9 Drive controllers SD6

9.1 Overview

High performance and flexibility

Features

- Nominal output current up to 85 A
- 250% overload capacity
- Control of linear and rotary synchronous servo motors and asynchronous motors
- Multi-functional encoder interfaces
- Automatic motor parameterization from the electronic motor nameplate
- Isochronic system bus (IGB motion bus) for parameterization and multi-axis applications
- Communication over CANopen, EtherCAT or PROFINET
- Safe Torque Off (STO) in the standard version, expanded safety technology (SIL 3, PL e, Cat. 4) as an option
- Digital and analog inputs and outputs as an option
- Brake chopper, brake control and line filter
- Flexible DC link connection for multi-axis applications
- Convenient operating unit consisting of graphical display and keys
- Paramodul removable data storage for quick commissioning and service

9.1.1 Features

The SD6 drive controller from the the 6th STOBER drive controller generation offers maximum precision and productivity for automation technology and mechanical engineering despite ever more complex functions. Highly dynamic drives ensure the shortest recovery times from fast changes in reference value and load jumps. There is also an option of connecting the drive controllers in a DC intermediate circuit for multi-axis applications, which improves the energy footprint of the entire system. The SD6 drive controller is available in four sizes with a nominal output current of up to 85 A.

The optimized vector control, sensorless vector control, U/f slip-compensated and U/f controller control types are available for use with asynchronous motors.

SD6 drive controller

Fully electronic STO as a standard feature

There is already a wear-free, fully electronic interface for the Safe Torque Off (STO) safety function available in the standard series version. The solution is a technical innovation that works without any system tests disrupting operation. In practical terms, this means an impressive increase in the availability of machines and systems. Time-consuming planning and documentation of tests are also eliminated. In multi-axis applications with SD6 drive controllers, the STO safety function can simply be looped through. The safety-relevant functions were developed together with Pilz GmbH & Co. KG.

Expanded safety option

In addition to the safe stop functions Safe Stop 1 (SS1) and Safe Stop 2 (SS2), additional safety functions such as Safely-Limited Speed (SLS), Safe Brake Control (SBC), Safe Brake Test (SBT), Safe Direction (SDI) and Safely-Limited Increment (SLI) are also available.

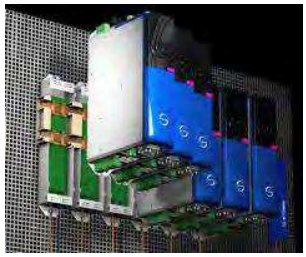
Certified safety

TÜV certification makes it possible to use SD6 drive controllers even in applications with challenging safety requirements:

- SIL 3, HFT 1 in accordance with EN 61800-5-2
- PL e, category 4 in accordance with DIN EN ISO 13849

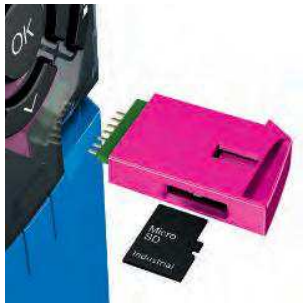
Quick DC-Link

All the product types of the SD6 drive controller have the option of a DC link connection. This technology makes it possible for the regenerative production of energy from one drive to be used as motor energy by another drive. The Quick DC-Link rear structure element has been developed to set up a reliable and efficient rail connection to the DC link connection. This optionally available accessory connects the DC links of the individual drive controllers by means of copper rails that can carry a load of up to 200 A. The rails can be attached without any tools using quick fastening clamps.



Paramodul removable data storage

Removable data storage with integrated microSD card is available for fast series commissioning by copying and for easy service when replacing devices. It represents the ideal medium for saving additional project data and documentation and can be used for direct editing on a PC.



Integrated bus (IGB)

SD6 drive controllers have two interfaces for the integrated bus in the standard version. The integrated bus is used for easy configuration over Ethernet and isochronic data exchange for the following functions:

- Multi-axis synchronization between the drive controllers (IGB motion bus)
- Direct connection for remote maintenance of individual and multiple drive controllers
- Direct connection between one or more drive controllers and a PC

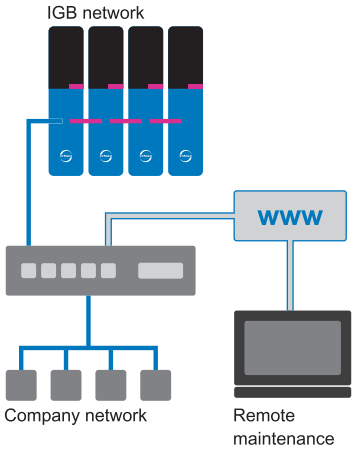
Interface for the Integrated Bus

IGB motion bus

The IGB motion bus allows for cyclic, isochronic data exchange between multiple SD6 drive controllers integrated into the IGB network. In addition to transferring guide values for master/slave operation, it is possible to exchange any other data as well.

STOBER remote maintenance concept

STOBER remote maintenance enables commissioning software to be used to perform all processes and sequences just like an on-site service visit. The concept guides users through a controlled and protected procedure. It ensures that the person responsible for the machine is there on site to pay attention to special situations and personal safety. On the other end, the remote maintenance specialist has the assurance of communicating with a responsible employee on site who is monitoring the situation on the machine.



Remote maintenance can be used to perform all processes and sequences just like an on-site service visit.

Brake management

The SD6 drive controller can activate a 24 V_{DC} brake using an integrated brake control. Brake management provides two functions for the brake system:

- Cyclic brake test
- Grind brake

9.1.2 Software components

Project configuration and commissioning

The 6th generation of DriveControlSuite project configuration and commissioning software has all the functions for the efficient use of drive controllers in single-axis and multi-axis applications. The program guides you step by step through the complete project configuration and parameterization process using wizards.

Open communication

Device communication is possible using EtherCAT, CANopen or PROFINET.

Applications

Drive-based motion control is recommended for the decentralized motion control of sophisticated machines.

The drive-based application package from STOBER is the right choice wherever universal and flexible solutions are needed. In the **STOBER Drive Based synchronous** application, the PLCopen Motion Control command set provides drive-based motion control for synchronous run, positioning, velocity and torque/force. These standard commands have been combined into operating modes for different application cases and supplemented with additional functions such as motion block linking or cams. For the command operating mode, all properties of the movements are specified directly by the controller. The properties of the movements in the drive are predefined in the motion block operating mode so that only a start signal is necessary to perform the movement. Linking can be used to define complete motion sequences.

In addition, the **CiA 402** application is also available, which includes both the controller-based and drive-based operating modes (csp, csv, cst, ip, pp, pv, pt).

9.1.3 Application training

STOBER offers a multi-level training program that focuses essentially on application programming of the motion controller and drive controller.

G6 Basic

Training content: System overview, installation and commissioning of the drive controller. Use of option modules. Parameterization, commissioning and diagnostics using the commissioning software. Remote maintenance. Basics of controller optimization. Configuration of the drive train. Integrated software functions. Software applications. Connection to a higher-level controller. Basics of safety technology. Practical exercises on training topics.

Software used: DriveControlSuite.

G6 Advanced

Training content: Special knowledge for regulating, control and safety technology. Practical exercises on training topics.

9.2 Technical data

Technical data for the drive controller can be found in the following chapters.

9.2.1 Type designation

SD	6	A	0	6	T	E	X

Tab. 1: Sample code

Code	Designation	Design
SD	Series	ServoDrive
6	Generation	Generation 6
A, B	Version	
0 – 3	Size	
6 (0 – 9)	Power output stage	Power output stage within the size
T	Safety module	ST6: STO via terminals
E		SE6: Expanded safety functionality using terminals
N	Communication module	Empty
E		EC6: EtherCAT
C		CA6: CANopen
P		PN6: PROFINET
N	Terminal module	Empty
X		XI6: Extended I/O
R		RI6: Resolver I/O
I		IO6: Standard I/O

Tab. 2: Explanation

9.2.2 Sizes

Type	Size
SD6A02	Size 0
SD6A04	Size 0
SD6A06	Size 0
SD6A14	Size 1
SD6A16	Size 1
SD6A24	Size 2
SD6A26	Size 2
SD6A34	Size 3
SD6A36	Size 3
SD6A38	Size 3

Tab. 3: Available SD6 types and sizes

SD6 in sizes 0, 1, 2 and 3

9.2.3 General technical data

The following specifications apply to all drive controller types.

Device features	
Protection class of the device	IP20
Protection class of the installation space	At least IP54
Radio interference suppression	Integrated line filter in accordance with EN 61800-3:2012, interference emission class C3
Overvoltage category	III in accordance with EN 61800-5-1:2008
Test symbols	

Tab. 4: Device features

Transport and storage conditions	
Storage/ transport temperature	−20 °C to +70 °C Maximum change: 20 K/h
Relative humidity	Maximum relative humidity 85%, non-condensing
Vibration (transport) in accordance with DIN EN 60068-2-6	5 Hz ≤ f ≤ 9 Hz: 3.5 mm 9 Hz ≤ f ≤ 200 Hz: 10 m/s² 200 Hz ≤ f ≤ 500 Hz: 15 m/s²

Tab. 5: Transport and storage conditions

Operating conditions	
Surrounding temperature during operation	0 °C to 45 °C with nominal data 45 °C to 55 °C with derating −2.5% / K
Relative humidity	Maximum relative humidity 85%, non-condensing
Installation altitude	0 m to 1000 m above sea level without restrictions 1000 m to 2000 m above sea level with −1.5%/100 m derating
Pollution degree	Pollution degree 2 in accordance with EN 50178
Ventilation	Installed fan
Vibration (operation) in accordance with DIN EN 60068-2-6	5 Hz ≤ f ≤ 9 Hz: 0.35 mm 9 Hz ≤ f ≤ 200 Hz: 1 m/s²

Tab. 6: Operating conditions

Discharge times	
Self-discharge of DC link	5 min

Tab. 7: Discharge times of the DC link circuit

9.2.4 Electrical data

The electrical data of the available SD6 sizes as well as the properties of the brake chopper can be found in the following sections.

Information

For the time span between two energizing processes, note that:

a) Direct, repeat activation of the supply voltage is possible for power-on/power-off operation.

b) A time span of > 15 must be observed between two energizing processes during continuous, cyclical power-on/power-off operation with increased charging capacity.

Information

The STO safety function is available for safe shutdown as an alternative to continuous, cyclical power-on/power-off operation.

An explanation of the formula symbols used can be found in the chapter [▶ 14.1].

9.2.4.1 Control unit

Electrical data	All types
U_{1CU}	24 V_{DC}, +20%/–15%
I_{1maxCU}	1.5 A

Tab. 8: Control unit electrical data

9.2.4.2 Power unit: Size 0

Electrical data	SD6A02	SD6A04	SD6A06
U_{1PU}	1 × 230 V_{AC}, +20% / –40%, 50/60 Hz	3 × 400 V_{AC}, +32% / –50%, 50/60 Hz; 3 × 480 V_{AC}, +10% / –58%, 50/60 Hz	
f_{2PU}	0 – 700 Hz		
U_{2PU}	0 – max. U_{1PU}		
C_{PU}	340 µF	135 µF	135 µF
C_{maxPU}	1620 µF	540 µF	540 µF

Tab. 9: SD6 electrical data, size 0

Nominal currents up to +45 °C (in the control cabinet)

Electrical data	SD6A02	SD6A04	SD6A06
$f_{PWM,PU}$	4 kHz		
$I_{1N,PU}$	8.3 A	2.8 A	5.4 A
$I_{2N,PU}$	4 A	2.3 A	4.5 A
I_{2maxPU}	180% for 5 s; 150% for 30 s		

Tab. 10: SD6 electrical data, size 0, for 4 kHz clock frequency

Electrical data	SD6A02	SD6A04	SD6A06
$f_{PWM,PU}$	8 kHz		
$I_{1N,PU}$	6 A	2.2 A	4 A
$I_{2N,PU}$	3 A	1.7 A	3.4 A
I_{2maxPU}	250% for 2 s; 200% for 5 s		

Tab. 11: SD6 electrical data, size 0, for 8 kHz clock frequency

Electrical data	SD6A02	SD6A04	SD6A06
U_{onCH}	400 – 420 V_{DC}	780 – 800 V_{DC}	
U_{offCH}	360 – 380 V_{DC}	740 – 760 V_{DC}	
R_{2minRB}	100 Ω		
P_{maxRB}	1.8 kW	6.4 kW	
P_{effRB}	1.0 kW	2.9 kW	

Tab. 12: Brake chopper electrical data, size 0

9.2.4.3 Power unit: Size 1

Electrical data	SD6A14	SD6A16
U_{1PU}	3 × 400 V_{AC}, +32% / −50%, 50/60 Hz; 3 × 480 V_{AC}, +10% / −58%, 50/60 Hz	
f_{2PU}	0 – 700 Hz	
U_{2PU}	0 – max. U_{1PU}	
C_{PU}	470 µF	560 µF
C_{maxPU}	1400 µF	1400 µF

Tab. 13: SD6 electrical data, size 1

Nominal currents up to +45 °C (in the control cabinet)

Electrical data	SD6A14	SD6A16
$f_{PWM,PU}$	4 kHz	
$I_{1N,PU}$	12 A	19.2 A
$I_{2N,PU}$	10 A	16 A
I_{2maxPU}	180% for 5 s; 150% for 30 s	

Tab. 14: SD6 electrical data, size 1, for 4 kHz clock frequency

Electrical data	SD6A14	SD6A16
$f_{PWM,PU}$	8 kHz	
$I_{1N,PU}$	9.3 A	15.8 A
$I_{2N,PU}$	6 A	10 A
I_{2maxPU}	250% for 2 s; 200% for 5 s	

Tab. 15: SD6 electrical data, size 1, for 8 kHz clock frequency

Electrical data	SD6A14	SD6A16
U_{onCH}	780 – 800 V_{DC}	
U_{offCH}	740 – 760 V_{DC}	
R_{2minRB}	47 Ω	
P_{maxRB}	13.6 kW	
P_{effRB}	6.2 kW	

Tab. 16: Brake chopper electrical data, size 1

9.2.4.4 Power unit: Size 2

Electrical data	SD6A24	SD6A26
U_{1PU}	3 × 400 V_{AC}, +32% / −50%, 50/60 Hz; 3 × 480 V_{AC}, +10% / −58%, 50/60 Hz	
f_{2PU}	0 – 700 Hz	
U_{2PU}	0 – max. U_{1PU}	
C_{PU}	680 µF	1000 µF
C_{maxPU}	1400 µF	1400 µF

Tab. 17: SD6 electrical data, size 2

Nominal currents up to +45 °C (in the control cabinet)

Electrical data	SD6A24	SD6A26
$f_{PWM,PU}$	4 kHz	
$I_{1N,PU}$	26.4 A	38.4 A
$I_{2N,PU}$	22 A	32 A
I_{2maxPU}	180% for 5 s; 150% for 30 s	

Tab. 18: SD6 electrical data, size 2, for 4 kHz clock frequency

Electrical data	SD6A24	SD6A26
$f_{PWM,PU}$	8 kHz	
$I_{1N,PU}$	24.5 A	32.6 A
$I_{2N,PU}$	14 A	20 A
I_{2maxPU}	250% for 2 s; 200% for 5 s	

Tab. 19: SD6 electrical data, size 2, for 8 kHz clock frequency

Electrical data	SD6A24	SD6A26
U_{onCH}	780 – 800 V_{DC}	
U_{offCH}	740 – 760 V_{DC}	
R_{2minRB}	22 Ω	
P_{maxRB}	29.1 kW	
P_{effRB}	13.2 kW	

Tab. 20: Brake chopper electrical data, size 2

9.2.4.5 Power unit: Size 3

Electrical data	SD6A34	SD6A36	SD6A38
U_{1PU}	3 × 400 V_{AC}, +32% / −50%, 50/60 Hz; 3 × 480 V_{AC}, +10% / −58%, 50/60 Hz		
f_{2PU}	0 – 700 Hz		
U_{2PU}	0 – max. U_{1PU}		
C_{PU}	430 µF	900 µF	900 µF
C_{maxPU}	5100 µF	5100 µF	5100 µF

Tab. 21: SD6 electrical data, size 3

Nominal currents up to +45 °C (in the control cabinet)

Electrical data	SD6A34	SD6A36	SD6A38
$f_{PWM,PU}$	4 kHz		
$I_{1N,PU}$	45.3 A	76 A	76 A
$I_{2N,PU}$	44 A	70 A	85 A[1]
I_{2maxPU}	180% for 5 s; 150% for 30 s		

Tab. 22: SD6 electrical data, size 3, for 4 kHz clock frequency

Electrical data	SD6A34	SD6A36	SD6A38
$f_{PWM,PU}$	8 kHz		
$I_{1N,PU}$	37 A	62 A	76 A
$I_{2N,PU}$	30 A	50 A	60 A
I_{2maxPU}	250% for 2 s; 200% for 5 s		

Tab. 23: SD6 electrical data, size 3, for 8 kHz clock frequency

Electrical data	SD6A34	SD6A36	SD6A38
U_{onCH}	780 – 800 V_{DC}		
U_{offCH}	740 – 760 V_{DC}		
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		
P_{effRB}	19.4 kW		

Tab. 24: Brake chopper electrical data, size 3

[1] Specification applies to the default setting of the field weakening voltage limit: B92 = 80%.

9.2.4.6 Power loss data in accordance with EN 61800-9-2

Type	Nominal current $I_{2N,PU}$	Apparent power	Absolute losses $P_{V,CU}$[2]	Operating points[3]								IE class[4]	Compar-ison[5]
				(0/25)	(0/50)	(0/100)	(50/25)	(50/50)	(50/100)	(90/50)	(90/100)		
				Relative losses									
	[A]	[kVA]	[W]	[%]									
SD6A02	4	0.9	10	5.01	5.07	5.68	5.20	5.37	6.30	5.88	7.43	IE2	
SD6A04	2.3	1.6	10	2.98	3.13	3.49	3.02	3.22	3.71	3.36	4.09	IE2	
SD6A06	4.5	3.1	12	1.71	1.86	2.24	1.75	1.97	2.51	2.16	3.04	IE2	
SD6A14	10	6.9	12	1.38	1.54	1.93	1.43	1.64	2.17	1.80	2.57	IE2	
SD6A16	16	11.1	12	0.95	1.12	1.66	0.99	1.23	1.98	1.41	2.52	IE2	
SD6A24	22	15.2	15	0.80	0.97	1.49	0.84	1.06	1.75	1.21	2.19	IE2	
SD6A26	32	22.2	15	0.70	0.87	1.40	0.74	0.97	1.67	1.11	2.10	IE2	
SD6A34	44	30.5	35	0.61	0.76	1.21	0.68	0.90	1.53	1.06	1.96	IE2	
SD6A36	70	48.5	35	0.53	0.69	1.18	0.59	0.82	1.49	0.97	1.89	IE2	
SD6A38	85	58.9	35	0.47	0.64	1.18	0.54	0.78	1.50	0.94	1.94	IE2	
				Absolute losses P_V									
	[A]	[kVA]	[W]	[W]									[%]
SD6A02	4	0.9	10	45.1	45.6	51.1	46.8	48.3	56.7	52.9	66.9	IE2	51.8
SD6A04	2.3	1.6	10	47.7	50.1	55.8	48.3	51.5	59.3	53.8	65.4	IE2	40.2
SD6A06	4.5	3.1	12	52.9	57.6	69.3	54.4	61.0	77.9	67.1	94.1	IE2	39.6
SD6A14	10	6.9	12	95.3	106.1	133.3	98.6	113.2	149.9	123.9	177.0	IE2	37.1
SD6A16	16	11.1	12	104.9	124.0	184.6	110.3	136.6	219.8	156.0	279.8	IE2	35.8
SD6A24	22	15.2	15	121.5	146.9	226.1	128.1	161.6	266.0	183.7	332.7	IE2	32.9
SD6A26	32	22.2	15	154.7	192.8	311.3	164.7	214.9	370.5	246.9	465.9	IE2	38.6
SD6A34	44	30.5	35	187.5	232.2	368.7	207.7	273.9	466.8	323.0	597.8	IE2	32.1
SD6A36	70	48.5	35	256.6	332.3	570.8	287.9	397.0	721.5	471.0	915.9	IE2	33.9
SD6A38	85	58.9	35	277.8	376.9	692.3	317.4	459.0	886.1	554.6	1143.1	IE2	35.3

Tab. 25: Power loss data of the SD6 drive controller in accordance with EN 61800-9-2

General conditions

The loss data applies to drive controllers without any accessories.

The power loss calculation is based on a three-phase supply voltage with 400 V_{AC}/50 Hz.

The calculated data includes a supplement of 10% in accordance with EN 61800-9-2.

The power loss specifications refer to a clock frequency of 4 kHz.

The absolute losses for a power unit that is switched off refer to the 24 V_{DC} power supply of the control electronics.

[2] Absolute losses for a power unit that is switched off

[3] Operating points for relative motor stator frequency in % and relative torque current in %

[4] IE class in accordance with EN 61800-9-2

[5] Comparison of the losses for the reference drive controller relative to IE2 in the nominal point (90, 100)

9.2.4.7 Power loss data of accessories

If you intend to order the drive controller with accessory parts, losses increase as follows:

Type	Absolute losses P_V [W]
SE6 safety module	< 4
ST6 safety module	1
IO6 terminal module	< 2
XI6 terminal module	< 5
RI6 terminal module	< 5
CA6 communication module	1
EC6 communication module	< 2
PN6 communication module	< 4

Tab. 26: Absolute losses in the accessories

Information

Note the absolute power loss of the encoder (usually < 3 W) and of the brake when designing as well.

Loss specifications for other optional accessories can be found in the technical data of the respective accessory part.

9.2.5 Derating

When dimensioning the drive controller, observe the derating of the nominal output current as a function of the clock frequency, surrounding temperature and installation altitude. There is no restriction for a surrounding temperature from 0 °C to 45 °C and an installation altitude of 0 m to 1000 m. The details given below apply to values outside these ranges.

9.2.5.1 Effect of the clock frequency

Changing the clock frequency f_{PWM} affects the amount of noise produced by the drive, among other things. However, increasing the clock frequency results in increased losses. During project configuration, define the highest clock frequency and use it to determine the nominal output current $I_{2N,PU}$ for dimensioning the drive controller.

Type	$I_{2N,PU}$ 4 kHz	$I_{2N,PU}$ 8 kHz	$I_{2N,PU}$ 16 kHz
SD6A02	4 A	3 A	2 A
SD6A04	2.3 A	1.7 A	1.1 A
SD6A06	4.5 A	3.4 A	2.3 A
SD6A14	10 A	6 A	4 A
SD6A16	16 A	10 A	5.7 A
SD6A24	22 A	14 A	8.1 A
SD6A26	32 A	20 A	12 A
SD6A34	44 A	30 A	18 A
SD6A36	70 A	50 A	31 A
SD6A38	85 A[6]	60 A	37.8 A

Tab. 27: Nominal output current $I_{2N,PU}$ dependent on the clock frequency

[6] Specification applies to the default setting of the field weakening voltage limit: B92 = 80 %.

9.2.5.2 Effect of the installation altitude

Derating as a function of the installation altitude is determined as follows:

- 0 m to 1000 m: No restriction (D_{IA} = 100%)
- 1000 m to 2000 m: Derating −1.5%/100 m

Example

The drive controller needs to be installed at an altitude of 1500 m above sea level.

The derating factor D_{IA} is calculated as follows:
D_{IA} = 100% − 5 × 1.5% = 92.5%

9.2.5.3 Effect of the surrounding temperature

Derating as a function of the surrounding temperature is determined as follows:

- 0 °C to 45 °C: No restrictions (D_T = 100%)
- 45 °C to 55 °C: Derating −2.5%/K

Example

The drive controller needs to be operated at 50 °C.

The derating factor D_T is calculated as follows
D_T= 100% − 5 × 2.5% = 87.5%

9.2.5.4 Calculating the derating

Follow these steps for the calculation:

1. Determine the highest clock frequency (f_{PWM}) that will be used during operation and use it to determine the nominal current $I_{2N,PU}$.
2. Determine the derating factors for installation altitude and surrounding temperature.
3. Calculate the reduced nominal current $I_{2N,PU(red)}$ in accordance with the following formula:
   $I_{2N,PU(red)} = I_{2N,PU} \times D_T \times D_{IA}$

Example

A drive controller of type SD6A06 needs to be operated at a clock frequency of 8 kHz at an altitude of 1500 m above sea level and a surrounding temperature of 50 °C.

The nominal current of the SD6A06 at 8 kHz is 3.4 A. The derating factor D_T is calculated as follows:
D_T = 100% − 5 × 2.5% = 87.5%

The derating factor D_{IA} is calculated as follows:
D_{IA} = 100% − 5 × 1.5% = 92.5%

The output current of importance for projecting is:
$I_{2N,PU(red)}$ = 3.4 A × 0.875 × 0.925 = 2.75 A

9.2.6 Dimensions

The dimensions of the available SD6 sizes can be found in the following sections.

9.2.6.1 Dimensions: sizes 0 to 2

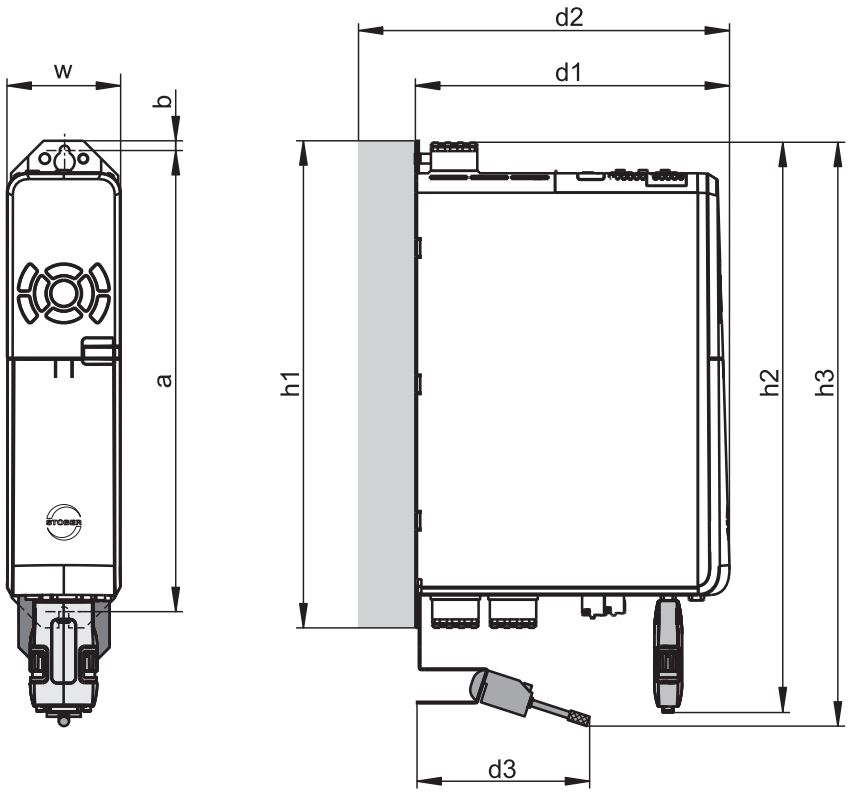


Fig. 1: SD6 dimensional drawing, sizes 0 to 2

Dimension			Size 0	Size 1	Size 2
Drive controller	Width	w	70	70	105
	Depth	d1	194	284	
	Depth incl. RB 5000 braking resistor	d2	212	302	
	Depth incl. Quick DC-Link	d2	229	319	
	Height incl. fastening clips	h1	300		
	Height incl. AES	h2	367		
	Height incl. EMC shroud	h3	approx. 376		
EMC shroud incl. shield connection terminal	Depth	d3	approx. 111		
Fastening holes	Vertical distance	a	283+2		
	Vertical distance to the upper edge	b	6		

Tab. 28: SD6 dimensions, sizes 0 to 2 [mm]

9.2.6.2 Dimensions: size 3

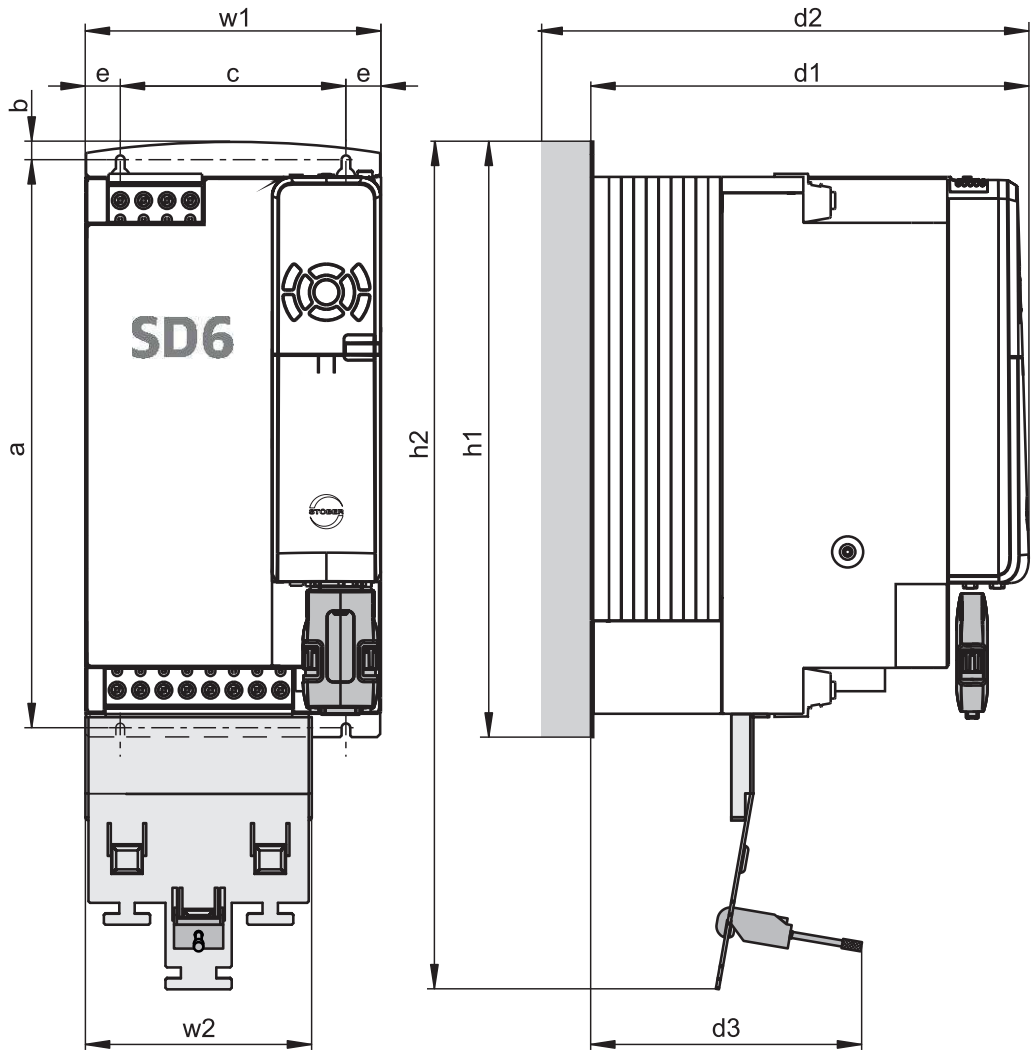


Fig. 2: SD6 dimensional drawing, size 3

Dimension			Size 3
Drive controller	Width	w1	194
	Depth	d1	305
	Depth incl. Quick DC-Link	d2	340
	Height incl. fastening clips	h1	382.5
	Height incl. EMC shroud	h2	540
EMC shroud incl. shield connection terminal	Width	w2	147
	Depth	d3	approx. 174
Fastening holes	Vertical distance	a	365+2
	Vertical distance to the upper edge	b	11.5
	Horizontal distance between the fastening holes of the drive controller	c	150+0.2/−0.2
	Horizontal distance to the side edge of the drive controller	e	20

Tab. 29: SD6 dimensions, size 3 [mm]

9.2.7 Minimum clearances

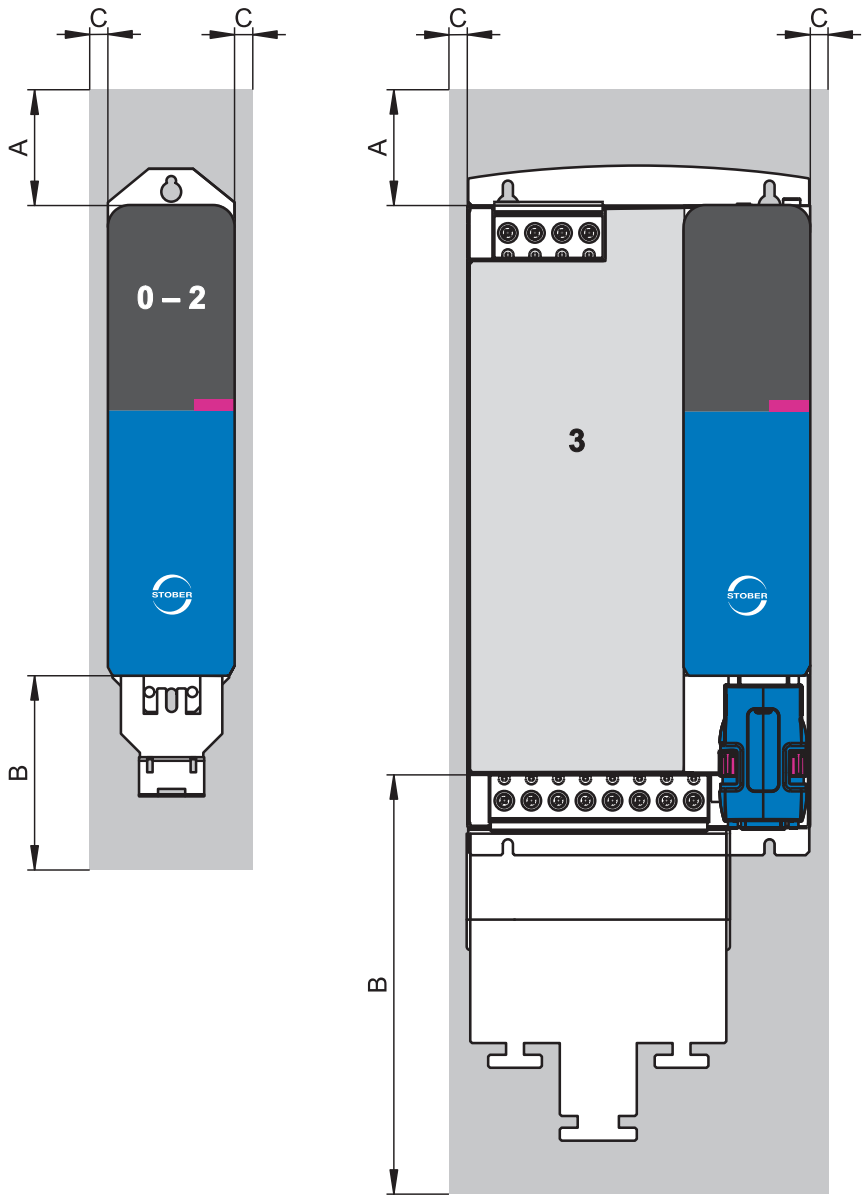


Fig. 3: Minimum clearances

The specified dimensions relate to the outer edges of the drive controller.

Minimum clearance	A (above)	B (below)	C (one the side)[7]
Size 0 – Size 2	100	100	5
... with EMC shroud	100	120	5
Size 3	100	100	5
... with EMC shroud	100	220	5

Tab. 30: Minimum clearances [mm]

[7] Installation without Quick DC-Link module

9.3 Drive controller/motor combinations

Parameterization of a STOBER drive controller is exceptionally easy, especially together with four-pole STOBER asynchronous motors. The motor is fully typified by inputting just the motor size (e.g. 90L) and its wiring (star or delta). A delta connection (measurement point 230 V, 50 Hz) is available for motors up to 3 kW (size 100). By increasing the voltage at higher frequencies, the full torque can be drawn through the motor up to 87 Hz. It usually makes sense to take this expanded speed adjustment range into account when selecting the gear unit. You can find more detailed information in Chapter [▸ 6.6].

An explanation of the formula symbols used can be found in the chapter [▸ 14.1].

									SD6 A02	SD6 A04	SD6 A06	SD6 A14	SD6 A16	SD6 A24	SD6 A26	SD6 A34	SD6 A36	SD6 A38
									$I_{2N,PU}$ [A] ($f_{PWM,PU}$ = 4 kHz)									
	f_T [Hz]	pz	Con-nec-tion	P_N [kW]	n_N [rpm]	M_N [Nm]	M_k/M_N	I_N [A]	4	2.3	4.5	10	16	22	32	44	70	85
Δ 230 V / Y 400 V motor winding									**$I_{2N,PU}$ / I_N**									
IE3D80L4	50	4	Y	0.75	1445	5.0	3.7	1.7		1.4								
IE3D80L4	87	4	Δ	1.3	2503	5.0	3.7	2.94	1.4		1.5							
IE3D90S4	50	4	Y	1.1	1440	7.3	3.7	2.5	1.6		1.8							
IE3D90S4	87	4	Δ	1.91	2494	7.3	3.7	4.33			1.0							
IE3D90L4	50	4	Y	1.5	1445	9.9	3.5	3.35	1.2		1.3							
IE3D90L4	87	4	Δ	2.6	2503	9.9	3.5	5.8				1.7						
IE3D100K4	50	4	Y	2.2	1455	14.4	3.6	4.8				2.1						
IE3D100K4	87	4	Δ	3.81	2520	14.4	3.6	8.31				1.2	1.9					
IE3D100L4	50	4	Y	3.0	1455	19.7	4.1	6.4				1.6						
IE3D100L4	87	4	Δ	5.2	2520	19.7	4.1	11.09					1.4	2.0				
IE3D112M4	50	4	Δ	4.0	1460	26.2	4.1	7.95				1.3	2.0					
IE3D132S4	50	4	Δ	5.5	1480	35	5.4	12					1.3	1.8				
IE3D132M4	50	4	Δ	7.5	1475	49	3.9	14.5					1.1	1.5				
IE3D160M4	50	4	Δ	11	1475	71	3.2	21						1.0	1.5	2.1		
IE3D160L4	50	4	Δ	15	1490	96	3.9	28							1.1	1.6		
IE3D180M4	50	4	Δ	18.5	1475	120	3.0	34.5								1.3	2.0	
IE3D180L4	50	4	Δ	22	1480	142	3.2	40.5								1.1	1.7	2.1
IE3D200L4	50	4	Δ	30	1485	193	2.6	54.5									1.3	1.6
IE3D225S4	50	4	Δ	37	1490	237	2.7	67									1.0	1.3
IE3D225M4	50	4	Δ	45	1482	290	2.6	84										1.0

9.4 Accessories

You can find information about the available accessories in the following chapters.

9.4.1 Safety technology

ST6 safety module – STO over terminals

Included in the standard version.

ID No. 56431
Optional accessory for the use of the Safe Torque Off safety function (STO) in safety-relevant applications (PL e, SIL 3) in accordance with DIN EN ISO 13849-1 and DIN EN 61800-5-2. Connection to a higher-level safety circuit via terminal X12.

SE6 safety module – Expanded safety functionality using terminals

ID No. 56432
Optional accessories for use in safety-related applications up to PL e, SIL 3 in accordance with DIN EN ISO 13849-1 and DIN EN 61800-5-2. In addition to the basic Safe Torque Off (STO) safety function, SE6 provides other safety functions specified in DIN EN 61800-5-2. In addition to the safe stop functions Safe Stop 1 (SS1) and Safe Stop 2 (SS2), these also include Safely-Limited Speed (SLS), Safe Brake Control (SBC), Safe Direction (SDI) and Safely-Limited Increment (SLI). The normative safety functions are supplemented by practical additional functions such as Safe Brake Test (SBT). Connection to the higher-level safety circuit using terminals X14 and X15.

X50 adapter cable (SE6 option)

ID No. 56434
Connection cable for the X50 encoder interface of the SE6 safety module with open cable ends. 1.5 m.

9.4.2 Communication

The SD6 drive controller has two interfaces for IGB communication on the top of the device as standard. The communication module is installed in the shaft at the top and it is used to connect the drive controller to the fieldbus system.
The following communication modules are available:

- EC6 for the EtherCAT connection
- CA6 for the CANopen connection
- PN6 for the PROFINET connection

IGB connecting cable

Cable for connecting the X3A or X3B interface for IGB, CAT5e, magenta.
The following versions are available:
ID No. 56489: 0.4 m.
ID no. 56490: 2 m.

PC connecting cables

ID No. 49857
Cable for connecting the X3A or X3B interface with the PC, CAT5e, blue, 5 m.

USB 2.0 Ethernet adapters

ID No. 49940
Adapter for connecting Ethernet to a USB port.

EC6 communication module

ID No. 138425
Communication module for the EtherCAT connection.

EtherCAT cables

Ethernet patch cable, CAT5e, yellow.
The following designs are available:
ID No. 49313: Length approx. 0.2 m.
ID No. 49314: length approx. 0.35 m.

CA6 communication module

ID No. 138427
Communication module for the CANopen connection.

PN6 communication module

ID No. 56426
Communication module for the PROFINET connection.

9.4.3 Terminal module

XI6 terminal module

ID no. 138421

Terminal module for connecting analog and binary signals as well as encoders.

Supported inputs and outputs:

- 13 binary inputs (24 V_{DC})
- 10 binary outputs (24 V_{DC})
- 3 analog inputs (±10 V_{DC}, 1 x 0 – 20 mA, 16 bits)
- 2 analog outputs (±10 V_{DC}, 12 bits)

Supported encoders / interfaces:

- SSI encoder (simulation and evaluation)
- TTL incremental encoder, differential (simulation and evaluation)
- HTL incremental encoder, single-ended (simulation and evaluation)
- TTL pulse train, differential (simulation and evaluation)
- HTL pulse train, single-ended (simulation and evaluation)

RI6 terminal module

ID no. 138422

Terminal module for connecting analog and binary signals as well as encoders.

Supported inputs and outputs:

- 5 binary inputs (24 V_{DC})
- 2 binary outputs (24 V_{DC})
- 2 analog inputs (±10 V_{DC}, 1 x 0 – 20 mA, 16 bits)
- 2 analog outputs (±10 V_{DC}, ±20 mA, 12 bits)

Supported encoders / interfaces:

- Resolver (evaluation)
- EnDat 2.1 sin/cos encoder (evaluation)
- EnDat 2.1/2.2 digital encoder (evaluation)
- Sin/cos encoder (evaluation)
- SSI encoder (simulation and evaluation)
- TTL incremental encoder, differential (simulation and evaluation)
- TTL incremental encoder, single-ended (evaluation)
- HTL incremental encoder, single-ended (simulation and evaluation)
- TTL pulse train, differential (simulation and evaluation)
- TTL pulse train, single-ended (evaluation)
- HTL pulse train, single-ended (simulation and evaluation)

Information

For connecting EnDat 2.1 sin/cos cables with a 15-pin D-sub connector with an integrated motor temperature sensor, you require the AP6A02 interface adapter (ID No. 56523), available separately, to feed out the motor temperature sensor leads.

IO6 terminal module

ID no. 138420

Terminal module for connecting analog and binary signals as well as encoders.

Supported inputs and outputs:

- 5 binary inputs (24 V_{DC})
- 2 binary outputs (24 V_{DC})
- 2 analog inputs (±10 V_{DC}, 1 x 0 – 20 mA, 12 bits)
- 2 analog outputs (±10 V_{DC}, ±20 mA, 12 bits)

Supported encoders / interfaces:

- HTL incremental encoder, single-ended (simulation and evaluation)
- HTL pulse train, single-ended (simulation and evaluation)

9.4.4 DC link connection

If you want to connect SD6 drive controllers into the DC link group, you will need the Quick DC-Link module of type DL6A.

You receive the DL6A rear section modules in different designs for a horizontal connection, suitable for the size of the drive controller.

The quick fastening clamps for attaching the copper rails and an insulation connection piece are contained in the scope of delivery. The copper rails are not included in the scope of delivery. These must have a cross-section of 5 x 12 mm. Insulation end sections are available separately.

DL6A Quick DC-Link for drive controller

The following designs are available:

DL6A0

ID No. 56440

Rear section module for size 0 drive controllers.

DL6A1

ID No. 56441

Rear section module for size 1 drive controller.

DL6A2

ID No. 56442

Rear section module for size 2 drive controllers.

DL6A3

ID No. 56443

Rear section module for size 3 drive controllers.

DL6A Quick DC-Link insulation end section

ID No. 56494

Insulation end sections for the left and right termination of the group, 2 pcs.

9.4.5 Braking resistor

In addition to drive controllers, STOBER offers the following braking resistors described below in various sizes and performance classes. For the selection, note the minimum permitted braking resistors specified in the technical data of the individual drive controller types.

9.4.5.1 FZMU, FZZMU tubular fixed resistor

Type	FZMU 400×65		FZZMU 400×65	
ID No.	49010	55445	53895	55447
SD6A02	X	—	—	—
SD6A04	X	—	—	—
SD6A06	X	—	—	—
SD6A14	(X)	—	X	—
SD6A16	(X)	—	X	—
SD6A24	(—)	X	(X)	X
SD6A26	(—)	X	(X)	X
SD6A34	(—)	(X)	(—)	(X)
SD6A36	(—)	(X)	(—)	(X)
SD6A38	(—)	(X)	(—)	(X)

Tab. 31: Assignment of FZMU, FZZMU 400×65 braking resistor – SD6 drive controller

X	Recommended
(X)	Possible
(—)	Useful under certain conditions
—	Not possible

Properties

Specification	FZMU 400×65		FZZMU 400×65	
ID No.	49010	55445	53895	55447
Type	Tubular fixed resistor		Tubular fixed resistor	
Resistance [Ω]	100	22	47	22
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 symbols				

Tab. 32: FZMU, FZZMU 400×65 specification

Dimensions

Dimension	FZMU 400×65		FZZMU 400×65	
ID No.	49010	55445	53895	55447
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	
U	64		150	
X	10		10	

Tab. 33: FZMU, FZZMU 400×65 dimensions [mm]

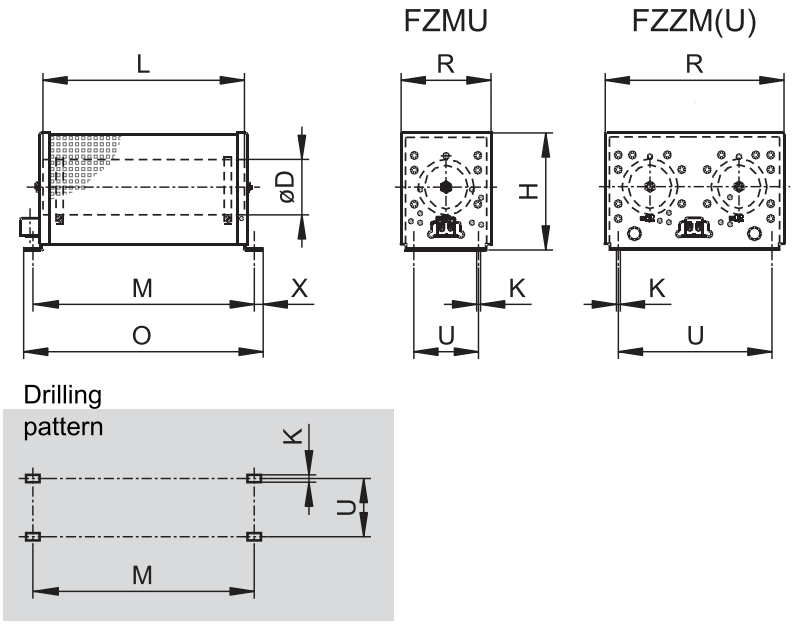


Fig. 4: FZMU, FZZMU 400×65 dimensional drawing

9.4.5.2 GVADU, GBADU flat resistor

Type	GVADU 210×20	GBADU 265×30	GBADU 405×30	GBADU 335×30	GBADU 265×30
ID No.	55441	55442	55499	55443	55444
SD6A02	X	X	X	—	—
SD6A04	X	X	X	—	—
SD6A06	X	X	X	—	—
SD6A14	(X)	(X)	(X)	X	—
SD6A16	(X)	(X)	(X)	X	—
SD6A24	(—)	(—)	(—)	(X)	X
SD6A26	(—)	(—)	(—)	(X)	X
SD6A34	(—)	(—)	(—)	(—)	(X)
SD6A36	(—)	(—)	(—)	(—)	(X)
SD6A38	(—)	(—)	(—)	(—)	(X)

Tab. 34: Assignment of GVADU, GBADU braking resistor – SD6 drive controller

X	Recommended
(X)	Possible
(—)	Useful under certain conditions
—	Not possible

Properties

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

Tab. 35: GVADU, GBADU specification

Dimensions

Dimension	GVADU 210×20	GBADU 265×30	GBADU 405×30	GBADU 335×30	GBADU 265×30
ID No.	55441	55442	55499	55443	55444
A	210	265	405	335	265
H	192	246	386	316	246
C	20	30	30	30	30
D	40	60	60	60	60
E	18.2	28.8	28.8	28.8	28.8
F	6.2	10.8	10.8	10.8	10.8
G	2	3	3	3	3
K	2.5	4	4	4	4
J	4.3	5.3	5.3	5.3	5.3
β	65°	73°	73°	73°	73°

Tab. 36: GVADU, GBADU dimensions [mm]

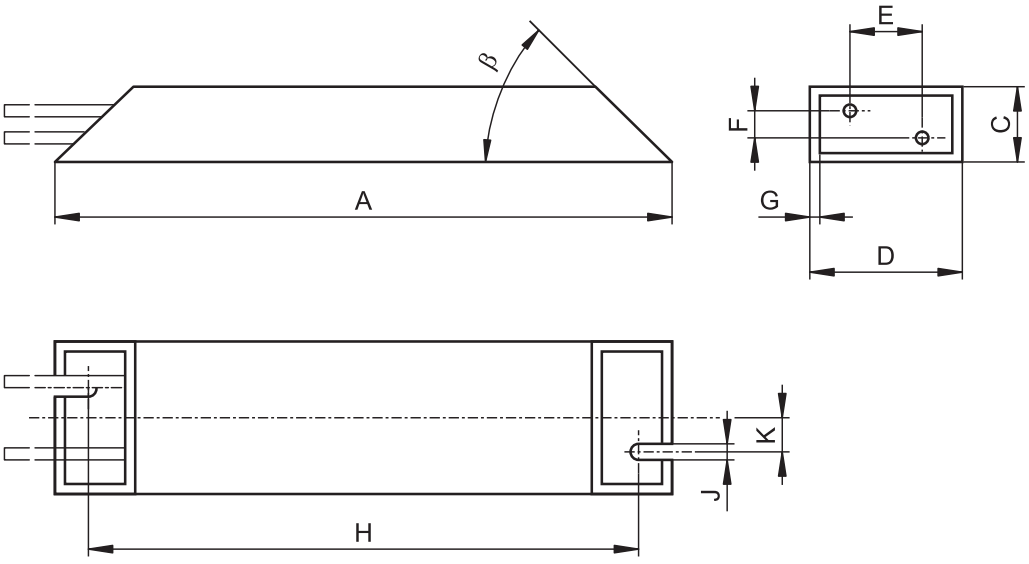


Fig. 5: GVADU, GBADU dimensional drawing

9.4.5.3 FGFKU steel-grid fixed resistor

Type	FGFKU			
ID No.	55449	55450	55451	53897
SD6A24	X	—	—	—
SD6A26	X	—	—	—
SD6A34	(X)	X	X	X
SD6A36	(X)	X	X	X
SD6A38	(X)	X	X	X

Tab. 37: Assignment of FGFKU braking resistor – SD6 drive controller

X	Recommended
(X)	Possible
—	Not possible

Properties

Specification	FGFKU			
ID No.	55449	55450	55451	53897
Type	Steel-grid fixed resistor			
Resistance [Ω]	22	15	15	15
Power [W]	2500	2500	6000	8000
Therm. time const. τ_{th} [s]	30	30	20	20
Pulse power for < 1 s [kW]	50	50	120	160
U_{max} [V]	848	848	848	848
Weight [kg]	Approx. 7.5	Approx. 7.5	12	18
Protection class	IP20	IP20	IP20	IP20
Test symbols				

Tab. 38: FGFKU specification

Dimensions

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

Tab. 39: FGFKU dimensions [mm]

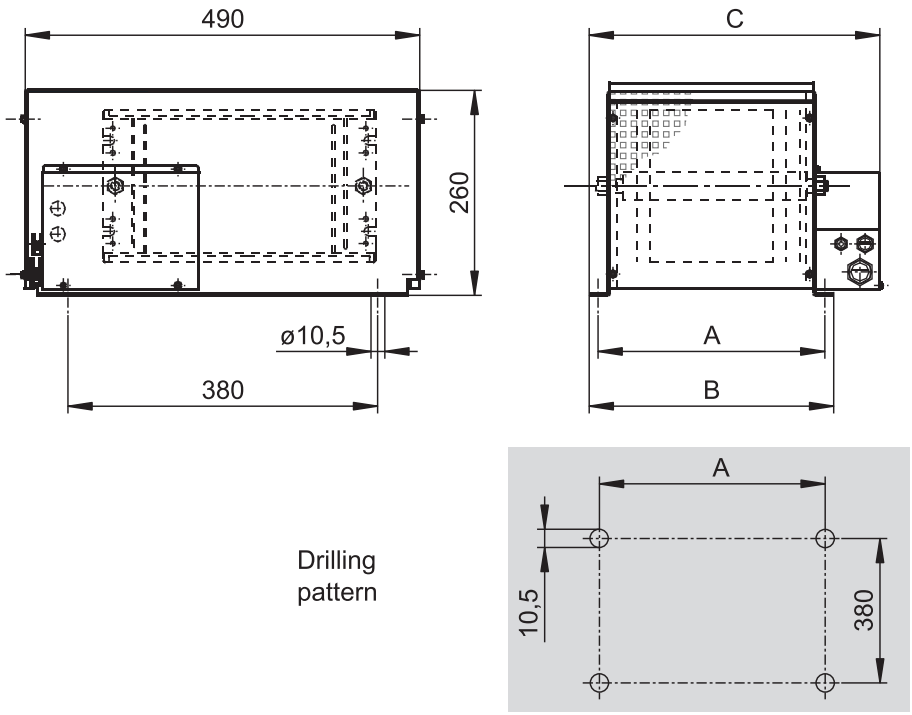


Fig. 6: FGFKU dimensional drawing

9.4.5.4 RB 5000 rear section braking resistor

Type	RB 5022	RB 5047	RB 5100
ID No.	45618	44966	44965
SD6A02	—	—	X
SD6A04	—	—	X
SD6A06	—	—	X
SD6A14	—	X	(X)
SD6A16	—	X	(X)
SD6A24	X	—	—
SD6A26	X	—	—
SD6A34	—	—	—
SD6A36	—	—	—
SD6A38	—	—	—

Tab. 40: Assignment of RB 5000 braking resistor – SD6 drive controller

X	Recommended
(X)	Possible
—	Not possible

Properties

Specification	RB 5022	RB 5047	RB 5100
ID No.	45618	44966	44965
Resistance [Ω]	22	47	100
Power [W]	100	60	60
Therm. time const. τ_{th} [s]	8	8	8
Pulse power for < 1 s [kW]	1.5	1.0	1.0
U_{max} [V]	800	800	800
Weight [g]	approx. 640	approx. 460	approx. 440
Cable design	Radox	Radox	Radox
Cable length [mm]	250	250	250
Conductor cross-section [AWG]	18/19 (0.82 mm²)	18/19 (0.82 mm²)	18/19 (0.82 mm²)
Maximum torque of M5 threaded bolts [Nm]	5	5	5
Protection class	IP40	IP40	IP40
Test symbols			

Tab. 41: RB 5000 specification

Dimensions

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

Tab. 42: RB 5000 dimensions [mm]

9.4.6 Chokes

The technical data for the available chokes can be found in the following chapters.

9.4.6.1 TEP power choke

For each size 3 SD6 drive controller, you need one power choke.

Properties

Specification	TEP4010-2US00
ID No.	56528
Phases	3
Thermally allowed continuous current	100 A
Nominal current $I_{N,MF}$	90 A
Absolute loss P_V	103 W
Inductance	0.14 mH
Voltage range	3 × 400 V_{AC}, +32%/−50% 3 × 480 V_{AC}, +10%/−58%
Voltage drop U_k	2%
Frequency range	50/60 Hz
Protection class	IP00
Max. surrounding temperature $\vartheta_{amb,max}$	40 °C
Insulation class	B
Connection	Screw terminal
Connection type	Flexible with and without end sleeve
Max. conductor cross-section	6 – 35 mm²
Tightening torque	2.5 Nm
Insulation stripping length	17 mm
Assembly	Screws
Directive	EN 61558-2-20
UL Recognized Component (CAN; USA)	Yes
Test symbol, symbol	

Tab. 43: Specification for TEP

Derating – Effect of surrounding temperature

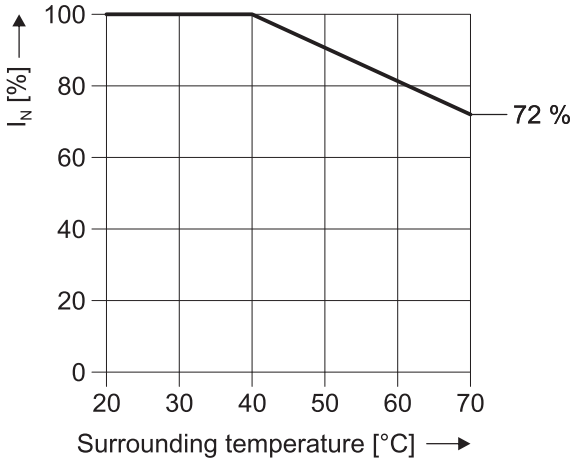


Fig. 7: Derating the nominal current based on surrounding temperature

Derating – Effect of the installation elevation

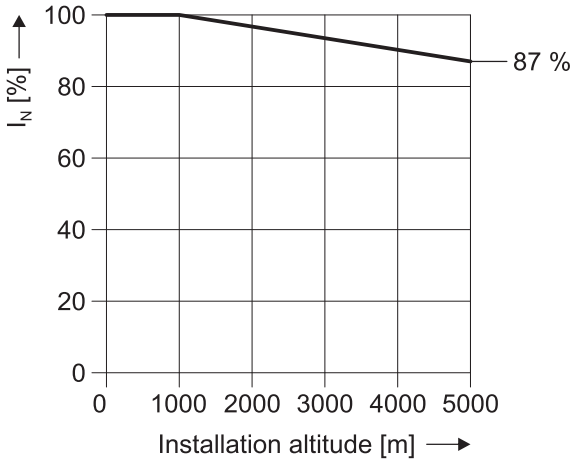


Fig. 8: Derating the nominal current depending on installation elevation

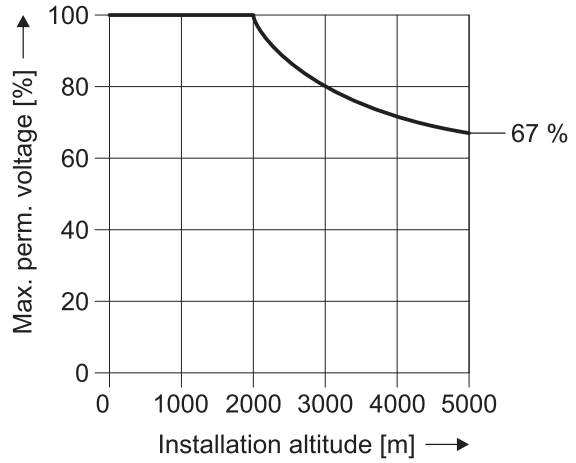


Fig. 9: Derating the voltage depending on installation elevation

Dimensions and weight

Dimensions	TEP4010-2US00
Height [mm]	235
Width [mm]	219
Depth [mm]	118
Vertical distance 1 – fastening holes [mm]	201
Vertical distance 2 – Fastening holes [mm]	136
Horizontal distance 1 – fastening holes [mm]	88
Horizontal distance 2 – Fastening holes [mm]	75
Drill holes – Depth [mm]	7
Drill holes – Width [mm]	12
Screw connection – M	M6
Weight [g]	10,000

Tab. 44: TEP dimensions and weight

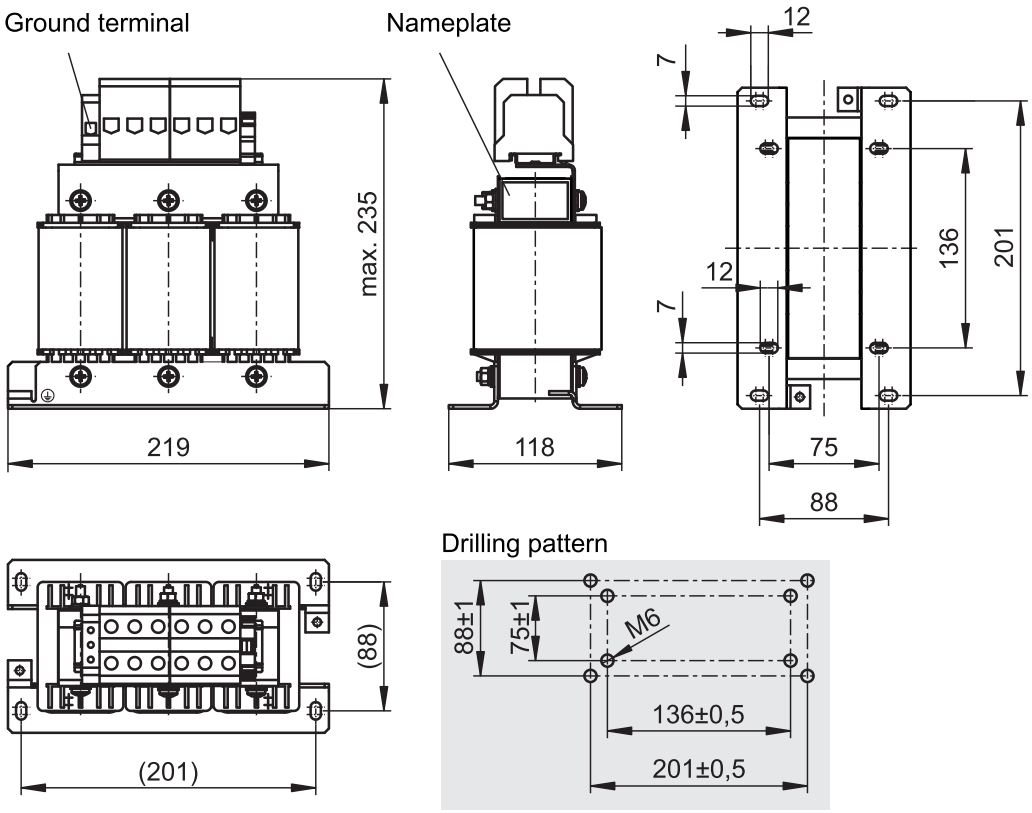


Fig. 10: Power choke dimensional drawing

9.4.6.2 TEP output choke

Output chokes are required for drive controllers of sizes 0 to 2 and for a cable length of 50 m or longer in order to reduce interference pulses and protect the drive system.

Information

The following technical data only applies to a rotating magnetic field frequency of 200 Hz. For example, this rotating magnetic 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 rotating magnetic field frequencies. Also observe the relationship with the clock frequency.

Properties

Specification	TEP3720-0ES41	TEP3820-0CS41	TEP4020-0RS41
ID No.	53188	53189	53190
Voltage range	3 × 0 to 480 V_{AC}		
Frequency range	0 – 200 Hz		
Nominal current $I_{N,MF}$ at 4 kHz	4 A	17.5 A	38 A
Nominal current $I_{N,MF}$ at 8 kHz	3.3 A	15.2 A	30.4 A
Max. permitted motor cable length with output choke	100 m		
Max. surrounding temperature $\vartheta_{amb,max}$	40 °C		
Protection class	IP00		
Winding losses	11 W	29 W	61 W
Iron losses	25 W	16 W	33 W
Connection	Screw terminal		
Max. conductor cross-section	10 mm²		
UL Recognized Component (CAN; USA)	Yes		
Test symbols	c UL us CE		

Tab. 45: Specification for TEP

Project configuration

Select the output chokes in accordance with the nominal currents of the output chokes, motor and drive controller. In particular, observe the derating of the output choke for rotating magnetic field frequencies higher than 200 Hz. You can calculate the rotating magnetic field frequency for your drive with the following formula:

$$f_N = n_N \times \frac{p}{60}$$

Derating – Effect of the clock frequency

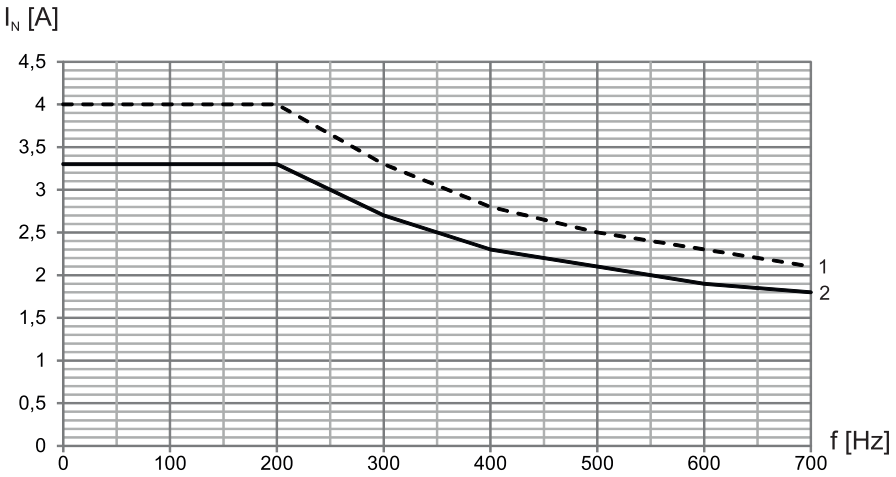


Fig. 11: Derating the nominal current depending on the clock frequency, TEP3720-0ES41

1 4 kHz clock frequency

2 8 kHz clock frequency

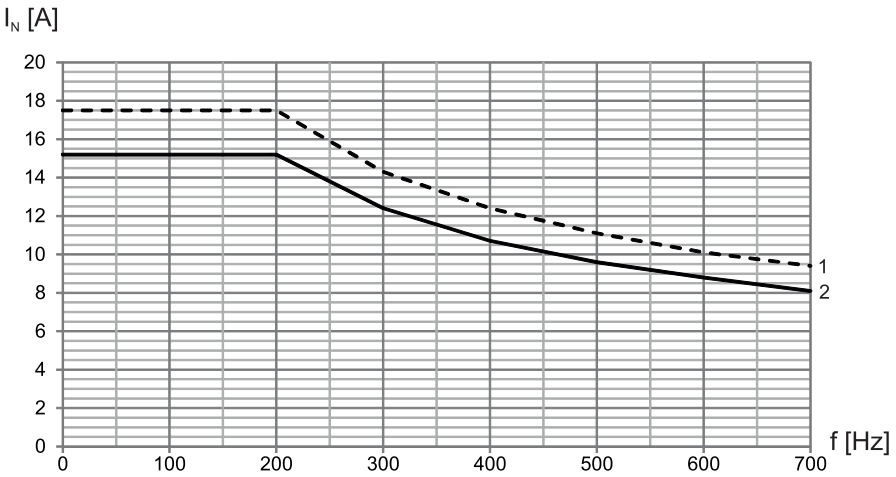


Fig. 12: Derating the nominal current depending on the clock frequency, TEP3820-0CS41

1 4 kHz clock frequency

2 8 kHz clock frequency

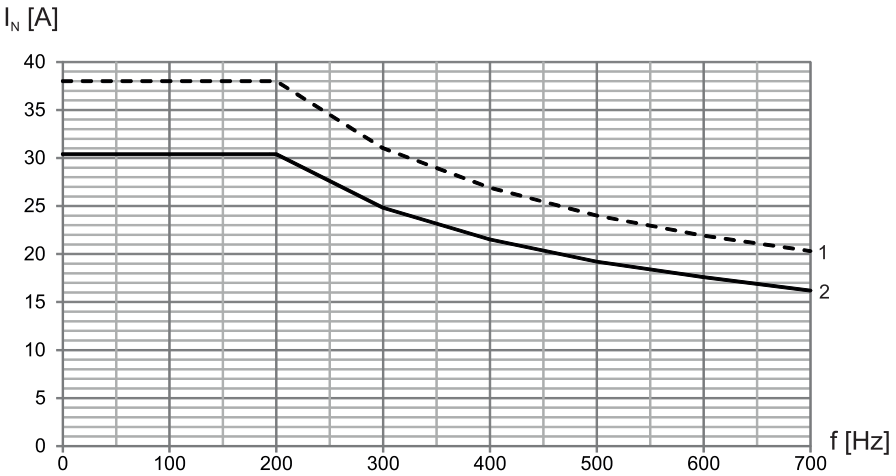


Fig. 13: Derating the nominal current depending on the clock frequency, TEP4020-0RS41

1 4 kHz clock frequency

2 8 kHz clock frequency

Derating – Effect of surrounding temperature

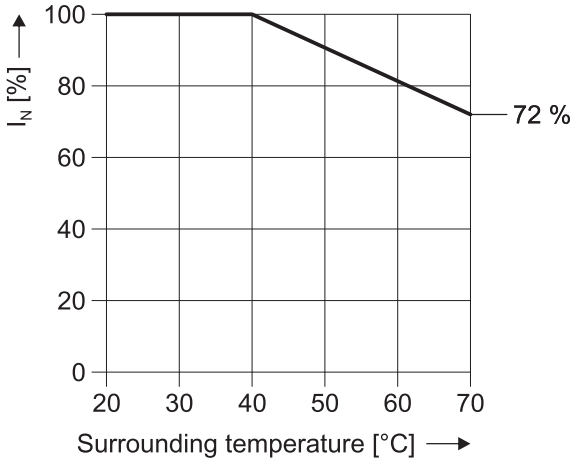


Fig. 14: Derating the nominal current based on surrounding temperature

Derating – Effect of the installation elevation

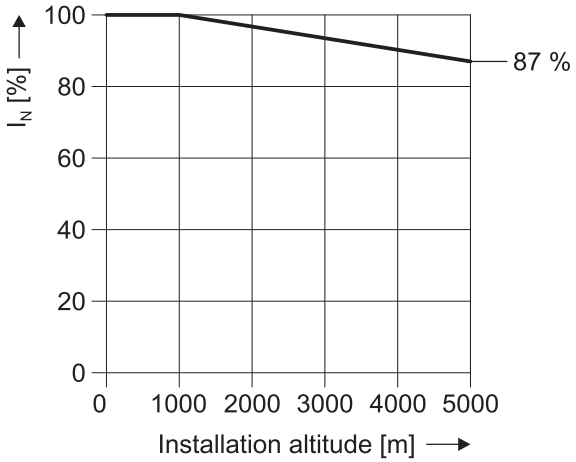


Fig. 15: Derating the nominal current depending on installation elevation

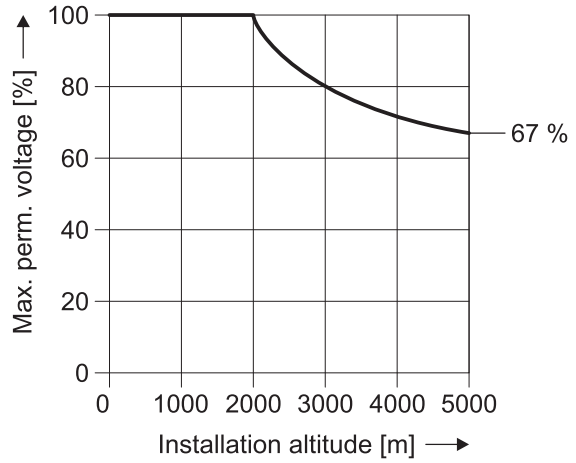


Fig. 16: Derating the voltage depending on installation elevation

Dimensions and weight

Dimension	TEP3720-0ES41	TEP3820-0CS41	TEP4020-0RS41
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 e [mm]	5,8	5,8	7
Drill holes – Width f [mm]	11	11	13
Screw connection – M	M5	M5	M6
Weight [g]	2900	5900	8800

Tab. 46: TEP dimensions and weight

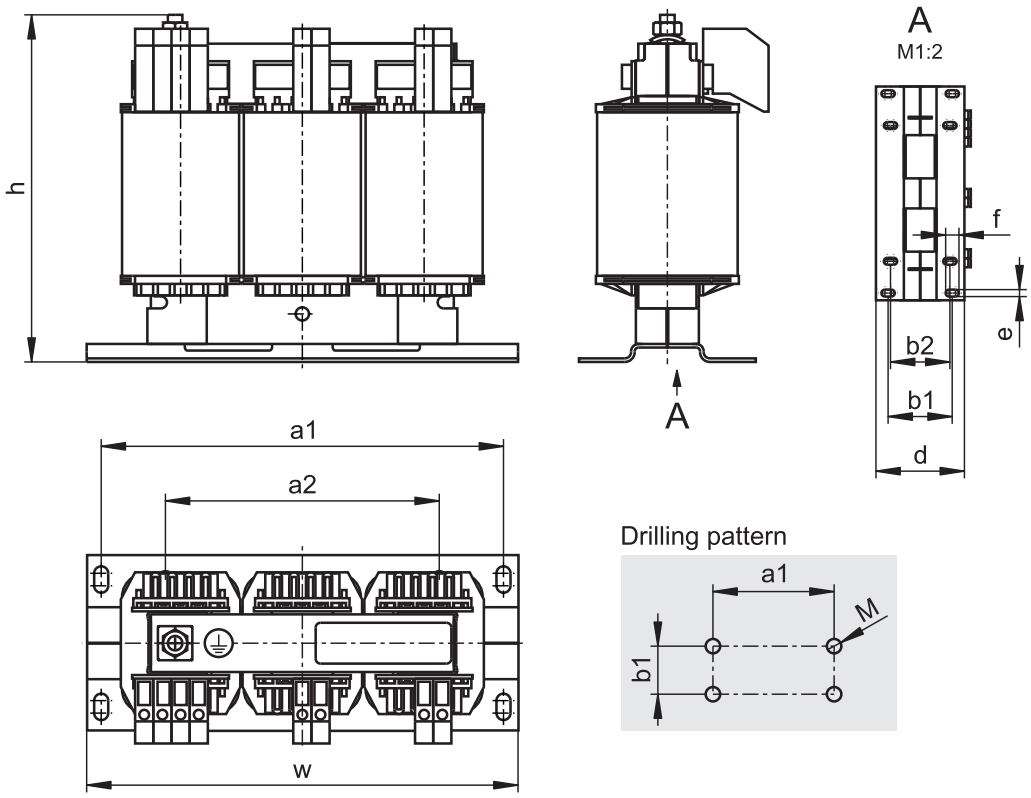


Fig. 17: TEP dimensional drawing

9.4.7 EMC shroud

You can use the EM6A EMC shroud to connect the cable shield of the power cable. Two different designs are available.

EMC shroud EM6A0

ID No. 135115
EMC shroud for the SD6 drive controller up to size 2.
Accessory part for shield connection of the power cable.
Can be attached to the basic housing.
Including shield connection terminal.

EMC shroud EM6A3

ID No. 135120
EMC shroud for drive controllers of the MDS 5000, SDS 5000 and SD6 series.
Accessory part for shield connection of the power cable for drive controllers up to size 3.
Can be attached to the basic housing.
Including shield connection terminal.
If necessary you can also connect the cable shield of the braking resistor and DC link connection to the shroud. Additional shield connection terminals are available as accessories for this purpose (ID No. 56521).

9.4.8 Removable data storage

Paramodul removable data storage

Included in the standard version.

ID No. 56403
The plug-in Paramodul with integrated microSD card (512 MB or greater, industrial type) is available as a storage medium.
The microSD card is also available separately as a spare part (ID No. 56436).

9.5 Further information

9.5.1 Directives and standards

The following European directives and standards are relevant to the drive controllers:

- Machinery Directive 2006/42/EC
- Low Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU
- EN 61326-3-1:2008
- EN 61800-3:2004 and A1:2012
- EN 61800-5-1:2007
- EN 61800-5-2:2007
- EN 50178:1997

9.5.2 Symbols, marks and test symbols

EN 61558-2-20
Choke without overload protection.

Grounding symbol
Grounding symbol in accordance with IEC 60417-5019 (DB:2002-10).

RoHS lead-free mark
Marking in accordance with RoHS directive 2011-65-EU.

CE mark
Manufacturer's self declaration: The product meets the requirements of EU directives.

UL test symbol
This product is listed by UL for the United States and Canada. Representative samples of this product have been evaluated by UL and meet the requirements of applicable standards.

UL recognized component mark
This component or material is recognized by UL. Representative samples of this product have been evaluated by UL and meet applicable requirements.

9.5.3 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Manual for SD6 drive controllers	442426