ServoOne System

System Catalogue

- ServoOne junior
  from 2 A to 16 A
- ServoOne Single-Axis System
  from 4 A to 450 A
- ServoOne Multi-Axis System
  with regenerative Power Supply
  from 4 A to 450 A

LTi DRiVES

ServoOne
System Catalogue

ID no.: 1100.24B.5-00

Date: 10/2013

Subject to technical change without notice.

The content of our System Catalogue was compiled with the greatest care and attention, and based on the latest information available to us.

We should nevertheless point out that this document cannot always be updated in line with ongoing technical developments in our products.

Information and specifications may be subject to change at any time. For information on the latest version please visit http://drives.lt-i.com.

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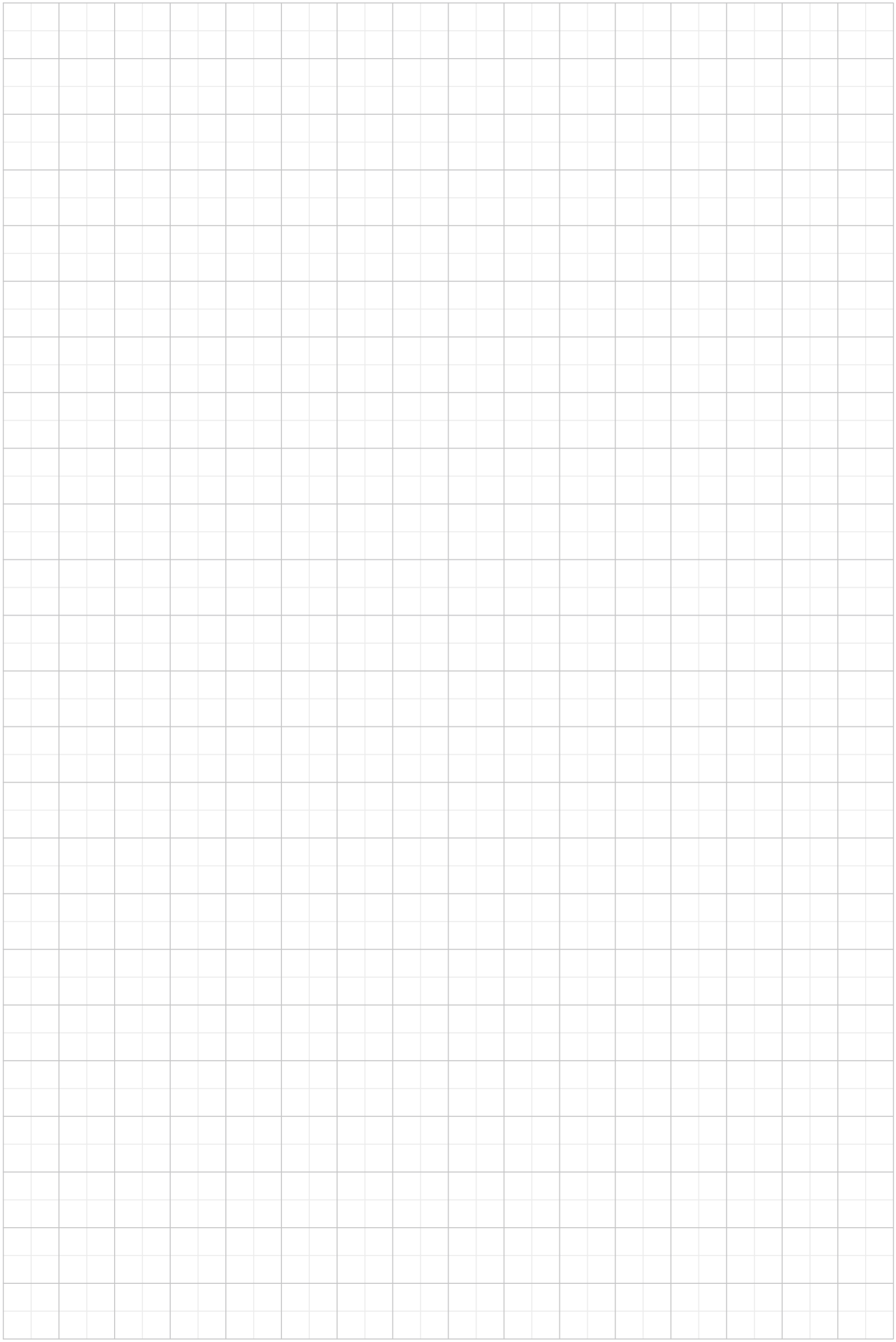
Space for own notes



Overview of functions and features of the ServoOne family

The modularity of the ServoOne family guarantees you optimum integration into the machine process at all times. A coordinated single-axis and energy-efficient multi-axis system meet the needs of any application across a wide power range. Whether in high-speed field bus communication with the central multi-axis machine controller or with distributed Motion Control intelligence in the drive controller – the ServoOne is a master of both. So enjoy the surprising diversity of functionality of the ServoOne, and make use of its future-proof specification for your application!

Alongside top product quality, we offer you sound, specifically targeted advice, expert commissioning support, a sophisticated, needs-oriented ordering and shipment logistics system, as well as outstanding service and diagnostic capability.

Servo drives from 2-450 A
for AC-powered single-axis motion
with 1/3 x 230 V – 3 x 480 V

Servo drives from 4-450 A
as DC-powered multi-axis systems
with sinusoidal regenerative power supply units

High-speed communication
based on a wide variety of profile-conforming field bus interfaces
(EtherCAT, sercos II & III, PROFINET IRT, CANopen, ...)

High-performance motor control
for precise, dynamic movement
of a wide variety of linear and rotary motor systems

Coordinated software functions
and packages
with Motion Control functionality for any application

iPlc to IEC 61131 integrated
permitting rapid adaptation to the application
with direct access to the drive controller peripherals

Integrated functional safety
ensures personal protection directly in the drive controller
Drive controller

Compact size
for optimum cabinet utilization

Flexible cooling methods
featuring air or liquid cooling

Future-proof
thanks to a flexible expansion concept

Extensive PC software
for planning, commissioning and
programming of multi-axis drive systems

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Overview of ServoOne family

ServoOne junior

Section 2

Optimised for the lower power output range, the ServoOne junior comes with all the technological genes present in the rest of the family. Full functional compatibility and uniform handling within the ServoOne family is guaranteed at all times.

- 3 - 8 A rated current at 1/3 x 230 V AC
- 2 - 16 A rated current at 3 x 400480 V AC
- Up to 300% overload capacity

ServoOne single-axis system

Section 3

The ServoOne servocontroller is suitable for a broad spread of applications thanks to its very wide power output range. From handling systems to complex test rigs, there are no limits to the diversity of applications covered.

- 4 - 450 A rated current at 3 x 230 - 480 V AC
- 8 sizes for optimum performance tailoring
- Air or liquid cooled systems
- Integrable safety control

ServoOne multi-axis system

Section 4

Comprising DC-powered axis controllers and coordinated supply units with sinusoidal regenerative power supply, the multi-axis system offers a high degree of solutions expertise and flexibility. A constantly controlled DC link voltage ensures independence from differing mains voltages in different parts of the world. Surplus kinetic braking energy is converted into electric power and fed back into the supply system in sinusoidal form, thereby helping to preserve the environment as well as delivering financial benefits.

- Axis controllers 4 - 450 A rated current
- DC link fuses integrated
- Supply units with 26 - 360 kW DC input power

Functions of the ServoOne units in detail

Hardware		AC SO junior	AC SO 4-450 A	DC SO 4-450 A	PSU 26-360 kW
Performance data					
Mains voltage		1/3 x 230 V AC 3 x 400 - 480 V AC	1 x 230 V AC 3 x 230 - 480 V AC	565 - 770 V DC	3 x 400 - 480 V AC
Rated current at 1 x 230 V AC		3 - 8 A (1/3 x 230 V)	4 A (1 x 230 V)	-	-
Rated current at 3 x 400 V AC		2 - 16 A	4 - 450 A	-	-
Rated current at 565 V DC		-	-	4 - 450 A	-
DC power		-	-	-	26 - 360 kW
Overload factor		3.0	1.5 - 2.0	1.5 - 3.0	1.0 - 2.0
Rotating field frequency		400 Hz	400 Hz 1600 Hz optional	400 Hz 1600 Hz optional	-
Power stage switching frequency		4, 8, 16 kHz	2, 4, 8, 12, 16 kHz	4, 8, 12, 16 kHz	4, 8, 12 kHz
Sinusoidal regenerative power supply		-	-	-	●
Braking chopper electronics integrated		●	●	-	●
Braking resistor, integrated		○	○	-	-
Safety systems					
STO (Safe Torque Off) function		●	●	●	-
Integrated safety control		-	○	○ 2)	-
Control hardware					
Inputs analog (±10 V DC, 12-bit)		2	2	2	2
Outputs analog (±10 V DC, 2 x 12-bit)		-	○	○	-
Inputs/outputs digital - standard		8/3	8/3	8/3	8/3
of which touchprobe inputs		2	2	2	-
Digital Input/Output expansion (4 inputs/8 outputs)		○	○ 2)	○ 2)	-
Relay		1	1	1	1
Motor temperature monitoring		● PTC, KTY, Klixon	● PTC, NTC, KTY, Klixon	● PTC, NTC, KTY, Klixon	-
MMC memory card		-	●	●	●
Encoder systems					
Encoder channel 1	Resolver	●	●	●	-
Encoder channel 2	SinCos encoder with NP, SSI, EnDat or HIPERFACE®	●	●	●	-
	SSI encoder	●	●	●	-
	EnDat encoder digital	●	●	●	-
	TTL encoder	●	●	●	-
Field bus systems					
CANopen		○	○	○	○
PROFIBUS-DPV1		○	○	○	○
Sercos II		○	○	○	○
Sercos III		○	○	○	○
EtherCAT		○	○	○	○
PROFINET IRT		○	○	○	-
Technology					
Second Sin-Cos encoder	SinCos encoder with NP, SSI, EnDat	○	○	○	-
	SSI encoder	○	○	○	-
	EnDat encoder digital	○	○	○	-
	TTL encoder	○	○	○	-
Single-cable system with HIPERFACE DSL encoders		○	-	-	-
TTL encoder simulation		○	○	○	-
SSI encoder simulation		-	○	○	-
TTL master		○	○	○	-
TTL encoder with commutation signals		○	○	○	-
Bidirectional axis cross-communication (TWINsync, max. 2 axes)		-	○	○	-
Cooling methods					
Air cooling		●	● To SO84.170	● To SO84.170	● To SO84.170.S
Liquid cooling		-	● From SO84.016	● From SO84.016	●

● = *Standard* ○ = *Optional* *- Not available* *2) In preparation*

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Hardware (continued)	AC SD junior	AC SD 4-450 A	DC SD 4-450 A	PSU 26-360 kW
EMC acceptance tests				
Mains filter integrated C2 (10 m) / C3 (25 m)	-	● To SO84.072	-	-
Mains filter external C2 (10 m) / C3 (30 m)	O	-	-	-
Mains filter external C2 (100 m) / C3 (150 m)	-	O	-	O
Acceptance tests	CE, UL	CE, UL	CE, UL	CE, UL, UL to to SO84.170.S

● = *Standard* O = *Optional* - *Not available* *1) on request*

Software functions	AC SD junior	AC SD 4-450 A	DC SD 4-450 A
Commissioning			
Automatic motor identification	●	●	●
Automatic encoder offset definition	●	●	●
Autotuning	●	●	●
Motor systems			
Rotary asynchronous motors	●	●	●
Rotary synchronous motors	●	●	●
Linear synchronous motors	●	●	●
Control modes			
Torque/force control	16 kHz	16 kHz	16 kHz
Speed control	8 kHz	8 kHz	8 kHz
Position control	8 kHz	8 kHz	8 kHz
Open-loop motor control VFC	-	O	O
Sensorless control of synchronous motors	1)	1)	1)
Control functions			
Field-weakening for asynchronous motors	●	●	●
Field-weakening for synchronous motors	●	●	●
Autocommutation for synchronous motors	●	●	●
Acceleration pre-control	●	●	●
Speed pre-control	●	●	●
Freely configurable filters (PT1-PT4, band elimination filter etc.)	●	●	●
Active vibration damping	●	●	●
Correction methods			
GPOC (encoder correction)	●	●	●
Friction torque compensation	●	●	●
Detent torque compensation	●	●	●
Axis/spindle error correction	●	●	●
Motion profiles			
Point-to-point positioning	●	●	●
Interpolating positioning	Linear, spline	Linear, spline	Linear, spline
Synchronous motion / Electronic gearing	●	●	●
Modulo/rotary axis	●	●	●
Cam plates	O	O	O
Axis-guided homing	●	●	●
Virtual Master	●	●	●
Standards-compliant motion profiles	CANopen CiA 402 sercos EtherCAT CoE PROFIdrive	CANopen CiA 402 sercos EtherCAT CoE PROFIdrive	CANopen CiA 402 sercos EtherCAT CoE PROFIdrive
Scaling in user units (°, µm, …)	●	●	●
Technology			
Programmable in IEC 61131	O	O	O

● = *Standard* O = *Optional* - *Not available* *1) on request*

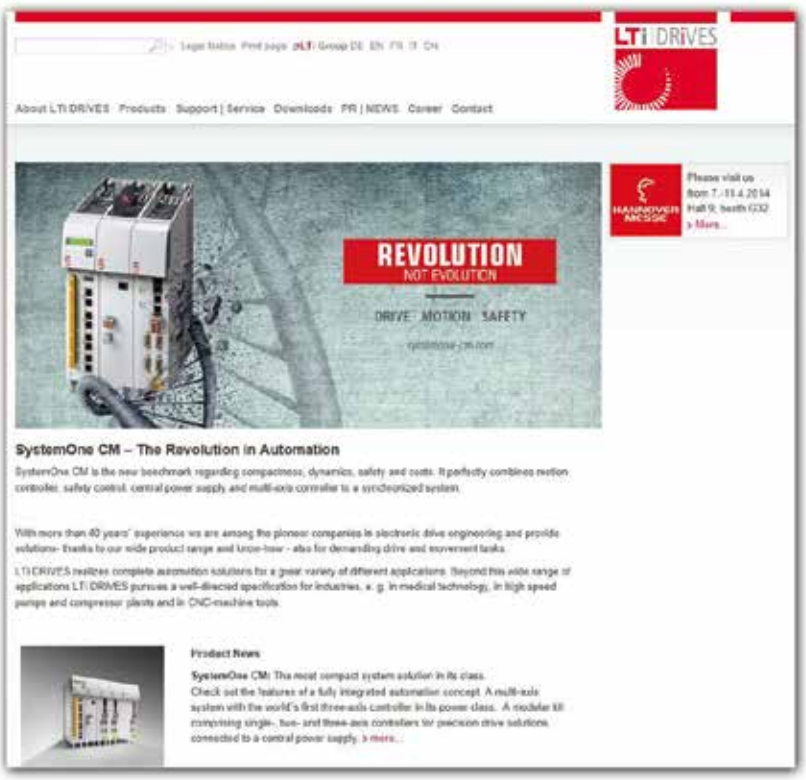
Equipment of the integrated safety control

System			
Configuration mode		User-programmable safety control	
Safety acceptance tests		SIL3 to IEC 61508 / IEC 62061, PL e and Cat 4 to EN ISO 13849	
Control hardware			
Safe digital inputs		4 [3]	
Safe digital outputs		4 [3]	
… of which usable as safe pulse outputs		4	
Safe brake outputs		2 [3]	
Connectable safety sensors		Light grids, emergency stops, guard doors, laser scanners; mode selector switches, deadlocks, permission buttons, two-handed controls, etc.	
Analog standard inputs (±10 V, 12-bit)		2	
Digital standard inputs		6	
Safety functions		**Speed-dependent**	**Position-dependent**
STO	Safe Torque Off	●	
SS1	Safe Stop 1	●	
SS2	Safe Stop 2	●	
SLS	Safe Limited Speed	●	
SDI	Safe Direction	●	
SLSmax	Safe Limited Speed maximum	●	
ECS	Encoder Supervisor	●	
ESM	Encoder Standstill Monitoring	●	
SOS	Safe Operating Stop	●	● [2]
SLT	Safe Limited Torque	● [2]	● [2]
SCA	Safe Cam	●	● [2]
SLI	Safe Limited Increment		● [2]
SLP	Safe Limited Position		● [2]
SCA	Safe Cam		● [2]
Sref	Safe reference		● [2]
SEL	Safe Emergency Limit		● [2]
Safety functions (brake)			
SBC	Safe Brake Control	●	
SBT	Safe Brake Test	● [2]	
Safety functions (bus systems)			
SCC	Safe Cross Communication	●	
FSoE	Functional Safety over EtherCAT	● [2]	
Operator control tools			
SafePLC S for ServoOne		●	
DriveManager (parameter changes)		●	

● = *Standard* O = *Optional* - *Not available*

2) In preparation *3) SIL2; SIL3 with redundant use of the inputs/outputs (2-channel)*

Services



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or call us on +49 6441 966-0 to obtain detailed information material on our broad range of services, available in printed form as a convenient reference source.

Design-in

Professional project management that keeps you to deadlines and budgets is an important element of our joint success.

The sooner you get to market with your new solution the better. That's why we can support you in

- analyzing requirements
- planning the drive design
- creating the functional specification
- total cost analysis
- project management

Logistics

To make ordering a routine exercise and reduce or even eliminate unnecessary formalities, the entire process is co-ordinated, from planning through ordering to spare parts supplies.

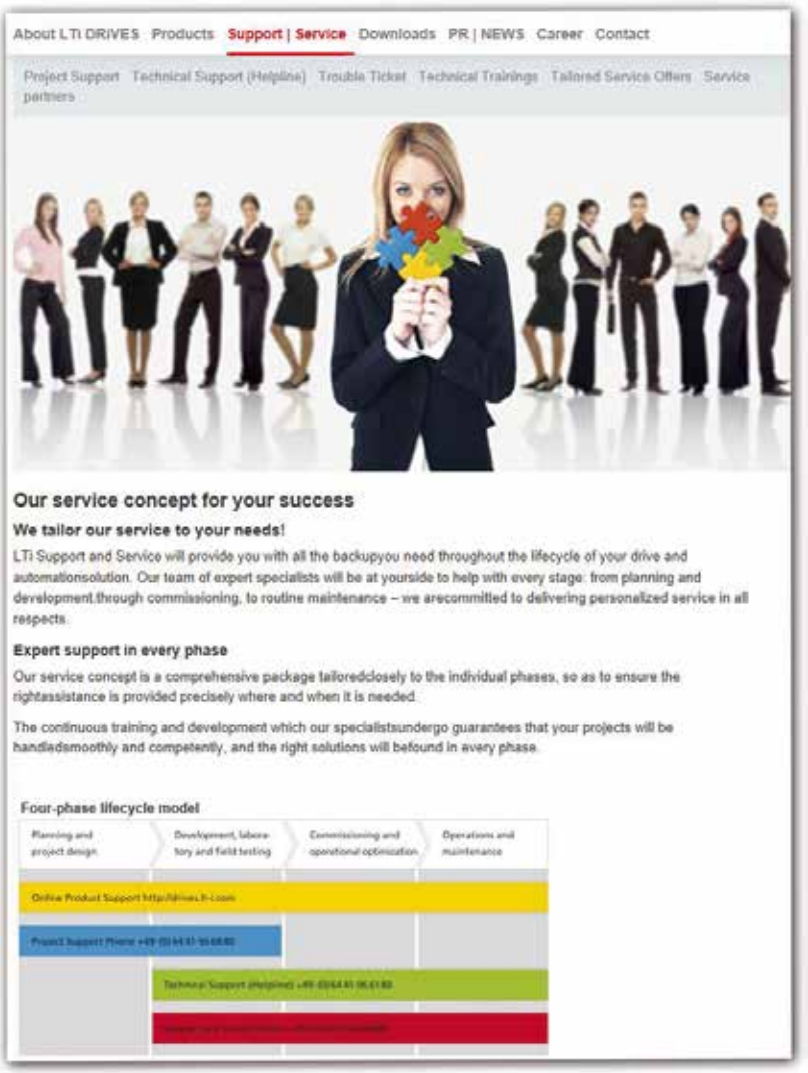
Software update service

As part of our product maintenance function we are continuously improving the quality of the drive system. Our software update service provides you with information on new releases and enhancements of the various firmware versions.

After-sales

You can call on our Service and Support wherever and whenever you need it.
With our flexibility, fast response times, superior technical know-how and extensive user experience, we can offer a wide range of services, including
e.g.

- On-site commissioning
- Advice and training
- Repairs/service concept



Helpline

Our Helpline can assist you with:

- telephone commissioning of standard products and systems
- evaluating error and
- diagnostic displays
- locating and dealing with repeatable faults
- software updates.

It is available as follows:

Mo.-Fr.: 8 a.m. - 5 p.m. (CET)
Phone: +49 (0) 6441 966-180
E-mail: helpline@lt-i.com
Internet: ► http://drives.lt-i.com
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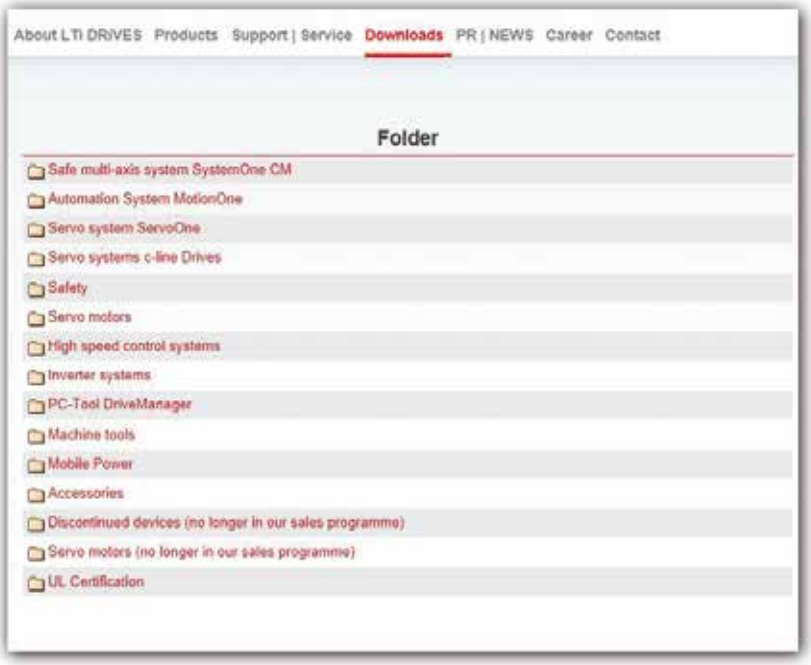
► Trouble Ticket



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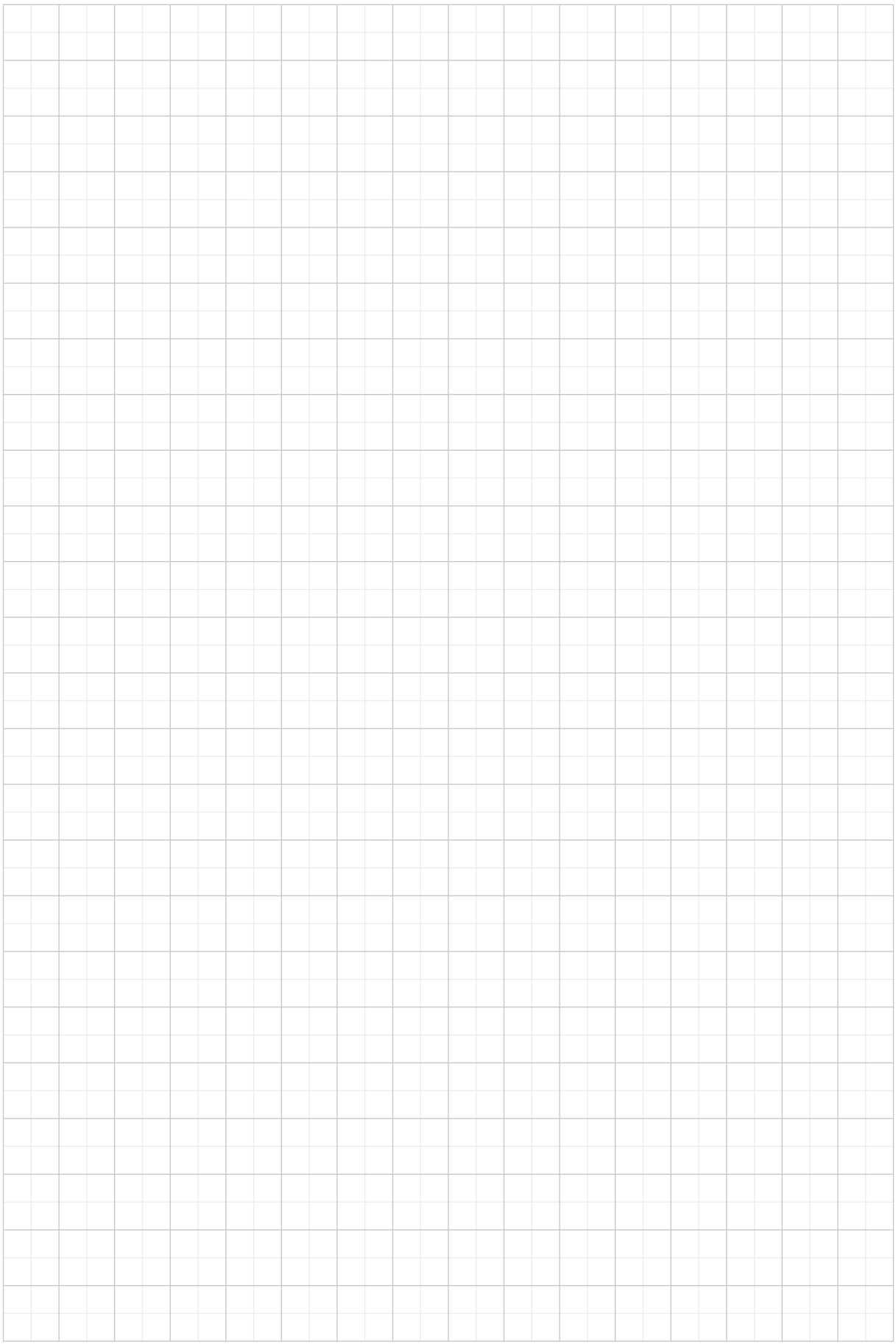

ServoOne junior

BG2 BG3 BG4 BG5

System voltage 1 x 230 V / 3 x 230 V

Type	Size	Rated current	Current capacity	Technical data
SO22.003	BG2	3 A	Page 2-4	Page 2-10
SO22.006	BG3	5.9 A	Page 2-4	Page 2-12
SO22.008	BG4	8 A	Page 2-4	Page 2-14

System voltage 3 x 400 V

Type	Size	Rated current	Current capacity	Technical data
SO24.002	BG2	2 A	Page 2-5	Page 2-10
SO24.004	BG3	3.5 A	Page 2-5	Page 2-12
SO24.007	BG4	6.5 A	Page 2-5	Page 2-14
SO24.012	BG5	12.0 A	Page 2-5	Seite 2-16
SO24.016	BG5	16.0 A	Page 2-5	Seite 2-16

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ServoOne junior - Order codes

Article designation	SO2	4	.	006	.	0	0	2	1	.	0	0	0	0	.	X
ServoOne junior																
System voltage	3 x 400 V	4														
	1/3 x 230 V	2														
Rated current	BG2	2.0 A		002												
		3.0 A		003												
	BG3	3.5 A		004												
		5.9 A		006												
	BG4	6.5 A		007												
		8 A		008												
	BG5	12 A		012												
		16 A		016												
Mains supply	AC					0										
Safety systems	STO						0									
Option 1 Communication	without							0								
	Sercos II							1								
	PROFIBUS							2								
	EtherCAT							3								
	CANopen							4								
	PROFINET							7								
	Sercos III							8								
Option 2 Technology	without								0							
	second SinCos encoder								1							
	TTL encoder simulation/TTL master encoder								2							
	TTL encoder with commutation signals								5							
	Digital Input/Output (DIO) expansion								8							
	Single-cable interface								D							
Housing/cooling method	Air-cooled (standard)										0					
	Air-cooled with internal braking resistor (not BG2)										1					
Function package	Basic (without additional function package)											0				
	iPlc											1				
Special design	None												0			
Protection	Standard													0		
	PCBs with protective coating													1		
Hardware version	(may be multi-digit)															X

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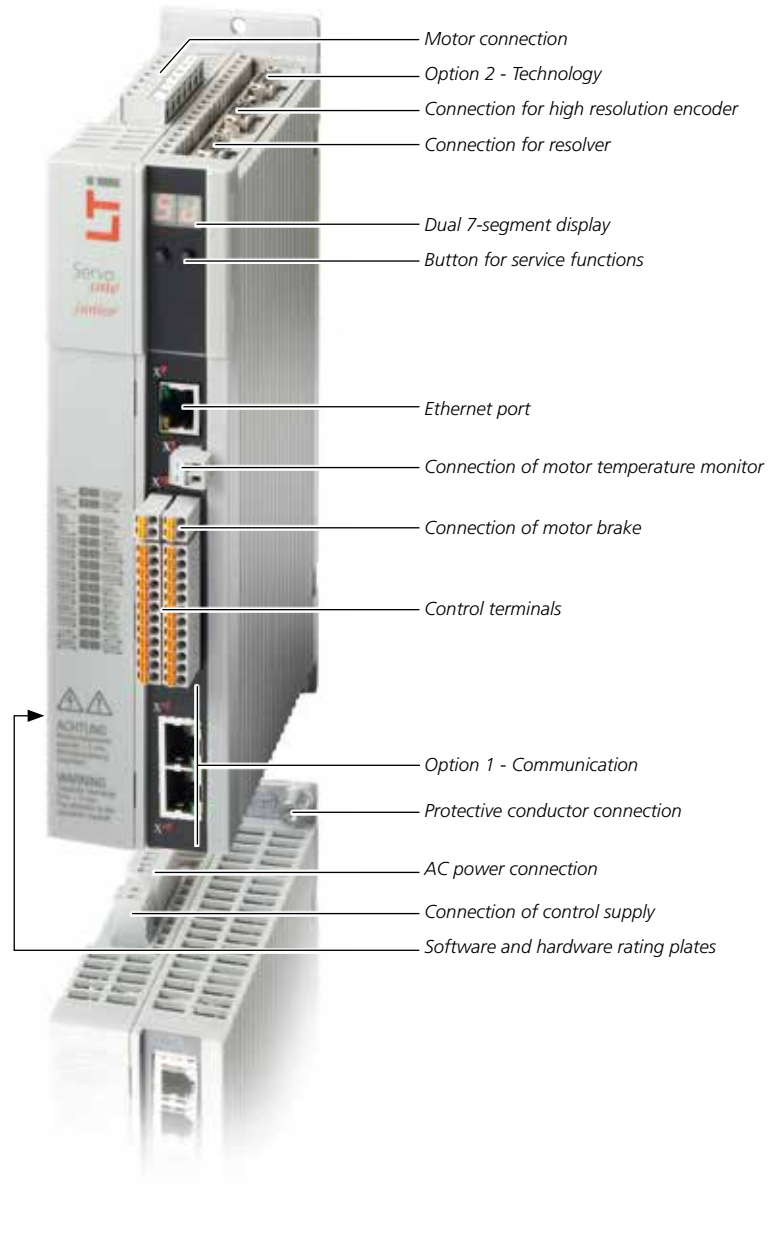
ServoOne junior - Equipment



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ServoOne junior - Current capacity

The rated current of the ServoOne junior and the maximum peak current are dependent on the mains voltage, the motor cable length, the power stage switching frequency and the ambient temperature. If the conditions change, the maximum permissible current capacity of the servocontrollers also changes.

ServoOne junior for 1 x 230 V

Device	Switching frequency of power stage	Ambient-temperature	Rated current I_N [A_{eff}]	Peak current			
				200% (2 I_N)		300% (3 I_N)	
	[kHz]	max. [°C]	at 1 x 230 V	[A_{eff}]	for time [s]	[A_{eff}]	for time [s]
SO22.003	4	45	3	6	10	9	0.08
	8	40	3	6		9 [1)]	0.08 [1)]
	16	40	2	4		6 [1)]	0.08 [1)]
SO22.006	4	45	5.9	11.8	10	-	-
	8	40					
	16	40					
SO22.008	4	45	8	16	10	-	-
	8	40	8	16			
	16	40	5.4	10.8			

1) Automatic power stage switching frequency change to 4 kHz
Figures apply to motor cable length ≤10 m. Maximum permissible motor cable length 30 m.
All current ratings with recommended mains choke

ServoOne junior for 3 x 230 V

Device	Switching frequency of power stage	Ambient-temperature	Rated current I_N [A_{eff}]	Peak current			
				200% (2 I_N)		300% (3 I_N)	
	[kHz]	max. [°C]	at 3 x 230 V	[A_{eff}]	for time [s]	[A_{eff}]	for time [s]
SO22.003	4	45	3	6	10	9	0.08
	8	40	3	6		9 [1)]	
	16	40	2	4		6 [1)]	
SO22.006	4	45	5.9	11.8	10	17.7	0.08
	8	40				17.7 [1)]	
	16	40				17.7 [1)]	
SO22.008	4	45	8	16	10	24	0.08
	8	40	8	16		24 [1)]	
	16	40	5.4	10.8		16.2 [1)]	

1) Automatic power stage switching frequency change to 4 kHz
Figures apply to motor cable length ≤10 m. Maximum permissible motor cable length 30 m.

ServoOne junior for 3 x 400 V

Device	Switching frequency of power stage [kHz]	Ambient temperature max. [°C]	Rated current I_N [A_{eff}] at 400 V	Peak current I_{1MAX} [A_{eff}]	t_1 [s]	I_{2MAX} [A_{eff}]	t_2 [s]
SO24.002	4	45	2	4	10	6	0.08
	8	40	2	4		6 [1]	
	16	40	0.7	1.4		2.1 [1]	
SO24.004	4	45	5.5	7	10	10.5	0.08
	8	40	3.5	7		10.5 [1]	
	16	40	2.2	4.4		6.6 [1]	
SO24.007	4	45	8.5	13	10	19.5	0.08
	8	40	6.5	13		19.5 [1]	
	16	40	4	8		12 [1]	
SO24.012	4	40	13	26	10	39	0.10
	8	40	12	24		36	
	16	40	8	16		24	
SO24.016	4	40	20	40	10	60	0.10
	8	40	16	32		48	
	16	40	9	18		27	

1) Automatic power stage switching frequency change to 4 kHz
Figures apply to motor cable length ≤10 m. Maximum permissible motor cable length 30 m.

ServoOne junior for 3 x 460 V

Device	Switching frequency of power stage [kHz]	Ambient-temperature max. [°C]	Rated current I_N [A_{eff}] att460 V	Peak current I_{1MAX} [A_{eff}]	t_1 [s]	I_{2MAX} [A_{eff}]	t_2 [s]
SO24.002	4	45	2	4	10	6	0.08
	8	40	2	4		6 [1]	
	16	40	0.7	1.4		2.1 [1]	
SO24.004	4	45	4.8	6.2	10	9.2 [1]	0.08
	8	40	3.5	7		10.5 [1]	
	16	40	1.3	2.6		3.9 [1]	
SO24.007	4	45	7.4	11.8	10	17.8	0.08
	8	40	6.5	13		19.5 [1]	
	16	40	2.4	4.8		7.2 [1]	
SO24.012	4	40	13	- [2]	- [2]	- [2]	- [2]
	8	40	12	- [2]		- [2]	
	16	40	6	- [2]		- [2]	
SO24.016	4	40	20	- [2]	- [2]	- [2]	- [2]
	8	40	14.5	- [2]		- [2]	
	16	40	6.5	- [2]		- [2]	

1) Automatic power stage switching frequency change to 4 kHz
Figures apply to motor cable length ≤10 m. Maximum permissible motor cable length 30 m.
2) In preparation

ServoOne junior for 3 x 480 V

Device	Switching frequency of power stage [kHz]	Ambient-temperature max. [°C]	Rated current I_N [A_{eff}]	Peak current			
				I_{1MAX} [A_{eff}]	t_1 [s]	I_{2MAX} [A_{eff}]	t_2 [s]
SO24.002	4	45	2	4	10	6	0.08
	8	40	1.7	3.4		5.1 [1)]	
	16	40	-	-		-	
SO24.004	4	45	4.6	6	10	8.8	0.08
	8	40	2.6	5.2		7.8 [1)]	
	16	40	-	-		-	
SO24.007	4	45	7	11.2	10	16.8	0.08
	8	40	6.5	13		19.5 [1)]	
	16	40	1.9	3.8		5.7 [1)]	
SO24.012	4	40	13	- [2)]	- [2)]	- [2)]	- [2)]
	8	40	12	- [2)]		- [2)]	
	16	40	5	- [2)]		- [2)]	
SO24.016	4	40	20	- [2)]	- [2)]	- [2)]	- [2)]
	8	40	14	- [2)]		- [2)]	
	16	40	6	- [2)]		- [2)]	

1) Automatic power stage switching frequency change to 4 kHz
Figures apply to motor cable length ≤10 m. Maximum permissible motor cable length 30 m.
2) In preparation

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Space for your own notes

ServoOne junior - Ambient conditions

Ambient conditions	
Protection	IP20 except terminals (IP00)
Accident prevention regulations	according to local regulations (in Germany e.g. BGV A3)
Mounting height	up to 1000 m above MSL, over 1000 m above MSL with power reduction (1% per 100 m, max. 2000 m above MSL)
Pollution severity	2
Type of installation	Built-in unit, only for vertical installation in a cabinet with min. IP4x protection, when using STO safety function min. IP54

Climatic conditions		
in transit	as per EN 61800-2, IEC 60721-3-2 class 2K3 [1]	
	Temperature	-25 °C to +70 °C
	Relative humidity	95% at max. +40 °C
in storage	as per EN 61800-2, IEC 60721-3-1 classes 1K3 and 1K4 [2]	
	Temperature	-25 °C to +55 °C
	Relative humidity	5 to 95%
in operation	as per EN 61800-2, IEC 60721-3-3 class 3K3 [3]	
	Temperature	-10 °C to +45 °C (4 kHz), to 55 °C with power reduction (2%/°C) -10 °C to +40 °C (8, 16 kHz) , to 55 °C with power reduction (2%/°C)
	Relative humidity	5 to 85% without condensation

1) The absolute humidity is limited to max. 60 g/m³. This means, at 70 °C for example, that the relative humidity may only be max. 40%.
2) The absolute humidity is limited to max. 29 g/m³. So the maximum values for temperature and relative humidity stipulated in the table must not occur simultaneously.
3) The absolute humidity is limited to max. 25 g/m³. That means that the maximum values for temperature and relative humidity stipulated in the table must not occur simultaneously.

Mechanical conditions			
Vibration limit in transit	as per EN 61800-2, IEC 60721-3-2 class 2M1		
	Frequency [Hz]	**Amplitude [mm]**	**Acceleration [m/s²]**
	2 ≤ f < 9	3.5	Not applicable
	9 ≤ f < 200	Not applicable	10
	200 ≤ f < 500	Not applicable	15
Shock limit in transit	as per EN 61800-2, IEC 60721-2-2 class 2M1		
	Drop height of packed device max. 0.25 m		
Vibration limits of the system [1]	as per EN 61800-2, IEC 60721-3-3 class 3M1		
	Frequency [Hz]	Amplitude [mm]	Acceleration [m/s²]
	2 ≤ f < 9	0.3	Not applicable
	9 ≤ f < 200	Not applicable	1

1) Note: The devices are only designed for stationary use. The drive controllers must not be installed in areas where they would be permanently exposed to vibrations.

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ServoOne junior - Certifications

CE mark

The ServoOne junior conform to the requirements of the Low Voltage Directive 2006/95/EC and the product standard EN 61800-5-1.

They thus conform to the requirements for installation in a machine or plant under the terms of the Machinery Directive 2006/42/EC.

The servocontrollers are accordingly CE marked. The CE mark on the type plate indicates conformity with the above Directives.

UL/UR certification

The ServoOne junior servocontrollers have the following certifications:

Servocontroller	certification
SO22.003.xxxx.xxxx.x	UR
SO22.006.xxxx.xxxx.x	UL
SO22.008.xxxx.xxxx.x	UL
SO24.002.xxxx.xxxx.x	UR
SO24.004.xxxx.xxxx.x	UL
SO24.007.xxxx.xxxx.x	UL
SO24.012.xxxx.xxxx.x	In preparation
SO24.016.xxxx.xxxx.x	In preparation

EMC certificate

All ServoOne junior models are by design resistant to interference in accordance with EN 61800-3, environment classes 1 and 2.

To limit line-borne interference emission to the permissible level, external EMC mains filters are available (see "Accessories"). The use of these mains filters ensures compliance with the EMC Directive 2004/108/EC:

- Public low-voltage network:
  first environment (residential C2) up to 10 m motor cable length
- Industrial low-voltage network:
  "second environment" (industrial C3) up to 30 m motor cable length

STO

The "STO" (Safe Torque Off) safety function integrated into the ServoOne junior is certified according to the following requirements:

- EN 61800-5-2
- EN ISO 13849-1 "PL e"
- EN 61508 / EN 62061 "SIL3"

Acceptance testing is carried out by the accredited certification agency, TÜV Rheinland.

ServoOne junior - Technical data - BG2

Type SO22.003

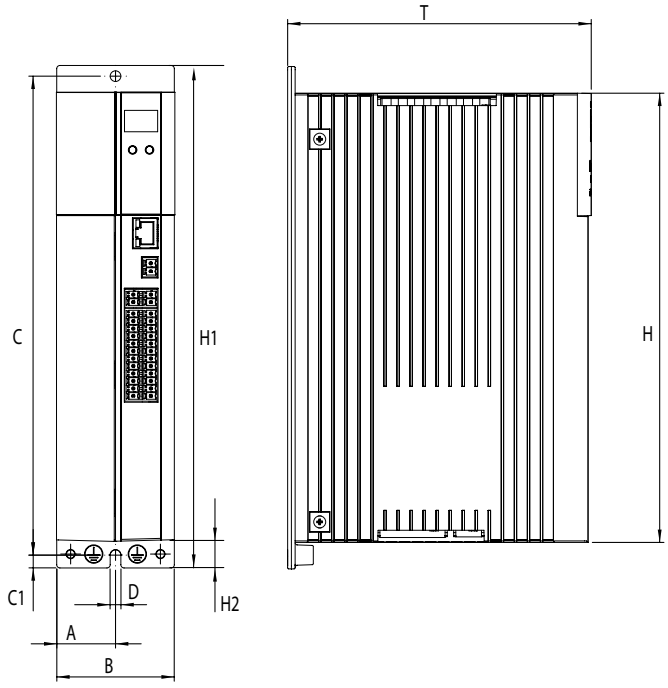
Technical data \ Article designation	SO22.003	SO24.002
Output, motor side		
Voltage	3-phase U_{mains}	
Rated current, effective (I_N) [1]	3 A	2 A [2]
Peak current	see tables on page 2-4	see table on page 2-5
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 16 kHz	
Input, mains side		
Mains voltage (U_{mains})	(1 x 230 V AC / 3 x 230 V AC) -20%/+15%	(3 x 400 V AC / 3 x 460 V AC / 3 x 480 V AC) ±10%
Device connected load (with mains choke)	1.3 kVA	1.5 kVA
Current (with mains choke)	5.4 A (1 x 230 V AC) 3.3 A (3 x 230 V AC)	2.2 A [2]
Asymmetry of mains voltage	±3% max. (at 3 x 230 V AC)	±3% max.
Frequency	50 / 60 Hz ±10%	
Power loss at 8 kHz and I_N	75 W	42 W [2]
DC link		
Capacitance	880 µF	220 µF
Braking chopper switch-on threshold	390 V DC	650 V DC [2]
Minimum ohmic resistance of an externally installed braking resistor	72 Ω	230 Ω
Brake chopper continuous power with external braking resistor [3]	2.1 kW	1.8 kW
Brake chopper peak power with external braking resistor [3]	2.1 kW	1.8 kW
Internal braking resistor	550 Ω (PTC)	7500 Ω (PTC)
Brake chopper continuous power with internal braking resistor [3]	0 W	0 W
Brake chopper peak power with internal braking resistor [3]	400 W	200 W [2]

1) Value referred to 4 V and 8 kHz switching frequency
2) Value referred to 400 V AC mains voltage
3) A braking resistor is always integrated;

Mechanism	SO22.003	SO24.002
Cooling method	Wall mounting	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	max. 45 °C (at 4 kHz power stage switching frequency)	
Weight	1.0 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	Direct end-to-end mounting	

Dimensions	BG2 [mm]
B (width)	55
H (height)	210
T (depth)	142 (without terminals)
A	27.5
C / C1	225 / 5
D Ø	4.8
H1 / H2	235 / 12.5

Dimensional drawings, BG2



Matching accessories (see section 9 f.)

Controller	SO22.003	SO24.002
Mains choke	LR 32.14-UR (1 x 230 V) LR 34.4-UR (3 x 230 V)	LR 34.4-UR
Braking resistor (ext.)	BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W)	BR-260.01.540-UR (35 W) BR-260.02.540-UR (150 W)
Mains filter	EMC8.2-1Ph,UR (1 x 230 V) EMC5.2-3Ph,UR (3 x 230 V)	EMC5.2-3Ph,UR

ServoOne junior - Technical data - BG3

Type SO24.004

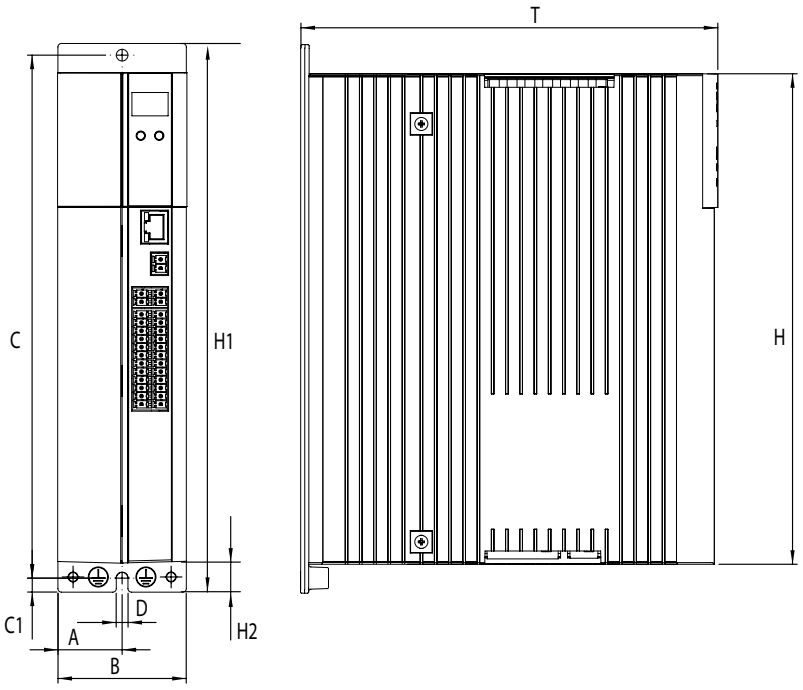
Technical data \ Article designation	SO22.006	SO24.004
Output, motor side		
Voltage	3-phase U_{mains}	
Rated current, effective (I_N) [1]	5.9 A	3.5 A [2]
Peak current	see tables on page 2-4	see table on page 2-5
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 16 kHz	
Input, mains side		
Mains voltage (U_{mains})	(1 x 230 V AC / 3 x 230 V AC) -20%/+15%	(3 x 400 V AC / 3 x 460 V AC / 3 x 480 V AC) ±10%
Device connected load (with mains choke)	2.6 kVA	2.7 kVA
Current (with mains choke)	10.6 A (1 x 230 V) 6.5 A (3 x 230 V)	3.9 A [2]
Asymmetry of mains voltage	±3% max. (at 3 x 230 V AC)	±3% max.
Frequency	50 / 60 Hz ±10%	
Power loss at 8 kHz and I_N	150 W	80 W [2]
DC link		
Capacitance	1320 µF	330 µF
Braking chopper switch-on threshold	390 V DC	650 V DC [2]
Minimum ohmic resistance of an externally installed braking resistor	72 Ω	180 Ω
Brake chopper continuous power with external braking resistor	2.1 kW	2.3 kW
Brake chopper peak power with external braking resistor	2.1 kW	2.3 kW
Optional: internal braking resistor	100 Ω	420 Ω
Brake chopper continuous power with internal braking resistor	Dependent on the effective loading of the controller in the corresponding application	
Brake chopper peak power with external braking resistor	1500 W	1000 W [2]

1) Data referred to 4 V and 8 kHz switching frequency
2) Data referred to 400 V mains voltage

Mechanism	SO22.006	SO24.004
Cooling method	Wall mounting	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	max. 45 °C (at 4 kHz power stage switching frequency)	
Weight	1.5 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	Direct end-to-end mounting	

Dimensions	BG3 [mm]
B (width)	55
H (height)	210
T (depth)	189 (without terminals)
A	27.5
C / C1	225 / 5
D Ø	4.8
H1 / H2	235 / 12.5

Dimensional drawings, BG3



Matching accessories (see section 9 f.)

Controller	SO22.006	SO24.004
Mains choke	LR 32.14-UR (1 x 230 V) LR 34.8-UR (3 x 230 V)	LR 34.6-UR
Braking resistor (ext.)	BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W) BR-090.10.650-UR (1000 W)	BR-200.01.540-UR (35 W) BR-200.02.540-UR (150 W) BR-200.03.540-UR (300 W)
Mains filter	EMC14.2-1Ph,UR (1 x 230 V) EMC11.2-3Ph,UR (3 x 230 V)	EMC5.2-3Ph,UR

ServoOne junior - Technical data - BG4

Type SO24.007

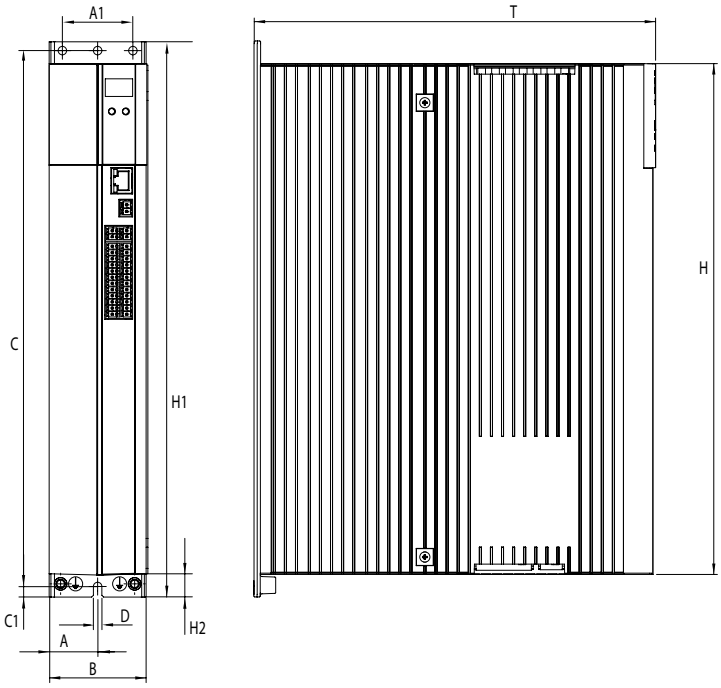
Technical data \ Article designation	SO22.008	SO24.007
Output, motor side		
Voltage	3-phase U_{mains}	
Rated current, effective (I_N) [1]	8.0 A	6.5 A [2]
Peak current	see tables on page 2-4	see table on page 2-5
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 16 kHz	
Input, mains side		
Mains voltage (U_{mains})	(1 x 230 V AC / 3 x 230 V AC) -20%/+15%	(3 x 400 V AC / 3 x 460 V AC / 3 x 480 V AC) ±10%
Device connected load (with mains choke)	3.5 kVA	5.0 kVA
Current (with mains choke)	14.4 A (1 x 230 V) 8.8 A (3 x 230 V)	7.2 A [2]
Asymmetry of mains voltage	±3% max. (at 3 x 230 V AC)	±3% max.
Frequency	50 / 60 Hz ±10%	
Power loss at 8 kHz and I_N	200 W	150 W [2]
DC link		
Capacitance	1760 µF	440 µF
Braking chopper switch-on threshold	390 V DC	650 V DC [2]
Minimum ohmic resistance of an externally installed braking resistor	72 Ω	72 Ω
Brake chopper continuous power with external braking resistor	2.1 kW	5.9 kW
Brake chopper peak power with external braking resistor	2.1 kW	5.9 kW
Optional: internal braking resistor	90 Ω	90 Ω
Brake chopper continuous power with internal braking resistor	Dependent on the effective loading of the controller in the corresponding application	
Brake chopper peak power with external braking resistor	1.7 kW	4.7 kW [2]

1) Data referred to 4 V and 8 kHz switching frequency
2) Data referred to 400 V mains voltage

Mechanism	SO22.008	SO24.007
Cooling method	Wall mounting	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	max. 45 °C (at 4 kHz power stage switching frequency)	
Weight	2.8 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servo-controllers	Direct end-to-end mounting	

Dimensions	BG4 [mm]
B (width)	55
H (height)	290
T (depth)	235.5 (without terminals)
A / A1	27.5 / 40
C / C1	305 / 5
D Ø	4.8
H1 / H2	315 / 12.5

Dimensional drawings, BG4



Matching accessories (see section 9 f.)

Controller	SO22.008	SO24.007
Mains choke	LR 34.8-UR	LR 34.8-UR
Braking resistor (ext.)	BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W) BR-090.10.650-UR (1000 W)	
Mains filter	EMC11.2-3Ph,UR	EMC11.2-3Ph,UR

ServoOne junior - Technical data - BG5

Type SO24.016

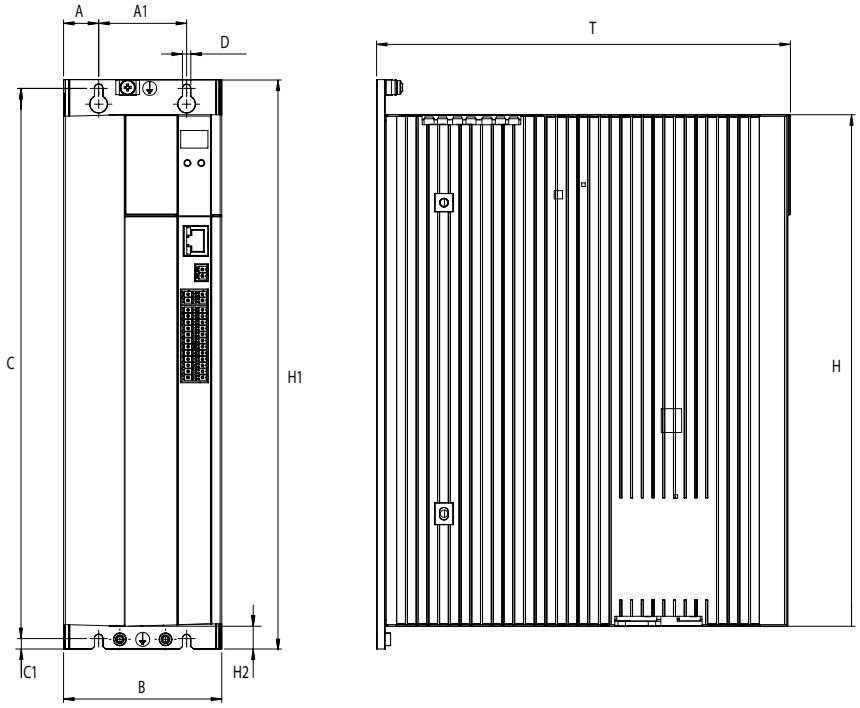
Technical data \ Article designation	SO24.012 In preparation	SO24.016 In preparation
Output, motor side		
Voltage	3-phase U_{mains}	
Rated current, effective (I_N) [1]	9.6	16
Peak current	see tables on page 2-5/2-6	see table on page 2-5/2-6
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 16 kHz	
Input, mains side		
Mains voltage (U_{mains})	(3 x 400 V AC / 3 x 460 V AC / 3 x 480 V AC) ±10%	
Device connected load (with mains choke)	7.3 kVA	12.2 kVA
Current (with mains choke)	10.6 A	17.6 A
Asymmetry of mains voltage	±3% max.	±3% max.
Frequency	50 / 60 Hz ±10%	
Power loss at 8 kHz and I_N	263 W [1) 2)]	316 W [1) 2)]
DC link		
Capacitance	680 µF	1120 µF
Braking chopper switch-on threshold	650 V DC [2)]	650 V DC [2)]
Minimum ohmic resistance of an externally installed braking resistor	35 Ω	35 Ω
Brake chopper continuous power with external braking resistor	[3)]	[3)]
Brake chopper peak power with external braking resistor	12 kW [2)]	16.9 kW [2)]
Optional: internal braking resistor	90 Ω	90 Ω
Brake chopper continuous power with internal braking resistor	Dependent on the effective loading of the controller in the corresponding application	
Brake chopper peak power with external braking resistor	4.7 kW [2)]	4.7 kW [2)]

1) Data referred to 8 kHz switching frequency
2) Data referred to 400 V mains voltage
3) In preparation

Mechanism	SO24.012	SO24.016
Cooling method	Wall mounting	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	max. 45 °C (at 4 kHz power stage switching frequency)	
Weight	5.5 kg	5.9 kg
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	Direct end-to-end mounting	

Dimensions	BG5 [mm]
B (width)	90
H (height)	291
T (depth)	235.5 (without terminals)
A / A1	20/50
C / C1	313/6
D Ø	4.8
H1 / H2	324/13

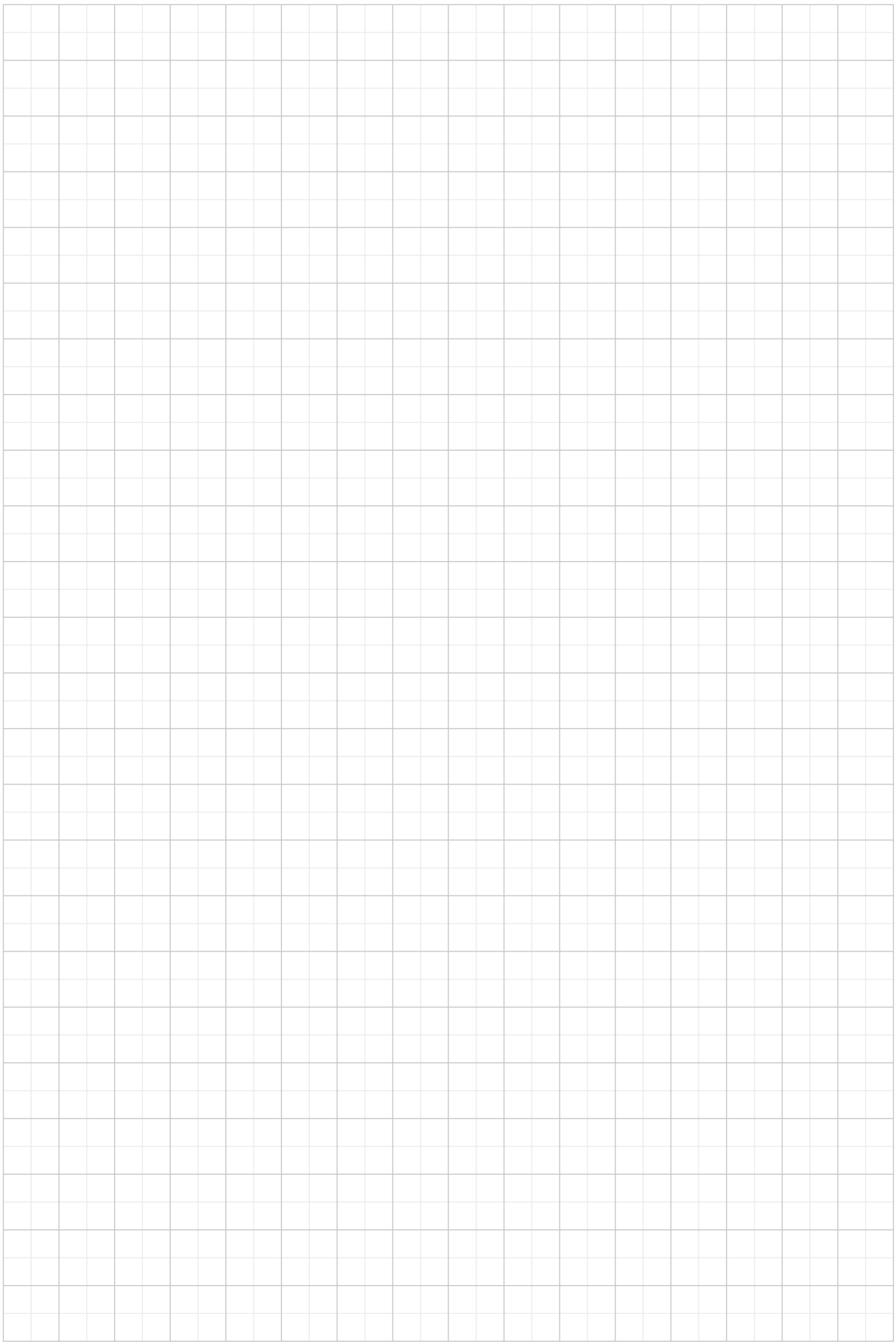
Dimensional drawings - BG5



Matching accessories (see section 9 f.)

Controller	SO24.012	SO24.016
Mains choke	LR 34.14-UR	LR 34.17-UR
Braking resistor (ext.)	BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W) BR-090.10.650-UR (1000 W)	
Mains filter	EMC16.1-UR, EMC25.1-UR	

Space for your own notes



ServoOne single-axis system

System voltage 1 x 230 V

Type	Size	Rated current	Current capacity	Technical data
SO82.004.0	BG1	4.0 A	page 3-6	page 3-16

System voltage 3 x 400 V

Type	Size	Rated current		Current capacity	Technical data
		Air cooling	Liquid cooling		
SO84.004.0	BG1	4.0 A	-	page 3-7	page 3-16
SO84.006.0		6.0 A	-		
SO84.008.0	BG2	8.0 A	-	page 3-7	page 3-18
SO84.012.0		12 A	-		
SO84.016.0	BG3	16 A	16 A	page 3-7	page 3-20
SO84.020.0		20 A	20 A		
SO84.024.0	BG4	24 A	24 A	page 3-7	page 3-22
SO84.032.0		32 A	32 A		
SO84.045.0	BG5	45 A	53 A	pages3-8 and 3-9	page 3-24
SO84.060.0		60 A	70 A		
SO84.072.0		72 A	84 A		
SO84.090.0	BG6	90 A	110 A	pages3-8 and 3-9	page 3-26
SO84.110.0		110 A	143 A		
SO84.143.0	BG6a	143 A	170 A	pages3-8 and 3-9	page 3-28
SO84.170.0		170 A	210 A		
SO84.250.0	BG7	-	250 A	page 3-10	page 3-30
SO84.325.0		-	325 A		
SO84.450.0		-	450 A		

ServoOne single-axis system - Order codes

Article designation	SO8	4	.	006	.	0	0	2	1	.	0	0	0	0	.	X
ServoOne																
System voltage	3 x 400 V	4														
	1 x 230 V	2														
Rated current	BG1 4 A			004												
	BG1 6 A			006												
	BG2 8 A			008												
	BG2 12 A			012												
	BG3 16 A			016												
	BG3 20 A			020												
	BG4 24 A			024												
	BG4 32 A			032												
	BG5 45 A			045												
	BG5 60 A			060												
	BG5 72 A			072												
	BG6 90 A			090												
	BG6 110 A			110												
	BG6a 143 A			143												
	BG6a 170 A			170												
	BG7 250 A			250												
	BG7 325 A			325												
	BG7 450 A			450												
Mains supply	AC					0										
Safety systems	STO						0									
	Integrated safety control						1									
Option 1 Communication	Without							0								
	Sercos II							1								
	PROFIBUS							2								
	EtherCAT							3								
	CANopen							4								
	CANopen + 2 AO							5								
	PROFINET IRT							7								
	Sercos III							8								
Option 2 Technology	Without								0							
	second SinCos encoder								1							
	TTL encoder simulation / TTL master encoder								2							
	TwinSync communication								3							
	SSI encoder simulation								4							
	TTL encoder with commutation signals								5							
	Digital input/output (DIO) expansion[1)]								8							
	Second safe SinCos encoder								A							
	Second safe SSI encoder								B							
	Second safe axis monitor (SinCos)								C							
Housing/cooling method	Air-cooled (standard)									0						
	Air-cooled with int. braking resistor									1						
	Liquid-cooled with int. braking resistor									7						
	Liquid-cooled (standard)									8						
Function package	Basic (without additional function package)										0					
	iPlc										1					
	HF										7					
	HF + iPlc										8					
Special design	None											0				
Protection	Standard												0			
	PCBs with protective coating (from SO84.045 standard)												1			
Hardware version	(may be multi-digit)															X

1) In preparation

ServoOne single-axis system - Equipment

Equipment - Servocontrollers BG1 to BG5

Equipment - Servocontrollers BG6 to BG6a

Equipment - Servocontroller BG7

ServoOne single-axis system - Current capacity

The maximum permissible servocontroller rated current and peak current are dependent on the mains voltage, the motor cable length, the power stage switching frequency and the ambient temperature. If the conditions change, the maximum permissible current capacity of the servocontrollers also changes.

ServoOne servocontroller BG1 (1-phase, air-cooled)

Type	Switching frequency of power stage	Ambient temperature	Rated current at 1 x 230 V AC	Peak current [A_{eff}] at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent mode	for time [1]
	[kHz]	[°C]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO82.004.0xxx.0 (BG1)	4	45	4.0	8.0	8.0	8.0	10
	8	40	4.0	8.0	8.0	8.0	
	12		3.7	7.4	7.4	7.4	
	16		2.7	5.4	5.4	5.4	

1) Shutdown as per I^2t characteristic
Figures apply to motor cable length ≤10 m

ServoOne servocontrollers BG1 to BG4 (air and liquid cooled)

Type	Switching frequency of power stage	Ambient temperature	Rated current			Peak current [A_{eff}] [1]			
			at 3 x 230 V AC at 3 x 400 V AC	at 3 x 460 V AC	at 3 x 480 V AC	at rotating field frequency rising in linear mode 0 to 5 Hz		for intermittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.004.0xxx.0 (BG1) *Air-cooled only*	4	45	4.0	4.0	4.0	8.0	8.0	8.0	10
	8	40	4.0	4.0	4.0	8.0	8.0	8.0	
	12		3.7	2.9	2.7	7.4	7.4	7.4	
	16		2.7	1.6	1.3	5.4	5.4	5.4	
SO84.006.0xxx.0 (BG1) *Air-cooled only*	4	45	6.0	6.0	6.0	12.0	12.0	12.0	10
	8	40	6.0	6.0	6.0	12.0	12.0	12.0	
	12		5.5	4.4	4.0	11.0	11.0	11.0	
	16		4.0	2.4	1.9	8.0	8.0	8.0	
SO84.008.0xxx.0 (BG2) *Air-cooled only*	4	45	8.0	8.0	8.0	16.0	16.0	16.0	10
	8	40	8.0	7.2	6.9	16.0	16.0	16.0	
	12		6.7	5.3	4.9	13.4	13.4	13.4	
	16		5.0	3.7	3.3	10.0	10.0	10.0	
SO84.012.0xxx.0 (BG2) *Air-cooled only*	4	45	12.0	12.0	12.0	24.0	24.0	24.0	10
	8	40	12.0	10.8	10.4	24.0	24.0	24.0	
	12		10.0	8.0	7.4	20.0	20.0	20.0	
	16		7.6	5.6	5.0	15.2	15.2	15.2	
SO84.016.0xxx.x (BG3)	4	45	16.0	16.0	16.0	32.0	32.0	32.0	10
	8	40	16.0	13.9	13.3	32.0	32.0	32.0	
	12		11.0	8.8	8.0	22.0	22.0	22.0	
	16		8.0	5.9	5.2	16.0	16.0	16.0	
SO84.020.0xxx.x (BG3)	4	45	20.0	20.0	20.0	40.0	40.0	40.0	10
	8	40	20.0	17.4	16.6	40.0	40.0	40.0	
	12		13.8	11.0	10.0	27.6	27.6	27.6	
	16		10.0	7.4	6.5	20.0	20.0	20.0	
SO84.024.0xxx.x (BG4)	4	45	24.0	24.0	24.0	48.0	48.0	48.0	10
	8	40	24.0	21.0	20.0	48.0	48.0	48.0	
	12		15.8	12.4	11.3	31.6	31.6	31.6	
	16		11.3	9.2	8.4	22.6	22.6	22.6	
SO84.032.0xxx.x (BG4)	4	45	32.0	32.0	32.0	64.0	64.0	64.0	10
	8	40	32.0	28.0	26.7	64.0	64.0	64.0	
	12		21.0	16.5	15.0	42.0	42.0	42.0	
	16		15.0	12.2	11.2	30.0	30.0	30.0	

1) When supplied with 400 V AC at max. 70% precharge
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤10m.

ServoOne servocontrollers BG5 to BG6a (air cooling)

Type	Switching frequency of power stage	Ambient temperature	Rated current			Peak current [A_{eff}] 1)			
			at 3 x 400 V AC	at 3 x 460 V AC	at 3 x 480 V AC	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent mode	for time 2)
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.045.0xxx.0 (BG5)	4	45	45	42	41	90	90	90	3
	8	40	45	42	41	90	90	90	
	12		45	42	41	90	90	90	
	16		42	39	38	84	84	84	
SO84.060.0xxx.0 (BG5)	4	45	60	56	54	120	120	120	3
	8	40	60	56	54	120	120	120	
	12		58	54	52	116	116	116	
	16		42	39	38	84	84	84	
SO84.072.0xxx.0 (BG5)	4	45	72	67	65	144	144	144	3
	8	40	72	67	65	144	144	144	
	12		58	54	52	116	116	116	
	16		42	39	38	84	84	84	
SO84.090.0xxx.0 (BG6)	4	45	90	83	81	170	180	180	30
	8	40	90	83	81	134	180	180	
	12		90	83	81	107	144	144	
	16		72	67	65	86	115	115	
SO84.110.0xxx.0 (BG6)	4	45	110	102	99	170	220	220	30
	8	40	110	102	99	134	165	165	
	12		90	83	81	107	144	144	
	16		72	67	65	86	115	115	
SO84.143.0xxx.0 (BG6a)	4	45	143	132	129	190	286	286	30
	8	40	143	132	129	151	215	215	
	12		115	106	104	121	172	172	
	16		92	85	83	97	138	138	
SO84.170.0xxx.0 (BG6a)	4	45	170	157	153	190	315	315	10
	8	40	170	157	153	151	220	220	10
	12	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-

1) When supplied with 400 V AC at max. 70% precharge
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤10m.

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ServoOne servocontrollers BG5 to BG6a (liquid cooling)

Type	Switching frequency of power stage	Ambient temperature	Rated current			Peak current [A_{eff}] [1]			
			at 3 x 400 V AC	at 3 x 460 V AC	at 3 x 480 V AC	at rotating field frequency rising in linear mode 0 to 5 Hz		for intermittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.045.0xxx.1 (BG5)	4	45	53	49	48	90	90	90	30
	8		53	49	48	90	90	90	
	12		53	49	48	90	90	90	
	16		49	45	44	84	84	84	
SO84.060.0xxx.1 (BG5)	4	45	70	65	63	120	120	120	30
	8		70	65	63	120	120	120	
	12		68	63	61	116	116	116	
	16		49	45	44	84	84	84	
SO84.072.0xxx.1 (BG5)	4	45	84	78	76	144	144	144	30
	8		84	78	76	144	144	144	
	12		68	63	61	116	116	116	
	16		49	45	44	84	84	84	
SO84.090.0xxx.1 (BG6)	4	45	110	102	99	205	220	220	30
	8		110	102	99	165	187	187	
	12		110	102	99	132	165	165	
	16		90	83	81	106	135	135	
SO84.110.0xxx.1 (BG6)	4	45	143	132	129	230	286	286	30
	8		143	132	129	190	215	215	
	12		114	105	103	152	172	172	
	16		91	84	82	122	138	138	
SO84.143.0xxx.1 (BG6a)	4	45	170	157	153	230	340	340	10
	8		170	157	153	190	255	255	
	12		136	126	122	152	204	204	
	16		109	101	98	122	163	163	
SO84.170.0xxx.1 (BG6a)	4	45	210	194	189	230	340	340	10
	8		210	194	189	190	255	255	
	12		168	155	151	152	204	204	
	16		134	124	121	122	163	163	

1) When supplied with 400 V AC at max. 70% precharge
2) Shutdown as per I^2t characteristic
Figures apply to motor cable length ≤10 m

ServoOne servocontroller BG7 (liquid-cooled, 400 V AC) - 2-16 kHz

Type	Switching frequency of power stage	Ambient temperature	Rated current	Peak current [A_{eff}]			
			at 565 V DC (400 V AC) [1]	at Rotating field frequency rising in linear mode 0 to 5 Hz		for intermittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.250.1xxx.8 (BG7)	2	40	250		425		30
	4		250		375		
	8		250		250	375	
	12		200		200	300	
	16		175		175	260	
SO84.325.1xxx.8 (BG7)	2	40	325		552		30
	4		325		485		
	8		325		325	485	
	12		300		300	450	
	16		270		270	400	
SO84.450.1xxx.8 (BG7)	2	40	450		765		30
	4		450		675		
	8		450		450	675	
	12		400		400	600	
	16		-		-	-	

1) When supplied with AC servocontroller
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

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ServoOne servocontroller BG7 (liquid-cooled, 460 V AC) - 2-16 kHz

Type	Switching frequency of power stage	Ambient temperature	Rated current	Peak current [A_{eff}]			
			at 650 V DC (460 V AC) [1]	at Rotating field frequency rising in linear mode 0 to 5 Hz		for intermittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.250.1xxx.8 (BG7)	2	40	231	425			30
	4		231	375			
	8		231	231		346	
	12		185	185		277	
	16		162	162		243	
SO84.325.1xxx.8 (BG7)	2	40	300	552			30
	4		300	485			
	8		300	300		450	
	12		277	277		415	
	16		250	250		375	
SO84.450.1xxx.8 (BG7)	2	40	416	765			30
	4		416	675			
	8		416	416		624	
	12		370	370		555	
	16		-	-		-	

1) When supplied with AC servocontroller
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

ServoOne servocontroller BG7 (liquid-cooled, 480 V AC) - 2-16 kHz

Type	Switching frequency of power stage	Ambient temperature	Rated current	Peak current [A_{eff}]			
			at 678 V DC (480 V AC) [1]	at Rotating field frequency rising in linear mode 0 to 5 Hz		for intermittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.250.1xxx.8 (BG7)	2	40	225	425			30
	4		225	375			
	8		225	225		337	
	12		180	180		270	
	16		157	157		235	
SO84.325.1xxx.8 (BG7)	2	40	292	552			30
	4		292	485			
	8		292	292		438	
	12		270	270		405	
	16		243	243		364	
SO84.450.1xxx.8 (BG7)	2	40	405	765			30
	4		405	675			
	8		405	405		607	
	12		360	360		540	
	16		-	-		-	

1) When supplied with AC servocontroller
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

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Space for your own notes

ServoOne single-axis system - Ambient conditions

Ambient conditions

Protection	IP20 except terminals (IP00)
Accident prevention regulations	according to local regulations (in Germany e.g. BGV A3)
Mounting height	up to 1000 m above MSL, over 1000 m above MSL with power reduction (1 % per 100 m, max. 2000 m above MSL)
Pollution severity	2
Type of installation	Built-in unit, only for vertical installation in a cabinet with min. IP4x protection, when using STO safety function min. IP54.

Climatic conditions

in transit	as per EN 61800-2, IEC 60721-3-2 class 2K3 [1]		
	Temperature		-25 °C to +70 °C
	Relative air humidity		95% at max. +40 °C
in storage	as per EN 61800-2, IEC 60721-3-1 classes 1K3 and 1K4 [2]		
	Temperature		-25 °C to +55 °C
	Relative humidity		5 to 95%
in operation	as per EN 61800-2, IEC 60721-3-3 class 3K3 [3]		
	Temperature	Air cooling	**BG1** -10 °C to +45 °C (4 kHz) -10 °C to +40 °C (8, 12, 16 kHz) **BG2 to BG4** -10 °C to +45 °C (4 kHz), to 55 °C with power reduction (5%/°C) -10 °C to +40 °C (8, 12, 16 kHz), to 55 °C with power reduction (4%/°C) **BG5 to BG6a** -10 °C to +45 °C (4 kHz) -10 °C to +40 °C (8, 12, 16 kHz), to 55 °C with power reduction (2%/°C)
		Liquid cooling	**BG3 and BG4** -10 °C to +45 °C (4 kHz), to 55 °C with power reduction (5%/°C) -10 °C to +40 °C (8, 12, 16 kHz), to 55 °C with power reduction (4%/°C) **BG5 to BG6a** -10 °C to +45 °C (4, 8, 12, 16 kHz), to 55 °C with power reduction (2%/°C) **BG7** -10 °C to +40 °C (2, 4 kHz), to 55 °C with power reduction (2%/°C)
	Relative humidity		5 to 85% without condensation

1) The absolute humidity is limited to max. 60 g/m³. This means, at 70 °C for example, that the relative humidity may only be max. 40%.
2) The absolute humidity is limited to max. 29 g/m³. So the maximum values for temperature and relative humidity stipulated in the table must not occur simultaneously.
3) The absolute humidity is limited to max. 25 g/m³. That means that the maximum values for temperature and relative humidity stipulated in the table must not occur simultaneously.

Mechanical conditions

Vibration limit in transit	as per EN 61800-2, IEC 60721-3-2 class 2M1		
	Frequency [Hz]	**Amplitude [mm]**	**Acceleration [m/s²]**
	2 ≤ f < 9	3.5	Not applicable
	9 ≤ f < 200	Not applicable	10
	200 ≤ f < 500	Not applicable	15
Shock limit in transit	as per EN 61800-2, IEC 60721-2-2 class 2M1		
	Drop height of packed device max. 0.25 m		
Vibration limits of the system [1]	as per EN 61800-2, IEC 60721-3-3 class 3M1		
	Frequency [Hz]	**Amplitude [mm]**	**Acceleration [m/s²]**
	2 ≦ f < 9	0.3	Not applicable
	9 ≦ f < 200	Not applicable	1

1) Note: The devices are only designed for stationary use. The drive controllers must not be installed in areas where they would be permanently exposed to vibrations.

ServoOne single-axis system - Certifications

CE mark

The ServoOne servocontrollers conform to the requirements of the Low Voltage Directive 2006/95/EC and the product standard EN 61800-5-1.

They thus conform to the requirements for installation in a machine or plant under the terms of the Machinery Directive 2006/42/EC.

The servocontrollers are accordingly CE marked. The CE mark on the type plate indicates conformity with the above Directives.

UL certification

For the ServoOne single-axis controllers UL certification has been obtained. Exception: BG7 (S084.250 - S084.450) with integrated braking resistor.

EMC certificate

All servocontrollers have an aluminium housing with an anodised finish (BG1 to BG4) or an aluminium rear panel made of aluminised/ galvanised sheet steel (BG5 to BG7) to enhance interference immunity in accordance with EN 61800-3, environment classes 1 and 2.

To limit line-borne interference emission to the permissible level, the ServoOne single-axis servocontrollers BG1 to BG5 are fitted with integral mains filters. For ServoOne single-axis controllers BG6 to BG7 external mains filters are available (see section 9 „Accessories“). This ensures compliance with the EMC Directive 2004/108/EC:

- Public low-voltage network: ”first environment” (residential C2) up to 10 m motor cable length
- Industrial low-voltage network: ”second environment” (industrial C3) up to 25 m motor cable length

Additional external mains filters are available for all single-axis controllers BG1 to BG5 (see section 9 „Accessories“).

STO

The STO (Safe Torque Off) safety function integrated into the ServoOne servocontroller is certified according to the requirements of

- EN ISO 13849-1 ”PL e” and
- EN 61508 / EN 62061 "SIL3".

Acceptance testing is carried out by the accredited certification agency, TÜV Rheinland.

NOTE: For the servocontrollers up to a rated current of 210 A (BG6a with liquid cooling) certification has been obtained. For all other servocontrollers (rated current ≥250 A) certification is currently in preparation.

Servocontrollers 4 A to 6 A (BG1) - Technical data

Type SO84.004.0

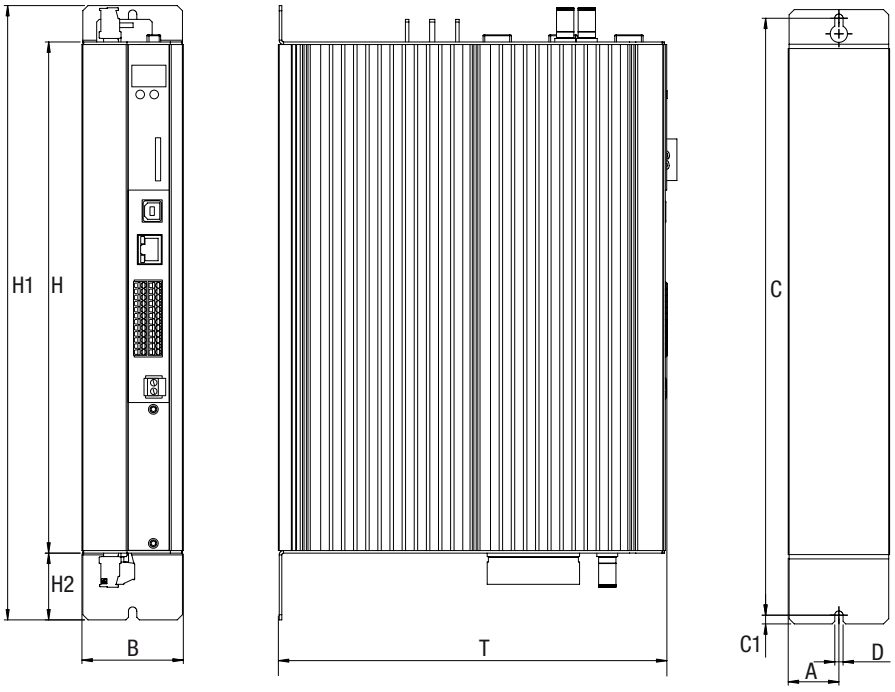
Article designation / Technical data	SO82.004.0	SO84.004.0	SO84.006.0
Output, motor side			
Voltage	3-phase U_{mains}		
Rated current, effective (I_N) [1]	4 A	4 A [2]	6 A [2]
Peak current	see table on page 3-6	see table on page 9-1	
Rotating field frequency	0 ... 400 Hz		
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 8 kHz at 40° C cooling air temperature)		
Input, mains side			
Mains voltage (U_{mains})	1 x 230 V ±10%	(3 x 230 V/3 x 400 V/3 x 460 V/3 x 480 V) ±10%	
Device power connection (with mains choke)	1.6 kVA	2.8 kVA [2]	4.2 kVA [2]
Current (with mains choke)	9.5 A [3]	4.2 A [2]	6.4 A [2]
Asymmetry of mains voltage	-	±3% max.	
Frequency	50/60 Hz ±10%		
Power loss at I_N [1]	85 W	96 W [2]	122 W [2]
DC link			
Capacitance	1740 µF	400 µF	
Braking chopper switch-on threshold	390 V DC	650 V DC [2]	
Minimum ohmic resistance of an externally installed braking resistor [4]	72 Ω		
Brake chopper continuous power with external braking resistor	2.1 kW	5.9 kW	
Brake chopper peak power with external braking resistor	2.1 kW	5.9 kW	
Optional: Internal braking resistor	PTC		
Brake chopper continuous power with internal braking resistor	Dependent on the effective loading of the controller in the corresponding application		
Brake chopper peak power with external braking resistor	1.7 kW	4.7 kW	

1)Data referred to 8 kHz switching frequency
2) Data referred to 3 x 400 V AC mains voltage
3) Without mains choke
4) Connection of an external braking resistor for device variant with internal braking resistor (SO8x.xxx.xxxx.1xxx) not permitted.

Mechanism, BG1	SO82.004.0	SO84.004.0	SO84.006.0
Cooling method	Air-cooled (wall-mounted)		
Protection	IP20 except terminals (IP00)		
Cooling air temperature	max. 45 °C (at 4 kHz power stage switching frequency)		
Weight	3.4 kg		
Mounting method	Vertical mounting with unhindered air flow		
End-to-end mounting of multiple servocontrollers	Direct end-to-end mounting		

Dimensions - BG1 [mm]	
B (width)	58.5
H (height)	295 (without terminals)
T (depth)	224 (without terminals)
A	29.25
C / C1	344.5 / 5
D Ø	4.8
H1 / H2	355 / 38.5

Dimensional drawings, BG1, air-cooled



Matching accessories (see section 9 f.)

Controller	SO82.004.0	SO84.004.0	SO84.006.0
Mains choke	LR32.14-UR	LR34.4-UR	LR34.6-UR
Braking resistor		BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W) BR-090.10.650-UR (1000 W)	
Mains filter	-	EMC7.1-UR	EMC7.1-UR

Servocontrollers 8 A to 12 A (BG2) - Technical data

Type SO84.008.0

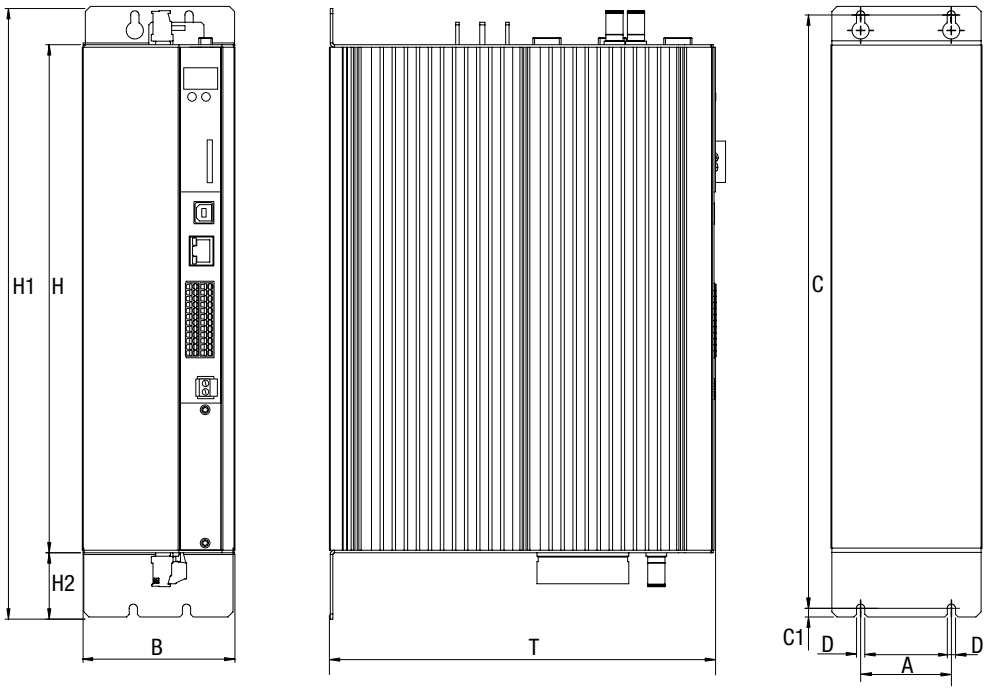
Technical data \ Article designation	SO84.008.0	SO84.012.0
Output, motor side		
Voltage	3-phase U_{mains}	
Rated current, effective (I_N)	8 A [1]	12 A [1]
Peak current	see table on page 3-7	
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 8 kHz at 40° C cooling air temperature)	
Input, mains side		
Mains voltage (U_{mains})	(3 x 230 V/3 x 400 V/3 x 460 V/3 x 480 V) ±10%	
Device connected load (with mains choke)	5.9 kVA [1]	8.8 kVA [1]
Current (with mains choke)	8.7 A [1]	13.1 A [1]
Asymmetry of mains voltage	±3% max.	
Frequency	50/60 Hz ±10%	
Power loss at I_N	175 W [1]	240 W [1]
DC link		
Capacitance	725 µF	
Braking chopper switch-on threshold	650 V DC [1]	
Minimum ohmic resistance of an externally installed braking resistor [2]	39 Ω	
Brake chopper continuous power with external braking resistor	11 kW	
Brake chopper peak power with external braking resistor	11 kW	
Optional: Internal braking resistor	90 Ω	
Brake chopper continuous power with internal braking resistor	Dependent on the effective loading of the controller in the corresponding application	
Brake chopper peak power with external braking resistor	4.7 kW [1]	

1) Data referred to mains voltage 3 V x 400 V AC and 8 kHz switching frequency
2) Connection of an external braking resistor for device variant with internal braking resistor (SO8x.xxx.xxxx.1xxx) not permitted.

Mechanism, BG2	SO84.008.0	SO84.012.0
Cooling method	Air-cooled (wall-mounted)	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	4.9 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servo-controllers	Direct end-to-end mounting	

Dimensions - BG2 [mm]	
B (width)	90
H (height)	295 (without terminals)
T (depth)	224 (without terminals)
A	50
C / C1	344.5 / 5
D Ø	4.8
H1 / H2	355 / 38.5

Dimensional drawings, BG2, air-cooled



Matching accessories (see section 9 f.)

Controller	SO84.008.0	SO84.012.0
Mains choke	LR34.8-UR	LR34.14-UR
Braking resistor	BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W) BR-090.10.650-UR (1000 W)	
Mains filter	EMC16.1-UR	EMC16.1-UR

Servocontrollers 16 A to 20 A (BG3) - Technical data

Type SO84.016.0

Technical data \ Article designation	SO84.016.0	SO84.020.0
Output, motor side		
Voltage	3-phase U_{mains}	
Rated current, effective (I_N)	16 A [1]	20 A [1]
Peak current	see table on page 3-7	
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 8 kHz at 40° C cooling air temperature)	
Input, mains side		
Mains voltage (U_{mains})	(3 x 230 V/3 x 400 V/3 x 460 V/3 x 480 V) ±10%	
Device connected load (with mains choke)	11.1 kVA [1]	13.9 kVA [1]
Current (with mains choke)	17.3 A [1]	21.6 A [1]
Asymmetry of mains voltage	±3% max.	
Frequency	50/60 Hz ±10%	
Power loss at I_N	330 W [1]	400 W [1]
DC link		
Capacitance	1230 µF	
Braking chopper switch-on threshold	650 V DC [1]	
Minimum ohmic resistance of an externally installed braking resistor [2]	20 Ω	
Brake chopper continuous power with external braking resistor	21 kW	
Brake chopper peak power with external braking resistor	21 kW	
Optional: Internal braking resistor	90 Ω	
Brake chopper continuous power with internal braking resistor	Dependent on the effective loading of the controller in the corresponding application	
Brake chopper peak power with external braking resistor	4.7 kW [1]	

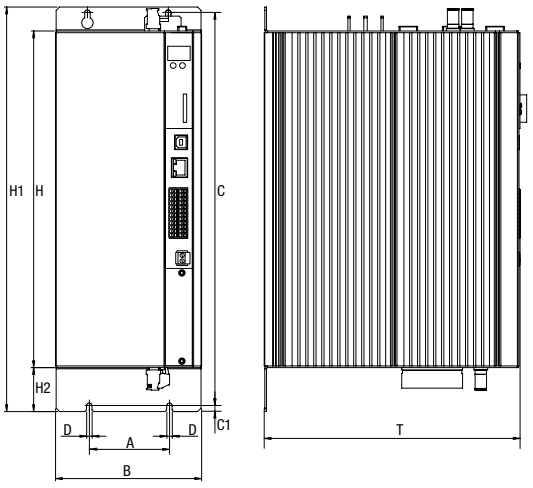
1) Data referred to mains voltage 3 V x 400 V AC and 8 kHz switching frequency

2) Connection of an external braking resistor for device variant with internal braking resistor (SO8x.xxx.xxxx.1xxx or SO8x.xxx.xxxx.7xxx) not permitted.

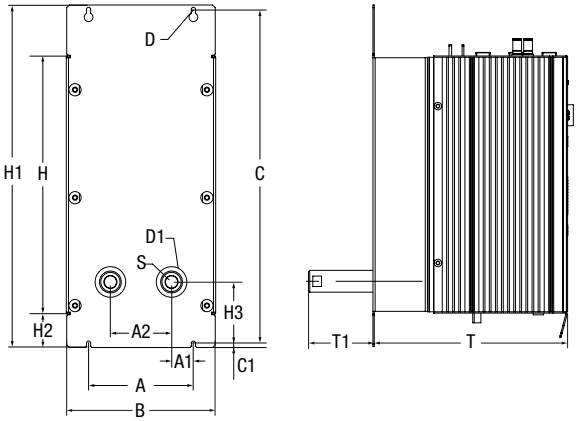
Mechanism, BG3	SO84.016.0	SO84.020.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	6.5 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servo-controllers	Direct end-to-end mounting	

Dimensions - BG3 [mm]	
B (width)	130
H (height)	295 (without terminals)
T (depth)	224 (without terminals)
A / A1 / A2	80 / 10 / 60
C (air/liquid cooled)	344.5 / 382
C1	5
D Ø	4.8
D1 Ø (hole for pipe socket)	48
H1 (air/liquid cooled)	355 / 392
H2 / H3	38.5 / 75
S	3/8 inch (inside thread)
D1	74

Dimensional drawings, BG3, air-cooled



Dimensional drawings BG3, liquid-cooled



Matching accessories (see section 9 f.)

Controller	SO84.016.0	SO84.020.0
Mains choke	LR34.17-UR	LR34.24-UR
Braking resistor	BR-026.01.540-UR (35 W) BR-026.02.540-UR (150 W) BR-026.03.540-UR (300 W) BR-026.10.650-UR (1000 W)	
Mains filter	EMC16.1-UR	EMC25.1-UR

Servocontrollers 24 A to 32 A (BG4) - Technical data

Type SO84.024.0

Technical data \ Article designation	SO84.024.0	SO84.032.0
Output, motor side		
Voltage	3-phase U_{mains}	
Rated current, effective (I_N)	24 A [1]	32 A [1]
Peak current	see table on page 3-7	
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 8 kHz at 40° C cooling air temperature)	
Input, mains side		
Mains voltage (U_{mains})	(3 x 230 V/3 x 400 V/3 x 460 V/3 x 480 V) ±10%	
Device connected load (with mains choke)	16.6 kVA [1]	22.2 kVA [1]
Current (with mains choke)	26.2 A [1]	34.9 A [1]
Asymmetry of mains voltage	±3% max.	
Frequency	50/60 Hz ±10%	
Power loss at I_N	475 W [1]	515 W [1]
DC link		
Capacitance	2000 µF	
Braking chopper switch-on threshold	650 V DC [1]	
Minimum ohmic resistance of an externally installed braking resistor [2]	12 Ω	
Brake chopper continuous power with external braking resistor	35 kW	
Brake chopper peak power with external braking resistor	35 kW	
Optional: Internal braking resistor	90 Ω	
Brake chopper continuous power with internal braking resistor	Dependent on the effective loading of the controller in the corresponding application	
Brake chopper peak power with external braking resistor	4.7 kW [1]	

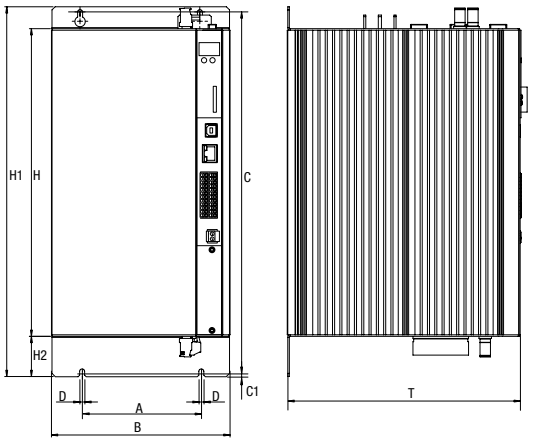
1) Data referred to mains voltage 3 V x 400 V AC and 8 kHz switching frequency

2) Connection of an external braking resistor for device variant with internal braking resistor (SO8x.xxx.xxxx.1xxx or SO8x.xxx.xxxx.7xxx) not permitted.

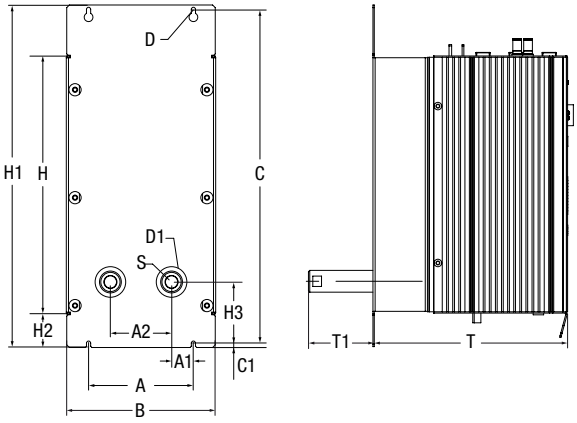
Mechanism, BG4	SO84.024.0	SO84.032.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	7.5 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servo-controllers	Direct end-to-end mounting	

Dimensions - BG4 [mm]	
B (width)	171
H (height)	295 (without terminals)
T (depth)	224 (without terminals)
A / A1 / A2	120 / 25 / 70
C (air/liquid cooled)	344.5 / 382
C1	5
D Ø	4.8
D1 Ø (hole for pipe socket)	48
H1 (air/liquid cooled)	355 / 392
H2 / H3	38.5 / 70
S	3/8 inch (inside thread)
D1	74

Dimensional drawings, BG4, air-cooled



Dimensional drawings BG4, liquid-cooled



Matching accessories (see section 9 f.)

Controller	SO84.024.0	SO84.032.0
Mains choke	LR 34.24-UR	LR34.32-UR
Braking resistor	BR-026.01.540-UR (35 W) BR-026.02.540-UR (150 W) BR-026.03.540-UR (300 W) BR-026.10.650-UR (1000 W)	
Mains filter	EMC25.1-UR	EMC35.1-UR

Servocontrollers 45 A to 84 A (BG5) - Technical data

Type SO84.045.0 (air-cooled)

Article designation / Technical data	SO84.045.0		SO84.060.0		SO84.072.0	
	Air cooling	Liquid cooling	Air cooling	Liquid cooling	Air cooling	Liquid cooling
Output, motor side						
Voltage	3-phase U_{mains}					
Rated current, effective (I_N)	45 A [1]	53 A [1]	60 A [1]	70 A [1]	72 A [1]	84 A [1]
Peak current	see tables on page 3-8(air cooling) and 3-9(liquid cooling)					
Rotating field frequency	0 ... 400 Hz					
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 8 kHz at 40° C cooling air temperature)					
Input, mains side						
Mains voltage (U_{mains})	(3 x 230 V/3 x 400 V/3 x 460 V/3 x 480 V) ±10%					
Device power connection (with mains choke)	31 kVA [1]	37 kVA [1]	42 kVA [1]	50 kVA [1]	50 kVA [1]	58 kVA [1]
Current (with mains choke)	45 A [1]	53 A [1]	60 A [1]	70 A [1]	72 A [1]	84 A [1]
Asymmetry of mains voltage	±3% max.					
Frequency	50/60 Hz ±10%					
Power loss at I_N	610 W [1]	690 W [1]	830 W [1]	930 W [1]	1010 W [1]	1130 W [1]
DC link						
Capacitance	430 µF		900 µF			
Braking chopper switch-on threshold	820 V DC					
Minimum ohmic resistance of an externally installed braking resistor	18 Ω	10 Ω	18 Ω	10 Ω	13 Ω	10 Ω
Brake chopper continuous power with external braking resistor	37 kW	67 kW	37 kW	67 kW	52 kW	67 kW
Brake chopper peak power with external braking resistor	37 kW	67 kW	37 kW	67 kW	52 kW	67 kW
Optional: Internal braking resistor	-	20 Ω	-	10 Ω	-	10 Ω
Brake chopper continuous power with internal braking resistor	-	675 W	-	1350 W	-	1350 W
Brake chopper peak power with external braking resistor	-	34 kW	-	67 kW	-	67 kW

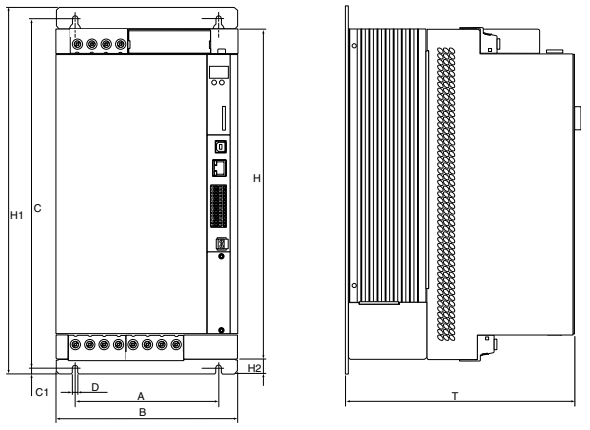
1) Data referred to mains voltage 3 V x 400 V AC and 8 kHz switching frequency

ID no.: 1100.24B.5-00 Date: 10/2013

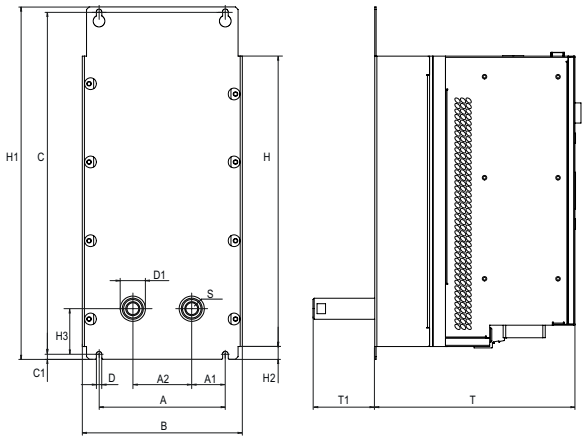
Mechanism, BG5	SO84.045.0	SO84.060.0	SO84.072.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled		
Protection	IP20 except terminals (IP00)		
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)		
Weight (air/liquid cooled)	13 kg / 16.5 kg		
Mounting method	Vertical mounting with unhindered air flow		
End-to-end mounting of multiple servocontrollers	Possible at a distance of 20 mm (air-cooled) or 2 mm (liquid-cooled)		

Dimensions - BG5 [mm]	
B (width)	190
H (height) (air/liquid cooled)	345 / 346.5 (without terminals)
D (depth) (air/liquid cooled)	240 / 198.3 (without terminals)
A (air/liquid cooled)	150 / 148
A1 / A2	39 / 70
C (air/liquid cooled)	365 / 377.25
C1	6
D Ø ((air/liquid cooled))	5.6 / 7
D1 Ø (hole for pipe socket)	48
H1 (air/liquid cooled)	387.5 / 420
H2 / H3	15 / 53.75
S	3/8 inch (inside thread)
D1	73.5

Dimensional drawings, BG5, air-cooled



Dimensional drawings, BG5, liquid-cooled



Matching accessories (see section 9 f.)

Controller	SO84.045.0		SO84.060.0		SO84.072.0	
	Air cooling	Liquid cooling	Air cooling	Liquid cooling	Air cooling	Liquid cooling
Mains choke	LR34.44-UR	LR34.58-UR		LR34.70-UR		LR34.88-UR
Braking resistor	BR-026.01.540-UR (35 W) BR-026.02.540-UR (150 W) BR-026.03.540-UR (300 W) BR-026.10.650-UR (1000 W)		BR-026.20.650-UR (2000 W) BR-020.03.540-UR (300 W) BR-015.03.540-UR (300 W)		*(not for SO84.045.0 und SO84.060.0 with air cooling)*	
Mains filter	EMC63.1-UR		EMC100.1-UR			

Servocontrollers 90 A to 143 A (BG6) - Technical data

Type SO84.110.0 (air-cooled)

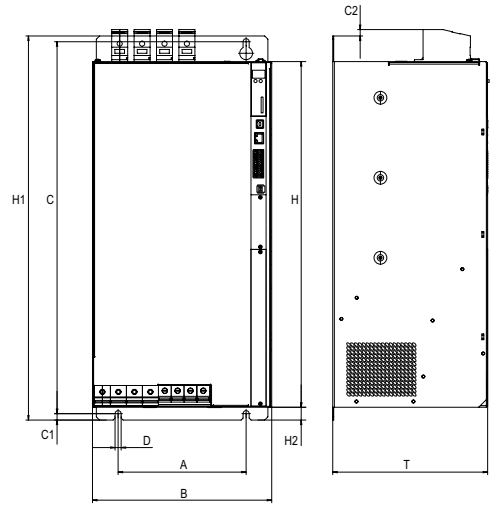
Article designation / Technical data	SO84.090.0		SO84.110.0	
	Air cooling	Liquid cooling	Air cooling	Liquid cooling
Output, motor side				
Voltage	3-phase U_{mains}			
Rated current, effective (I_N)	90 A [1)]	110 A [1)]	110 A [1)]	143 A [1)]
Peak current	see table on page 3-8 (air cooling) and page 3-9(liquid cooling)			
Rotating field frequency	0 ... 400 Hz			
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 8 kHz at 40° C cooling air temperature)			
Input, mains side				
Mains voltage (U_{mains})	(3 x 230 V/3 x 400 V/3 x 460 V/3 x 480 V) -15%/+10%			
Device connected load (with mains choke)	62 kVA [1)]	76 kVA [1)]	76 kVA [1)]	99 kVA [1)]
Current (with mains choke)	90 A [1)]	110 A [1)]	110 A [1)]	143 A [1)]
Asymmetry of mains voltage	±3% max.			
Frequency	50 / 60 Hz ±10%			
Power loss at I_N	1300 W [1)]	1500 W [1)]	1600 W [1)]	1940 W [1)]
DC link				
Capacitance	1060 µF	2120 µF	2120 µF	
Braking chopper switch-on threshold	820 V DC			
Minimal ohmic resistance of an externally installed Braking resistor	12 Ω		10 Ω	
Brake chopper continuous power with external braking resistor	56 kW	56 kW	65 kW	67 kW
Brake chopper peak power with external braking resistor	56 kW	56 kW	67 kW	67 kW
Optional: Internal braking resistor	-	7.5 Ω	-	7.5 Ω
Brake chopper continuous power with internal braking resistor	-	2650 W	-	2650 W
Brake chopper peak power with external braking resistor	-	90 kW	-	90 kW

1) Data referred to mains voltage 3 V x 400 V AC and 8 kHz switching frequency

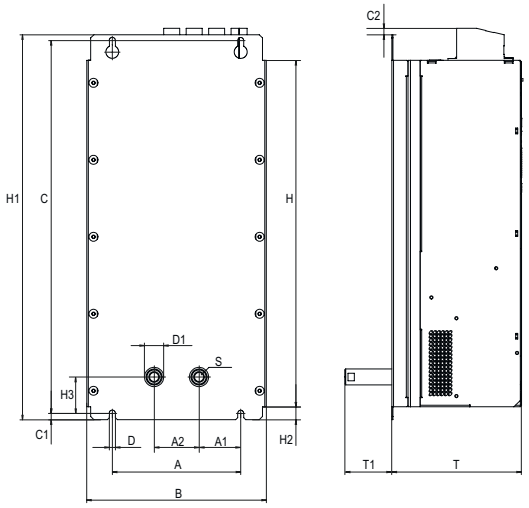
Mechanism, BG6	SO84.090.0	SO84.110.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight (air/liquid cooled)	28 kg / 31.5 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	Possible at a distance of 40 mm (air-cooled) or 2 mm (liquid-cooled)	

Dimensions - BG6 [mm]	
B (width)	280
H (height)	540 (without terminals)
D (depth) (air/liquid cooled)	242 / 202 (without terminals)
A / A1 / A2	200 / 65 / 70
C / C1 / C2	581 / 10 / 10
D Ø	9.5
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	600 / 20 / 56.5
S	3/8 inch (inside thread)
D1	73.5

Dimensional drawings, BG6, air-cooled



Dimensional drawings, BG6, liquid-cooled



Matching accessories (see section 9 f.)

Controller	SO84.090.0		SO84.110.0	
	Air cooling	Liquid cooling	Air cooling	Liquid cooling
Mains choke	LR 34.88-UR	LR34.108-UR		LR34.140-UR
Braking resistor	BR-026.01.540-UR (35 W) BR-026.02.540-UR (150 W) BR-026.03.540-UR (300 W) BR-026.10.650-UR (1000 W)		BR-026.20.650-UR (2000 W) BR-020.03.540-UR (300 W) BR-015.03.540-UR (300 W)	
Mains filter	EMC100.1-UR	EMC150.1-UR		

Servocontrollers 143 A to 210 A (BG6a) - Technical data

Type SO84.170.0 (air-cooled)

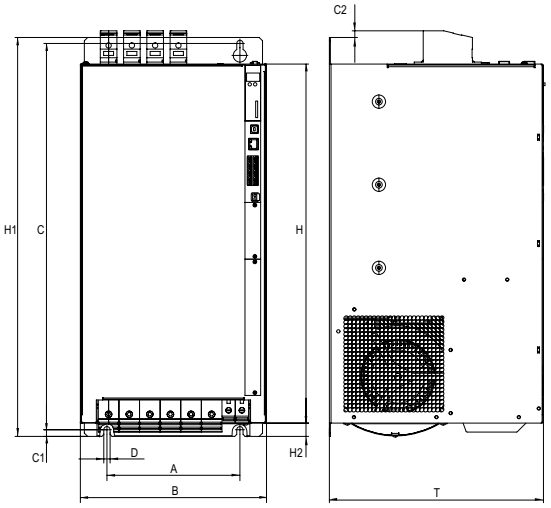
Article designation / Technical data	SO84.143.0		SO84.170.0	
	Air cooling	Liquid cooling	Air cooling	Liquid cooling
Output, motor side				
Voltage	3-phase U_{mains}			
Rated current, effective I_N	143 A [1)]	170 A [1)]	170 A [1)]	210 A[1)]
Peak current	see table on page 3-8 (air cooling) and page 3-9(liquid cooling)			
Rotating field frequency	0 ... 400 Hz			
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 8 kHz at 40° C cooling air temperature)			
Input, mains side				
Mains voltage (U_{mains})	(3 x 230 V/3 x 400 V/3 x 460 V/3 x 480 V) -15%/+10%			
Device connected load (with mains choke)	99 kVA [1)]	118 kVA [1)]	118 kVA [1)]	128 kVA [1)]
Current (with mains choke)	143 A [1)]	170 A [1)]	170 A [1)]	185 A [1)]
Asymmetry of mains voltage	±3% max.			
Frequency	50/60 Hz ±10%			
Power loss at I_N	2100 W [1)]	2380 W [1)]	2500 W [1)]	2650 W [1)]
DC link				
Capacitance	3180 µF	4240 µF	4240 µF	
Braking chopper switch-on threshold	820 V DC			
Minimal ohmic resistance of an externally installed Braking resistor	8.5 Ω		6.5 Ω	
Brake chopper continuous power with external braking resistor	65 kW	79 kW	65 kW	103 kW
Brake chopper peak power with external braking resistor	79 kW	79 kW	103 kW	103 kW
Optional: Internal braking resistor	-	5 Ω	-	5 Ω
Brake chopper continuous power with internal braking resistor	-	4000 W	-	4000 W
Brake chopper peak power with external braking resistor	-	135 kW	-	135 kW

1) Data referred to mains voltage 3 V x 400 V AC and 8 kHz switching frequency

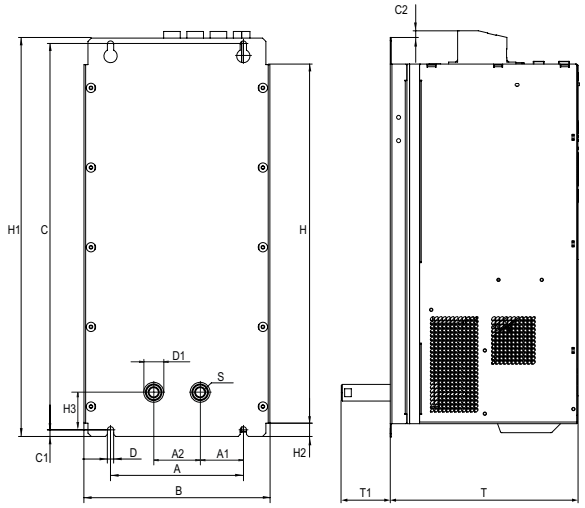
Mechanism, BG6a	SO84.143.0	SO84.170.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight (air/liquid cooled)	32 kg / 41.1 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	Possible at a distance of 40 mm (air-cooled) or 2 mm (liquid-cooled)	

Dimensions - BG6a [mm]	
B (width)	280
H (height)	540 (without terminals)
D (depth) (air/liquid cooled)	322 / 282 (without terminals)
A / A1 / A2	200 / 65 / 70
C / C1 / C2	581 / 10 / 10
D Ø	9.5
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	600 / 20 / 56.5
S	3/8 inch (inside thread)
D1	73.5

Dimensional drawings, BG6a, air-cooled



Dimensional drawings, BG6a, liquid-cooled



Matching accessories (see section 9 f.)

Controller	SO84.143.0		SO84.170.0	
	Air cooling	Liquid cooling	Air cooling	Liquid cooling
Mains choke	LR34.140-UR	LR34.168-UR		LR34.210-UR
Braking resistor	BR-026.01.540-UR (35 W) BR-026.02.540-UR (150 W) BR-026.03.540-UR (300 W) BR-026.10.650-UR (1000 W)		BR-026.20.650-UR (2000 W) BR-020.03.540-UR (300 W) BR-015.03.540-UR (300 W)	
Mains filter	EMC150.1-UR	EMC180.1-UR		EMC220.1-UR

Servocontrollers 250 A to 450 A (BG7) - Technical data

Type SO84.250.0 (liquid-cooled)

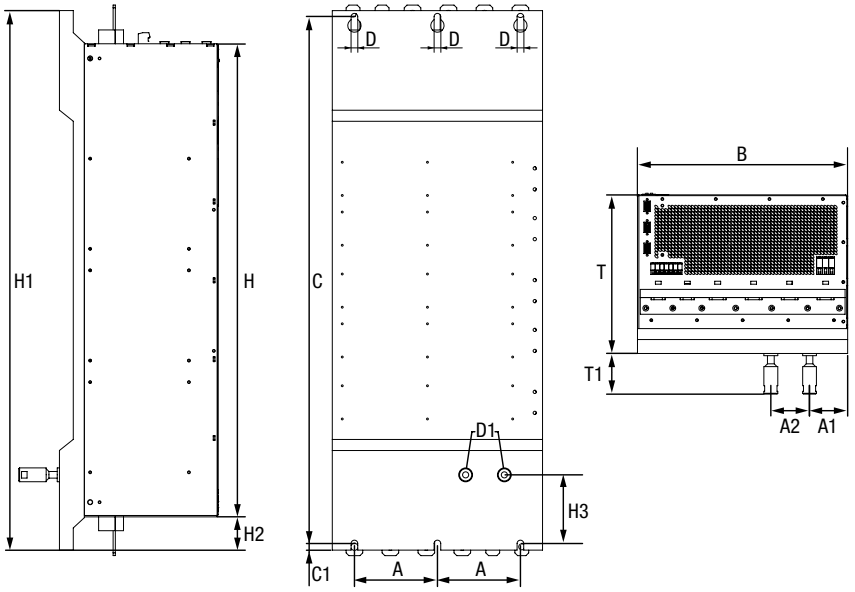
Article designation / Technical data	SO84.250.0	SO84.325.0	SO84.450.0
Output, motor side			
Voltage	3-phase U_{mains}		
Rated current, effective (I_N)	250 A [1)]	325 A [1)]	450 A [1)]
Peak current	see table on page 3-10		
Rotating field frequency	0 ... 400 Hz		
Switching frequency of power stage	2, 4 kHz (factory setting 2 kHz at +40 °C)		
Input, mains side			
Mains voltage (U_{mains})	(3 x 230 V/3 x 400 V/3 x 460 V/3 x 480 V) ±10%		
Device power connection (with mains choke)	173 kVA [1)]	225 kVA [1)]	310 kVA [1)]
Current (with mains choke)	250 A [1)]	325 A [1)]	450 A [1)]
Asymmetry of mains voltage	±3% max.		
Frequency	50/60 Hz ±10%		
Power loss at I_N	3960 W [1)]	4800 W [1)]	6750 W [1)]
DC link			
Capacitance	3600 µF	5400 µF	7200 µF
Braking chopper switch-on threshold	820 V DC		
Minimum ohmic resistance of an externally installed braking resistor	3.2 Ω	2.5 Ω	1.7 Ω
Brake chopper continuous power with external braking resistor	210 kW	269 kW	395 kW
Brake chopper peak power with external braking resistor	210 kW	269 kW	395 kW
Optional: Internal braking resistor	3.3 Ω		
Brake chopper continuous power with internal braking resistor	5000 W		
Brake chopper peak power with external braking resistor	204 kW		

1) Data referred to mains voltage 3 V x 400 V AC and 2 kHz switching frequency

Mechanism, BG7	SO84.250.0	SO84.325.0	SO84.450.0
Cooling method	Liquid cooling		
Protection	IP20 except terminals (IP00)		
Coolant temperature	max. 40 °C, not more than 10 °C below the ambient temperature		
Weight	100 kg		
Mounting method	Vertical mounting		
End-to-end mounting of multiple servocontrollers	Direct end-to-end mounting		

Dimensions - BG7 [mm]	
B (width)	380 (with terminal covers: 392)
H (height)	952 (with terminal covers and shield plates: 1305)
T (depth)	286.5 (without terminals)
A / A1 / A2	150 / 29 / 70
C / C1	952 / 12
D Ø	12
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	971 / 60 / 124
S	3/8 inch (inside thread)
D1	73.5

Dimensional drawings, BG7, liquid-cooled

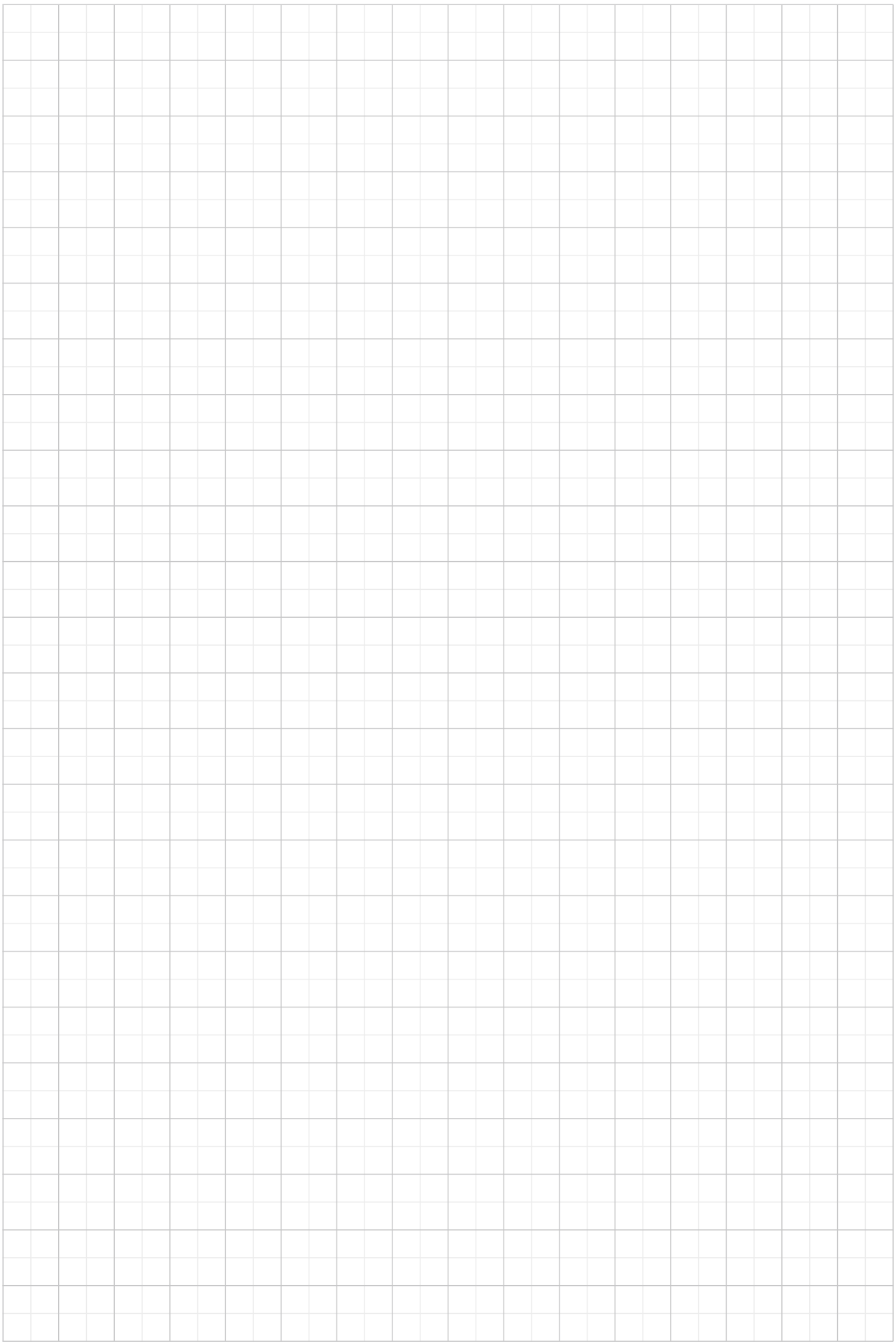


Matching accessories (see section 9 f.)

Controller	SO84.250.0	SO84.325.0	SO84.450.0
Mains choke	LR34.250-UR	LR34.325-UR	LR34.450-UR
Braking resistor	BR-026.10.650-UR (1000 W) BR-026.20.650-UR (2000 W)	BR-020.03.540-UR (300 W) BR-015.03.540-UR (300 W)	
Mains filter	EMC250.1-UR	EMC300.1-UR [1] EMC400.1-UR [1]	EMC400.1-UR [1] EMC500.1-UR [1]

1) Depending on effective mains current

Space for your own notes



ServoOne multi-axis system

unit BG5 | Supply BG5 | Axis controller BG4 | Axis controller BG3 | Axis controller BG2 BG1

Axis controller

Type	Size	Rated current		Current capacity	Technical data
		Air cooling	Liquid cooling		
SO84.004.1	BG1	4.0 A	-	from page 4-8	Page 4-24
SO84.006.1	BG1	6.0 A	-		
SO84.008.1	BG2	8.0 A	-	from page 4-8	Page 4-26
SO84.012.1	BG2	12 A	-		
SO84.016.1	BG3	16 A	20 A	from page 4-8 and from page 4-13	Page 4-28
SO84.020.1	BG3	20 A	25 A		
SO84.024.1	BG4	24 A	26 A	from page 4-8 and from page 4-13	Page 4-30
SO84.032.1	BG4	32 A	35 A		
SO84.045.1	BG5	45 A	53 A	from page 4-12 and from page 4-15	Page 4-32
SO84.060.1	BG5	60 A	70 A		
SO84.072.1	BG5	72 A	84 A		
SO84.090.1	BG6a	90 A	110 A	from page 4-12 and from page 4-15	Page 4-34
SO84.110.1	BG6a	110 A	143 A		
SO84.143.1	BG6a	143 A	170 A		
SO84.170.1	BG6a	170 A	210 A		
SO84.250.1	BG7	-	250 A		
SO84.325.1	BG7	-	325 A	from page 4-16	Page 4-36
SO84.450.1	BG7	-	450 A		

Supply units

Type	Size	Rated current	Current capacity	Technical data
SO84.040.S	BG5	40 A	Page 4-20	Page 4-40
SO84.076.S	BG5	76 A		
SO84.115.S	BG6a	115 A	Page 4-20	Page 4-42
SO84.170.S	BG6a	170 A		
SO84.375.S	BG7	375 A	Page 4-20	Page 4-44
SO84.540.S	BG7	540 A		

ServoOne multi-axis system - Order codes

Axis controller - Order codes

Article designation	SO84.		006	.	1	0	2	1	.	0	0	0	0	.	X
ServoOne															
Rated current	BG1	4 A	004												
		6 A	006												
	BG2	8 A	008												
		12 A	012												
	BG3	16 A	016												
		20 A	020												
	BG4	24 A	024												
		32 A	032												
	BG5	45 A	045												
		60 A	060												
		72 A	072												
	BG6	90 A	090												
		110 A	110												
	BG6a	143A	143												
		170 A	170												
	BG7	250 A	250												
		325 A	325												
		450 A	450												
Supply	DC				1										
Safety systems	STO					0									
	Integrated safety control					1									
Option 1 Communication	without						0								
	Sercos II						1								
	PROFIBUS						2								
	EtherCAT						3								
	CANopen						4								
	CANopen + 2 AO						5								
	PROFINET IRT						7								
	Sercos III						8								
Option 2 Technology	without							0							
	second SinCos encoder							1							
	TTL encoder simulation / TTL master encoder							2							
	TwinSync communication							3							
	SSI encoder simulation							4							
	TTL encoder with commutation signals							5							
	Digital Input/Output (DIO) expansion[1)]							8							
	second safe SinCos encoder							A							
	second safe SSI encoder							B							
	second safe axis monitor (SinCos)							C							
Housing/cooling method	Air-cooled (standard)								0						
	liquid cooled (standard)								8						
Function package	Basic (without additional function package)									0					
	iPlc									1					
	HF									7					
	HF + iPlc									8					
Special design	None										0				
Protection	Standard											0			
	PCBs with protective coating (from SO84.045 standard)											1			
Hardware version	(may be multi-digit)														X

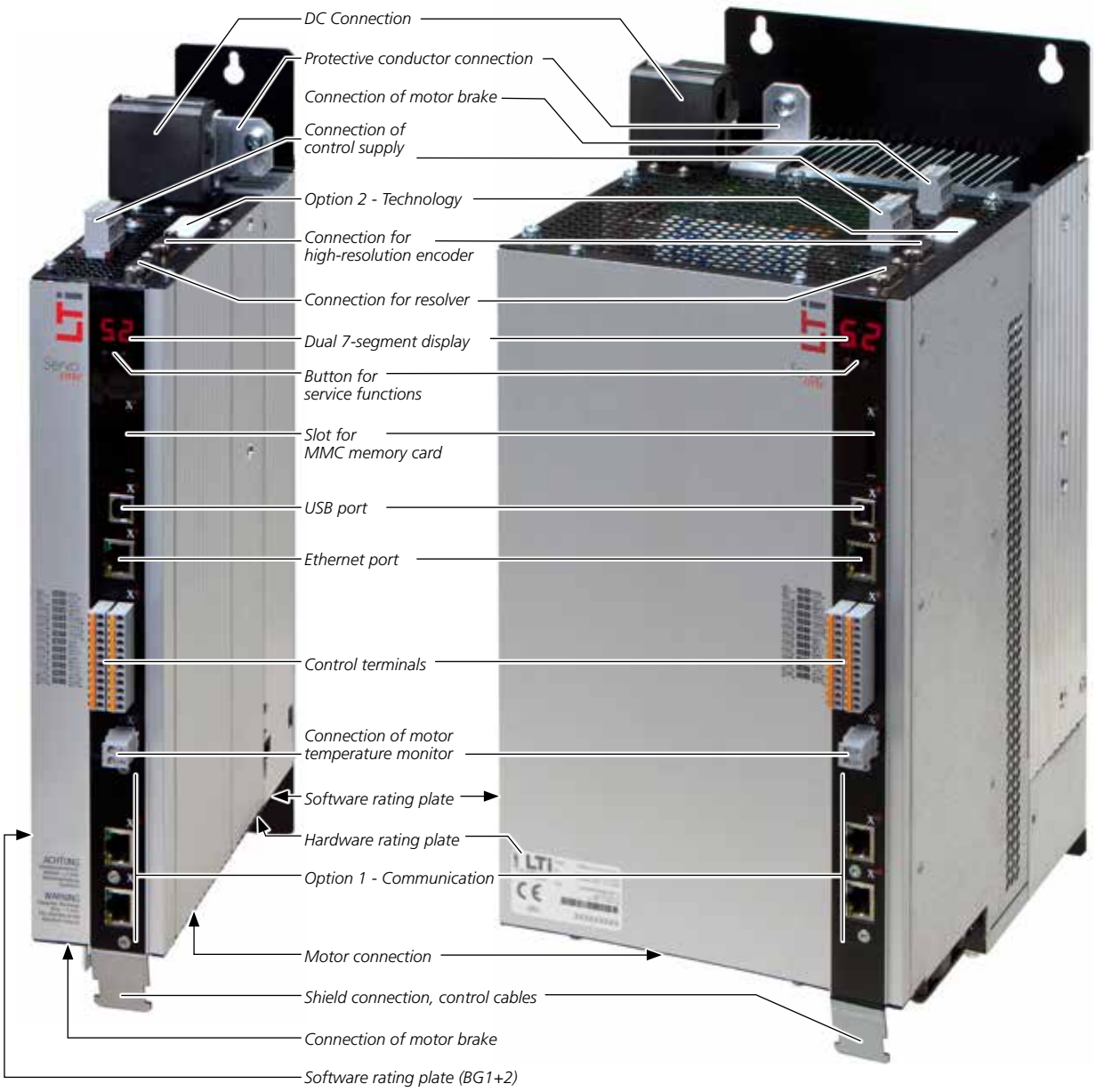
1) In preparation

Supply unit - Order codes

Article designation	SO8	4	.	040	.	S	0	2	0	.	0	0	0	0	.	X
ServoOne																
Connection class	*3 x 400 V*	*4*														
Rated current	*BG5*	*40 A*		*040*												
		76 A		*076*												
	BG6a	*115 A*		*115*												
		170 A		*170*												
	BG7	*375 A*		*375*												
		540 A		*540*												
DC supply unit regenerative						*S*										
Option 1 Communication	*without*							*0*								
	Sercos II							*1*								
	PROFIBUS							*2*								
	EtherCAT							*3*								
	CANopen							*4*								
	Sercos III							*8*								
Option 2 Technology	*without*								*0*							
Housing/cooling method	*Air-cooled*										*0*					
	Liquid-cooled with int. braking resistor										*7*					
	Liquid-cooled										*8*					
Function package	*Basic (without additional function package)*											*0*				
	iPlc											*1*				
Special design	*None*												*0*			
Protection	*Standard*													*0*		
	PCBs with protective coating													*1*		
Hardware version	*(may be multi-digit)*															*X*

ServoOne multi-axis system - Equipment

Equipment - Axis controllers BG1 to BG5



Equipment - Axis controller BG6a

ID no.: 1100.24B.5-00 Date: 10/2013

Equipment - Supply unit BG5

Equipment - Supply unit BG6a

ServoOne multi-axis system - Current capacity

The maximum permissible output current of the axis controllers and the peak current are dependent on the DC supply voltage, the motor cable length, the power stage switching frequency and the ambient temperature. If the conditions change, the maximum permissible current capacity of the axis controllers also changes.

ServoOne axis controllers BG1 to BG4 (air-cooled, 400 V AC)

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current[1]				
				I_{MAX} 0 Hz	I_{1MAX} ≥5 Hz	t_1 [2]	I_{2MAX} ≥5 Hz	t_2 [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[s]	[A_{eff}]	[s]
SO84.004.1xxx.0 (BG1)	4	40	5.3	8.4	8.4	10	11.9	0.5
	8		4.0	8.4	8.4		-	-
	12		3.7	6.6	6.6		-	-
	16		2.7	5.2	5.2		-	-
SO84.006.1xxx.0 (BG1)	4	40	8.0	12.7	12.7	10	18.0	0.5
	8		6.0	12.7	12.7		-	-
	12		5.5	9.9	9.9		-	-
	16		4.0	7.7	7.7		-	-
SO84.008.1xxx.0 (BG2)	4	40	9.3	15.9	15.9	10	23.9	0.5
	8		9.3	15.9	15.9		-	-
	12		6.7	9.4	9.4		-	-
	16		5.5	7.7	7.7		-	-
SO84.012.1xxx.0 (BG2)	4	40	14.0	24.0	24.0	10	36.0	0.5
	8		14.0	24.0	24.0		-	-
	12		10.0	14.1	14.1		-	-
	16		8.2	11.5	11.5		-	-
SO84.016.1xxx.0 (BG3)	4	40	20.0	33.6	33.6	10	48.0	0.5
	8		16.0	33.6	33.6		-	-
	12		11.0	23.6	23.6		-	-
	16		8.5	19.4	19.4		-	-
SO84.020.1xxx.0 (BG3)	4	40	25.0	42.0	42.0	10	60.0	0.5
	8		20.0	42.0	42.0		-	-
	12		13.8	29.6	29.6		-	-
	16		10.0	22.8	22.8		-	-
SO84.024.1xxx.0 (BG4)	4	40	30.0	48.0	48.0	10	72.0	0.5
	8		24.0	48.0	48.0		-	-
	12		15.8	31.6	31.6		-	-
	16		11.3	22.6	22.6		-	-
SO84.032.1xxx.0 (BG4)	4	40	40.0	64.0	64.0	10	96.0	0.5
	8		32.0	64.0	64.0		-	-
	12		21.0	42.0	42.0		-	-
	16		15.0	30.0	30.0		-	-

1) At max. 70% precharge
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

ServoOne axis controllers BG1 to BG4 (air-cooled, 460 V AC)

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current[1]				
				I_{MAX} 0 Hz	I_{1MAX} ≥5 Hz	t_1 [2]	I_{2MAX} ≥5 Hz	t_2 [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[s]	[A_{eff}]	[s]
SO84.004.1xxx.0 (BG1)	4	40	5.3	8.4	8.4	10	11.9	0.5
	8		3.4	7.2	7.2		-	-
	12		2.8	5.0	5.0		-	-
	16		1.9	3.6	3.6		-	-
SO84.006.1xxx.0 (BG1)	4	40	8.0	12.7	12.7	10	18.0	0.5
	8		5.1	10.8	10.8		-	-
	12		4.2	7.5	7.5		-	-
	16		2.9	5.6	5.6		-	-
SO84.008.1xxx.0 (BG2)	4	40	8.5	14.6	14.6	10	21.8	0.5
	8		6.7	11.5	11.5		-	-
	12		5.6	7.9	7.9		-	-
	16		4.1	5.8	5.8		-	-
SO84.012.1xxx.0 (BG2)	4	40	11.8	20.2	20.2	10	30.3	0.5
	8		10.0	17.1	17.1		-	-
	12		8.4	11.8	11.8		-	-
	16		6.2	8.7	8.7		-	-
SO84.016.1xxx.0 (BG3)	4	40	20.0	33.6	33.6	10	48.0	0.5
	8		13.9	29.1	29.1		-	-
	12		8.8	18.9	18.9		-	-
	16		6.5	14.8	14.8		-	-
SO84.020.1xxx.0 (BG3)	4	40	25.0	42.0	42.0	10	60.0	0.5
	8		17.4	36.5	36.5		-	-
	12		11.0	23.6	23.6		-	-
	16		7.4	16.8	16.8		-	-
SO84.024.1xxx.0 (BG4)	4	40	26.0	41.6	41.6	10	62.4	0.5
	8		21.0	42.0	42.0		-	-
	12		12.4	24.8	24.8		-	-
	16		8.9	17.8	17.8		-	-
SO84.032.1xxx.0 (BG4)	4	40	33.7	53.9	53.9	10	80.9	0.5
	8		28.0	56.0	56.0		-	-
	12		16.5	33.0	33.0		-	-
	16		11.9	23.8	23.8		-	-

1) At max. 70% precharge
2) Shutdown as per I^2t characteristic

ServoOne axis controllers BG1 to BG4 (air-cooled, 480 V AC)

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current[1]				
				I_{MAX} 0 Hz	I_{1MAX} ≥5 Hz	t_1 [2]	I_{2MAX} ≥5 Hz	t_2 [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[s]	[A_{eff}]	[s]
SO84.004.1xxx.0 (BG1)	4	40	5.3	8.4	8.4	10	11.9	0.5
	8		3.3	7.0	7.0		-	-
	12		2.7	4.8	4.8		-	-
	16		1.8	3.4	3.4		-	-
SO84.006.1xxx.0 (BG1)	4	40	8.0	12.7	12.7	10	18.0	0.5
	8		5.0	10.6	10.6		-	-
	12		4.0	7.2	7.2		-	-
	16		2.7	5.2	5.2		-	-
SO84.008.1xxx.0 (BG2)	4	40	8.5	14.6	14.6	10	21.8	0.5
	8		6.1	10.4	10.4		-	-
	12		5.4	7.6	7.6		-	-
	16		3.9	5.5	5.5		-	-
SO84.012.1xxx.0 (BG2)	4	40	11.4	19.5	19.5	10	29.3	0.5
	8		9.2	15.8	15.8		-	-
	12		8.1	11.4	11.4		-	-
	16		5.8	8.2	8.2		-	-
SO84.016.1xxx.0 (BG3)	4	40	20.0	33.6	33.6	10	48.0	0.5
	8		13.3	27.9	27.9		-	-
	12		8.5	18.3	18.3		-	-
	16		6.0	13.7	13.7		-	-
SO84.020.1xxx.0 (BG3)	4	40	25.0	42.0	42.0	10	60.0	0.5
	8		16.6	34.8	34.8		-	-
	12		10.0	21.5	21.5		-	-
	16		6.5	14.8	14.8		-	-
SO84.024.1xxx.0 (BG4)	4	40	26.0	41.6	41.6	10	62.4	0.5
	8		20.0	40.0	40.0		-	-
	12		11.3	22.6	22.6		-	-
	16		8.4	16.8	16.8		-	-
SO84.032.1xxx.0 (BG4)	4	40	32.5	52.0	52.0	10	78.0	0.5
	8		26.7	53.4	53.4		-	-
	12		15.0	30.0	30.0		-	-
	16		11.2	22.4	22.4		-	-

1) At max. 70% precharge
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

ServoOne axis controllers BG1 to BG4 (air-cooled, 770 V DC)

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current [1]				
				I_{MAX} 0 Hz	I_{1MAX} ≥5 Hz	t_1 [2]	I_{2MAX} ≥5 Hz	t_2 [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[s]	[A_{eff}]	[s]
SO84.004.1xxx.0 (BG1)	4	40	5.1	8.1	8.1	10	11.5	0.5
	8		3.2	6.8	6.8		-	-
	12		2.1	3.8	3.8		-	-
	16		1.1	2.1	2.1		-	-
SO84.006.1xxx.0 (BG1)	4	40	7.6	12.1	12.1	10	17.1	0.5
	8		4.8	10.2	10.2		-	-
	12		3.2	5.7	5.7		-	-
	16		1.6	3.1	3.1		-	-
SO84.008.1xxx.0 (BG2)	4	40	8.0	13.7	13.7	10	20.6	0.5
	8		5.9	10.1	10.1		-	-
	12		5.3	7.4	7.4		-	-
	16		3.7	5.2	5.2		-	-
SO84.012.1xxx.0 (BG2)	4	40	11.2	19.2	19.2	10	28.8	0.5
	8		8.8	15.1	15.1		-	-
	12		7.9	11.1	11.1		-	-
	16		5.5	7.7	7.7		-	-
SO84.016.1xxx.0 (BG3)	4	40	20.0	33.6	33.6	10	48.0	0.5
	8		11.2	23.5	23.5		-	-
	12		7.0	15.0	15.0		-	-
	16		4.5	10.2	10.2		-	-
SO84.020.1xxx.0 (BG3)	4	40	25.0	42.0	42.0	10	60.0	0.5
	8		14.0	29.4	29.4		-	-
	12		7.5	16.1	16.1		-	-
	16		5.0	11.4	11.4		-	-
SO84.024.1xxx.0 (BG4)	4	40	26.0	41.6	41.6	10	62.4	0.5
	8		18.9	37.8	37.8		-	-
	12		10.5	21.0	21.0		-	-
	16		7.9	15.8	15.8		-	-
SO84.032.1xxx.0 (BG4)	4	40	32.0	51.2	51.2	10	76.8	0.5
	8		25.2	50.4	50.4		-	-
	12		14.0	28.0	28.0		-	-
	16		10.5	21.0	21.0		-	-

1) At max. 70% precharge
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

ID no.: 1100.24B.5-00 Date: 10/2013

ServoOne axis controllers BG5 to BG6a (air-cooled)

Type	Switching frequency of power stage	Ambient-temperature	Rated current				Peak current [A_{eff}] [1]			
			at 565 V DC (400 VAC) [3]	at 650 V DC (460 VAC) [3]	at 678 V DC (480 VAC) [3]	at 770 V DC	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.045.1xxx.0 (BG5)	4	40	45	42	41	41	90	90	90	3
	8		45	42	41	41	90	90	90	
	12		45	42	41	37	90	90	90	
	16		42	39	38	34	84	84	84	
SO84.060.1xxx.0 (BG5)	4	40	60	56	54	54	120	120	120	3
	8		60	56	54	54	120	120	120	
	12		58	54	52	48	116	116	116	
	16		42	39	38	34	84	84	84	
SO84.072.1xxx.0 (BG5)	4	40	72	67	65	65	144	144	144	3
	8		72	67	65	65	144	144	144	
	12		58	54	52	48	116	116	116	
	16		42	39	38	34	84	84	84	
SO84.090.1xxx.0 (BG6a)	4	40	90	83	81	73	170	180	180	10
	8		90	83	81	73	134	180	180	
	12		90	83	81	73	107	144	144	
	16		72	67	65	59	86	115	115	
SO84.110.1xxx.0 (BG6a)	4	40	110	102	99	90	170	220	220	10
	8		110	102	99	90	134	165	165	
	12		90	83	81	73	107	144	144	
	16		72	67	65	59	86	115	115	
SO84.143.1xxx.0 (BG6a)	4	40	143	132	129	116	190	286	286	10
	8		143	132	129	116	151	215	215	
	12		115	106	104	94	121	172	172	
	16		92	85	83	75	97	138	138	
SO84.170.1xxx.0 (BG6a)	4	40	170	157	153	138	190	315	315	10
	8		170	157	153	138	151	220	220	
	12		136	126	122	110	121	164	164	
	16		109	101	98	88	97	131	131	

1) When supplied with 565 VDC (corresponding to 400 V AC) at max. 70% precharge
2) Shutdown as per I^2t characteristic
3) When supplied with AC servocontroller
All data apply for motor cable length ≤ 10 m

ServoOne axis controllers BG3 and BG4 (liquid-cooled, 400 V AC)

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current[1]				
				I_{MAX} 0 Hz	I_{1MAX} ≥5 Hz	t_1 [2]	I_{2MAX} ≥5 Hz	t_2 [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[s]	[A_{eff}]	[s]
SO84.016.1xxx.8 (BG3)	4	40	20.0	33.6	33.6	10	48.0	0.5
	8		20.0	33.6	33.6		-	-
	12		17.4	26.4	26.4		-	-
	16		12.0	18.2	18.2		-	-
SO84.020.1xxx.8 (BG3)	4	40	25.0	42.0	42.0	10	60.0	0.5
	8		25.0	42.0	42.0		-	-
	12		21.8	33.1	33.1		-	-
	16		15.0	22.8	22.8		-	-
SO84.024.1xxx.8 (BG4)	4	40	30.0	48.0	48.0	10	72.0	0.5
	8		26.3	48.1	48.1		-	-
	12		22.5	31.5	31.5		-	-
	16		16.1	22.5	22.5		-	-
SO84.032.1xxx.8 (BG4)	4	40	40.0	64.0	64.0	10	96.0	0.5
	8		35.0	64.0	64.0		-	-
	12		30.0	42.0	42.0		-	-
	16		21.4	29.9	29.9		-	-

1) At max. 70% precharge *2) Shutdown as per I²t characteristic* *All data apply for motor cable length ≤10 m*

ServoOne axis controllers BG3 and BG4 (liquid-cooled, 460 V AC)

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current[1]				
				I_{MAX} 0 Hz	I_{1MAX} ≥5 Hz	t_1 [2]	I_{2MAX} ≥5 Hz	t_2 [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[s]	[A_{eff}]	[s]
SO84.016.1xxx.8 (BG3)	4	40	20.0	33.6	33.6	10	48.0	0.5
	8		17.4	29.2	29.2		-	-
	12		12.5	19.0	19.0		-	-
	16		9.1	13.8	13.8		-	-
SO84.020.1xxx.8 (BG3)	4	40	25.0	42.0	42.0	10	60.0	0.5
	8		21.8	36.6	36.6		-	-
	12		15.6	23.7	23.7		-	-
	16		11.4	17.3	17.3		-	-
SO84.024.1xxx.8 (BG4)	4	40	26.0	41.6	41.6	10	62.4	0.5
	8		23.0	42.0	42.0		-	-
	12		17.7	24.8	24.8		-	-
	16		12.8	17.9	17.9		-	-
SO84.032.1xxx.8 (BG4)	4	40	33.7	53.9	53.9	10	80.9	0.5
	8		30.6	55.9	55.9		-	-
	12		23.6	33.0	33.0		-	-
	16		17.0	23.8	23.8		-	-

1) At max. 70% precharge *2) Shutdown as per I²t characteristic* *All data apply for motor cable length ≤10 m*

ServoOne axis controllers BG3 and BG4 (liquid-cooled, 480 V AC)

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current[1]				
				I_{MAX} 0 Hz	I_{1MAX} ≥5 Hz	t_1 [2]	I_{2MAX} ≥5 Hz	t_2 [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[s]	[A_{eff}]	[s]
SO84.016.1xxx.8 (BG3)	4	40	20.0	33.6	33.6	10	48.0	0.5
	8		16.6	27.9	27.9		-	-
	12		11.4	17.3	17.3		-	-
	16		8.5	12.9	12.9		-	-
SO84.020.1xxx.8 (BG3)	4	40	25.0	42.0	42.0	10	60.0	0.5
	8		20.8	34.9	34.9		-	-
	12		14.3	21.7	21.7		-	-
	16		10.6	16.1	16.1		-	-
SO84.024.1xxx.8 (BG4)	4	40	26.0	41.6	41.6	10	62.4	0.5
	8		21.9	40.0	40.0		-	-
	12		16.1	22.5	22.5		-	-
	16		12.0	16.8	16.8		-	-
SO84.032.1xxx.8 (BG4)	4	40	32.5	52.0	52.0	10	78.0	0.5
	8		29.2	53.4	53.4		-	-
	12		21.4	30.0	30.0		-	-
	16		16.0	22.4	22.4		-	-

1) At max. 70% precharge *2) Shutdown as per I^2t characteristic* *All data apply for motor cable length ≤10 m*

ServoOne axis controllers BG3 and BG4 (liquid-cooled, 770 V DC)

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current[1]				
				I_{MAX} 0 Hz	I_{1MAX} ≥5 Hz	t_1 [2]	I_{2MAX} ≥5 Hz	t_2 [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[s]	[A_{eff}]	[s]
SO84.016.1xxx.8 (BG3)	4	40	20.0	33.6	33.6	10	48.0	0.5
	8		15.8	26.5	26.5		-	-
	12		10.7	16.2	16.2		-	-
	16		8.1	12.3	12.3		-	-
SO84.020.1xxx.8 (BG3)	4	40	25.0	42.0	42.0	10	60.0	0.5
	8		19.8	33.2	33.2		-	-
	12		13.4	20.3	20.3		-	-
	16		10.1	15.3	15.3		-	-
SO84.024.1xxx.8 (BG4)	4	40	26.0	41.6	41.6	10	62.4	0.5
	8		20.7	37.8	37.8		-	-
	12		15.4	21.5	21.5		-	-
	16		11.3	15.8	15.8		-	-
SO84.032.1xxx.8 (BG4)	4	40	32.0	51.2	51.2	10	76.8	0.5
	8		27.6	50.5	50.5		-	-
	12		20.5	28.7	28.7		-	-
	16		15.0	21.0	21.0		-	-

1) At max. 70% precharge *2) Shutdown as per I^2t characteristic* *All data apply for motor cable length ≤10 m*

ServoOne axis controllers BG5 and BG6a (liquid-cooled)

Type	Switching frequency of power stage	Ambient-temperature	Rated current				Peak current [A_{eff}] [1]			
			at 565 V DC (400 V AC) [3]	at 650 V DC (460 V AC) [3]	at 678 V DC (480 V AC) [3]	at 770 V DC	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.045.1xxx.8 (BG5)	4	40	53	49	48	48	90	90	90	3
	8		53	49	48	48	90	90	90	
	12		53	49	48	42	90	90	90	
	16		49	45	44	39	84	84	84	
SO84.060.1xxx.8 (BG5)	4	40	70	65	63	63	120	120	120	3
	8		70	65	63	63	120	120	120	
	12		68	63	61	55	116	116	116	
	16		49	45	44	39	84	84	84	
SO84.072.1xxx.8 (BG5)	4	40	84	78	76	76	144	144	144	3
	8		84	78	76	76	144	144	144	
	12		68	63	61	55	116	116	116	
	16		49	45	44	39	84	84	84	
SO84.090.1xxx.8 (BG6a)	4	40	110	102	99	90	205	220	220	10
	8		110	102	99	90	165	187	187	
	12		110	102	99	90	132	165	165	
	16		90	83	81	73	106	135	135	
SO84.110.1xxx.8 (BG6a)	4	40	143	132	129	116	230	286	286	10
	8		143	132	129	116	190	215	215	
	12		114	105	103	93	152	172	172	
	16		91	84	82	74	122	138	138	
SO84.143.1xxx.8 (BG6a)	4	40	170	157	153	138	230	340	340	10
	8		170	157	153	138	190	255	255	
	12		136	126	122	110	152	204	204	
	16		109	101	98	88	122	163	163	
SO84.170.1xxx.8 (BG6a)	4	40	210	194	189	170	230	340	340	10
	8		210	194	189	170	190	255	255	
	12		168	155	151	136	152	204	204	
	16		134	124	121	109	122	163	163	

1) When supplied with 565 VDC (corresponding to 400 V AC) at max. 70% precharge
2) Shutdown as per I^2t characteristic
3) When supplied with AC servocontroller
All data apply for motor cable length ≤ 10 m

ID no.: 1100.24B.5-00 Date: 10/2013

ServoOne axis controller BG7 (liquid-cooled, 400 V AC) - 2-16 kHz

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current [A_{eff}]			
			at 565 V DC (400 V AC) [1]	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.250.1xxx.8 (BG7)	2	45	250		425		30
	4		250		375		
	8	40	250	250		375	
	12		200	200		300	
	16		175	175		260	
SO84.325.1xxx.8 (BG7)	2	45	325		552		30
	4		325		485		
	8	40	325	325		485	
	12		300	300		450	
	16		270	270		400	
SO84.450.1xxx.8 (BG7)	2	45	450		765		30
	4		450		675		
	8	40	450	450		675	
	12		400	400		600	
	16		-	-		-	

1) When supplied with AC servocontroller
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

ServoOne axis controller BG7 (liquid-cooled, 460 V AC) - 2-16 kHz

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current [A_{eff}]			
			at 650 V DC (460 V AC) [1]	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.250.1xxx.8 (BG7)	2	45	231		425		30
	4		231		375		
	8	40	231	231		346	
	12		185	185		277	
	16		162	162		243	
SO84.325.1xxx.8 (BG7)	2	45	300		552		30
	4		300		485		
	8	40	300	300		450	
	12		277	277		415	
	16		250	250		375	
SO84.450.1xxx.8 (BG7)	2	45	416		765		30
	4		416		675		
	8	40	416	416		624	
	12		370	370		555	
	16		-	-		-	

1) When supplied with AC servocontroller
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

ServoOne axis controller BG7 (liquid-cooled, 480 V AC) - 2-16 kHz

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current [A_{eff}]			
			at 678 V DC (480 V AC) [1]	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent mode	for time [2]
	[kHz]	[°C]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.250.1xxx.8 (BG7)	2	45	225		425		30
	4		225		375		
	8	40	225		225	337	
	12		180		180	270	
	16		157		157	235	
SO84.325.1xxx.8 (BG7)	2	45	292		552		30
	4		292		485		
	8	40	292		292	438	
	12		270		270	405	
	16		243		243	364	
SO84.450.1xxx.8 (BG7)	2	45	405		765		30
	4		405		675		
	8	40	405		405	607	
	12		360		360	540	
	16		-		-	-	

1) When supplied with AC servocontroller
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

ServoOne axis controller BG7 (liquid-cooled, 770 V DC) - 2-16 kHz

Type	Switching frequency of power stage	Ambient-temperature	Rated current	Peak current [A_{eff}]			
			at 770 V DC	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent mode	for time [1]
	[kHz]	[°C]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.250.1xxx.8 (BG7)	2	45	208	425			30
	4		208	375			
	8	40	210	210		315	
	12		168	168		252	
	16		147	147		220	
SO84.325.1xxx.8 (BG7)	2	45	270	552			30
	4		270	485			
	8	40	273	273		409	
	12		252	252		378	
	16		204	204		306	
SO84.450.1xxx.8 (BG7)	2	45	375	765			30
	4		375	675			
	8	40	378	378		567	
	12		336	336		504	
	16		-	-		-	

1) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

ServoOne supply units BG5, BG6a and BG7 (air and liquid cooled)

Type	Switching frequency of power stage [kHz]	Ambient-temperature [°C]	Rated current at 650 V DC [A_{eff}]	Rated current at 770 V DC [A_{eff}]	Peak current at 650 V DC [A_{eff}]	Peak current at 770 V DC [A_{eff}]	Peak current for time [s]
SO84.040.S (BG5)	12	40	40	34	76	68	10
SO84.076.S (BG5)	4	40	80	64	144	122	10
SO84.115.S (BG6a)	8	40	115	97	195	165	10
SO84.170.S (BG6a)	4	40	170	144	246	207	10
SO84.375.S (BG7)[1)]	4	40	375	325	565	487	10
SO84.540.S (BG7)[1)]	4	40	540	468	565	487	10

[1)] ... Supply units only available with liquid cooling.

ServoOne multi-axis system - Ambient conditions

Ambient conditions	
Protection	IP20 except terminals (IP00)
Accident prevention regulations	According to local regulations (in Germany e.g. BGV A3)
Mounting height	up to 1000 m above MSL, above with power reduction (1% per 100 m, max. 2000 m above MSL)
Pollution severity	2
Type of installation	Built-in unit, only for vertical installation in a cabinet with min. IP4x protection, when using STO safety function min. IP54

Climatic conditions		
in transit	as per EN 61800-2, IEC 60721-3-2 class 2K3 [1]	
	Temperature	-25 °C to +70 °C
	Relative humidity	95% at max. +40 °C
in storage	as per EN 61800-2, IEC 60721-3-1 classes 1K3 and 1K4 [2]	
	Temperature	-25 °C to +55 °C
	Relative humidity	5 to 95%
in operation	as per EN 61800-2, IEC 60721-3-3 class 3K3 [3]	
	Temperature	**BG1** -10 °C to +40 °C (4, 8, 12, 16 kHz) **BG2-4** -10 °C to +45 °C (4 kHz), to 55 °C with power reduction (5%/°C) -10 °C to +40 °C (8, 12, 16 kHz), to 55 °C with power reduction (4%/°C) **BG5-6a** -10 °C to +40 °C (4, 8, 12, 16 kHz), to 55 °C with power reduction (2%/°C) **BG7** -10 °C to +40 °C (2, 4 kHz), to 55 °C with power reduction (2%/°C)
	Relative humidity	5 to 85% without condensation

1) The absolute humidity is limited to max. 60 g/m³. This means, at 70 °C for example, that the relative humidity may only be max. 40%.

2) The absolute humidity is limited to max. 29 g/m³. So the maximum values for temperature and relative humidity stipulated in the table must not occur simultaneously.

3) The absolute humidity is limited to max. 25 g/m³. That means that the maximum values for temperature and relative humidity stipulated in the table must not occur simultaneously.

Mechanical conditions			
Vibration limit in transit	as per EN 61800-2, IEC 60721-3-2 class 2M1		
	Frequency [Hz]	**Amplitude [mm]**	**Acceleration [m/s²]**
	2 ≤ f < 9	3.5	Not applicable
	9 ≤ f < 200	Not applicable	10
	200 ≤ f < 500	Not applicable	15
Shock limit in transit	as per EN 61800-2, IEC 60721-2-2 class 2M1		
	Drop height of packed device max. 0.25 m		
Vibration limits of the system [1]	as per EN 61800-2, IEC 60721-3-3 class 3M1		
	Frequency [Hz]	**Amplitude [mm]**	**Acceleration [m/s²]**
	2 ≤ f < 9	0.3	Not applicable
	9 ≤ f < 200	Not applicable	1

1) Note: The devices are only designed for stationary use. The drive controllers must not be installed in areas where they would be permanently exposed to vibrations.

ServoOne multi-axis system - Certifications

CE mark

The ServoOne multi-axis system conforms to the requirements of the Low Voltage Directive 2006/95/EC and the product standard EN 61800-5-1.

The axis controllers and supply units thus conform to the requirements for installation in a machine or plant under the terms of the Machinery Directive 2006/42/EC.

The axis controllers and supply units are accordingly CE marked. The CE mark on the type plate indicates conformity with the above Directives.

UR certification

UR certification has been obtained for the ServoOne axis controller sizes BG5, BG6a and BG7 (45 A to 450 A rated current) and for the supply units BG5 and BG6a (40 A to 170 A).

NOTE: For the axis controllers in sizes BG1 to BG4 (4 A to 35 A) UL certification is in preparation.

For the BG7 supply units (375 A to 540 A) UR certification is only available on request.

EMC certificate

All ServoOne axis controllers SO8x.xxx have an aluminium housing with an anodised finish (BG1 to BG4) or an aluminium rear panel made of aluminised/galvanised sheet steel (BG5 to BG7) to enhance interference immunity in accordance with EN 61800-3, environment classes 1 and 2.

To limit line-borne interference emission to the permissible level and to comply with the EMC Directive 2004/108/EC, external filter sets are available for the supply units (see Technical data of supply units starting on page Seite 4-22).

STO

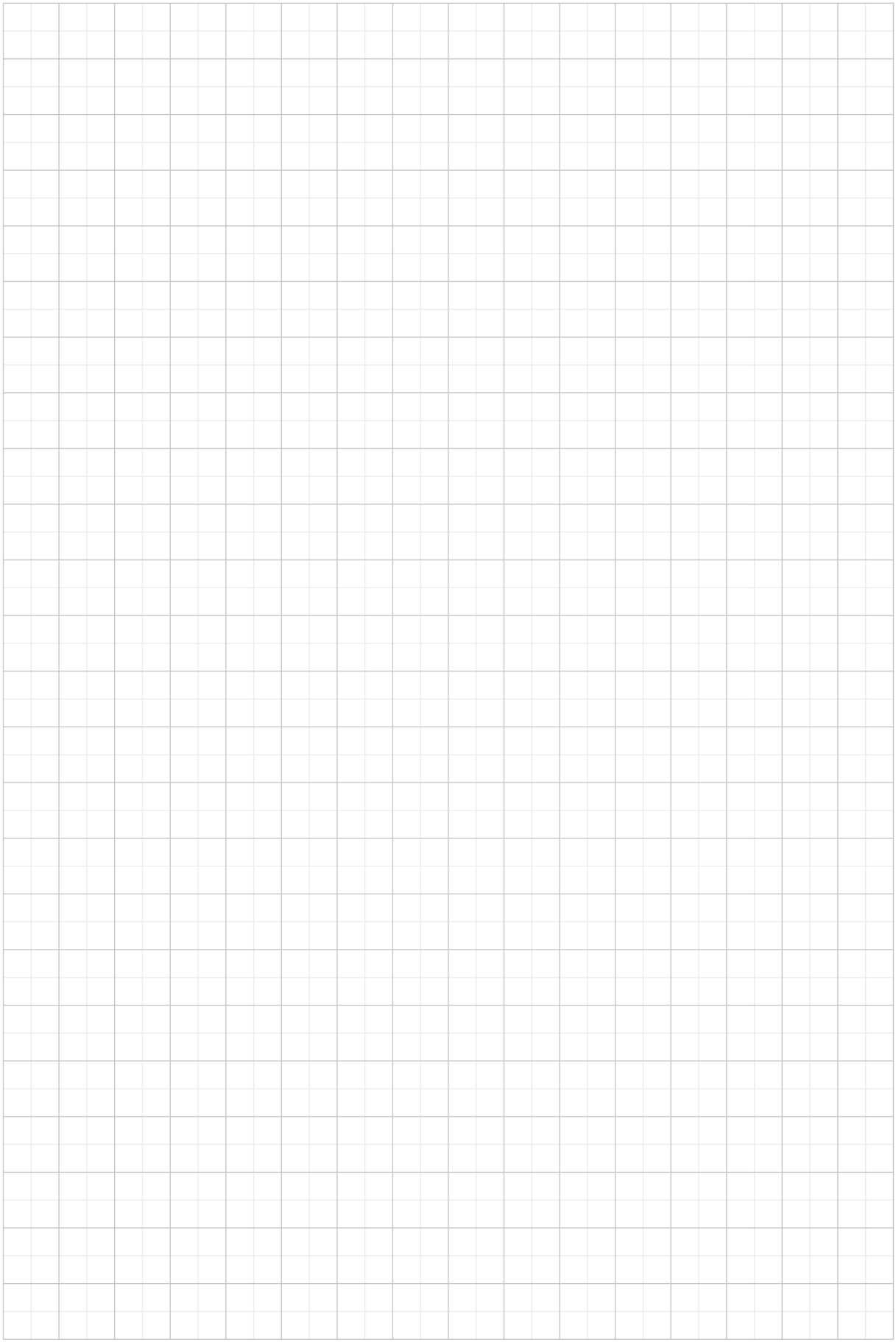
The "STO" (Safe Torque Off) safety function integrated into the ServoOne axis controller is certified according to the requirements of

- EN ISO 13849-1 "PL e" and
- EN 61508 / EN 62061 "SIL3".

Acceptance testing is carried out by the accredited certification agency, TÜV Rheinland.

NOTE:
For the axis controller in size BG7 (rated current ≥250 A) certification is currently in preparation.

Space for your own notes



Axis controllers 4 A to 6 A (BG1) - Technical data

Type SO84.004.1 (air-cooled)

Technical data / Designation		SO84.004.1	SO84.006.1
Output, motor side			
Voltage		3-phase $U_{DC}/\sqrt{2}$	
Rated current, effective (I_N)	Air cooling	4 A [1]	6 A [1]
	Liquid cooling	*BG1 not available with liquid cooling*	
Peak current	Air cooling	see tables on page 4-8 to 4-11	
	Liquid cooling	*BG1 not available with liquid cooling*	
Rotating field frequency		0 ... 400 Hz	
Switching frequency of power stage		4, 8, 12, 16 kHz	
DC input			
DC voltage (U_{DC}) nominal [2]		565 V_{DC} / 650 V_{DC} / 678 V_{DC} / 770 V_{DC}	
Current (RMS approximation value)		$1.7 \cdot I_{Motor}$	
Device connected load [3]		$U_{DC} \cdot 1.7 \cdot I_{Motor}$	
Power loss at I_N	Air cooling	110 W [1]	140 W [1]
	Liquid cooling	*BG1 not available with liquid cooling*	
DC link			
Capacitance		60 µF	

1) Data referred to output voltage 400 V_{eff} and switching frequency 8 kHz

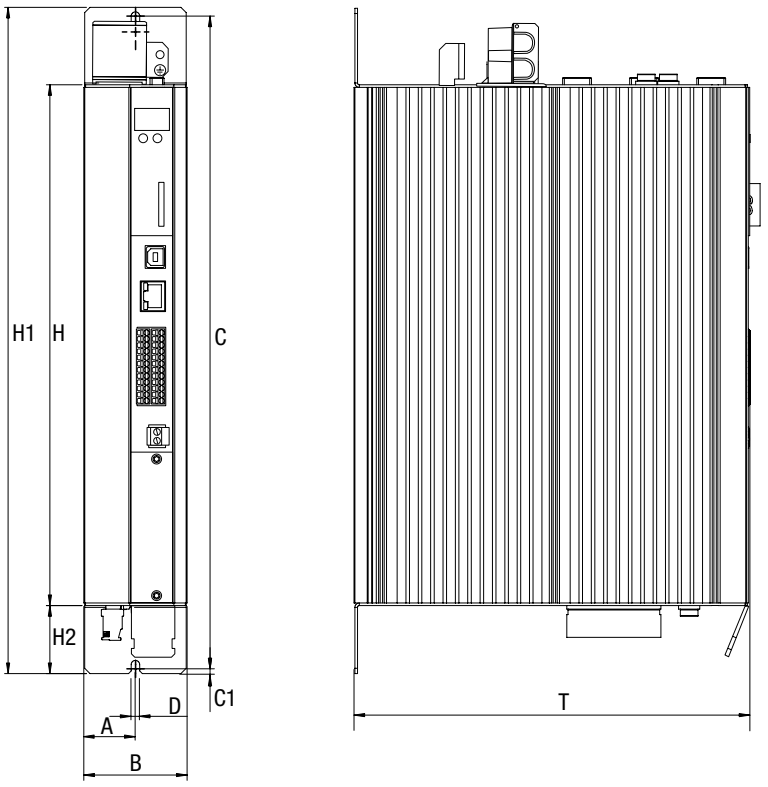
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 3 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC servocontroller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category III.

3) Approximation value

Mechanism, BG1	SO84.004.1	SO84.006.1
Cooling method	Air-cooled (wall-mounted)	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	40 °C	
Weight	3.4 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple axis controllers	Direct butt-mounted, max. 2 mm	

Dimensions - BG1 [mm]	
B (width)	58.5
H (height)	295 (without terminals)
T (depth)	224 (without terminals)
A	29.25
C / C1	382 / 5
D Ø	4.8
H1 / H2	392 / 38.5

Dimensional drawings, BG1, air-cooled



Axis controllers 8 A to 12 A (BG2) - Technical data

Type SO84.008.1 (air-cooled)

Technical data / Designation		SO84.008.1	SO84.012.1
Output, motor side			
Voltage		3-phase $U_{DC}/\sqrt{2}$	
Rated current, effective (I_N)	Air cooling	8 A [1]	12 A [1]
	Liquid cooling	*BG2 not available with liquid cooling*	
Peak current	Air cooling	see tables on page 4-8 to 4-11	
	Liquid cooling	*BG2 not available with liquid cooling*	
Rotating field frequency			
Switching frequency of power stage			
DC input			
DC voltage (U_{DC}) nominal [2]		565 V_{DC} / 650 V_{DC} / 678 V_{DC} / 770 V_{DC}	
Current (RMS approximation value)		$1.7 \cdot I_{Motor}$	
Device connected load [3]		$U_{DC} \cdot 1.7 \cdot I_{Motor}$	
Power loss at I_N	Air cooling	185 W [1]	255 W [1]
	Liquid cooling	*BG2 not available with liquid cooling*	
DC link			
Capacitance		105 µF	

1) Data referred to output voltage 400 V_{eff} and switching frequency 8 kHz

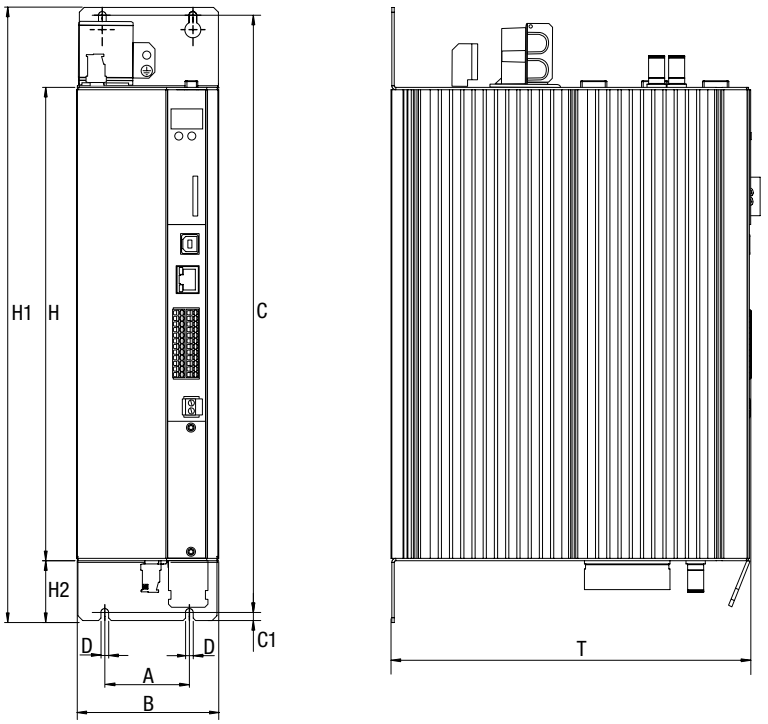
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 3 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC servocontroller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category III.

3) Approximation value

Mechanism, BG2	SO84.008.1	SO84.012.1
Cooling method	Air-cooled (wall-mounted)	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	4.9 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple axis controllers		

Dimensions - BG2 [mm]	
B (width)	90
H (height)	295 (without terminals)
T (depth)	224 (without terminals)
A	50
C / C1	382 / 5
D Ø	4.8
H1 / H2	392 / 38.5

Dimensional drawings, BG2, air-cooled



Axis controllers 16 A to 25 A (BG3) - Technical data

Type SO84.016.1 (liquid-cooled)

Technical data / Designation		SO84.016.1	SO84.020.1
Output, motor side			
Voltage		3-phase $U_{DC}/\sqrt{2}$	
Rated current, effective (I_N)	Air cooling	16 A [1]	20 A [1]
	Liquid cooling	20 A [1]	25 A [1]
Peak current	Air cooling	see tables on page 4-8 to 4-11	
	Liquid cooling	see tables on page 4-13 to 4-14	
Rotating field frequency			
Switching frequency of power stage			
DC input			
DC voltage (U_{DC}) nominal [2]		565 V_{DC} / 650 V_{DC} / 678 V_{DC} / 770 V_{DC}	
Current (RMS approximation value)		$1.7 \cdot I_{Motor}$	
Device connected load [3]		$U_{DC} \cdot 1.7 \cdot I_{Motor}$	
Power loss at I_N	Air cooling	320 W [1]	390 W [1]
	Liquid cooling	390 W [1]	480 W [1]
DC link			
Capacitance		288 µF	

1) Data referred to output voltage 400 V_{eff} and switching frequency 8 kHz

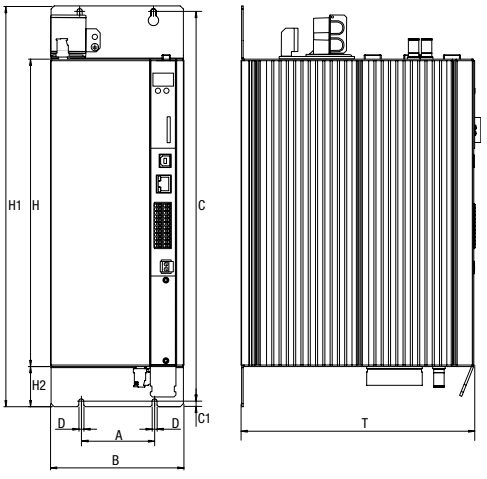
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 3 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC servocontroller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category III.

3) Approximation value

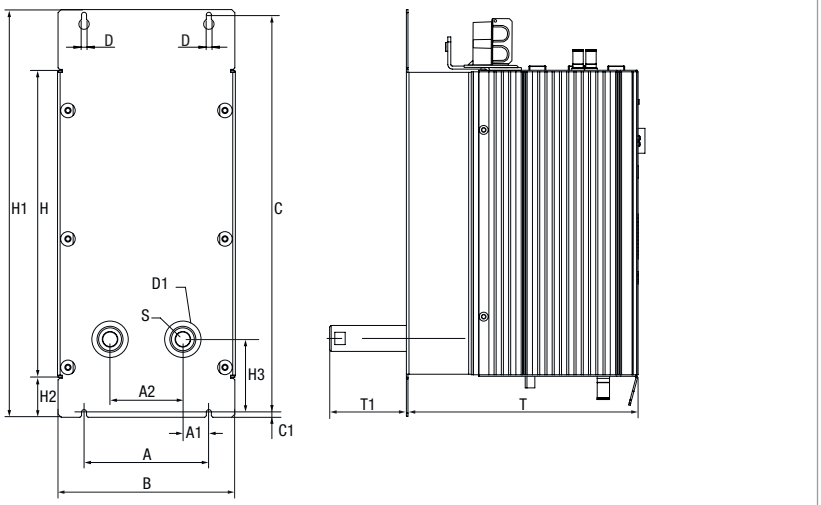
Mechanism, BG3	SO84.016.1	SO84.020.1
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	6.5 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple axis controllers		

Dimensions - BG3 [mm]	
B (width)	130
H (height)	295 (without terminals)
T (depth)	224 (without terminals)
A / A1 / A2	80 / 10 / 60
C / C1	382 / 5
D Ø	4.8
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	392 / 38,5 / 70
S	3/8 inch (inside thread)
D1	74

Dimensional drawings, BG3, air-cooled



Dimensional drawings BG3, liquid-cooled



Axis controllers 24 A to 35 A (BG4) - Technical data

Type SO84.024.1 (liquid-cooled)

Technical data / Designation		SO84.024.1	SO84.032.1
Output, motor side			
Voltage		3-phase $U_{DC}/\sqrt{2}$	
Rated current, effective (I_N)	Air cooling	24 A [1]	32 A [1]
	Liquid cooling	26 A [1]	35 A [1]
Peak current	Air cooling	see tables on page 4-8 to 4-11	
	Liquid cooling	see tables on page 4-13 to 4-14	
Rotating field frequency			
Switching frequency of power stage			
DC input			
DC voltage (U_{DC}) nominal [2]		565 V_{DC} / 650 V_{DC} / 678 V_{DC} / 770 V_{DC}	
Current (RMS approximation value)		$1.7 \cdot I_{Motor}$	
Device connected load [3]		$U_{DC} \cdot 1.7 \cdot I_{Motor}$	
Power loss at I_N	Air cooling	420 W [1]	545 W [1]
	Liquid cooling	455 W [1]	595 W [1]
DC link			
Capacitance		504 µF	

1) Data referred to output voltage 400 V_{eff} and switching frequency 8 kHz

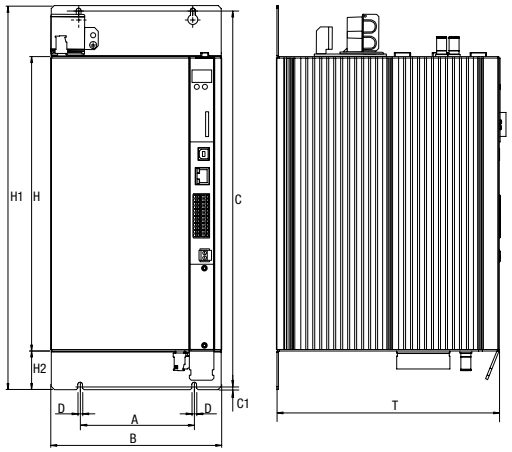
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 3 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC servocontroller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category III.

3) Approximation value

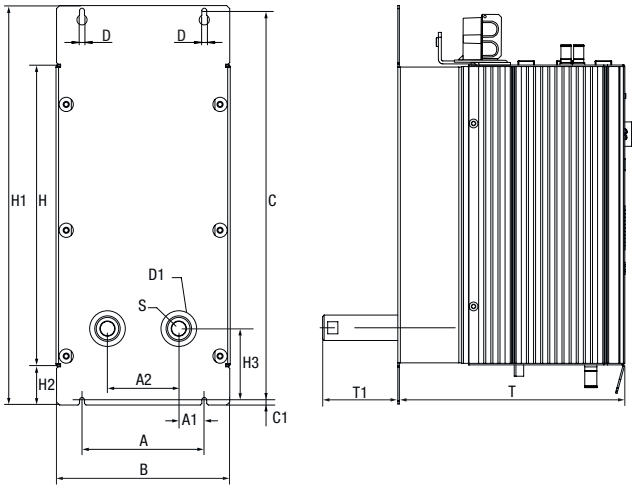
Mechanism, BG4	SO84.024.1	SO84.032.1
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	7.5 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple axis controllers		

Dimensions - BG4 [mm]	
B (width)	171
H (height)	295 (without terminals)
T (depth)	224 (without terminals)
A / A1 / A2	120 / 25 / 70
C / C1	382 / 5
D Ø	4.8
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	392 / 38,5 / 70
S	3/8 inch (inside thread)
D1	74

Dimensional drawings, BG4, air-cooled



Dimensional drawings BG4, liquid-cooled



Axis controllers 45 A to 84 A (BG5) - Technical data

Type SO84.045.1 (air-cooled)

Technical data \ Designation		SO84.045.1	SO84.060.1	SO84.072.1
Output, motor side				
Voltage		3-phase $U_{DC}/\sqrt{2}$		
Rated current, effective (I_N)	Air cooling	45 A [1]	60 A [1]	72 A [1]
	Liquid cooling	53 A [1]	70 A [1]	84 A [1]
Peak current	Air cooling	see table on page 4-12		
	Liquid cooling	see table on page 4-15		
Rotating field frequency				
Switching frequency of power stage				
DC input				
DC voltage (U_{DC}) nominal [2]		565 V_{DC} / 650 V_{DC} / 678 V_{DC} / 770 V_{DC}		
Current (RMS approximation value)		$1.7 \cdot I_{Motor}$		
Device connected load [3]		$U_{DC} \cdot 1.7 \cdot I_{Motor}$		
Power loss at I_N	Air cooling	610 W [1]	830 W [1]	1010 W [1]
	Liquid cooling	690 W [1]	930 W [1]	1130 W [1]
DC link				
Capacitance	Air cooling	430 µF	900 µF	
	Liquid cooling	900 µF		

1) Data referred to output voltage 400 V_{eff} and switching frequency 8 kHz

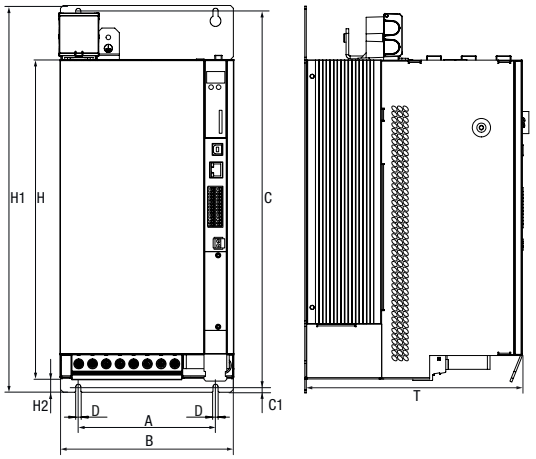
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 3 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC servocontroller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category III.

3) RMS approximation value

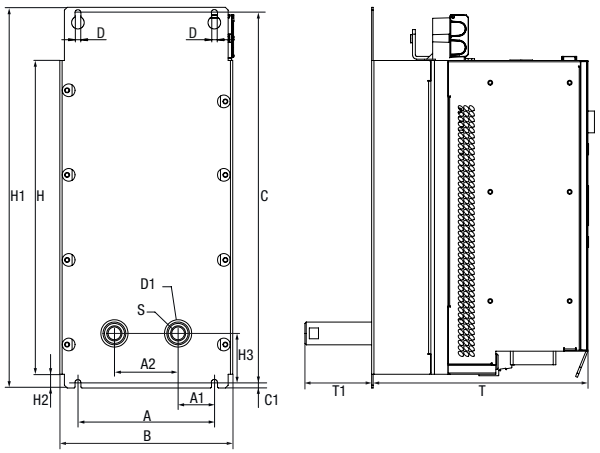
Mechanism, BG5	SO84.045.1	SO84.060.1	SO84.072.1
Cooling method	Air-cooled (wall-mounted) or liquid-cooled		
Protection	IP20 except terminals (IP00)		
Cooling air temperature	40 °C (at 4 kHz power stage switching frequency)		
Weight	13 kg		
Mounting method	Vertical mounting with unhindered air flow		
End-to-end mounting of multiple axis controllers			

Dimensions - BG5 [mm]	
B (width)	190
H (height) (air/liquid cooled)	345 / 346.5 (without terminals)
D (depth) (air/liquid cooled)	240 / 238.5 (without terminals)
A / A1 / A2	150 / 40 / 70
C / C1	406.5 / 6
D Ø ((air/liquid cooled))	5,6 / 6,5
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	418.5 / 15 / 54
S	3/8 inch (inside thread)
D1	73.5

Dimensional drawings, BG5, air-cooled



Dimensional drawings, BG5, liquid-cooled



Axis controllers 90 A to 210 A (BG6a) - Technical data

Type SO84.170.1 (air-cooled)

Technical data / Designation		SO84.090.1	SO84.110.1	SO84.143.1	SO84.170.1
Output, motor side					
Voltage		3-phase $U_{DC}/\sqrt{2}$			
Rated current, effective (I_N)	Air cooling	90 A [1]	110 A [1]	143 A [1]	170 A [1]
	Liquid cooling	110 A [1]	143 A [1]	170 A [1]	210 A [1]
Peak current	Air cooling	see table on page 4-12			
	Liquid cooling	see table on page 4-15			
Rotating field frequency					
Switching frequency of power stage					
DC input					
DC voltage (U_{DC}) nominal [2]		565 V_{DC} / 650 V_{DC} / 678 V_{DC} / 770 V_{DC}			
Current (RMS approximation value)		$1.7 \cdot I_{Motor}$			
Device connected load [3]		$U_{DC} \cdot 1.7 \cdot I_{Motor}$			
Power loss at I_N and 8 kHz/ 400 V	Air cooling	1300 W	1600 W	2100 W	2500 W
	Liquid cooling	1500 W	1940 W	2380 W	2650 W
DC link					
Capacitance	Air cooling	1060 µF	2120 µF	3180 µF	4240 µF
	Liquid cooling	2120 µF		4240 µF	

1) All data referred to output voltage 400 V_{eff} and switching frequency 8 kHz

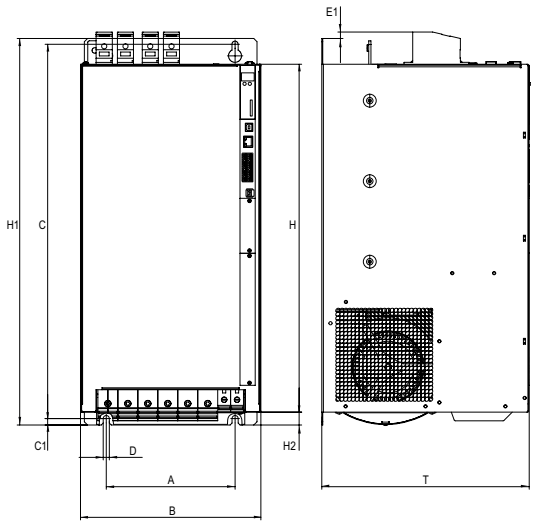
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 3 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC servocontroller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category III.

3) Approximation value

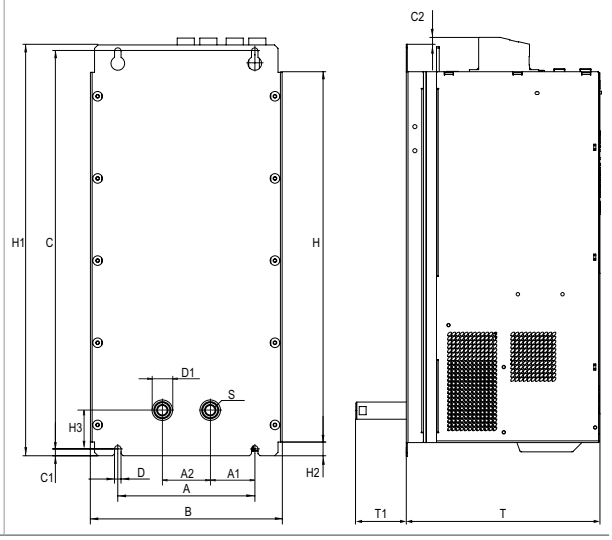
Mechanism, BG6a	SO84.090.1	SO84.110.1	SO84.143.1	SO84.170.1
Cooling method	Air-cooled (wall-mounted) or liquid-cooled			
Protection	IP20 except terminals (IP00)			
Cooling air temperature	40 °C (at 4 kHz power stage switching frequency)			
Weight	32 kg			
Mounting method	Vertical mounting with unhindered air flow			
End-to-end mounting of multiple axis controllers	max. 2 mm, 40 mm between two BG6a devices with air cooling			

Dimensions - BG6a [mm]	
B (width)	280
H (height)	540 (without terminals)
D (depth) (air/liquid cooled)	322 / 285 (without terminals)
A / A1 / A2	200 / 65 / 70
C / C1	581 / 10
D Ø	9.5
D1 Ø (hole for pipe socket)	48
H1 (air/liquid cooled)	600 / 540
H2 / H3	20 / 56,5
S	3/8 inch (inside thread)
D1	73.5

Dimensional drawings, BG6a, air-cooled



Dimensional drawings, BG6a, liquid-cooled



Axis controllers 250 A to 450 A (BG7) - Technical data

Type SO84.250.1 (liquid-cooled)

Technical data / Designation	SO84.250.1	SO84.325.1	SO84.450.1
Output, motor side			
Voltage	3-phase $U_{DC}/\sqrt{2}$		
Rated current, effective (I_N)	250 A [1]	325 A [1]	450 A [1]
Peak current	see table on page 4-20		
Rotating field frequency			
Switching frequency of power stage	2 kHz, 4 kHz		
DC input			
DC voltage (U_{DC}) nominal [2]	565 V_{DC} / 650 V_{DC} / 679 V_{DC} / 770 V_{DC}		
Current (RMS approximation value) [3]	1.2 · I_{Motor}		
Device connected load [3] [4]	U_{DC} · 1.2 · I_{Motor}		
Power loss at I_N and 4 kHz/ 565 V_{DC}	3200 W	3800 W	5400 W
DC link			
Capacitance	3600 µF	5400 µF	7200 µF

1) All data referred to output voltage 400 V_{eff} and switching frequency 4 kHz

2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 3 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC servocontroller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category III.

3) All data referred to DC voltage (U_{DC}) 565 V_{DC}

4) Approximation value

NOTE: High-frequency drive controllers with an output rotating field frequency up to 1600 Hz, at power stage switching frequencies 8 to 16 kHz, need the HF parameter data set.

Technical data \ Designation	SO84.250.1	SO84.325.1	SO84.450.1
Output, motor side			
Voltage	3-phase $U_{DC}/\sqrt{2}$		
Rated current, effective (I_N)	250 A [1]	325 A [1]	450 A [1]
Peak current	see table on page		
Rotating field frequency	0 ... 1600 Hz		
Switching frequency of power stage	8 kHz, 12 kHz, 16 kHz		
DC input			
DC voltage (U_{DC}) nominal [2]	565 V_{DC} / 650 V_{DC} / 679 V_{DC} / 770 V_{DC}		
Current (RMS approximation value) [3]	1.2 · I_{Motor}		
Device connected load [3] [4]	U_{DC} · 1.2 · I_{Motor}		
Power loss at I_N and 4 kHz/ 565 V_{DC}	3200 W	3800 W	5400 W
DC link			
Capacitance	7200 µF	7200 µF	7200 µF

1) All data referred to output voltage 400 V_{eff} and switching frequency 4 kHz

2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 3 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC servocontroller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category III.

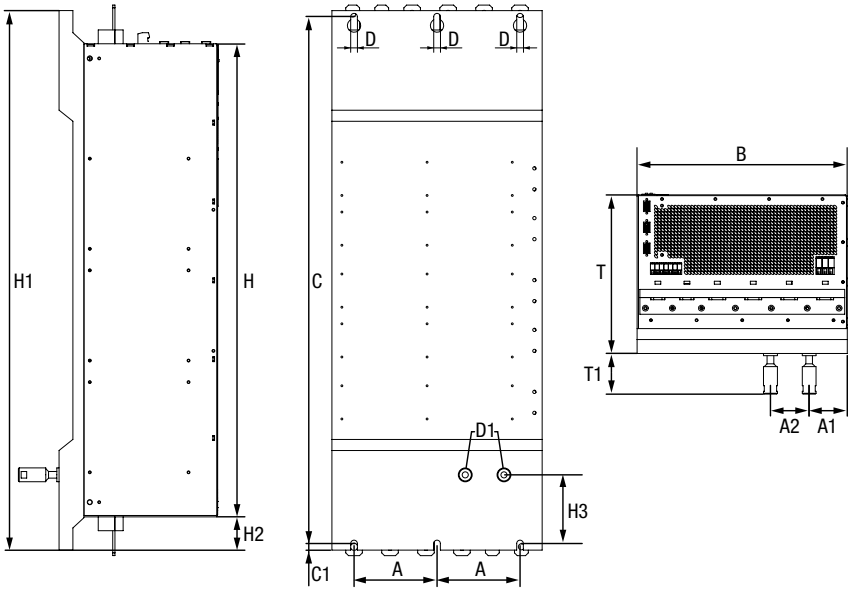
3) All data referred to DC voltage (U_{ZK}) 565 V_{DC}

4) Approximation value

Mechanism, BG7	SO84.250.0	SO84.325.0	SO84.450.0
Cooling method	Liquid cooling		
Protection	IP20 except terminals (IP00)		
Coolant temperature	max. 40 °C, not more than 10 °C below the ambient temperature		
Weight	100 kg		
Mounting method	Vertical mounting		
End-to-end mounting of multiple servocontrollers	Direct end-to-end mounting		

Dimensions - BG7 [mm]	
B (width)	380 (with terminal covers: 392)
H (height)	952 (with terminal covers and shield plates: 1305)
T (depth)	286.5 (without terminals)
A / A1 / A2	150 / 29 / 70
C / C1	952 / 12
D Ø	12
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	971 / 60 / 124
S	3/8 inch (inside thread)
D1	73.5

Dimensional drawings, BG7, liquid-cooled



Space for your own notes

Supply units 40 A to 76 A (BG5) - Technical data

Type SO84.040.S (air-cooled)

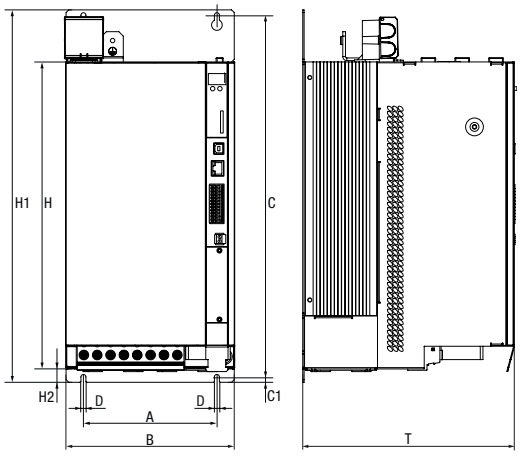
Technical data / Designation		SO84.040.S	SO84.076.S
DC link output			
Voltage		650 V_{DC} / 770 V_{DC}	
Rated current, effective (I_N)	at 650 V_{DC}	40 A	76 A
	at 770 V_{DC}	34 A	64 A
Peak current (for 10 s)	at 650 V_{DC}	80 A	144 A
	at 770 V_{DC}	68 A	122 A
Continuous power		26 kW	50 kW
Peak current (for 10 s)		52 kW	94 kW
DC link capacitance [1)]		900 µF	
Input mains			
Voltage		400 V_{AC} / 460 V_{AC} / 480 V_{AC} ±10%	
Continuous current, effective	at 400 V_{AC}	40 A	76 A
	at 460 / 480 V_{AC}	33 A	63 A
Peak current (for 10 s)	at 400 V_{AC}	80 A	144 A
	at 460 / 480 V_{AC}	67 A	120 A
Clock frequency		12 kHz	4 kHz
Continuous power		27.5 kW	52.5 kW
Power loss		1010 W	
Asymmetry of mains voltage		±3% max.	
Frequency		50/60 Hz	

1) The maximum overall capacitance of the multi-axis system DC link in the case of a ServoOne supply unit BG5 (inclusive) 10000 µF.

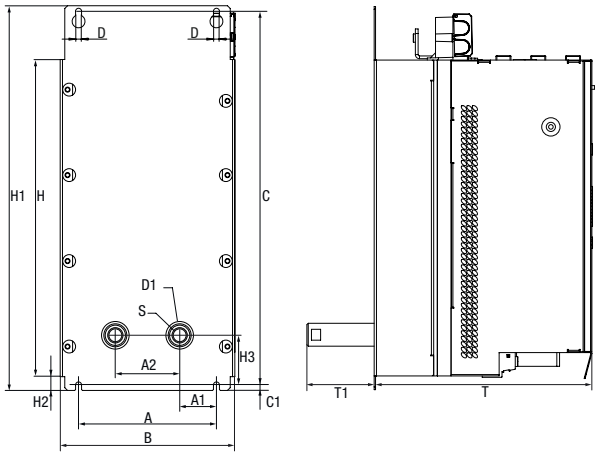
Mechanism, BG5	SO84.040.S	SO84.076.S
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	40 °C	
Weight	13 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple supply units	Direct butt-mounted, max. 2 mm	

Dimensions - BG5 [mm]	
B (width)	190
H (height) (air/liquid cooled)	345 / 346.5 (without terminals)
D (depth) (air/liquid cooled)	240 / 238.5 (without terminals)
A / A1 / A2	150 / 40 / 70
C / C1	406.5 / 6
D Ø ((air/liquid cooled))	5.6 / 6.5
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	418.5 / 15 / 54
S	3/8 inch (inside thread)
D1	73.5

Dimensional drawings, BG5, air-cooled



Dimensional drawings, BG5, liquid-cooled



Supply unit	SO84.040.S	SO84.076.S
Mains connection	**LCL-040** Included components: • Mains filter FFU 3x56K • input choke 40 A including capacitor • step-up choke 40 A • EMC mounting set CU weight 8.3 kg	**LCL-076** Included components: • Mains filter FFU 3x80K • input choke 76 A including capacitor • step-up choke 76 A • EMC mounting set CU weight 17.5 kg

Supply units 115 A to 170 A (BG6a) - Technical data

Type SO84.115.S (air-cooled)

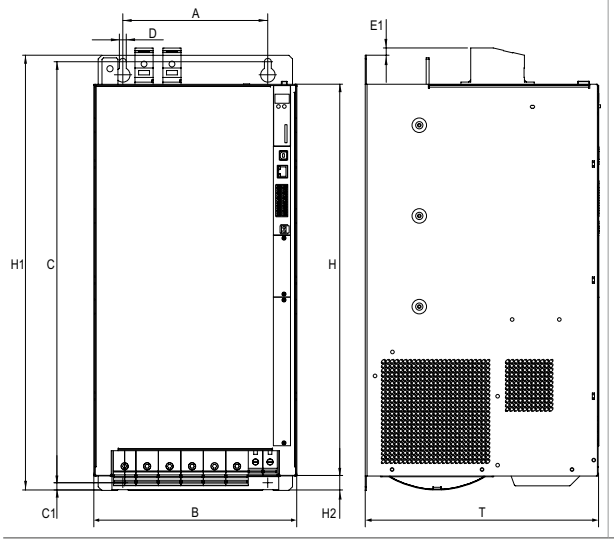
Technical data / Designation		SO84.115.S	SO84.170.S
DC link output			
Voltage		650 V_{DC} / 770 V_{DC}	
Rated current, effective (I_N)	at 650 V_{DC}	115 A	170 A
	at 770 V_{DC}	97 A	144 A
Peak current (for 10 s)	at 650 V_{DC}	195 A	246 A
	at 770 V_{DC}	165 A	207 A
Continuous power		75 kW	110 kW
Peak current (for 10 s)		127 kW	160 kW
DC link capacitance [1)]		4240 µF	
Input mains			
Voltage		400 V_{AC} / 460 V_{AC} / 480 V_{AC} ±10%	
Continuous current, effective	at 400 V_{AC}	115 A	170 A
	at 460 / 480 V_{AC}	96 A	142 A
Peak current (for 10 s)	at 400 V_{AC}	195 A	245 A
	at 460 / 480 V_{AC}	163 A	204 A
Clock frequency		8 kHz	4 kHz
Continuous power		80 kW	118 kW
Power loss		2500 W	
Asymmetry of mains voltage		±3% max.	
Frequency		50/60 Hz	

1) The maximum overall capacitance of the multi-axis system DC link in the case of a ServoOne supply unit BG6a (inclusive) 20000 µF.

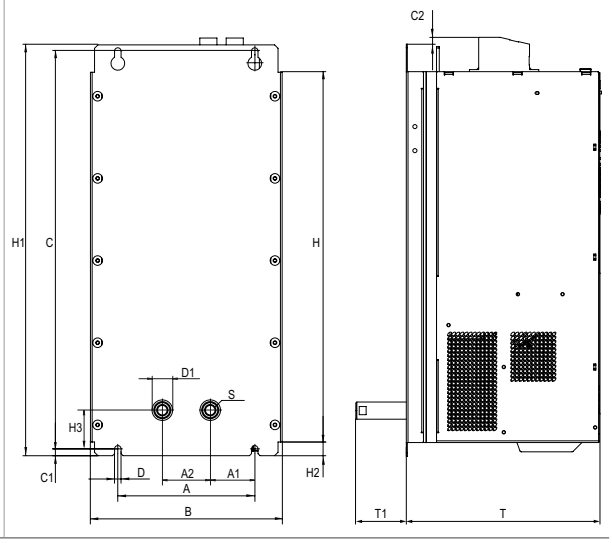
Mechanism, BG6a	SO84.115.S	SO84.170.S
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	40 °C	
Weight	32 kg	
Mounting method	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple supply units	Direct end-to-end mounting, 40 mm between two BG6a devices with air cooling	

Dimensions - BG6a [mm]	
B (width)	280
H (height)	540 (without terminals)
D (depth) (air/liquid cooled)	321 / 281 (without terminals)
A / A1 / A2	200 / 65 / 70
C / C1	581 / 10
D Ø	9.5
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	600 / 20 / 56.5
S	3/8 inch (inside thread)
D1	73.5

Dimensional drawings, BG6a, air-cooled



Dimensional drawings, BG6a, liquid-cooled



Supply unit	SO84.115.S	SO84.170.S
Mains connection	**LCL-115** Included components: • Mains filter FFU 3x130K • input choke 115 A including capacitor • step-up choke 115 A • EMC mounting set CU weight 23.7 kg	**LCL-170** Included components: • Mains filter FFU 3x180K • input choke 170 A including capacitor • step-up choke 170 A • EMC mounting set CU weight 37 kg

Supply units 375 A to 540 A (BG7) - Technical data

Type SO84.375.S (liquid-cooled)

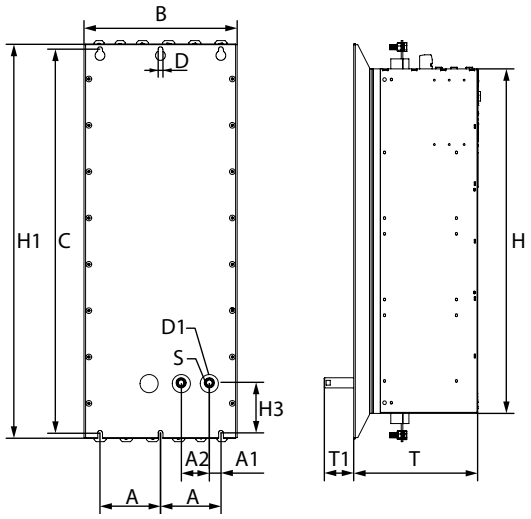
Technical data / Designation		SO84.375.S	SO84.540.S
DC link output			
Voltage		650 V_{DC} / 770 V_{DC}	
Rated current, effective (I_N)	at 650 V_{DC}	385 A	553 A
	at 770 V_{DC}	325 A	468 A
Peak current (for 10 s)	at 650 V_{DC}	577 A	577 A
	at 770 V_{DC}	487 A	487 A
Continuous power		250 kW	360 kW
Peak current (for 10 s)		375 kW	375 kW
DC link capacitance [1)]		7200 µF	
Input mains			
Voltage		400 V_{AC} / 460 V_{AC} / 480 V_{AC} ±10%	
Continuous current, effective	at 400 V_{AC}	375 A	540 A
	at 460 / 480 V_{AC}	313 A	450 A
Peak current (for 10 s)	at 400 V_{AC}	565 A	565 A
	at 460 / 480 V_{AC}	470 A	565 A
Clock frequency		4 kHz	4 kHz
Continuous power		260 kW	374 kW
Power loss		3300 W	4100 W
Asymmetry of mains voltage		±3% max.	
Frequency		50/60 Hz	

1) The maximum overall capacitance of the multi-axis system DC link in the case of a ServoOne supply unit BG6a (inclusive) 20000 µF.

Mechanism, BG7	SO84.375.S	SO84.540.S
Cooling method	Liquid cooling (wall-mounted)	
Protection	IP20 except terminals (IP00)	
Coolant temperature	5 °C to 40 °C (not more than 10 °C below ambient temperature)	
Weight	90 kg	
Mounting method	Vertical installation in a cabinet	
End-to-end mounting of multiple supply units	Direct end-to-end mounting, 40 mm between two BG7 devices	

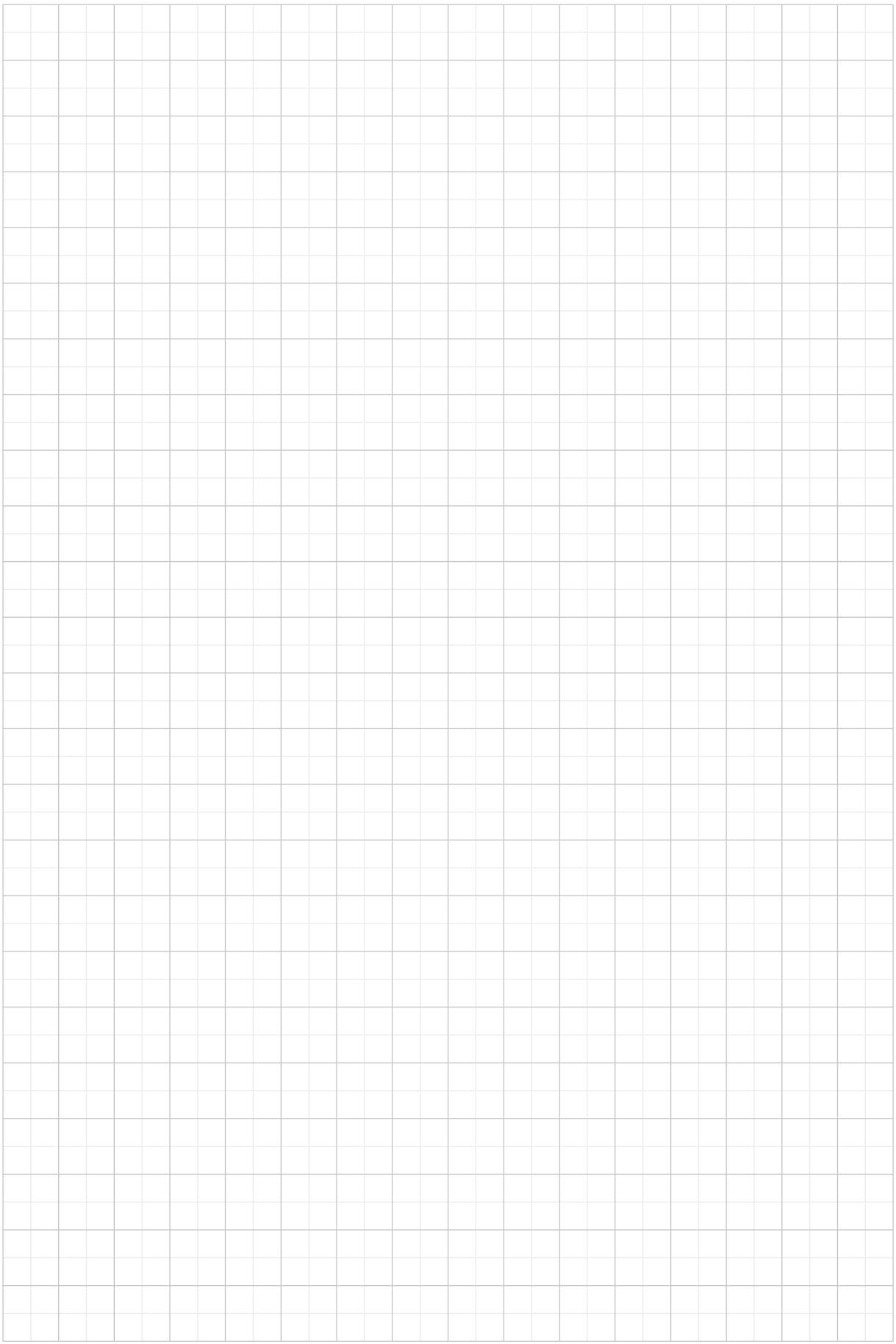
Dimensions - BG7 [mm]	
B (width)	380
H (height)	855 (without terminals)
D (depth) (liquid cooled)	287 (without terminals)
A / A1 / A2	150 / 69 / 70
C / C1	955 / -
D Ø	12
D1 Ø (hole for pipe socket)	48
H1 / H2 / H3	980 / - / 124
S	3/8 inch (inside thread)
D1	74

Dimensional drawings - BG7, liquid cooled



Supply unit	SO84.375.S	SO84.540.S
Mains connection	**LCL-375** Included components: • Mains filter FN 3359-400-99, 400 A • input choke 375 A including capacitor • step-up choke 375 A • EMC mounting set	**LCL-540** Included components: • Mains filter FN 3359-600-99, 600 A • Input choke 540 A incl. capacitor • Step-up choke 540 A • EMC mounting set

Space for your own notes



Safety systems

Type	Page	AC SD junior	AC SD 4-450 A	DC SD 4-450 A	PSU 26-360 kW
Integrated safety control	5-2	-	●[2] to SO84.072	●[1] to SO84.072	-

1) In preparation
2) Up to 32 A available,

NOTE: The integrated safety control can only be ordered together with the drive controller. It is always shipped ready-installed from the factory.

Accessories for integrated safety control	from Page 5-4
PC programming software SafePLC S	Page 5-4
Dongle	Page 5-5
Network cable for the Safe Cross Communication (SCC)	Page 5-5
I/O expansion module SMC-E12	Page 5-6
Connection cable for SMC-E12 module	Page 5-6

Safety systems - Integrated safety control

Integrated safety control model

Availability

SO8□.□□□.□□1□.□□□□

Article designation

Short description

The safety systems option includes a fully-featured safety control for machines, and is acceptance-tested to the latest standards and the highest safety levels. The Safe-Cross communication feature enables data to be exchanged among up to six ServoOne units.

NOTE: Only available built-in ex factory. Only for devices up to and including SO84.072.

NOTE: The acceptance for the ServoOne with integrated safety control is subject to the Machinery Directive 2006/42/EC. For this reason it is only permitted to place the safety control on the market in countries with the official languages German, English and Italian.

Equipment of the integrable safety control

Safety functions (speed-dependent)		
STO	Safe Torque Off	6/1 per axis
SS1	Safe Stop 1	12 (optionally SS1 *or* SS2)
SS2	Safe Stop 2	
SLS	Safe Limited Speed	48 (optionally SLS *or* SLSmax)
SLSmax	Safe Limited Speed maximum	
SDI	Safe Direction	6/1 per axis
ECS	Encoder Supervisor	6/1 per axis
ESM	Encoder Standstill Monitoring	6/1 per axis
Safety functions (speed- or position-dependent)		
SOS	Safe Operating Stop	6/1 per axis
SLT [2)]	Safe Limited Torque	1 per axis
SCA	Safe Cam	64
SLI	Safe Limited Increment	6/1 per axis
Safety functions (position-dependent)		
SLP [2)]	Safe Limited Position	12
SCA [2)]	Safe Cam	64
Sref [2)]	Safe reference	6
SEL [2)]	Safe Emergency Limit	6
Safety functions (brake)		
SBC	Safe Brake Control	1 per axis
SBT [2)]	Safe Brake Test	1 per axis
Safety functions (bus systems)		
SCC	Safe Cross Communication	
FSoE [2)]	Functional Safety over EtherCAT	

PC software	
Programming software SafePLC S	• Configuration • Programming • Validation
DriveManager	For details see page 9-3
System	
Configuration mode	User-programmable safety control
Safety acceptance tests	SIL3 to IEC 61508 / IEC 62061, PL e and Cat 4 to EN ISO 13849
Control hardware	
Safe digital inputs	4 [1)]
Safe digital outputs	4 [1)]
… of which usable as safe pulse outputs	4
Safe brake outputs	2 [1)]
Connectable safety sensors	Light grids, emergency stops, guard doors, laser scanners; mode selector switches, deadlocks, permission buttons, etc.
Analog standard inputs (±10 V, 12-bit)	2
Digital standard inputs	6
Encoder systems (Safety level dependent on application solution)	SinCos, SSI, TTL, HTL and resolver

1) SIL2; SIL3 with redundant use of the inputs/outputs (2-channel)
2) In preparation

ID no.: 1100.24B.5-00 Date: 10/2013

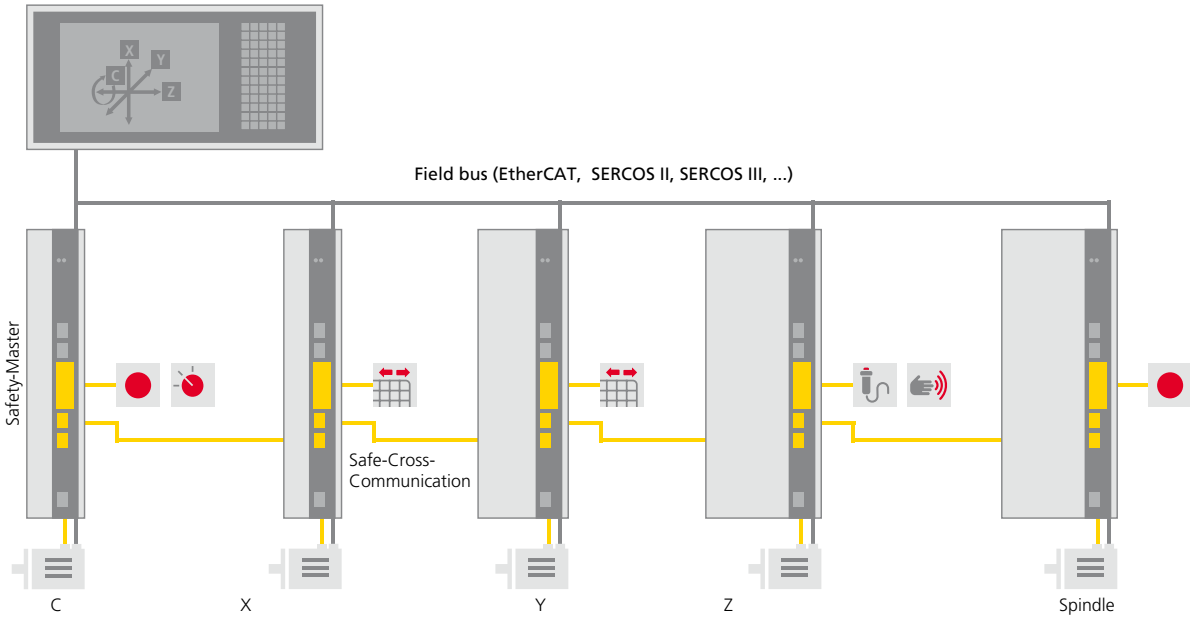
Additional safety system terminal overview

System description

The ServoOne with integrated safety control provides a complete, freely programmable safety control system for safe handling of machines.

The Safe Cross Communication (SCC) feature enables up to six drives to be linked to form a network. This enables a complete machine safety solution independent of the control. The SCCs permit centralised evaluation in the safety master of safety switching elements connected to the drives as well as exchange of status information.

For ease of operation of the safety control, the axis network is programmed and parameterised by a program in the master drive, which also makes serial commissioning much easier. The Safe PLC S programming software includes pre-programmed modules for all commonly used sensor, output and input types, so ensuring high levels of user-friendliness. This flexibility, in conjunction with the available encoder systems, allows the creation of innovative safety solutions for machines.



ID no.: 1100.24B.5-00 Date: 10/2013

PC programming software SafePLC S

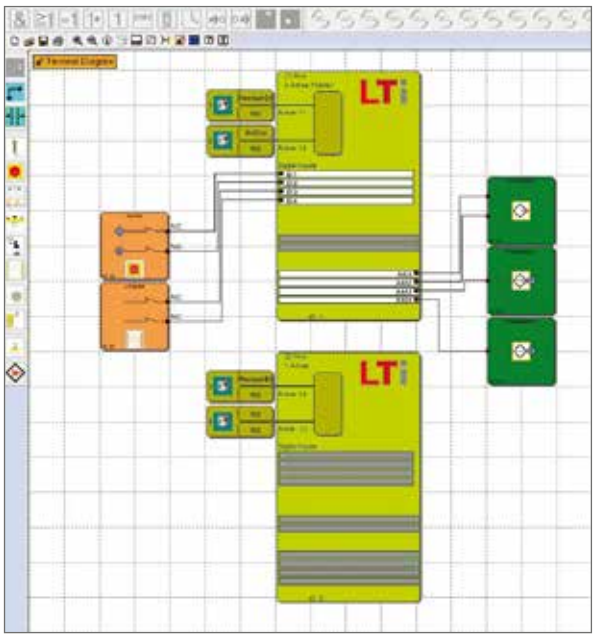
SafePLC S

Order designation

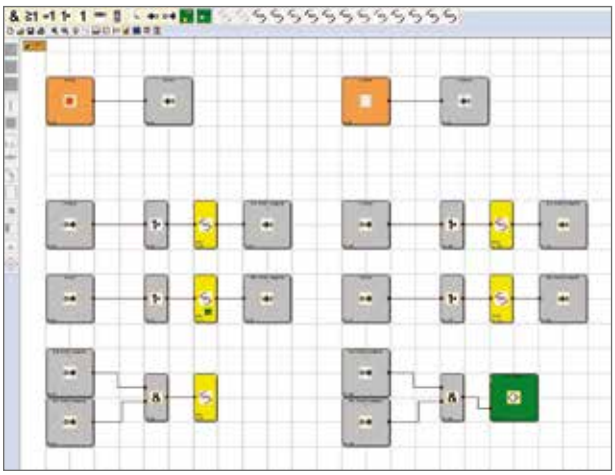
The programming software SafePLC S is only available for download free of charge on the LTi DRiVES homepage.

Short description
The graphic PC software SafePLC S is required to create the machine safety application. The entire safety solution for the machine can be programmed using only one program.

Functions	Explanations
Hardware configuration	Selection by Drag-and-Drop of among other features the drive controllers, encoders, safety switching elements or safety outputs
Programming	Graphic programming of the machine safety solution using function blocks
Parameterization	Setting thresholds for the safety function blocks
Validation	Validation of the programmed safety functionality
Commissioning	Download of the safety program to the drive controller and debugging or PC-based commissioning of the application
Languages	German, English
System requirements	PC with operating system Windows XP (SP2), Windows 7 (32/64 bit) or Windows 8 (32/64 bit)



Hardware configuration



Programming

Dongle

SafePLC S Dongle

Order designation

Short description
The USB dongle is necessary to authenticate the programmer as well as to prepare and change safety programs. The necessary USB driver is supplied together with the SafePLC S programming software.

Network cable for the Safe Cross Communication (SCC)

SCC-04

Order designation

Technical data	SCC cable
Cable length	0.4 m
Connections	Ready to connect for networking ServoOne controllers with integrated safety control via the Safe Cross Communication (SCC)
Cable diameter	6 mm

I/O expansion module SMC-E12

SMC-E12

Order designation

Short description
The SMC-E12 module expands the number of safe inputs and outputs on the safety control integrated in the ServoOne. Up to 2 SMC-E12 modules can be connected to the Safe Cross Communication (SCC) via the separately available connection cable SCC-08 IO.

Technical data	SMC-E12
External system voltage	24V (-15%+10%)
Safe inputs	12
Safe inputs or outputs (configurable)	10
Pulse output	2
Type of connection	Plug-in terminals
Mounting	DIN rail mounting
Dimensions (HxDxW [mm])	100x115x68

Similar to illustration

Connection cable for SMC-E12 module

SCC-08 IO

Order designation

Technical data	SCC-08 IO
Cable length	0.8 m
Connections	Ready to connect for connecting an SMC-E12 module to the Safe Cross Communication (SCC)
Cable diameter	6 mm

Option 1 - Communication

Type	Page	AC SD junior	AC SD 4-450 A	DC SD 4-450 A	PSU 26-360 kW
Field bus module for Sercos II	6-2	●	●	●	●
Field bus module for PROFIBUS-DPV1	6-3	●	●	●	●
Field bus module for EtherCAT	6-4	●	●	●	●
Field bus module for CANopen	6-5	●	●	●	●
Field bus module for CANopen plus 2 analog outputs	6-6	-	●	●	-
Field bus module for PROFINET IRT (isochronous)	6-7	-	●	●	-
Field bus module for Sercos III	6-8	●	●	●	-

NOTE: Option 1 can only be ordered together with the drive controller. It is always shipped ready-installed from the factory.

Option 1 - Sercos II

sercos
the automation bus

Availability

SO□□.□□□.□□1□.□□□□

Sercos II version	Article designation

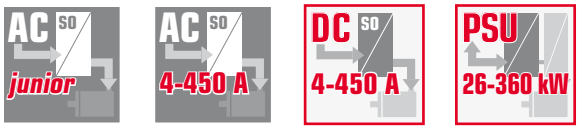
Short description

The interface conforms to IEC 61491 / EN 61491 for sercos interfaces and ensures optimum interworking of digital drives and controllers from different manufacturers.

Technical data	Sercos II
Application note	AN17.2 (dated 11.02.2003)
Transfer rate	2/4/8 and 16 MBit/s
Connections	1 transmitter, 1 receiver, optical waveguides conform to sercos interface specification (version 2.4, February 2005)

NOTES: Only available built-in ex factory.
Sercos III is also available as option 1. For details see page 6-8.

Option 1 - PROFIBUS



Availability

SO□□.□□□.□□2□.□□□□

PROFIBUS version

Article designation

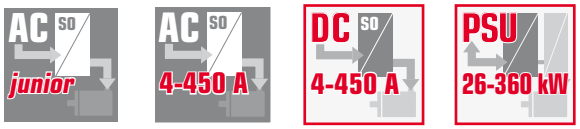
Short description

Communication interface for PROFIBUS-DPV1

Technical data	PROFIBUS
Standardisation	EN 50170
Communication	Directive 2.082
Device profile	PROFIdrive V3.1
Transfer rate/Cable length	9.6 kBit/s to 1,200 m 12 MBit/s up to 100 m
Connection	PROFIBUS D-SUB connector 9-pin

NOTE: Only available built-in ex factory.

Option 1 - EtherCAT



Availability

SO□□.□□□.□□3□.□□□□

EtherCat model	Article designation

Short description

EtherCAT is an Ethernet-based, real time-capable, synchronous field bus system. It is classed as one of the fastest real-time Ethernet solutions for automation.

Technical data	EtherCAT
Scaling	IEC 61158 / IEC 61784-2 / IEC 61800-7
Transfer rate	up to 100 MBit/s
Transfer medium	Standardised Ethernet to IEEE 802.3
Sampling time	≥125 µs
Synchronisation jitter	≤1 µs (distributed clocks)
Communication profile	CoE (CiA 301) (V1.0.2)
Device profile	CiA 402 (Rev. 2.0)
Network topology	Line, tree or star possible
Connection	RJ45 (shielded)
Cable type	CAT5

NOTE: Only available built-in ex factory.

Option 1 - CANopen

Availability

CANopen version	Article designation
	SO□□.□□□.□□4□.□□□□

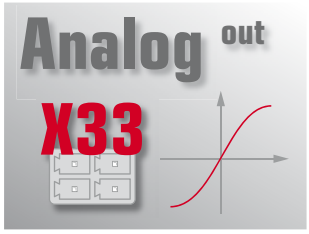
Short description

Communication interface for CANopen, isolated from device electronics

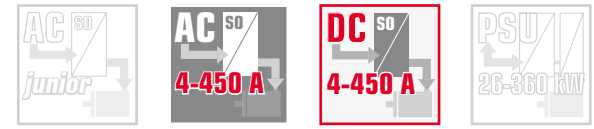
Technical data	CANopen
Standardisation	ISO 11898 / IEC 61800-7
Communication	CiA 301 (Rev. 4.01)
Device profile	CiA 402 (Rev. 2.0)
Transfer rate/ Cable length	20 kBit/s to 1000 m 1 MBit/s up to 40 m
Connections	2 x Phoenix Contact connectors (type FMC 1.5/5-ST-3.5 - GY RAL7042) 5-pin (as per CiA 303)
Supply voltage ext.	24 V ±20% (to IEC 61131-2)

NOTE: Only available built-in ex factory.

Option 1 - CANopen + 2AO



CANopen + 2AO version



Availability

SO8□.□□□.□□5□.□□□□

Article designation

Short description

Communication interface for CANopen (isolated from device electronics) and two analog outputs (2AO)

Technical data	CANopen
Standardisation	ISO 11898
Communication	CiA 301 (Rev. 4.01)
Device profile	CiA 402 (Rev. 2.0)
Transfer rate/ Cable length	20 kBit/s to 1000 m 1 MBit/s up to 40 m
Connections	2 x Phoenix Contact connectors (type FMC 1.5/5-ST-3.5 - GY RAL7042) 5-pin (as per CiA 303)
Supply voltage ext.	24 V ±20% (to IEC 61131-2)

Technical data	2AO
Number of channels	2
Voltage range	±10 V differential
Current capacity	max. 3 mA, short-circuit-proof
Resolution	12-bit
Accuracy	max. ± 2% referred to 10 V, offset error < ± 0.1 V
Sampling time	125 µs
Connections	2 x Phoenix Contact connectors (type FMC 1.5/2-ST3.5-GY RAL7042)

NOTE: Only available built-in ex factory.

Option 1 - PROFINET IRT

Availability on request

PROFINET IRT version	Article designation
	SO8□.□□□.□□7□.□□□□

Short description

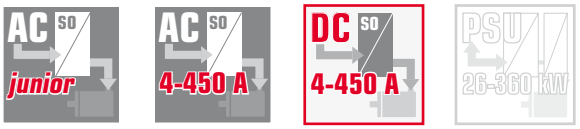
The interface conforms to the international standards IEC 61158-5-10 and IEC 61158-6-10.

Technical data	PROFINET IRT
Communication	PROFINET I/O, V 2.2.4, Conformance Class C (isochronous)
Device profile	PROFIdrive
Sampling time	500 µs to 65 ms (multiples of 500 µs programmable)
Network topology	Line
Connection	RJ45 shielded
Cable type	CAT5

NOTE: Only available built-in ex factory.

Option 1 - Sercos III

sercos
the automation bus



Availability

SO□□.□□□.□□8□.□□□□

Sercos III version | Article designation

Short description

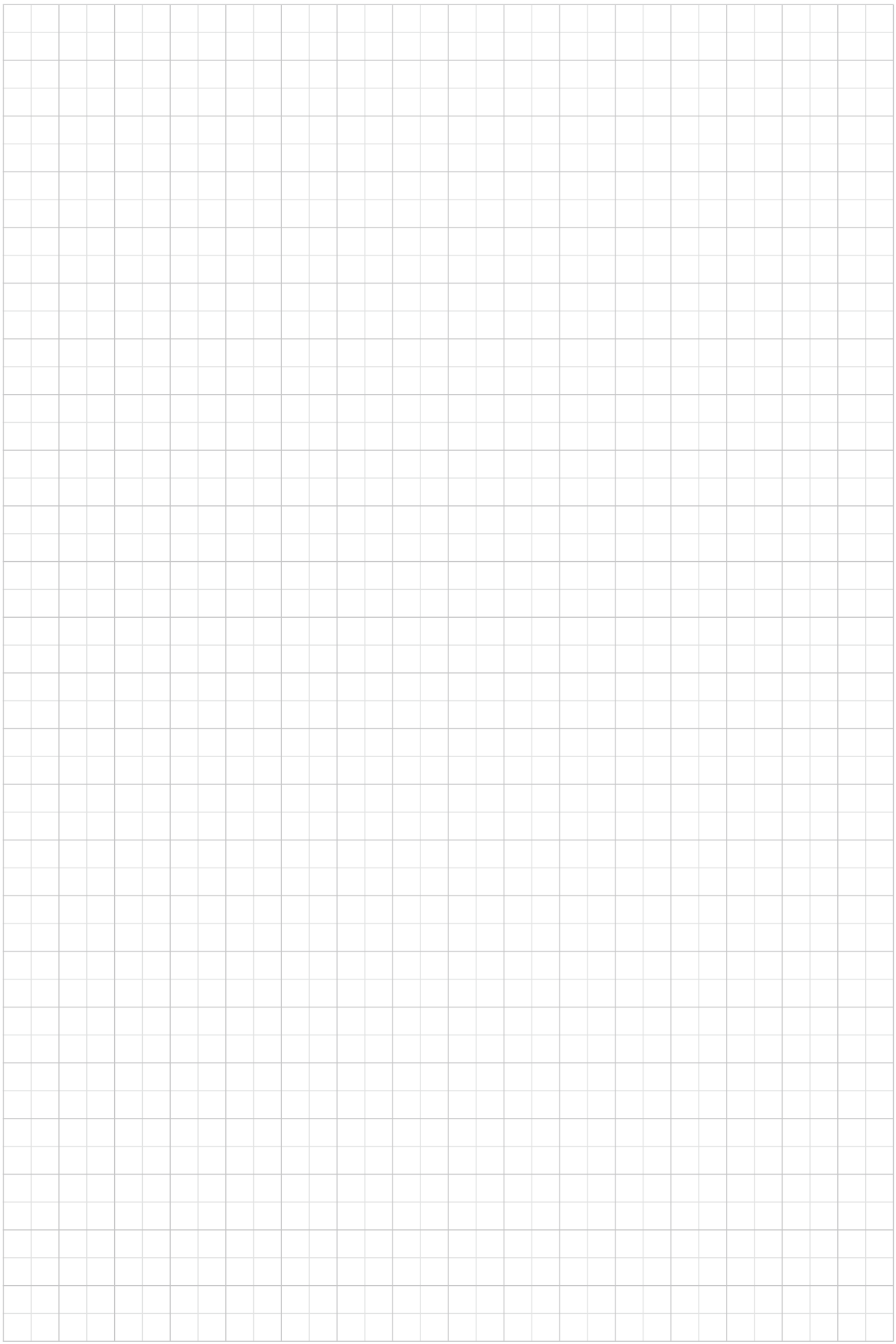
The interface conforms to IEC 61491 / EN 61491 for sercos interfaces and ensures optimum interworking of digital drives and controllers from different manufacturers.
The basis for sercos III implementation in the ServoOne is the specification V1.1.2 from Sercos International.

Technical data	Ssercos III
Application note	AN17.2 (dated 11.02.2003)
Communication profile	Aercos Communication (V1.1.2.1.7) (Sercos International)
Device profile	Generic Device profile (V1.1.2.1.1) (Sercos International)
Sampling time	125 µs to 65 ms (multiples of 125 µs programmable)
Network topology	Line or ring possible
Connection	RJ45 shielded
Cable type	CAT5e

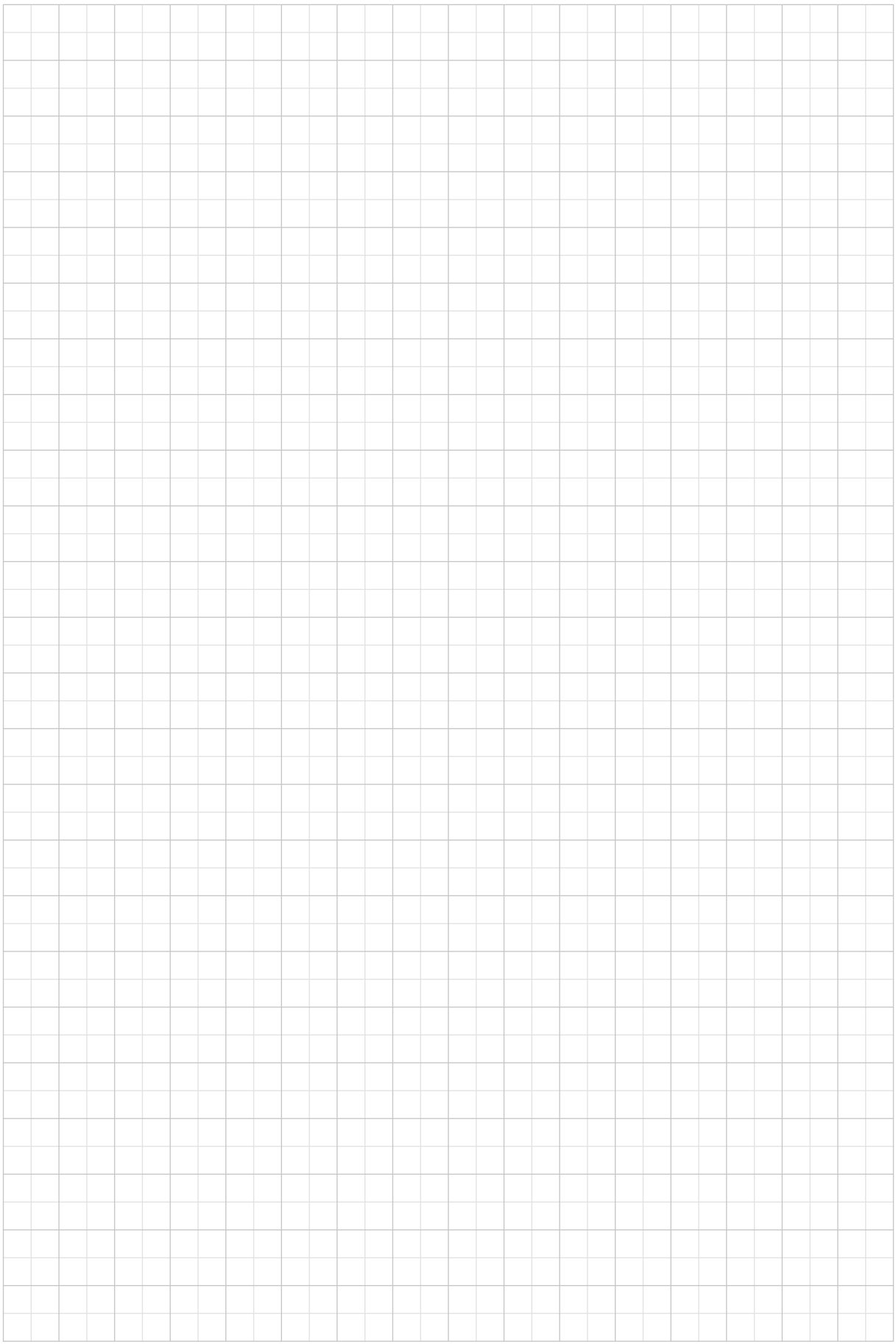
NOTES: Only available built-in ex factory. Sercos II is also available as option 1. For details see page 6-2.

ID no.: 1100.24B.5-00 Date: 10/2013

Space for your own notes



Space for your own notes



Option 2 - Technology

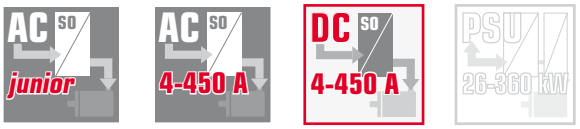
Type	Page	AC SD junior	AC SD 4-450 A	DC SD 4-450 A	PSU 26-360 kW
Interface for second SinCos encoder	7-2	●	●	●	-
Interface for TTL encoder simulation / TTL master encoder	7-3	●	●	●	-
Interface for TwinSync communication	7-4	-	●	●	-
Interface for SSI encoder simulation	7-5	-	●	●	-
Interface for TTL encoder with commutation signals	7-6	●	●	●	-
Interface for Digital Input/Output (DIO) expansion	7-7	●	●[1)]	●[1)]	-
Interface for second safe SinCos encoder	7-8	-	●[1)]	●[1)]	-
Interface for second safe SSI encoder	7-9	-	●[1)]	●[1)]	-
Interface for second safe axis monitor (SinCos)	7-10	-	●[1)]	●[1)]	-
Interface for one-cable interface	7-11	●	-	-	-

1) In preparation

NOTE: Option 2 - technology can only be ordered together with the drive controller.
It is always shipped ready-installed from the factory.

Option 2 - Second SinCos encoder

Second SinCos encoder model



Availability

●	Operable without integrated safety control
-	Operable with integrated safety control

SO□□.□□□.□□□1.□□□□

Article designation

Short description

This option enables parallel evaluation of two SinCos encoders. Evaluation of only one SinCos encoder is included in the device standard (connection via X7). For details of the supported encoder types refer to the function overview on page 1-3 in the "Technology options" section.

Technical data	SinCos encoder
Signals	A/B, zero pulse
Signal level	SinCos, 1 V_{ss} + analog zero pulse
Signal frequency	500 kHz max.

Technical data	Absolute value sender
Signals	Data, CLK
Signal level	RS485-conforming
Switching frequency EnDat	2 MHz max.
Switching frequency SSI	1 MHz max.

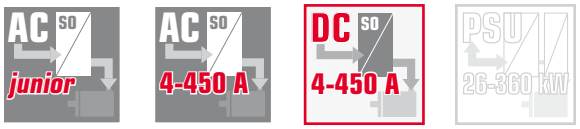
Technical data	General
Supply voltage ext. encoder, SinCos, SSI, EnDat	5 V ±5% / 250 mA
Cable length	50 m max. (ServoOne junior 30 m max.)
Wave terminating resistance	120 Ω (integrated)

NOTE: Only available built-in ex factory.

ID no.: 1100.24B.5-00 Date: 10/2013

Option 2 - TTL encoder simulation / TTL master encoder

TTL encoder simulation / TTL master encoder version



Availability

●	Operable without integrated safety control
-	Operable with integrated safety control

SO□□.□□□.□□□2.□□□□

Article designation

Short description

This option permits TTL encoder simulation of a connected encoder and/or connection of a TTL master encoder. The following operation modes are possible:

- Evaluation of a TTL encoder
- Simulation of a TTL encoder (signals from other encoders are converted into TTL signals and made available as output signals)
- TTL repeater: Evaluation of encoder connected to X7 or X8 and direct floating transmission via encoder simulation

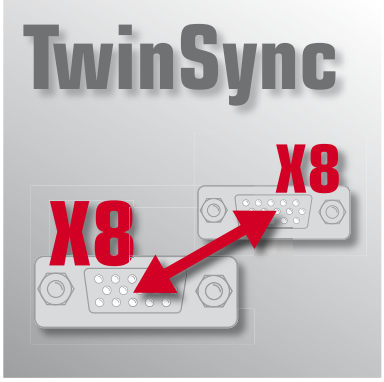
Technical data	TTL encoder simulation
Signals	A/B, zero pulse
Signal level	TTL differential (RS422), electrically isolated from the drive controller
Signal frequency	1 MHz max.

Technical data	TTL master encoder
Signals	A/B, zero pulse or pulse/direction
Signal level	TTL-differential (RS422)
Signal frequency	500 kHz max.

Technical data	General
Supply voltage ext. encoder	5 V ±5% / 250 mA
Cable length	10 m max.
Wave terminating resistance	120 Ω (integrated)

NOTE: Only available built-in ex factory.

Option 2 - TwinSync communication



TwinSync communication version

Availability	
●	Operable without integrated safety control
-	Operable with integrated safety control

SO□□.□□□.□□□3.□□□□

Article designation

Short description

By way of the TwinSync option, two drives can be synchronised in master/slave mode. The data mapping for bidirectional cyclic communication between the drives can be flexibly parameterised. The master drive can transmit setpoint (reference) values and control information for the slave drive via TwinSync.

Technical data	TwinSync communication
Signal level	TTL differential (RS422), electrically isolated from the drive controller
User data	8 bytes bidirectional, spread across max. three objects
Transfer mode	Asynchronous, synchronised via Sync pulse
Transfer rate	max. 8 kHz
Cable length	max. 10 m
Wave terminating resistance	120 Ω (integrated)

NOTE: Only available built-in ex factory.

TwinSync connecting cable

KTS-SO-010

Article designation

Technical data	TwinSync cable
Cable length	1 m
Connections	2 x SUB-D 9-pin male
Cross-section	4 x 2 x 0.25 + 2 x 0.50

Option 2 - SSI encoder simulation

SSI encoder simulation version

Availability

●	Operable without integrated safety control
-	Operable with integrated safety control

SO□□.□□□.□□□4.□□□□

Article designation

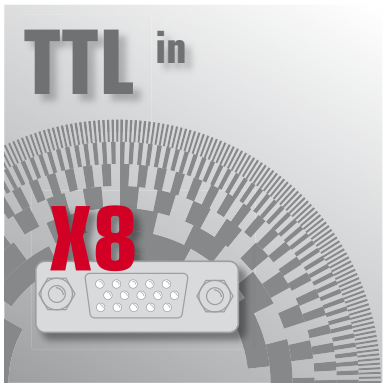
Short description

This option permits SSI encoder simulation for output of position information. The length and the protocol for SSI data transfer can be flexibly parameterised. Synchronisation of the control cycle to the external SSI clock signal is possible as an option.

Technical data	SSI encoder simulation
Signal level	TTL differential (RS422), electrically isolated from the drive controller
Baud rate	250, 500, 750, 1000 kBaud
Coding	Gray, binary
Cable length	max. 10 m
Wave terminating resistance	120 Ω (integrated)

NOTE: Only available built-in ex factory.

Option 2 - TTL encoder with commutation signals



Version featuring TTL encoder with commutation signals

Availability	
●	Operable without integrated safety control
-	Operable with integrated safety control

SO□□.□□□.□□□5.□□□□

Article designation

Short description

This option permits evaluation of a TTL encoder with additional 120° phase-shifted differential commutation signals.

Technical data	TTL encoder with commutation signals
Signals	A/B tracks, zero pulse, U, V, W commutation signals
Signal level	TTL-differential (RS422)
Signal frequency	500 kHz max.
Supply voltage ext. encoder	5 V ±5% / 250 mA
Cable length	10 m max.
Wave terminating resistance	120 Ω (integrated)

NOTE: Only available built-in ex factory.

Option 2 - Digital Input/Output (DIO) expansion

Digital Input/Output (DIO) expansion version

Availability

(For ServoOne single-axis and multi-axis systems in preparation)

●	Operable without integrated safety control
-	Operable with integrated safety control

SO□□.□□□.□□□8.□□□□.x

Article designation

Short description

This technology option expands the digital inputs and outputs at option slot 2 (Technology).
The desired function can be freely parameterised equivalent to the standard inputs and outputs.

Technical data	Digital input/output expansion (DIO)
Number of inputs	4 (floating to control electronics)
Number of outputs	8 (floating to control electronics)
Inputs signal level	+24 V DC +20%; Low/High: ≤4.8 V/ ≥18 V
Inputs signal frequency	<500 Hz
Outputs signal level	+24 V DC, Imax = 100 mA
Outputs sampling rate	1 ms
Input supply voltage	24 V DC ±20%

Digital IO cable

DIOC-KS002

Article designation

Technical data	Digital IO cable
cable length	2 m (without plug and cable ends)
Plug/connections	Side A: Sub-D, 15-pin, male, high-density, metal housing Side B: Open cable end, 20 cm, stripped with heat-shrink tubing
Cable type/cross-section	6 x 2 x 0.25 + 2 x 0.5 mm² ROHS, UL compliant

NOTE: Only available built-in ex factory.

Option 2 - Second safe SinCos encoder

Second safe SinCos encoder model

Availability

-	Operable without integrated safety control
●	Operable with integrated safety control

SO8□.□□□.□□□A.□□□□

Article designation

Short description

This option permits evaluation of a second SinCos encoder. Evaluation of only one safe SinCos encoder is included in the device standard (connection via X7). The option permits evaluation of the SinCos encoder as a second safe channel for the drive axis.

Technical data	Safe SinCos encoder
Signals	A/B
Signal level	SinCos, 1 V_{ss}
Signal frequency	400 kHz max.

Technical data	General
Supply voltage ext. encoder, SinCos	5 V ±5% / 250 mA
Cable length	50 m max.
Wave terminating resistance	120 Ω (integrated)

NOTE: Only for devices with optional safety system. Only available built-in ex factory.

Option 2 - Second safe SSI encoder

Second safe SSI encoder model

Availability

-	Operable without integrated safety control
●	Operable with integrated safety control

SO8□.□□□.□□□B.□□□□

Article designation

Short description

This option permits evaluation of a second SSI encoder. Evaluation of only one safe SSI encoder is included in the device standard (connection via X7). The option permits evaluation of the SSI encoder as a second safe channel for the drive axis.
Evaluation of a second SSI channel allows use of the SLP (Safe Limited Position) function, subject to certain safety constraints.

Technical data	Absolute value sender
Signals	Data, CLK
Signal level	RS485-conforming
Switching frequency SSI	1 MHz max.

Technical data	General
Supply voltage ext. encoder	No encoder supply
Cable length	50 m max.
Wave terminating resistance	120 Ω (integrated)

NOTE: Only for devices with optional safety system. Only available built-in ex factory.

Option 2 - Second safe axis monitor (SinCos)

Second safe axis monitor (SinCos) model

Availability	
-	Operable without integrated safety control
●	Operable with integrated safety control

SO8□.□□□.□□□C.□□□□

Article designation

Short description

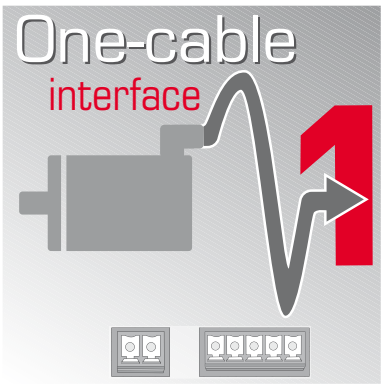
This option permits safe evaluation of an external drive axis. The encoder must be a safe encoder, as it can only be evaluated over one channel.

Technical data	SinCos encoder
Signals	A/B
Signal level	SinCos, 1 V_{ss}
Signal frequency	400 kHz max.

Technical data	General
Supply voltage ext. encoder	No encoder supply
cable length	30 cm max. (between the monitored drive axis and the option connection)
Wave terminating resistance	not integrated

NOTE: Only for devices with optional safety system. Only available built-in ex factory.

Option 2 - One-cable interface



One-cable interface version

Availability	
●	Operable without integrated safety control
-	Operable with integrated safety control

SO2□□.□□□.□□□D.□□□□.x

Article designation

Short description

This technology option permits evaluation of encoder systems according to the HIPERFACE DSL protocol. The two-wire encoder cable can be integrated directly into the motor cable. A motor temperature sensor is connected to the encoder inside the motor and is evaluated by it. The data is likewise transferred via the encoder interface. This implements a one-cable motor system. When using a motor brake, the brake is connected directly to the option module.

Technical data	encoder interface
Log	HIPERFACE DSL two-wire interface
Max. current	150 mA
Motor temperature sensor	Connected and evaluated in the encoder
Purpose	Only with motors of the LSP series with suitable encoder and associated motor cable

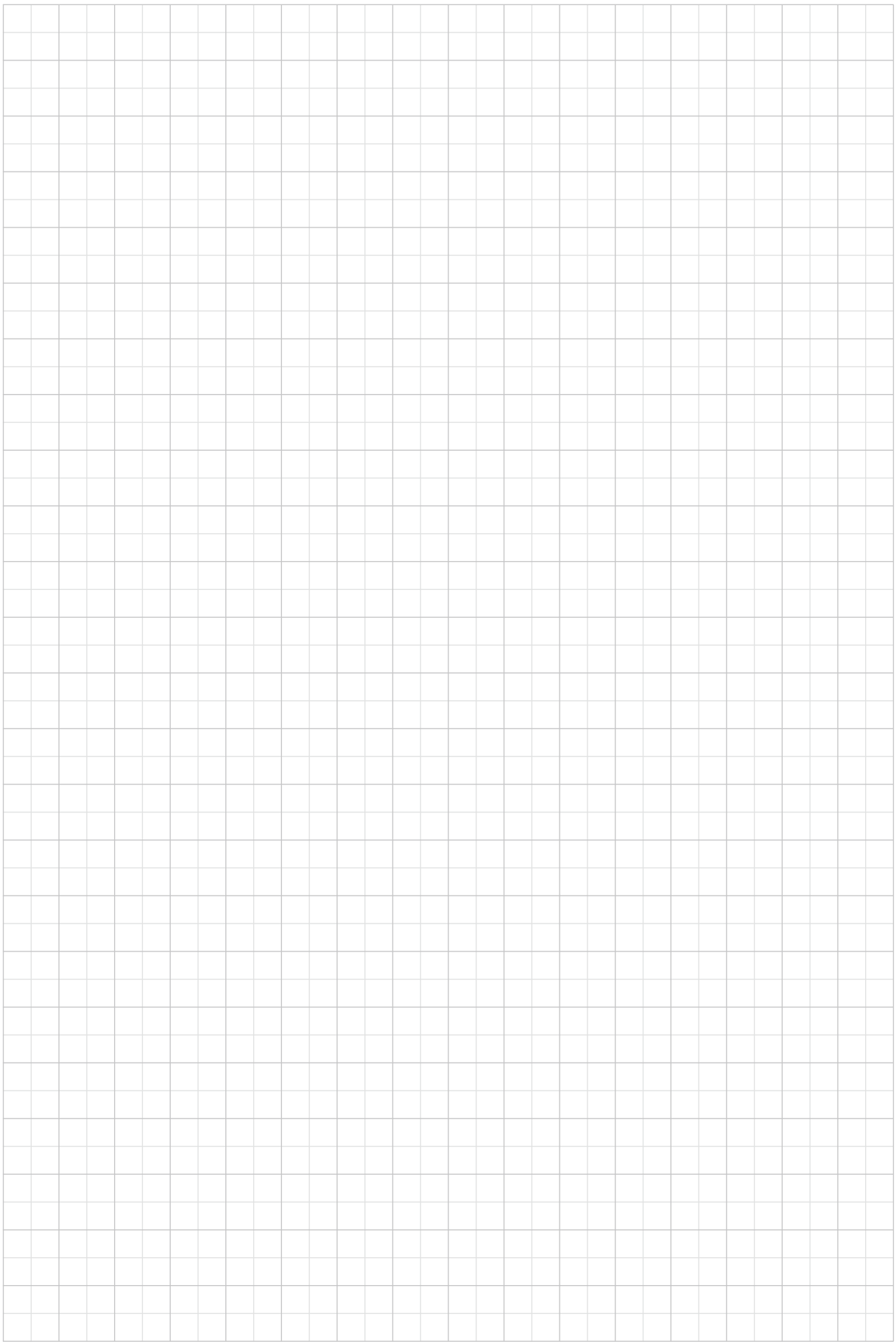
Technical data	Motor brake connection
Output voltage	+24 V DC (typ. U_{IN} – 1.4 V)
Max. output current	2.0 A
Supply U_{IN} (external)	+24 V DC +20%; I_{max} = 2.1 A
Purpose	Short-circuit-proof, integrated overload protection, activatable wire-break monitor (I < 200 mA), functionality as standard motor brake connection

Accessories:

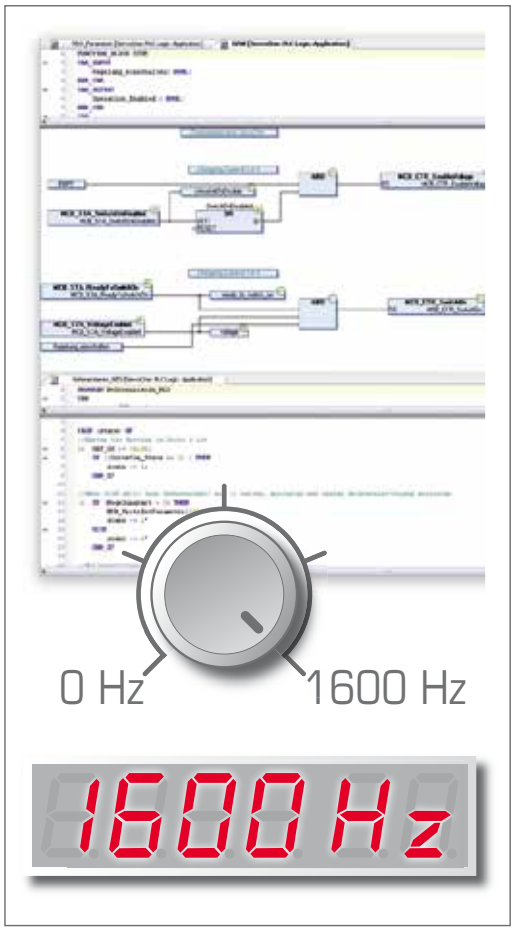
- 5-pin connector for one-cable interface: Order designation 1306.0001.0

NOTE: Only available built-in ex factory.

Space for your own notes



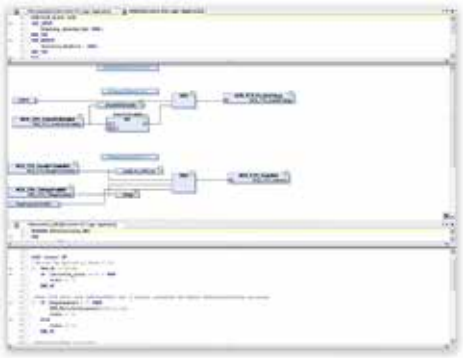
Function packages



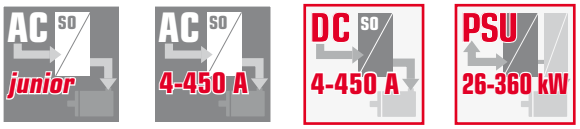
Type	Page	AC SD junior	AC SD 4-450 A	DC SD 4-450 A	PSU 26-360 kW
Function package Standard [1] (see table on page 1-4)	1-4	●	●	●	●
iPlc function package for programming in IEC 61131	8-2	●	●	●	●
HF function package for rotating field frequencies up to 1600 Hz	8-3	-	●	●	-

1) Included in the standard scope of supply for the hardware sizes..

Function package iPlc programming in IEC 61131



iPlc software



Availability

iPlc function package:
SO□□.□□□.□□□□.□1□□.□

iPlc+HF function package:
SO□□.□□□.□□□□.□8□□.□

Article designation

Short description

The iPlc, programmable in IEC 61131, shares the microcontroller platform of the ServoOne with the drive control, so permitting optimised, fast access to all system and control parameters and interfaces. Extensive motion and interface libraries permit easy, flexible creation of applications and provide a wide range of solution options.

Technical data	General
Platform	Microcontroller 32-bit FPU (integrated in standard drive µC)
Flash program memory	512 kByte
Data memory SDRAM	512 kByte
Data memory remanent NVRAM	512 bytes (retain), 512 bytes (persistent)
Real-time clock	No
Operating system	Single tasking

Technical data	Open-loop control
Processing time	Dependent on CPU workload
Number of controllable axes	1.5
Real-time tasks	Cyclic (max. 3 tasks), free-running (max. 3 tasks)
Minimum sampling time	1 ms (5 ms recommended)
Online program change	Yes
Watchdog timer	Yes
Field bus access to variables	respectively 20 Int16 and Int32, 10 FLOAT32 parameter

Technical data	Programming and debugging
Programming system	CoDeSys V3
Programming languages	STL, LD, FBD, ST, SFC, CFC editor
Command set	IEC 61131-3
Debug, Single Step, Watch function	Yes
Simulation, Online Trace	Yes
Breakpoints	Yes
Source Code Download	No
Program management	No
Programming interface	Ethernet TCP/IP

NOTE: Also available to order as upgrade to basic function package (article designation 1100.0000.0100.0) or to HF function package (article designation 1100.0000.0800.0).

HF (High Frequency) function package

HF function package

Availability

HF function package:
SO8□.□□□.□□□□.□7□□.□

HF+iPlc function package:
SO8□.□□□.□□□□.□8□□.□

Article designation

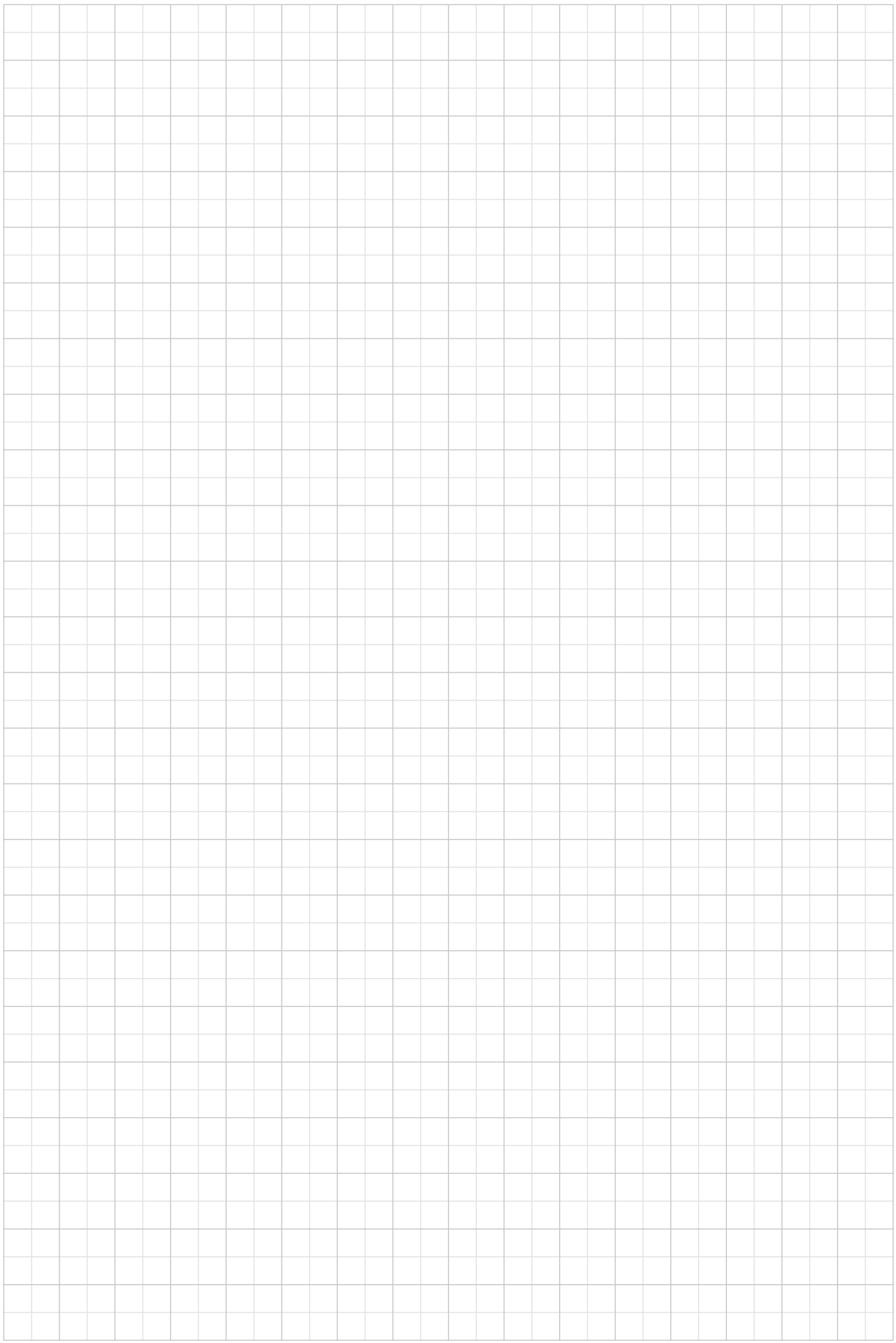
Short description

Function package for motor-side rotating field frequencies up to 1600 Hz

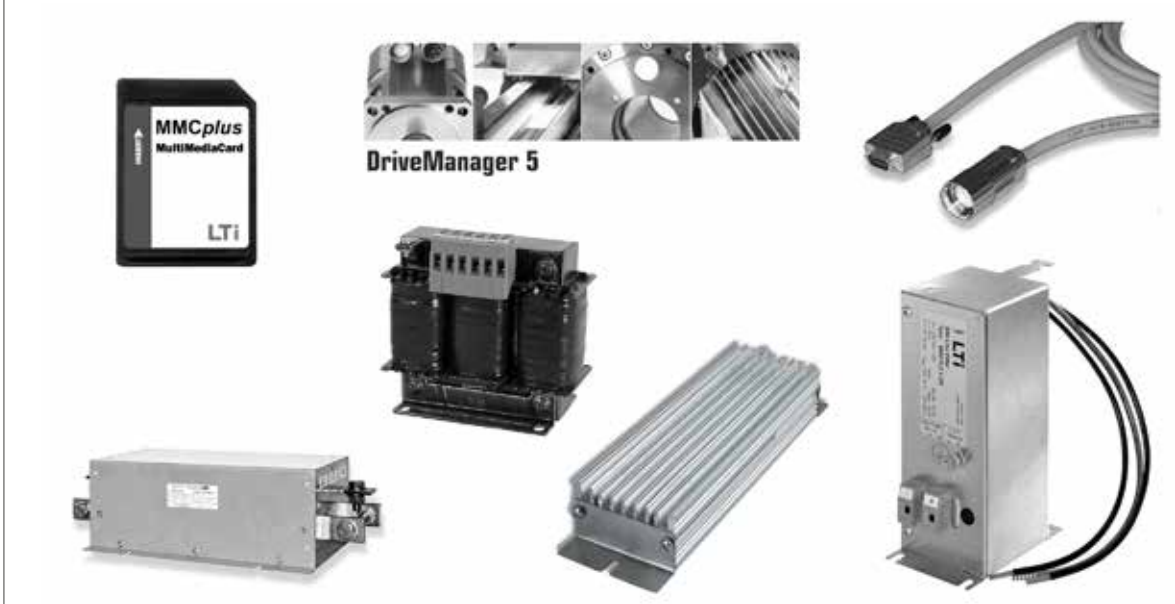
Technical data	HF functions
Output frequency	0 to 1600 Hz
Operation modes	Closed loop mode for ASM and PSM, VFC mode for ASM, sensorless control for PSM
Current controller	Fast current controller each with double switching frequency
Encoder evaluation	Additional encoder evaluation for digital Hall senders (90° and 120°) with semi-automatic encoder offset calculation
Control circuit	Sine filters and output chokes are integrated into the control loop and are compensated accordingly
Field-weakening mode	for ASM 1:10 and PSM 1:2
	Power failure backup mode and up-synchronisation
Parallel operation	via master/slave synchronisation (in option 2 requires TwinSync interface)
VFC functions	IxR and slip compensation, anti-oscillation, current limit value controller, constant current control, characteristic switchover

NOTE: Only available built-in ex factory.

Space for your own notes



Accessories



Contents	Type	Page
MMC memory card	MMC*plus*™	9-2
DriveManager 5 PC user software	Full version	9-3
Data cables	Ethernet, USB	9-4
Selection of motor cables	KM3, KM4, KM5, KM6, KM8	9-6
Selection of encoder cables	KRY2, KRY3, KGS2, KGH3, KGH4, KGH5	9-10
Mains chokes	LR32.14-UR, LR34.4-UR ... LR34.450-UR	9-12
Braking resistors	BR-200.0x.xx0-UR ... BR-026.xx.xx0-UR	9-16
ServoOne junior mains filters	EMC8.2-1Ph,UR ... EMC11.2-3Ph,UR	9-18
ServoOne single-axis system mains filters	EMC7.1-UR ... EMC500.1-UR	9-20
Liquid cooling connection set	LCS01	9-24

MMC memory card

MMC*plus*™

Availability

SC-MMC128

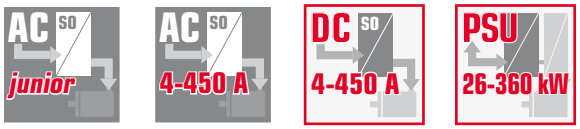
Article designation

Short description

Memory card for easy interchange of data or firmware.

Technical data	SC-MMC128
Capacitance	128 MB
Data transfer	2 MB/s read 2 MB/s write
Memory card type	Industrial MMC*plus*™ with SPI interface/protocol
Weight	1.5 g
Dimensions (WxHxD)	24 mm x 1.4 mm x 32 mm
Voltage	2.7 V ... 3.6 V
Temperature	-25 °C ... +85 °C

DriveManager 5 PC user software



Availability

DriveManager 5

DriveManager 5

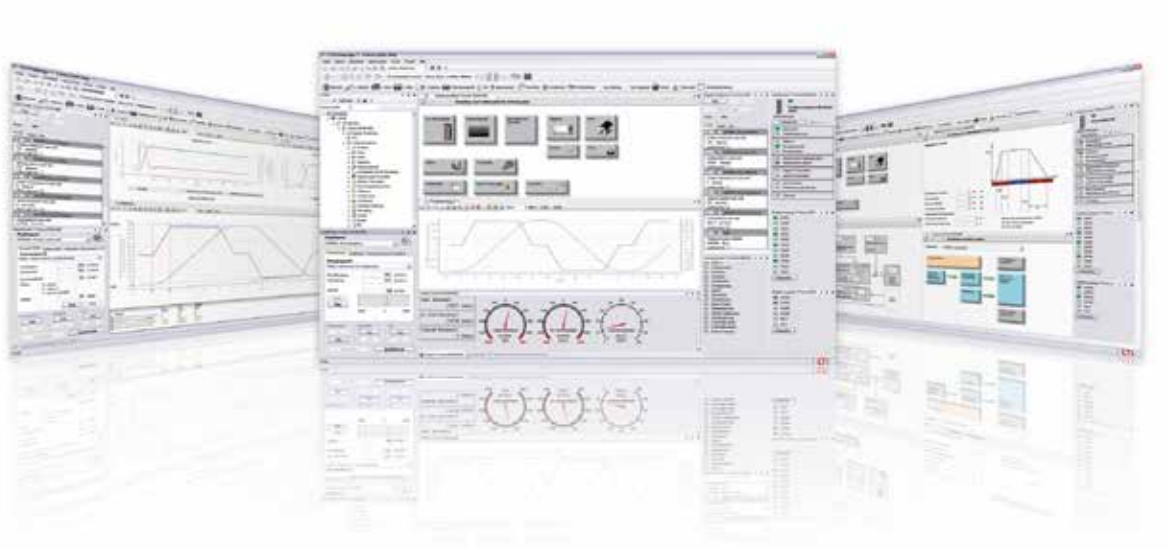
Article designation

Short description

The DriveManager 5 PC user software, with integrated online help and autotuning, cuts commissioning times substantially. DriveManager 5 has network capability and is able to manage multiple axis modules simultaneously in a project. A full version valid for 180 days is available on the LTi DRiVES homepage (http://drives.lt-i.com).

Technical data	DriveManager 5
Support for the following functions	• Initial commissioning of one or more servocontrollers
	• Fast serial commissioning with a configurable commissioning file (containing firmware, parameters, iPLC program)
	• Operator control and diagnosis with cockpit, 6-channel oscilloscope, and others
	• Project management

User interface



Data cables

Ethernet

Connecting cable type CC-ECL03 (Ethernet)

Availability

CC-ECL03

Cable length in metres

Article designation

Technical data	CC-ECL03
Short description	Cable for connection from servocontroller Ethernet port to PC running DriveManager
Cable length	3 m
Cable type	Crosslink Ethernet cable, CAT 5
Connections	2 x RJ45 connectors

USB

Connecting cable type CC-USB03 (USB)

Availability

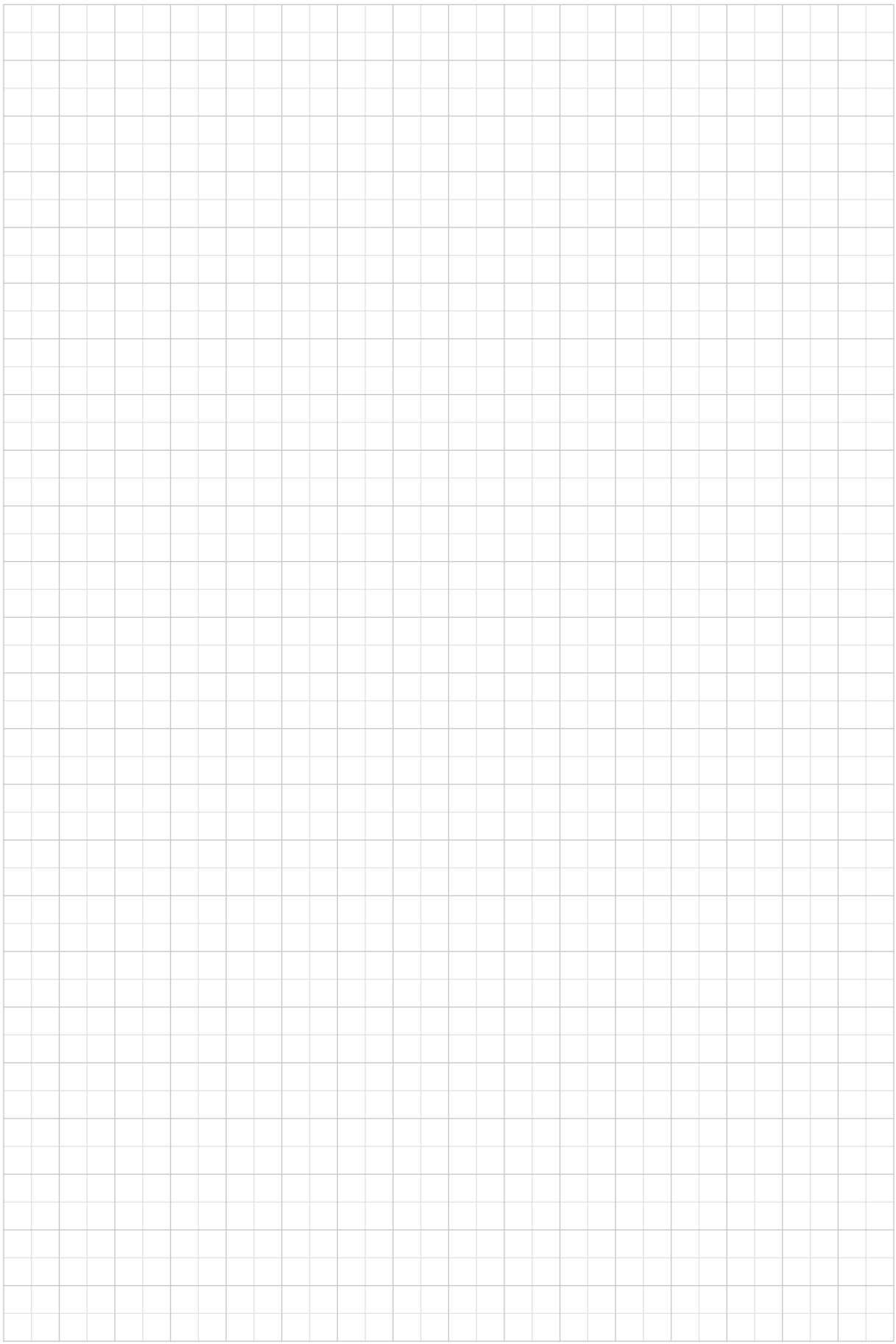
CC-USB03

Cable length in metres

Article designation

Technical data	CC-USB03
Short description	Cable for connection from servocontroller USB port to PC running DriveManager
Cable length	3 m
Cable type	USB connecting cable
Connections	1 x connector type A, 1 x connector type B

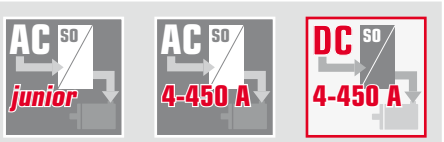
Space for your own notes



Selection of motor cables

Ready-made motor cable for LSN, LST and LSH servomotors

Availability KM3



Availability KM4

Availability KM5

Ready-made motor cables for LSP servomotors

Availability KM6 (with brake)

Availability KM8 (without brake)

Ready-made motor cable for LSP servomotors with Hiperface DSL encoders

Availability KM13

Order codes, motor cables for LSN, LST, LSH and LSP servomotors

KM3	-	KS	-	005	-	XXX

Ready-made cable

C Line → **KM2**
ServoOne → **KM3**
C Line / ServoOne / ServoOne junior → **KM4**
ServoOne junior → **KM5**

Capable for energy chains

Cable length

Cable length in metres
(1 m to 50 m, for ServoOne junior to 30 m)
005 → **5 m (example)**

Motor cable

to I_0 = 16 A → **-**
to I_0 = 24 A → **24 A** *(only KM3)*
to Io = 63 A (only LSx-220) → **63 A** *(only KM3)*

Motor cable for LSP servomotors with Hiperface DSL encoder order codes

KM13	-	3PHBD	-	I17	-	10A	-	KS	-	001

Ready-made motor cable

Cable layout — **3PHBD** → 3-phases + earth + brake + Hiperface DSL

Plug — **I17** → I17 plug motor-side

Rated current — **10A** → Cable cross-section 1 mm²

Additional option — **KS** → Capable for energy chains

Cable length

Cable length in metres (1 m to 30 m)
001 → 1 m (example)

Technical data

Technical data		KM3	KM4	KM5	KM6	KM8	KM13
Rated current		16 A, 24 A or 63 A	16 A				10 A
Cable length		up to 50 m, for ServoOne junior up to 30 m					
Structure	16 A	4G1.5 + 2 x 2 x 0.75 mm²	4G1.5	4G1.5 + 2 x 2 x 0.75 mm²	4G1.5 + 2 x 2 x 0.75 mm²	4G1.5	4G1.5 + 2 x 0.75 mm² + 2 x AWG22
	24 A	4G2.5 + 2 x 2 x 1 mm²	-	-	-	-	-
	63 A	4G10 + 2 x 1.5 mm² + 2 x 1 mm²	-	-	-	-	-
Capable for energy chains		Yes					

NOTE: For details and the full selection of available motor cables refer to the LSN/LST/LSH servomotor order catalogues (ID no.: 0814.05B.x) and LSP servomotors (ID no.: 0814.08B.x).

Space for your own notes

Selection of encoder cables

Ready-made encoder cable for LSN, LST and LSH servomotors

Availability KRY2

Availability KGS2

Availability KGH3

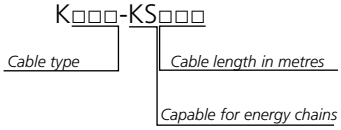
Availability KGH4

Ready-made encoder cable for LSP servomotors

Availability KRY3

Availability KGH5

Encoder cable



Article designation

Technical data	KRY2	KRY3	KGS2	KGH3	KGH4	KGH5
Encoder system	Resolver	Resolver	Single or multiturn with SSI/ EnDat interface	Single or multiturn with HIPERFACE® interface		HXX HIPERFACE® encoder
Cable length	up to 50 m, for ServoOne junior up to 30 m					
Capable for energy chains	Yes					

NOTE: For details and the full selection of available motor cables refer to the LSN/LST/LSH servomotor order catalogues (ID no.: 0814.05B.x) and LSP servomotors (ID no.: 0814.08B.x).

Mains chokes

LR34.8-UR

Availability

LR3□.□□□-UR

Series and voltage | *Rated current*

Article designation

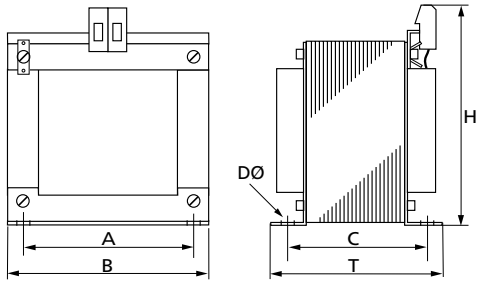
Technical data	LR32.14-UR	LR34.xxx-UR
Mains voltage	1 x 230 V, -20% +15%, 50/60 Hz [1]	3 x 460 V -25% +10%, 50/60 Hz [1]
Overload factor	1.8 x I_N for 40 s	2.0 x I_N for 30 s
Ambient temperature	-25 °C to +45 °C, with power reduction up to 60 °C (1.3% per °C)	
Mounting height	1000 m, with power reduction up to 2000 m (6% per 1000 m)	
Relative humidity	15 ... 95%, condensation not permitted	
Storage temperature	-25 °C to +70 °C	
Protection	IP00	
Short-circuit voltage	U_K 4% (corresponding to 9.2 V at 230 V)	U_K 4% (corresponding to 9.24 V at 400 V) applies to mains chokes with I_N = 4.0 A to 32 A [2] U_K 2% (corresponding to 4.6 V at 400 V) applies to mains chokes with I_N = 45 A to 450 A [3]
Permissible contamination	P2 as per EN 61558-1	
Thermal configuration	$I_{eff} \leq I_N$	$I_{eff} \leq I_N$
UL recognition	Version LR3X.xxx-UR has UL Recognition for the USA and Canadian markets	

1) At mains frequency 60 Hz the power loss increases by approx. 5 - 10%. *2) Only for controllers up to 32 A.* *3) Only for controllers from 45A.*

NOTE: For recommended combinations of controllers and mains chokes refer to the relevant controller catalogue page.

Single-phase mains chokes

Article designation	Rated current [A]	Short-circuit voltage U_K [%]	Power loss tot. [W]	Inductance [mH]	Weight [kg]	CU weight [kg]	Connection [mm²]
LR32.14-UR	14	4	16	2.1	1.5	0.3	4

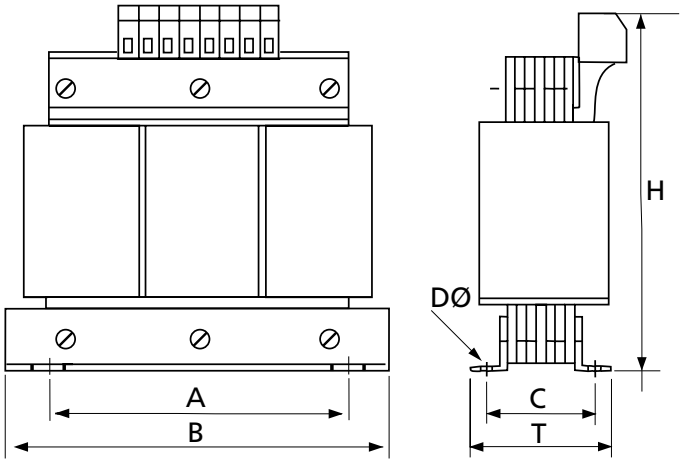
Dimensions [mm]	LR32.14-UR	Dimensional drawing
B (width)	85	
H (height)	100	
T (depth)	65	
A	64	
C	50	
D Ø	4.8	

Three-phase mains chokes

Article designation	Rated current [A]	Short-circuit voltage U_K [%]	Power loss tot. [W]	Inductance [mH]	Weight [kg]	CU weight [kg]	Connection
LR34.4-UR	4.2	4	20	7	2.5	0.4	4 mm²
LR34.6-UR	6		25	4.88		0.8	
LR34.8-UR	8		25	3.66		1.0	
LR34.14-UR	14		45	2.09	4.0	1.5	
LR34.17-UR	17		45	1.72		2.0	
LR34.24-UR	24		50	1.22	5.0	2.0	16 mm²
LR34.32-UR	32		70	0.92	6.0	2.5	
LR34.44-UR	45	2	60	0.33	5.0	2.0	
LR34.58-UR	60		70	0.25	7.0	3.5	
LR34.70-UR	72		80	0.20	10	4.0	
LR34.88-UR	90		120	0.16	13	5.5	35 mm²
LR34.108-UR	110		140	0.13	15	7.0	
LR34.140-UR	143		160	0.10	25	8.5	70 mm²
LR34.168-UR	170		170	0.09	25	9.0	
LR34.210-UR	210		268	0.07	27	6.1	M12
LR34.250-UR	250		285	0.059	28	10.8	
LR34.325-UR	325		351	0.045	43	14.3	
LR34.450-UR	450		296	0.033	46	11.9	M12

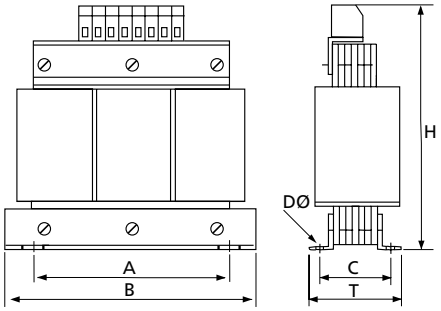
Dimensions [mm]	LR34.4-UR	LR34.6-UR	LR34.8-UR	LR34.14-UR	LR34.17-UR	LR34.24-UR	LR34.32-UR	LR34.44-UR	LR34.58-UR
W (width)	125			155			190	155	190
H (height)	130			160		170	200	170	200
T (depth)	75			80		120	110	120	120
A	100			130			170	130	170
C	55			59		72	58	72	68
D Ø	5			8					

Dimensional drawing for LR34.4-UR to LR34.58-UR

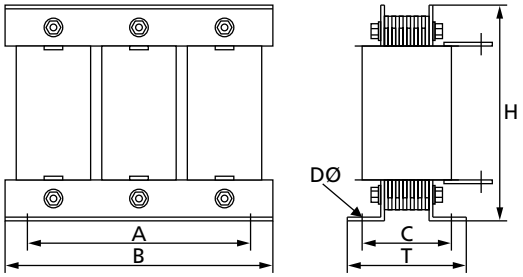


Dimen-sions [mm]	LR34. 70-UR	LR34. 88-UR	LR34. 108-UR	LR34. 140-UR	LR34. 168-UR	LR34. 210-UR	LR34. 250-UR	LR34. 325-UR	LR34. 450-UR
W (width)	190	230		240		265	300		
H (height)	240	300		330		230	275		
T (depth)	110	160	180	200		152		177	192
A	170	180		190		215	240		
C	78	98	122	125		126	120	145	160
D Ø	8			11					

Dimensional drawing for LR34.70-UR to LR34.168-UR



Dimensional drawing for LR34.210-UR to LR34.450-UR



Space for your own notes

Braking resistors

Availability

BR-□□□.□□.□□0-UR

Value (in Ohms) — *Protection* — *Power in (Watts) 01 = 100 W, 10 = 1 kW*

BR-090.01.540-UR BR-090.02.540-UR

Article designation

Technical data	as per fig.. A1	as per fig. A2	as per fig. A3	as per fig. A4	as per fig. A5
Surface temperature	>250 °C				
Touch protection	No				
Voltage	max. 970 V DC				
High-voltage strength	4000 V DC				
Temperature monitoring	Yes, with bimetallic protector (breaking capacity 0.5 A / 230 V)				
Acceptance tests	CE-compliant; UL recognition				
Connection	1 m long PTFE-insulated litz wire			Terminal box with PG glands (M12 x 1.5 and M25 x 1.5)	

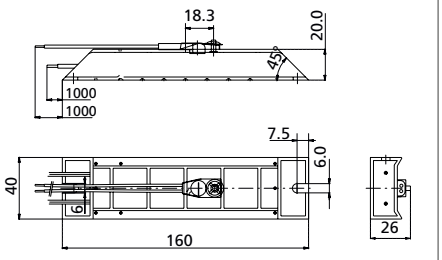
NOTE: For recommended combinations of controllers and braking resistors refer to the relevant controller catalogue page.

Article designation	Continuous power [1] [W]	Resistance [Ω ±10%]	Peak power [W]			Protection	Connection		Picture
			390 V DC	650 V DC	750 V DC		Resistance	Bimetallic protector	
BR-260.01.540-UR	35	260	580	1620	2160	IP54	AWG 16	AWG 18	A1
BR-260.02.540-UR	150	260	580	1620	2160	IP54	AWG 14	AWG 18	A2
BR-200.01.540-UR	35	200	760	2100	2800	IP54	AWG 16	AWG 18	A1
BR-200.02.540-UR	150	200	760	2100	2800	IP54	AWG 14	AWG 18	A2
BR-200.03.540-UR	300	200	760	2100	2800	IP54	AWG 14	AWG 18	A3
BR-090.01.540-UR	35	90	1690	4690	6250	IP54	AWG 16	AWG 18	A1
BR-090.02.540-UR	150	90	1690	4690	6250	IP54	AWG 14	AWG 18	A2
BR-090.03.540-UR	300	90	1690	4690	6250	IP54	AWG 14	AWG 18	A3
BR-090.10.650-UR	1000	90	1690	4690	6250	IP65	max. AWG 6	max. AWG 12	A4
BR-026.01.540-UR	35	26	-	16250	21600	IP54	AWG 16	AWG 18	A1
BR-026.02.540-UR	150	26	-	16250	21600	IP54	AWG 14	AWG 18	A2
BR-026.03.540-UR	300	26	-	16250	21600	IP54	AWG 14	AWG 18	A3
BR-026.10.650-UR	1000	26	-	16250	21600	IP65	max. AWG 6	max. AWG 12	A4
BR-026.20.650-UR	2000	26	-	16250	21600	IP65	max. AWG 6	max. AWG 12	A5
BR-020.03.540-UR	300	20	7600	21100	28100	IP54	AWG 14	AWG 18	A3
BR-015.03.540-UR	300	15	10100	28100	37500	IP54	AWG 14	AWG 18	A3

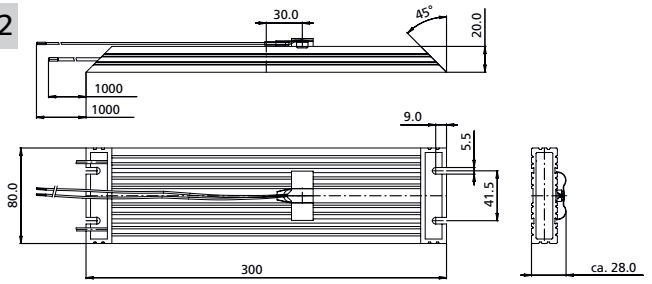
1) At cycle times of max. 150 s the required rated continuous power can be calculated according to the following formula: Rated continuous power (W) = max. pulse duration (s) x peak power (W) / cycle time (s)

Dimensions, braking resistors [mm]

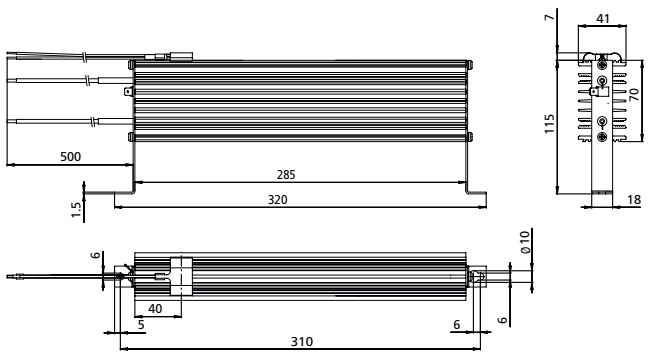
A1



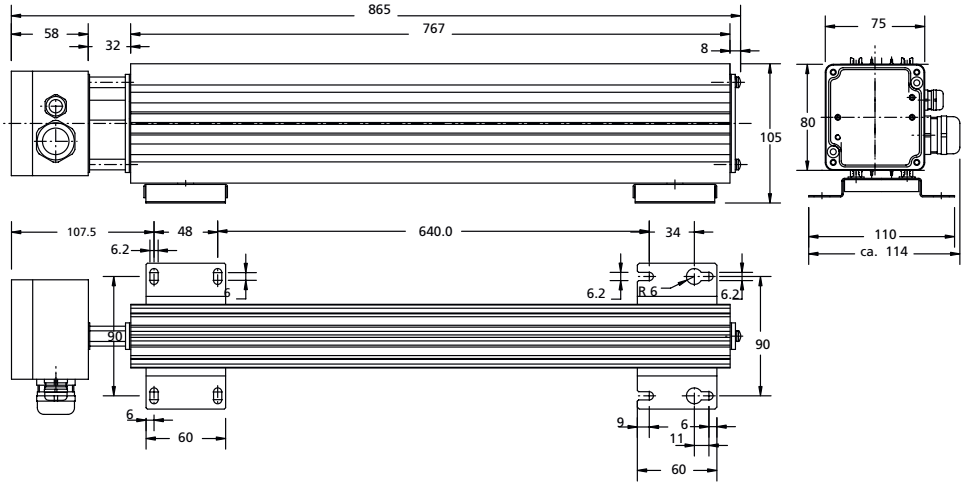
A2



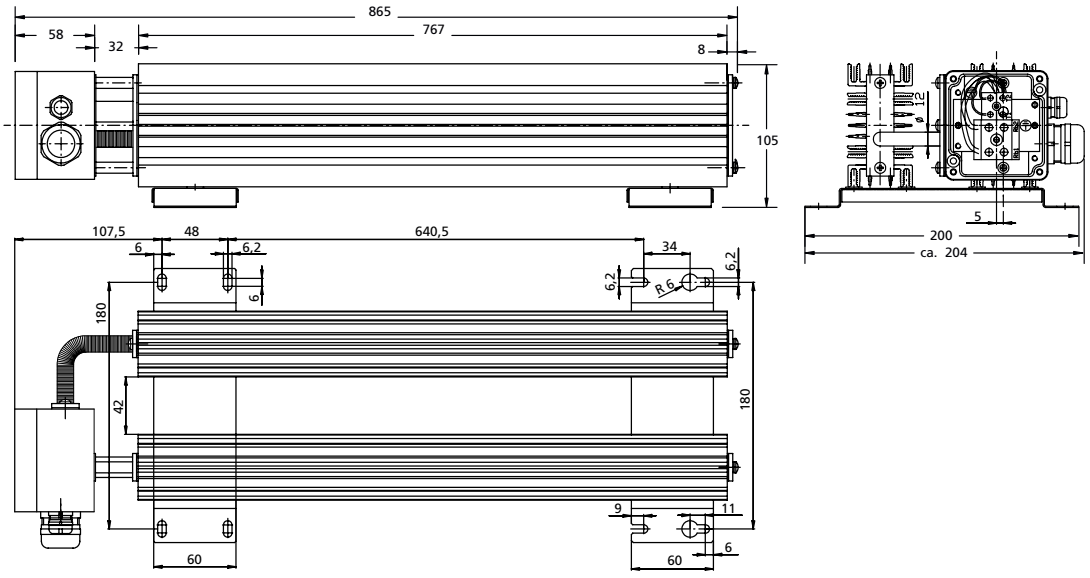
A3



A4



A5



ServoOne junior - Mains filters

EMC19.2-1Ph,UR

Availability

EMC□□.□-□Ph,UR

Rated current *Number of phases* *Version*

Article designation

Ambient conditions	EMCxx.x-1Ph,UR	EMCxx.x-3Ph,UR
Rated voltage	1 x 230 V AC +10% at 50/60 Hz	3 x 480 V AC +10% at 50/60 Hz
Overload	2x for 10 s, repeatable after 6 minutes [1]	
Ambient temperature	max. 45 °C	
IEC climate category	25/085/21	
Protection ports	IP00	
Acceptance tests	IEC 60939, UL 508	IEC 60939, UL 1238, UL 508
RFI suppression to EN 61800-3 -residential-	Motor cable length up to 10 m permitted	
RFI suppression to EN 61800-3 -industrial-	Motor cable length up to 30 m permitted	
Connections	Input: Touch-protected terminals (IP20); output: Litz wire	

1) Precondition: Mains filter mounting vertically on metallically bright base plate

NOTE: For recommended combinations of controllers and mains filters refer to the relevant controller catalogue page.

Single-phase mains filters

Usable for servocontrollers	Article designation	Rated current [A]	Power loss [W]	Leakage current[1] [mA]	Touch current [2] [mA]		Weight [kg]
					N	F	
SO22.003	EMC8.2-1Ph,UR	8	2.5	7.9	15	25	0.75
SO22.006	EMC14.2-1Ph,UR	14	5.8				
SO22.008	EMC19.2-1Ph,UR	19	6.1				

1) Effective value of leakage current to EN 60939 (2009) at 50 Hz and rated voltage. The leakage current may increase further due to the suppressed device.

2) Peak value measurement with measurement circuit to EN 60990 at 50 Hz and rated voltage.
N: Peak value of occurring touch current in normal operation with PE conductor circuit open. At a touch current >3.5 mA the mains filter must be provided with a fixed connection as per EN 50178.
F: Peak value of worst-case touch current in case of fault with PE conductor and N conductor circuits open.

Three-phase mains filters

Usable for servocontrol-lers	Article designation	Rated current [A]	Power loss [W]	Leakage current[1] [mA]	Touch current [2] [mA]		Weight [kg]
					N	F	
SO22.003	EMC5.2-3Ph,UR	5	2	1.7	2.3	70	0.7
SO24.002							
SO24.004							
SO22.006	EMC11.2-3Ph,UR	11	7				
SO22.008							
SO24.007							
SO24.012	In preparation, provisionally EMC16.1-UR (see page 9-19)						
SO24.016							

1) *Effective value of leakage current to EN 60939 (2009) at 50 Hz and rated voltage with 2% asymmetry. The leakage current may increase further due to the suppressed device.*

2) *Peak value measurement with measurement circuit to EN 60990 at 50 Hz and rated voltage with 2% asymmetry.*
N: Peak value of occurring touch current in normal operation with PE conductor circuit open. At a touch current >3.5 mA the mains filter must be provided with a fixed connection as per EN 50178.
F: Peak value of worst-case touch current in case of fault with PE conductor and N conductor circuits open.

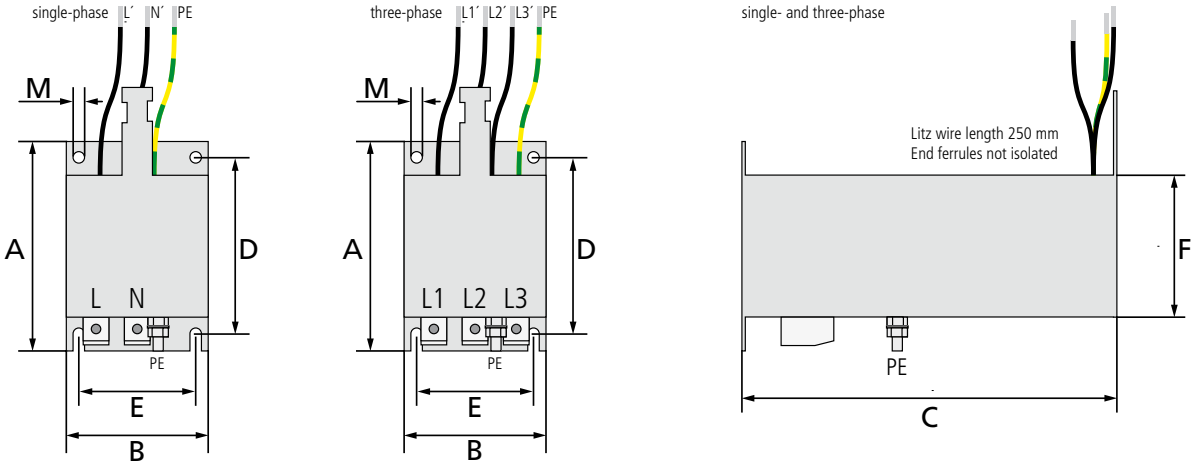
Dimensions, single-phase mains filters

Article designation	Dimensions [mm]							PE	Input		Output
	A	B	C	D	E	F	M Ø		Clamping area [mm²]	Tightening torque [Nm]	Litz wire cross-section
EMC8.2-1Ph,UR	81	55	145	68	45	55	4	M4	0.2 - 4.0	0.6 - 0.8	AWG 16
EMC14.2-1Ph,UR											AWG 16
EMC19.2-1Ph,UR											AWG 14

Dimensions, three-phase mains filters

Article designation	Dimensions [mm]							PE	Input		Output
	A	B	C	D	E	F	M Ø		Clamping area [mm²]	Tightening torque [Nm]	Litz wire cross-section
EMC5.2-3Ph,UR	81	55	145	68	45	55	4	M4	0.2 - 4.0	0.6 - 0.8	AWG 16
EMC11.2-3Ph,UR											

Dimensional drawings for EMC8.2-1Ph,UR to EMC11.2-3Ph,UR



ServoOne single-axis system - Mains filters

EMC180.1-UR

Availability

EMC□□□.1,UR

Rated current | *Variant*

Article designation

Ambient conditions	EMC.xxx.1-UR
Rated voltage	3 x 480 V AC +10% at 50/60 Hz
Ambient temperature	-25 °C to +40 °C, with power reduction up to 60 °C (1.3% per °C)
Mounting height	1000 m, with power reduction up to 4000 m (6% per 1000 m)
Relative humidity	15 ... 85%, condensation not permitted
Storage/transportation temperature	-25 °C to +70 °C / -40 °C to +85 °C
Protection	IP20 (from EMC180.1-UR IP00)
Permissible contamination	P2 as per EN 61558-1
Acceptance tests	CE-compliant UL recognition (EMC7.1-UR to EMC150.1-UR)
RFI suppression to EN61800-3 **(category C2 -residential-)**	Motor cable length up to 50 m permitted
RFI suppression to EN61800-3 **(category C3 - industrial-)**	Motor cable length up to 100 m permitted

NOTE: For recommended combinations of controllers and mains filters refer to the relevant controller catalogue page.

Three-phase mains filters EMC7.1-UR to EMC150.1-UR

Article designation	Rated current [A]	Overload [1] [A]	Power-loss [W]	Leakage current [2] [mA]	Touch current [3] [mA]		Weight [kg]
					N	F	
EMC7.1-UR	7	14	7.5	11.7	7.6	195	1.65
EMC16.1-UR	16	32	11	11.7	6.8	194	2.0
EMC25.1-UR	25	50	24	11.7	8.2	223	2.0
EMC35.1-UR	35	64	34	11.7	8.3	225	3.4
EMC63.1-UR	63	125	30	5.5	6.8	195	5.0
EMC100.1-UR	100	150	40	16.9	9.8	252	6.0
EMC150.1-UR	150	225	55	16.9	9.8	253	6.8

1) *For 10 s, repeatable after 6 minutes; precondition: Mains filter mounting vertically on metallically bright base plate*
2) *Effective value of leakage current to EN 60939 (2009) at 50 Hz and rated voltage with 2% asymmetry. The leakage current may increase further due to the suppressed device.*
3) *Peak value measurement with measurement circuit to EN 60990 at 50 Hz and rated voltage with 2% asymmetry.*
N: Peak value of occurring touch current in normal operation with PE conductor circuit open. At a touch current >3.5 mA the mains filter must be provided with a fixed connection as per EN 50178.
F: Peak value of worst-case touch current in case of fault with PE conductor circuit open and two of three phase open.

Three-phase mains filters EMC180.1-UR to EMC500.1-UR

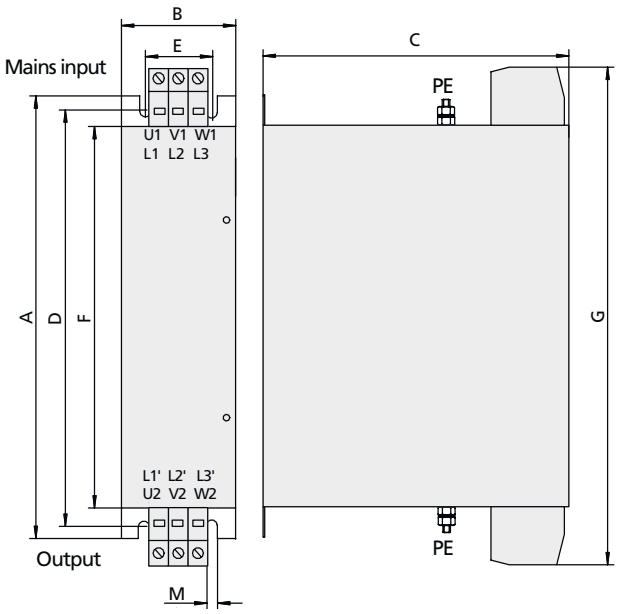
Article designation	Rated current [A]	Overload [4] [A]	Power-loss [W]	Leakage current [5] [mA]	Touch current [6] [mA]		Weight [kg]
					N	F	
EMC180.1-UR	180	270	15	-	9.6	-	7.0
EMC220.1-UR	220	330	20	33.8	7.2	225	7.5
EMC250.1-UR	250	375	40				8.5
EMC300.1-UR	300	450	40				9.5
EMC400.1-UR	400	600	55				11.0
EMC500.1-UR	500	750	60				12.5

4) *For 60 s, repeatable after 30 minutes; precondition: Mains filter mounting vertically on metallically bright base plate*
5) *Effective value of leakage current to EN 60939 (2009) at 50 Hz and rated voltage with 2% asymmetry. The leakage current may increase further due to the suppressed device.*
6) *Peak value measurement with measurement circuit to EN 60990 at 50 Hz and rated voltage with 2% asymmetry.*
N: Peak value of occurring touch current in normal operation with PE conductor circuit open. At a touch current >3.5 mA the mains filter must be provided with a fixed connection as per EN 50178.
F: Peak value of worst-case touch current in case of fault with PE conductor circuit open and two of three phase open.

Dimensions, three-phase mains filters EMC7.1-UR to EMC150.1-UR

Article designation	Dimensions [mm]								PE	Input/output	
	A	B	C	D	E	F	G	M Ø		Clamping area (mm²)	Tightening torque (Nm)
EMC7.1-UR	210	55	90	200	40	180	202	4.0	M5	0.2 ... 4.0	0.6 - 0.8
EMC16.1-UR											
EMC25.1-UR	270	62	115	255	40	240	272	5.5	M5	0.2 ... 6.0	1.5 - 1.8
EMC35.1-UR	270	62	145	255	40	240	305	5.5	M5	0.5 ... 16	2.0 - 2.3
EMC63.1-UR	280	62	180	270	40	240	305	7.0	M6	0.5 ... 16	2.0 - 2.3
EMC100.1-UR	290	75	200	270	45	250	336	7.0	M8	16 ... 50	6.0 - 8.0
EMC150.1-UR	320	90	220	300	60	280	380	7.0	M8	16 ... 50	15 - 20

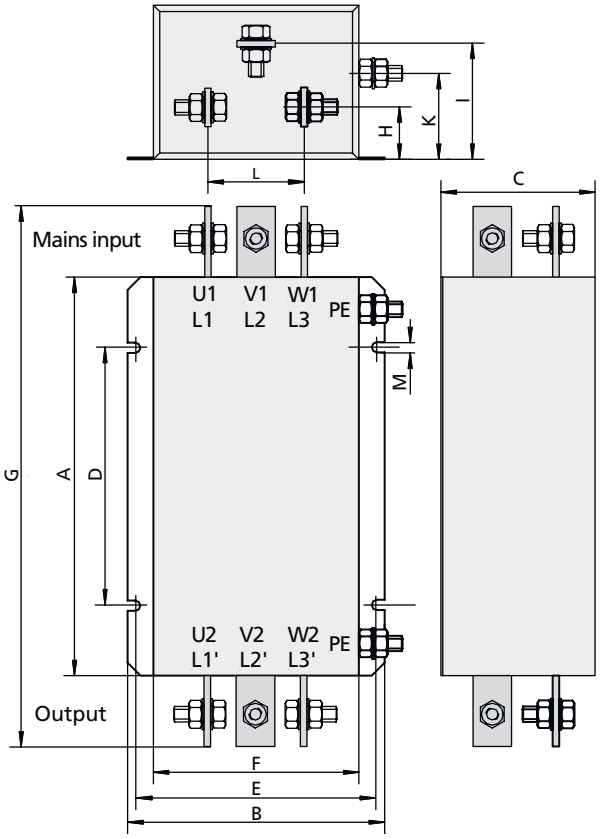
Dimensional drawing for EMC7.1-UR to EMC150.1-UR



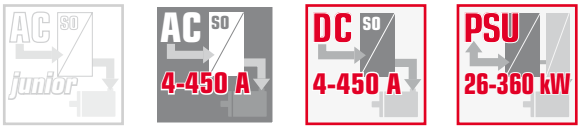
Dimensions, three-phase mains filters EMC180.1-UR to EMC500.1-UR

Article designation	Dimensions [mm]												PE	Input/output	
	A	B	C	D	E	F	G	H	I	K	L	M Ø		Busbar [mm]	Hole [mm]
EMC180.1-UR	313	200	120	180	180	160	410	45	86	30	91	8.5	M10	3 x 25	11
EMC220.1-UR													M10	4 x 25	11
EMC250.1-UR								54					M10	5 x 25	11
EMC300.1-UR													M12	6 x 25	11
EMC400.1-UR	353	240	150	200	220	200	480	69	110		128		M12	8 x 25	11
EMC500.1-UR													M12	8 x 30	13

Dimensional drawing for EMC180.1-UR to EMC500.1-UR



Liquid cooling connection set



Availability

LCS01

LCS01 — Article designation

Short description

The connection set includes all the components needed to connect liquid-cooled ServoOne devices to the cooling system (intake and return lines). It consists of a roll of Teflon strip, two elbow sections, two quick-fasteners, two couplings and two hose clamps.

NOTE: Fits all liquid-cooled ServoOne units.

Three-phase mains filters

Usable for servocontrollers	Article designation	Rated current [A]	Power loss [W]	Leakage current[1] [mA]	Touch current[2] [mA]		Weight [kg]
					N	F	
SO22.003	EMC5.2-3Ph,UR	5	2	1.7	2.3	70	0.7
SO24.002							
SO24.004							
SO22.006	EMC11.2-3Ph,UR	11	7				
SO22.008							
SO24.007							
SO24.012	In preparation, provisionally EMC16.1-UR (see page 9-19)						
SO24.016							

1) *Effective value of leakage current to EN 60939 (2009) at 50 Hz and rated voltage with 2% asymmetry. The leakage current may increase further due to the suppressed device.*

2) *Peak value measurement with measurement circuit to EN 60990 at 50 Hz and rated voltage with 2% asymmetry.*
N: Peak value of occurring touch current in normal operation with PE conductor circuit open. At a touch current >3.5 mA the mains filter must be provided with a fixed connection as per EN 50178.
F: Peak value of worst-case touch current in case of fault with PE conductor and N conductor circuits open.

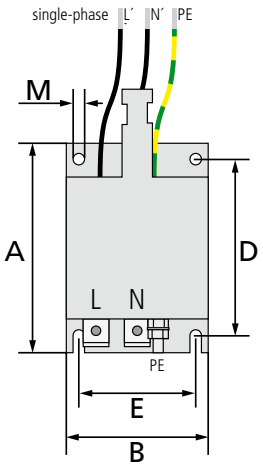
Dimensions, single-phase mains filters

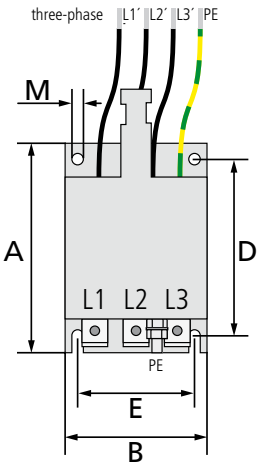
Article designation	Dimensions [mm]							PE	Input		Output
	A	B	C	D	E	F	M Ø		Clamping area [mm²]	Tightening torque [Nm]	Litz wire cross-section
EMC8.2-1Ph,UR	81	55	145	68	45	55	4	M4	0.2 - 4.0	0.6 - 0.8	AWG 16
EMC14.2-1Ph,UR											AWG 16
EMC19.2-1Ph,UR											AWG 14

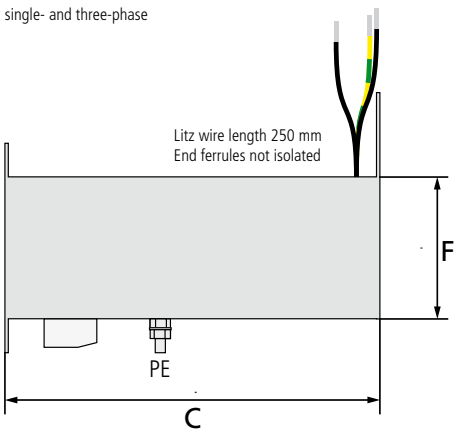
Dimensions, three-phase mains filters

Article designation	Dimensions [mm]							PE	Input		Output
	A	B	C	D	E	F	M Ø		Clamping area [mm²]	Tightening torque [Nm]	Litz wire cross-section
EMC5.2-3Ph,UR	81	55	145	68	45	55	4	M4	0.2 - 4.0	0.6 - 0.8	AWG 16
EMC11.2-3Ph,UR											

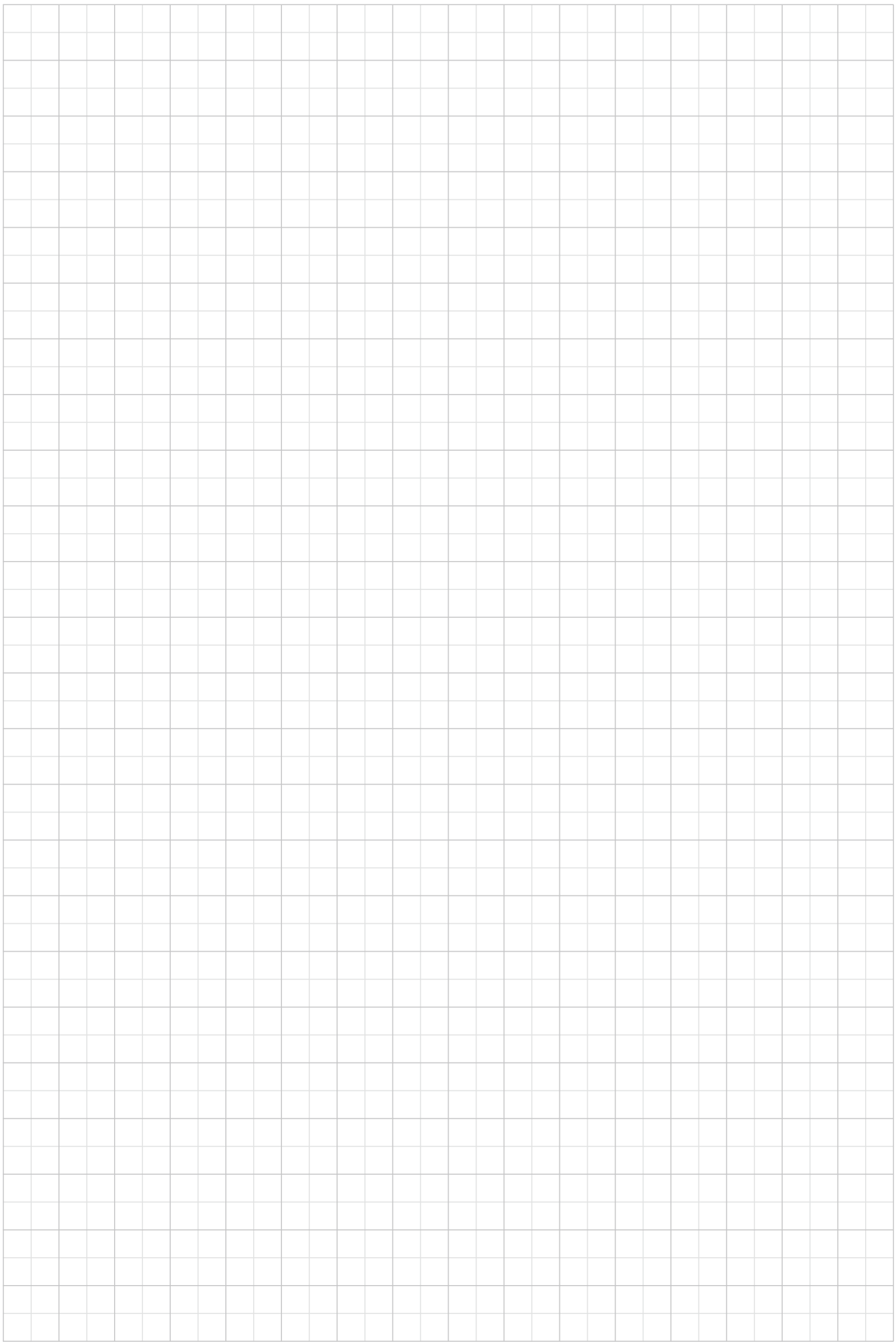
Dimensional drawings for EMC8.2-1Ph,UR to EMC11.2-3Ph,UR







Space for your own notes



Overview of servomotors

Contents	Types
 LSH servomotor – the power pack	LSH-050-x to LSH-127-x
 LST servomotor – the versatile one	LST-037-x to LST-220-x
 LSN servomotor – compact and low-cost	LSN-050-x to LSN-090-x
 LSP servomotor with optional planetary gearbox – slim and cost-effective (LSP-04-x to LSP-13-x)	 LSP-04-x to LSP-13-x motors among other features with one-cable solution

ID no.: 1100.24B.5-00 Date: 10/2013

The LSH motor - The power pack

Using a completely new winding technology known as concentrated winding, the new LSH generation of motors improves power density by between 30% and 70% compared with conventional technologies. For the user this means up to 100% improvement in dynamics and significantly reduced space requirements combined with smooth running.

Overview of technical data

Motor type	DC link voltage	Stall torque M_0 [Nm]	Rated torque M_n [Nm]	Rated current at 560 V I_n [A]	Rated current at 320 V I_n [A]	Rated speed n_n [min^{-1}]
LSH-050-1	320	0.26	0.24	-	0.68	4500
LSH-050-2	320	0.53	0.45	-	1.11	4500
LSH-050-3	320	0.74	0.67	-	1.55	4500
LSH-050-4	320	0.95	0.84	-	1.90	4500
LSH-074-1	320/560	0.95	0.86	1.28	1.43	3000
LSH-074-2	320/560	1.90	1.60	1.46	2.40	3000
LSH-074-3	320/560	3.30	2.90	2.30	4.00	3000
LSH-074-4	320/560	4.20	3.10	2.30	3.70	3000
LSH-097-1	320/560	4.10	3.20	2.80	5.00	3000
LSH-097-2	320/560	6.30	4.60	3.60	7.00	3000
LSH-097-3	320/560	8.60	6.10	4.80	8.3	3000
LSH-127-1	560	11.60	8.40	7.90	-	3000
LSH-127-2	560	14.90	10.90	9.60	-	3000
LSH-127-3	560	18.70	14.30	13.10	-	3000
LSH-127-4	560	27.30	21.00	14.90	-	3000

NOTE: For detailed electrical data and accessories, such as system cables, refer to the Servomotors order catalogue (ID no.: 0814.05B.x).

The LST motor - The versatile one

Featuring conventional winding technology, the LST motor combines all the advantages of a 6-pole synchronous servomotor.

- Well suited to speeds up to 9000 rpm. Special windings are possible on request.
- High overload capacity even at standstill based on efficient heat distribution in the stator packet.
- Increased rotor moment of inertia for torque adaptation.

Overview of technical data

Motor type	Motor type/ Length	Stall torque M_0 [Nm]	Rated torque M_n [Nm]	Rated current at 560 V I_n [A]	Rated current at 320 V I_n [A]	Rated speed n_n [min^{-1}]
LST-037	LST-037-1	0.10	0.09	-	0.56	6000
	LST-037-2	0.20	0.18	-	0.92	6000
	LST-037-3	0.30	0.27	-	0.89	6000
LST-050	LST-050-1	0.20	0.19	-	0.60	4500
	LST-050-2	0.40	0.36	-	0.88	4500
	LST-050-3	0.60	0.55	-	1.18	4500
	LST-050-4	0.80	0.72	-	1.47	4500
	LST-050-5	0.95	0.85	-	1.71	4500
LST-074	LST-074-1	0.65	0.60	0.64	1.04	3000
	LST-074-2	1.30	1.15	0.95	1.58	3000
	LST-074-3	1.90	1.60	1.26	2.20	3000
	LST-074-4	2.50	2.20	1.62	2.70	3000
	LST-074-5	3.00	2.50	1.82	3.00	3000
LST-097	LST-097-1	2.60	2.30	1.85	3.00	3000
	LST-097-2	3.90	3.30	2.60	4.30	3000
	LST-097-3	5.30	4.60	3.80	5.90	3000
	LST-097-4	7.50	6.40	4.40	8.10	3000
	LST-097-5	9.50	8.50	6.20	10.5	3000
LST-127	LST-127-1	6.60	5.70	4.00	-	3000
	LST-127-2	10.5	8.80	6.30	-	3000
	LST-127-3	13.5	11.0	9.50	-	3000
	LST-127-4	17.0	14.5	10.0	-	3000
	LST-127-5	22.0	17.0	13.0	-	3000
LST-158	LST-158-1	13.5	13.0	8.20	-	3000
	LST-158-2	19.0	17.0	10.6	-	3000
	LST-158-3	22.0	19.0	12.3	-	3000
	LST-158-4	29.0	24.0	14.7	-	3000
	LST-158-5	35.0	26.0	18.2	-	3000
LST-190	LST-190-1	27.0	21.0	13.5	-	3000
	LST-190-2	32.0	23.0	15.0	-	3000
	LST-190-3	40.0	26.0	17.9	-	3000
LST-220	LST-220-1	40.0	30.0	17.8	-	3000
	LST-220-2	68.0	50.0	31.1	-	3000
	LST-220-3	93.0	60.0	34.9	-	3000
	LST-220-4	115.0	50.0	29.3	-	3000

NOTE: For detailed electrical data and accessories, such as system cables, refer to the Servomotors order catalogue (ID no.: 0814.05B.x).

The LSN motor - Compact and low-cost

The LSN product range featuring stall torques (M0) from 0.28 Nm to 60 Nm (externally cooled up to 78 Nm) is an enhancement of the LSH range incorporating the Q 158 and Q 190 platforms.

The winding construction is a compound-die pole winding. An optimised thermal design has increased the power density by a further approximately 30% compared to the LSH range.
So the power density and dynamism of the LSN servomotors are in the "high-end" segment.

Overview of technical data

Motor type	Motor type/ Rating plate	DC link voltage [V]	Stall torque M_0 [Nm]	Rated torque M_n [Nm]	Rated current I_n [A]	Rated speed n_n [min^{-1}]
LSN-050	LSN-050-0028-45-320	320	0.28	0.25	0.96	4500
	LSN-050-0054-45-320		0.54	0.48	1.12	4500
	LSN-050-0075-45-320		0.75	0.68	1.48	4500
	LSN-050-0095-45-320		0.95	0.85	1.70	4500
	LSN-050-0028-45-560	560	0.28	0.25	0.96	4500
	LSN-050-0054-45-560		0.54	0.48	0.90	4500
	LSN-050-0075-45-560		0.75	0.68	0.83	4500
	LSN-050-0095-45-560		0.95	0.85	1.07	4500
LSN-074	LSN-074-0115-30-320	320	1.15	1.13	2.30	3000
	LSN-074-0205-30-320		2.05	1.90	3.10	3000
	LSN-074-0350-30-320		3.50	3.00	4.30	3000
	LSN-074-0480-30-320		4.80	3.70	4.50	3000
	LSN-074-0115-30-560	560	1.15	1.13	1.30	3000
	LSN-074-0205-30-560		2.05	1.90	1.70	3000
	LSN-074-0350-30-560		3.50	3.00	2.40	3000
	LSN-074-0480-30-560		4.80	3.70	2.60	3000
LSN-097	LSN-097-0510-30-320	320	5.10	4.20	7.00	3000
	LSN-097-0750-30-320		7.50	6.10	8.80	3000
	LSN-097-0960-30-320		9.60	7.70	10.80	3000
	LSN-097-1130-30-320		11.30	8.80	10.70	3000
	LSN-097-0510-30-560	560	5.10	4.20	3.90	3000
	LSN-097-0750-30-560		7.50	6.10	5.10	3000
	LSN-097-0960-30-560		9.60	7.70	6.00	3000
	LSN-097-1130-30-560		11.30	8.80	6.90	3000
LSN-127	LSN-127-1200-30-560	560	12.00	10.50	8.30	3000
	LSN-127-1600-30-560		16.00	13.80	9.90	3000
	LSN-127-2000-30-560		20.00	16.00	11.50	3000
	LSN-127-2400-30-560		24.00	20.00	14.10	3000

Motor type	Motor type/ Rating plate	DC link voltage [V]	Stall torque M_0 [Nm]	Rated torque M_n [Nm]	Rated current I_n [A]	Rated speed n_n [min^{-1}]
LSN-158	LSN-158-1800-20-560	560	18.00	14.80	8.60	2000
	LSN-158-2400-20-560		24.00	20.00	10.70	2000
	LSN-158-3000-20-560		30.00	25.30	12.90	2000
	LSN-158-3800-20-560		38.00	29.00	15.00	2000
	LSN-158-4400-20-560		44.00	36.50	17.30	2000
	LSN-158-1800-30-560	560	18.00	13.00	11.00	3000
	LSN-158-2400-30-560		24.00	17.00	13.80	3000
	LSN-158-3000-30-560		30.00	21.00	16.20	3000
	LSN-158-3800-30-560		38.00	25.00	19.70	3000
	LSN-158-4400-30-560		44.00	30.00	24.40	3000
LSN-190	LSN-190-3000-20-560	560	30.00	26.10	13.20	2000
	LSN-190-4000-20-560		40.00	32.80	15.40	2000
	LSN-190-5000-20-560		50.00	40.40	21.80	2000
	LSN-190-6000-10-560		60.00	54.00	14.60	1000
	LSN-190-3000-30-560	560	30.00	23.00	15.50	3000
	LSN-190-4000-30-560		40.00	25.00	20.10	3000
	LSN-190-5000-30-560		50.00	30.00	24.40	3000
	LSN-190-6000-25-560		60.00	36.20	20.70	2500

NOTE: For detailed electrical data and accessories, such as system cables, refer to the Servomotors order catalogue (ID no.: 0814.05B.x).

The LSP motor with optional planetary gearbox - Slim and cost-effective

The LSN product range featuring stall torques (M_0) from 0.18 Nm to 18.5 Nm meets the highest demands in terms of synchronism and accuracy.

Its advantages are highlighted particularly in conjunction with the ServoOne junior drive controller. Users can choose from a total of 32 variants, enabling them to make a cost-effective drive controller combination.

The range offers a homogeneous mass inertia progression. This means the motor in IP65 can always be adapted to specific needs.

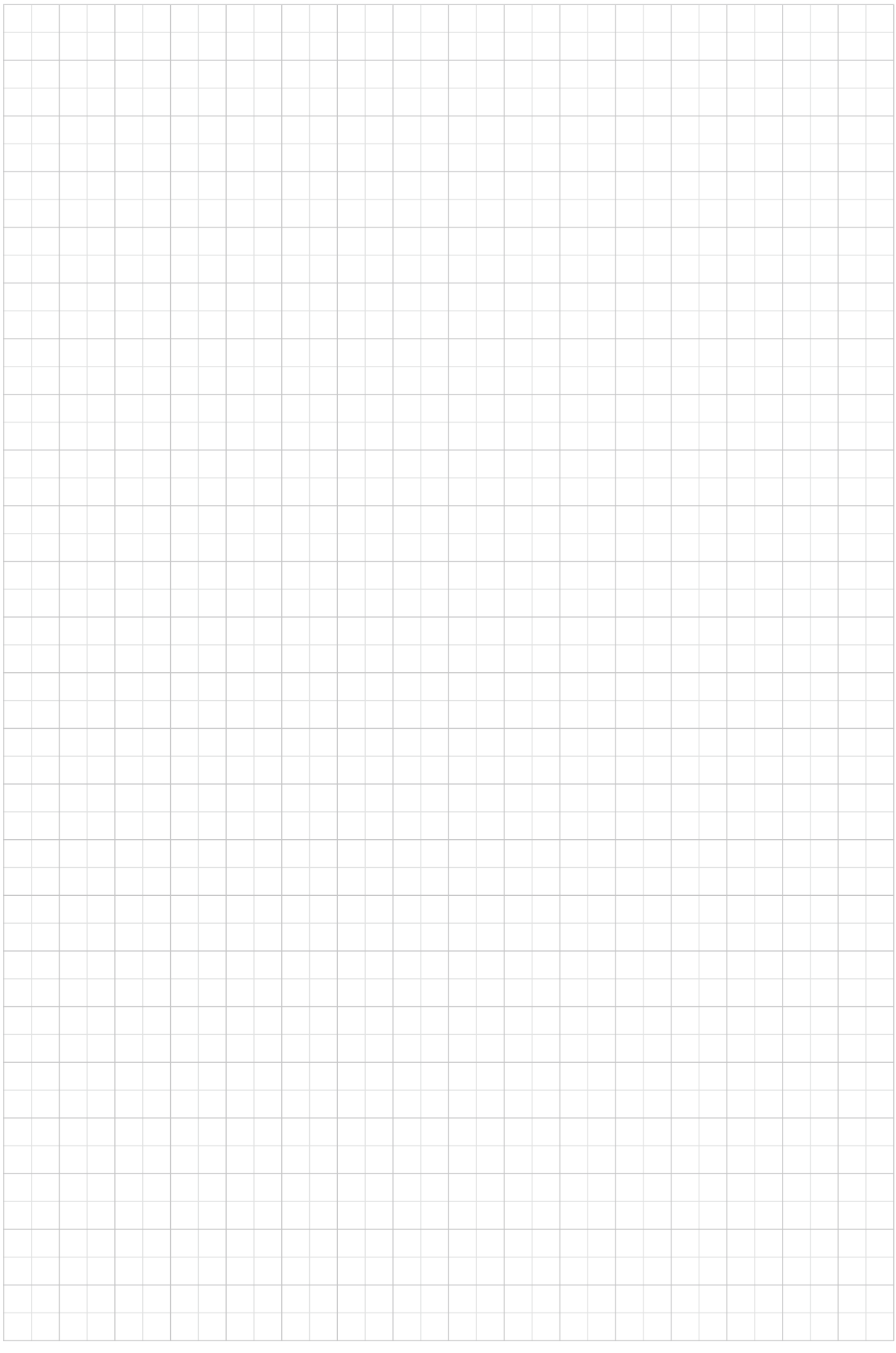
The further enhancement of the classic winding technology in these units makes it possible to produce compact designs and cuts production costs.

Overview of technical data

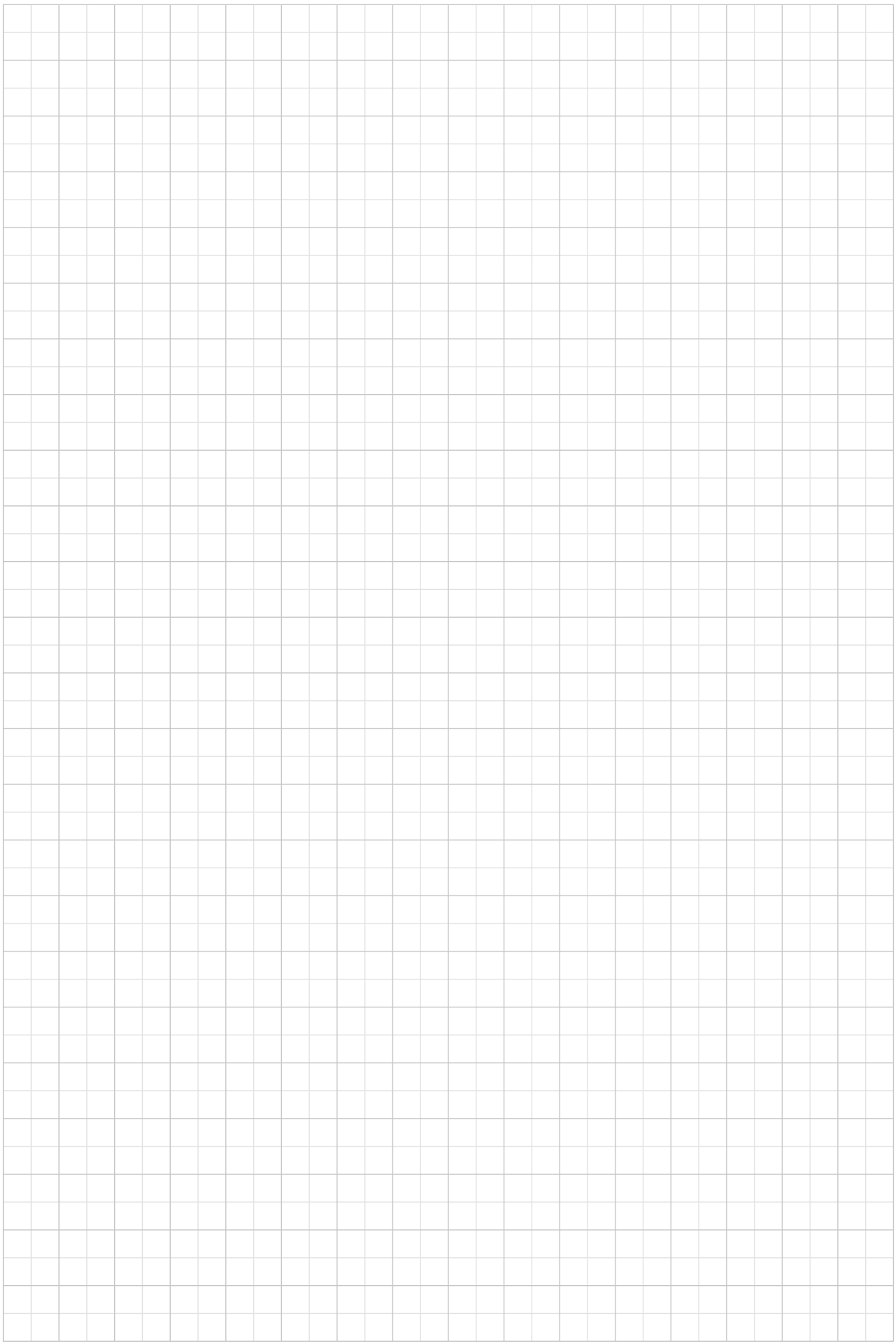
Type	Technical data	DC link voltage	Stall torque M_0 [Nm]	Rated torque M_n [Nm]	Rated current I_n [A]	Rated speed n_n [min^{-1}]
LSP04	LSP04-002	320	0.18	0.12	0.6	9000
	LSP04-004	320	0.35	0.21	1.1	9000
LSP06	LSP06-007	320	0.7	0.6	0.8	3000
		320	0.7	0.5	1.3	6000
	LSP06-015	320	1.5	1.2	1.6	3000
		320	1.5	0.9	2.1	6000
LSP08	LSP08-028	320	2.8	2.4	3.0	3000
		320	2.8	1.7	3.8	5500
		560	2.8	2.3	1.7	3000
		560	2.8	1.7	2.2	5500
	LSP08-035	320	3.5	3.2	3.9	3000
		320	3.5	2.1	4.7	5500
		560	3.5	3.2	2.2	3000
		560	3.5	2.1	2.6	5500
LSP10	LSP10-056	560	5.6	4.8	3.3	3000
		560	5.6	3.4	3.9	5000
	LSP10-075	560	7.5	6.4	4.4	3000
		560	7.5	4.8	5.3	5000
LSP13	LSP13-055	320	5.5	4.8	4.1	2000
		320	5.5	4.0	6.0	3600
		560	5.5	4.8	2.3	2000
		560	5.5	4.0	3.4	3600
	LSP13-091	560	9.1	7.2	3.4	2000
		560	9.1	6.0	5.0	3600
	LSP13-123	560	12.3	9.6	4.5	2000
		560	12.3	8.0	6.7	3600
	LSP13-185	560	18.5	14.4	6.5	2000
		560	18.5	10.0	8.0	3600

NOTE: For detailed electrical data and accessories, such as system cables, refer to the Servomotors order catalogue (ID no.: 0814.08B.x).

Space for your own notes



Space for your own notes



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Subject to technical change without notice.

The content of our Installation Manual was compiled with the greatest care and attention, and based on the latest information available to us.

We point out that this document cannot always be updated in line with ongoing technical developments in our products.

Information and specifications may be subject to change at any time. Please obtain information on the latest version from http://drives.lt-i.com using the "Downloads" menu item.

ServoOne System Catalogue
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