STÖBER

POSIDRIVE® FDS 5000

Operation manual

Settings

Interfaces

Communication

V 5.6-S or later

08/2016 **en**

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1 Introduction

Axis management is integrated on the inverters. This offers the following operating modes:

- Single-axis operation:

  An axis configured with POSITool is used on a connected motor.
- Multiple-axis operation:

  Two, three and four axes configured with POSITool are used on a connected motor. The axes can be used sequentially like parameter records on the motor.

This option requires the following system structure.
The system of the 5th generation of STOBER inverters is divided into two ranges, the global and the axis range. The global range includes programming and parameterization that relates to the inverter. This includes the device controller, the setting of peripheral components such as braking resistors, etc. It is also responsible for the administration of the axis range.

The axis range is divided into up to four axes. Each axis contains the programming and parameterization for a motor and is selected from the global range. The axis range contains the motor setting and the application of the motor. The applications are defined by STOBER in so-called applications or can optionally be freely programmed by the user.

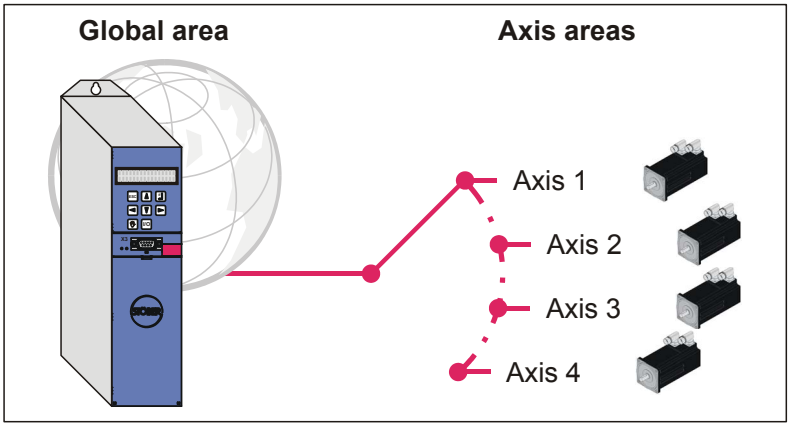

Fig. 1-1Structure of the global and axis range

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1.1 About this manual

This manual provides you with information on the basic operation of the inverter. Here functions in the inverter independent of the standard applications defined by STOBER are explained.

Original version
The original language of this documentation is German.

1.2 Readers

Users who are familiar with the control of drive systems and have a knowledge of commissioning inverter systems are the target group of this manual.

1.3 Further documentation

Manual	Contents	ID
Projecting manual FDS 5000	Installation and connection	442269
Commissioning Instructions FDS 5000	Reinstallation, replacement, function test	442293

You can find the latest document versions at www.stoeber.de.

You can find information on the POSITool software in the following manuals:

Manual	Contents	ID
POSITool operating manual	Information on the basic functions of POSITool	442233
Programming manual	Information on programming with POSITool	441693

You can find the latest document versions at www.stoeber.de.

Note that the programming functionality of POSITool can only be used after training by STOBER. You can find information on training at www.stoeber.de.

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The devices of the 5th generation of STOBER inverters can be optionally connected with different fieldbus systems. The connection is described in the following manuals:

Manuals	ID
PROFIBUS DP operating manual	441687
CANopen operating manual	441686
EtherCAT operating manual	441896
PROFINET operating manual	442340
USS operating manual	441707

You can find the latest document versions at www.stoeber.de.

The accessories of the inverter are documented in the following manuals:

Manual	Product description	ID
ASP 5001 operating manual	Safe technical integration of the inverter in a machine	442181
Operating instructions POSISwitch AX 5000	Sequential switchover between up to four axes	441689
Control box operating manual	Operating device for parameterization and configuration of the inverter.	441479
Operating manual Absolute Encoder Support AES	For buffering the power supply when using the inductive absolute value encoder EnDat 2.2 digital with battery-buffered multiturn power unit, for example EBI1135, EBI135.	442343

You can find the latest document versions at www.stoeber.de.

1.4 Further support

If you have technical questions that are not answered by this document, please contact:
- Phone: +49 7231 582-3060
- E-mail: applications@stoeber.de

If you have questions about the documentation, please contact:
- E-mail: electronics@stoeber.de

If you have questions about training sessions, please contact:
- E-mail: training@stoeber.de

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1.5 Abbreviations

Abbreviations	
AA	Analog output
AES	Absolute Encoder Support
BA	Binary output
BE	Binary input
CAN	Controller Area Network
EMC	Electromagnetic Compatibility
EtherCAT	Ethernet for Control Automation Technology
HTL	High Threshold Logic
IGB	Integrated Bus
MAC	Media Access Control
PE	Protective Earth
PTC	Positive Temperature Coefficient
SPS	Programmable logic controller
SSI	Serial Synchronous Interface
TTL	Transistor-transistor logic

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1.6 Trademarks

POSIDRIVE®, POSIDYN® and POSISwitch® are trademarks of STÖBER ANTRIEBSTECHNIK GmbH & Co. KG.

The following names that are used in conjunction with the device, its optional equipment and its accessories are trademarks or registered trademarks of other companies:

Trademarks	
CANopen®, CiA®	CANopen® and CiA® are registered Community trademarks of CAN in Automation e.V., Nuremberg, Germany.
EnDat®	EnDat® and the EnDat® logo are registered trademarks of Dr. Johannes Heidenhain GmbH, Traunreut, Germany.
EtherCAT®, Safety over EtherCAT®, TwinCAT®	EtherCAT®, Safety over EtherCAT® and TwinCAT® are registered trademarks and patented technologies that are licensed by Beckhoff Automation GmbH, Verl, Germany.
PROFIBUS®, PROFINET®	The PROFIBUS®/PROFINET® logo is a registered trademark of PROFIBUS Nutzerorganisation e. V. Karlsruhe, Germany.

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Products that are registered as trademarks are not specially indicated in this documentation. Existing property rights (patents, trademarks, protection of utility models) are to be observed.

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2 Notes on safety

The devices can represent a source of danger. Therefore observe
- the safety guidelines, technical rules and regulations given in the following sections and the
- Generally applicable technical rules and regulations.

Always read the corresponding documentation as well. STÖBER ANTRIEBSTECHNIK GmbH & Co. KG shall assume no liability for damage resulting from failure to comply with the instruction manual or relevant regulations. This documentation is purely a production description. It does not include any guaranteed features in terms of a warranty right. We reserve the right to make technical changes for the purpose of improving the devices.

2.1 Component part of the product

As this documentation includes important information for the safe and efficient handling of the product, always keep it in the immediate vicinity of the product until product disposal and ensure it can be accessed by qualified personnel at any time.

Also pass on this documentation if the product is handed over or sold to a third party.

2.2 Operation in accordance with its intended use

As defined by DIN EN 50178 (previously VDE 0160), the inverters are electrical equipment operating as power electronics to control the flow of energy in high voltage systems. They are designed exclusively for installation in the control cabinet with at least protection class IP54 and for supplying asynchronous motors. Designated use does not include connecting other electrical loads!

2.3 Risk assessment

Before the manufacturer may bring a machine onto the market, he must conduct a risk assessment according to Machine Directive 06/42/EC. As a result, the risks associated with the use of the machine are determined. The risk assessment is a multi-stage and iterative process. On no account can sufficient insight into the Machine Directive be given as part of this documentation. For this reason, seek detailed information about the norms and legal position. When installing the inverter in machines, commissioning is forbidden until it has been determined that the machine meets the requirements of EC Directive 06/42/EC.

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2.4 Ambient conditions

The inverters are products subject to sales restrictions in accordance with IEC 61800-3. In a residential environment this product may cause high-frequency interference. If this occurs the user may be asked to take suitable measures to reduce it.

The inverters are not designed for use in a public low frequency network that supplies residential areas. High-frequency interference can be expected if the inverters are used in a network of this type. The inverters are designed exclusively for operation in TN networks. The inverters are only suitable for use in supply current networks that are able to provide a maximally symmetrical nominal short circuit current at maximally 480 volts according to the following table:

Size	Max. symmetrical nominal short-circuit current
0 and 1	5,000 A
2	5,000 A
3	10,000 A

Install the inverter in a control cabinet in which the admissible surrounding temperature will not be exceeded.

The following applications are prohibited:
- Use in areas subject to explosion hazard
- Use in environments with harmful substances as specified by EN 60721, for example oils, acids, gases, vapors, dust and radiation
- Use with mechanical vibration and impact loads exceeding the limits specified in the technical data in the projecting manuals

Implementation of the following applications is only permitted after approval is obtained from STOBER:
- Use in non-stationary applications

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2.5 Qualified personnel

Since the devices may harbor residual risks, all configuration, transportation, installation and commissioning tasks including operation and disposal may only be performed by trained personnel who are aware of the possible risks.

Personnel must have the qualifications required for the job. The following table lists examples of occupational qualifications for the jobs:

Activity	Possible occupational qualifications
Transportation and storage	Worker skilled in storage logistics or comparable training
Configuration	- Graduate engineer (electro-technology or electrical power technology) - Technician (m/f) (electro-technology)
Installation and connection	Electronics technician (m/f)
Commissioning (of a standard application)	- Technician (m/f) (electro-technology) - Master electro technician (m/f)
Programming	Graduate engineer (electro-technology or electrical power technology)
Operation	- Technician (m/f) (electro-technology) - Master electro technician (m/f)
Disposal	Electronics technician (m/f)

In addition, the valid regulations, the legal requirements, the reference books, this technical documentation and, in particular, the safety information contained therein must be carefully

- read,
- understood and
- complied with.

2.6 Transportation and storage

Immediately upon receipt, examine the delivery for any transportation damages. Immediately inform the transportation company of any damages. If damages are found, do not commission the product. If the device is not to be installed immediately, store it in a dry, dust-free room. Please see the documentation for how to commission an inverter after it has been in storage for a year or longer.

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2.7 Installation and connection

Installation and connection work are only permitted after the device has been isolated from the power!

The accessory installation instructions allow the following actions during the installation of accessories:
- The housing in the upper slot can be opened.

Opening the housing in another place or for other purposes is not permitted.

Use only copper conductors. For the line cross sections to be used, refer to DIN VDE 0298-4 or DIN EN 60204-1 Appendix D and Appendix G.

The permissible protection class is protective ground. Operation is not permitted unless the protective ground is connected in accordance with the regulations.

Comply with the applicable instructions for installation and commissioning of motor and brakes.

Main equipment grounding markings: The main ground connections are marked "PE" or with the international ground symbol (IEC 60417, Symbol 5019 ⏚).

The motor must have an integrated temperature monitor with basic isolation in acc. with EN 61800-5-1 or external motor overload protection must be used.

Protect the device from falling parts (pieces of wire, leads, metal parts, and so on) during installation or other tasks in the switching cabinet. Parts with conductive properties inside the inverter can cause short circuits or device failure.

2.8 Commissioning, operation and service

Remove the additional covers before commissioning so that the device will not overheat. Note the minimum open areas specified in the projecting manuals during installation to prevent the inverter and its accessories from overheating.

The inverter housing must be closed before you turn on the power supply voltage. When the power supply voltage is turned on, hazardous voltages may be present on the connection terminals and the cables and motor terminals connected to them. Note that the device is not reliably free of voltage simply because all the displays are blank.

The following actions are prohibited while the supply voltage is applied
- Opening the housing
- Connecting or disconnecting connection clamps and
- Installing/removing or attaching/detaching accessories.

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Apply the 5 safety rules in the order stated before performing any work on the machine:
1. Disconnect.
   Also ensure that the auxiliary circuits are disconnected.
2. Protect against being turned on again.
3. Check that voltage is not present.
4. Ground and short circuit.
5. Cover adjacent live parts.

Information
Note that the discharge time of the DC link capacitors is up to 5 minutes. You can only determine the absence of voltage after this time period.

You can carry out work on the inverter later. Repairs may only be performed by STOBER.

Send faulty devices with a fault description to:
STÖBER ANTRIEBSTECHNIK GmbH & Co. KG
Department VS-EL
Kieselbronner Str.12
75177 Pforzheim
GERMANY

2.9 Disposal

Please observe the current national and regional regulations! Dispose of the individual parts separately depending on the quality and currently applicable regulations, e.g. as
- Electronic waste (circuit boards)
- Plastic
- Sheet metal
- Copper
- Aluminum
- Battery

2.10 Residual dangers

The connected motor can be damaged with certain settings of inverters:
- Longer operation against an applied motor halting brake
- Longer operation of self-cooled motors at slow speeds

Drives can reach dangerous excess speeds (e.g., setting of high output frequencies for motors and motor settings which are unsuitable for this). Secure the drive accordingly.

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2.11 Presentation of notes on safety

NOTICE

Notice

means that property damage may occur

▶ if the stated precautionary measures are not taken.

⚠ CAUTION!

Caution

with warning triangle means that minor injury may occur

▶ if the stated precautionary measures are not taken.

⚠ WARNING!

Warning

means that there may be a serious danger of death

▶ if the stated precautionary measures are not taken.

⚠ DANGER!

Danger

means that serious danger of death exists

▶ if the stated precautionary measures are not taken.

Information

refers to important information about the product or serves to emphasize a section in the documentation to which the reader should pay special attention.

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3 Commissioning an inverter

For the solution of a technical drive task, the programming of the inverter system must conform to the sequence of certain device states. They define the state of the power portion and implement functions such as the restart of the drive. The device state can be changed with control commands and internal events.

The 5th generation of STOBER inverters offers you a choice between a standard state machine and a state machine as per DSP 402.You can select the state machines in the Configuration Assistant of the POSITool software.

Information
Please observe the special features when commissioning an inverter with the safety function *Safe Torque Off* (accessory ASP 5001). Read the instructions in the ASP 5001 operating manual; see section 1.3 Further documentation.

3.1 Standard device state machine

Information
The 24-V power for the accessories must be switched on before or at the same time as the voltage supply of the control unit.

To be able to place an inverter in operation with the standard device state of the machine, the following requirements apply:

- You have connected all power supplies.
- You have connected the motor and, if necessary, the encoder, brake and motor temperature sensor in accordance with your machine documentation.
- You use the standard device state of the machine with the default settings in your project.
- You have completed all parameter settings, transferred them to the inverter and saved them.

Proceed as follows:

Placing inverter in operation

1. If available, switch on the 24V supply of the accessory (e.g. LEA 5000).
2. If you are using an inverter with a 24V supply for the control part, switch on the 24V supply (X11).
   ⇨ The device starts. If relay 1 is closed (X1.1, X1.2), the inverter changes to the *1:switchONinh* device state.
3. Switch on the power supply of the power stage (X10).
   ⇨ The DC link capacitors are charged (*E14 = 1:active*).

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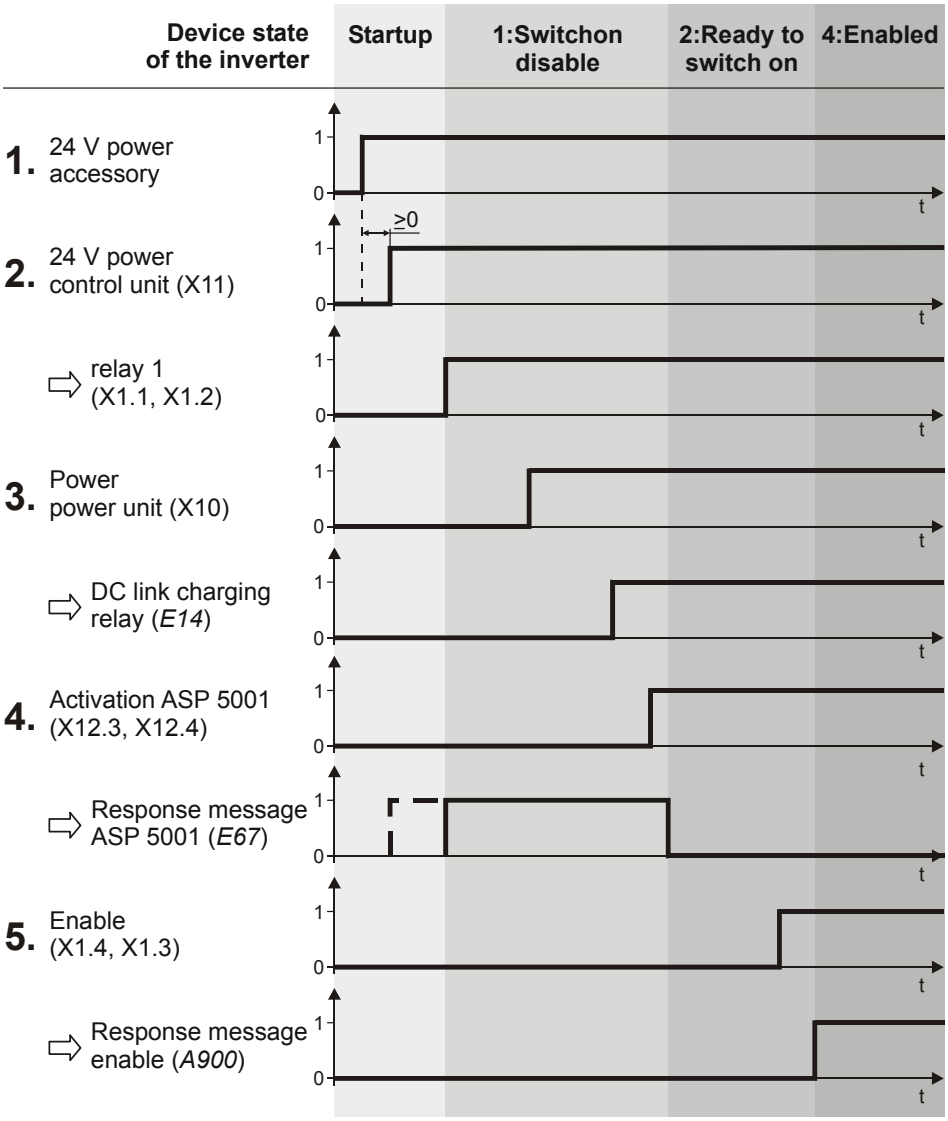
4. If you use safety technology, switch on the controller of the ASP 5001.
   ⇨ The acknowledgement on the ASP 5001 displays that the safety function is not active (*E67* = *0:inactive*). Afterwards the inverter is in the *2:Ready for switch on* device state.
5. Switch on the enable.
   ⇨ The inverter is in the *4:Enabled* device state.

⇨ You have placed the inverter in operation.



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The following eight states exist in the standard device state machine in accordance with the DRIVECOM profile for drive technology.

Display	Designation	Behavior
XDS 5000 V5.X Or ±0Rpm 0.0A 0: Self test	Not ready to switch on	• The electronics are powered. • Self-test is running. • Initialization is running. • Drive function[a)] is disabled. • Ready-for-operation relay is open.
±0Rpm 0.0A 1: ONdisable	Switchon disable	• Software/hardware initialization is finished. • The application was reparameterizedn. • The drive function[1] is disabled. • The ready-for operation relay is closed. • The ASP 5001 option (safe torque off) is active.
±0Rpm 0.0A 2: ReadyforON	Ready to switch on	• The application can be reparameterized. • The drive function[1] is disabled. • The ready-for-operation relay is closed.
±0Rpm 0.0A 3: Switched on	Switched on	• The application can be reparameterized. • The drive function[1] is disabled. • The ready-for-operation relay is closed.
±0Rpm 0.0A 4: Enabled	Operation enabled	• The application can be partially parameterized. • The drive function[1] is enabled. • The ready-for-operation relay is closed.
Fault No.X: type of fault	Fault	• The application can be partially parameterized. • The drive function[1] is disabled. • The ready-for-operation relay is closed.
Fault No.X: type of fault	Fault reaction active	• The application can be reparameterized. • An error-dependent action is being executed (disable drive function or quick stop). • The drive function[1] can be enabled. • The ready-for-operation relay is open.
±0Rpm 0.0A 7: Quick stop	Quick stop active	• The application can be reparameterized. • The quick stop function is being executed. • The drive function[1] is enabled. • The ready-for-operation relay is closed.

a) A disabled drive function means the same as a power part which is switched off and a reset application (e.g., reset ramp generator). This means that the drive is not following the reference value.

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The following Figure 3 1 shows which state changes are possible. The table below shows which conditions apply.

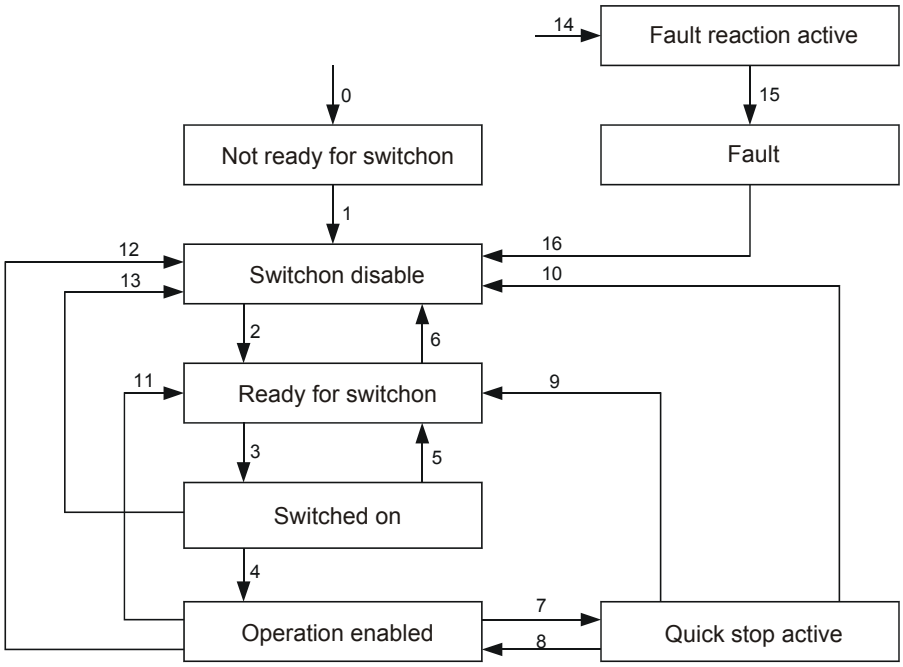

Fig. 3-1: Standard device state machine

Change of state		Conditions
0	Device start-up → Not ready to switch on	Control unit power supply turned on.
1	Not ready to switch on → switch on disable	Self test without errors and initialization completed.
2	Switch on disable → ready to switch on	• Enable on low level (*E19* bit 0 = 0 or *A300* = 0) or for initial start-up autostart active (*A34*). • DC link charged (*E03*). • Option ASP 5001 (Safe Torque Off) is not active (*E67*). • Axis activated (*E84*).
3	Ready to switch on → switched on	Enable on high level (*E19* bit 0 = 1 and *A300* = 1).
4	Switched on → operation enabled	Enable on high level (*E19* bit 0 = 1 and *A300* = 1).
5	Switched on → ready to switch on	Enable on low level (*E19* bit 0 = 0 or *A300* = 0).
6	Ready to switch on → switch on disable	• DC link not loaded (*E03*) or • Option ASP 5001 (Safe Torque Off) is active (*E67*). • Axis deactivated (*E84*).
7	Operation enabled → quick stop active	• Signal *quick stop* on high level (*A302*) or • Enable on low level(*E19* bit 0 = 0 or *A300* = 0) and signal *quick stop with enable off* active (*A44*).

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Change of state		Conditions
8	Quick stop active → operation enabled	Enable on high level (*E19* bit 0 = 1 and *A300* = 1) and signal *quick stop* on low level (*A302*) and quick stop end reached according to parameterization (*A45*).
9	Quick stop active → ready to switch on	Enable on low level (*E19* bit 0 = 0 or *A300* = 0) and quick stop end reached according to parameterization (*A45*). Quick stop is then only regularly moved to end according to *A45* when the quick stop function is active with enable off (*A44*). Quick stop is immediately canceled when the quick stop function is inactive with enable off (*A44*).
10	Quick stop active → switch on disable	Option ASP 5001 (Safe Torque Off) is active (*E67*).
11	Operation enabled → ready to switch on	Enable on low level (*E19* bit 0 = 0 or *A300* = 0) and *quick stop* with enable off inactive (*A44*).
12	Operation enabled → switch on disable	Option ASP 5001 (Safe Torque Off) is active (*E67*).
13	Switched on → switch on disable	• DC link not charged or • Option ASP 5001 (Safe Torque Off) is active (*E67*).
14	All states → fault response active	Fault detected (*E81*).
15	Fault response active → fault	Fault response completed (*E81*).
16	Fault → switch on disable	There is no fault (*E81*) and rising edge of signal *acknowledgment* (*A301*).

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3.2 Device state machine acc. to DSP 402

The device state machine according to DSP 402 has the same states as in the standard device state machine. The following table shows the designation of the states according to DSP 402.

Display[a)]	Designation according to DSP 402
XDS 5000 V5.X Or ±0Rpm 0.0A 0: Self test	Not ready to switch on
±0Rpm 0.0A 1: ONdisable	Switch on disabled
±0Rpm 0.0A 2: ReadyforON	Ready to switch on
±0Rpm 0.0A 3: Switched on	Switched on
±0Rpm 0.0A 4: Enabled	Operation enabled
Fault No.X: type of fault (2nd line flashing)	Fault Fault reaction active
±0Rpm 0.0A 7: Quick stop	Quick stop active

a) The display of the device states may be different to the form shown depending on the applications.

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The device state machine must receive certain commands for a change in state. The commands are bit combinations in the DSP 402 control word (parameter *A576 Controlword*). The table shows the states of the bits in parameter *A576* and their combination for the commands (the bits marked with X are irrelevant).

Command	Bit of the control word (*A576 control word*)				
	Bit 7	Bit 3	Bit 2	Bit 1	Bit 0
	Fault reset	Enable operation	Quick stop	Enable voltage	Switch on
Shutdown	0	X	1	1	0
Switch on	0	0	1	1	1
Disable voltage	0	X	X	0	X
Quick stop	0	X	0	1	X
Disable operation	0	0	1	1	1
Enable operation	0	1	1	1	1
Fault reset	pos. edge	X	X	X	X

The difference between the standard device state machine is the possible state changes and the conditions for the changes. Fig. 3-2 : State machine as per DSP 402shows the possible changes in state.

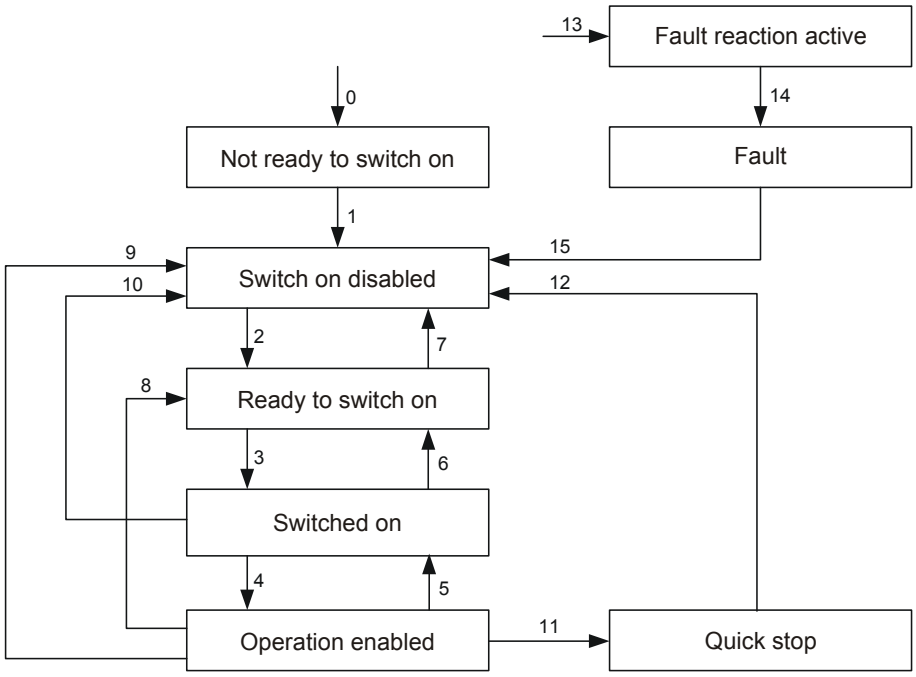

Fig. 3-2: State machine as per DSP 402

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The following table lists the conditions for changes in the state machine.

Change in State		Conditions
0	Device startup → Not ready for switchon	Control power section switched on.
1	Not ready for switchon → Switchon disable	Self-test without errors and initialization concluded.
2	Switchon disable → Ready for switchon	Enable on high level (*E19* Bit 0 = 1) and command Shutdown (*A576*) and the ASP 5001 option (safe torque off) is not active (*E67*).
3	Ready for switchon → Switched on	Enable on high level (*E19* Bit 0 = 1) and command Switch on (*A576*).
4	Switched on → Operation enabled	Enable on high level (*E19* Bit 0 = 1) and command Enable operation (*A576*).
5	Operation enabled → Switched on	Enable on high level (*E19* Bit 0 = 1) and command Disable operation (*A576*).
6	Switched on → Ready for switchon	Enable on high level (*E19* Bit 0 = 1) and command Shutdown (*A576*).
7	Ready for switchon → Switchon disable	• Enable on low level (*E19* Bit 0 = 0) or • Command Quick stop (*A576*) or • Command Disable voltage (*A576*) or • The ASP 5001 option (safe torque off) is active (*E67*).
8	Operation enabled → Ready for switchon	Command Shutdown (*A576*).
9	Operation enabled → Switchon disable	• Enable on low level (*E19* Bit 0 = 0) or • Command Disable voltage (*A576*) or • The ASP 5001 option (safe torque off) is active (*E67*).
10	Switched on → Switchon disable	• Enable on low level (*E19* Bit 0 = 0) or • Command Quick stop (*A576*) or • Command Disable voltage (*A576*) or • The ASP 5001 option (safe torque off) is active (*E67*).
11	Operation enabled → Quick stop	Command Quick stop (*A576*).
12	Quick stop → Switchon disable	• Quick stop finished or • Command Disable Voltage (*A576*).
13	All states → Fault reaction active	Fault detected.
14	Fault reaction active → Fault	Fault reaction concluded.
15	Fault → Switchon disable	Command Fault Reset (positive edge) (*A576*).

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4 Parameterize

The user interfaces of the 5th generation of STOBER inverters consist of several elements with different functionalities (see figure).

To program a device system of the 5th generation of STOBER inverters, the user needs the POSITool software. With the POSITool software, either an application defined by STOBER or the option of a freely programmed application can be used. POSITool provides a parameter list with which the application can be adjusted. The software also has comprehensive diagnostic functions.

Parameters can also be changed via the operator panel on the front of the inverter. It consists of a keyboard for calling the menu functions and the display for indication. When appropriately programmed, the keyboard can be used to implement functions such as manual operation or tipping. Response messages on the device status are shown by the LEDs on the front.The display provides detailed information.

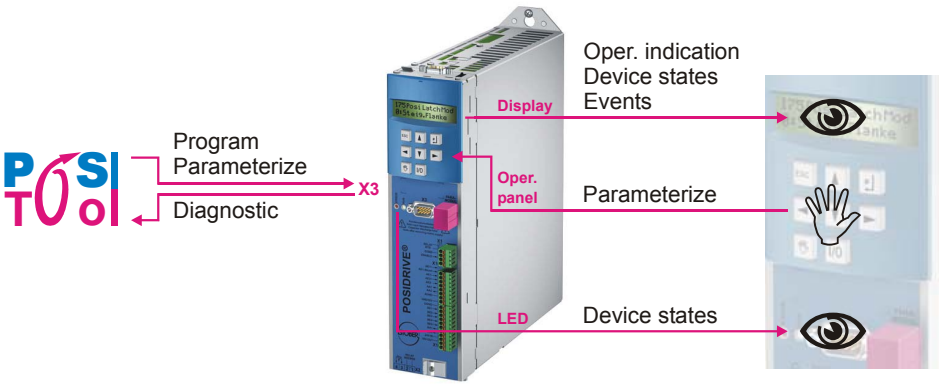

Fig. 4-1: User interface

4.1 Parameters

Parameters perform various tasks in the inverter system:

- Adjust the application to external conditions (e.g., the motor type)
- Indicate the values (e.g. current speed or the torque).
- Trigger actions (e.g., "save values" or "phase test"

Parameters are allocated to the global area or the axis area.

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4.1.1 Structure

The parameter structure is set up as shown in the adjacent example::
The axis code identifies an axis parameter when it is shown mixed with global parameters.
The group divides the parameters into functional characteristics.
The line distinguishes the individual parameters in a group.
The element subdivides a parameter (subfunctions).

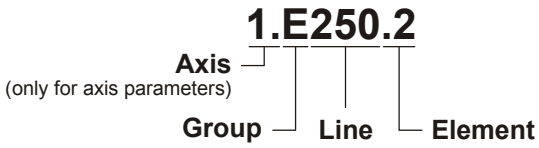

Fig. 4-2: Parameter structure

The individual subject areas of the parameter groups are listed in the table below:

Parameter group	Subject area / dependency
A.. Inverter	Inverter, bus, cycle time
B.. Motor	Motor
C.. Machine	Speed, torque
D.. Reference value	Speed ref. values, reference value generator
E.. Display value	Indication for device and application
F.. Control interface	Analog inputs / outputs, binary inputs / outputs, brake
G.. Technology	Depends on the application (e.g., synchronous running)
H.. Encoder	Encoder
I.. Positioning	Only with positioning applications
J.. Process blocks	Only with positioning application motion block positioning
L.. PLCopen reference values	Only with positioning application PLCopen
N.. Posi.switches	Only with positioning applications
P.. Customer-specific parameters	Only with "free, graphic programming" option
Q.. Customer-specific parameters, dependent on instance	Only with "free, graphic programming" option
R.. Production data[a)]	Production data of inverter
T.. Scope	Scope parameters
U.. Protection functions	Parameterizing the results
Z.. Fault counter	Fault counter of events; In POSITool only visible during online operation

a) Only visible in POSITool during online operation.

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4.1.2 Data types

Name	Abbrev. Name	Description	Value Range
Boolean	B	1 bit (internal: LSB in 1 byte)	0 ... 1
Unsigned 8	U8	1 byte, without sign	0 ... 255
Integer 8	I8	1 byte, with sign	-128 ... 127
Unsigned 16	U16	2 bytes - 1 word, without sign	0 ... 65535
Integer 16	I16	2 bytes - 1 word, with sign	-32768 ... 32767
Unsigned 32	U32	4 bytes - 1 douple word, without sign	0 ... 4294967295
Integer 32	I32	4 bytes - 1 douple word, with sign	-2147483648 ... 2147483647
Float	R32	Floating decimal, simple accuracy	in acc. with ANSI / IEEE 754
Double	R64	Floating decimal, double accuracy	
String 8	STR8	Text, 8 characters	
String 16	STR16	Text, 16 characters	
Posi 64	P64	32 bits, increments	-2147483648 ... 2147483647
		32 bits, rest	0 ... 2147483647

4.1.3 Parameter list structure

To address parameters via the fieldbus, the following information is important:
- Value range
- Scaling via fieldbus if this differs form the scaling via POSITool.
- Rounding errors via fieldbus, if present.
- Data type

They are specified in the parameter table in the application description.

The fieldbus addresses are specified as hexadecimal numbers. For CANopen and EtherCAT, the index and subindex can be transferred directly. For PROFIBUS DP-V1 and PROFINET, index = PNU and subindex = index. Further details are in the documentation for the fieldbus interface connection, see section1.3 Further documentation.

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4.2 POSITool

The versatile interface between user and inverter is the POSITool software. It offers various possibilities for the configuration of an inverter.

POSITool has an interface to represent programming. In the “free graphic programming” option, blocks are linked and as a result a control sequence is realized.

STOBER also provides predefined applications for programming. This includes applications such as fast reference value application and command positioning that are selected using a wizard.

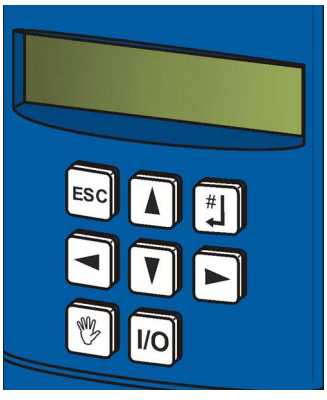
POSITool provides the user with parameter lists for parameterization. Using the lists, the control sequence is adapted to external conditions such as motor type, rotary encoder or bus systems. Limit values such as maximum speed are also defined or display values such as the current speed are shown.

The program and parameters are transferred to the inverter via a serial interface (RS232). Afterwards it starts processing. Here the user can observe the parameters via the serial connection. A scope function is available to record the different values over time for use in further diagnostics.

More details about the use of POSITool can be found in the corresponding section of the POSITool operating manual or programming manual (see section 1.3 Further documentation).

4.3 Operator panel

The operator panel is used for monitoring and changing parameter values. The operator panel consists of a two-line display with 16 characters each and a keyboard. The keyboard has six keys for menu prompting and two keys for local operation.



ESC	Jumps back to operator level. Resets parameter value.
#	Enter key: Opens the menu level, menu groups and the parameters. Accepts a changed parameter value.
▲ ▼	Selects a parameter in the menu group. During entry, increases/decreases the parameter value (positive/negative).
◄ ►	Selects the menu group. During entry, changes the decade (ones, tens, hundreds, etc.).
	Activates/deactivates local mode (if programmed). In local mode, deactivation also deletes the enable.
I/O	Enable for local mode I/O (if programmed).

Tab. 4-1: Operator panel

WE KEEP THINGS MOVING

The parameter menu of the inverter is divided into menu groups. The menu groups are arranged in alphabetical order, beginning with the group A.. Inverter, B.. Motor, C.. Machine, and so on. Each menu group contains a list of parameters which are identified by the letter of the group and a consecutive number such as *A00*, *A01*, *A02*, etc. To change a parameter, proceed as shown below. Use the Enter key [#↵] to go from the operation indicators to the menu level.

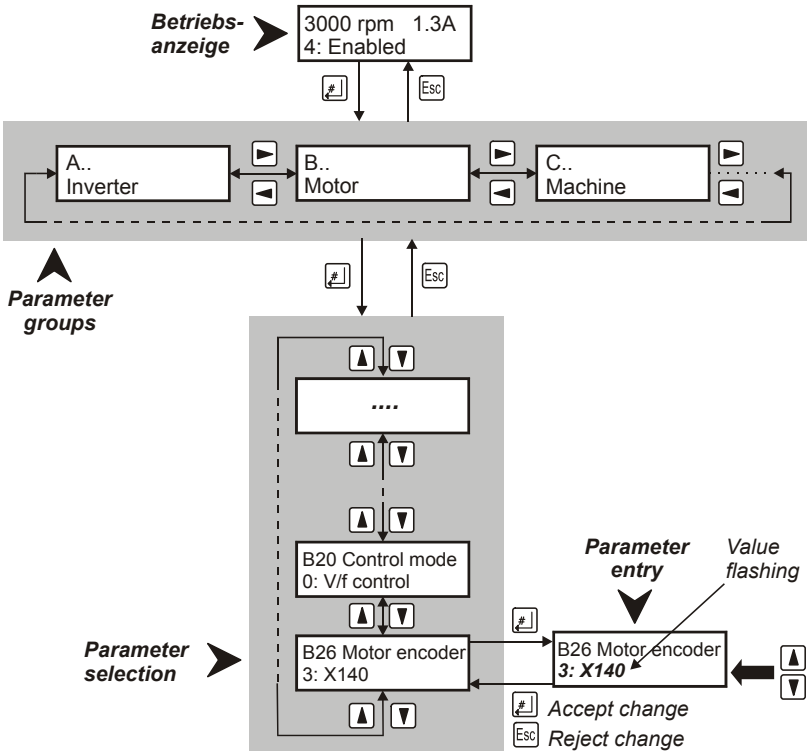


Fig. 4-3: Menu structure

The menu groups are selected with the arrow keys [◄] [►] and activated with [#↵]. Use the [▲] [▼] keys to select the desired parameter within the menu group. You can switch back and forth between the elements in an array parameter with the [◄] [►] keys. A parameter is then activated for change with [#↵]. The value flashes to indicate that it can be changed with [▲] [▼] . The [◄] [►] keys can be used to select which decade (ones, tens, hundreds, and so on) is to be adjusted. The value is then accepted with the [#↵] key or reset with the [ESC] key. Use the [ESC] key to access a higher menu level. To save safe from power failure, all changes must be stored with the *A00 save values = 1:active*!

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5 Parameterizing motor data

Specifications and control mode must be given so that the motors can be controlled correctly. There are several ways to enter the motor data:

- Selection of a STOBER standard motor in the configuration assistant.
- Direct entry in the parameter lists for motors from other manufacturers or special motors.

Information
Refer to the inverter's projecting manual of the inverter for information on connection, see section 1.3 Further documentation.

Information
The number of parameters displayed on the inverter and in the POSITool depends on the access level set in the parameters. The access level in the inverter can be set in the parameter *A10* and in POSITool in Tools/Change access level.

WE KEEP THINGS MOVING

5.1 Selection in the configuration assistant

Information
In control type *0:V/f-control*, no current or torque limitation occurs. Also connection to a rotating motor is not possible (capture).

Proceed as shown below to select a STOBER standard motor in the configuration assistant:

Selecting the motor in the configuration assistant

1. Open the configuration assistant in POSITool.
2. Proceed up to step 5 motor selection.
3. Select your required motor from the list of motors (e.g. asynchronous motor 112 M Y 4 kW).
4. Close the assistant.
5. In POSITool select the parameter list and in parameter *B20* enter the necessary control mode (e.g. *1:Sensorless vector control*).
6. Go online and transfer the settings to the inverter.
7. Save the settings with *A00 Save values*.

⇨ The motor data and the control mode are correctly entered.

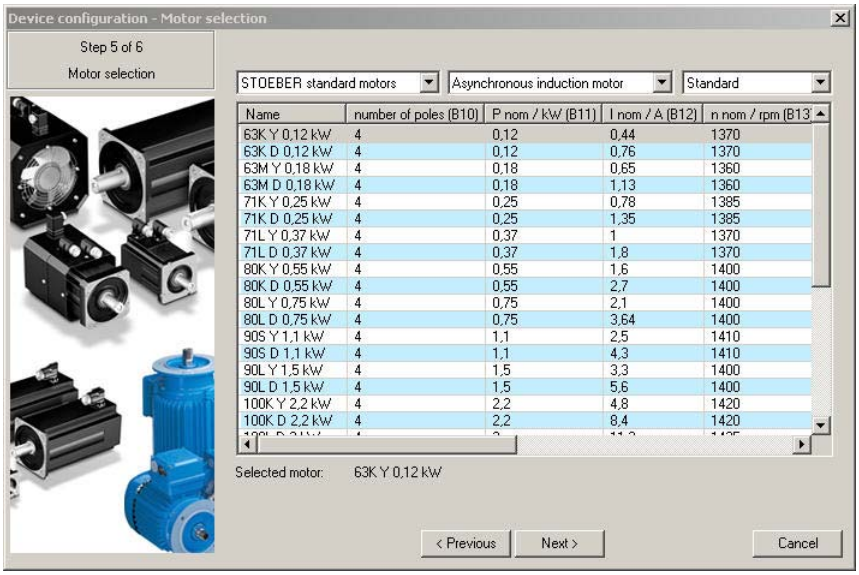


Fig. 5-1: Motor selection in Step 5 of the configuration assistant

WE KEEP THINGS MOVING

5.2 Direct entry in the parameters

The specifications of motors which do not have an electronic nameplate and cannot be selected in the configuration assistant must be entered in the parameter list (e.g. motors of other manufacturers and special motors). Depending on the motor type and the type of control, different parameters must sometimes be used.

Information
In control type *0:V/f-control*, no current or torque limitation occurs. Also connection to a rotating motor is not possible (capture).

Direct entry of the motor data

1. Call up the configuration wizard in POSITool.
2. Continue up to step 5 motor selection.
3. Select a motor similar to your motor from the list of motors.
4. Close the assistant.
5. In POSITool select the parameter list.
6. Set the required control type in *B20 Control type*.
7. Enter in *B06 Motor data 1: User defined*.
8. Now edit the following parameters*:*
   - *B02 EMC constant* (only for servo motors)
   - *B05 commutation offset* (only for servo motors)
   - *B10 Motor pole*
   - *B11 Nominal motor output*
   - *B12 Nominal motor current*
   - *B13 Nominal motor speed*
   - *B14 Nominal motor voltage* (only for asynchronous motors)
   - *B15 Nominal motor frequency* (only for asynchronous motors)
   - *B16 cos phi* (only for asynchronous motors)
   - *B17 M0* (only for servo motors)
   - *B52 Stator inductance*
   - *B53 Stator resistance*
   - *B54 Leakage factor* (only for asynchronous motors)
   - *B55 Magnetic saturation coefficient* (only for asynchronous motors)
   - *B62 Moment of inertia*
   - *B73 Stat. friction moment* and
   - *B74 Dyn. friction moment* for an optimized i^2t-model
9. In parameter *B00 motor type*, you can also enter the type designation (max. 16 characters).
10. Go online and transfer the settings to the inverter.
11. Save the settings with *A00 Save values*.

⇨ The motor data and control type are correctly entered.

WE KEEP THINGS MOVING

The following actions will make it easier for you to enter parameters:

- You can calibrate the parameter *B05 Commutation-offset* with the aid of the action *B40 Phase test*.
- The parameters *B52* to *B55* can be determined using action *B41 Autotune motor*.
- The current controller can be adapted using the action *B42 Activate current controller*.

The actions are described in section 12.5 Actions.

5.3 Further motor datas

Information
Since parameters in the parameter lists and assistant are indicated or hidden based on how *B20* is set, all parameters are not always visible for each setting.

5.3.1 Current controller

The parameters *B64* to *B68* are important for the setting of the current controller. If an initial test does not provide the desired running result with the default setting in the parameters, current controller optimization is recommended. It is performed with the action *B42 Optimize current controller*. Now save the measured values with *A00 Save values*.

5.3.2 Thermal model

The parameters *B70*, *B71* and *B72* describe a motor model for the protection of the motor. The default values are usually sufficient.

5.3.3 Absolute Limit values

The parameters *B82 I-max* and *B83 n-max motor* are limit values which may never be exceeded.

WE KEEP THINGS MOVING

5.4 Parameterize the SLVC-HP control mode

The encoderless control type SLVC-HP is available for AC motors. Activate this control mode with *B20* = 3:*SLVC-HP*.

Areas of application for the SLVC-HP are drives with
- high accelerations,
- changing loads and
- large loads when the motor starts up.

The parameters *B46*, *B47* and *B48* are optimized during commissioning of the SLVC-HP control mode. You can perform this automatically with the action *Optimize B45 SLVC-HP* see section 12.5.2.5 Optimize B45 SLVC-HP.

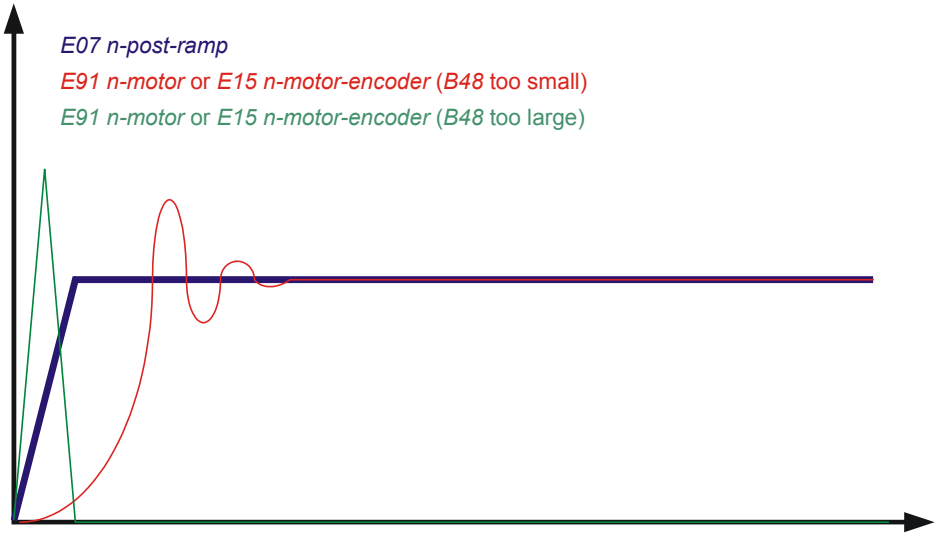
If action *B45* can not be performed, note the following description for a manual setting.

The quality of control of the SLVC-HP control mode also depends on how exact the values *B52 stator inductance*, *B53 stator resistance* and *B54 leakage factor* are. For external motors, you can use the action *B41* to optimize these parameters, s. section 12.5.2.2 B41 Autotuning.

Set ***B48 Integral gain SLVC-HP***
This parameter affects the dynamic properties of the motor. The larger *B48* is, the faster the motor model can follow the actual speed.

The correct setting can be checked by means of the speed curve. If an encoder is present during commissioning, *E15 n-motor encoder* should be considered, otherwise *E91*.

If the motor can not follow the set speed ramp despite sufficiently large torque limits, *B48* must be increased. Values that are too large lead to the fault *56:Overspeed*.



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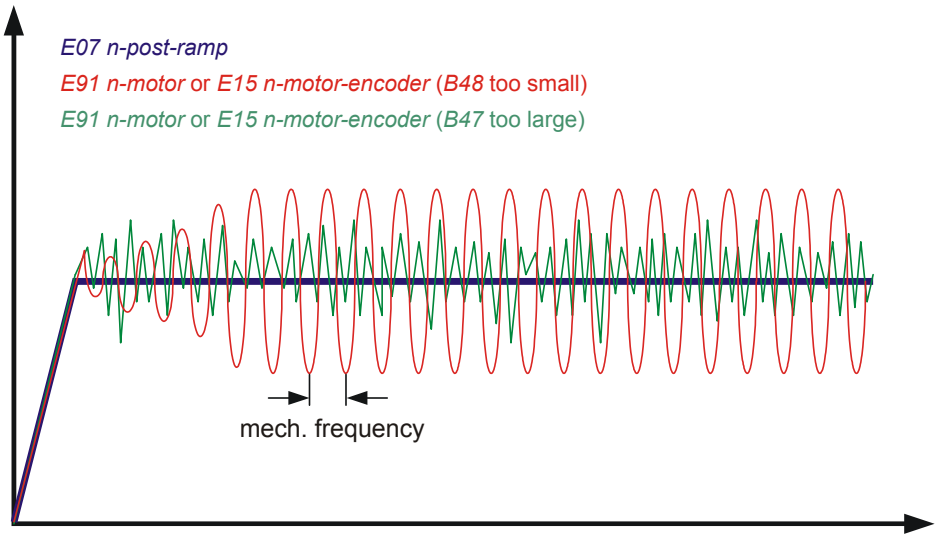
Set ***B47 Proportional gain SLVC-HP***
This parameter affects the dynamic properties of the motor (especially the stability and overshoot behavior of the speed).

The correct setting can be checked by means of the speed curve. If an encoder is present during commissioning, *E15* should be considered as the actual speed, otherwise *E91*. *B47* should not be smaller than 1 % of *B48*. The drive can become unstable for values that are too small. The resulting vibration oscillates at the mechanical frequency. By increasing *B47*, overshoots in the speed can be dampened. Values that are too large lead to vibrations in the current and speed.



***Set* B46 Feedback ASM Observer**
This parameter affects the accuracy of control type SLVC-HP. For values that are too large or too high, the stationary difference between the reference and actual speed increases. The amount of feedback is an option for reporting to the ASM observer how exact the machine constants *B54 leakage factor*, *B52 stator inductance* and *B53 stator winding resistance* were determined. The smaller the feedback selected, the more the ASM observer depends on these constants.

WE KEEP THINGS MOVING

5.5 Parameterize motor temperature sensor evaluation

Information
Note that evaluation of the temperature sensors is always active. If operation without temperature sensor is permitted, the connections must be bridged on X2. Otherwise a fault will be triggered when the device is switched on.

Information
Note that the evaluation of a Pt1000 is only possible from firmware V 5.6-S. Before using a Pt or KTY sensor, note that motor protection is not ensured to the same extent as when monitoring with PTC triplet.

Connect the motor temperature sensor at terminal X2.

Motor temperature sensor connection
Motor windings are monitored thermally using the motor temperature sensors such as PTC thermistors, KTY temperature sensors or Pt temperature sensors.

PTC thermistors are thermistors whose resistance changes significantly with the temperature. When a PTC reaches its defined nominal response temperature, the resistance increases dramatically, by twice or more the original resistance to several kOhms. As PTC triplets are used, one thermistor monitors each phase of the motor winding. With 3 thermistors, all 3 phases are monitored which brings about effective motor protection.

On the other hand, KTY or Pt temperature sensors are temperature sensors with characteristic resistance curves that follow the temperature linearly. They therefore allow for analog measurements of motor temperatures. However, the measurements are limited to one phase of the motor winding, which also restricts motor protection considerably compared with PTC triplets.

In the *B38 Motor temperature sensor* parameter, set whether you will evaluate a PTC triplet, a KTY 84-1xx or a Pt1000.

B38 = 0:PTC
B38 = 1:KTY 84-1xx
B38 = 2:Pt1000

In *B39 maximum motor temperature*, set the maximum permitted temperature of the motor. If this is reached, the *41:TempMotorTMP* fault is triggered.

The motor temperature measured by the KTY or Pt1000 is displayed in *E12 Motor temperature*.

WE KEEP THINGS MOVING

6 Parameterizing encoder data

The following paragraphs explain the settings for commissioning encoder systems with POSITool. We assume that an encoder system and the appropriate interface have already been chosen for your drive. The settings for the simulation of encoder signals is not described in this chapter.

Various encoder interfaces are provided on the MDS 5000 or SDS 5000. The interfaces must be selected in the parameter *B26 Motor encoder*. Interface X4 which is the interface integrated in the basic system is entered as the default setting. The motor encoder can also be deactivated or set to another interface.

Information
Refer to the inverter's projecting manual of the inverter for information on connection, see section 1.3 Further documentation.

6.1 Deactivating the motor encoders

Select *B26=0:inactive* when an asynchronous motor without speed feedback is to be used (*B20=0:V/f-control* or *1:Sensorless vector control*). This setting is not permitted when servo motors or vector control are used.

6.2 Interface X4

You can evaluate the following encoders on X4:
- Incremental encoder HTL
- Incremental encoder TTL

Parameterize interface X4

1. From the parameter list, select the parameter *B26*.
2. In *B26*, set *2:X4-encoder*.
3. Open group H.. in the parameter list...
4. In *H00*, set the encoder system which you want to run on X4.
5. Set *H01* and *H02* in accordance with the connected encoder.
6. Transfer the settings to the inverter and save them.
7. Switch the inverter off and back on again.

⇨ You have parameterized the X4 interface.

WE KEEP THINGS MOVING

6.3 Connection X101 (binary input encoder)

You can connect the following encoders to X101:
- Incremental encoder HTL
- Pulse train

NOTICE

If a BE encoder is used, the binary inputs BE3, BE4 and BE5 may not be used for any other function in the application.

BE encoder

1. Select the parameter *B26* in the parameter list.
2. Set to *B26 = 1:BE encoder*.
3. Select in *H40* whether you connect stepper motor signals or an incremental encoder HTL.
4. Make additional parameterizations in *H41* and *H42*.
5. Transfer the settings to the inverter and save them.
6. Switch the inverter off and back on again.

⇨ You have parameterized the BE encoder.

WE KEEP THINGS MOVING

7 Parameterizing brake data

Motors with holding brakes can be connected to the devices oft the 5th generation of STOBER inverters. There are two ways to activate the brake. A brake control is integrated in the following applications:

- Fast reference value with brake activation
- Comfort reference value
- Technology controller
- Command positioning (endless and limited position range)
- Synchronous command positioning (endless and limited position range)
- Motion block positioning (endless and limited position range)
- Electronic cam (endless and limited position range)

You can activate the brake control in parameter *F08*. Further adjustments are made depending on the selected control mode.

In addition, a signal source can be parameterized in *F100*. The signal for releasing the brake can be given direct via the source. *F100* is a global parameter and is available in every application.

If *F08* is set to *0:inactive*, the brake is activated together with system enable *A900*. In this case, the brake release times and brake application times are ignored.

In the *F08 = 1:active* setting, the current motor torque is saved when the brake is applied. This torque is applied again when the brake is released. If *F08* is set to *2:Do not save torque*, only the motor magnetization is established when the brake is released.

As the brake controller parameterization depends on the selected control mode, the following sections are subdivided accordingly.

WE KEEP THINGS MOVING

7.1 B20 = 0:V/f-control

Proceed as follows for parameterization:

Parameterize the brake control for *B20 = 0:V/F controller*

1. Activate the brake control in parameter *F08*.
2. Enter the speed when the brake should be set in *F02*.
3. Enter the speed when the brake should be released in *F01*.
4. Enter the time that the brake requires to be set in *F07*.
5. Enter the time that the brake requires to be released in *F06*.
6. Transfer the parameters to the inverter and save them in it.
7. Switch the inverter off and back on again.

⇨ You have now parameterized the brake control.

You can make these settings with the *General settings* assistant on the *Holding brake* page:

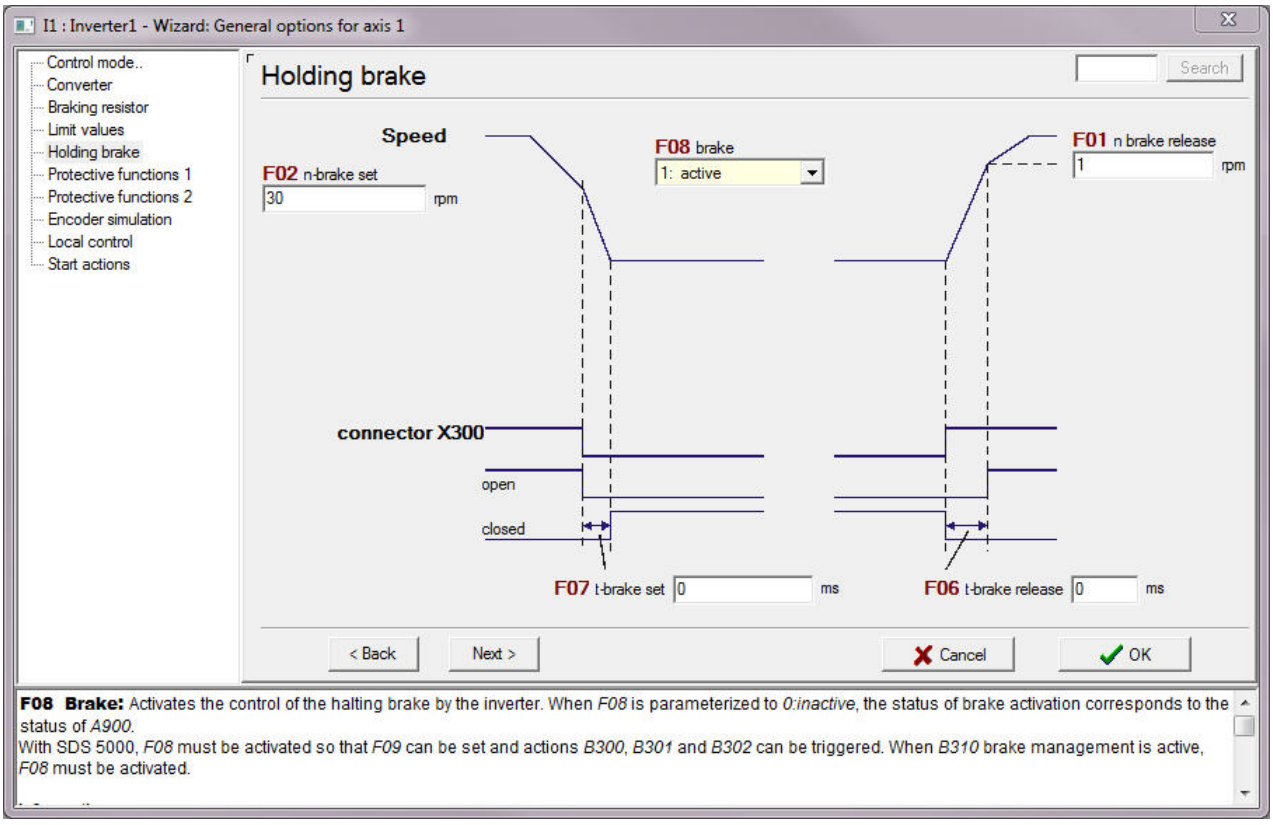


Fig. 7-1: *General settings* assistant, *Holding brake* page

WE KEEP THINGS MOVING

7.2 B20 = 1:Sensorless vector control

To parameterize, proceed as shown below:

Parameterize brake control for *B20 = 1:sensorless Vector control*

1. Activate brake activation in parameter *F08*.
2. In *F02*, enter the speed at which the brake is to be applied.
3. In *F01*, enter the speed at which the brake is to be released.
4. In *B27*, enter the time during which the motor is to remain magnetized after the braking process is triggered.
5. In *B25*, enter the percentage of the halt flux which is to be maintained after the time entered in *B27*.
6. In *F07*, enter the time that the brake takes to be applied.
7. In *F06*, enter the time that the brake takes to be released.
8. Transfer the parameters to the inverter and save them there.
9. Turn the inverter off and on again.

⇨ You have parameterized brake activation.

You can make these settings with the *General options* assistant on the *Holding brake* page:

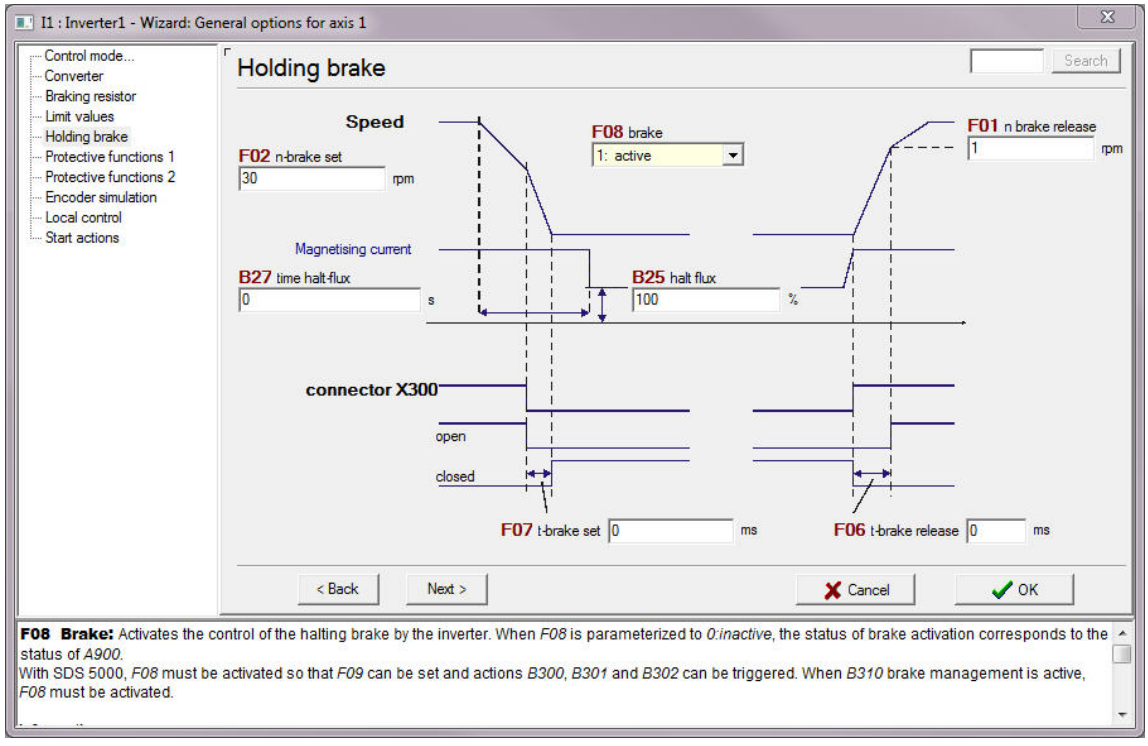


Fig. 7-2: *General options* assistant, *Holding brake* page

WE KEEP THINGS MOVING

7.3 B20 = 3:SLVC-HP

Proceed as follows for parameterization:

Parameterize the brake control for *B20 = 3:SLVC-HP*

1. Activate the brake control in parameter *F08*.
2. Enter the speed when the brake should be set in *F02*.
3. Enter the speed when the brake should be released in *F01*.
4. Enter the time for which the motor should remain magnetized after triggering the braking procedure in *B27*.
5. In *B25*, enter the percentage of halt flux that should remain after the time in *B27*.
6. Enter the time that the brake requires to be set in *F07*.
7. Enter the time that the brake requires to be released in *F06*.
8. Transfer the parameters to the inverter and save them in it.
9. Switch the inverter off and back on again.

⇨ You have now parameterized the brake control.

WE KEEP THINGS MOVING

7.4 B20 = 2:Vector control

Proceed as follows for parameterization:

Parameterize the brake control for *B20 = 2:vector control*

1. Activate the brake control in parameter *F08*.
2. Enter the time for which the motor should remain magnetized after triggering the braking procedure in *B27*.
3. In *B25*, enter the percentage of halt flux that should remain after the time in *B27*.
4. Enter the time that the brake requires to be set in *F07*.
5. Enter the time that the brake requires to be released in *F06*.
6. Transfer the parameters to the inverter and save them in it.
7. Switch the inverter off and back on again.

⇨ You have now parameterized the brake control.

You can make these settings with the *General settings* assistant on the *Holding brake* page:

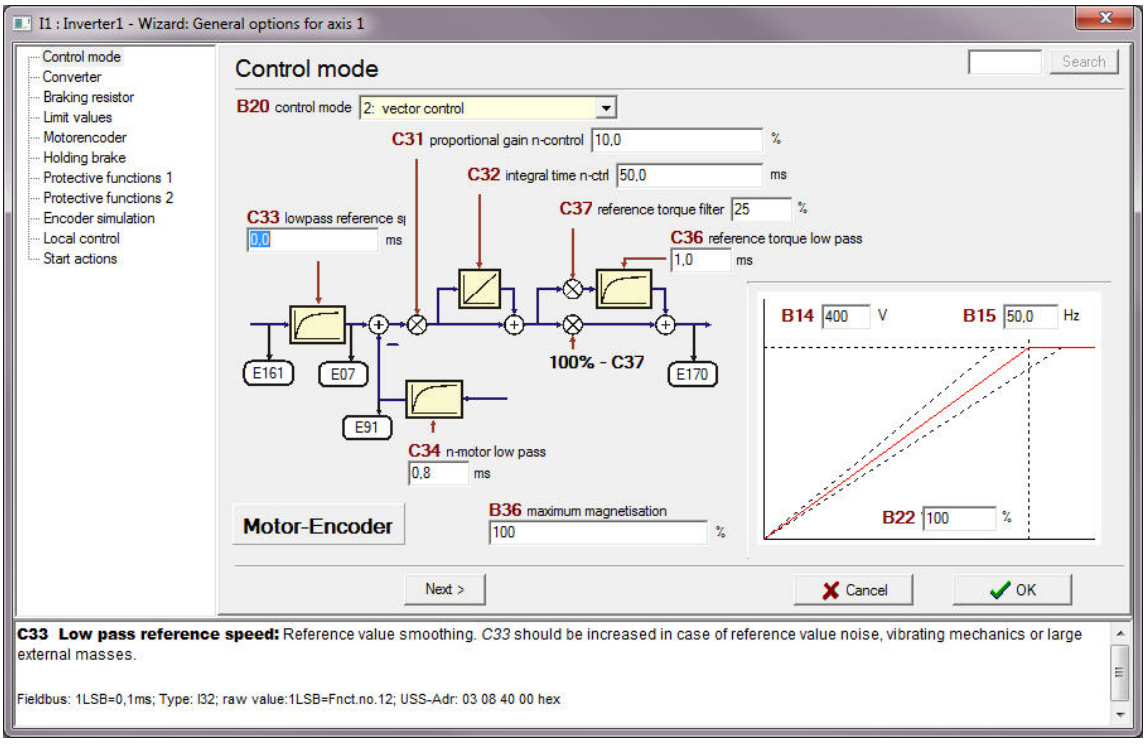


Fig. 7-3: *General settings* assistant, *Holding brake* page

WE KEEP THINGS MOVING

8 Parameterizing axis management

This section describes axis management. Management of the axes takes place in the global area. Management means the unique control of a maximum of one axis. All axes can be deactivated. The display of the inverter shows which axis is active or whether there is an active axis.

Information
The axis can only be switched when the enable has been switched off and *E48 device state* is not *5:fault*. The option startup disable ASP 5001 may not be active when an axis is switched!

The axes can be combined with motors in different ways. For instance, when only one motor is connected directly to the inverter, several axes can be allocated with applications and switched. In this case, the axes function like parameter sets (see Figure 8 1).

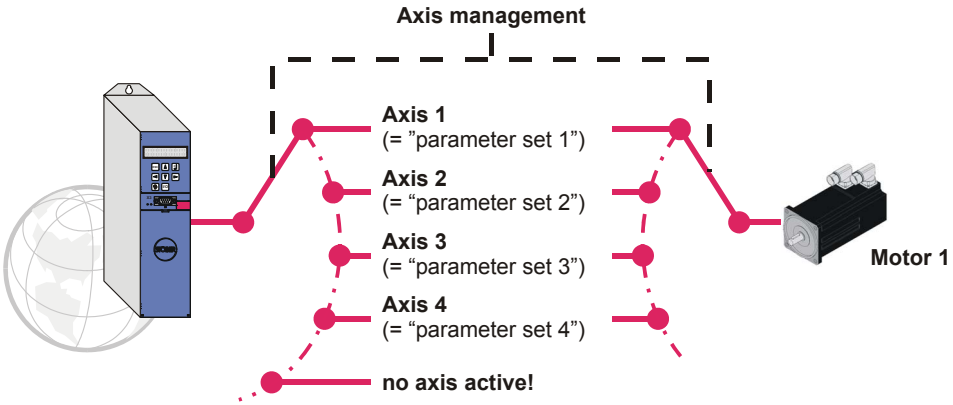


Fig. 8-1: Using the axes as parameter records

WE KEEP THINGS MOVING

9 Parameterizing brake resistor

To remove excess braking energy from the DC link, a brake resistor can be connected to the 5th generation of STOBER inverters. You will find information on the types available from STOBER and connection in the configuration manual for the inverter.

Parameters

- *A21 Braking resistor R [Ω]*
- *A22 Braking resistor P [W]*
- *A23 Braking resistor thermal [s]*

are available for the settings. Enter the value 0 in *A22* and the activation of the braking resistor (brake chopper) is deactivated. Note that the brake chopper continues working when most malfunctions occur. The malfunctions that cause the brake chopper to be switched off are documented accordingly in section 13.

WE KEEP THINGS MOVING

10 Parameterizing in-/outputs

This chapter discusses the linking of control and status signals with the application.
The system of the control signals will now be explained with the example of quick stop.

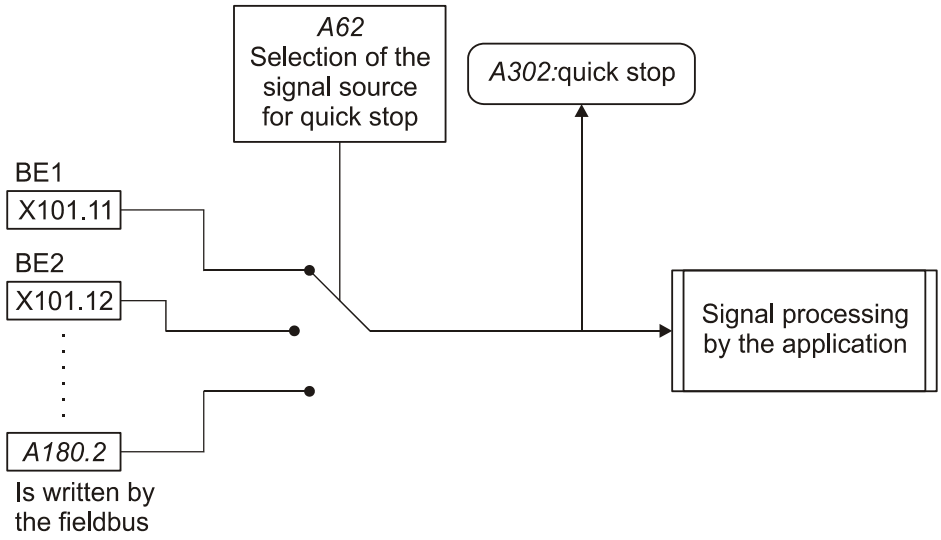


Fig. 10-1: Selection of the signal sources for input signals

The signal can be provided on various binary inputs or via fieldbus. The user makes the selection with a selector (*A62* here). In addition, an indicator parameter exists which shows the signal status (*A302* here). The application descriptions list selection, fieldbus and indicator parameters for each signal.

The output signals are allocated by the specific selection of status signals. The routine is explained with the example of *ref.value reached*.

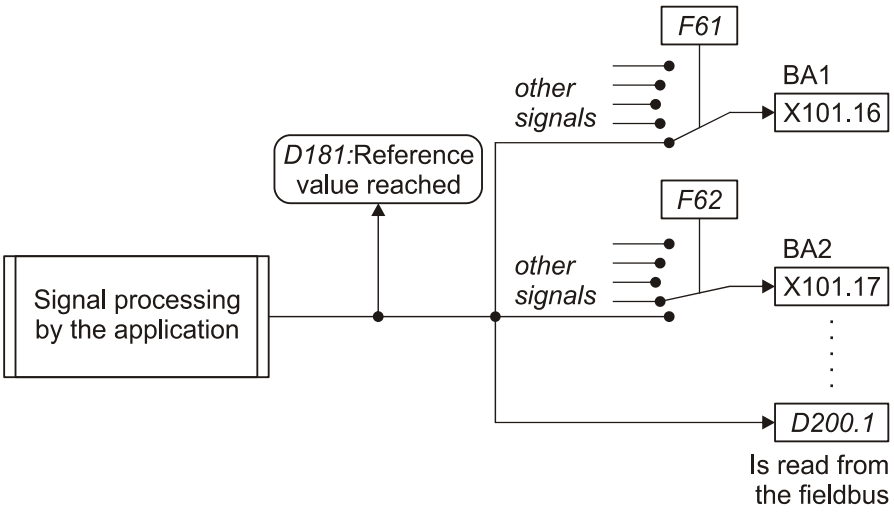


Fig. 10-2: Selection of the signal sources for output signals

WE KEEP THINGS MOVING

All available parameters can be entered in the source parameters.

To be able to poll application status signals, the signals must be allocated to an output (BA, AA, parameter). There is a source parameter for each output in which the signals available for the particular application can be selected / inscribed. Source parameters *F61* and *F62* are used for the binary outputs BA1 and BA2 shown in the diagram. At the same time, the signal is written in a parameter (*D200* bit 1 here). This parameter can be read from a fieldbus system.
The indicator parameter (*D181* in the diagram) shows the signal state after handling by the application. It is used to check the signal path. The application descriptions specifies for each signal the possible outputs and the related selection parameters as well as the fieldbus and indicator parameter.

WE KEEP THINGS MOVING

11 Communication between inverter and PC

Communication between PC and inverter is established with a serial connection. A cable (ID no. 41488) is connected to a serial interface on the PC and to terminal X3 of the inverter as shown in the adjacent figure.

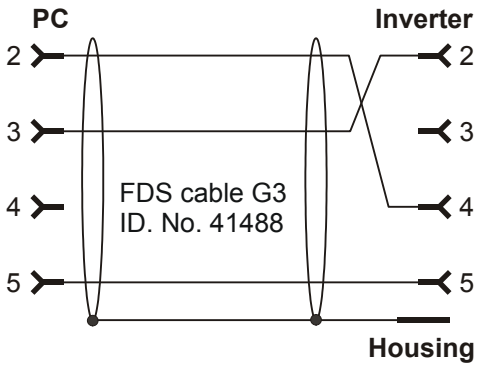


Fig. 11-1: Serial connection to communication between inverter and PC

11.1 Settings

The serial transmission is parameterized in the inverter entry under *Communication/Settings*. The dialog which appears indicates the communication status. Communication is parameterized below this. The settings include the interface used on the PC, the transmission speed and the bus address. *0* is preset as the bus address. It does not have to be changed unless you want to establish a serial *daisy chain* connection with several inverters.

The checkboxes under the communication status are used to select whether the settings saved in the project are to be used for communication or the global settings of POSITool. It can be useful to use the project settings when an inverter network is configured on a PC on which each inverter has a permanently assigned interface. The disadvantage of the project settings becomes obvious, however, when the project is transferred to other users.Sometimes online operation cannot be established with the project settings because another COM interface is being used. In this case, you can use the global settings of POSITool. The global parameterization takes place in the menu *Extras/Options* in the dialog screen *General* (see Fig. 11-2).

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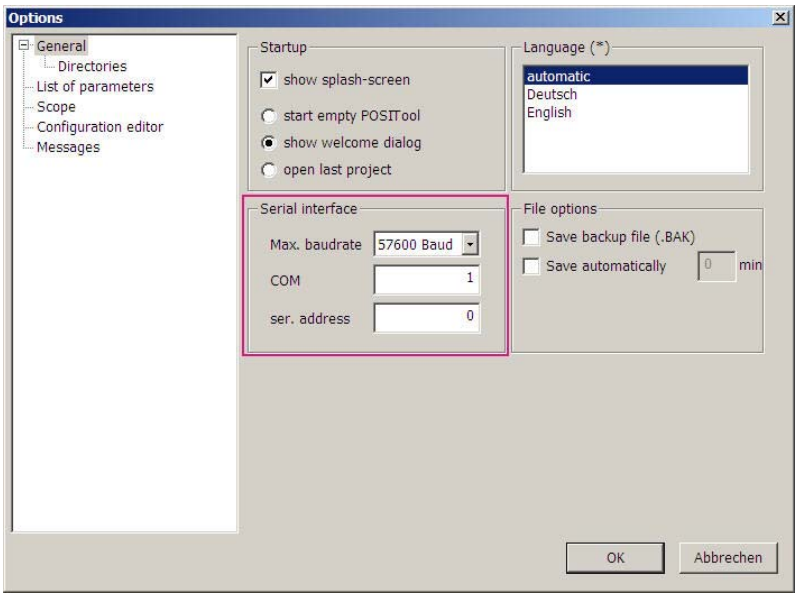

Fig. 11-2: Project settings

11.2 Online operation

There are three ways for a user to establish a connection between inverter and PC:

- The button in the tool bar
- The area labeled *Establish connection to inverter* in the inverter entry under *Communication*
- the F5 key

Both devices must have the same configuration and parameter values for a serial connection between PC and inverter. If the user gives the command to *go online* via one of the two ways, POSITool checks the configuration of PC and inverter. During this check a differentiation can be made between two results:

- The configurations are different
- The configurations are identical

First case: Different configurations

When POSITool determines that inverter and PC have different configurations, the dialog screen shown in Fig. 11-3 appears. You have the following choices,

- Transfer the configuration in POSITool to the inverter (1) or
- Load the configuration of the inverter to POSITool (2, reverse documentation)

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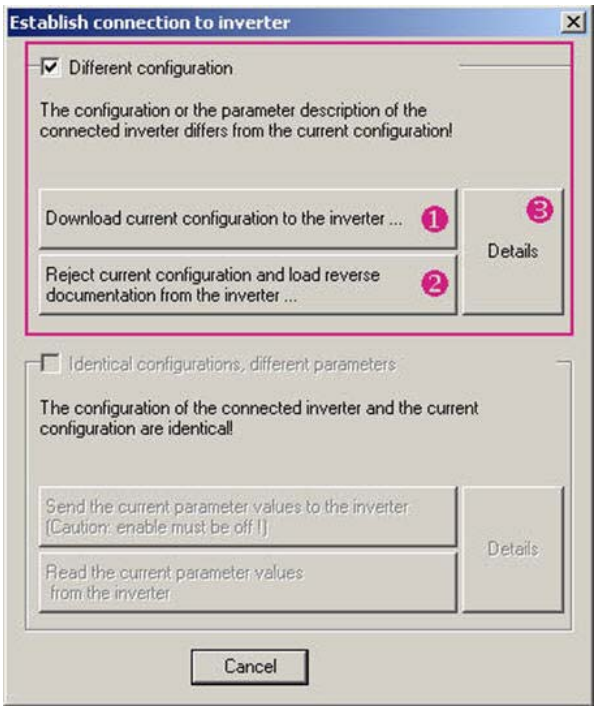

Fig. 11-3: Establishing connection with different configurations

If you want to check the differences between the applications, press the *Details* button (3).

When the configuration is adjusted, the parameters of the selected project are also used.

Partial reverse documentation

It is standard that, when a file is saved, all information is stored to enable a reverse documentation with configuration data to be read out. If this is not the case (know-how protection) a partial reverse documentation can be read. The following functions are available in this online mode.

- Parameter lists
- Fault memory indication
- Scope
- Simubox
- Free parameter list

When online mode is concluded with a partial reverse documentation, the data record is marked as reverse documentation and parameter values can no longer be changed. The data record cannot be converted in a configuration or transferred again to the inverter.

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Utilizing memory space

When the configuration is loaded, the memory requirements of the data record are compared with existing memory space on the inverter. If it is certain that the data record can be stored, POSITool does not give you a message. If the expected memory utilization is 95 % or more, a message is indicated.
A memory utilization in this range occurs, for example, when you have defined too many motion blocks and profiles in the motion block positioning application. Try to optimize the configuration. Contact application@stoeber.de if you have questions.

Second case: Identical configurations

When POSITool determines that the configurations are identical, the dialog screen shown in Fig. 11-4appears. When this happens, you have the following choices:

- Load the parameters from POSITool to the inverter (4) or
- Load the parameters from the inverter to POSITool (5)

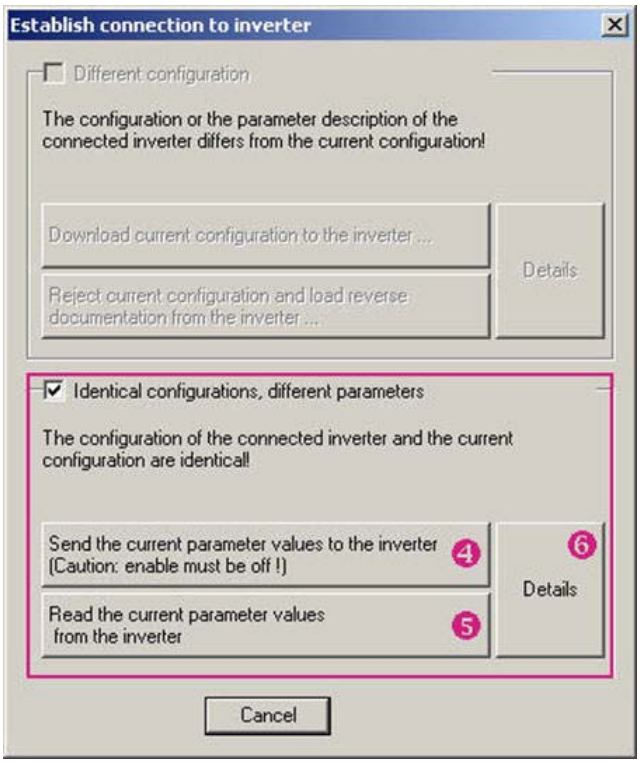

Fig. 11-4: Establishing a connection for identical configurations

If you want to check the differences between the parameters in POSITool and the inverter, press the *Details* button (6). POSITool then indicates the differences in a dialog screen in which the values of the parameters in POSITool and the inverter are listed.

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Result

NOTICE

After being loaded to the inverter the application is not saved safe from power failures!

▶ To do this, execute *A00 Save values*.

During the connection is established, a status screen appears in the working area. The progress of the current status procedure is indicated in this screen.
When the connection is activated, the following screen appears.

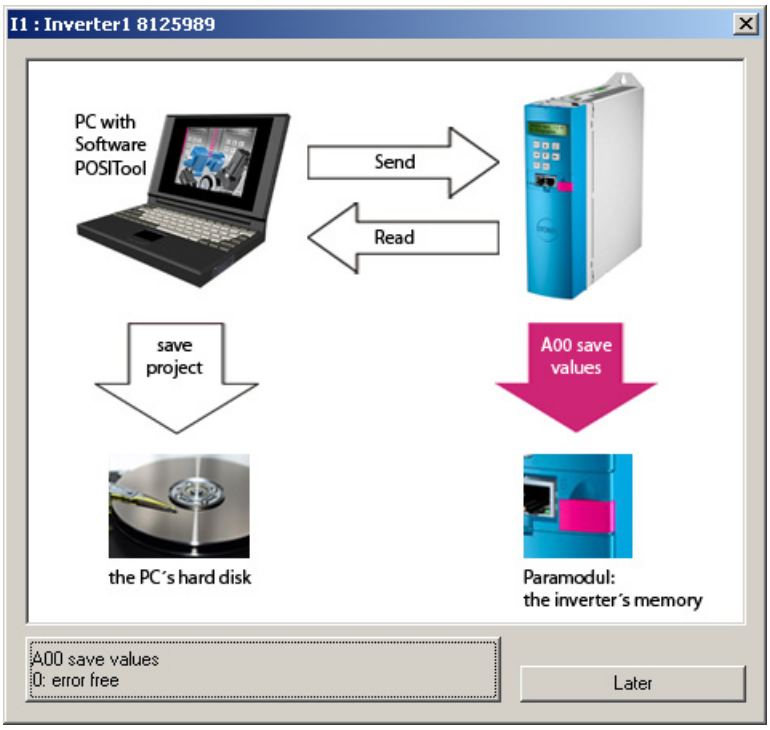


Fig. 11-5: Online connection established

With active connection ...

When a connection is active, the values which were changed on the inverter are automatically transferred to the PC and vice versa. Similarly, actions can start the Scope and Simubox function. The indicator parameters are only visible in online mode.

WE KEEP THINGS MOVING

12 Service

This chapter lists various service jobs and explains their performance.

12.1 Replacing inverters

⚠ WARNING!

Electric shock hazard!

Risk of serious injury from contact with live parts!

- ▶ Observe the 5 safety rules.
- ▶ Note that dangerously high voltages can still be present in the inverter even 5 minutes after switching off the power supply due to the residual charge of the DC link capacitors.
- ▶ Ensure that the motor shaft is at a standstill before carrying out work. A rotating rotor can generate high voltages at the terminals.

This chapter provides you with an introduction to the simple replacement of two inverters without additional aids. Only the Paramodule from the replaced inverter must be used on the new inverter. In the Paramodule, the action *A00 save values* stores the programming and the parameterization of the inverter safe from a power failure.

Information
If inverters of different types are replaced or the devices to be configured on the inverter are changed, the entire configuration must be changed with POSITool and checked!

The following conditions apply for the replacement:

- The replacement inverter assumes the task of the inverter that is replaced. There is no change in the drive-related task.
- Inverters of the same device type are replaced.
- The replacement inverter has the same or a higher hardware and software version as the inverter that was replaced.
- No projected devices or components (motor, rotary encoder, option boards, etc.) in the inverter are changed.

Follow these steps:

Replacing the inverter

1. Start the *A00 save values* action. Wait until the action is complete with result *0:error free*.
2. Turn off the power supply voltage of the inverter. Wait until the display goes out.

WE KEEP THINGS MOVING

3. Disconnect the Paramodule that was previously used on the inverter that is being removed!

Inverter that is being removed

4. Connect the Paramodule that was previously used to the inverter that is being installed!

Inverter that is being installed

5. Remove the inverter that is being replaced and install the new inverter. Follow the instructions in the projecting manual!
6. Connect the power supply voltage.
   ⇨ The inverter loads the configuration at the start from the Paramodule that was previously used and takes on the application of the previously installed inverter as it does so.
7. Disconnect the previously used Paramodule.
8. Connect the new Paramodule to the new inverter.
9. Start the *A00 save values* action. Wait until the action is complete with result *0:error free*.

⇨ The inverter is replaced.

WE KEEP THINGS MOVING

12.2 Replacing an application

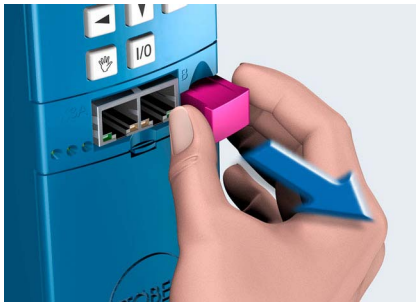
This chapter provides you with a guide to the simple change of an application without extra aids. Only the Paramodule must be replaced. In the Paramodule, the action *A00 save values* stores the programming and the parameterization of the inverter safe from a power failure.
The following conditions apply to the replacement:

- The hardware configuration (option boards, motor settings, etc.) stored on the Paramodule corresponds to the drive which will use the data of the Paramodule in the future.
- The programming and parameterization stored on the Paramodule was tested beforehand.
- After the Paramodule has been exchanged and the drive has been tested, set up the drive again (referencing, parameter optimization, etc.).

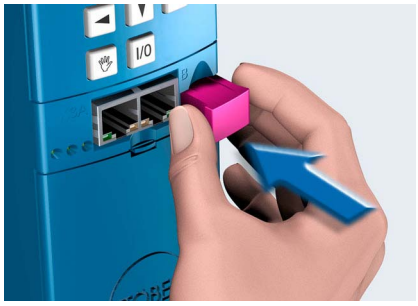
Proceed as shown below:

Replacing the application

1. Start the action *A00 save values*. Wait until the action has been concluded with the result *0:error free*.
2. Turn the power supply of the inverter off. Wait until the indication on the display disappears.
3. Remove the Paramodule from the inverter.



4. Install the new Paramodule (Paramodule with changed application) on the inverter!



5. Connect the power supply.

⇨ During startup, the inverter loads the configuration and the new application from the Paramodule and accepts these.

WE KEEP THINGS MOVING

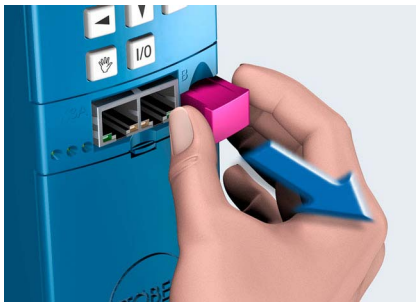
12.3 Copying Paramodule

The following section describes how to copy a Paramodule so that an application can be utilized in additional inverters.

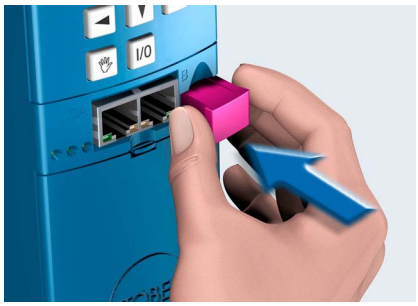
Proceed as shown below:

Copying Paramodule

1. Start the action *A00 save values*. Wait until the action has been concluded with the result *0:error free*.
2. Remove the Paramodule from the inverter.



3. Install the new Paramodule on the inverter!



4. Start the action *A00 save values*. Wait until the action has been concluded with the result *0:error free*.

⇨ You have copied Paramodule.

WE KEEP THINGS MOVING

12.4 Firmware

12.4.1 Firmware files

A folder named Download is created in the POSITool directory when POSITool is installed:

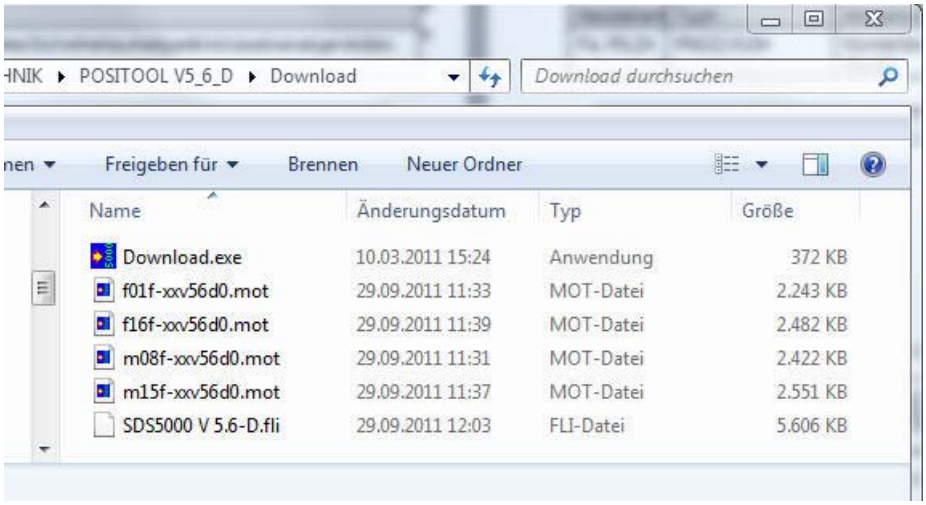


Fig. 12-1: The *Download* folder is in the POSITool directory

The following files are saved in the folder:

- Download.exe: Use this file to download the firmware for MDS 5000 and FDS 5000. Observe section 12.4.2 for the download procedure:
- fx..x.mot: Firmware files for FDS 5000.
- mx..x.mot: Firmware files for MDS 5000.
- SDS5000x..x.fli: Firmware files for SDS 5000.

Information
For the FDS 5000, you can read the hardware version (HW version) from the label that is stuck to the front of the inverter below the operating console.

FDS 5000	HW version	
	190 or lower (FDS 5000)	200 or higher (FDS 5000A)
f01...	X	—
f16...	—	X

You can find different versions of firmware files on the STOBER Electronics CD. This CD is supplied with the inverter.

WE KEEP THINGS MOVING

12.4.2 Replacing the firmware

The following section describes how to replace the firmware of an inverter.

⚠ WARNING!

Danger of injury or property damage due to unsecured loads. During the firmware download, the control and the power unit of the inverter are switched off. This means that unsecured loads on the drive may slip through.

▶ Secure the drive load before beginning the firmware download.

NOTICE

Unexpected inverter behavior! If a firmware download is carried out, the previously saved firmware will be deleted initially. If the firmware download is a tear stopped too early, the inverter will not start as normal. The display will remain empty, the LEDs will only illuminate briefly.

▶ Avoid any early stoppage of the firmware download.

▶ If an interruption took place, carry out the firmware download again and ensure that it completes. After this, the inverter can be operated normally.

Prerequisites:
- At least the control unit of the inverter is powered (24 V on terminal X11). The power may only be switched off during the download when the software displays an appropriate instruction.
- You have connected the inverter to the PC via serial interface X3.
- POSITool is not communicating with the inverter via serial interface X3.

You will need:
- The program *Download.exe* which is stored in the *Download* folder in the directory of POSITool. Note that you require V 5.6 or higher of the Download.exe program for A-devices (HW version 200 or higher).
- The mot files which are stored in the same directory.

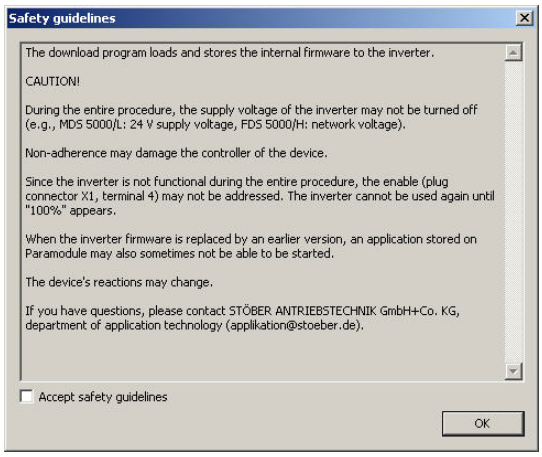
WE KEEP THINGS MOVING

Proceed as shown below:

Replacing the firmware

1. Start the program *Download.exe*.
   ⇨ The following dialog screen appears:

2. Select the language in which the download is to be presented by pressing one of the flag buttons.
3. Press the button *Next*.
   ⇨ The following dialog screen appears:



4. Read the safety guidelines.
5. If you accept the safety guidelines, check the box *Accept safety guidelines*.

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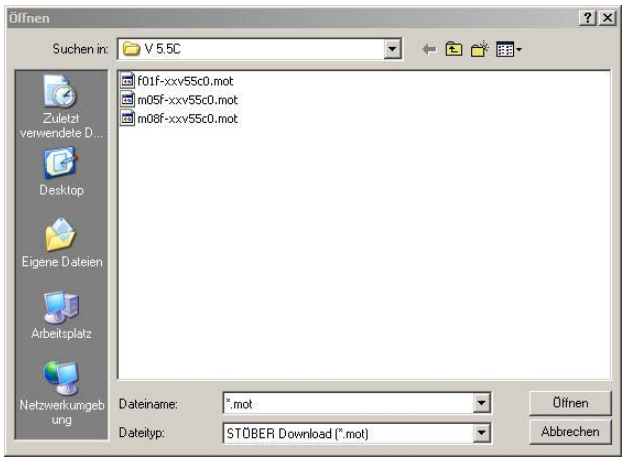
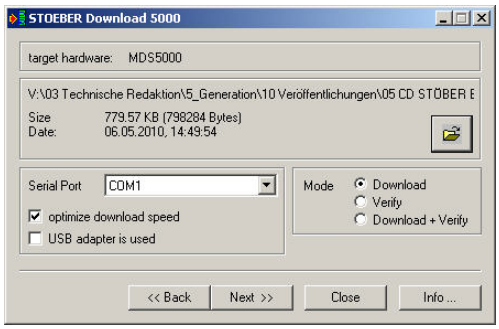
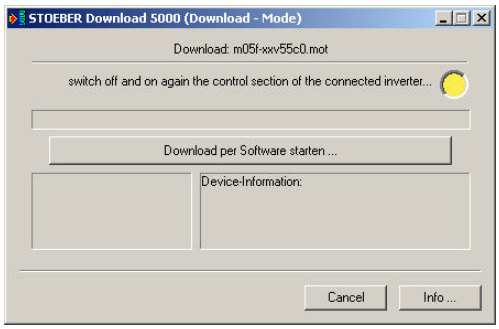
6. Press the *OK* button.
   ⇨ The following dialog screen appears:



7. Select the mot file which is to be loaded to the inverter.
8. Press the *Open* button
   ⇨ The following dialog screen appears:



9. In the lower part of the screen set the options with which the download is to be executed.
10. Confirm the check box *Next* >>.
    ⇨ The following dialog screen appears:



11. Press the button *Download per Software start*....
    ⇨ The firmware download is started.

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12. Wait until a dialog message reports that the firmware was saved to the inverter.

⇨ You have performed the firmware download.

If the download failed, check the following points:

1. After you pressed the button *Download per Software start...*, the following instruction appears after a certain amount of time:

   Switch off and on again the control section of the connected inverter ....

   Switch the power supply on X11 off and on again to continue with the download. Then proceed with step 12.

WE KEEP THINGS MOVING

12.5 Actions

Actions are functions which are executed by the inverter automatically after their start.
Actions are controlled and analyzed using special parameters. The parameters contain three elements.
You can start the action via the element 0 (e.g. *A00.0*) The element 1 (e.g. *A00.1*) shows you the action's progress. Element 2 (e.g. *A00.2*) shows the result. You can start an action via every interface (operator panel on the inverter, fieldbus or POSITool in online mode).
For some actions, power must be applied to the motor and the motor must be free to turn. For this reason the inverter must be enabled if you want to run these actions. Other actions can be performed without energizing the motor. Since these two action groups are executed differently, they will be described separately below.

12.5.1 Actions without enable

Actions which do not need an enable before they can be executed are:
- *A00 Save values*
- *A37 Reset memorized values*

Proceed as shown below:

Executing actions without enable

1. Set element 0 of 0 to the value 1 (e.g., *A00.0* = 1).
   ⇨ Element 1 indicates the progress of the action (e.g., *A00.1* = 33 %).
2. Wait until element 0 indicates the value 0 again (e.g., *A00.0* = 0)

⇨ Element 2 indicates the results of the action (e.g., *A00.2* = *0:error free*).

12.5.1.1 A00 Save values

When you activate *A00.0*, the inverter's current configuration and the parameter values are stored in Paramodule, safe from loss due to a power failure. After power-off, the inverter starts with the configuration stored in Paramodule.
When it is determined during the saving procedure that the configuration data in Paramodule and the inverter are identical, only the parameters are stored. This speeds up the procedure.
You can read the following results from the third element (*A00.2*):
0: error free
10: write error
11: invalid data
12: write error
14: Warning

With the results *10* to *12* an error was determined while saving to Paramodule. If the results occur repeatedly, the Paramodule should be replaced.

WE KEEP THINGS MOVING

Result 14 means that saving was error-free. At the same time it is determined that the maximum number of approx. 10,000 write cycles has almost been reached. The Paramodule should be replaced as soon as possible (for the ID no. of the Paramodule, see the Accessories Chapter in the projecting manuals of the inverter).

Information
Do not turn off the power of the control section (devices of the /L version: 24 V, devices of the /H version: supply voltage) while the action is still being executed. Turning off the power while actions are being executed will cause data to be lost. The display indicates the fault **ConfigStartERROR parameters lost" or *Paramodul ERROR - Read error*. In such cases, the application must be transferred to the inverter again (POSITool or Paramodul).

12.5.1.2 A37 Reset memorized values

The action *A37* resets memorized values *E33* to *E37* and *E41*. The action can be started in *A37.0*.
The action offers the following result (*A37.2*): *0:error free*.

12.5.2 Actions with enable

Actions which require that the motors be energized before these actions can be executed:
- *B41 Autotune motor*
- *B42 Optimize current controller*
- *B43 Winding test*
- *D96 Reference value generator*

12.5.2.1 Execute

Executing actions with enable

1. Change to the device state Ready for switch on.
2. Set the first element of the action to the value 1 (e.g., *B40.0* = 1).
3. Enable the motor.
   ⇨ Element 1 indicates the progress of the action (e.g., *B40.1* = 33 %).
4. Wait until element 1 indicates the value 100 % (e.g., *B40.1* = 100 %).
5. Turn off the enable.

⇨ Element 2 indicates the result of the action (e.g., *B40.2 = 0:error free*).

Please note that since parameter values be determined directly during these actions, you should perform the action *A00 save values* afterwards so that the values are stored safe from loss due to power failure.

WE KEEP THINGS MOVING

12.5.2.2 B41 Autotuning

NOTICE

During this action, the motor shaft will move.

▶ Make sure that the motor can turn freely during the action!

Using the action *B41* the stator resistance (*B53*) and stator inductance (*B52*) are measured on servo motors. On asynchronous motors *Leakage factor (B54)* and *Magnetic saturation coefficient (B55)* are also determined.

During activation, the enable must be inactive. If you have started the action in *B41.0*, you must activate the enable. After the action was concluded, you must deactivate the enable again. You can then read the measured values (*B52* to *B55*).

During the action, the cycle time is set internally to 32 msec.

You can read the following results from the third element (*B41.2*):
0: error free: The action was executed without errors and concluded.
1: abortedn: The action was aborted by turning off the enable.

WE KEEP THINGS MOVING

12.5.2.3 B42 Optimize current controller

NOTICE

During the action, the motor turns at approx. 2000 Rpm.

- ▶ For this reason ensure the motor and the mechanism coupled to it are allowed to be operated at this speed and can rotate freely!
- ▶ During the action, you hear clicking noises at regular intervals. The action takes approx. 20 minutes.

NOTICE

Danger due to delayed shut-down.

- ▶ If you have enable the action via local operation, the action can only be interrupted with a very long delay by deactivating the enable!

When you start the action, the parameters of the current controller are specified again (*B64* to *B68*).

During activation, the enable must be inactive. If you have started the action in *B42.0*, you must activate the enable. After the action was concluded, you must deactivate the enable again. You can then read the measured values in *B64* to *B68*.

If a quick stop request occurs during the action, the drive is halted immediately.
For the duration of the action, the cycle time is set internally to 32 msec.

You can read the following results from the third element (*B42.2*):
0: error free: The action was executed without errors and concluded.
1: aborted: The action was aborted by turning off the enable.

WE KEEP THINGS MOVING

12.5.2.4 B43 Winding test

NOTICE

During this action, the motor shaft will move.

▶ Make sure that the motor can turn freely during the action!

When you start the action, the symmetry of the ohmic resistors of the motor windings are checked. During activation, the enable must be inactive. If you have started the action in *B43.0*, you must activate the enable. After the action was concluded, you must deactivate the enable again.

During the action, the cycle time is set internally to 32 msec.

You can read the following results from the third element (*B43.2*):
0: error free: The action was executed without errors and concluded.
1: aborted: The action was aborted by turning off the enable.
2: R_SYM_U: The resistance of phase U differs significantly from that of the other phases.
3: R_SYM_V: Same as 2
4: R_SYM_W: Same as 2
5: POLAR_SYM_U: An asymmetry was determined when the polarity changed.
6: POLAR_SYM_V: Same as 5
7: POLAR_SYM_W: Same as 5
Results 5 to 7 are usually an indication of an inverter error.

WE KEEP THINGS MOVING

12.5.2.5 Optimize B45 SLVC-HP

⚠ WARNING!

Risk of injury due to high speeds!

The action accelerates the motor up to twice its nominal speed.

- ▶ Only perform this action when the motor is adequately fastened. Secure feather keys, etc.
- ▶ Make sure that any mechanical systems (gear units, etc.) that are attached can reach these speeds.

NOTICE

Unsuitable optimization results!

The results are falsified if the action is performed with a loaded motor.

- ▶ If possible, only perform the action when the motor is not connected to a mechanical system (gear units, etc.).
- ▶ If it is not possible to disconnect the mechanical system, make sure that the load torque is not more than 10 % of the nominal torque.

The action optimizes the following parameters:

- *B46 Feedback SLVC-HP*,
- *B47 P-gain SLVC-HP* and
- *B48 I-Gain SLVC-HP*.

The enable must be inactive during activation. If you have started the action in *B45.0*, you must activate the enable. If the action has completed, the enable must be deactivated again. The result of the action can be read after removing the enable in *B46*, *B47* & *B48*.

Note that the result is more accurate if you fit the motor with an encoder for this action. This is possible for initial commissioning of a machine series, for example.
In this case, mount and connect the encoder, set control mode *B20 = 2:vector control* and parameterize the encoder. Now perform the action. After you have the dismantled the encoder, set control mode *B20 = 3:SLVC-HP* again.

WE KEEP THINGS MOVING

12.5.2.6 D96 Reference value generator

NOTICE

During this action, the motor shaft will move.

▶ Make sure that the motor can turn freely during the action!

When you start the action, a square-shaped reference value is specified for the motor. You can parameterize the reference value in *D93* to *D95*.

During activation, the enable must be inactive. If you have started the action in *D96.0*, you must activate the enable.

The action can only be concluded by turning off the enable and quick stop! With a quick stop signal, the drive is halted immediately.

During the action, the cycle time is set internally to 32 msec.

You can read the following result from the third element (*D96.2*):
1: aborted: The action was aborted by turning off the enable.

WE KEEP THINGS MOVING

13 Diagnosis

13.1 LED

The LEDs on the front of the inverter give the user a quick overview of the device state of the inverter. A green LED and a red LED light up in different combinations and at different frequencies to provide information about the device state as shown in the table below.

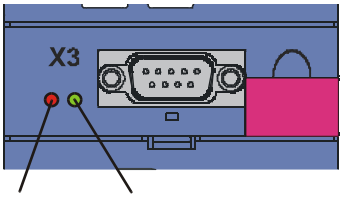

Fig. 13-1: LEDs on the front

LEDs		State of the inverter
ERROR (red) RUN (green)	OFF OFF	No power supply voltage.
ERROR (red) RUN (green)	OFF Flashing at 8 Hz	Data is written on the Paramodule.
ERROR (red) RUN (green)	ON Flashing at 8 Hz	Paramodule is not detected.
ERROR (red) RUN (green)	OFF Flashing at 1 Hz	Ready for operation (not enabled).
ERROR (red) RUN (green)	OFF ON	Operation (enabled).
ERROR (red) RUN (green)	Flashing at 1 Hz ON	Warning.
ERROR (red) RUN (green)	Flashing at 1 Hz Flashes	Warning.

WE KEEP THINGS MOVING

LEDs			State of the inverter
ERROR (red)		ON	Fault.
RUN (green)		OFF	
ERROR (red)		Flashing at 8 Hz	No configuration active.
RUN (green)		OFF	

13.2 Display

The display gives the user a detailed response message on the state of the inverter. In addition to the indication of the parameters and events, the device states are shown.
The display permits an initial diagnosis without additional aids.

13.2.1 General

After the *self-test* of the inverter, the operation indication appears on the display. Depending on the configuration and the current device state, the first and second line of the display may differ from what is shown in the example. Im Picture shows the configuration *fast ref. value* in the device *state enabled*. See chap. 3 for device states.
If no axis is active, this is indicated with an asterisk (*). The active axis is then shown when it differs from axis no. 1. Only for active brake chopper Bc or active local mode L does the appropriate symbol appear on the display.

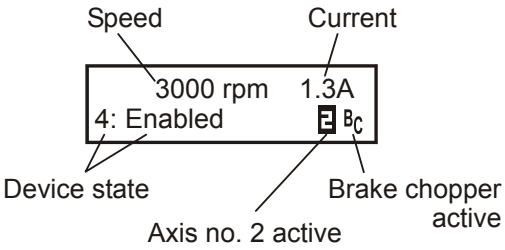

Fig. 13-2: Display indication

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13.2.2 Event Indications

Events

Event indications on the display give the user information on the state of the device. The event list (chapter 13.3 Events) gives you a list of the event indications. The following event groups exist.

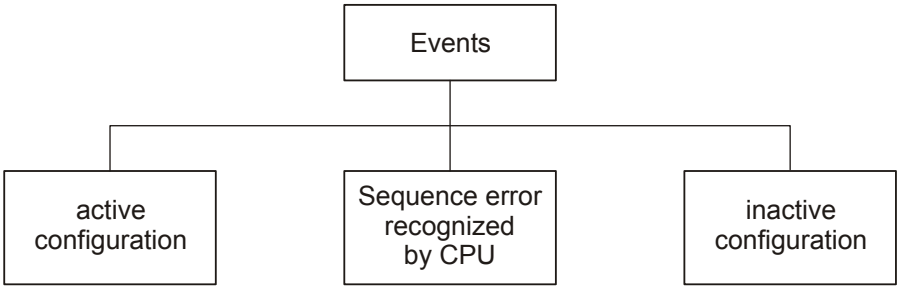

Fig. 13-3: Events

Error during active configuration

Events during active configuration are used to monitor the device during operation. The reaction to one of these events can be set in four levels - inactive, message, warning or fault.

1. When an event is parameterized as a message, it is shown flashing at the bottom of the display. An application is not affected by a message (i.e., the top part of the display does not change). A message is not acknowledged. It is queued until the cause disappears.
2. A warning is shown in the top part of the display with the appropriate logo. The bottom line indicates the flashing event. The upper right corner shows the remaining time after which the warning becomes a fault. If the cause disappears within this parameterized time, the warning is reset. An application is not affected by a warning.
3. When an event with the level "fault" occurs, the device immediately changes to the device state "fault reaction." The event appears flashing in the bottom line of the display. A fault must be acknowledged.

The device provides notes on the cause of some of the events. These events are marked with a number and appear alternately to the event indicators on the display. Causes which are not documented with a number in the event description are only an indication of possible faults. They do not appear on the display.

For additional diagnosis, the occurrence of an event of this group is documented by incrementing a counter. The fault counters are stored in the parameter group Z.. An acknowledgment can be programmed on the operator panel or via binary input for some of these events. These events do not affect communication and device control. The events can be identified by their consecutive numbering.

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Sequence faults recognized by the CPU
The 5th generation of STOBER inverters includes a digital computer with microprocessor, memory and I/O modules. When an error occurs which affects this area, the device reacts with an indication on the display. At the same time, the inverter assumes a defined state (power section is turned off). The device must be turned off and on again before it can return to its normal functionality.

At the same time, device control (menu function) and communication with the inverter are not possible. Events of this type are marked on the display with the character "#".

Inactive configuration…
There are two cases when a configuration is inactive:
1. A fault occurs during device start.
2. The configuration was stopped by POSITool.

Events which will lead to an inactive configuration are marked on the display with an asterisk (*).

...during device startup
During device startup, configuration and parameters, flags and signal values are loaded from Paramodul. Afterwards the configuration is started. During both steps detailed error messages can be generated. When a fault occurs during loading from Paramodul, "*ParaModuleERROR" appears in the top line. When a fault occurs while the configuration is being started, "*ConfigStrtERROR" appears. These faults are corrected by turning the device off and on or transferring a configuration.

...after stop by POSITool
If the configuration was stopped by POSITool, the logo of the company STÖBER ANTRIEBSTECHNIK appears on the display.

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13.3 Events

13.3.1 31:Short/ground

Triggering	Level	Response	Fault counter
The hardware short-circuit switch-off is active. The output current is too high. If there is no supply voltage when starting the device, the cause may be a device-internal short circuit/ ground fault.	Fault	The motor continues to coast. The brake chopper cuts out. Any existing brakes are engaged if they were not released via *F100* independent of the device controller.	*Z31*

Possible cause	Test	Measure	Acknowledgement
Interwinding fault	Check the motor.	Replace the motor.	Switch the device off/on or programmed acknowledgement
Fault in motor cable	Check the cable	Replace the cable.	
Connection fault	Check the connection, e.g. whether V or W is connected to PE at X20 U.	Correct the connection.	
Braking resistor short circuit	Check the braking resistor.	Replace the braking resistor.	
Device-internal short circuit/ground fault	Check whether the fault only occurs when enabling the inverter.	Replace the inverter.	

13.3.2 32:Short/gr.int

Resolution	Level	Response	Fault counter
An internal test is performed when the controller part power supply is switched on. An existing short-circuit causes a malfunction. A requirement for triggering this event is for the supply voltage to already be present when starting the device.	Malfunction	The inverter cannot be enabled.	*Z32*

Possible cause	Test	Measure	Acknowledgement
There is an internal device fault.	—	Please contact our service department, see section 1.4 Further support	Switch the device on/off or programmed acknowledgement

13.3.3 33:Overcurrent

Triggering	Level	Response	Fault counter
The total motor current exceeds the permitted maximum value.	Fault	The motor always coasts except when U30 Emergency stop is activated. Any existing brakes are engaged if they were not released via *F100* independent of the device controller.	*Z33*

Possible cause	Test	Measure	Acknowledgement
Acceleration times too short.	Extend the ramps.	Apply this setting for operation.	Switch the device off/on or programmed acknowledgement
Incorrectly set torque limits in the *C03* and *C05* parameters.	Set smaller values in *C03* and *C05*.	Apply this setting for operation.	

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13.3.4 34:Hardw.fault

Triggering	Level	Response	Fault counter
There is a hardware fault.	Fault	The inverter can no longer be enabled.	*Z34*

Cause	Description	Measure	Acknowledgement
1:FPGA	Fault when loading the FPGA	Replace the inverter.	Not confirmable
2:NOV-ST	Faulty power unit memory (EEPROM)		
3:NOV-LT	Faulty control unit memory (EEPROM)		
11:CurrentMeas	The current offset measurement for the device start-up indicates a deviation that is too large.		

13.3.5 35:Watchdog

Resolution	Level	Response	Fault counter
The watchdog of the microprocessor is activated.	Malfunction	The motor continues to coast. The brake chopper is switched off while the inverter restarts. Any existing brakes are engaged if they were not released via *F100* independent of the device controller.	*Z35*

Possible cause	Test	Measure	Acknowledgement
The microprocessor is used to capacity or faulty.	• Check the *E191* parameter, it should indicate a value less than 80%. • Check the wiring for EMC-compliant design.	• Set a higher cycle time in the *A150* parameter. • Wire according to EMC regulations.	Switch the device on/off or programmed acknowledgement

13.3.6 36:High voltage

Triggering	Level	Response	Fault counter
The voltage in the intermediate circuit exceeds the permitted maximum (DC link voltage display in *E03*).	Fault	The motor continues to coast. Any existing brakes are engaged if they were not released via *F100* independent of the device controller.	*Z36*

Possible cause	Test	Measure	Acknowledgement
Supply voltage too high	Check whether the supply voltage exceeds the permitted input voltage.	Take measures to adjust the supply voltage.	Switch the device off/on or programmed acknowledgement
No braking resistor connected	Check the wiring.	Connect a braking resistor.	
Brake chopper is deactivated	Check whether *A22* = 0 is set.	Enter the values of the braking resistor in the *A21*, *A22* and *A23* parameters.	
Braking resistor too small or too large	• Check whether *A21* does not reach the permitted value. • Check whether the resistance is suitable to dissipate the power losses arising.	Connect a suitable braking resistor.	
Braking ramps to steep	Observe the DC link voltage during a braking procedure, e.g. using a Scope recording.	• Extend the braking ramps. • Connect a suitable braking resistor. • Check the application of the DC link connection.	
Brake chopper is faulty	Observe the DC link voltage in the Scope. If this increases to the overvoltage limit without hindrance, the brake chopper is faulty.	Please contact our service department, see section 1.4 Further support	

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13.3.7 37:Encoder

Triggering	Level	Response	Fault counter
Error due to encoder	Fault	The motor always coasts except when *U30 Emergency stop* is activated. Attention: The reference is deleted for positioning applications due to the event 37:Encoder. Referencing must be repeated after acknowledgement. If the encoder is not connected when switching on the control unit power supply, the encoder supply is permanently switched off. Acknowledgement is then only possible by switching the inverter off and on.	*Z37*

Cause	Description	Measure	Acknowledgement
1:Para<>Encoder	Parameterization is not suitable for the connected encoder.	Check and correct the H-parameter.	Programmed acknowledgement
2:ParaChgOffOn	Parameter change; encoder parameterization can not be changed during operation	Save and then switch the device off/on so that the change is effective.	Programmed acknowledgement
4:X4 chan. A/Clk	Wire break track A/Clock	Check the encoder cable and replace if necessary.	Programmed acknowledgement
5:X4-chan. B/Dat	Wire break track B/Data		Programmed acknowledgement
6:X4-channel 0	Wire break channel 0		Programmed acknowledgement
7:X4-EnDatAlarm	Alarm bit of EnDat encoder present.	Replace the motor.	Switch device off/on
8:X4-EnDatCRC	Errors accumulate during data transfer.	• Check the connection and shielding of the encoder cable. • Reduce the electromagnetic interference.	Programmed acknowledgement

Cause	Description	Measure	Acknowledgement
10:Resol.carrier	The resolver could not be calibrated or optimized.	• Check the encoder cable. • Check whether the specification of the resolver matches the specifications of STOBER.	Programmed acknowledgement
11:X140-undervolt.	Incorrect transfer factor		Switch device off/ on
12:X140-Overvltg			Programmed acknowledgement
14:Resol.failure	Wire break	• Check the encoder cable.	Programmed acknowledgement
15:X120-double transmission	Different positions are frequently determined at X120 during double transmission.		Switch device off/ on
16:X120-Busy	Encoder has not responded for too long; for SSI Slave: No telegram for 5 ms for enabled drive.	• Replace the option board that the encoder is connected to. • Replace the inverter.	Programmed acknowledgement
17:X120-Wire break	A wire break was detected at X120.	• Check the connected cable (encoder or SSI connection). • Check the power supply of the SSI encoder or the source that simulates the SSI signals. • Make sure that the settings of the SSI master are matched to the SSI encoder or the source that simulates the SSI signals. • Check whether a device is correctly parameterized as the source of the SSL signals in the SSI motion bus. • Check whether the devices in the SSI motion bus boot up together.	Programmed acknowledgement

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Cause	Description	Measure	Acknowledgement
18:X120-Timeout	No cycle signal was detected from the SSI master.	• Check the connected cable. • Check the power supply of the SSI master. • Make sure that the settings of all devices in the SSI motion bus are matched to each other. • Check whether a device is correctly parameterized as the SSL master in the SSI motion bus. • Check whether the devices in the SSI motion bus boot up together.	Programmed acknowledgement
19:X4 double transmission	Different positions are frequently determined at X4 during double transmission.	• Check the connection and shielding of the encoder cable. • Reduce the electromagnetic interference.	Programmed acknowledgement
20:X4-Busy	Encoder has not responded for too long.	• Check the encoder cable. • Check whether a suitable encoder is connected.	Programmed acknowledgement
21:X4-wire break	A wire break from one or more tracks was detected.	• Check the encoder cable.	Programmed acknowledgement
22:AX5000	Acknowledgement for axis switchover did not occur.	Check the wiring between the inverter and POSISwitch AX 5000.	Programmed acknowledgement
23:AX5000required	A POSISwitch AX 5000 was projected but not connected.	• Match the projection of your hardware. • Check the connection of the POSISwitch AX 5000.	Programmed acknowledgement
24:X120-speed	*B297*, *G297* or *I297* exceeded for the encoder at X120	• Check the connection and shielding of the encoder cable. • Reduce the electromagnetic interference. • Check the parameterization of *B297*, *G297* or *I297*.	Programmed acknowledgement
25:X4-speed	*B297*, *G297* or *I297* exceeded for the encoder at X4		Programmed acknowledgement
26:X4-noEnc.found	No encoder was found at X4 or a wire break was detected at the EnDat/SSI encoder.	• Correct the connection of the encoder. • Check the encoder cable. • Correct the power supply of the encoder. • Check the setting of the *H00* parameter.	Programmed acknowledgement

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Cause	Description	Measure	Acknowledgement
27:X4-AX5000 gef	A functional AX 5000 option was found at X4 although the incremental encoder or EnDat encoder was parameterized or no EnDat encoder is connected to option AX 5000.	• Check the setting of the *H00* parameter. • Check the connection of the encoder at the POSISwitch AX 5000.	Programmed acknowledgement
28:X4-EnDatfound	An EnDat encoder was detected at X4 although a different encoder was parameterized.	Check the setting of the *H00* parameter.	Programmed acknowledgement
29:AX5000/IncEnc	A faulty POSISwitch AX 5000 option at X4 or a wire break in the A-channel for an incremental encoder was detected.	• Replace the AX 5000 option. • Check the encoder cable of the incremental encoder.	Programmed acknowledgement
30:Opt2 incomp	Option 2 is not the latest version.	Install the latest version of the option board.	Programmed acknowledgement
31:X140EnDatAlar	The EnDat encoder at X140 reports an alarm.	Replace the motor.	Programmed acknowledgement
32:X140EnDatCRC	Errors accumulate during data transfer. The encoder is not available.	• Make sure that the correct encoder type is connected. • Check the connection and shielding of the encoder cable. • Reduce the electromagnetic interference.	Programmed acknowledgement
33:IGB Angle dif.	*G297* exceeded on the IGB	• Check the parameterization of G297. • Check the producer.	Programmed acknowledgement

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Cause	Description	Measure	Acknowledgement
34:battery low	When switching on the inverter, it was determined that the voltage of the battery has fallen below the warning limit of the encoder. Referencing of the axis remains intact. However, the remaining service life of the backup battery is limited.	• Replace the AES battery before the next time the inverter is switched off. Note also the Absolute Encoder Support AES operating instructions (see section 1.3 Further documentation).	Programmed acknowledgement
35:battery empty	When switching on the inverter, it was determined that the voltage of the battery has fallen below the minimal voltage of the encoder. Referencing of the axis has been deleted. The backup battery is no longer able to retain the position in the encoder over the time during which the inverter in switched off.	• Referencing the axis. • Replace the AES battery before the next time the inverter is switched off. Note also the Absolute Encoder Support AES operating instructions (see section 1.3 Further documentation).	Programmed acknowledgement

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13.3.8 38:TempDev.sens

Triggering	Level	Response	Fault counter
The temperature measured by the device sensor exceeds the permitted maximum value or has fallen below the permitted minimum value. The permitted temperatures are saved in the power unit of the inverter.	Fault	The parameterized fault reaction in the *A29* parameter.	*Z38*

Possible cause	Test	Measure	Acknowledgement
The ambient/control cabinet temperatures are too high or too low.	Correct the surrounding temperature of the inverter.	Take suitable measures to match the surrounding temperature to the operating conditions of the inverter.	Switch the device off/on or programmed acknowledgement
Fan faulty	Switch on the control unit power supply and check whether the fan(s) start up.	Replace the inverter.	

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13.3.9 39:TempDev i2t

Triggering	Level	Response	Fault counter
The i^2t-model calculated for the inverter exceeds the thermal load of 100% (for firmware 5.6-P or higher, the threshold in A27 can be set).	Inactive, message, warning or malfunction can be parameterized in *U02*	When triggering an event, a current limit initially takes place in the servo and vector control control types. At the same time, a quick stop is triggered as a fault when parameterizing in *U02*. Reducing the current can cause the quick stop to no longer perform correctly.	*Z39*

Possible cause	Test	Measure	Acknowledgement
Inverter overloaded	Check the load situation of your drive.	• Correct the design of the drive. • Check the maintenance condition of the drive (block, lubrication, etc.)	Switch the device off/on or programmed acknowledgement
Cycle frequency too high (*B24*)	Check the load situation of your drive under consideration of the derating.	• Reduce *B24*. • Use a drive with a suitable power rating.	

13.3.10 40:Invalid data

Triggering	Level	Response	Fault counter
A data error was detected when initializing the non-volatile memory.	Fault	The inverter cannot be enabled.	*Z40*

Cause	Description	Measure	Acknowledgement
1:Error	Low level write/read error or timeout.	Replace the inverter.	Not confirmable
2:BlockMiss	unknown data block		
3:DataSecurity	Block has no data security.		
4:CheckSum	Block has a check sum error.		
5:R/O	Block is r/o.		
6:ReadErr	Start-up phase: Block read error		
7:BlockMiss	Block not found		
17:Error	Low level write/read error or timeout		
18:BlockMiss	unknown data block		
19:DataSecurity	Block has no data security.		
20:CheckSum	Block has a check sum error.		
21:R/O	Block is r/o.		
22:ReadErr	Start-up phase: Block read error		
23:BlockMiss	Block not found.		

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Cause	Description	Measure	Acknowledgement
32:el. Nameplate	no nameplate data available	• For STOBER standard motor: Please contact our service department, see section 1.4 Further support • For motor from other manufacturers: Set *B06* to *1:arbitrary setting* and manually enter the motor data.	Switch the device off/on or programmed acknowledgement
33:el.typeLim	Nameplate parameter cannot be entered (limit value or existence).	• Check the configuration of the inverter and motor. • Please contact our service department, see section 1.4 Further support	
48:Option module2	Error in memory of option 2 for REA 5000 or REA 5001 and XEA 5000 or XEA 5001.	The option must be sent in for repair.	Not confirmable

13.3.11 41:Temp.MotorTMS

Resolution	Level	Response	Fault counter
Motor temperature sensor reports overtemperature (connection clamp X2).	Warning and malfunction can be parameterized in *U15.*	The parameterized malfunction reaction in the *A29* parameter.	*Z41*

Possible cause	Test	Measure	Acknowledgement
The motor temperature sensor is not connected.	Check whether the motor temperature sensor is connected to X2 and whether the wiring is OK.	Connect the cable properly.	Switch the device on/off or programmed acknowledgement
The motor is overloaded	Check whether the operating conditions have caused the motor to overheat (load state, ambient temperature of the motor, etc.).	• Check and, if necessary, correct the drive design. • Check whether a blockage caused overheating.	
The KTY evaluation is activated although an A-device is not involved.	Your device indicates a HW version of 190 or lower and *B38* is set to *1: KTY 84-1xx*.	• If the motor allows it, set *B38 = 0: PTC*. • Replace the inverter with an A-device (HW version 200 or higher).	

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13.3.12 42:TempBrakeRes

Triggering	Level	Response	Fault counter
The i^2t model for the braking resistor exceeds 100% load.	Fault	The parameterized fault reaction in the *A29* parameter.	*Z42*

Possible cause	Test	Measure	Acknowledgement
The braking resistor may not be designed according to the application.	Check whether the load state of the braking resistor has caused overheating.	Check the drive configuration. Consider a DC link connection or the use of a braking resistor with a larger power rating.	Programmed acknowledgement; acknowledgement by switching of/on is not recommended as in this case the i^2t model is reset to 80 %. As a result, there is a risk that the braking resistor will be damaged.

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13.3.13 44:External fault

Triggering	Level	Response	Fault counter
Application-specific or by free programming option	Fault	The parameterized fault reaction in the *A29* parameter: • *A29 = 0:inactive* The power unit is switched off, the motor coasts down. The holding brakes are applied when the purge override is inactive. • *A29 = 1:active* The drive is stopped with a quick stop. The holding brakes are applied at the end of a quick stop if the purge override is inactive.	*Z44*

Possible cause	Test	Measure	Acknowledgement
Application-specific or based on free programming option; can be separately programmed for each axis	—	—	Switch the device off/on or programmed acknowledgement

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13.3.14 45:oTempMot. i2t

Resolution	Level	Response	Fault counter
The i^2t model for the motor reaches 100% load.	Parameterized as inactive, message or warning in *U10* and *U11*.	The parameterized malfunction reaction in the *A29* parameter.	*Z45*

Possible cause	Test	Measure	Acknowledgement
The motor is overloaded	Check whether the operating conditions have caused the motor to overheat (load state, ambient temperature of the motor, etc.).	• Take measures to meet the requirements for the operating conditions. • Rectify any existing blockages. • If necessary, correct the drive design.	Switch the device off/on or programmed acknowledgement.

13.3.15 46:Low voltage

Resolution	Level	Response	Fault counter
A problem with the supply voltage or DC link voltage was detected.	• Cause 1: Parameterized in *U00* and *U01* • Cause 2: Warning with 10 s warning time • Cause 3: Malfunction	The parameterized malfunction reaction in the *A29* parameter for cause 1 and 2. For cause 3, the motor always coasts except when *U30 Emergency stop* is activated.	*Z46*

Cause	Description	Measure	Acknowledgement
1:low Voltage	The value in *E03 DC link voltage* has fallen below the value parameterized in *A35 Undervoltage limit*.	Check whether the supply voltage corresponds to the specification.	Can be acknowledged for malfunction level by switching the device off/on or programmed acknowledgement.
2:network phase	The line monitoring has detected that a phase is missing when the power stage is switched on.	Check the line fuse and wiring.	
3:drop in network	If the line monitoring detects that the line is missing, the load relay is immediately switched off. Normal operation is maintained. If the line return of the power stage is still switched on, a malfunction is triggered after 0.5 s.	Check whether the supply voltage corresponds to the specification or whether there is a power failure.	

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13.3.16 47:TorqueLimit

Resolution	Level	Response	Fault counter
The maximum torque permitted for static operation is exceeded in the control types of servo control, vector control or sensorless vector control (*E62 act. pos. T-max*, *E66 act. neg. T-max*). Note that in many cases, operation at the torque limit is desirable.	Can be parameterized in *U20* and *U21*	The parameterized malfunction reaction in the *A29* parameter.	*Z47*

Possible cause	Test	Measure	Acknowledgement
Incorrect parameterization	Check whether the torque moments in *E62* and *E66* correspond with your projection.	Correct the setting of the parameters in *C03*, *C05*, *C06*, *C130* and *C230*.	Can be acknowledged for malfunction level by switching the device off/on or programmed acknowledgement.
Drive overloaded	Check the load situation of your drive.	Rectify any existing blockages.	

13.3.17 52:Communication

Triggering	Level	Response	Fault counter
Communication malfunction	Fault		*Z52*

Cause	Description	Measure	Acknowledgement
1:CAN LifeGuard	The device detects the *Life-Guarding event* (master no longer sends any Remote Transmit Request).	Check the CANOpen master.	Switch off/on the Esc key of the device at the front of the inverter or rising flank of the enable signal or programmed acknowledgement
2:CAN Sync Error	Sync message was not received within the timeout period that is calculated from the *A201 Cycle Period Timeout* as follows: • *A201* ≤ 20 ms: Timeout period = *A201* * 4, • 20 ms < *A201* ≤ 200 ms: Timeout period = *A201* * 3, • Otherwise: Timeout period = *A201* * 2	• Make sure that the *A201* parameter is correctly set. • Make sure that the master sends the sync message reliably.	Switch off/on the Esc key of the device at the front of the inverter or rising flank of the enable signal or programmed acknowledgement
3:CAN Bus Off	The CAN controller in the inverter has switched off due to critical and repeated CAN bit timing errors. The CAN controller is restarted after a waiting time of 2 s and acknowledgement of the malfunction.	• Make sure that the CAN baud rate was correctly set. • Check the wiring. • Check the bit timing of a different CAN subscriber.	Switch off/on the Esc key of the device at the front of the inverter or rising flank of the enable signal or programmed acknowledgement
4:PZD-Timeout	• Failure of the cyclic data connection (PROFIBUS master no longer sends) or connection is faulty or • PROFINET IO controller no longer sends or the connection is faulty	• Check the PLC (RUN switch, set cycle time). • Check the wiring.	Switch off/on the Esc key of the device at the front of the inverter or rising flank of the enable signal or programmed acknowledgement

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Cause	Description	Measure	Acknowledgement
5:USS	Failure of cyclic data connection (USS).	Check the USS master.	Switch off/on the Esc key of the device at the front of the inverter or rising flank of the enable signal or programmed acknowledgement
6:EtherCAT PDO-Ti	The inverter did not receive process data in the time period that was parameterized in *A258*.	• Make sure that the *A252.x, A253.x, A256, A257.x, A258, A259.x, A260, A261.x, A262.x, A263.x, A264.x, A265.x, A266* and *A267.x* parameters are correctly set. • Make sure that the timeout value parameterized in *A258* matches the *A150 cycle time* (of the inverter) and the cycle time of the controller or EtherCAT masters that were selected. • Check the wiring. • Check the EtherCat state of the inverter and the controller or EtherCAT master. • Check whether CoE emergency messages are present in the controller or the EtherCAT master.	Switch the device off/on or programmed acknowledgement. Note that an action must also occur in the controller or the EtherCAT master for complete acknowledgement.

Cause	Description	Measure	Acknowledgement
7:EtherCAT-DcSYN	If the inverter is synchronized to EtherCAT by means of the Distributed Clock, the "SYNC 0" synchronization signal is checked by a watchdog. If this SYNC 0 signal remains for a certain time (that cannot be parameterized), this cause is triggered. This cause can only be triggered for EtherCAT with synchronization by the Distributed Clock.	• Check the controller. • Make sure that the wiring is in accordance with electromagnetic interference regulations. • Replace the ECS 5000. • Please contact our service department, see section 1.4 Further support	Switch the device off/on or programmed acknowledgement. Note that an action must also occur in the controller or the EtherCAT master for complete acknowledgement.
8:IGB µC failure	The microcontroller for the IGB communication has failed.	• Check the wiring for EM-compliant design. • The inverter must be sent in for repair. Please contact our service department, see section 1.4 Further support	Switch the device off/on or programmed acknowledgement
9:IGB Lost Frame	IGB motion bus: The subscriber has detected the loss of min. 2 consecutive data frames (double error). This cause can only occur when the IGB state = *3:Motion bus* and the motor is powered.	• Make sure that all inverters in the IGB network are switched on. • Make sure that all connection cables are plugged in.	Switch the device off/on or programmed acknowledgement
10:IGB P. LostFr	IGB motion bus: A different subscriber has detected a double error and reported this via *A163*. As a result, this inverter is also faulty with this cause. This cause can only occur when the IGB state = *3:Motion bus* and the motor is powered.		Switch the device off/on or programmed acknowledgement

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Cause	Description	Measure	Acknowledgement
11:IGB Sync Erro	The synchronization within the inverter is faulty as the configuration was stopped by POSITool. This cause can only occur when the IGB state = *3:Motion bus* and the motor is powered.	• Start the configuration in the inverter. • If the result occurs with this cause for a running configuration, the inverter must be sent in for repair. Please contact our service department, see section 1.4 Further support	Switch the device off/on or programmed acknowledgement
12:IGB ConfigTim	An IGB motion bus consumer block or producer block in the graphical programming was called up at the wrong time. The block was called up too early or closed too late. This cause can only occur when the IGB state = *3:Motion bus* and the motor is powered.	Adjust the run-time sequence of the blocks, transfer the changed configuration to the inverter and save it there. Restart the inverter.	Switch the device off/on or programmed acknowledgement.
13:IGBPartnerSyn	There is a synchronization malfunction for another subscriber in the IGB network (see cause 11). This subscriber reported its fault via *A163*. As a result, this inverter is also faulty with cause 13. This cause can only occur when the IGB state = *3:Motion bus* and the motor is powered.	Check the inverter that displays event 52 with cause 11.	Switch the device off/on or programmed acknowledgement

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13.3.18 55:OptionBoard

Resolution	Level	Response	Fault counter
Error when operating with option board.	Malfunction	The parameterized malfunction reaction in the *A29* parameter.	*Z55*

Cause	Description	Measure	Acknowledgement
1:CAN5000Failure	CAN 5000 was detected, installed and failed.	• Uninstall the option, check the contacts and reinstall the option. • Replace the option.	Switch the device on/off or programmed acknowledgement
2:DP5000Failure	DP 5000 was detected, installed and failed.		
3:REA5000Failure	REA 5000 was detected, installed and failed.		
4:SEA5000failure	SEA 5000 was detected, installed and failed.		
5:XEA5000Failure	XEA 5000 or XEA 5001 was detected, installed and failed.		
6:InkSim-Init	Incremental encoder simulation on XEA could not be initialized. The motor may have rotated during initialization.		
7:wrongOption	incorrect or missing option board (see*E54/E58* with *E68/E69*)	• Install the projected option. • Adjust the projection.	Switch device off/on
8:LEA5000failure	LEA 5000 was detected, installed and failed.	• Uninstall the option, check the contacts and reinstall the option. • Replace the option.	Switch the device on/off or programmed acknowledgement
9:ECS5000failure	ECS 5000 was detected, installed and failed.	• Uninstall the option, check the contacts and reinstall the option. • Replace the option.	Switch the device on/off or programmed acknowledgement
10:24Vfailure	Failure of 24V supply for XEA 5001 or LEA 5000.	Check and, if necessary, correct the 24V supply of the option.	Switch device off/on

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Cause	Description	Measure	Acknowledgement
11:SEA5001failure	SEA 5001 was detected, installed and failed.	• Uninstall the option, check the contacts and reinstall the option. • Replace the option.	Switch the device on/off or programmed acknowledgement
12:REA5001failure	REA 5001 was detected, installed and failed.	• Uninstall the option, check the contacts and reinstall the option. • Replace the option.	Switch the device on/off or programmed acknowledgement
13:PN5000 Failure1	PN 5000 was detected, installed and failed. Basic hardware tests have detected an error.	• Check whether the PN 5000 accessory was correctly installed. • Check whether suitable EMC measures were taken. • Check whether only PROFINET-certified components were connected to the inverter. • Check whether the cabeling and connections correspond to the PROFINET standard. • Contact the service department, see section 1.4 Further support.	Switch device off/on
14:PN5000 failure2	PN 5000 was detected, installed and failed. Basic software tests have detected an error.		Switch device off/on
15:PN5000 failure3	PN 5000 was detected, installed and failed. The watchdog function of the PN-5000 monitoring system has detected an error.		Switch device off/on

13.3.19 56:Overspeed

Resolution	Level	Response	Fault counter
The measured speed is larger than *C01* x 1.1 + 100 rpm.	Malfunction	The motor always coasts (from V5.0D) except when *U30 Emergency stop* is activated. Any existing brakes are engaged if they were not released via *F100* independent of the device controller.	*Z56*

Possible cause	Test	Measure	Acknowledgement
Incorrect parameterization of the encoder	Check the parameterization of the encoder, e.g. the line number of the incremental encoders.	If necessary, correct the parameters.	Switch the device on/off or programmed acknowledgement
Lag error too large	Use a Scope recording to check whether the value in *E07* is larger than *C01* at the time of the error.	Correct the parameters (ramps, torque limits, etc.).	
Motor overshoots	Use a Scope recording to check the value in *E91* is larger than *E07* at the time of the error.	Optimize the parameterization of the speed controller (*C31* ,*C32*).	
Incorrect commutation offset for the encoder of a servo motor	Perform the *B40 phase test* action.	The *B40 phase test*action must be in accordance with specifications.	
Encoder faulty	Check whether a speed that clearly differs to zero is displayed in *E91* during a motor standstill.	The motor must be sent in for repair. Please contact our service department, see section 1.4 Further support	

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13.3.20 57:Runtime usage

Triggering	Level	Response	Fault counter
The cycle time of a real time cycle was exceeded.	Fault	The parameterized fault reaction in the *A29* parameter.	*Z57*

Cause	Description	Measure	Acknowledgement
2:RT2	Cycle time of real time task 2 exceeded (1 ms).	Replace the inverter.	Switch the device off/on or programmed acknowledgement
3:RT3	Cycle time of real time task 3 exceeded (technology task).	Set a higher cycle time in A150.	
4:RT4	Cycle time of real time task 4 exceeded (32 ms).		
5:RT5	Cycle time of real time task 5 exceeded (256 ms)		

13.3.21 58:Grounded

Resolution	Level	Response	Fault counter
Unbalanced motor currents were detected. This involves a hardware from the power stage for MDS 5000 size 3 or SDS 5000 size 3.	Malfunction	The motor continues to coast. Any existing brakes are engaged if they were not released via *F100* independent of the device controller. The brake chopper is switched off as long as the malfunction is present.	*Z58*

Possible cause	Test	Measure	Acknowledgement
Ground fault in motor	Check the motor.	Replace the motor.	Switch the device on/off or programmed acknowledgement
Fault in motor cable	Check the cable.	Replace the cable	
Connection fault	Check the connection, e.g. whether V or W is connected to PE at X20 U.	Correct the connection.	

13.3.22 59:TempDev. i2t

Triggering	Level	Response	Fault counter
The i^2t-model calculated for the inverter exceeds the maximum allowed thermal load of 105% (for firmware 5.6-P or higher, triggering only occurs when A27=100% is set).	Fault	The parameterized fault reaction in the *A29* parameter.	*Z59*

Possible cause	Test	Measure	Acknowledgement
Inverter overloaded	Check the load situation of your drive.	• Reduce any existing loads (lubrications, blockages, etc.). • Use a drive with a suitable power rating.	Switch the device off/on or programmed acknowledgement
Cycle frequency too high	Check the load situation of your drive under consideration of the derating.	• Reduce *B24*. • Use a drive with a suitable power rating.	

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13.3.23 60-67:Application events 0-7

Resolution	Level	Response	Fault counter
Application-specific or due to free programming option; can be separately programmed for each axis • Message/warning: Evaluation occurs in 256 ms cycle. • Malfunction: Evaluation occurs in parameterized cycle time (*A150*)	Can be parameterized in the *U100*, *U110, U120*, etc. up to *U170* system parameters.	The parameterized malfunction reaction in the *A29* parameter.	*Z60* to *Z67*

Possible cause	Test	Measure	Acknowledgement
Application-specific or due to free programming option; can be separately programmed for each axis	—	—	Switch the device on/off or programmed acknowledgement

13.3.24 68: External fault 2

Triggering	Level	Response	Fault counter
Application-specific or by free programming option; should be used for application events that may only be parameterized on the fault level.	Fault	The parameterized fault reaction in the *A29* parameter: • *A29 = 0:inactive* The power unit is switched off, the motor coasts down. The holding brakes are applied when the purge override is inactive. • *A29 = 1:active* The drive is stopped with a quick stop. The holding brakes are applied at the end of a quick stop if the purge override is inactive.	*Z68*

Possible cause	Test	Measure	Acknowledgement
Application-specific or by free programming option	—	—	Switch the device off/on or programmed acknowledgement

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13.3.25 69:Motor connect.

Triggering	Level	Response	Fault counter
Motor connection error	Can be parameterized as inactive or malfunction in U12	The parameterized fault reaction in the *A29* parameter: • *A29 = 0:inactive* The power unit is switched off, the motor coasts down. The holding brakes are applied when the purge override is inactive. • *A29 = 1:active* The drive is stopped with a quick stop. The holding brakes are applied at the end of a quick stop if the purge override is inactive.	*Z69*

Cause	Description	Measure	Acknowledgement
1:motorNotDiscon	The contactor did not open during the axis change. This cause can only be determined when at least two phases stick and the intermediate circuit is loaded (see E03).	Replace the contactor.	Switch the device off/on or programmed acknowledgement
2:no motor	Possibly no motor connected or the line to the motor is interrupted.	• Check and correct the connection of the motor. • Replace the cable.	

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13.3.26 70:Param.consist

Resolution	Level	Response	Fault counter
Conflicting parameterization.	Malfunction	A malfunction is only triggered when enabled for faulty parameterization.	*Z70*

Cause	Description	Measure	Acknowledgement
1:Encoder type	The *B20* control type is set to *servo or Vector Control* but no corresponding encoder is selected (*B26*, H.. parameter).	Correct the parameterization.	Switch the device on/off or programmed acknowledgement
2:X120-direction	X120 is used as the source in a parameter but is parameterized in *H120* as a drain (or vice-versa).	Correct the parameterization.	
3:B12<->B20	*B20* control type is not set to the servo but the rated motor current (*B12*) exceeds the 4 kHz rated current (*R24*) of the device by more than 1.5x.	Correct the parameterization.	Switch the device on/off or programmed acknowledgement
4:B10<->H31	The set motor pole number (*B10*) and the resolver pole number (*H31*) do not match.	Correct the parameterization.	Switch the device on/off or programmed acknowledgement
5:neg. slip	When using the control types U/f, SLVC or Vector Control (*B20*): Control type set to "ASM": The values for the rated motor speed (*B13*), rated motor frequency (*B15*) and motor pole number (*B10*) result in a negative slippage.	Correct the parameterization.	Switch the device on/off or programmed acknowledgement
6:Torque limit	When using the values entered in *C03* or *C05*, the maximum current of the inverter is exceeded. Enter lower torque limits.	Correct the parameterization.	Switch the device on/off or programmed acknowledgement

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Cause	Description	Measure	Acknowledgement
7:B26:SSI-Slave	SSI slave must not be used as a motor encoder (synchronisation problems).	Correct the parameterization.	Switch the device on/off or programmed acknowledgement
8:C01>B83	*C01* must not be larger than *B83*.	Correct the parameterization.	Switch the device on/off or programmed acknowledgement
9:E102/E103 faulty	An attempt was made to apply a master position via the IGB but the required *E102* and *E103* parameters are not available.	Correct the parameterization.	Switch the device on/off or programmed acknowledgement
10: G104<->G27	A master position is sent via the IGB Motionbus (i.e. *G104* is not set to *0:inactive*) but the *0:inactive* and *6:IGB* settings valid for this case could not be detected in *G27*.	Correct the parameterization.	Switch the device on/off or programmed acknowledgement

13.3.27 71:Firmware

Triggering	Level	Response	Fault counter
A firmware error was detected.	Fault	Causes 1 and 2 only occur when the device starts so that the inverter can not be enabled. Cause 3 can also occur during operation.	*Z71*

Cause	Description	Measure	Acknowledgement
1:FW defective	Only for SDS 5000: An active firmware error was detected or faulty firmware was detected in the firmware download memory.	Reload the firmware using the POSITool software. Also note the Service section.	Switch device off/on
2:Activate FW!	Only for SDS 5000: The firmware was loaded into the inverter but not yet activated.	Activate the firmware and perform a device restart. Also note the Service section.	
3:CRC error	A firmware error was detected.	Switch off the 24 vdc power supply and switch it on again. If the error occurs repeatedly, replace the inverter.	

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13.3.28 72:Brake test

Triggering	Level	Response	Fault counter
For active brake management in the SDS 5000, the time set in *B311* has elapsed without the *B300 Brake test* action having been performed.	Cause 1 and 2: Fault, Cause 3: Message	This fault only occurs with the enable switched off.	*Z72*

Cause	Description	Measure	Acknowledgement
1:B311Timeout	The time entered in *B311 Timeout for brake test B300* has elapsed twice without the *B300 Brake test* action having been performed.	Perform the *B300 brake test* action.	For the *Fault* level, the event can be acknowledged for a duration of 5 minutes to be able to perform the *B300 brake test* action. If this time elapses without the *B300 Brake test* action being successfully performed, the inverter changes to the *Malfunction* state again. If the *B300 brake test* action is successfully performed, the event is automatically acknowledged.
2:Brake defective	When performing the brake test action, the holding torque entered in *B304* or *B305* could not be applied or the encoder test run included in the brake test was completed with errors.	• Perform the brake grinding function and then the brake test. • Replace the motor.	
3:Brake test required	Timeout for brake test has elapsed once without the test brake action being performed.	Perform the action *B300* test brake.	

13.3.29 73:Ax2braketest

Triggering	Level	Response	Fault counter
For active brake management in the SDS 5000, the time set in *B311* has elapsed without the *B300 Brake test* action with active axis 2 having been performed.	Cause 1 and 2: Fault, Cause 3: Message	This fault only occurs with the enable switched off.	*Z73*

Cause	Description	Measure	Acknowledgement
1:B311Timeout	The time entered in *B311 Timeout for brake test B300* has elapsed twice without the *B300 Brake test* action with active axis 2 having been performed.	Perform the *B300 brake test* action.	For the *Fault* level, the event can be acknowledged for a duration of 5 minutes to be able to perform the *B300 brake test* action. If this time elapses without the *B300 Brake test* with active axis 2 being successfully performed, the inverter changes to the *Malfunction* state again. If the *B300 brake test* action is successfully performed, the event is automatically acknowledged.
2:Brake defective	When performing the brake test action with active axis 2, the holding torque entered in *B304* or *B305* could not be applied or the encoder test run included in the brake test was completed with errors.	• Perform the brake grinding function and then the brake test. • Replace the motor.	
3:Brake test required	Timeout for brake test has elapsed once without the test brake action being performed.	Perform the action *B300* test brake.	

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13.3.30 74:Ax3braketest

Triggering	Level	Response	Fault counter
For active brake management in the SDS 5000, the time set in *B311* has elapsed without the *B300 Brake test* action with active axis 3 having been performed.	Cause 1 and 2: Fault, Cause 3: Message	This fault only occurs with the enable switched off.	*Z74*

Cause	Description	Measure	Acknowledgement
1:B311Timeout	The time entered in *B311 Timeout for brake test B300* has elapsed twice without the *B300 Brake test* action with active axis 3 having been performed.	Perform the *B300 brake test* action.	For the *Fault* level, the event can be acknowledged for a duration of 5 minutes to be able to perform the *B300 brake test* action. If this time elapses without the *B300 Brake test* with active axis 3 being successfully performed, the inverter changes to the *Malfunction* state again. If the *B300 brake test* action is successfully performed, the event is automatically acknowledged.
2:Brake defective	When performing the brake test action with active axis 3, the holding torque entered in *B304* or *B305* could not be applied or the encoder test run included in the brake test was completed with errors.	• Perform the brake grinding function and then the brake test. • Replace the motor.	
3:Brake test required	Timeout for brake test has elapsed once without the test brake action being performed.	Perform the action *B300* test brake.	

13.3.31 75:Ax4braketest

Triggering	Level	Response	Fault counter
For active brake management in the SDS 5000, the time set in *B311* has elapsed without the *B300 Brake test* action with active axis 4 having been performed.	Cause 1 and 2: Fault, Cause 3: Message	This fault only occurs with the enable switched off.	*Z75*

Cause	Description	Measure	Acknowledgement
1:B311Timeout	The time entered in *B311 Timeout for brake test B300* has elapsed twice without the *B300 Brake test* action with active axis 4 having been performed.	Perform the *B300 brake test* action.	For the *Fault* level, the event can be acknowledged for a duration of 5 minutes to be able to perform the *B300 brake test* action. If this time elapses without the *B300 Brake test* with active axis 4 being successfully performed, the inverter changes to the *Malfunction* state again. If the *B300 brake test* action is successfully performed, the event is automatically acknowledged.
2:Brake defective	When performing the brake test action with active axis 4, the holding torque entered in *B304* or *B305* could not be applied or the encoder test run included in the brake test was completed with errors.	• Perform the brake grinding function and then the brake test. • Replace the motor.	
3:Brake test required	Timeout for brake test has elapsed once without the test brake action being performed.	Perform the action *B300* test brake.	

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13.3.32 85:Excessive jump in reference value

Triggering	Level	Response	Counter
If reference value monitoring *C100* is active, the assigned reference values require an acceleration that the motor is unable to maintain while keeping to the maximum output current of the inverter power unit I_{2maxPU} (*R04*R26*) – even in idle.	Fault	Parameterized fault response in *A29*: • *A29 = 0:inactive* The power unit is switched off and the drive becomes torque-free/force-free. The holding brakes are applied when the purge override is inactive. • *A29 = 1:active* The drive is stopped with a quick stop. The holding brakes are applied at the end of a quick stop if the purge override is inactive.	*Z85*

Cause	Description	Measure	Acknowledgement
1: Position	Reference position changes cause acceleration that cannot be executed	Reduce velocity of the reference value changes so that the resulting acceleration is smaller than *E64*.	Switch the device off/on or programmed acknowledgement
2: Velocity	Reference velocity changes cause acceleration that cannot be executed		

13.3.33 #004:illeg.Instr

Triggering	Level	Response
An unknown operation code was detected.	Fault	The motor coasts, the microprocessor is stopped and all device functions are inoperable.

Possible cause	Test	Measure	Acknowledgement
Error in code memory (bit dumped, permanent).	Reestablish the operating conditions at the time of the error and check whether the error occurs again.	• Reload the application in the inverter and save it. • Perform a firmware upgrade.	Switch device off/on
EMC error	Check the wiring for EMC-compliant design.	Wire according to EMC regulations.	

13.3.34 #006:illSlotInst

Triggering	Level	Response
An invalid operation code was detected after a jump command.	Fault	The motor coasts, the microprocessor is stopped and all device functions are inoperable.

Possible cause	Test	Measure	Acknowledgement
Error in code memory (bit dumped, permanent).	Reestablish the operating conditions at the time of the error and check whether the error occurs again.	• Reload the application in the inverter and save it. • Perform a firmware upgrade.	Switch device off/on
EMC error	Check the wiring for EMC-compliant design.	Wire according to EMC regulations.	

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13.3.35 #009:CPU AddrErr

Triggering	Level	Response
The address for data access is invalid.	Fault	The motor coasts, the microprocessor is stopped and all device functions are inoperable.

Possible cause	Test	Measure	Acknowledgement
Error in code memory (bit dumped, permanent).	Reestablish the operating conditions at the time of the error and check whether the error occurs again.	• Reload the application in the inverter and save it. • Perform a firmware upgrade.	Switch device off/on
EMC error	Check the wiring for EMC-compliant design.	Wire according to EMC regulations.	

13.3.36 #00c:StackOverfl

Triggering	Level	Response
A stack that is too small was detected.	Fault	The motor coasts, the microprocessor is stopped and all device functions are inoperable.

Possible cause	Test	Measure	Acknowledgement
Error in code memory (bit dumped, permanent).	Reestablish the operating conditions at the time of the error and check whether the error occurs again.	• Reload the application in the inverter and save it. • Perform a firmware upgrade.	Switch device off/on
EMC error	Check the wiring for EMC-compliant design.	Wire according to EMC regulations.	

13.3.37 *ParaModul ERROR:update firmware!

Resolution	Level	Response
The versions of configuration and firmware do not match.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
Old firmware version	—	Apply a suitable configuration or firmware.	—

13.3.38 *ParaModul ERROR: file not found

Resolution	Level	Response
The Paramodule file can not be read.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
May have been switched off during the *A00* action.	—	• Apply a suitable configuration via POSITool and then save it (*A00*) • Attach a suitable Paramodule.	—
Faulty or unformatted Paramodule	—	Replace the Paramodule.	—

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13.3.39 *ParaModul ERROR: Checksum error

Resolution	Level	Response
A checksum error was detected when loading from the Paramodule.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
Memory bit dumped.	—	Apply a suitable configuration via POSITool and then save it (*A00*)	—

13.3.40 *ParaModul ERROR: ksb write error

Resolution	Level	Response
An error was detected when writing the configuration in the configuration memory.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
Faulty flash memory.	—	Replace the Paramodule.	—
The configuration is too large for the configuration memory.		• Apply a suitable configuration via POSITool and then save it (*A00*) • Replace the Paramodule.	

13.3.41 *ConfigStartERROR parameters lost

Resolution	Level	Response
No parameter values are saved in the Paramodule.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
The control part was switched off while *A00* was active.	—	• Apply a suitable configuration via POSITool and then save it (*A00*) • Replace the Paramodule.	—

13.3.42 *ConfigStartERROR remanents lost

Resolution	Level	Response
No flag values are saved.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
The *A00 Save values* action was not performed.	—	• Apply a suitable configuration via POSITool and then save it (*A00*) • Replace the Paramodule.	—

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13.3.43 *ConfigStartERROR unknown block

Resolution	Level	Response
The versions of configuration and firmware do not match.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
The configuration saved in the Paramodule originates from a newer inverter firmware that recognises more system modules.	—	Apply a suitable configuration or firmware via POSITool.	—

13.3.44 *ConfigStartERROR unknown string

Resolution	Level	Response
The versions of configuration and firmware do not match.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
The configuration saved in the Paramodule originates from a newer inverter firmware that recognises more texts (e.g. name of the system standard module parameters).	—	Apply a suitable configuration or firmware via POSITool.	—

13.3.45 *ConfigStartERROR unknown scale

Resolution	Level	Response
The versions of configuration and firmware do not match.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
The configuration saved in the Paramodule originates from a newer inverter firmware that recognises more scaling functions.	—	Apply a suitable configuration or firmware via POSITool.	—

13.3.46 *ConfigStartERROR unknown limit

Resolution	Level	Response
The versions of configuration and firmware do not match.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
The configuration saved in the Paramodule originates from a newer inverter firmware that recognises more limit value functions.	—	Apply a suitable configuration or firmware via POSITool.	—

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13.3.47 *ConfigStartERROR unknown post-wr

Resolution	Level	Response
The versions of configuration and firmware do not match.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
The configuration saved in the Paramodule originates from a newer inverter firmware that recognises more PostWrite functions.	—	Apply a suitable configuration or firmware via POSITool.	—

13.3.48 *ConfigStartERROR unknown pre-rd

Resolution	Level	Response
The versions of configuration and firmware do not match.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
The configuration saved in the Paramodule originates from a newer inverter firmware that recognises more Pre-read functions (mapping of firmware parameters to configuration parameters).	—	Apply a suitable configuration or firmware via POSITool.	—

13.3.49 *ConfigStartERROR unknown hiding

Resolution	Level	Response
The versions of configuration and firmware do not match.	—	The configuration does not start.

Possible cause	Test	Measure	Acknowledgement
The configuration saved in the Paramodule originates from a newer inverter firmware that knows more hide functions (hide parameters that should be visible depending on other parameters).	—	Apply a suitable configuration or firmware via POSITool.	—

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13.3.50 no configuration paramodul error

When displaying *no configuration paramodule error*, the device start-up is ended and an error was detected by the Paramodule during start-up. Note also the events in section 13.3.37 *ParaModul ERROR:update firmware! to 13.3.40 *ParaModul ERROR: ksb write error. Alternating to the event display, STÖBER ANTRIEBSTECHNIK appears.

13.3.51 no configuration start error

When displaying *no configuration start error*, the device start-up is ended and an error was detected when starting the configuration. Note also the events in section 13.3.41 *ConfigStartERROR parameters lost to 13.3.49 *ConfigStartERROR unknown hiding. Alternating to the event display, STÖBER ANTRIEBSTECHNIK appears.

13.3.52 configuration stopped

When displaying *configuration stopped*, the current configuration was stopped. Apply a configuration or switch the inverter off and on again so that the previous configuration can be loaded from the Paramodule.

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13.3.53 HW defective FirmwareStartErr

Triggering	Level	Response
A firmware error was detected.	Fault	Cause 1 only occurs when the device starts so that the inverter can not be enabled.

Cause	Description	Measure	Acknowledgement
1:FW defective	The active firmware as well as the firmware in the download memory are faulty.	A "normal" firmware download is not possible. Please contact our Service department.	Not confirmable

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- **Service network Germany**
- **Service network international**
- **STOBER subsidiaries:**

USA

STOBER DRIVES INC.
1781 Downing Drive
41056 Maysville
Fon +1 606 759 5090
sales@stober.com
www.stober.com

Austria

STÖBER ANTRIEBSTECHNIK GmbH
Hauptstraße 41a
4663 Laakirchen
Fon +43 7613 7600-0
sales@stoeber.at
www.stoeber.at

United Kingdom

STOBER DRIVES LTD.
Centrix House
Upper Keys Business Village
Keys Park Road, Hednesford
Cannock | Staffordshire WS12 2HA
Fon +44 1543 458 858
sales@stober.co.uk
www.stober.co.uk

Turkey

STOBER Turkey
Istanbul
Fon +90 212 338 8014
sales-turkey@stober.com
www.stober.com

Switzerland

STÖBER SCHWEIZ AG
Rugghölzli 2
5453 Remetschwil
Fon +41 56 496 96 50
sales@stoeber.ch
www.stoeber.ch

France

STOBER S.a.r.l.
131, Chemin du Bac à Traille
Les Portes du Rhône
69300 Caluire-et-Cuire
Fon +33 4 78.98.91.80
sales@stober.fr
www.stober.fr

China

STOBER China
German Centre Beijing Unit 2010,
Landmark Tower 2 8 North
Dongsanhuan Road
Chaoyang District BEIJING 10004
Fon +86 10 6590 7391
sales@stoeber.cn
www.stoeber.cn

Taiwan

STOBER Branch Office Taiwan
sales@stober.tw
www.stober.tw

Italy

STÖBER TRASMISSIONI S. r. l.
Via Italo Calvino, 7 Palazzina D
20017 Rho (MI)
Fon +39 02 93909570
sales@stober.it
www.stober.it

South East Asia

STOBER South East Asia
sales@stober.sg
www.stober.sg

Japan

STOBER JAPAN K. K.
Elips Building 4F, 6 chome 15-8,
Hon-komagome, Bunkyo-ku
113-0021 Tokyo
Fon +81 3 5395 6788
sales@stober.co.jp
www.stober.co.jp

www.stober.com

STÖBER

STÖBER ANTRIEBSTECHNIK GmbH & Co. KG
Kieselbronner Str. 12
75177 PFORZHEIM
GERMANY
Fon +49 7231 582-0
mail@stoeber.de

24 h Service Hotline +49 7231 5823000

www.stober.com

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