ServoOne System

System Catalogue

- ServoOne junior
  from 2 A to 8 A
- ServoOne Single-Axis system
  from 4 A to 450 A
- ServoOne Multi-Axis System
  with mains feedback
  from 4 A to 210 A

LTi DRiVES

ServoOne
System Catalogue

ID no.: 1100.24B.2-01

Date: 10/2010

We reserve the right to make technical changes.

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.

ServoOne junior

ServoOne
Single-axis system

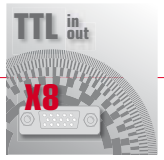
ServoOne Multi-axis system

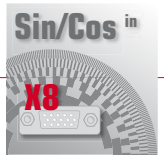
SERCOS interface

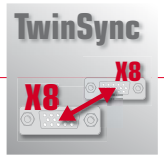
PROFIBUS PROCESS FIELD BUS

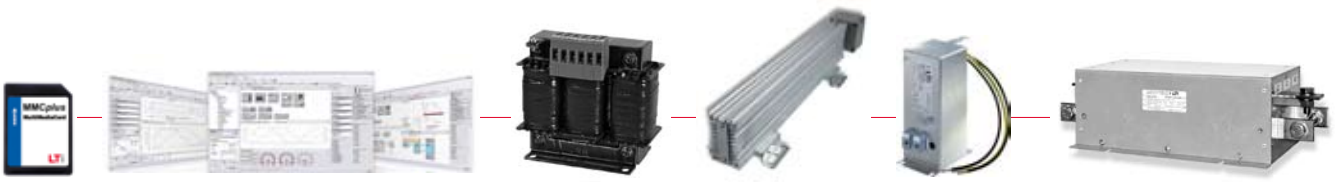
EtherCAT

CANopen









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For details see Servomotors order catalogue
ID no.: 0814.05B.x

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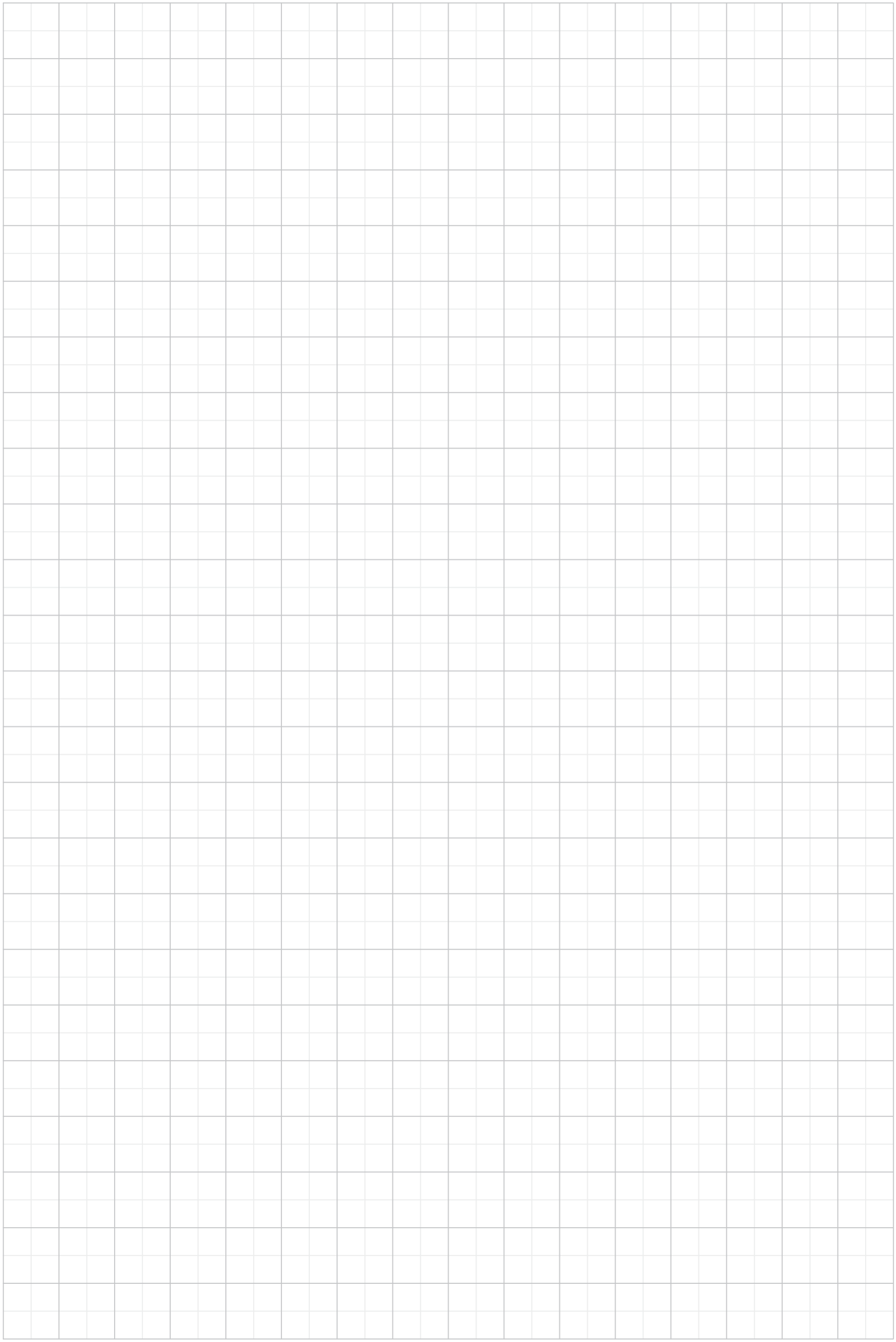

Overview of functions and features of the ServoOne family

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 4-170 A
as DC-powered multi-axis systems
with sinusoidally regenerative 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

Optimized 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 - 6.5 A Rated current with 3 x 400 - 480 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
- Eight 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 mains feedback, 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 controller 4 - 210 A Rated current
- DC link fuses built-in
- Supply units with 26 kW to 110 kW DC input power

Functions of the ServoOne devices in detail

Hardware		AC SO junior	AC SO 4-450 A	DC SO 4-210 A	PSU 26-110 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 - 6.5 A	4 - 450 A	-	-
Rated current at 565 V DC		-	-	4 - 210 A	-
DC power		-	-	-	26 - 110 kW
Overload factor		3.0	1.5 - 2.0	1.5 - 3.0	1.5 - 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 mains feedback		-	-	-	●
Braking chopper electronics integrated		●	●	-	●
Braking resistor, integrated		O	O	-	-
Safety engineering					
STO (Safe Torque Off) function		●	●	●	-
Integrated safety control		-	O 2)	O 2)	-
Control hardware					
Inputs analog (±10 V DC, 12 bit)		2	2	2	2
Outputs analog (±10 V DC, 2 x 12 bit)		-	O	O	-
Inputs/outputs digital		8/3	8/3	8/3	8/3
of which touch-probe		2	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 2.1/2.2 encoder digital	●	-	-	-
	TTL encoder	●	-	-	-
Field bus systems					
CANopen		O	O	O	O
PROFIBUS-DPV1		O	O	O	O
SERCOS II		O	O	O	O
SERCOS III		O	O	O	O
EtherCAT		O	O	O	O
PROFINET IRT		-	O 1)	O 1)	-
VARAN		-	O 1)	O 1)	-
Technology options					
Second Sin-Cos encoder	SinCos encoder with NP, SSI, EnDat or HIPERFACE®	O	O only NP and EnDat	O only NP and EnDat	-
	SSI encoder	O	-	-	-
	EnDat 2.1/2.2 encoder digital	O	-	-	-
	TTL encoder	O	O	O	-
TTL encoder simulation		O	O	O	-
SSI encoder simulation		-	O	O	-
TTL master axis		O	O	O	-
TTL encoder with commutation signals		O	-	-	-
Bidirectional axis cross-communication (TwinSync, max. 2 axes)		-	O	O	-
Cooling methods					
Air-cooled		●	● to SO84.170	●	●
Liquid-cooled		-	● from SO84.016	● from SO84.016	●

● = *Standard* O = *Optional* - *Not available* *1) On request* *2) In preparation*

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Hardware (continued)	AC SD junior	AC SD 4-450 A	DC SD 4-210 A	PSU 26-110 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 2)	CE UL to SO84.170	CE, UL 2)	CE, UL 2)

● = *Standard* O = *Optional* - *Not available* *1) On request* *2) In preparation*

Software functions	AC SD junior	AC SD 4-450 A	DC SD 4-210 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			
Encoder correction GPOC	●	●	●
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 axis	●	●	●
Standards-compliant motion profiles	CANopen DSP402 Sercos EtherCAT CoE	CANopen DSP402- Sercos EtherCAT CoE PROFIdrive	CANopen DSP402 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 integrable safety control

System		
Configuration mode		User-programmable safety control
Safety acceptance tests		SIL 3 to IEC 61508 / IEC 62061, PL e to EN ISO 13849
Control hardware		
Safe digital inputs		4 [1)]
Safe digital outputs		4 [1)]
… of which usable as safe pulse outputs		2
Safe brake outputs		2 [1)]
Connectable safety sensors		Light grids, emergency stops, guard doors, laser scanners; mode selector switches, deadlocks, permission buttons, two-handed controls, etc.
Inputs analog (±10 V, 12 bit)		2
Digital inputs		6
Safety functions (speed-dependent)		
STO	Safe Torque Off	●
SS1	Safe Stop 1	●
SS2	Safe Stop 2	●
SLS	Safe Limited Speed	●
SDI	Safe Direction	●
SSM	Safe Speed Monitoring	●
SLSmax	Safe Limited Speed maximum	●
Safety functions (speed- or position-dependent)		
SOS	Safe Operating Stop	●
SZM	Safe Zero Monitoring	●
SLT	Safe Limited Torque	●
Safety functions (position-dependent)		
SLI	Safe Limited Increment	●
SLP	Safe Limited Position	●
SCA	Safe Cam	●
Safety functions (position-dependent)		
SLI	Safe Limited Increment	●
SLP	Safe Limited Position	●
SCA	Safe Cam	●
Sref	Safe reference	●
Safety functions (brake)		
SBC	Safe Brake Control	●
SBT	Safe Brake Test	●
Safety functions (bus systems)		
SCC	Safe Cross Communication	●
FSOE	Functional Safety over EtherCAT	●

● = *Standard* O = *Optional* - *Not available* *1) SIL 2; SIL 3 when using the input/outputs in pairs*

Services

LTi DRiVES offers a wide range of information on the Internet. Whether you are looking for more detailed technical information on our products or on project planning and design, or want to contact your nearest local office - visit our website at:

http://drives.lt-i.com

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 within 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

- analysing 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 coordinated, from planning through ordering to spare parts supplies.

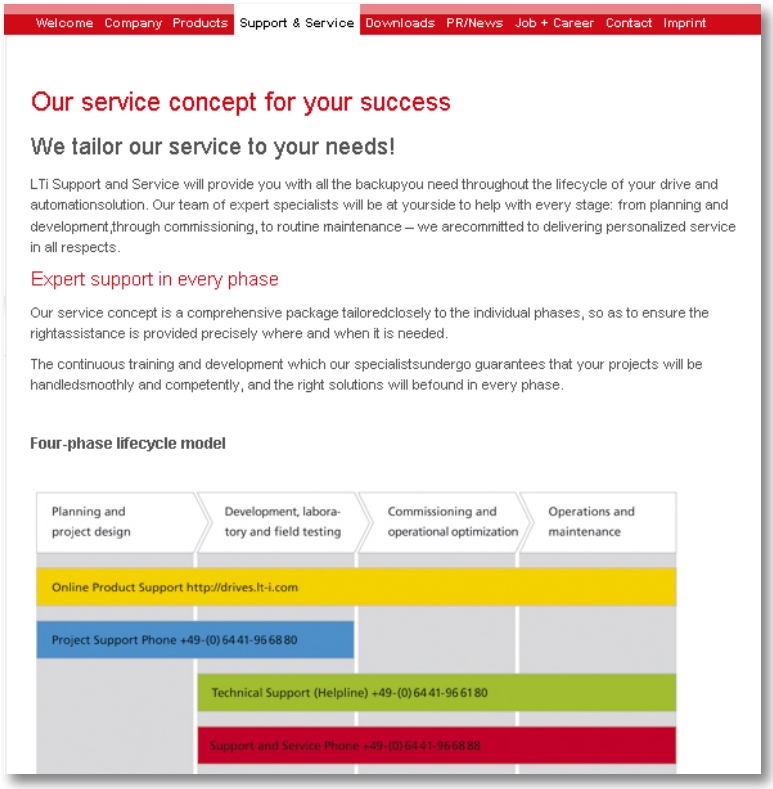
Software update service

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:

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



Helpline

Our Helpline can assist you with:

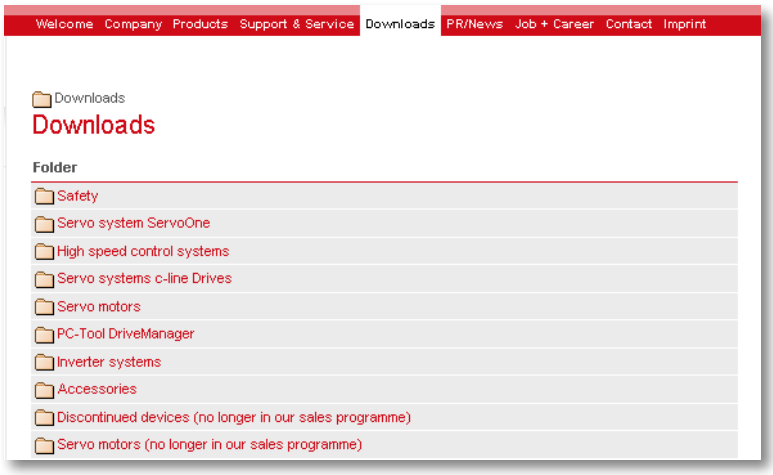
- the telephone commissioning of standard products and systems
- evaluating error and diagnostic displays
- locating and dealing with repeatable faults, and
- software updates.

It is available as follows:

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

Downloads

You will find detailed information on our products in the "Downloads" section of our website at http://drives.lt-i.com.



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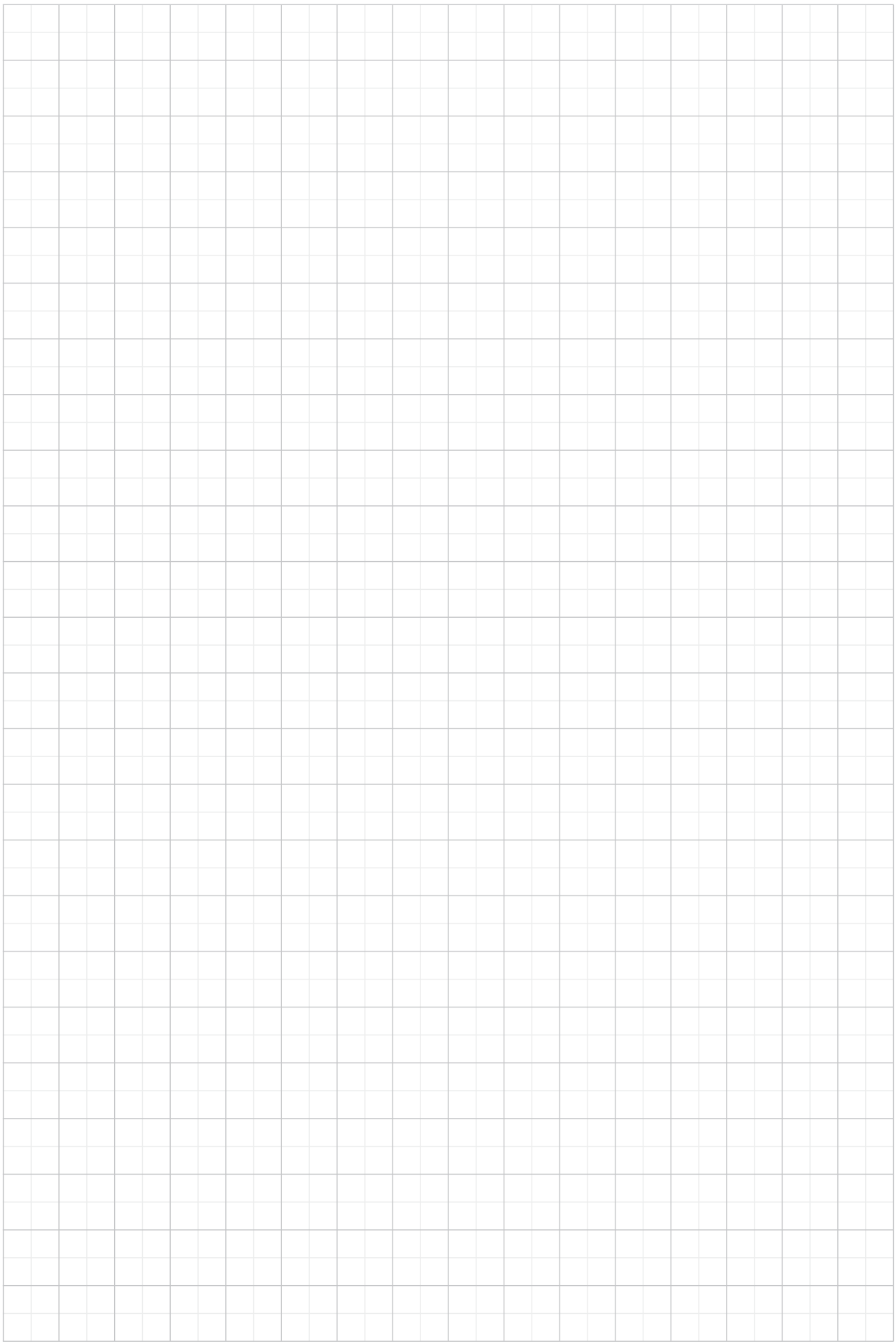


ServoOne junior

BG2 BG3 BG4

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 2-8
SO22.006	BG3	5.9 A	Page 2-4	Page 2-10
SO22.008	BG4	8 A	Page 2-4	Page 2-12

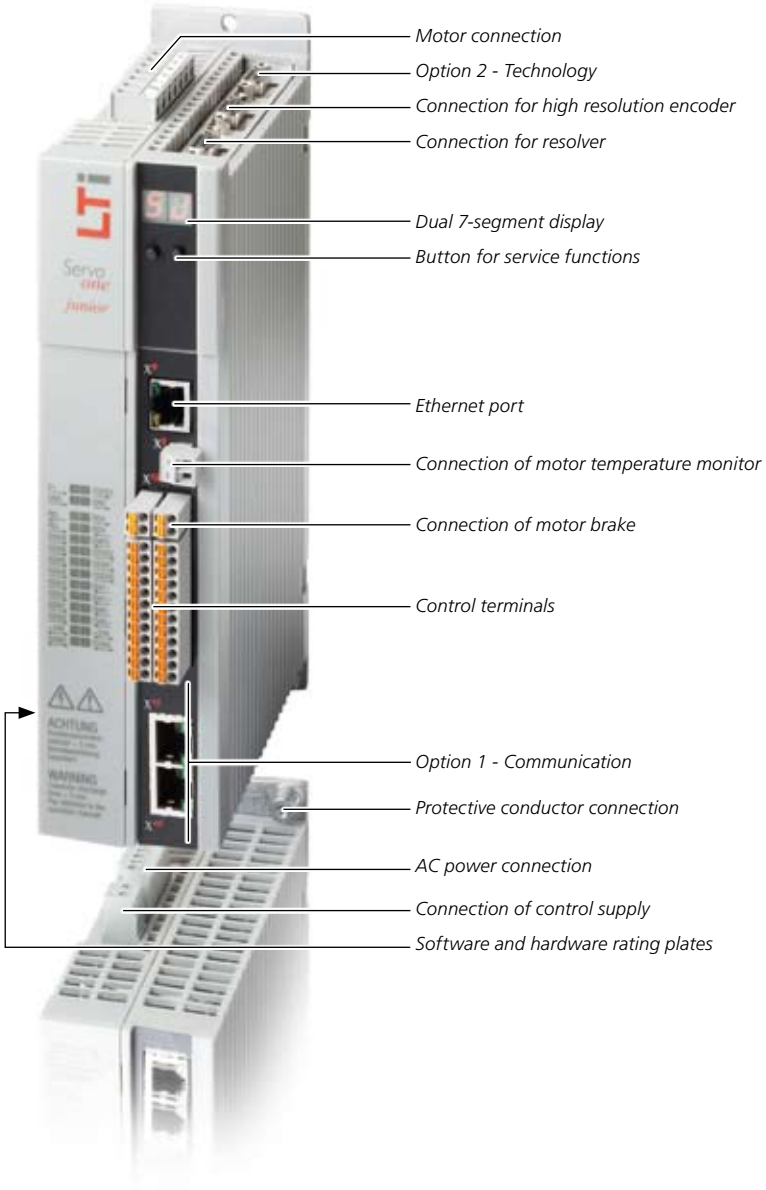
System voltage 3 x 400 V

Type	Size	Rated current	Current capacity	Technical data
SO24.002	BG2	2 A	Page 2-5	Page 2-8
SO24.004	BG3	3.5 A	Page 2-5	Page 2-10
SO24.007	BG4	6.5 A	Page 2-5	Page 2-12

Order code - ServoOne junior

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*												
Mains supply	*AC*					*0*										
Safety engineering	*STO*						*0*									
Option 1 Communication	*without*							*0*								
	SERCOS II							*1*								
	PROFIBUS							*2*								
	EtherCAT							*3*								
	CANopen							*4*								
	SERCOS III							*8*								
Option 2 Technology	*without*								*0*							
	second Sin/Cos encoder								*1*							
	TTL encoder simulation / TTL master encoder								*2*							
	TTL encoder with commutation signals								*5*							
Housing/cooling method	*Air-cooled (standard)*										*0*					
	Air-cooled with internal braking resistor										*1*					
Function package	*Basic (without additional function package)*											*0*				
	iPlc											*1*				
Special design	*None*												*0*			
Protection	*Standard*													*0*		
	PCB with protective lacquer													*1*		
Hardware version																*X*

Equipment - ServoOne junior



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Current capacitiy - ServoOne junior

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	3.0	6.0	10	9.0	0.08
	8	40	3.0	6.0		9.0 [1)]	0.08 [1)]
	16	40	2.0	4.0		6.0 [1)]	0.08 [1)]
SO22.006	4	45	5.9	11.8	10	-	-
	8	40					
	16	40					
SO22.008	4	45	8.0	-	-	-	-
	8	40	8.0				
	16	40	5.4				

1) Automatic power stage switching frequency change to 4 kHz
Data apply for a motor cable length of ≤10 m. Maximum permissible motor cable length 30 m.
All current ratings with recommended line reactor

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	3.0	6.0	10	9.0	0.08
	8	40	3.0	6.0		9.0 [1)]	
	16	40	2.0	4.0		6.0 [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	8.0	16.0	10	24.0	0.08
	8	40	8.0	16.0		24.0 [1)]	
	16	40	5.4	10.8		16.2 [1)]	

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

ServoOne junior for 3 x 400/460/480 V

Device	Switching frequency of power stage	Ambient temperature	Rated current I_N [A_{eff}]			Peak current[1]			
						200 % (2 I_N)		300 % (3 I_N)	
	[kHz]	max. [°C]	at 400 V	at 460 V	at 480 V	[A_{eff}]	for time [s]	[A_{eff}]	for time [s]
SO24.002	4	45	2.0	2.0	2.0	4.0	10	6.0	0.08
	8	40	2.0	2.0	1.7	4.0		6.0 [2]	
	16	40	0.7	0.7	-	1.4		2.1 [2]	
SO24.004	4	45	3.5	3.5	3.5	7.0	10	10.5	0.08
	8	40	3.5	3.5	2.6	7.0		10.5 [2]	
	16	40	2.2	1.3	-	4.4		6.6 [2]	
SO24.007	4	45	6.5	6.5	6.5	13.0	10	19.5	0.08
	8	40	6.5	6.5	6.5	13.0		19.5 [2]	
	16	40	4.0	2.4	1.9	8.0		12.0 [2]	

1) Data referred to 3 x 400 V mains voltage
2) Automatic power stage switching frequency change to 4 kHz
Data apply for a motor cable length of ≤10 m. Maximum permissible motor cable length 30 m.

Ambient conditions - ServoOne junior

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 switch 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. +55 °C
in storage	as per EN 61800-2, IEC 60721-3-1 class 1K3 and 1K4 [2]	
	Temperature	-25 °C to +55 °C
	Relative air 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 air 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 air 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 air 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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Acceptance tests - ServoOne junior

CE mark

The ServoOne junior 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 approbation

NOTE: UL approbation is in preparation for the ServoOne junior.

EMC acceptance tests

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" section). 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 acceptance

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 "SIL 3"

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

Technical data - ServoOne junior 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 line reactor)	1.3 kVA	1.5 kVA
Current (with line reactor)	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]
Braking chopper power electronics		
Braking chopper switch-on threshold	390 V DC	650 V DC [2]
Peak braking power, integrated braking resistor[3]	400 W at 550 Ω (PTC)	200 W at 7500 Ω (PTC) [2]
Minimum ohmic resistance of an externally installed braking resistor	72 Ω	230 Ω

1) Data referred to 4 kHz and 8 kHz switching frequency
2) Data referred to 400 V AC Mains voltage
3) A braking resistor is always integrated; connection of an external resistor is permissible.

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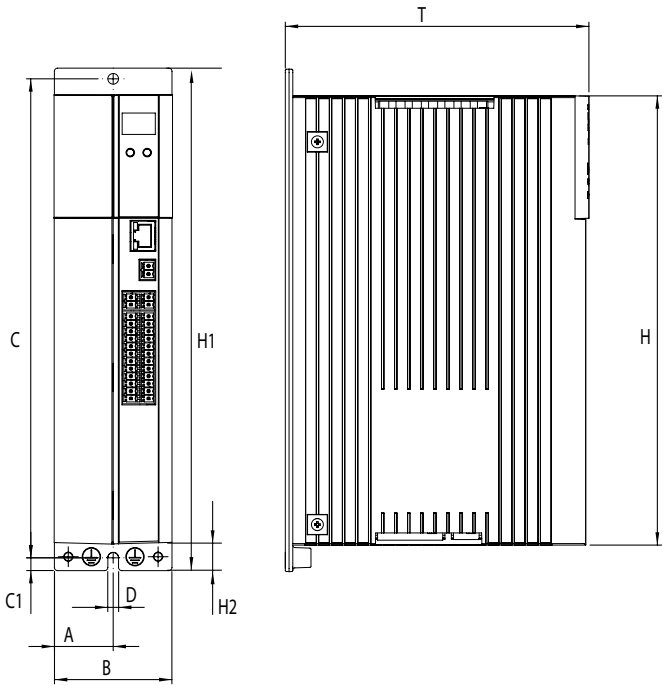
Mechanism	SO22.003	SO24.002
Cooling method	Wall mounting	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	max. 45 °C (at 4 kHz power stage switching frequency)	
Weight	1.0 kg	
Mounting type	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	Direct 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 also section 8)

Controller	SO22.003	SO24.002
Line reactor	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)	-
Mains filter	EMC8.2-1Ph,UR (1 x 230 V) EMC5.2-3Ph,UR (3 x 230 V)	EMC5.2-3Ph,UR

Technical data - ServoOne junior BG3

Type SO24.004

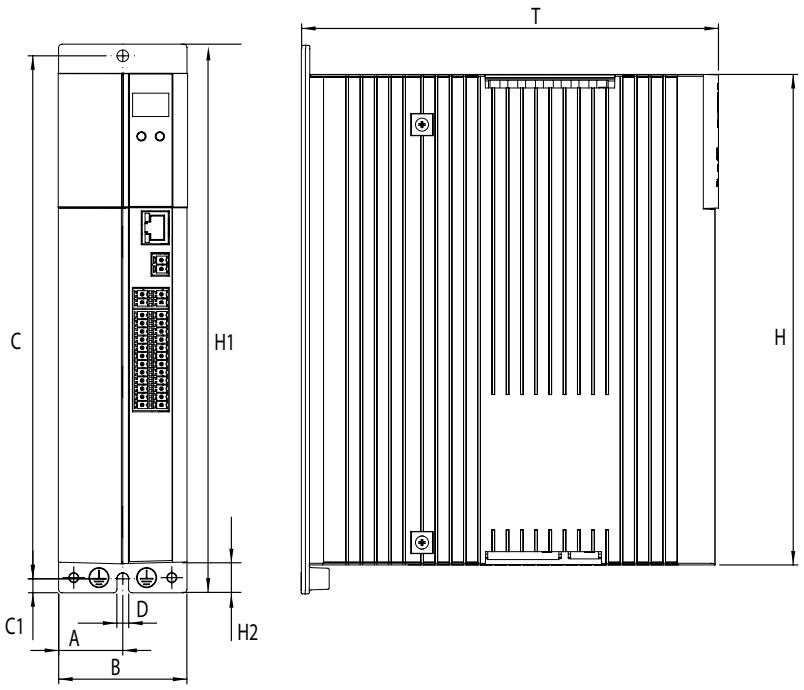
Technical data \ Article designation	SO22.006	SO24.004
Output, motor side		
Voltage	3-phase U_{Mains}	
Rated current, effective (I_N) [1]	5.9 A	3.5 A [2]
Peak current	see tables on page 2-4	see table on page 2-5
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 16 kHz	
Input, 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 line reactor)	2.6 kVA	2.7 kVA
Current (with line reactor)	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]
Braking chopper power electronics		
Braking chopper switch-on threshold	390 V DC	650 V DC [2]
Peak braking power, integrated braking resistor	1500 W at 100 Ω	1000 W at 420 Ω [2]
Minimum ohmic resistance of an externally installed braking resistor	72 Ω	180 Ω

1) Data referred to 4 kHz 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 type	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 also section 8)

Controller	SO22.006	SO24.004
Line reactor	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

Technical data - ServoOne junior BG4

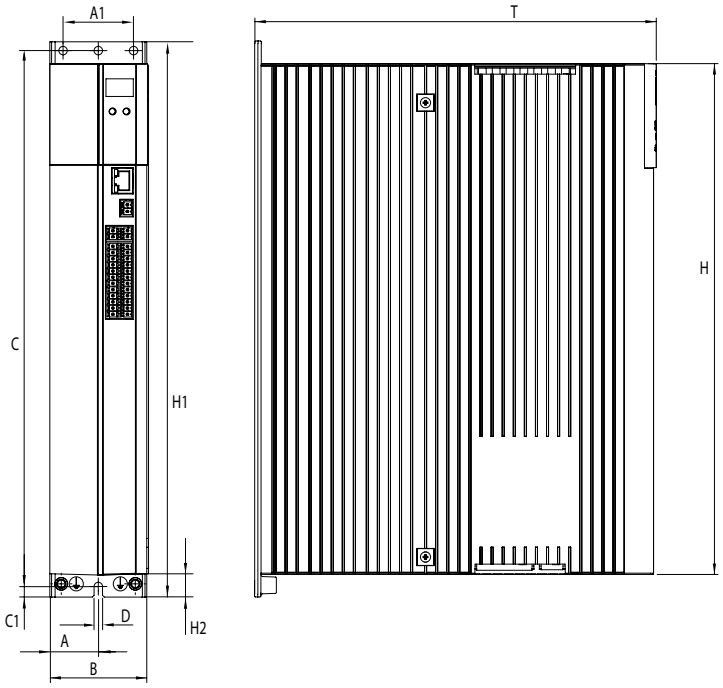
Type SO24.007

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 table 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})	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 line reactor)	3.5 kVA	5.0 kVA
Current (with line reactor)	8.8 A	7.2 A [2]
Asymmetry of mains voltage	±3 % max.	
Frequency	50/60 Hz ±10 %	
Power loss at 8 kHz and I_N	200 W	150 W [2]
Braking chopper power electronics		
Braking chopper switch-on threshold	390 V DC	650 V DC [2]
Peak braking power, integrated braking resistor	1.7 kW at 90 Ω	4.7 kW at 90 Ω [2]
Minimum ohmic resistance of an externally installed braking resistor	72 Ω	72 Ω

1) Data referred to 4 kHz 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 type	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	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 also section 8)

Controller	SO22.008	SO24.007
Line reactor	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

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 3-14

System voltage 3 x 400 V

Type	Size	Rated current		Current capacity	Technical data
		Air-cooled	Liquid-cooled		
SO84.004.0	BG1	4.0 A	-	Page 3-7	Page 3-14
SO84.006.0		6.0 A	-		
SO84.008.0	BG2	8.0 A	-	Page 3-7	Page 3-16
SO84.012.0		12 A	-		
SO84.016.0	BG3	16 A	16 A	Page 3-7	Page 3-18
SO84.020.0		20 A	20 A		
SO84.024.0	BG4	24 A	24 A	Page 3-7	Page 3-20
SO84.032.0		32 A	32 A		
SO84.045.0	BG5	45 A	53 A	Page 3-8 and 3-9	Page 3-22
SO84.060.0		60 A	70 A		
SO84.072.0		72 A	84 A		
SO84.090.0	BG6	90 A	110 A	Page 3-8 and 3-9	Page 3-24
SO84.110.0		110 A	143 A		
SO84.143.0	BG6a	143 A	170 A	Page 3-8 and 3-9	Page 3-26
SO84.170.0		170 A	210 A		
SO84.250.0	BG7	-	250 A	Page 3-10	Page 3-28
SO84.325.0		-	325 A		
SO84.450.0		-	450 A		

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Order code - ServoOne single-axis system

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												
		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	143 A		143												
		170 A		170												
	BG7	250 A		250												
		325 A		325												
		450 A		450												
Mains supply	AC					0										
Safety engineering	STO						0									
	Integrated safety control						1									
Option 1 Communication	without							0								
	SERCOS II							1								
	PROFIBUS							2								
	EtherCAT							3								
	CANopen							4								
	CANopen + 2 AO							5								
	VARAN							6								
	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							
Housing/cooling method	Air-cooled (standard)										0					
	Air-cooled with internal braking resistor										1					
	Peak braking power with internal 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		
	PCB with protective lacquer (as from BG5 standard version)													1		
Hardware version																X

Equipment - ServoOne single-axis system

Equipment - Servocontrollers BG1 to BG5

ID no.: 1100.24B.2-01 Date: 10/2010

Equipment - Servocontrollers BG6 to BG6a

Equipment - Servocontroller BG7

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Current capacity - ServoOne single-axis system

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	Peak current [A_{eff}]			
			at 1 x 230 V_{AC}	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent operation	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
Data apply for 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 400 V_{AC}	at 460 V_{AC}	at 480 V_{AC}	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent operation	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 % preload
2) Shutdown as per I²t characteristic
All data apply for motor cable length ≤ 10 m.

ServoOne servocontrollers BG5 to BG6a (air-cooled)

Type	Switching frequency of power stage	Ambient temperature	Rated current			Peak current [A_{eff}] 1)			
			at 400 V_{AC}	at 460 V_{AC}	at 480 V_{AC}	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent operation	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 % preload
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m.

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ServoOne servocontrollers BG5 to BG6a (liquid-cooled)

Type	Switching frequency of power stage	Ambient temperature	Rated current			Peak current [A_{eff}] [1]			
			at 400 V_{AC}	at 460 V_{AC}	at 480 V_{AC}	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent operation	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 % preload
2) Shutdown as per I^2t characteristic
Data apply for motor cable length ≤10 m

ServoOne servocontroller BG7 (liquid-cooled)

Type	Switching frequency of power stage	Ambient temperature	Rated current			Peak current [A_{eff}] [1]			
			at 400 V_{AC}	at 460 V_{AC}	at 480 V_{AC}	at rotating field frequency rising in linear mode 0 to 5 Hz		for inter-mittent operation	for time [2]
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	0 Hz	5 Hz	> 5 Hz	[s]
SO84.250.0xxx.1 (BG7)	2	40	250	231	225		425		30
	4						375		
SO84.325.0xxx.1 (BG7)	2	40	325	300	292		552		30
	4						485		
SO84.450.0xxx.1 (BG7)	2	40	450	416	405		765		30
	4						675		

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

Ambient conditions - ServoOne single-axis system

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 switch 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. +55 °C
in storage	as per EN 61800-2, IEC 60721-3-1 class 1K3 and 1K4[2]		
	Temperature		-25 °C to +55 °C
	Relative air humidity		5 to 95 %
in operation	as per EN 61800-2, IEC 60721-3-3 class 3K3[3]		
	Temperature	Air-cooled	**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-cooled	**BG2 andBG4** -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 air 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 air 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 air 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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Acceptance tests - ServoOne single-axis system

CE mark

The ServoOne junior 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 approbation

For the ServoOne servocontrollers UL approbation has been obtained up to a rated current of 210 A (BG6a with liquid cooling). For devices 250 A to 450 A UL approbation is in preparation.

EMC acceptance tests

All servocontrollers have an aluminium housing with an anodized finish (BG1 to BG4) or an aluminium rear panel made of aluminized/galvanized 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 8, "Accessories"). This ensures compliance with the EMC Directive 2004/108/EC:

- Public low voltage system:
  Residential areas up to 10 metres motor cable length
- Industrial low voltage system:
  Industry up to 25 metres motor cable length

Additional external mains filters are available for all single-axis controllers BG1 to BG5 (see section 8 "Accessories").

STO acceptance

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 air-cooled servocontrollers up to a rated current of 210 A (BG6a) certification has been obtained. For all other servocontrollers (rated current >250 A) certification is currently in preparation.

Space for your own notes

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

Type SO84.004.0

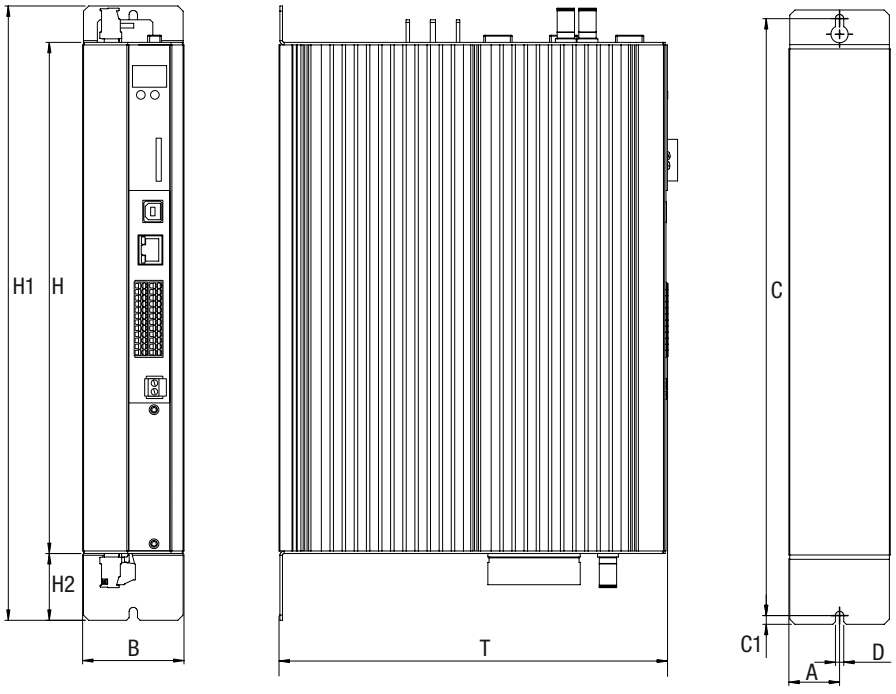
Article designation / Technical data	SO82.004.0	SO84.004.0	SO84.006.0
Output, motor side			
Voltage	3-phase U_{Mains}		
Rated current, effective (I_N) [1]	4 A	4 A [2]	6 A [2]
Peak current	see table on page 3-6	see table on page 3-7	
Rotating field frequency	0 ... 400 Hz		
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 8 kHz at 40° C cooling air temperature)		
Input, mains side			
Mains voltage (U_{mains})	1 x 230 V ±10 %	(3 x 230 V/3 x 400 V/3 x 460 V/3 x 480 V) ±10 %	
Device connected load (with line reactor)	1.6 kVA	2.8 kVA [2]	4.2 kVA [2]
Current (with line reactor)	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 bei I_N [1]	85 W	96 W [2]	122 W [2]
DC link			
DC link capacity	1740 µF	400 µF	
Braking chopper switch-on threshold	390 V DC	650 V DC [2]	
Braking chopper peak braking power with int. Bremswiderstand (SO8x.xxx.xxxx.1xxx)	PTC		
Minimum ohmic resistance of an externally installed braking resistor [4]	72 Ω		

1) Data referred to 8 kHz switching frequency
2) Data referred to 3 x 400 V AC mains voltage
3) Without line reactor
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 type	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



Matching accessories (see also section 8)

Controller	SO82.004.0	SO84.004.0	SO84.006.0
Line reactor	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

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

Type SO84.008.0

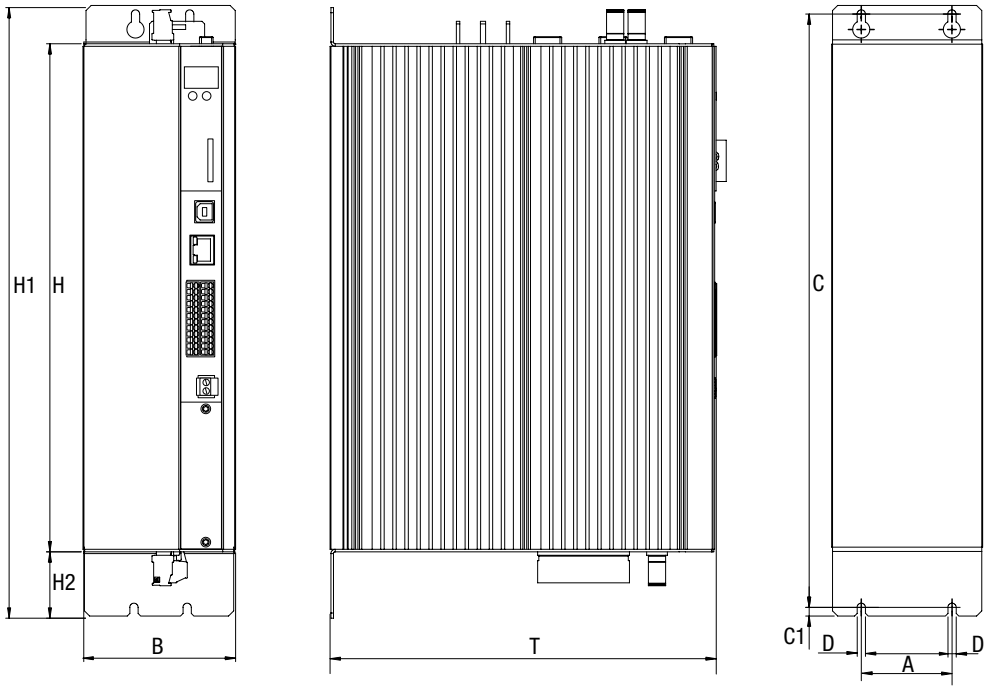
Technical data \ Article designation	SO84.008.0	SO84.012.0
Output, motor side		
Voltage	3-phase U_{Mains}	
Rated current, effective (I_N)	8 A [1]	12 A [1]
Peak current	see table on page 3-7	
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 8 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 line reactor)	5.9 kVA [1]	8.8 kVA [1]
Current (with line reactor)	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		
DC link capacity	725 µF	
Braking chopper switch-on threshold	650 V DC [1]	
Braking chopper peak braking power with int. braking resistor (SO8x.xxx.xxxx.1xxx)	4.7 kW [1] at 90 Ω	
Minimum ohmic resistance of an externally installed braking resistor [2]	39 Ω	

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 type	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	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



Matching accessories (see also section 8)

Controller	SO84.008.0	SO84.012.0
Line reactor	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

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

Type SO84.016.0

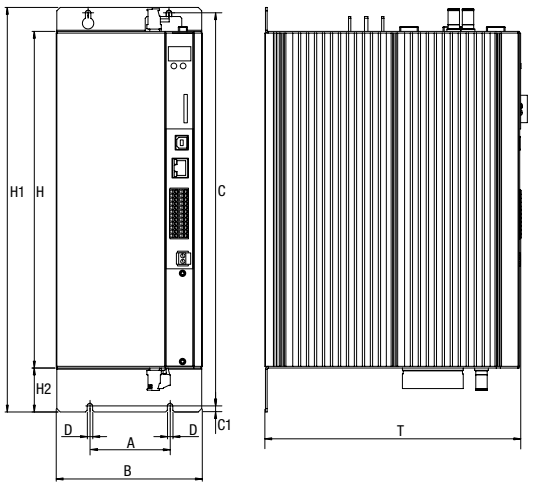
Article designation / Technical data	SO84.016.0	SO84.020.0
Output, motor side		
Voltage	3-phase U_{Mains}	
Rated current, effective (I_N)	16 A [1)]	20 A [1)]
Peak current	see table on page 3-7	
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 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 line reactor)	11.1 kVA [1)]	13.9 kVA [1)]
Current (with line reactor)	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		
DC link capacity	1230 µF	
Braking chopper switch-on threshold	650 V DC [1)]	
Braking chopper peak braking power with int. braking resistor (SO8x.xxx.xxxx.1xxx)	4.7 kW [1)] at 90 Ω	
Minimum ohmic resistance of an externally installed braking resistor [2)]	20 Ω	

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 bzw. SO8x.xxx.xxxx.7xxx) not permitted.

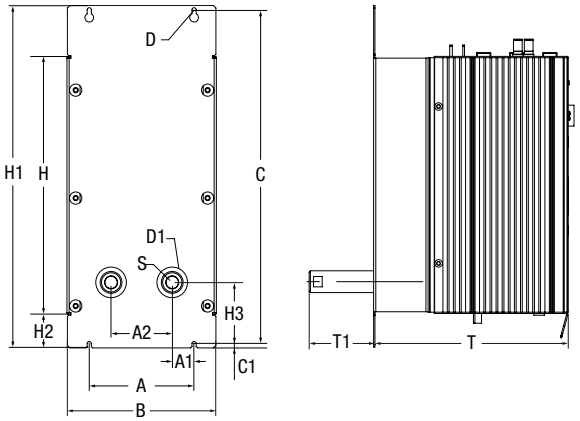
Mechanism, BG3	SO84.016.0	SO84.020.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	6.5 kg	
Mounting type	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	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 also section 8)

Controller	SO84.016.0	SO84.020.0
Line reactor	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

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

Type SO84.024.0

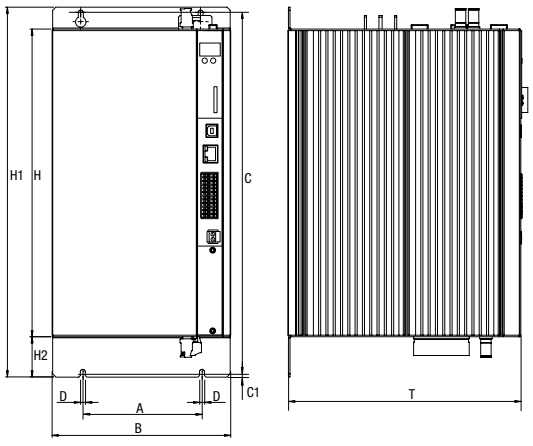
Technical data \ Article designation	SO84.024.0	SO84.032.0
Output, motor side		
Voltage	3-phase U_{Mains}	
Rated current, effective (I_N)	24 A [1)]	32 A [1)]
Peak current	see table on page 3-7	
Rotating field frequency	0 ... 400 Hz	
Switching frequency of power stage	4, 8, 12, 16 kHz (factory setting 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 line reactor)	16.6 kVA [1)]	22.2 kVA [1)]
Current (with line reactor)	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		
DC link capacity	2000 µF	
Braking chopper switch-on threshold	650 V DC [1)]	
Braking chopper peak braking power with int. braking resistor (SO8x.xxx.xxxx.1xxx)	4.7 kW [1)] at 90 Ω	
Minimum ohmic resistance of an externally installed braking resistor [2)]	12 Ω	

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 bzw. SO8x.xxx.xxxx.7xxx) not permitted.

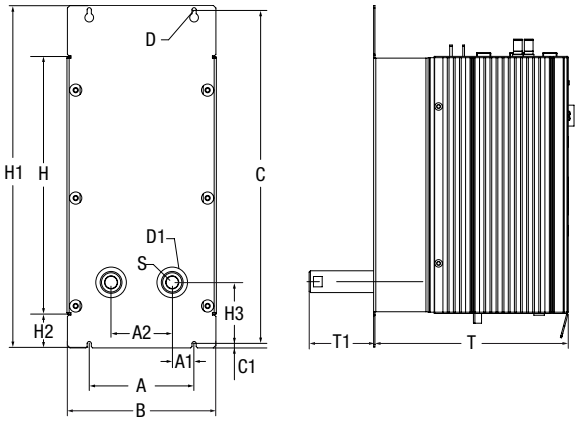
Mechanism, BG4	SO84.024.0	SO84.032.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	7.5 kg	
Mounting type	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple servocontrollers	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 also section 8)

Controller	SO84.024.0	SO84.032.0
Line reactor	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

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

Type SO84.045.0 (air-cooled)

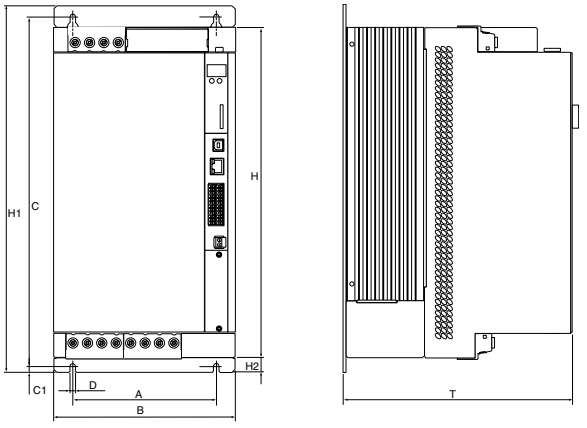
Article designation / Technical data	SO84.045.0		SO84.060.0		SO84.072.0	
	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled
Output, motor side						
Voltage	3-phase U_{Mains}					
Rated current, effective (I_N)	45 A [1)]	53 A [1)]	60 A [1)]	70 A [1)]	72 A [1)]	84 A [1)]
Peak current	see tables on page 3-8 (air-cooled) and 3-9 (liquid-cooled)					
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 line reactor)	31 kVA [1)]	37 kVA [1)]	42 kVA [1)]	50 kVA [1)]	50 kVA [1)]	58 kVA [1)]
Current (with line reactor)	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						
DC link capacity	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

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

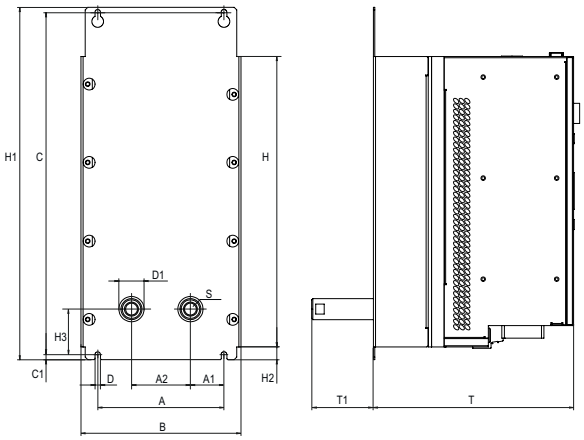
Mechanism, BG5	SO84.045.0	SO84.060.0	SO84.072.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled		
Protection	IP20 except terminals (IP00)		
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)		
Weight (air/liquid cooled)	13 kg / 16.5 kg		
Mounting type	Vertical mounting 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)
T (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 also section 8)

Controller	SO84.045.0		SO84.060.0		SO84.072.0	
	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled
Line reactor	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)					
Mains filter	EMC63.1-UR			EMC100.1-UR		

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

Type SO84.110.0 (air-cooled)

Article designation / Technical data	SO84.090.0		SO84.110.0	
	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled
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 tables on page 3-8 (air-cooled) and page 3-9 (liquid-cooled)			
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 line reactor)	62 kVA [1)]	76 kVA [1)]	76 kVA [1)]	99 kVA [1)]
Current (with line reactor)	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)]
Braking chopper power electronics				
DC link capacity	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	

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

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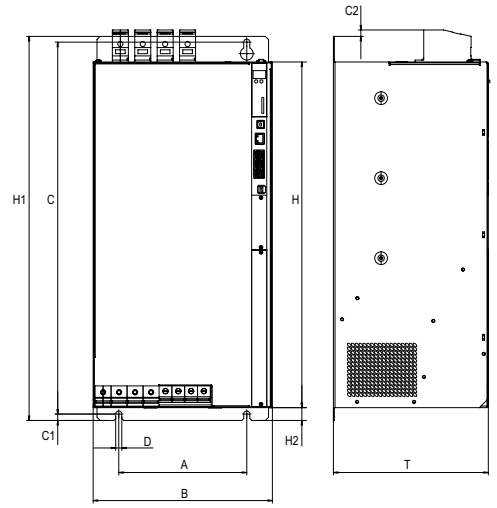
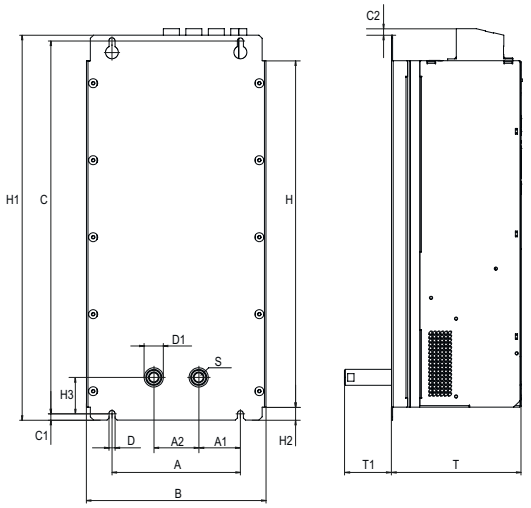
Mechanism, BG6	SO84.090.0	SO84.110.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight (air/liquid cooled)	28 kg / 31.5 kg	
Mounting type	Vertical mounting with unhindered 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)
T (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 also section 8)

Controller	SO84.090.0		SO84.110.0	
	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled
Line reactor	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)			
Mains filter	EMC100.1-UR	EMC150.1-UR		

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

Type SO84.170.0 (air-cooled)

Article designation / Technical data	SO84.143.0		SO84.170.0	
	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled
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 tables on page 3-8 (air-cooled) and page 3-9 (liquid-cooled)			
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 line reactor)	99 kVA [1)]	118 kVA [1)]	118 kVA [1)]	128 kVA [1)]
Current (with line reactor)	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)]
Braking chopper power electronics				
DC link capacity	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	

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

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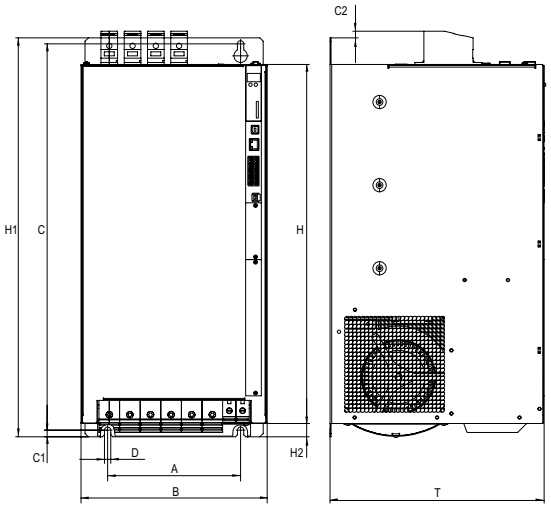
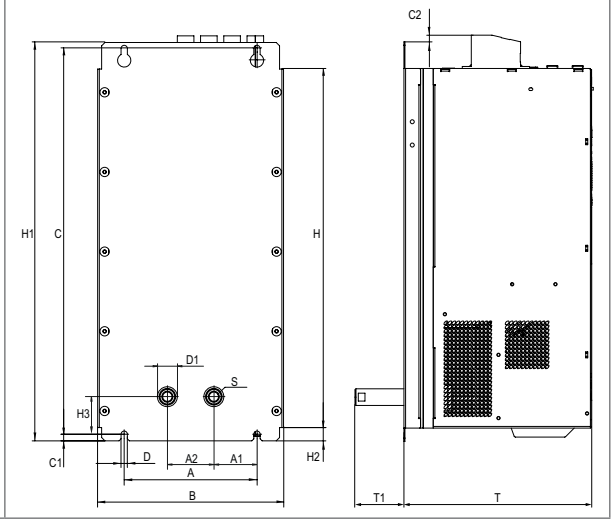
Mechanism, BG6a	SO84.143.0	SO84.170.0
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight (air/liquid cooled)	32 kg / 41.1 kg	
Mounting type	Vertical mounting with unhindered 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)
T (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 also section 8)

Controller	SO84.143.0		SO84.170.0	
	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled
Line reactor	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)			
Mains filter	EMC150.1-UR	EMC180.1-UR		EMC220.1-UR

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

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 connected loa (with line reactor)	173 kVA [1)]	225 kVA [1)]	310 kVA [1)]
Current (with line reactor)	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)]
Braking chopper power electronics			
DC link capacity	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

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

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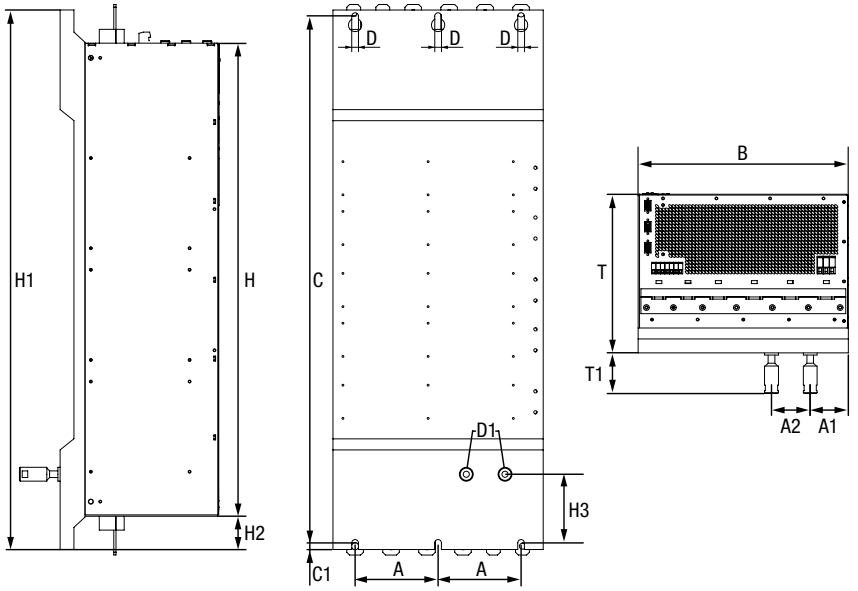
Mechanism, BG7	SO84.250.0	SO84.325.0	SO84.450.0
Cooling method	Liquid-cooled		
Protection	IP20 except terminals (IP00)		
Coolant temperature	Max. 40 °C, not more than 10 °C below the ambient temperature		
Weight	100 kg		
Mounting type	Vertical mounting		
End-to-end mounting of multiple servocontrollers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



Matching accessories (see also section 8)

Controller	SO84.250.0	SO84.325.0	SO84.450.0
Line reactor	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)	
Mains filter	EMC250.0-UR	EMC300.0-UR [1)] EMC400.0-UR [1)]	EMC400.0-UR [1)] EMC500.0-UR [1)]

1) Depending on effective mains current

Space for your own notes

ServoOne multi-axis system

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

Axis controller

Type	Size	Rated current		Current capacity	Technical data
		Air-cooled	Liquid-cooled		
SO84.004.1	BG1	4.0 A	-	from page 4-8	Page 4-18
SO84.006.1	BG1	6.0 A	-		
SO84.008.1	BG2	8.0 A	-	from page 4-8	Page 4-20
SO84.012.1	BG2	12 A	-		
SO84.016.1	BG3	16 A	20 A	from page 4-8 and from page 4-13	Page 4-22
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 4-24
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 4-26
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 4-28
SO84.110.1	BG6a	110 A	143 A		
SO84.143.1	BG6a	143 A	170 A		
SO84.170.1	BG6a	170 A	210 A		

Supply units

Type	Size	Rated current	Current capacity	Technical data
SO84.040.S	BG5	40 A	Page 4-16	Page 4-30
SO84.076.S	BG5	76 A		
SO84.115.S	BG6a	115 A	Page 4-16	Page 4-32
SO84.170.S	BG6a	170 A		

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Order code - ServoOne multi-axis system

Axis controller order code

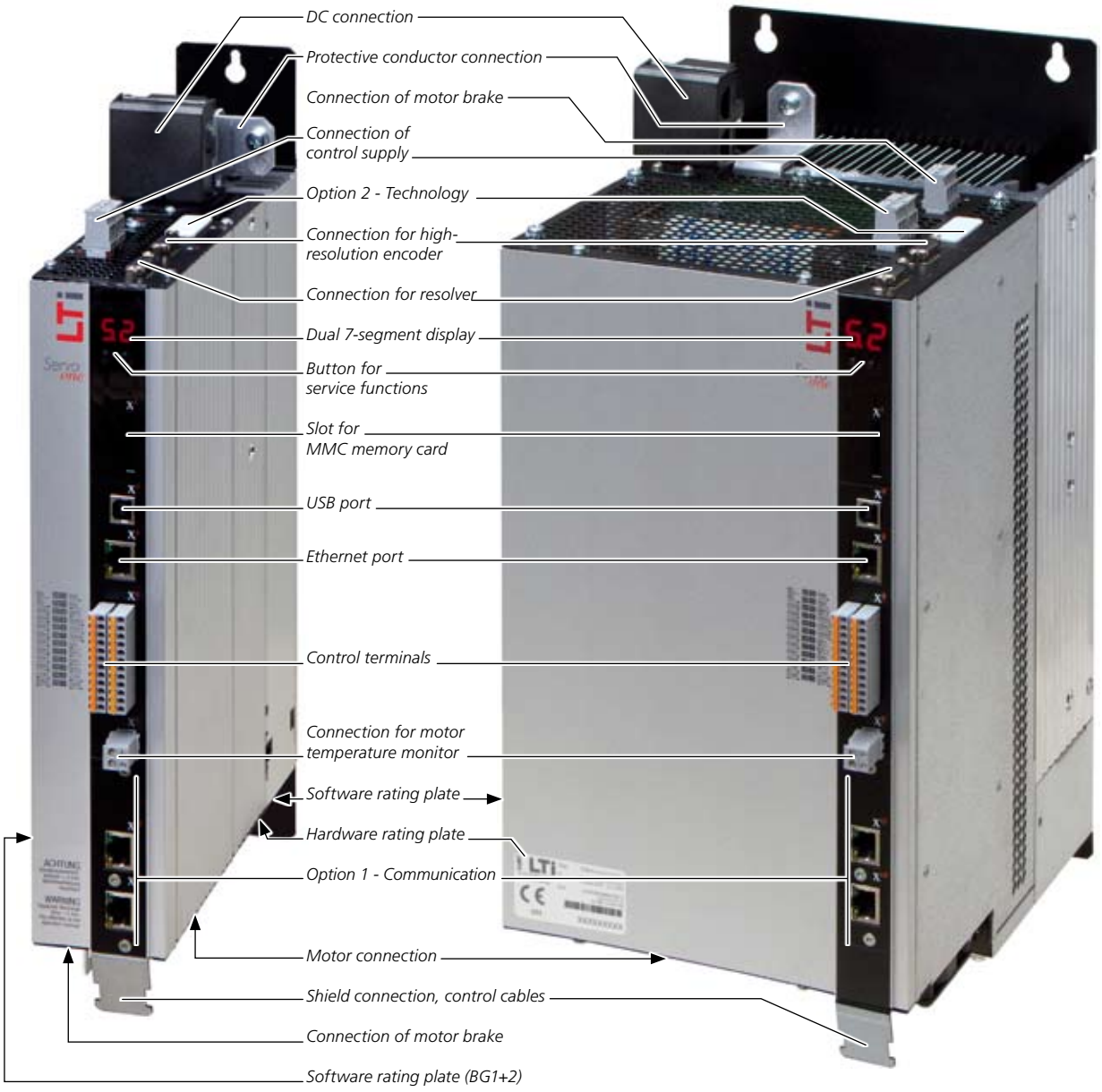
Article designation	SO84.	006	.	1	0	2	1	.	0	0	0	0	.	X
ServoOne														
Rated current	*BG1*	*4 A* *004* *6 A* *006*												
	BG2	*8 A* *008* *12 A* *012*												
	BG3	*16 A* *016* *20 A* *020*												
	BG4	*24 A* *024* *32 A* *032*												
	BG5	*45 A* *045* *60 A* *060* *72 A* *072*												
	BG6	*90 A* *090* *110 A* *110*												
	BG6a	*143 A* *143* *170 A* *170*												
Supply	*DC*			*1*										
Safety engineering	*STO*				*0*									
	Integrated safety control				*1*									
Option 1 Communication	*without*					*0*								
	SERCOS II					*1*								
	PROFIBUS					*2*								
	EtherCAT					*3*								
	CANopen					*4*								
	CANopen + 2 AO					*5*								
	VARAN					*6*								
	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*							
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*		
	PCB with protective lacquer (as from SO84.045 standard version)											*1*		
Hardware version														*X*

Supply unit order code

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*												
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*						
	Air-cooled with internal braking resistor									*7*						
	Liquid-cooled									*8*						
Function package	*Basic (without additional function package)*										*0*					
	iPlc										*1*					
Special design	*None*											*0*				
Protection	*Standard*												*0*			
	PCB with protective lacquer												*1*			
Hardware version																*X*

Equipment - ServoOne multi-axis system

Equipment - Axis controllers BG1 to BG5



Equipment - Axis controller BG6a

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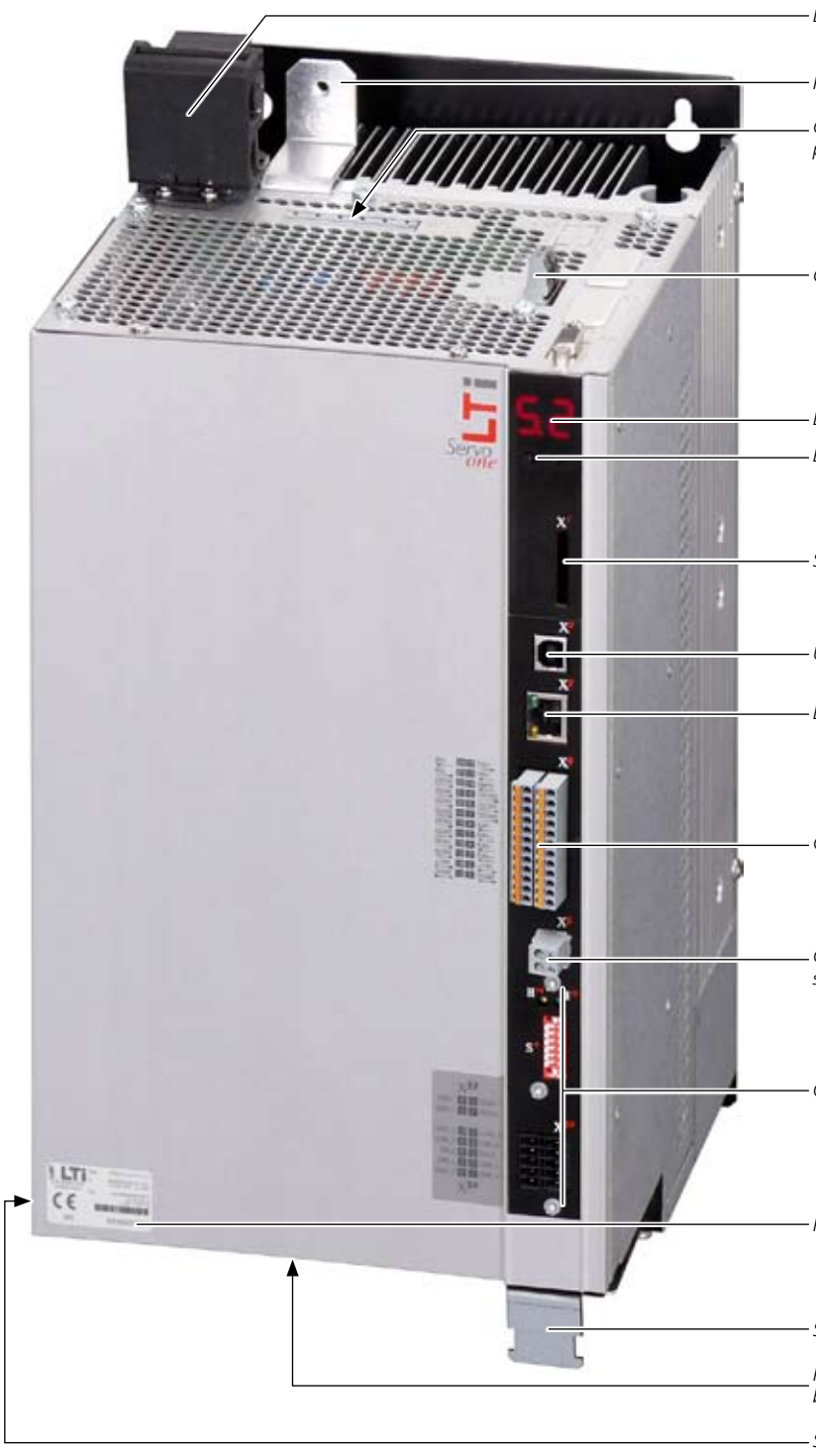
Equipment - Supply unit BG5



Equipment - Supply unit BG6a

ID no.: 1100.24B.2-01 Date: 10/2010

Current capacity - ServoOne multi-axis system

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	6.0	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 % preload
2) Shutdown as per I²t 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 % preload
2) Shutdown as per I^2t characteristic
All data apply for motor cable length ≤ 10 m

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

ID no.: 1100.24B.2-01 Date: 10/2010

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 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 intermittent operation	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 VDCDC (corresponding to 400 VAC) at max. 70 % preload
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 % preload *2) Shutdown as per I^2t 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 % preload *2) Shutdown as per I^2t 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 % preload *2) Shutdown as per I²t 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 % preload *2) Shutdown as per I²t 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 operation	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 V DC (corresponding to 400 V AC) at max. 70 % preload
2) Shutdown as per I^2t characteristic
3) When supplied with AC servocontroller
All data apply for motor cable length ≤ 10 m

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

Type	Switching frequency of power stage	Ambient temperature	Rated current		Peak current		
			at 650 V_{DC}	at 770 V_{DC}	at 650 V_{DC}	at 770 V_{DC}	for time
	[kHz]	[°C]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[A_{eff}]	[s]
SO84.040.S (BG5)	12	40	40	34	76	64	10
SO84.076.S (BG5)	4	40	80	68	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

Acceptance tests - ServoOne multi-axis system

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.

UL approbation

UL approbation is in preparation for the ServoOne multi-axis system.

EMC acceptance tests

All ServoOne axis controllers SO8x.xxx have an aluminium housing with an anodized finish (BG1 to BG4) or an aluminium rear panel made of aluminized/galvanized sheet steel (BG5 to BG6a) 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 “Accessories” section).

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.

Ambient conditions - ServoOne multi-axis system

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 switch 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. +55 °C
in storage	as per EN 61800-2, IEC 60721-3-1 class 1K3 and 1K4[2]	
	Temperature	-25 °C to +55 °C
	Relative air 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)
	Relative air 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 air 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 air 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.

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

Type SO84.004.1 (air-cooled)

Technical data / Designation		SO84.004.1	SO84.006.1
Output, motor side			
Voltage		3-phase $U_{ZK}/\sqrt{2}$	
Rated current, effective (I_N)	Air-cooled	4 A [1]	6 A [1]
	Liquid-cooled	*BG1 not available with liquid cooling*	
Peak current	Air-cooled	See tables, pages 4-8 to 4-11	
	Liquid-cooled	*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_{ZK}) 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]		$U_{ZK} \cdot 1.7 \cdot I_{motor}$	
Power loss at I_N	Air-cooled	110 W [1]	140 W [1]
	Liquid-cooled	*BG1 not available with liquid cooling*	
DC link			
DC link capacity		60 µF	

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

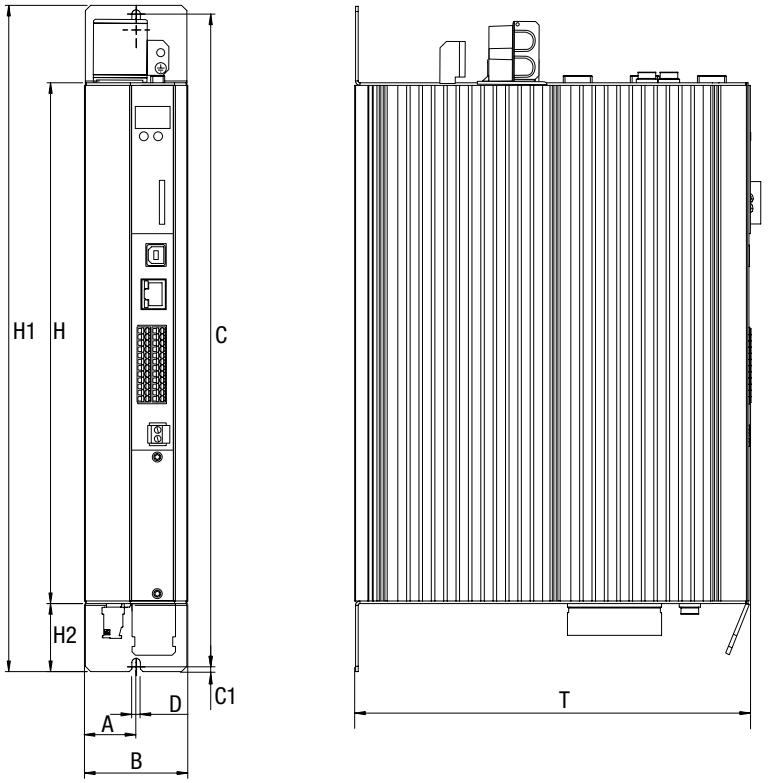
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 2 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC axis controller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category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



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

Type SO84.008.1 (air-cooled)

Technical data / Designation		SO84.008.1	SO84.012.1
Output, motor side			
Voltage		3-phase $U_{ZK}/\sqrt{2}$	
Rated current, effective (I_N)	Air-cooled	8 A [1]	12 A [1]
	Liquid-cooled	*BG2 not available with liquid cooling*	
Peak current	Air-cooled	See tables, pages 4-8 to 4-11	
	Liquid-cooled	*BG2 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_{ZK}) 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]		$U_{ZK} \cdot 1.7 \cdot I_{motor}$	
Power loss at I_N	Air-cooled	185 W [1]	255 W [1]
	Liquid-cooled	*BG2 not available with liquid cooling*	
DC link			
DC link capacity		105 µF	

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

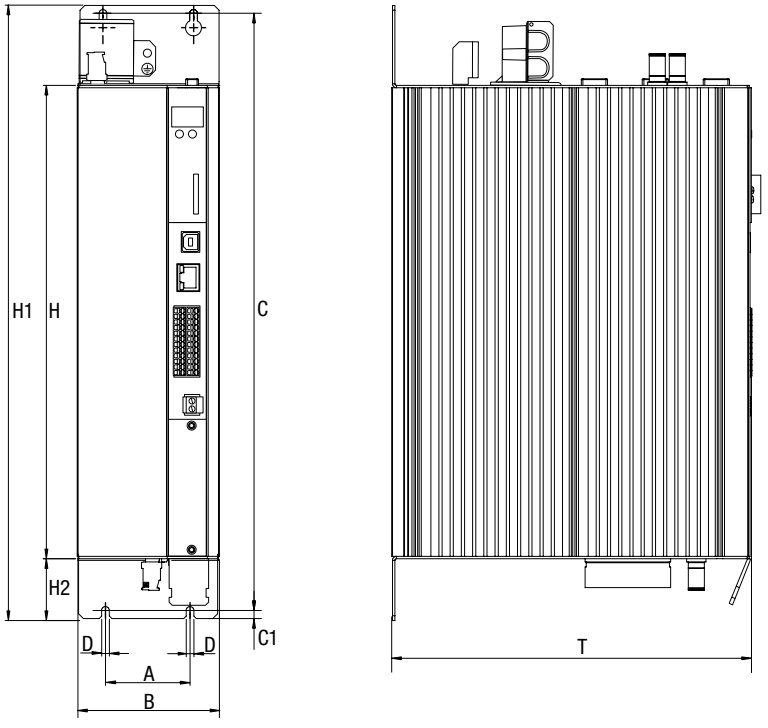
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 2 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC axis controller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category 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 type	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple axis controllers	Direct butt-mounted, max. 2 mm	

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



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

Type SO84.016.1 (liquid-cooled)

Technical data / Designation		SO84.016.1	SO84.020.1
Output, motor side			
Voltage		3-phase $U_{ZK}/\sqrt{2}$	
Rated current, effective (I_N)	Air-cooled	16 A [1]	20 A [1]
	Liquid-cooled	20 A [1]	25 A [1]
Peak current	Air-cooled	See tables, pages 4-8 to 4-11	
	Liquid-cooled	See tables, pages 4-13 and 4-14	
Rotating field frequency		0 ... 400 Hz	
Switching frequency of power stage		4, 8, 12, 16 kHz	
DC input			
DC voltage (U_{ZK}) 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]		$U_{ZK} \cdot 1.7 \cdot I_{motor}$	
Power loss at I_N	Air-cooled	320 W [1]	390 W [1]
	Liquid-cooled	390 W [1]	480 W [1]
DC link			
DC link capacity		288 µF	

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

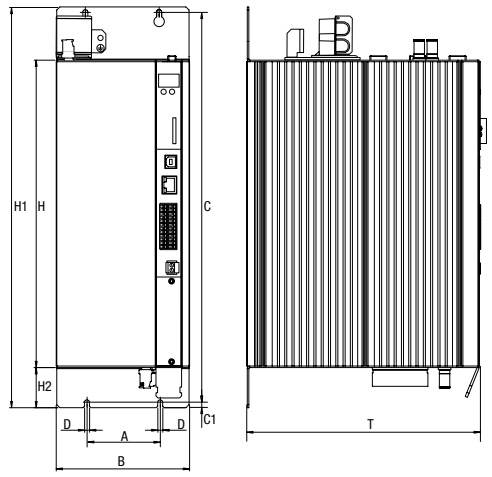
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 2 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC axis controller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category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

3) Approximation value

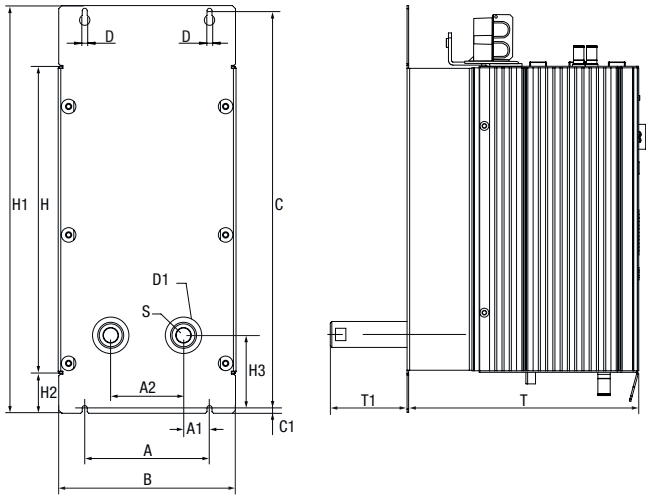
Mechanism, BG3	SO84.016.1	SO84.020.1
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	6.5 kg	
Mounting type	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple axis controllers	Direct butt-mounted, max. 2 mm	

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



ID no.: 1100.24B.2-01 Date: 10/2010

Technical data - Axis controllers 24 A to 40 A (BG4)

Type SO84.024.1 (liquid-cooled)

Technical data / Designation		SO84.024.1	SO84.032.1
Output, motor side			
Voltage		3-phase $U_{ZK}/\sqrt{2}$	
Rated current, effective (I_N)	Air-cooled	24 A [1]	32 A [1]
	Liquid-cooled	30 A [1]	40 A [1]
Peak current	Air-cooled	see tables, pages 4-8 to 4-11	
	Liquid-cooled	see tables, pages 4-13 and 4-14	
Rotating field frequency		0 ... 400 Hz	
Switching frequency of power stage		4, 8, 12, 16 kHz	
DC input			
DC voltage (U_{ZK}) nominal [2]		565 V_{DC} / 650 V_{DC} / 678 V_{DC} / 770 V_{DC}	
Current (RMS approximation value)		1.7 · I_{motor}	
Device connected load [3]		U_{ZK} · 1.7 · I_{motor}	
Power loss at I_N	Air-cooled	420 W [1]	545 W [1]
	Liquid-cooled	455 W [1]	595 W [1]
DC link			
DC link capacity		504 µF	

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

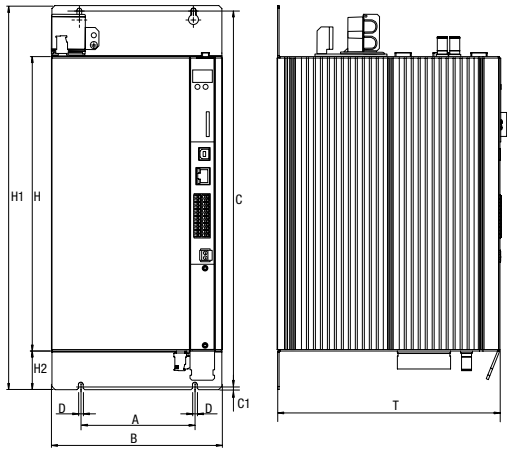
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 2 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC axis controller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category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

3) Approximation value

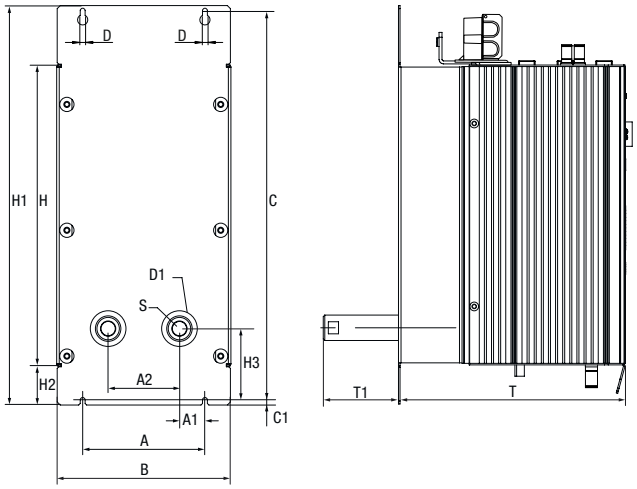
Mechanism, BG4	SO84.024.1	SO84.032.1
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	45 °C (at 4 kHz power stage switching frequency)	
Weight	7.5 kg	
Mounting type	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple axis controllers	Direct butt-mounted, max. 2 mm	

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



ID no.: 1100.24B.2-01 Date: 10/2010

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

Type SO84.045.1 (air-cooled)

Technical data / Designation		SO84.045.1	SO84.060.1	SO84.072.1
Output, motor side				
Voltage		3-phase $U_{ZK}/\sqrt{2}$		
Rated current, effective (I_N)	Air-cooled	45 A [1]	60 A [1]	72 A [1]
	Liquid-cooled	53 A [1]	70 A [1]	84 A [1]
Peak current	Air-cooled	see table on page 4-12		
	Liquid-cooled	see table on page 4-15		
Rotating field frequency		0 ... 400 Hz		
Switching frequency of power stage		4, 8, 12, 16 kHz		
DC input				
DC voltage (U_{ZK}) 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]		$U_{ZK} \cdot 1.7 \cdot I_{motor}$		
Power loss at I_N	Air-cooled	610 W [1]	830 W [1]	1010 W [1]
	Liquid-cooled	690 W [1]	930 W [1]	1130 W [1]
DC link				
DC link capacity	Air-cooled	430 µF	900 µF	
	Liquid-cooled	900 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, 2 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC axis controller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category III.

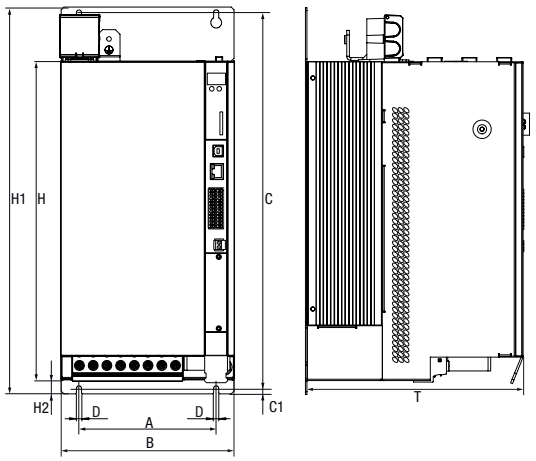
3) RMS approximation value

ID no.: 1100.24B.2-01 Date: 10/2010

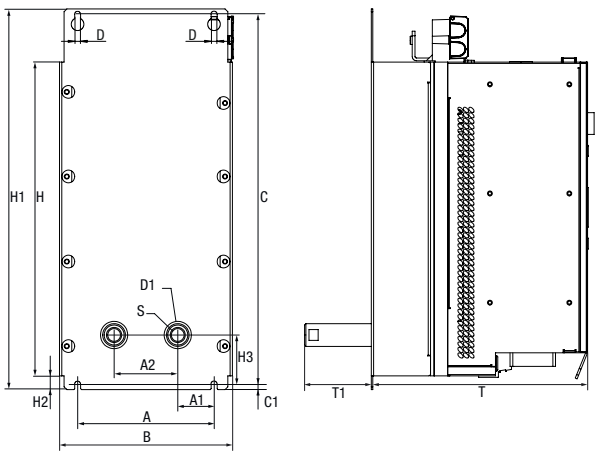
Mechanism, BG5	SO84.045.1	SO84.060.1	SO84.072.1
Cooling method	Air-cooled (wall-mounted) or liquid-cooled		
Protection	IP20 except terminals (IP00)		
Cooling air temperature	40 °C (at 4 kHz Switching frequency of Power stage)		
Weight	13 kg		
Mounting type	Vertical mounting with unhindered air flow		
End-to-end mounting of multiple axis controllers	Direct butt-mounted, max. 2 mm		

Dimensions, BG5 [mm]	
B (width)	190
H (height) (air/liquid cooled)	345 / 346.5 (without terminals)
T (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



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

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 $U_{ZK}/\sqrt{2}$			
Rated current, effective (I_N)	Air-cooled	90 A [1]	110 A [1]	143 A [1]	170 A [1]
	Liquid-cooled	110 A [1]	143 A [1]	170 A [1]	210 A [1]
Peak current	Air-cooled	see table on page 4-12			
	Liquid-cooled	see table on page 4-15			
Rotating field frequency		0 ... 400 Hz			
Switching frequency of power stage		4, 8, 12, 16 kHz			
DC input					
DC voltage (U_{ZK}) nominal [2]		565 V_{DC} / 650 V_{DC} / 678 V_{DC} / 770 V_{DC}			
Current (RMS approximation value)		1.7 · I_{motor}			
Device connected load [3]		U_{ZK} · 1.7 · I_{motor}			
Power loss at I_N and 8 kHz/ 400 V	Air-cooled	1300 W	1600 W	2100 W	2500 W
	Liquid-cooled	1500 W	1940 W	2380 W	2650 W
DC link					
DC link capacity	Air-cooled	1060 µF	2120 µF	3180 µF	4240 µF
	Liquid-cooled	2120 µF		4240 µF	

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

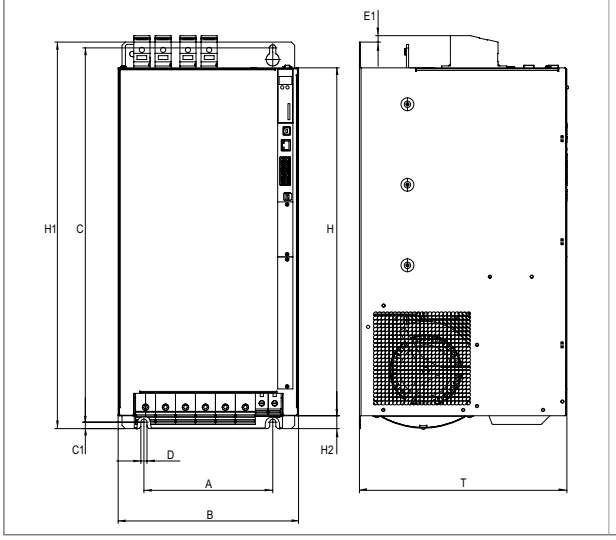
2) Generated from rectified TN system with grounded neutral point and external conductor voltages 3 x 400 V AC, 2 x 460 V AC or 3 x 480 V AC with the approved LTi DRiVES devices (ServoOne AC axis controller or supply unit). Insulation voltage as per EN 61800-5-1, system voltage 277 V, overvoltage category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

3) Approximation value

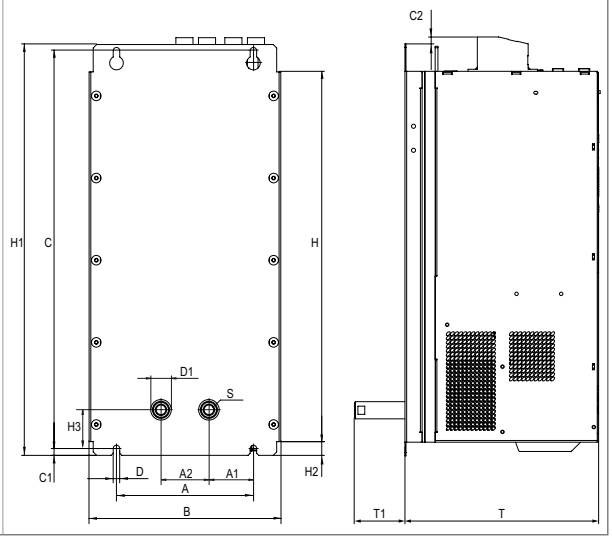
Mechanism, BG6a	SO84.090.1	SO84.110.1	SO84.143.1	SO84.170.1
Cooling method	Air-cooled (wall-mounted) or liquid-cooled			
Protection	IP20 except terminals (IP00)			
Cooling air temperature	40 °C (at 4 kHz switching frequency of power stage)			
Weight	32 kg			
Mounting type	Vertical mounting with unhindered 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)
T (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



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

Type SO84.040.S (air-cooled)

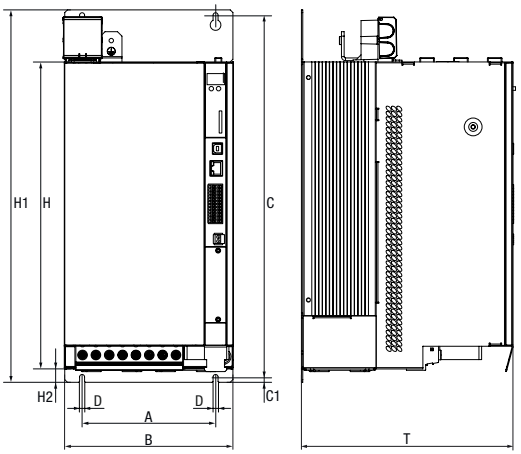
Technical data / Designation		SO84.040.S	SO84.076.S
DC link output			
Voltage		650 V_{DC} / 770 V_{DC}	
Rated current, effective (I_N)	at 650 V_{DC}	40 A	76 A
	at 770 V_{DC}	34 A	64 A
Peak current (for 10 s)	at 650 V_{DC}	80 A	144 A
	at 770 V_{DC}	68 A	122 A
Continuous power		26 kW	50 kW
Peak current (for 10 s)		52 kW	94 kW
DC link capacity [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 capacity of the multi-axis system DC link in the case of a ServoOne supply unit BG5 (inclusive) must NOT exceed 10,000 µF.

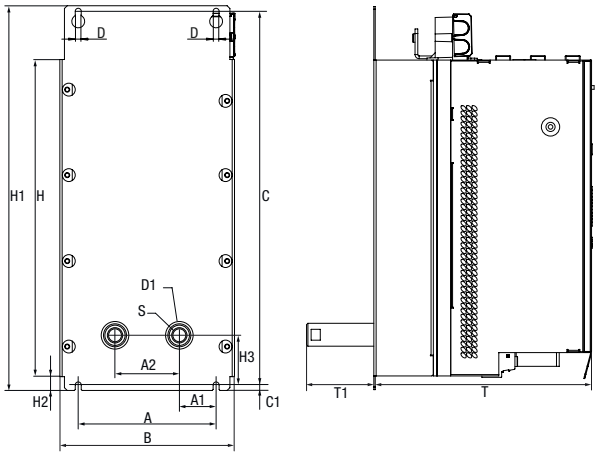
Mechanism, BG5	SO84.040.S	SO84.076.S
Cooling method	Air-cooled (wall-mounted) or liquid-cooled	
Protection	IP20 except terminals (IP00)	
Cooling air temperature	40 °C	
Weight	13 kg	
Mounting type	Vertical mounting with unhindered air flow	
End-to-end mounting of multiple supply units	Direct butt-mounted,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

Dimensions, BG5 [mm]	
B (width)	190
H (height) (air/liquid cooled)	345 / 346.5 (without terminals)
T (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



Required accessories

Supply unit	SO84.040.S	SO84.076.S
Mains connection	LCL-040 Included components: Mains filter FFU 3x56K, input reactor 40 A including capacitor, step-up reactor 40 A, EMC mounting set	LCL-076 Included components: Mains filter FFU 3x80K, input reactor 76 A including capacitor, step-up reactor 76 A, EMC mounting set

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

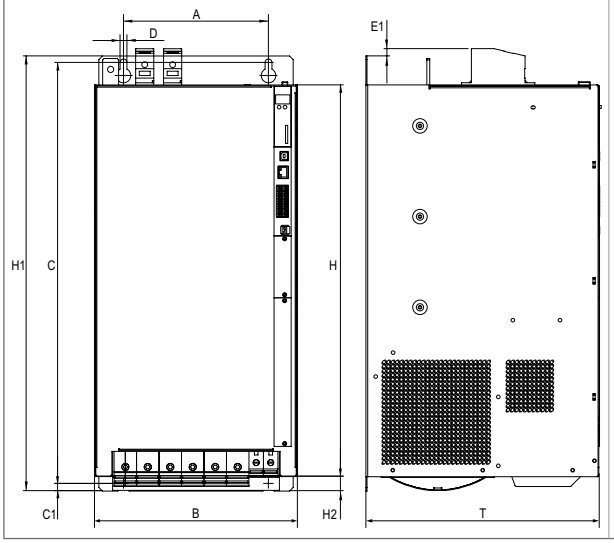
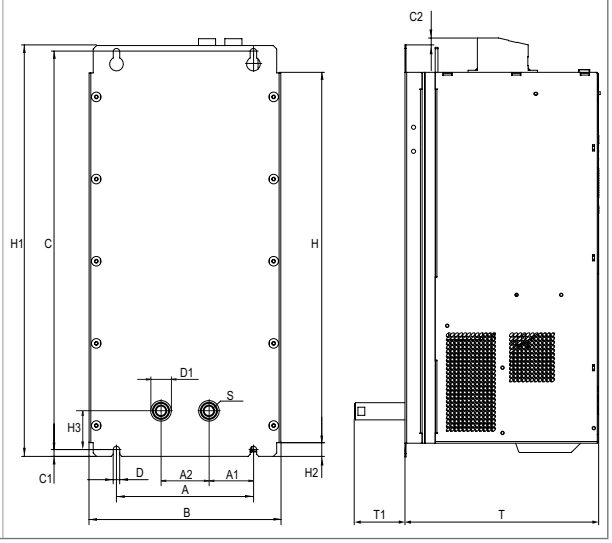
Type SO84.115.S (air-cooled)

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 capacity [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 capacity of the multi-axis system DC link for a ServoOne supply unit BG6a (incl.) must not exceed 20,000 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 type	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)
T (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
	

Required accessories

Supply unit	SO84.115.S	SO84.170.S
Mains connection	LCL-115 Included components: Mains filter FFU 3x130K, input reactor 115 A including capacitor, step-up reactor 115 A, EMC mounting set	LCL-170 Included components: Mains filter FFU 3x180K, input reactor 170 A including capacitor, step-up reactor 170 A, EMC mounting set

Space for your own notes

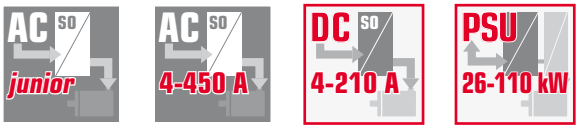
Option 1 - Communication

5

Type	Page	AC SD junior	AC SD 4-450 A	DC SD 4-210 A	PSU 26-110 kW
Field bus module for SERCOS II	5-2	●	●	●	●
Field bus module for PROFIBUS-DPV1	5-3	●	●	●	●
Field bus module for EtherCAT	5-4	●	●	●	●
Field bus module for CANopen	5-5	●	●	●	●
Field bus module for CANopen plus 2 analog outputs	5-6	-	●	●	-
Field bus module for VARAN	5-7	-	●	●	-
Field bus module for PROFINET IRT (clock-synchronized)	5-8	-	●	●	-
Field bus module for SERCOS III	5-9	●	●	●	-

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



Availability

SO□□.□□□.□□1□.□□□□

SERCOS II version	Order designation

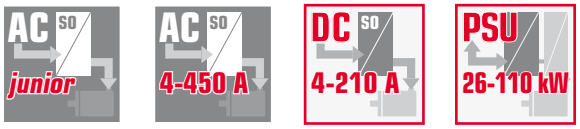
Summary explanation
The interface conforms to IEC 61491/ EN 61491 for SERCOS interfaces and ensures optimum interworking of digital drives and controllers from different manufacturers.

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 5-9.

Option 1 - PROFIBUS



Availability

SO□□.□□□.□□2□.□□□□

PROFIBUS version	Order designation

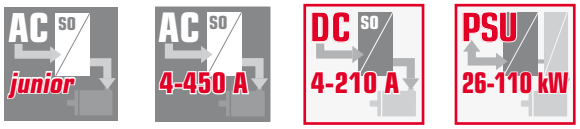
Summary explanation

Communication interface for PROFIBUS-DPV1

Technical data	PROFIBUS
Standardization	EN 50170
Communication	Directive 2.082
Device profile	PROFIdrive V3.1
Transfer rate/ line length	9.6 kBit/s to 1200 m 12 MBit/s to 100 m
Connection	PROFIBUS D-SUB connector 9-pin

Note
Only available built-in ex factory.

Option 1 - EtherCAT



Availability

SO□□.□□□.□□3□.□□□□

EtherCAT version	Order designation

Summary explanation

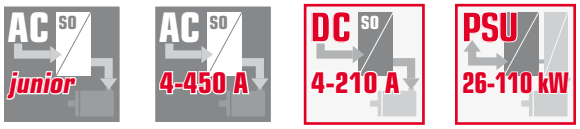
EtherCAT is an Ethernet-based, real time-capable, synchronous field bus system. It is classed as one of the fastest real-time Ethernet solutions for automation.

Technical data	EtherCAT
Scaling	IEC 61158 / IEC 61784-2 / IEC 61800-7
Transfer rate	up to 100 MBit/s
Transfer medium	Standardized Ethernet to IEEE 802.3
Sampling time	≥125 µs
Synchronization jitter	≤1 µs (distributed clocks)
Communication profile	CoE (DS301) (V1.0.2)
Device profile	DS402 (Rev. 2.0)
Network topology	S-line, tree or star possible
Connection	RJ45 (shielded)
Cable type	CAT5

Note
Only available built-in ex factory.

ID no.: 1100.24B.2-01 Date: 10/2010

Option 1 - CANopen



Availability

CANopen

SO□□.□□□.□□4□.□□□□

CANopen version	Order designation

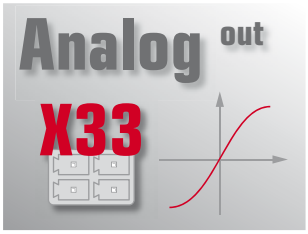
Summary explanation

Communication interface for CANopen, isolated from device electronics

Technical data	CANopen
Standardization	ISO 11898 / IEC 61800-7
Communication	CiA/DS301 (Rev. 4.01)
Device profile	CiA/DS402 (Rev. 2.0)
Transfer rate/ line length	20 kBit/s to 1000 m 1 MBit/s to 40 m
Connections	2 x Phoenix Contact connectors (type FMC 1,5/5-ST-3,5 - GY RAL7042) 5-pin (as per. CiA/ DR-303)
Supply voltage ext.	24 V ±20 % (as per. IEC 61131-2)

Note
Only available built-in ex factory.

Option 1 - CANopen + 2AO



CANopen + 2AO version

Availability

SO8□.□□□.□□5□.□□□□

Order designation

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

Technical data	CANopen
Standardization	ISO 11898
Communication	CiA/DS301 (Rev. 4.01)
Device profile	CiA/DS402 (Rev. 2.0)
Transfer rate/ line length	20 kBit/s to 1000 m 1 MBit/s to 40 m
Connections	2 x Phoenix Contact Connectors (Typ FMC 1,5/5-ST-3,5-GY RAL7042) 5-pin (as per. CiA/DR-303)
Supply voltage ext.	24 V ±20 % (as per. 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 - VARAN

Availability on request.

VARAN version	Order designation
	SO8□.□□□.□□6□.□□□□

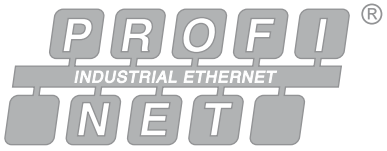
Summary explanation

The interface conforms to the international standards IEC 61158-2-11 and IEC 61158-6-12.

Technical data	VARAN
Sampling time	125µs to 65 ms (multiples of 125 µs programmable)
Network topology	Linie
Connection	RJ45 shielded
Cable type	CAT5

Note
Only available built-in ex factory.

Option 1 - PROFINET IRT



Availability on request.

SO8□.□□□.□□7□.□□□□

PROFINET IRT version	Order designation

Summary explanation

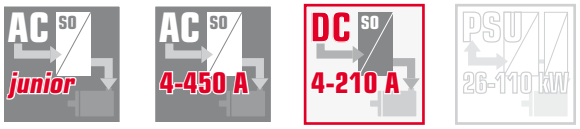
The interface conforms to the international standards IEC 61158-5-10 and IEC 61158-6-10.

Technical data	PROFINET IRT
Sampling time	500 µs to 65 ms (multiples of 500 µs programmable)
Network topology	Linie
Connection	RJ45 shielded
Cable type	CAT5

Note
Only available built-in ex factory.

5

Option 1 - SERCOS III



Availability

SERCOS III version

SO□□.□□□.□□8□.□□□□

Order designation

Summary explanation

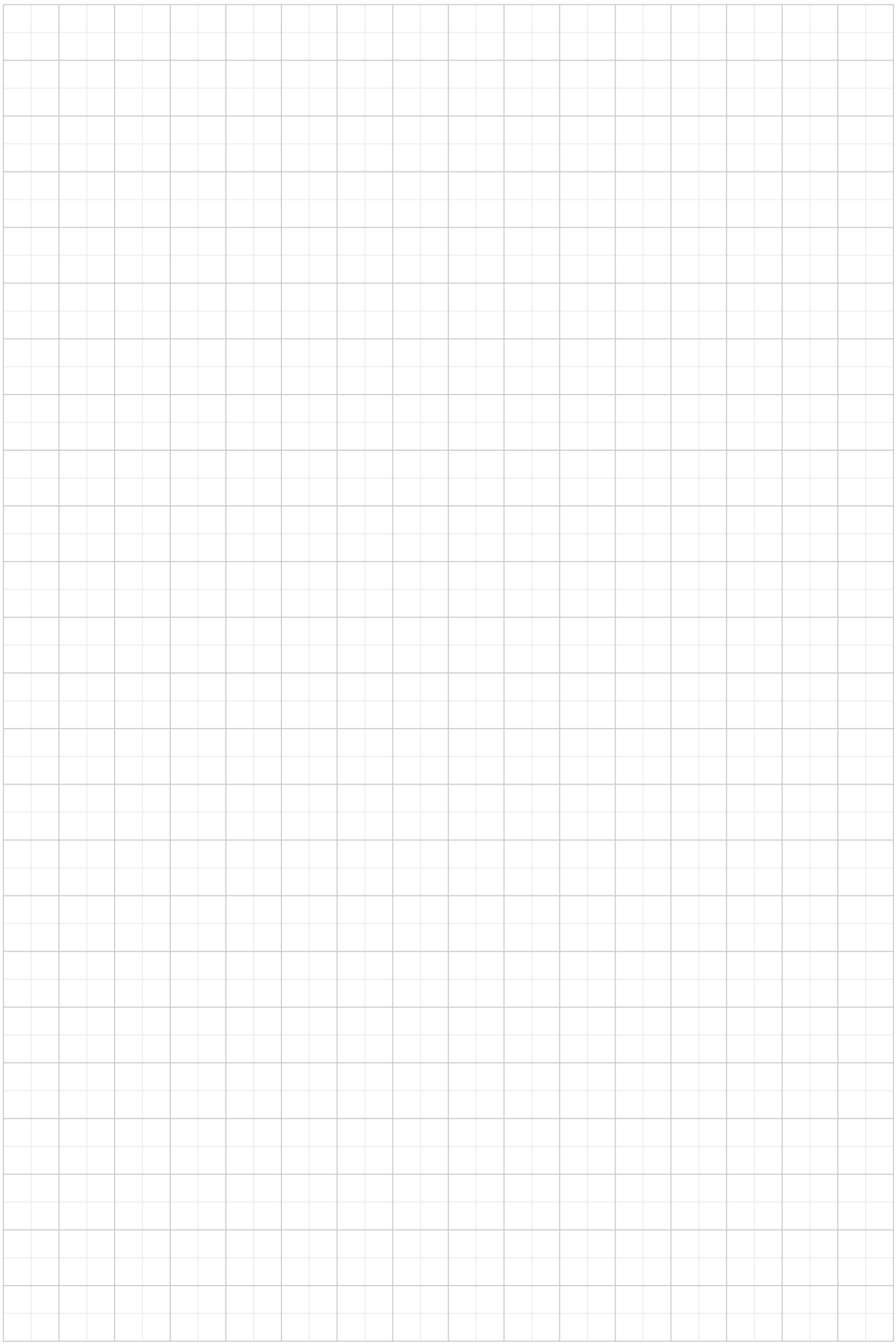
The interface conforms to IEC 61491 EN 61491 for SERCOS interfaces and ensures optimum interworking of digital drives and controllers from different manufacturers. The basis for SERCOS III implementation in the ServoOne is the specification V1.1.2 from SERCOS International.

Technical data	SERCOS III
Application note	AN17.2 (dated 11.02.2003)
Communication profile	SERCOS Communication (V1.1.2.1.7) (SERCOS International)
Device profile	Generic Device profile (V1.1.2.1.1) (SERCOS International)
Sampling time	125µs 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 III is also available as option 1. For details see page 5-2.

Space for your own notes



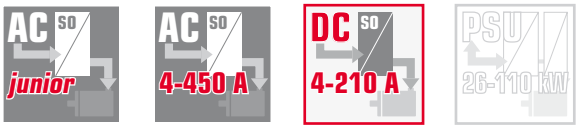
Option 2 - Technology

Type	Page	AC SD junior	AC SD 4-450 A	DC SD 4-210 A	PSU 26-110 kW
Interface for second sin/cos encoder	6-2	●	●	●	-
Interface for TTL encoder simulation / TTL master encoder	6-3	●	●	●	-
Interface for TwinSync communication	6-4	-	●	●	-
Interface for SSI encoder simulation	6-5	-	●	●	-
Interface for TTL encoder with commutation signals	6-6	●	-	-	-

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

Option 2 - Second sin/cos encoder

Version featuring second SinCos encoder



Availability

SO□□.□□□.□□□1.□□□□

Order designation

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

Technical data	SIN/COS encoders:
Signals	A/B, zero pulse
Signal level	Sin/Cos, 1 V_{SS} + analog zero pulse
Signal frequency	500 kHz max.

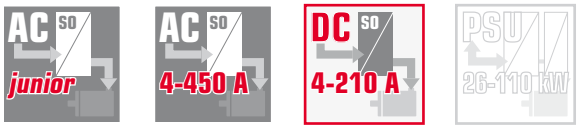
Technical data	Absolute value sender
Signals	DATA, CLK
Signal level	RS485-conforming
Clock frequency EnDat	500 kHz max. (ServoOne junior 2 MHz max.)
Switching frequency SSI (only ServoOne junior)	1 MHz max.

Technical data	General
Supply voltage ext. encoder, Sin/Cos, SSI, EnDat	5 V ±5 % / 150 mA (ServoOne junior 250 mA)
Supply voltage Hiperface (only ServoOne junior)	12 V / 100 mA
Cable length	50 m max. (ServoOne junior 30 m max.)
Wave terminating resistance	120 Ω (integrated)

Note: Only available built-in ex factory.

Option 2 - TTL encoder simulation / TTL master encoder

TTL encoder simulation / TTL master encoder version



Availability

SO□□.□□□.□□□2.□□□□

Order designation

Summary explanation

This option alternatively permits TTL encoder simulation of a connected encoder 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
  ServoOne: Evaluation of encoder connected to X7 or X8 and direct floating transmission via encoder simulation
  ServoOne junior: Evaluation of encoder connected to X7 or X8 and direct floating transmission via encoder simulation

The ServoOne junior permits simultaneous use of encoder simulation and a master encoder.

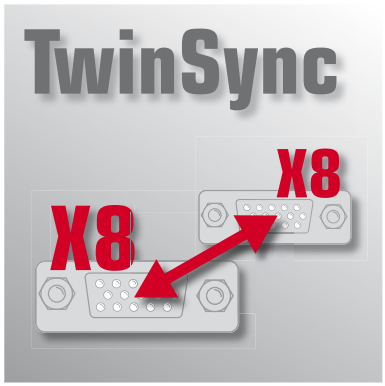
Technical data	TTL encoder simulation
Signals	A/B, zero pulse
Signal level	TTL differential (RS422), electrically isolated from the drive controller
Signal frequency	1 MHz max.

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 % / 100 mA (250 mA at ServoOne junior)
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

SO□□.□□□.□□□3.□□□□

Order designation

Summary explanation

By way of the TWINsync option, two drives can be synchronized in master/slave mode. The data mapping for bidirectional cyclic communication between the drives can be flexibly parameterized. 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, synchronized 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.

Option 2 - SSI encoder simulation

SSI encoder simulation version

Availability

SO□□.□□□.□□□4.□□□□

Order designation

Summary explanation

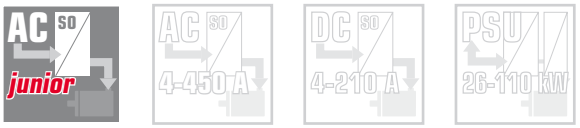
This option permits SSI encoder simulation for output of position information. The length and the protocol for SSI data transfer can be flexibly parameterized. Synchronization of the control cycle to the external SSI clock signal is possible as an option.

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

SO2□.□□□.□□□5.□□□□

Order designation

Summary explanation

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.

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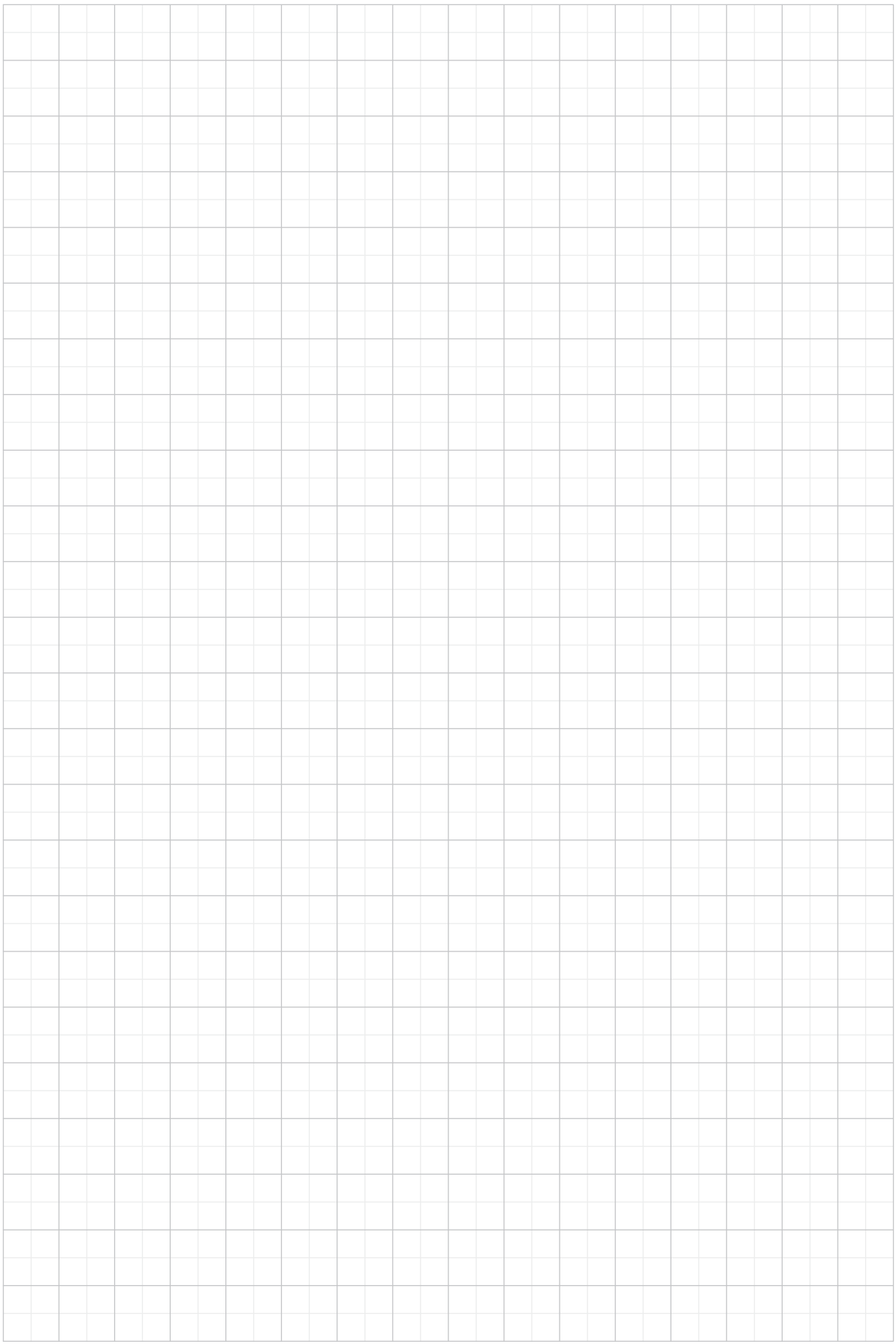
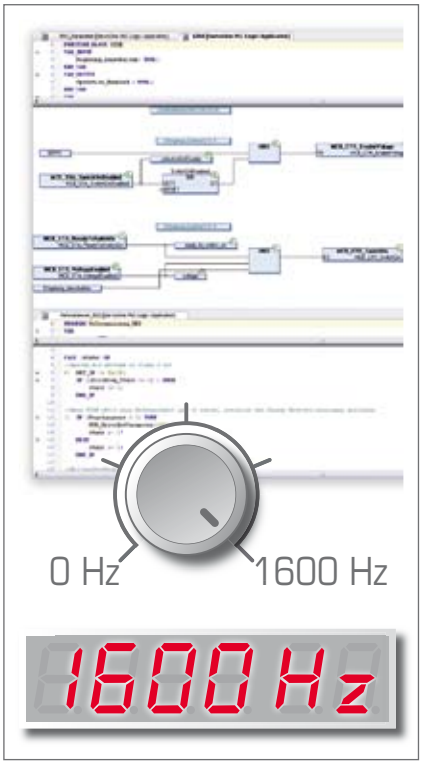
Space for your own notes

Space for your own notes



Function packages



Type	Page	AC SD junior	AC SD 4-450 A	DC SD 4-210 A	PSU 26-110 kW
iPlc function package for programming in IEC 61131	7-2	●	●	●	●
HF function package for rotating field frequencies up to 1600 Hz	7-3	-	●	●	-

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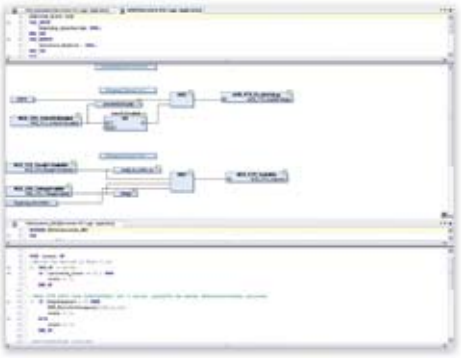
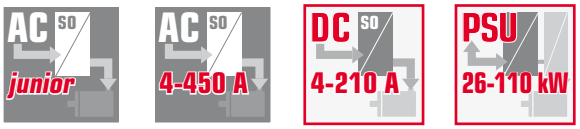
iPlc function package for programming in IEC 61131



iPlc software



Availability

iPlc function package: SO□□.□□□.□□□□.□1□□.□
iPlc+HF function package: SO□□.□□□.□□□□.□8□□.□

Order designation

Summary explanation

The iPlc, programmable in IEC 61131, shares the microcontroller platform of the ServoOne with the drive control, so permitting optimized, 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 Byte (retain), 512 Byte (persistant)
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, AS, 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 (order designation 1100.0000.0100.0) or to HF function package (order designation 1100.0000.0800.0).

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HF (High Frequency) function package

HF function package

Availability

HF function package: SO8□.□□□.□□□□.□7□□.□
HF+iPlc function package: SO8□.□□□.□□□□.□8□□.□

Order designation

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

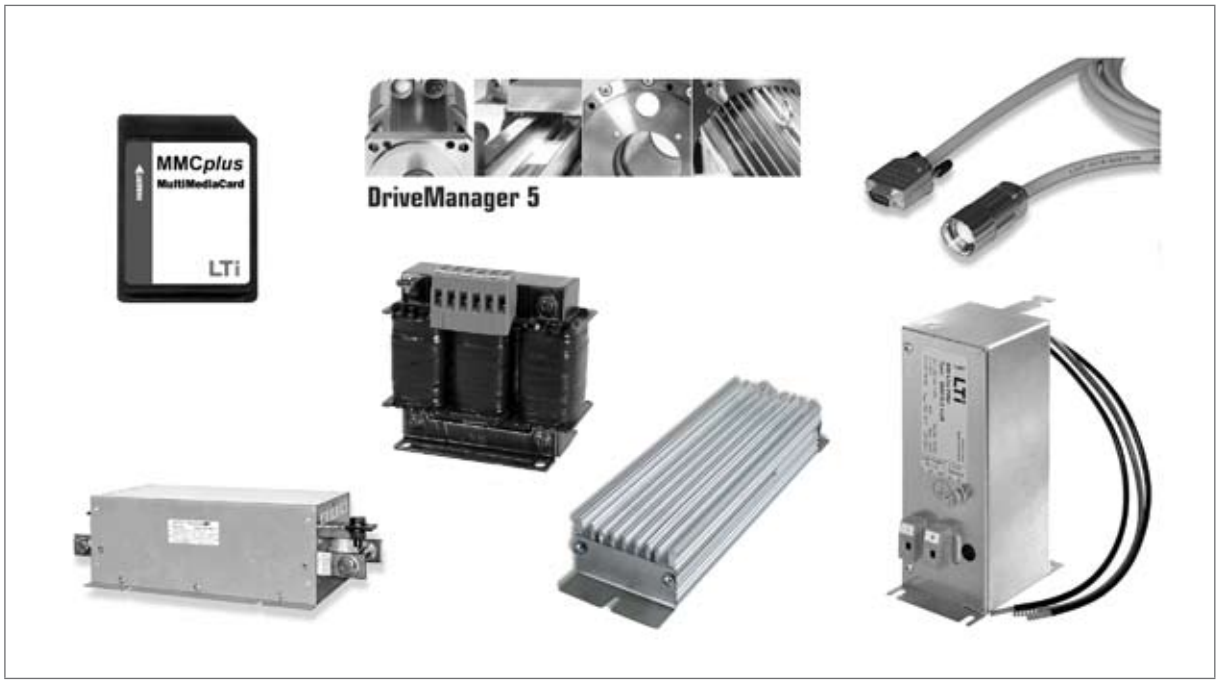
Technical data	HF-Functions
Output frequency	0 to 1600 Hz
Operation modes	Closed loop mode for ASM and PSM, VFC mode for ASM
Encoder evaluation	Additional encoder evaluation for digital Hall senders (90° and 120°) with semi-automatic encoder offset calculation
Control circuit	Sine filters and output reactors 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-synchronization
Dual-motor operation	via master/slave synchronization (in option 2 requires TwinSync interface)
VFC functions	IxR and slip compensation, anti-oscillation, current limit value controller, characteristic data switchover

Notes:

- The HF function package will be available from November 2010, with deployment in field tests possible as from April 2010.
- If the output frequency is above 600 Hz, the product is subject to the Dual Use Regulation, and as such requires a licence for export outside of the EU!
- Only available built-in ex factory.

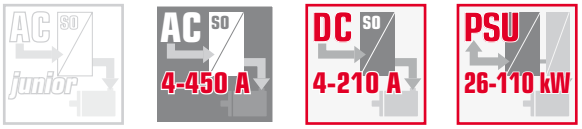
Space for your own notes

Accessories



MMC memory card

MMC*plus*™ card



Availability

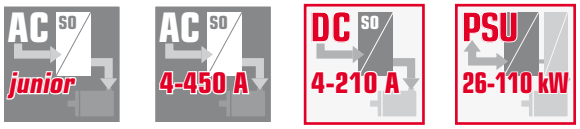
SC-MMC128

Order designation

Short description
Memory card for easy interchange of data or firmware.

Technical data	SC-MMCxxx
Capacity	128 MB
Data transfer	2 MB/s read 2 MB/s write
Memory card type	MMC*plus*™
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

PC User Software DriveManager 5



Availability

DriveManager 5

DriveManager 5	Order designation

Short description

The DriveManager 5 PC user software, featuring extensive integrated online help and autotuning, cuts commissioning times substantially. The DriveManager 5 of course offers full network capability. This means multiple axis modules can be managed simultaneously in a project.

Technical data	DriveManager 5
Support for the following functions	• Commissioning • Operator control and diagnosis with cockpit, 6-channel oscilloscope, and others • Project management

User interface

Data cables

Ethernet

Connecting cable type CC-ECLxx (Ethernet)

Availability

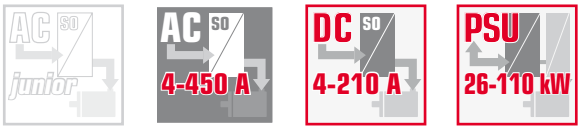
CC-ECL□□
Cable length in metres

Order designation

CC-ECLxx	
Short description	Cable for connection from servocontroller Ethernet port to PC running DriveManager
Technical data	Crosslink Ethernet cable, CAT 5, with 2 x RJ45 connector

USB

Connecting cable type CC-USBxx (USB)



Availability

CC-USB□□
Cable length in metres

Order designation

CC-USBxx	
Short description	Cable for connection from servocontroller USB port to PC running DriveManager
Technical data	USB cable, A to B

Selection of motor cables

Motor cable

Availability KM3

Availability KM4

Availability KM5

KM□-KS□□□-□□□

Cable type

Current capacity

Cable length in metres

Order designation

Technical data		KM3	KM4	KM5
Rated current		16 A, 24 A or 63 A	16 A	
Cable length		up to 20 m		
Cable crosssection	16 A	4G1.5 + 2 x 2 x 0.75 mm²	4G1.5	4G1.5 + 2 x 2 x 0.75 mm²
	24 A	4G2.5 + 2 x 2 x 1 mm²	-	-
	63 A	4G10 + 2 x 1.5 mm² + 2 x 1 mm²	-	-
Festoon-compatible		Yes		
Temperature range		-50 ... +90 °C	-30 ... +80 °C	
Material of outer sheath		PUR		
Resistance		Resistant to oil, hydrolysis and microbic attack		
Approval		UL, CSA		

Note: For details and the full selection of available motor cables refer to the Servomotors Order Catalogue (ID no.: 0814.05B.x).

Selection of encoder cables

Encoder cable

Availability

K□□□-KS□□□

Cable type | *Cable length in metres*

Order designation

Technical data	KRY2	KGS2	KGH3
Encoder system	Resolver	Single or multiturn with SSI/ EnDat interface	Single or multiturn with HIPER-FACE® interface
Cable length	up to 20 m		
Festoon-compatible	Yes		
Temperature range	-40 ... +85 °C	-35 ... +80 °C	-40 ... +85 °C
Material of outer sheath	PUR		
Resistance	Resistant to oil, hydrolysis and microbic attack		
Approval	UL, CSA		

Note: For details and the full selection of available encoder cables refer to the Servomotors order catalogue (ID no.: 0814.058.x.).

Line reactors

LR34.8-UR

Availability

LR3□.□□□-UR

Series and voltage | *Rated current*

Order designation

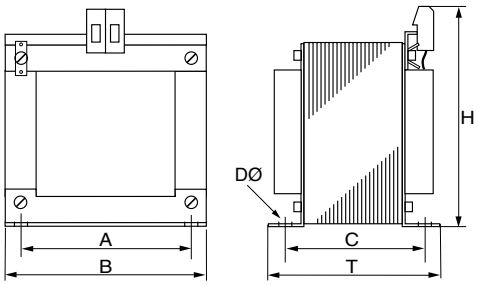
Ambient conditions	LR32.14-UR	LR34.xxx-UR
Mains voltage	1 x 230 V, -20 % +15 %, 50/60 Hz [1]	3 x 460 V -25 % +10 %, 50/60 Hz [1]
Overload factor	1.8 x I_N for 40 s	2.0 x I_N for 30 s
Ambient temperature	-25 °C to +45 °C, with power reduction up to 60 °C (1.3 % per °C)	
Mounting height	1000 m, with power reduction up to 2000 m (6 % per 1000 m)	
Relative air 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 line reactors with I_N = 4.0 A to 32 A [2] U_K 2 % (corresponding to 4.6 V at 400 V) Applies to line reactors 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 line reactors refer to the relevant controller catalogue page.

Single-phase line reactors

Order designation	Rated current [A]	U_K [%]	Power loss tot. [W]	Inductance [mH]	Weight [kg]	Connection [mm²]
LR32.14-UR	14	4	16	2.1	1.5	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 line reactors

Order designation	Rated current [A]	U_K [%]	Power loss tot. [W]	Inductance [mH]	Weight [kg]	Connection
LR34.4-UR	4.2	4	20	7	2.5	4 mm²
LR34.6-UR	6		25	4.88		
LR34.8-UR	8		25	3.66		
LR34.14-UR	14		45	2.09	4.0	
LR34.17-UR	17		45	1.72		
LR34.24-UR	24		50	1.22	5.0	16 mm²
LR34.32-UR	32		70	0.92	6.0	
LR34.44-UR	45	2	60	0.33	5.0	
LR34.58-UR	60		70	0.25	7,0	
LR34.70-UR	72		80	0.20	10	
LR34.88-UR	90		120	0.16	13	35 mm²
LR34.108-UR	110		140	0.13	15	
LR34.140-UR	143		160	0.10	25	70 mm²
LR34.168-UR	170		170	0.09	25	
LR34.210-UR	210		268	0.07	27	M12
LR34.250-UR	250		285	0.059	28	
LR34.325-UR	325		351	0.045	43	
LR34.450-UR	450		296	0.033	46	2 x M10

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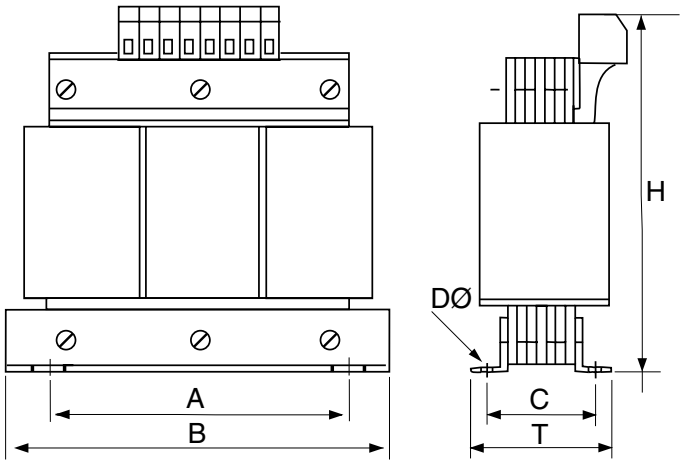
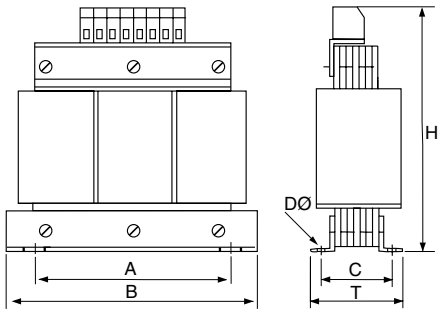
Dimensions [mm]	LR34.4-UR	LR34.6-UR	LR34.8-UR	LR34.14-UR	LR34.17-UR	LR34.24-UR	LR34.32-UR	LR34.44-UR	LR34.58-UR
B (width)	125			155			190	155	190
H (height)	130			160		170	200	170	200
T (depth)	75			80		120	110	120	120
A	100			130			170	130	170
C	55			59		72	58	72	68
D Ø	5			8					

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

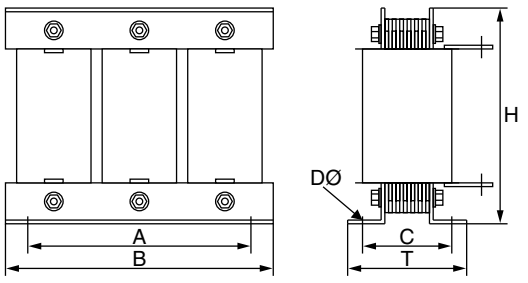


Dimensions [mm]	LR34. 70-UR	LR34. 88-UR	LR34. 108-UR	LR34. 140-UR	LR34. 168-UR	LR34. 210-UR	LR34. 250-UR	LR34. 325-UR	LR34. 450-UR
B (width)	190	230		240		265	300		
H (height)	240	300		330		230	275		
T (depth)	110	160	180	200		152		177	192
A	170	180		190		215	240		
C	78	98	122	125		126	120	145	160
D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

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



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



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 Order 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 flex wire			Terminal box with PG glands (M12 x 1.5 and M25 x 1.5)	

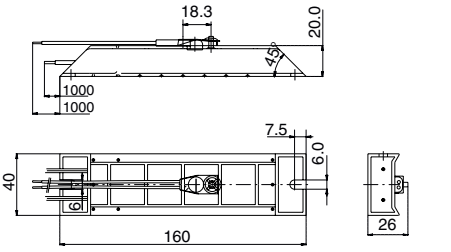
Note: For recommended combinations of controllers and braking resistors refer to the relevant controller catalogue page.

Order designation	Continuous power [1] [W]	Resistance [Ω ±10 %]	Peak power [W] 390 V DC	650 V DC	750 V DC	Protection	Connection Resistance	Connection Bimetallic protector	Diagram
BR-200.01.540-UR	35	200	760	2100	2800	IP54	AWG 16	AWG 18	A1
BR-200.02.540-UR	150						AWG 14		A2
BR-200.03.540-UR	300						AWG 14		A3
BR-090.01.540-UR	35	90	1690	4690	6250	IP54	AWG 16	AWG 18	A1
BR-090.02.540-UR	150						AWG 14		A2
BR-090.03.540-UR	300						AWG 14		A3
BR-090.10.650-UR	1000					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						AWG 14		A2
BR-026.03.540-UR	300						AWG 14		A3
BR-026.10.650-UR	1000					IP65	Max. AWG 6	Max. AWG 12	A4
BR-026.20.650-UR	2000								A5

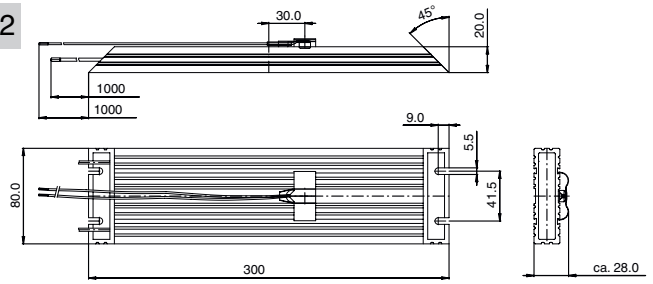
1) At cycle times of max. 150 s the required rated continuous power can be calculated according to the following formula: Rated continuous power (W) = max. pulse duration (s) x peak power (W) / cycle time (s)

Dimensions, braking resistors [mm]

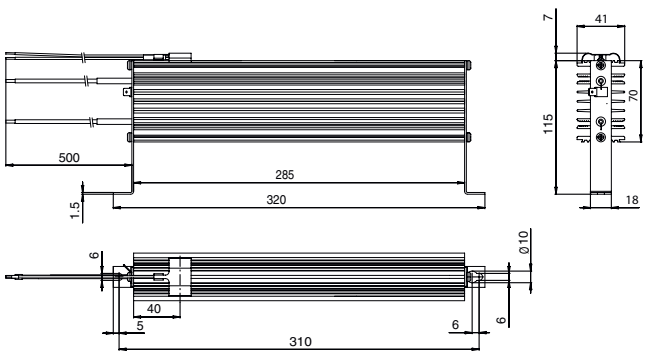
A1



A2



A3



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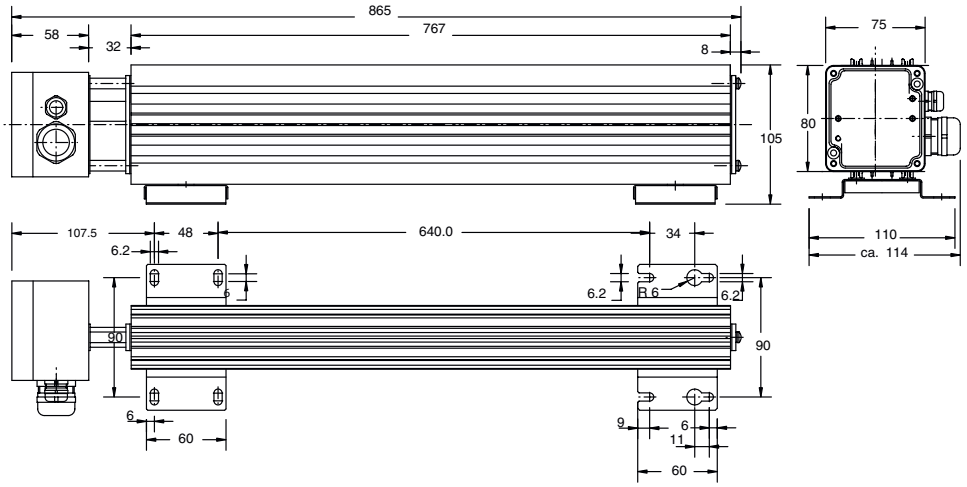
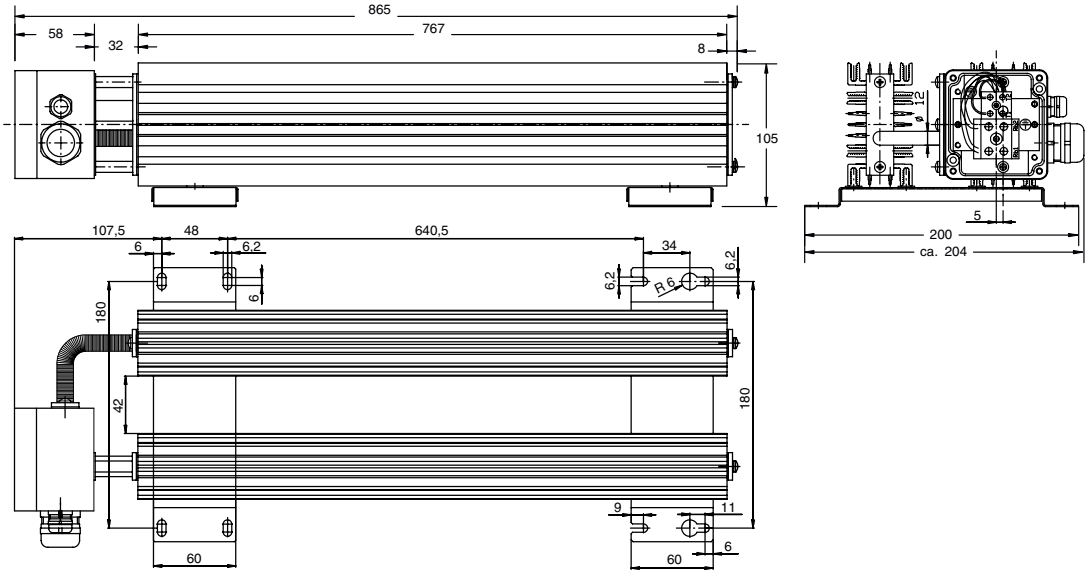


A5



Mains filters - ServoOne junior

EMC19.2-1Ph,UR

Availability

EMC□□.□-□Ph,UR

Rated current | *Number of phases* | *Version*

Order 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	2 for 10 s, repeatable after 6 min [1]	
Ambient temperature	Max. 45 °C	
IEC climate category	25/085/21	
Protection	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 toEN 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	Order 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 servocontrollers	Order 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							

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.

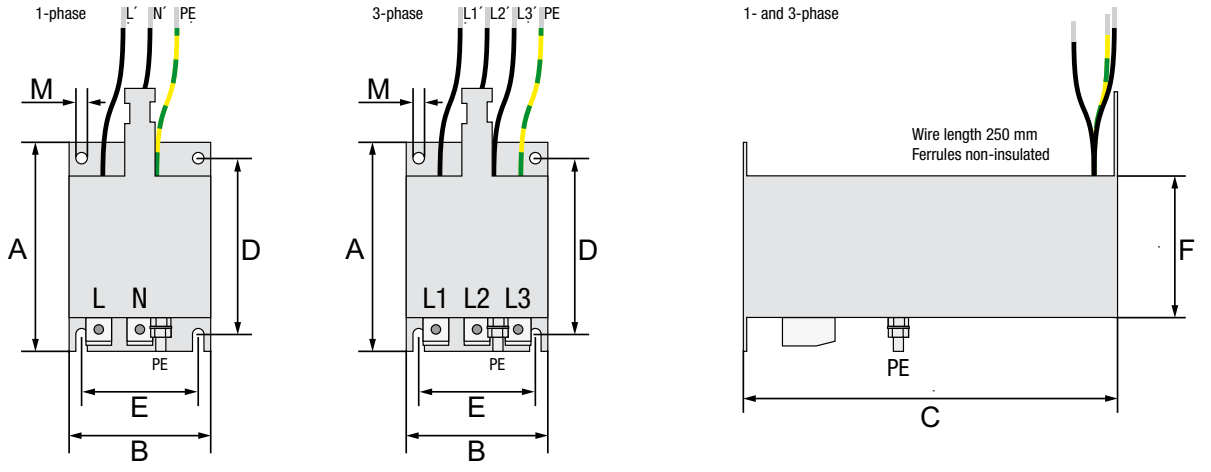
Dimensions, single-phase mains filters

Order designation	Dimensions [mm]							PE	Input		Output
	A	B	C	D	E	F	M Ø		Clamping area [mm²]	Tightening torque [Nm]	Wire crosssection
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

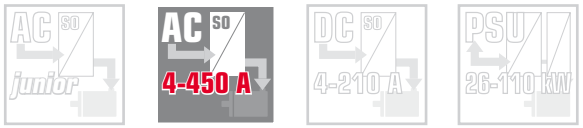
Order designation	Dimensions [mm]							PE	Input		Output
	A	B	C	D	E	F	M Ø		Clamping area [mm²]	Tightening torque [Nm]	Wire crosssection
EMC5.2-3Ph,UR	81	55	145	68	45	55	4	M4	0.2 - 4.0	0.6 - 0.8	AWG 16
EMC11.2-3Ph,UR											

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



Mains filters - ServoOne single-axis system

EMC180.1-UR



Availability

EMC□□□.1,UR

Rated current *Version*

Order 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 air humidity	15 ... 85 %, condensation not permitted
Storage/transportation temperature	-25 °C to +70 °C / -40 °C to +85 °C
Protection	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 -residential-	Motor cable length up to 100 m permitted
RFI suppression to EN61800-3 -industrial-	Motor cable length up to 150 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

Order 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 min; 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

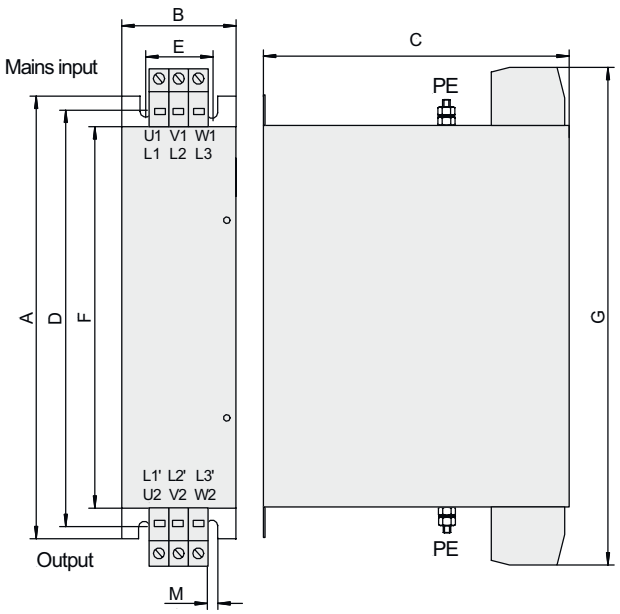
Order designation	Rated current [A]	Overload [4] [A]	Power loss [W]	Leakage current [5] [mA]	Touch current [6] [mA]		Weight [kg]
					N	F	
EMC180.1-UR	180	270	15	33.8	7.2	225	7.0
EMC220.1-UR	220	330	20				7.5
EMC250.1-UR	250	375	40				8.5
EMC300.1-UR	300	450	40				9.5
EMC400.1-UR	400	600	55				11.0
EMC500.1-UR	500	750	60				12,5

4) For 60 s, repeatable after 30 min; 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

Order 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	205	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	271	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

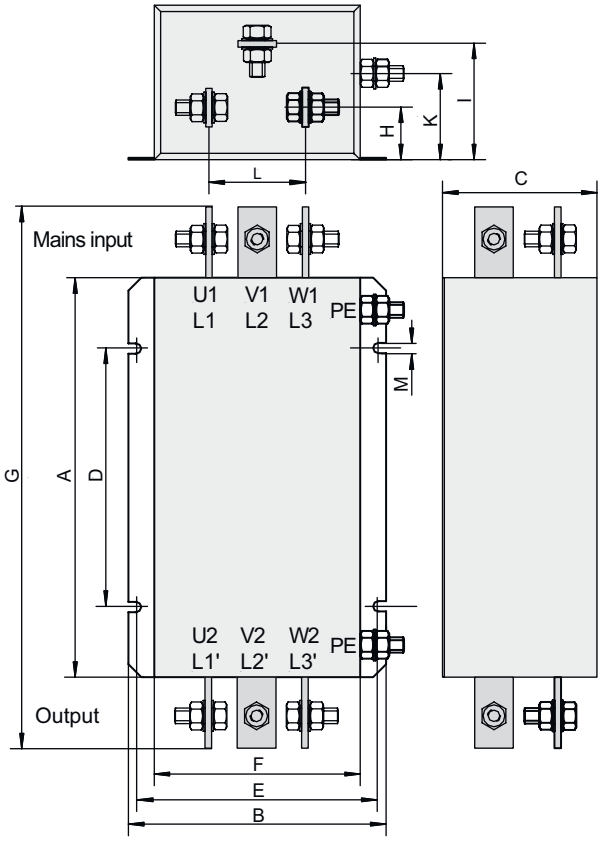
Dimensional drawing for EMC7.1-UR to EMC150.1-UR



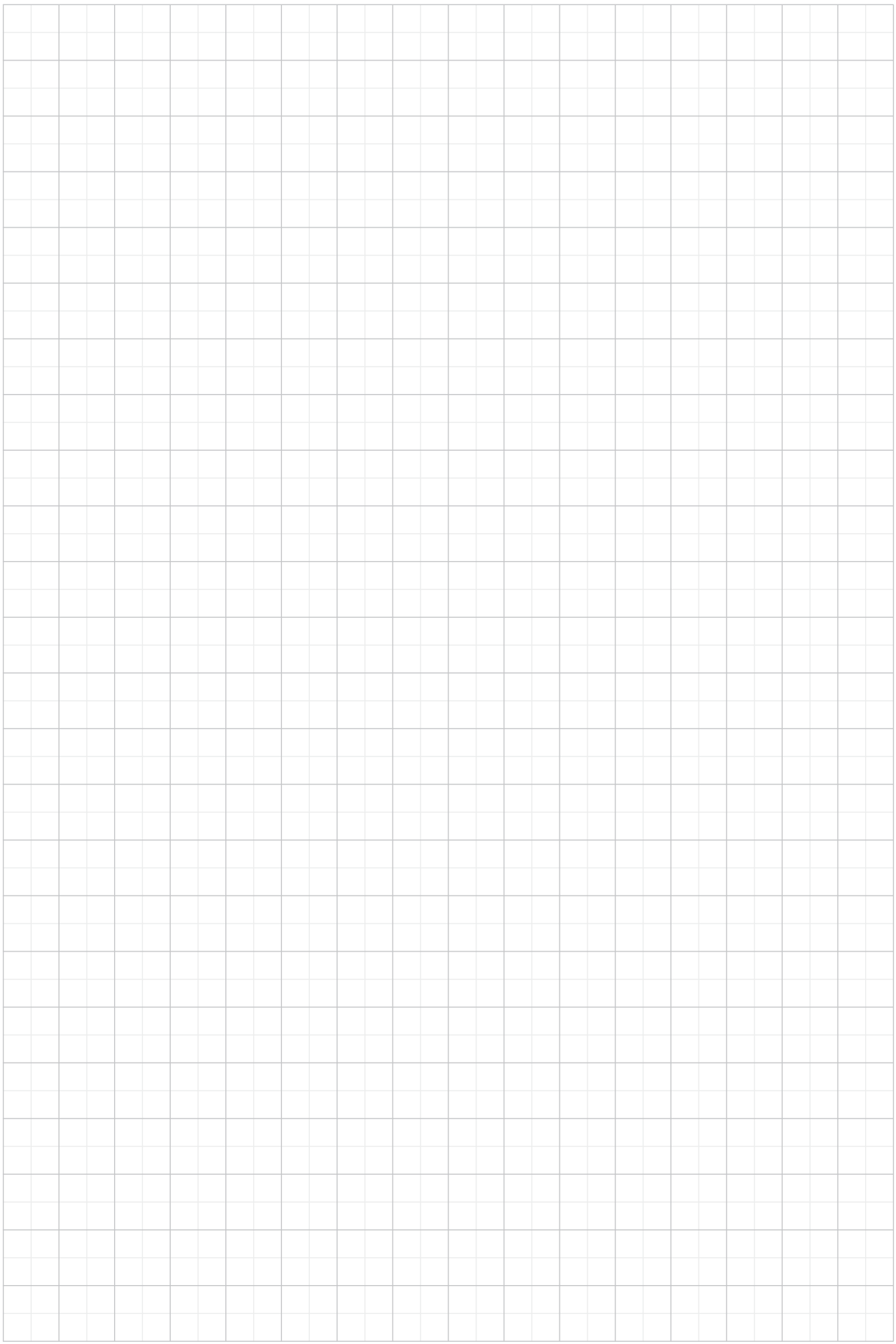
Dimensions, three-phase mains filters EMC180.1-UR to EMC500.1-UR

Order 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	310	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	350	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



Space for your own notes



Overview of servomotors

Contents	Type	Page
LSH servomotor	LSH-050-x to LSH-127-x	9-2
LST servomotor	LST-037-x to LST-220-x	9-3

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 100 % improvement in dynamics and significantly reduced space requirements combined with smooth running.

Overview of technical data

Technical data of motor	Standstill torque M_0 [Nm]	Rated torque M_N [Nm]	Rated current I_N [A] at 560 V	Rated current I_N [A] at 320 V	Rated speed n_N [min^{-1}]
LSH-050-1 [1)]	0.26	0.24	-	0,68	4500
LSH-050-2 [1)]	0.53	0.45	-	1.11	4500
LSH-050-3 [1)]	0.74	0.67	-	1.55	4500
LSH-050-4 [1)]	0.95	0.84	-	1.90	4500
LSH-074-1 [2)]	0.95	0.86	1.28	1.43	3000
LSH-074-2 [2)]	1.90	1.60	1.46	2.40	3000
LSH-074-3 [2)]	3.30	2.90	2.30	4.00	3000
LSH-074-4 [2)]	4.20	3.10	2.30	3.70	3000
LSH-097-1 [2)]	4.10	3,20	2.80	5.00	3000
LSH-097-2 [2)]	6.30	4.60	3.60	7.00	3000
LSH-097-3 [2)]	8.60	6,10	4.80	8.3	3000
LSH-127-1 [3)]	11.60	8.40	7.90	-	3000
LSH-127-2 [3)]	14.90	10.90	9.60	-	3000
LSH-127-3 [3)]	18.70	14.30	13.10	-	3000
LSH-127-4 [3)]	27.30	21.00	14.90	-	3000

1) DC-link voltage 320 V
2) DC-link voltage 320 V / 560 V
3) DC-link voltage 560 V

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.$^{-1}$, 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

Technical data of motor	Standstill torque M_0 [Nm]	Rated torque M_N [Nm]	Rated current I_N [A] at 560 V	Rated current I_N [A] at 320 V	Rated speed n_N [min^{-1}]
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-050-1	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-074-1	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-097-1	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-127-1	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-158-1	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-190-1	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-220-1	40.0	30.0	17.8	-	3000
LST-220-2	68.0	50.0	31.1	-	3000
LST-220-3	93.0	60.0	43.6	-	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).

Space for your own notes

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We reserve the right to make technical changes.

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.

ServoOne System Catalogue
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