 24 V signal is present.
- Adjust the observer moment of inertia so that the amplitude of the position deviation of the observer is as small as possible.
- When the observer undergoes the final test, the observer actual speed (command “**OTA8**”) and the actual speed (“**OTB3**”) at the analog outputs must be the same.

New values can be entered directly for the observer moment of inertia:

SJ Changing the observer moment of inertia

```
Vel. Loop Gain
9.999E-3
[Nm/(Rad/sec)]
P?                    Enter value <↵ >
```

However, it is simpler to determine the optimum speed controller setting by using the following commands.

J **Adjusting the observer moment of inertia**

```
Gain Adjust
Mode
H for Help
J >>                    Enter letter
```

You can use the following commands:

- **U** Each “U” entered increases the observer moment of inertia by 5 percentage points (up).
- **D** Each “D” entered decreases the observer moment of inertia by 5 percentage points until the setting reaches zero (down).
- **L** Indicates the current momemt of observer moment of inertia (list).
- **S** Allows you to directly enter a value if the total moment of inertia is known (set).
- **Z** The observer moment of inertia is set to zero.
- **Q** Quits the adjustment mode (quit).
- **H** Description of commands possible “P..” (help)

OO **Switching the observer on/off**

```
Use Observer
Velocity
Estimate                Enter “Y”
? (Y/N)..
```

After activating the observer, you should readjust the speed controller loop gain and intregral time constant.
You can also set a higher band width (up to approx. 600 Hz) for the speed controller filter with the command “**SW**”.

☞ **Note** **A speed controller optimized with an active observer will vibrate if the observer is switched off without the speed controller being reoptimized afterwards.**

3.2.8 Special settings

OC Setting the n-controller to 1:1

The speed controller gain can be set to 1:1 (Torque Mode) for commissioning purposes or special applications.
This means that the setpoint value at terminals XA..F5.19/20 acts as a torque setpoint.

```
Select
Compensator
Sure (Y/N)? Y          Enter "Y"

Control
Options:-
-more-
1 Torque Mode
2 Velocity Mode
Option?                Enter number <↵>
```

OD Switching off temperature monitoring

3.5

CAUTION !

The absence of temperature monitoring can destroy the motor.
This command is for test purposes only and must otherwise never be used!

3.3 Initialization of the encoder simulation card

Initialization of the Encoder Simulationskarte

If an encoder simulation card is employed, it must also be initialized.

The command "**OE**" starts initialization:

```
Encoder
Configuration
Sure (Y/N) ? Y
```

Enter "Y"

After initialization has been started, all setting menus listed are automatically rolled up without a command being entered.
Charges can be made later via individual commands.

OEL **Number of lines**

☞ **Note** **You should note that fixing the number of lines also fixes the maximum motor speed at the same time.**

The maximum number of lines for the encoder is calculated from the given limit frequency and the maximum motor speed desired:

$$\text{Max. encoder no. of lines} = \frac{\text{limit frequency 100 kHz (} \triangleq \text{ 6 000 000 imp/rer)}}{\text{maximum speed in rpm}}$$

e. g. at 6000 rpm, the max. number of lines for the encoder is:

$$\frac{\text{6 000 000 pulses/rev}}{\text{6 000 rpm}} = \underline{\underline{\text{1 000 pulses}}}$$

```
Number of Lines
is      0
(Minimum 200)
? 1000 <↵ >
```

Enter value <↵ >

```
Warning !!
-more-
Max. Speed for
1000 Lines is
6000 [RPM]
OK (Y/N) ? Y
```

Enter "Y"

After fixing the number of lines, the reset pulse is fixed with a zero shift. The mechanical position of the reset differs from motor to motor; it can be displayed with the "**?P**"command in order to fix the following value.

OEA **Zero shift**

```
Encoder Angle
(0.0) [Deg]
?                          Enter value <↵>

Encoder
Initialization
```

We recommend you store the data fixed in the initialization phase, using the "**C**" command to do so.

OEO **Switch off encoder simulation**

Encoder simulation can be switched off at any time using a software command.

```
Sure (Y/N)? Y              Enter "Y"

Removing
Encoder
Simulation
```

4 Diagnostics

4.1 Displays on the modules

VM 5/E–G

Light diode	Colour	Meaning
⊗ ⚠	green	DC link voltage > 50 V
⊗ ±15V	green	Internal ± 15 V DC ready
⊗ ±5V	green	Internal + 5 V DC ready
⊗ 🌡	red	Heat sink overtemperature, the relay contacts BTB2 and $BTB_{ent.}$ open
⊗ >400V	red	DC link voltage > 400 V DC the relay contacts BTB2 and BTB_{ent} open
⊗ ⎍	yellow	Braking resistor active
⊗ 3~	red	Missing network phase the relay contact BTB2 at the VM opens. Switch off monitoring for a single-phase operation, see manual no. 23, the diode is continually lit.

VM 7,5/BE–G

Light diode	Colour	Meaning
L1 ⊗ ⚠	green	DC link voltage > 50 V
L2 ⊗ OK	green	Internal ± 15 V DC and + 5 V DC ready
L3 ⊗ ⊟	red	F1 fuse for external ballast resistor defective
L4 ⊗ 🌡	red	Heat sink overtemperature, the relay contacts BTB2 and BTB_{ent} open
L5 ⊗ >400V	red	DC link voltage > 400 V DC the relay contacts BTB2 and BTB_{ent} open
L6 ⊗ ⎍	yellow	Braking resistor active
L7 ⊗ 3~	red	Missing network phase, the relay contact BTB2 at the VM opens. Switch off monitoring for a single-phase operation, see manual no. 23, the diode is continually lit.

Reset The system voltage is switched off. The external 24 V supply need not be switched off.
Switch back on after an interval of 5 seconds.

SM ... - G

Light diode	Colour	Meaning
⊗ ↙	red	**EEPROM is loaded (LED flashes)** Always takes place when machine is first switched on or reprogrammed. **Fault (LED lit)**, Exact error designation via command "**?F**" (see manual "Operating, commissioning"). The relay contact $BTB_{ent.}$ opens.
⊗ ▽	yellow	**Current limiting** due to temperature, the relay contact BTB1 opens.
⊗ ✓	green	**Enable**, the SM module has been enabled.

Reset This is performed by a repeat enable operation. A positive enable slope is required.

4.2 Current operating data

L* All parameters

The values of all axes are listed. Use "**S***" to change the value of any parameter.

L- Set motor-module combination

The following information is listed:

- `EEPROM ID number`
- `Controller: SM..-G16`
- `Motor: SG...`
- `Encoder No. Lines`
- `Thermal Foldback in operation`
- `Thermal Protection enabled!`
- `RS 485 Multidrop Axis Number`
- `Compensator has an Analog Reference`
- `Velocity Filter 2nd Order on PI`

LM **Motor parameter**

All stored motor data and the position of the MCO jumper are listed.

LD **Drive address**

Displays the assigned axis number of the drive.

LV **Software version**

Displays the software version inside the dive.
The software version is likewise visible on the right-hand side of the screen at the beginning of the parameter overview list.

?F **Current faults**

If a fault occurs, the module is switched off and the fault is logged. The command “?F” lists all faults which have occurred since the last enable operation.

?S **Current SM status**

The following information is listed:

- Velocity/torque mode
- Limit switches
- Thermal protection
- Manual/Automatic Mode
- Brake
- Reference filter In
- Observer Velocity

?L **Current limits**

```
Bridge Limit
5.999E 0 [A]
-more-                    – press any key –

Motor Limit
6.498E 0 [A]
-more-                    – press any key –

Max Ilt
5.999E 0 [A]
```

?V Average motor speed

The motor speed is calculated as a mean value from 100 different measured values. This command should only be used if the motor does not accelerate.

```
Wait..
Av. Motor
Velocity
1.05E3 [RPM]
```

?P Resolver zero point

The mechanical position of the zero point varies from motor to motor. It is displayed at an angle of less than 360°.

```
Shaft Angle
7.300E 1 [Deg]
```

?M Motor temperature in [°C]

```
Motor Temp.
< 100 [C]
```

?B Heat sink temperature SM in [°C]

```
Bridge Temp.
3.000E 1 [C]
```

A Anhang

A.1 Sicherheitshinweise

A.1.1 Dansk

Farehenvisninger i håndbogen.

Følg sikkerhedshenvisningerne i håndbogen (FARE, ADVARSEL) om farer for liv og helbred og forebyggelse af materielle skader, såvel som de fremhævede informationer om produktet (Bemærk).

Alle sikkerhedshenvisninger har et fortløbende nummer med henvisning til kapitlerne, eksempelvis 1.1. I tillægget finder De de tilhørende oversættelser af disse sikkerhedshenvisninger på alle sprog indenfor EU.

! FARE ! 1.1

Vedligeholdelse og installation af komponenter må kun udføres af kvalificeret personale under overholdelse af de ulykkesforebyggende forskrifter samt installationsforskrifterne (EN 60204-del1, prEN 50178).

! FARE ! 1.2

En fejlfri og sikker brug af produktet, forudsætter formålstjenlig transport, korrekt oplagring, opstilling og montering såvel som en omhyggelig betjening.

! FARE ! 1.3

Før arbejder på effekttilslutningerne skal De afvente afladningstiden (3 minutter) og ubetinget kontrollere, at tilslutningerne er uden spænding !

! FARE ! 1.4

I tilfælde af fejl skal modulet afbrydes fra nettet.
Se foreskreven BTB-ledningsføring !

! FARE ! 1.5

Kontrollér ledningsføringen ud fra maskinproducentens strømskemaer.
Kontrollér NØDSTOP-kæden, før De tænder !

! FARE ! 2.1

Slå kun netspændingen til, når spændingsforsyningen og opstartkoblingen er tilsluttet og testet iht. håndbog nr. 23 !

! FARE ! 2.2

Drevet godkender ingen kommandoer, mens terminalen sender.
I nødstilfælde skal motoren derfor også slås fra via en hardware-kontakt.

! FARE ! 3.1

Slå kun netspændingen til, når spændingsforsyningen og opstartkoblingen er tilsluttet og testet iht. håndbog nr. 23 !

ADVARSEL ! 3.2

Netspændingen på VM må kun tilkobles ved allerede eksisterende 24 V-forsyning.
Er 24 V-forsyningen ikke slået til, kan VM blive beskadiget.

Mellem fra- og tilkobling af netspændingen skal der være en pause på 5 sek.

ADVARSEL ! 3.4

Det skal sikres, at der ikke kan opstå beskadigelser på maskinen gennem den nominelle værdi for frekvensgeneratoren.

ADVARSEL ! 3.5

Uden temperaturovervågning kan motoren ødelægges.
Denne kommando er kun beregnet til testformål og må ikke benyttes !

A.1.2 Deutsch

Gefahrenhinweise im Handbuch

Beachten Sie die im Handbuch enthaltenen Sicherheitshinweise ('GEFAHR', 'ACHTUNG') zu Gefahren für Leben und Gesundheit und zur Vermeidung von Sachschäden, sowie die hervorgehobenen Informationen zum Produkt ('Hinweis').

Alle Sicherheitshinweise haben eine fortlaufende Nummer mit Bezug zu den Kapiteln, z.B. 1.1 . Im Anhang finden Sie die zugehörigen Übersetzungen dieser Sicherheitshinweise in allen Amtssprachen der EU.

! GEFAHR ! 1.1

Warten und Installieren der Komponenten nur durch qualifiziertes Personal unter Beachtung der Unfallverhütungsvorschriften (UVV VBG4, VDE 100, VDE 105) und Installationsvorschriften (EN 60204-Teil1, prEN 50178).

! GEFAHR ! 1.2

Der einwandfreie und sichere Betrieb des Produktes setzt sachgemäßen Transport, sachgerechte Lagerung, Aufstellung und Montage sowie sorgfältige Bedienung voraus.

! GEFAHR ! 1.3

Vor Arbeiten an den Leistungsanschlüssen Entladezeit abwarten (3 Minuten) und unbedingt auf Spannungsfreiheit prüfen!

! GEFAHR ! 1.4

Im Fehlerfall muß das Modul vom Netz getrennt werden. Siehe vorgeschriebene BTB-Verdrahtung!

! GEFAHR ! 1.5

Verdrahtung anhand der Schaltpläne des Maschinenherstellers prüfen. Erst NOT-AUS-Kette überprüfen, dann einschalten!

! GEFAHR ! 2.1

Schalten Sie die Netzspannung nur ein, nachdem Spannungsversorgung und Anlaufschaltung gemäß Handbuch Nr. 23 angeschlossen und geprüft wurden!

! GEFAHR ! 2.2

**Der Antrieb nimmt keine Befehle an, während er an das Terminal sendet.
Im Notfall muß daher auch über einen Hardware-Schalter der Motor abzuschalten sein.**

! GEFAHR ! 3.1

Schalten Sie die Netzspannung nur ein, nachdem Spannungsversorgung und Anlaufschaltung gemäß Handbuch Nr. 23 angeschlossen und geprüft wurden!

ACHTUNG ! 3.2

Die Netzspannung am VM darf nur bei bereits anstehender 24 V-Versorgung eingeschaltet werden. Ist die 24 V-Versorgung nicht eingeschaltet, könnte das VM beschädigt werden.

Zwischen Aus- und Einschalten der Netzspannung muß eine Pause von 5 s eingehalten werden.

ACHTUNG ! 3.3

Die Endschalter der Maschine müssen an die Endschaltereingänge des Antriebs angeschlossen sein, um sicherzustellen, daß bei Erreichen eines Endschalters der Motor stoppt und die entsprechende Drehrichtung gesperrt wird.

ACHTUNG ! 3.4

Es muß sichergestellt sein, daß durch den Sollwert des Frequenzgenerators keine Beschädigungen an der Maschine auftreten können.

ACHTUNG ! 3.5

**Ohne Temperaturüberwachung kann der Motor zerstört werden.
Dieser Befehl ist nur für Prüfzwecke vorgesehen und darf nicht verwendet werden!**

A.1.3 Ελληνικά

Υποδείξεις για πηγές κινδύνου στο Εγχειρίδιο

Προσέξτε τις υποδείξεις ασφαλείας στο Εγχειρίδιο (”ΚΙΝΔΥΝΟΣ”, ”ΠΡΟΣΟΧΗ”) για την πρόληψη κινδύνων για τη ζωή και την υγεία, καθώς και για την αποφυγή υλικών ζημιών, και τις πληροφορίες για το προϊόν (”Υπόδειξη”).

Ολες οι υποδείξεις ασφαλείας έχουν έναν αύξοντα αριθμό που αντιστοιχεί στα επιμέρους κεφάλαια, π.χ. 1.1. Στο παράρτημα βρίσκετε τη μετάφραση αυτών των υποδείξεων ασφαλείας σε όλες τις επίσημες γλώσσες της Ευρωπαϊκής Ενωσης.

! ΚΙΝΔΥΝΟΣ ! 1.1

Η συντήρηση και εγκατάσταση των στοιχείων πρέπει να γίνεται μόνο από ειδικευμένο προσωπικό τηρώντας τις προδιαγραφές πρόληψης ατυχημάτων και τις προδιαγραφές ασφαλείας (EN 60204 Μέρος 1, προEN 50178).

! ΚΙΝΔΥΝΟΣ ! 1.2

Η απρόσκοπτη και ασφαλής λειτουργία του προϊόντος προϋποθέτει σωστή μεταφορά, κατάλληλη αποθήκευση, τοποθέτηση και συναρμολόγηση καθώς και προσεκτικό χειρισμό

! ΚΙΝΔΥΝΟΣ ! 1.3

Πριν από εργασίες σε εισόδους ισχύος περιμένετε τον χρόνο αποφόρτισης (3 λεπτά) και βεβαιωθείτε ότι δεν υπάρχει τάση!

! ΚΙΝΔΥΝΟΣ ! 1.4

Σε περίπτωση λάθους, το στοιχείο πρέπει να απομακρύνεται από το κύκλωμα.
Βλέπε τις προκαθορισμένες καλωδιώσεις BTB!

! ΚΙΝΔΥΝΟΣ ! 1.5

Βεβαιωθείτε ότι η καλωδίωση συμφωνεί με τα διαγράμματα συνδέσεων του κατασκευαστή.
Ελέγξτε την αλυσίδα NOT – AUS και μετά ενεργοποιήστε το κύκλωμα!

! ΚΙΝΔΥΝΟΣ ! 2.1

Ενεργοποιήστε την τάση του κυκλώματος, μόνον όταν είναι συνδεμένες και ελεγμένες,
οι παροχή τάσης και η συνδεσμολογία προώθησης, με βάση το εγχειρίδιο αρ. 23!

! ΚΙΝΔΥΝΟΣ ! 2.2

Ο μηχανισμός προώθησης δεν δέχεται εντολές, όσο αυτός εκπέμπει στο τερματικό.
Στην ανάγκη πρέπει ο κινητήρας να μπορεί να κλείνει, μέσω ενός διακόπτη του υπολογιστή.

! ΚΙΝΔΥΝΟΣ ! 3.1

Ενεργοποιήστε την τάση του κυκλώματος, μόνον όταν είναι συνδεμένες και ελεγμένες, οι παροχή τάσης και η συνδεσμολογία προώθησης, με βάση το εγχειρίδιο αρ. 23!

ΠΡΟΣΟΧΗ ! 3.2

Η τάση στο VM μπορεί να ενεργοποιείται μόνο με μια ήδη υπάρχουσα παροχή 24 V.
Αν η παροχή των 24 V δεν είναι ενεργοποιημένη, τότε υπάρχει κίνδυνος βλάβης του VM.

Μεταξύ απενεργοποίησης και ενεργοποίησης της τάσης, πρέπει να υπάρχει μια παύση 5 δευτερολέπτων.

ΠΡΟΣΟΧΗ ! 3.3

Οι τερματικοί διακόπτες της μηχανής πρέπει να είναι συνδεδεμένοι με τις εισόδους τερματικών διακοπτών του κινητήρα, ώστε να βεβαιωθεί, ότι κατά την προσέγγιση ενός τερματικού διακόπτη ο κινητήρας θα σταματήσει και θα αποκλειστεί η περαιτέρω περιστροφή του κατά την αντίστοιχη διεύθυνση.

ΠΡΟΣΟΧΗ ! 3.4

Βεβαιωθείτε ότι με την αρχική τιμή της γεννήτριας συχνοτήτων,
δεν παρουσιάζονται βλάβες στο μηχάνημα.

ΠΡΟΣΟΧΗ ! 3.5

Χωρίς έλεγχο της θερμοκρασίας, μπορεί να καταστραφεί ο κινητήρας
Αυτή η εντολή προβλέπεται μόνο για λόγους ελέγχου και δεν επιτρέπεται η χρησιμοποίησή της!

A.1.4 Español

Indicaciones de peligro incluidas en el manual

Observe las indicaciones de seguridad incluidas en el manual (PELIGRO, ATENCION) referentes a peligros para la vida y la salud y para prevenir daños materiales, así como las informaciones destacadas sobre el producto (Nota).

Todas las indicaciones de seguridad tienen un número consecutivo con referencia a los capítulos, p. ej. 1.1. En el anexo usted encontrará las traducciones respectivas en todos los idiomas oficiales de la UE.

¡PELIGRO! 1.1

El mantenimiento y la instalación de los componentes sólo serán realizados por personal cualificado y observando las normas para la prevención de accidentes y las instrucciones de instalación (EN 60204-1ª parte, prEN 50178).

¡PELIGRO! 1.2

Para que el producto funcione perfectamente y de forma segura es imprescindible que haya sido transportado, almacenado, instalado y montado de manera adecuada y que se maneje cuidadosamente.

¡PELIGRO! 1.3

Antes de trabajar en las conexiones de cable, ¡espere el tiempo de descarga (3 minutos) y compruebe sin falta si están desenergizadas!

¡PELIGRO! 1.4

En caso de error, hay que separar el módulo de la red.
¡Véase el cableado BTB prescrito!

¡PELIGRO! 1.5

Compruebe el cableado en base a los esquemas eléctricos del fabricante de la máquina.
Antes de conectar, ¡compruebe primero la cadena de DESCONEXION DE EMERGENCIA!

¡PELIGRO! 2.1

Conecte la tensión de red sólo después de haber conectado y comprobado la alimentación de tensión y el circuito de arranque según el manual nº 23.

¡PELIGRO! 2.2

El accionamiento no acepta ninguna orden mientras el terminal transmite. Por tanto, debe ser posible desconectar el motor, en caso de emergencia, también con un interruptor de hardware.

¡PELIGRO! 3.1

Conecte la tensión de red sólo después de haber conectado y comprobado la alimentación de tensión y el circuito de arranque según el manual nº 23.

¡ATENCION! 3.2

La tensión de red en el módulo de alimentación deberá conectarse sólo cuando ya esté aplicada la alimentación de 24 V. Si no está conectada la alimentación de 24 V, podría dañarse el módulo.

Entre la conexión y desconexión debe haber un intervalo de 5 s.

¡ATENCION! 3.3

Los detectores fin de carrera de la m quina deben conectarse a las entradas fin de carrera del servoamplificador, para asegurar una parada del motor y bloqueo del correspondiente sentido de giro una vez alcanzado el fin de carrera.

¡ATENCION! 3.4

Deberá estar asegurado que el valor nominal del generador de frecuencia no pueda provocar ningún deterioro en la máquina.

¡ATENCION! 3.5

Sin control térmico podrá destruirse el motor.
¡Esta orden está prevista únicamente para fines de prueba, y no debe utioizarse!

A.1.5 Français

Indications de danger dans le manuel

Tenez compte des consignes de sécurité contenu es dans le manuel (DANGER, ATTENTION) relatives aux dangers pour la vie et la santé et pour éviter les dommages matériels, ainsi que les informations particulières sur le produit (Remarque).

Toutes les consignes de sécurité ont une numérotation en c ontinu en rapport avec les chapitres, par exemple 1.1. En annexe vous trouverez les traductions correspondantes dans toutes les langues officielles de la CEE.

! DANGER ! 1.1

La maintenance et l'installation des composants doivent uniquement être effectuées par du personnel qualifié et en respect des prescriptions en matière d'accidents de travail et des consignes d'installation (NE 60204 section 1, NE pr 50178).

! DANGER ! 1.2

Le fonctionnement parfait et sûr du prod uit est conditionné par un transport professionnel, un stockage, une implantation et un montage corrects ainsi qu'une manipulation soigneuse.

! DANGER ! 1.3

Avant de procéder à des travaux sur les raccordements de puissance, attendre la fin de la période de décharge (3 minutes) et vérifier absolument l'absence de tension !

! DANGER ! 1.4

En cas d'erreur, le module relié au réseau d'alimentation doit être déconnecté. Tenir compte du câblage BTB prescrit !

! DANGER ! 1.5

Vérifier que le câblage correspond bien aux schémas des connexions fournis par le constructeur de la machine. Avant de mettre l'installation sous tension, vérifier la chaîne d'instructions ARRET D'URGENCE !

! DANGER ! 2.1

Ne raccorder l'installation à la tension du secteur que lorsque l'alimentation en courant et le câblage de démarrage ont été raccordés et contrôlés conformément aux prescriptions spécifiées dans le manuel N° 23 !

! DANGER ! 2.2

L'unité de commande ne reçoit aucune commande lorsqu'elle envoie des données au terminal. C'est pourquoi le moteur doit pouvoir être coupé à l'aide d'un interrupteur en cas d'urgence.

! DANGER ! 3.1

Ne raccorder l'installation à la tension du secteur que lorsque l'alimentation en courant et le câblage de démarrage ont été raccordés et contrôlés conformément aux prescriptions spécifiées dans le manuel N° 23 !

ATTENTION ! 3.2

Le VM ne doit être mis sous tension que si l'alimentation électrique 24 V est déjà connectée. Si l'alimentation 24 V n'est pas connectée, le VM pourrait être endommagé.

Une pause de 5 s doit être observée entre la mise hors tension et la mise sous tension du secteur.

ATTENTION ! 3.3

Les fins de course de la machine doivent être connectés aux entrées 'fin de course' du variateur, afin de s'assurer que le moteur s'arrête dès l'actionnement du fin de course et que le sens de rotation correspondant est verrouillé.

ATTENTION ! 3.4

S'assurer que la valeur de consigne du générateur de fréquences n'entraîne pas d'endommagements de la machine.

ATTENTION ! 3.5

Si un contrôle de la température n'est pas effectué, le moteur peut être endommagé. Cette commande n'est prévue que pour des essais et ne doit pas être utilisée !

A.1.6 Italiano

Indicazioni di pericolo nel manuale

Osservare le indicazioni di sicurezza (PERICOLO, ATTENZIONE) contenute nel manuale relative ai pericoli anche mortali, alla salute e alle misure necessarie per evitare danni all'apparecchio, nonché le informazioni sul prodotto (Nota).

Tutte le indicazioni di sicurezza sono numerate in ordine crescente con riferimento al capitolo, come ad es. 1.1. Nell'appendice è riportata la traduzione corrispondente di tali norme di sicurezza, in tutte le lingue ufficiali dell'Unione Europea.

! PERICOLO ! 1.1

La manutenzione e installazione dei componenti vanno eseguite solamente da personale qualificato, in osservanza delle norme antinfortunistiche e d'installazione (EN 60204, parte 1 - prEN 50178).

! PERICOLO ! 1.2

Questo prodotto può funzionare in modo sicuro e a regola d'arte solamente se il suo trasporto, immagazzinaggio, installazione e montaggio sono avvenuti in modo appropriato e col presupposto di un corretto azionamento.

! PERICOLO ! 1.3

Prima di eseguire operazioni sui collegamenti di potenza attendere un intervallo per la scarica (3 minuti) e controllare sempre la mancanza di tensione!

! PERICOLO ! 1.4

**In caso di errore bisogna separare il modulo dalla rete.
Vedere il cablaggio BTB prescritto!**

! PERICOLO ! 1.5

**Controllare il cablaggio in base agli schemi del costruttore della macchina.
Controllare prima il funzionamento dell'ARRESTO EMERGENZA, e dopo accendere!**

! PERICOLO ! 2.1

Inserire la tensione di rete solo dopo che l'alimentazione ed il circuito d'avviamento sono stati collegati e controllati come riportato nel manuale 23!

! PERICOLO ! 2.2

**L'azionamento non accetta istruzioni mentre trasmette al terminale.
Per questo motivo in casi d'emergenza il motore deve poter essere spento anche con un interruttore hardware.**

! PERICOLO ! 3.1

Inserire la tensione di rete solo dopo che l'alimentazione ed il circuito d'avviamento sono stati collegati e controllati come riportato nel manuale 23!

ATTENZIONE ! 3.2

La tensione di rete del modulo di alimentazione deve essere inserita solo in presenza dell'alimentazione a 24 V. In mancanza dell'alimentazione a 24 V il modulo potrebbe venire danneggiato.

Attendere 5 s tra il disinserimento e l'inserimento della tensione di rete.

ATTENZIONE ! 3.3

I finecorsa della macchina devono essere collegati ai rispettivi ingressi presenti sugli azionamenti, si avra la sicurezza che al raggiungimento di un finecorsa il motore uerra fermato e la relativa direzione di mouimento bloccata.

ATTENZIONE ! 3.4

Bisogna assicurarsi che il valore nominale del generatore di frequenza non possa danneggiare la macchina.

ATTENZIONE ! 3.5

**In mancanza del controllo termico il motore può venire distrutto.
Questo comando è previsto solo per scopi di controllo e non deve essere impiegato!**

A.1.7 Nederlands

Waarschuwingsrichtlijnenwenken in het handboek

Neem de in het handboek vermelde veiligheidsrichtlijnen (GEVAAR, ATTENTIE) voor de gevaren voor leven en gezondheid en ter voorkoming van schade, en de gemarkeerde informatie over het produkt (Tip) in acht.

Alle veiligheidsrichtlijnen hebben een doorlopend nummer met betrekking tot de hoofdstukken, b.v. 1.1. In het aanhangsel vindt u deze veiligheidsrichtlijnen vertaald in alle officiële talen van de EU.

! GEVAAR ! 1.1

Het onderhoud en de installatie van de componenten alleen door opgeleid personeel laten uitvoeren met inachtneming van de voorschriften ter voorkoming van ongevallen en de installatievoorschriften (EN 60204 deel 1, prEN 50178).

! GEVAAR ! 1.2

Het goed en veilig functioneren van het produkt stelt deskundig transport, goede opslag, opstelling en montage en zorgvuldige bediening voorop.

! GEVAAR ! 1.3

Voor werkzaamheden aan aansluiting met spanning, ontladingstijd afwachten (3 minuten) en altijd controleren of de spanning weggenomen is!

! GEVAAR ! 1.4

**In geval van storing moet het moduul van het net genomen worden.
Zie de voorgeschreven BTB-bedrading!**

! GEVAAR ! 1.5

**Controleer de bedrading met behulp van de schakelschema's van de machinefabrikant.
Eerst de NOOD-UIT-keten controleren, dan inschakelen!**

! GEVAAR ! 2.1

Schakel de netspanning pas aan, nadat spanningsverzorging en aanloopschakeling overeenkomstig handboek nr. 23 aangesloten en gecontroleerd werden!

! GEVAAR ! 2.2

De aandrijving neemt geen bevelen aan terwijl ze naar de terminal zendt.
In geval van nood moet de motor via een hardware-schakelaar afgezet kunnen worden.

! GEVAAR ! 3.1

Schakel de netspanning pas aan, nadat spanningsverzorging en aanloopschakeling overeenkomstig handboek nr. 23 aangesloten en gecontroleerd werden!

ATTENTIE ! 3.2

De netspanning aan de VM mag pas ingeschakeld worden als er een 24 V-verzorging voorhanden is. Is de 24 V-verzorging niet ingeschakeld, kan de VM beschadigd worden.

Tussen het in- en uitschakelen van de netspanning moet een pauze van 5 s liggen.

ATTENTIE ! 3.3

De eindschakelaars van de machine dienen aan de einschakelaar-ingangen van de aandrijving aangesloten te zijn, om er zeker van te zijn, dat bij het bereiken van de eindschakelaar de motor stopt en de dienovereenkomstige draairichting wordt geblokkeerd.

ATTENTIE ! 3.4

Er moet voor gezorgd worden dat door de nominale waarde van de frequentiegenerator geen schade aan de machine veroorzaakt wordt.

ATTENTIE ! 3.5

Zonder temperatuurcontrole kan de motor vernietigd worden.
Dat commando is voor tests voorbehouden en mag niet gebruikt worden!

A.1.8 Português

Notas de perigo no manual

Considere as notas de segurança (PERIGO, ATENÇÃO) do manual acerca de perigo de morte e de ferimento e para evitar danos materiais e, considere as informações destacadas sobre o produto (NOTA).

Todas as notas de segurança levam um número corrente que se refere aos capítulos em questão, por ex. 1.1. A tradução das notas em todas as línguas oficiais da CE encontra-se no anexo.

! PERIGO ! 1.1

A instalação e a manutenção devem ser realizadas somente por técnicos qualificados e levando–se em consideração as instruções para prevenção de acidentes e as instruções para instalação (EN 60204 – parte 1, prEN 50178).

! PERIGO ! 1.2

Premissas indispensáveis para o funcionamento impecável e seguro do produto são transporte, armazenamento, instalação e montagem competentes bem como o manejo correcto do mesmo.

! PERIGO ! 1.3

Antes de trabalhar nas conexões do circuito derivado, deverá aguardar o intervalo de descarga (3 minutos) e certificar-se impreterivelmente que o circuito esteja isento de tensão!

! PERIGO ! 1.4

Em caso de erros o módulo deverá ser desligado da alimentação de tensão. Consulte as informações descritas na cablagem BTB!

! PERIGO ! 1.5

Verifique a cablagem conforme o esquema de ligações determinado pelo fabricante da máquina. Primeiro verifique a rede de PARAGEM DE EMERGÊNCIA, e em seguida, poderá ligar!

! PERIGO ! 2.1

Ligue a tensão de rede somente após ter verificado e conectado a alimentação de tensão e o circuito de arranque, conforme o manual nº 23!

! PERIGO ! 2.2

O accionamento não aceitará nenhum comando enquanto estiver a enviar para o terminal. Em situação de emergência, o motor deverá então ser desligado através de um interruptor do hardware.

! PERIGO ! 3.1

Ligue a tensão de rede somente após ter verificado e conectado a alimentação de tensão e o circuito de arranque, conforme o manual nº 23!

ATENÇÃO ! 3.2

A tensão de rede no módulo de alimentação só poderá ser ligada perante uma alimentação de 24 V já existente. Se a alimentação de 24 V não estiver ligada, o módulo de alimentação poderá ser danificado.

Após o desligamento, aguarde 5 segundos antes de voltar a ligar.

ATENÇÃO ! 3.3

As chaves fim de curso da máquina necessitam ser ligadas às ”entradas de fim de curso” do acionamento. Garante-se assim, que na ocorrência da sua atuação, ocorra a parada do motor e o bloqueio da rotação no sentido do fim de curso atuada.

ATENÇÃO ! 3.4

Certifique-se que não poderá ocorrer danos na máquina devido ao valor nominal do gerador de frequências.

ATENÇÃO ! 3.5

O motor poderá ser destruído se não houver monitoração da temperatura.
Este comando serve somente para fins de verificação, e não poderá ser utilizado!

A.1.9 Suomi

Käsikirjan varoitusohjeet

Ota huomioon käsikirjan hengenvaaraa ja terveysriskejä sekä tavaravahinkojen välttämistä koskevat turvallisuusohjeet (’VAARA’, ’HUOMIO’), sekä korostetut tuotetta koskevat tiedot (’Ohje’).

Kaikilla turvallisuusohjeilla on kappaleisiin liittyvä, juokseva numero, esim. 1.1 . Liitteestä löytyvät näiden turvallisuusohjeiden vastaavat käännökset kaikilla virallisilla EU-kielillä.

! VAARA ! 1.1

Komponenttien huollon ja asennuksen saa suorittaa ainoastaan koulutettu henkilökunta tapaturmantorjuntaohjeet ja asennusohjeet huomioon ottaen (EN 60204-osa1, prEN 50178).

! VAARA ! 1.2

Asianmukainen kuljetus, varastointi, sijoitus ja asennus sekä huolellinen käyttöon edellytyksenä tuotteen moitteettomalle ja varmalle toiminnalle.

! VAARA ! 1.3

Ennen teholiitännöissä suoritettavia töitä on odotettava purkautumisajan verran (3 minuuttia) ja ehdottomasti tarkistettava, että osissa ei ole jännitettä!

! VAARA ! 1.4

**Häiriön ilmetessä moduuli on irrotettava verkosta.
Katso määräysten mukainen BTB-johdotus!**

! VAARA ! 1.5

**Tarkista johdotus koneen valmistajan kytkentäkaavioiden mukaan.
Tarkista ensin HÄTÄ-SEIS-ketju, kytke vasta sitten päälle!**

! VAARA ! 2.1

Kytke verkkojännite vasta sitten, kun jännitteen tulo ja käynnistyskytkentä on tarkastettu käsikirjan nro 23 mukaan!

! VAARA ! 2.2

Käyttökoneisto ei ota käskyjä vastaan, kun se lähettää tietoja terminaaliin.
Sen vuoksi moottorin poiskytkennän tulee olla mahdollista myöskin Hardware-kytkimellä.

! VAARA ! 3.1

Kytke verkkojännite päälle vasta kun jännitteentulo ja käynnistyskytkentä on liitetty ja tarkastettu käsikirjan nro 23 mukaisesti!

HUOMIO ! 3.2

Huoltomoduulin verkkojännitteen saa kytkeä päälle ainoastaan, kun 24 V-huoltojännite on jo olemassa. Jos 24 V-jännitettä ei ole vielä kytketty, huoltomoduuli voi vahingoittua.

Verkkojännitteen päälle- ja poiskytkennän välillä täytyy pitää 5 sekunnin mittainen tauko.

HUOMIO ! 3.3

Koneen rajakatkaisijoiden täytyy olla moottorikäyttöjen rajakatkaisijasisäänmenoissa suljettuna, jotta voidaan varmistua, että rajakatkaisija saavutettaessa mootton pysähtyy ja vastaava pyörimissuunta estyy.

HUOMIO ! 3.4

On varmistuttava siitä, että kone ei voi vahingoittua taajuusgeneraattorin ohjearvon kautta.

HUOMIO ! 3.5

Moottori voi tuhoutua ilman lämpötilanvalvontaa.
Tämä käsky on tarkoitettu ainoastaan tarkistuskäyttöä varten, eikä sitä saa käyttää!

A.1.10 Svenska

Anvisning om risker i handboken

Beakta de säkerhetsanvisningar som ingår handboken (”RISKER”, ”OBSERVERA”) över risker för liv och hälsa och hur sakskador undviks, samt de specificerade informationerna över produkten (”Anvisning”).

Alla säkerhetsanvisningarna är numrerade fortlöpande på samma sätt som kapitlen, t. ex. 1.1. I bilagan finns tillhörande översättningar över säkerhetsanvisningen i alla EU-språk.

! FARA ! 1.1

Underhåll och installation av komponenter endast av kvalificerad personal som skall beakta bestämmelserna över olycksfallsförebyggande och bestämmelserna för installation (EN 60204-Teil1, prEN 50178).

! FARA ! 1.2

Produktens perfekta och säkra drift förutsätter sakkunnig transport, riktig lagring, uppställning och montage samt noggrann manövrering.

! FARA ! 1.3

Vänta tills urladdningstiden (3 minuter) har gått innan arbeten genomförs på effektanslutningarna och kontrollera ovillkorligen att maskinen är spänningsfri!

! FARA ! 1.4

I störningsfall måste modulen frånkopplas från el-nätet. Se föreskriven BTB-koppling!

! FARA ! 1.5

Kontrollera att kopplingen överensstämmer med maskintillverkarens kopplingsscheman. Kontrollera först NÖD/FRÅN-kretsen, tillkoppla sedan!

! FARA ! 2.1

Tillkoppla endast nätspänningen efter att spänningsförsörjningen och igångkörningsväxeln har anslutits och kontrollerats enligt handbok nr. 23!

! FARA ! 2.2

**Drivningen mottar inga kommandon när terminalen sänder.
I nödfall måste motorn frånkopplas via en hardware-brytare.**

! FARA ! 3.1

Tillkoppla endast nätspänningen efter att spänningsförsörjningen och igångkörningsväxeln har anslutits och kontrollerats enligt handbok nr. 23!

OBSERVERA ! 3.2

**Nätspänningen hos VM får endast tillkopplas när 24 V-försörjningen redan är tillkopplad.
Om 24 V-försörjningen inte är tillkopplad, kan VM skadas.**

Mellan från- och tillkoppling av nätspänningen skall en paus på 5 sek. ligga.

OBSERVERA ! 3.3

**Maskinens graenslaegesgivare skall anslutas till servodriftens respektive ingång,
för att garantera att motorn stoppas och beordrad rörelse spaerras.**

OBSERVERA ! 3.4

Det skall vara säkerställt, att inga skador kan uppstå på maskinen genom frekvensgeneratorns börvärde.

OBSERVERA ! 3.5

**Utan temperaturövervakning kan motorn förstöras.
Detta kommando är endast avsett för provning och får inte användas!**

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Technische Änderungen vorbehalten

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