STÖBER

POSIDYN® SDS 5000

Projecting manual

Installation

Connecting

Accessories

PosiTool Page 143

V 5.6-N or later

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Table of contents

1 Introduction

1.1 Purpose of the manual

This document will give you technical data and information about the installation and connection of the inverter and its accessories. This technical documentation will enable the following personnel to perform their tasks correctly.

- Project engineer - planning
- Electrical specialist - installation and connection

Original version
The original version of this manual is in German.

1.2 Further documentation

Manual	Contents	ID
Commissioning Instructions SDS 5000	Reinstallation, replacement, function test	442301
Operating manual SDS 5000	Set up the inverter	442289
Operating manual CANopen	Connection of the inverter to the CANopen fieldbus system	441686
Operating manual EtherCAT	Connection of the inverter to the EtherCAT fieldbus system	441896
Operating manual PROFIBUS	Connection of the inverter to the PROFIBUS fieldbus system	441687
Operating manual PROFINET	Connection of the inverter to the PROFINET fieldbus system	442340
Operating manual ASP 5001	Integration of the safety technology with the ASP 5001 option	442181

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

1.3 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

1.4 Abbreviations, formula symbols and indices

Abbreviations	
AA	Analog output
AC	Alternating Current
AE	Analog input
AES	Absolute Encoder Support
BA	Binary output
BAT	Battery
BE	Binary input
BG	Size
CAN	Controller Area Network
CH	Brake chopper
CNC	Computerized Numerical Control
CU	Control Unit
DC	Direct Current
I/O	Input/Output
EMC	Electromagnetic Compatibility
HTL	High threshold logic
IP	International Protection
PE	Protective Earth
PELV	Protective Extra Low Voltage
PTC	Positive Temperature Coefficient
PU	Power Unit
PWM	Pulse Width Modulation
RB	Brake Resistor
RCD	Residual Current Device
PLC	Programmable logic controller
SSI	Serial Synchronous Interface
TTL	Transistor-transistor logic
UL	Underwriters Laboratories
ZK	DC link

Formula symbols	Unit	Explanation
f	**Hz**	**Frequency**
f_2	Hz	Output frequency
f_{2PU}	Hz	Output frequency of the inverter power board
f_{max}	Hz	Maximum frequency
$f_{PWM,PU}$	Hz	Internal pulse clock frequency of the inverter power board
I	**A**	**Current**
I_1	A	Input current
I_{1maxPU}	A	Maximum input current of the inverter power board
I_{1maxCU}	A	Maximum input current of the inverter control board
$I_{1N,PU}$	A	Nominal input current of the inverter power board
I_2	A	Output current
I_{2max}	A	Maximum output current
I_{2maxPU}	A	Maximum output current of the inverter power board
I_{2min}	A	Minimum output current
$I_{2N,PU}$	A	Nominal output current of the inverter power board
I_N	A	Nominal current
n	**rpm**	**Speed**
n_N	rpm	Nominal speed: Speed at which the nominal torque M_N is reached.
P	**W**	**Power**
P_{2maxPU}	W	Maximum sum of drive power
P_{maxRB}	W	Maximum power at the external braking resistor
$P_{V,PU}$	W	Power loss of the inverter power board
$P_{V,CU}$	W	Power loss of the inverter control board
R	**Ω**	**Resistance**
R_{2minRB}	Ω	Minimum resistance of the external braking resistor
R_{int}	Ω	Internal resistance
R_{intRB}	Ω	Resistance of the internal braking resistor
ϑ	**°C**	**Temperature**
$\vartheta_{amb,max}$	°C	Maximum surrounding temperature

Formula symbols	Unit	Explanation
τ_{th}	s	Thermal time constant
t	**s**	**Time**
t_{min}	s	Minimum time
R	**V**	**Voltage**
U_1	V	Input voltage
U_{1PU}	V	Input voltage of the inverter power board
U_{1max}	V	Maximum input voltage
U_2	V	Output voltage
U_{2BAT}	V	Output voltage of the backup battery
U_{2PU}	V	Output voltage of the inverter power board
U_{max}	V	Maximum voltage
U_{maxPU}	V	Maximum voltage of the inverter power board
U_{offCH}	V	Off limit of the brake chopper
U_{onCH}	V	On limit of the brake chopper
		Other
p		Number of pole pairs

1.5 Symbols, identifiers, marks

Symbols	
	**EN 61558-2-20** Choke without overload protection.
	Grounding symbol according to IEC 60417-5019 (DB:2002-10).

Identification and test symbols	
	**Lead-free identifier for RoHS** Lead-free identifier according to RoHS directive 2011-65-EU.
CE	**CE mark** Manufacturer's self declaration: The product meets the requirements of EU directives.

Identification and test symbols	
	**UL test mark** This product is listed by UL for the USA and Canada. Representative samples of this product have been evaluated by UL and meet the requirements of applicable standards.
	**UL test marks for recognized component** This component or material is recognized by UL. Representative samples of this product have been evaluated by UL and meet applicable requirements.

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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:

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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

The technical documentation is a component part of a product.
- Since the technical documentation contains important information, always keep it handy in the vicinity of the device until the machine is disposed of.
- If the product is sold, disposed of, or rented out, always include the technical documentation with the product.

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
- servo motors and
- 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.

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

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)

Activity	Possible occupational qualifications
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.

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
- The housing in the bottom 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.

Note for UL-compliant use additionally 2.11.

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 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 accessories.

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
Abteilung VS-EL
Kieselbronner Str.12
75177 Pforzheim
GERMANY

2.9 Disposal

Please comply with the latest national and regional regulations! Dispose of the individual parts separately depending on their nature and currently valid regulations such as, for example:

- Electronic scrap (PCBs)
- Plastic
- Sheet metal
- Copper
- Aluminum

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.

2.11 UL-compliant use

Additional information for use under UL conditions (UL – Underwriters Laboratories).

Surrounding temperature and pollution degree
The maximum surrounding temperature for UL-compliant operation is 45 °C.
Observe the specifications in the general data for use in an environment with a pollution degree, see section 3.1.1.

Power grid type
All device types that are supplied with 480 V are designed exclusively for operation on Wye sources with 480/277 V.

Power supply and motor overload protection
Observe the specifications in the electrical data of the inverter for this, see section 3.2.

Line fuse
Observe the specifications for the UL-compliant line fuse in section 5.3.1.

Motor protection
All models of STOBER 5th generation inverters have a certified i²t model, a calculation model for thermal monitoring of the motor. This fulfills the requirements for semiconductor motor overload protection in accordance with the change to UL 508C dated May 2013. To activate the protective function and set it up,

make the following parameter settings – which differ from the default values: U10 = *2:Warning* and U11 = 1.00 s. This model can be used as an alternative or in addition to motor protection with temperature monitoring as described in section 5.8.

Information
STÖBER ANTRIEBSTECHNIK GmbH & Co. KG recommends using PTC thermistors as thermal motor protection.

Motor temperature sensor
All models of the 5th generation of STOBER inverters starting with HW 200 have connections for PTC thermistors (NAT 145 °C) or KTY temperature sensors (KT84-130). Observe the terminal description X2 for proper connection, see section 5.8.

Braking resistor
If the inverters will be fitted with an externally mounted braking resistor, separate overtemperature protection must be made available.

24 V power supply
Low-voltage circuits shall be supplied by an isolating source such that the maximum open circuit voltage available to the circuit is not more than 28.8 V.
Observe terminal description X11 for this, see section 5.4.

Lines
Use only copper conductors for an surrounding temperature of 60/75 °C.

Fuses
Use a 1 A fuse (time lag) upstream from relay 1. The fuse must be approved in accordance with UL 248.
Refer to the connection example of terminal description X1 for this, see section 5.5.

Branch circuit protection
An integral solid state short circuit protection does not provide branch circuit protection. If you would like to branch the output of the inverter, branch circuit protection must be ensured in conformity with the instructions of STOBER, the National Electrical Code and all additional applicable local regulations or equivalent specifications.

UL test
During the UL acceptance process of STÖBER ANTRIEBSTECHNIK GmbH & Co. KG, only risks for electrical shock and fire hazard were investigated. Aspects of functional safety were not assessed. These aspects are assessed for STOBER by the TÜV SÜD certification authority, for example.

2.12 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

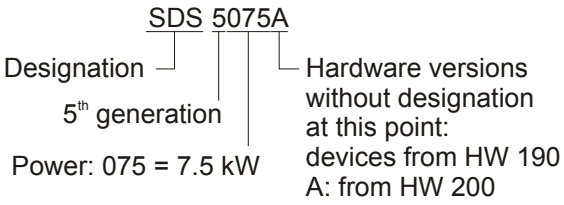
means that serious danger of death exists

▶ 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.

3 Technical data

Product key



3.1 General data of the inverters

3.1.1 Transportation, storage and operating environment

NOTICE

Material damage!

The DC link capacitors in devices of sizes 0, 1 and 2 can lose their electrical strength through long storage times. Considerable material damage can arise from a reduced electrical strength of the DC link capacitors when switching on.

▶ Use devices in storage annually or before startup.

Maximum surrounding air temperature during operation	0° C to 45° C for rated data Up to 55° C with power reduction, 2.5 %/K
Temperature during storage/transportation	-20° C to +70° C Maximum change: 20 K/h
Humidity	Relative humidity: 85 %, no condensation
Installation altitude	Up to 1000 m above sea level without restrictions 1000 to 2000 m above sea level with power reduction, 1.5 %/100 m
Pollution degree	2 as per EN 50178
Ventilation	Built-in fan
Vibration (operation) acc. to DIN EN 60068-2-6	5 Hz ≤ f ≤ 9 Hz: 0.35 mm 9 Hz ≤ f ≤ 200 Hz: 1 m/s
Vibration (transportation) acc. to DIN EN 60068-2-6	5 Hz ≤ f ≤ 9 Hz: 3.5 mm 9 Hz ≤ f ≤ 200 Hz: 10 m/s 200 Hz ≤ f ≤ 500 Hz: 15 m/s

3.1.2 Device features

Protection rating	IP20
Interference suppression	EN 61800-3, interference emission, class C3
High-voltage category	III as per EN 61800-5-1

3.1.3 Weight

Device	Weight	
	Without Packaging [kg]	With Packaging [kg]
SDS 5007	2.3	3.5
SDS 5008		
SDS 5015		
SDS 5040	3.9	5.3
SDS 5075		
SDS 5110	5.0	6.2
SDS 5150		
SDS 5220	11.9	13.7
SDS 5370	13.3	15.1
SDS 5450		

If you order an inverter with accessory parts, the weight increases by the following amounts:
- Accessory parts for higher option (fieldbus): 0.1 kg
- Accessory parts for lower option (terminals): 0.2 kg

3.2 Electrical data of the inverters

Information
An explanation of the most important formula symbols can be found in section 1.4 Abbreviations, formula symbols and indices.

3.2.1 Size 0 (BG 0): SDS 5007 to SDS 5015

Device	SDS 5007	SDS 5008	SDS 5015
ID no. up to HW 190 (SDS 5xxx) start. from HW 200 (SDS 5xxxA)	 49825 55428	 49826 55429	 49827 55430
Recommended motor power	0.75 kW	0.75 kW	1.5 kW
U_{1PU}	(L1 – N) 1 × 230 V +20 % / -40 % 50/60 Hz	(L1 – L3) 3 × 400 V, +32 % / -50 %, 50 Hz (L1 – L3) 3 × 480 V, +10 % / -58 %, 60 Hz	
$I_{1N,PU}$	1 × 5.9A	3 × 2 A	3 × 3.7
f_{2PU}	ID 49825, 49826, 49827: 0 to 400 Hz ID 55428, 55429, 55430: 0 to 700 Hz		
U_{2PU}	0 to 230 V	0 to 400 V	

Operation with servo motor (control type servo)

$I_{2N,PU}$	ID 49825: 3 × 3 A ID 55428: 3 × 3 A	ID 49826: 3 × 1.5 A ID 55429: 3 × 1.7 A	ID 49827: 3 × 3 A ID 55430: 3 × 3.4 A
I_{2maxPU}	250 % for 2 s; 200 % for 5 s		
$f_{PWM,PU}$	8 kHz (adjustable up to 16 kHz, see chap. 3.2.5 Derating by increasing the switching frequency)		

Operation with asynchronous motor (control types U/f, SLVC, VC)

$I_{2N,PU}$	ID 49825: 3 × 4 A ID 55428: 3 × 4 A	ID 49826: 3 × 2.1 A ID 55429: 3 × 2.3 A	ID 49827: 3 × 4 A ID 55430: 3 × 4.5 A
I_{2maxPU}	180 % for 5 s; 150 % for 30 s		
$f_{PWM,PU}$	4 kHz (adjustable up to 16 kHz, see chap. 3.2.5 Derating by increasing the switching frequency)		

$P_{V,PU}$ ($I_2 = I_N$)	80 W	65 W	90 W
$P_{V,CU}$ (I_2 = 0 A)[a)]	Max. 30 W		
U_{maxPU}	440 V	830 V	
U_{onCH}	400 V to 420 V	780 V to 800 V	
U_{offCH}	360 V to 380 V	740 V to 760 V	
R_{2minRB}	100 Ω	100 Ω	
P_{maxRB}	1,8 kW	6,4 kW	

a) Depends on the connected option boards and sensors (e.g., encoder)

3.2.2 Size 1 (BG 1): SDS 5040 to SDS 5075

Device	SDS 5040	SDS 5075
ID no. up to HW 190 (SDS 5xxx) start. from HW 200 (SDS 5xxxA)	 49829 55431	 49830 55432
Recommended motor power	4.0 kW	7.5 kW
U_{1PU}	(L1 – L3) 3 × 400 V, +32 % / -50 %, 50 Hz (L1 – L3) 3 × 480 V, +10 % / -58 %, 60 Hz	
$I_{1N,PU}$	3 × 9.3 A	3 × 15.8 A
f_{2PU}	ID 49829, 49830: 0 to 400 Hz ID 55431, 55432: 0 to 700 Hz	
U_{2PU}	0 to 400 V	

Operation with servo motor (control type servo)

$I_{2N,PU}$	3 × 6 A	3 × 10 A
I_{2maxPU}	250 % for 2 s; 200 % for 5 s	
$f_{PWM,PU}$	8 kHz (adjustable up to 16 kHz, see chap. 3.2.5 Derating by increasing the switching frequency)	

Operation with asynchronous motor (control types U/f, SLVC, VC)

$I_{2N,PU}$	3 × 10 A	3 × 16 A
I_{2maxPU}	180 % for 5 s; 150 % for 30 s	
$f_{PWM,PU}$	4 kHz (adjustable up to 16 kHz, see chap. 3.2.5 Derating by increasing the switching frequency)	

$P_{V,PU}$ ($I_2 = I_N$)	170 W	200 W
$P_{V,CU}$ (I_2 = 0 A)[a)]	Max. 30 W	
U_{maxPU}	830 V	
U_{onCH}	780 V to 800 V	
U_{offCH}	740 V to 760 V	
R_{2minRB}	ID 49829: 100 Ω ID 55431: 47 Ω	47 Ω
P_{maxRB}	ID 49829: 6.4 kW ID 55431: 13.6 kW	13.6 kW

a) Depends on the connected option boards and sensors (e.g., encoder).

3.2.3 Size 2 (BG 2): SDS 5110 and SDS 5150

Device	SDS 5110	SDS 5150
ID no. up to HW 190 (SDS 5xxx) start. from HW 200 (SDS 5xxxA)	 49831 55433	 49832 55434
Recommended motor power	11 kW	15 kW
U_{1PU}	(L1 – L3) 3 × 400 V, +32 % / -50 %, 50 Hz (L1 – L3) 3 × 480 V, +10 % / -58 %, 60 Hz	
$I_{1N,PU}$	3 × 24.5 A	3 × 32.6 A
f_{2PU}	ID 49831, 49832: 0 to 400 Hz ID 55433, 55434: 0 to 700 Hz	
U_{2PU}	0 to 400 V	

Operation with servo motor (control type servo)

$I_{2N,PU}$	3 × 14 A	3 × 20 A
I_{2maxPU}	250 % for 2 s; 200 % for 5 s	
$f_{PWM,PU}$	8 kHz (adjustable up to 16 kHz, see chap. 3.2.5 Derating by increasing the switching frequency)	

Operation with asynchronous motor (control types U/f, SLVC, VC)

$I_{2N,PU}$	3 × 22 A	3 × 32 A
I_{2maxPU}	180 % for 5 s; 150 % for 30 s	
$f_{PWM,PU}$	4 kHz (adjustable up to 16 kHz, see chap. 3.2.5 Derating by increasing the switching frequency)	

$P_{V,PU}$ ($I_2 = I_N$)	220 W	280 W
$P_{V,CU}$ (I_2 = 0 A)[a)]	Max. 30 W	
U_{maxPU}	830 V	
U_{onCH}	780 V to 800 V	
U_{offCH}	740 V to 760 V	
R_{2minRB}	22 Ω	
P_{maxRB}	29.1 kW	

a) Depends on the connected option boards and sensors (e.g., encoder).

3.2.4 Size 3 (BG 3): SDS 5220 to SDS 5450

Device	SDS 5220	SDS 5370	SDS 5450
ID no. up to HW 190 (SDS 5xxx) from HW 200 (SDS 5xxxA)	 49833 55435	 49835 55436	 49836 55437
Recommended motor rating	22 kW	37 kW	45 kW
U_{1PU}	(L1 – L3) 3 × 400 V, +32 % / -50 %, 50 Hz (L1 – L3) 3 × 480 V, +10 % / -58 %, 60 Hz		
$I_{1N,PU}$	3 × 37 A	3 × 62 A	3 × 76 A
f_{2PU}	ID 49833, 49835, 49836: 0 to 400 Hz ID 55435, 55436, 55437: 0 to 700 Hz		
U_{2PU}	0 to 400 V		

Operation with servo motor (control mode Servo)

$I_{2N,PU}$	3 × 30 A	3 × 50 A	3 × 60 A
I_{2maxPU}	250 % for 2 s; 200 % for 5 s		
$f_{PWM,PU}$	8 kHz (adjustable up to 16 kHz with derating, see section 3.2.5 Derating by increasing the switching frequency)		

Operation with asynchronous motor (control modes V/f, SLVC, VC)

$I_{2N,PU}$	3 × 44 A	3 × 70 A	3 × 85 A
I_{2maxPU}	180 % for 5 s; 150 % for 30 s		
$f_{PWM,PU}$	4 kHz (adjustable up to 16 kHz, see section 3.2.5 Derating by increasing the switching frequency)		

$P_{V,PU}$ ($I_2 = I_N$)	About 350 W	About 600 W	About 1000 W
$P_{V,CU}$ (I_2 = 0 A)[a)]	Max. 55 W		
U_{maxPU}	830 V		
U_{onCH}	780 V to 800 V		
U_{offCH}	740 V to 760 V		
R_{intRB}	30 Ω (PTC resistance; 100 W; max. 1 kW for 1 s; τ = 40 s)		
R_{2minRB}	15 Ω		
P_{maxRB}	42 kW		

a) Depends on the connected option boards and sensors (encoder, etc.).

3.2.5 Derating by increasing the switching frequency

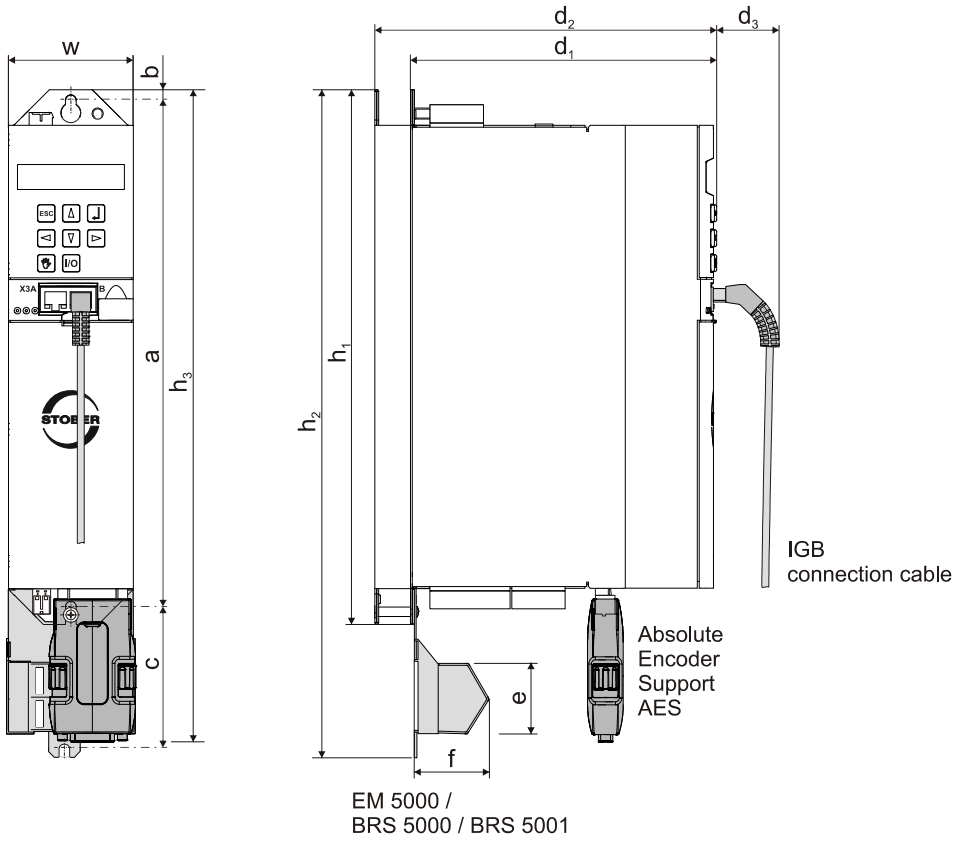
Based on the switching frequency $f_{PWM,PU}$ (Parameter *B24*), the following values of the output currents $I_{2N,PU}$ result. Remember that only 8 kHz and 16 kHz can be set for control type servo.

Output current $I_{2N,PU}$

Switching frequency	4 kHz	8 kHz	16 kHz
SDS 5007	4.0 A	3.0 A	2.0 A
SDS 5008 – ID 49826: – ID 55429:	 2.1 A 2.3 A	 1.5 A 1.7 A	 1.1 A 1.2 A
SDS 5015 – ID 49827: – ID 55430:	 4.0 A 4.5 A	 3.0 A 3.4 A	 2.0 A 2.2 A
SDS 5040	10.0 A	6.0 A	3.3 A
SDS 5075	16.0 A	10.0 A	5.7 A
SDS 5110	22.0 A	14.0 A	8.1 A
SDS 5150	32.0 A	20.0 A	11.4 A
SDS 5220	44.0 A	30.0 A	18.3 A
SDS 5370	70.0 A	50.0 A	31.8 A
SDS 5450	85.0 A	60.0 A	37.8 A

3.3 Dimensions

3.3.1 Size 0 to 2: SDS 5007 to SDS 5150

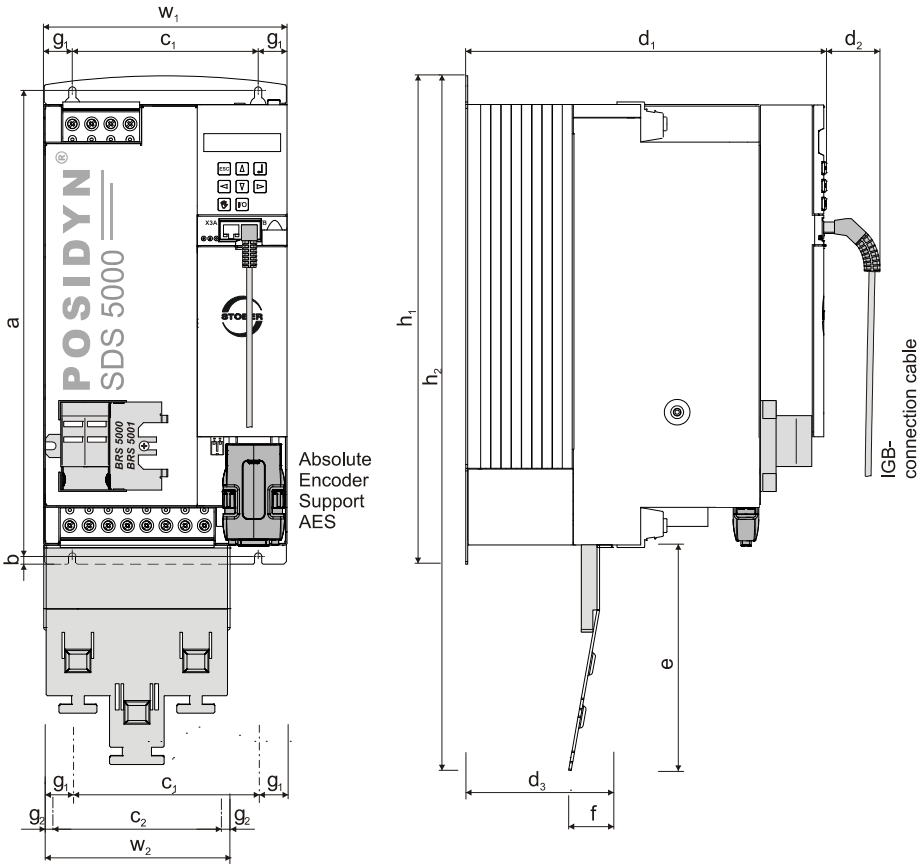


Dimensions [mm]			Size 0	Size 1	Size 2
Inverter	Height	h_1	300		
		h_2	360[a] / 373[b]		
		h_3 [c]	365		
	Width	w	70		105
	Depth	d_1	175	260	260
		d_2 [d]	193	278	278
		d_3	40		
EMC shroud	Height	e	37.5[e] / 44[f]		
	Depth	f	40		
Fastening holes	Vertical distance to upper edge	b	6		
	Vertical distance	a	283+2		
	Vertical distance	c[g]	79		

a) h_2 = Height incl. EMC shroud EM 5000 or brake module BRS 5000
b) h_2 = Height incl. brake module BRS 5001
c) h_3 = Height incl. AES
d) d_2 = Depth incl. brake resistor RB 5000
e) e = Height of the EMC shroud EM 5000 or brake module BRS 5000
f) e = Height of the brake module BRS 5001
g) c = Vertical distance at brake module BRS 5001

Information
Brake module BRS 5000 has been replaced by the follow-up model BRS 5001 (from firmware V 5.6-N). You can find more information about both models in section 7. Differences with regard to assembly and connection are described in the relevant section.

3.3.2 Size 3: SDS 5220 to SDS 5450



Dimensions [mm]			Size 3
Inverter	Height	h_1	382.5
		h_2 a)	540
	Width	w_1	190
	Depth	d_1	276
		d_2	40
EMC shroud	Höhe	e	174
	Width	w_2	147
	Depth	f	34
	Depth	d_3	113
Fastening holes	Vertical distance	a	365+2
	Vertical distance to bottom edge	b	6
	Horizontal distance	c_1 b)	150+0.2/-0.2
	Horizontal distance from the side edge	g_1 c)	20
	Horizontal distance	c_2 d)	132
	Horizontal distance from the side edge	g_2 e)	7.5

a) h_2 = Height incl. EMC shroud EM6A3
b) c_1 = Horizontal distance from the fastening holes of the inverter
c) g_1 = Horizontal distance from the side edge of the inverter
d) c_2 = Horizontal distance from the fastening holes of the EMC shroud EM6A3
e) g_2 = Horizontal distance from the side edge of the EMC shroud EM6A3

3.4 Brake resistors SDS 5xxx

3.4.1 FZMU, FZZM

Braking resistor – inverter assignment

Type	FZMU 400x65		FZZM 400x65	FZZMU 400x65
ID no.	49010	49011	41642	41650
SDS 5007	X	—	—	—
SDS 5008	X	—	—	—
SDS 5015	X	—	—	—
SDS 5040	X	—	—	—
SDS 5075	X	—	—	—
SDS 5110	—	X	X	—
SDS 5150	—	X	X	—
SDS 5220	—	X	—	X
SDS 5370	—	X	—	X
SDS 5450	—	X	—	X

The internal connections are wired with heat-resistant, silicon-insulated strands of wire on terminals. Also ensure a heat-resistant and stress-resistance design for the connection!

Conductor cross-section

Connection type	Conductor cross-section [mm²]
Rigid	0.5 – 4.0
Flexible with cable end sleeve	0.5 – 2.5

Properties

Type	FZMU 400x65		FZZM 400x65	FZZMU 400x65
ID no.	49010	49011	41642	41650
Resistance [Ω]	100	30	30	20
Power [W]	600		1200	
Therm. time const. τ_{th} [s]	40		40	
Pulse power for < 1 s [kW]	18		36	
Weight [kg]	Approx. 2.2		Approx. 4.2	
Protection class	IP20		IP20	
Test marks	cULus		—	cULus

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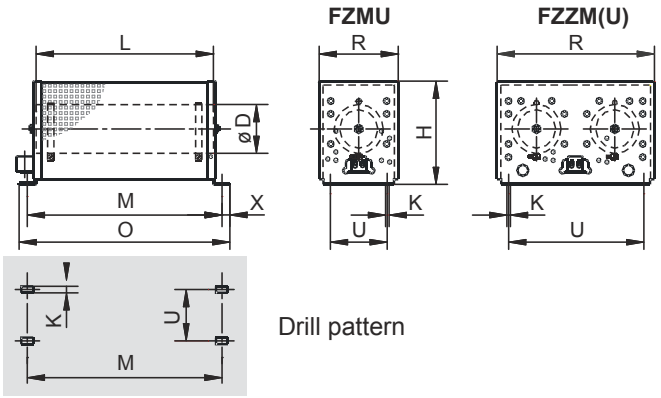
Dimensions [mm]

Type	FZMU 400x65		FZZM(U) 400x65	
ID no.	49010	49011	41642	41650
L x D	400 × 65		400 × 65	
H	120		120	
K	6.5 × 12		6.5 × 12	
M	430		426	
O	485		450	
R	92		185	
R	64		150	
X	10		10	



Drill pattern

3.4.2 VHPR

Braking resistor – inverter assignment

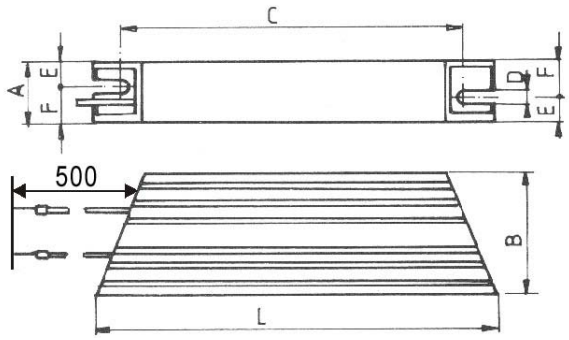
Type	VHPR	
ID no.	45973	45974
SDS 5007	X	—
SDS 5008	X	—
SDS 5015	X	—
SDS 5040	X	—
SDS 5075	X	X
SDS 5110	—	X
SDS 5150	—	X
SDS 5220	—	X
SDS 5370	—	X
SDS 5450	—	X

Properties

Type	VHPR150V	VHPR500V
ID no.	45973	45974
Resistance [Ω]	100	47
Power [W]	150	400
Therm. time const. τ_{th} [s]	80	65
Pulse power for < 1 s [kW]	13	19.5
Weight [g]	Approx. 310	Approx. 1020
Protection class	IP54	IP54
Test marks	c UL us	c UL us

Dimensions [mm]

Type	VHPR150V	VHPR500V
ID no.	45973	45974
L	212	337
C	193 ± 2	317 ± 2
B	40	60
A	21	31
D	4.3	5.3
E	8	11.5
F	13	19.5



3.4.3 FZZT, FZDT and FGFT

Braking resistor – inverter assignment

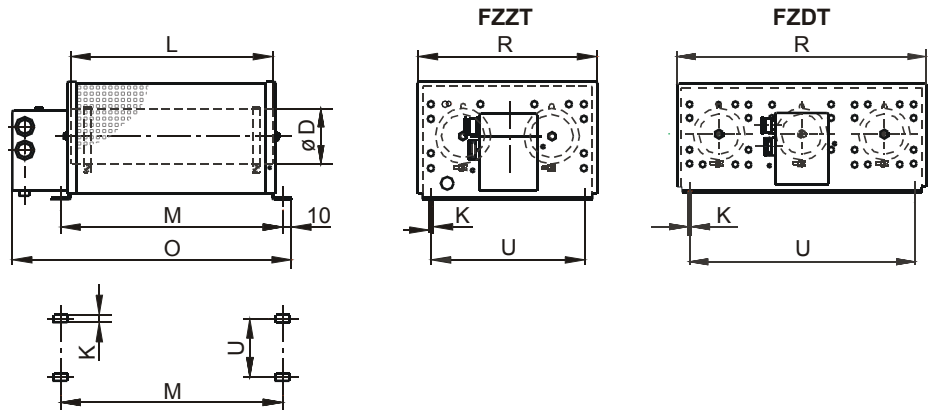
Type	FZZT 400×65	FZDT 500×65	FGFT 3111202
ID no.	41651	41653	41655
SDS 5220	X	X	X
SDS 5370	X	X	X
SDS 5450	X	X	X

Properties

Type	FZZT 400×65	FZDT 500×65	FGFT 3111202
ID no.	41651	41653	41655
Resistance [Ω]	20	20	20
Power [W]	1200	2500	6000
Thermal time constant τ_{th}	30	30	20
Weight [kg]	Approx. 4.6	Approx. 7.8	Approx. 13
Protection class	IP20	IP20	IP20

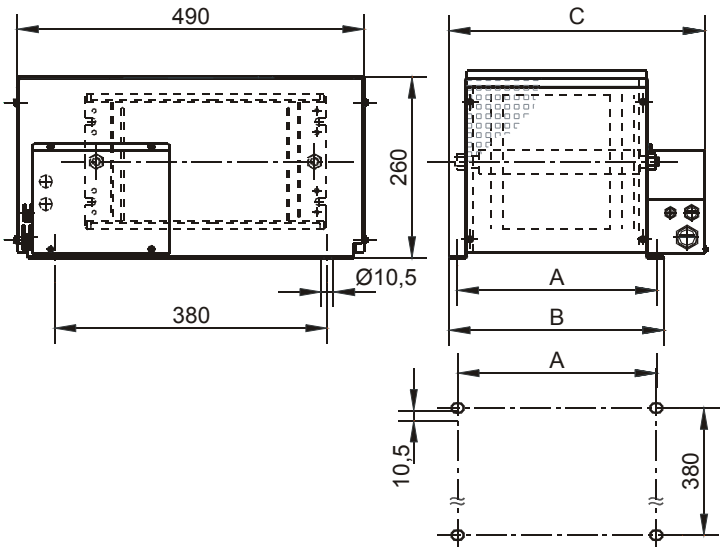
Dimensions [mm]

Type	FZZT 400×65	FZDT 500×65
ID no.	41651	41653
L × D	400 × 65	500 × 65
H	120	120
K	6.5 × 12	6.5 × 12
M	426	526
O	506	606
R	185	275
R	150	240



Dimensions [mm]

Type	FGFT 3111202
ID no.	41655
A	370
B	395
C	455



3.4.4 Bottom brake resistor RB 5000

Braking resistor – inverter assignment

Type ID no.	RB 5022 45618	RB 5047 44966	RB 5100 44965
SDS 5008	—	—	X
SDS 5015	—	—	X
SDS 5040	—	—	X
SDS 5075	—	X	—
SDS 5110	X	—	—
SDS 5150	X	—	—

Note the attachment to the inverter (section 4 Installation)!

Properties

Type ID no.	RB 5022 45618	RB 5047 44966	RB 5100 44965
Resistance [Ω]	22	47	100
Power [W]	100	60	60
Therm. time const. τ_{th} [s]	8		
Pulse power for < 1 s [kW]	1.5	1.0	1.0
U_{max} [V]	800		
Weight [g]	Approx. 640	Approx. 460	Approx. 440
Cable design	Radox		
Cable length [mm]	250		
Cable cross-section [AWG]	18/19 (0.82 mm²)		
Maximum torque for studs [Nm]	5		
Protection class	IP40		
Test marks	c UL us		

Dimensions [mm]

Type ID no.	RB 5022 45618	RB 5047 44966	RB 5100 44965
Height	300	300	
Width	94	62	
Depth	18	18	
Drilling pattern corresponds to size	2	1	0 and 1

3.5 Brake resistors SDS 5xxxA

3.5.1 FZMU, FZZMU

Braking resistor – inverter assignment

Type	FZMU 400x65			FZZMU 400x65		
ID no.	49010	55445	55446	53895	55447	55448
SDS 5007A	X	—	—	—	—	—
SDS 5008A	X	—	—	—	—	—
SDS 5015A	X	—	—	—	—	—
SDS 5040A	—	—	—	X	—	—
SDS 5075A	—	—	—	X	—	—
SDS 5110A	—	X	—	—	X	—
SDS 5150A	—	X	—	—	X	—
SDS 5220A	—	—	X	—	—	X
SDS 5370A	—	—	X	—	—	X
SDS 5450A	—	—	X	—	—	X

The internal connections are wired with heat-resistant, silicon-insulated strands of wire on terminals. Also ensure a heat-resistant and stress-resistance design for the connection!

Conductor cross-section

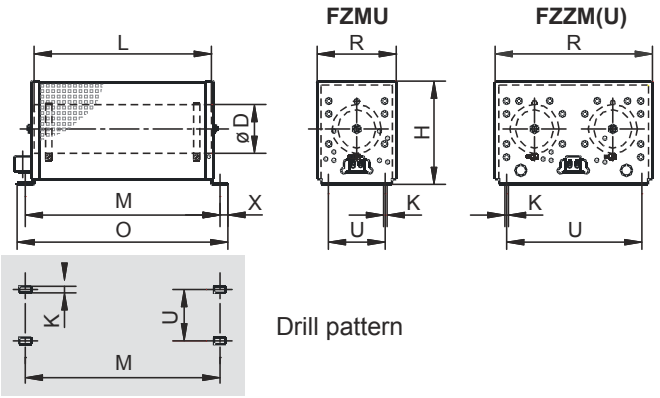
Connection type	Conductor cross-section [mm^2]
Rigid	0.5 – 4.0
Flexible with cable end sleeve	0.5 – 2.5

Properties

Type	FZMU 400x65			FZZMU 400x65		
ID no.	49010	55445	55446	53895	55447	55448
Resistance [Ω]	100	22	15	47	22	15
Power [W]	600			1200		
Therm. time const. τ_{th} [s]	40			40		
Pulse power for < 1 s [kW]	18			36		
U_{max} [V]	848			848		
Weight [kg]	Approx. 2.2			Approx. 4.2		
Protection class	IP20			IP20		
Test marks	c UL us			c UL us		

Dimensions [mm]

Type	FZMU 400x65			FZZMU 400x65		
ID no.	49010	55445	55446	53895	55447	55448
L x D	400 × 65			400 × 65		
H	120			120		
K	6.5 × 12			6.5 × 12		
M	430			426		
O	485			450		
R	92			185		
R	64			150		
X	10			10		



Drill pattern

3.5.2 GVADU, GBADU

Braking resistor – inverter assignment

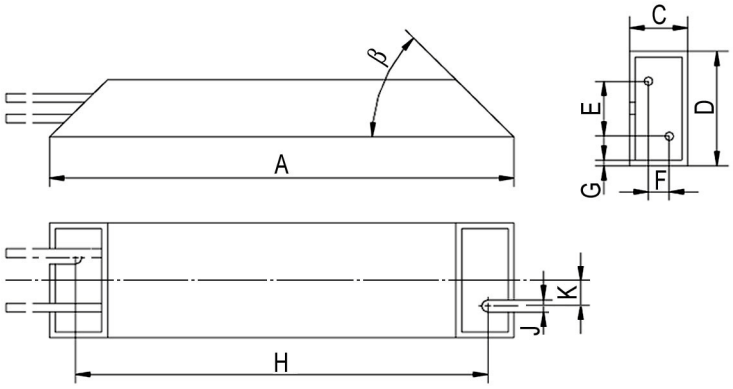
Type	GVADU 210x20	GBADU 265x30	GBADU 405x30	GBADU 335x30	GBADU 265x30
ID no.	**55441**	**55442**	**55499**	**55443**	**55444**
SDS 5007A	X	X	X	—	—
SDS 5008A	X	X	X	—	—
SDS 5015A	X	X	X	—	—
SDS 5040A	X	X	X	X	—
SDS 5075A	—	—	—	X	—
SDS 5110A	—	—	—	—	X
SDS 5150A	—	—	—	—	X
SDS 5220A	—	—	—	—	X
SDS 5370A	—	—	—	—	X
SDS 5450A	—	—	—	—	X

Properties

Type	GVADU 210×20	GBADU 265×30		GBADU 335×30	GBADU 405×30
ID no.	**55441**	**55442**	**55444**	**55443**	**55499**
Resistance [Ω]	100	100	22	47	100
Power [W]	150	300	300	400	500
Therm. time const. τ_{th} [s]	60	60			
Pulse power for < 1 s [kW]	3.3	6.6	6.6	8.8	11
U_{max} [V]	848	848			
Cable design	Radox	FEP			
Cable length [mm]	50	50			
Cable cross-section [AWG]	18/19 (0.82 mm²)	14/19 (1.9 mm²)			
Weight [g]	300	950	950	1200	1450
Protection class	IP54	IP54			
Test marks	cULus	cULus			

Dimensions [mm]

Type	GVADU 210×20	GBADU 265×30		GBADU 335×30	GBADU 405×30
ID no.	55441	55442	55444	55443	55449
A	210	265		335	405
H	192	246		316	386
C	20	30		30	30
D	40	60		60	60
E	18.2	28.8		28.8	28.8
F	6.2	10.8		10.8	10.8
G	2	3		3	3
K	2.5	4		4	4
J	4.3	5.3		5.3	5.3
β	65°	73°		73°	73°



3.5.3 FGFKU

Braking resistor – inverter assignment

Type	FGFKU			
ID no.	55449	55450	55451	53897
SDS 5110A	X	—	—	—
SDS 5150A	X	—	—	—
SDS 5220A	—	X	X	X
SDS 5370A	—	X	X	X
SDS 5450A	—	X	X	X

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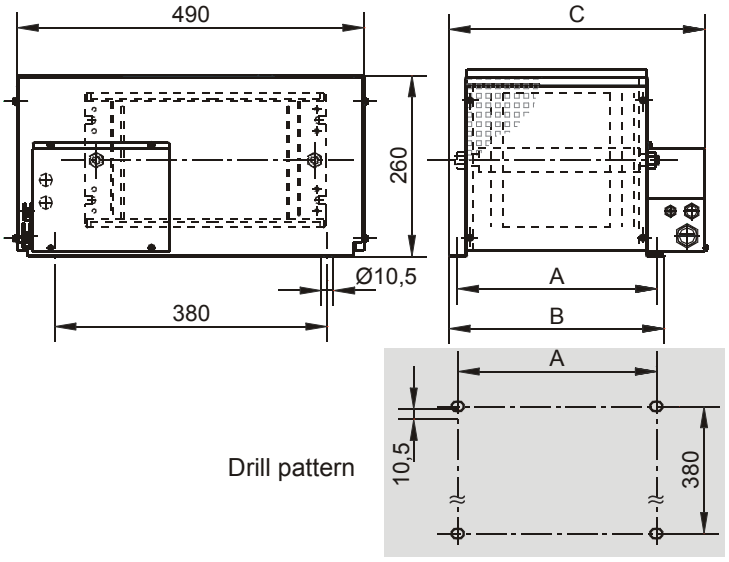
Properties

Type	FGFKU			
ID no.	55449	55450	55451	53897
Resistance [Ω]	22	15	15	15
Power [W]	2500		6000	8000
Therm. time const. τ_{th} [s]	30		20	20
Pulse power for < 1 s [kW]	50		120	160
U_{max} [V]	848		848	848
Weight [kg]	Approx. 7.5		12	18
Test marks	cULus		cULus	cULus

Dimensions [mm]

Type	FGFKU		
ID no.	55449 55450	55451	53897
A	270	370	570
B	295	395	595
C	355	455	655



Drill pattern

3.5.4 Bottom brake resistor RB 5000

Braking resistor – inverter assignment

Type ID no.	RB 5022 45618	RB 5047 44966	RB 5100 44965
SDS 5008A	—	—	X
SDS 5015A	—	—	X
SDS 5040A	—	X	X
SDS 5075A	—	X	—
SDS 5110A	X	—	—
SDS 5150A	X	—	—

Note the attachment to the inverter (section 4 Installation)!

Properties

Type ID no.	RB 5022 45618	RB 5047 44966	RB 5100 44965
Resistance [Ω]	22	47	100
Power [W]	100	60	60
Therm. time const. τ_{th} [s]	8		
Pulse power for < 1 s [kW]	1.5	1.0	1.0
U_{max} [V]	800		
Weight [g]	Approx. 640	Approx. 460	Approx. 440
Cable design	Radox		
Cable length [mm]	250		
Cable cross-section [AWG]	18/19 (0.82 mm²)		
Maximum torque for studs [Nm]	5		
Protection class	IP40		
Test marks	c UL us		

Dimensions [mm]

Type ID no.	RB 5022 45618	RB 5047 44966	RB 5100 44965
Height	300	300	
Width	94	62	
Depth	18	18	
Drilling pattern corresponds to size	2	1	0 and 1

3.6 Output derater

⚠ WARNING!

Risk of burns! Fire hazard! Material damage!

Chokes can heat up to over 100°C under permitted operating conditions.

- ▶ Take protective measures against accidental and intentional contact with the choke.
- ▶ Make sure that no flammable material is in the vicinity of the choke.
- ▶ Do not install chokes under or near the inverter.

⚠ WARNING!

Fire hazard!

Using chokes outside of the nominal data (cable length, current, frequency, etc.) can cause the chokes to overheat.

- ▶ Always comply with the maximum nominal data when operating the chokes.

NOTICE

Danger of machine standstill!

The motor temperature sensor evaluation is malfunctioning due to cable capacities.

- ▶ If you use cables which are longer than 50 m and the cables are not from STOBER, the cores for the motor temperature sensor and the brake must be separate (maximum length: 100 m).

Information

The following technical data applies for a rotary field frequency of 200 Hz. For example, this rotary field frequency is achieved with a motor with 4 pole pairs and a nominal speed of 3000 rpm.
Always observe the specified derating for higher rotary field frequencies.
Also observe the dependency of the cycle frequency.

Type	TEP3720-0ES41	4EP3820-0CS41	4EP4020-0RS41
ID no.	53188	53189	53190
Voltage range	3 x 0 to 480 V		
Frequency range	0 to 200 Hz		
I_N at 4 kHz	4 A	17.5 A	38 A
I_N at 8 kHz	3.3 A	15.2 A	30.4 A
Max. permitted motor cable length with output derater	100 m		
Max. surrounding temperature $\vartheta_{amb,max}$	40° C		
Design	Open		
Winding losses	11 W	29 W	61 W
Iron losses	25 W	16 W	33 W
Connections	Screw terminals		
Max. conductor cross-section	10 mm^2		
UL Recognized Component (CAN; USA)	Yes		
Test marks	c UL us		

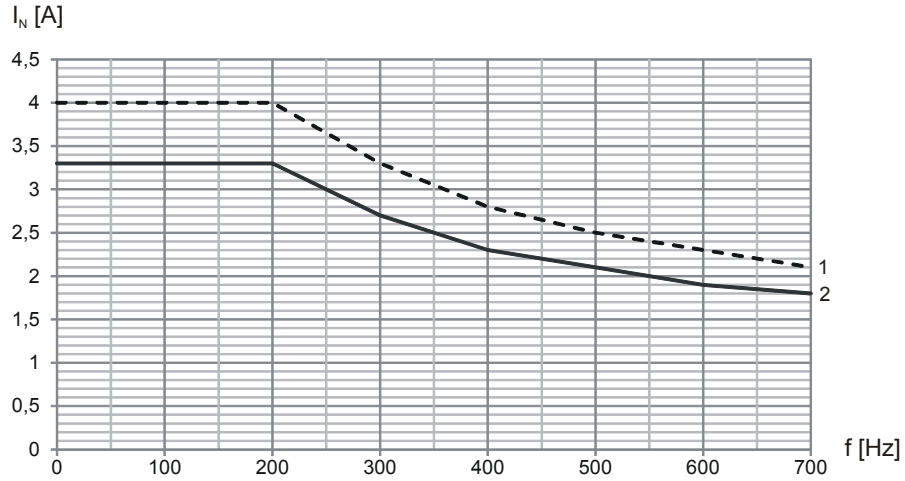
Projecting

Select the output chokes according to the rated currents of the motor and output chokes. In particular, observe the derating of the output choke for rotary field frequencies higher than 200 Hz.
You can calculate the rotary field frequency for your drive with the following formula:

$$f = n_N \cdot \frac{p}{60}$$

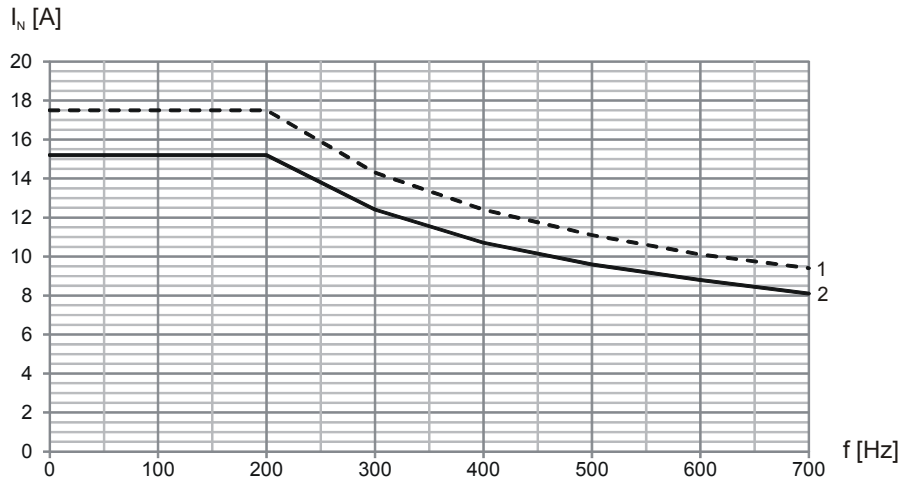
f Rotary field frequency in Hz
n Speed in rpm
p Number of pole pairs
N Nominal value

Derating TEP3720-0ES41



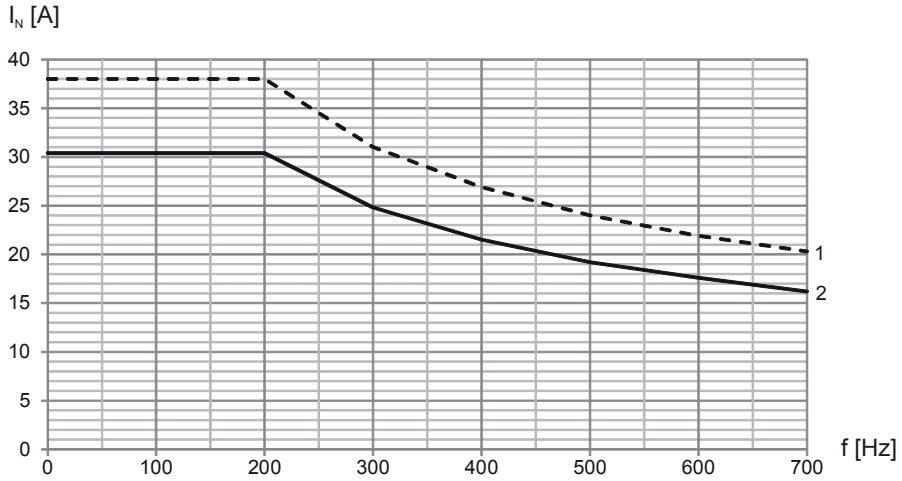
1 Cycle frequency 4 kHz
2 Cycle frequency 8 kHz

Derating 4EP3820-0CS41



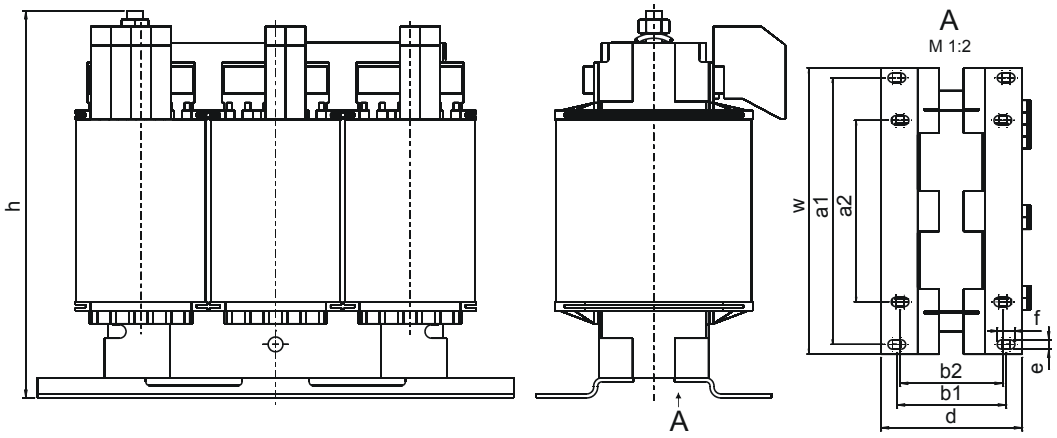
1 Cycle frequency 4 kHz
2 Cycle frequency 8 kHz

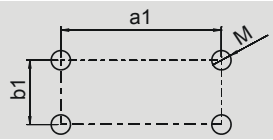
Derating 4EP4020-0RS41



1 Cycle frequency 4 kHz
2 Cycle frequency 8 kHz

Dimensions	TEP3720-0ES41	4EP3820-0CS41	4EP4020-0RS41
Height h [mm]	Max. 153	Max. 153	Max. 180
Width w [mm]	178	178	219
Depth d [mm]	73	88	119
Vertical distance – fastening holes a1 [mm]	166	166	201
Vertical distance – fastening holes a2 [mm]	113	113	136
Horizontal distance – fastening holes b1 [mm]	53	68	89
Horizontal distance – fastening holes b2 [mm]	49	64	76
Drill holes – depth [mm]	5.8	5.8	7
Drill holes – width f [mm]	11	11	13
Screw connection – M	M5	M5	M6
Weight [kg]	2.9	5.9	8.8





Mounting borings in
acc. to DIN EN 60852-4

4 Installation

This chapter will give you information about installation. This includes:

- Installation of the inverter in the switching cabinet
- Installation of accessories on or in the inverter

⚠ WARNING!

Danger of personal injury and material damage due to electric shock!

▶ Always switch off all power supply voltage before working on the inverter! 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.

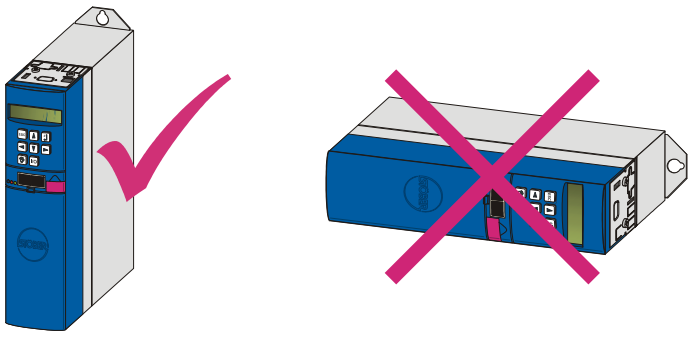
4.1 Installation of the inverter in the switching cabinet

NOTICE

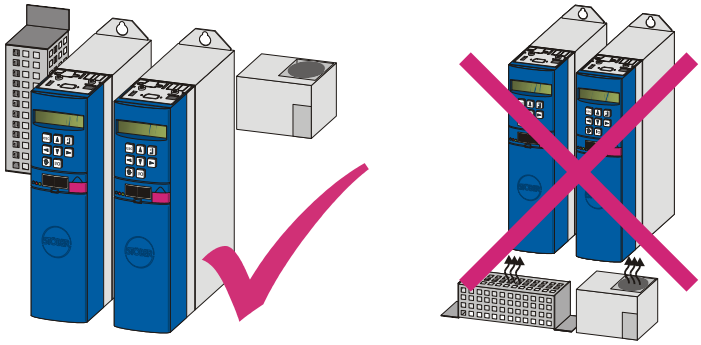
Danger of property damage from incorrect installation of the devices!

▶ It is essential to comply with the following installation instructions to avoid damage to the devices.

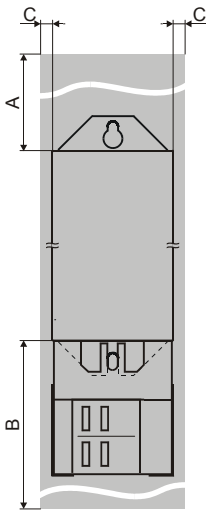
- The inverters must be installed in a control cabinet with at least protection class IP54.
- The installation location must be free of dust, corrosive vapors and all fluids (in accordance with pollution degree 2 as per EN 60204/EN 50178).
- The installation location must be free of atmospheric moisture.
- Prevent condensation, for example with anti-condensation heating elements.
- For reasons related to EMC, use mounting plates with a conductive surface (unpainted, etc.).
- Fasten the inverters onto the mounting plate with M5 screws.
- The inverters must be installed vertically:



- Avoid installation above or in the immediate vicinity of heat-generating devices, e.g. output chokes or braking resistors:



- To ensure there is sufficient air circulation in the control cabinet, observe the minimum clearances.



Min. clearance [dimensions in mm]	A Above	B Below	C On the side
Size 0 – size 2	100	100	5
... With EMC shroud or brake module	100	120	5
Size 3	100	100	5
... With EMC shroud	100	220	5

4.2 Accessories

4.2.1 Installation of bottom brake resistor

⚠ WARNING!

Danger of personal injury and material damage due to electric shock!

▶ Always switch off all power supply voltage before working on the inverter! 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.

Requirements:

- You have tapped holes for threaded bolts on the mounting plate in the control cabinet at the installation location, taking into consideration the different device dimensions. The threaded bolts are included with the submounting braking resistor.

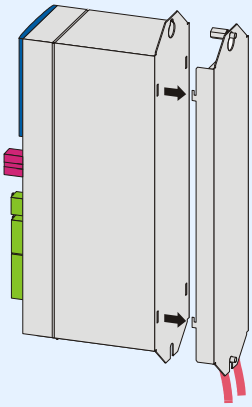
You need:

- The threaded bolts included with the submounting brake resistor.
- The screws and washers included with the submounting brake resistor.
- A PH2 Phillips screwdriver.
- An 8 mm hexagonal socket wrench.

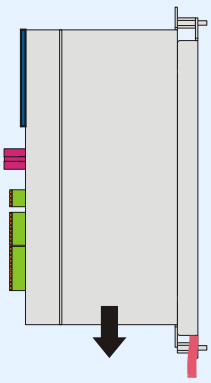
Installation of the submounting brake resistor

1. Attach the bottom brake resistor to the mounting plate with the studs:

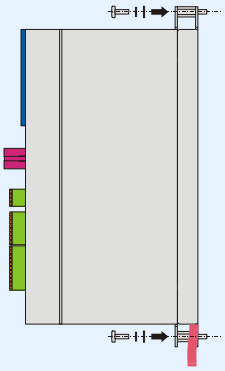
2. Place the device on the guides:



3. Press the device down on the guides:



4. Attach the device to the studs with the screws and washers:



⇨ You have installed the submounting brake resistor.

5. Connect the braking resistor.
   Refer to the terminal description X21 for proper connection of the cable, see section 5.10.
6. Parameterize the braking resistor in the inverter.

4.2.2 Installation of EMC shroud or brake module

⚠ WARNING!

Danger of personal injury and material damage due to electric shock!

▶ Always switch off all power supply voltage before working on the inverter! 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 use the EMC shroud EM 5000 for sizes 0 to 2 to connect the cable shield of the power cable. The brake module BRM 5000 or BRS 5001 additionally includes the power electronics for the optional brake controller for one or two 24 V brakes. The EMC shroud and brake module are identical with regard to the mechanical elements. The attachment for both accessory parts on inverters of size 0 to 2 is therefore also the same and is treated in the same way in the following sections.

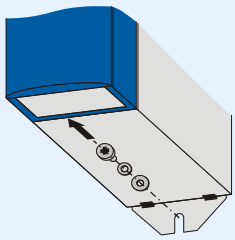
Information
Brake module BRS 5000 has been replaced by the follow-up model BRS 5001 (from firmware V 5.6-N). You can find more information about both models in section 7. Differences with regard to assembly and connection are described in the relevant section.

Prerequisites (sizes 0 to 2):
- You have already installed the inverter in the switching cabinet.

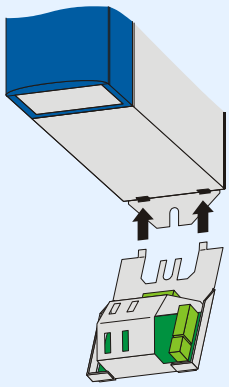
For attachment you will need:
- A Phillips screwdriver

Installation of EMC shroud EM 5000, brake module BRS 5000 or BRS 5001 on the inverter (size 0, 1 or 2)

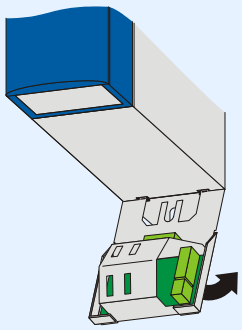
1. Remove the bottom mounting screw and washers from the inverter:



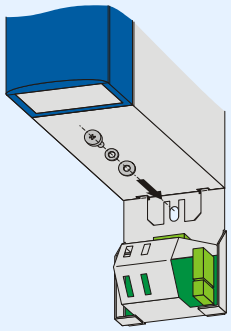
2. Slide the component into the openings at a slight angle:



3. Press the back of the component onto the wall of the switching cabinet:

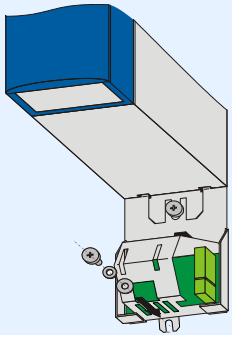


4. Attach the component to the mounting plate and inverter with the mounting screw and the washers:



⇨ You have now installed the accessory.

5. **BRS 5001**: It is possible to also attach the component to the mounting plate from below for this variant.



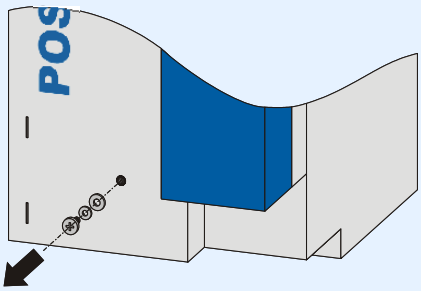
The attachment of brake module BRM 5000 or BRS 5001 to inverters of size 3 is different to the attachment to inverters of size 0 to 2.

For attachment you will need:

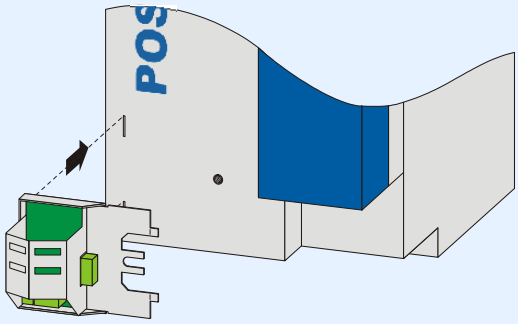
- A Phillips screwdriver

Installation of brake module BRS 5000 or BRS 5001 on the inverter (size 3)

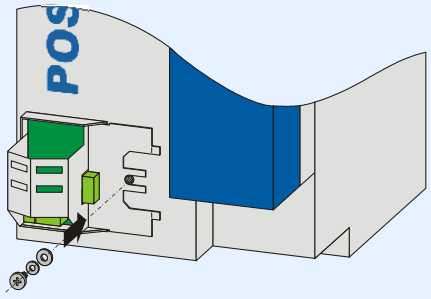
1. Remove the mounting screw and washers from the front of the inverter:



2. Place the component on the device so that the guide rails are in the openings:



3. Secure the component to the device with the mounting screw and the washers:



⇨ You have now installed the accessory.

For size 3, the larger EMC shroud EM6A3 for the shield connection of the motor line is available, see section 7 Accessories.

For attachment you will need:
- A Phillips screwdriver
- The two enclosed screws and washers (combination screws with toothed lock washer, M4x8)

Attaching the EMC shroud EM6A3 to an inverter (size 3)

1. Fasten the part onto the bottom of the inverter with the enclosed fastening screws in the tapped holes provided for that purpose (maximum tightening torque: 2.4 Nm).

4.2.3 Installation of the terminal accessories

⚠ WARNING!

Danger of personal injury and material damage due to electric shock!

▶ Always switch off all power supply voltage before working on the inverter! 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.

⚠ CAUTION!

Danger of property damage due to electrostatic discharge, among others!

▶ Provide suitable protective measures while handling open PCBs (e.g., ESD clothing, environment free of dirt and grease).

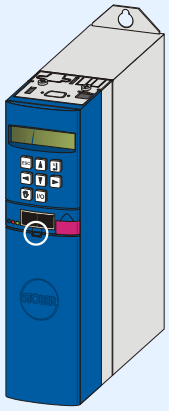
▶ Do not touch the contact surfaces.

You will need one of the following accessory parts before you can connect binary and analog signals to the inverter. Installation is the same for all four accessory parts.
- SEA 5001, ID no. 49576
- REA 5001, ID no. 49854
- XEA 5001, ID no. 49015

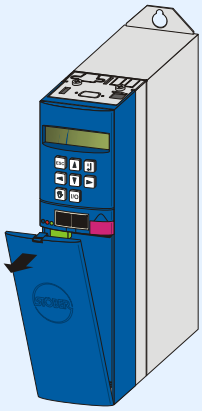
You will need:
- A Phillips screwdriver
- The screws which are pre-mounted on the accessory.

Installation of an SEA 5001, REA 5001 or XEA 5001 in an SDS 5000

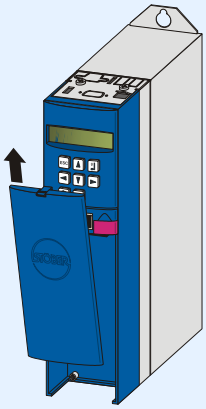
1. Unlock the snap catch on the inverter cover:



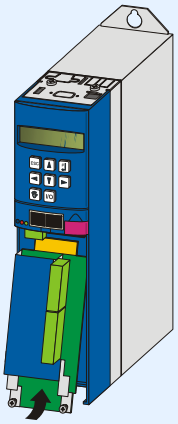
2. Lift up the upper end of the cover from the inverter:



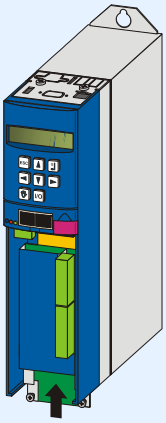
3. Lift the cover up and remove it from the inverter:



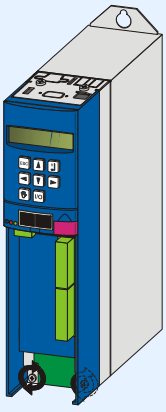
4. Insert the accessory part at a slant with the gold contacts in front. The gold contacts must be in front of the black terminal block.



5. Slide the gold contacts into the black connector.



6. Secure the accessory part to the inverter with the mounting screws:



⇨ You have now installed the accessory.

4.2.4 Installation of CANopen, PROFIBUS, EtherCAT or PROFINET accessories

⚠ WARNING!

Danger of personal injury and material damage due to electric shock!

▶ Always switch off all power supply voltage before working on the inverter! 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.

⚠ CAUTION!

Danger of property damage due to electrostatic discharge, among others!

▶ Provide suitable protective measures while handling open PCBs (e.g., ESD clothing, environment free of dirt and grease).

▶ Do not touch the contact surfaces.

You will need the following accessories for the connection of CANopen or PROFIBUS. The accessory part is installed above the inverter's display.

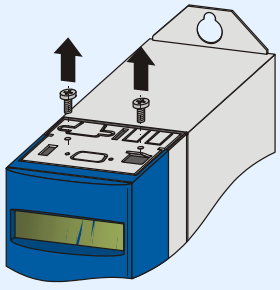
- CANopen: CAN 5000
- PROFIBUS: DP 5000

You will need the following for installation of CAN 5000 or DP 5000.

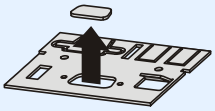
- A TX10 Torx screwdriver
- A pair of pliers
- Hexagon socket wrench, 4.5 mm

Installation of a CAN 5000 or DP 5000 in an inverter

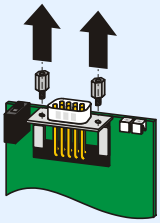
1. Remove the mounting screws and take off the cover plate:



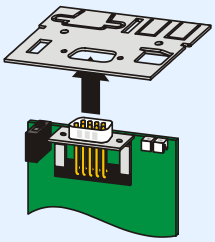
2. Remove the metal plate punch-out with a pair of pliers:



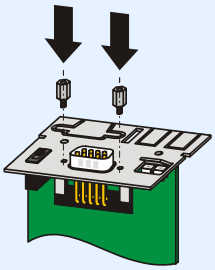
3. Remove the screws from the option board:



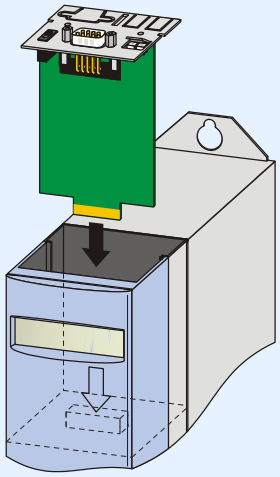
4. From below, thread the sub D plug connector of the PCB through the metal plate:



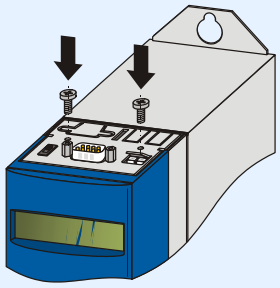
5. Secure the PCB to the metal plate with the screws which you removed in step 3:



6. Guide the option board into the inverter so that the gold contacts slide into the black connector:



7. Secure the metal plate to the inverter with the mounting screws:



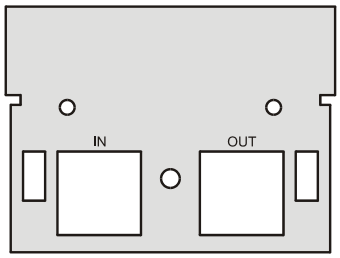
⇨ You have now installed the accessory.

You will need the following accessories for the connection of EtherCAT or PROFINET. The accessory part is installed above the inverter's display.

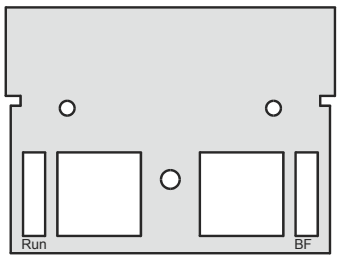
- EtherCAT: ECS 5000
- PROFINET: PN 5000

You will require the following for installation:

- A TX10 Torx screwdriver
- A Phillips screwdriver
- the following cover plate, which is included in the accessories, is required for installing the ECS 5000:



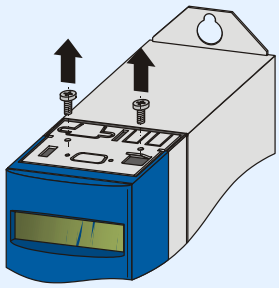
- the following cover plate, which is included in the accessories, is required for installing the PN 5000:



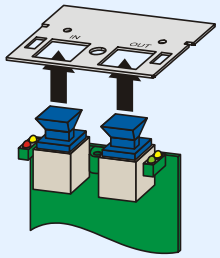
- The screw with locking disk which is included with the ECS 5000 accessories.

Installation of an ECS 5000 or PN 5000 in an inverter

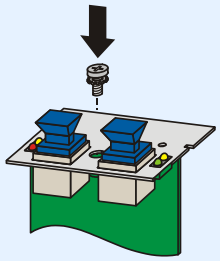
1. Remove the mounting screws and take off the cover plate:



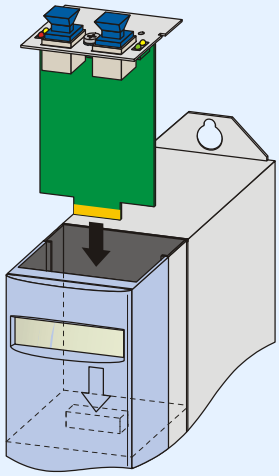
2. From below, guide the RJ45 plug connector of the PCB through the metal plate which is included with the accessory:



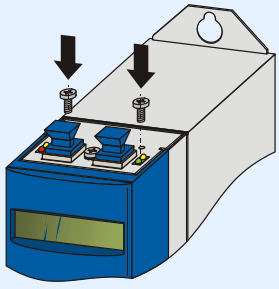
3. Secure the metal plate on the PCB with the included screw with locking disk:



4. Guide the option board into the inverter so that the gold contacts slide into the black connector:



5. Secure the metal plate on the PCB with the included screws:

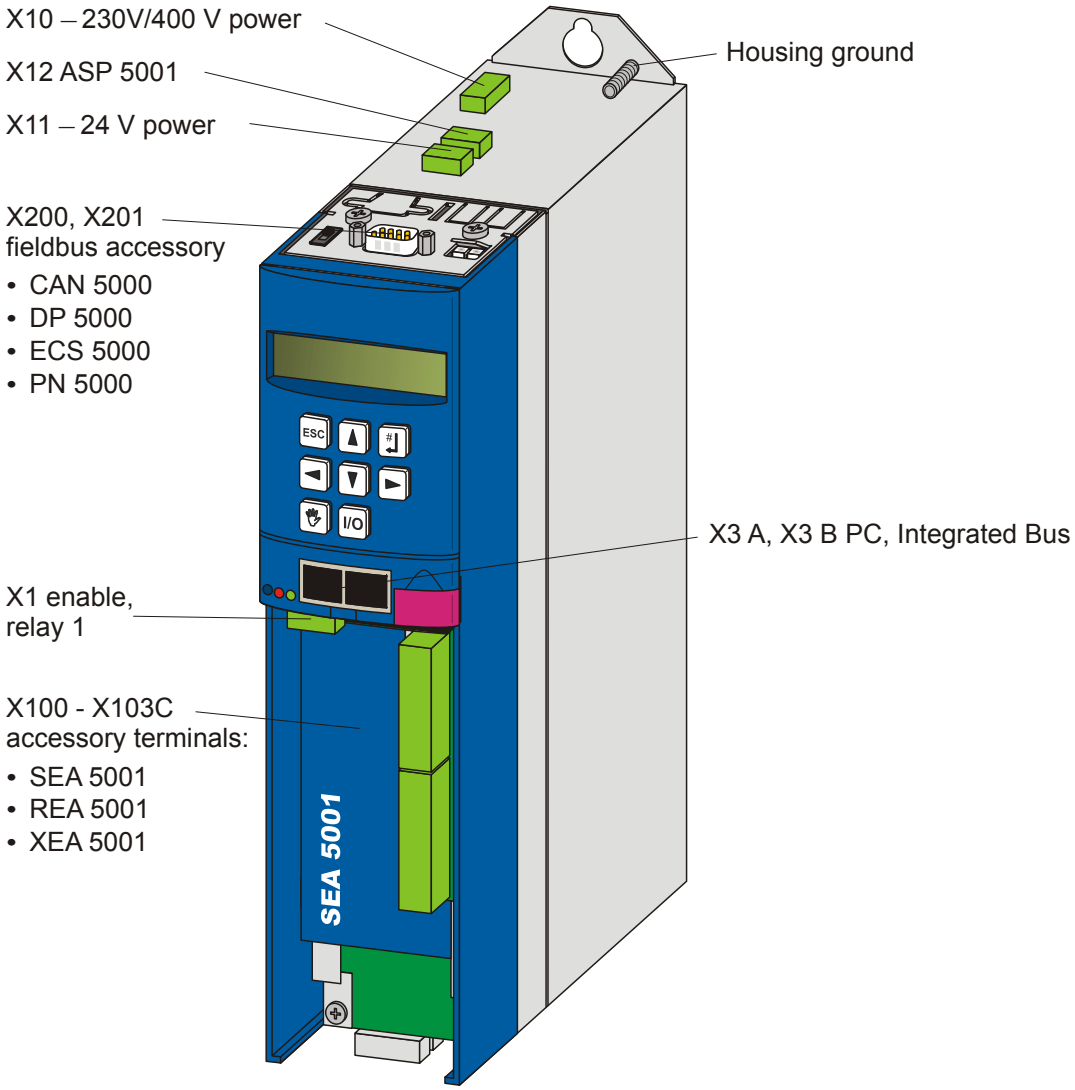


⇨ You have now installed the accessory.

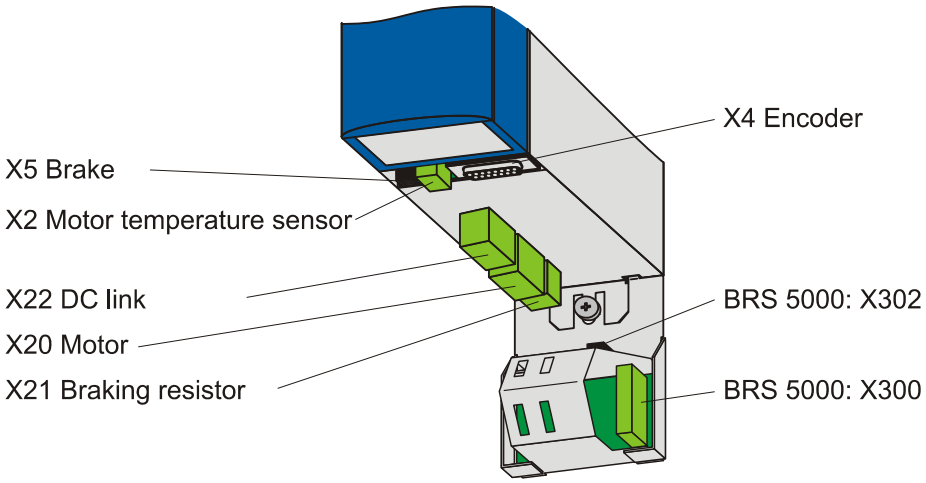
5 Connection

5.1 Overview of terminals

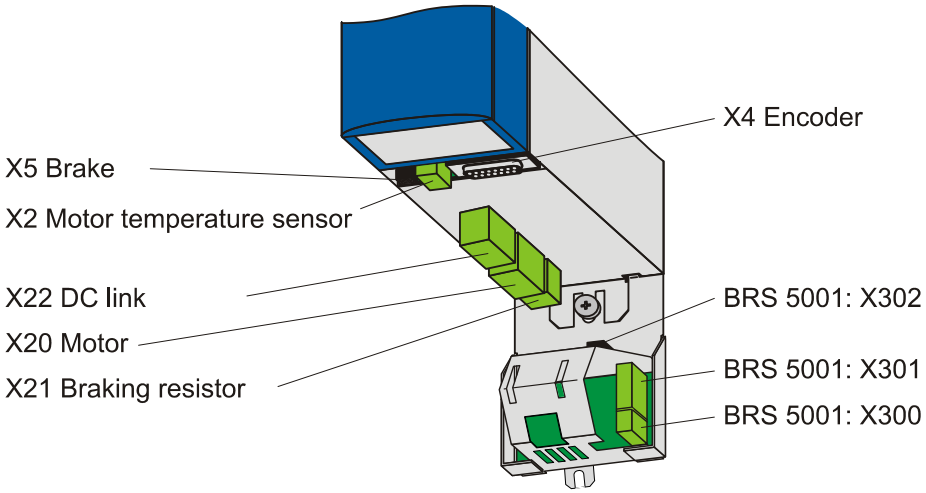
Front and top of the device



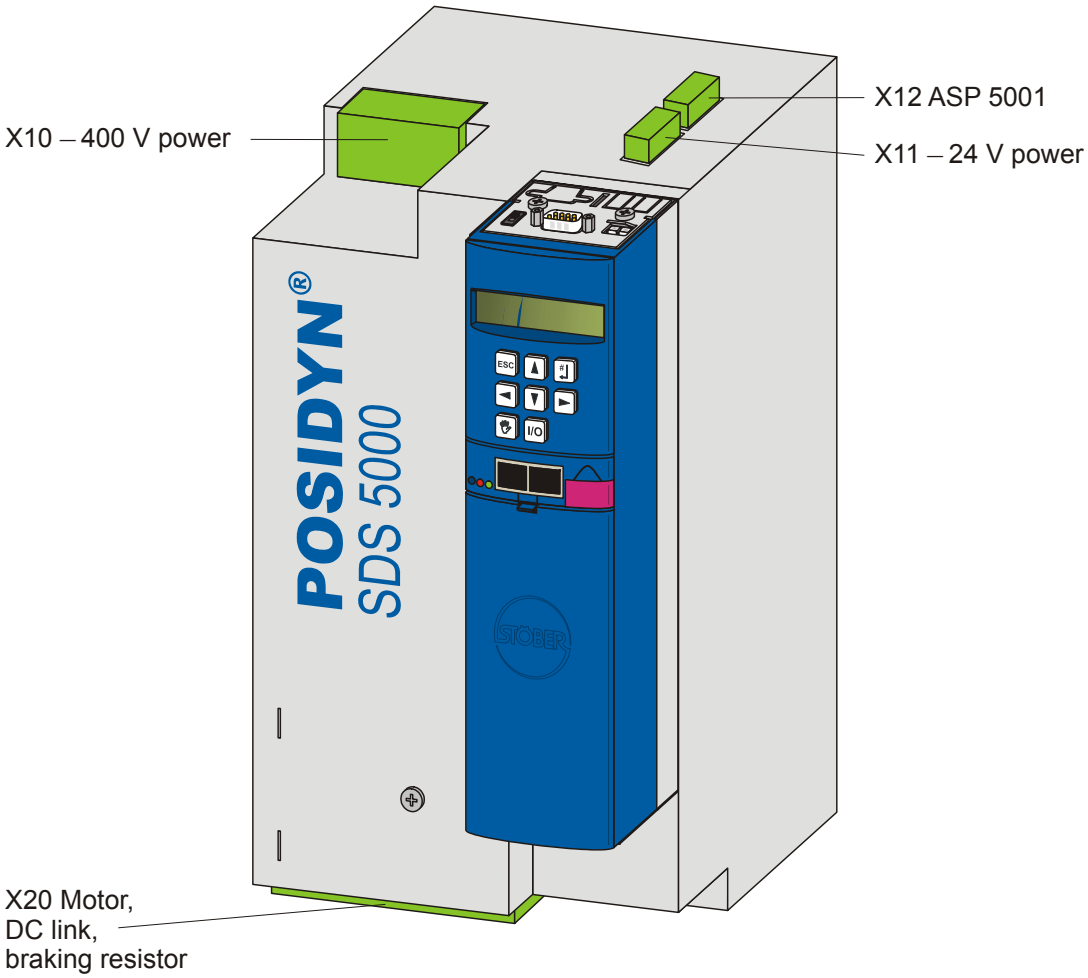
Bottom of the device with BRS 5000



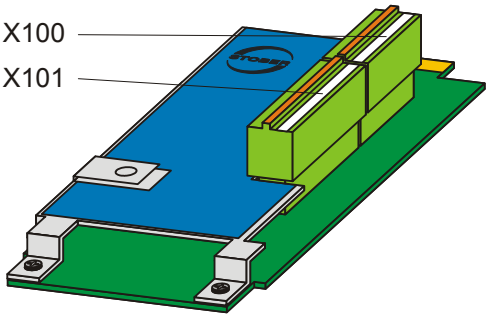
Bottom of the device with BRS 5001



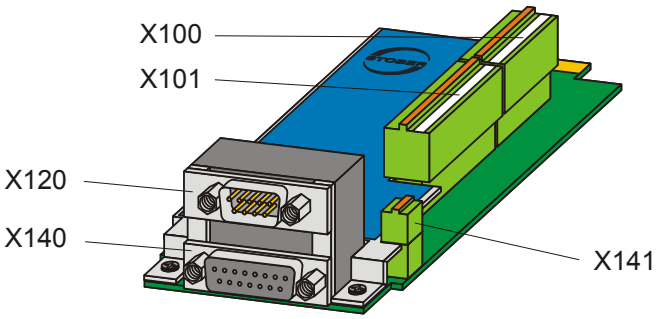
Size 3



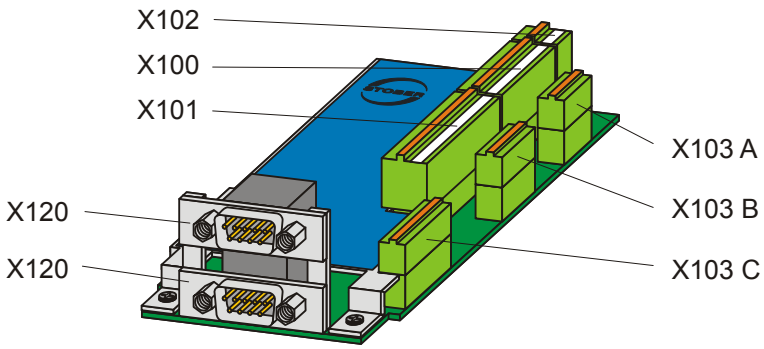
SEA 5001



REA 5001



XEA 5001



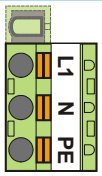
5.2 EMC connection

Information
In this section you can find general information on EMC-compliant installation. This involves recommendations. Depending on the application, ambient conditions as well as the legal requirements, measures beyond these recommendations may be required.

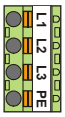
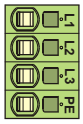
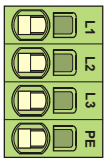
- Lay the power line, motor cable and signal lines separately from each other, e.g. in separate cable channels.
- Only use shielded cables as motor cables. Note also section 5.16 Cables.
- If the brake line is carried in the motor cable, the brake line must be separately shielded.
- Connect the shield of the motor cable with large contact areas and in the immediate vicinity of the inverter. For this purpose, use the EMC shroud EM 5000 or the brake module BRS 5000 or BRS 5001 for the sizes 0 to 2 or the EMC shroud EM6A3 for size 3.
- Shield the cable for connection to a braking resistor if it exceeds a length of 30 cm. In this case, connect the shield with large contact areas and in the immediate vicinity of the inverter.
- For motors with terminal boxes, connect the shield with large contact areas to the terminal box. For example, use EMC cable screw connections.
- Connect the shield of the control lines on one side with the reference ground of the source, e.g. the PLC or CNC.

5.3 X10: 230 V/400 V power

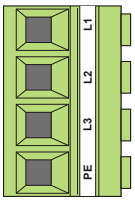
Terminal description – single-phase power connection Size 0

Pin	Designation	Function	Data
	—	Plastic dummy plug	—
	L1	Input voltage	230 V +20 %/-40 % 50/60 Hz
	N	Neutral conductor	—
	PE	Protective ground	—

Terminal description – three-phase power connection sizes 0, 1 and 2

Pin			Designation	Function	Data
Size 0	Size 1	Size 2			
			L1	Input voltage	3 x 400 V +32 %/-50 % 50 Hz or 3 x 480 V +10 %/-58 % 60 Hz
			L2		
			L3		
			PE	Protective ground	—

Terminal description – three-phase power connection – size 3

Pin	Designation	Function	Data
	L1	Input voltage	3 x 400 V +32 %/-50 % 50 Hz or3 x 480 V +10 %/-58 % 60 Hz
	L2		
	L3		
	PE	Protective ground	—

Minimum tightening torque M_{min} – screw-type terminals

Size	Size 1		Size 2		Size 3	
Unit	[Nm]	[lb-in]	[Nm]	[lb-in]	[Nm]	[lb-in]
M_{min}	0.5	4.4	1.2	11	2.5	22

Maximum conductor cross-section of power terminals

Size	0	1	2	3
Maximum cross-section for conductor with ferrule [mm^2]	2.5	4	6 (10 for rigid conductors)	25 (35 for rigid conductors)

5.3.1 Line fuse

The device's cables and output are protected by means of line protection. Various protective devices may be used for this purpose:

- Full range fuse (class "gG" in accordance with IEC class specification or "time lag" in accordance with VDE)
- Line circuit breaker
  Use line circuit breaker with trigger characteristics C in accordance with EN 60898.
- Power circuit breaker

Use fuses of class RK1 for UL-compliant applications, for example Bussmann KTS-R-xxA/600 V. For devices of sizes 0 and 1 it is also possible to uses fuses of class CC.

Type	Input current	Protection rating		
	$I_{1N,PU}$	Recommended	For UL-compliant use	For DC link connection in group 1
SDS 5007	1 x 5.9 A	1 x 10 A	1 x 10 A	1 x 10 A
SDS 5008	3 x 2 A	3 x 6 A	3 x 6 A	3 x 10 A
SDS 5015	3 x 3,7 A	3 x 10 A	3 x 10 A	3 x 10 A
SDS 5040	3 x 9,3 A	3 x 16 A	3 x 15 A	3 x 20 A
SDS 5075	3 x 15,8 A	3 x 20 A	3 x 20 A	3 x 20 A
SDS 5110	3 x 24,5 A	3 x 35 A	3 x 35 A	3 x 50 A
SDS 5150	3 x 32,6 A	3 x 50 A	3 x 50 A	3 x 50 A
SDS 5220[a)]	3 x 37 A	3 x 50 A	3 x 50 A	3 x 80 A
SDS 5370[a)]	3 x 62 A	3 x 80 A	3 x 80 A	3 x 80 A
SDS 5450[a)]	3 x 76 A	3 x 80 A	3 x 80 A	3 x 80 A

a) operation with network commutation reactors and line fuses for operating class gG (full range fuses for cable and circuit protection to IEC 60269-2-1/DIN VDE 0636, part 201 NH fuses)

The inverters are only designed for use on supply current networks which can delivery at the most a maximum of symmetrical rated short circuit current at 480 Volts as per the following table:

Size	Max. symmetrical rated short circuit current
Size 0 and size 1	5000 A
Size 2	5000 A
Size 3	10000 A

5.3.2 Residual current safety device

STOBER devices can be protected with a Residual Current protective Devices (RCD) to detect residual currents. Residual current protective devices prevent electrical accidents, especially ground fault through the body. They are generally distinguished according to their triggering limit and suitability for detecting different types of residual current.
Depending on the function, stray currents may occur when operating inverters. Stray currents are interpreted as residual currents by residual current protective devices and may therefore lead to false triggering.
Depending on the relevant power supply connections, residual currents may occur with or without a DC current component. Because of this, you should take into consideration both the height and also the shape of the possible stray or residual current when selecting a suitable RCD.

⚠ DANGER!

Electric shock hazard!

The combination of single-phase inverters and residual current protective devices type A or AC can lead to false triggering of the RCDs.

Stray currents with a DC current component may occur in 3-phase inverters.

- ▶ Always protect single-phase inverters with *residual current protective devices type B, sensitive to all currents*, or with type F, sensitive to mixed currents.
- ▶ Always protect 3-phase inverters with *residual current protective devices type B, sensitive to all currents*.

False triggering – causes

Depending on stray capacitances and asymmetries, stray currents up to 40 mA may occur during operation.
Undesirable false triggering occurs

- ... when inverters to the supply voltage.
  This false triggering can be rectified by using short-time delayed (super-resistant), selective (delayed switch-off) residual current protective devices or RCDs with increased trigger current (for example 300 or 500 mA).
- ... Due to higher frequency stray currents for long motor cables under normal operating conditions:
  This false triggering can be rectified for example using low-capacitance cables or output deraters.
- ... due to unbalances in the supply network.
  This false triggering can be rectified for example using an isolating transformer.

Information
Check whether the use of residual current protective devices with increased trigger current as well as with short-time delayed or delayed switch-off trigger characteristics are permitted in your application.

Installation:

DANGER!

Electric shock hazard!

Stray and residual currents with a DC current component can restrict the functionality of residual current protective devices types A and AC.

▶ Always follow the installation instructions for the protective devices you are using.

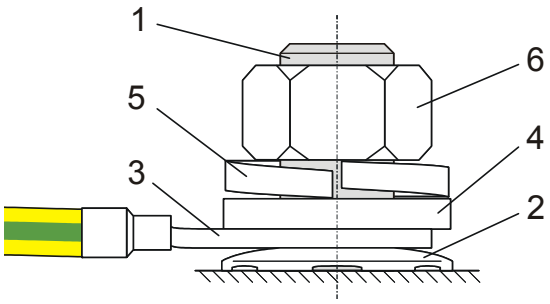
5.3.3 Housing ground

5.3.3.1 Size 0 to 2

Note the following information on the connection of the protective earth to ground the housing correctly:

- Note the assembly sequence on the M6 earth bolts (1):
  - 2 Contact disk
  - 3 Cable socket
  - 4 Washer
  - 5 Return spring (optional)
  - 6 Nut

  Contact disk, washer, return spring and nuts are supplied with the inverter.



- Tightening torque: 4 Nm
- Stray currents > 10 mA can arise in normal operation.
  To fulfill DIN EN 61800-5-1 and EN 60204-1, connect the earth bolts with a copper conductor according to the following table:

Cross-section A Feeder	Minimum cross-section A_P Earth conductor at earth bolts
A ≤ 2.5 mm^2	2.5 mm^2
2.5 < A ≤ 16 mm^2	A
16 – 35 mm^2	≥ 16 mm^2
> 35 mm^2	A/2

5.3.3.2 Size 3

Design the housing earth at interface X10 in at least mm^2 copper or 16 mm^2 aluminum.

5.3.4 Forming

NOTICE

Material damage!

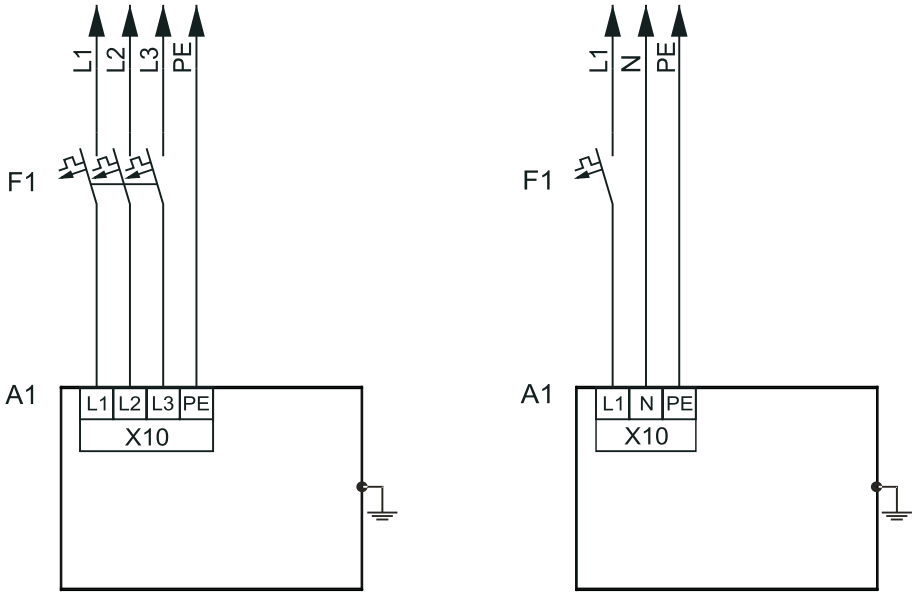
The DC link capacitors in devices of sizes 0, 1 and 2 can lose their electrical strength through long storage times. Considerable material damage can arise from a reduced electrical strength of the DC link capacitors when switching on.

▶ Use devices in storage annually or before startup.

Perform forming for stored devices.

Information
STOBER recommends connecting stored devices to the supply voltage according to the wiring shown for one hour every year. Please note that the inverters are designed exclusively for operation in TN networks.

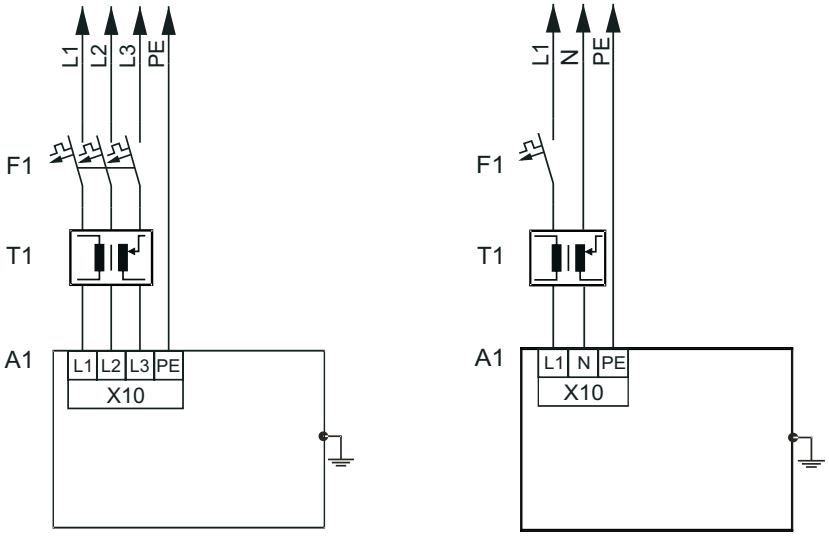
The graphics below show the principle network connection for 3-phase and 1-phase devices.



Legend

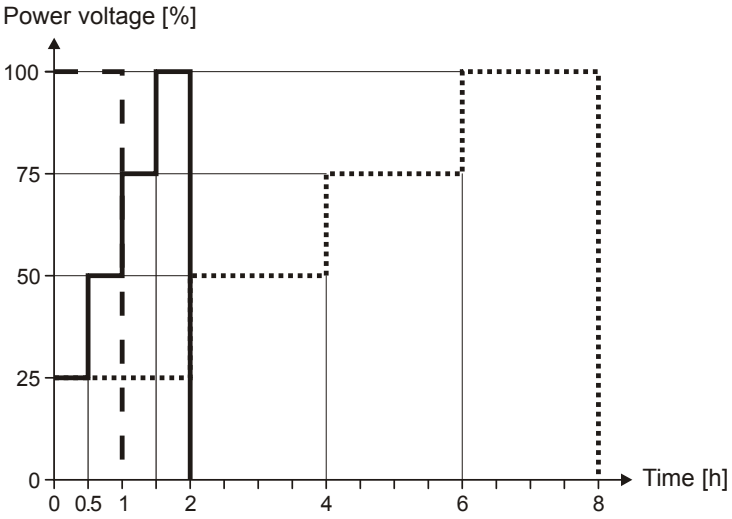
L1–L3 = lines 1 to 3
N = neutral conductor
PE = protective ground
F1 = fuse
A1 = inverter

If annual forming is not possible, form the stored devices before commissioning according to the wiring and voltage levels shown below.



Legend

L1–L3 = lines 1 to 3
N = neutral conductor
PE = protective ground
F1 = fuse
T1 = variable transformer
A1 = inverter



– –	Storage time 1 - 2 years:	Before enabling, apply voltage for one hour.
———	Storage time 2 - 3 years:	Before enabling, form as per curve.
·····	Storage time ≥3 years:	Before enabling, form as per curve.
	Storage time under 1 year:	No action required.

5.4 X11: 24 V power

Connection of 24 V to X11 is required for powering the control part.

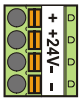
NOTICE

Danger of damage to the device due to overload!

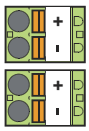
▶ If the 24 V power is looped through, a max. of four devices may be powered on one line.

Information
Remember that, with size 3 devices, the control unit is also powered via the DC link. If, with these inverters, only the 24 V power is switched off, the control electronics are initially still powered via the DC link and continue to run. This can cause problems if the control electronics evaluate the signals of devices which are powered externally and their power is switched off with the 24 V of the inverter (e.g., limit switch or encoder).

Terminal description – size 0, size 1 and size 2

Pin		Designation	Function	Data
	+	+24 V	Auxiliary voltage (PELV) for powering the control electronics	U_1 = 20.4 – 28.8 V I_{1max} = 1.5 A
	+	+24 V		
	–	GND	Reference potential for +24 V	—
	–	GND		

Terminal description – size 3

Pin		Designation	Function	Data
	+	+24 V	Auxiliary voltage (PELV) for powering the control electronics	U_1 = 20.4 – 28.8 V I_{1max} = 1.5 A
	–	GND	Reference potential for +24 V	—
	+	+24 V	Auxiliary voltage (PELV) for powering the control electronics	U_1 = 20.4 – 28.8 V I_{1max} = 1.5 A
	–	GND	Reference potential for +24 V	—

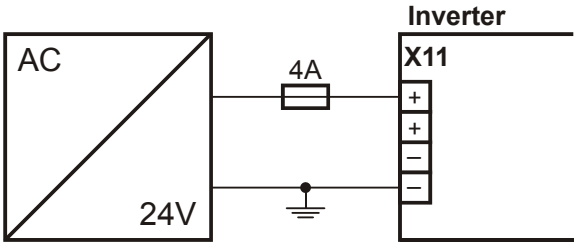
Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm²]
Rigid	1.5
Flexible	1.5
Flexible with cable end, without plastic sleeve	1.5
Flexible with cable end, with plastic sleeve	0.5
2 leads with the same cross-section with double cable end	—

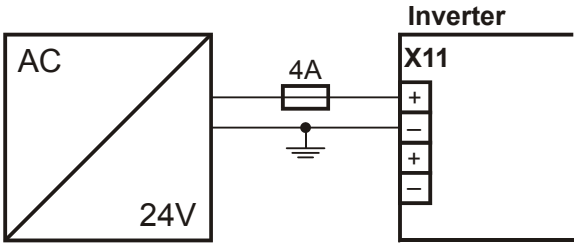
Example of connection

If the 24 V power is looped through, a max. of four devices may only be powered on one line. For conformity with UL, a 4 A fuse must be used on the 24 V incoming line. The fuse must be approved as per UL 248.

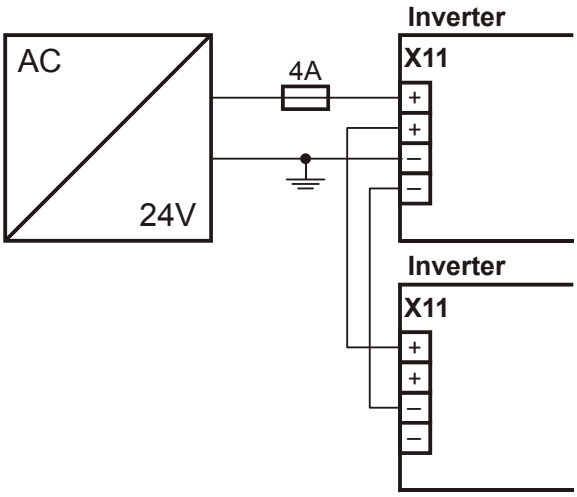
Size 0, size 1 and size 2



Size 3



Example of the connection of two devices

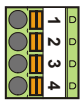


5.5 X1: Enable and relay 1

Use the enable signal to enable the power pack of the inverter. Starting with V 5.5-C, the function of relay 1 can be adjusted in parameter *F10*.

General specification	
Maximum cable length	30 m

Terminal description

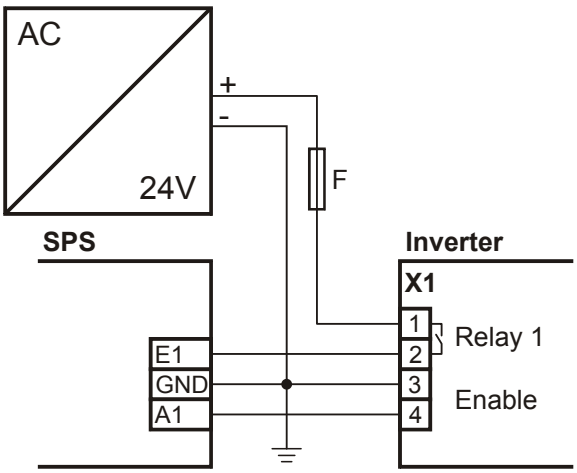
Pin		Designation	Function	Data
	1	Contact 1	Relay 1	U_{max} = 30 V I_{max} = 1.0 A Life expectation (number of switching operations): • Mechanical min. 5 000 000 switching operations; • at 24 V/1A (ohm. load): 300 000 switching operations. Recommended fuse: max. 1 A (time lag)
	2	Contact 2		
	3	GND	Enable power board	High level ≥12 V Low level < 8 V I_{1max} = 16 mA U_{1max} = 30 V
	4	+ input		

Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm²]
Rigid	1.5
Flexible	1.5
Flexible with cable end, without plastic sleeve	1.5
Flexible with cable end, with plastic sleeve	0.5
2 leads with the same cross-section with double cable end	—

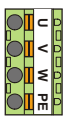
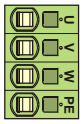
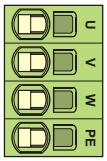
Example of connection

For a UL-compliant application, the use of a 1 A fuse before relay 1 is mandatory. The fuse must be approved as per UL 248.



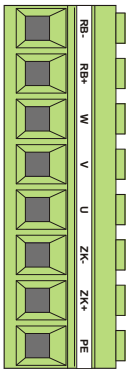
5.6 X20: Motor

Terminal description - size 0, size 1 and size 2

Pin			Designation	Function
Size 0	Size 1	Size 2		
			U	Motor connection, phase U
			V	Motor connection, phase V
			W	Motor connection, phase W
			PE	Protective ground

Terminal description – size 3 (with braking resistor and DC link connection)

Remember that with size 3 in addition to the motor the braking resistor and the DC link are also connected to terminal X20.

Pin	Designation	Function
	RB-	Braking resistor connection (see chapter X21: Braking Resistor)
	RB+	
	W	Motor connection, phase W
	V	Motor connection, phase V
	U	Motor connection, phase U
	ZK-	Reference potential for DC link
	ZK+	+ Potential of DC link
	PE	Protective ground

Minimum tightening torque M_{min} – screw-type terminals

Size	Size 1		Size 2		Size 3	
Unit	[Nm]	[lb-in]	[Nm]	[lb-in]	[Nm]	[lb-in]
M_{min}	0.5	4.4	1.2	11	2.5	22

Maximum conductor cross-section of power terminals

Size	0	1	2	3
Maximum cross-section for conductor with ferrule [mm^2]	2.5	4	6 (10 for rigid conductors)	25 (35 for rigid conductors)

Maximum motor cable length

Size	0 to 2	3
Without output derater	50 m	100 m
With output choke	100 m	—

Connection without output derater

Observe the following points when connecting the motor without the output derater:

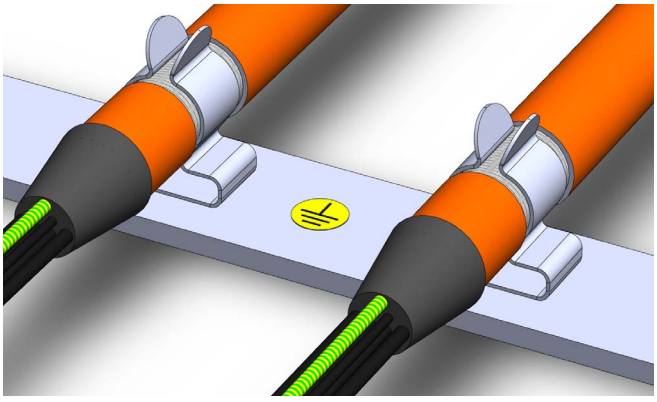
- Ground the shield of the motor cable with the shield connection clamp on the EMC shroud.
- Keep the exposed conductor as short as possible. All devices and circuits that are sensitive to EMC must be kept at a distance of at least 0.3 m.

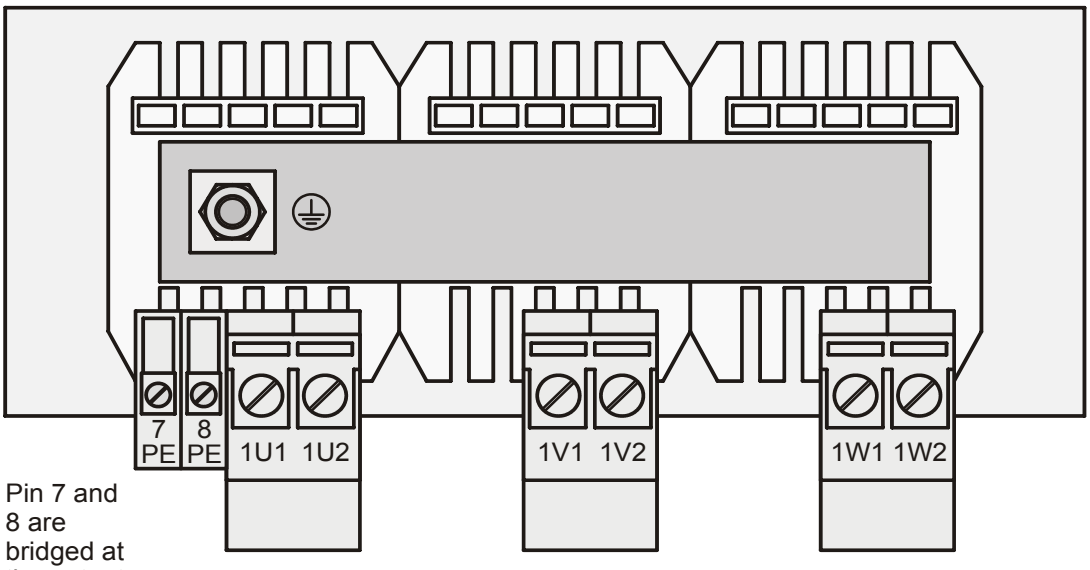
Connection with output derater

Observe the following points when connecting the motor to the output derater:

- Ground the shield of the motor cable with large area contacts in the immediate vicinity of the output derater, for example with electrically conductive metal cable terminals on a grounded connection rail.
- Keep the exposed conductor as short as possible. All devices and circuits that are sensitive to EMC must be kept at a distance of at least 0.3 m.

The graphic below shows an example for the shielded connection of a motor with output derater (graphic: icotek GmbH).



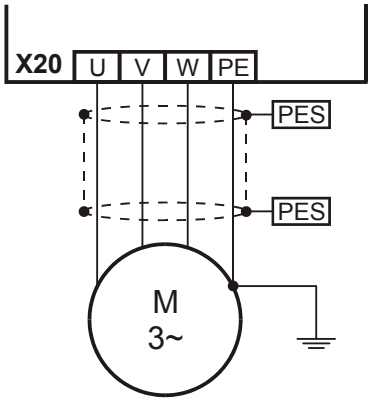


Pin 7 and 8 are bridged at the output derator

Example of connection

PES: HF shield connection via large-surface connection to PE

Inverter

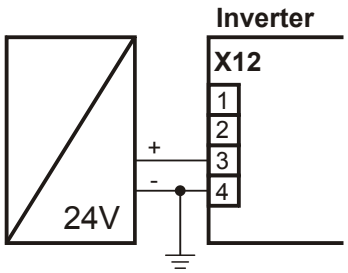


5.7 X12: ASP 5001 – Safe Torque Off

Information
If you are going to use this safety function, you will need the ASP 5001 option. It is imperative you read the operating instructions ASP 5001 (see section 1.2 Further documentation) and integrate the safety technology in your safety circuit in accordance with the description given there. Note that for devices of size 2 and size 3 the ASP 5001 option is fitted as standard. Even if you do not use safety technology, the inverter cannot be placed in operation if you leave the ASP 5001 option unconnected! Therefore connect the ASP 5001 option as per the following description if you are not using any safety technology.

Information
Please remember that the following description only applies to the ASP 5001. Go to applications@stoeber.de for the description of the ASP 5001.

Terminal description X12

Pin	Des.	Function	Data	Circuiting (If safety technology is not used!)
 1				
1	NC contact (break contact element)	Feedback contact; must be integrated in the safety circuit of the controller!	Note the specifications in the operating instructions ASP 5001, see section 1.2 Further documentation.	
2				
3	Relay coil+	Activation[a)]	U_1 = 20.4 – 28.8 V_{DC} (PELV) I_{1Typ} = 50 mA I_{1max} = 70 mA Note the specifications in the operating instructions ASP 5001, see section 1.2 Further documentation.	
4	Relay coil-			

a) To conform with UL, a 4 A delayed fuse must be used in the 24 V feeder line. The fuse must be approved in accordance with UL 248.

Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm²]
Rigid	1.5
Flexible	1.5
Flexible with cable end, without plastic sleeve	1.5
Flexible with cable end, with plastic sleeve	0.5
2 leads with the same cross-section with double cable end	—

5.8 X2; X141: Motor temperature sensor

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 or KTY sensors.

PTC sensors are thermistors and their 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. PTC sensors therefore allow for effective motor protection.

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

Information
Note that the evaluation of a KTY84-130 on the SDS 5000 is possible with a hardware version of 200 or higher. Before using a KTY, note that motor protection is not ensured to the same extent as when monitoring with PTC drilling.

Motor temperature sensor lines in the resolver or EnDat cable (SDS 4000)
If you replace a SDS 4000 with a MDS or SDS 5000, the lines of the motor temperature sensor are carried in the previously used resolver or EnDat cable. To be able to continue using the cable, you will need the accessory part REA 5001 (see section 7 Accessories).

You can connect the EnDat cable directly to the REA 5001. You can connect the nine pole resolver cable using the resolver adapter included in the scope of delivery of the REA 5001 (see section 7 Accessories).
The signal of the motor temperature sensor is output on the REA 5001 to the interface X141. In this case connect X141 to X2.

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.

Terminal description – X2

Pin		Function	Data
	1	1TP1/1K1+	Max. 2 PTC triplets (series-connected) or one KTY84-130
	2	1TP2/1K2-	

Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm²]
Rigid	2,5
Flexible	2,5
Flexible with cable end, without plastic sleeve	2,5
Flexible with cable end, with plastic sleeve	2,5
2 leads with the same cross-section with double cable end	1,5

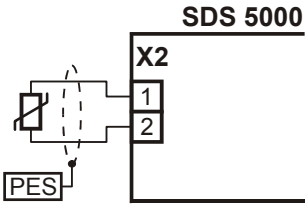
Terminal description – X141

Pin		Function	Description
	1	1TP1/1K1+	Thermal motor protection signal, comes from X140 pin 7
	2	1TP2/1K2-	Thermal motor protection signal, comes from X140 pin 14

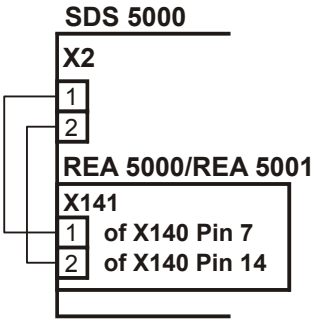
Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm²]
Rigid	1,5
Flexible	1,5
Flexible with cable end, without plastic sleeve	1,5
Flexible with cable end, with plastic sleeve	0,75
2 leads with the same cross-section with double cable end	—

Example of connection of X2



Example of connection of X141 and X2



5.9 X5; X300 - X302: Motor holding brake

The inverter SDS 5000 can control one or two motor holding brakes. Usually brake 1 is the motor-internal brake and brake 2 the one in the motor adapter ServoStop. STÖBER ANTRIEBSTECHNIK GmbH & Co. KG offers the motor adapter ServoStop as an option for servo geared motors.

Requirement for the connection of motor holding brakes on the SDS 5000:
- The accessory part BRS 5000 or the BRS 5001, from firmware V 5.6-N, see section 7
- The enclosed connection cable (X5, X302)

Information
Remember that motor halting brakes of other manufacturers may not be connected to the BRS 5000 or BRS 5001 without first consulting STOBER.

Information
Remember that you may only make the connection between X5 and X302 with the connection cable included with the BRS 5000 or BRS 5001.

Information
Remember that two LEDs are installed on the brake module. These LEDs indicate the status of the brake control:
- LED on: brake output, energized (active)
- LED off: brake output, not energized (inactive)

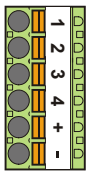
Terminal description X5 (inverter) and X302 (BRS 5000 or BRS 5001)

Pin		Designation	Function
	1	1BD1	Brake 1 controller
	2	1BD2	Reference potential at pin 1, 2, 5 and 6
	3	Status1	Brake 1 feedback
	4	Status2	Brake 2 feedback
	5	2BD2	Reference potential at pin 1, 2, 5 and 6
	6	2BD1	Brake 2 controller

Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm^2]
Rigid	2,5
Flexible	2,5
Flexible with cable end, without plastic sleeve	2,5
Flexible with cable end, with plastic sleeve	2,5
2 leads with the same cross-section with double cable end	1,5

Terminal description X300 (BRS 5000)

Pin		Designation	Function	Data
	1	1BD1	Control brake 1	I_2 ≤ 2,5 A: max. of 15 switching cycles per minute I_2 ≤ 3,6 A: max. of 10 switching cycles per minute I_{2max} = 3,6 A
	2	1BD2	Reference potential for brake 1	—
	3	2BD1	Control brake 2	I_2 ≤ 2,5 A: max. of 15 switching cycles per minute I2 ≤ 3,6 A: max. of 10 switching cycles per minute I_{2max} = 3,6 A
	4	2BD2	Reference potential for brake 2	—
	+	24 V	Feedin for brake control	U_1 = 24–30 V I_{1max} = 7,5 A Fuses: Up to a max. of 10 AT in acc. with the brakes used
	-	GND	Reference potential for 24 V	—

Information
Note that the 24-V power supply on X300 Pin + must always be at least 24 V. If the voltage falls below 24 V, a malfunction is triggered in the inverter.
Connect a controlled 24-V power supply to X300 Pin +.

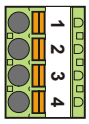
Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm²]
Rigid	2,5
Flexible	2,5
Flexible with cable end, without plastic sleeve	2,5
Flexible with cable end, with plastic sleeve	2,5
2 leads with the same cross-section with double cable end	1,5

Terminal description X300 (BRS 5001)

Pin		Designation	Function	Data
	+	24 V	Power input for brake controller	U_1 = 24 – 30 V I_{1max} = 7.5 A Fuse: up to max. 10 AT according to brakes used
	–	GND	Reference potential for 24 V	—

Terminal description X301 (BRS 5001)

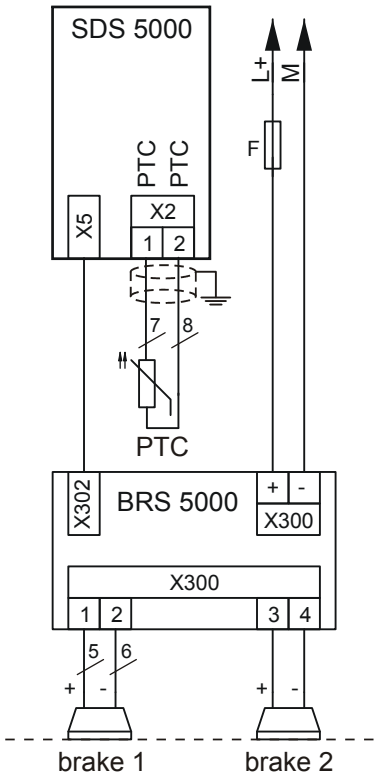
Pin		Designation	Function	Data
	1	1BD1	Controller Brake 1	$I_2 \leq 3.6$ A: max. 15 operating cycles per min. I_{2max} = 3.6 A
	2	1BD2	Brake 1 reference potential	—
	3	2BD1	Controller Brake 2	$I_2 \leq 3.6$ A: max. 15 operating cycles per min. I_{2max} = 3.6 A
	4	2BD2	Brake 2 reference potential	—

Information
Note that the 24-V power supply on X300 Pin + must always be at least 24 V. If the voltage falls below 24 V, a malfunction is triggered in the inverter.
Connect a controlled 24-V power supply to X300 Pin +.

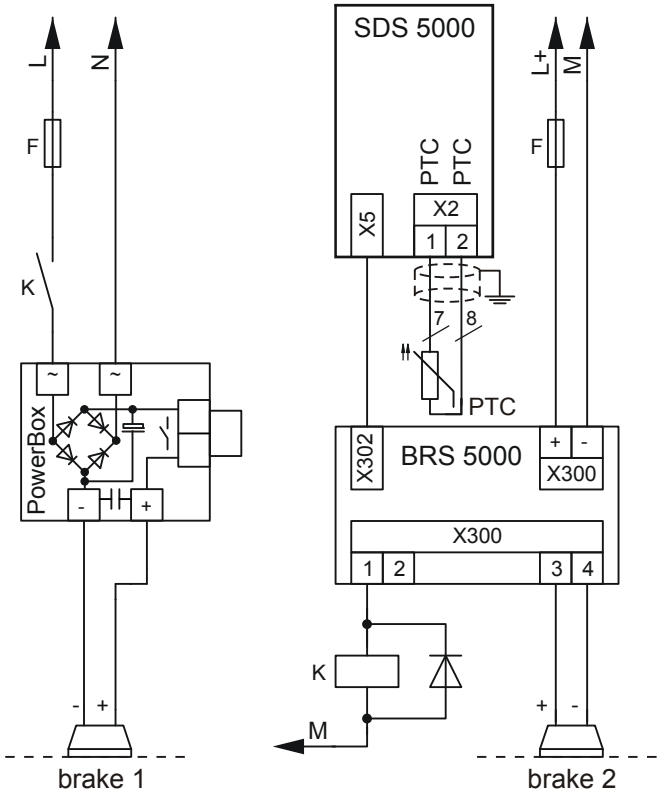
Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm²]
Rigid	2,5
Flexible	2,5
Flexible with cable end, without plastic sleeve	2,5
Flexible with cable end, with plastic sleeve	2,5
2 leads with the same cross-section with double cable end	1,5

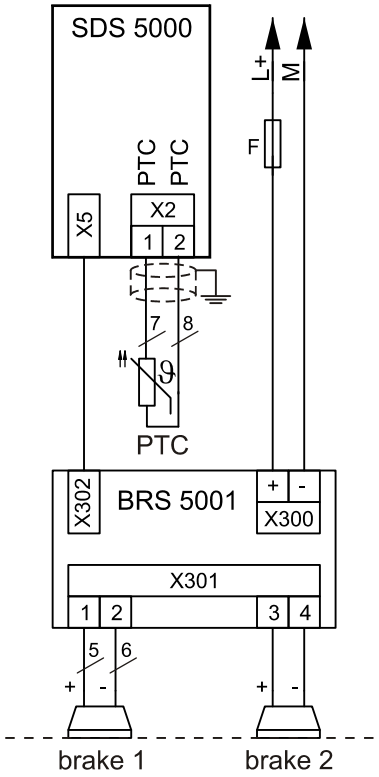
Brake connection with BRS 5000 for 24 V DC brakes



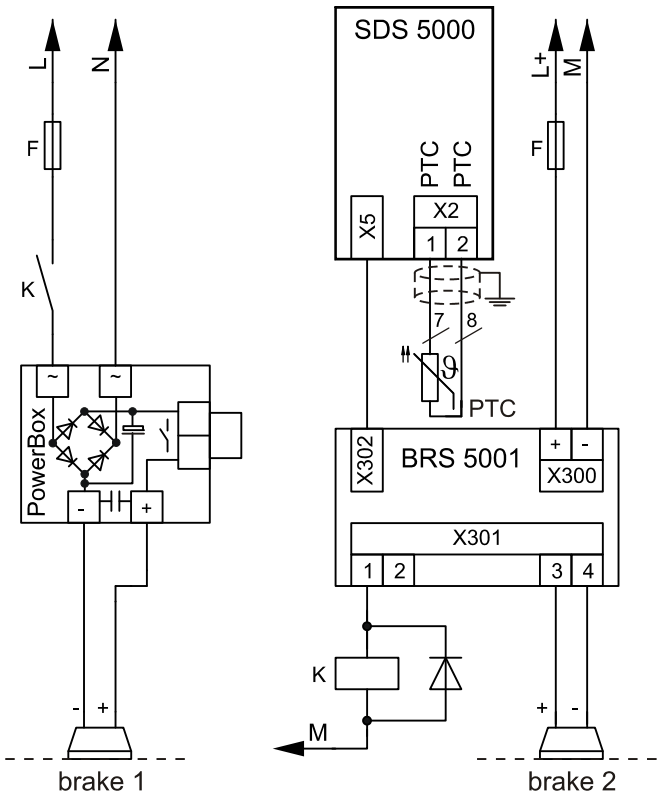
Indirect brake control



Brake connection with BRS 5001 for 24 V DC brakes



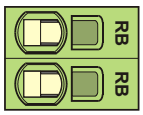
Indirect brake control



5.10 X21: Braking resistor

An external braking resistor may be necessary during generating operation. For the technical data on the braking resistors, see chapter 3 Technical data. The braking resistor is connected to terminal X20 on size 3 versions (chapter 5.6 X20: Motor).

Terminal description – size 0 to size 2

Pin			Designation	Function
Size 0	Size 1	Size 2		
			RB RB	Connection of braking resistor

Minimum tightening torque M_{min} – screw-type terminals

Size	Size 1		Size 2	
Unit	[Nm]	[lb-in]	[Nm]	[lb-in]
M_{min}	0.5	4.4	1.2	11

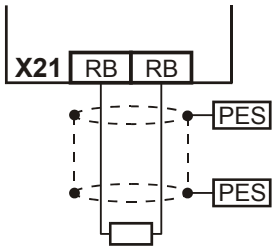
Maximum conductor cross-section of power terminals

Size	0	1	2	3
Maximum cross-section for conductor with ferrule [mm^2]	2.5	4	6 (10 for rigid conductors)	25 (35 for rigid conductors)

Example of connection

Use a shielded cable for cables longer than 30 cm between braking resistor and device.

Inverter



5.11 X22: DC link coupling

Information
Remember that the DC link coupling described here can only be used with the device families MDS 5000, SDS 5000 and FDS 5000.

When you have axes in your system which operate in combination and are continuously regenerative and motor-driven, the DC link coupling may offer advantages. The DC link coupling takes the excess power and offers it to other axes as drive power instead of converting it into heat via a braking resistor. Remember that you will need a braking resistor to absorb the power peaks when all drives in the DC link coupling brake at the same time.

DANGER!

Danger of device damage! When single-phase and three-phase devices are coupled, the single-phase devices will be destroyed.

- ▶ Only use three-phase devices for the DC link coupling!

NOTICE

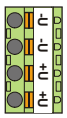
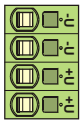
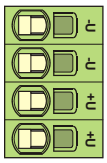
Danger of device damage!

Because the failure of one device could damage other devices, failure of a device must cause the entire DC link compound system to be disconnected from the power supply.

- ▶ Make a note of the wiring and parameterization of relay 1 in Section Principal circuit diagram (X1.1 and X1.2).
- ▶ After a failure, replace all the devices in a group.

Information
Remember that the parameter *A38 DC power-input* must be set before the DC link coupling can function correctly:
Group 1: *A38 = 0: inactive*
Groups 2 and 3: *A38 = 1: active*
See the description of the parameter.

Terminal description X22 – size 0, size 1 and size 2

Pin			Designation	Function
Size 0	Size 1	Size 2		
			-U	Reference potential for DC link
			-U	
			+U	+ Potential of DC link
			+U	

Size 3: For connection to terminal X20, see 5.6 X20: Motor

Minimum tightening torque M_{min} – screw-type terminals

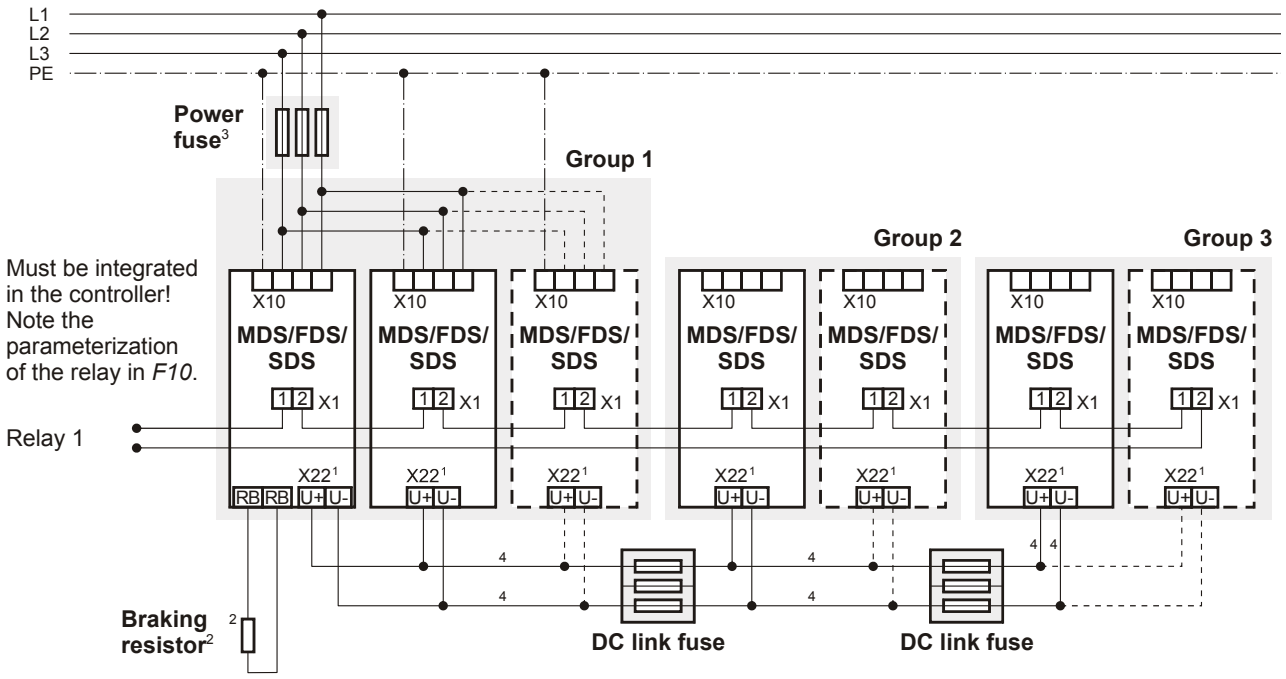
Size	Size 0		Size1		Size 2	
Unit	[Nm]	[lb-in]	[Nm]	[lb-in]	[Nm]	[lb-in]
M_{min}	0.5	4.4	0.5	4.4	1.2	11

Maximum conductor cross-section of power terminals

Size	0	1	2	3
Maximum cross-section for conductor with ferrule [mm^2]	2.5	4	6 (10 for rigid conductors)	25 (35 for rigid conductors)

Principal circuit diagram

The following circuit diagram shows the principal circuit diagram of the DC link coupling. The inverters can be linked together in up to three groups. The table on the next page shows the possible combinations. The combination determines the types of line fuses and the DC link fuse.



1 With size 3 MDS 5000 and SDS 5000 devices: X20, terminals ZK+, ZK-.
2 Dimension the braking resistor in accordance with the braking performance of the DC link coupling and the technical data of the device.
3 See chapter 5.3.
4 Dimension the conductor cross-sections of the DC link connection according to the requirements of your application. A reference point can be the maximum cross-section for the terminals X22 for size 0 to 2 or X20 for size 3.

Combinations

The following table shows the possible combinations for the DC link connection. There are a total of 15 combinations available.

Example: Combination no. 7:
With combination no. 7, you can combine an inverter of size 1 in group 1 with two devices of size 0 in group 2. Group 3 is not set up. The line fuse must have a rated current of 20 A. The groups are separated via the DC link fuse of type 1. Wait three minutes before switching on the devices of the DC link connection again.

	Group 1				DC link fuse	Group 2		DC link fuse	Group 3	t_{min} a)
Device family	MDS/FDS/SDS		MDS/SDS			MDS/FDS/SDS			MDS/FDS/SDS	
Size	Size 0	Size 1	Size 2	Size 3		Size 0	Size 1		Size 0	
Line fuse	10 A	20 A b)	50 A b)	80 A b)		—	—		—	
P_{2maxPU} c)	4 kW	10 kW	20 kW	45 kW		—	—		—	
Combination no.										
1	Max. 4	—	—	—	—	—	—	—	—	1
2	—	Max. 4	—	—	—	—	—	—	—	5
3	—	3	—	—	Type 1	2	—	—	—	5
4	—	3	—	—	Type 1	1	—	—	—	3
5	—	2	—	—	Type 1	2	—	—	—	3
6	—	2	—	—	Type 1	1	—	—	—	4
7	—	1	—	—	Type 1	2	—	—	—	3
8	—	—	Max. 3	—	—	—	—	—	—	2
9	—	—	3	—	Type 2	—	1	Type 1	2	2
10	—	—	3	—	Type 1	2	—	—	—	2
11	—	—	3	—	Type 2	—	1	—	—	2
12	—	—	2	—	Type 2	—	1	—	—	2
13	—	—	2	—	Type 2	—	1	Type 1	1	2
14	—	—	1	—	Type 2	1	—	—	—	2
15	—	—	—	Max. 3	—	—	—	—	—	1

a) Restart time
b) Note the list of line fuses for UL-compliant use in section 5.3.1 Line fuse
c) Maximum sum of drive power

Instead of delaying the process by the restart time, you can determine the restart time by evaluating the *E14* parameter. The parameter in all devices connected to the network must show that the load relay is open before the supply voltage may be switched on again. You can query the parameter via the fieldbus or binary output. If you are setting up a DC link connection only with devices from the SDS 5000 family or A-devices (HW version 200 or higher), you do not need to note the restart time.

Fuses

⚠ CAUTION!

Danger of machine standstill! If a fuse element fails, the second fuse element will be damaged.

▶ Always replace the elements of a fuse in pairs.

Remember the following points during mounting and operation:

- Shield the DC link connections if the cables are longer than 20 cm. This prevents EMC problems.
- Use the two outer elements of the fuse holder to ensure adequate safe flashover distance.
- Use the following fuses to protect the DC link:

	Type 1	Type 2
Manufacturer	SIBA Sicherungs-Bau GmbH Borker Straße 22 D-44534 Lünen www.siba.de	
Size	10 x 38	
Operating class	gRL	
Rated voltage	AC 600 V	
Rated current	10 A	20 A
Power loss per element	1.6 W	3.5 W
Art. no. of fuse	6003434.10	6003434.20
Art. no. of fuse holder	5106304.3	

5.12 X100 - X103: Analog and binary signals

Below are the prerequisites for connecting analog and binary signals:

- SEA 5001
- REA 5001
- XEA 5001

⚠ WARNING!

Danger of faulty machine behavior due to EMC faults!

▶ Use exclusively cables up to 30 m in length for analog and binary inputs and outputs (AE, AA, BE, BA)!

Information

Note that the sampling time of the inputs and the refresh rate of the outputs correspond to the cycle time set in parameter *A150*.

For time critical functions such as a print mark control, a time stamp is also available for the binary inputs.

If BE encoders or BA encoder simulation is used, the sampling time and refresh rate is independent of the set cycle time (see section 5.13.4 BE encoder and BA encoder simulation).

Terminal description X100 – SEA 5001, REA 5001, XEA 5001

NOTICE

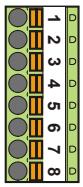
Machine movement by unexpected reference value

The inverter detects a reference value setting of +5V for an unconnected analog input.

▶ Always operate the inverter with a connected analog input.

General specification	
Maximum cable length	30 m, shielded

Terminal description

Pin		Designation	Function	Data
	1	AE1+	+ input of analog input AE1 resolution: • SEA 5001: 10 bit + sign • REA 5001 and XEA 5001: 15 bit + sign	Reference: Pin 3 U_1 = ± 10 V R_{int} = 40 kΩ U_{1max} against pin 3 = 30 V U_{1max} against protective ground 15 V U_{1max} against AGND = 30 V
	2	AE1 shunt	Current input; shunt connection pin 2 is to be bridged with pin 1.	Reference: Pin 3 I_1 = ± 20 mA R_{int} = 510 Ω
	3	AE1-	Inverted input of analog input AE1	U_{1max} against pin 1 = 30 V U_{1max} against protective ground = 15 V U_{1max} against AGND = 30 V
	4	AE2+	+ input of the analog input AE2; Resolution: • SEA 5001, XEA 5001: 10 bit + sign • REA 5001: 15 bit + sign	Reference: Pin 5 U_1 = ± 10 V R_{int} = 40 kΩ U_{1max} against pin 5 = 30 V U_{1max} against protective ground = 15 V U_{1max} against AGND = 30 V
	5	AE2-	Inverted input of analog input AE2	U_{1max} against protective ground = 15 V U_{1max} against AGND = 30 V
	6	AA1	Analog output 1	Reference: Pin 8 I_{2max} = 10 mA R_{int} = 20 Ω Resolution: • MDS 5000: 10 bit + sign • MDS 5000A, SDS 5000, SDS 5000A: 11 bit + sign
	7	AA2	Analog output 2	
	8	AGND	Reference ground for analog signals	—

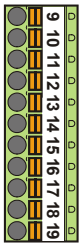
Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm²]
Rigid	1.5
Flexible	1.5
Flexible with cable end, without plastic sleeve	1.5
Flexible with cable end, with plastic sleeve	0.5
2 leads with the same cross-section with double cable end	—

Terminal description X101 – SEA 5001, REA 5001, XEA 5001

General specification	
Maximum cable length	30 m, shielded

Terminal description

Pin		Designation	Function	Data
	9	GND 18 V	Reference ground for pin 19	—
	10	DGND	Reference ground for pins 11 to 18	—
	11	BE1	Binary input	High level: 12 – 30 V Low level: 0 – 8 V U_{1max} = 30 V I_{1max} = 16 mA at U_{1max}
	12	BE2		
	13	BE3[a)]		
	14	BE4[a)]		
	15	BE5[a)]		
	16	BA1	Binary output	I_{2max} = 50 mA at 45° C, 40 mA at 55° C
	17	BA2		
	18	24 V-In	24 vdc power supply • for XEA 5001 and • for binary outputs for SEA 5001 and REA 5001	Input range: 18 – 28.8 V
	19	18 V-Out	Auxiliary voltage 18 V	U_2 = 16 – 18 V I_{2max} = 50 mA

a) BE3, BE4 and BE5 can be used as an encoder input. Also note section 5.13.4 BE encoder and BA encoder simulation. On the REA 5001, these inputs can be switched by the sliding switch S0, S1 and S2 on the TTL level.

Maximum conductor cross-section

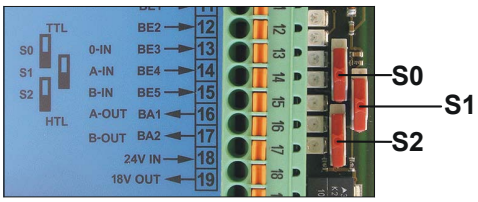
Connection type	Maximum conductor cross-section [mm²]
Rigid	1.5
Flexible	1.5
Flexible with cable end, without plastic sleeve	1.5
Flexible with cable end, with plastic sleeve	0.5
2 leads with the same cross-section with double cable end	—

TTL/HTL switchover REA 5001

Switch	TTL/HTL conversion
S0	BE3
S1	BE4
S2	BE5

The identification of the switches and the assignment of the switch positions to the function (HTL/TTL) are shown on the PCB cover of the REA 5001.

REA 5001



Terminal description X102 – XEA 5001

NOTICE

Machine movement by unexpected reference value

The inverter detects a reference value setting of +5V for an unconnected analog input.

▶ Always operate the inverter with a connected analog input.

General specification	
Maximum cable length	30 m, shielded

Terminal description

Pin		Designation	Function	Data
	1	AE3+	+ input of analog input AE3 Differential input voltage resolution: 10 bit + sign	Reference: Pin 2 U_1 = ± 10 V R_{int} = 40 kΩ U_{1max} against pin 2 = 30 V U_{1max} against protective ground 15 V U_{1max} against AGND = 30 V
	2	AE3-	Inverted input of analog input AE3	U_{1max} against pin 2 = 30 V U_{1max} against protective ground = 15 V U_{1max} against AGND = 30 V

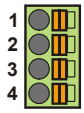
Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm²]
Rigid	1.5
Flexible	1.5
Flexible with cable end, without plastic sleeve	1.5
Flexible with cable end, with plastic sleeve	0.5
2 leads with the same cross-section with double cable end	—

Terminal description X103 A – XEA 5001

General specification	
Maximum cable length	30 m, shielded

Terminal description

Pin		Designation	Function	Data
	1	BA3	Binary output	I_{2max} = 50 mA
	2	BA4		
	3	BA5		
	4	BA6		

Maximum conductor cross-section

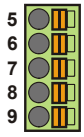
Connection type	Maximum conductor cross-section [mm²]
Rigid	1,5
Flexible	1,5
Flexible with cable end, without plastic sleeve	1,5
Flexible with cable end, with plastic sleeve	0,75
2 leads with the same cross-section with double cable end	—

Information
When the 24 V power fails, binary inputs BE6 to BE13 have signal status 0 (regardless of the physical signal state).

Terminal description X103 B – XEA 5001

General specification	
Maximum cable length	30 m, shielded

Terminal description

Pin		Designation	Function	Data
	5	BA7	Binary output	I_{2max} = 50 mA
	6	BA8		
	7	BA9		
	8	BA10		
	9	BE6	Binary input	Reference: Pin 10 of terminal X101 High level: 12 – 30 V Low level: 0 – 8 V U_{1max} = 30 V I_{1max} = 3 mA at U_{1max}

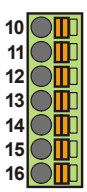
Maximum conductor cross-section

Connection type	Maximum conductor cross-section [mm^2]
Rigid	1,5
Flexible	1,5
Flexible with cable end, without plastic sleeve	1,5
Flexible with cable end, with plastic sleeve	0,75
2 leads with the same cross-section with double cable end	—

Terminal description X103 C – XEA 5001

General specification	
Maximum cable length	30 m, shielded

Terminal description

Pin		Designation	Function	Data
	10	BE7	Binary input	Reference: Pin 10 of terminal X101 High level: 12 – 30 V Low level: 0 – 8 V U_{1max} = 30 V I_{1max} = 3 mA at U_{1max}
	11	BE8		
	12	BE9		
	13	BE10		
	14	BE11		
	15	BE12		
	16	BE13		

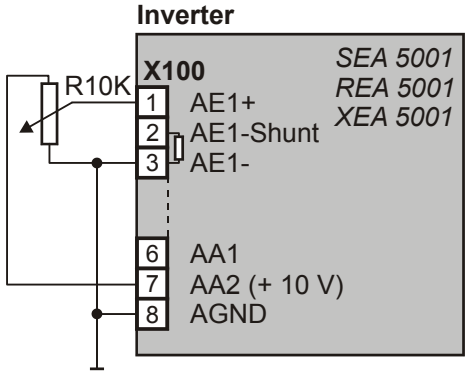
STÖBER

Maximum conductor cross-section

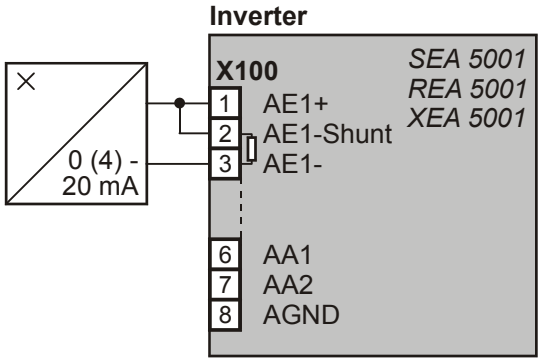
Connection type	Maximum conductor cross-section [mm²]
Rigid	1,5
Flexible	1,5
Flexible with cable end, without plastic sleeve	1,5
Flexible with cable end, with plastic sleeve	0,75
2 leads with the same cross-section with double cable end	—

Examples of connection

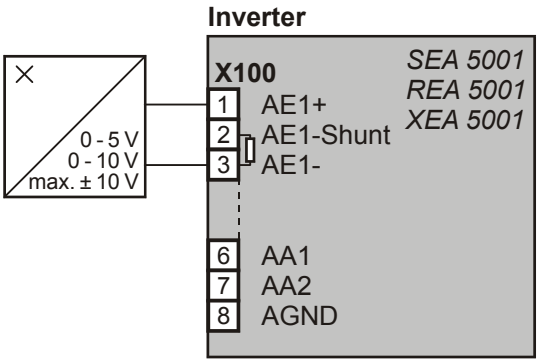
Potentiometer



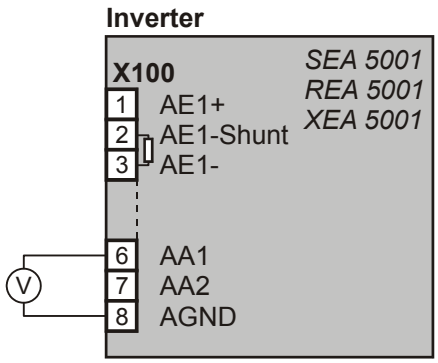
Current (0 - 20 mA, 4 - 20 mA)



Voltage (max. ± 10 V)



Analog output voltage



5.13 Encoder

Information
Remember that the encoder interfaces can usually evaluate or simulate several systems (e.g., EnDat and incremental encoder). In the parameters enter the particular system that you are connecting to an interface. Please consult the inverter operating manual in this case.

5.13.1 X4

NOTICE

Danger of encoder destruction!

▶ X4 may not be connected or disconnected when the device is on!

General specification	
U_2	5–16 V, see the encoder supply table below
I_{2max}	X4: 250 mA Total of X4, X120 and X140: 500 mA
I_{2min}	≤ HW 190: 30 mA; ≥ HW 200: 13 mA
Maximum cable length	100 m

Specification for EnDat 2.1	
Encoder type	Single and Multiturn, not suitable for linear measuring devices
Switching frequency	2 MHz
Evaluation	Digital signals only; starting with HW 200 and firmware V 5.6-H, analog signals are tolerated on pins 1, 3, 9 and 11 (compatible with X140).

Specification for EnDat 2.2	
Encoder type	Single and Multiturn, not suitable for linear measuring devices
Switching frequency	4 MHz
Evaluation	Digital signals only; starting with HW 200 and firmware V 5.6-H, analog signals are tolerated on pins 1, 3, 9 and 11 (compatible with X140).

SSI specification	
Switching frequency	250 kHz
Sampling rate	250 µs Not permitted as motor encoder in servo mode

SSI specification	
Code	Binary or Gray
Encoder type and format	Multiturn: 24 or 25 bits Single turn: 13 bits short or 13 bits tree (13 bits of data in a 25-bit telegram)
Transfer	Double transmission, can be switched off

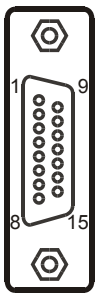
Specification for incremental signals	
Encoder type	Only TTL and HTL encoders with N channel may be connected to X4. Encoders without N channel generate a fault when the device starts. If the use of an encoder without N channel is required, the encoder must be connected to X120. Observe the terminal description X120 for incremental signals for proper connection, see section 5.13.2 X120.
f_{max}	Evaluation: ≤ 1 MHz Simulation: < 250 kHz
Signal level	TTL and HTL

Calculation example – limit frequency f_{max}
... for an encoder with 2,048 pulses per revolution:
3,000 revolutions per minute (equivalent to 50 revolutions per second) * 2,048 pulses per revolution
= 102,400 pulses per second
= 102.4 kHz

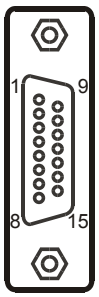
Encoder supply

U_2	Through	Remarks
5 V (unregulated)		Pin 12 (sense) not used
5 V (controlled at cable end)	Encoder sense line connected to pin 12 (sense)	STOBER synchronous servo motors EnDat 2.1/2.2 (standard)
5 V (controlled at X4)	Pin 12 (sense) bridged with pin 4 (UB+)	STOBER asynchronous motors TTL (for customer-specific solutions), without cable compensation
15 – 16 V	Pin 12 (sense) bridged with pin 2 (GND)	STOBER asynchronous motors HTL encoder: Bridge created in the cable plug that is connected to X4. SSI encoder: Bridge for UB+ is created in the bracket flange socket.

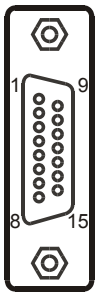
Terminal description X4 – EnDat and SSI encoders

Pin		Designation	Function
Socket 	1	—	—
	2	GND	Reference for encoder power on pin 4
	3	—	—
	4	U_2	Encoder power
	5	DATA+	Differential input for DATA
	6	—	—
	7	—	—
	8	CLK+	Differential input for CLOCK
	9	—	—
	10	—	—
	11	—	—
	12	Sense	Sensor lead for power supply to settle the encoder power
	13	DATA-	Inverse, differential input for DATA
	14	—	—
	15	CLK-	Inverse, differential input for CLOCK

Terminal description X4 for HTL encoder

Pin		Designation	Function, data
Socket 	1	B+	Differential input for B-track
	2	GND	Reference for encoder power on pin 4
	3	N+	Differential input for N-track
	4	U_2	Encoder power
	5	—	—
	6	A+	Differential input for A-track
	7	—	—
	8	—	—
	9	B-	Inverse, differential input for B-track
	10	N-	Inverse, differential input for N-track
	11	A-	Inverse, differential input for A-track
	12	Sense	Sensor lead for power supply to settle the encoder power
	13	—	—
	14	—	—
	15	—	—

Terminal description X4 for TTL encoder

Pin		Designation	Function, data
Socket 	1	—	—
	2	GND	Reference for encoder supply to pin 4
	3	—	—
	4	U_2	Encoder supply
	5	B+	Differential input for B channel
	6	—	—
	7	N+	Differential input for N channel
	8	A+	Differential input for A channel
	9	—	—
	10	—	—
	11	—	—
	12	Sense	Sensor line for the supply voltage to adjust the encoder supply
	13	B-	Inverse, differential input for B channel
	14	N-	Inverse, differential input for N channel
	15	A-	Inverse, differential input for A channel

5.13.2 X120

Prerequisite for using interface X120:
- REA 5001 or
- XEA 5001

Information
Interface X120 is a double interface on option board XEA 5001. The double interface makes it possible to distribute encoder signals to other inverters without a great amount of wiring work. This is why the two sub D connections have the same allocation.

General specification	
U_2	18 V, see encoder supply
I_{2max}	250 mA, sum X4, X120 and X140: 500 mA
Maximum cable length	50 m
Maximum number of subscribers	1 master and 31 subscribers
Terminating resistor	120 Ω

Specification SSI (evaluation and simulation)	
Cycle frequency (SSI master)	592 kHz (motor encoder) or 250 kHz (position encoder)
Code	Binary or Gray
Encoder type	Multiturn: 24 or 25 bits Single turn: 13 bit short or 13 bit Tannenbaum
Transfer	Double transmission, can be switched off

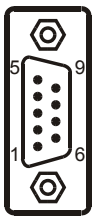
Specification incremental and stepper motor signals (evaluation and simulation)	
f_{max}	Evaluation: ≤ 1 MHz Simulation: < 250 kHz
Signal level	TTL

Calculation example – limit frequency f_{max}
... for an encoder with 2,048 pulses per revolution:
3,000 revolutions per minute (equivalent to 50 revolutions per second) * 2,048 pulses per revolution
= 102,400 pulses per second
= 102.4 kHz

Encoder supply

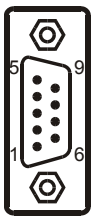
Encoder supply	Bridge
Pin 8 (U_2)	Pin 1 (GND-Enc) to pin 9 (GND)
External	Pin 1 (GND-Enc) to GND of external supply

Terminal description X120 for SSI encoder

Pin		Designation	Function
Connector 	1	GND-ENC	Reference potential for pin 4 to pin 7
	2	—	—
	3	—	—
	4	CLK-	Inverse differential input/output for CLOCK
	5	CLK+	Differential input/output for CLOCK
	6	DATA+	Differential input/output for DATA
	7	DATA-	Inverse differential input/output for DATA
	8	U_2	Encoder supply
	9	GND	Reference for pin 8

Information
Remember that all SSI slaves must be switched on/off simultaneously (24 V on X11 and X101.18). Switching individual stations during operation will cause other stations to malfunction.

Terminal description of X120 for incremental signals

Pin		Designation	Function
Connector 	1	GND-ENC	Reference potential for pin 2 to pin 7
	2	N+	Differential input/output for the N channel
	3	N-	Inverse differential input/output for the N channel
	4	A-	Inverse differential input/output for the A channel
	5	A+	Differential input/output for the A channel
	6	B+	Differential input/output for the B channel
	7	B-	Inverse differential input/output for the B channel
	8	U_2	Encoder supply
	9	GND	Reference for pin 8

Terminal description of X120 for stepper motor signals

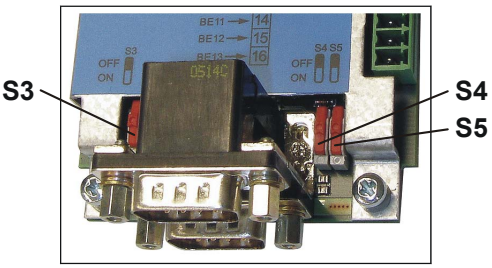
Pin		Designation	Function
Connector 	1	GND-ENC	Reference potential for pin 2 to pin 7
	2	—	—
	3	—	—
	4	Imp-	Inverse differential input/output for pulses
	5	Imp+	Differential input/output for pulses
	6	Direction+	Differential input/output for the direction
	7	Direction-	Inverse differential input/output for the direction
	8	U_2	Encoder supply
	9	GND	Reference for pin 8

Connection – topology

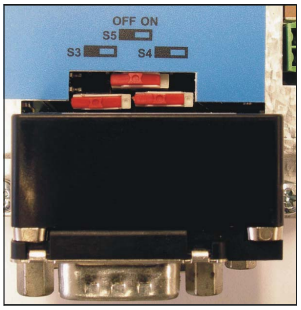
Only linear topology is permitted when two or more stations are coupled via interface X120. The signal lines must be terminated with resistors for the stations at either end of the coupling. The terminating resistors can be switched through via switches S3, S4 and S5 on accessory parts XEA 5001 and REA 5001.

Switch	TTL Encoder	SSI Encoder
S3	Zero	—
S4	A	CLK
S5	B	DATA

XEA 5001



REA 5001



Please note that the switches are installed in different positions on the REA 5001 and XEA 5001 accessories. Identification of the switches and assignment of the switch positions to the function (switched on/switched off terminal resistance) are shown on the PCB cover.

5.13.3 X140

Prerequisite for using interface X140:
- REA 5001

Resolver specification (evaluation)	
U_2	-10 V ... +10 V
I_2	80 mA
f_2	7 – 9 kHz
P_{max}	0.8 W
Transfer ratio	0,5 ± 5 %
Number of poles	2, 4 and 6
Phase shift	± 20 el.°
Maximum cable length	100 m

Specification EnDat 2.1 sin/cos (evaluation)	
U_2	5 – 16 V, see below table encoder supply EnDat
I_{2max}	250 mA, total of X4, X120 and X140 (EnDat): 500 mA
I_{2min}	30 mA
f_{max}	225 kHz
Encoder type	Single and Multiturn, not suitable for linear measuring devices
Maximum cable length	100 m

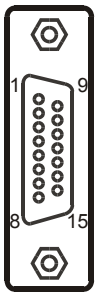
Calculation example – limit frequency f_{max}
... for an encoder with 2,048 pulses per revolution:
3,000 revolutions per minute (equivalent to 50 revolutions per second) * 2,048 pulses per revolution
= 102,400 pulses per second
= 102.4 kHz

Encoder supply EnDat 2.1

U_2	Through	Remarks
5 V (unregulated)		Pin 12 (sense) not used
5 V (controlled at cable end)	Encoder sense line connected to pin 12 (sense)	STOBER servo motors EnDat 2.1
5 V (controlled at X4)	Pin 12 (sense) bridged with pin 4 (UB+)	TTL (for customer-specific solutions)

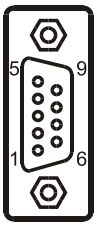
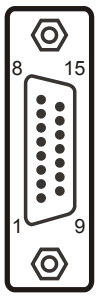
Information
Note that the resolver interface at X140 is also used if a SDS 4000 is replaced where a motor with resolver at X40 was operated.
In this case, you can continue to use the previously used encoder cable. The connection of the motor temperature sensor is carried in this cable. For this reason, observe the Chapter 5.8.

Terminal description X140 resolver (REA 5001)

Pin[a)]		Designation	Function
Socket	1	Sin+	Sin input
	2	GND	Reference to pin 6
	3	Cos+	Cos input
	4	—	—
	5	—	—
	6	ErregungResolv	Resolver excitation signal
	7	1TP1/K1	Motor temperature sensor connection, if carried by the encoder cable; output at pin 1 of X141.
	8	—	—
	9	Sin-	Sin input (inverse)
	10	—	—
	11	Cos-	Cos input (inverse)
	12	—	—
	13	—	—
	14	1TP2/K2	Motor temperature sensor connection, if carried by the encoder cable; output at pin 2 of X141.
	15	—	—

a) View of sub-D

Terminal description of resolver adapter (REA 5001)

Pin[a]		Designation	Function	Pin[b]	
Socket 	1	—	—	—	Connector 
	2	1TP1/K1	Motor temperature sensor connection, if carried by the encoder cable; output at pin 1 of X141.	7	
	3	Sin-	Sin input (inverse)	9	
	4	Cos-	Cos input (inverse)	11	
	5	GND	Reference to ErregungResolv	2	
	6	1TP2/K2	Motor temperature sensor connection, if carried by the encoder cable; output at pin 2 of X141.	14	
	7	Sin+	Sin input	1	
	8	Cos+	Cos input	3	
	9	ErregungResolv	Resolver excitation signal	6	

a) view of sub-D 9-pole for the connection of the SDS 4000-compatible resolver cable

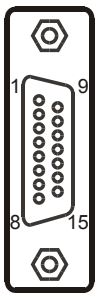
b) view of sub-D 15-pole for the connection to the SDS 5000, terminal X140 (REA 5001)

Information

Note that the EnDat interface at X140 is used if a SDS 4000 is replaced and a motor with an absolute encoder at X41 was operated.

In this case, you can continue to use the previously used encoder cable. The connection of the motor temperature sensor is carried in this cable. For this reason, observe the Chapter 5.8.

Terminal description X140 EnDat (REA 5001)

Pin[a)]		Designation	Function
Socket 	1	Sin+	Sin input
	2	GND	Reference for encoder supply to pin 4
	3	Cos+	Cos input
	4	U_2	Encoder supply
	5	DATA+	Differential input for DATA
	6	—	—
	7	1TP1/K1	Connection motor temperature sensor is output to X141, pin 1 if carried by the encoder cable
	8	CLK+	Differential input for C:PCL
	9	Sin-	Inverse sin input
	10	—	—
	11	Cos-	Inverse cos input
	12	Sense	Sense signals for voltage control
	13	DATA-	Inverse differential input for DATA
	14	1TP2/K2	Connection motor temperature sensor is output to X141, pin 2 if carried by the encoder cable
	15	CLK-	Inverse differential input for CLOCK

a) View of sub-D

5.13.4 BE encoder and BA encoder simulation

Prerequisite for being able to evaluate or simulate an encoder on the binary interfaces:
- SEA 5001 or
- REA 5001 or
- XEA 5001

To evaluate single-ended incremental encoder or stepper motor signals, use binary inputs BE3, BE4 and BE5.
If you would like to simulate them, use outputs BA1 and BA2.
Hall encoders are connected to binary inputs BE1, BE2 and BE3.

General specification	
Maximum cable length	30 m
Signal level	HTL for SEA 5001 and XEA 5001 TTL/HTL switchable for REA 5001

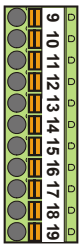
Evaluation – incremental and stepper motor signals		
	HTL	**TTL**
High level	12 – 30 V	2 – 6 V
Low level	0 – 8 V	0 – 0.8 V
U_{1max}	30 V	6 V
I_{1max}	16 mA	13 mA
f_{max}	100 kHz	

Simulation – incremental and stepper motor signals	
I_{2max}	50 mA at 45° C, 40 mA at 55° C
Eff. update rate	4 kHz
f_{max}	250 kHz
Extrapolation frequency	1 MHz

Calculation example – limit frequency f_{max}
... for an encoder with 2,048 pulses per revolution:
3,000 revolutions per minute (equivalent to 50 revolutions per second) * 2,048 pulses per revolution
= 102,400 pulses per second
= 102.4 kHz

STÖBER

Terminal description X101 incremental encoder and stepper motor signals

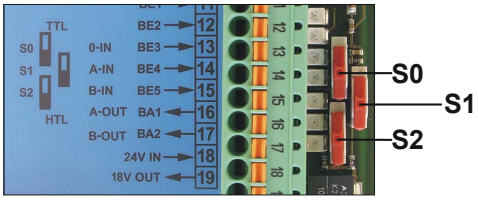
Pin		Designation	Function	Data
	9	GND 18 V	Reference ground for pin 19	—
	10	DGND	Reference ground for pins 11 to 18	—
	11	BE1	—	—
	12	BE2	—	
	13	BE3	Evaluation: Incremental encoder: N Stepper motor signals: –	
	14	BE4	Evaluation: Incremental encoder: A Stepper motor signals: freq.	
	15	BE5	Evaluation: Incremental encoder: B Stepper motor signals: direction	
	16	BA1	Simulation Incremental encoder: A Stepper motor signals: freq.	—
	17	BA2	Simulation Incremental encoder: B Stepper motor signals: direction	
	18	24 V-In	24 V power - For XEA 5001 and - For binary outputs with SEA 5001 and REA 5001	Input range: 18 – 28.8 V
	19	18 V-Out	Auxiliary voltage 18 V	U_2 = 16 – 18 V I_{2max} = 50 mA

TTL/HTL switchover REA 5001

Switch	TTL/HTL conversion
S0	BE3
S1	BE4
S2	BE5

The identification of the switches and the assignment of the switch positions to the function (HTL/TTL) are shown on the PCB cover of the REA 5001.

REA 5001



5.14 Fieldbus

5.14.1 X200: CANopen

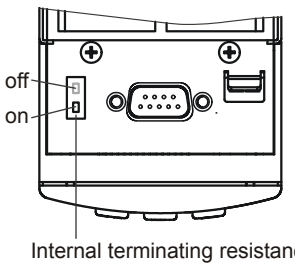
Prerequisite for the CANopen link:

- CAN 5000

Information
Please see the supplementary documentation of CANopen (see section 1.2 Further documentation)!

Terminal description X200

Pin		Designation	Function
Plug 	1	—	—
	2	CAN-low	CAN-low line
	3	GND	Signal Ground
	4	—	—
	5	—	—
	6	CAN-low	CAN-low line connected internally with pin 2
	7	CAN-high	CAN-high line
	8	—	—
	9	CAN-high	CAN-high line connected internally with pin 7



Internal terminating resistance 120 Ω can be activated

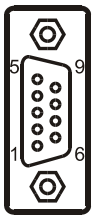
5.14.2 X200: PROFIBUS

Prerequisite for the PROFIBUS link:

- DP 5000

Information
Please see the supplementary documentation of PROFIBUS DP (see section 1.2 Further documentation)!

Terminal description X200

Pin		Designation	Function
Socket 	1	—	—
	2	—	—
	3	B	RxD / TxD-P (send/receive data +)
	4	RTS	Direction control for repeater +
	5	GND	Ground to + 5 V
	6	+5 V	Power for terminating resistors
	7	—	—
	8	A	RxD / TxD-N (send/receive data -)
	9	—	—

5.14.3 X200, X201: EtherCAT

Prerequisite for the EtherCAT link:
- ECS 5000

Information
Please see the supplementary documentation of EtherCAT (see section 1.2 Further documentation)!

X200 and X201 terminal description

Pin		Designation	Function
	1	TxData+	EtherCAT communication
	2	TxData-	
	3	RecvData+	
	4	—	—
	5	—	—
	6	RecvData-	EtherCAT communication
	7	—	—
	8	—	—

Cable specification
STOBER provides ready-made cables for the EtherCAT connection. These cables must be used to ensure proper functionality.
It is also possible to use cables with the following specification:

Plug wiring	Patch or crossover
Quality	CAT5e
Shielding	SFTP or PIMF

5.14.4 X200, X201: PROFINET

Requirement for the die PROFINET connection:

- PN 5000

Information
Observe the PROFINET operating manual (see section 1.2 Further documentation)!

X200 and X201 terminal description
The terminal configuration is determined by T 568-B.

Pin		Designation	Function
	1	TxData +	PROFINET communication
	2	TxData -	
	3	RecvData +	
	4	—	Connect via RC-link with housing
	5	—	
	6	RecvData -	PROFINET communication
	7	—	Connect via RC-link with housing
	8	—	

Observe the PROFINET installation guideline for the cable specification (PROFINET Order No. 8.071, identification: T2-08-0001); you can obtain the document at www. profibus.com.

5.15 X3A, X3B: PC, IGB

You can implement the functions of the IGB (Integrated Bus) with interface X3 located on the front of the inverter:

- Direct connection to the PC
- IGB Motionbus
- remote maintenance

Observe the operating manual SDS 5000, see section 1.2 Further documentation for setting up communication.

Terminal description X3A and X3B

Pin		Designation	Function
	1	TxData+	Ethernet communication
	2	TxData-	
	3	RecvData+	
	4	—	Not used
	5	—	
	6	RecvData-	Ethernet communication
	7	—	Not used
	8	—	

Cable specification

STOBER provides ready-made cables for

- direct connection PC - inverter and
- to set up the Integrated Bus.

These cables must be used to ensure proper functionality. Note also section 7 Accessories.
It is also possible to use cables with the following specification:

Plug wiring	Patch or crossover
Quality	CAT5e
Shielding	SFTP or PIMF

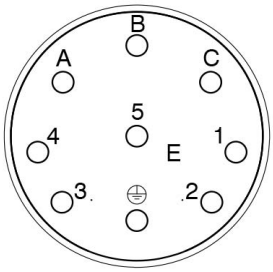
5.16 Cables

Information
To ensure proper functionality of the drive we recommend using cables from STOBER that are coordinated with the system. In case of use of unsuitable connection cables, we reserve the right to reject claims under the warranty.

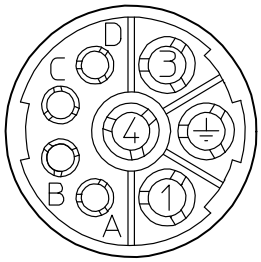
5.16.1 Power cable

Synchronous servo motors of series ED/EK and EZ are equipped with circular plugs as standard and can be connected to inverters with the following power cables (the color specifications relate to the connection strands and are only significant for the motor-internal wiring).

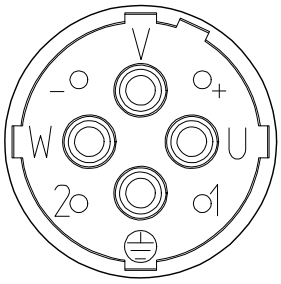
Power cable – connector size con.15

Bracket flange socket – motor	Pin	Signal	Motor-internal wire colors
	A	1U1	BK
	B	1V1	BU
	C	1W1	RD
	1	1TP1/1K1	BK/BN
	2	1TP2/1K2	WH/WH
	3	1BD1	RD
	4	1BD2	BK
	⏚	PE	GNYE
	Housing	Shield	

Power cable – connector size con.23

Bracket flange socket – motor	Pin	Signal	Motor-internal wire colors
	A	1BD1	RD
	B	1BD2	BK
	C	1TP1/1K1	BK/BN
	D	1TP2/1K2	WH/WH
	1	1U1	BK
	3	1V1	RD
	4	1W1	BU
	⏚	PE	GNYE
	Housing	Shield	

Power cable – connector sizes con.40, con.58

Bracket flange socket – motor	Pin	Signal	Motor-internal wire colors
	U	1U1	BK
	V	1V1	BU
	W	1W1	RD
	+	1BD1	RD
	–	1BD2	BK
	1	1TP1/1K1	BK/BN
	2	1TP2/1K2	WH/WH
	⏚	PE	GNYE
	Housing	Shield	

5.16.2 Encoder Cables

STOBER motors are equipped with encoder systems as standard.
Depending on the respective motor types, different encoder systems and associated plug connectors are used.

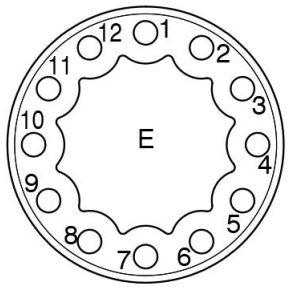
The following section describes the individual encoder systems, plug connectors and signal assignments.

5.16.2.1 Encoder EnDat and SSI

Digital absolute encoder EnDat 2.1 and EnDat 2.2 of series ECI, EQI, ECN or EQN can be combined with STOBER motors of series ED/EK and EZ. SSI encoders can also be connected to STOBER asynchronous motors.

The suitable encoder cables are described below.

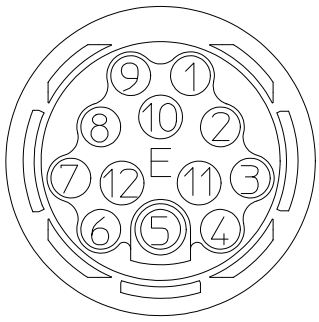
Encoder cable – plug connector con.15
Cable with plug connector con.15 in combination with EnDat encoders can be connected to EZ motors.
The voltage supply is buffered for the inductive EnDat 2.2 encoders "EBI 1135" and "EBI 135" with multiturn function. In this case, pin 2 and pin 3 are assigned to the backup battery U_{2BAT}. Note that the encoder cable must not be connected to X4 of the inverter but to the Absolute Encoder Support (AES) for these encoders.

Motor		Signal	Wire colors		Sub-D connector (X4)
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	CLK+	VT	YE	8
	2	Sense/ U_{2BAT+} a)	BU	PK	12
	3	U_{2BAT-}	WH	GY	3
	4	—	—	—	—
	5	DAT-	PK	BN	13
	6	DAT+	GY	WH	5
	7	—	—	—	—
	8	CLK-	YE	GN	15
	9	—	—	—	—
	10	GND	WHGN	BU	2
	11	—	—	—	—
	12	U_2	BNGN	RD	4
	Housing	Shield			

a) buffer battery U_{2BAT} (= 3.6 – 5.25 V_{DC}): only relevant for EBI encoder in conjunction with the "Absolute Encoder Support (AES)" option.

Encoder cable – plug connector con.17

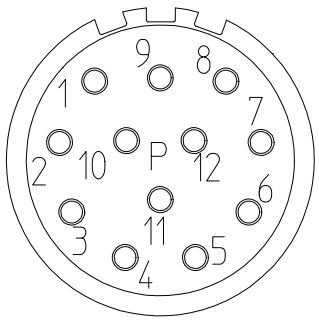
The voltage supply is buffered for the inductive EnDat 2.2 encoders "EBI 1135" and "EBI 135" with multiturn function. In this case, pin 2 and pin 3 are assigned to the backup battery U_{2BAT}. Note that the encoder cable must not be connected to X4 of the inverter but to the Absolute Encoder Support (AES) for these encoders.

Motor		Signal	Wire colors		Sub-D connector (X4)
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	CLK+	VT	YE	8
	2	Sense/ U_{2BAT+} a)	BU	PK	12
	3	U_{2BAT-}	WH	GY	3
	4	—	—	—	—
	5	DAT-	PK	BN	13
	6	DAT+	GY	WH	5
	7	—	—	—	—
	8	CLK-	YE	GN	15
	9	—	—	—	—
	10	GND	WHGN	BU	2
	11	—	—	—	—
	12	U_2	BNGN	RD	4
	Housing	Shield			

a) buffer battery U_{2BAT} (= 3.6 – 5.25 V_{DC}): only relevant for EBI encoder in conjunction with the "Absolute Encoder Support (AES)" option.

Encoder cable – plug connector con.23

Cable with plug connector con.23 in combination with EnDat 2.1 and EnDat 2.2 encoders can be connected to synchronous servo motors ED/EK; connect these with asynchronous motors in combination with SSI encoders.

Motor		Signal	Wire colors		Sub-D connector (X4)
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	CLK+	VT	YE	8
	2	Sense	BNGN	PK	12
	3	—	—	—	—
	4	—	—	—	—
	5	DAT-	PK	BN	13
	6	DAT+	GY	WH	5
	7	—	—	—	—
	8	CLK-	YE	GN	15
	9	—	—	—	—
	10	GND	WHGN	BU	2
	11	—	—	—	—
	12	U_2	BNGN	RD	4
	Housing	Shield			

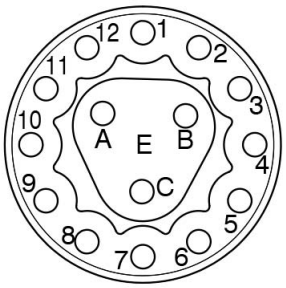
5.16.2.2 Encoder EnDat Sin/Cos

Absolute encoder EnDat 2.1 Sin/Cos of series ECI, EQI, ECN or EQN can be combined with STOBER motors of series ED/EK and EZ.

The suitable encoder cables are described below.

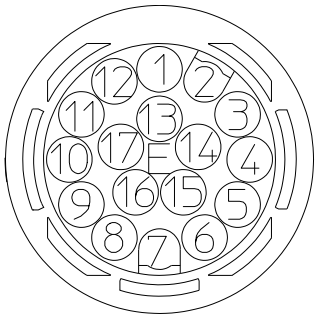
Encoder cable – plug connector con.15

Cable with plug connector con.15 in combination with EnDat 2.1 Sin/Cos encoders can be connected to EZ motors.

Motor		Signal	Wire colors		Sub-D connector (X140)
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	Sense+	BU	GNRD	12
	2	Sense-	WH	GNBK	10
	3	U_2	BNGN	BNRD	4
	4	CLK+	VT	WHBK	8
	5	CLK-	YE	WHYE	15
	6	GND	WHGN	BNBU	2
	7	B+ (Sin+)	BUBK	RD	9
	8	B- (Sin-)	RDBK	OG	1
	9	DAT+	GY	GY	5
	10	A+ (Cos+)	GNBK	GN	11
	11	A- (Cos-)	YEBK	YE	3
	12	DAT-	PK	BU	13
	A	—	—	—	—
	B	—	—	—	—
	C	—	—	—	—
	Housing	Shield			

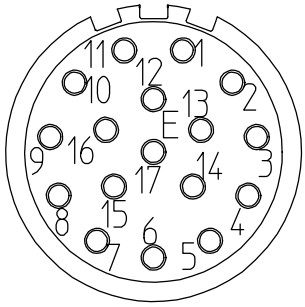
Encoder cable – plug connector con.17

Cable with plug connector con.17 in combination with EnDat 2.1 Sin/Cos encoders can be connected to EZ motors.

Motor		Signal	Wire colors		Sub-D connector (X140)
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	Sense+	BU	GNRD	12
	2	—	—	—	—
	3	—	—	—	—
	4	Sense-	WH	GNBK	10
	5	—	—	—	—
	6	—	—	—	—
	7	U_2	BNGN	BNRD	4
	8	CLK+	VT	WHBK	8
	9	CLK-	YE	WHYE	15
	10	GND	WHGN	BNBU	2
	11	—	—	—	—
	12	B+ (Sin+)	BUBK	RD	9
	13	B- (Sin-)	RDBK	OG	1
	14	DAT+	GY	GY	5
	15	A+ (Cos+)	GNBK	GN	11
	16	A- (Cos-)	YEBK	YE	3
	17	DAT-	PK	BU	13
	Housing	Shield			

Encoder cable – plug connector con.23

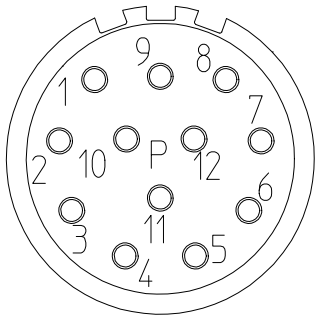
Cable with plug connector con.23 in combination with EnDat 2.1 Sin/Cos encoders can be connected to ED/EK motors.

Motor		Signal	Wire colors		Sub-D connector (X140)
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	Sense+	BU	GNRD	12
	2	—	—	—	—
	3	—	—	—	—
	4	Sense-	WH	GNBK	10
	5	—	—	—	—
	6	—	—	—	—
	7	U_2	BNGN	BNRD	4
	8	CLK+	VT	WHBK	8
	9	CLK-	YE	WHYE	15
	10	GND	WHGN	BNBU	2
	11	—	—	—	—
	12	B+ (Sin+)	BUBK	RD	9
	13	B- (Sin-)	RDBK	OG	1
	14	DAT+	GY	GY	5
	15	A+ (Cos+)	GNBK	GN	11
	16	A- (Cos-)	YEBK	YE	3
	17	DAT-	PK	BU	13
	Housing	Shield			

5.16.2.3 Encoder HTL

HTL incremental encoders can be combined with STOBER motors of series ED/EK or EZ.
The suitable encoder cable is described below.

Encoder cable – plug connector con.23

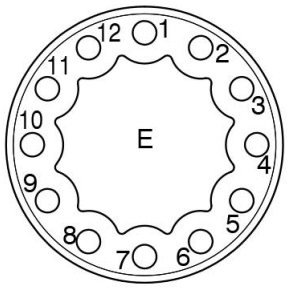
Motor		Signal	Wire colors		Sub-D connector (X4)
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	B-	PK	YE	9
	2	—	—	—	—
	3	N+	RD	PK	3
	4	N-	BK	GY	10
	5	A+	BN	BN	6
	6	A-	GN	WH	11
	7	—	—	—	—
	8	B+	GY	GN	1
	9	—	—	—	—
	10	GND	WH	BU	2
	11	—	—	—	—
	12	U_2	BN	RD	4
	Housing	Shield			

5.16.2.4 Resolver

Resolvers can be combined with STOBER motors of series ED/EK or EZ.
The suitable resolver cables are described below.

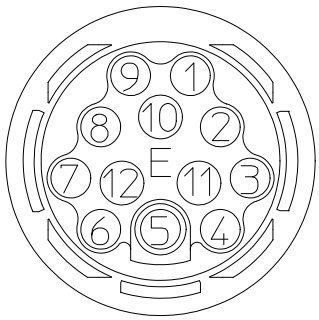
Encoder cable – plug connector con.15

Cable with plug connector con.15 in combination with resolvers can be connected to EZ motors.

Motor		Signal	Wire colors		Sub-D connector (X140)
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	S3 Cos+	BK	YE	3
	2	S1 Cos-	RD	GN	11
	3	S4 Sin+	BU	WH	1
	4	S2 Sin-	YE	BN	9
	5	—	—	—	Do not connect
	6	—	—	—	Do not connect
	7	R2 Ref+	YEWH	GY	6
	8	R1 Ref-	RDWH	PK	2
	9	—	—	—	—
	10	—	—	—	—
	11	—	—	—	—
	12	—	—	—	—
	Housing	Shield			

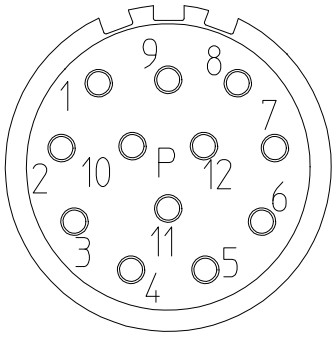
Encoder cable – plug connector con.17

Cable with plug connector con.17 in combination with resolvers can be connected to EZ motors.

Motor		Signal	Wire colors		Sub-D connector at terminal X140
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	S3 Cos+	BK	YE	3
	2	S1 Cos-	RD	GN	11
	3	S4 Sin+	BU	WH	1
	4	S2 Sin-	YE	BN	9
	5	—	—	—	Do not connect
	6	—	—	—	Do not connect
	7	R2 Ref+	YEWH	GY	6
	8	R1 Ref-	RDWH	PK	2
	9	—	—	—	—
	10	—	—	—	—
	11	—	—	—	—
	12	—	—	—	—
	Housing	Shield			

Encoder cable – plug connector con.23

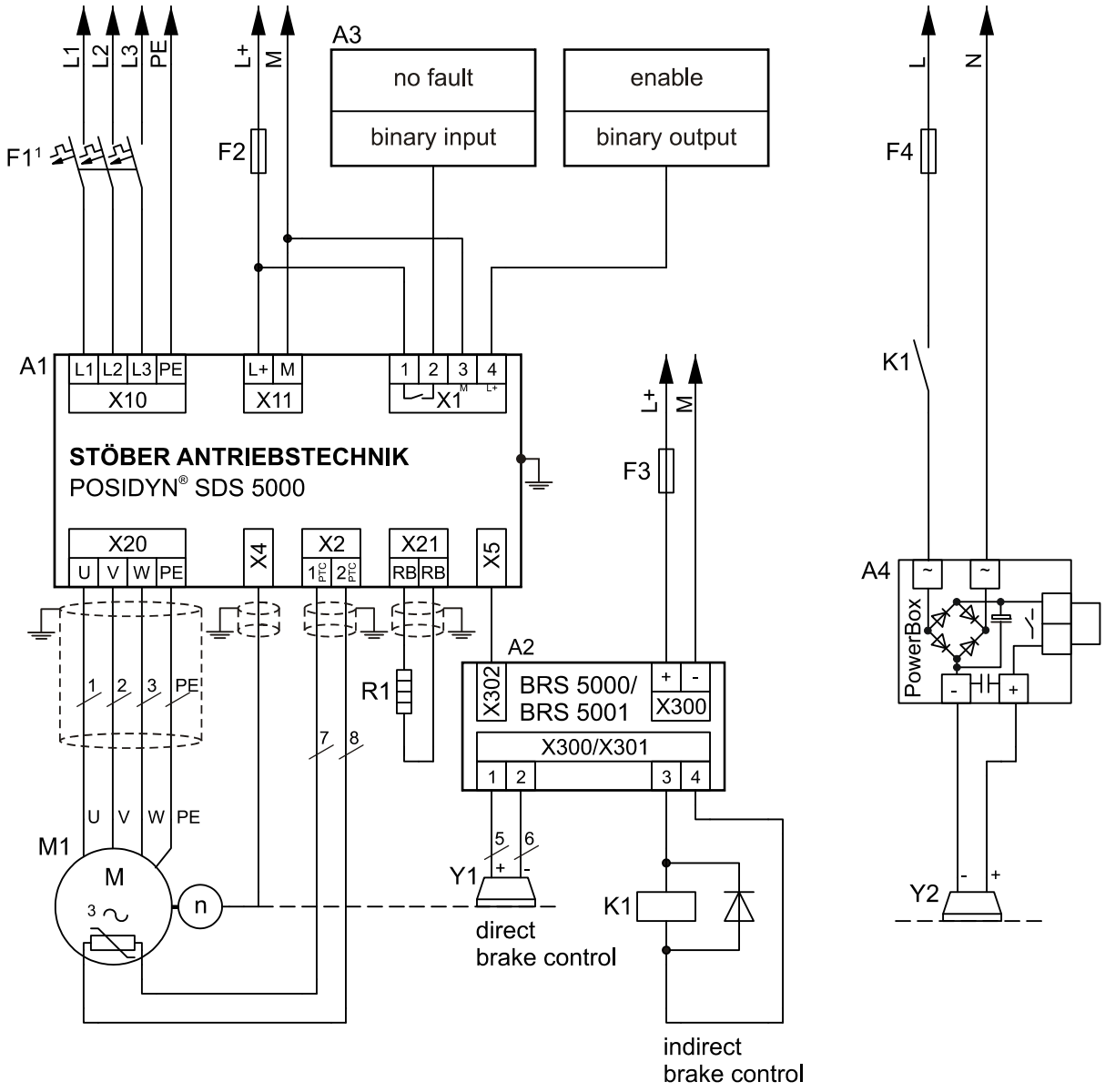
Cable with plug connector con.23 in combination with resolvers can only be connected to synchronous servo motors ED/EK.

Motor		Signal	Wire colors		Sub-D connector (X140)
Angle flange socket	Pin		Motor-internal	Encoder	Pin
	1	S3 Cos+	BK	YE	3
	2	S1 Cos-	RD	GN	11
	3	S4 Sin+	BU	WH	1
	4	S2 Sin-	YE	BN	9
	5	—	—	—	Do not connect
	6	—	—	—	Do not connect
	7	R2 Ref+	YEWH	GY	6
	8	R1 Ref-	RDWH	PK	2
	9	—	—	—	—
	10	—	—	—	—
	11	—	—	—	—
	12	—	—	—	—
	Housing	Shield			

Cable color – key

BK	BLACK	PK	PINK
BN	BROWN	RD	RED
BU	BLUE	VT	VIOLET
GN	GREEN	WH	WHITE
GY	GREY	YE	YELLOW
OG	ORANGE		

6 Examples of connections



[1] circuit protection
tripping characteristics C

7 Accessories

Inverter	HW status of the inverter	SEA 5001	REA 5001	XEA 5001
SDS 5000A	200 or higher	Yes	Yes	HW status 11 or higher for the accessories
SDS 5000	up to 199	Yes	Yes	HW status 11 or higher for the accessories

I/O terminal module standard SEA 5001

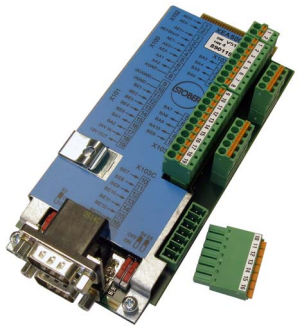
ID no. 49576

Terminals:

- 2 analog inputs
- 2 analog outputs
- 5 binary inputs
- 2 binary outputs

I/O terminal module extended XEA 5001

ID no. 49015



Terminals:

- 3 analog inputs
- 2 analog outputs
- 13 binary inputs
- 10 binary outputs

Encoder:

- TTL incremental encoder (simulation and evaluation)
- Stepper motor signals (simulation and evaluation)
- SSI encoder (simulation and evaluation)

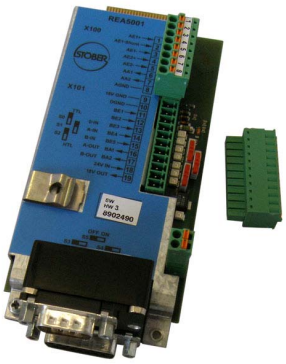
SSI/TTL connection cable X120

ID no. 49482

For connection of the SSI interface X120 to the XEA 5001, 0.3 m.

I/O terminal module resolver REA 5001

ID no. 49854



Terminals:
- 2 analog inputs
- 2 analog outputs
- 5 binary inputs
- 2 binary outputs

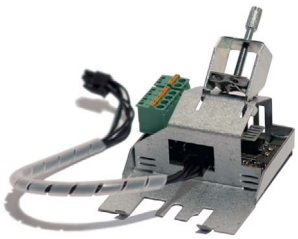
Encoder:
- Resolver
- EnDat 2.1 Sin/Cos encoder
- TTL incremental encoder (simulation and evaluation)
- SSI encoder (simulation and evaluation)
- Stepper motor signals (simulation and evaluation)

Resolver cables that were connected to an inverter SDS 4000 can be connected via the resolver cable included in the scope of delivery to terminal X140 of REA 5001.

Information
The brake module BRS 5001 is the follow-up model to BRS 5000. The new version is equipped with separate terminals for the connection of a motor holding brake and 24 vdc power supply as well as a screwable shield connection terminal.
BRS 5001 requires firmware V 5.6-N or higher.

Brake module BRS 5001

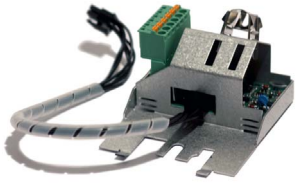
ID no. 56518



Accessory part for direct control of up to two motor holding brakes (24 V/DC).
Attachable on the basic housing.
Including connection cable for basic device and shield connection terminal for power cable cross-sections of 1 to 10 mm².

Brake module BRS 5000

ID no. 49853



Accessory part for direct control of up to two motor holding brakes (24 V/DC).
Attachable on the basic housing.
Including connection cable for basic device and shield connection terminal.

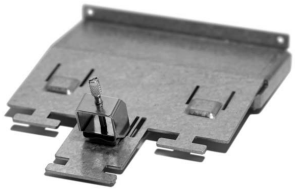
EMC shroud EM 5000

ID no. 44959

Accessory part for shield connection of the motor line.
Attachable on the basic housing.
Including shield connection terminal

EMC shroud EM6A3

ID no. 135120



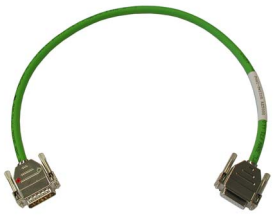
EMC shroud for size 3.
Accessory part for shield connection of the motor line. Attachable on the basic housing.
Including shield connection terminal for power cable cross-sections of 6 to 25 mm².
If necessary you can also connect the cable shield of the braking resistor and DC link connection on the shroud. Additional shield connection terminals are available as accessories for this purpose.

4-way axis switcher POSISwitch AX 5000

ID no. 49578

Enables the operation of up to four servo motors on one inverter.

POSISwitch connection cable



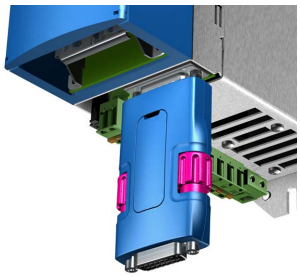
Connection between inverter and POSISwitch AX 5000.

The following versions are available:

ID no. 45405: 0.5 m.
ID no. 45386: 2.5 m.

Absolute Encoder Support AES

ID no. 55452



For buffering the power supply when using the inductive Multiturn EnDat 2.2 absolute encoder EBI1135 when the 24 vdc power supply is switched off at the inverter.
A battery is included.

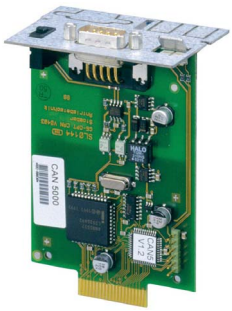
Replaceable battery AES

ID no. 55453

Replaceable battery for Absolute Encoder Support AES.

Fieldbus module CANopen DS-301 CAN 5000

ID no. 44574



Accessory part for connecting CAN bus.

Fieldbus module PROFIBUS DP-V1 DP 5000

ID no. 44575

Accessory module for connecting PROFIBUS DP-V1.

Fieldbus module EtherCAT ECS 5000

ID no. 49014

Accessory part for connecting EtherCAT (CANopen over EtherCAT).

EtherCAT cable

EtherNet patch cable, CAT5e, yellow.

The following versions are available:

ID no. 49313: approx. 0.2 m.
ID no. 49314: approx. 0.35 m.

Fieldbus module PROFINET PN 5000

ID no. 53893

Accessory part for connecting PROFINET.

ASP 5001 – Safe Torque Off

Available with the standard version.

The ASP 5001 may only be installed by STÖBER ANTRIEBSTECHNIK GmbH & Co. KG!
The ASP 5001 must be ordered with the basic device.

IGB connecting cable

To connect the interface X3 A or X3 B on the inverter front for IGB, CAT5e, magenta, connector angled at 45°.

The following versions are available:

ID no. 49855: 0.4 m.
ID no. 49856: 2 m.

PC connecting cable

ID no. 49857

To connect the X3 A or X3 B interface to PC, CAT5e, blue, 5m.

Hi-speed USB 2.0 Ethernet adapter

ID no. 49940

Adapter for connecting Ethernet to a USB connection.

Paramodule

Memory module for configuration and parameters.

The following versions are available:

ID no. 49315:
for SDS 5000 (HW version < 190), 256 kB.

ID no. 55464:
for SDS 5000A (HW version > 200), 1 MB.

STÖBER

STÖBER

Address registers

Always up to date on the internet: *www.stober.com* (Contact)

- **Technical offices for advice and marketing in Germany**
- **Global presence for advice and marketing in about 25 countries**
- **Service network Germany**
- **Service network international**
- **STOBER subsidiaries:**

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www.stoeber.at

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Fax +1 606 7595045
eMail: sales@stober.com
www.stober.com

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Fax +33 4 78985901
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STÖBER

POSITool

Operation manual

Setup

Communication

Diagnosis

V 5.6-H or later

09/2013 en

Table of contents

1 Introduction

1.1 Purpose of the manual

This manual describes the POSITool software. The following topics are included:

- A discussion of the installation
- Explanations of the structure of the software
- The levels which can be set
- The communication between inverter and PC
- The diagnostic functions

1.2 Other manuals

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

Manual	Contents	ID	Latest version[a)]
POSITool operating manual	Information on the basic functions of POSITool	442233	V 5.6-H
Programming manual	Information on programming with POSITool	441693	V 5.6-H

a) At the time of publication. You can find all versions at www.stoeber.de > Products > Doc Center.

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

The documentation of the MDS 5000 includes the following manuals:

Manual	Contents	ID	Latest version[a)]
Commissioning Instructions	Reinstallation, replacement, function test	442297	V 5.6-H
Projecting manual	Installation and connection	442273	V 5.6-H
Operating manual	Set up the inverter	442285	V 5.6-H

a) At the time of publication. You can find all versions at www.stoeber.de > Products > Doc Center.

The documentation of the FDS 5000 includes the following manuals:

Manual	Contents	ID	Latest version[a)]
Commissioning Instructions	Reinstallation, replacement, function test	442293	V 5.6-H
Projecting manual	Installation and connection	442269	V 5.6-H
Operating manual	Set up the inverter	442281	V 5.6-H

a) At the time of publication. You can find all versions at www.stoeber.de > Products > Doc Center.

The documentation of the SDS 5000 includes the following manuals:

Manual	Contents	ID	Latest version[a)]
Commissioning Instructions	Reinstallation, replacement, function test	442301	V 5.6-H
Projecting manual	Installation and connection	442277	V 5.6-H
Operating manual	Set up the inverter	442289	V 5.6-H

a) At the time of publication. You can find all versions at www.stoeber.de > Products > Doc Center.

The standard applications provided by STÖBER ANTRIEBSTECHNIK GmbH & Co. KG are documented in the following manuals:

Manual	ID	Latest version[a)]
Electronic disc cam	441777	V 5.6-F
Command positioning, Synchronous command positioning	441729	V 5.6-F
Motion block positioning	441781	V 5.6-F
Comfort reference value	441842	V 5.6-H
Technology controller	441822	V 5.6-F
Fast reference value, fast reference value with brake	441717	V 5.6-F

a) At the time of publication. You can find all versions at www.stoeber.de > Products > Doc Center.

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

Manuals	ID	Latest version[a)]
PROFIBUS DP operating manual	441685	V 5.6-H
CANopen® operating manual	441684	V 5.6-H
EtherCAT operating manual	441895	V 5.6-H
PROFINET operating manual	442339	V 5.6-H
USS operating manual	441706	V 5.6-H

a) At the time of publication. You can find all versions at www.stoeber.de > Products > Doc Center.

1.3 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

2 Notes on Safety

2.1 Product maintenance

The obligation to maintain refers to the two latest software versions created by STÖBER ANTRIEBSTECHNIK GmbH + Co. KG and approved for use.
STÖBER ANTRIEBSTECHNIK GmbH + Co. KG will either correct software errors or will provide the customer with a new software version. This choice will be made by STÖBER ANTRIEBSTECHNIK GmbH + Co. KG. If, in individual cases, the error cannot be immediately corrected, STÖBER ANTRIEBSTECHNIK GmbH + Co. KG will provide an intermediate solution which may require the customer to comply with special operation regulations.
A claim to error correction only exists when the reported errors are reproducible or can be indicated with machine-generated outputs. Errors must be reported in a reconstructable form and provide information which is useful to error correction.
The obligation to correct errors ceases to exist for such software which the customer changes or edits in any way unless the customer can prove that such action is not the cause of the reported error.
STÖBER ANTRIEBSTECHNIK GmbH + Co. KG will keep the respective valid software versions in an especially safe place (fireproof data safe, bank deposit box).

2.2 Using the software

The POSITool software package can be used to select the application and adjust the parameters and signal monitoring of the 5th generation of STÖBER inverters. The functionality is specified by selecting an application and transmitting these data to an inverter.
The software is the property of STÖBER ANTRIEBSTECHNIK GmbH + Co. KG and is copyrighted. The software is licensed for the user.
The software is only provided in machine-readable form. STÖBER ANTRIEBSTECHNIK GmbH + Co. KG gives the customer a non-exclusive right to use the software (license) provided it has been legitimately obtained.
The customer is authorized to use the software for the above activities and functions and to make copies of the software, including a backup copy for support of this use, and to install same.
The conditions of this license apply to each copy. The customer promises to affix the copyright notation to each copy of the software and all other property notations.

The customer is not authorized to use, copy, change or pass on/transmit the software for purposes other than those in these regulations. The customer is also not authorized to convert the software (i.e., reverse assembly, reverse compilation) or to compile it in any other way. The customer is also not authorized to issue sublicenses for the software, or to rent or lease it out.

2.3 Component part of the product

The technical documentation is a component part of a product.

- Since the technical documentation contains important information, always keep it handy in the vicinity of the device until the machine is disposed of.
- If the product is sold, disposed of, or rented out, always include the technical documentation with the product.

2.4 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

indicates important information about the product or a highlighted portion of the documentation which requires special attention.

3 Installation

The software package POSITool is available free of charge on the related product CD or from the Internet under www.stoeber.de. During installation, be sure to adhere to the described notes!
Following system requirements apply to the software POSITool:

- Operating system Windows XP or better
- Internet Explorer 4.0 or better
- Processor
  Min. Pentium III with 800 MHz and 256-MB RAM
- Hard drive: Min. of 80 MB
- For communication between PC and MDS 5000 or FDS 5000:
  RS 232 serial interface or USB port with USB serial adapter
- For communication with SDS 5000:
  Free network interface or connection to local network
  For remote maintenance: Internet access (see IGB manual, ID 442090)
- Monitor screen resolution
  Required: 1024 x 768 or better
- For installation: CD drive or Internet connection

4 Start POSITool

To make it easier for the user to open POSITool, the start will be explained first. After the software is open, the start screen (shown below) appears. It offers the user three possibilities (see Figure 4 1):

- Create a new project
- Open an existing project
- Read a project from a connected inverter.

Fig. 4-1 Welcome dialog

4.1 "Start new project with assistant"

To create a new project, open the configuration assistant.
In six steps it defines the primary components of an inverter configuration:

- Step 1: Resource names, designations and commentaries can be entered. The resource names and the designation are used as the title for the inverter entry (see chap. 5.3 Inverter view).
- Step 2: The number of axes to be operated sequentially is specified here.
- Step 3: The application is selected with this step. Please observe the application descriptions in this case, see chapter 1.2 Other manuals.
- Step 4: Here it is decided how the inverter is to be controlled. The user can choose between control via terminal strip of the inverter or a bus system (PROFIBUS DP, CANopen, EtherCAT, PROFINET or USS).

- Step 5: This step provides the user with databases of the STÖBER standard motors. When a motor is selected, the motor data are entered in the project.
- Step 6: This step concerns the configuration of the inverter. This includes the setting of the type of inverter used, the option modules and the braking resistor. With the SDS 5000, the IGB-Motionbus is activated during this step.

A control bar is available to switch between the different steps. You can skip between steps, terminate the configuration or exit the configuration.
Additional assistants are loaded to the project when applications and the inverter controller are selected. These show a selected set of available parameters. The assistants make parameterization easy and clear.

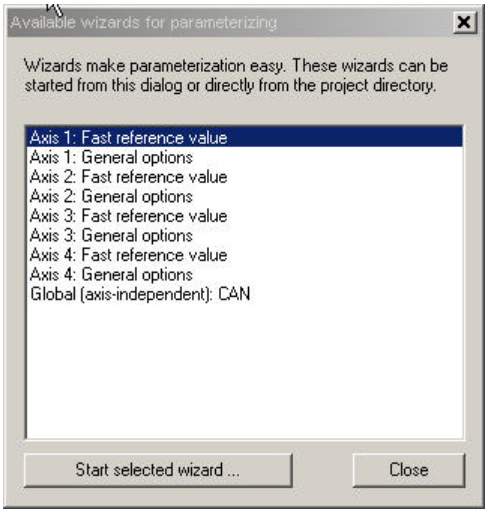


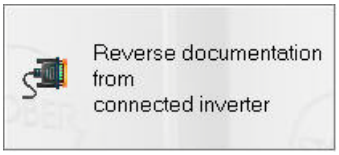
Fig. 4-2 Available assistants

After the configuration is concluded, a selection screen automatically appears (Fig. 4-2 Available assistants).
The assistants can be selected there for the individual axes and started via the applicable button.
The "close" button closes the screen.

4.2 "Open project"

If you want to process an existing project, select the middle button in the start screen. A dialog appears which can be used to select and open a file.

4.3 "Reverse documentation from connected inverter"



When a reverse documentation is created, the data stored on the inverter is read during online operation and indicated in POSITool (see chap. 5.5). The inverter must be connected with the PC. For further information on the communication between PC and inverter, see chapter 7 Communication. Note that, with the SDS 5000, a reverse documentation can be prepared with a direct connection or a remote maintenance connection. For information on the direct connection, see chap. 7 Communicationof this manual. Remote maintenance is explained in operating manual SDS 5000 (see chapter 1.2 Other manuals).
If you are using the *POSITool via EtherCAT* function, you can read out an EtherCAT network using this button. The *POSITool via EtherCAT* function is described in the EtherCAT operating manual (see chapter 1.2 Other manuals).

5 Setup of POSITool

This chapter explains the setup of POSITool. This includes the definition of various areas and the explanation of management functions.
POSITool contains several areas which must be distinguished between (see). To the left you will find project administration with the project view, the library view and the hierarchy view. The views can be selected with the tabs at the bottom of project administration.
The right-hand side contains the working area. Configurations and parameter lists can be opened and processed here.

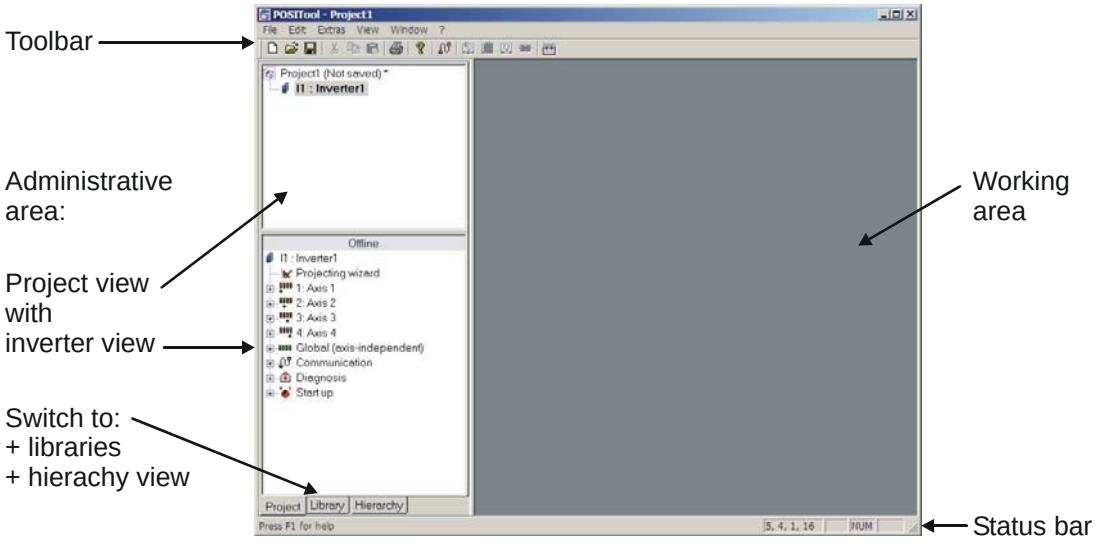


Fig. 5-1 POSITool design

5.1 Toolbar

The buttons of the toolbars have the following functions:

Button	Function
	Create new project
	Open existing project
	Save current project
	Cut marking
	Copy marking
	Paste clipboard

Button	Function
	Print
	Info about POSITool
	Establish connection to inverter (MDS 5000 and FDS 5000), see section 7.1 Communication with MDS 5000 and FDS 5000
	Establish direct connection (SDS 5000), see section 7.2.6 Establishing a direct connection
	Establish Internet connection (SDS 5000), see section 7.2 Communication with SDS 5000
	Establish LAN connection (SDS 5000), see section 7.2 Communication with SDS 5000
	Disconnect
	Establish connection by POSITool over EtherCAT, see EtherCAT opening manual, see section 1.2 Other manuals
	Check wiring on all levels, function for Free Programming option, see programming manual, see section 1.2 Other manuals

5.2 Project view

The project view offers a complete view of the project. When a new file is opened, the project has an inverter entry. You can add the following to the project view:

- Additional inverters (MDS 5000, FDS 5000, SDS 5000, see chapter 5.3) or
- An IGB entry (Integrated Bus) or
- An EtherCAT entry (POSITool over EtherCAT).

The *File* menu is used for project management, among others. The following menu items are available:

- *New project* for creation of a new project.
- *Open project* for opening an existing project.
- *Close project* to close current file.
- *Save project* for saving the currently opened project.
- *Save project under* for saving the project in another directory or under a different name.

5.3 Inverter view

Information
Please note that POSITool can communicate exclusively with an SDS 5000 if the inverter entry of the SDS 5000 is configured in an IGB entry or an EtherCAT entry. See chapter 5.4 IGB Entry or the EtherCAT documentation for more information (see chapter 1.2 Other manuals).

Information
To maintain clear organization, a project should not contain more than 32 inverters. However, many more can be added.

An inverter entry is identified by the resource name and the designation. They are entered in the configuration assistant.
The configuration assistant is called under "Projecting wizard." This can be used to change features such as number of axes or motor types at all times. The inverter entry has a separate path for each axis area and the global area. Each path contains a configuration and a parameter screen (except at the configuration level 0 - see chapter 6 Access level) and the available assistants.
To open a configuration screen, a parameter screen or an assistant, double-click the applicable entry. A configuration screen or a parameter screen is opened in the working area. An assistant is not dependent on the working area and switches other processing areas to inactive. The items Communication, Diagnosis and Commissioning are described in the next few chapters.

Fig. 5-2 Inverter entry

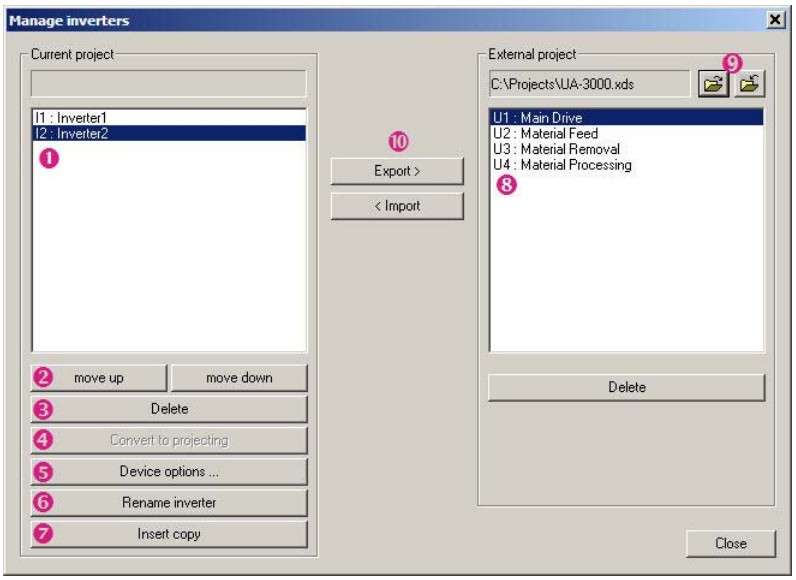
The *File* menu has several items for management of an inverter within a project:

- *New inverter* adds a new inverter to a project. The new inverter directory is indicated in the project view and can be edited there.
- *New inverter from connected inverter* adds an inverter configuration to a project which (the configuration) is read from a connected inverter. The reverse documentation is indicated in the project view.
- *Manage inverter* manages the inverters entered in a project. When you select this menu item, the dialog screen *Manage inverters* from appears.

On the left-hand side of the "Manage inverters" dialog screen are the inverters which exist in the currently opened project (1). The buttons offer you the following options:

- Move (2) the inverters in the list of the current project up or down.
- Delete inverter from the project (3).
- Convert reverse documentations into configurations (4), so that you can edit the data record offline.
- Call the inverter settings (5).
- Renaming inverter (6)
- Insert a copy of the highlighted inverter in the project (7).

You can open an already saved project on the right side of the dialog screen (8). Open and close projects with the buttons on the upper portion of the screen (9). Use the buttons to export inverters between the lists and import inverters between the projects (10).
You can also delete inverters in the external project (*Delete* button underneath the right-hand list).



5.4 IGB Entry

In order for POSITool to communicate via IGB with one or more inverters of device series SDS 5000, an IGB entry must be available in the project and the SDS 5000 must be assigned to the IGB entry.

5.4.1 Create an IGB entry

Remember that only one IGB per project may be present. An IGB entry is automatically created when you set up a new project with an SDS 5000. To create an IGB entry later, proceed as shown below:

Create an IGB entry

1. Open the menu *File*.
2. Select the menu item *New IGB*.
   ⇨ A dialog screen for entering the IGB designation appears.
3. Enter the designation of the IGB.
4. Confirm the dialog screen with the *OK* button.

⇨ The IGB entry appears under your designation in the project view.

5.4.2 Allocate an SDS 5000 to an IGB

To allocate one or more SDS 5000s to an IGB, proceed as shown below:

Allocate an SDS 5000 to an IGB

1. Double click the IGB entry.
   ⇨ The IGB properties dialog screen appears. The SDS 5000s of the project are shown here.
2. Click the check boxes of the SDS 5000s which are to be allocated to the IGB.
3. Confirm the dialog screen with the *OK* button.

⇨ The allocated SDS 5000s now appear under the IGB in the project view.

You have two further method of opening the IGB properties dialog:
- Right-click the IGB entry and then select *Properties* in the context menu.
- In the *File* menu, select the *Manage IGB* entry. Press the *Properties* button in the *Manage IGB dialog*.

You can also change the IGB designation and delete the IGB in the *Manage IGB* dialog.

5.5 Parameters

The parameters contained in the particular configuration are available in a parameter list. The parameters to be indicated are determined by the selected application and the set parameter level.

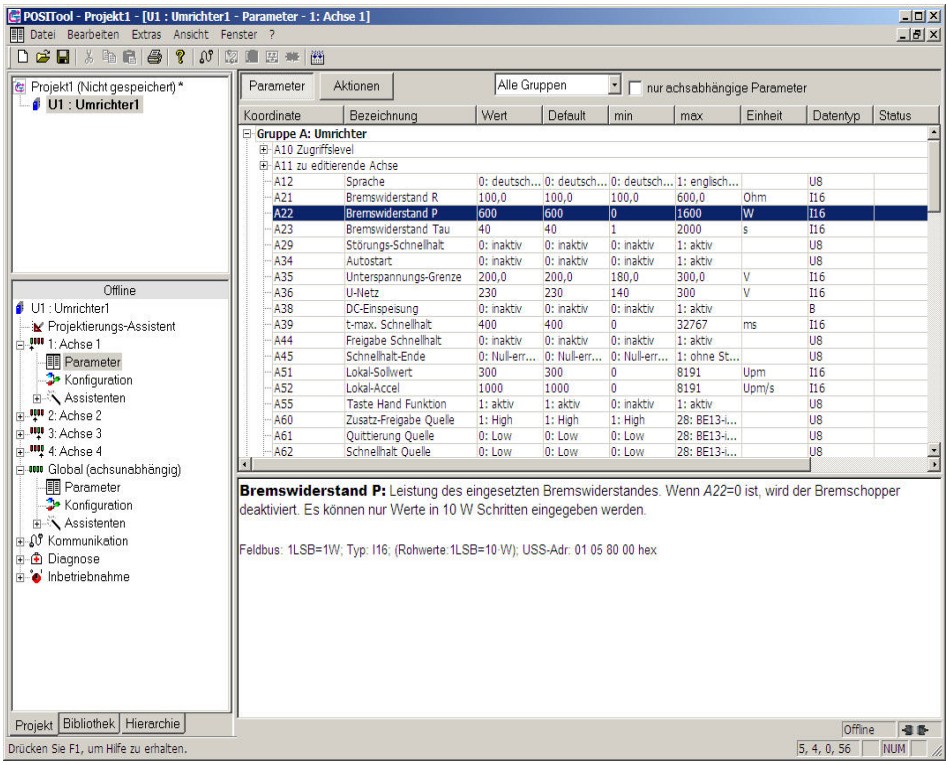


Fig. 5-3 Parameter list

The parameter table is shown in the upper half of the screen. A parameter with the following information is inserted in each line:

- Coordinate
- Designation
- Current setting
- Default value
- Upper and lower limit value
- Unit
- Data type
- Read and write level
- Status
- PreRead or PostWrite function
- PDO mapping

When a parameter is selected, the parameter description appears in the lower half of the screen. To change a parameter, double-click the left mouse button on the line. When the line is highlighted, just press the Enter / ↵ or F2 key.

To reset a changed value to the default value, the user can click on the line with the right mouse button. A context menu appears with the command "accept value from default".

⚠ CAUTION!

To reset a changed value to the default value, the user can click on the line with the right mouse button. A context m.

▶ Before you change a default value, check the validity of the new value!

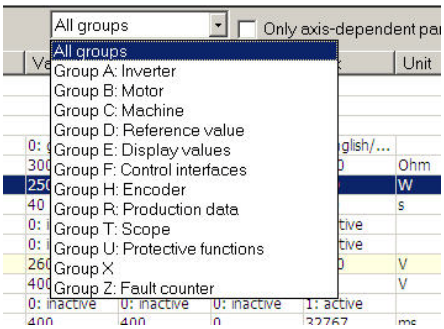


Fig. 5-4 Selection of the parameter groups

Above the parameter list are several control elements. The parameter list appears when the *Parameter* button is pressed. The *Actions* button leads you to the parameters which can trigger actions (please see the inverter operating manual for a description of the actions, 1.2 Other manuals).
In addition to the buttons there is a selection list. A certain parameter group can be selected with this function (s. Fig. 5-4 Selection of the parameter groups).
When the parameter list is open in an axis area, the parameters from the global area can also be indicated. Global parameters can be hidden via a check box *only axis-dependent parameters*.
Changed parameter values and parameter errors (e.g., the limit values are exceeded) are marked in color. Changed parameter values are shown in yellow in the default setting. Parameter errors are marked in red. The error marking is retained until a valid access is made or the error is acknowledged with the F12 key on the PC keyboard.

5.6 Configuration

The configuration screen contains the programming user interface. When the option *free graphic programming* is used, blocks can be inserted here and linked. Applications defined by STÖBER ANTRIEBSTECHNIK GmbH & Co. KG contain the programming in a capsule block.
The structural setup of the POSITool configuration is illustrated in .

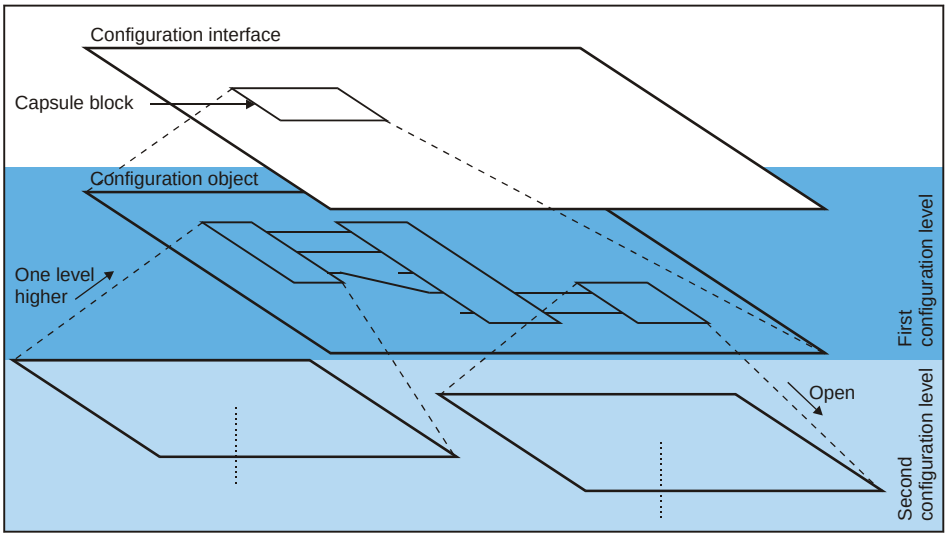


Fig. 5-5 Configuration structure

A block can contain other blocks. The block must be opened before the configuration structure within a block can be viewed. The user clicks with the right mouse button on the block and select *Open* in the context menu which appears. The next level in the configuration environment is then shown.
To reach a higher level, the user clicks with the right mouse button on a free area in the configuration environment. In the dialog screen which appears the user selects *One level higher*. This results in a jump back one configuration level.

5.7 Other Areas

5.7.1 Libraries

Blocks for the *free, graphic programming* option are entered in the library directory. The user can drag them to the configuration screen and link them. The user level determines which blocks are visible and can be used (see chapter 6).

5.7.2 Hierarchy view

The hierarchy view shows a tree structure of the hierarchy of the current configuration (see). To indicate, double click the applicable block in the configuration.

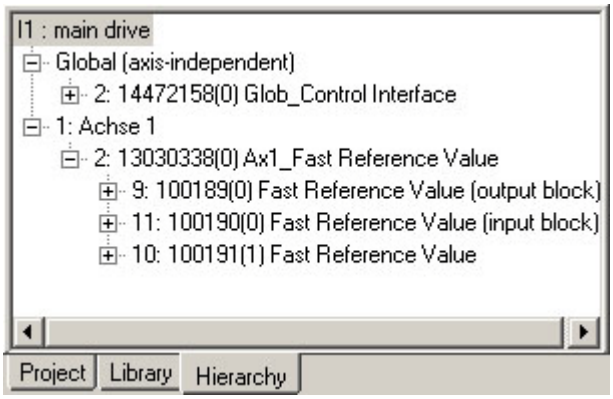


Fig. 5-6 Hierarchy view

5.7.3 "View" menu

In the *View* menu the user can adjust the indication of the status bar and the tool bar as well as the administrative area.

5.7.4 "Screen" menu

In the *Screen* menu the arrangement of the screens in the working area can be set. When several screens are open, they can be directly selected in this menu.

6 Access level

Separate access levels for configuration and parameters exist for the 5th generation of STÖBER inverter. This means that parameters disappear and the view of the configuration is locked at a certain level. The user can choose between the levels 0, 1, 2 and 3.

6.1 Parameter level

A free choice among the four levels is available for indication of the parameters. The higher the parameter level is set, the more parameters appear in the parameter list. The level is set with parameter *A10.0*.
In parameter level 3, POSITool offers an additional functionality which can hide parameters. When the user clicks a line in the parameter list with the right mouse button, the following context menu appears (Fig. 6-1).

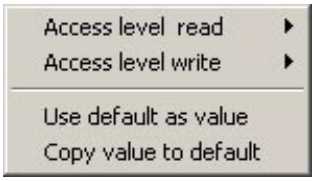


Fig. 6-1 Changing parameter level

In this menu, the read or write level of a parameter can be changed separately. Skillful setting of the parameter *A10.0* can cause a lock at the same time. When, for example, the value 1 is entered in *A10.0*, all parameters with the level 0 and 1 can be viewed. To prevent the user from entering level 2 or 3 in *A10.0*, the write level can be set to 2 via POSITool. Although *A10.0* is visible, it cannot be changed. Another method is to set the read level to 2 at the same time. The parameter is then no longer visible on the display. POSITool shows it in the parameter list starting at level 2.

6.2 Configuration level

Information
At the configuration level only levels 0 to 2 can be set as desired.
Level 3 can only be used with a key file!
The settings up to level 2 are sufficient for users of the applications defined by STÖBER ANTRIEBSTECHNIK!

The configuration level determines the programming capability.

- Level 0: The configuration screen is not visible at this level.
  The user can load and parameterize applications. The *free, graphic programming* option cannot be used.
- Level 1: At this level the user can load and parameterize applications. The application can be opened up to the first program level. The *free, graphic programming* option cannot be used.
- Level 2: The user can load and parameterize applications. The application can be opened up to the second program level. The *free, graphic programming* option cannot be used.
- Level 3: At this level a user can load and parameterize an application and, at the two highest program levels, program an application. The user can open additional levels. The *free, graphic programming* option is available to the user.

6.3 Setting the levels

In the menu *Extra* the following screen is called under the menu item *Change access level …*. The levels can be individually set here.

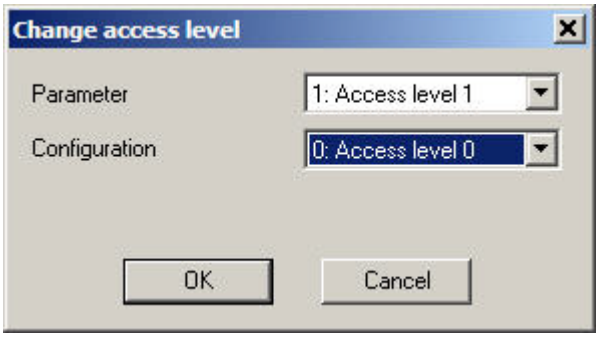


Fig. 6-2 Setting the access levels

7 Communication

Since communication with the MDS 5000 and FDS 5000 is very different from the SDS 5000, these two methods of communication will be described separately.

7.1 Communication with MDS 5000 and FDS 5000

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

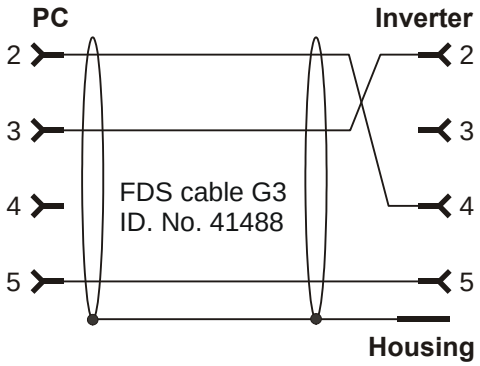


Fig. 7-1 Serial connection to communication between inverter and PC

7.1.1 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).

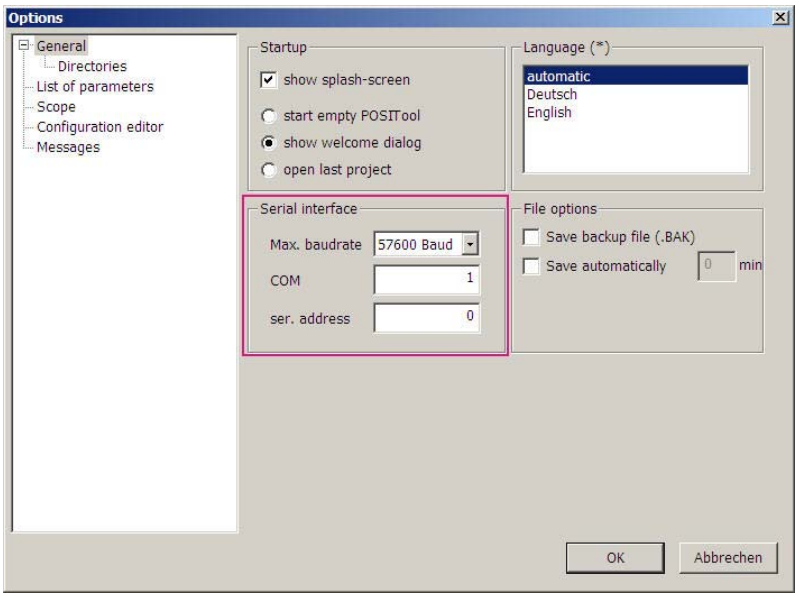


Fig. 7-2 Project settings

7.1.2 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 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)

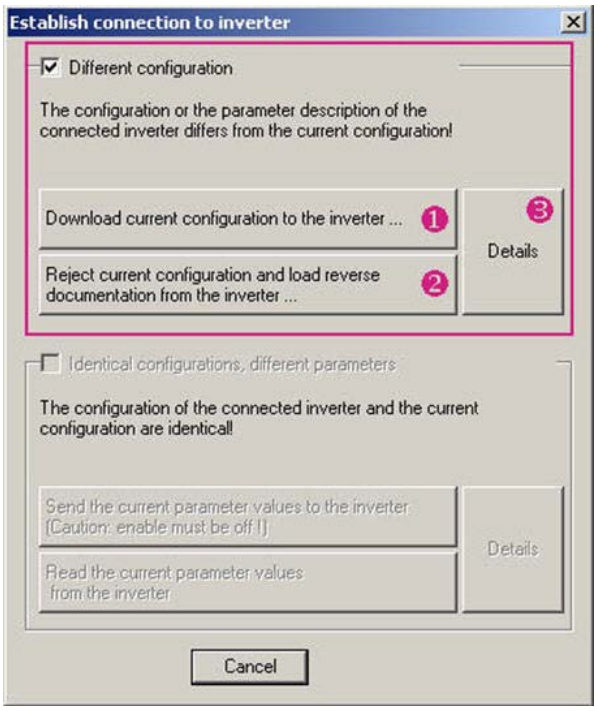


Fig. 7-3 Establishing connection with different configurations

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.

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 appears. 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)

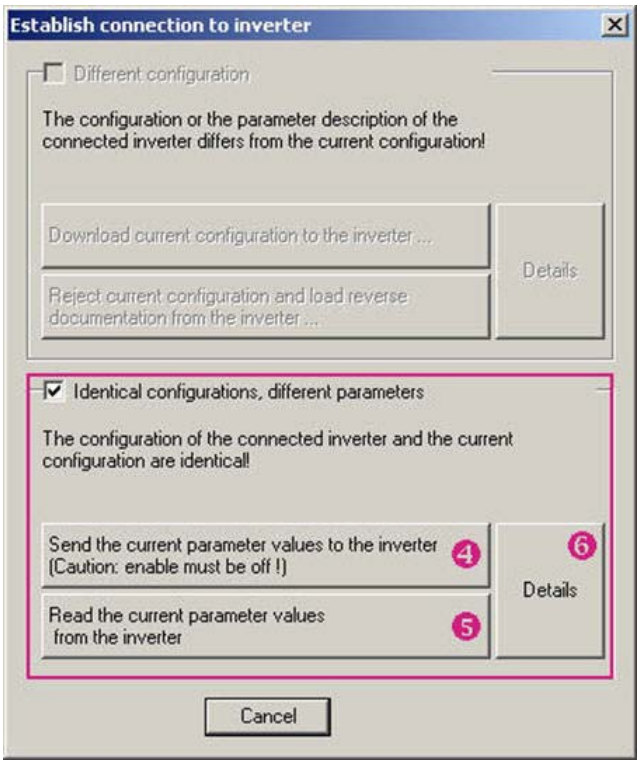


Fig. 7-4 Establishing a connection for identical configurations

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.

Ergebnis

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.

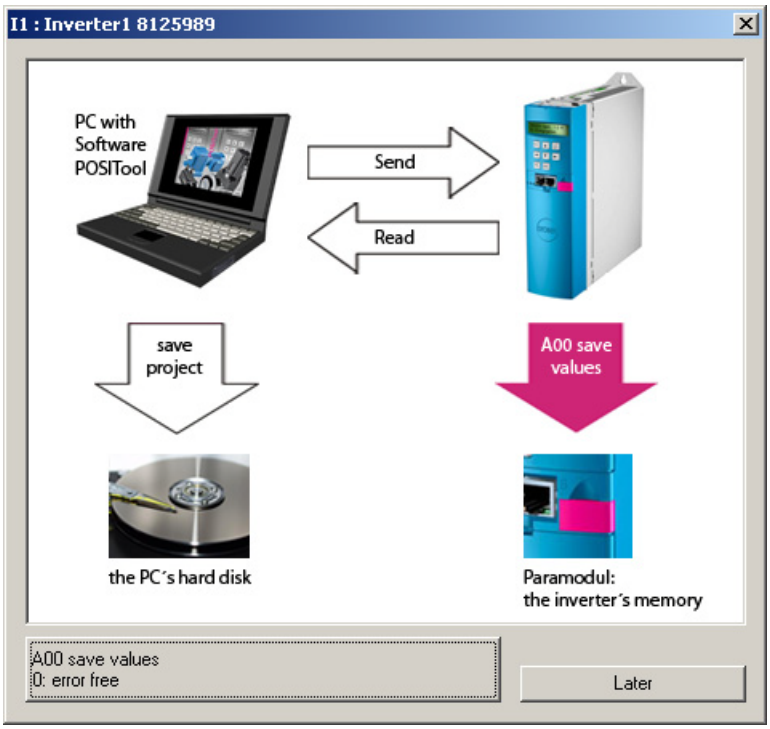


Fig. 7-5 Online connection established

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.

7.2 Communication with SDS 5000

By setting up an Integrated Bus (IGB), you have different possibilities for communication with one or more SDS 5000 units:

- a direct connection between the inverter and PC
- a remote maintenance connection via a local network (LAN)
- a remote maintenance connection via the internet

The connection via a local network or the internet is described in the SDS 5000 operating manual, see section 1.2 Other manuals. A direct connection is only described in this section.

A direct connection is the direct connection of a PC with POSITool to a SDS 5000 or an IGB network via a cable without other network components for the purpose of commissioning, diagnostics or maintenance. You can establish a direct connection with a SDS 5000 or an IGB network.

7.2.1 Basics of IGB communication

Information
Remember that an IGB network can never be accessed by remote maintenance and direct connection (PC) at the same time.

Communication uses the following interfaces:

- Direct connection: TCP/IP protocol on port 37915 and UDP/IP protocol on port 37915
- Remote maintenance without proxy server: HTTP protocol on port 80
- Remote maintenance with proxy server: HTTP protocol on port of the proxy server

You may be asked to share this port by the personal firewall. Share these port for your firewall. To do this, contact your network administrator.

The IGB network must meet the following conditions:

- A maximum of 32 SDS 5000s may be connected in one network.
- All inverters involved in the IGB network must be directly connected with each other. No other components such as hubs and switches are permitted between them in the circuit.
- The overall resulting layout must be a line topology.
- The X3 A interfaces may only be connected with X3 B interfaces of other inverters and vice versa.
- Suitable cables must be used. STÖBER ANTRIEBSTECHNIK provides ready-made cables for the layout of the Integrated Bus. These cables must be used to ensure proper functionality. Note also the SDS 5000 projecting manual.

  It is also possible to use cables with the following specification:

Plug wiring	Patch or crossover
Quality	CAT5e (or better)
Shielding	SFTP or PIMF (or better)

- The maximum overall extent of the IGB network is 100 m.
- The IGB does not require an explicit master and the extensive configuration typically required for Ethernet is eliminated.

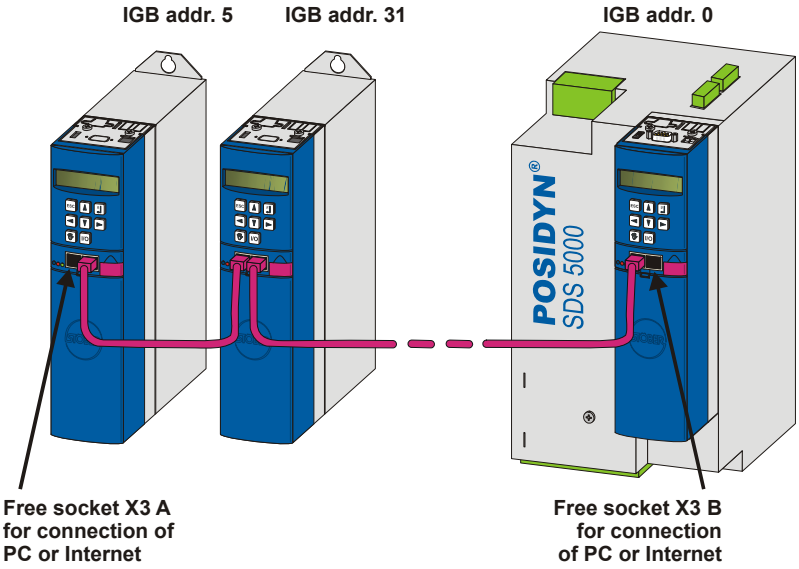


Fig. 7-6 IGB network

PC or the internet are connected to a free outer socket. The IGB network is set up automatically when you turn on at least one inverter. The following conditions apply when integrating additional inverters into the network:

- You have connected these inverters to the IGB network.
- The inverters in the network must be receiving a 24-V power supply.

To start the integration, the 24-V power supply of the inverter in the network must be turned on. When the 24-V power supply is turned on, the IGB network is restructured and up to 32 connected inverters will be integrated.

7.2.2 Requirements for a direct connection

Note the following rule for the direct connection:

- The socket of the gateway device and the computer's network connection must have IP addresses on the same subnet.

Information
To coordinate the IP addresses of the gateway device and the computer, you have the option of changing the IP address of either the computer or the gateway device. However, since you generally need administrator rights to change the IP address of the computer, we recommend changing the IP address of the gateway device.

Information
Please note that the device has two RJ45 sockets (X3A and X3B). Since one socket must be access concretely for a direct connection, the related parameters are created as array parameters. Element 0 contains the settings for socket X3A and element 1 for socket X3B. Make the settings described in this section appropriately for the socket with which you will connect the gateway device with the computer.

7.2.3 IP adress and subnet mask

An IP address is divided into a network section and a device section by the subnet mask. The subnet mask can be represented in binary format, for example, as a series of numbers with the left side consisting only of the number 1 and the right side consisting only of the number 0.
1111 1111.1111 1000.0000 0000.0000 0000 = 255.248.0.0
The section of the subnet mask with the number 1 shows which part of the IP address indicates the address of the subnet (the network section). The other part with the number 0 shows the part of the IP address that represents the address of the device in the subnet (device section).
The following example illustrates how to calculate the IP address.
The IP address 128.206.17.177 with subnet mask 255.240.0.0 is entered for the network interface of the computer:
Subnet mask:1111 1111.1111 0000.0000 0000.0000 0000

The 12 numbers on the left of the IP address indicate the address of the subnet and must be identical in the IP address of the device. The 20 number of the IP address on the right indicate the address of the computer in the subnet. This section must be different in the IP address of the device.

IP address: 1000 0000.1100 1110.0001 0001.1011 0001

Network section, must be identical in the device and PC	Device section, must be different in the device and PC

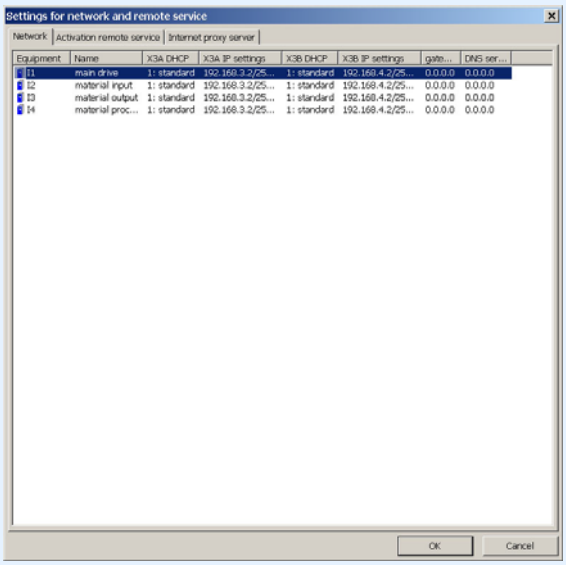
A possible IP address for the device could therefore be:
1000 0000.1100 1111.0001 0001.1011 0001 = 128.207.17.177

7.2.4 Determining the IP address and subnet mask of the PC

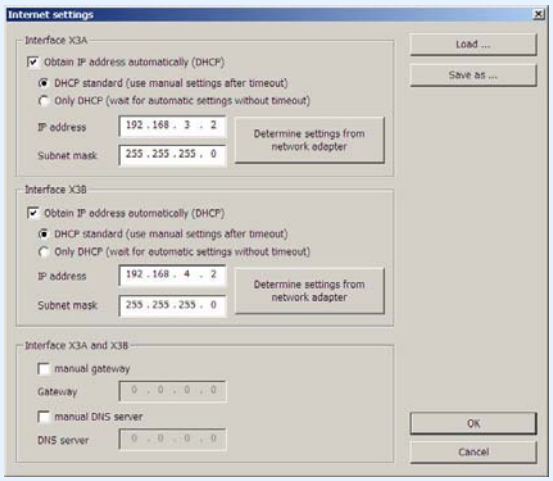
You can determine the IP address and subnet mask of the PC network interface in the system control of the PC but POSITool offers an easier way of finding this information:

Determining the IP address and subnet mask of the PC

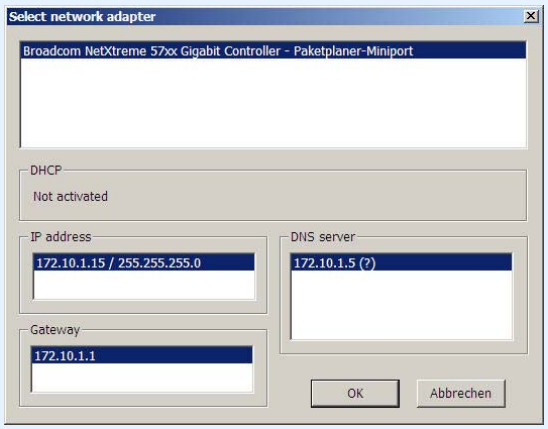
1. In the Project view of POSITool, open the *Network and remote service* assistant.
   ⇨ The following dialog screen appears:



2. Double click an inverter in the list.
   ⇨ The following dialog screen appears:



3. Click one of the two *Determine settingsfrom network adapter* buttons.
   ⇨ The following dialog screen appears:



4. In the top part of the dialog screen, select the network interface which is connected with the direct connection to the inverter.

⇨ The IP address and the subnet mask of the PC on this interface are indicated in the IP address field.

7.2.5 Adjusting the IP address of the inverter

Proceed as shown below to adjust the IP address of the inverter to that of the PC network connection:

Adjusting the IP address of the inverter

1. Determine the IP address and the subnet mask of the PC network connection (e.g., in the system control of your PC or in POSITool).
2. Determine an IP address which is located in the same subnet as that of the PC.
3. Using the operator panel of the gateway inverter, enter this address in parameter *A164.x*. Use *A164.0* if the direct connection uses X3 A. Use *A164.1* if you connect the PC to X3 B.
4. Check whether parameter A166.x has the entry *0:manual* or *1:standard*. Remember that, also here, *A166.0* applies to X3 A and *A166.1* to X3 B.
5. If *A166.x* is not set to *0:manual* or *1:standard*, correct the setting.
6. Save your settings with *A00 save values*.

⇨ You have adjusted the IP address of the inverter.

⚠ CAUTION!

Danger of property damage due to electrostatic discharge, among others!

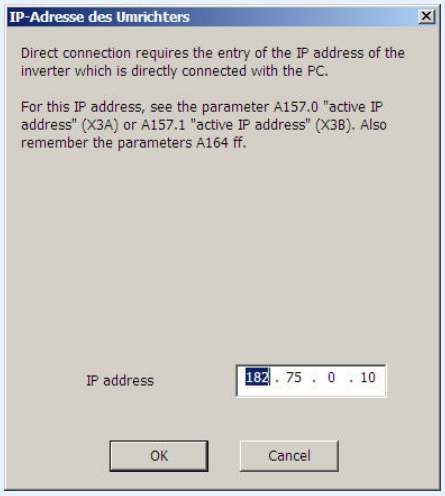
- ▶ Provide suitable protective measures while handling open PCBs (e.g., ESD clothing, environment free of dirt and grease).
- ▶ Do not touch the contact surfaces.

7.2.6 Establishing a direct connection

To establish a direct connection, proceed as follows:

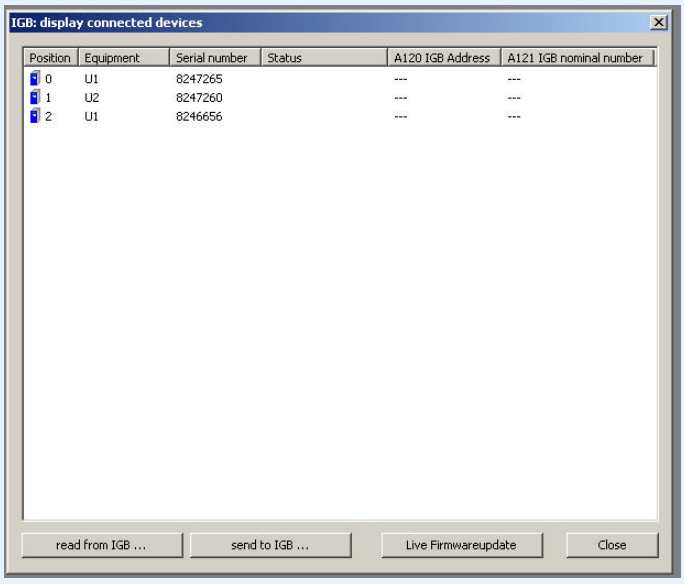
Establish a direct connection

1. Click the  button in the toolbar of POSITool.
   ⇨ The following dialog screen is displayed:



2. Specify the IP address of the RJ45 connector that you have connected to the PC.
3. Click the *OK* button.

⇨ You have established a direct connection and the *IGB: Display connected devices* dialog screen is displayed. The dialog screen shows all devices that are connected via the direct connection to the PC:

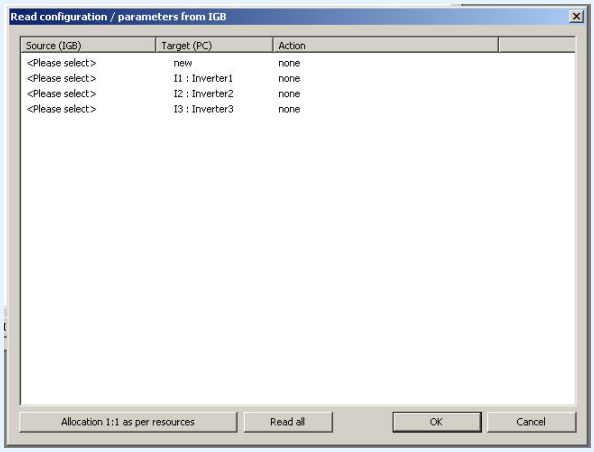


7.2.7 Reading data from the SDS 5000

You must have established a direct connection before you can read data from an SDS 5000. After you have done this, proceed as shown below:

Reading data from the SDS 5000

1. In the *IGB*: *display connected* devices dialog screen, click the *read from IGB…* button.
   ⇨ The following dialog screen appears:



   In the first column of this dialog screen, you can select the inverters which are connected to the PC. The possible targets in your project are shown in the second column.
2. Highlight the line of the inverter entry in POSITool to which the data are to be written. You can select an already existing inverter entry (*I1: Inverter1*) or set up a new inverter entry (*new*).
3. In this line, double click the first column *Source* (*IGB*) (<*Please select*>).
   ⇨ A selection list appears showing all inverters which are connected to the PC.
4. Select the inverter whose data you want to read.
5. Repeat steps 2 to 4 for each source to be read from.
6. Click the *OK* button.

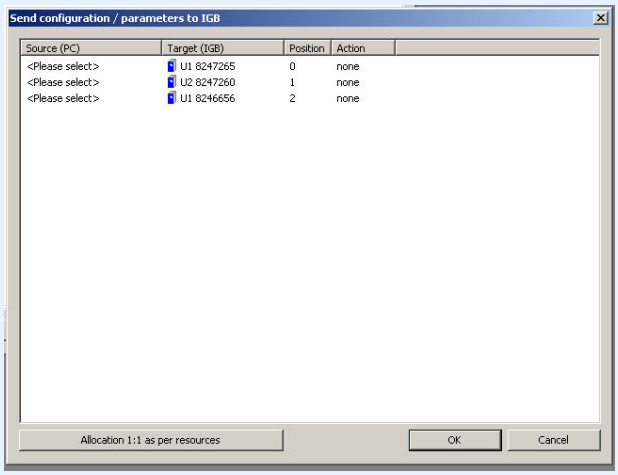
⇨ The data are loaded as you specified and shown in POSITool.

7.2.8 Writing data to the inverter

To write data to the inverter, proceed as shown below:

Writing data to the inverter

1. Click the Send to *IGB...* button in the *IGB: display connected devices* dialog screen.
   ⇨ The following dialog screen appears:



2. Highlight the line of the inverter to which you want to write data.
3. In this line, double click the first column *Source (PC)*.
   ⇨ A selection list appears in which all inverter entries are listed which contain your project.
4. Select the inverter entry which you want to write to the selected inverter.
5. In this line, double click the *Action* column.
   ⇨ A selection list appears in which you can set whether you want an automatic adjustment or whether the previously stored configuration and the parameters are to be overwritten.
6. Select one of the actions.
7. Repeat steps 2 to 6 for each inverter to which you want to write data.
8. Click the *OK* button.

⇨ The data are written to the inverters as specified by you.

8 Diagnosis

The POSITool software offers a wide range of diagnostic functions.

- Fault memory: The fault memory contains the last 10 faults.
- Free parameter list: Parameters can be inscribed, monitored and changed in the free parameter list.
- Simubox: The Simubox software implements the functions of the operator panel with display. The display can be monitored on the PC via an online connection and the key functions can be initiated.
- Scope: Scope can be used by the user to record the progress of parameters.

8.1 Fault memory

The last 10 events are recorded in the fault memory. To obtain an exact overview of the fault situation, the following values are read and stored at the time the fault occurred:

- Fault
- Cause (if it can be determined)
- Operating time when the event occurred
- Active axis
- Device state
- Speed
- DC link voltage
- Current (motor or device)
- Temperature of the device
- Four freely selectable parameters of the application which the user enters in parameters *U80* to *U83*.

The fault memory is not reset when a new application is loaded in the inverter. It has 10 positions which are assigned in succession when faults occur. When all items are full, the oldest entry is overwritten when the next fault occurs.

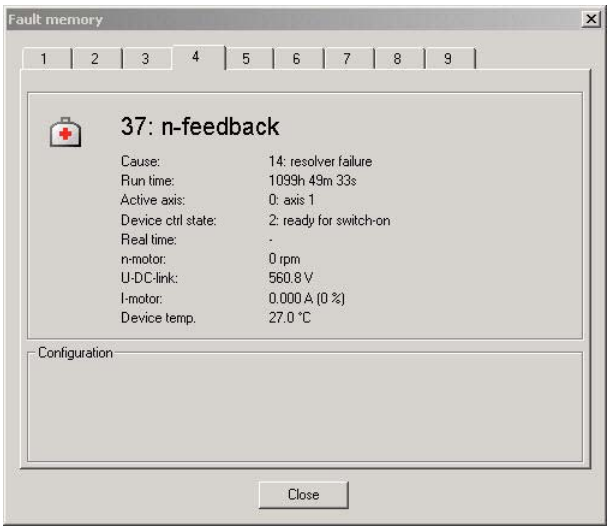


Fig. 8-1 View of the fault memory

Reading the fault memory requires an online connection. It is opened in the inverter entry under *Diagnosis\Fault memory*. The display of the fault memory is updated when it is opened.

8.2 Free Parameter list

The free parameter list is used to indicate and change a selection of parameters adjusted to the application. The list is opened in the inverter entry under *Commissioning/Free parameter list*. The following screen appears:

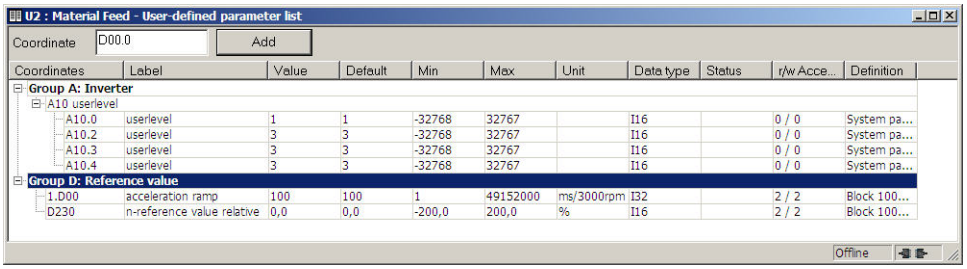


Fig. 8-2 Free parameter list

To enter a parameter in the list, its coordinates must be entered in the field *coordinate*. With a global parameter, the letter of the group and its number (e.g., *A10*) is sufficient. When an axis parameter is to be inserted, the axis no. must be stated (e.g., *3.I09*: Parameter *I09* from axis 3).
Parameter elements can also be entered (e.g., *A10.1*).
If the parameter is not entered correctly in the field, it is not accepted.When the free parameter list is open while a picture is being read with the Scope functionality, the parameters entered in the list are included with the current values when the picture info is written.
In order to use a free parameter list which has already been compiled in other projects, you can export the list (*Export* button) and save it in the *.fpl file format. In another project, you can press the *Import* button, then select the *.fpl file so that you can display the same parameter collection in the list.

8.3 Simubox

Simubox can be used to monitor the display on the PC and to press keys. This makes it possible to perform commissioning in local mode, for instance, when the inverter is installed in an inaccessible place.

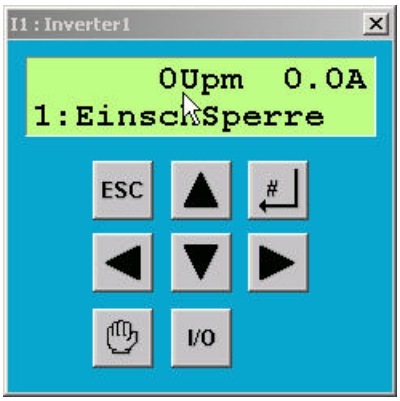


Fig. 8-3 Simubox

Simubox is opened in the inverter entry under *Commissioning\Simubox*. Simubox can only be used in online mode. If it is opened in offline mode, a display like the one in appears.
Simubox is also available as a *stand-alone* application (i.e., it can be opened regardless of POSITool).
The buttons of Simubox can be activated with the keyboard of the PC:
ESC button: ESC key
button: Return / Enter
◀ button: Pfeiltaste nach links auf Ziffern- oder Curserblock
▶ button: Pfeiltaste nach rechts auf Ziffern- oder Curserblock
▲ button: Pfeiltaste nach oben auf Ziffern- oder Curserblock
▼ button: Pfeiltaste nach unten auf Ziffern- oder Curserblock
Hand button: ‚H' key
I/O button: ‚I' or ‚1' key

8.4 Scope

The Scope function is used to record parameters. It is called in the inverter entry under *Commissioning\Scope - new picture*.
Settings can always be made. A picture can only be started and read in online mode.

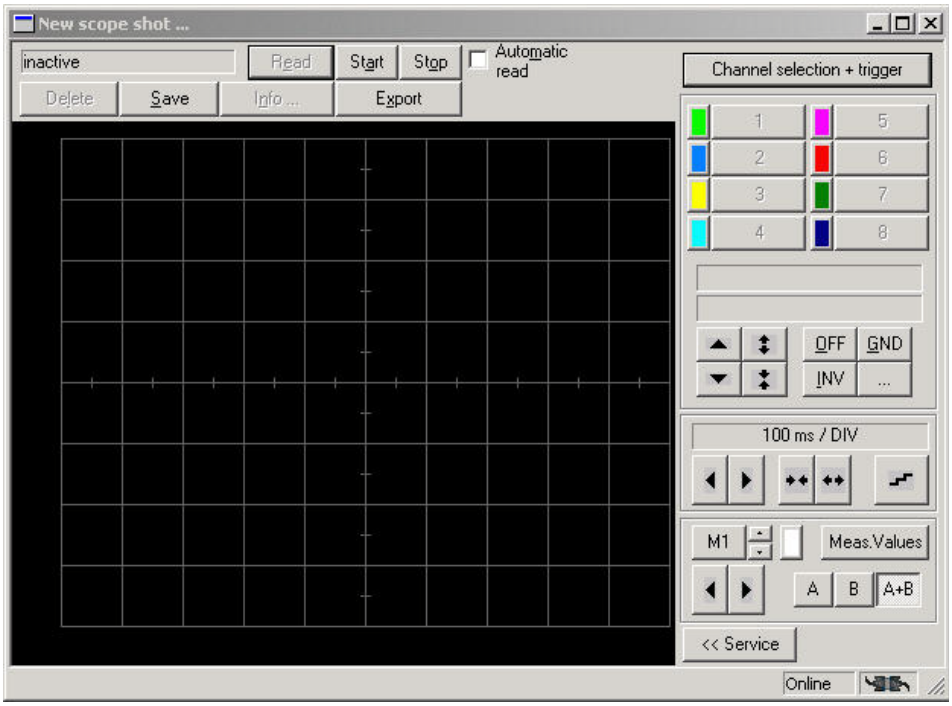


Fig. 8-4 Scope

8.4.1 Setup

The status is indicated in the upper, left-hand corner of the screen. The buttons *Read*, *Start* and *Stop* are used to control the picture. When this box is checked, the picture is automatically read from the inverter when the status of the picture reaches *Done*.
Pictures are managed with *Save*, *Delete*, *Info*…, and *Export*. A stored picture appears in the inverter entry under *Commissioning*. It can be called again from there. Names and remarks pertaining to a stored picture can be called under *Info*. The dialog is automatically called during saving. The measured values are exported to an Excel file (CSV file) with *Export*.

8.4.2 Channel selection

The dialog for selection of the parameters to be recorded is located under the *Channel selection + trigger button*.

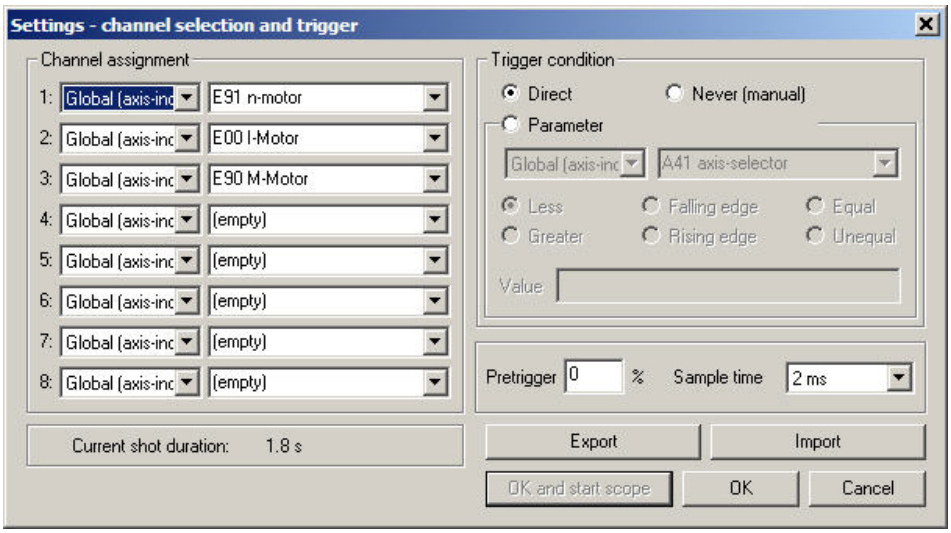


Fig. 8-5 Channel selection and trigger

It must first be specified in the dialog box whether a parameter from the global or axis area is to be pictured. The parameter is then selected. If applications are selected via the configuration assistants, some of the channels are preassigned.

8.4.3 Trigger

A trigger condition is then be specified. The trigger condition defines the picture time together with the pre-trigger and the scanning time. The scanning time determines the duration of picture. It is indicated at the bottom left. The trigger condition is used to define an event to which the picture time frame refers. The pre-trigger specifies which time period will be recorded before the event.
Example:
Total picture time: 5 seconds
Trigger: Axis parameter *E15 n-motorencoder* greater than 50 (Rpm).
Pretrigger: 40 %

Result:
Scope trips when a value greater than 50 Rpm is determined in parameter*E15 n-motorencoder*. Recording is made two seconds before the event (40%) and three seconds afterwards.

Information
When a large pretrigger value is entered for a long picture duration, Scope can remain in the *started* state for some time after its start until picture readiness is signaled by the state *ready to trigger*.

When the dialog screen is confirmed with *OK*, the settings are accepted but Scope is not started before the *OK and start Scope* button is pressed. *Terminate* rejects the settings

8.4.4 Exporting and importing

If you use the same or similar Scope settings in different projects, you can export the settings from the *Settings - channel selection and trigger* dialog screen and save them as a *.sco file (*Export* button). You can choose this file in another project by pressing the *Import* button and the same settings are displayed.

8.4.5 Channels

When a picture is finished and read, the channels can be selected via the buttons on the right-hand side. The recorded parameters are specified (e.g., *E91*) with the occupied channels. The display below the buttons contains the complete parameter designation of the selected channel. The complete parameter designation is located under the buttons. The second indication specifies the set scaling.

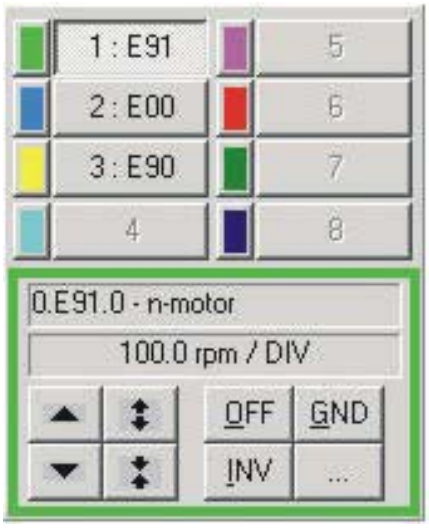


Fig. 8-6 Channel selection and channel scaling

The buttons under the indications can be used to change the representation of the characteristic curve.

Button	Function
	Shift the characteristic curve of the activated channel up or down by one grid interval. + shift key: Shift by one pixel. + Ctrl key: Shift to the next grid line. + Ctrl + shift key: Shift to middle of the image.

Button	Function
	Enlarge/reduce the scaling of the channel; + Ctrl key: Auto scaling
OFF	Indicate/hide the channel.
INV	Inverted indication of the channel.
GND	Indicate the zero line of the channel.
...	Indication of a value in individual bits. Can only be used for whole-number parameters without positions after the decimal point and not with selection parameters.

The user can specify the color of the channel by clicking the colored field with the left mouse button.

8.4.6 Time axis

The following field is used to change the representation of the time axis. The indication shows the current scaling.

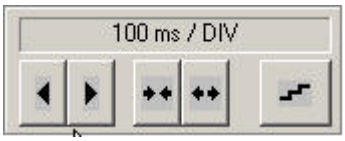
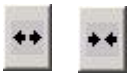


Fig. 8-7 Time axis

Button	Function
	Shift the picture to the right/left by one grid interval. Shift key: Shift the picture by 1 pixel. Ctrl key: Shift the picture to the next grid line. Ctrl + shift key: Shift the picture to the middle of the image
	Enlarge/reduce the scaling of the x-axis; Ctrl key: Auto scaling
	Type of indication of the measured values interpolated or in step format (presetting: interpolated).

8.4.7 Scalings

The characteristic curves and the time axis are scaled as related to a scaling point. The scaling point remains in the same position on the display (fixed point) during scaling. The coordinate of the scaling point is defined by a horizontal value (on the time axis) and a vertical value (of the characteristic curve). The default setting of the scaling point is located at 50 % of the indicated time axis section and the function value at this time.
Changes can be made in the menu *Extras/POSITool options* in the *Scope* dialog. The horizontal value can be selected in 10 % increments. In addition to selecting the *function value* for the vertical value, you can also set the scaling point to the vertical midpoint of the image or the zero line of the characteristic curve (selection *Picture midpoint and Zero line*).

8.4.8 Measure

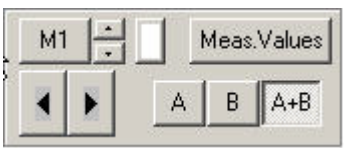


Fig. 8-8 Measuring function

Eight markers (M1 to M8) are available for precise analysis of the recorded values. Each marker has two measuring points (A and B). The buttons control the following functions:

Button	Function
M1	Switch on/off the selected marker.
	Selection of a selected marker.
	Selection of the color for the selected marker.
Meas.Values	Indication of the measured value window.
A	Select the left marker point (A) for the shift.
B	Select the left marker point (B) for the shift.
A+B	Select both marker points (A+B) for the simultaneous shift.
	Shift the selected marker to the left or to the right (A, B or A+B);Shift key: Shift by 1 pixel.

8.4.9 Service

NOTICE

During this action, the motor shaft will move.

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

<< Service

The Service button can be used to indicate an area in which the *Start reference value generator* action, the Simubox and the *free parameter list* can be called in Scope.

Fig. 8-9 Reference value generator

The functions are used for quick optimization. The user can proceed as shown below:

1. Set the reference value generator via the parameters *D93*, *D94* and *D95* and start the drive via the button.
2. Make a picture of the movement with Scope.
3. The parameters to be changed are entered in the *Free parameter list* and adjusted.

This procedure is repeated until the drive is optimally adjusted.

8.4.10 Print Scope pictures

When Scope pictures are printed, this includes saved and current pictures. Printing can be started from Scope or from the general print dialog. After start, the print dialog is indicated as shown in Fig. 8-10.
One picture is printed to a page. Printing consists of a graphic area showing the picture and an area showing additional information. The print options offer a choice of black and white or color (print dialog, *Options* button, *Scope* page). The Scope commentary can also be printed as an option.

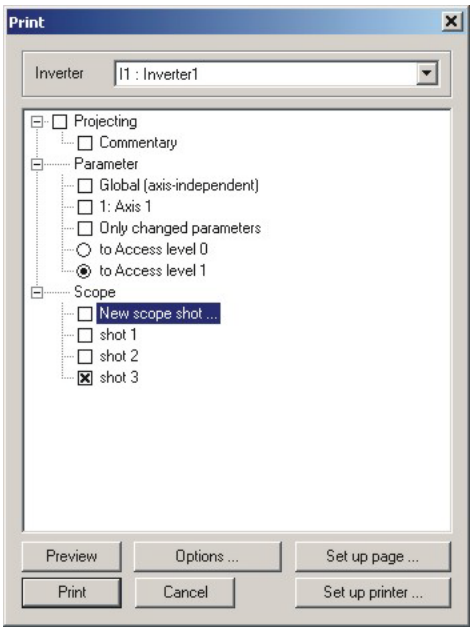


Fig. 8-10 View of the print dialog

Graphic area
The graphic area includes the current display from Scope. The curve number is specified via the curve on the zero point for a black and white printout. The identifier of the individual bits is handled with Bxx for binary split curves. When a color printout is selected the colors of the curves are used.

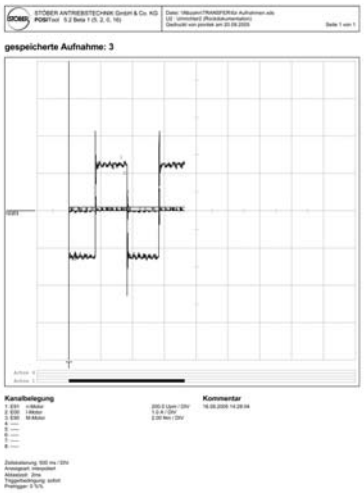


Fig. 8-11 View of a printed page

The axis switchover data are also shown graphically under the picture. Black bars indicate when an axis was active (*E84*=0 to 3). Gray bars indicate selected but inactive axes (*E84*=4 to 7). In the example shown in Fig. 8-12the area of the black bar shows axis 1 as active.

Fig. 8-12 Bar diagram

Additional informationen

The following information is indicated in this area:

- Allocation of the eight channels with address, designation, scaling (unit/div.) and the identifier of an inverted presentation (INV) or a curve drawn to zero (GND).
- Scaling of the time axis (time unit/DIV).
- Indication type: *Steps* or *Interpolated*.
- Trigger condition and scanning time; pictures which were stored with an older version of POSITool are provided with a note indicating this. They are printed without information on scanning times and trigger conditions.

Any commentary which the options indicate is to be printed is shown in a box to the right of the additional information.

9 POSITool – Options

9.1 Print

The print function can be accessed via the menu item *File/Print ...*. The inverter to be printed is selected in the print dialog with a combination box (8.4.10). The following data can be shown in a printout:

- Configuration information, with optional configuration commentary
- Parameter values of the various axes or the global area. The scope of the parameters can be limited with the access level and selection of the changed parameters.
- Fault memory in online operation or in a reverse documentation.
- Stored and current Scope pictures. (Scope pictures can also be printed directly from Scope.)

The dialog offers several buttons. This is where a preview of the printout can be indicated, the printer and the page can be set up and the global settings can be switched to.

9.2 Importing/exporting of parameter values

Parameter values can be imported and exported to a text file and archived. These functions are available in the *File* menu.

9.2.1 Export

First an inverter is selected in the dialog for exporting the parameter values. In the tree structure which appears below you can choose between various axes and the global area. The number of parameters to be exported can be limited by specifying the access level. In addition the export can be limited just to changed parameters.

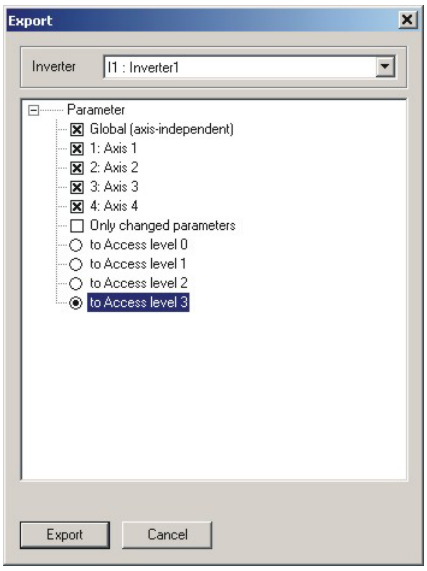


Fig. 9-1 Export window

The export procedure is started by pressing the *Export* button. A dialog appears in which the target folder and file name are entered.
The parameter values are exported in CSV format (*comma separated value*). A CSV file contains one area for each axis and global area. Each area is identified with the following title:
["U1","inverter1","Global","Global"]
The first sections indicate the resource identifier and the designation of the inverter from the configuration Assistant. The resource identifier and designation of the axis or the global area from the configuration Assistant are indicated next. Then the parameters are listed. One parameter is indicated per line with coordinate, designation, value and unit:
"A21","Brake resistor R","300,0","Ohm"

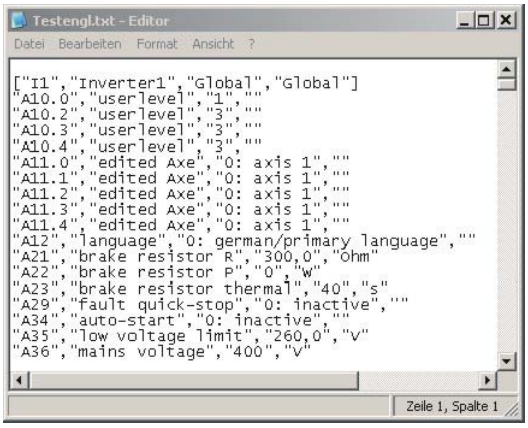


Fig. 9-2 View of exported parameters in CSV format

9.2.2 Import

To import a file, select menu item *Import parameter values...* in the File menu. After the file is selected with the *Open file* dialog, the screen shown in appears. An area of the CSV is assigned a target area in POSITool. This makes it possible, for instance, to import the axis 1 area of the CSV file to axis 3.

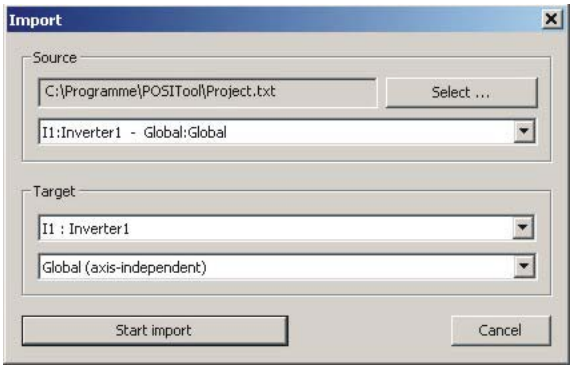


Fig. 9-3 Setting dialog for the import

After assignment has been completed the import is started. A list of parameters appears which exist in both the import file area and the target area. The first section of the list shows the parameters which are identical in both areas. Then the list appears with the parameters which are not set identically and the value in the target area which the import changed.
When the checkbox *All parameter* is activated in the dialog, those parameters are also shown which exist exclusively either in the area of the import file or in the target area. The parameters which exist in the import file but not in the target area are ignored during the import. Parameters which exist in the target area but not in the import file remain unchanged.

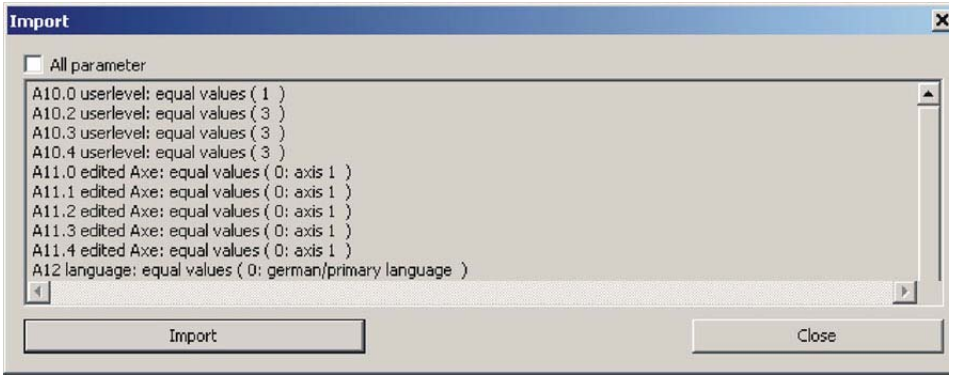


Fig. 9-4 Parameter list with checkboxes

9.3 Integrating Documentation in POSITool

You have the option of indicating product descriptions of STÖBER ANTRIEBSTECHNIK GmbH & Co. KG in PDF format in POSITool and opening them there. Proceed as described below:

Integrating documentation in POSITool

1. Set up a directory on your PC.
2. Copy the PDF documents to the directory which you want to call in POSITool. You will find the documents on the product-CD Electronics 5000 or at www.stoeber.de.
3. Open POSITool.
4. Open the Open the Options dialog screen of POSITool in the menu *Extras\POSITool* options.
5. Select the page Directories:

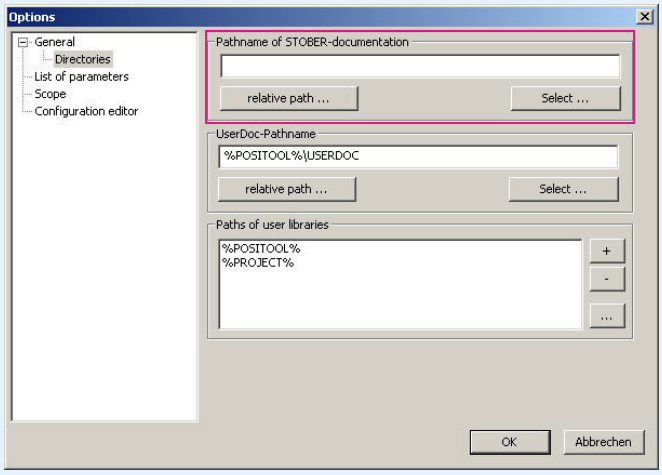


Fig. 9-5 Integrating documentation

6. In the upper portion of the page, set the directory in which you stored the PDF documents. You can specify the directory relative to POSITool (*relative path …* button) of select a concrete directory (*Select …* button).
7. Close the Options dialog with the "OK" button.

⇨ The documentation appears in the Project view.

Under *Documentation* in the project entry, POSITool lists the PDF documents which go with your configurations.

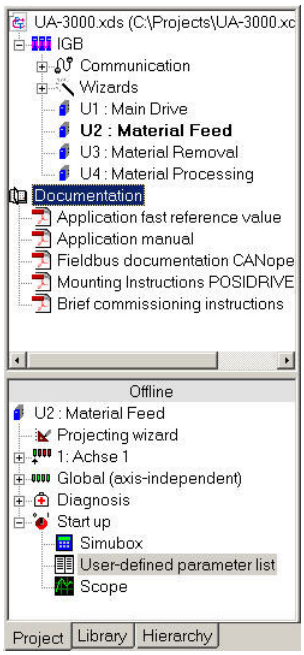


Fig. 9-6 Listing of the PDF documents in the Project view

9.4 Additional options

Configuration-independent options of POSITool are indicated under *Options* in the *Extras* menu. For instance, the start behavior or memory options can be set here.

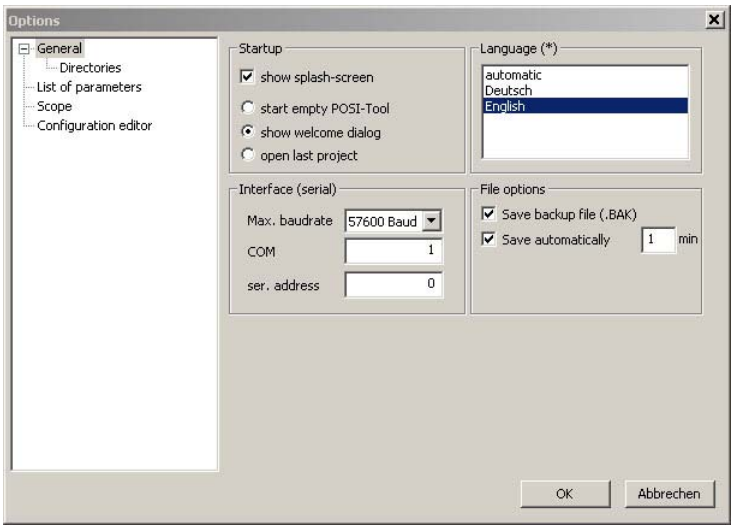


Fig. 9-7 View of the setting dialog

9.4.1 Start behavior

The optional indication of the start screen is part of the start behavior of POSITool. You can also choose between indication of the welcoming dialog (standard), a start screen with the last project or a blank POSITool screen.

9.4.2 Memory options

The memory options include the activation of Autosave and the setting up of a backup file. A backup file is set up when an old status is overwritten during saving. The backup file is given the suffix *.bak*.
Autosave automatically triggers storage of the entire project at regular intervals which can be set. This file is given the suffix *.sav*.

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