Motion control

Catalogue

2008/2009

Schneider Electric

A full range of catalogues for . . . . .

Detection

Global Detection Electronic and electromechanical sensors
n° 960262
MKTED208052EN

Photo-electric sensors
Proximity sensors
Capacitive proximity sensors
Ultrasonic sensors
Limit switches
Pressure switches
Rotary encoders
Radio frequency identification
Machine cabling accessories

Automation

Modicon Momentum distributed I/O and control
n° 807861
MKTED205061EN

Modicon Quantum automation platform, Unity, Concept & ProWORX 32
n° 960237
MKTED208011EN

Modicon Premium and Unity - PL7 software
n° 960268
MKTED208054EN

Modicon M340 and Unity software
n° 960128
DIAED2061001EN

PLCs
Discrete, analogue I/O and application-specific solutions
Communication

Automation

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n° 960211
DIA3ED2070902EN

Controller base
Discrete, analogue I/O
Communication

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MKTED207031EN

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Timing relays
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Counters
Plug-in relays
Interfaces for discrete signals
Power supplies & transformers

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PLCs and safety controllers programming software

Operator dialog

Control and signalling components
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MKTED208031EN

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Control stations & enclosures
Cam switches
Beacons and indicator banks
Pendant control stations
Controllers
Emergency stops
Foot switches

Human-Machine interfaces
n° 821230
MKTED206071EN

Operator interface terminals
Industrial PCs
HMI and SCADA PC-based software

Software
Vijeo Designer
Operator terminal software

Motion and Drives

Motion control
n° 960283
MKTED208071EN

Motion controllers
Servo drives and Servo motors
Stepper motors and drives
Integrated drives
Modicon Premium motion control modules

Soft starters and variable speed drives
n° 960142
MKTED206111EN

Soft starters and variable speed drives

Software
Software for drives
Motor control programming software

Not all products shown in this catalogue are available in every country. Check individual country's web site or Sales Office for product availability.
See on: ***www.schneider-electric.com***

. . . . all Automation & Control functions

Motor control

Motor starter solutions Control and protection components
n° 814711
MKTED205103EN

Contactors
Circuit-breakers, fuse carriers
Thermal relays
Combinations, motor controllers
Mounting solutions
Motor starter mounting kits

Machine safety

*This catalogue contains Automation and Control function products relating to **machines Safety***

Safety functions and solutions using Preventa
n° 960260
MKTED208051EN

Safety PLCs
Safety controllers
Safety monitors
Safety solutions on AS-Interface cabling system
Safety switches
Safety light curtains
Safety mats
Emergency stops
Control stations
Enabling switches
Foot switches
Beacons & indicator banks
Switch disconnectors
Thermal-magnetic motor circuit breakers
Enclosed D.O.L. starters

Software
XPSMFWIN configuration software
XPSMCWIN configuration software

Interfaces and I/O

Interfaces, I/O splitter boxes and power supplies
n° 70263
MKTED203113EN

Discrete interfaces
Pre-wired interfaces
IP 67 Splitter boxes

Terminal blocks
n° 960151
MKTED207011EN

Terminal blocks
Cable ends

IP 20 distributed inputs/outputs Advantys STB
n° 960266
MKTED208053EN

Modules for automation island
Network interfaces
Power distribution
Digital I/O, analogs and application-specific

Software
STB configuration software

Power supplies

Power supplies and transformers Phaseo
n° 822591
DIA3ED2061209EN

Switch mode power supplies
Filtered rectified power supplies
Transformers

Systems & architectures

This catalogue contains Automation and Control function products relating to Communication

Machine & Installations with industrial communication
n° 960153
MKTED207012EN

Preferred implementations
Ethernet TCP/IP, the universal communication standard
CANopen for machines and installations
AS-interface, simple and safe

Products
Human-Machine interface
Controllers and PLCs
Field devices
Infrastructure and wiring
Gateways

Software and tools
Collaborative Automation
Partner Program & Partners

Motion control

4 - Lexium integrated drives

5 - Lexium SD3 motion control

6 - Appendices

Motion control

Type of application		**Main axes of the machine or high power applications**			
Type of solution		**Drive and motor combination (drive mounted in the cabinet)**			
					
Type of process		High dynamic process with accurate positioning			
Type of technology		Servo drive and servo motor			
Main characteristics		Simple and compact		Multifunction Wide power range	
Dynamic		★★★★★	★★★★	★★★★★	★★★★
Precision and stability		★★★★	★★★★★	★★★★	★★★★★
Energy saving		★★★★★	★★★★★	★★★★★	★★★★★
Motor inertia		Low	Medium	Low	Medium
Control Interface	Control signals	Pulse/direction Input/output		Input/output	
	Bus and networks	CANopen, PROFIBUS DP, Modbus serial link		CANopen, PROFIBUS DP, Modbus Plus, FIPIO, Sercos , Modbus TCP	
	Motion bus	CANopen Motionbus			
Association Drive/motor combinations	Nominal power	130…4500 W	120…2360 W	900…9500 W	900…7500 W
	Nominal speed	1500…6000 min^{-1}		500…8000 min^{-1}	
	Nominal torque	0.43…28.2 Nm	0.41…10 Nm	0.41…90 Nm	0.17…53 Nm
Drive characteristics	Safety function	"Power Removal" (PWR) equivalent to "Safe Torque Off" (STO) function			
	Line supply voltage	100…120 V single-phase 200…240 V single-phase 200…240 V three-phase 380…480 V three-phase		200…240 V single-phase 200…240 V three-phase 208…480 V three-phase	
	Control power – Input voltage	24 V			
	Control power – Input current	< to 1 A		1 or 2.5 A, depending on the model	
Motor characteristics	Type of sensor (resolution) *(1)*	Single turn SinCos encoder (131,072 increments/ turn) Multiturn SinCos encoder (131,072 increments/ turns x 4096 turns)	Single turn SinCos encoder (16,384 increments/ turn) Single turn SinCos encoder (131,072 increments/ turn) Multiturn SinCos encoder (131,072 increments/ turn x 4096 turns)	Single turn SinCos encoder (131,072 increments/ turn) Multiturn SinCos encoder (131,072 increments/ turn x 4096 turns)	Resolver Single turn SinCos encoder (1,048,576 increments/ turn) Multiturn SinCos encoder (1,048,576 increments/ turn x 4096 turns)
	Motor flange size	55, 70, 100, 140, 205	57, 85, 110	55, 70, 100, 140, 205	40, 58, 70, 84, 108, 138,188
Reference		**LXM 05 and BSH**	**LXM 05 and BRH**	**LXM 15 and BSH**	**LXM 15 and BDH**
Page		2/30 and 2/138	2/30 and 2/96	3/28 and 3/200	3/28 and 3/138

(1) Sensor resolution given for use with a drive/motor combination.

	Auxiliary axes of the machine or low power applications		
	Integrated drive for a minimum size of the cabinet		
			
Short distance movements with accurate positioning	Dynamic process and accurate positioning	Automatic format adjustement	Short distance movements with accurate positioning
Three-phase stepper drive and stepper motor	Integrated drive with servo motor	Integrated drive with dc brushless motor	Integrated drive with three-phase stepper motor
Easy to tune High torque at low speed	Compact Integrated holding brake in option	High holding torque without power Integrated gearbox in option	High torque at low speed
★★★	★★★★	★★	★★★
★★★★	★★★★	★★	★★★★
★★	★★★★★	★★★★	★★
Medium			
Pulse/direction Input/ouput	Input/output		Pulse/direction Input/ouput
CANopen, PROFIBUS DP, Modbus serial link	CANopen, PROFIBUS DP, RS 485 serial link, DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink		
CANopen Motionbus	–		
350…750 W	150…370 W	100…350 W	
0…1000 min^{-1}	500…9000 min^{-1}	1500…7000 min^{-1}	0…1000 min^{-1}
1.5…16.5 Nm	0.26…0.78 Nm	0.18…0.5 Nm	0.45…6 Nm
“Safe Torque Off ”			
100…120 V single phase 200…240 V single phase	24/36/48 V ⎓		
24 V	Common with the line supply voltage		
< to 1 A	Common with the line supply voltage		
Optional index pulse monitoring	Single turn SinCos encoder (16,384 increments/turn) Multiturn SinCos encoder (16,384 Increments/turn x 4096 turns)	Absolute value encoder (12…1380 increments/turn)	Index pulse monitoring
57, 85, 110	57	66	57, 85
SD3 and BRS3	**ILA**	**ILE**	**ILS**
5/14 , 5/34 and 5/44	4/20 and 4/52	4/27 and 4/59	4/35, 4/67, 4/84 and 4/103

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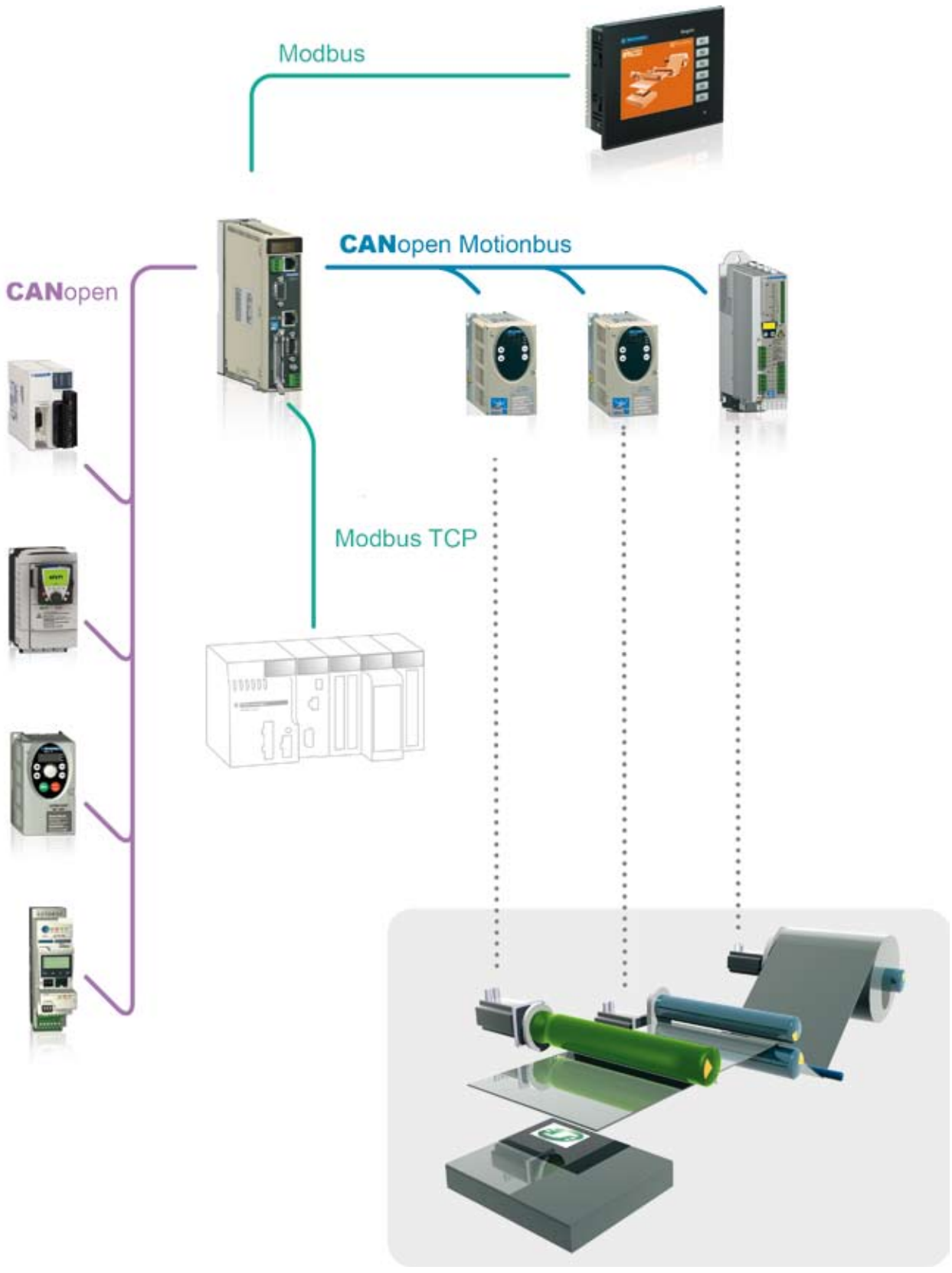
1 - Lexium Controller motion controllers

Lexium Controller motion controllers



Lexium Controller motion controllers

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LMC 10, LMC 20 and LMC 20A130● Lexium Controller

Presentation

The Lexium Controller range delivers optimized solutions for axis control and positioning, including automation functions. It meets the needs of a wide range of applications in all sectors of industry.

With Lexium Controller motion controllers, Lexium 05 and Lexium 15 servo drives, and BSH and BDH servo motors, Schneider Electric offers a complete, high-performance and economical solution, namely Lexium PAC.

The Lexium PAC solution can be adapted and integrated on most automation platforms - Schneider Electric or third party.

The software solution provided by Lexium Controller motion controllers offers very quick and easy start-up of the machine, thanks to the application template and function block library.

Lexium Controller motion controllers are particularly suited to small machines, thanks to:
- Their compact dimensions
- The limited number of models and the integration of function blocks
- Their ease of installation
- The fact that the application can be put into operation immediately thanks to the application template and remote graphic display terminal
- Reduced installation and start-up costs.

Furthermore, they satisfy the performance requirements of specialized and modular machines thanks to:
- Their expansion capability (input/output etc.)
- Their modular software functions
- Their ease of integration into standard automation systems thanks to the possibility of connection to buses and networks available on the market such as CANopen, Modbus, PROFIBUS DP, DeviceNet and Modbus TCP.

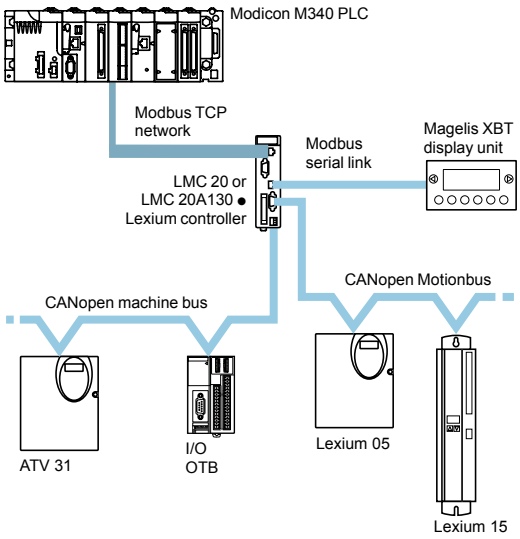
Applications

The Lexium Controller motion controller guarantees coordination and synchronization of axes, via a fieldbus, for applications requiring control of up to 8 synchronized axes.

It includes standard motion control functions:
- Speed and torque control
- Relative or absolute positioning
- Cam profiles for slave axes and programmable cam switch control
- Virtual axis
- Electronic gearing function for speed and position
- Linear and circular interpolations (2½ dimensions)
- Master axis via external encoder
- Distance measurement and position capture at high-speed (30µs) discrete input
- Optimized sequencing of movements (blending).

It is dedicated to the following types of application:
- Handling equipment (conveyors, palletizers, storage and retrieval systems) and transfer machines (gantry cranes etc.)
- Assembly machines (shrink fitting, clamping)
- Inspection and quality control machines
- Machines for working “on the fly” (flying shear, printing, marking, etc.).

Characteristics: page 1/8 | References: page 1/14 | Dimensions: page 1/32 | Schemes: page 1/34



Example of integration of Lexium Controller in an automation platform

Integration in automation platforms

Lexium Controller motion controllers can easily be integrated into the standard automation architectures available on the market.

It can be connected directly via the communication ports on the front panel to the following buses and networks:
Modbus, PROFIBUS DP, DeviceNet and Modbus TCP.

In this way, the Lexium Controller motion controller makes all the axis data which it controls accessible to PLCs, Magelis HMI terminals or any other client.

CANopen machine bus and CANopen Motionbus

The CANopen machine bus is now very widely used in industry because of its high performance. In accordance with international standard ISO 11898 promoted by the "CAN in Automation" association of users and manufacturers, it guarantees a high level of openness and interoperability thanks to its standardized communication and equipment profiles.

Two CANopen machine buses are directly accessible via two integrated communication ports conforming to standard CiA DSP 301 V4.0:
- CANopen Motionbus:
for coordination and synchronization of the drives, conforming to standard CiA DSP 402, "Device Profile Drives & Motion Control".
It is available for all the Lexium Controllers.
- CANopen machine bus:
for expansion of the automation capabilities, such as I/O, servo drives, encoders, etc.
It is available for the LMC 20 and LMC 20A130● motion controllers.
(See characteristics page 1/11).

Remote graphic display terminal

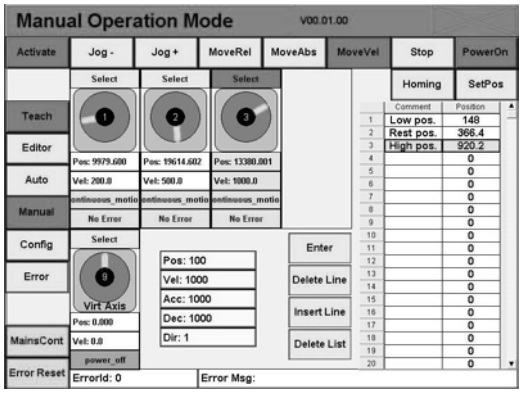
Remote graphic display terminal

The optional remote diagnostic and debugging terminal, used in conjunction with the Easy Motion application template, allows you to:
- Carry out diagnostics on the Lexium Controller motion controllers or servo drives
- Adjust the Lexium Controller motion controller or the servo drive parameters
- Perform debugging
- Back up and restore the application data.

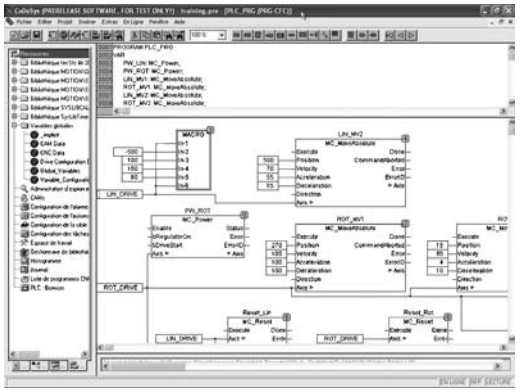
The user is closer to the machine, resulting in better performance and higher efficiency.

Ergonomically designed, the navigation button gives direct access to drop-down menus.

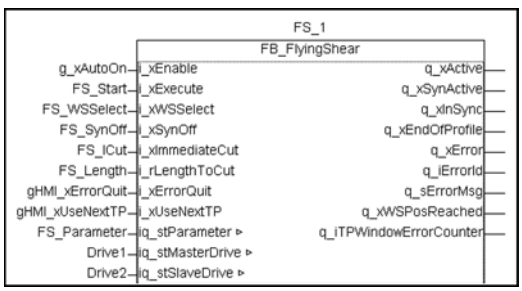
This graphic terminal offers two configurable levels of access:
- Maintenance (limited access)
- Design (allowing access to configurable data)



Example of application template screen



Example of IEC 61131-3 compliant programming editor



Example of application function block

Software solution

The Lexium Controller range offers two application development modes depending on the requirements:
- Easy Motion mode which relies on an application template and integrated graphic interface to configure the motion control functions
- Motion Pro mode to configure and program motion control and automation functions using a language conforming to standard IEC 31161-3.

The Lexium Controller range also offers a function block library so that you can start to use your application immediately.

Easy Motion mode

The Lexium Controller motion controller is supplied with an application template pre-installed. It allows immediate start-up of the whole Lexium PAC system (motion controller, servo drive and motor) and automatic execution of the configured function.

The following services are available:
- Configuration of axes
- Adjustment and diagnostics of drives
- Adjustment and diagnostics of the motion controller
- Creation of position registers via teach function
- Management of axis operating modes (Auto-Man.)
- Manual axis control
- Configuration of positioning tasks (Motion Tasks)
- Editing of cam profiles (8 profiles of 16 points of type XYVA)
- Backup and recovery of the application.

EasyMotion See page 1/24.

Motion Pro mode

Motion Pro mode gives the user complete freedom to develop the application.

While retaining the benefits offered by Easy Motion mode for motion control, it allows you to add automation functions using the integrated programming editor.

The entire application, motion control functions and automation functions can be realized with this editor.

MotionPro See page 1/26.

Application function block library

To simplify application programming and improve machine performance, the Easy Motion and Motion Pro modes have an application function block library.

These functions considerably reduce the time taken to program and debug the whole installation.

The available function blocks are very widely used in the industrial world:
- Flying shear
- Rotary knife
- Grouping/ungrouping
- Clamping with torque control.

With its ergonomic, PLCopen design, this library has been developed so as to accommodate many different mechanical variants and application types.

See page 1/30.

Lexium Controller motion controllers

Description

The Lexium Controller range offers three levels of integration in automation systems depending on the available references:

■ LMC 10 : This is an economical product with a dedicated CANopen Motionbus,

■ LMC 20 : In addition to the characteristics of the LMC 10, it offers a connection to the Modbus TCP network for integration in automation architectures; its CANopen connection extends its capabilities in terms of I/O and the control of other devices,

■ LMC 20A130● : In addition to the characteristics of the LMC 20, it offers a connection to the PROFIBUS DP and DeviceNet fieldbuses.

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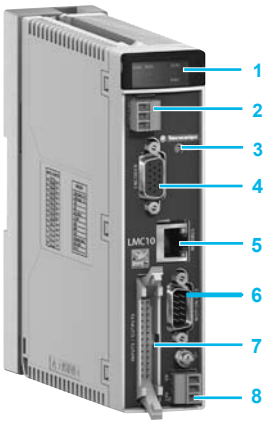

LMC 10

Lexium Controller LMC 10

1 Front display unit with status LED:
■ Indication of status of the Lexium Controller
■ Indication of communication status of the CANopen machine bus and of the CANopen Motionbus
2 3-pin connector for power supply of master encoder
3 Lexium Controller reinitialize button
4 High-Density 15-way female SUB-D connector for connection of incremental encoder or SSI serial absolute encoder
5 RJ45 connector for connection of Modbus or RS 485 serial link, with status LED
6 9-way male SUB-D connector for connection to the CANopen Motionbus
7 HE 10 connector (26-way) for connection of I/O via Telefast® connection bases or via a supplied female connector
8 24 V ⎓ power supply of the Lexium Controller via 3-pin connector

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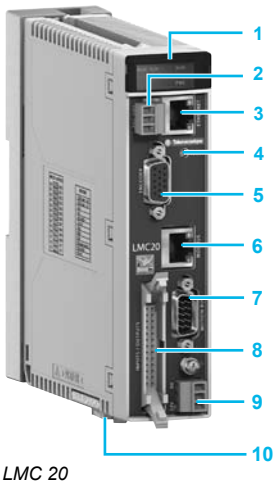

LMC 20

Lexium Controller LMC 20

1 Front display unit with status LED:
■ Indication of status of the Lexium Controller
■ Indication of communication status of the CANopen machine bus and of the CANopen Motionbus
2 3-pin connector for power supply of master encoder
3 RJ45 connector for connection to the Modbus TCP network
4 Lexium Controller reinitialize button
5 High-Density 15-way female SUB-D connector for connection of incremental encoder or SSI serial absolute encoder
6 CRJ45 connector for connection of Modbus or RS 485 serial link, with status LED
7 9-way male SUB-D connector for connection to the CANopen Motionbus
8 HE 10 connector (26-way) for connection of I/O via Telefast® connection bases or via a supplied female connector
9 24 V ⎓ power supply of the Lexium Controller via 3-pin connector
10 CANopen 9-way male SUB-D communication port for extending the configuration (discrete or analogue I/O, drives, encoders, other equipment)

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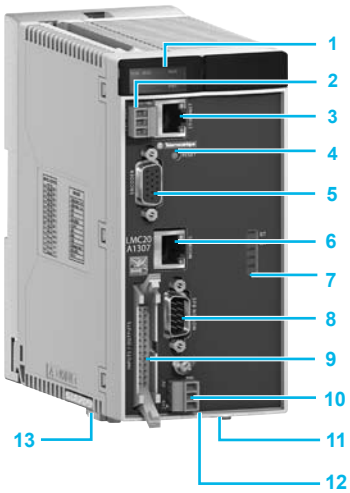

LMC 20A130●

Lexium Controller LMC 20A1307 and LCM 20A1309

1 Front display unit with status LED:
■ Indication of status of the Lexium Controller
■ Indication of communication status of the CANopen machine bus and of the CANopen Motionbus
2 3-pin connector for power supply of master encoder
3 RJ45 connector for connection to the Modbus TCP network
4 Lexium Controller reinitialize button
5 High-Density 15-way female SUB-D connector for connection of incremental encoder or SSI serial absolute encoder
6 RJ45 connector for connection of Modbus or RS 485 serial link, with status LED
7 Diagnostic LEDs for the PROFIBUS DP or DeviceNet communication card
8 9-way male SUB-D connector for connection to the CANopen Motionbus
9 HE 10 connector (26-way) for connection of I/O via Telefast® connection bases or via a supplied female connector.
10 24 V ⎓ power supply of the Lexium Controller via 3-pin connector
11 9-way male SUB-D connector for connection of PROFIBUS DP bus or removable 5-way screw terminal for connection to the DeviceNet bus
12 Terminal with 8 microswitches for configuration of slave address on the PROFIBUS DP or DeviceNet bus
13 CANopen 9-way male SUB-D communication port for extending the configuration (discrete or analogue I/O, drives, encoders, other equipment)

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Lexium Controller motion controllers

Environmental characteristics

Controller type			LMC 10	LMC 20	LMC 20A130●
Conforming to standards			Lexium Controllers have been developed to conform to the strictest international standards and the recommendations relating to electrical industrial control devices (IEC, EN), in particular: low voltage, IEC/EN 61800-5-1, IEC/EN 61800-3 (conducted and radiated EMC immunity and emissions).		
	EMC immunity		IEC/EN 61800-3, environments 1 and 2 IEC/EN 61000-4-2 level 3 IEC/EN 61000-4-3 level 3 IEC/EN 61000-4-4 level 4 IEC/EN 61000-4-5 level 3		
CE marking			The motion controllers have CE marking in accordance with the European directives on low voltage (2006/95/EC) and EMC (89/336/EEC).		
Product certifications			UL, CSA, C-Tick, GOST and CCC (pending)		
Degree of protection			IP 20		
Withstand to vibrations			1.5 mm peak to peak from 5…13 Hz, 1 gn from 13…200 Hz, conforming to IEC/EN 60068-2-6		
Shock resistance			15 gn for 11 ms conforming to IEC/EN 60068-2-27		
Withstand to electrostatic discharge	Immunity to electrostatic discharge		Conforming to standard EN 61000-4-2, level 3		
Withstand to HF interference	Immunity to radiated electromagnetic fields		Conforming to standard EN 61000-4-3, level 3		
	Immunity to fast transients/ bursts		Conforming to standard EN 61000-4-4, level 4		
	Surge immunity		Conforming to standard EN 61000-4-5, level 3		
Relative humidity	Operation		10…95 % without condensation		
	Storage		5…95 % without condensation, conforming to IEC 61131-2		
Ambient air temperature around the unit	Operation	**°C**	0…60	0…50	
	Storage	**C**	- 25…+ 70, conforming to IEC 61131-2		
Maximum altitude	Operation	**m**	0…2000		

Electrical characteristics

Power supply *(1)*	Nominal voltage	**V**	⎓ 24		
	Limit values	**V**	⎓ 19…30 (including ripple)		
	Nominal input current	**mA**	300	400	500
	Maximum inrush current	**A**	< 10 for 0,2 ms		

(1) Use of a regulated switch mode power supply, such as Phaseo ABL 7, is recommended.

Presentation: page 1/2 | References: page 1/14 | Dimensions: page 1/32 | Schemes: page 1/34

1

Characteristics of discrete and event-triggered inputs

Number of input channels	Discrete		8 positive logic (Source)
	Event-triggered		2
Power supply	Nominal input voltage	**V**	24 ⎓
	Nominal input current	**mA**	7
Connection			1 HE 10 connector
Common			1
Input limit values		**V**	19…30 ⎓ (including ripple)
Input impedance for nominal U		**kΩ**	3
Filtering time	At state1	**µs**	15
	At state 0	**µs**	70
Isolation	Between channels		None Isolation with internal logic via optical coupler

Characteristics of Touch Probe inputs

Number of input channels			2
Power supply	Nominal input voltage	**V**	24 ⎓
	Nominal input current	**mA**	7
Connection			1 HE 10 connector
Common			1
Input limit values		**V**	19…30 ⎓ (including ripple)
Input impedance for nominal U		**kΩ**	3
Filtering time	At state1	**µs**	1
	At state 0	**µs**	0,5
Isolation	Between channels		None Isolation with internal logic via optical coupler

Characteristics of the master encoder input

Type of compatible encoders			Encoder with RS 422 compatible differential outputs, 5 or 24 V power supplied Encoder with push-pull output, 5 V power supplied Encoder with open collector output, 5 V power supplied Universal encoder with SSI output, 24 V power supplied
Power supply	Nominal voltage	**V**	5 ⎓ or 24 ⎓
	Nominal current	**mA**	500
Connection			One High-Density 15-way female SUB-D connector for the encoder input and one stripped end
Input limit values	Voltage	**V**	5,5 ⎓
	Current	**mA**	12
Input impedance for nominal U		**kΩ**	2
Isolation		**V**	2500
Incremental encoder	Signal type		A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$
	Maximum operating frequency		250 kHz as input x 4, or 1 MHz as counter
SSI serial absolute encoder	Number of bits		32, with configurable frame (number of revolutions, number of bits/revolution, binary or gray format, parity, etc)
	Clock frequency	**kHz**	200
	Clock voltage	**V**	5

1

Output characteristics

Number of output channels			8
Output logic			2 positive logic outputs (Source)
Power supply	Nominal voltage	**V**	24 ⎓
	Nominal current	**mA**	200
Common			1
Output limit values	Voltage	**V**	19…30 ⎓ (including ripple)
Response time	At state1	**µs**	150
	At state 0	**µs**	250
Short-circuit current limiting		**A**	1
Isolation	Between channels		None Isolation with internal logic via optical coupler

Processor characteristics

Memory	Data storage (NV/RAM)	**kb**	60
	Application in RAM	**MB**	1
	Application in Flash EPROM	**MB**	1
RTC	Autonomy	**days**	20
Application structure	Master task		1
	Auxiliary task		1
	Event-triggered tasks		2
Cycle time		**ms**	2 for 4 synchronized axes 4 for 8 synchronized axes
Typical program code execution time	For 1000 lines, in structured language: 60 % Boolean, 20 % numerical, 20 % floating point	**µs**	< 120

Communication port characteristics

Modbus protocol

Structure	Connector		RJ45 type
	Physical interface		2-wire RS 485
	Transmission mode		RTU
	Transmission speed		Can be configured at 19.6 kbps or 38.4 kbps using Motion Pro software
	Access method		Slave
	Isolation between the internal circuit and serial port		–
	Format		8 bits, no parity, 1 stop
	Polarization	**kΩ**	10
	Address		1 to 247, can be configured by the graphic display terminal or using Easy Motion and Motion Pro software
Services	Messaging		Read Holding Registers (03), 121 words maximum Write Single Register (06) Write Multiple Registers (16), 121 words maximum Read Device Identifi cation (43) Diagnostics (08)
	Communication monitoring		Configurable time out
Diagnostics	Using LEDs		An activity LED on the front panel relating to the RJ45 connector

Communication port characteristics (continued)

CANopen Motionbus

Structure	Connector	9-way male SUB-D
	Transmission speed	Can be configured using Easy Motion and Motion Pro software: at 250 kbps for a maximum bus length of 250 m, at 500 kbps for a maximum bus length of 80 m, at 1 Mbps for a maximum bus length of 15 m
	Access method	Master
	Address (Node ID)	8 Lexium 05 or Lexium 15 servo drives or SD3 28A stepper drives
Services	Number of PDOs	2 PDOs per slave (1 transmit and 1 receive)
	Number of SDOs	2 SDOs per cycle (1 read and 1 write)
	Emergency	Yes
	CANopen application layer	CiA DSP 301 V4.02
	Device profile	CiA DSP 405 Control of devices with CiA DSP 402 profile (Device Profile for Drives and Motion Control)
	Communication monitoring	Node Guarding, Heartbeat
	Length of bus	15 m maximum at 1 Mbps (the bus must always be wired in a daisy-chain)
Diagnostics	Using DELs	An activity LED on the front panel

CANopen machine bus for I/O extensions, servo drives, etc

Structure	Connector	9-way male SUB-D
	Transmission speed	Can be configured using Motion Pro software from 50 kbps for a maximum bus length of 1000 m to 1 Mbps for a maximum bus length of 15 m
	Access method	Master
	Address (Node ID)	1 to 32, can be configured using Motion Pro software
Services	Number of PDOs	10 PDOs per slave (5 transmit and 5 receive, 6 transmit and 4 receive, …)
	Number of SDOs	2 SDOs per cycle (1 read and 1 write)
	CANopen application layer	CiA DSP 301 V4.02
	Device profile	CiA DSP 405
	Communication monitoring	Note Guarding, Heartbeat
Diagnostics	Using LEDs	An activity LED on the front panel

1

Communication port characteristics (continued)

PROFIBUS DP fieldbus

Structure	Connector	9-way male SUB-D
	Transmission speed	Autodetected by the Lexium Controller
	Address	1 to 126, can be configured using a microswitch
Services	Periodic exchanges	Type 5 PPO format cyclic frame ■ PZD service: Communication scanner exchanging 8 input words and 8 output words periodically ■ PKW service: Read/write access to the whole Lexium Controller %MW zone
	Communication monitoring	Can be inhibited Time out can be set via the PROFIBUS DP network configurator
Diagnostics	Using LEDs	An activity LED on the front panel
Description file		A gsd file is supplied on the documentation CD-ROM for the whole range or can be downloaded from the Internet at “www.schneider-electric.com”. This file does not contain a description of the motion controller parameters.

DeviceNet fieldbus

Structure	Connector	Screw-type, 5 contacts, 5.08 pitch
	Transmission speed	Can be configured at 125 kbps, 250 kbps or 500 kbps by a microswitch
	Address	1 to 63, can be configured by a microswitch
Services	Periodic variables	Communication scanner assemblies 100 and 101
	Periodic exchange mode	Inputs: Polled, Change of state, Cyclic Outputs: Polled
	Auto Device Replacement	No
	Communication monitoring	Can be inhibited Time out can be set via the DeviceNet network configurator
Diagnostics	Using LEDs	An activity LED on the front panel
Description file		A eds file is supplied on the documentation CD-ROM for the whole range or can be downloaded from the Internet at “www.schneider-electric.com”. This file contains a description of the motion controller parameters.

Communication port characteristics (continued)

Modbus TCP network

Structure	Connector	RJ45 type
	Physical interface	2-wire RS 485
	Transmission mode	Half duplex and full duplex
	Transmission speed	10/100 Mbps, autodetected by the Lexium Controller
	IP addressing	■ Manual assignment via the display terminal or Motion Pro software ■ BOOTP (dynamic IP address server depending on the IEEE address) ■ DHCP (dynamic address server depending on the Device Name) with automatic reiteration
	Physical	Ethernet 2
	Link	LLC: IEEE 802.2 MAC: IEEE 802.3
	Network	IP (RFC791) ICMP client for supporting certain IP services such as the “ping” command
	Transport	TCP (RFC793), UDP The maximum number of connections is 8 (port 502)
Services	Transparent Ready class *(1)*	C20
	Web server	Simultaneous access via three Web browsers (more, depending on the number of connections used) Server is factory-configured and modifiable The factory-configured server contains the following pages: ■ Lexium Controller viewer: display of the Lexium Controller status and the state of its I/O ■ Data viewer: display and password-protected modification of the Lexium Controller parameters, arranged in order of %MW words ■ Lexium Controller chart: oscilloscope type display ■ Security: configuration of passwords for viewing and modification ■ I/O scanner: configuration for exchanging periodic data (10 input words, 10 output words) ■ Ethernet statistics: identification of the Lexium Controller and communication statistics
	Messaging	Read Holding Registers (03), 121 words maximum Write Single Register (06) Write Multiple Registers (16), 121 words maximum Read Device Identification (43) Diagnostics (08)
	Network management	SNMP
	File transfer	FTP for Web server
	Communication monitoring	Can be inhibited Time out adjustable from 0.5…60 s via the embedded Web server
Diagnostics	Using LEDs	An activity LED on the front panel relating to the RJ45 connector
	Via the Web server	Number of frames received Number of incorrect frames

(1) Please consult our “Ethernet TCP/IP Transparent Ready” catalogue.

Lexium Controller motion controllers
LMC 10, LMC 20 and LMC 20A130●

LMC 20

Lexium Controller motion controllers *(1)*

Power supply	Number of I/O	Max. nb of synchronized axes (via CANopen Motionbus) *(2)*	Integrated communication				Reference	Weight
			Bus machine CANopen *(3)*	Modbus serial link	Ethernet network	Third party bus		
V								kg
24 ⎓	8/8 24 V ⎓	8	–	Yes	–	–	**LMC 10**	0.666
			Yes	Yes	Yes	–	**LMC 20**	0.697
			Yes	Yes	Yes	PROFIBUS DP	**LMC 20A1307**	1.076
			Yes	Yes	Yes	DeviceNet	**LMC 20A1309**	1.079

Software and documentation pack

Désignation	Composition	Reference	Weight kg
Software and documentation pack	The pack consists of: ■ Easy Motion software ■ Motion Pro software ■ application function blocks library ■ technical documentation for setting up hardware and software	**VW3 M8 702**	–

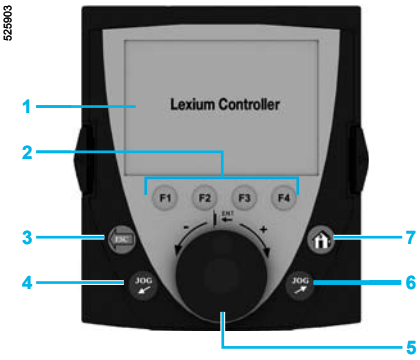
Connection accessories

Désignation	Description	Length m	Reference	Weight kg
For SSI serial incremental encoders or absolute encoders *(4)*				
Cable for master encoder input	1 High Density 15-way male SUB-D connector 1 stripped end	1	**VW3 M4 701**	–
For display units and Magelis graphic terminals *(5)*				
Cable for display unit or Magelis graphic terminal input	One 25-way male SUB-D connector 1 RJ45 connector	3	**XBT Z938**	–
For PC serial port				
Cable for PC serial port via serial link	1 RJ45 connector One 9-way female SUB-D connector	3	**VW3 M8 701 R030**	–
Crossed shielded twisted pair cables	2 RJ45 connectors	3	**490 NTC 00003**	–
		5	**490 NTC 00005**	–

(1) Lexium Controller motion controllers are supplied as standard with an HE 10 female connector for connection of I/O and with two 3-pin female connectors for the power supply of the Lexium Controller motion controller and the encoder. Transparent Ready class: C20.
(2) Cycle time: 2 ms for 4 synchronized axes and 4 ms for 8 synchronized axes.
(3) CANopen machine bus for I/O extension, drives etc. or connection of third party products.
(4) Incremental encoders or absolute SSI series absolute encoders: Please refer to the "Osicoder" catalogue or visit "www.schneider-electric.com".
(5) Display units and Magelis graphic terminals: Please refer to the "Human-Machine interfaces" catalogue or visit "www.schneider-electric.com".

Presentation: page 1/2
Characteristics: page 1/8
Dimensions: page 1/32
Schemes: page 1/34

Lexium Controller motion controllers
Option: graphic display terminal



Graphic display terminal

Presentation

The HMI terminal, available as an option with the Lexium Controller motion controller, brings the user as close as possible to the machine so that he can:
- Carry out diagnostics on the motion controller or drives
- Adjust the Lexium Controller motion controller or the drive parameters
- Carry out debugging
- Backup and restore application data

The main debugging functions are as follows:
- Management of “Auto-Manu” mode, of the axes
- Fine adjustment and validation of axes
- In Manu mode:
  - Control the position, speed and homing of the axis
  - JOG functions
- In Auto mode, controlling the execution of positioning tasks
- Creation of position registers via teach function

The principal maintenance functions are as follows:
- Diagnostics of motion controller or servo drives
- Quick restart of the machine after a stoppage
- Transfer of programs
- Backup and recovery of configuration of servo drives

It is multilingual, supplied with 6 languages installed as standard (English, French, German, Italian, Spanish and Chinese). Other languages can be downloaded to the flash memory.
It is connected to the Lexium Controller motion controller via a cable which must be ordered separately (see below).
The terminal’s maximum operating temperature is 60°C and it features IP 54 protection.

Description

The front panel of the remote graphic terminal has the following features:

1 Graphic display unit:
- 8 lines, 240 x 160 pixels
- large digits that can be read from 5 m away

2 Dynamic function keys F1, F2, F3 and F4:
- application functions: Auto/Man.
- system functions: “RUN”, “STOP”, “RESET”
- Navigation functions

3 “ESC” key: Aborts a value or a parameter to return to the previous selection

4 “JOG ↙” key: Turns the axis in the negative direction

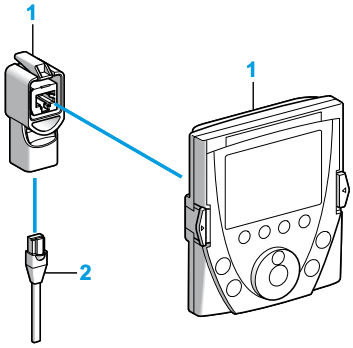
5 Navigation button:
- Press: Saves the current value (ENT)
- Turn +/-: Increases or decreases the value, takes you to the next or previous line

6 “JOG ↗” key: Turns the axis in the positive direction

7 Key to return to the home screen.

Reference

Description	No.	Reference	Weight kg
Remote graphic display terminal supplied with an angled female/female RJ45 adapter	1	**VW3 M1 701**	–



Remote graphic display terminal accessory

A cable equipped with two RJ45 connectors can be supplied in option to connect the graphic display terminal to the Lexium Controller motion controller (available in lengths of 1, 3 and 5 metres).

Reference

Description	No.	Length m	Reference	Weight kg
Remote cables for graphic display terminal VW3 M1 701 equipped with 2 RJ45 connectors	2	1	**VW3 A1 104 R10**	0.050
		3	**VW3 A1 104 R30**	0.150
		5	**VW3 A1 104 R50**	0.250

Lexium Controller motion controllers
Telefast® I/O connection bases

Presentation

The Telefast® connection base is an interface for connecting the I/O of the Lexium Controller motion controller to the operational section.
It guarantees a quick, reliable and economic connection.

It also allows:
- Distribution of common signals on inputs
- Disconnection of outputs per channel
- Protection of the 24 V ⎓ power supply of the Lexium Controller motion controller using fuses

Depending on the model, it also provides:
- Visual indication of I/O status via LEDs
- Protection of each channel using fuses

It is connected directly to the HE 10 connector of the Lexium Controller motion controller via a cable.

Characteristics

Power supply characteristics

Supply voltage	Conforming to IEC 61131-2	**V** ⎓	19…30 (Un = 24)
Maximum supply current per sub-base		**A** ⎓	2
Voltage drop on supply fuse		**V** ⎓	0,.3
Supply overload and short-circuit protection by quick-blow fuse (included)		**A**	2

Characteristics of the control circuit for one channel

Sub-base type			**Passive connection sub-bases for discrete signals**	
			ABE 7B20MPN20	**ABE 7B20MPN22**
Number of channels	Passive input		12	
	Passive output		8	
Rated voltage at Ue		**V** ⎓	24	
Min/max voltage	Conforming to IEC 61131-2	**V** ⎓	20.4/26.4	
Internal current per channel at Ue	Passive input	**mA**	–	3.2
	Passive output	**mA**	–	3.2
Conformity	Conforming to IEC 61131-2		Type 1	

Output circuit characteristics

Sub-base type			**Passive connection sub-bases for discrete signals**	
			ABE 7B20MPN20	**ABE 7B20MPN22**
Number of channels	Passive output		8	
Rated voltage at Ue	Passive output	**V** ⎓	24	
Current switched per I/O channel	Passive input/output	**mA**	15/300	
Maximum current per common	Passive output	**A**	2	
Rated insulation voltage		**V**	Not isolated	
Channel fuse protection		**mA**	–	315

Other characteristics (at ambient temperature of 20 °C)

Sub-base type		**Passive connection sub-bases for discrete signals**	
		ABE 7B20MPN20	**ABE 7B20MPN22**
Permissible leakage current without illuminating the channel LED	**mA**	–	1.5

References: page 1/17 Dimensions: page 1/33 Schemes: page 1/35

Lexium Controller motion controllers
Telefast® I/O connection bases

000013-35-M

ABE 7B20MPN20

References *(1)*

Telefast® I/O connection bases

Number of I/O	Number, type of inputs	Number, type of outputs	LED per channel	Fuse	Reference	Weight kg
20	12, Sink, 24 V ⎓	8, Source, 24 V ⎓	No	No	**ABE 7B20MPN20**	0.430
			Yes	Yes	**ABE 7B20MPN22**	0.430

Connection cables for Telefast® sub-bases

Type of signal	Type of connection		Gauge/ cross-section	Length *(2)*	Reference	Weight
	Lexium Controller side	Telefast® side	AWG/ mm²	m		kg
Discrete inputs/ outputs	HE 10 26 ways	HE 10 26 ways	28/ 0.08	0.5	**ABF T26B050**	0.080
				1	**ABF T26B100**	0.110
				2	**ABF T26B200**	0.180

Accessories

Description	Number of shunted terminals	Characteristics	Sold in lots of	Reference	Weight kg
Optional snap-on terminal blocks	20	–	5	**ABE 7BV20**	0.060
	12 + 8	–	5	**ABE 7BV20TB**	0.060
Quick-blow fuses 5 x 20, 250 V, UL	–	0.125 A	10	**ABE 7FU012**	0.010
		0.315 A	10	**ABE 7FU030**	0.010
		1 A	10	**ABE 7FU100**	0.010
		2 A	10	**ABE 7FU200**	0.010

1) For further information about Telefast® I/O connection bases, please refer to the "Twido programmable controllers" catalogue, or visit "www.schneider-electric.com".
(2) For lengths over 2 metres, please consult your Regional Sales Office.

Lexium Controller motion controllers
Communication buses and networks

Modbus serial link

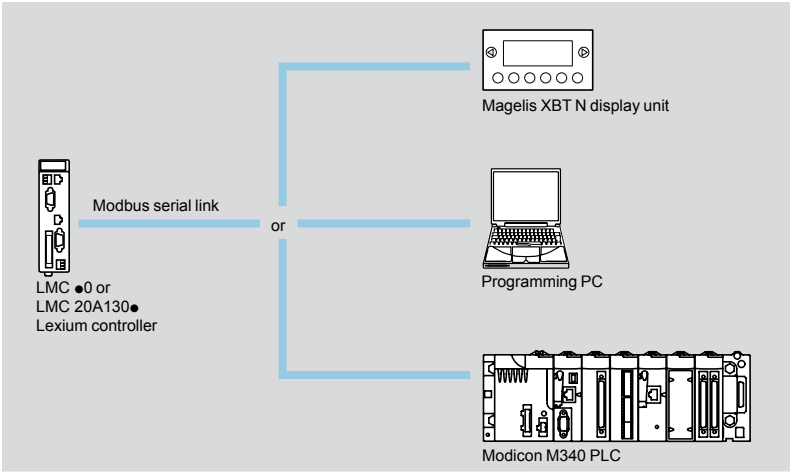
Presentation

The Modbus protocol is of master/slave type, consisting of a master station and slave stations. Lexium Controller LMC 10, LMC 20 and LMC 20A130● motion controllers have the Modbus protocol integrated as standard: These are slave stations.

Two exchange mechanisms are possible:
■ Request/response: The request from the master is addressed to a given slave. The master then waits for the response from the slave which has been interrogated.
■ Broadcasting: The master broadcasts a request to all the slave stations on the bus, which execute the command without transmitting a response.

The Modbus protocol allows:
■ Programming and configuration of the Lexium Controller motion controller with Easy Motion and Motion Pro software or with the remote graphic terminal
■ Connection of an HMI terminal (Magelis XBT GT graphic terminal, Magelis XBT N alphanumeric display or Magelis XBT R alphanumeric terminal)
■ An economical connection point for sharing application data with a PLC or any other type of client.

Architecture



Example of architecture with Modbus serial link

CANopen machine bus and CANoption Motionbus

Presentation

The CANopen machine bus complies with standard ISO 11898. Thanks to its standard communication profiles, it can be used to ensure openness and interoperability with various devices (drives, motor starters, smart sensors, etc.).

The CANopen bus is a multi-master bus based on the master/slave principle, which guarantees secure access to realtime automation device data. The CSMA/CA type protocol is based on broadcast exchanges, transmitted cyclically or on event, which guarantee optimum use of the bandwidth. A messaging channel is also used to parameterize the slave devices.

A staged CANopen connectivity solution reduces costs and optimizes the realization of your architecture, thanks to:
■ Reduced cabling time
■ Greater reliability of the cabling
■ Flexibility should you need to add or remove equipment.

Lexium Controller motion controllers
Communication buses and networks

Architecture

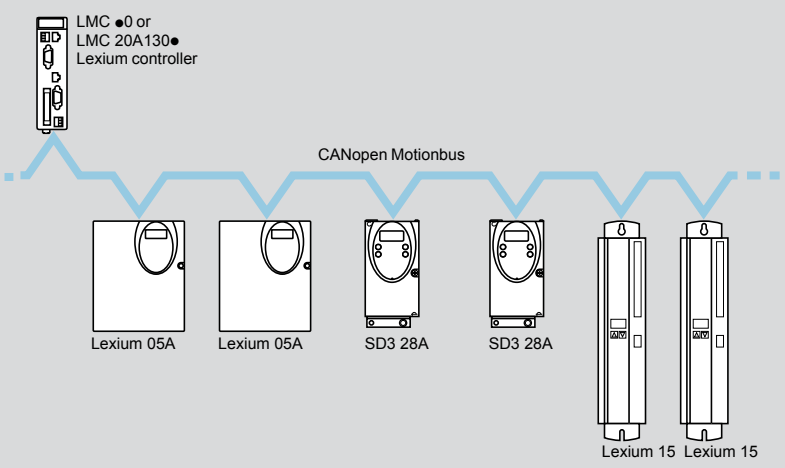
CANopen Motionbus

The CANopen connection dedicated to the Motion bus allows the possibility of connecting and controlling up to 8 Lexium 05A, Lexium 15 servo drives or SD3 28A steppers.

The network cycle ensures updating of the position setpoints so as to guarantee synchronization of axes.

Lexium Controller LMC 10, LMC 20 and LMC 20A130● motion controllers have the CANopen Motionbus integrated as standard.

To guarantee the performance of the CANopen Motionbus, it is advisable to create a bus in a daisy-chain formation, without tap junctions; our range of connection accessories has been extended with this in mind.



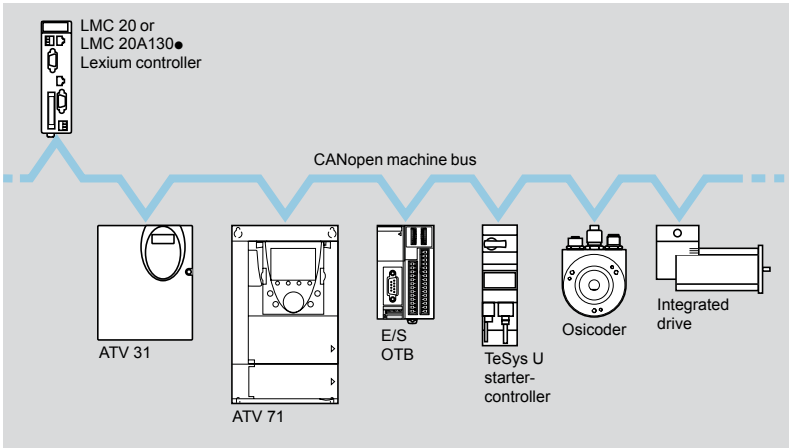
Example of architecture with CANopen Motionbus

CANopen machine bus

Thanks to their CANopen connection, Lexium Controller LMC 20 and LMC 20A130● motion controllers extend their capabilities to include applications requiring the control of a greater number of I/O, control devices or motor starters.

Schneider Electric products which can be connected to the CANopen machine bus are:

- TeSys U controller-starters
- Advantys OTB and STB distributed I/O
- Advantys FTB and FTM I/O splitter boxes
- Altivar 31, Altivar 61 and Altivar 71 variable speed drives
- XCC incremental or absolute rotary encoders
- Lexium integrated drives.

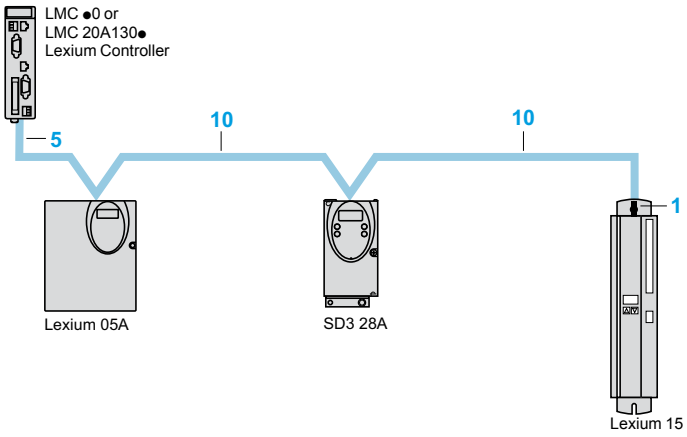


Example of architecture with CANopen machine bus

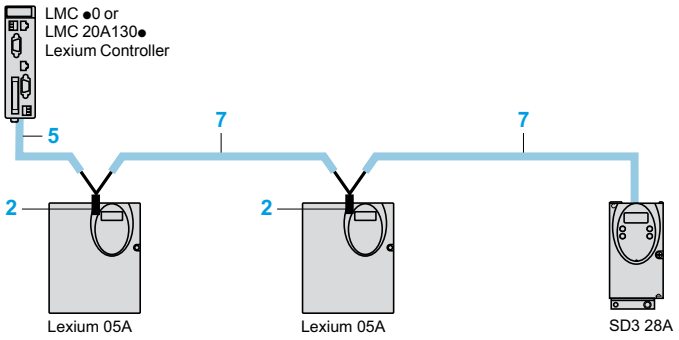
Lexium Controller motion controllers
Communication buses and networks

Examples of connection to CANopen Motionbus

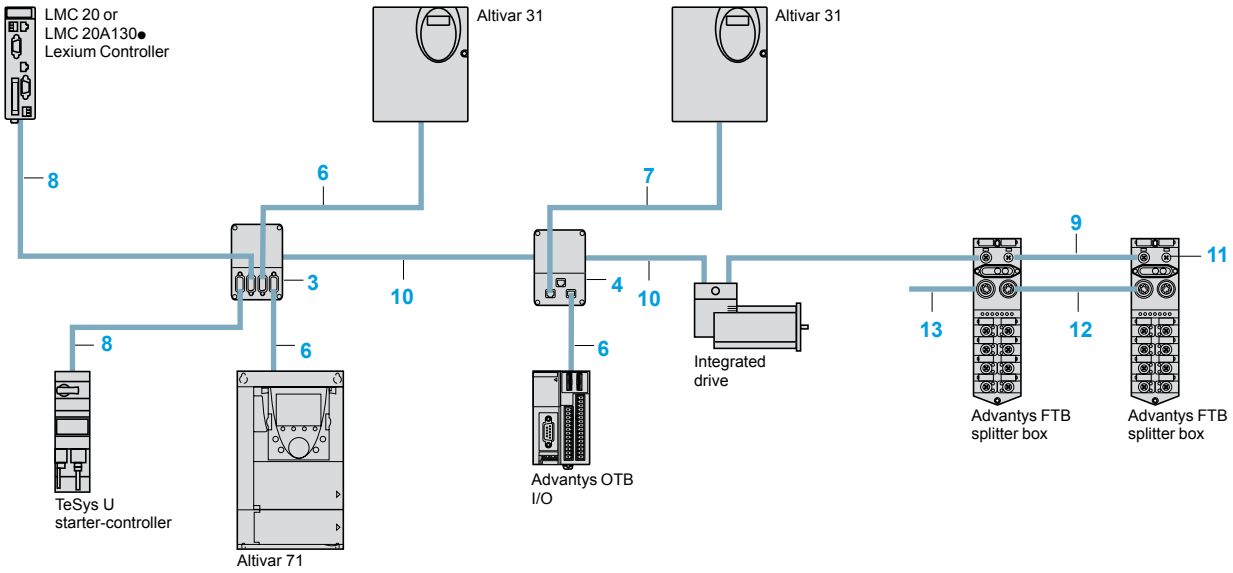
For Lexium 05A and Lexium 15 servo drives or SD3 28A stepper, for customer assembly



For Lexium 05A servo drive or SD3 28A stepper, prewired



Example of connection to CANopen machine bus



Lexium Controller motion controllers
Communication buses and networks

Connection accessories

Connection accessories

Description	Use	No.	Reference	Weight kg
Connector 9-way female SUB-D with screw terminals and line terminator	Connection of Lexium 15 servo drive	1	**VW3 M3 802**	–
Daisy chain tap with 3 RJ45 connectors and a 0.3 m cable	Daisy-chain connection of Lexium 05 servo drive or SD3 28A stepper	2	**TCS CTN023F13M03**	–
CANopen IP 20 tap junctions				
With 4 SUB-D ports. Screw terminals for connection of trunk cables. Line terminator	Tapping of trunk cable for SUB-D cabling	3	**TSX CAN TDM4**	0.196
With 2 RJ45 ports	Tapping of trunk cable for RJ45 cabling	4	**VW3 CAN TAP2**	–

Description	Use From	Use To	No.	Length. m	Reference	Weight kg
Connection cables with connectors						
CANopen cable with one 9-way female SUB-D connector with integrated line terminator and one RJ45 connector	LMC Lexium controller	Lexium 05A servo drive, SD3 28A stepper, TCS CTN023F13M03 daisy chain tap	5	1	**VW3 M3 805R010**	–
CANopen cables with one 9-way female SUB-D connector and one RJ45 connector	TSX CAN TDM4 junction box	ATV 31 drive, ATV 71 drive	6	0.5	**TCS CCN4F3M05T**	–
				1	**TCS CCN4F3M1T**	–
	TSX CAN TAP2 junction box	Advantys OTB I/O		3	**TCS CCN4F3M3T**	–
CANopen cables *(1)* with 1 RJ45 connector at each end	TCS CTN023F13M03 daisy chain tap	TCS CTN023F13M03 daisy chain tap	7	0.3	**VW3 CAN CARR 03**	–
	VW3 CAN TAP2 junction box	ATV 31 drive		1	**VW3 CAN CARR 1**	–
CANopen IP 20 cables *(1)* with one 9-way female SUB-D connector at each end Standard cable, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	LMC Lexium controller	TSX CAN TDM4 junction box	8	0.3	**VW3 CAN CADD 03**	0.091
				1	**VW3 CAN CADD 1**	0.143
	TSX CAN TDM4 junction box	TeSys U starter-controller		3	**VW3 CAN CADD 3**	0.295
				5	**VW3 CAN CADD 5**	0;440
CANopen IP 67 cables *(1)* with 2 x 5-way angled M12 connectors, A coding (1 female connector and 1 male connector)	Advantys FTB splitter box	Advantys FTB splitter box	9	0.3	**FTX CN 3203**	0.040
				0.6	**FTX CN 3206**	0.070
				1	**FTX CN 3210**	0.100
				2	**FTX CN 3220**	0.160
				3	**FTX CN 3230**	0.220
				5	**FTX CN 3250**	0.430
Connection cables						
CANopen IP 20 cables *(1)*						
Standard cables, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)			10	50	**TSX CAN CA 50**	4.930
				100	**TSX CAN CA 100**	8.800
				300	**TSX CAN CA 300**	24.560
UL certification, CE marking Flame retardant (IEC 60332-2)				50	**TSX CAN CB 50**	3.580
				100	**TSX CAN CB 100**	7.840
				300	**TSX CAN CB 300**	21.870
Cable for harsh environments *(2)* or mobile installation, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)				50	**TSX CAN CD 50**	3,510
				100	**TSX CAN CD 100**	7.770
				300	**TSX CAN CD 300**	21.700
Connection accessories						
IP 67 line terminator with one M12 connector (for end of bus)	–	–	11		**FTX CNTL12**	0.010
Power supply cables 24 V ⎓ with two 5-way 7/8 connectors	Advantys FTB splitter box	Advantys FTB splitter box	12	0.6	**FTX DP2206**	0.150
				1	**FTX DP2210**	0.190
				2	**FTX DP2220**	0.310
				5	**FTX DP2250**	0.750
Power supply cables 24 V ⎓ with one 5-way 7/8 connector and one stripped end	Phaseo ABL 7 power supply	Advantys FTB splitter box	13	1.5	**FTX DP2115**	0.240
				3	**FTX DP2130**	0.430
				5	**FTX DP2150**	0.700

(1) Please refer to the "Machines and installations with CANopen" catalogue.
(2) Harsh environments:
- resistance to hydrocarbons, industrial oils, detergents, solder splashes
- relative humidity up to 100 %,
- saline atmosphere,
- significant temperature variations,
- operating temperature between - 10°C and + 70°C.

1

PROFIBUS DP and DeviceNet fieldbuses

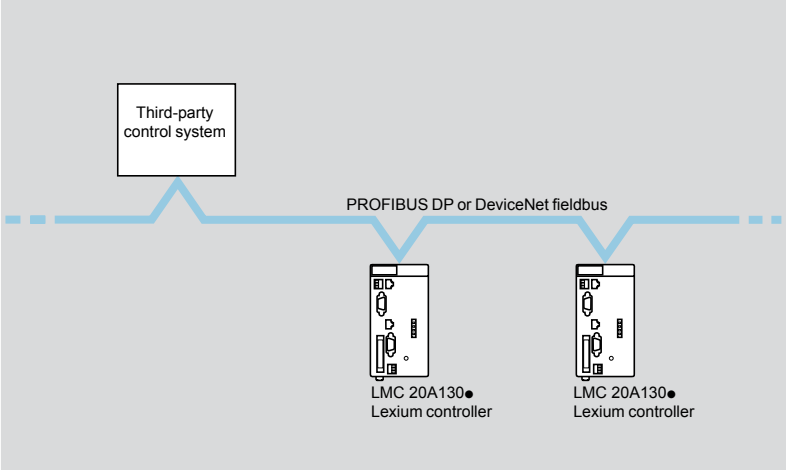
Presentation

The PROFIBUS DP bus is a fieldbus that meets industrial communication requirements.
It has linear bus topology with a master/slave-type centralized access procedure. The physical link is made by a single shielded twisted pair, although optical interfaces are available for establishing tree, star or ring structures.

The DeviceNet fieldbus is an open low-end type bus system, used in various industrial applications. It is based on CAN technology (layers OSI 1 and 2).
The DeviceNet fieldbus is based on the master/slave principle. The physical link is composed of 2 shielded twisted pairs to which it is possible to connect up to 63 slaves. Each end must have a line terminator.

The connection to the PROFIBUS DP and DeviceNet fieldbuses allows the LMC 20A1307 and LMC 20A1309 motion controllers to standardize the motion control solutions, while remaining independent of the system controlling the automation of the machine.

Architecture



Example of architecture with PROFIBUS DP or DeviceNet fieldbus

Connection type

For	Description
PROFIBUS DP fieldbus	9-way male SUB-D connector 490 NAD 911 for LMC 20A1307 Lexium Controller
DeviceNet fieldbus	Removable 5-way screw terminal for LMC 20A1309 Lexium Controller

1

Modbus TCP network

Presentation

Introduced by Schneider Electric, the Transparent Ready concept enables transparent communication between control system devices, production and management. Network technologies and the associated new services are used to share and distribute data between sensors, PLCs, workstations and third-party devices in an increasingly efficient manner.

This concept is based on the Modbus TCP industrial standard which proposes a single network that meets most communication requirements from sensors/actuators through to production management systems. Where a variety of communication systems are usually required, Transparent Ready standard technologies can result in significant cost savings in the areas of definition, installation, maintenance or training.

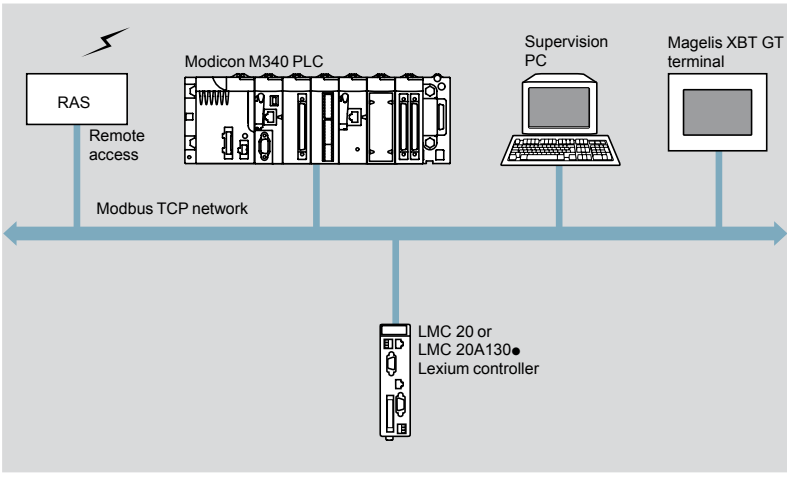
Transparent Ready is based on:
- Modbus TCP-based services meeting control system requirements in terms of functions, performance and quality of services
- Products including motion controllers, several ranges of PLC, distributed I/O, industrial terminals, variable speed drives, gateways and an increasing number of partner products
- The ConneXium range of cabling accessories: hubs, switches, cables adapted to the environment and to the requirements of industrial conditions.

Lexium Controller LMC 20 and LMC 20A130● motion controllers are connected to the Modbus TCP network via an RJ45 connector.

They are supplied with an integrated Web server which users can adapt according to the application. This can be used to:
- Access configuration data transparently
- Perform remote diagnostics or maintenance
- Incorporate simple human/machine interface functions.

The Modbus TCP link thus provides a convenient connection for the programming, configuration and debugging of your Lexium PAC: Lexium Controller LMC 20 and LMC 20A130● motion controllers, Lexium 05A and Lexium 15 servo drives, and BSH and BDH servo motors.

Architecture



Example of architecture with Modbus TCP network

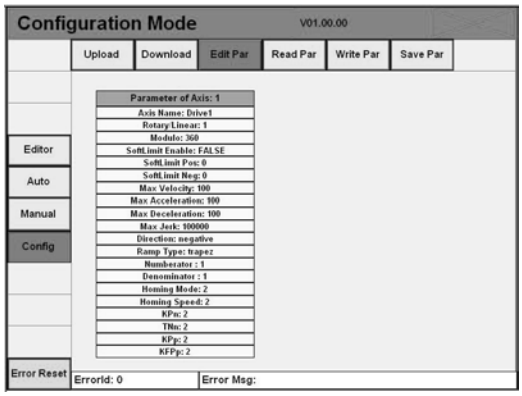
Lexium Controller motion controllers
Software solution

EasyMotion

The Lexium Controller range offers two levels of application implementation: Easy Motion mode for configuration and Motion Pro mode for configuration and programming.

Easy Motion mode is intended for applications in which the Lexium Controller motion controller handles the positioning functions, while a third-party device, such as a PLC, controls the machine automation functions.
This mode is available with Lexium 05A servo drive.

Motion Pro mode is intended for applications in which the Lexium Controller motion controller handles both the motion control functions and the automation functions.



Example of configuration with the application template

Easy Motion mode

Presentation

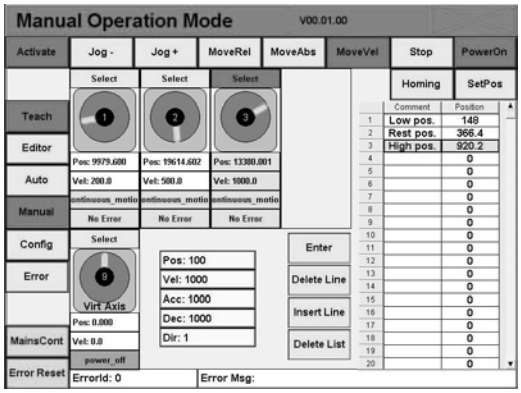
Supplied preinstalled in Lexium Controller motion controllers, the application template associated with the Easy Motion software is an ergonomic tool which allows:
- Rapid configuration of axes
- Implementation of the first movements in manual mode (JOG+/-)
- Creation of a Motion task table
- Control of execution of this table in automatic mode
- Diagnostics of the motion controller and of the different axes
- Backup and recovery of the machine parameters.

This tool optimizes debugging times, whether it involves a new installation, a prototype or on-site set-up.

Configuration

Configuration of axes

Configuration involves defining the physical parameters of the axis:
- Rotary or linear axis
- Maximum and minimum limits
- User units
- Principal parameters of the Lexium 05A servo drive

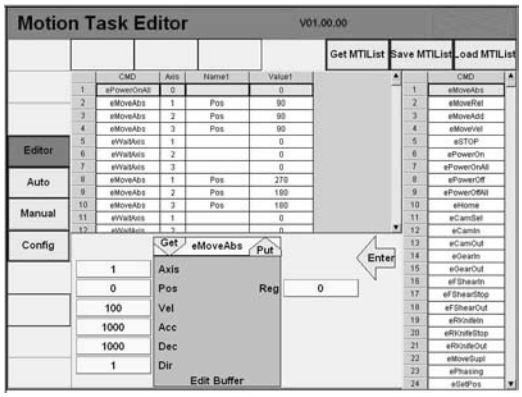


Manual control mode

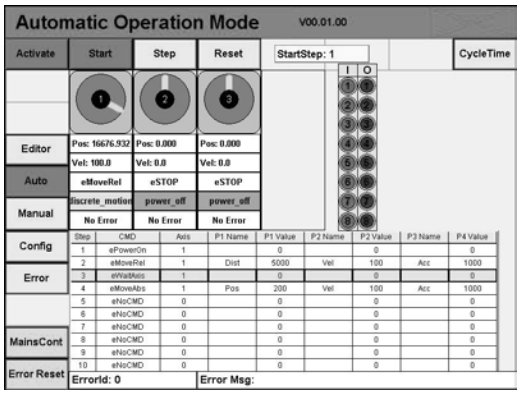
Manual control

One control panel per axis enables the first movements to be implemented manually, so that the mechanical constraints of the machine can be identified very quickly.

The available functions are:
- Validation drive variables
- Speed control
- Position control
- JOG+/JOG-
- Homing
- Creation of position registers via the teach function.



Motion Task Editor



Automatic control mode

Motion Task Editor

The Motion Task editor allows you to define a motion task table and configure each task.
These functions conform to the PLCopen standard.

The principal configurable functions are as follows:
- ■ Single-axis:
  - □ Absolute positioning
  - □ Relative positioning
  - □ Additive positioning
  - □ Homing
  - □ Speed control
- ■ Multi-axis:
  - □ Cam profile
  - □ Phasing
  - □ Electronic gearing
- ■ For the application function blocks:
  - □ Flying shear
  - □ Rotary knife
  - □ Grouping/ungrouping
  - □ Clamping with torque control

In addition, logical functions (waiting for conditions, time delay etc.) allow you to create a complete positioning sequence.

Automatic control

Automatic control mode allows execution of Motion Task table.

This step ensures debugging of program sequences and parameters.

Thanks to the control panel, it is possible:
- ■ To visualize the behaviour of all the axes
- ■ To control the execution of the function table (stop, pre-positioning etc.).

Complementary functions

Configuration in Easy Motion mode also allows:
- ■ Editing of cam profiles (8 profiles of 16 points of type XYVA)
- ■ Backup and recovery:
  - □ of the machine parameters (configuration of axes, positioning function table)
  - □ of the complete configuration of the Lexium 05A, to reduce the time taken to replace a device
  - □ of the Motion Task table
- ■ Access to on-line help

1

MotionPro

Motion Pro mode

Presentation

Motion Pro mode provides a graphical development environment for configuring, programming and managing motion controller applications.

It relies on a standard interface, CoDeSys®, offering the convenience of the familiar Windows® environment: windows, toolbars, pop-up menus, contextual help etc. As in Easy Motion mode, the application template can be used to configure the positioning functions. The automation functions are then added in the program organization units (POU).

In this way, Motion Pro allows you to create an application perfectly adapted to your needs.

Programming in Motion Pro

Creating a project

The application is structured using function modules, function blocks or programs. An ergonomic browser gives you an overall view of the different components of the application.

Configuration

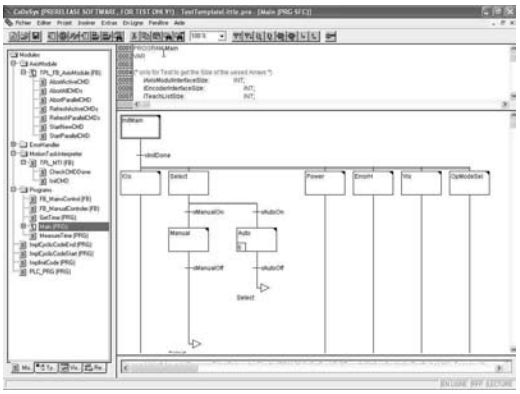
The Motion Pro software allows you to configure:
- I/O (discrete, capture or event-triggered)
- Tasks (master, auxiliary or event-triggered)
- Networks (Modbus TCP)
- Fieldbuses (PROFIBUS DP or Device Net)
- A CANopen machine bus and CANopen Motionbus

Programming conforming to standard IEC 61131

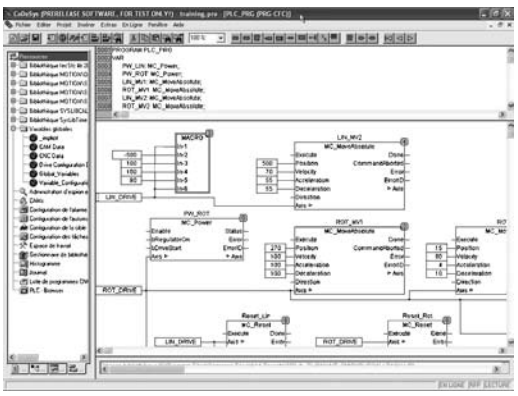
The Motion Pro software offers six programming languages of which two are text languages and four are graphical languages.

The text languages are:
- IL: Instruction List
- ST: Structured Text language

The graphical languages include:
- LD: Ladder Diagram (FBD reversible)
- FBD: Function Block Diagram (LD reversible)
- SFC: Sequential Function Chart (Grafcet)
- CFC: Continuous Function Chart



Example of sequential function chart (Grafcet)



Example of continuous sequential function chart

Multitask structure

The master task, which controls the synchronization of axes, is sequenced from 1 to 8 ms. This cycle time is linked to the number of configured drives to be synchronized. One auxiliary, non-priority task can be configured to process the automation functions.

To be able to manage reflex actions in response to external events, it is also possible to configure two event-triggered tasks.

Library manager

The library manager lists all the libraries integrated into the project.

- Standard library

The main functions are as follows:
- Processing on character string
- Time delay
- Counting
- Bistable
- Data type conversion
- Mathematical calculation functions
- System

Library manager (continued)

■ Motion library
This library is based on the 3S SoftMotion function library and conforms to the PLCopen standard.

It is composed of administrative function blocks (read/write parameters, statuses etc.) and single-axis and multi-axis function blocks.

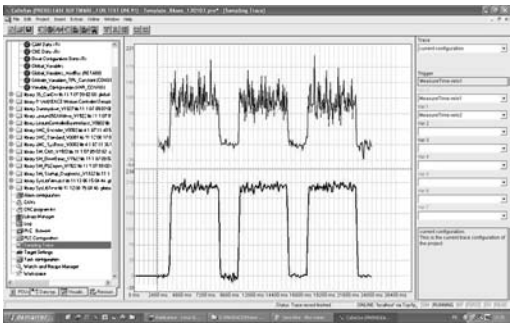
The main functions are as follows:
- □ "Power On", stop, reset
- □ Absolute, relative or additive positioning
- □ Continuous positioning (reaching position at a predetermined speed)
- □ Velocity control
- □ Velocity profile
- □ Position profile
- □ Cam profile
- □ Electronic gearing
- □ Phasing
- □ Programmable cam switch
- □ Linear or circular interpolation

This library also includes application function blocks:
- □ Flying shear
- □ Rotary knife
- □ Grouping/ungrouping
- □ Clamping with torque control

See pages 1/30 and 1/31.

■ User library
With Motion Pro software, it is very easy to create your own function blocks (user library) so as to reduce programming time.

Creating a user library simplifies the standardization and reuse of programs and also allows you to protect your know-how.



Example of trace recording

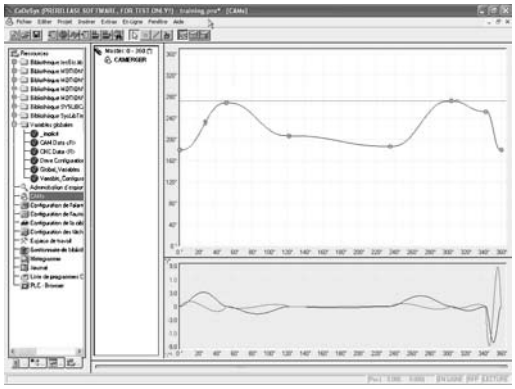
Debugging tools

Motion Pro software offers tools to help the user debug his applications, including:
- ■ Dynamic animation of program blocks
- ■ Breakpoints which allow you to run the program step by step
- ■ Display screens:
  - □ Direct access to the variables of the Lexium Controller motion controller
  - □ Command buttons
  - □ Visualization of dynamic values
  - □ Animation of diagrams

Trace recording

In trace recording, the sequence of variable values is logged during a particular period.

The values are written into a ring memory (trace buffer).
When the memory is full, the oldest values are overwritten. It is possible to record a maximum of 20 variables, each with up to 500 values, at the same time.



Example of cam profile

Cam profile editor

Two graphic editors are incorporated into the programming interface of the Motion Pro software:
- ■ A cam profile editor
- ■ An interpolation profile editor

These editors allow you to create, back up and restore profiles.

1

Comparative table of functions

Functions	Graphic display terminal	Easy Motion mode	Motion Pro mode	
	With application template			Without application template
	For Lexium 05A			For Lexium 15
Configuration of axes and drives				
Mechanical parameters	■	■	■	■
User units	■	■	■	■
Configuration of master encoder	■	■	■	■
Drive parameters	■	■	■	■
Manual mode functionalities				
Power On/Off	■	■	■	■
JOG+/JOG-	■	■	■	■
Absolute or relative positioning	■	■	■	■
Velocity reference	■	■	■	■
Position teaching	■	■	■	■
Set position	■	■	■	■
Homing	■	■	■	■
Automatic mode functionalities				
Execution of motion task table	■	■	■	■
Pre-positioning of motion task table	■	■	■	■
Diagnostics	■	■	■	■
Motion functions				
Configuration	■	■	■	■
Configuration of motion task table	■	■	■	■
Status of motion task table	■	■	■	■
Backup and restore motion task table	■	■	■	■
Programming conforming to standard IEC 61131	■	■	■	■
Cam profile functionalities				
Creation of “CAM” function	■	■	■	■
Cam profile editor	■	■	■	■
XYVA profiles	■	■	■	■
Equidistant point profiles	■	■	■	■
Number of cam profiles	■	■	■	■
Programmable cam switch	■	■	■	■

■ Function accessible ■ Function not accessible ■ Not applicable

Comparative table of functions (continued)

Functions	Graphic display terminal	Easy Motion mode	Motion Pro mode	
	With application template			Without application template
	For Lexium 05A			For Lexium 15
I/O functionalities				
Input forcing and display	■	■	■	■
Output forcing and display	■	■	■	■
Logical functions and combinations	■	■	■	■
Dedicated output: power control	■	■	■	■
Position capture (by Touch Probe input)	■	■	■	■
Distance measurement (by Touch Probe input)	■	■	■	■
Event-triggered tasks	■	■	■	■
Up/Downloading				
Applications (data and program)	■	■	■	■
Table of motion tasks	■	■	■	■
Configuration of drives	■	■	■	■
Programming of logical functions conforming to standard IEC 61131	■	■	■	■
Programming of motion control functions conforming to standard IEC 61131	■	■	■	■
Programming of linear and circular interpolation function blocks in 2½ dimensions	■	■	■	■
CANopen machine bus				
Configuration of slave devices	■	■	■	■
Configuration of Lexium Controller motion controller				
IP address	■	■	■	■
Modbus bus address	■	■	■	■
Profibus DP/DeviceNet bus addresses (via terminal with 8 microswitches)	■	■	■	■
RUN/STOP Lexium Controller	■	■	■	■
Configurable automatic “RUN” mode (default: no)	■	■	■	■
User management				
Password creation	■	■	■	■
Access limited by password	■	■	■	■

■ Function accessible ■ Function not accessible ■ Not applicable

1

Application function block library

Presentation

This library is a function library developed specifically by Schneider Electric.

It contains application functions currently encountered in applications used in the fields of:
- Assembly
- Material handling
- Cutting to length

Each function block comprises a large number of mechanical and application variants.

The use of function blocks:
- Saves programming time
- Saves set-up time
- Makes reading easier

The function blocks available in the library are:
- Flying shear
- Rotary knife
- Grouping/ungrouping
- Clamping with torque control

"Flying shear" function block

This function block optimises the production performance of machines. It enables an operation to be performed on a product without stopping the flow.

The "Flying shear" function block guarantees synchronisation of two linear axes, the master axis conveying the product and the slave axis performing the operation. Once the operation is finished, the slave axis returns to its home position and is resynchronised for the next operation.

This function block is suitable for such diverse applications as:
- Cutting (thick or hard products)
- Gluing
- Inspection
- Assembly
- ...

To meet a wide range of applications, the "Flying shear" function block incorporates numerous mechanical and functional variants:
- Continuous or discontinuous flow
- With or without mark detection
- With or without tolerance window on mark detection
- Dynamic length modification
- Immediate cutting
- Master/slave coefficient

"Rotary knife" function block

Like "Flying shear" function block, this function block optimizes the production performance of machines. It enables an operation to be performed on a product without stopping the flow.

It guarantees synchronization of a linear master axis conveying the product and of a rotary slave axis performing the operation. Once the operation is finished, the slave axis carries on turning to its home position before being resynchronized for the next operation.

This function block is suitable for such diverse applications as:
- Cutting (fine products, flexible products etc.)
- Printing of motifs
- Marking
- …

To meet a wide range of applications, the "Rotary knife" function block incorporates numerous mechanical and functional variants:
- Continuous or discontinuous flow
- With or without mark detection
- With or without tolerance window on mark detection
- Dynamic length modification
- Immediate cutting
- Master/slave coefficient

"Grouping/ungrouping" function block

The "Grouping/Ungrouping" function is very widely used in manufacturing and the handling sector.
It synchronizes several linear axes so that products can be sorted and grouped on a conveyor, with defined spacing between products/groups.

The function is suitable for applications requiring handling:
- Of products of different sizes
- Of fragile products
- With low acceleration/deceleration to avoid products sliding on the conveyor.

To meet a wide range of applications, the "Grouping/ungrouping" function block takes account of numerous mechanical and functional variants:
- Different groups of products possible
- Fixed or variable spacing between groups and products
- Number and type of conveyors that can be adapted to the application requirements

"Clamping" function block

This function block provides automatic tightening of a part with torque control to avoid marking the part.

The logical sequence is carried out in three steps:
- Rapid approach
- Tightening
- Rapid release

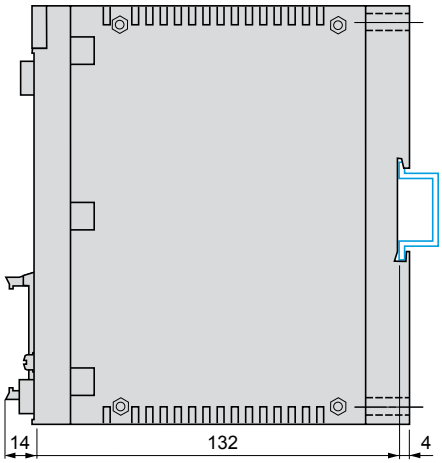
This function block is suitable for such diverse applications as:
- Shoeing/welding
- Machine tool chucking
- Inspection
- Assembly/shrink fitting
- …

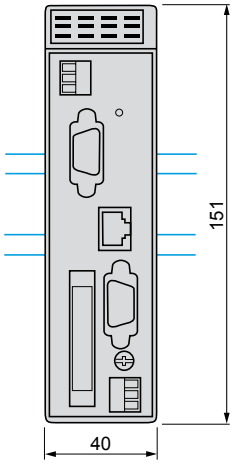
To meet a wide range of applications, the "Clamping" function block incorporates numerous mechanical and functional variants:
- Automatic measurement of approach distance
- With or without teach function

Lexium Controller motion controllers

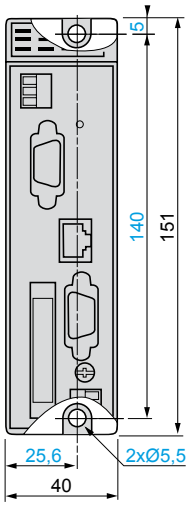
Lexium Controller motion controller LMC 10 *(1)*

Mounting on 35 mm ⊔ rail



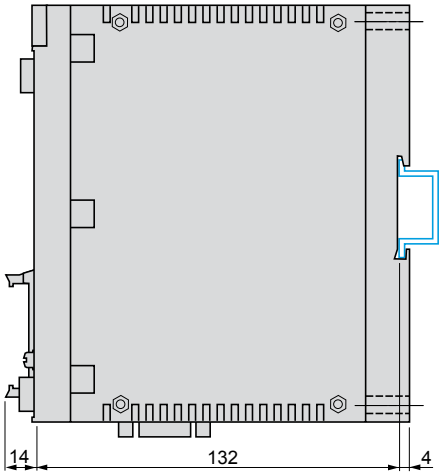


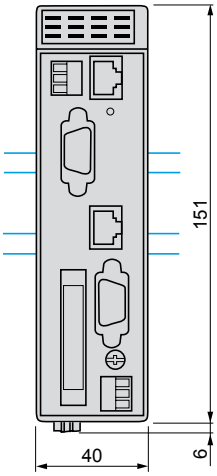
Screw fixing



Lexium Controller motion controller LMC 20 *(1)*

Mounting on 35 mm ⊔ rail





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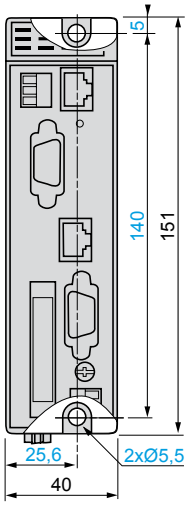
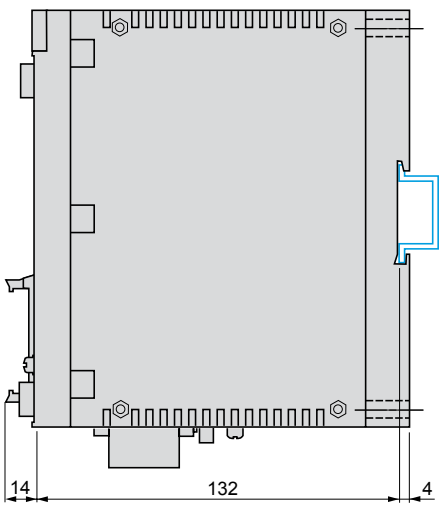
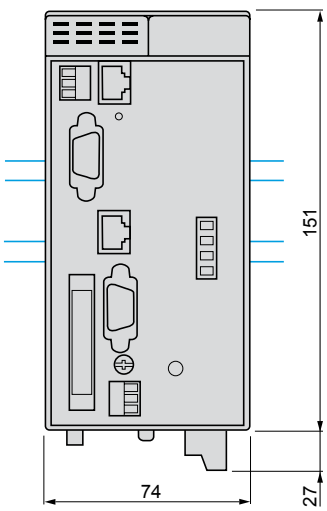


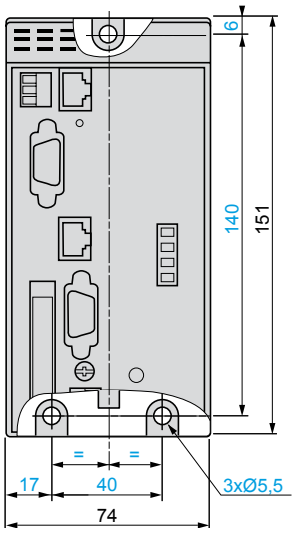
Lexium Controller motion controllers LMC 20A1307 and LMC 20A1309 *(1)*

Mounting on 35 mm ⊔ rail





Screw fixing



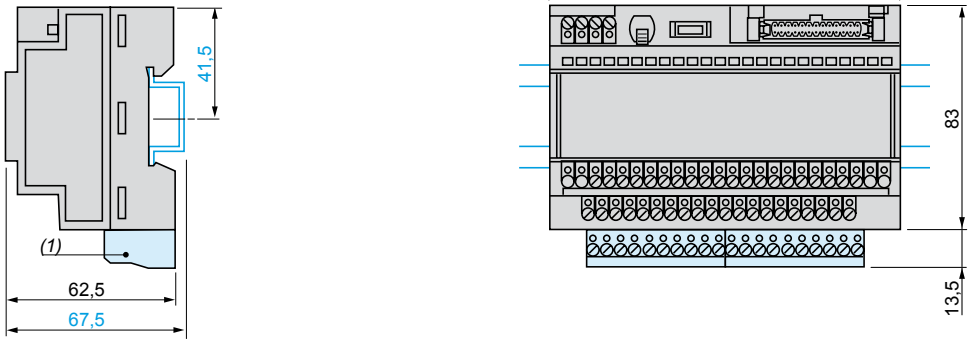
(1) Leave 50 mm free space above and below the unit for cooling purposes.

Presentation: page 1/2
Characteristics: page 1/8
References: page 1/14
Schemes: page 1/34

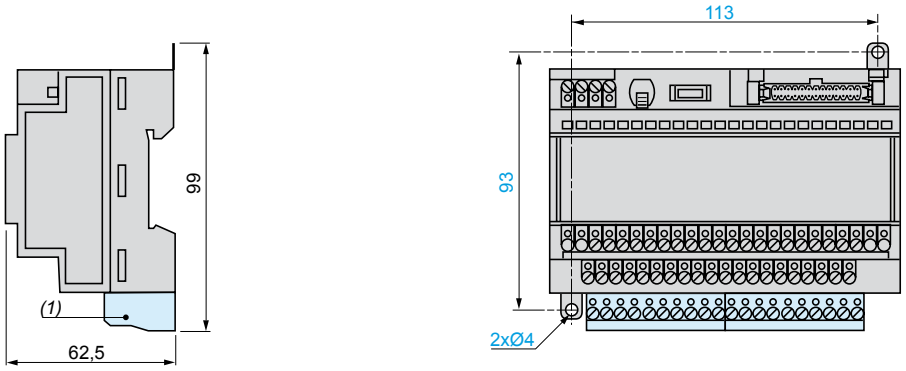
1

Telefast® connection bases ABE7 B20MPN2●

Mounting on 35 mm ⊔ rail



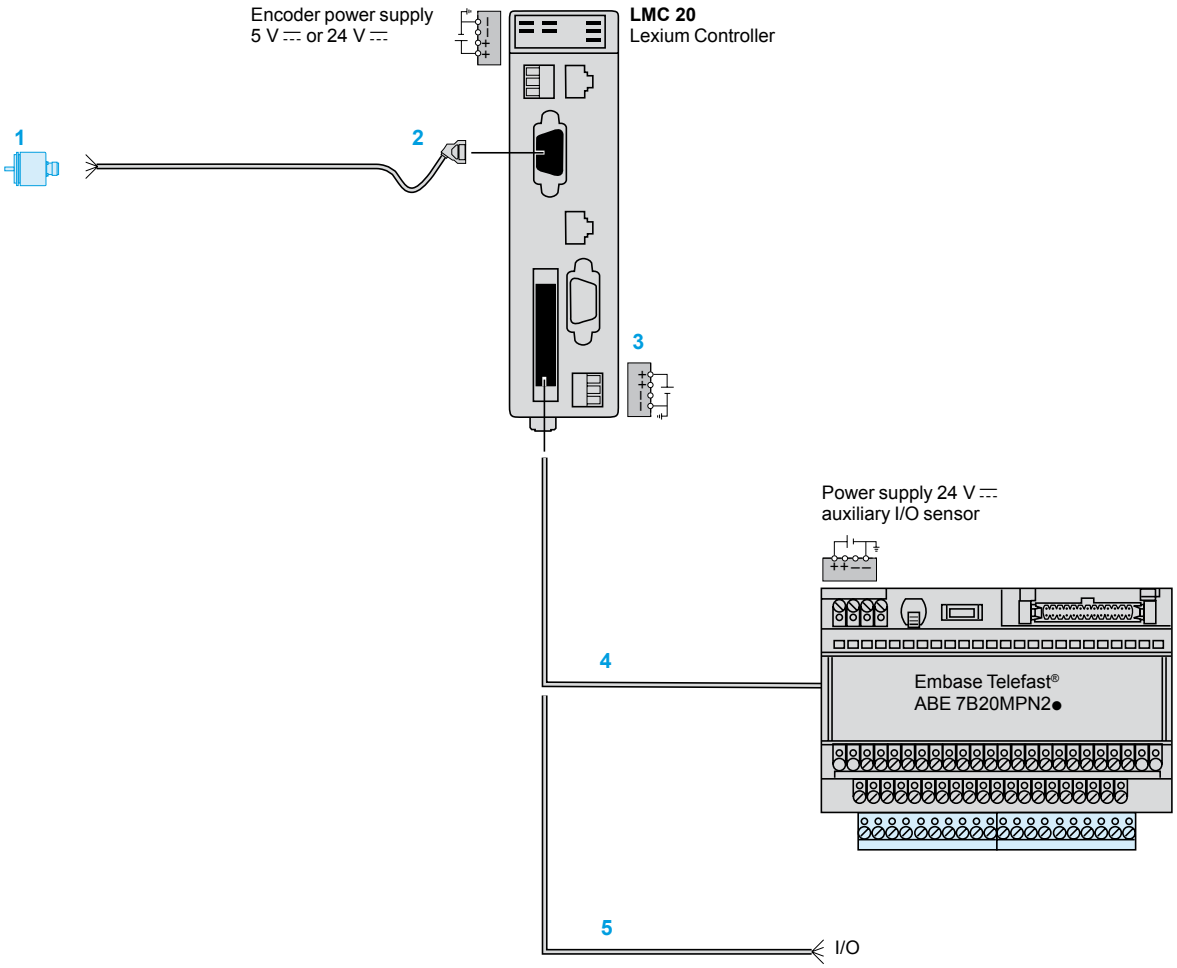
Screw fixing (retractable lugs)



(1) ABE7 BV20, ABE7 BV20TB (please refer to the "Programmable controller Twido" catalogue or visit "www.schneider-electric.com").

Lexium Controller motion controllers

Example of connection of the Lexium Controller motion controller

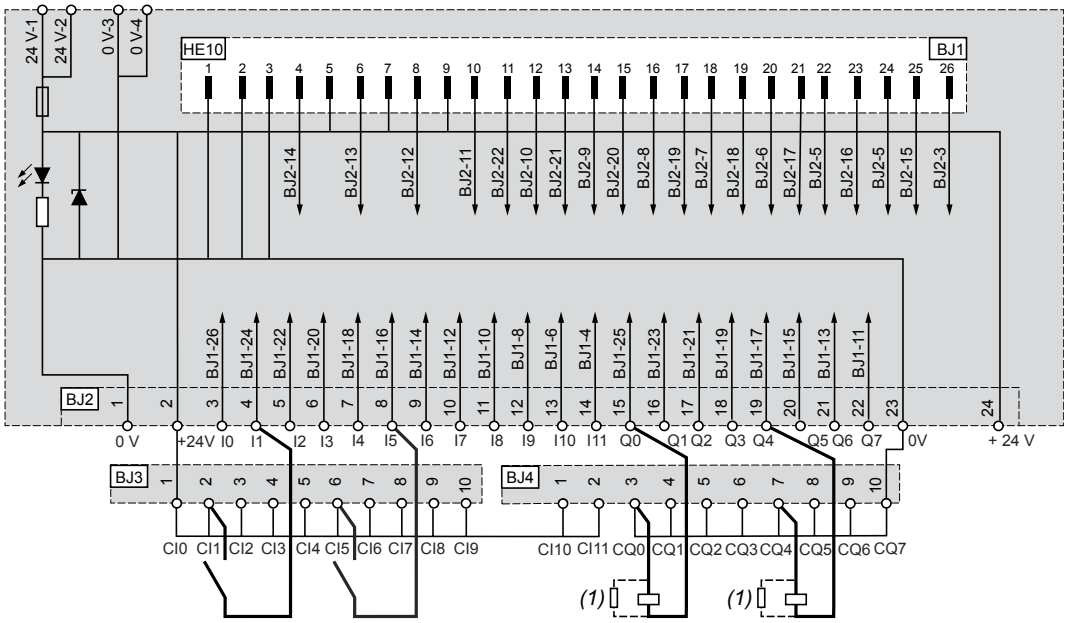


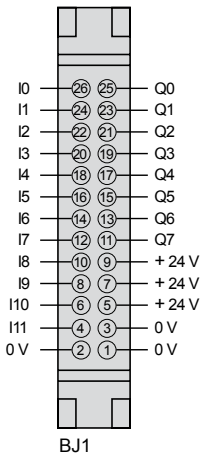
Components for use with the Altivar	
Repère	**Description**
1	Incremental encoder type XCC 1 or SSI series absolute encoder type XCC 3. Please refer to the “Osicoder” catalogue or visit “www.schneider-electric.com”.
2	VW3 M4 701 cable
3	Phaseo (TBTS) 24 V ⎓ power supply. Please refer to the “Power supplies & transformers - Phaseo” catalogue or visit “www.schneider-electric.com”.
4	ABF T26B●●● cable
5	Cable (not supplied) for direct connection to HE 10 female connector supplied with Lexium Controller LMC ●●

Telefast® I/O connection bases

ABE7 B20MPN20

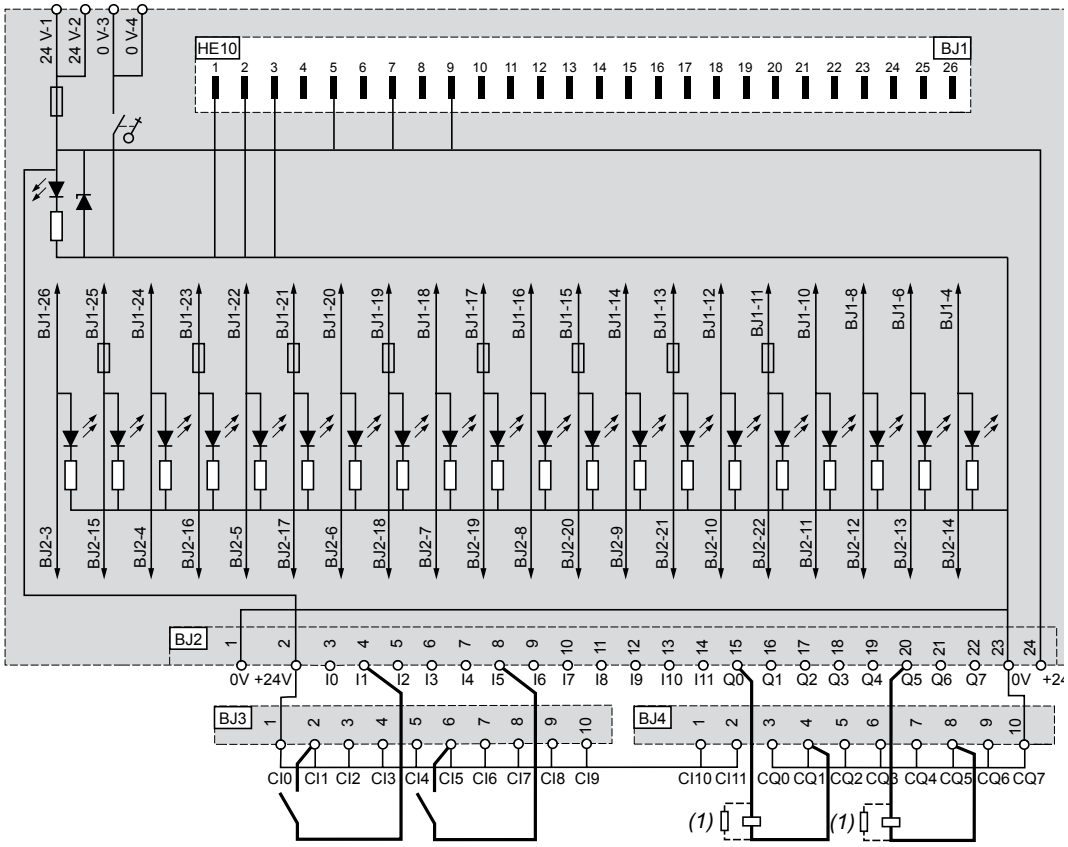
HE 10, 26-way

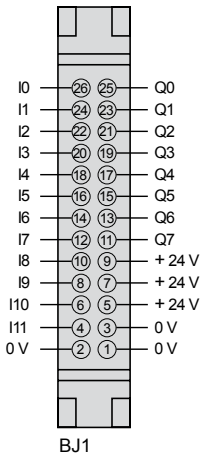




ABE7 B20MPN22

HE 10, 26-way





(1) Example of output connections.
For an inductive load, a diode or varistor is required.

Contents

2 - Lexium 05 motion control

Lexium 05 motion control
Presentation

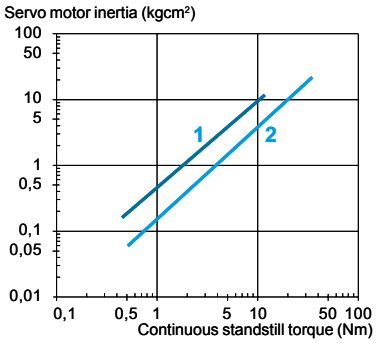
Lexium 05 servo drive

BRH servo motor

Lexium 05 servo drive

BSH servo motor

Lexium 05: A servo drive offer from Schneider Electric



Inertia of BRH 1 and BSH 2 servo motors as a function of the continuous standstill torque

A comprehensive offer

When used in combination with BRH and BSH servo motors, Lexium 05 servo drives satisfy requirements for high speed, speed accuracy and high dynamic performance.

This offer covers a wide range of supply voltages and power ratings:

■ **Lexium 05 servo drives:**
- □ 100…120 V single-phase, 0.4 to 0.85 kW (LXM 05●●●●F1)
- □ 200…240 V single-phase, 0.4 to 2.5 kW (LXM 05CU70M2, LXM 05●D●●M2)
- □ 200…240 V three-phase, 0.75 to 3.2 kW (LXM 05●●●●M3X)
- □ 380…480 V three-phase, 1.4 to 6 kW (LXM 05●●●●N4)

■ **BRH servo motors:**
- □ Nominal torque: 0.41 to 10 Nm
- □ Nominal speed: 1500 to 6000 rpm

■ **BSH servo motors:**
- □ Nominal torque: 0.43 to 28.2 Nm
- □ Nominal speed: 1500 to 6000 rpm

The Lexium 05 offer also includes GBX planetary gearboxes. These are available in 15 reduction ratios ranging from 3:1 to 100:1.
GBX gearboxes are cost-effective, easy to mount and lubricated for life and are designed for applications which are not susceptible to mechanical backlash.

The Lexium 05 offer can also be used with Lexium Controllers. This combination constitutes a simple, cost-effective solution that offers the exact level of performance for compact or modular machines requiring axis synchronization.

Lexium 05 servo drives comply with EN 50178 and IEC/EN 61800-3 international standards and carry UL (USA) and cUL (Canada) approvals and CE marking.

Dynamic and powerful

BRH and BSH servo motors are synchronous three-phase motors. They feature a SinCos Hiperface® encoder and are available with or without a holding brake.

The high dynamic performance of BSH servo motors and the speed accuracy of BRH servo motors are enhanced by the fast sampling time of the Lexium 05 servo drive control loops:
- ■ 62.5 µs for the current loop
- ■ 250 µs for the speed loop
- ■ 250 µs for the position loop

BRH servo motors

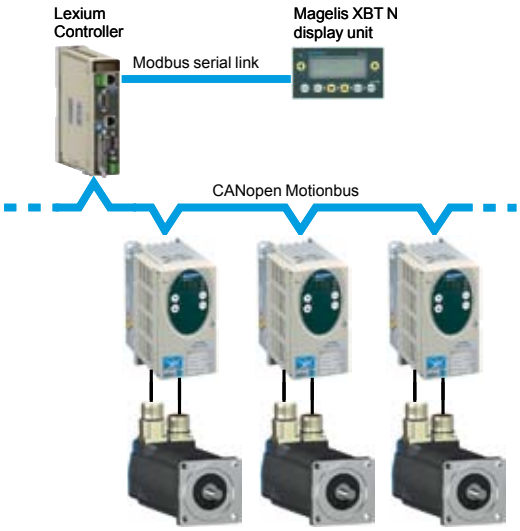
BRH servo motors are designed in particular to satisfy the requirements for high speed and speed accuracy thanks to the rotor inertia 1.

BSH servo motors

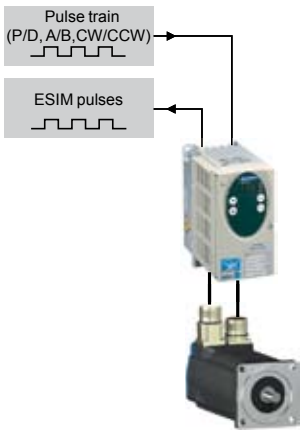
Thanks to their new winding technology based on salient poles, BSH servo motors are compact and offer a high power density.
The low rotor inertia 2 satisfies the requirements for high dynamic performance.

Functions: pages 2/16, 2/76 and 2/110
Characteristics: pages 2/24, 2/78 and 2/112
References: pages 2/30, 2/96 and 2/138
Dimensions: pages 2/44, 2/100 and 2/142
Schemes: page 2/48

Lexium 05 motion control
Presentation



Lexium 05A servo drive controlled by the Lexium Controller via the CANopen Motionbus



Electronic gearing mode (pulse position control)

A complete unit

The Lexium 05 offer integrates functions and components that are usually external, thus saving space and making it easier to integrate the servo drive into control enclosures or machines.

Electromagnetic compatibility (EMC)

The incorporation of class A EMC filters in LXM 05●●●●F1, LXM 05●●●●M2 and LXM 05●●●●N4 servo drives simplifies installation provides a very economical means of complying with CE marking requirements.
LXM 05●●●●M3X servo drives do not include an EMC filter. Filters are available as an option and can be installed by the user to reduce emission levels (see page 2/41).

Safety

LXM 05A●●●●●● and LXM 05B●●●●●● servo drives are incorporated into an installations's safety system. They integrate the Power Removal safety function which prevents unintended operation of the motor.
This function complies with machine safety standard ISO 13849-1, performance level “d” (PL d), standard IEC/EN 61508 SIL2 governing electrical installations and the power drive systems standard IEC/EN 61800-5-2.

Braking

The Lexium 05 servo drive integrates a resistor as standard, which does away with the need to use an external braking resistor in most applications.

Control and interfaces

Lexium 05 servo drives can be controlled by numerous operating modes:
- Point-to-point mode: Relative and absolute movements
- Motion sequence mode: Sequencing configurable relative and absolute movements
- Electronic gearing mode (pulse position control)
- Speed control with acceleration/deceleration ramp
- Instantaneous speed control
- Current control

The Lexium 05 servo drive also features conventional adjustment modes, such as manual mode (JOG), for easy setup.

Depending on the model, the Lexium 05 servo drive has four control interfaces as standard:
- One interface for the CANopen, Modbus or PROFIBUS DP communication buses and networks
- One interface for the CANopen Motionbus
- A maximum of 2 ± 10 V analog setpoint inputs to give the speed or current setpoint and limit the speed or current
- A maximum of 2 RS 422 inputs (pulse/direction signals (P/D), A/B or CW/CCW type encoder signals) The RS 422 input can be:
  - Connected to an external encoder, which can be used as a reference for position control
  - Configured as an ESIM (Encoder SIMulation) output for encoder emulation

These interfaces are supplemented by logic I/O which can be used as follows in order to adapt to the different axis controllers available on the market:
- In positive logic (Sink input, Source output)
- In negative logic (Source input, Sink output)

Lexium 05 motion control
100…120 V single-phase supply voltage
Servo drive/servo motor combinations

Lexium 05A or 05B servo drive/BRH or BSH servo motor combinations

Servo motors

Lexium 05A and 05B servo drives
100…120 V single-phase supply voltage with integrated EMC filter

BRH (IP 41 or IP 56)	BSH (IP 50 or IP 65)	LXM 05AD10F1, BD10F1 Continuous output current: 4 A rms			
		Nominal operating point			Standstill torques
		Nominal torque	Nominal speed	Nominal power	M_0 / M_{max} (1)
		Nm	rpm	W	Nm/Nm
BRH 0571T		0.43	3000	135	0.46/1.15
	BSH 0551T	0.46	3000	150	0.5/1.4
BRH 0572P		0.73	1500	120	0.76/2.07
	BSH 0552T	0.8	3000	250	0.9/1.77
BRH 0573P					
	BSH 0553T				
	BSH 0701T	1.2	3000	380	1.4/2.42
BRH 0574P					
BRH 0851P					
	BSH 0702T				
	BSH 0703T				
BRH 0852P					
	BSH 1001T				
BRH 0853P					
BRH 0854P					

(1) - M_0: Continuous standstill torque
- M_{max}: Peak standstill torque

LXM 05AD17F1, BD17F1 Continuous output current: 8 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} *(1)*
Nm	rpm	W	Nm/Nm
0.8	3000	250	0.9/2.7
1	1500	160	1.05/3.9
1.1	3000	350	1.3/3.31
1.22	1500	190	1.3/4.73
1.76	1500	280	1.86/4.61
1.83	3000	570	2.12/4.14

LXM 05AD28F1, BD28F1 Continuous output current: 15 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} *(1)*
Nm	rpm	W	Nm/Nm
2.4	3000	750	2.8/7.38
2.78	1500	440	3.1/8.7
3.16	1500	500	3.4/8.5
3.65	1500	570	4.2/9.7
4.71	1500	740	5.3/13

Lexium 05 motion control
200…240 V single-phase supply voltage
Servo drive/servo motor combinations

Lexium 05A, 05B or 05C servo drive/BRH or BSH servo motor combinations

Servo motors

Lexium 05A, 05B and 05C servo drives
200…240 V single-phase supply voltage with integrated EMC filter

BRH (IP 41 or IP 56)	BSH (IP 50 or IP 65)	LXM 05CU70M2 Continuous output current: 3 A rms			
		Nominal operating point			Standstill torques
		Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} *(1)*
		Nm	rpm	W	Nm/Nm
BRH 0571T		0.41	6000	260	0.46/0.88
BRH 0571P		0.43	3000	135	0.46/1.26
	BSH 0551T	0.46	3000	150	0.5/1.08
BRH 0572P		0.7	3000	220	0.76/1.55
	BSH 0552T	0.77	3000	240	0.77/1.31
	BSH 0552P	0.81	3000	250	0.9/2.17
	BSH 0552M	0.85	1500	130	0.9/2.3
BRH 0573P					
BRH 0574P					
	BSH 0553P				
	BSH 0553T				
	BSH 0553M				
	BSH 0701P				
	BSH 0701T				
BRH 0851P					
BRH 0851M					
	BSH 0702P				
	BSH 0702T				
	BSH 0702M				
BRH 0852P					
	BSH 0703P				
	BSH 0703T				
BRH 0852M					
BRH 0853P					
	BSH 0703M				
	BSH 1001T				
BRH 0853M					
BRH 0854P					
BRH 0854M					
BRH 1101P					
	BSH 1002P				
	BSH 1003P				
BRH 1102P					
BRH 1103P					

(1) - M_0: Continuous standstill torque
- M_{max}: Peak standstill torque

LXM 05AD10M2, BD10M2, CD10M2 Continuous output current: 4 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} *(1)*
Nm	rpm	W	Nm/Nm
0.41	6000	260	0.46/1.15
0.43	6000	270	0.5/1.4
0.7	3000	220	0.76/2.07
0.71	6000	450	0.9/1.77
0.81	3000	250	0.9/2.7
0.85	1500	130	0.9/2.3
0.91	4500	430	1.05/2.43
1.1	3000	350	1.3/3.18
1.2	1500	190	1.3/3.5
1.3	3000	400	1.4/2.66
1.66	3000	520	1.86/3.4
1.9	3000	600	2.12/4.57
2	1500	300	2.12/5.63
2.63	1500	400	2.8/8.6

LXM 05AD17M2, BD17M2, CD17M2 Continuous output current: 8 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} *(1)*
Nm	rpm	W	Nm/Nm
1.08	4500	510	1.3/4.73
1.1	3000	350	1.3/3.31
1.3	3000	400	1.4/3.19
1.55	4500	730	1.86/4.61
1.9	3000	600	2.12/5.63
1.9	3000	600	2.12/4.14
2.4	3000	750	2.8/7.16
2.45	3000	770	3.1/7.81

LXM 05AD28M2, BD28M2, CD28M2 Continuous output current: 15 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} *(1)*
Nm	rpm	W	Nm/Nm
1.9	3000	600	2.12/6.8
2.13	4500	1000	3.1/8.7
2.4	3000	750	2.8/10.3
2.4	3000	750	2.8/7.38
2.55	4500	1200	4.2/9.7
2.9	3000	900	3.4/8.5
3.1	3000	970	4.2/13
4	3000	1250	5.3/13
4	3000	1250	5.3/15.8
4.5	3000	1400	5.2/14
4.96	1500	780	5.5/16
6.73	1500	1100	7.8/19.69
7.83	1500	1250	9/18.4
10	1500	1550	12/21

Lexium 05 motion control

200…240 V three-phase supply voltage

Servo drive/servo motor combinations

Lexium 05A or 05B servo drive/BRH or BSH servo motor combinations

Servo motors

Lexium 05A and 05B servo drives

200…240 V three-phase supply voltage without integrated EMC filter

BRH (IP 41 or IP 56)	BSH (IP 50 or IP 65)	LXM 05AD10M3X, BD10M3X Continuous output current: 4 A rms			
		Nominal operating point			Standstill torques
		Nominal torque	Nominal speed	Nominal power	M_0 / M_{max}
		Nm	rpm	W	Nm/Nm
BRH 0571T		0.41	6000	260	0.46/1.15
	BSH 0551T	0.43	6000	270	0.5/1.4
BRH 0572P		0.64	6000	400	0.76/2.07
	BSH 0552T	0.71	6000	450	0.9/1.77
	BSH 0552P	0.81	3000	250	0.9/2.7
	BSH 0552M	0.85	1500	130	0.9/2.3
BRH 0573P		0.91	4500	430	1.05/2.43
BRH 0574P					
	BSH 0553P	1.1	3000	350	1.3/3.18
	BSH 0553T				
	BSH 0553M	1.2	1500	190	1.3/3.5
	BSH 0701T	1.3	3000	400	1.4/2.42
	BSH 0701P	1.3	3000	400	1.4/2.66
	BSH 0701M	1.36	1500	210	1.4/2.66
BRH 0851P					
BRH 0851M					
	BSH 0702P	1.9	3000	600	2.12/4.57
	BSH 0702T				
	BSH 0702M	2	1500	300	2.12/5.63
BRH 0852P					
	BSH 0703P				
	BSH 0703T				
BRH 0852M					
BRH 0853P					
	BSH 0703M	2.63	1500	400	2.8/8.6
	BSH 1001T				
BRH 0853M					
	BSH 1001P				
BRH 0854M					
BRH 0854P					
	BSH 1002T				
BRH 1101P					
	BSH 1002P				
	BSH 1003P				
	BSH 1401T				
BRH 1102P					
	BSH 1004P				
	BSH 1402T				
BRH 1103P					
	BSH 1402P				

(1) - M_0: Continuous standstill torque
- M_{max}: Peak standstill torque

Functions: pages 2/16, 2/76 and 2/110
Characteristics: pages 2/24, 2/78 and 2/112
References: pages 2/30, 2/96 and 2/138
Dimensions: pages 2/44, 2/100 and 2/142
Schemes: page 2/48

LXM 05AD17M3X, BD17M3X Continuous output current: 8 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0 / M_{max}
Nm	rpm	W	Nm/Nm
1.08	4500	510	1.3/4.73
1.1	3000	350	1.3/3.31
1.3	3000	400	1.4/3.19
1.55	4500	730	1.86/4.61
1.66	3000	520	1.86/5.27
1.9	3000	600	2.12/5.63
2.4	3000	750	2.8/7.16
2.45	3000	770	3.1/7.81
3.1	3000	970	4.2/7.73
3.16	1500	500	3.4/7.1
4	3000	1250	5.3/9.2
4.96	1500	780	5.5/11.23

LXM 05AD42M3X, BD42M3X Continuous output current: 17 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0 / M_{max}
Nm	rpm	W	Nm
1.9	3000	600	2.12/6.8
2.13	4500	1000	3.1/10.8
2.4	3000	750	2.8/10.25
2.55	4500	1200	4.2/13.6
2.9	3000	900	3.4/8.5
4	3000	1250	5.3/18.3
4.4	3000	1400	5.5/16
4.5	3000	1400	5.2/16.2
6.73	1500	1100	7.8/23.17
6.9	3000	2200	11.4/23.33
7.83	1500	1250	9/26
8.22	1500	1300	9.31/35.7
9.2	3000	2900	14.4/24.56
10	1500	1550	12/30.3
15	1500	2350	19.2/41.94

Lexium 05 motion control
380…480 V three-phase supply voltage
Servo drive/servo motor combinations

Lexium 05A, 05B or 05C servo drive/BRH or BSH servo motor combinations

Servo motors

Lexium 05A, 05B and 05C servo drives
380…480 V three-phase supply voltage with integrated EMC filter

BRH (IP 41 or IP 56)	BSH (IP 50 or IP 65)	LXM 05AD14N4, BD14N4, CD14N4 Continuous output current: 6 A rms			
		Nominal operating point			Standstill torques
		Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} (1)
		Nm	rpm	W	Nm/Nm
BRH 0571P		0.41	6000	260	0.46/1.39
BRH 0572P		0.64	6000	400	0.76/2.46
	BSH 0552P	0.81	3000	250	0.9/2.7
BRH 0573P		0.87	6000	550	1.05/3
BRH 0574P					
	BSH 0553P	1.1	3000	350	1.3/3.87
BRH 0851M		1.45	6000	910	1.86/4.05
BRH 0851P					
BRH 0852M					
BRH 0852P					
	BSH 0702P	1.9	3000	600	2.12/5.63
BRH 0853M					
BRH 0854P					
BRH 0854M					
	BSH 0703M	2.4	3000	750	2.8/8.6
	BSH 0703P				
	BSH 1001P				
	BSH 1001M	3.16	1500	500	3.4/7.1
BRH 1101P					
	BSH 1002P				
BRH 1102P					
	BSH 1002M	4.96	1500	780	5.5/13.3
	BSH 1003P				
	BSH 1003M				
	BSH 1401P				
	BSH 1004P				
BRH 1103P					
	BSH 1402P				
	BSH 1404P				
	BSH 1403P				
	BSH 1402M				
	BSH 1403M				
	BSH 1404M				
	BSH 2051M				

(1) - M_0: Continuous standstill torque
- M_{max}: Peak standstill torque

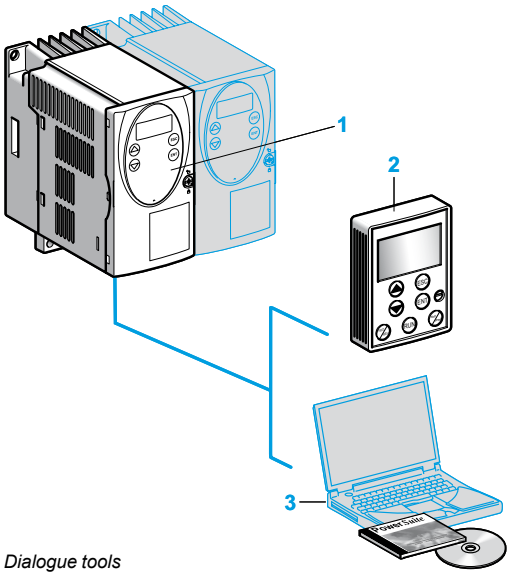
Functions: pages 2/16, 2/76 and 2/110
Characteristics: pages 2/24, 2/78 and 2/112
References: pages 2/30, 2/96 and 2/138
Dimensions: pages 2/44, 2/100 and 2/142
Schemes: page 2/48

LXM 05AD22N4, BD22N4, CD22N4 Continuous output current: 9 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} *(1)*
Nm	rpm	W	Nm/Nm
1	6000	630	1.3/4.9
1.45	6000	910	1.86/5.34
1.8	6000	1150	3.1/9.51
2.2	6000	1400	4.8/9.3
2.4	3000	750	2.8/8.75
2.92	3000	900	3.4/7.1
4.4	3000	1400	5.5/13.92
6.73	1500	1100	7.8/23.17

LXM 05AD34N4, BD34N4, CD34N4 Continuous output current: 15 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} *(1)*
Nm	rpm	W	Nm/Nm
1.8	6000	1150	3.1/7.95
2	6000	1250	4.2/12
2.2	6000	1400	5.3/14.5
4.04	4500	1900	5.2/13
4.58	4500	2150	9/16.7
5.7	3000	1800	7.8/23.01
6.9	3000	2200	11.4/23.33
7.1	3000	2200	9.31/23.47
7.5	3000	2360	12/18.9
15	1500	2350	19.2/47.5
17.2	1500	2700	25.4/68

LXM 05AD57N4, BD57N4, CD57N4 Continuous output current: 25 A rms			
Nominal operating point			Standstill torques
Nominal torque	Nominal speed	Nominal power	M_0/ M_{max} *(1)*
Nm	rpm	W	Nm/Nm
7.1	3000	2200	9.31/35.7
7.5	3000	2360	12/30.3
10.8	3000	3400	19.2/47.5
10.8	3000	3400	32.1/63.09
12.43	3000	3900	25.4/57.32
20.3	1500	3200	25.4/71.7
24.9	1500	3900	32.1/95
28.2	1500	4500	34.4/110

Lexium 05 motion control
Setup and dialogue tools



Dialogue tools

Simplicity

Integration

The high level of integration, compact size, facility to mount the servo drives side-by-side and their ability to operate at ambient temperatures of 50°C without derating, all mean that enclosures can be smaller.
Low-power servo drives can be mounted on DIN rails.

Wiring

Spring terminals are used to reduce wiring time and avoid periodic checking of tightening torques.

Setup

Using the SinCos Hiperface® encoders on BRH and BSH servo motors, the Lexium 05 servo drive automatically receives data from the servo motor.
The servo motor parameters do not need to be set manually.

The “Simply Start” menu available with the PowerSuite software workshop ensures that the installation can function within a few seconds.

The Lexium 05 auto-tuning function and its new algorithm automatically define the optimum gains of the control loops in accordance with the mechanics for different types of movement, including vertical movements.

The oscilloscope function in the PowerSuite software workshop is used to display the electrical and mechanical values of the axis. The Fourier series transform (FFT) can be used for fine analysis of the signals from the machine.

Dialogue tools

Integrated 7-segment display terminal 1

The Lexium 05 servo drive is supplied with an integrated 7-segment display terminal, which is used for setting the servo drive parameters, displaying errors and monitoring.
It can also be used to control the servo drive in manual mode.

Remote LCD display terminal 2

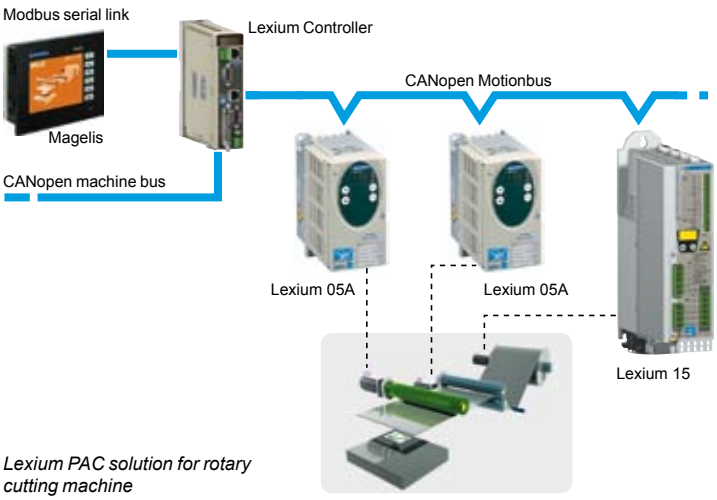
Available as an option, this can be mounted on an enclosure door so that the monitoring and adjustment functions and the manual mode are always accessible.
Its IP 65 protection makes it suitable for use in difficult environments.

PowerSuite software workshop 3

The PowerSuite software workshop is used to configure, adjust and debug the Lexium 05 axis in the same way as for all other Schneider Electric variable speed drives and starters.
It can be used with a direct connection or a Bluetooth® wireless connection.
See page 2/74.

Lexium 05 motion control
Lexium PAC solution

Example of a Lexium PAC solution



Lexium PAC solution for rotary cutting machine

Presentation

The Lexium PAC offer is Schneider Electric's axis coordination and synchronization solution.

This comprehensive, cost-effective, high-performance solution is based on combining the Lexium Controller motion controller with the Lexium 05 and Lexium 15 offers.

Applications

The Lexium PAC solution is dedicated to the following types of application:
- Handling equipment (conveyors, palletizers, storage and retrieval systems) and transfer machines (gantry cranes, etc.)
- Assembly machines (tool fitting, clamping, etc.)
- Inspection and quality control machines (testing machines, etc.)
- Machines for working “on the fly” (flying shear, printing, marking, etc.)

Control and motion control functions

This solution can be used to perform standard control and motion control functions:
- Control and command of up to 8 synchronized real axes with a maximum cycle time of 2 ms for 4 axes and 4 ms for 8 axes
- Speed and torque control
- Relative or absolute positioning
- Cam profiles for slave axes and programmable cam switch control
- Virtual axis function
- Electronic gearing function for speed and position
- Linear and circular interpolations (2½D)
- Master axis via external encoder
- Distance measurement and position capture on high-speed (30µs) discrete input
- Motion position sequencing with a preset end speed (blending)

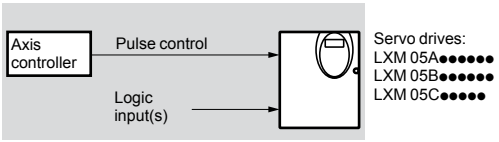
Application function block library

This function block library, specially developed by Schneider Electric, integrates global application functions and thus significantly reduces programming and setup time.

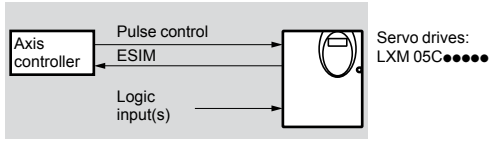
The function blocks available in the library are:
- Flying shear
- Rotary knife
- Grouping/ungrouping
- Clamping with torque control

Presentation:
page 1/2

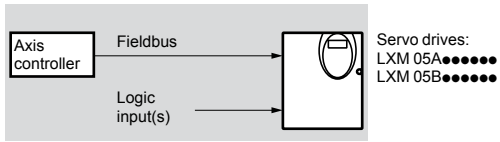
Lexium 05 motion control
Lexium 05A, 05B and 05C servo drives
Presentation



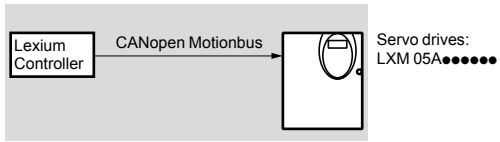
Pulse control



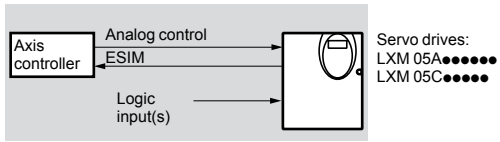
Pulse control and ESIM (Encoder SIMulation) output



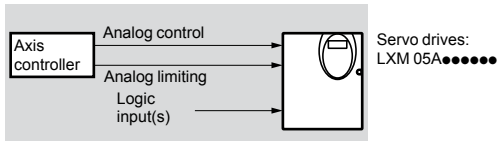
Control via fieldbus



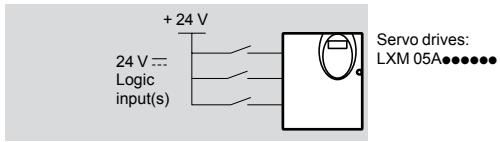
Control via CANopen Motionbus (see Lexium PAC solution on page 2/13)



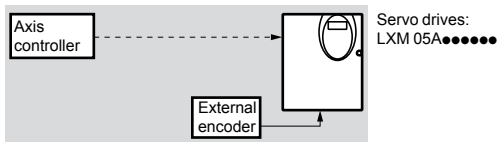
Control via analog input



Control with limiting via analog input



Standalone operation via logic inputs



Closed position loop operation via external encoder

The Lexium 05A, 05B and 05C servo drive range

The Lexium 05A servo drive: Versatility in terms of architectures

The versatility offered by the Lexium 05A servo drive's characteristics means that it can be used with a number of different axis controllers available on the market and integrated into numerous architectures.

It can also be used in standalone operation, without an axis controller.

The Lexium 05A servo drive comprises:
- 1 RS 422 interface
- 2 analog inputs
- 6 x 24 V ⎓ logic inputs, 3 of which are reassignable
- 2 reassignable 24 V ⎓ logic outputs
- Interfaces for CANopen machine bus, CANopen Motionbus and Modbus serial link

The Lexium 05B servo drive: Control via PROFIBUS DP

The Lexium 05B servo drive features a PROFIBUS DP bus control interface. In addition to this control interface, the Lexium 05B servo drive can also be controlled via an RS 422 interface and logic I/O.

It also has a Modbus serial link interface allowing easy configuration via the PowerSuite software workshop.

The Lexium 05C servo drive: Control via I/O

The Lexium 05C servo drive is ideal for control via I/O or pulse train.

It includes numerous I/O and interfaces:
- 1 analog input
- 6 x 24 V ⎓ logic inputs, 5 of which are reassignable
- 3 reassignable 24 V ⎓ logic outputs
- 2 RS 422 interfaces, one of which features a pulse control input and an ESIM (Encoder SIMulation) output

Like the Lexium 05A and Lexium 05B servo drives, it has the Modbus serial link interface for easy configuration via the PowerSuite software workshop.

Possible architectures

Lexium 05 servo drives are designed for use in different types of architecture. The table below shows the types of architecture available for each servo drive:

Architecture	Servo drive		
	Lexium 05A	Lexium 05B	Lexium 05C
Pulse control	■	■	■
Pulse control and ESIM output	■	■	■
Control via fieldbus	■	■	■
Control via CANopen Motionbus	■	■	■
Control via analog input	■	■	■
Control with limiting via analog input	■	■	■
Standalone operation via logic inputs	■	■	■
Closed position loop operation via an encoder (external or servo motor)	■	■	■

■ Architecture available

■ Architecture not available

Lexium 05 motion control

Lexium 05A, 05B and 05C servo drives

Main functions

Main functions				
Type of servo drive		**LXM 05A●●●F1, LXM 05A●●●M2, LXM 05A●●●M3X, LXM 05A●●●N4**	**LXM 05B●●●F1, LXM 05B●●●M2, LXM 05B●●●M3X, LXM 05B●●●N4**	**LXM 05C●●●M2, LXM 05C●●●N4**
Communication	Integrated	Modbus		
		CANopen, CANopen Motionbus	PROFIBUS DP	–
	Operating modes	Manual (JOG), speed control, current control, electronic gearing (pulse position control)		
		Homing, point to point, speed profile		–
		Motion sequence	–	
	Functions	Auto-tuning, monitoring, stopping, conversion		
		Stop window, rapid entry of position values		–
24 V ⎓ logic inputs *(1)* (number and assignment)	Assigned inputs	3, assigned to the following functions: power bridge enable, Power Removal (negative logic)	6, assigned to the following functions: servo motor stop, Power Removal, limit switches and homing switches, rapid entry of position values	1, assigned to the power bridge enable function
	Reassignable inputs	3 - Possible assignments: fault reset/acknowledgement, servo motor stop, starting point to point motion, authorizing servo motor motion (in positive or negative direction), manual movement (positive/negative, fast/slow), speed limiting, inversion of the analog setpoint, starting a motion sequence, limit switches and homing switches, rapid entry of position values	–	5 - Possible assignments: fault reset/acknowledgement, servo motor stop, authorizing servo motor motion (in positive or negative direction), manual movement (positive/negative, fast/slow), speed limiting
24 V ⎓ logic inputs *(1)* (number and assignment)	Assigned outputs	–	2, assigned to the following functions: servo drive fault, control of holding brake controller	–
	Reassignable outputs	2 - Possible assignments: servo drive fault, servo drive ready, servo motor motion blocked, position (or speed) error in configured range, stop acknowledgement, HBC control, servo motor current value less than configured value, servo motor speed value less than configured value, acknowledgement on motion sequence start request, motor stopped	–	3 - Possible assignments: servo drive fault, servo drive ready, servo motor motion blocked, position (or speed) error in configured range, stop acknowledgement, HBC control, servo motor current value less than configured value, servo motor speed value less than configured value
Analog inputs (number and assignment)		2, assigned to: speed or current setpoint, speed or current limiting	–	1, assigned to the speed or current setpoint
RS 422 interfaces (number and configuration)		1, configurable as: ■ Electronic gearing input (A/B, P/D or CW/CCW signals) or ■ Input for external encoder to close the position loop (A/B signals) or ■ ESIM (Encoder SIMulation) output (A/B signals)	1, configurable as: ■ Electronic gearing input (A/B or CW/CCW signals) or ■ ESIM (Encoder SIMulation) output (A/B signals)	2, configurable as: ■ 1 electronic gearing input (A/B, P/D or CW/CCW signals) and ■ 1 ESIM (Encoder SIMulation) output (A/B signals)
Human/Machine Interface (HMI)	Via integrated 7-segment display terminal	Manual movement (positive or negative, fast/slow), auto-tuning, simple startup, display of information and errors		
		Homing		–

(1) Unless otherwise stated, the logic I/O can be used in positive logic (Sink inputs, Source outputs) or negative logic (Source inputs, Sink outputs).

Lexium 05 motion control
Lexium 05 servo drives

General overview of Lexium 05 functions

The Lexium 05 servo drive integrates a large number of functions, enabling it to be used in a wide range of industrial applications.
There are two main function families:
■ Conventional adjustment functions, such as:
□ Homing
□ Manual mode (JOG)
□ Auto-tuning of the servo drive/servo motor combination
■ Operating modes:
□ Position control:
- Point-to-point mode
- Motion sequence mode
- Electronic gearing mode (pulse position control mode)

□ Speed control:
- Speed control with acceleration/deceleration ramp
- Instantaneous speed control

□ Current control:
- Current regulation

Two types of operation are possible:
■ Local
■ Via communication buses and networks

In local mode:
The servo drive parameters are defined via:
■ The user interface
■ The remote display terminal
■ The PowerSuite software workshop
Movements are then determined by:
■ Analog signals (± 10 V)
■ RS 422 type signals (pulse/direction (P/D), A/B or CW/CCW signals)
In this mode, limit switches and homing switches are not managed by the servo drive. It is, however, possible to limit movement by assigning a logic input, see pages 2/66 and 2/62

Via communication buses and networks:
All the servo drive parameters and those associated with the operating modes can be accessed via:
■ The communication buses and networks, in addition to the access via the user interface
■ The remote display terminal
■ The PowerSuite software workshop

The following table indicates the control type and the sources of setpoint values available for each of the operating modes.

Operating modes	Control		Setpoint value via
	Via communication buses and networks	Local	
Adjustment functions			
Homing	■	■	Communication buses and networks or PowerSuite software workshop
Manual mode (JOG)	■	■	Via communication buses and networks, PowerSuite software workshop or user interface
Auto tune	■	■	Communication buses and networks or PowerSuite software workshop
Operation modes			
Point-to-point mode	■	■	Communication buses and networks or PowerSuite software workshop
Motion sequence mode	■	■	Communication buses and networks or PowerSuite software workshop
Electronic gearing mode (pulse position control)	■	■	Pulse/direction (P/D), A/B or CW/CCW signals
Speed control with ramp	■	■	Communication buses and networks or PowerSuite software workshop
Current control	■	■	Analog input, communication buses and networks or PowerSuite software workshop

■ Functions available
■ Functions not available

Presentation: page 2/2 | Characteristics: page 2/24 | References: page 2/30 | Dimensions: page 2/44 | Schemes: page 2/48

Lexium 05 motion control
Lexium 05 servo drives
Adjustment functions

Homing

***Note**: Available with Lexium 05A and Lexium 05B servo drives*

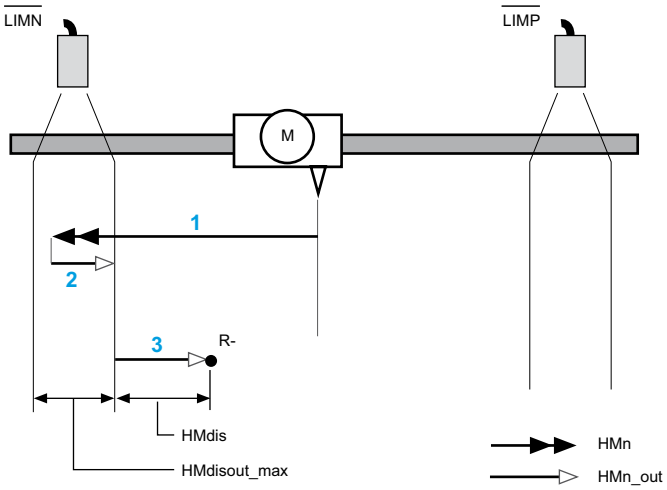
Before performing an absolute movement in point-to-point mode, a homing operation must be carried out.
Homing consists of associating an axis position with a known mechanical position. This position then becomes the reference position for any subsequent movement of the axis.

Homing is carried out by:
- Immediately writing the actual position register
- Movements up to a reference sensor

Homing with search for sensors

Four types of homing with movement to sensors are possible:
- Homing on - limit switch, "$\overline{\text{LIMN}}$"
- Homing on + limit switch, "$\overline{\text{LIMP}}$"
- Homing on reference contact "REF" with initial movement in negative direction of rotation
- Homing on reference contact "REF" with initial movement in positive direction of rotation

These homing movements can be executed with or without taking the "Zero marker" pulse into account.

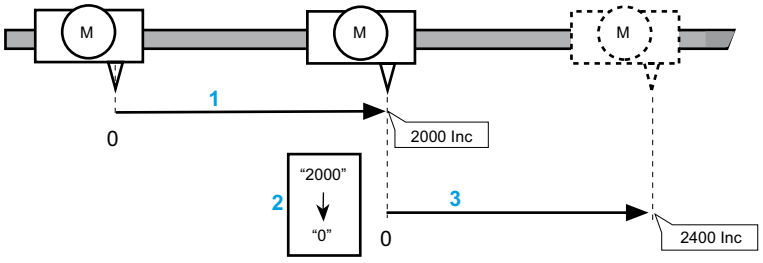


Homing operating mode: Example with limit switch and clearance from sensor edge

1 Move at search speed HMn
2 Move at output speed HMn_out
3 Clearance at distance HMdis at output speed HMn_out

Forced homing

Forced homing consists of setting the current motor position as the new reference point to which all subsequent positioning data refer.



Forced homing operating mode

After power-up, the position value is 0.

1 Start towards the home point: the servo motor is positioned using a relative movement of 2000 increments
2 Forced homing to value 0 by writing the actual position expressed in user units
3 Initiation of a command to move 2400 increments to the absolute position. The target position is 2400 increments (if forced homing (step 2) had not been performed, the target position would be 4400 increments (2000+ 2400)).

Homing parameters

The homing parameters are transmitted via the communication buses and networks, or using the PowerSuite software workshop.

2

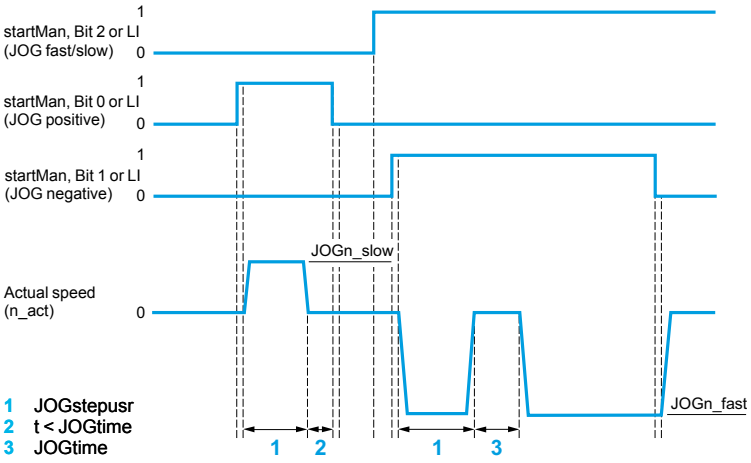
Manual mode (JOG)

***Note**: Available with Lexium 05A, Lexium 05B and Lexium 05C servo drives*

This mode enables an axis to be moved manually. The movement can be carried out over one movement step or continuously, at constant speed. Two speeds of movement are available (slow or fast). Various parameters are used to configure the manual movement.

Setpoint value

The parameters are transmitted via the fieldbus, the PowerSuite software workshop or the servo drive user interface.



Machine adjustment in manual mode (JOG)

Manual mode works in local mode via the reassignable logic inputs LI● (only applies to Lexium 05A and Lexium 05C servo drives) or via communication buses and networks using a bit from the control word (Bit 0, Bit 1, etc.).
When a high logic level is applied to the “JOG positive” or “JOG negative” logic input, or to a rising edge of a bit from the control word (Bit 0, Bit 1), a movement step is carried out at low or high speed. The choice between low and high speed is defined by the logic state of the “JOG fast/slow” input or by the logic level of a bit from the control word (Bit 2).

Auto-tuning of the servo drive/servo motor combination

***Note**: Available with Lexium 05A, Lexium 05B and Lexium 05C servo drives*

The auto-tuning function integrated in the servo drive enables automatic tuning of the servo control parameters to be performed after the initial configuration.
This function is activated via:
- The user interface
- The remote display terminal
- The PowerSuite software workshop

This procedure requires the servo motor to be coupled to its mechanism.
Additional parameters can be used to:
- Define mechanical rigidity depending on the type of coupling
- Limit the amplitude and the direction of the movements performed during the auto-tuning phase

The PowerSuite software workshop also provides screens for carrying out these servo control adjustments conventionally.

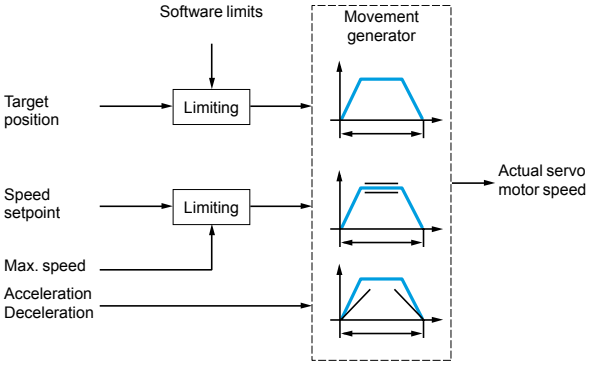
Point-to-point mode

***Note**: Available with Lexium 05A and Lexium 05B servo drives*

This mode, also referred to as PTP (Point To Point), is used to move the axis from a position A to a position B. The movement can be absolute: this consists of expressing position B in relation to a home position (the axis must have previously been referenced), or relative: in this case the movement is performed in relation to the current position of the axis (A). The movement is performed according to acceleration, deceleration and speed parameters.

Setpoint value

The setpoint value is transmitted via the communication buses and networks, or using the PowerSuite software workshop.



Point-to-point mode, absolute and relative movements

Possible applications

A motion controller for coordinated axes or a PLC can manage several axes controlled via communication buses and networks.
This mode is often used in:
- Material handling
- Automated inspection

For multi-axis applications requiring fast and precise sequences, we recommend using the motion sequence operating mode, see page 2/20.

2

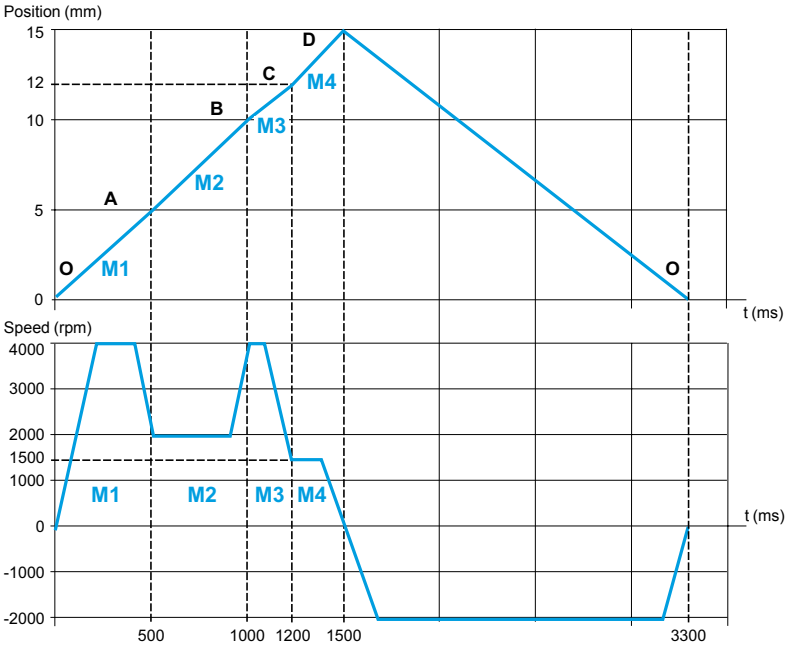
Motion sequence mode

***Note**: Available with the Lexium 05A servo drive*

This mode is used for programming the parameters required for executing rapid movements. It allows absolute or relative movement of the axis from a point A to a point B, in accordance with a predefined movement, and then from point B to a point C, in accordance with another movement.
The movement is executed according to the selected acceleration, deceleration and speed parameters.
It is also possible to choose the type of sequencing for the various movements.

Example of movement sequencing

The movement executed below is made up of 5 parameterized movement stages:
- Movement 1 is used to move from initial point **O** to point **A** in 500 ms
- Movement 2 is used to move from point **A** to point **B** in 500 ms
- Movement 3 is used to move from point **B** to point **C** in 200 ms
- Movement 4 is used to move from point **C** to point **D** in 300 ms
- Movement 5 is used to move from point **D** to the initial point **O** in 1800 ms at negative speed.



Example of a movement executed using 5 movement stages

***Note**: It is also possible to keep the axis in position (zero speed) between 2 movement stages*

Possible applications

This mode is used for applications requiring fast, precise sequences, and where movements are being made over short distances:
- Material handling
- Automated inspection
- Punching
- Drilling, etc.

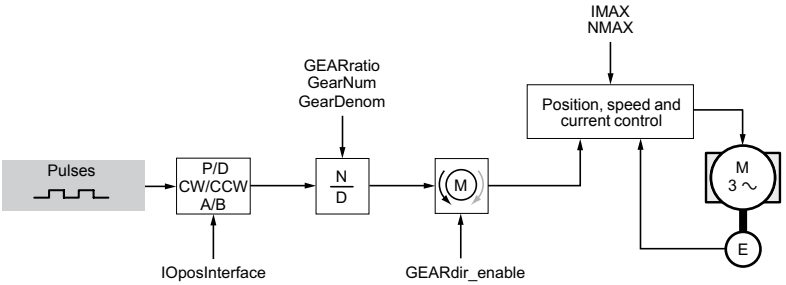
Electronic gearing mode
(pulse position control mode)

***Note**: Available with Lexium 05A, Lexium 05B and Lexium 05C servo drives*

In this mode, a master/slave relationship is established between a number of Lexium 05 servo drives or between a Lexium 05 servo drive and an external master (external A/B encoder, pulse/direction signals (P/D)).

This mode is used for position control via pulse train (pulse/direction (P/D) or CW/CCW signals, depending on the servo drive) sent by an axis controller (PLC, motion controller, numerical controller, etc.).

The Lexium 05 servo drive's integrated electronic reduction ratio makes it possible to adapt the pulse train frequency to the frequency of the servo drive input. This means that the servo motor's full speed range can be utilized.
This reduction ratio, which can be either fixed or variable, is determined by the Lexium 05 servo drive's “Gearnum” and “GearDenom” parameters.
The ratio and direction of operation parameters can be accessed dynamically via the communication buses and networks.



Electronic gearing mode

Possible applications
- Handling
- Conveying
- Packing
- Cutting to length
- Applications in the fields of plastics and fibres

2

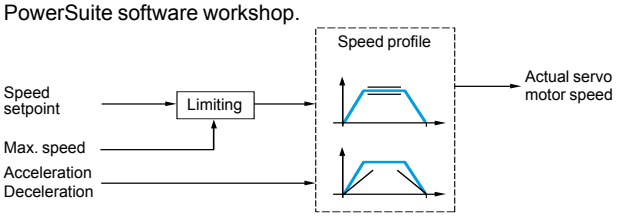
Speed control with acceleration/deceleration ramp

***Note**: Available with Lexium 05A and Lexium 05B servo drives*

In this operating mode, the speed setpoint is applied according to an acceleration/deceleration ramp that can be adjusted using parameters. The speed setpoint can be modified during the movement. Current limiting is also possible.
The position control that is present in the background allows flexible synchronization of two axes that are in speed control mode, and enables position control mode to be entered on the fly.

Setpoint value

The setpoint value is transmitted via the communication bus and networks, or via the PowerSuite software workshop.



Speed control with acceleration/deceleration ramp operating mode

Possible applications

This mode is mainly used with infinite axes.
Examples include turntable management, printing, labelling applications.

Instantaneous speed control

***Note**: Available with Lexium 05A, Lexium 05B and Lexium 05C servo drives*

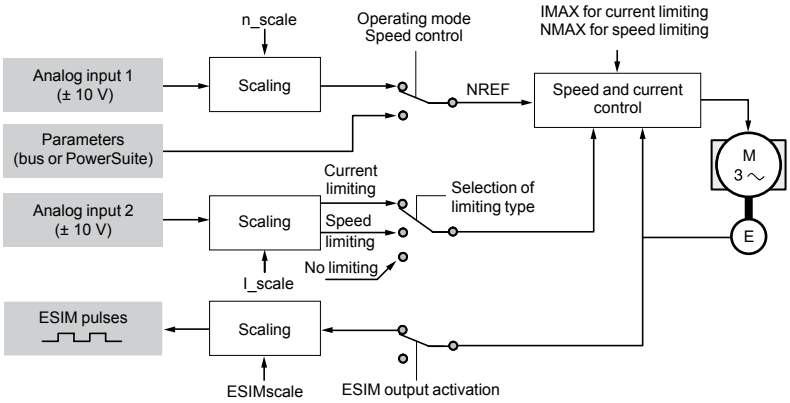
In this mode, the Lexium 05 servo drive can be used with an analog output motion controller. It is suitable for all other high-performance speed control requirements.

Setpoint value

The setpoint value is transmitted:
- Via analog input 1 or a parameter for Lexium 05A and Lexium 05C servo drives
- Via a parameter for the Lexium 05B servo drive

Speed or current limiting is transmitted:
- Via analog input 2 or a parameter for the Lexium 05A servo drive
- Via a parameter for Lexium 05B and Lexium 05C servo drives

***Note:** A reassignable logic input can also be used to limit speed, although this only applies to Lexium 05A and Lexium 05C servo drives.*



Instantaneous speed control operating mode with current limiting via analog input 2.

Use with analog output motion controller

Axis position feedback can be supplied to the axis controller (PLC, motion controller, numerical controller, etc.) by the ESIM (Encoder SIMulation) output on the RS 422 interface.

Lexium 05 motion control
Lexium 05 servo drives
Operating modes

Instantaneous speed control (continued)

Possible applications

- Handling
- Packaging
- Cutting to length
- Winding and unwinding applications

Current control

***Note**: Available with Lexium 05A, Lexium 05B and Lexium 05C servo drives*

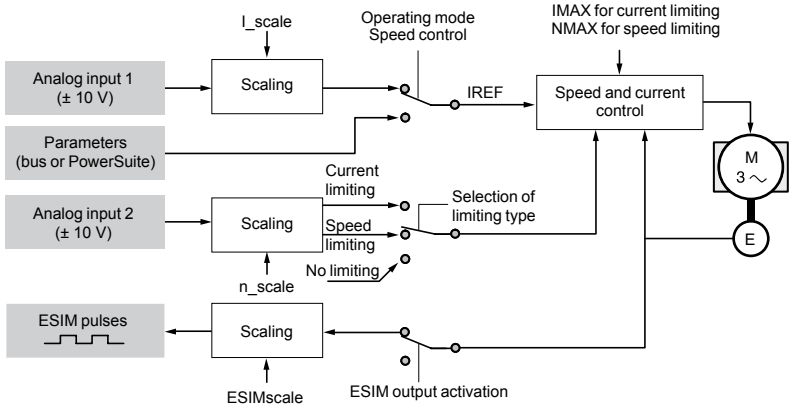
Current control is necessary for servo motor torque control. This mode, which can be added onto the other modes, is used in machine phases where torque control is crucial.

Setpoint value

The setpoint value is transmitted:
- Via analog input 1 or a parameter for Lexium 05A and Lexium 05C servo drives
- Via a parameter for the Lexium 05B servo drive

Speed or current limiting is transmitted:
- Via analog input 2 or a parameter for the Lexium 05A servo drive
- Via a parameter for Lexium 05B and Lexium 05C servo drives

The ESIM (Encoder SIMulation) output on the RS 422 interface can be used to transmit the position and speed of the servo motor to the axis controller (PLC, motion controller, numerical controller, etc.).



Current control operating mode with speed limiting via analog input 2

Possible applications

- Car assembly applications (tool fixing machine)
- Special machines

Other functions

- Control functions:
  - Status monitoring in movement mode
  - Monitoring of the axis signals
  - Monitoring of the internal signals specific to the servo drive
  - Monitoring switching
  - Monitoring the communication on the communication buses and networks (only applies to Lexium 05A and Lexium 05B servo drives)
- Entering the various scaling factors
- Adjusting the movement generator
- Activating the STOP signal
- Triggering the fast stop function (Quick-Stop)
- Activating the motor brake via the HBC (Holding Brake Controller)
- Reversing the direction of rotation of the motor
- Reading the analog input values
- Determining the logic of the signals
- Possible replacement of the servo motor encoder with an external encoder to close the position loop (only applies to the Lexium 05A servo drive).

These functions can be activated and parameterized via:
- The logic inputs/outputs, some of which are reassignable (only applies to Lexium 05A and Lexium 05C servo drives)
- The communication buses and networks (only applies to Lexium 05A and Lexium 05B servo drives)
- The PowerSuite software workshop
- The servo drive user interface

Lexium 05 motion control
Lexium 05 servo drives

Environmental characteristics

Conformity to standards			Lexium 05 servo drives have been developed to conform to the strictest international standards and the recommendations relating to electrical industrial control equipment (IEC, EN), including: low voltage, IEC/EN 61800-5-1, IEC/EN 50178, IEC/EN 61800-3 (conducted and radiated EMC immunity and emissions).
EMC immunity			IEC/EN 61800-3, environments 1 and 2 IEC/EN 61000-4-2 level 3 IEC/EN 61000-4-3 level 3 IEC/EN 61000-4-4 level 4 IEC/EN 61000-4-5 level 3
Conducted and radiated EMC emissions for servo drives			IEC/EN 61800-3, environments 1 and 2, categories C2, C3
	LXM 05●●●●F1 LXM 05●●●●M2 LXM 05●●●●N4		EN 55011 class A group 2, IEC/EN 61800-3 category C3 With additional EMC filter *(1)*: ■ EN 55011 class A group 1, IEC/EN 61800-3 category C2 ■ EN 55011 class A group 2, IEC/EN 61800-3 category C3
	LXM 05●●●●M3X		With additional EMC filter *(1)*: ■ EN 55011 class A group 1, IEC/EN 61800-3 category C2 ■ EN 55011 class A group 2, IEC/EN 61800-3 category C3
CE marking			The servo drives are CE marked in accordance with the European low voltage (2006/95/EC) and EMC (89/336/EEC) directives.
Product certification			UL (USA), cUL (Canada)
Degree of protection			IEC/EN 61800-5-1, IEC/EN 60529
	LXM 05●●●●F1 LXM 05●●●●M2 LXM 05●●●●M3X LXM 05●●●●N4		IP 41 on the upper part with protective cover in place IP 20 after removal of the protective cover, see page 2/70
Vibration resistance	LXM 05●●●●F1 LXM 05●●●●M2 LXM 05●●●●M3X LXM 05●●●●N4		According to IEC/EN 60068-2-6: 1.5 mm peak to peak from 3 Hz to 13 Hz 1 gn from 13 Hz to 150 Hz
Shock resistance	LXM 05●●●●F1 LXM 05●●●●M2 LXM 05●●●●M3X LXM 05●●●●N4		According to IEC/EN 61131 paragraph 6.3.5.2 15 gn for 11 ms conforming to IEC/EN 60028-2-27
Maximum ambient pollution	LXM 05●●●●F1 LXM 05●●●●M2 LXM 05●●●●M3X LXM 05●●●●N4		Degree 2 conforming to IEC/EN 61800-5-1
Environmental conditions	LXM 05●●●●F1 LXM 05●●●●M2 LXM 05●●●●M3X LXM 05●●●●N4		IEC 60721-3-3 category 3C1
Relative humidity			According to IEC 60721-3-3, category 3K3, 5% to 93%, without condensation
Ambient air temperature around the device	Operation	**°C**	0…+ 50 Temperature derating and limitations: see mounting recommendations page 2/70
	Storage	**°C**	- 25…+ 70
Type of cooling	LXM 05●D10F1 LXM 05CU70M2, ●D10M2 LXM 05●D10M3X		Natural convection
	LXM 05●D17F1, ●D28F1 LXM 05●D17M2, ●D28M2 LXM 05●D17M3X, ●D42M3X LXM 05●●●●N4		Fan
Maximum operating altitude		**m**	1000 without derating Up to 2000 under the following conditions: ■ Temperature 40°C max. ■ Mounting distance between servo drives > 50 mm ■ Protective cover removed
Operating position Maximum permanent angle in relation to the normal vertical mounting position			

(1) See table on page 2/41 to check permitted cable lengths.

Drive characteristics

Switching frequency		**kHz**	4 or 8 depending on rating and associated servo motor. See pages 2/78 and 2/112

Electrical power characteristics

Power supply	Voltages	**V**	100 - 15%...120 + 10% single-phase for LXM 05●●●●F1 200 - 15%...240 + 10% single-phase for LXM 05●●●●M2 200 - 15%...240 + 10% three-phase for LXM 05●●●●M3X 380 - 15%...480 + 10% three-phase for LXM 05●●●●N4
	Frequency	**Hz**	50 - 5%...60 + 5%
	Transient overvoltage		Overvoltage category III
	Inrush current	**A**	< 60
	Leakage current	**mA**	< 30
External 24 V ⎓ power supply (not provided) *(1)*	Input voltage	**V**	24 (-15/+20%)
	Input current (no-load)	**A**	1
	Ripple		⩽ 5%
Signalling			1 red LED: LED lit indicates the presence of servo drive voltage
Output voltage			Maximum three-phase voltage equal to line supply voltage
Electrical isolation			Between power and control (inputs, outputs, power supplies)

Connection cable characteristics

Recommended cable type for mounting in an enclosure			Single-strand IEC cable, ambient temperature 45°C, copper 90°C XLPE/EPR or copper 70°C PVC

Connection characteristics (terminals for the power supply, the DC bus, and the servo motor)

Servo drive terminals		**R/L1, S/L2, T/L3 (power supply)**	**PA/+, PBI, PBe (external braking resistor)**	**U/T1, V/T2, W/T3 (servo motor)**
Maximum wire size and tightening torque for the power supply, braking resistor, DC bus and servo motor.	LXM 05●D10F1 LXM 05CU70M2, ●D10M2 LXM 05●D10M3X	2.5 mm² (AWG 14) 0.8 Nm	2.5 mm² (AWG 14) 0.8 Nm	See characteristics of VW3 M5 10● R●●● and VW3 M5 30● R●●●● cables on pages 2/94 and 2/137
	LXM 05●D17F1, ●D28F1 LXM 05●D17M2, ●D28M2 LXM 05●D17M3X, ●D42M3X LXM 05●D14N4, ●D34N4	6.0 mm² (AWG 10) 1.2 Nm	6.0 mm² (AWG 10) 1.2 Nm	
	LXM 05●D57N4	16.0 mm² (AWG 6) 2.2 Nm	16.0 mm² (AWG 6) 2.2 Nm	

(1) Please consult our specialist catalogue "Phaseo power supplies and transformers".

2

Control signal characteristics

Type of servo drive			LXM 05A●●●●●●	LXM 05B●●●●●●	LXM 05C●●●●●
Protection	Inputs		Against reverse polarity		
	Outputs		Against short circuits		
Electrical link			Presence of an electrical link on the 0 V ⎓		
24 V ⎓ I/O logic			Positive logic (Sink input/Source output) or negative logic (Source input/Sink output). Positive logic is default setting.		
Logic inputs					
Type			24 V ⎓ logic inputs with positive (Sink) or negative (Source) logic		
Number			6, of which 3 are reassignable, see page 2/60	4	6, of which 5 are reassignable, see page 2/62
Power supply		**V ⎓**	24		
Sampling period		**ms**	0.25		
Debounce filtering		**ms**	1		
Positive logic *(Sink)*			State 0 if < 5 V or input not wired, state 1 if > 15 V Logic inputs conforming to standard IEC/EN 61131-2 type 1		
Negative logic *(Source)*			State 0 if > 19 V or input not wired, state 1 if < 9 V		
Safety inputs					
Type			Inputs for the Power Removal safety function		
Number			2 ($\overline{\text{PWRR\_A}}$, $\overline{\text{PWRR\_B}}$)		–
Power supply		**V ⎓**	24		
Input filtering		**ms**	1		
Response time		**ms**	⩽ 10		
Positive logic *(Sink)*			State 0 if < 5 V or input not wired, state 1 if > 15 V Logic inputs conforming to standard IEC/EN 61131-2 type 1		
Logic outputs					
Type			24 V ⎓ logic outputs with positive (Source) or negative (Sink) logic.		
Number			2, reassignable, see page 2/60	2	3, reassignable, see page 2/62
Output voltage		**V**	⩽ 30, conforming to standard IEC/EN 61131-2		
Sampling period		**ms**	1		
Max. breaking current		**mA**	50		
Voltage drop		**V**	1 (at 50 mA load)		
Analog inputs					
Type			±10 V differential analog inputs		
Resolution		**bit**	14		
Number			2 (ANA 1+/ANA 1–, ANA 2+/ANA 2–)	–	1 (ANA 1+/ANA 1–)
Input resistance		**kΩ**	⩾ 10		
Sampling period		**µs**	250		
Absolute error			Less than ±1% at 25°C, less than ±2% over the operating temperature range		
Linearity			Less than ±0.5%		

Control signal characteristics (continued)

Type of servo drive			LXM 05A●●●●●●	LXM 05B●●●●●●	LXM 05C●●●●●
Pulse/direction (P/D), A/B, CW/CCW signals					
Type			RS 422 link		
Number			1 interface for P/D, A/B, CW/CCW signals	1 interface for P/D, A/B signals	2 interfaces for P/D, A/B, CW/CCW signals
Common mode range		**V**	- 7…+ 12		
Input resistance		**kΩ**	5		
Signal input frequency	Pulse/direction (P/D)	**kHz**	≤ 400		
	A/B	**kHz**	≤ 400		
	CW/CCW	**kHz**	≤ 400	–	≤ 400
ESIM (Encoder SIMulation) output signals					
Logic level			RS 422 link		
Output frequency		**kHz**	≤ 400		
Servo motor encoder feedback signals					
Voltages	Encoder power supply	**V**	+ 10/100 mA		
	SinCos input signals	**V**	1 V_{SS} with 2.5 V offset 0.5 V_{SS} at 100 kHz		
Input resistance		Ω	120		

Operational safety characteristics

Type of servo drive		LXM 05A●●●●●●	LXM 05B●●●●●●	LXM 05C●●●●●
Protection	Of the machine	"Power Removal" (PWR) safety function which forces stopping and/or prevents unintended restarting of the servo motor, conforming to standard ISO 13849-1, performance level "d" (PL d), and standard IEC/EN 61800-5-2		–
	Of the system process	"Power Removal" (PWR) safety function which forces stopping and/or prevents unintended restarting of the servo motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2		–

2

Communication port characteristics

CANopen and CANopen Motionbus protocols (only applies to LXM 05A●●●●●● servo drives)

Protocol type		CANopen	CANopen Motionbus
Structure	Connectors	RJ45 (labelled CN4) or spring terminals (labelled CN1)	
	Network management	Slave	
	Transmission speed	Transmission speed depends on the length of the bus: ■ 50 kbps for bus lengths of up to 1000 m ■ 125 kbps for bus lengths of up to 500 m ■ 250 kbps for bus lengths of up to 250 m ■ 500 kbps for bus lengths of up to 100 m ■ 1 Mbps for bus lengths of up to 4 m, where no segment is no longer than 0.3 m	
	Address (Node ID)	1 to 127, configurable via the display terminal or the PowerSuite software workshop	
	Polarization	Line termination impedances are integrated in the servo drive and are switchable.	
Service	PDO (Process Data Objects)	Implicit exchange of PDO: ■ 3 PDO conforming to DSP 402 modes (position control and speed profile modes) ■ 1 configurable mapping PDO	Implicit exchange of PDO: ■ 2 PDO conforming to DSP 402 (position control mode)
	PDO modes	Event-triggered, Time-triggered, Remotely-requested, Sync (cyclic), Sync (acyclic)	Sync (cyclic)
	PDO mapping	1 configurable PDO	–
	Number of SDO (Service Data Objects)	Explicit exchange of SDO: ■ 2 receive SDO ■ 2 transmit SDO	Explicit exchange of SDO: ■ 1 receive SDO ■ 1 transmit SDO
	Emergency	Yes	
	Profile	CiA DSP 402: CANopen “Device Profile Drives and Motion Control”	
		Position control and speed profile modes	Position control mode
	Communication monitoring	Node guarding, heartbeat	
Diagnostics	Using LEDs	2 LEDs: “RUN” and “ERROR” on integrated 7-segment display terminal Display of faults Full diagnostics with the PowerSuite software workshop	
Description file		A single eds file for the whole range is supplied on the documentation CD-ROM. This file contains the description of the servo drive parameters	

Modbus protocol (LXM 05A●●●●●●, LXM 05B●●●●●●, LXM 05C●●●●● servo drives)

Structure	Connector	RJ45 (labelled CN4)
	Physical interface	2-wire RS 485 multidrop
	Transmission mode	RTU
	Transmission speed	Configurable via the display terminal or the PowerSuite software workshop: 9600 bps, 19.2 kbps or 38.4 kbps for serial links of up to 400 m
	Format	Configurable via the display terminal or the PowerSuite software workshop: ■ 8 bits, odd parity, 1 stop ■ 8 bits, even parity, 1 stop ■ 8 bits, no parity, 1 stop ■ 8 bits, no parity, 2 stop
	Polarization	No polarization impedances These must be provided by the wiring system (for example, in the master)
	Number of servo drives	31 Lexium 05 servo drives maximum
	Address	1 to 247, configurable via the display terminal or the PowerSuite software workshop
Services	Messaging	Read Holding Registers (03) 63 words maximum Write Single Register (06) Write Multiple Registers (16) 61 words maximum Read/Write Multiple Registers (23) 63/59 words maximum Read Device Identification (43) Diagnostics (08)
	Communication monitoring	Monitoring function (node guarding) can be activated “Time out” can be set between 0.1 s and 10 s
Diagnostics		Display of faults on integrated 7-segment display terminal

Communication port characteristics (continued)

PROFIBUS DP protocol (only applies to LXM 05B●●●●●● servo drives)

Structure	Connector	Spring terminals (labelled CN1)
	Physical interface	2-wire RS 485 multidrop
	Transmission speed	Transmission speed depends on the length of the bus: ■ 9.6 kbps, 19.2 kbps, 45.45 kbps, 93.75 kbps for bus lengths of up to 1200 m ■ 187.5 kbps for bus lengths of up to 1000 m ■ 500 kbps for bus lengths of up to 400 m ■ 1.5 Mbps for bus lengths of up to 200 m ■ 3 Mbps, 6 Mbps, 12 Mbps for bus lengths of up to 100 m
	Address	1 to 126, configurable via the integrated 7-segment display terminal or the PowerSuite software workshop
Services	Periodic variables	PPO type 2 8 PKW bytes 12 Process Data bytes
	Communication monitoring	Can be inhibited “Time out” can be set via the PROFIBUS DP bus configurator
Diagnostics		Two LEDs: RUN and ERR Display of faults on integrated 7-segment display terminal Full diagnostics with the PowerSuite software workshop
Description file		A single gsd file for the whole range is supplied on the documentation CD-ROM. This file does not contain the description of the servo drive parameters

Lexium 05 motion control
Lexium 05A, 05B and 05C servo drives

538609

LXM 05●D10F1
LXM 05CU70M2
LXM 05●D10M2
LXM 05●D10M3X

106859

LXM 05●D17F1
LXM 05●D17M2
LXM 05●D17M3X
LXM 05●D14N4

105085

LXM 05●D28F1
LXM 05●D28M2
LXM 05●D42M3X
LXM 05●D22N4
LXM 05●D34N4

105500

LXM 05●D57N4

Lexium 05A, 05B and 05C servo drives

Output current				Nominal power	Line current		Max. prospective line Isc	Reference *(1) (2)*	Weight
Continuous (RMS)		Peak (RMS) *(3)*			at U1	at U2			
at 4 kHz	at 8 kHz	at 4 kHz	at 8 kHz	at 4 kHz	*(4)*	*(4)*			
A	A	A	A	kW	A	A	kA		kg
Single-phase supply voltage: 100…120 V ∿ *(4)* 50/60 Hz, with integrated EMC filter									
4	3.2	7	6	0.4	7.6	7	1	**LXM 05AD10F1**	1.100
								LXM 05BD10F1	1.100
8	7	12	11	0.65	11.5	10.5	1	**LXM 05AD17F1**	1.400
								LXM 05BD17F1	1.400
15	13	20	20	0.85	22.6	20.7	1	**LXM 05AD28F1**	2.000
								LXM 05BD28F1	2.000
Single-phase supply voltage: 200…240 V ∿ *(4)* 50/60 Hz, with integrated EMC filter									
3	2.4	5	4.3	0.4	4.8	4	1	**LXM 05CU70M2**	1.100
4	3.2	7	6	0.75	8.1	6.7	1	**LXM 05AD10M2**	1.100
								LXM 05BD10M2	1.100
								LXM 05CD10M2	1.100
8	7	12	11	1.2	12.7	10.5	1	**LXM 05AD17M2**	1.400
								LXM 05BD17M2	1.400
								LXM 05CD17M2	1.400
15	13	20	20	2.5	23	19.2	1	**LXM 05AD28M2**	2.000
								LXM 05BD28M2	2.000
								LXM 05CD28M2	2.000
Three-phase supply voltage: 200…240 V ∿ *(4)* 50/60 Hz, without integrated EMC filter *(5)*									
4	3.2	7	6	0.75	5.2	4.3	5	**LXM 05AD10M3X**	1.100
								LXM 05BD10M3X	1.100
8	7	12	11	1.4	9	7.5	5	**LXM 05AD17M3X**	1.300
								LXM 05BD17M3X	1.300
17	15	30	30	3.2	19	15.8	5	**LXM 05AD42M3X**	1.900
								LXM 05BD42M3X	1.900
Three-phase supply voltage: 380…480 V ∿ *(4)* 50/60 Hz, with integrated EMC filter									
6	5	10	7.5	1.4	4.2	3.3	5	**LXM 05AD14N4**	1.400
								LXM 05BD14N4	1,400
								LXM 05CD14N4	1.400
9	7	16	14	2	6.3	5	5	**LXM 05AD22N4**	2.000
								LXM 05BD22N4	2.000
								LXM 05CD22N4	2.000
15	11	24	18	3	9.7	7.7	5	**LXM 05AD34N4**	2.000
								LXM 05BD34N4	2.000
								LXM 05CD34N4	2.000
25	20	40	30	6	17.7	14	22	**LXM 05AD57N4**	4.800
								LXM 05BD57N4	4.800
								LXM 05CD57N4	4.800

EMC conformity kits *(2)*

Description	Used for	Reference	Weight kg
EMC conformity kits provide a connection compliant with EMC standards, see page 2/67 The kit consists of: ■ EMC plate ■ Clamps ■ Fixing accessories	LXM 05●D10F1 LXM 05CU70M2, LXM 05●D10M2 LXM 05●D10M3X	**VW3 M2 101**	–
	LXM 05●D17F1, ●D28F1 LXM 05●D17M2, ●D28M2 LXM 05●D17M3X, ●D42M3X LXM 05●D14N4 ●D34N4	**VW3 M2 102**	–
	LXM 05●D57N4	**VW3 M2 103**	–

(1) For information on the various functions of LXM 05A●●●●●●, LXM 05B●●●●●● and LXM 05C●●●●● servo drives, see page 2/15.
(2) LXM 05A●●●●●● and LXM 05B●●●●●● servo drives come with an EMC conformity kit. For LXM 05C●●●●● servo drives, the kit is available as an option and can be ordered separately.
Additional kits can also be ordered separately for any of the Lexium 05 servo drives.
(3) Maximum value for 3 seconds.
(4) Nominal supply voltage, min. U1, max. U2: 100 (U1)…120 V (U2), 200 (U1)…240 V (U2), 380 (U1)…480 V (U2)
(5) Additional EMC filters available as an option, see page 2/41.

538662

VW3 A31101

Separate parts

The Lexium 05 servo drive can be connected to a remote display terminal. The remote display terminal can be mounted on the door of an enclosure with IP 65 protection on the front panel.
The terminal provides access to the same functions as the integrated display and keypad on the the front panel of the servo drive.
It can be used to:
- Configure, adjust and control the servo drive remotely
- Provide a remote display

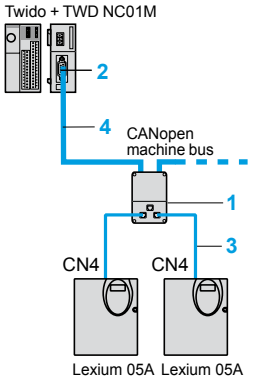
Description	Used for	Reference	Weight kg
Remote display terminal Supplied with one 5 m cable fitted with 2 connectors, and with seal and screws for IP 65 mounting on an enclosure door	LXM 05●●●●●●●	**VW3 A31101**	0.380
Plates for mounting on ⊔ rail, width 35 mm	LXM 05●D10F1 LXM 05CU72M2, ●D10M2 LXM 05●D10M3X	**VW3 A11851**	0.200
	LXM 05●D17F1, LXM 05●D17M2, LXM 05●D17M3X, LXM 05●D14N4	**VW3 A31852**	0.220

Documentation *(1)*

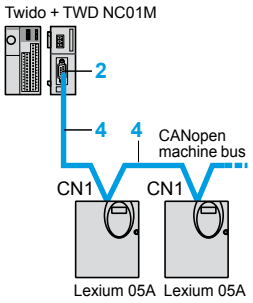
Description	Reference	Weight kg
Simplified Lexium 05 user's manual	*(2)*	–
CD-ROM, containing: ■ A variables user's manual ■ A Modbus and CANopen user's manual ■ A Profibus DP user's manual	**VW3 M8 703**	–

(1) The manuals and quick reference guides for servo drives and servo motors are available on our website: "www.schneider-electric.com".
(2) Supplied with every Lexium 05 drive

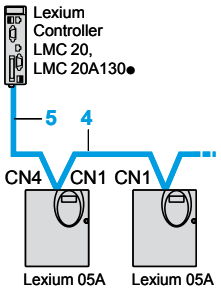
Lexium 05 motion control
Lexium 05A servo drives



Connection to Lexium 05A via RJ45 connector (CN4)



Connection to Lexium 05A via spring terminals (CN1)



Connection to the CANopen Motionbus

CANopen machine bus for the Lexium 05A servo drive

The Lexium 05A servo drive can be connected directly to the CANopen machine bus via a spring terminal, or using an RJ45 connector.
The communication function provides access to the servo drive's configuration, adjustment, control and monitoring functions.
Each servo drive incorporates line terminators that can be disconnected via a switch.

Connection accessories *(1)*

Description	Use	Item no.	Reference	Weight kg
CANopen IP20 junction box 2 RJ45 ports	Tap-off from trunk cable for RJ45 cabling	1	**VW3 CAN TAP2**	0.480
IP 20 SUB-D connectors, 90° angled. 9-way female SUB-D. Switch for line terminator.	Connecting the trunk cable to the Twido programmable controller and the Premium PLC	2	**TSX CAN KCDF 90T**	0.046

Cables *(1)*

Description	Use		Item no.	Length m	Reference	Weight kg
	From	To				
CANopen cables fitted with 2 RJ45 connectors	LXM 05A●●●●●● servo drive (connector CN4)	VW3 CAN TAP2 junction box	3	0.3	**VW3 CAN CARR03**	0.050
				1	**VW3 CAN CARR1**	0.500
CANopen cables *(1)* Standard cables, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	LXM 05A●●●●●● servo drive (terminal CN1)	VW3 CAN TAP2 junction box TSX CAN KCDF 90T CANopen connector LXM 05A●●●●●● servo drive (terminal CN1)	4	50	**TSX CAN CA 50**	4.930
				100	**TSX CAN CA 100**	8.800
				300	**TSX CAN CA 300**	24.560
	VW3 CAN TAP2 junction box	TSX CAN KCDF 90T CANopen connector				
CANopen cables *(1)* UL certification, CE marking Flame retardant (IEC 60332-2)	LXM 05A●●●●●● servo drive (terminal CN1)	VW3 CAN TAP2 junction box TSX CAN KCDF 90T CANopen connector LXM 05A●●●●●● servo drive (terminal CN1)	4	50	**TSX CAN CB 50**	3.580
				100	**TSX CAN CB 100**	7.840
				300	**TSX CAN CB 300**	21.870
	VW3 CAN TAP2 junction box	TSX CAN KCDF 90T CANopen connector				
CANopen cables *(1)* Cables for harsh environment *(2)* or mobile installation, CE marking. Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	LXM 05A●●●●●● servo drive (terminal CN1)	VW3 CAN TAP2 junction box TSX CAN KCDF 90T CANopen connector LXM 05A●●●●●● servo drive (terminal CN1)	4	50	**TSX CAN CD 50**	3.510
				100	**TSX CAN CD 100**	7.770
				300	**TSX CAN CD 300**	21.700
	VW3 CAN TAP2 junction box	TSX CAN KCDF 90T CANopen connector				

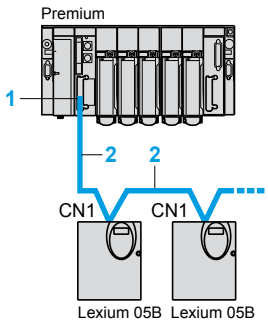
CANopen Motionbus for the Lexium 05A servo drive

CANopen Motionbus can be used, with the Lexium Controller, to control the motion of up to 8 Lexium 05A servo drives.

Connecting cable

Description	Use		Item no.	Length m	Reference	Weight kg
	From	To				
Cable fitted with one 9-way female SUB-D connector with integrated line terminator and one RJ45 connector	Motion controller LMC 20, LMC 20A130● Lexium controller	LXM 05A●●●●●● servo drive (connector CN4)	5	1	**VW3 M3 805R010**	–

(1) For other CANopen machine bus connection accessories, please consult our catalogue "Machines & installations with CANopen".
(2) Harsh environment:
- *Resistance to hydrocarbons, industrial oils, detergents, solder splashes*
- *Relative humidity up to 100%*
- *Saline atmosphere*
- *Significant temperature variations*
- *Operating temperature between -10°C and +70°C*



Connection to Lexium 05B via spring terminals (CN1)

PROFIBUS DP fieldbus for the Lexium 05B servo drive

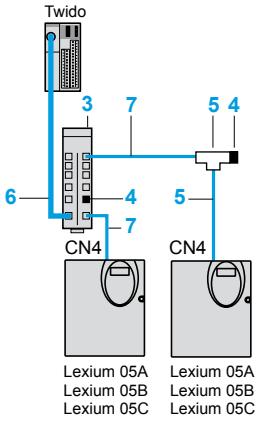
The Lexium 05B servo drive can be connected directly to the PROFIBUS DP bus via a spring terminal (CN1).
The communication function provides access to the functions already described for the CANopen machine bus.

Connection accessories *(1)*

Description	Use	Item no.	Reference	Weight kg
IP 20 SUB-D connectors, 90° angled. 9-way female SUB-D. Switch for line terminator.	Connecting the trunk cable to the Twido programmable controller and the Premium PLC	1	**TSX CAN KCDF 90T**	0.046

Cables

Description	Use		Item no.	Length m	Reference	Weight kg
	From	To				
PROFIBUS DP trunk cables	Servo drive LXM 05B●●●●●●	Servo drive LXM 05B●●●●●●, connector TSX CAN KCDF 90T	2	100	**TSX PBS CA 100**	–
				400	**TSX PBS CA 400**	–



Connection to Lexium 05 via RJ45 connector (CN4)

Modbus serial link for Lexium 05A, 05B and 05C servo drives

Every Lexium 05 servo drive can be connected directly to the Modbus serial link using an RJ45 connector.
The communication function provides access to the servo drive's configuration, adjustment, control and monitoring functions.

Connection accessories

Description	Use		Item no.	Length m	Unit reference	Weight kg
Junction box 3 screw terminals, RC line terminator	To be connected using cable VW3 A8 306 D30		–	–	**TSX SCA 50**	0.520
Subscriber socket Two 15-way female SUB-D connectors and 2 screw terminals, RC line terminator	To be connected using cable VW3 A8 306		–	–	**TSX SCA 62**	0.570
Modbus splitter box 10 RJ45 connectors and 1 screw terminal	For connecting up to 8 Lexium 05 servo drives to the Modbus serial link using RJ45 connectors		3	–	**LU9 GC3**	0.500
Modbus line terminators *(2)*	For RJ45	R = 120 Ω, C = 1 nf	4	–	**VW3 A8 306 RC**	0.200
		R = 150 Ω	4	–	**VW3 A8 306 R**	0.200
	For screw terminals	R = 120 Ω, C = 1 nf	–	–	**VW3 A8 306 DRC**	0.200
		R = 150 Ω	–	–	**VW3 A8 306 DR**	0,200
Modbus RJ45 T-junction boxes(with integrated cable)	Branching off from Modbus serial link		5	0.3	**VW3 A8 306 TF03**	0.190
				1	**VW3 A8 306 TF10**	0.210

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TSX SCA50

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TSX SCA62

522184

LU9 GC3

Connection cables

Description	Use		Item no.	Length m	Reference	Weight kg
	From	To				
Cables for Twido controller serial link *(1)* fitted with a mini-DIN and an RJ45 connector	Twido programmable controller	LXM 05●●●●●●● servo drive Modbus splitter box LU9 GC3	6	0.3	**TWD XCA RJ 003**	–
				1	**TWD XCA RJ 010**	0.090
				3	**TWD XCA RJ 030**	0.160
Cable for Modbus serial link fitted with one RJ45 connector and one free wire end	LXM 05●●●●●●● servo drive (CN4)	TSX SCA 50 junction box	–	3	**VW3 A8 306 D30**	0.150
Cable for Modbus serial link fitted with one RJ45 connector and one 15-way male SUB-D connector	LXM 05●●●●●●● servo drive (CN4)	TSX SCA 62 subscriber socket	–	3	**VW3 A8 306**	0.150
Cables for Modbus serial link fitted with 2 RJ45 connectors	LXM 05●●●●●●● servo drive (CN4) Modbus splitter box LU9 GC3 Modbus T-junction box VW3 M8 306 TF●●	Modbus splitter box LU9 GC3 Modbus T-junction box VW3 M8 306 TF●●	7	0.3	**VW3 A8 306 R03**	0.025
				1	**VW3 A8 306 R10**	0.060
				3	**VW3 A8 306 R30**	0.130
RS 485 double shielded twisted pair Modbus cables Supplied without connector	Modbus splitter box LU9 GC3	Modbus splitter box LU9 GC3	–	100	**TSX SCA 100**	5.680
				200	**TSX SCA 200**	10.920
				500	**TSX SCA 500**	30.000

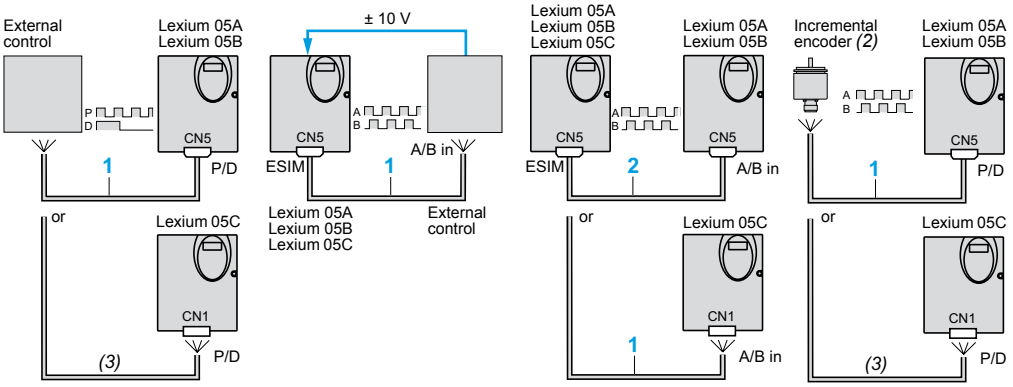
(1) For connection to other PLCs, please consult our automation products catalogues.
(2) Order in multiples of 2.

Lexium 05 motion control
Lexium 05A, 05B and 05C servo drives

Cables for Modicon Premium motion control modules (1)

Description	Use		Item no.	Length	Reference	Weight
	From	To		m		kg
Cables for TSX CAY ●● Premium module fitted with a 10-way Molex connector and a 15-way SUB-D connector	LXM 05●●●●●●● servo drives (CN5: ESIM (Encoder SIMulation))	TSX CAY ●● Premium module (15-way, SUB-D)	–	0.5	**VW3 M8 203 R05**	0.020
				1.5	**VW3 M8 203 R15**	0.030
				3	**VW3 M8 203 R30**	0.040
				5	**VW3 M8 203 R50**	0.050
Cables for TSX CFY ●● Premium module fitted with a 10-way Molex connector and a 15-way SUB-D connector	Servo drives LXM 05A●●●●●●, LXM 05B●●●●●● (CN5 input: pulse/ direction signals (P/D))	TSX CFY ●● Premium module (15-way, SUB-D)	–	0.5	**VW3 M8 204 R05**	0.020
				1.5	**VW3 M8 204 R15**	0.030
				3	**VW3 M8 204 R30**	0.040
				5	**VW3 M8 204 R50**	0.050
Cables for TSX CFY ●● Premium module fitted with a 15-way SUB-D connector	LXM 05C●●●●● servo drives, (CN1 input: pulse/ direction signals (P/D))	TSX CFY ●● Premium module (15-way, SUB-D)	–	0.5	**VW3 M8 214 R05**	–
				1.5	**VW3 M8 214 R15**	–
				3	**VW3 M8 214 R30**	–
				5	**VW3 M8 214 R50**	–

Cables for RS 422 control



Description	Use		Item no.	Length	Reference	Weight
	From	To		m		kg
RS 422 control cables fitted with a 10-way Molex connector	LXM 05A●●●●●●, LXM 05B●●●●●● servo drives (CN5 input: pulse/ direction signals (P/D) or A/B)	External control (pulse/direction signals), External encoder (A/B signals)	1	0.5	**VW3 M8 201 R05**	0.020
				1.5	**VW3 M8 201 R15**	0.030
				3	**VW3 M8 201 R30**	0.040
				5	**VW3 M8 201 R50**	0.050
	LXM 05●●●●●●● servo drives, (CN5: ESIM (Encoder SIMulation))	External control (A/B signals)				
	LXM 05C●●●●●servo drives, (CN5: ESIM (Encoder SIMulation))	LXM 05C●●●●● servo drives with master/slave link (CN1 input: A/B signals)				
RS 422 control cables fitted with two 10-way Molex connectors	LXM 05●●●●●●● servo drives, (CN5: ESIM (Encoder SIMulation))	Servo drives LXM 05A●●●●●●, LXM 05B●●●●●● with master/slave link (CN5 input: A/B signals)	2	0.5	**VW3 M8 202 R05**	0.025
				1.5	**VW3 M8 202 R15**	0.035
				3	**VW3 M8 202 R30**	0.045
				5	**VW3 M8 202 R50**	0.055

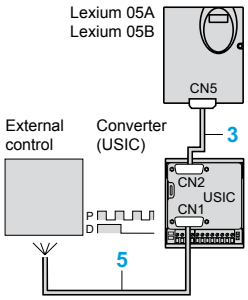
Note: *ESIM (Encoder SIMulation) designates encoder output signals simulated by the servo drives (available on the CN5 connector of Lexium 05 servo drives, configured as output).*

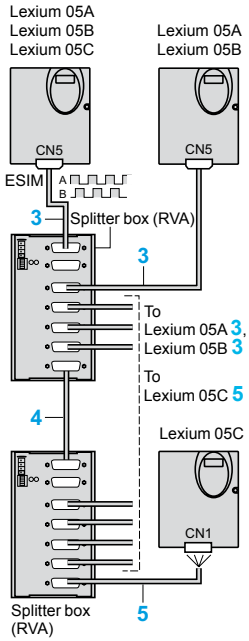
(1) For other Modicum Premium connection cables, please consult our "Automation platform Modicon Premium and Unity - PL7 software" specialist catalogue
(2) Option to use Osicoder® XCC14, XCC15 or XCC19 incremental encoders; please consult our "Rotary encoders - Osicoder®" specialist catalogue
(3) Cable not supplied; see specification in the Lexium 05 user's manual available on our website at "www.schneider-electric.com"

Lexium 05 motion control
Lexium 05A, 05B and 05C servo drives

568040

VW3 M3 102 (USIC)





Replacement connectors

Description	Use	Reference	Weight kg
Molex connectors (sold in lots of 5)	10-way female connectors for the CN5 connector of the Lexium 05 servo drive	**VW3 M8 212**	–

Other connection components

RS 422 interface accessories

Description	Use	Reference	Weight kg
Splitter box for encoder signals *(RVA)*	For distributing A/B encoder signals or pulse/direction (P/D) signals to five Lexium 05 servo drives. Includes a 24 V/5 V ⎓ power supply for external encoder.	**VW3 M3 101**	0.700
RS 422 converter *(USIC)*	For adapting 24 V control signals to RS 422 standard	**VW3 M3 102**	–

Cables

Description	Use		Item no.	Length m	Reference	Weight kg
	From	To				
Cables for RS 422 interface fitted with a 10-way Molex connector and a 15-way SUB-D connector	Servo drives LXM 05A●●●●●●, LXM 05B●●●●●● (CN5 input)	Splitter box VW3 M3 101 (RVA) for ESIM distribution Converter VW3 M3 102 (USIC)	3	0.5	**VW3 M8 209 R05**	0.020
				1.5	**VW3 M8 209 R15**	0.030
				3	**VW3 M8 209 R30**	0.040
				5	**VW3 M8 209 R50**	0.050
	LXM 05●●●●●●● servo drives (CN5: ESIM (Encoder SIMulation))	Splitter box VW3 M3 101 (RVA) for ESIM distribution				
Cable fitted with two 15-way female SUB-D connectors For cascading two splitter boxes	VW3 M3 101 (RVA) splitter box	VW3 M3 101 (RVA) splitter box	4	0.5	**VW3 M8 211 R05**	–
Cables for PLC fitted with a 15-way female SUB-D connector For pulse/direction signals	PLC or external control	Converter VW3 M3 102 (USIC) (15-way, SUB-D)	5	0.5	**VW3 M8 210 R05**	–
				1.5	**VW3 M8 210 R15**	–
				3	**VW3 M8 210 R30**	–
	Splitter box VW3 M3 101 (RVA) for ESIM distribution	LXM 05C●●●●●● servo drive (CN1 input)		5	**VW3 M8 210 R50**	–
Pulse/direction control cables fitted with a 10-way Molex connector (for Lexium 05 servo drive) and an adapted 9-way SUB-D connector	Servo drives LXM 05A●●●●●●, LXM 05B●●●●●● (CN5 input)	Siemens S5 IP 247	–	3	**VW3 M8 205 R30**	–
	Servo drives LXM 05A●●●●●●, LXM 05B●●●●●● (CN5 input)	Siemens S5 IP 267	–	3	**VW3 M8 206 R30**	–
Pulse/direction control cables fitted with a 10-way Molex connector (for Lexium 05 servo drive) and an adapted 15-way SUB-D connector	Servo drives LXM 05A●●●●●●, LXM 05B●●●●●● (CN5 input)	Siemens S7 FM 353	–	3	**VW3 M8 207 R30**	–
Encoder feedback cables fitted with a 10-way Molex connector (for Lexium 05 servo drive) and a 15-way SUB-D connector	LXM 05●●●●●●● servo drives, (CN5: ESIM (Encoder SIMulation))	Siemens S7 FM 354	–	3	**VW3 M8 208 R30**	–

Note: *ESIM (Encoder SIMulation) designates encoder output signals simulated by the servo drives (available on the CN5 connector of Lexium 05 servo drives, configured as output).*

Lexium 05 motion control
Lexium 05 servo drives
Option: Braking resistors

Braking resistors

Internal braking resistor

A braking resistor is built into the servo drive to absorb the braking energy. If the DC bus voltage in the servo drive exceeds a specified value, this braking resistor is activated. The restored energy is converted into heat by the braking resistor.

External braking resistor

When the servo motor has to be braked frequently, an external braking resistor must be used to dissipate the excess braking energy.

If an external braking resistor is used, the internal braking resistor must be deactivated. To do this, the shunt between PA/+ and PBI must be removed and the external braking resistor connected between PA/+ and PBE, see page 2/66.

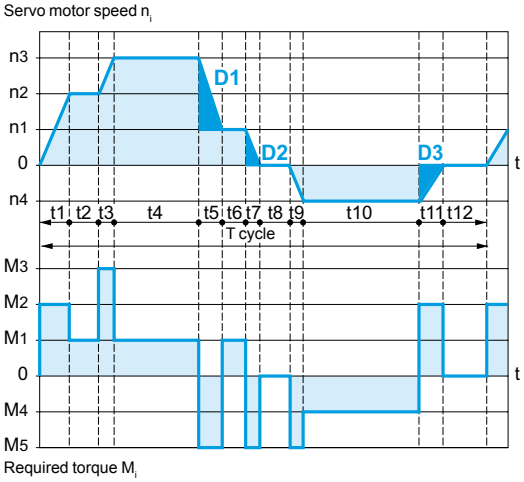
Two or more external braking resistors can be connected in parallel.
The servo drive monitors the power dissipated in the braking resistor.

Sizing the braking resistor

During braking or deceleration requested by the servo drive, the kinetic energy of the moving load must be absorbed by the servo drive. The energy generated by deceleration charges the capacitors integrated in the servo drive.
When the voltage at the capacitor terminals exceeds the permitted threshold, the braking resistor (internal or external) will be activated automatically in order to dissipate this energy.
In order to calculate the power to be dissipated by the braking resistor, the user needs a knowledge of the timing diagram giving the servo motor torques and speeds as a function of time in order to identify the curve segments in which the servo drive decelerates the load.

Servo motor cycle timing diagram

These curves are the same as those used on page 6/2 for selecting the size of the servo motor. The curve segments during which the servo drive is decelerating must be taken into account (D_i).



Sizing the braking resistor (continued))

Calculation of the constant deceleration energy

To do this, the user must know the total inertia, defined as follows:
J_t: Total inertia
where:
J_t = Jm (servo motor inertia) + **Jc** (load inertia). For **Jm**, see pages 2/78 and 2/112
The energy **E_i** of each segment is defined as follows:

$$E_i = \frac{1}{2} J_t . \omega i^2 = \frac{1}{2} J_t . \left(\frac{2\pi n_i}{60} \right)^2$$

Which gives the following for the various segments:

$$E_1 = \frac{1}{2} J_t . \left(\frac{2\pi [n_3 - n_1]}{60} \right)^2$$

$$E_2 = \frac{1}{2} J_t . \left(\frac{2\pi n_1}{60} \right)^2$$

$$E_3 = \frac{1}{2} J_t . \left(\frac{2\pi n_4}{60} \right)^2$$

where **E_i** is in joules, **J_t** in kgm², ω in radians and **n_i** in rpm.

Energy absorbed by the internal capacitor

The energy absorption capacity of the servo drive **Edrive** (without using an internal or external braking resistor) is given for each servo drive in the table on page 2/38.
In the remainder of the calculation, only take account of the **D_i** segments for which the energy **E_i** is greater than the absorption capacity **Edrive**. This additional energy **E_{Di}** must be dissipated in the resistor (internal or external):
E_{Di} = E_i - **Edrive** (in joules).

Calculation of the continuous power

The continuous power Pc is calculated for each machine cycle:

$$Pc = \frac{\sum E_{Di}}{Tcycle}$$

where **Pc** is in W, **E_{Di}** in joules and **T cycle** in s.

Selecting the braking resistor (internal or external)

***Note**: This is a simplified selection method. In extreme applications, for example with vertical axes, this method is inadequate. In this case, please consult your Regional Sales Office.*

The selection is carried out in two steps:

1 The internal braking resistor is adequate if the following two conditions are met:
- The maximum energy during a braking procedure must be less than the peak energy that can be absorbed by the internal braking resistor (**E_{Di}** < **EPk**),
- The continuous power must be lower than the continuous power of the internal braking resistor (**Pc** < **PPr**)

2 If one of the above conditions is not met, an external braking resistor must be used to satisfy these two conditions.
The value of the external braking resistor must be between the minimum and maximum values given in the table on page 2/38. If this range of values is not respected, the servo drive may be subject to disturbance and the load can no longer be braked safely.

Lexium 05 motion control

Lexium 05 servo drives

Option: Braking resistors

Characteristics

Braking resistors used with LXM 05●●●●F1 servo drives

Type of servo drive				LXM 05●D10F1	LXM 05●D17F1	LXM 05●D28F1
Supply voltage			V ∿	115		
Number of phases				Single-phase		
Load threshold			V ⎓	250		
Energy absorption of the internal capacitors		Edrive	Joules (Ws)	10.8	16.2	26
Internal resistor	Resistance		Ω	40		10
	Continuous power	PPr	W	20	40	60
	Peak energy	EPk	Joules (Ws)	500		1000
External resistor	Minimum resistance		Ω	27	20	10
	Maximum resistance		Ω	45	27	20

Braking resistors used with LXM 05●●●●M2 servo drives

Type of servo drive				LXM 05CU70M2	LXM 05●D10M2	LXM 05●D17M2	LXM 05●D28M2
Supply voltage			V ∿	230			
Number of phases				Single-phase			
Load threshold			V ⎓	430			
Energy absorption of the internal capacitors		Edrive	Joules (Ws)	17.7		26.6	43
Internal resistor	Resistance		Ω	40			20
	Continuous power	PPr	W	20		40	60
	Peak energy	EPk	Joules (Ws)	900			1600
External resistor	Minimum resistance		Ω	50		27	16
	Maximum resistance		Ω	75		45	27

Braking resistors used with LXM 05●●●●M3X servo drives

Type of servo drive				LXM 05●D10M3X	LXM 05●D17M3X	LXM 05●D42M3X
Supply voltage			V ∿	230		
Number of phases				Three-phase		
Load threshold			V ⎓	430		
Energy absorption of the internal capacitors		Edrive	Joules (Ws)	17.7	26.6	43
Internal resistor	Resistance		Ω	40		20
	Continuous power	PPr	W	20	40	60
	Peak energy	EPk	Joules (Ws)	900		1600
External resistor	Minimum resistance		Ω	50	27	10
	Maximum resistance		Ω	75	45	20

Braking resistors used with LXM 05●●●●N4 servo drives

Type of servo drive				LXM 05●D14N4		LXM 05●D22N4		LXM 05●D34N4		LXM 05●D57N4	
Supply voltage			V ∿	400	480	400	480	400	480	400	480
Number of phases				Three-phase							
Load threshold			V ⎓	770						760	
Energy absorption of the internal capacitors		Edrive	Joules (Ws)	26	6	52	12	52	12	104	10
Internal resistor	Resistance		Ω	40		30				20	
	Continuous power	PPr	W	40		60				100	
	Peak energy	EPk	Joules (Ws)	1000		1600				2000	
External resistor	Minimum resistance		Ω	60		25				10	
	Maximum resistance		Ω	80		36				21	

General characteristics

Type of braking resistor			**VW3 A7 601 R●●…607 R●●**
Ambient air temperature around the device	Operation	**°C**	0…+ 50
	Storage	**°C**	- 25…+ 85
Degree of protection of the casing			IP 65

Connection characteristics

Maximum wire size	**VW3 A7 601 R●●…607 R●●**		Supplied with connection cable for servo drive

References

106005

VW3 A7 60● R●●

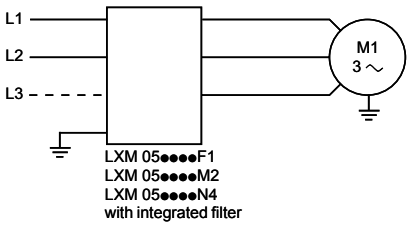
Value	Continuous power PPr	Peak energy EPk			Length of connection cable	Reference	Weight
		115 V	230 V	400 V			
Ω	W	Ws	Ws	Ws	m		kg
10	400	18,800	13,300	7300	0.75	**VW3 A7 601 R07**	1.420
					2	**VW3 A7 601 R20**	1.470
					3	**VW3 A7 601 R30**	1.620
27	100	4200	3800	1900	0.75	**VW3 A7 602 R07**	0.630
					2	**VW3 A7 602 R20**	0.780
					3	**VW3 A7 602 R30**	0.900
	200	9700	7400	4900	0.75	**VW3 A7 603 R07**	0.930
					2	**VW3 A7 603 R20**	1.080
					3	**VW3 A7 603 R30**	1.200
	400	25,500	18,100	11,400	0.75	**VW3 A7 604 R07**	1.420
					2	**VW3 A7 604 R20**	1.470
					3	**VW3 A7 604 R30**	1.620
72	100	5500	3700	2500	0.75	**VW3 A7 605 R07**	0.620
					2	**VW3 A7 605 R20**	0.750
					3	**VW3 A7 605 R30**	0.850
	200	14,600	9600	6600	0.75	**VW3 A7 606 R07**	0.930
					2	**VW3 A7 606 R20**	1.080
					3	**VW3 A7 606 R30**	1.200
	400	36,600	24,700	16,200	0.75	**VW3 A7 607 R07**	1.420
					2	**VW3 A7 607 R20**	1.470
					3	**VW3 A7 607 R30**	1.620

***Note**: The total continuous power dissipated in the external braking resistor(s) must be less than or equal to the nominal power of the Lexium 05 servo drive, see page 2/30.*

Lexium 05 motion control

Lexium 05 servo drives: EMC filters

Optional integrated filters and additional filters

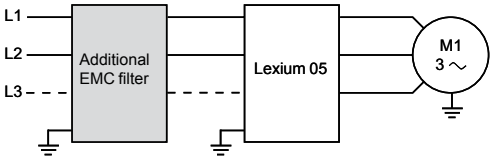


Integrated EMC filter

Function

All Lexium 05 servo drives, with the exception of the LXM 05●●●●M3X models, have integrated radio interference input filters to comply with the EMC standard for variable speed electrical power drive “products” IEC/EN 61800-3, edition 2, category C3 in environment 2, and to comply with the European directive on EMC (electromagnetic compatibility).

For servo drive	Maximum servo motor cable length conforming to EN 55011, class A, Gr2 IEC/EN 61800-3, category C3 in environment 2 Switching frequency 4 kHz (default) m
Single-phase supply voltage: 110…120 V ~ 50/60 Hz	
LXM 05●●●●F1	10
Single-phase supply voltage: 200…240 V ~ 50/60 Hz	
LXM 05●●●●M2	10
Three-phase supply voltage: 380…480 V ~ 50/60 Hz	
LXM 05●●●●N4	10



Additional EMC input filters

Applications

When combined with LXM 05●●●●F1, LXM 05●●●●M2, LXM 05●●●●M3X and LXM 05●●●●N4 servo drives, additional EMC filters can be used to meet more stringent requirements and are designed to reduce conducted emissions on the line supply below the limits of standard IEC 61800-3, edition 2, categories C2 and C3; see page 2/41.
The additional EMC filters can be mounted beside or under the device. They act as a support for the servo drives and are attached to them via tapped holes.

Use according to the type of line supply

These integrated or additional filters can only be used on TN (neutral connection) and TT (neutral to earth) type supplies.

The filters must not be used on IT (impedance or isolated neutral) type supplies. For servo drives with an integrated filter (LXM 05●●●●F1, LXM 05●●●●M2 and LXM 05●●●●N4), the filter must be disconnected using a jumper or wiring depending on the particular model; see page 2/67.

Standard IEC/EN 61800-3, appendix D2.1, states that on IT (isolated or impedance earthed neutral) type supplies, filters can adversely affect the operation of the insulation monitors. In addition, the effectiveness of additional filters on this type of line supply depends on the type of impedance between neutral and earth, and therefore cannot be predicted.

***Note**: If a machine is to be installed on an IT supply, one solution is to insert an isolation transformer in order to re-create a TT system on the secondary side.*

Lexium 05 motion control

Lexium 05 servo drives: EMC filters

Option: Additional input filters

Characteristics of servo drive/EMC filter mounting

Conforming to standards			EN 133200
Degree of protection			IP 41 on the upper part with protective cover in place IP 20 after removal of the protective cover, see page 2/70
Relative humidity			According to IEC 60721-3-3, class 3K3, 5% to 85%, without condensation or dripping water
Ambient air temperature around the device	Operation	**°C**	0…+ 50
	Storage	**°C**	- 25…+ 70
Altitude		**m**	1000 m without derating Up to 2000 m under the following conditions: ■ Max. temperature 40°C ■ Mounting distance between servo drives > 50 mm ■ Protective cover removed
Vibration resistance	Conforming to IEC 60068-2-6		10 Hz to 57 Hz: amplitude 0.075 mm 57 Hz to 150 Hz: 1 g
Shock resistance	Conforming to IEC 60068-2-27		15 gn for 11 ms
Maximum nominal voltage	Single-phase 50/60 Hz	**V**	120 + 10 % 240 + 10 %
	Three-phase 50/60 Hz	**V**	240 + 10 % 480 + 10 %

Application, category: EN 61800-3: 2001-02 ; IEC 61800-3, Ed. 2			**Description**
Category C2 in environment 1			Restricted distribution, for domestic use, sale conditioned by the competence of the user and the distributor on the subject of EMC compatibility
Category C3 in environment 2			Use in industrial premises

References

535765

VW3 A31402

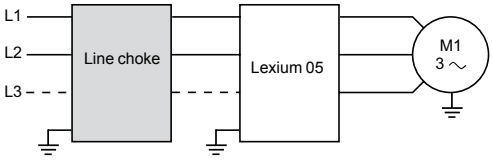
Additional EMC input filters

For servo drive	Maximum servo motor cable length conforming to			Reference	Weight
	EN 55011 class A Gr1 IEC/EN 61800-3 category C2 in environment 1	EN 55011 class A Gr2 IEC/EN 61800-3 category C3 in environment 2			
	Switching frequency 4 kHz (default)	Switching frequency 4 kHz (default)	Switching frequency 8 kHz		
	m	m	m		kg
Single-phase supply voltage					
LXM 05●D10F1 **LXM 05CU70M2, ●D10M2**	20	40	100	**VW3 A31401**	0.600
LXM 05●D17F1 **LXM 05●D17M2**	20	40	100	**VW3 A31403**	0.775
LXM 05●D28F1 **LXM 05●D28M2**	20	40	100	**VW3 A31405**	1.130
Three-phase supply voltage					
LXM 05●D10M3X	20	40	100	**VW3 A31402**	0.550
LXM 05●D17M3X **LXM 05●D14N4**	20	40	100	**VW3 A31404**	0.900
LXM 05●D42M3X **LXM 05●D22N4** **LXM 05●D34N4**	20	40	100	**VW3 A31406**	1.350
LXM 05●D57N4	20	40	100	**VW3 A31407**	3.150

Presentation: page 2/40 Dimensions: page 2/46 Schemes: page 2/66

Lexium 05 motion control
Lexium 05 servo drives
Option: Line chokes

Line chokes



A line choke can be used to provide improved protection against overvoltages on the line supply and to reduce harmonic distortion of the current produced by the servo drive.

The recommended chokes limit the line current.
They have been developed in line with standard EN 50178 (VDE 0160 level 1 high energy overvoltages on the line supply).
The inductance values are defined for a voltage drop between 3% and 5% of the nominal line voltage. Values higher than this will cause loss of torque.
These chokes must be installed upstream of the servo drive.

One line choke can be connected to a number of servo drives. In such cases, the current consumption of all the servo drives at nominal voltage must not exceed the nominal current of the line choke.

Applications

The use of line chokes is recommended in particular under the following circumstances:
- Close connection of several servo drives in parallel
- Line supply with significant disturbance from other equipment (interference, overvoltages)
- Line supply with voltage imbalance between phases that is more than 1.8% of the nominal voltage
- Servo drive supplied by a line with very low impedance (in the vicinity of a power transformer 10 times more powerful than the servo drive rating)
- Installation of a large number of servo drives on the same line
- Reduction of overloads on the cos φ correction capacitors, if the installation includes a power factor correction unit

General characteristics

Type of line choke			VZ1 L007UM50	VZ1 L018UM20	VW3 A4 551	VW3 A4 552	VW3 A4 553
Conformity to standards			EN 50178 (VDE 0160 level 1 high-energy overvoltages on the line supply)				
Voltage drop			Between 3% and 5% of the nominal supply voltage. Values higher than this will cause loss of torque				
Degree of protection	Choke		IP 00				
	Terminals		IP 20				
Inductance value		**mH**	5	2	10	4	2
Nominal current		**A**	7	18	4	10	16
Losses		**W**	20	30	45	65	75

References


536283

VW3 A4 55●

Line chokes

For servo drive	Line current without choke		Line current with choke		Reference	Weight
	U min.	U max.	U min.	U max.		
	A	A	A	A		kg
Single-phase supply voltage: 100…120 V 50/60 Hz *(1)*						
LXM 05●D10F1	7.6	7	5.9	5.4	**VZ1 L007UM50**	0.880
LXM 05●D17F1	11.5	10.5	9.7	8.9	**VZ1 L018UM20**	1.990
LXM 05●D28F1	15.7	14.4	13.3	12.2		
Single-phase supply voltage: 200…240 V 50/60 Hz *(1)*						
LXM 05CU70M2, ●D10M2	8.1	6.7	6.3	5.3	**VZ1 L007UM50**	0.880
LXM 05●D17M2	12.7	10.5	10.7	8.9	**VZ1 L018UM20**	1.990
LXM 05●D28M2	23	19.2	20.2	16.8		
Three-phase supply voltage: 200…240 V 50/60 Hz *(1)*						
LXM 05●D10M3X	5.2	4.2	2.7	2.2	**VW3 A4 551**	1.500
LXM 05●D17M3X	9	7.5	5.2	4.3	**VW3 A4 552**	3.000
LXM 05●D42M3X	19	15.8	12.2	10.2	**VW3 A4 553**	3.500
Three-phase supply voltage: 380…480 V 50/60 Hz *(1)*						
LXM 05●D14N4	4.2	3.3	2.2	1.8	**VW3 A4 551**	1.500
LXM 05●D22N4	6.3	5	3.4	2.7		
LXM 05●D34N4	9.7	7.7	5.8	4.6	**VW3 A4 552**	3.500
LXM 05●D57N4	17.7	14	9.8	7.8		

(1) Nominal supply voltage: U min…U max.

Dimensions:
page 2/46

Schemes:
page 2/66

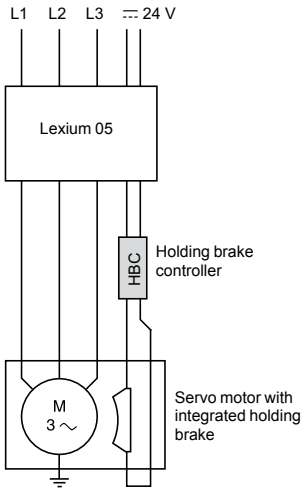
Schneider Electric

Lexium 05 motion control

Lexium 05 servo drives

Option: Holding brake controller

Holding brake controller



If a servo motor has a holding brake, it must be given an appropriate control logic (HBC, Holding Brake Controller), which releases the brake when power is supplied to the servo motor and immobilizes the servo motor shaft when it is stationary.

The holding brake controller amplifies the braking control signal transmitted by the Lexium 05 servo drive, so that the brake is deactivated quickly. It then reduces this control signal so as to decrease the power dissipated by the holding brake.

General characteristics

Mounting on rail				⊔ 55
Degree of protection				IP 20
Supply voltage			**V** ⎓	19.2…30
Input current			**A**	Brake nominal current + 0.5
Brake output	Voltages	Before power reduction	**V** ⎓	23…25
		After power reduction	**V** ⎓	17…19
	Maximum current		**A**	1.6
	Time before voltage reduction		**ms**	1000

Note: *Electrical isolation between the 24 V power supply, the control input and the brake control output.*

References

536284

VW3 M3 103

Holding brake controller

Designation	Description	Reference	Weight kg
Holding brake controller	24 V ⎓ power supply Max. power 50 W IP 20, for mounting on 55 mm ⊔ rail	**VW3 M3 103**	0.600

Dimensions: page 2/47

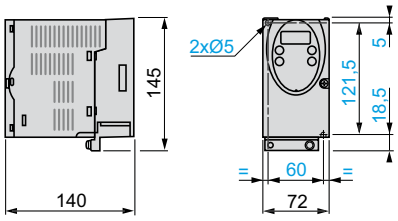
Schemes: page 2/66

Lexium 05 motion control
Lexium 05A, 05B, 05C servo drives
and EMC conformity kits

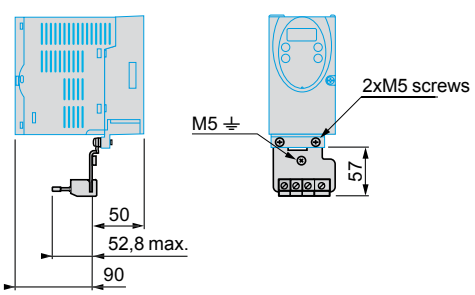
Dimensions

LXM 05●D10F1, LXM 05CU70M2, ●D10M2, LXM 05●D10M3X servo drives

Servo drive only

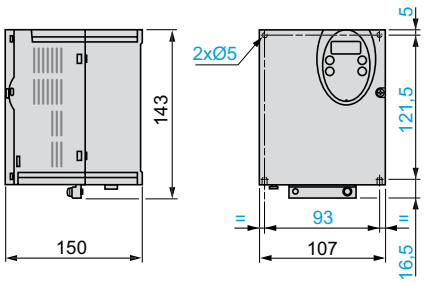


Servo drive with EMC conformity kit *(1)*

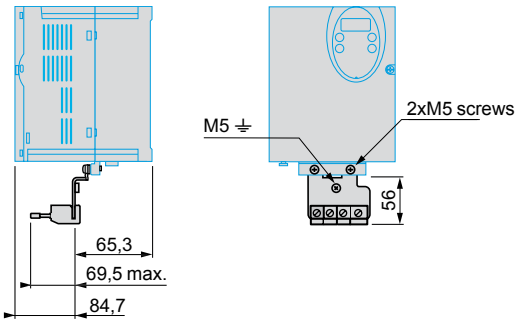


LXM 05●D17F1, LXM 05●D17M2, LXM 05●D17M3X, LXM 05●D14N4 servo drives

Servo drive only

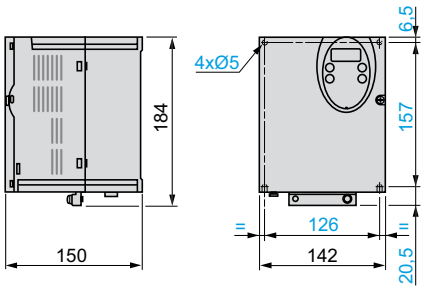


Servo drive with EMC conformity kit *(1)*

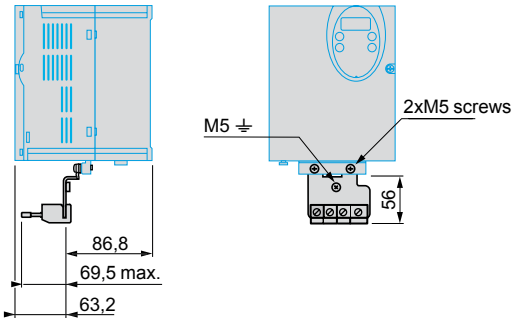


LXM 05●D28F1, LXM 05●D28M2, LXM 05●D42M3X, LXM 05●D22N4, ●D34N4 servo drives

Servo drive only

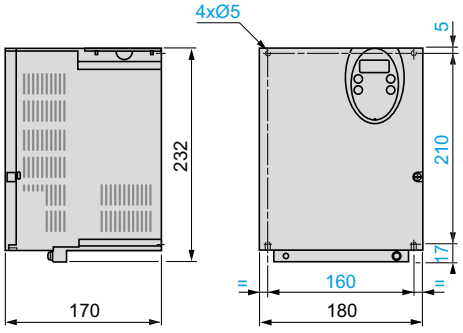


Servo drive with EMC conformity kit *(1)*

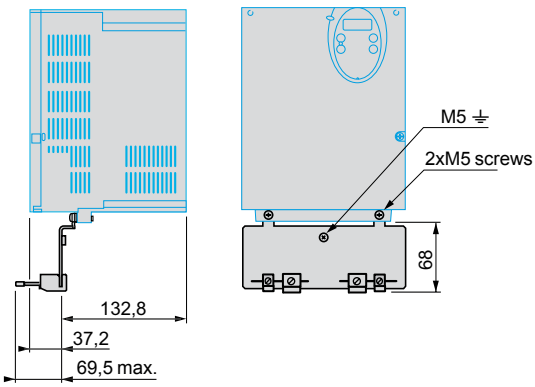


LXM 05●D57N4 servo drives

Servo drive only



Servo drive with EMC conformity kit *(1)*



(1) The kit is supplied with LXM 05A●●●●●● and LXM 05B●●●●●● servo drives; it must be ordered separately for LXM 05C●●●●● servo drives.

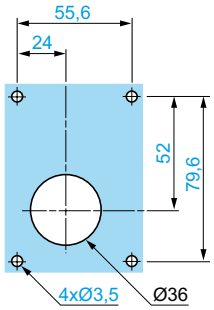
Lexium 05 motion control

Options: Remote display terminal, plates for mounting on ⊔ rail and braking resistors

Dimensions (continued)

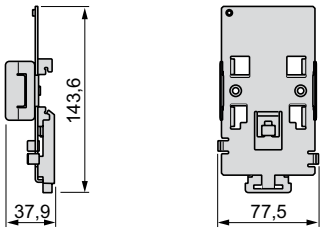
Remote display terminal

VW3 A31101

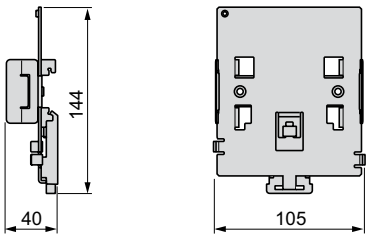


Plates for mounting on ⊔ rail

VW3 A11851

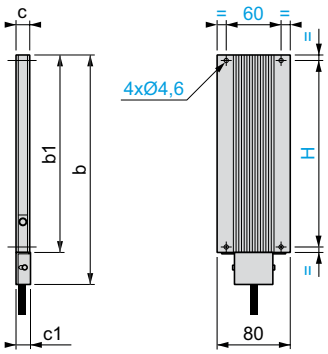


VW3 A31852



Braking resistors

VW3 A7 60● R●●



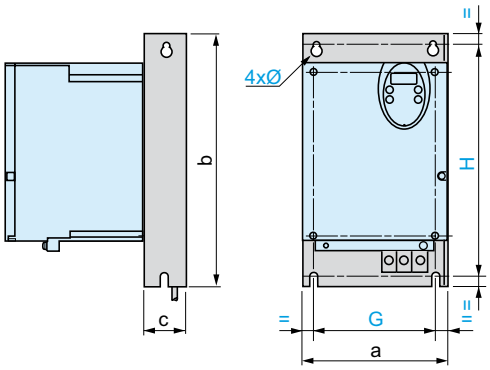
VW3	b	b1	c	c1	H
A7 602, 605	145	110	15	15.5	98
A7 603, 606	251	216	15	15.5	204
A7 601, 604, 607	257	216	30	–	204

2

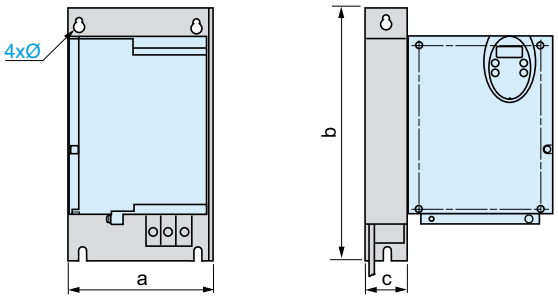
Dimensions (continued)

Additional EMC input filters VW3 A31401…407

Mounting the filter under the servo drive



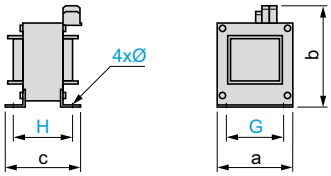
Mounting the filter next to the servo drive



VW3	a	b	c	G	H	Ø
A31401, 402	72	195	37	52	180	4.5
A31403	107	195	35	85	180	4.5
A31404	107	195	42	85	180	4.5
A31405	140	235	35	120	215	4.5
A31406	140	235	50	120	215	4.5
A31407	180	305	60	140	285	5.5

Single-phase line chokes

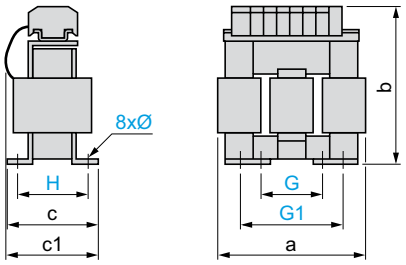
VZ1 L007UM50, VZ1 L018UM20



VZ1	a	b	c	G	H	Ø
L007UM50	60	100	95	50	60	4 x 9
L018UM20	85	120	105	70	70	5 x 11

Three-phase line chokes

VW3 A4 551…553



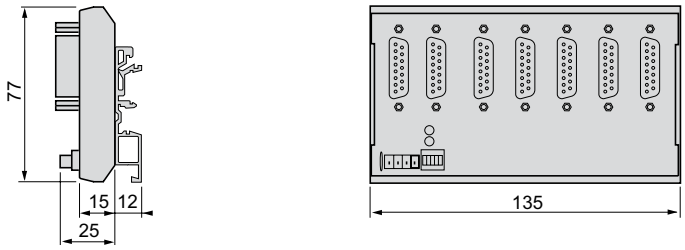
VW3	a	b	c	c1	G	G1	H	Ø
A4 551	100	135	55	60	40	60	42	6 x 9
A4 552	130	155	85	90	60	80.5	62	6 x 12
A4 553	130	155	85	90	60	80.5	62	6 x 12

Presentation: pages 2/40 and 2/42
Characteristics: pages 2/41 and 2/42
References: pages 2/41 and 2/42
Schemes: page 2/66

Dimensions (continued)

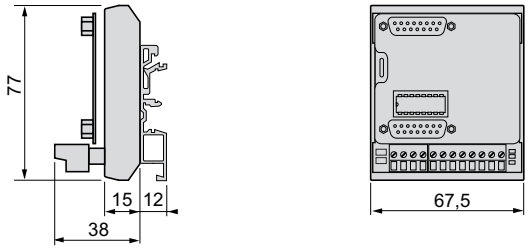
Splitter box

VW3 M3 101



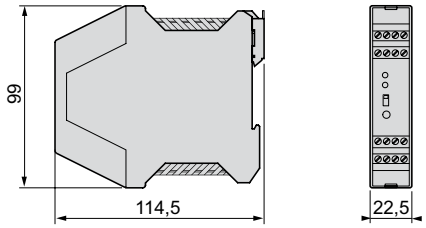
RS 422 converter (USIC)

VW3 M3 102



Holding brake controller

VW3 M3 103



Lexium 05 motion control
Lexium 05A and 05B servo drives
Safety requirements

"Power Removal" safety function

Lexium 05A and Lexium 05B servo drives integrate the "Power Removal" safety function which prevents unintended restarting of the servo motor. The servo motor no longer produces any torque.

This safety function:
- Complies with the machine safety standard ISO 13849-1, performance level "d" (PL d)
- Complies with the standard for functional safety IEC/EN 61508, SIL2 capability (safety control-signalling applied to processes and systems)

The SIL (Safety Integrity Level) capability depends on the connection diagram for the servo drive and for the safety function. Failure to observe the setup recommendations could inhibit the SIL capability of the "Power Removal" safety function.
- Complies with the product standard IEC/EN 61800-5-2 for both stop functions:
  - ◻ Safe Torque Off "STO"
  - ◻ Safe Stop 1 "SS1". This controlled stop requires a Preventa XPS AV safety module with time delay *(1)*.

The "Power Removal" safety function has a redundant electronic architecture *(2)* which is monitored continuously by a diagnostics function.

This PL d and SIL2 safety function is certified as conforming to these standards by the TÜV certification body under a program of voluntary certification.

Performance level (PL) according to ISO 13849-1

Performance level PL	Mean probability of hazardous failure per hour 1/h
a	$\geq 10^{-5}$ to $< 10^{-4}$
b	$\geq 3 \times 10^{-6}$ to $< 10^{-5}$
c	$\geq 10^{-6}$ to $< 3 \times 10^{-6}$
d	$\geq 10^{-7}$ to $< 10^{-6}$
e	$\geq 10^{-8}$ to $< 10^{-7}$

***Note**: In addition to the mean probability of undetected hazardous failure per hour, other measures are also necessary in order to achieve the PL (performance level).*

***Note**: Lexium 05A and Lexium 05B servo drives can be used up to performance level "d" (PL d).*

Safety Integrity Levels (SIL) according to IEC/EN 61508

SIL1 according to standard IEC/EN 61508 is comparable with performance levels "b" and "c" (PL b and PL c) according to ISO 13849-1 (SIL1: mean probability of undetected hazardous failure per hour between 10^{-5} and 10^{-6}).
SIL2 according to standard IEC/EN 61508 is comparable with performance level "d" (PL d) according to ISO 13849-1 (SIL2: mean probability of undetected hazardous failure per hour between 10^{-6} and 10^{-7}).

(1) Please refer to the "Safety functions and solutions using Preventa" catalogue.
(2) Redundant: Consists of mitigating the effects of the failure of one component by means of the correct operation of another, assuming that faults do not occur simultaneously on both.

"Power Removal" safety function considerations

The “Power Removal” safety function cannot be considered as a means of electrical disconnection of the servo motor (no electrical isolation); if necessary, a Vario switch disconnector must be used.
The “Power Removal” safety function is not designed to compensate for any malfunction in the servo drive process control or application functions.
The output signals available on the servo drive must not be considered as safety-related signals (e.g. “Power Removal” active); these are Preventa-type safety module outputs *(1)* which must be integrated into a safety control-signalling circuit.

The schemes on the following pages take into account conformity to standard IEC/EN 60204-1, which defines three stopping categories:
- Category 0: Stopping by immediate removal of the power from the actuators (e.g. uncontrolled stop)
- Category 1: Controlled stop maintaining the power on the actuators until the machine stops, then removal of the power when the actuators stop once the machine has stopped
- Category 2: Controlled stop maintaining the power on the actuators

Connection diagrams and applications

Conformity to performance levels “b” and “c” (PL b and PL c) according to ISO 13849-1 and to SIL1 according to IEC/EN 61508

Use of the connection diagrams on page 2/50 which use a line contactor or a Vario switch disconnector between the servo drive and the servo motor. In this case, the “Power Removal” safety function is not used and the servo motor stops in accordance with **category 0** of standard IEC/EN 60204-1.

Conformity to performance level “d” (PL d) according to ISO 13849-1 and to SIL2 according to IEC/EN 61508

The connection diagrams use the "Power Removal" safety function of the Lexium 05A and Lexium 05B servo drives combined with a Preventa safety module to monitor the emergency stop circuits.

Machines with short freewheel stopping times (low inertia or high resistive torque, see page 2/51).
When the activation command is given on the $\overline{\text{PWRR\_A}}$ and $\overline{\text{PWRR\_B}}$ inputs with the controlled servo motor, the servo motor power supply is immediately switched off and the motor stops according to **category 0** of standard IEC/EN 60204-1.
Restarting is not permitted even when the activation command is given after the servo motor has come to a complete stop.
This safe stop is maintained for as long as the $\overline{\text{PWRR\_A}}$ and $\overline{\text{PWRR\_B}}$ inputs remain activated.
For hoisting activities it is necessary to add a Preventa XPS AC-type safety module *(1)* (see page 2/52).
On a “Power Removal” command, the servo drive requires the brake to be engaged, but a Preventa safety module contact must be inserted in series in the brake control circuit to engage it safely when a request is made to activate the “Power Removal” safety function.

Machines with long freewheel stopping times (high inertia or low resistive torque, see page 2/53).
When the activation command is given, deceleration of the servo motor controlled by the servo drive is first requested, then, following a time delay controlled by a Preventa XPS AV-type safety module *(1)* which corresponds to the deceleration time, the “Power Removal” safety function is activated by the PWRR_A and PWRR_B inputs. The servo motor stops according to **category 1** of standard IEC/EN 60204-1 ("SS1").

Periodic test
The “Power Removal” safety input must be activated at least once a year for preventive maintenance purposes. The servo drive must be switched off before preventive maintenance takes place, and then powered up again. If the power supply to the servo motor is not switched off during testing, safety integrity is no longer assured for the “Power Removal” safety function. The servo drive must therefore be replaced to ensure the operational safety of the machine or the system process.

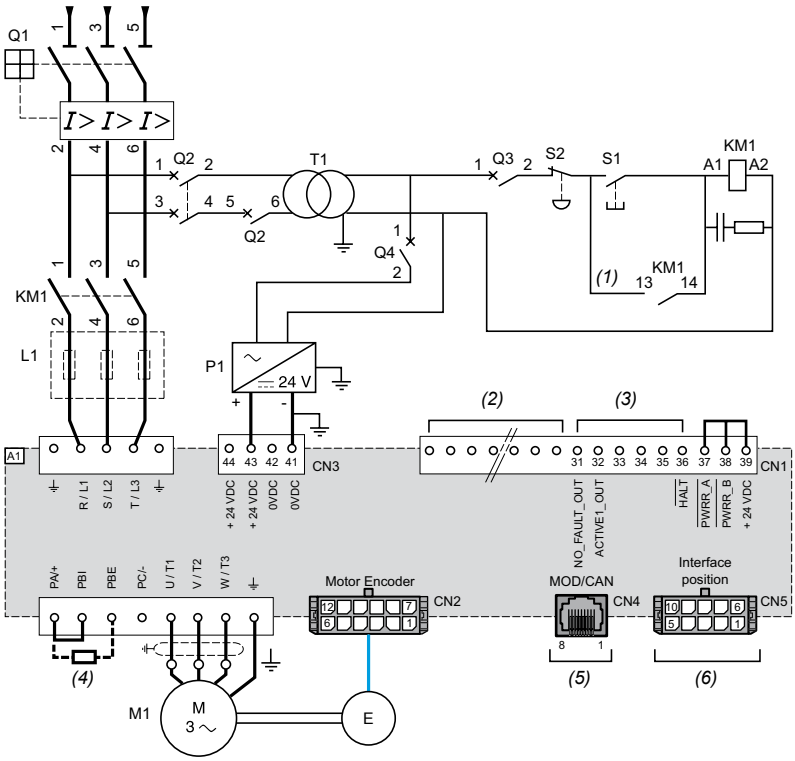
(1) Please refer to the “Safety functions and solutions using Preventa” catalogue.

2

Schemes conforming to standards ISO 13849-1, PL b and PL c, IEC/EN 61508 SIL1 capability, in stopping category 0 according to IEC/EN 60204-1

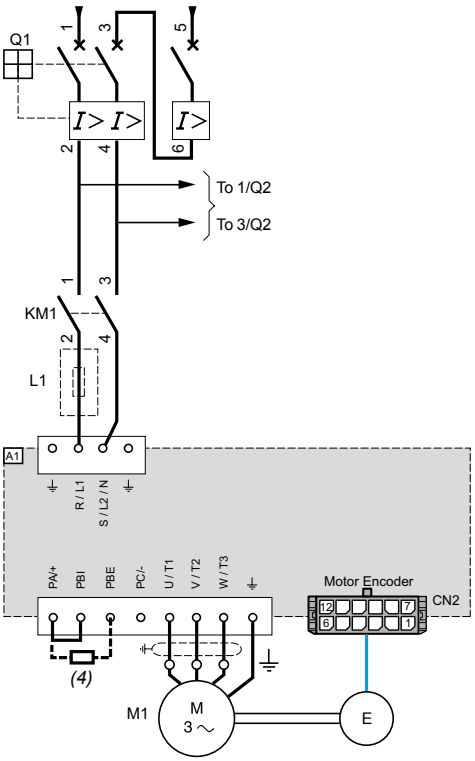
LXM 05A●●●M3X, B●●●M3X, LXM 05A●●●N4, B●●●N4

Three-phase power supply with upstream breaking via contactor



LXM 05A●●●F1, B●●●F1, LXM 05A●●●M2, B●●●M2

Power section for single-phase power supply



Note: *All terminals are located at the bottom of the servo drive. Fit interference suppressors to all inductive circuits near the servo drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" catalogue).

Ref.	Description
A1	Lexium 05A or Lexium 05B servo drive (see page 2/30)
KM1	Line contactor (see motor starters on page 2/68)
L1	Line choke (see page 2/42)
M1	BRH or BSH servo motor (see page 2/96 or 2/138)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue
Q1	Circuit breaker (see motor starters on page 2/68)
Q2	GV2-L magnetic circuit-breaker rated at twice the nominal primary current of T1
Q3, Q4	GB2 CB05 thermal magnetic circuit breakers
S1, S2	XB4 B or XB5 A "Start" and "Emergency stop" pushbuttons
T1	220 V secondary transformer

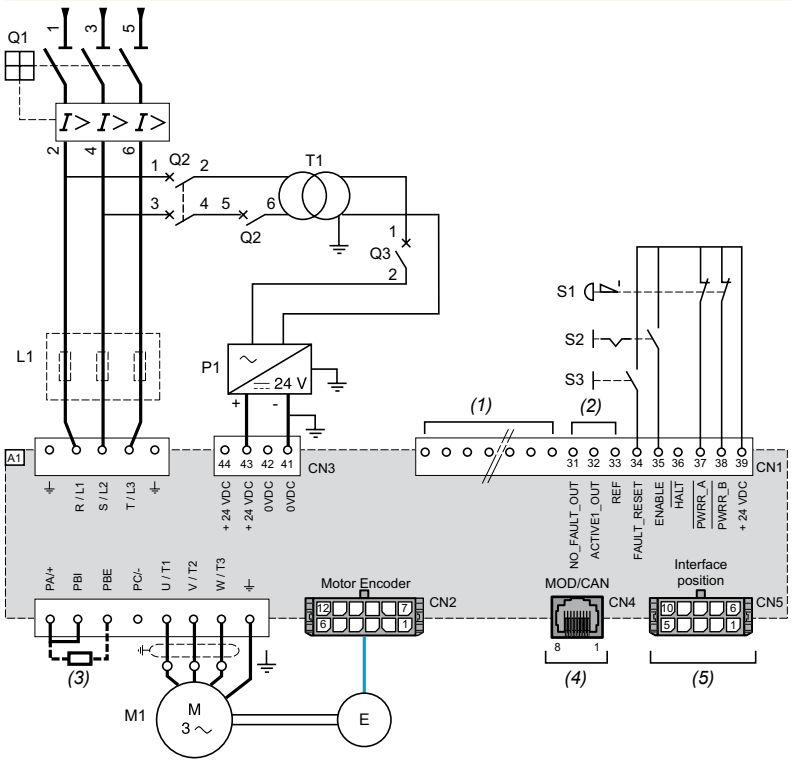
(1) Insert (in series) a contact of the relay driven by the "NO_FAULT_OUT" (31) logic output: on a servo drive fault, KM1 (line contactor) opens.
(2) Specific spring terminals according to the type of servo drive (see page 2/59).
(3) 4 logic inputs and 2 logic outputs 24 V ⎓. For Lexium 05A servo drives these logic I/O are reassignable (see page 2/59).
(4) External braking resistor (see page 2/39).
(5) CANopen machine bus or Modbus serial link on RJ45 connector. Can also be used to connect a PC terminal (equipped with PowerSuite software workshop) or the remote terminal VW3 A31101.
(6) Molex connector for connecting A/B encoder signals or pulse/direction (P/D) signals (see page 2/64).

Schemes conforming to standards ISO 13849-1, PL d, IEC/EN 61508 SIL2 capability, in stopping category 0 according to IEC/EN 60204-1

The scheme below is shown in local control mode via logic I/O. In communication network control mode, the inputs marked 34 and 35 on the CN1 spring terminals must be controlled via the network. In this network control mode, inputs 34 and 35 have the assignments "LIMN" and "LIMP".

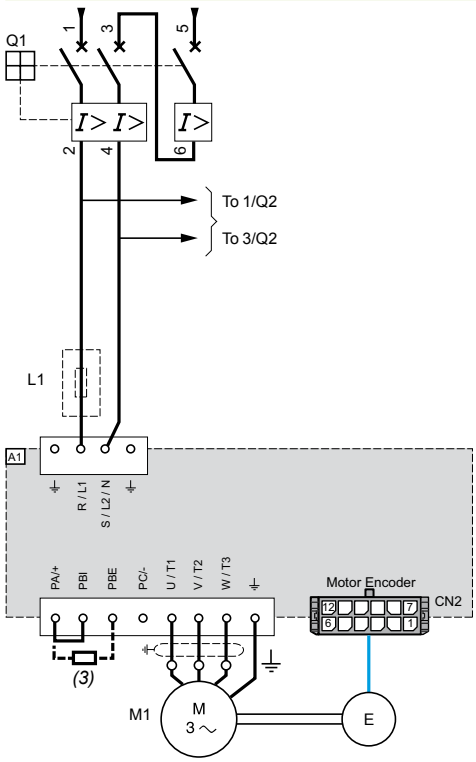
LXM 05A●●●M3X, B●●●M3X, LXM 05A●●●N4, B●●●N4

Three-phase power supply, low inertia machine



LXM 05A●●●F1, B●●●F1, LXM 05A●●●M2, B●●●M2

Power section for single-phase power supply



Note: *All terminals are located at the bottom of the servo drive. Fit interference suppressors to all inductive circuits near the servo drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" catalogue).

Ref.	Description
A1	Lexium 05A or Lexium 05B servo drive (see page 2/30)
L1	Line choke (see page 2/42)
M1	BRH or BSH servo motor (see page 2/96 or 2/138)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue
Q1	Circuit breaker (see motor starters on page 2/68)
Q2	GV2-L magnetic circuit-breaker rated at twice the nominal primary current of T1
Q3	GB2 CB05 thermal magnetic circuit breaker
S1	XB4 B or XB5 A "Emergency stop" dual contact pushbutton
S2	XB4 B or XB5 A "Enable" stay-put pushbutton
S3	XB4 B or XB5 A "Reset" pushbutton
T1	220 V secondary transformer

(1) Specific spring terminals according to the type of servo drive (see page 2/59).
(2) 1 logic input and 2 logic outputs 24 V ⎓. For Lexium 05A servo drives these logic I/O are reassignable (see page 2/59).
(3) External braking resistor (see page 2/39).
(4) CANopen machine bus or Modbus serial link on RJ45 connector. Can also be used to connect a PC terminal (equipped with PowerSuite software workshop) or the remote terminal VW3 A31101.
(5) Molex connector for connecting A/B encoder signals or pulse/direction (P/D) signals (see page 2/64).

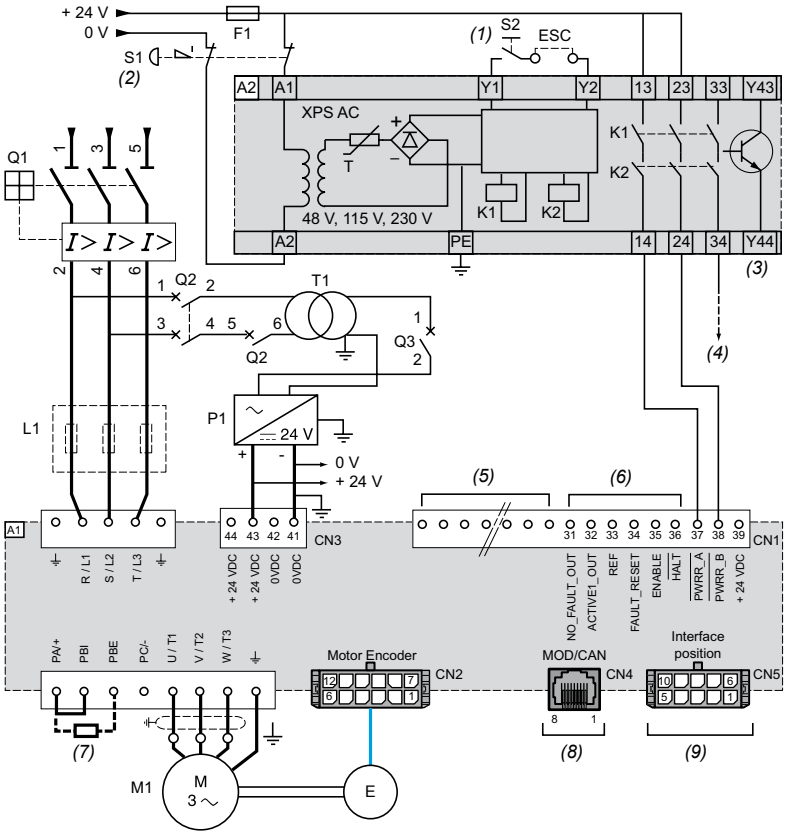
2

Schemes conforming to standards ISO 13849-1, PL d, IEC/EN 61508 SIL2 capability, in stopping category 0 according to IEC/EN 60204-1 (continued)

The scheme below is shown in local control mode via logic I/O. In communication network control mode, the inputs marked 34 and 35 on the CN1 spring terminals must be controlled via the network. In this network control mode, inputs 34 and 35 have the assignments "LIMN" and "LIMP".

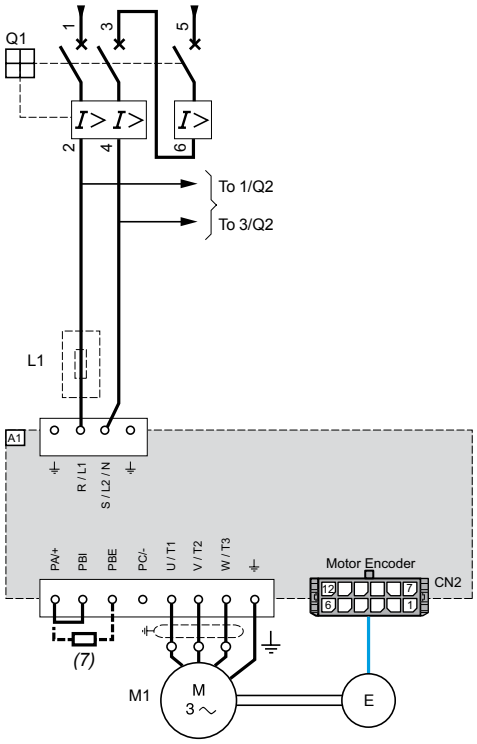
LXM 05A●●●M3X, B●●●M3X, LXM 05A●●●N4, B●●●N4

Three-phase power supply, low inertia machine, vertical movement



LXM 05A●●●F1, B●●●F1, LXM 05A●●●M2, B●●●M2

Power section for single-phase power supply



Note: *All terminals are located at the bottom of the servo drive. Fit interference suppressors to all inductive circuits near the servo drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" and "Safety functions and solutions using Preventa" catalogues).

Ref.	Description
A1	Lexium 05A or Lexium 05B servo drive (see page 2/30)
A2	Preventa XPS AC safety module for monitoring emergency stops and switches. The XPS AC safety module can manage the "Power Removal" function of several servo drives on the same machine.
F1	Fuse
L1	Line choke (see page 2/42)
M1	BRH or BSH servo motor (see page 2/96 or 2/138)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue
Q1	Circuit breaker (see motor starters on page 2/68)
Q2	GV2-L magnetic circuit-breaker rated at twice the nominal primary current of T1
Q3	GB2 CB05 thermal magnetic circuit breaker
S1	XB4 B or XB5 A "Emergency stop" pushbutton with 2 contacts
S2	XB4 B or XB5 A spring return pushbutton
T1	220 V secondary transformer

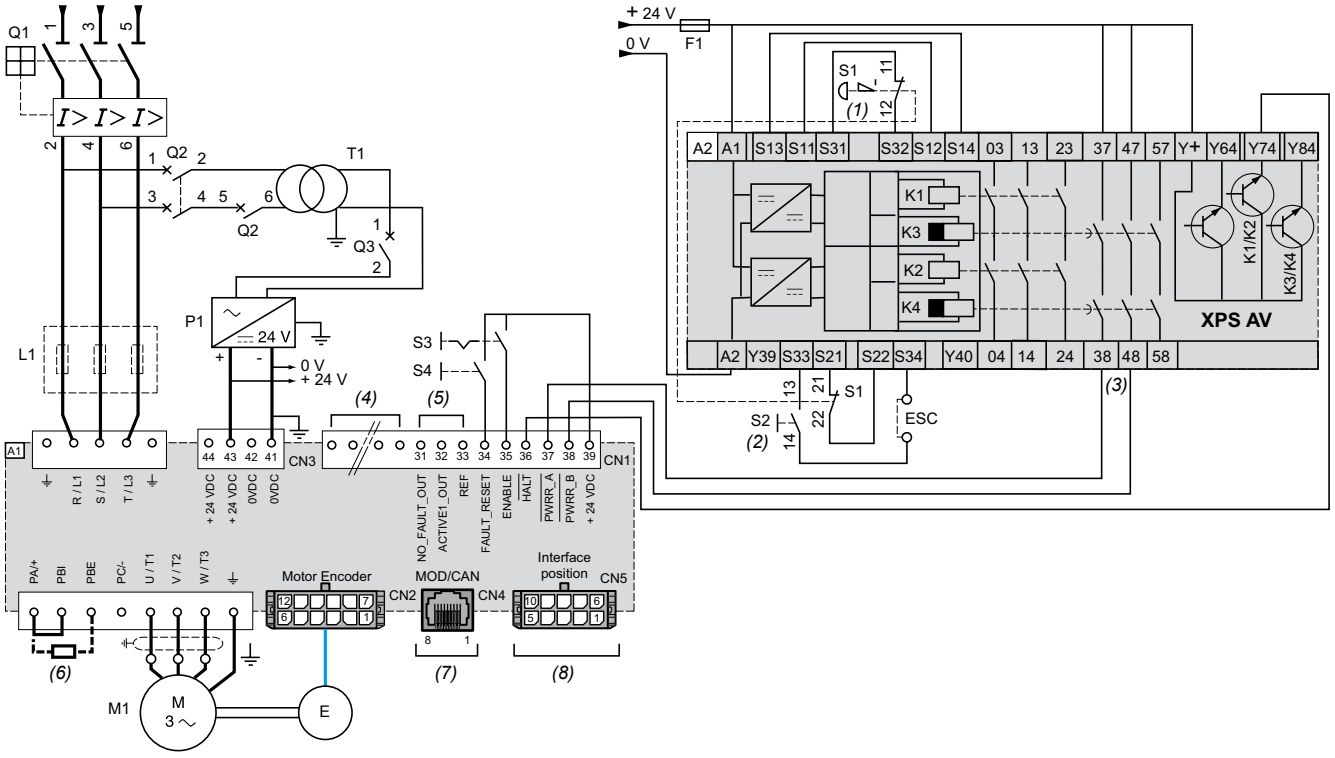
(1) S2: Resets the XPS AC module on power-up or after an emergency stop. ESC can be used to set external starting conditions.
(2) S1: Requests uncontrolled stopping of the movement and activates the "Power Removal" safety function.
(3) The logic output can be used to indicate that the machine is in a safe stop state.
(4) To "Power Removal" safety function of an Altivar 71 variable speed servo drive (for example).
(5) Specific spring terminals according to the type of servo drive (see page 2/59).
(6) 4 logic inputs and 2 logic outputs 24 V ⎓. For Lexium 05A servo drives these logic I/O are reassignable (see page 2/59).
(7) External braking resistor (see page 2/39).
(8) CANopen machine bus or Modbus serial link on RJ45 connector. Can also be used to connect a PC terminal (equipped with PowerSuite software workshop) or the remote terminal VW3 A31101.
(9) Molex connector for connecting A/B encoder signals or pulse/direction (P/D) signals (see page 2/64).

Schemes conforming to standards ISO 13849-1, PL d, IEC/EN 61508 SIL2 capability, in stopping category 1 according to IEC/EN 60204-1

The scheme below is shown in local control mode via logic I/O. In communication network control mode, the inputs marked 34 and 35 on the CN1 spring terminals must be controlled via the network. In this network control mode, inputs 34 and 35 have the assignments "LIMN" and "LIMP".

LXM 05A●●●M3X, B●●●M3X, LXM 05A●●●N4, B●●●N4

Three-phase power supply, high inertia machine



Note: *All terminals are located at the bottom of the servo drive. Fit interference suppressors to all inductive circuits near the servo drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" and "Safety functions and solutions using Preventa" catalogues).

Ref.	Description
A1	Lexium 05A or Lexium 05B servo drive (see page 2/30)
A2	Preventa XPS AV safety module for monitoring emergency stops and switches. One safety module can manage the “Power Removal” safety function of several servo drives on the same machine, but the time delay must be adjusted on the servo drive controlling the servo motor that requires the longest stopping time.
F1	Fuse
L1	Line choke (see page 2/42)
M1	BRH or BSH servo motor (see page 2/96 or 2/138)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue
Q1	Circuit breaker (see motor starters on page 2/68)
Q2	GV2-L magnetic circuit-breaker rated at twice the nominal primary current of T1
Q3	GB2 CB05 thermal magnetic circuit breaker
S1	XB4 B or XB5 A "Emergency stop" dual contact pushbutton
S2	XB4 B or XB5 A "Start" pushbutton
S3	XB4 B or XB5 A "Enable" stay-put pushbutton
S4	XB4 B or XB5 A "Reset" pushbutton
T1	220 V secondary transformer

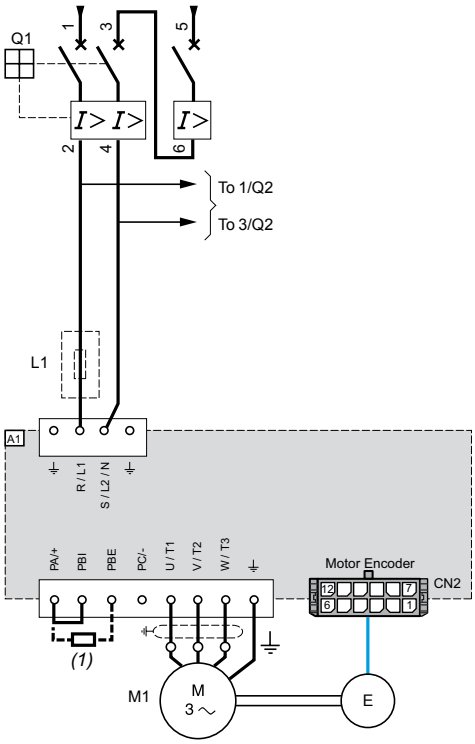
(1) S1: Requests controlled stopping of the movement and activates the “Power Removal” safety function.
(2) S2: Resets the XPS AV module on power-up or after an emergency stop. ESC can be used to set external starting conditions.
(3) Time-delayed opening safety outputs, 300 seconds max. (stopping category 1).
(4) Specific spring terminals according to the type of servo drive (see page 2/59).
(5) 1 logic input and 2 logic outputs 24 V ⎓. For Lexium 05A servo drives these logic I/O are reassignable (see page 2/59).
(6) External braking resistor (see page 2/39).
(7) CANopen machine bus or Modbus serial link on RJ45 connector. Can also be used to connect a PC terminal (equipped with PowerSuite software workshop) or the remote terminal VW3 A31101.
(8) Molex connector for connecting A/B encoder signals or pulse/direction (P/D) signals (see page 2/64).

2

Schemes conforming to standards ISO 13849-1, PL d, IEC/EN 61508 SIL2 capability, in stopping category 1 according to IEC/EN 60204-1 (continued)

LXM 05A●●●F1, B●●●F1, LXM 05A●●●M2, B●●●M2

Power section for single-phase power supply, high inertia machine



Note: *All terminals are located at the bottom of the servo drive. Fit interference suppressors to all inductive circuits near the servo drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" and "Safety functions and solutions using Preventa" catalogues).

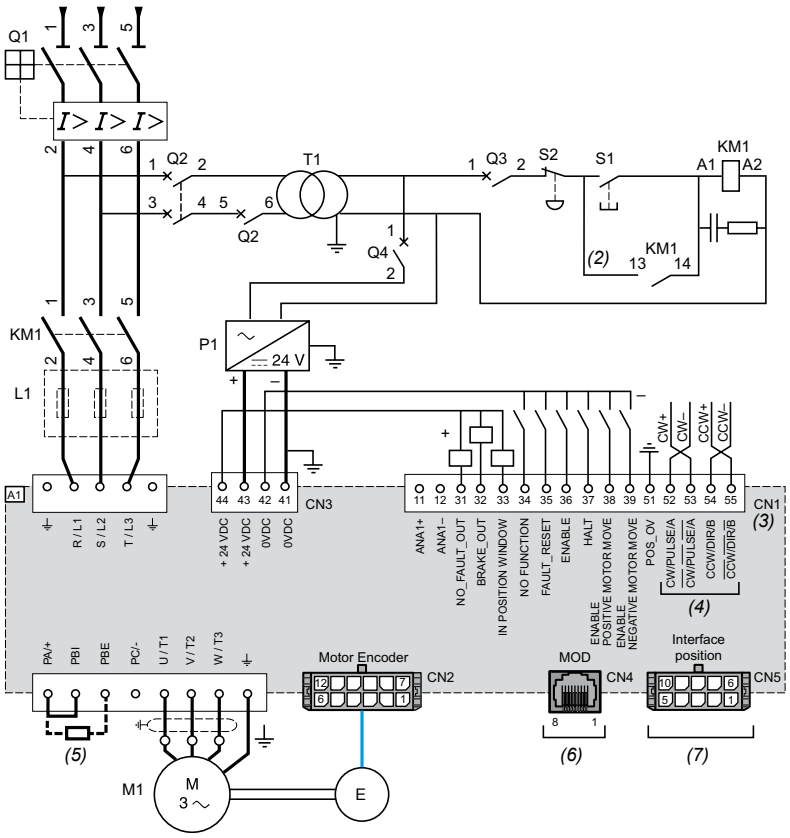
Ref.	Description
A1	Lexium 05A or Lexium 05B servo drive (see page 2/30)
L1	Line choke (see page 2/42)
M1	BRH or BSH servo motor (see page 2/96 or 2/138)
Q1	Circuit breaker (see motor starters on page 2/68)
Q2	GV2-L magnetic circuit-breaker rated at twice the nominal primary current of T1

(1) External braking resistor (see page 2/39).

Schemes for pulse position control (example with Lexium 05C servo drive) *(1)*

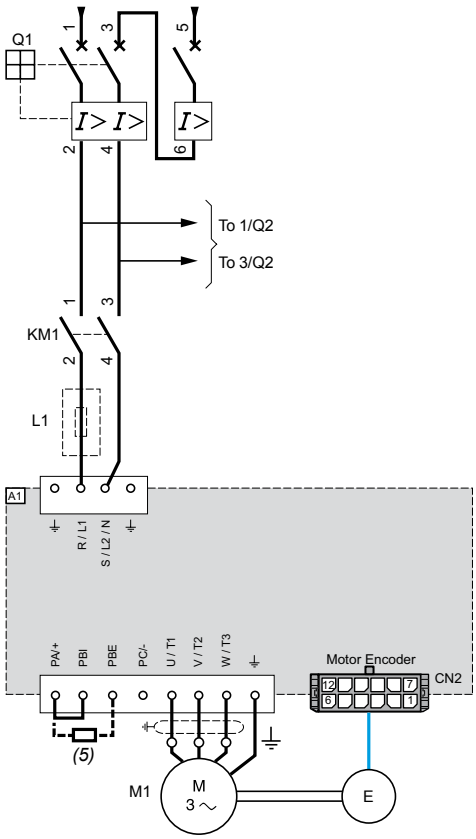
LXM 05C●●●N4

Three-phase power supply with upstream breaking via contactor



LXM 05C●●●M2

Power section for single-phase power supply



Note: *All terminals are located at the bottom of the servo drive. Fit interference suppressors to all inductive circuits near the servo drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" catalogue).

Ref.	Description
A1	Lexium 05C (this example), Lexium 05A *(1)* or Lexium 05B *(1)* servo drive (see page 2/30)
KM1	Line contactor (see motor starters on page 2/68)
L1	Line choke (see page 2/42)
M1	BRH or BSH servo motor (see page 2/96 or 2/138)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue
Q1	Circuit breaker (see motor starters on page 2/68)
Q2	GV2-L magnetic circuit-breaker rated at twice the nominal primary current of T1
Q3, Q4	GB2 CB05 thermal magnetic circuit breakers
S1, S2	XB4 B or XB5 A "Start" and "Emergency stop" pushbuttons
T1	220 V secondary transformer

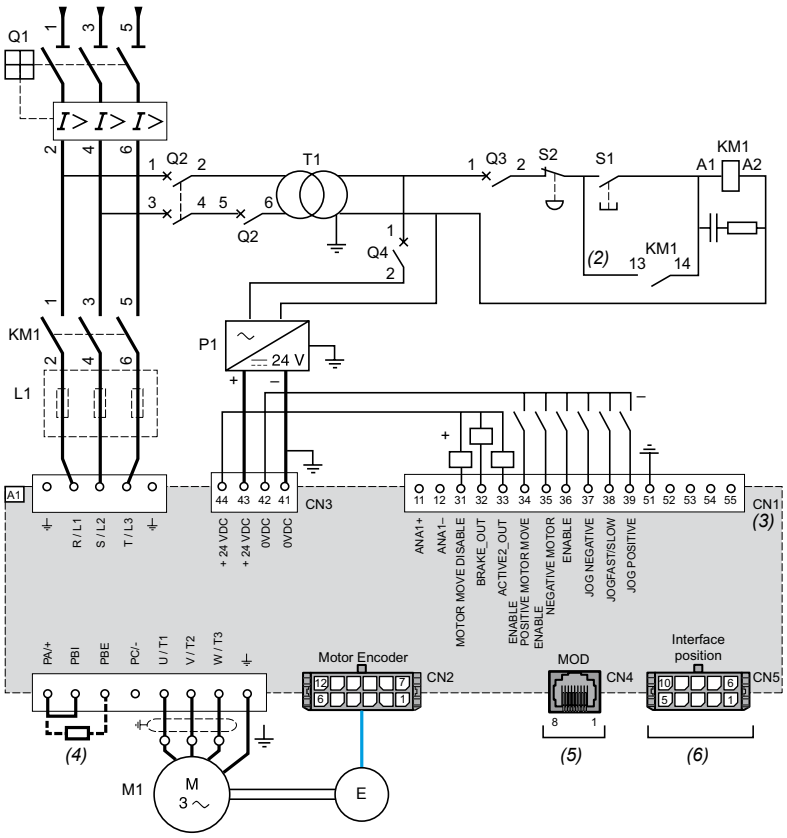
(1) To connect Lexium 05A and Lexium 05B servo drives (connectors CN1 and CN5), please refer to the user manuals, which are available on our website at "www.schneider-electric.com".
(2) Insert (in series) a contact of the relay driven by the "NO_FAULT_OUT" (31) logic output: on a servo drive fault, KM1 (line contactor) opens.
(3) Example of logic I/O assignment for pulse position control with a Lexium 05C servo drive.
The name of the logic I/O differs depending on which assignment is selected and the servo drive type (Lexium 05A, Lexium 05B or Lexium 05C). See pages 2/59 to 2/62.
(4) The pulse train configuration is CW/CCW by default (Lexium 05C servo drives only).
(5) External braking resistor (see page 2/39).
(6) Modbus serial link on RJ45 connector. Can also be used to connect a PC terminal (equipped with PowerSuite software workshop) or the remote terminal VW3 A31101.
(7) Molex connector for the ESIM (Encoder SIMulation) output on the RS 422 interface (see page 2/65)

2

Schemes for manual mode (JOG) in local control mode (example with Lexium 05C servo drive) *(1)*

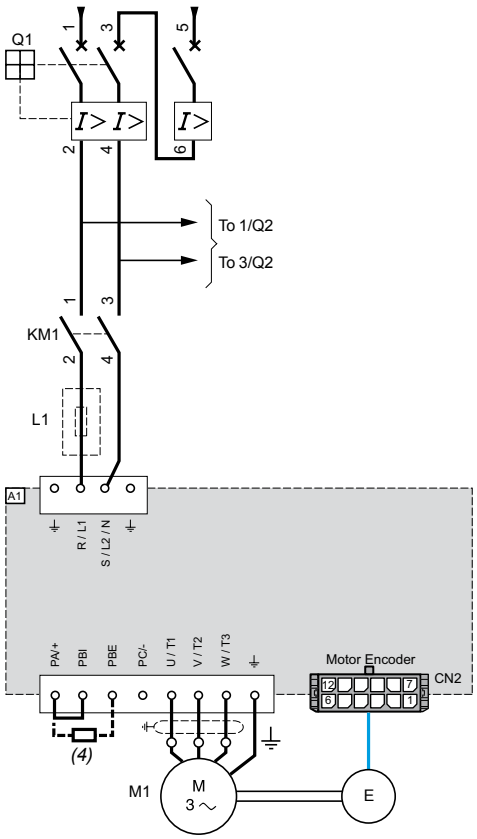
LXM 05C●●●N4

Three-phase power supply with upstream breaking via contactor



LXM 05C●●●M2

Power section for single-phase power supply



Note: *All terminals are located at the bottom of the servo drive. Fit interference suppressors to all inductive circuits near the servo drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" catalogue).

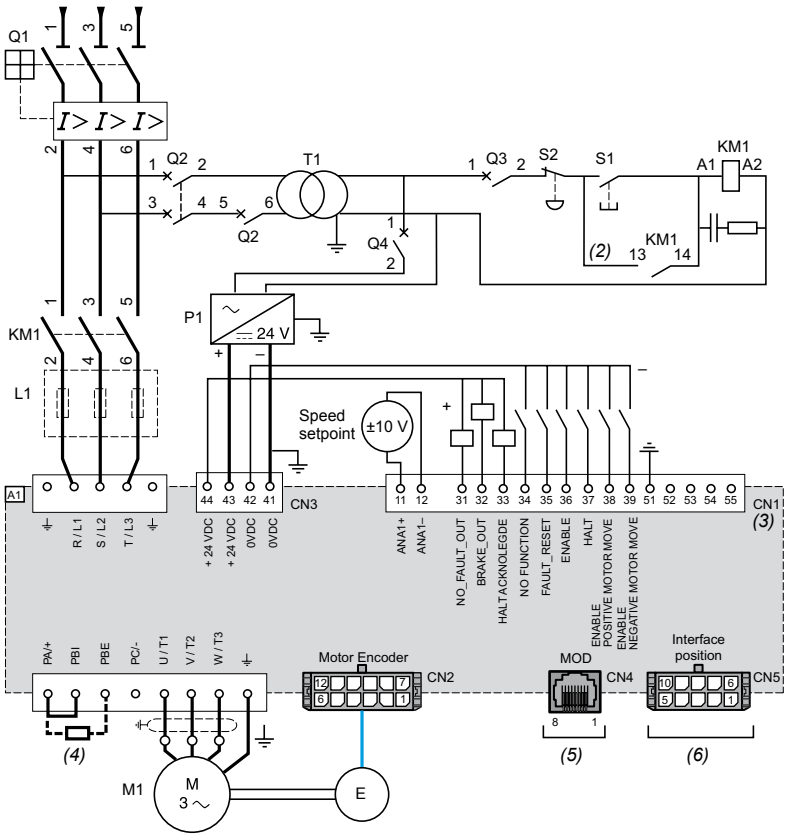
Ref.	Description
A1	Lexium 05C (this example) or Lexium 05A *(1) servo drive* (see page 2/30)
KM1	Line contactor (see motor starters on page 2/68)
L1	Line choke (see page 2/42)
M1	BRH or BSH servo motor (see page 2/96 or 2/138)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue
Q1	Circuit breaker (see motor starters on page 2/68)
Q2	GV2-L magnetic circuit-breaker rated at twice the nominal primary current of T1
Q3, Q4	GB2 CB05 thermal magnetic circuit breakers
S1, S2	XB4 B or XB5 A "Start" and "Emergency stop" pushbuttons
T1	220 V secondary transformer

(1) To connect a Lexium 05A servo drive (connectors CN1 and CN5), please refer to the user manual, which is available on our website at "www.schneider-electric.com".
(2) Insert (in series) a contact of the relay driven by the "MOTOR MOVE DISABLE" (31) logic output: on a servo drive fault, KM1 (line contactor) opens.
(3) Example of logic I/O assignment for manual mode (JOG) with a Lexium 05C servo drive.
The name of the logic I/O differs depending on which assignment is selected (Lexium 05A and Lexium 05C servo drives only). See pages 2/60 and 2/62.
(4) External braking resistor (see page 2/39).
(5) Modbus serial link on RJ45 connector. Can also be used to connect a PC terminal (equipped with PowerSuite software workshop) or the remote terminal VW3 A31101.
(6) Molex connector for the ESIM (Encoder SIMulation) output on the RS 422 interface (see page 2/65)

Schemes for speed control mode in local control mode (example with Lexium 05C servo drive) *(1)*

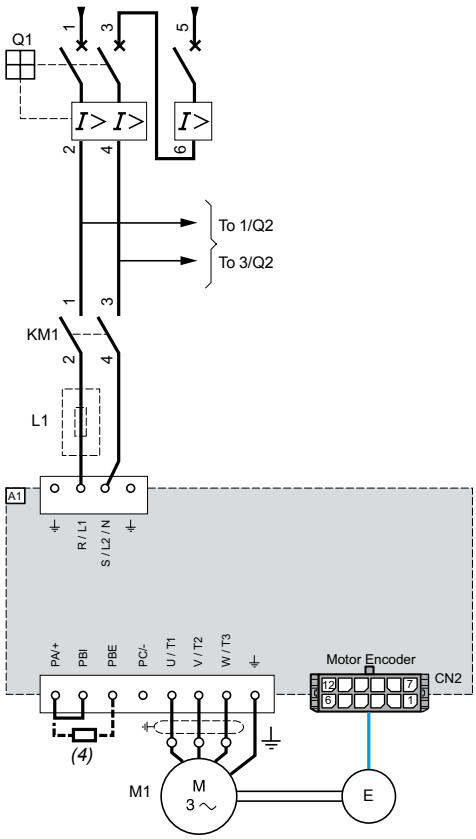
LXM 05C●●●N4

Three-phase power supply with upstream breaking via contactor



LXM 05C●●●M2

Power section for single-phase power supply



Note: *All terminals are located at the bottom of the servo drive. Fit interference suppressors to all inductive circuits near the servo drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" catalogue).

Ref.	Description
A1	Lexium 05C (this example) or Lexium 05A *(1) servo drive* (see page 2/30)
KM1	Line contactor (see motor starters on page 2/68)
L1	Line choke (see page 2/42)
M1	BRH or BSH servo motor (see page 2/96 or 2/138)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue
Q1	Circuit breaker (see motor starters on page 2/68)
Q2	GV2-L magnetic circuit-breaker rated at twice the nominal primary current of T1
Q3, Q4	GB2 CB05 thermal magnetic circuit breakers
S1, S2	XB4 B or XB5 A "Start" and "Emergency stop" pushbuttons
T1	220 V secondary transformer

(1) To connect a Lexium 05A servo drive (connectors CN1 and CN5), please refer to the user manual, which is available on our website at "www.schneider-electric.com".
(2) Insert (in series) a contact of the relay driven by the "NO_FAULT_OUT" (31) logic output: on a servo drive fault, KM1 (line contactor) opens.
(3) Example of logic I/O assignment for speed control mode with a Lexium 05C servo drive.
The name of the logic I/O differs depending on which assignment is selected (Lexium 05A and Lexium 05C servo drives only). See pages 2/60 and 2/62.
(4) External braking resistor (see page 2/39).
(5) Modbus serial link on RJ45 connector. Can also be used to connect a PC terminal (equipped with PowerSuite software workshop) or the remote terminal VW3 A31101.
(6) Molex connector for the ESIM (Encoder SIMulation) output on the RS 422 interface (see page 2/65)

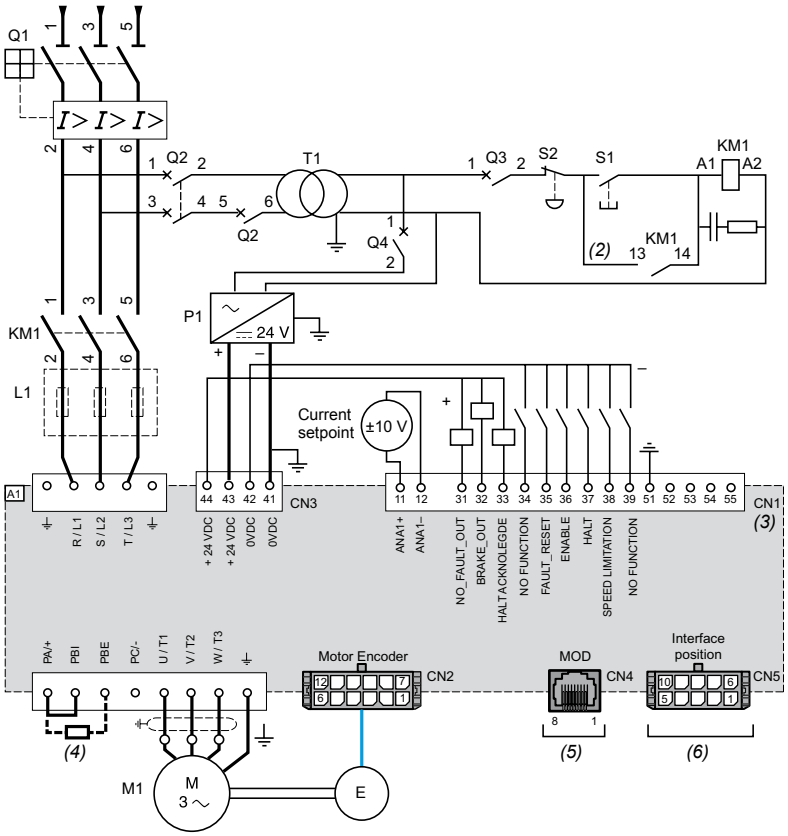
2

Schemes for current control mode for torque control applications in local control mode

(example with a Lexium 05C servo drive) *(1)*

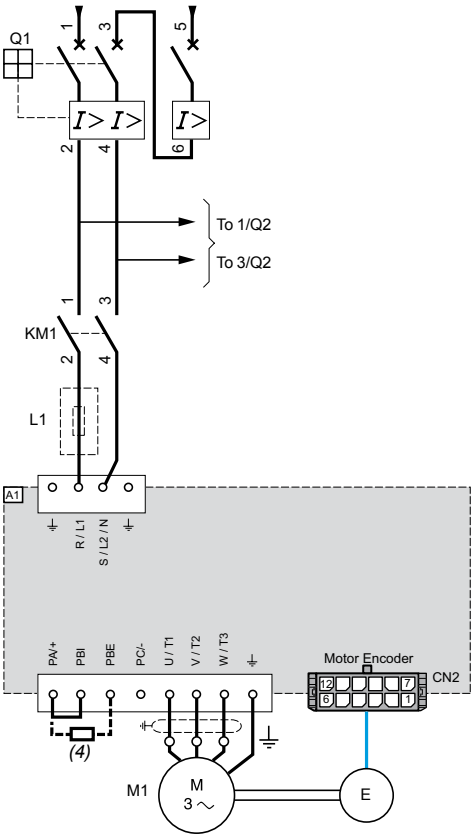
LXM 05C●●●N4

Three-phase power supply with upstream breaking via contactor



LXM 05C●●●M2

Power section for single-phase power supply



Note: *All terminals are located at the bottom of the servo drive. Fit interference suppressors to all inductive circuits near the servo drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

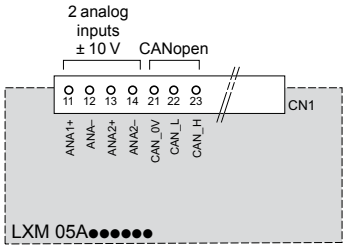
Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" catalogue).

Ref.	Description
A1	Lexium 05C (this example) or Lexium 05A *(1) servo drive* (see page 2/30)
KM1	Line contactor (see motor starters on page 2/68)
L1	Line choke (see page 2/42)
M1	BRH or BSH servo motor (see page 2/96 or 2/138)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue
Q1	Circuit breaker (see motor starters on page 2/68)
Q2	GV2-L magnetic circuit-breaker rated at twice the nominal primary current of T1
Q3, Q4	GB2 CB05 thermal magnetic circuit breakers
S1, S2	XB4 B or XB5 A "Start" and "Emergency stop" pushbuttons
T1	220 V secondary transformer

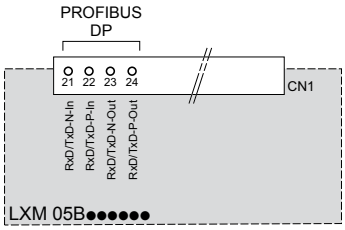
(1) To connect Lexium 05A servo drives (connectors CN1 and CN5), please refer to the user manual, which is available on our website at "www.schneider-electric.com".
(2) Insert (in series) a contact of the relay driven by the "NO_FAULT_OUT" (31) logic output: on a servo drive fault, KM1 (line contactor) opens.
(3) Example of logic I/O assignment for current control mode for torque control applications with a Lexium 05C servo drive. The name of the logic I/O differs depending on which assignment is selected (Lexium 05A and Lexium 05C servo drives only). See pages 2/60 and 2/62.
(4) External braking resistor (see page 2/39).
(5) Modbus serial link on RJ45 connector. Can also be used to connect a PC terminal (equipped with PowerSuite software workshop) or the remote terminal VW3 A31101.
(6) Molex connector for the ESIM (Encoder SIMulation) output on the RS 422 interface (see page 2/65)

Specific spring terminals on Lexium 05A and Lexium 05B servo drives

LXM 05A●●●●●●



LXM 05B●●●●●●



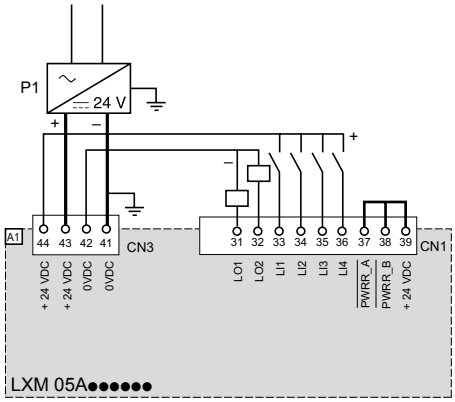
Logic I/O

The servo drive parameters are used to adapt the logic operation of the logic I/O (24 V ⎓) to the technology of the peripherals connected to the servo drive I/O (sensors, preactuators, PLC I/O, etc.):

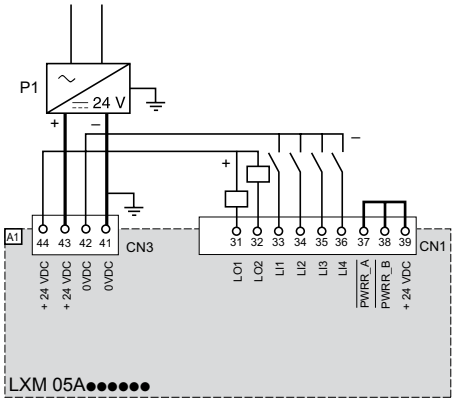
- Positive logic (default logic) *(1)* for connection to PNP transistor sensors
- Negative logic *(2)* for connection to NPN transistor peripherals

Logic I/O on the Lexium 05A servo drive

Positive logic (default setting) *(1)*



Negative logic *(2)*



Compatible components

Ref.	Description
A1	Lexium 05A servo drive (see page 2/30)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue

(1) Positive logic: Sink input, Source output
(2) Negative logic: Source input, Sink output

Logic I/O (continued)

Assignment of logic I/O on the Lexium 05A servo drive

Functions		6 logic inputs 24 V ⎓						2 logic outputs 24 V ⎓	
Name	**Description**	**LI1**	**LI2**	**LI3**	**LI4**	**LI5**	**LI6**	**LO1**	**LO2**
No function/free available	No function assigned/freely available								
ENABLE	Power bridge enable			*(1)*					
Enable negative motor move	Authorization of servo motor movement in the negative direction								
Enable positive motor move	Authorization of servo motor movement in the positive direction								
FAULT_RESET	Fault reset/acknowledgement								
HALT	Servo motor stop (stopping category 1)				*(1)*				
JOG fast/slow	Fast/slow manual movement								
JOG negative	Negative manual movement								
JOG positive	Positive manual movement								
Speed limitation	Speed limitation according to a set value								
DataSet Start	Motion sequence start (motion sequence mode)								
DataSet Select	Motion sequence restart (motion sequence mode)								
Start profile positioning	Start of point-to-point movement								
Invert ANA1	Inversion of analog input ANA1								
Power Removal	Power Removal function					*(1)*	*(1)*		
ACTIVE2_OUT	Servo drive ready								
BRAKE_OUT	Holding brake controller VW3 M3 103 command								
Current threshold reached	Servo motor current value below a set value								
Halt acknowledge	Acknowledgement of stop								
In position window	Position deviation within set range								
In speed window	Speed deviation within set range								
Motor move disable	Servo motor movement disabled in requested direction								
NO_FAULT_OUT	Servo drive fault								
DataSet Start acknowledge	Acknowledgement of start request (motion sequence mode)								
Motor standstill	Servo motor stopped								
Speed threshold reached	Servo motor speed value below a set value								

(1) Default assignment

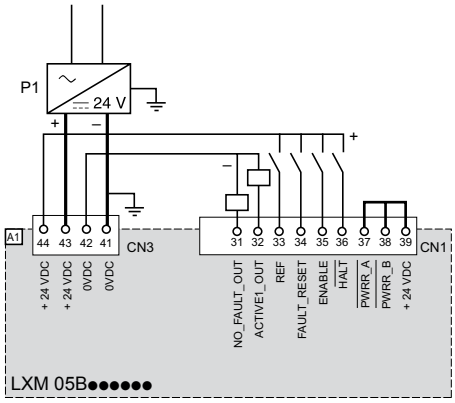
Assignable function

Unassignable function

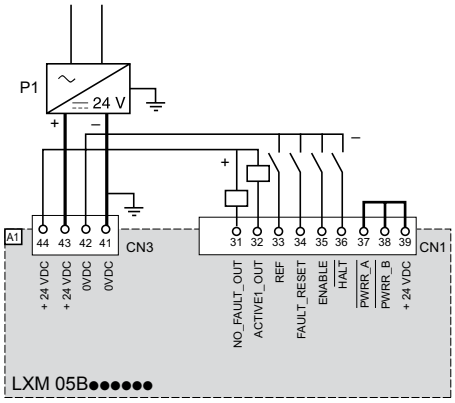
Logic I/O (continued)

Logic I/O on the Lexium 05B servo drive

Positive logic (default setting) *(1)*



Negative logic *(2)*



Compatible components

Ref.	Description
A1	Lexium 05B servo drive (see page 2/30)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Interfaces, I/O splitter boxes and power supplies" catalogue

Assignment of logic I/O on the Lexium 05B servo drive

Functions		Logic input	Logic output
Name	**Description**	**Ref.**	**Ref.**
REF	Not used *(3)*	33	–
FAULT_RESET	Fault reset/acknowledgement *(3)*	34	–
ENABLE	Power bridge enable *(3)*	35	–
HALT	Servo motor stop (stopping category 1)	36	–
NO_FAULT_OUT	Servo drive fault	–	31
ACTIVE1_OUT	Holding brake controller VW3 M3 103 command	–	32

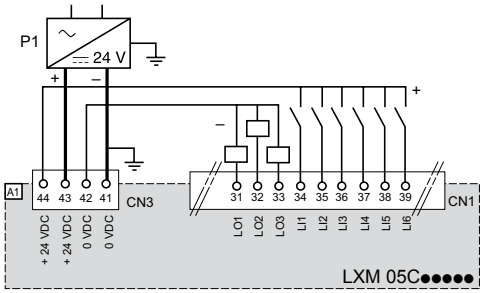
(1) Positive logic: Sink input, Source output
(2) Negative logic: Source input, Sink output
(3) If the servo drive is controlled via a communication network, these inputs have different assignments; please refer to the user manual, which is available on our website at "www.schneider-electric.com".

2

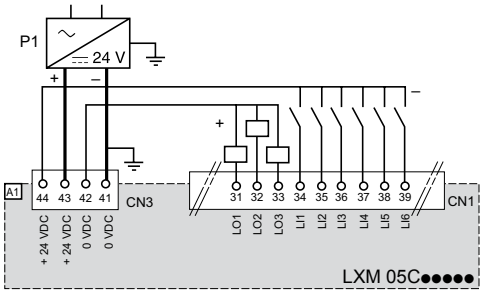
Logic I/O (continued)

Logic I/O on the Lexium 05C servo drive

Positive logic (default setting) *(1)*



Negative logic *(2)*



Compatible components

Ref.	Description
A1	Lexium 05C servo drive (see page 2/30)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue

Assignment of logic I/O on the Lexium 05C servo drive

Reassignable functions		6 logic inputs 24 V ⎓						3 logic outputs 24 V ⎓		
Name	**Description**	**LI1**	**LI2**	**LI3**	**LI4**	**LI5**	**LI6**	**LO1**	**LO2**	**LO3**
No function/free available	No function assigned/freely available									
ENABLE	Power bridge enable			*(3)*						
Enable negative motor move	Authorization of servo motor movement in the negative direction									
Enable positive motor move	Authorization of servo motor movement in the positive direction									
FAULT_RESET	Fault reset/acknowledgement		*(3)*							
HALT	Servo motor stop (stopping category 1)				*(3)*					
JOG fast/slow	Fast/slow manual movement									
JOG negative	Negative manual movement									
JOG positive	Positive manual movement									
Speed limitation	Speed limitation according to a set value									
ACTIVE2_OUT	Servo drive ready									
BRAKE_OUT	Holding brake controller VW3 M3 103 command								*(3)*	
Current threshold reached	Servo motor current value below a set value									
Halt acknowledge	Acknowledgement of stop									
In position window	Position deviation within set range									
In speed window	Speed deviation within set range									
Motor move disable	Servo motor movement disabled in requested direction									
NO_FAULT_OUT	Servo drive fault							*(3)*		
Speed threshold reached	Servo motor speed value below a set value									

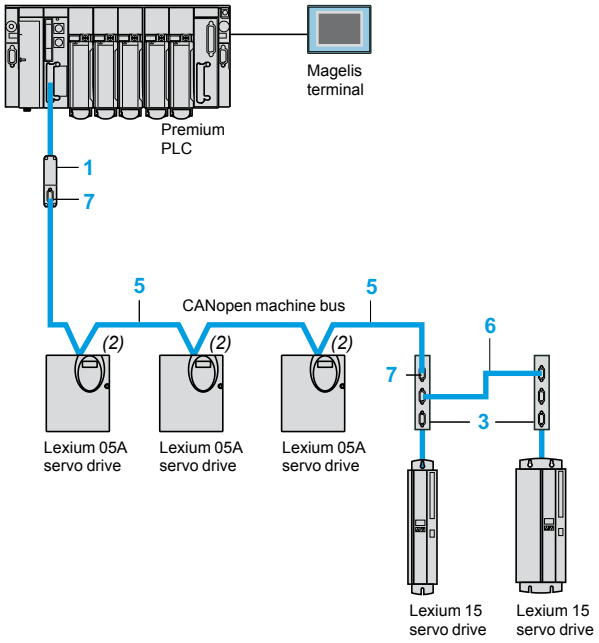
Assignable function Unassignable function

(1) Positive logic: Sink input, Source output
(2) Negative logic: Source input, Sink output
(3) Default assignment

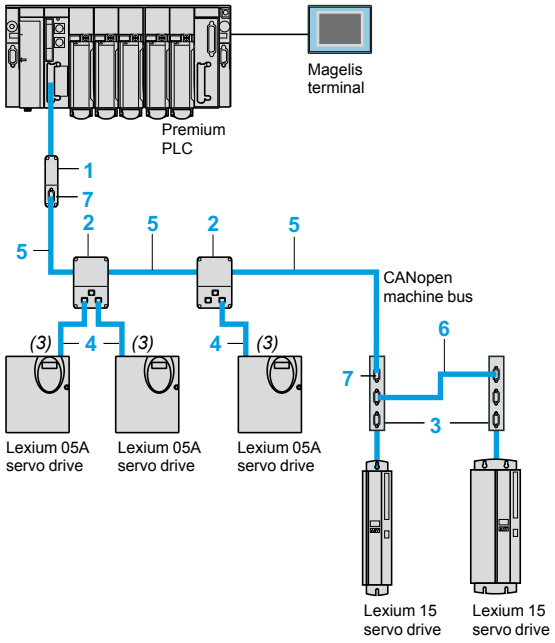
Lexium 05A servo drive control by Modicon Premium automation platform (1)

Via CANopen machine bus

Example of daisy chain connection



Example of tap junction connection



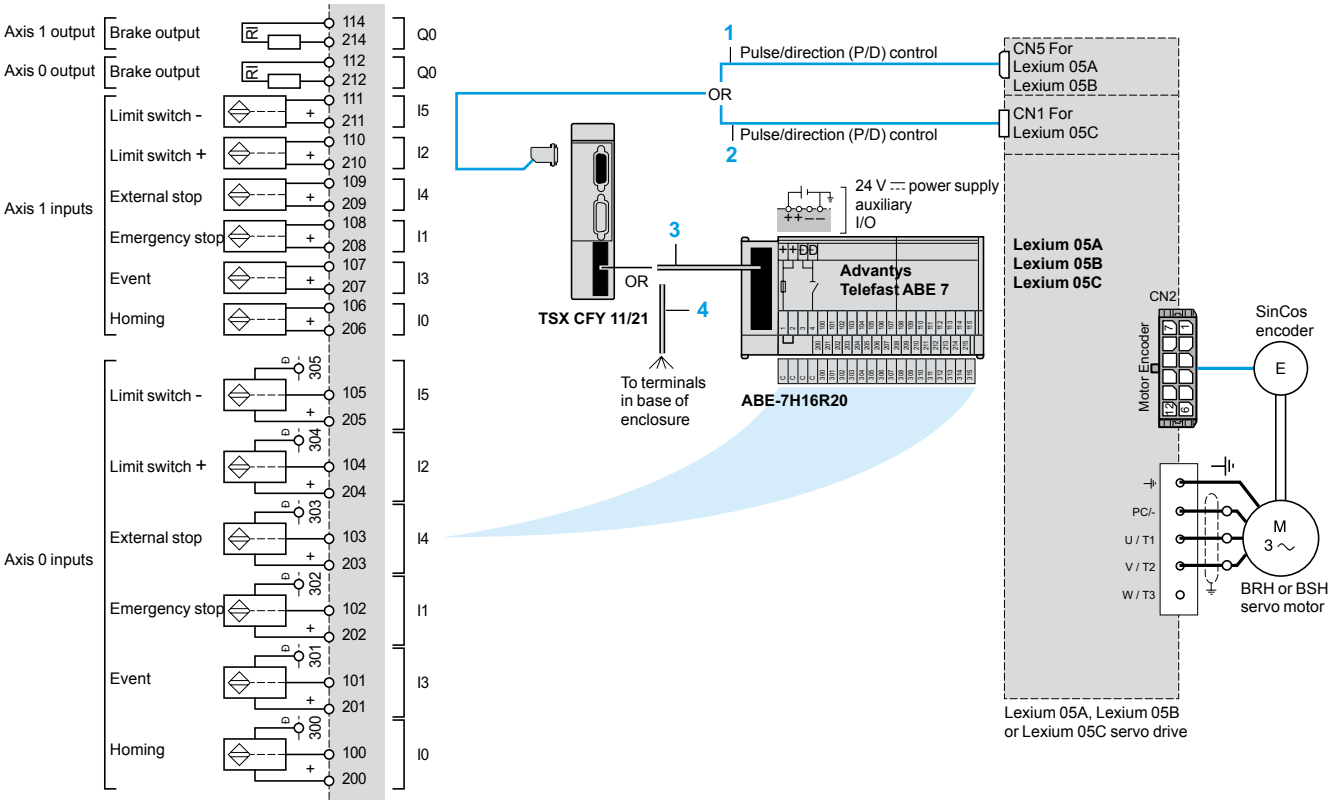
Ref.	Description
1	PCMCIA card assembly with tap junction and cable L = 0.5 m, TSX CPP 110
2	Junction box with 2 RJ45 ports, VW3 CAN TAP2 *(4)* (see page 2/32)
3	CANopen bus adaptor for Lexium 15 servo drive (CANopen standard hardware interface), AM0 2CA 001V000
4	Cable fitted with 2 RJ45 connectors, VW3 CAN CARR03, 1 (L = 0.3 or 1 m) (see page 2/32)
5	CANopen cables, TSX CAN C● 50, 100, 300 (L = 50, 100 or 300 m), with flying leads at both ends (see page 2/32)
6	Cable fitted with 2 SUB-D connectors (9-way, 1 male and 1 female), TLA CD CBA 005, 015, 030, 050 (L = 0.5, 1.5, 3 or 5 m)
7	9-way female SUB-D IP 20 connector with line terminator, TSX CAN KCDF 180T, 90T, 90TP (right-angled, straight or right-angled with SUB-D for diagnostic tool) (see page 2/32)

(1) For Lexium 05A servo drive control by Twido programmable controller or Lexium Controller motion controller, see page 2/32.
(2) Connection to spring terminal (CN1)
(3) Connection to RJ45 connector (CN4)
(4) Disconnect the line termination resistors from the junction box VW3 CAN TAP2 (included in the Lexium 05A servo drive).

2

Lexium 05A, Lexium 05B and Lexium 05C servo drive control by Modicon Premium automation platform

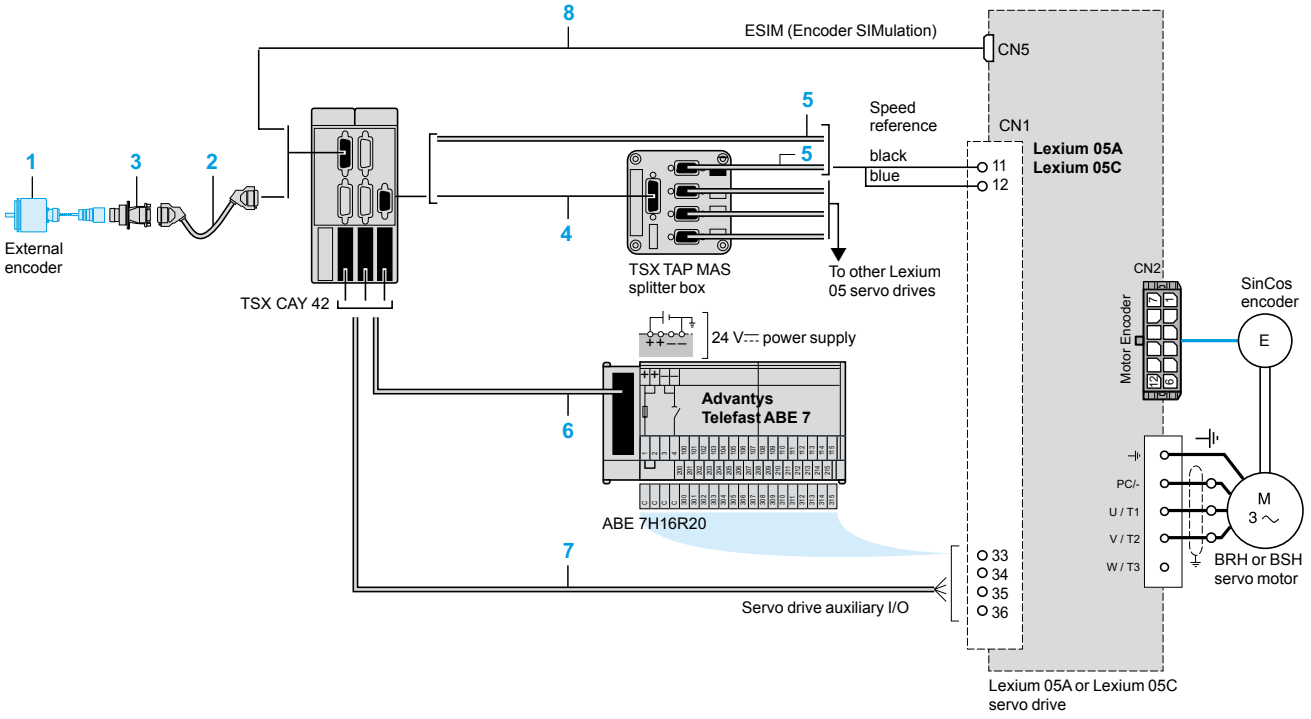
Connection example for TSX CFY 11/21 motion control module



Ref.	Description
1	Cable with connectors VW3 M8 204 R05/R15/R30/R50 (L = 0.5, 1.5, 3 or 5 m) Lexium 05A and Lexium 05B servo drives (see page 2/34)
2	Cable with connectors VW3 M8 214 R05/R15/R30/R50 (L = 0.5, 1.5, 3 or 5 m) for Lexium 05C servo drive (see page 2/34)
3	Cable with connectors TSX CDP 053/103/203/303/503 (L = 0.5, 1, 2, 3 or 5 m)
4	Stranded cable with connector at one end and flying leads at the other TSX CDP 301/501/1001 (L = 3, 5 or 10 m). Please refer to the TSX CFY installation manual, which is available on our website at “www.schneider-electric.com”.

Lexium 05A and Lexium 05C servo drive control by Modicon Premium automation platform (continued)

Connection example for TSX CAY 21/41/22/42/33 motion control module

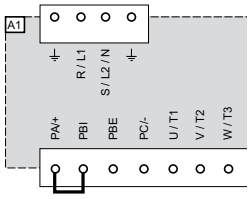


Ref.	Description
1	Absolute or incremental encoder. Option to use Osicoder® XCC 14, XCC 15 and XCC 19 incremental encoders or XCC 25 and XCC 29 absolute encoders; please refer to the "Rotary encoders – Osicoder®" catalogue.
2	Cable with connectors TSX CCP S15 050/100 and TSX CCP S15 (L = 0.5, 1 or 2.5 m)
3	Connector TSX TAP S15 05
4	Cable with connectors TSX CXP 213/613 (L = 2.5 or 6 m)
5	Cable with connectors TSX CDP 611 (L = 6 m)
6	Cable with connectors TSX CDP 053/103/203/303/503 (L = 0.5, 1, 2, 3 or 5 m)
7	Stranded cable with connector at one end and flying leads at the other TSX CDP 301/501/1001 (L = 3, 5 or 10 m).
8	Cables VW3 M8 203 R05/R15/R30/R50 (L = 0.5, 1.5, 3 or 5 m) (see page 2/34)

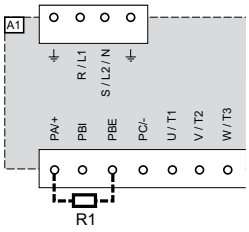
Lexium 05 motion control
Lexium 05A, 05B and 05C servo drives
Options

Braking resistor VW3 A7 60● R●●

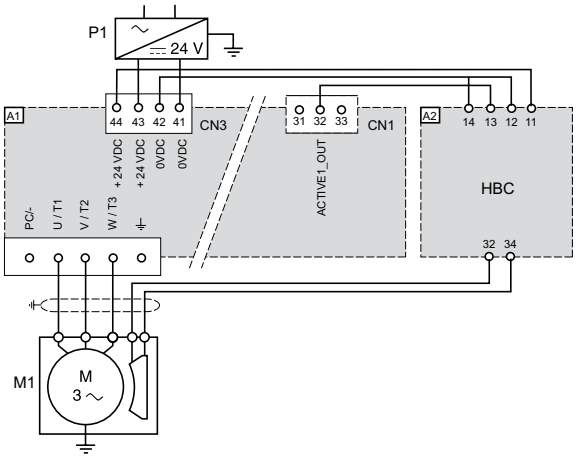
Internal resistor



External resistor



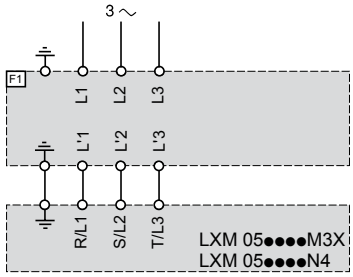
Holding brake controller VW3 M3 103



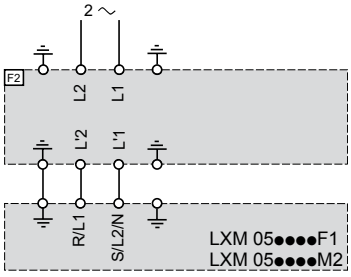
Compatible components	
Ref.	**Description**
A1	Lexium 05 servo drive (see page 2/30)
A2	Holding brake controller VW3 M3 103 (see page 2/43)
M1	BRH or BSH servo motor with holding brake (see page 2/96 or 2/138)
P1	Phaseo (SELV) power supply 24 V ⎓, please refer to the "Phaseo power supplies and transformers" catalogue
R1	External braking resistor VW3 A7 60● R●● (see page 2/39)

Additional EMC input filters VW3 A3140●

Three-phase power supply



Single-phase power supply

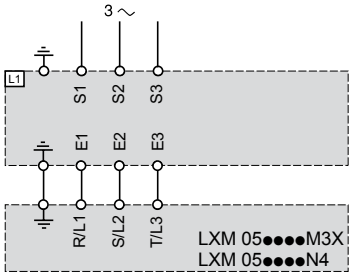


Compatible components	
Ref.	**Description**
F1	Additional three-phase EMC input filter VW3 A31402, 404, 406, 407 (see page 2/41)
F2	Additional single-phase EMC input filter VW3 A31401, 403, 405 (see page 2/41)

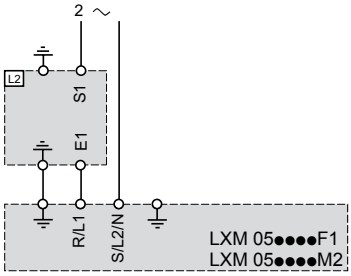
Note: *The additional EMC input filters are connected as close as possible to the servo drive, directly upstream of the drive.*

Line chokes VW3 A4 552…554, VZ1 L0●●UM●0

Three-phase power supply



Single-phase power supply



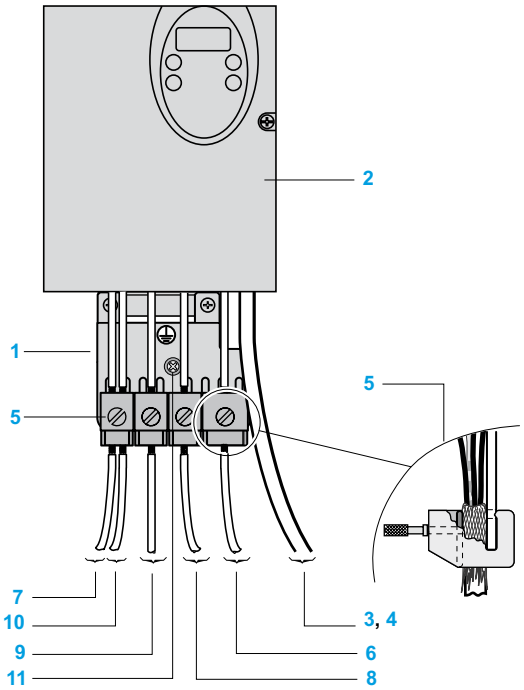
Compatible components	
Ref.	**Description**
L1	Three-phase line choke VW3 A4 552, 553, 554 (see page 2/42)
L2	Single-phase line choke VZ1 L0●●UM●0 (see page 2/42)

Presentation: pages 2/36, 2/40, 2/42 and 2/43 | Functions: page 2/16 | Characteristics: pages 2/38, 2/41, 2/42 and 2/43 | References: pages 2/39, 2/41, 2/42 and 2/43 | Dimensions: pages 2/45 to 2/47

Connections for ensuring conformity to EMC standards

Principle

■ The earths between the servo drive, servo motor and cable shielding must have “high frequency” equipotentiality.
■ Use shielded cables with shielding connected to earth throughout 360° at both ends for the servo motor cable, the braking resistor cable and the control-signalling cables. Conduit or metal ducting can be used for part of the shielding length provided that there is no break in the continuity of the earth connections.
■ Ensure maximum separation between the power supply cable (line supply) and the motor cable.



Installation diagram for servo drives

This installation requires the EMC conformity kit.
This kit is supplied with Lexium 05A and Lexium 05B servo drives; for Lexium 05C servo drives it must be ordered separately (see page 2/30).
The kit comprises:
■ An EMC plate 1
■ Clamps 5 and fixing accessories

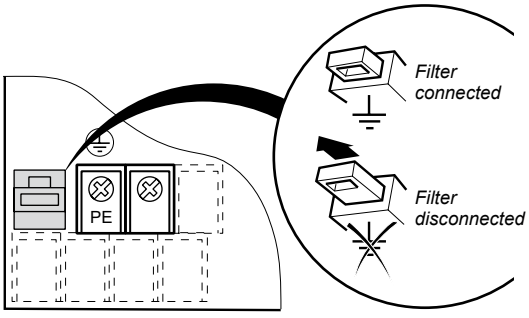
1 Steel plate to be mounted on the Lexium 05 servo drive (earthed casing)
2 Lexium 05 servo drive
3 Unshielded power supply wires or cable
4 Unshielded wires for the output of the fault relay contacts
5 Attach and earth the shielding of cables 6, 7, 8, 9 and 10 as close as possible to the servo drive:
- Strip the shielding.
- Attach the cable to the plate 1 by attaching the clamp to the stripped part of the shielding.
The shielding must be clamped tightly enough to the steel plate to ensure good contact.
6 Shielded cable for connecting the BRH or BSH servo motor power
7 Shielded cable for connecting the BRH or BSH servo motor encoder
8 Shielded cable for connecting the position interface signals (CW/CCW, pulse/direction or A/B signals)
9 Shielded cable for connecting the communication network
10 Shielded cable for connecting the braking resistor
For cables 6, 7, 8, 9, 10, the shielding must be connected to earth at both ends. The shielding must be continuous, and if intermediate terminals are used, they must be placed in EMC shielded metal boxes.
11 Earth screw for servo motor cable

Note: *The HF equipotential earth connection between the servo drive, servo motor and cable shielding does not remove the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit.*
If using an additional EMC input filter, it should be mounted beneath the servo drive and connected directly to the line supply via an unshielded cable. Link 3 on the servo drive is via the filter output cable.

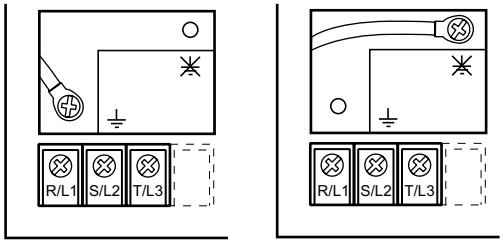
Operation on an IT system

Principle

IT system: Isolated or impedance earthed neutral
Use a permanent insulation monitor compatible with non-linear loads, such as a Schneider Electric type XM200 (please consult your Regional Sales Office).
LXM 05●●●●F1, LXM 05●●●●M2 and LXM 05●●●●N4 servo drives have an integrated EMC filter. These filters must be isolated from earth for use on an IT system. For this disconnection see opposite, depending on the model.



LXM 05●●●●F1, LXM 05●●●●M2, LXM 05●D14N4…●D34N4



LXM 05●D57N4

Lexium 05 motion control
Motor starters
Protection by circuit breaker

567961

567962

105085

GV2 L16
+
LC1 K0610●●
+
LXM 05●D34N4

Applications

The combinations listed below can be used to create a complete motor starter unit comprising a circuit breaker, a contactor and a Lexium 05 servo drive.
The circuit breaker provides protection against accidental short-circuits, disconnection and, if necessary, isolation.
The contactor is responsible for starting up and managing any safety features, as well as isolating the servo motor on stopping.
The servo drive controls the servo motor, provides protection against short-circuits between the servo drive and the servo motor and protects the motor cable against overloads. The overload protection is provided by the motor thermal protection of the servo drive.

Motor starters for Lexium 05 servo drives

Servo drive		Circuit breaker		Max. prsp. line Isc	Contactor
Reference	Nominal power	Reference	Rating		Reference *(1) (2)*
	kW		A	kA	
Single-phase supply voltage: 100…120 V ∿ 50/60 Hz					
LXM 05●D10F1	0.4	**GV2 L14**	10	1	**LC1 K0610●●**
LXM 05●D17F1	0.65	**GV2 L16**	14	1	**LC1 K0610●●**
LXM 05●D28F1	1.4	**GV2 L20**	18	1	**LC1 K0610●●**
Single-phase supply voltage: 200…240 V ∿ 50/60 Hz					
LXM 05CU70M2	0.4	**GV2 L14**	10	1	**LC1 K0610●●**
LXM 05●D10M2	0.75	**GV2 L14**	10	1	**LC1 K0610●●**
LXM 05●D17M2	1.2	**GV2 L16**	14	1	**LC1 K0610●●**
LXM 05●D28M2	2.5	**GV2 L22**	25	1	**LC1 D09●●**
Three-phase supply voltage: 200…240 V ∿ 50/60 Hz					
LXM 05●D10M3X	0.75	**GV2 L10**	6.3	5	**LC1 K0610●●**
LXM 05●D17M3X	1.4	**GV2 L16**	14	5	**LC1 K0610●●**
LXM 05●D42M3X	3.2	**GV2 L22**	25	5	**LC1 D09●●**
Three-phase supply voltage: 380…480 V ∿ 50/60 Hz					
LXM 05●D14N4	1.4	**GV2 L14**	10	5	**LC1 K0610●●**
LXM 05●D22N4	2	**GV2 L14**	10	5	**LC1 K0610●●**
LXM 05●D34N4	3	**GV2 L16**	14	5	**LC1 K0610●●**
LXM 05●D57N4	6	**GV2 L22**	25	5	**LC1 D09●●**

(1) Composition of contactors:
LC1 K06: 3 poles + 1 "N/O" auxiliary contact
LC1 D09: 3 poles + 1 N/O auxiliary contact + 1 N/C auxiliary contact
(2) Replace ●● with the control circuit voltage reference given in the table below:

	Volts ∿	24	48	110	220	230	240
LC1 K	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
	Volts ∿	**24**	**48**	**110**	**220/230**	**230**	**230/240**
LC1 D	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	50 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**

For other available voltages between 24 V and 660 V, or for a DC control circuit, please consult your Regional Sales Office.

Protection using class J fuses (UL standard)

Servo drive		Fuse to be placed upstream
Reference	Nominal power	
	kW	A
Single-phase supply voltage: 100…120 V ∼ 50/60 Hz		
LXM 05●D10F1	0.4	10
LXM 05●D17F1	0.65	15
LXM 05●D28F1	1.4	25
Single-phase supply voltage: 200…240 V ∼ 50/60 Hz		
LXM 05CU70M2	0.4	10
LXM 05●D10M2	0.75	10
LXM 05●D17M2	1.2	15
LXM 05●D28M2	2.5	25
Three-phase supply voltage: 200…240 V ∼ 50/60 Hz		
LXM 05●D10M3X	0.75	10
LXM 05●D17M3X	1.4	15
LXM 05●D42M3X	3.2	25
Three-phase supply voltage: 380…480 V ∼ 50/60 Hz		
LXM 05●D14N4	1.4	10
LXM 05●D22N4	2	15
LXM 05●D34N4	3	15
LXM 05●D57N4	6	25

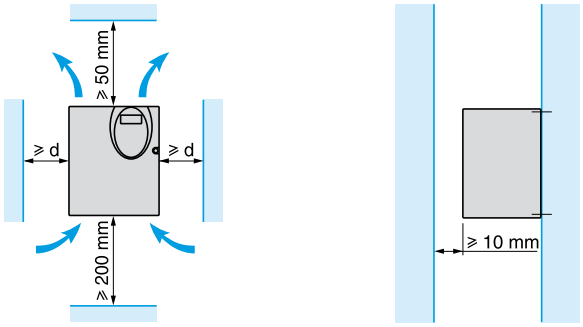
2

Mounting recommendations

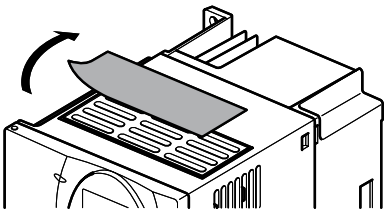
LXM 05●D10F1, LXM 05CU70M2, ●D10M2 and LXM 05●D10M3X servo drives are cooled by natural convection.

LXM 05●D17F1, ●D28F1, LXM 05●D17M2, ●D28M2, LXM 05●D17M3X, ●D42M3X and LXM 05●●●●N4 servo drives have an integrated fan.

When installing the servo drive in the electrical enclosure, the instructions below should be followed with regard to the temperature and protection index:
- Provide sufficient cooling of the servo drive by complying with the minimum mounting distances
- Do not mount the servo drive near heat sources
- Do not mount the servo drive on flammable materials
- Do not heat the servo drive cooling air by currents of hot air from other equipment and components, for example from an external braking resistor
- If the servo drive is used above its thermal limits, the control stops due to overtemperature
- When IP 20 protection is sufficient, we recommend that the protective cover is removed once installation is complete.
- Mount the servo drive vertically (± 10%).



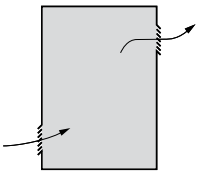
***Note**: For cables that are connected via the underside of the servo drive, a free space ≥ 200 mm is required under the unit to comply with the bending radius of the connection cables.*



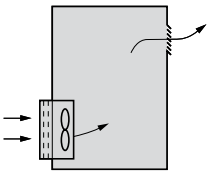
Remove the protective cover if IP 20 is sufficient

Ambient temperature	Mounting distances	Instructions to be followed
0°C…+ 40°C	d > 50 mm	–
	10 < d < 50 mm	Remove the protective cover
	0 < d < 10 mm	Remove the protective cover
+ 40°C…+ 50°C	d > 50 mm	Remove the protective cover
	d < 50 mm	Remove the protective cover Reduce the output current by 2.2% per °C above 40°C

***Note**: Do not use insulated enclosures, as they have a poor level of conductivity.*



Natural convection



Forced ventilation

Recommendations for mounting in a wall-mounted or floor-standing enclosure

To ensure good air circulation in the servo drive:
- Fit ventilation grilles on the enclosure.
- Ensure that ventilation is adequate: if not install a forced ventilation unit with a filter.
- Any apertures and/or fans must provide a flow rate at least equal to that of the servo drive fans (see below).
- Use special filters with IP 54 protection
- Remove the protective cover attached to the upper part of the servo drive

Dissipated power and fan flow rate compatible with the servo drive rating

Servo drive	Dissipated power W	Ventilation	Flow rate m³/min
LXM 05●D10F1 LXM 05CU70M2 LXM 05●D10M2 LXM 05●D10M3X	43 38 48 43	Natural convection	0.3
LXM 05●D17F1 LXM 05●D17M2 LXM 05●D17M3X LXM 05●D14N4	76 74 68 65	Integrated fan	0.55
LXM 05●D28F1 LXM 05●D28M2 LXM 05●D42M3X LXM 05●D22N4 LXM 05●D34N4	150 142 132 90 147	Integrated fan	1.55
LXM 05●D57N4	240	Integrated fan	1.75

Metal dust and damp proof wall-mounted or floor-standing enclosure (IP 54 degree of protection)

The servo drive must be mounted in a dust and damp proof enclosure in certain environmental conditions, such as dust, corrosive gases, high humidity with risk of condensation and dripping water, splashing liquid, etc.
In these cases, Lexium 05 servo drives can be installed in an enclosure where the internal temperature must not exceed 50°C.

Calculating the dimensions of the enclosure

Maximum thermal resistance Rth (°C/W)

The thermal resistance is defined by the following formula:

$$R_{th} = \frac{\theta° - \theta e}{P}$$

θ° = maximum temperature inside the enclosure in °C
θe = maximum external temperature in °C
P = total power dissipated in the enclosure in W

Power dissipated by the servo drive: see table above. Add the power dissipated by the other equipment components.

Useful heat exchange area of enclosure S (m²)

For a wall-mounted enclosure, the useful heat exchange area is defined as the sum of the areas of the two sides + top + front panel.

$$S = \frac{k}{R_{th}}$$

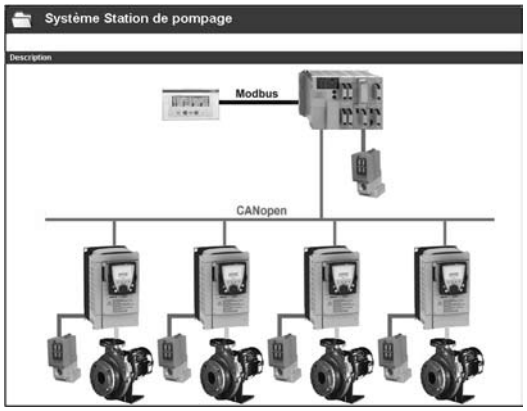
k = thermal resistance per m² of the enclosure

For metal enclosures:
- k = 0.12 with internal fan
- k = 0.15 without fan

***Note**: Do not use insulated enclosures, as they have a poor level of conductivity.*

PowerSuite software workshop

534513



PowerSuite screen on PC

Presentation

The PowerSuite software workshop for PC is a user-friendly tool designed for setting up the Schneider Electric control device motors:
- TeSys U starter-controllers
- TeSys T motor management systems
- Altistart soft start/soft stop units
- Altivar variable speed drives
- Lexium 05 servo drives

It includes various functions designed for setup phases such as:
- Preparing configurations
- Start-up
- Maintenance

To facilitate start-up and maintenance, the PowerSuite software workshop is compatible with the Bluetooth® wireless link.

Functions *(1)*

Preparing configurations

The PowerSuite software workshop can be used on its own to generate the device configuration, which can be saved, printed and exported to office automation software.

The PowerSuite software workshop can also be used to convert an Altivar 58 or Altivar 58F drive configuration into one that is compatible with an Altivar 71.

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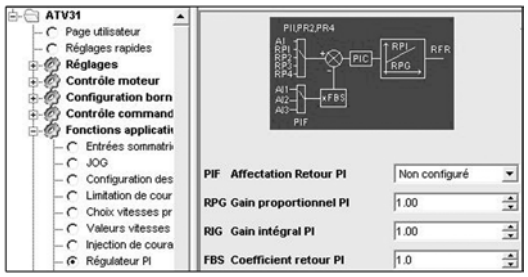

PowerSuite screen on PC
View of PI regulator function parameters

Start-up

When the PC is connected to the device, the PowerSuite software workshop can be used to:
- Transfer the generated configuration
- Adjust
- Monitor. This option has been enhanced with new functions such as:
  - The oscilloscope
  - The high-speed oscilloscope (minimum time base: 2 ms)
  - The FFT *(Fast Fourier Transform)* oscilloscope
  - Display of communication parameters
- Control
- Save the final configuration

Maintenance

To facilitate maintenance operations, the PowerSuite software workshop can be used to:
- Compare the configuration of a device currently being used with a saved configuration
- Manage the user's installed equipment base, in particular:
  - Organize the installed base into folders (electrical equipment, machinery, workshops, etc.)
  - Store maintenance messages
  - Facilitate Modbus TCP connection by storing the IP address

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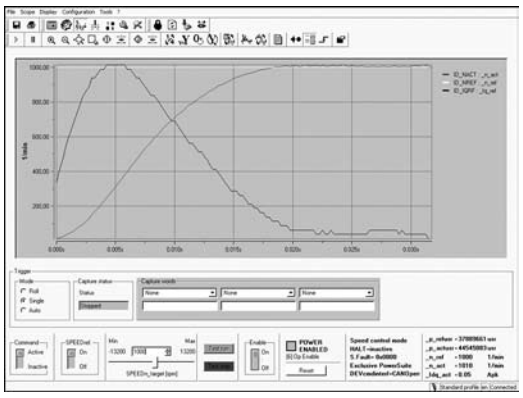

View of the FTT oscilloscope

User interface

The PowerSuite software workshop can be used to:
- Present the device parameters (arranged by function) in the form of illustrated views of diagrams or simple tables
- Customize the parameter names
- Create:
  - A user menu (choice of particular parameters)
  - Monitoring control panels with graphic elements (cursors, gauges, bar charts)
- Perform sort operations on the parameters
- Display text in five languages (English, French, German, Italian and Spanish). The language changes immediately and there is no need to restart the program.

It also features online contextual help:
- On the PowerSuite tool
- On the device functions by direct access to the user manuals

(1) Certain functions are not available for all devices. See the table of available functions, page 2/73.

References:
page 2/74

Functions available for the PowerSuite software workshop

Functions not listed in the table are available for all devices.

Function available with devices	Controller	Starter-controller	Soft start/ soft stop unit	Drives				Servo drive
	TeSys T	TeSys U	ATS 48	ATV 11	ATV 31	ATV 61	ATV 71	LXM 05
Monitoring	■	■	■	□	■	■	■	■
Oscilloscope	□	□	□	□	■	■	■	■
High-speed oscilloscope	□	□	□	□	□	■	■	■
FFT oscilloscope	□	□	□	□	□	■	■	■
Display of communication parameters	■	□	□	□	□	■	■	■
Control	□	□	■	□	■	■	■	■
Customization of parameter names	□	□	□	■	■	■	■	■
Creation of a user menu	□	□	□	■	■	■	■	■
Creation of monitoring control panels	□	□	□	□	■	■	■	■
Sort operation on parameters	□	□	□	■	■	■	■	■
Custom logic editor	■	□	□	□	□	□	□	□

■ Functions available
□ Functions not available

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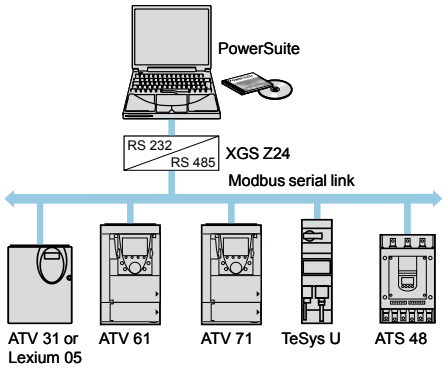

Modbus multidrop connection

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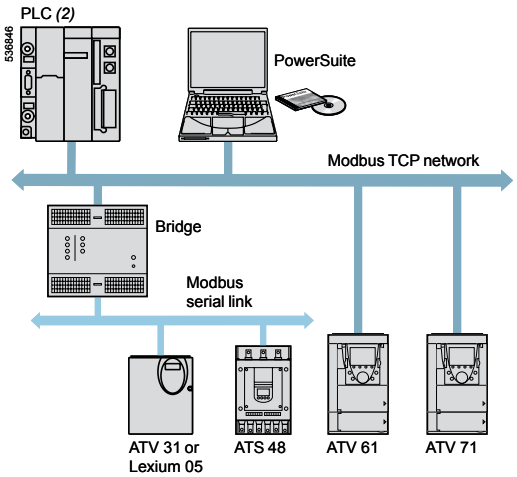


Modbus TCP connection

Connections *(1)*

Modbus serial link

The PowerSuite software workshop can be connected directly to the device terminal port or Modbus network port via the serial port on the PC.

Two types of connection are possible:
- With a single device (point-to-point connection), use a VW3 A8 106 PC serial port connection kit.
- With a number of devices (multidrop connection), use the XGS Z24 interface.

Modbus TCP communication network

The PowerSuite software workshop can be connected to a Modbus TCP network. In this case, the devices can be accessed:
- Using a VW3 A3 310 communication card for the Altivar 61and 71 drives
- Using a TSX ETG 100 Modbus TCP/Modbus gateway

Bluetooth® wireless link

The PowerSuite software workshop can communicate via a Bluetooth® radio link if the device is equipped with a Bluetooth® Modbus VW3 A8 114. The adapter plugs into the device connector terminal port or Modbus network port and has a range of 10 m (class 2).

If the PC does not feature Bluetooth® technology, use the VW3 A8 115 USB - Bluetooth® adapter.

Remote maintenance

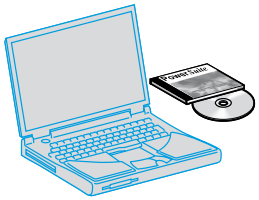
A simple Modbus TCP connection is all that is required for the PowerSuite software workshop to support remote monitoring and diagnostics.
When devices are not connected to the Modbus TCP network, or it is not directly accessible, various remote transmission solutions may be used instead (modem, teleprocessing gateway, etc.). Please consult your Regional Sales Office.

(1) Please refer to the compatibility table on page 2/75.
(2) Please refer to our specialist "Automation platform Modicon Premium and Unity - PL7 software" and "Automation platform Modicon M340" catalogues.

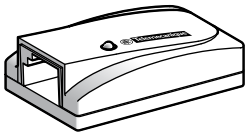
Presentation: page 2/72
References: page 2/74

PowerSuite software workshop

PowerSuite software workshop



VW3 A8 104



VW3 A8 114

Description	Composition	Reference	Weight kg
PowerSuite CD-ROM	■ 1 program for PC in English, French, German, Italian and Spanish ■ Variable speed drive, starter and servo drive technical manuals	**VW3 A8 104**	0.100
PowerSuite update CD-ROM *(1)*	■ 1 program for PC in English, French, German, Italian and Spanish ■ Variable speed drive and starter technical manuals	**VW3 A8 105**	0.100
PC serial port connection kit for point-to-point Modbus connection	■ 1 x 3 m cable with 1 RJ45 connector on starter-controller or drive side and 1 RS 232/RS 485 converter with 1 9-way female SUB-D connector on PC side ■ For the ATV 11 drive: 1 converter with one 4-way male SUB-D connector and 1 RJ45 connector ■ For ATV 38/58/58F drives: 1 RJ45/9-way male SUB-D adapter	**VW3 A8 106**	0.350
RS 232/RS 485 interface for multidrop Modbus connection	■ 1 Modbus multidrop converter for connection to screw terminals. Requires a 24 V ⎓ (20...30 V), 20 mA power supply *(2)*	**XGS Z24**	0.105
Modbus-Bluetooth® adapter *(3)*	■ 1 Bluetooth® adapter (10 m range, class 2) with 1 RJ45 connector ■ For PowerSuite: 1 x 0.1 m cable with 2 RJ45 connectors ■ For TwidoSoft: 1 x 0.1 m cable with 1 RJ45 connector and 1 mini DIN connector ■ For ATV 38/58/58F drives: 1 RJ45/9-way male SUB-D adapter	**VW3 A8 114**	0.155
USB - Bluetooth® adapter for PC	This adapter is required in the case of a PC that does not feature Bluetooth® technology. It is connected to a USB port on the PC. 10 m range (class 2)	**VW3 A8 115**	0.290

(1) Updates a version ≥ V1.40 with the latest available version. For versions < V1.40, you should order the PowerSuite CD-Rom, VW3 A8 104.
(2) Please refer to the "Interfaces, I/O splitter boxes and power supplies" catalogue.
(3) Can also be used to communicate between a Twido PLC and the TwidoSoft software workshop.

Presentation:
page 2/72

Fonctions:
page 2/72

Compatibilité de l'atelier logiciel PowerSuite avec les appareils *(1)*

Connexion	Controller	Starter-controller	Soft start/ soft stop unit	Drives				Servo drives		
	TeSys T	TeSys U *(2)*	ATS 48	ATV 11	ATV 31	ATV 61	ATV 71	LXM 05A	LXM 05B	LXM 05C
Modbus	V2.5	V1.40	V1.30	V1.40	V2.0	V2.3	V2.2	V2.2	V2.4	V2.5
Modbus TCP (device equipped with Modbus TCP card)						V2.3	V2.2			
Modbus TCP via Modbus TCP/Modbus gateway			V1.50		V2.0	V2.3	V2.2	V2.2	V2.4	V2.5
Bluetooth®			V2.2		V2.2	V2.3	V2.2	V2.2	V2.4	V2.5

Compatible software versions
Incompatible software versions

Hardware and software environments

The PowerSuite software workshop can operate in the following PC environments and configurations:

- Microsoft Windows® XP SP1, SP2,
- Pentium III, 800 MHz, hard disk with 300 MB available, 128 MB RAM
- SVGA or higher definition monitor

(1) Minimum software version.
(2) TeSys U starter-controller without communication module or with Modbus LUL C031, C032 or C033 communication module.

BRH servo motor with straight connectors

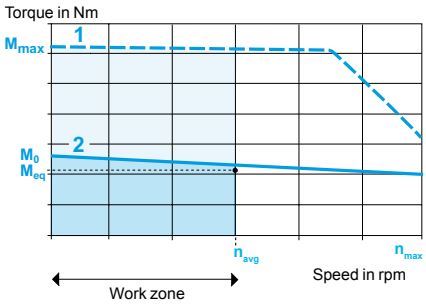
BRH servo motor with rotatable angled connectors

Presentation

BRH servo motors offer an excellent solution to the requirements for high speed and speed precision. With three flange sizes and a variety of lengths, there is a suitable solution for most applications, covering a continuous stall torque range from 0.46 to 12 Nm and catering for speeds of up to 8000 rpm.

Available for use with BRH servo motors, Lexium 05 servo drives deliver a sinusoidal wave, ensuring perfect rotation even at low speed.
BRH servo motors are available in three flange sizes: 57, 85 and 110 mm. Thermal protection is provided by a temperature probe integrated into the servo motors. They are certified as "Recognized" by the Underwriters Laboratories and conform to UL 1004 standards as well as to European directives (CE marking).

BRH servo motors are available with the following variants:
- IP 41 or IP 56 degree of protection
- With or without holding brake
- Straight or angled connectors
- Single turn or multiturn SinCos encoder
- Untapped or keyed shaft end



Torque/speed characteristics

BRH servo motors provide torque/speed curve profiles similar to the example shown on the left with:
1 Peak torque, depending on the servo drive model
2 Continuous torque, depending on the servo drive model
where:
- n_{max} (in rpm) corresponds to the servo motor's maximum speed
- M_{max} (in Nm) represents the peak stall torque value
- M_0 (in Nm) represents the continuous stall torque value

Principle for determining servo motor size according to the application

The torque/speed curves can be used to determine the correct servo motor size:
1 Locate the work zone of the application in terms of speed.
2 Verify, using the servo motor cycle timing diagram, that the torques required by the application during the various phases of the cycle are located within the area bounded by curve 1 in the work zone.
3 Calculate the average speed n_{avg} and the equivalent thermal torque M_{eq} (see page 6/2).
4 The point defined by n_{avg} and M_{eq} must be located below curve 2 in the work zone.
***Note**: For sizing of servo motors, see page 6/2.*

Functions

General functions

BRH servo motors have been developed to meet the following requirements:
- Functional characteristics, ruggedness, safety, etc. in accordance with IEC/EN 60034-1
- Ambient operating temperature:
  - 20...40°C according to DIN 50019R14.
  - Maximum 55°C with derating from 40°C of 1% of the nominal output power per additional °C
- Relative humidity: ≤ 75% based on an annual average/95% based on a period of 30 days, without condensation
- Maximum operating altitude: 1000 m without derating, 2000 m with k = 0.86, 3000 m with k = 0.8 *(1)*
- Storage and transport temperature: - 25...60°C,
- Winding insulation class: F (maximum temperature for windings 150°C) according to DIN VDE 0530
- Power and encoder connection via straight or angled connectors
- Thermal protection by built-in PTC thermistor probe, controlled by the Lexium 05 servo drive
- Out-of-round, concentricity and perpendicularity between flange and shaft according to DIN 42955, class N
- Flange compliant with standard EN 50347:2001-07
- Permitted mounting positions: no mounting restrictions for IMB5 - IMV1 and IMV3 according to DIN 42950
- Polyester resin-based paint: Opaque black paint RAL 9005

(1) k: derating factor

Characteristics: page 2/78
References: page 2/96
Dimensions: page 2/100

Functions (continued)

General functions (continued)

■ Degree of protection:
□ Casing: IP 56 in accordance with IEC/EN 60529
□ Shaft end: IP 41 or IP 56 in accordance with IEC/EN 60529 *(1)*
■ Integrated sensor: SinCos Hiperface® single turn or multiturn high-resolution encoder
■ Untapped or keyed shaft end in standard sizes (according to EN 50347:2001-07)

Holding brake

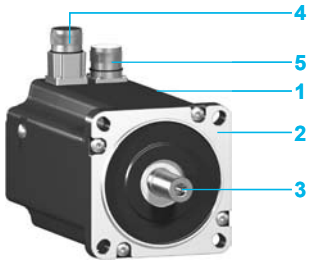
BRH servo motors can be equipped with a failsafe electro-magnetic holding brake.

⚠ **Do not use the holding brake as a dynamic brake for deceleration, as this will rapidly damage the brake.**

Integrated encoder

If required, BRH servo motors can be equipped with one of the following SinCos Hiperface® high-resolution absolute encoders:
■ Single turn encoder (16,384 points/turn) *(2)* providing angular precision to within ±4.8 arc minutes.
■ Single turn encoder (131,072 points/turn) *(2)* providing angular precision to within ±1.3 arc minutes.
■ Multiturn encoder (131,072 points/turn x 4096 turns) *(2)* providing angular precision to within ±1.3 arc minutes.

This encoder performs the following functions:
■ Gives the angular position of the rotor so that flows can be synchronized
■ Measures the servo motor speed via the associated Lexium 05 servo drive. This information is used by the speed controller of the servo drive.
■ Measures the position information for the servo drive position controller
■ Measures and sends position information in incremental format for the position feedback of a motion control module (ESIM (Encoder SIMulation) output of the RS 422 interface)



Description

BRH servo motors with a 3-phase stator and a 10-pole rotor with Neodymium Iron Boron (NdFeB) magnets consisting of:
1 A casing protected by RAL 9005 opaque black paint
2 A 4-point axial fixing flange in accordance with DIN 42948
3 A standard shaft end in accordance with DIN 42948, untapped or keyed (depending on the model)
4 A threaded dust and damp proof male straight connector for connecting the power cable *(3)*
5 A threaded dust and damp proof male straight connector for connecting the control cable (encoder) *(3)*

Connectors to be ordered separately, for connection to Lexium 05 servo drives, see page 2/98.
Schneider Electric has taken particular care to ensure compatibility between BRH servo motors and Lexium 05 servo drives. This compatibility can only be assured by using cables and connectors sold by Schneider Electric, see page 2/98.

(1) IP 41 mounted in position IMV3 (vertical mounting with shaft end at the top)
(2) Encoder resolution given for use with a Lexium 05 servo drive
(3) Other model with rotatable angled connector

2

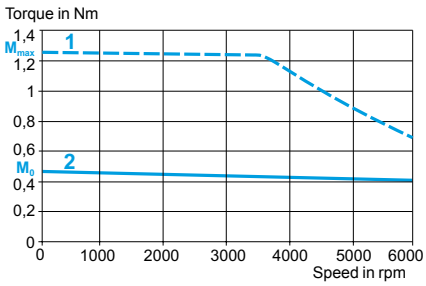
Characteristics of BRH 0571P/0571T servo motors

Type of servo motor				BRH 0571P		BRH 0571T			
Associated with Lexium 05 servo drive				LXM 05 CU70M2	LXM 05 ●D14N4	LXM 05 ●D10F1	LXM 05 CU70M2	LXM 05 ●D10M2	LXM 05 ●D10M3X
Line supply voltage			V	230 single-phase	400/480 3-phase	115 single-phase	230 single-phase		230 3-phase
Switching frequency			kHz	8					
Torque	Continuous stall	M_0	Nm	0.46					
	Peak stall	M_{max}	Nm	1.26	1.39	1.15	0.88	1.15	
Nominal operating point	Nominal torque		Nm	0.43	0.41	0.43	0.41		
	Nominal speed		rpm	3000	6000	3000	6000		
	Nominal servo motor output power		W	135	260	135	260		
Maximum current			A rms	4.3	5.4	6	4.3	6	
Servo motor characteristics									
Maximum mechanical speed			rpm	8000					
Constants (at 120°C)	Torque		Nm/A rms	0.34		0.21			
	Back emf		V rms/ krpm	20.9		13.1			
Rotor	Number of poles			10					
	Inertia	Without brake J_m	kgcm²	0.18					
		With brake J_m	kgcm²	0.18					
Stator (at 20°C)	Resistance (phase/phase)		Ω	12.7		5			
	Inductance (phase/phase)		mH	24.1		9.5			
	Electrical time constant		ms	1.9					
Holding brake (depending on model)				See page 2/102					

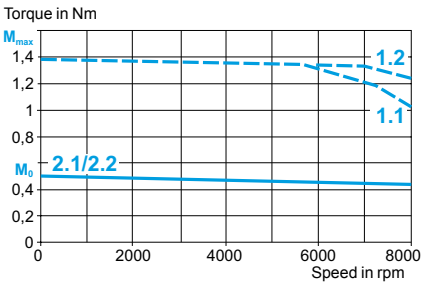
Torque/speed curves

BRH 0571P servo motor

With LXM 05CU70M2 servo drive
230 V single-phase

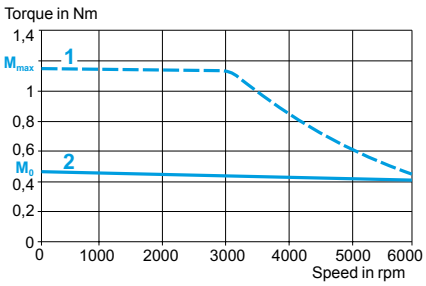


With LXM 05●D14N4 servo drive
400/480 V 3-phase



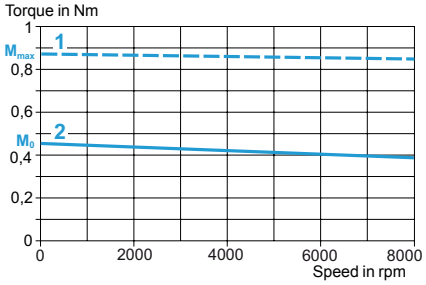
BRH 0571T servo motor

With LXM 05●D10F1 servo drive
115 V single-phase

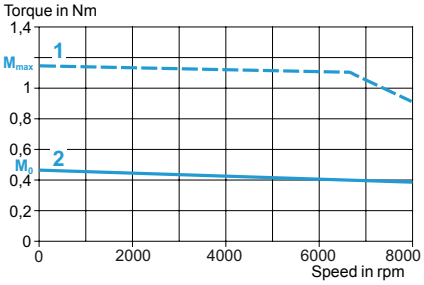


BRH 0571T servo motor (continued)

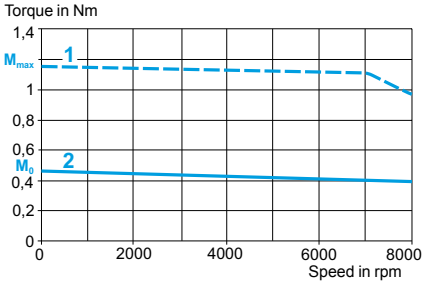
With LXM 05CU70M2 servo drive
230 V single-phase



With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/76
References: page 2/96
Dimensions: page 2/100

Characteristics of BRH 0572P servo motors

Type of servo motor				BRH 0572P				
Associated with Lexium 05 servo drive				LXM 05 ●D10F1	LXM 05 CU70M2	LXM 05 ●D10M2	LXM 05 ●D10M3X	LXM 05 ●D14N4
Line supply voltage			V	115 single-phase	230 single-phase		230 3-phase	400/480 3-phase
Switching frequency			kHz	8				
Torque	Continuous stall	M_0	Nm	0.76				
	Peak stall	M_{max}	Nm	2.07	1.55	2.07		2.46
Nominal operating point	Nominal torque		Nm	0.73	0.7		0.64	
	Nominal speed		rpm	1500	3000		6000	
	Nominal servo motor output power		W	120	220		400	
Maximum current			A rms	6	4.3	6		7.5

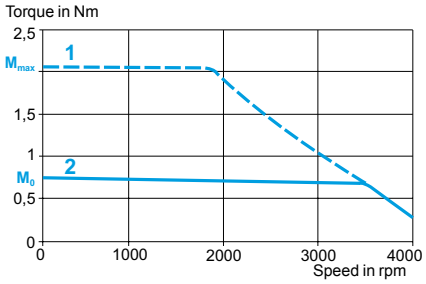
Servo motor characteristics

Maximum mechanical speed			rpm	8000
Constants (at 120°C)	Torque		Nm/A rms	0.38
	Back emf		V rms/ krpm	24.3
Rotor	Number of poles			10
	Inertia	Without brake J_m	kgcm²	0.26
		With brake J_m	kgcm²	0.26
Stator (at 20°C)	Resistance (phase/phase)		Ω	6.7
	Inductance (phase/phase)		mH	13.6
	Electrical time constant		ms	2
Holding brake (depending on model)				See page 2/102

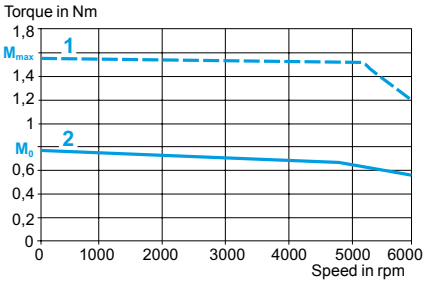
Torque/speed curves

BRH 0572P servo motor

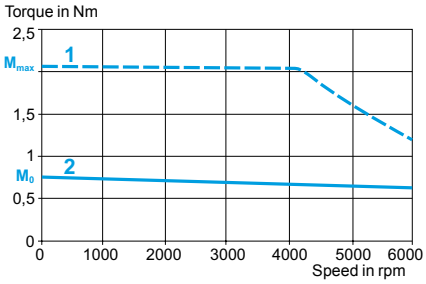
With LXM 05●D10F1 servo drive
115 V single-phase



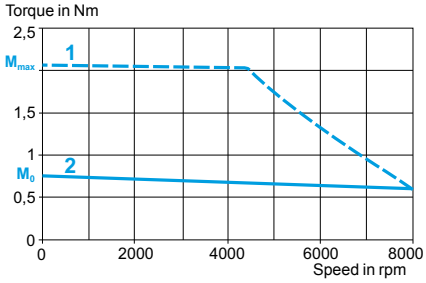
With LXM 05CU70M2 servo drive
230 V single-phase



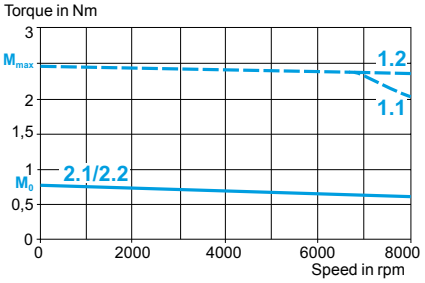
With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



With LXM 05●D14N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/76
References: page 2/96
Dimensions: page 2/100

2

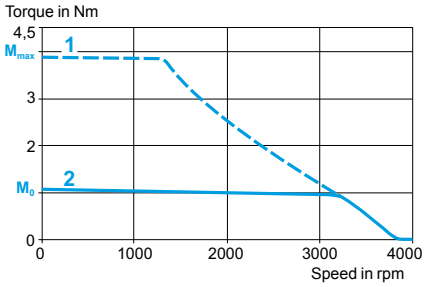
Characteristics of BRH 0573P servo motors

Type of servo motor				BRH 0573P			
Associated with Lexium 05 servo drive				**LXM 05 •D17F1**	**LXM 05 •D10M2**	**LXM 05 •D10M3X**	**LXM 05 •D14N4**
Line supply voltage			**V**	115 single-phase	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	1.05			
	Peak stall	M_{max}	**Nm**	3.9	2.43		3
Nominal operating point	Nominal torque		**Nm**	1	0.91		0.87
	Nominal speed		**rpm**	1500	4500		6000
	Nominal servo motor output power		**W**	160	430		550
Maximum current			**A rms**	10	7		10
Servo motor characteristics							
Maximum mechanical speed			**rpm**	8000			
Constants (at 120°C)	Torque		**Nm/A rms**	0.42			
	Back emf		**V rms/ krpm**	27.2			
Rotor	Number of poles			10			
	Inertia	Without brake J_m	**kgcm²**	0.34			
		With brake J_m	**kgcm²**	0.34			
Stator (at 20°C)	Resistance (phase/phase)		Ω	5.2			
	Inductance (phase/phase)		**mH**	11			
	Electrical time constant		**ms**	2.1			
Holding brake (depending on model)				See page 2/102			

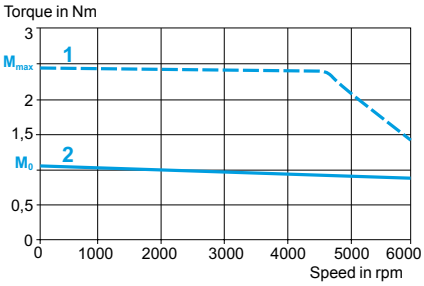
Torque/speed curves

BRH 0573P servo motor

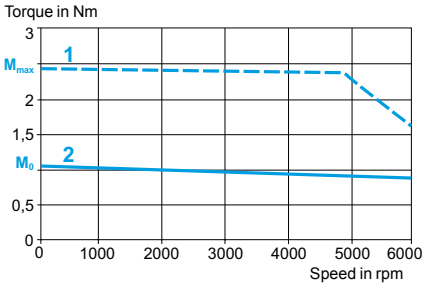
With LXM 05•D17F1 servo drive
115 V single-phase



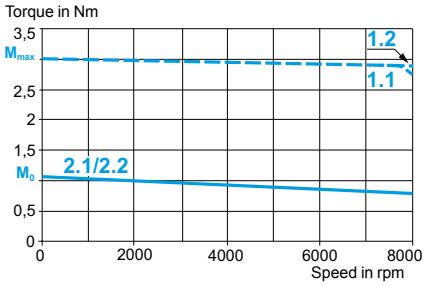
With LXM 05•D10M2 servo drive
230 V single-phase



With LXM 05•D10M3X servo drive
230 V 3-phase



With LXM 05•D14N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 2/100

Characteristics of BRH 0574P servo motors

Type of servo motor				BRH 0574P			
Associated with Lexium 05 servo drive				**LXM 05 ●D17F1**	**LXM 05 ●D17M2**	**LXM 05 ●D17M3X**	**LXM 05 ●D22N4**
Line supply voltage			**V**	115 single-phase	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	1.3			
	Peak stall	M_{max}	**Nm**	4.73			4.9
Nominal operating point	Nominal torque		**Nm**	1.22	1.08		1
	Nominal speed		**rpm**	1500	4500		6000
	Nominal servo motor output power		**W**	190	510		630
Maximum current			**A rms**	11			11.35

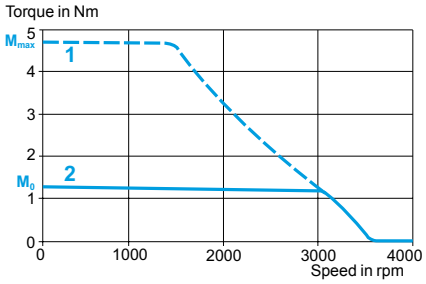
Servo motor characteristics

Maximum mechanical speed			**rpm**	8000
Constants (at 120°C)	Torque		**Nm/A rms**	0.46
	Back emf		**V rms/ krpm**	29.3
Rotor	Number of poles			10
	Inertia	Without brake J_m	**kgcm²**	0.42
		With brake J_m	**kgcm²**	0.42
Stator (at 20°C)	Resistance (phase/phase)		Ω	4.3
	Inductance (phase/phase)		**mH**	9
	Electrical time constant		**ms**	2.1
Holding brake (depending on model)				See page 2/102

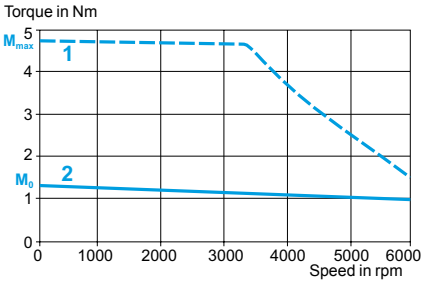
Torque/speed curves

BRH 0574P servo motor

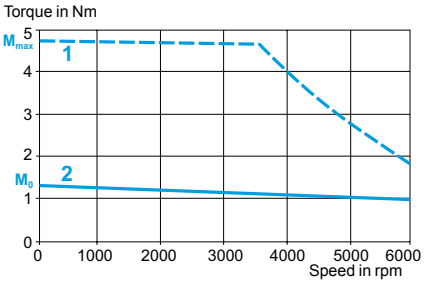
With LXM 05●D17F1 servo drive
115 V single-phase



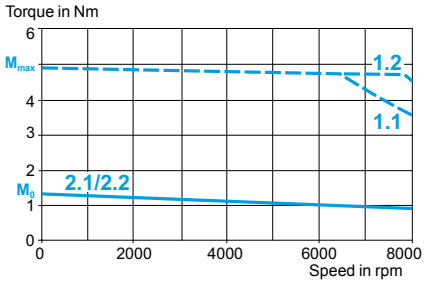
With LXM 05●D17M2 servo drive
230 V single-phase



With LXM 05●D17M3X servo drive
230 V 3-phase



With LXM 05●D22N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque
1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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References: page 2/96
Dimensions: page 2/100

2

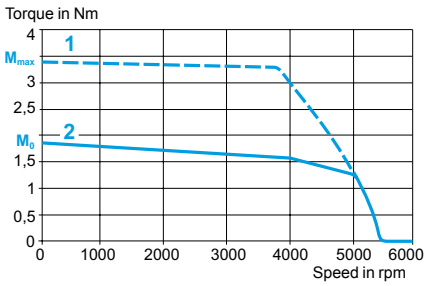
Characteristics of BRH 0851M servo motors

Type of servo motor				**BRH 0851M**		
Associated with Lexium 05 servo drive				**LXM 05 ●D10M2**	**LXM 05 ●D17M3X**	**LXM 05 ●D14N4**
Line supply voltage			**V**	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	1.86		
	Peak stall	M_{max}	**Nm**	3.4	5.27	4.05
Nominal operating point	Nominal torque		**Nm**	1.66		1.45
	Nominal speed		**rpm**	3000		6000
	Nominal servo motor output power		**W**	520		910
Maximum current			**A rms**	6	11	7.5
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.6		
	Back emf		**V rms/ krpm**	37.9		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	1.06		
		With brake J_m	**kgcm²**	1.59		
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.3		
	Inductance (phase/phase)		**mH**	12.3		
	Electrical time constant		**ms**	3.7		
Holding brake (depending on model)				See page 2/102		

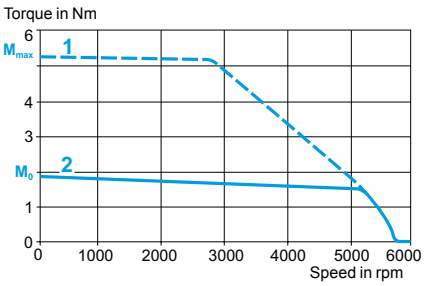
Torque/speed curves

BRH 0851M servo motor

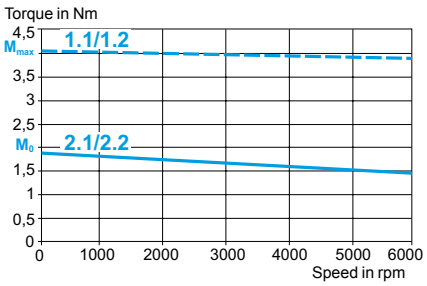
With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D17M3X servo drive
230 V 3-phase



With LXM 05●D14N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/76
References: page 2/96
Dimensions: page 2/100

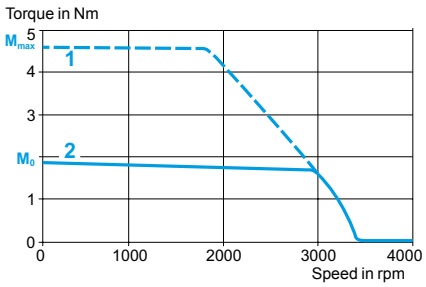
Characteristics of BRH 0851P servo motors

Type of servo motor				BRH 0851P			
Associated with Lexium 05 servo drive				LXM 05 ●D17F1	LXM 05 ●D17M2	LXM 05 ●D17M3X	LXM 05 ●D22N4
Line supply voltage			**V**	115 single-phase	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	1.86			
	Peak stall	M_{max}	**Nm**	4.61			5.34
Nominal operating point	Nominal torque		**Nm**	1.76	1.55		1.45
	Nominal speed		**rpm**	1500	4500		6000
	Nominal servo motor output power		**W**	280	730		910
Maximum current			**A rms**	11			14
Servo motor characteristics							
Maximum mechanical speed			**rpm**	6000			
Constants (at 120°C)	Torque		**Nm/A rms**	0.48			
	Back emf		**V rms/ krpm**	30.5			
Rotor	Number of poles			10			
	Inertia	Without brake J_m	**kgcm²**	1.06			
		With brake J_m	**kgcm²**	1.59			
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.1			
	Inductance (phase/phase)		**mH**	8			
	Electrical time constant		**ms**	3.8			
Holding brake (depending on model)				See page 2/102			

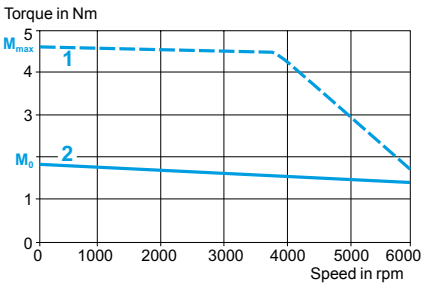
Torque/speed curves

BRH 0851P servo motor

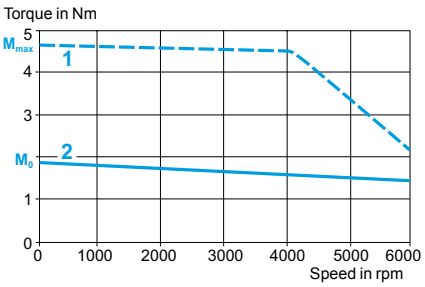
With LXM 05●D17F1 servo drive
115 V single-phase



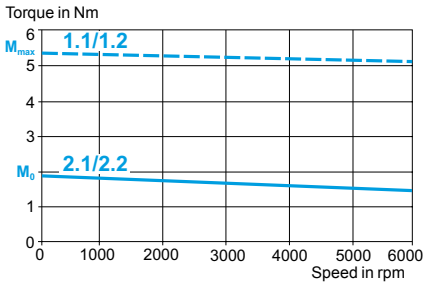
With LXM 05●D17M2 servo drive
230 V single-phase



With LXM 05●D17M3X servo drive
230 V 3-phase



With LXM 05●D22N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 2/100

2

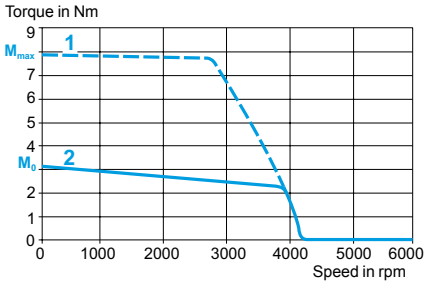
Characteristics of BRH 0852M servo motors

Type of servo motor				**BRH 0852M**		
Associated with Lexium 05 servo drive				**LXM 05 ●D17M2**	**LXM 05 ●D17M3X**	**LXM 05 ●D22N4**
Line supply voltage			**V**	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	3.1		
	Peak stall	M_{max}	**Nm**	7.81		9.51
Nominal operating point	Nominal torque		**Nm**	2.45		1.8
	Nominal speed		**rpm**	3000		6000
	Nominal servo motor output power		**W**	770		1150
Maximum current			**A rms**	11		14
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.75		
	Back emf		**V rms/ krpm**	49.2		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	2		
		With brake J_m	**kgcm²**	2.53		
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.5		
	Inductance (phase/phase)		**mH**	9.5		
	Electrical time constant		**ms**	3.8		
Holding brake (depending on model)				See page 2/102		

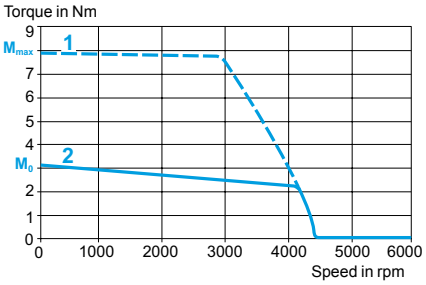
Torque/speed curves

BRH 0852M servo motor

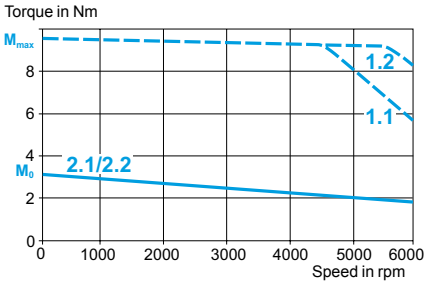
With LXM 05●D17M2 servo drive
230 V single-phase



With LXM 05●D17M3X servo drive
230 V 3-phase



With LXM 05●D22N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BRH 0852P servo motors

Type of servo motor				BRH 0852P			
Associated with Lexium 05 servo drive				**LXM 05 ●D28F1**	**LXM 05 ●D28M2**	**LXM 05 ●D42M3X**	**LXM 05 ●D34N4**
Line supply voltage			**V**	115 single-phase	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	3.1			
	Peak stall	M_{max}	**Nm**	8.7		10.8	7.95
Nominal operating point	Nominal torque		**Nm**	2.78	2.13		1.8
	Nominal speed		**rpm**	1500	4500		6000
	Nominal servo motor output power		**W**	440	1000		1150
Maximum current			**A rms**	20		26.4	18

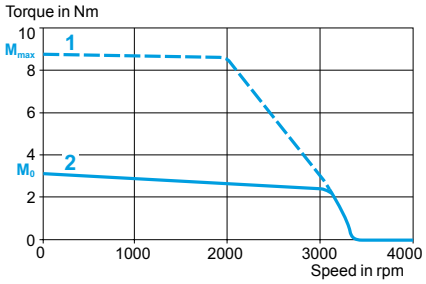
Servo motor characteristics

Maximum mechanical speed		**rpm**	6000	
Constants (at 120°C)	Torque	**Nm/A rms**	0.47	
	Back emf	**V rms/ krpm**	30.7	
Rotor	Number of poles		10	
	Inertia Without brake	J_m **kgcm²**	2	
	With brake	J_m **kgcm²**	2.53	
Stator (at 20°C)	Resistance (phase/phase)	Ω	1	
	Inductance (phase/phase)	**mH**	3.7	
	Electrical time constant	**ms**	3.7	
Holding brake (depending on model)			See page 2/102	

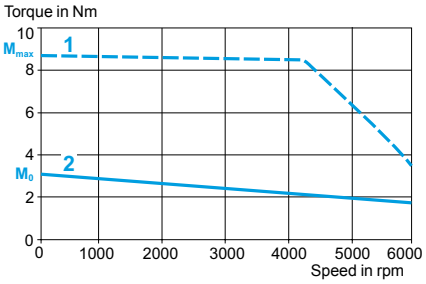
Torque/speed curves

BRH 0852P servo motor

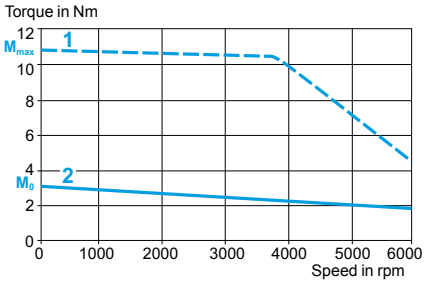
With LXM 05●D28F1 servo drive
115 V single-phase



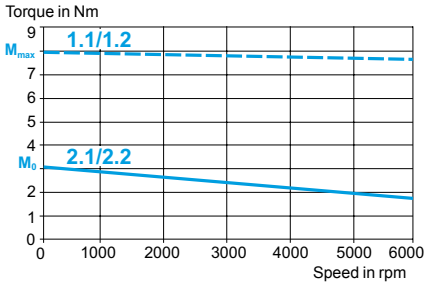
With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D42M3X servo drive
230 V 3-phase



With LXM 05●D34N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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References: page 2/96
Dimensions: page 2/100

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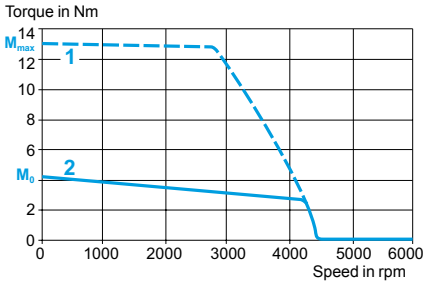
Characteristics of BRH 0853M servo motors

Type of servo motor				BRH 0853M		
Associated with Lexium 05 servo drive				**LXM 05 ●D28M2**	**LXM 05 ●D17M3X**	**LXM 05 ●D34N4**
Line supply voltage			**V**	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	4.2		
	Peak stall	M_{max}	**Nm**	13	7.73	12
Nominal operating point	Nominal torque		**Nm**	3.1		2
	Nominal speed		**rpm**	3000		6000
	Nominal servo motor output power		**W**	970		1250
Maximum current			**A rms**	20	11	18
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.72		
	Back emf		**V rms/ krpm**	46.8		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	2.9		
		With brake J_m	**kgcm²**	3.49		
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.4		
	Inductance (phase/phase)		**mH**	5.5		
	Electrical time constant		**ms**	4.1		
Holding brake (depending on model)				See page 2/102		

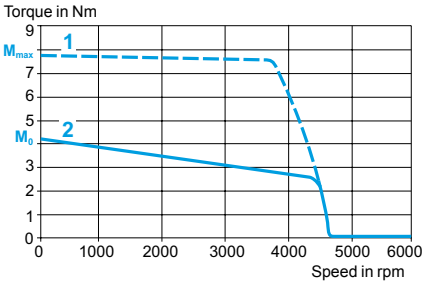
Torque/speed curves

BRH 0853M servo motor

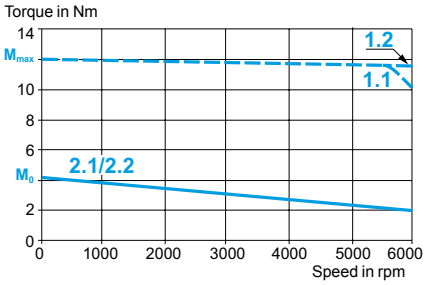
With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D17M3X servo drive
230 V 3-phase



With LXM 05●D34N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

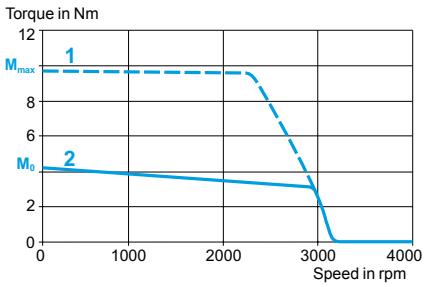
Characteristics of BRH 0853P servo motors

Type of servo motor				**BRH 0853P**		
Associated with Lexium 05 servo drive				**LXM 05 ●D28F1**	**LXM 05 ●D28M2**	**LXM 05 ●D42M3X**
Line supply voltage			**V**	115 single-phase	230 single-phase	230 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	4.2		
	Peak stall	M_{max}	**Nm**	9.7		13.6
Nominal operating point	Nominal torque		**Nm**	3.65	2.55	
	Nominal speed		**rpm**	1500	4500	
	Nominal servo motor output power		**W**	570	1200	
Maximum current			**A rms**	20		30
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.51		
	Back emf		**V rms/ krpm**	33		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	2.96		
		With brake J_m	**kgcm²**	3.49		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.7		
	Inductance (phase/phase)		**mH**	2.7		
	Electrical time constant		**ms**	4		
Holding brake (depending on model)				See page 2/102		

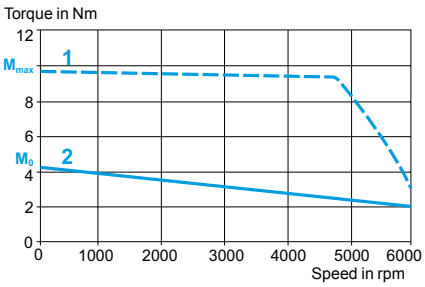
Torque/speed curves

BRH 0853P servo motor

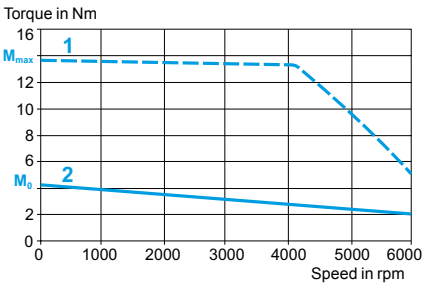
With LXM 05●D28F1 servo drive
115 V single-phase



With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D42M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

2

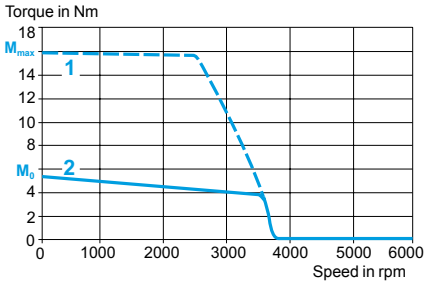
Characteristics of BRH 0854M servo motors

Type of servo motor				**BRH 0854M**		
Associated with Lexium 05 servo drive				**LXM 05 ●D28M2**	**LXM 05 ●D17M3X**	**LXM 05 ●D34N4**
Line supply voltage			**V**	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	5.3		
	Peak stall	M_{max}	**Nm**	15.8	9.2	14.5
Nominal operating point	Nominal torque		**Nm**	4		2.2
	Nominal speed		**rpm**	3000		6000
	Nominal servo motor output power		**W**	1250		1400
Maximum current			**A rms**	20	11	18
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.86		
	Back emf		**V rms/ krpm**	55.3		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	3.9		
		With brake J_m	**kgcm²**	4.44		
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.4		
	Inductance (phase/phase)		**mH**	5.7		
	Electrical time constant		**ms**	4.2		
Holding brake (depending on model)				See page 2/102		

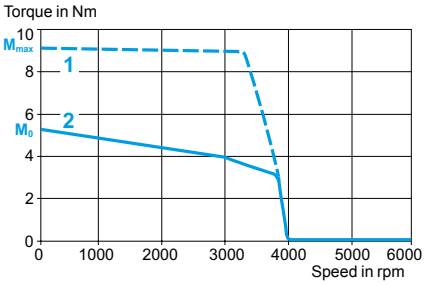
Torque/speed curves

BRH 0854M servo motor

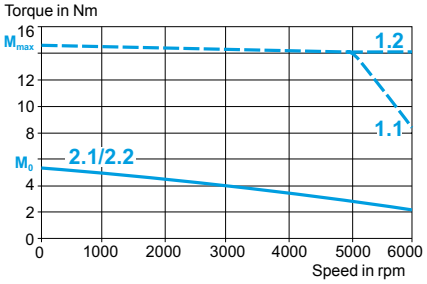
With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D17M3X servo drive
230 V 3-phase



With LXM 05●D34N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/76
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Dimensions: page 2/100

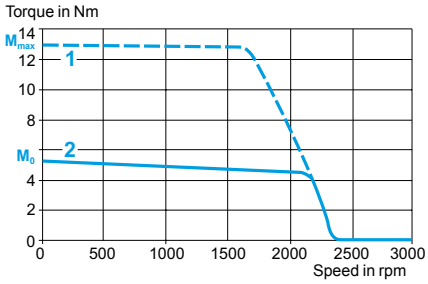
Characteristics of BRH 0854P servo motors

Type of servo motor				**BRH 0854P**			
Associated with Lexium 05 servo drive				**LXM 05 ●D28F1**	**LXM 05 ●D28M2**	**LXM 05 ●D42M3X**	**LXM 05 ●D22N4**
Line supply voltage			**V**	115 single-phase	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	5.3			4.8
	Peak stall	M_{max}	**Nm**	13		18.3	9.3
Nominal operating point	Nominal torque		**Nm**	4.71	4		2.2
	Nominal speed		**rpm**	1500	3000		6000
	Nominal servo motor output power		**W**	740	1250		1400
Maximum current			**A rms**	20		30	14
Servo motor characteristics							
Maximum mechanical speed			**rpm**	6000			
Constants (at 120°C)	Torque		**Nm/A rms**	0.68			
	Back emf		**V rms/ krpm**	44			
Rotor	Number of poles			10			
	Inertia	Without brake J_m	**kgcm²**	3.9			
		With brake J_m	**kgcm²**	4.44			
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.9			
	Inductance (phase/phase)		**mH**	3.6			
	Electrical time constant		**ms**	4.2			
Holding brake (depending on model)				See page 2/102			

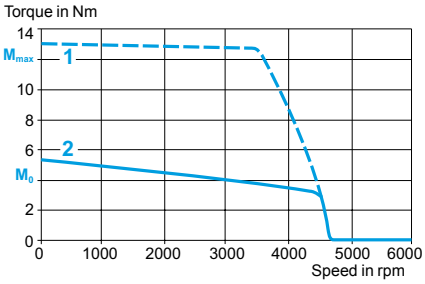
Torque/speed curves

BRH 0854P servo motor

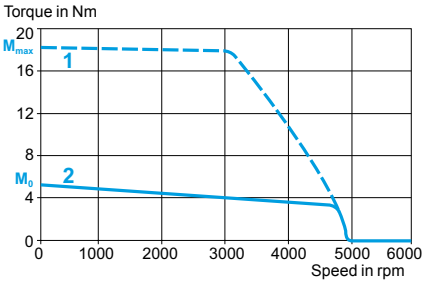
With LXM 05●D28F1 servo drive
115 V single-phase



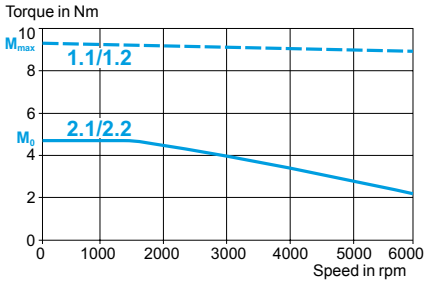
With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D42M3X servo drive
230 V 3-phase



With LXM 05●D22N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque
1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/76
References: page 2/96
Dimensions: page 2/100

2

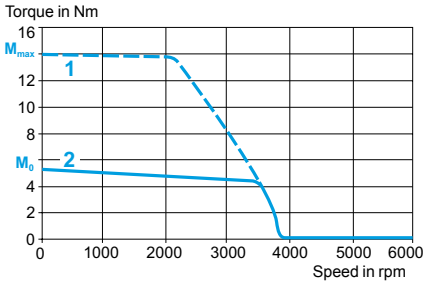
Characteristics of BRH 1101P servo motors

Type of servo motor				**BRH 1101P**		
Associated with Lexium 05 servo drive				**LXM 05 ●D28M2**	**LXM 05 ●D42M3X**	**LXM 05 ●D34N4**
Line supply voltage			**V**	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	5.2		
	Peak stall	M_{max}	**Nm**	14	16.2	13
Nominal operating point	Nominal torque		**Nm**	4.5		4.04
	Nominal speed		**rpm**	3000		4500
	Nominal servo motor output power		**W**	1400		1900
Maximum current			**A rms**	20	30	18
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.83		
	Back emf		**V rms/ krpm**	54.2		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	4.5		
		With brake J_m	**kgcm²**	5.8		
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.2		
	Inductance (phase/phase)		**mH**	8.1		
	Electrical time constant		**ms**	6.5		
Holding brake (depending on model)				See page 2/102		

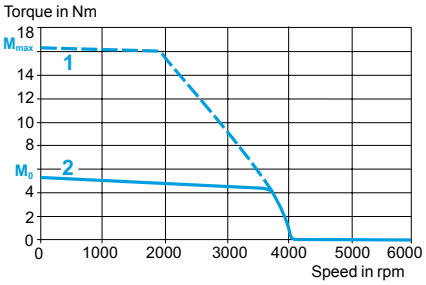
Torque/speed curves

BRH 1101P servo motor

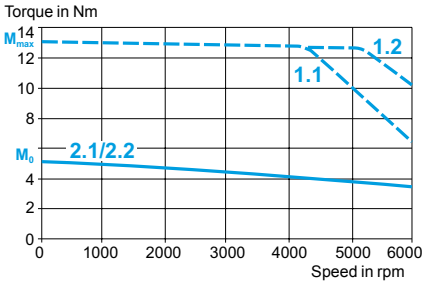
With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D42M3X servo drive
230 V 3-phase



With LXM 05●D34N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/76
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Dimensions: page 2/100

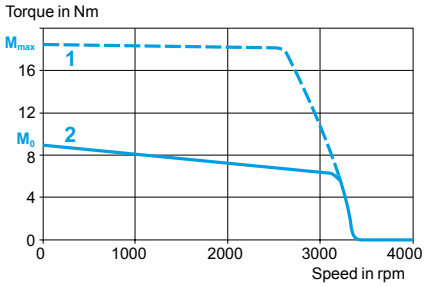
Characteristics of BRH 1102P servo motors

Type of servo motor				BRH 1102P		
Associated with Lexium 05 servo drive				**LXM 05 ●D28M2**	**LXM 05 ●D42M3X**	**LXM 05 ●D34N4**
Line supply voltage			**V**	230 single-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	9		
	Peak stall	M_{max}	**Nm**	18.4	26	16.7
Nominal operating point	Nominal torque		**Nm**	7.83		4.58
	Nominal speed		**rpm**	1500		4500
	Nominal servo motor output power		**W**	1250		2150
Maximum current			**A rms**	20	30	18
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.96		
	Back emf		**V rms/ krpm**	62.1		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	8.8		
		With brake J_m	**kgcm²**	10.1		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.7		
	Inductance (phase/phase)		**mH**	4.9		
	Electrical time constant		**ms**	7.1		
Holding brake (depending on model)				See page 2/102		

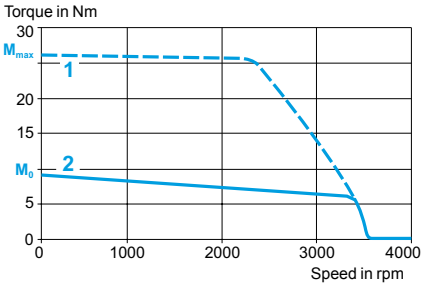
Torque/speed curves

BRH 1102P servo motor

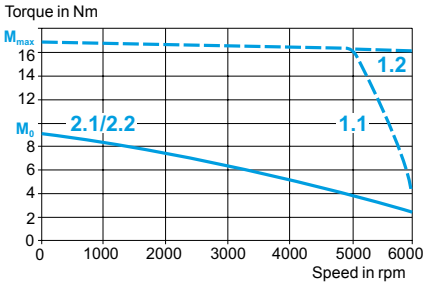
With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D42M3X servo drive
230 V 3-phase



With LXM 05●D34N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

2

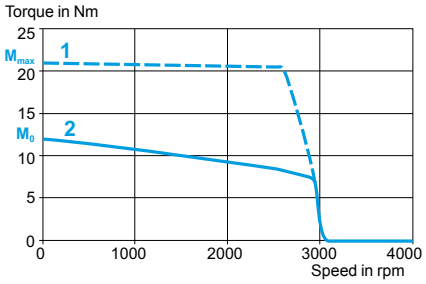
Characteristics of BRH 1103P servo motors

Type of servo motor				**BRH 1103P**			
Associated with Lexium 05 servo drive				**LXM 05 ●D28M2**	**LXM 05 ●D42M3X**	**LXM 05 ●D34N4**	**LXM 05 ●D57N4**
Line supply voltage			**V**	230 single-phase	230 3-phase	400/480 3-phase	
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	12			
	Peak stall	M_{max}	**Nm**	21	30.3	18.9	30.3
Nominal operating point	Nominal torque		**Nm**	10		7.5	
	Nominal speed		**rpm**	1500		3000	
	Nominal servo motor output power		**W**	1550		2360	
Maximum current			**A rms**	20	30	18	30
Servo motor characteristics							
Maximum mechanical speed			**rpm**	4500			
Constants (at 120°C)	Torque		**Nm/A rms**	1.06			
	Back emf		**V rms/ krpm**	68.5			
Rotor	Number of poles			10			
	Inertia	Without brake J_m	**kgcm²**	13.1			
		With brake J_m	**kgcm²**	14.4			
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.5			
	Inductance (phase/phase)		**mH**	3.9			
	Electrical time constant		**ms**	7.2			
Holding brake (depending on model)				See page 2/102			

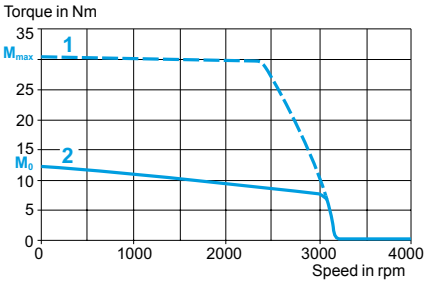
Torque/speed curves

BRH 1103P servo motor

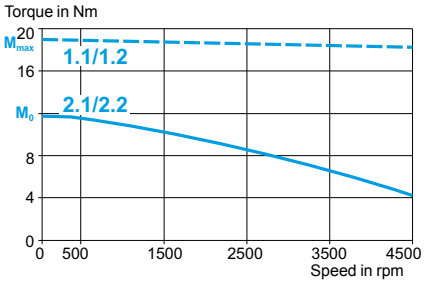
With LXM 05●D28M2 servo drive
230 V single-phase



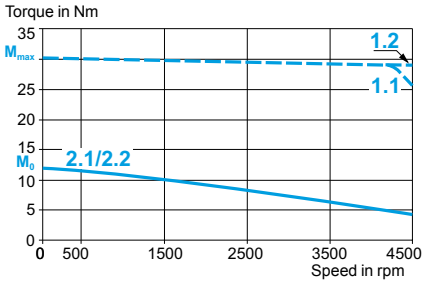
With LXM 05●D42M3X servo drive
230 V 3-phase



With LXM 05●D34N4 servo drive
400/480 V 3-phase



With LXM 05●D57N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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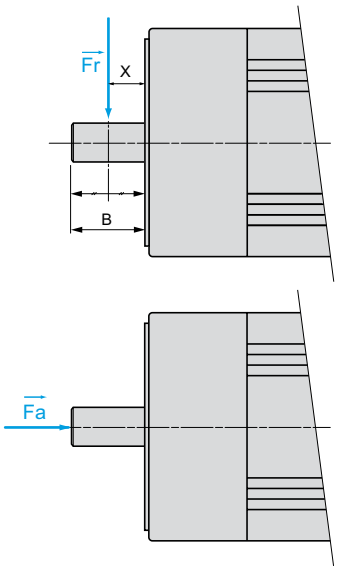


Radial and axial forces permitted on the motor shaft

Even when the servo motors are used under optimum conditions, their service life is limited by that of the bearings.

Conditions	
Nominal service life of bearings *(1)*	L_{10h} = 20,000 hours
Ambient temperature (bearing temperature ∼ 100°C)	40°C
Force application point	Fr applied at the middle of the shaft end X = B/2 (dimension B, see page 2/100)

(1) Hours of use with a failure probability of 10%

⚠ The following conditions must be adhered to:
- Radial and axial forces must not be applied simultaneously
- Shaft end with IP 41 or IP 56 degree of protection
- The bearings cannot be changed by the user as the built-in position sensor must be realigned if the unit is dismantled.

			Maximum radial force Fr					
Mechanical speed		**rpm**	**1000**	**2000**	**3000**	**4000**	**5000**	**6000**
Servo motor	BRH 0571	**N**	109	81	76	74	73	72
	BRH 0572	**N**	130	96	91	89	87	86
	BRH 0573	**N**	143	106	100	98	96	94
	BRH 0574	**N**	152	112	106	103	101	100
	BRH 0851	**N**	226	193	187	181	176	173
	BRH 0852	**N**	265	226	219	213	207	203
	BRH 0853	**N**	287	244	237	230	223	220
	BRH 0854	**N**	300	256	248	241	234	230
	BRH 1101	**N**	729	709	697	688	655	629
	BRH 1102	**N**	848	824	811	800	762	731
	BRH 1103	**N**	908	883	869	857	–	–
		Maximum axial force: Fa = 0.2 x Fr						

2

Characteristics of servo motor/servo drive power connection cables

Cables fitted with a connector on servo motor side

Type of cable		VW3 M5 101 R●●●
Outer cover, insulation		PUR (RAL 2003 orange), TPM or PP/PE
Capacity	pF/m	< 70 (conductors/shielding)
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]
Connector type		1 M23 industrial connector (servo motor side) and 1 free wire end (servo drive side)
External diameter	mm	12 ± 0.2
Curvature radius	mm	90, suitable for daisy-chain, cable-carrier chain
Operating voltage	V	600
Maximum length	m	75 *(1)*
Operating temperature	°C	- 40…+ 90 (fixed), - 20…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

Cables without connectors

Cable type		VW3 M5 301 R●●●●
Outer cover, insulation		PUR (RAL 2003 orange), TPM or PP/PE
Capacity	pF/m	< 70 (conductors/shielding)
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]
Connector type		None, see page 2/99
External diameter	mm	12 ± 0.2
Curvature radius	mm	90, suitable for daisy-chain, cable-carrier chain
Operating voltage	V	600
Maximum length	m	100
Operating temperature	°C	- 40…+ 90 (fixed), - 20…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

(1) For cables longer than 75 m, please consult your Regional Sales Office.

Characteristics of the servo motor/servo drive control connection cables

Cables fitted with a connector at both ends (servo motor and servo drive)

Type of cable		VW3 M8 101 R●●●
Type of encoder		**SinCos encoder**
Outer cover, insulation		PUR (RAL 6018 green), polyester
Number of conductors (shielded)		[5 x (2 x 0.25 mm^2) + (2 x 0.5 mm^2)]
External diameter	**mm**	8.8 ± 0.2
Connector type		1 M23 industrial connector (servo motor side) and one 12-way female Molex connector (servo drive side)
Min. curvature radius	**mm**	68, suitable for daisy-chain, cable-carrier chain
Operating voltage	**V**	350 (0.25 mm^2), 500 (0.5 mm^2)
Maximum length	**m**	75 *(1)*
Operating temperature	**°C**	- 50…+ 90 (fixed), - 40…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

Cables without connectors

Cable type		VW3 M8 221 R●●●●
Type of encoder		**SinCos encoder**
Outer cover, insulation		PUR (RAL 6018 green), polyester
Number of conductors (shielded)		[5 x (2 x 0.25 mm^2) + (2 x 0.5 mm^2)]
External diameter	**mm**	8.8 ± 0.2
Connector type		None, see page 2/99
Min. curvature radius	**mm**	68, suitable for daisy-chain, cable-carrier chain
Operating voltage	**V**	350 (0.25 mm^2), 500 (0.5 mm^2)
Maximum length	**m**	100
Operating temperature	**°C**	- 50…+ 90 (fixed), - 40…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

(1) For cables longer than 75 m, please consult your Regional Sales Office.

Lexium 05 motion control
BRH servo motors

108025

BRH 057●● ●●A1A

108024

BRH 057●● ●●A2A

108108

BRH 085●● ●●A2A

BRH servo motors

The BRH servo motors shown below are supplied without a gearbox.
For GBX gearboxes see page 2/107.

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed	Maximum mechanical speed	Associated LXM 05 servo drive	Reference *(1)*	Weight *(2)*
Nm	Nm	W	rpm	rpm			kg
0.46	0.88	260	6000	8000	CU70M2	**BRH 0571T ●●●●A**	1.100
	1.15	135	3000	8000	●D10F1		
		260	6000	8000	●D10M2		
		260	6000	8000	●D10M3X		
	1.26	135	3000	8000	CU70M2	**BRH 0571P ●●●●A**	1.100
	1.39	260	6000	8000	●D14N4		
0.76	1.55	220	3000	8000	CU70M2	**BRH 0572P ●●●●A**	1.400
	2.07	120	1500	8000	●D10F1		
		220	3000	8000	●D10M2		
		400	6000	8000	●D10M3X		
	2.46	400	6000	8000	●D14N4		
1.05	2.43	430	4500	8000	●D10M2	**BRH 0573P ●●●●A**	1.700
		430	4500	8000	●D10M3X		
	3	550	6000	8000	●D14N4		
	3.9	160	1500	8000	●D17F1		
1.3	4.73	190	1500	8000	●D17F1	**BRH 0574P ●●●●A**	2.000
		510	4500	8000	●D17M2		
		510	4500	8000	●D17M3X		
	4.9	630	6000	8000	●D22N4		
1.86	3.4	520	3000	6000	●D10M2	**BRH 0851M ●●●●A**	2.200
	4.05	910	6000	6000	●D14N4		
	4.61	280	1500	6000	●D17F1	**BRH 0851P ●●●●A**	2.200
		730	4500	6000	●D17M2		
		730	4500	6000	●D17M3X		
	5.27	520	3000	6000	●D17M3X	**BRH 0851M ●●●●A**	2.200
	5.34	910	6000	6000	●D22N4	**BRH 0851P ●●●●A**	2.200
3.1	7.81	770	3000	6000	●D17M2	**BRH 0852M ●●●●A**	3.300
		770	3000	6000	●D17M3X		
	7.95	1150	6000	6000	●D34N4	**BRH 0852P ●●●●A**	3.300
	8.7	440	1500	6000	●D28F1		
		1000	4500	6000	●D28M2		
	9.51	1150	6000	6000	●D22N4	**BRH 0852M ●●●●A**	3.300
	10.8	1000	4500	6000	●D42M3X	**BRH 0852P ●●●●A**	3.300
4.2	7.73	970	3000	6000	●D17M3X	**BRH 0853M ●●●●A**	4.400
	9.7	570	1500	6000	●D28F1	**BRH 0853P ●●●●A**	4.400
		1200	4500	6000	●D28M2		
	12	1250	6000	6000	●D34N4	**BRH 0853M ●●●●A**	4.400
	13	970	3000	6000	●D28M2		
	13.6	1250	6000	6000	●D42M3X	**BRH 0853P ●●●●A**	4.400
4.8	9.3	1400	6000	6000	●D22N4	**BRH 0854P ●●●●A**	6.100
5.2	13	1900	4500	6000	●D34N4	**BRH 1101P ●●●●A**	4.900
	14	1400	3000	6000	●D28M2		
	16.2	1400	3000	6000	●D42M3X		
5.3	9.2	1250	3000	6000	●D17M3X	**BRH 0854M ●●●●A**	6.100
	13	740	1500	6000	●D28F1	**BRH 0854P ●●●●A**	6.100
		1250	3000	6000	●D28M2		
	14.5	1400	6000	6000	●D34N4	**BRH 0854M ●●●●A**	6.100
	15.8	1250	3000	6000	●D28M2		
	18.3	1450	4000	6000	●D42M3X	**BRH 0854P ●●●●A**	6.100

(1) To complete each reference see the table on page 2/97.
(2) Weight of servo motor without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 2/102.

Presentation: page 2/76
Characteristics: page 2/78
Dimensions: page 2/100

Schneider Electric

BRH servo motors (continued)

536757

BRH 110●● ●●A2A

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed	Maximum mechanical speed	Associated LXM 05 servo drive	Reference *(1)*	Weight *(2)*
Nm	Nm	W	rpm	rpm			kg
9	16.7	2150	4500	6000	●D34N4	**BRH 1102P ●●●●A**	7.700
	18.4	1250	1500	6000	●D28M2		
	26	1250	1500	6000	●D42M3X		
12	18.9	2360	3000	4500	●D34N4	**BRH 1103P ●●●●A**	10.500
	21	1550	1500	4500	●D28M2		
	30.3	1550	1500	4500	●D42M3X		
		2360	3000	4500	●D57N4		

To order a BRH servo motor, complete each reference above with:

			BRH 0571P	●	●	●	●	A
Shaft end	IP 41	Untapped		**0**				
		Keyed		**1**				
	IP 56	Untapped		**2**				
		Keyed		**3**				
Integrated sensor	Single turn, SinCos Hiperface® 16,384 points/turn *(3)*				**0**			
	Single turn, SinCos Hiperface® 131,072 points/turn *(3)*				**1**			
	Multiturn, SinCos Hiperface® 131,072 points/turn x 4096 turns *(3)*				**2**			
Holding brake	Without					**A**		
	With					**F**		
Connections	Straight connectors						**1**	
	Rotatable right-angled connectors						**2**	
Flange	International standard							**A**

***Note:** The example above is for a **BRH 0571P** servo motor. Replace **BRH 0571P** by the relevant reference for other servo motors.*

(1) To complete each reference see the table above.
(2) Weight of servo motor without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 2/102.
(3) Sensor resolution given for use with a Lexium 05 servo drive.

2

567830

VW3 M5 101 R●●●

Connection elements

Power cordsets

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
Cables equipped with one M23 industrial connector (servo motor side)	BRH ●●●●●	LXM 05●●●●●●●, depending on combinations, see pages 2/78 to 2/92	[(4 x 1.5 mm²) + (2 x 1 mm²)]	3	**VW3 M5 101 R30**	0.810
				5	**VW3 M5 101 R50**	1.210
				10	**VW3 M5 101 R100**	2.290
				15	**VW3 M5 101 R150**	3.400
				20	**VW3 M5 101 R200**	4.510
				25	**VW3 M5 101 R250**	6.200
				50	**VW3 M5 101 R500**	12.325
				75	**VW3 M5 101 R750**	18.450

567831

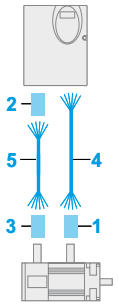
VW3 M8 101 R●●●

Control cordsets

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
SinCos Hiperface® encoder cables equipped with one M23 industrial connector (servo motor side) **and one 12-way female Molex connector** (servo drive side)	BRH ●●●●●	LXM 05●●●●●●●	[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]	3	**VW3 M8 101 R30**	0.800
				5	**VW3 M8 101 R50**	1.200
				10	**VW3 M8 101 R100**	2.250
				15	**VW3 M8 101 R150**	3.450
				20	**VW3 M8 101 R200**	4.350
				25	**VW3 M8 101 R250**	4.950
				50	**VW3 M8 101 R500**	13.300
				75	**VW3 M8 101 R750**	17.650

Presentation:
page 2/76

Characteristics:
page 2/94



Connection elements (continued)

Connection accessories for creating power and control cordsets

Description	Used for	Ref.	For cable of cross-section	Reference	Weight
			mm²		kg
M23 industrial connector for creating power cordsets (sold in lots of 5)	BRH servo motors ●●●●●	1	1.5	**VW3 M8 215**	0.350
12-way female Molex connector for creating control cordsets (sold in lots of 5)	LXM 05 servo drives ●●●●●●● (CN2 connector)	2	–	**VW3 M8 213**	–
M23 industrial connector for creating control cordsets (sold in lots of 5)	BRH servo motors ●●●●●	3	–	**VW3 M8 214**	–

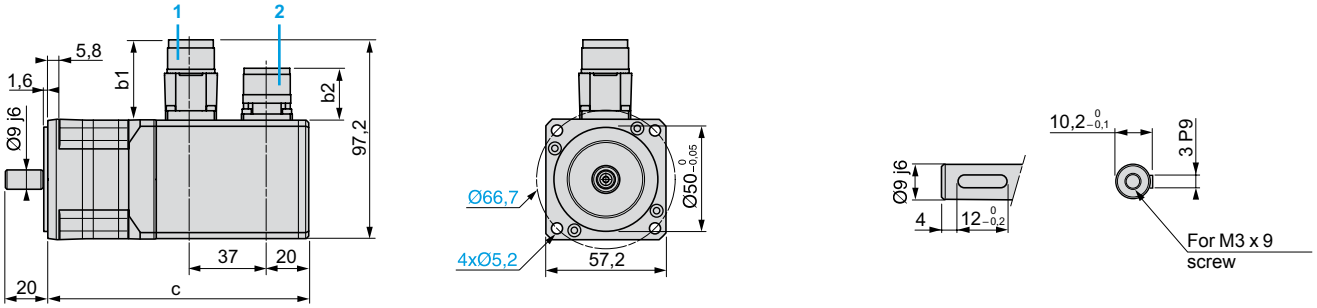
Description	From servo motor	To servo drive	Composition	Ref.	Length	Reference	Weight
					m		kg
Cables for creating power cordsets	BRH ●●●●●	LXM 05●●●●●●●, depending on combinations, see pages 2/78 to 2/92	[(4 x 1.5 mm²) + (2 x 1 mm²)]	4	25	**VW3 M5 301 R250**	5.550
					50	**VW3 M5 301 R500**	11.100
					100	**VW3 M5 301 R1000**	22.200
Cables for creating control cordsets for SinCos Hiperface® encoders	BRH ●●●●●	LXM 05●●●●●●●	[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]	5	25	**VW3 M8 221 R250**	5.250
					50	**VW3 M8 221 R500**	10.500
					100	**VW3 M8 221 R1000**	21.000

2

2

BRH 057 (example with straight connectors: servo motor/brake power supply 1 and encoder 2)

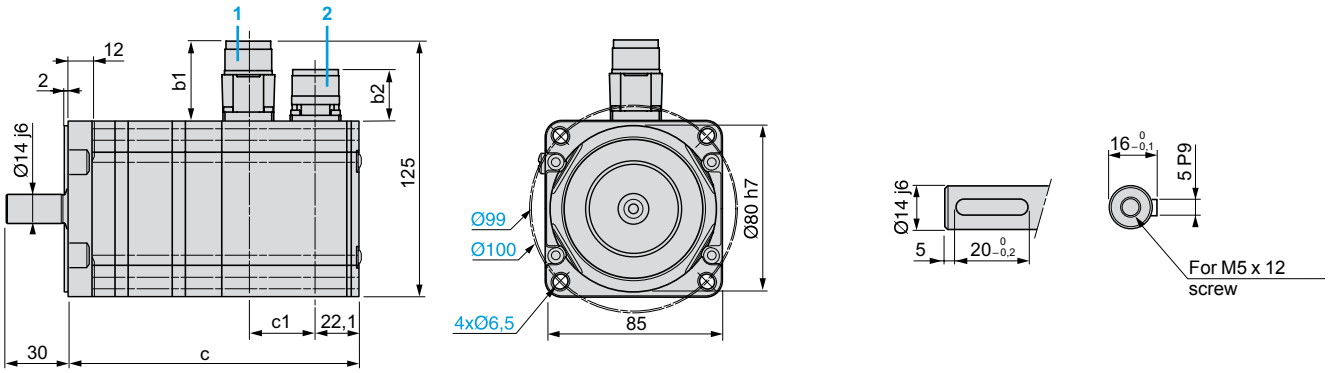
Keyed shaft end (optional)



	Straight connectors		Angled connectors			
	b1	**b2**	**b1**	**b2**	**c** (without brake)	**c** (with brake)
BRH 0571	39.4	22.3	39.4	39.4	124.6	124.6
BRH 0572	39.4	22.3	39.4	39.4	143.1	143.1
BRH 0573	39.4	22.3	39.4	39.4	161.6	161.6
BRH 0574	39.4	22.3	39.4	39.4	180.1	180.1

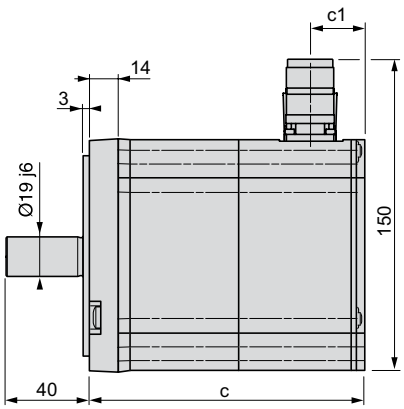
BRH 085 (example with straight connectors: servo motor/brake power supply 1 and encoder 2)

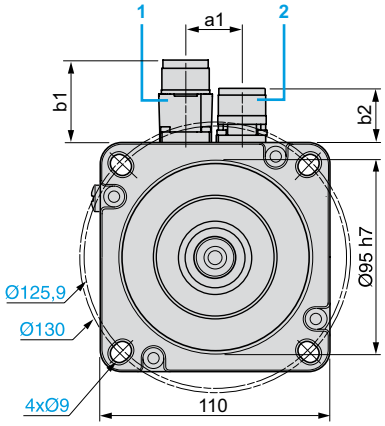
Keyed shaft end (optional)



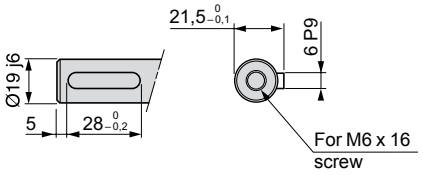
	Straight connectors		Angled connectors					
	b1	**b2**	**b1**	**b2**	**c** (without brake)	**c** (with brake)	**c1** (without brake)	**c1** (with brake)
BRH 0851	38.9	21.8	38.9	38.9	140.4	162.1	30	31
BRH 0852	38.9	21.8	38.9	38.9	170.4	192.1	30	31
BRH 0853	38.9	21.8	38.9	38.9	200.4	222.1	30	31
BRH 0854	38.9	21.8	38.9	38.9	230.4	252.1	30	31

BRH 110 (example with straight connectors: servo motor/brake power supply 1 and encoder 2)





Keyed shaft end (optional)

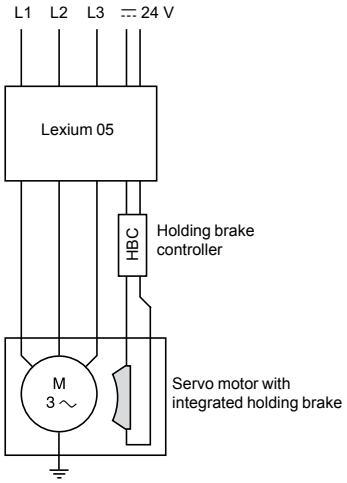


			Straight connectors		Angled connectors					
	a1 (without brake)	**a1** (with brake)	**b1**	**b2**	**b1**	**b2**	**c** (without brake)	**c** (with brake)	**c1** (without brake)	**c1** (with brake)
BRH 1101	31	30.5	38.9	21.8	38.9	38.9	132.1	198.1	25.6	28.6
BRH 1102	31	30.5	38.9	21.8	38.9	38.9	180.1	246.1	25.6	28.6
BRH 1103	31	30.5	38.9	21.8	38.9	38.9	228.1	294.1	25.6	28.6

Lexium 05 motion control
BRH servo motors
Option: Holding brake integrated in servo motor

Holding brake

Presentation



The holding brake integrated in the BRH servo motor is an electromagnetic pressure spring brake that blocks the servo motor axis once the output current has been switched off.
In the event of an emergency, such as a power outage or an emergency stop, the drive is immobilized, thus significantly increasing safety.
Blocking the servo motor axis is also necessary in cases of torque overload, such as in the event of vertical axis movement.

The holding brake is activated using the holding brake controller (HBC) **VW3 M3 103** (see page 2/43).

The HBC is an external device. It also ensures electrical isolation.

Characteristics

Type of servo motor	BRH	0571, 0572, 0573, 0574	0851, 0852, 0853, 0854	1101, 1102, 1103
Holding torque M_{Br}	**Nm**	2.2	8	15
Moment of inertia of rotor (brake only) J_{Br}	**kgcm²**	0.09	0.53	1.3
Electrical clamping power P_{Br}	**W**	9	15	18
Nominal current	**A**	0.375	0.625	0.75
Supply voltage	**V**	24 +10/-10%		
Opening time	**ms**	30	50	80
Closing time	**ms**	15	25	
Weight (to be added to the weight of the servo motor without brake, see page 2/96)	**kg**	0.200	0.600	1.100

References

108107

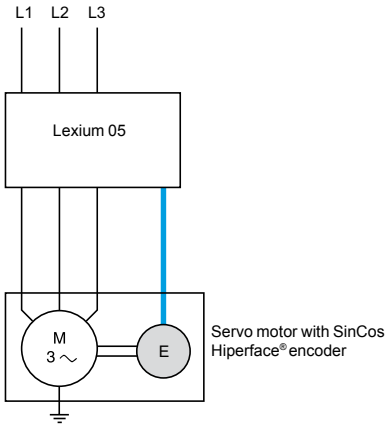
BRH servo motor

For selection of BRH servo motor with or without holding brake, see references on page 2/97.

Lexium 05 motion control
BRH servo motors
Option: Encoder integrated in servo motor

Encoder integrated in BRH servo motor

Presentation



The standard measurement device is the SinCos Hiperface® single turn or multiturn encoder integrated in BRH servo motors. This measurement device is perfectly suited to the Lexium 05 range of servo drives.

Use of this interface enables:
- Automatic identification of BRH servo motor data by the servo drive
- Automatic initialization of the servo drive's control loops, thus simplifying installation of the motion control device

Characteristics

Type of encoder		Single turn SinCos		Multiturn SinCos
Sine periods per turn		16	128	
Number of points *(1)*		16,384	131,072	131,072 x 4096 turns
Encoder precision	**arc min**	± 4.8	± 1.3	
Measurement method		Optical, high resolution		
Interface		Hiperface®		
Operating temperature	**°C**	-5…+110		

(1) Encoder resolution given for use with a Lexium 05 servo drive.

References

108107

BRH servo motor

For selection of the SinCos Hiperface® single turn or multiturn encoder integrated in the BRH servo motor, see references on page 2/97.

Dimensions:
page 2/100

Lexium 05 motion control
BRH servo motors
Option: GBX planetary gearboxes

Presentation

GBX planetary gearbox

In many cases, motion control requires the use of planetary gearboxes to adapt speeds and torques, while continuing to provide the precision demanded by the application.

Schneider Electric has chosen to use GBX gearboxes (made by Neugart) with the BRH range of servo motors. These gearboxes are lubricated for life and are designed for applications which are not susceptible to mechanical backlash.
The fact that their use in combination with BRH servo motors has been fully verified and that they are easily assembled, ensures simple, risk-free operation.

Available in 5 sizes (GBX 40…GBX 160), the planetary gearboxes are offered in 15 reduction ratios (3:1…100:1), see table below.

The continuous and peak standstill torques available at the gearbox output are obtained by multiplying the characteristic values of the servo motor by the reduction ratio and efficiency of the gearbox (0.96, 0.94 or 0.9 depending on the reduction ratio).

The table below shows the most suitable servo motor/gearbox combinations. For other combinations, refer to the servo motor data sheets.

BRH servo motor/GBX gearbox combinations

Reduction ratios from 3:1 to 16:1

Type of servo motor	Reduction ratio							
	3:1	4:1	5:1	8:1	9:1	12:1	15:1	16:1
BRH 0571	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40
BRH 0572	GBX 40	GBX 40	GBX 40	GBX 60	GBX 40	GBX 40	GBX 40	GBX 40
BRH 0573	GBX 40	GBX 40	GBX 40	GBX 60	GBX 40	GBX 40	GBX 60	GBX 60
BRH 0574	GBX 40	GBX 40	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BRH 0851	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 60	GBX 60	GBX 60
BRH 0852	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 60	GBX 80	GBX 80
BRH 0853	GBX 60	GBX 60	GBX 80	GBX 80	GBX 60	GBX 80	GBX 80	GBX 80
BRH 0854	GBX 60	GBX 60	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BRH 1101	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 80	GBX 80
BRH 1102	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 120	GBX 120
BRH 1103	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 120	GBX 120

Reduction ratios from 20:1 to 100:1

Type of servo motor	Reduction ratio						
	20:1	25:1	32:1	40:1	60:1	80:1	100:1
BRH 0571	GBX 40	GBX 40	GBX 60	GBX 60	GBX 60	*(1)*	*(1)*
BRH 0572	GBX 40	GBX 60	GBX 60	*(1)*	*(1)*	*(1)*	*(1)*
BRH 0573	GBX 60	GBX 60	GBX 60	*(1)*	*(1)*	*(1)*	*(1)*
BRH 0574	GBX 60	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*
BRH 0851	GBX 60	GBX 80	GBX 80	GBX 80	GBX 120	GBX 120	GBX 120
BRH 0852	GBX 80	GBX 80	GBX 80	GBX 120	GBX 120	GBX 120	GBX 120
BRH 0853	GBX 80	GBX 80	GBX 120	GBX 120	GBX 120	–	–
BRH 0854	GBX 80	GBX 120	GBX 120	GBX 120	GBX 120	–	–
BRH 1101	GBX 80	GBX 120	GBX 120	GBX 160	GBX 120	–	–
BRH 1102	GBX 120	GBX 120	GBX 120	GBX 160	–	–	–
BRH 1103	GBX 120	GBX 160	GBX 120	GBX 160	–	–	–

(1) For this combination, please consult your Regional Sales Office.

GBX 60 *For these combinations, you must check that the application will not exceed the maximum output torque of the gearbox (see the values given on page 2/106).*

Lexium 05 motion control
BRH servo motors
Option: GBX planetary gearboxes

Characteristics of GBX gearboxes

Type of gearbox			GBX 40	GBX 60	GBX 80	GBX 120	GBX 160
Type of gearbox			Planetary gearbox with straight teeth				
Backlash	**3:1… 8:1**	**arc min**	< 24	< 16	< 9	< 8	< 6
	9:1… 40:1		< 28	< 20	< 14	< 12	< 10
	60:1… 100:1		< 30	< 22	< 16	< 14	–
Torsion rigidity	**3:1… 8:1**	**Nm/arc min**	1	2.3	6	12	38
	9:1… 40:1		1.1	2.5	6.5	13	41
	60:1… 100:1		1	2.5	6.3	12	–
Noise level *(1)*		**dB (A)**	55	58	60	65	70
Casing			Black anodized aluminium				
Shaft material			C 45				
Shaft output dust and damp protection			IP 54				
Lubrication			Lubricated for life				
Average service life *(2)*		**h**	30,000				
Mounting position			Any position				
Operating temperature		**°C**	-25…+90				
Efficiency	**3:1…8:1**		0.96				
	9:1…40:1		0.94				
	60:1…100:1		0.9				
Maximum permitted radial force *(2) (3)*	L_{10h} = 10,000 hours	**N**	200	500	950	2000	6000
	L_{10h} = 30,000 hours	**N**	160	340	650	1500	4200
Maximum permitted axial force *(2)*	L_{10h} = 10,000 hours	**N**	200	600	1200	2800	8000
	L_{10h} = 30,000 hours	**N**	160	450	900	2100	6000
Moment of inertia of gearbox	**3:1**	**kgcm²**	0.031	0.135	0.77	2.63	12.14
	4:1	**kgcm²**	0.022	0.093	0.52	1.79	7.78
	5:1	**kgcm²**	0.019	0.078	0.45	1.53	6.07
	8:1	**kgcm²**	0.017	0.065	0.39	1.32	4.63
	9:1	**kgcm²**	0.03	0.131	0.74	2.62	–
	12:1	**kgcm²**	0.029	0.127	0.72	2.56	12.37
	15:1	**kgcm²**	0.023	0.077	0.71	2.53	12.35
	16:1	**kgcm²**	0.022	0.088	0.5	1.75	7.47
	20:1	**kgcm²**	0.019	0.075	0.44	1.5	6.65
	25:1	**kgcm²**	0.019	0.075	0.44	1.49	5.81
	32:1	**kgcm²**	0.017	0.064	0.39	1.3	6.36
	40:1	**kgcm²**	0.016	0.064	0.39	1.3	5.28
	60:1	**kgcm²**	0.029	0.076	0.51	2.57	–
	80:1	**kgcm²**	0.019	0.075	0.5	1.5	–
	100:1	**kgcm²**	0.019	0.075	0.44	1.49	–

(1) Value measured at a distance of 1 m, at no-load for a servo motor speed of 3000 rpm and a reduction ratio of 5:1.
(2) Values given for an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines for an ambient temperature of 30°C.
(3) Force applied at mid-distance from the output shaft.

2

Characteristics of GBX gearboxes (continued)

Type of gearbox			GBX 40	GBX 60	GBX 80	GBX 120	GBX 160
Continuous output torque M_{2N} *(1)*	**3:1**	**Nm**	11	28	85	115	400
	4:1	**Nm**	15	38	115	155	450
	5:1	**Nm**	14	40	110	195	450
	8:1	**Nm**	6	18	50	120	450
	9:1	**Nm**	16.5	44	130	210	–
	12:1	**Nm**	20	44	120	260	800
	15:1	**Nm**	18	44	110	230	700
	16:1	**Nm**	20	44	120	260	800
	20:1	**Nm**	20	44	120	260	800
	25:1	**Nm**	18	40	110	230	700
	32:1	**Nm**	20	44	120	260	800
	40:1	**Nm**	18	40	110	230	700
	60:1	**Nm**	20	44	110	260	–
	80:1	**Nm**	20	44	120	260	–
	100:1	**Nm**	20	44	120	260	–
Maximum output torque *(1)*	**3:1**	**Nm**	17.6	45	136	184	640
	4:1	**Nm**	24	61	184	248	720
	5:1	**Nm**	22	64	176	312	720
	8:1	**Nm**	10	29	80	192	720
	9:1	**Nm**	26	70	208	336	–
	12:1	**Nm**	32	70	192	416	1280
	15:1	**Nm**	29	70	176	368	1120
	16:1	**Nm**	32	70	192	416	1280
	20:1	**Nm**	32	70	192	416	1280
	25:1	**Nm**	29	64	176	368	1120
	32:1	**Nm**	32	70	192	416	1280
	40:1	**Nm**	29	64	176	368	1120
	60:1	**Nm**	32	70	176	416	–
	80:1	**Nm**	32	70	192	416	–
	100:1	**Nm**	32	70	192	416	–

(1) Values given for an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines for an ambient temperature of 30°C.

Lexium 05 motion control
BRH servo motors
Option: GBX planetary gearboxes

References

GBX ●●●

Size	Reduction ratio	Reference	Weight kg
GBX 40	3:1, 4:1, 5:1 and 8:1	**GBX 040●●● ●●● ●G**	0.350
	9:1, 12:1, 15:1, 16:1, 20:1 and 25:1	**GBX 040●●● ●●● ●G**	0.450
GBX 60	3:1, 4:1, 5:1 and 8:1	**GBX 060●●● ●●● ●G**	0.900
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 060●●● ●●● ●G**	1.100
	60:1	**GBX 060●●● ●●● ●G**	1.300
GBX 80	3:1, 4:1, 5:1 and 8:1	**GBX 080●●● ●●● ●G**	2.100
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 080●●● ●●● ●G**	2.600
	60:1, 80:1 and 100:1	**GBX 080●●● ●●● ●G** *(1)*	3.100
GBX 120	8:1	**GBX 120●●● ●●● ●G**	6.000
	15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 120●●● ●●● ●G**	8.000
	60:1, 80:1 and 100:1	**GBX 120●●● ●●● ●G**	10.000
GBX 160	25:1 and 40:1	**GBX 160●●● ●●● ●G**	22.000

To order a GBX planetary gearbox, complete each reference above with:

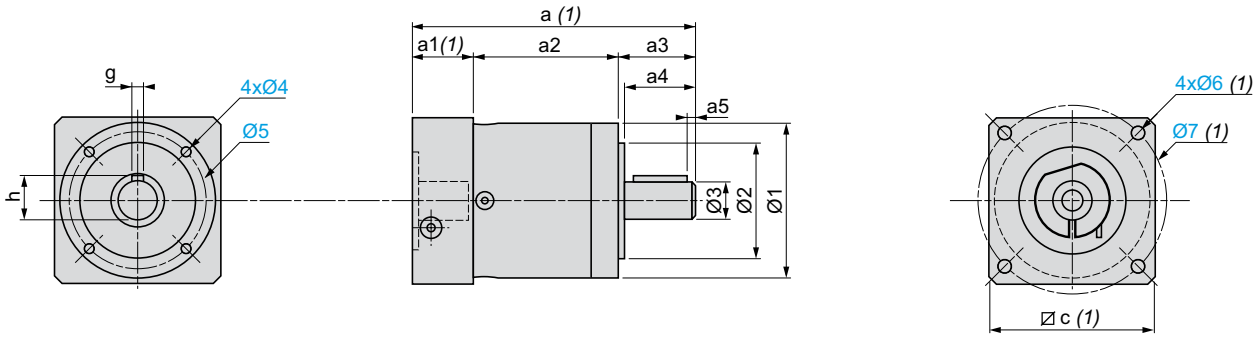
			GBX ●●●	●●●	●●●	●	G
Size	Diameter of the casing (see table of combinations with BRH servo motor on page 2/104)	40 mm	**040**				
		60 mm	**060**				
		80 mm	**080**				
		120 mm	**120**				
		160 mm	**160**				
Reduction ratio		3:1		**003**			
		4:1		**004**			
		5:1		**005**			
		8:1		**008**			
		9:1		**009**			
		12:1		**012**			
		15:1		**015**			
		16:1		**016**			
		20:1		**020**			
		25:1		**025**			
		32:1		**032**			
		40:1		**040**			
		60:1		**060**			
		80:1		**080**			
		100:1		**100**			
Associated BRH servo motor	Type	BRH 057			**057**		
		BRH 085			**085**		
		BRH 110			**110**		
	Model	BRH ●●●1				**1**	
		BRH ●●●2				**2**	
		BRH ●●●3				**3**	
		BRH ●●●4				**4**	
BRH servo motor adaptation							**G**

(1) For a GBX 080 gearbox/BRH 057● servo motor combination, please consult your Regional Sales Office.

Lexium 05 motion control
BRH servo motors
Option: GBX planetary gearboxes

Dimensions

Servo motor assembly



GBX	a2	a3	a4	a5	h	g	Ø1	Ø2	Ø3	Ø4	Ø5
040 003...008	39	26	23	2,5	11.2	3	40	26 h7	10 h7	M4 x 6	34
040 009...025	52	26	23	2.5	11.2	3	40	26 h7	10 h7		34
060 003...008	47	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
060 009...040	59.5	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
060 060	72	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
080 003...008	60.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
080 009...040	77.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
080 060...100	95	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
120 008	74	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
120 015...040	101	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
120 060...100	128	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
160 025, 040	153.5	87	80	8	43	12	160	130 h7	40 h7	M12 x 20	145

(1) Dimensions a, a1, ⍁c, Ø6 and Ø7 depend on the planetary gearbox/BRH servo motor combination:

Combinations		Reduction ratios						
Gearbox	**Servo motor**	**3:1 to 8:1**	**9:1 to 40:1**	**60:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**
		a	**a**	**a**	**a1**	**⍁ c**	**Ø6**	**Ø7**
GBX 040	**BRH 057●**	89.5	102.5	–	24.5	60	M5	66.7
GBX 060	**BRH 057●**	106	118.5	131.5	24.5	60	M5	66.7
GBX 060	**BRH 085●**	113	125.5	138.5	31.5	90	M6	100
GBX 080 *(2)*	**BRH 057●** *(2)*	–	151	168.5	33.5	80	M5	66.7
GBX 080	**BRH 085●**	133.5	151	168.5	33.5	90	M6	100
GBX 080	**BRH 110●**	143.5	161	178.5	43.5	115	M8	130
GBX 120	**BRH 085●**	–	203.5	231	47.5	115	M6	100
GBX 120	**BRH 110●**	176.5	203.5	231	47.5	115	M8	130
GBX 160	**BRH 110●**	–	305	–	64.5	140	M8	130

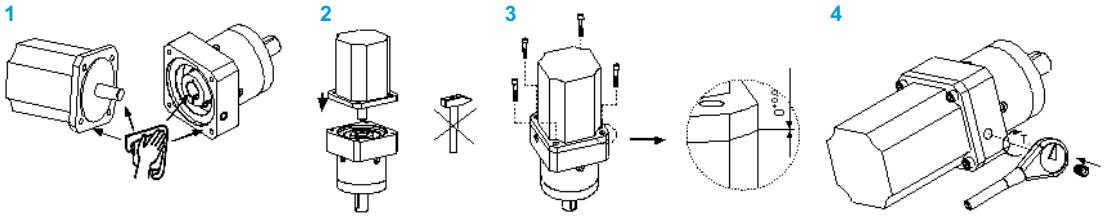
(2) For this combination, please consult your Regional Sales Office.

Lexium 05 motion control
BRH servo motors
Option: GBX planetary gearboxes

Mounting

No special tool is required for mounting the GBX planetary gearbox on the BRH servo motor. The usual rules for mechanical mounting must be followed:
1 Clean the bearing surfaces and seals.
2 Align the shafts that are to be coupled and assemble in vertical position.
3 Uniform adhesive force of the servo motor flange on the gearbox flange, with tightening of the Phillips screws.
4 Correct tightening torque of the TA ring using a torque wrench (2...40 Nm depending on the gearbox model).

For more information, refer to the instruction sheets supplied with the products.



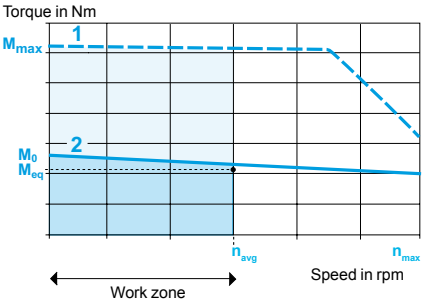
BSH servo motor with straight connectors

BSH servo motor with rotatable angled connectors

Presentation

BSH servo motors are the ideal choice to meet the requirements of dynamics and precision. With five flange sizes and a variety of lengths, there is a suitable solution for most applications, covering a continuous stall torque range from 0.5 to 34.4 Nm for a maximum speed of 8000 rpm.

Thanks to their new winding technology based on salient poles, BSH servo motors are far more compact and offer a higher power density than conventional servo motors.
BSH servo motors are available in five flange sizes: 55, 70, 100, 140 and 205 mm.
Thermal protection is provided by a temperature probe integrated into the servo motors. They are certified as "Recognized" by the Underwriters Laboratories and conform to UL 1004 standards as well as to European directives (CE marking).
BSH servo motors are available with the following variants:
- IP 50 or IP 65 degree of protection
- With or without holding brake
- Straight or angled connectors
- Single turn or multiturn SinCos encoder
- Untapped or keyed shaft end



Torque/speed characteristics

BSH servo motors provide torque/speed curve profiles similar to the example shown on the left with:
1 Peak torque, depending on the servo drive model
2 Continuous torque, depending on the servo drive model
where:
- n_{max} (in rpm) corresponds to the maximum speed of the servo motor
- M_{max} (in Nm) represents the peak stall torque value
- M_0 (in Nm) represents the continuous stall torque value

Principle for determining servo motor size according to the application

The torque/speed curves can be used to determine the correct servo motor size.
1 Locate the work zone of the application in terms of speed.
2 Verify, using the servo motor cycle timing diagram, that the torques required by the application during the various phases of the cycle are located within the area bounded by curve 1 in the work zone.
3 Calculate the average speed n_{avg} and the equivalent thermal torque M_{eq} (see page 6/2).
4 The point defined by n_{avg} and M_{eq} must be located below curve 2 in the work zone.
***Note**: For sizing of servo motors, see page 6/2.*

Functions

General functions

BSH servo motors have been developed to meet the following requirements:
- Functional characteristics, ruggedness, safety, etc. in accordance with IEC/EN 60034-1
- Ambient operating temperature:
  - - 20...40°C according to DIN 50019R14.
  - Maximum 55°C with derating from 40°C by 1% of the nominal output power per additional °C
- Relative humidity: IEC 60721-3-3 category 3K4
- Maximum operating altitude: 1000 m without derating, 2000 m with k = 0.86, 3000 m with k = 0.8 *(1)*
- Storage and transport temperature: - 25...70°C
- Winding insulation class: F (threshold temperature for windings 155°C) in accordance with DIN VDE 0530
- Power and encoder connection via straight or angled connectors
- Thermal protection by built-in PTC thermistor probe, controlled by the Lexium 05 servo drive
- Out-of-round, concentricity and perpendicularity between flange and shaft in accordance with DIN 42955, class N
- Permitted mounting positions: no mounting restrictions for IMB5 - IMV1 and IMV3 in accordance with DIN 42950
- Polyester resin-based paint: opaque black RAL 9005

(1) k: derating factor

Characteristics: page 2/112
References: page 2/138
Dimensions: page 2/142

Functions (continued)

General functions (continued)

- Degree of protection:
  - Casing: IP 65 in accordance with IEC/EN 60529
  - Shaft end: IP 50 *(1)* or IP 65 in accordance with IEC/EN 60529
- Integrated sensor: SinCos Hiperface® single turn or multiturn high-resolution encoder
- Untapped or keyed shaft end

Holding brake

BSH servo motors can be fitted with a failsafe electro-magnetic holding brake.

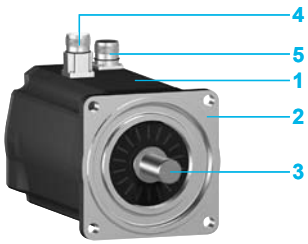
⚠ **Do not use the holding brake as a dynamic brake for deceleration, as this will quickly damage the brake.**

Integrated encoder

BSH servo motors are fitted with a SinCos Hiperface® high-resolution single turn (131,072 points/turn) *(2)* or multiturn (131,072 points/turn x 4096 turns) *(2)* encoder providing angular precision of the shaft position, accurate to less than ± 1.3 arc minutes.

This performs the following functions:
- Gives the angular position of the rotor so that flows can be synchronized
- Measures the servo motor speed via the associated Lexium 05 servo drive.

This information is used by the speed controller of the servo drive.
- Measures the position information for the servo drive position controller
- Measures and transmits position information in incremental format for the position return of a motion control module (ESIM (Encoder Simulation) output of the RS 422 interface)



Description

BSH servo motors with a three-phase stator and a 6- to 10-pole rotor (depending on model) with Neodymium Iron Boron (NdFeB) magnets consist of:
1 A casing protected by RAL 9005 opaque black paint
2 A 4-point axial fixing flange
3 A keyed or untapped shaft end (depending on the model)
4 A threaded dust and damp proof male straight connector for connecting the power cable *(3)*
5 A threaded dust and damp proof male straight connector for connecting the control cable (encoder) *(3)*

Connectors to be ordered separately, for connection to Lexium 05 servo drives (see page 2/140).
Schneider Electric has taken particular care to ensure compatibility between BSH servo motors and Lexium 05 servo drives. This compatibility can only be assured by using cables and connectors sold by Schneider Electric (see page 2/140).

(1) IP 50 mounted in position IMV3 (vertical mounting with shaft end at the top), IP 54 mounted in position IMV1 (vertical mounting with shaft end at the bottom) or position IMB5 (horizontal mounting).
(2) Encoder resolution given for use with a Lexium 05 servo drive.
(3) Other model with rotatable angled connector

Lexium 05 motion control
BSH servo motors

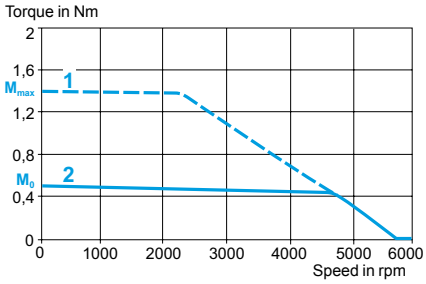
Characteristics of BSH 0551T servo motors

Type of servo motor				BSH 0551T			
Associated with Lexium 05 servo drive				LXM 05 ●D10F1	LXM 05 CU70M2	LXM 05 ●D10M2	LXM 05 ●D10M3X
Line supply voltage			V	115 single phase	230 single phase		230 3-phase
Switching frequency			kHz	8			
Torque	Continuous stall	M_0	Nm	0.5			
	Peak stall	M_{max}	Nm	1.4	1.08	1.4	
Nominal operating point	Nominal torque		Nm	0.46		0.43	
	Nominal speed		rpm	3000		6000	
	Nominal servo motor output power		W	150		270	
Maximum current			A rms	5.4			
Servo motor characteristics							
Maximum mechanical speed			rpm	9000			
Constants (at 120°C)	Torque		Nm/A rms	0.36			
	Back emf		V rms/ krpm	22			
Rotor	Number of poles			6			
	Inertia	Without brake J_m	kgcm²	0.059			
		With brake J_m	kgcm²	0.0803			
Stator (at 20°C)	Resistance (phase/phase)		Ω	12.2			
	Inductance (phase/phase)		mH	20.8			
	Electrical time constant		ms	1.7			
Holding brake (depending on model)				See page 2/144			

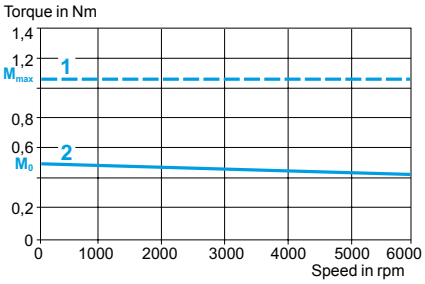
Torque/speed curves

BSH 0551T servo motor

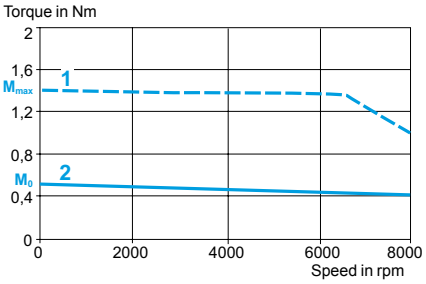
With LXM 05●D10F1 servo drive
115 V single-phase



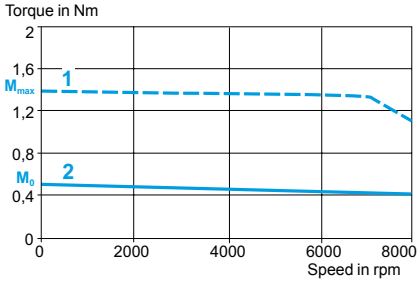
With LXM 05CU70M2 servo drive
230 V single-phase



With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

Presentation: page 2/110
References: page 2/138
Dimensions: page 2/142

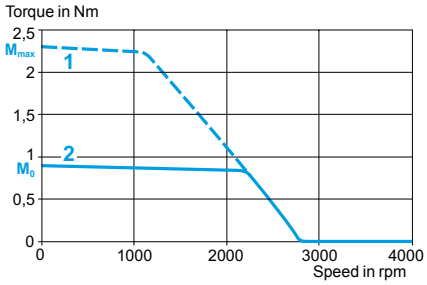
Characteristics of BSH 0552M servo motors

Type of servo motor				BSH 0552M		
Associated with Lexium 05 servo drive				**LXM 05 CU70M2**	**LXM 05 ●D10M2**	**LXM 05 ●D10M3X**
Line supply voltage			**V**	230 single phase		230 3-phase
Switching frequency			**kHz**	4		
Torque	Continuous stall	M_0	**Nm**	0.9		
	Peak stall	M_{max}	**Nm**	2.3		
Nominal operating point	Nominal torque		**Nm**	0.85		
	Nominal speed		**rpm**	1500		
	Nominal servo motor output power		**W**	130		
Maximum current			**A rms**	2.6		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	9000		
Constants (at 120°C)	Torque		**Nm/A rms**	1.33		
	Back emf		**V rms/ krpm**	74		
Rotor	Number of poles			6		
	Inertia	Without brake J_m	**kgcm²**	0.096		
		With brake J_m	**kgcm²**	0.1173		
Stator (at 20°C)	Resistance (phase/phase)		Ω	60.2		
	Inductance (phase/phase)		**mH**	122		
	Electrical time constant		**ms**	2.03		
Holding brake (depending on model)				See page 2/144		

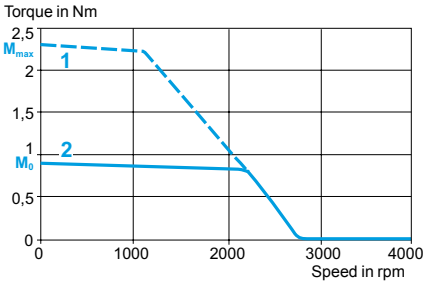
Torque/speed curves

BSH 0552M servo motor

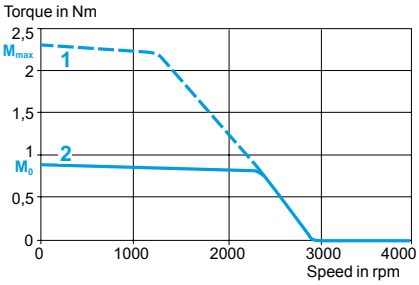
With LXM 05CU70M2 servo drive
230 V single-phase



With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

2

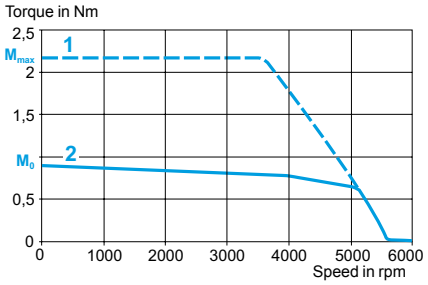
Characteristics of BSH 0552P servo motors

Type of servo motor				BSH 0552P			
Associated with Lexium 05 servo drive				**LXM 05 CU70M2**	**LXM 05 ●D10M2**	**LXM 05 ●D10M3X**	**LXM 05 ●D14N4**
Line supply voltage			**V**	230 single phase		230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	0.9			
	Peak stall	M_{max}	**Nm**	2.17	2.7		
Nominal operating point	Nominal torque		**Nm**	0.81			
	Nominal speed		**rpm**	3000			
	Nominal servo motor output power		**W**	250			
Maximum current			**A rms**	4.8			
Servo motor characteristics							
Maximum mechanical speed			**rpm**	9000			
Constants (at 120°C)	Torque		**Nm/A rms**	0.7			
	Back emf		**V rms/ krpm**	40			
Rotor	Number of poles			6			
	Inertia	Without brake J_m	**kgcm²**	0.096			
		With brake J_m	**kgcm²**	0.1173			
Stator (at 20°C)	Resistance (phase/phase)		Ω	17.4			
	Inductance (phase/phase)		**mH**	35.3			
	Electrical time constant		**ms**	2.03			
Holding brake (depending on model)				See page 2/144			

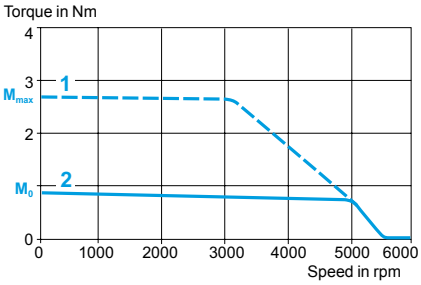
Torque/speed curves

BSH 0552P servo motor

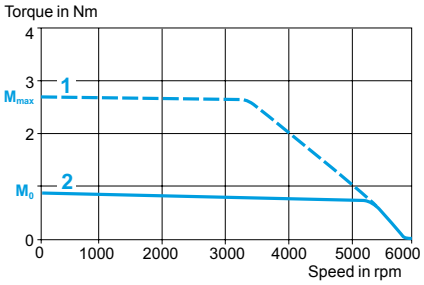
With LXM 05CU70M2 servo drive
230 V single-phase



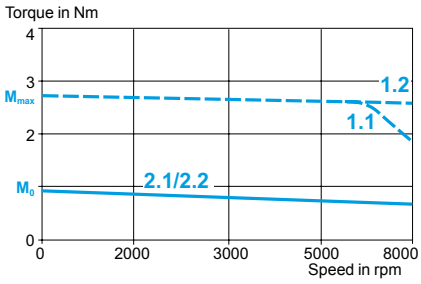
With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



With LXM 05●D14N4 servo drive
400/480 V three-phase



1 Peak torque
2 Continuous torque
1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/110
References: page 2/138
Dimensions: page 2/142

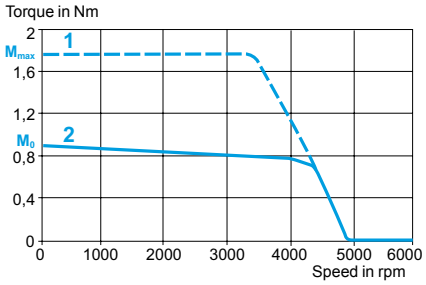
Characteristics of BSH 0552T servo motors

Type of servo motor				BSH 0552T				
Associated with Lexium 05 servo drive				**LXM 05 ●D10F1**	**LXM 05 ●D17F1**	**LXM 05 CU70M2**	**LXM 05 ●D10M2**	**LXM 05 ●D10M3X**
Line supply voltage			**V**	115 single phase		230 single phase		230 3-phase
Switching frequency			**kHz**	8				
Torque	Continuous stall	M_0	**Nm**	0.9		0.77	0.9	
	Peak stall	M_{max}	**Nm**	1.77	2.7	1.31	1.77	
Nominal operating point	Nominal torque		**Nm**	0.8		0.77	0.71	
	Nominal speed		**rpm**	3000			6000	
	Nominal servo motor output power		**W**	250		240	450	
Maximum current			**A rms**	8.8				
Servo motor characteristics								
Maximum mechanical speed			**rpm**	9000				
Constants (at 120°C)	Torque		**Nm/A rms**	0.36				
	Back emf		**V rms/ krpm**	22				
Rotor	Number of poles			6				
	Inertia	Without brake J_m	**kgcm²**	0.096				
		With brake J_m	**kgcm²**	0.1173				
Stator (at 20°C)	Resistance (phase/phase)		Ω	5.2				
	Inductance (phase/phase)		**mH**	10.6				
	Electrical time constant		**ms**	2.04				
Holding brake (depending on model)				See page 2/144				

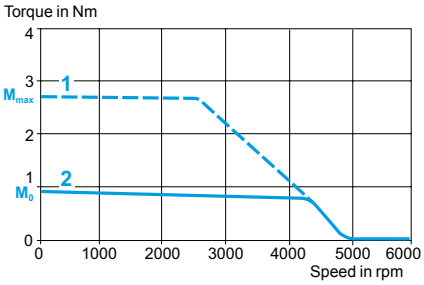
Torque/speed curves

BSH 0552T servo motor

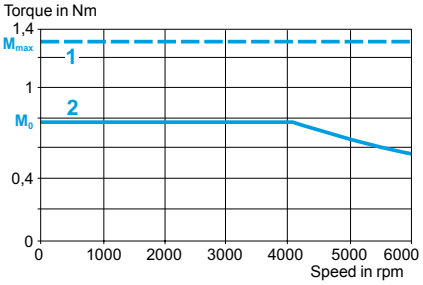
With LXM 05●D10F1 servo drive
115 V single-phase



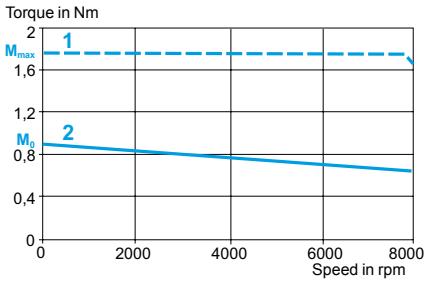
With LXM 05●D17F1 servo drive
115 V single-phase



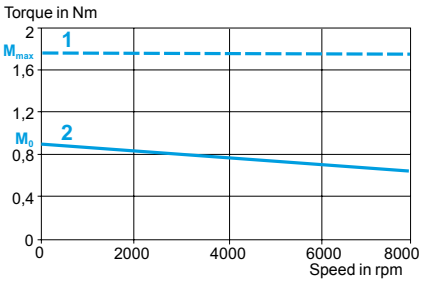
With LXM 05CU70M2 servo drive
230 V single-phase



With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

Presentation: page 2/110
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Dimensions: page 2/142

2

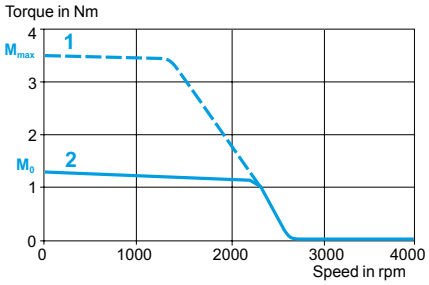
Characteristics of BSH 0553M servo motors

Type of servo motor				BSH 0553M	
Associated with Lexium 05 servo drive				**LXM 05 ●D10M2**	**LXM 05 ●D10M3X**
Line supply voltage			**V**	230 single phase	230 3-phase
Switching frequency			**kHz**	4	
Torque	Continuous stall	M_0	**Nm**	1.3	
	Peak stall	M_{max}	**Nm**	3.5	
Nominal operating point	Nominal torque		**Nm**	1.2	
	Nominal speed		**rpm**	1500	
	Nominal servo motor output power		**W**	190	
Maximum current			**A rms**	3.4	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	9000	
Constants (at 120°C)	Torque		**Nm/A rms**	1.33	
	Back emf		**V rms/ krpm**	79	
Rotor	Number of poles			6	
	Inertia	Without brake J_m	**kgcm²**	0.134	
		With brake J_m	**kgcm²**	0.1553	
Stator (at 20°C)	Resistance (phase/phase)		Ω	38.4	
	Inductance (phase/phase)		**mH**	92.2	
	Electrical time constant		**ms**	2.4	
Holding brake (depending on model)				See page 2/144	

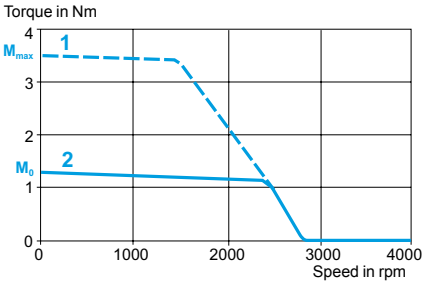
Torque/speed curves

BSH 0553M servo motor

With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

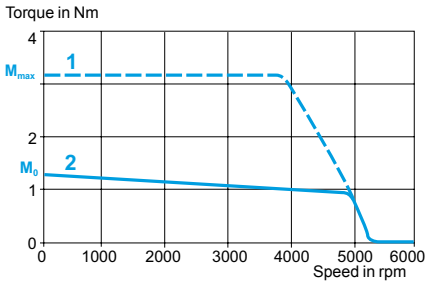
Characteristics of BSH 0553P/0553T servo motors

Type of servo motor				BSH 0553P			BSH 0553T		
Associated with Lexium 05 servo drive				**LXM 05 ●D10M2**	**LXM 05 ●D10M3X**	**LXM 05 ●D14N4**	**LXM 05 ●D17F1**	**LXM 05 ●D17M2**	**LXM 05 ●D17M3X**
Line supply voltage			**V**	230 single phase	230 3-phase	400/480 3-phase	115 single phase	230 single phase	230 3-phase
Switching frequency			**kHz**	8					
Torque	Continuous stall	M_0	**Nm**	1.3					
	Peak stall	M_{max}	**Nm**	3.18		3.87	3.31		
Nominal operating point	Nominal torque		**Nm**	1.1					
	Nominal speed		**rpm**	3000					
	Nominal servo motor output power		**W**	350					
Maximum current			**A rms**	6.5			11.9		
Servo motor characteristics									
Maximum mechanical speed			**rpm**	9000					
Constants (at 120°C)	Torque		**Nm/A rms**	0.7			0.39		
	Back emf		**V rms/ krpm**	41			22		
Rotor	Number of poles			6					
	Inertia	Without brake J_m	**kgcm²**	0.134					
		With brake J_m	**kgcm²**	0.1553					
Stator (at 20°C)	Resistance (phase/phase)		Ω	10.4			3.1		
	Inductance (phase/phase)		**mH**	25			7.4		
	Electrical time constant		**ms**	2.4			2.39		
Holding brake (depending on model)				See page 2/144					

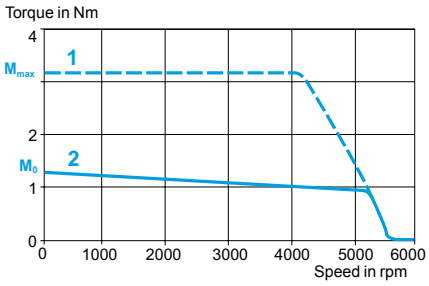
Torque/speed curves

BSH 0553P servo motor

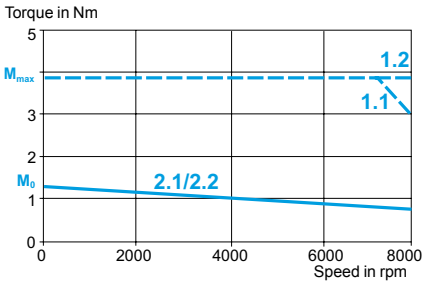
With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase

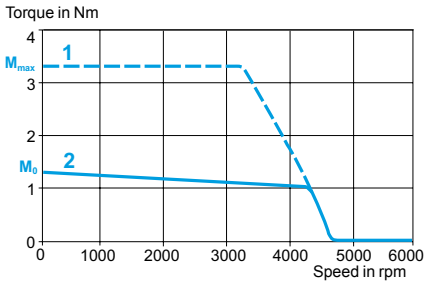


With LXM 05●D14N4 servo drive
400/480 V three-phase

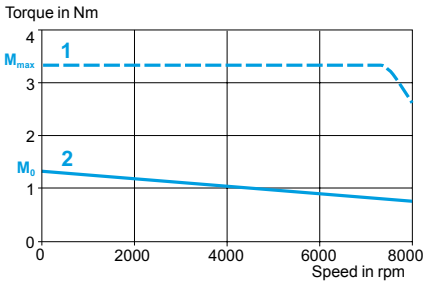


BSH 0553T servo motor

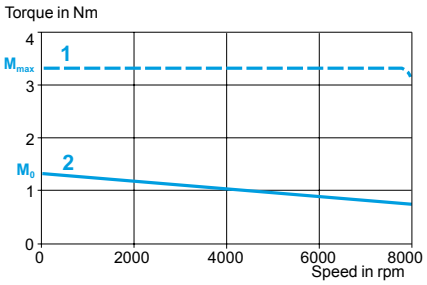
With LXM 05●D17F1 servo drive
115 V single-phase



With LXM 05●D17M2 servo drive
230 V single-phase



With LXM 05●D17M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/110
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Dimensions: page 2/142

2

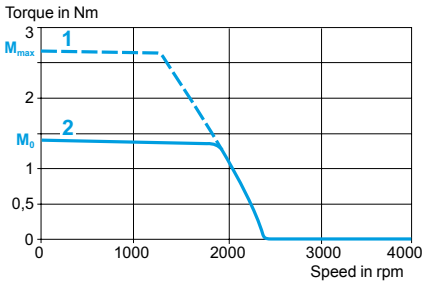
Characteristics of BSH 0701M/0701P servo motors

Type of servo motor				BSH 0701M	BSH 0701P	
Associated with Lexium 05 servo drive				LXM 05 ●D10M3X	LXM 05 ●D10M2	LXM 05 ●D10M3X
Line supply voltage			**V**	230 3-phase	230 single phase	230 3-phase
Switching frequency			**kHz**	4		
Torque	Continuous stall	M_0	**Nm**	1.4		
	Peak stall	M_{max}	**Nm**	2.66		
Nominal operating point	Nominal torque		**Nm**	1.36	1.3	
	Nominal speed		**rpm**	1500	3000	
	Nominal servo motor output power		**W**	210	400	
Maximum current			**A rms**	3.1	5.7	
Servo motor characteristics						
Maximum mechanical speed			**rpm**	8000		
Constants (at 120°C)	Torque		**Nm/A rms**	1.4	0.8	
	Back emf		**V rms/ krpm**	85	46	
Rotor	Number of poles			6		
	Inertia	Without brake J_m	**kgcm²**	0.25		
		With brake J_m	**kgcm²**	0.322		
Stator (at 20°C)	Resistance (phase/phase)		Ω	35.4	10.4	
	Inductance (phase/phase)		**mH**	131.9	38.8	
	Electrical time constant		**ms**	3.73	3.73	
Holding brake (depending on model)				See page 2/144		

Torque/speed curves

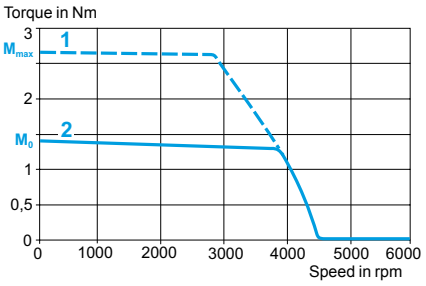
BSH 0701M servo motor

With LXM 05●D10M3X servo drive
230 V 3-phase

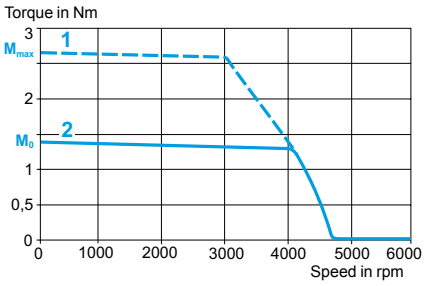


BSH 0701P servo motor

With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

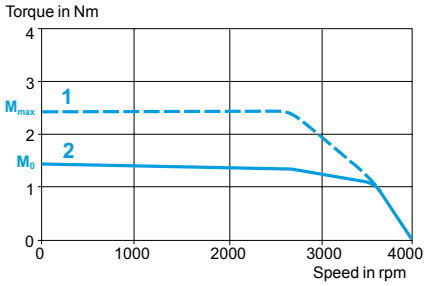
Characteristics of BSH 0701T servo motors

Type of servo motor				BSH 0701T			
Associated with Lexium 05 servo drive				**LXM 05 ●D10F1**	**LXM 05 ●D17M2**	**LXM 05 ●D10M3X**	**LXM 05 ●D17M3X**
Line supply voltage			**V**	115 single phase	230 single phase	230 3-phase	
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	1.4			
	Peak stall	M_{max}	**Nm**	2.42	3.19	2.42	3.19
Nominal operating point	Nominal torque		**Nm**	1.2	1.3		
	Nominal speed		**rpm**	3000			
	Nominal servo motor output power		**W**	380	400		
Maximum current			**A rms**	10.1			
Servo motor characteristics							
Maximum mechanical speed			**rpm**	8000			
Constants (at 120°C)	Torque		**Nm/A rms**	0.44			
	Back emf		**V rms/ krpm**	26			
Rotor	Number of poles			6			
	Inertia	Without brake J_m	**kgcm²**	0.25			
		With brake J_m	**kgcm²**	0.322			
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.3			
	Inductance (phase/phase)		**mH**	12.3			
	Electrical time constant		**ms**	3.73			
Holding brake (depending on model)				See page 2/144			

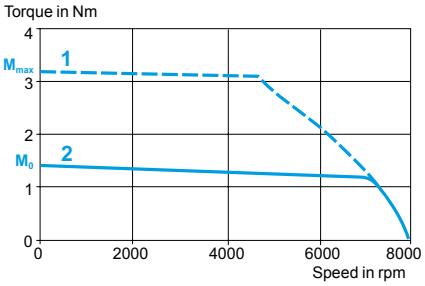
Torque/speed curves

BSH 0701T servo motor

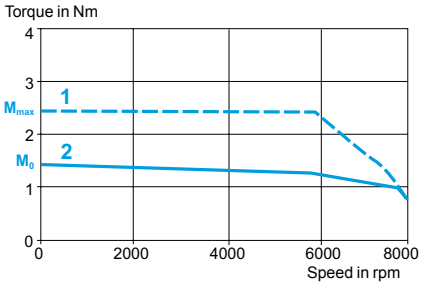
With LXM 05●D10F1 servo drive
115 V single-phase



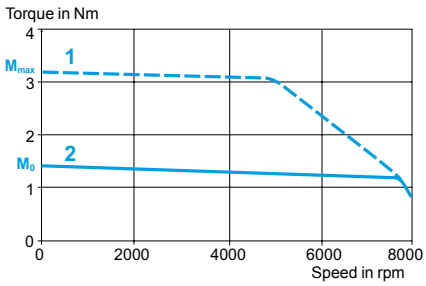
With LXM 05●D17M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



With LXM 05●D17M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

2

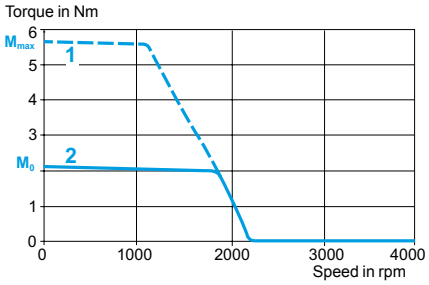
Characteristics of BSH 0702M servo motors

Type of servo motor				**BSH 0702M**	
Associated with Lexium 05 servo drive				**LXM 05 ●D10M2**	**LXM 05 ●D10M3X**
Line supply voltage			**V**	230 single phase	230 3-phase
Switching frequency			**kHz**	4	
Torque	Continuous stall	M_0	**Nm**	2.12	
	Peak stall	M_{max}	**Nm**	5.63	
Nominal operating point	Nominal torque		**Nm**	2	
	Nominal speed		**rpm**	1500	
	Nominal servo motor output power		**W**	300	
Maximum current			**A rms**	6	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	8000	
Constants (at 120°C)	Torque		**Nm/A rms**	1.47	
	Back emf		**V rms/ krpm**	95	
Rotor	Number of poles			6	
	Inertia	Without brake J_m	**kgcm²**	0.41	
		With brake J_m	**kgcm²**	0.482	
Stator (at 20°C)	Resistance (phase/phase)		Ω	16.4	
	Inductance (phase/phase)		**mH**	74.1	
	Electrical time constant		**ms**	4.52	
Holding brake (depending on model)				See page 2/144	

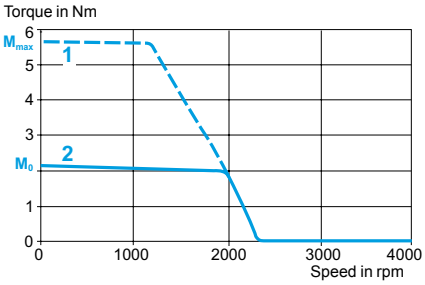
Torque/speed curves

BSH 0702M servo motor

With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

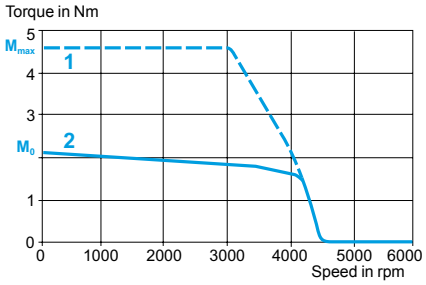
Characteristics of BSH 0702P servo motors

Type of servo motor				BSH 0702P				
Associated with Lexium 05 servo drive				LXM 05 •D10M2	LXM 05 •D17M2	LXM 05 •D10M3X	LXM 05 •D17M3X	LXM 05 •D14N4
Line supply voltage			V	230 single phase		230 3-phase		400/480 3-phase
Switching frequency			kHz	4				
Torque	Continuous stall	M_0	Nm	2.12				
	Peak stall	M_{max}	Nm	4.57	5.63	4.57	5.63	
Nominal operating point	Nominal torque		Nm	1.9				
	Nominal speed		rpm	3000				
	Nominal servo motor output power		W	600				
Maximum current			A rms	11.8				
Servo motor characteristics								
Maximum mechanical speed			rpm	8000				
Constants (at 120°C)	Torque		Nm/A rms	0.77				
	Back emf		V rms/ krpm	48				
Rotor	Number of poles			6				
	Inertia	Without brake J_m	kgcm²	0.41				
		With brake J_m	kgcm²	0.482				
Stator (at 20°C)	Resistance (phase/phase)		Ω	4.2				
	Inductance (phase/phase)		mH	19				
	Electrical time constant		ms	4.52				
Holding brake (depending on model)				See page 2/144				

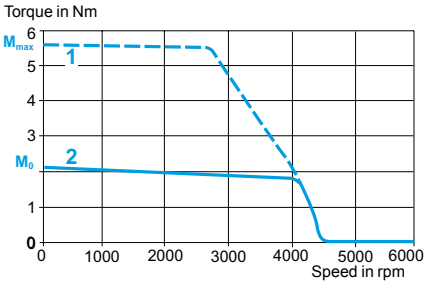
Torque/speed curves

BSH 0702P servo motor

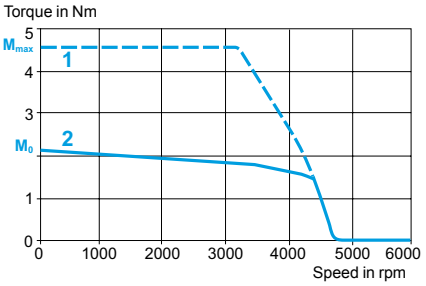
With LXM 05•D10M2 servo drive
230 V single-phase



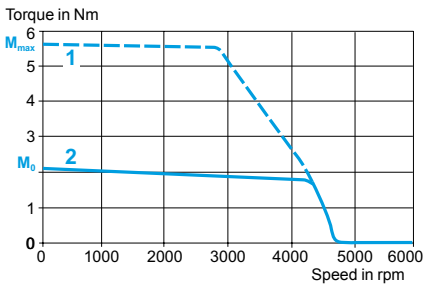
With LXM 05•D17M2 servo drive
230 V single-phase



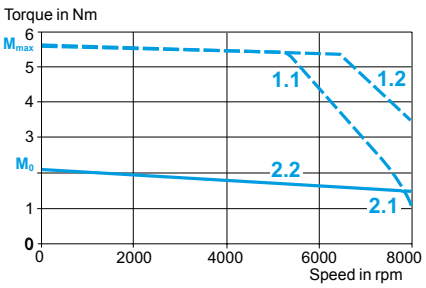
With LXM 05•D10M3X servo drive
230 V 3-phase



With LXM 05•D17M3X servo drive
230 V 3-phase



With LXM 05•D14N4 servo drive
400/480 V three-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/110
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Dimensions: page 2/142

2

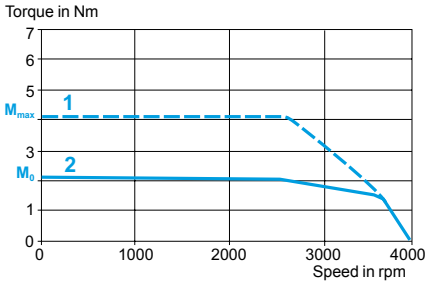
Characteristics of BSH 0702T servo motors

Type of servo motor				**BSH 0702T**		
Associated with Lexium 05 servo drive				**LXM 05 ●D17F1**	**LXM 05 ●D17M2**	**LXM 05 ●D28M2** / **LXM 05 ●D42M3X**
Line supply voltage			**V**	115 single phase	230 single phase	230 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	2.12		
	Peak stall	M_{max}	**Nm**	4.14		6.8
Nominal operating point	Nominal torque		**Nm**	1.83	1.9	
	Nominal speed		**rpm**	3000		
	Nominal servo motor output power		**W**	570	600	
Maximum current			**A rms**	19.9		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	8000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.45		
	Back emf		**V rms/ krpm**	28		
Rotor	Number of poles			6		
	Inertia	Without brake J_m	**kgcm²**	0.41		
		With brake J_m	**kgcm²**	0.482		
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.5		
	Inductance (phase/phase)		**mH**	6.7		
	Electrical time constant		**ms**	4.47		
Holding brake (depending on model)				See page 2/144		

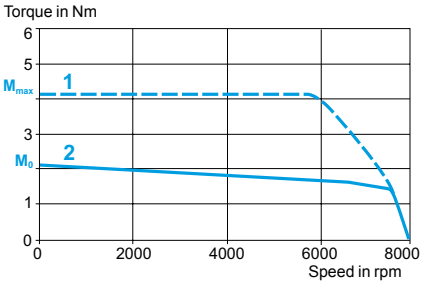
Torque/speed curves

BSH 0702T servo motor

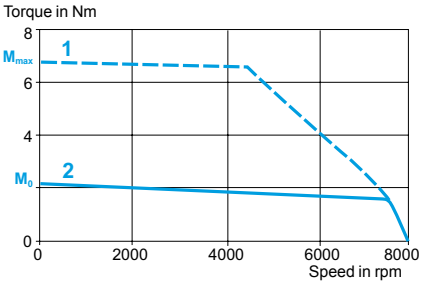
With LXM 05●D17F1 servo drive
115 V single-phase



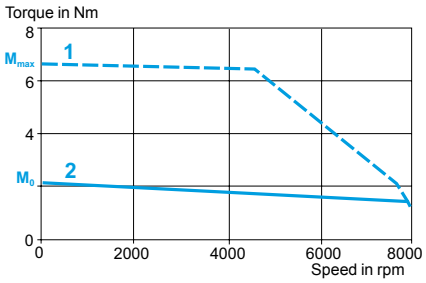
With LXM 05●D17M2 servo drive
230 V single-phase



With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D42M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

Presentation: page 2/110
References: page 2/138
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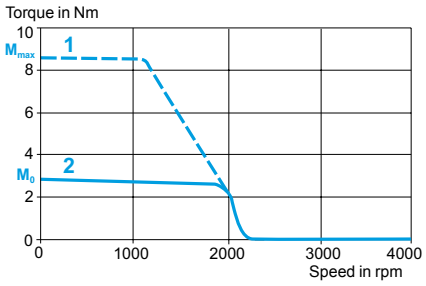
Characteristics of BSH 0703M servo motors

Type of servo motor				BSH 0703M		
Associated with Lexium 05 servo drive				**LXM 05 ●D10M2**	**LXM 05 ●D10M3X**	**LXM 05 ●D14N4**
Line supply voltage			**V**	230 3-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	4		
Torque	Continuous stall	M_0	**Nm**	2.8		
	Peak stall	M_{max}	**Nm**	8.6		
Nominal operating point	Nominal torque		**Nm**	2.63		2.4
	Nominal speed		**rpm**	1500		3000
	Nominal servo motor output power		**W**	400		750
Maximum current			**A rms**	8.7		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	8000		
Constants (at 120°C)	Torque		**Nm/A rms**	1.48		
	Back emf		**V rms/ krpm**	95		
Rotor	Number of poles			6		
	Inertia	Without brake J_m	**kgcm²**	0.58		
		With brake J_m	**kgcm²**	0.81		
Stator (at 20°C)	Resistance (phase/phase)		Ω	10.2		
	Inductance (phase/phase)		**mH**	49.2		
	Electrical time constant		**ms**	4.82		
Holding brake (depending on model)				See page 2/144		

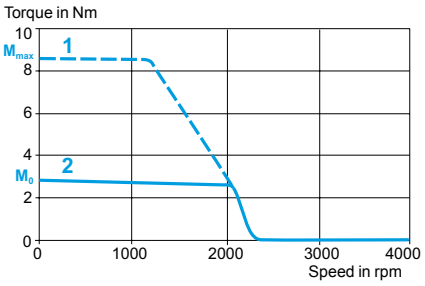
Torque/speed curves

BSH 0703M servo motor

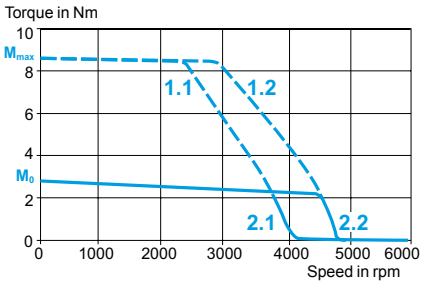
With LXM 05●D10M2 servo drive
230 V single-phase



With LXM 05●D10M3X servo drive
230 V 3-phase



With LXM 05●D14N4 servo drive
400/480 V three-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

2

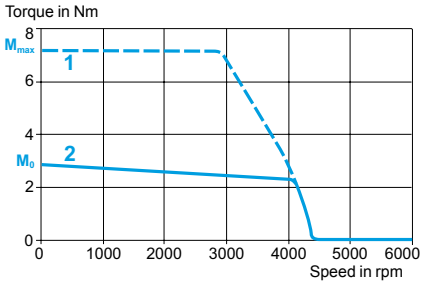
Characteristics of BSH 0703P servo motors

Type of servo motor				**BSH 0703P**			
Associated with Lexium 05 servo drive				**LXM 05 ●D17M2**	**LXM 05 ●D28M2**	**LXM 05 ●D17M3X**	**LXM 05 ●D22N4**
Line supply voltage			**V**	230 single phase		230 3-phase	400/480 3-phase
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	2.8			
	Peak stall	M_{max}	**Nm**	7.16	10.3	7.16	8.75
Nominal operating point	Nominal torque		**Nm**	2.4			
	Nominal speed		**rpm**	3000			
	Nominal servo motor output power		**W**	750			
Maximum current			**A rms**	17			
Servo motor characteristics							
Maximum mechanical speed			**rpm**	8000			
Constants (at 120°C)	Torque		**Nm/A rms**	0.78			
	Back emf		**V rms/ krpm**	49			
Rotor	Number of poles			6			
	Inertia	Without brake J_m	**kgcm²**	0.58			
		With brake J_m	**kgcm²**	0.81			
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.7			
	Inductance (phase/phase)		**mH**	13			
	Electrical time constant		**ms**	4.81			
Holding brake (depending on model)				See page 2/144			

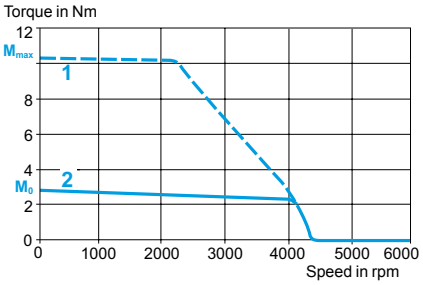
Torque/speed curves

BSH 0703P servo motor

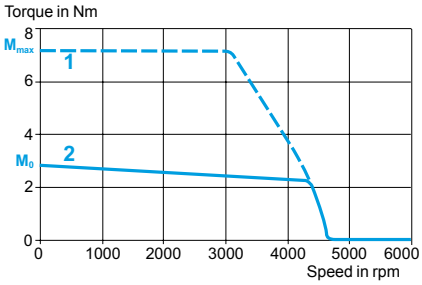
With LXM 05●D17M2 servo drive
230 V single-phase



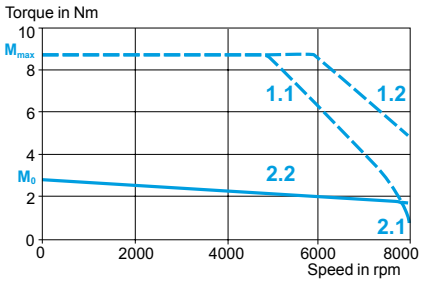
With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D17M3X servo drive
230 V 3-phase



With LXM 05●D22N4 servo drive
400/480 V three-phase



1 Peak torque
2 Continuous torque
1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 2/142

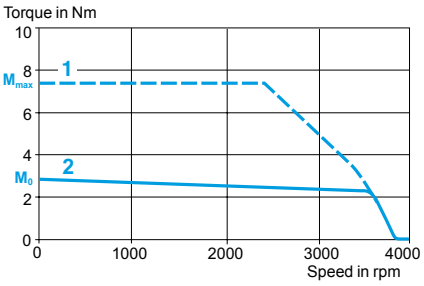
Characteristics of BSH 0703T servo motors

Type of servo motor				BSH 0703T		
Associated with Lexium 05 servo drive				**LXM 05 ●D28F1**	**LXM 05 ●D28M2**	**LXM 05 ●D42M3X**
Line supply voltage			**V**	115 single phase	230 single phase	230 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	2.8		
	Peak stall	M_{max}	**Nm**	7.38		10.25
Nominal operating point	Nominal torque		**Nm**	2.4		
	Nominal speed		**rpm**	3000		
	Nominal servo motor output power		**W**	750		
Maximum current			**A rms**	29.2		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	8000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.44		
	Back emf		**V rms/ krpm**	29		
Rotor	Number of poles			6		
	Inertia	Without brake J_m	**kgcm²**	0.58		
		With brake J_m	**kgcm²**	0.81		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.91		
	Inductance (phase/phase)		**mH**	4.4		
	Electrical time constant		**ms**	4.84		
Holding brake (depending on model)				See page 2/144		

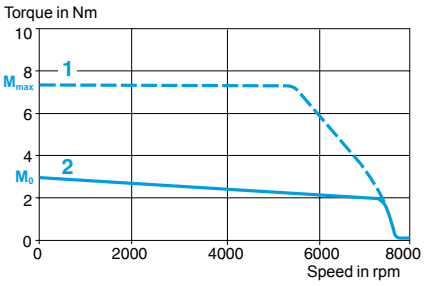
Torque/speed curves

BSH 0703T servo motor

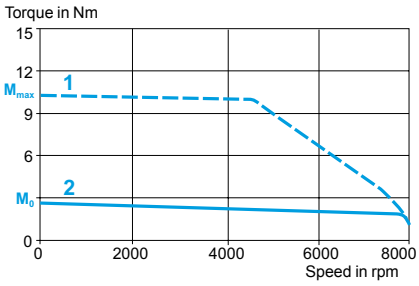
With LXM 05●D28F1 servo drive
115 V single-phase



With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D42M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

Presentation: page 2/110
References: page 2/138
Dimensions: page 2/142

2

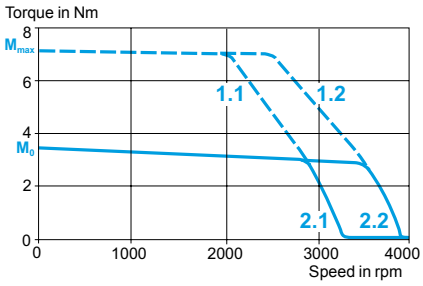
Characteristics of BSH 1001M/1001P servo motors

Type of servo motor				BSH 1001M	BSH 1001P	
Associated with Lexium 05 servo drive				LXM 05 ●D14N4	LXM 05 ●D17M3X	LXM 05 ●D22N4
Line supply voltage			**V**	400/480 3-phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	4		
Torque	Continuous stall	M_0	**Nm**	3.4		
	Peak stall	M_{max}	**Nm**	7.1		
Nominal operating point	Nominal torque		**Nm**	3.16		2.92
	Nominal speed		**rpm**	1500		3000
	Nominal servo motor output power		**W**	500		900
Maximum current			**A rms**	6.3	12	
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	1.83	0.89	
	Back emf		**V rms/ krpm**	115	60	
Rotor	Number of poles			8		
	Inertia	Without brake J_m	**kgcm²**	1.4		
		With brake J_m	**kgcm²**	2.018		
Stator (at 20°C)	Resistance (phase/phase)		Ω	13.9	3.8	
	Inductance (phase/phase)		**mH**	64.3	17.6	
	Electrical time constant		**ms**	4.63	4.63	
Holding brake (depending on model)				See page 2/144		

Torque/speed curves

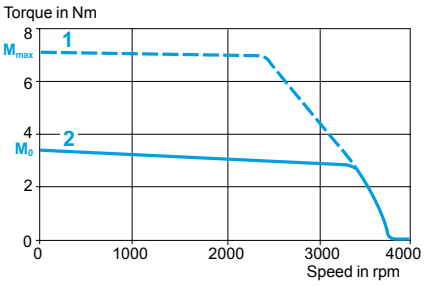
BSH 1001M servo motor

With LXM 05●D14N4 servo drive
400/480 V three-phase

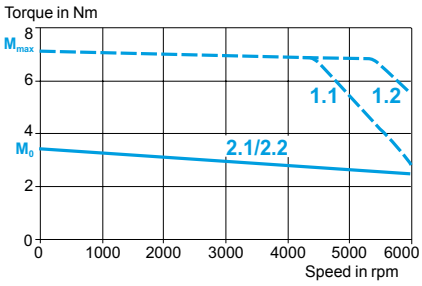


BSH 1001P servo motor

With LXM 05●D17M3X servo drive
230 V 3-phase



With LXM 05●D22N4 servo drive
400/480 V three-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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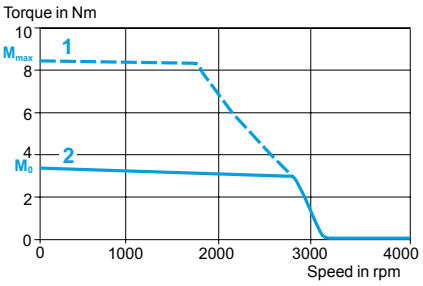
Characteristics of BSH 1001T servo motors

Type of servo motor				BSH 1001T		
Associated with Lexium 05 servo drive				**LXM 05 ●D28F1**	**LXM 05 ●D28M2**	**LXM 05 ●D42M3X**
Line supply voltage			**V**	115 single phase	230 single phase	230 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	3.4		
	Peak stall	M_{max}	**Nm**	8.5		
Nominal operating point	Nominal torque		**Nm**	3.16	2.9	
	Nominal speed		**rpm**	1500	3000	
	Nominal servo motor output power		**W**	500	900	
Maximum current			**A rms**	25.1		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.45		
	Back emf		**V rms/ krpm**	29		
Rotor	Number of poles			8		
	Inertia	Without brake J_m	**kgcm²**	1.4		
		With brake J_m	**kgcm²**	2.018		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.87		
	Inductance (phase/phase)		**mH**	4		
	Electrical time constant		**ms**	4.6		
Holding brake (depending on model)				See page 2/144		

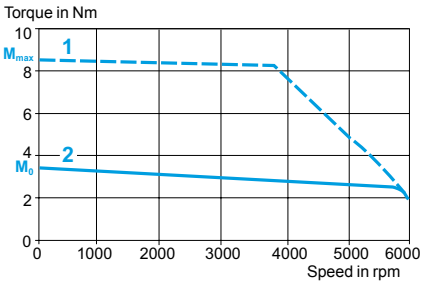
Torque/speed curves

BSH 1001T servo motor

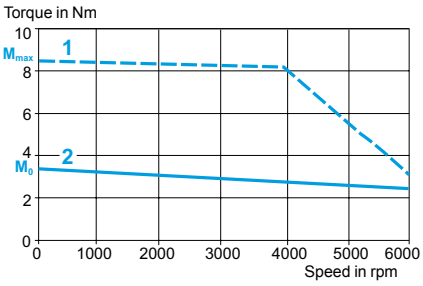
With LXM 05●D28F1 servo drive
115 V single-phase



With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D42M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

2

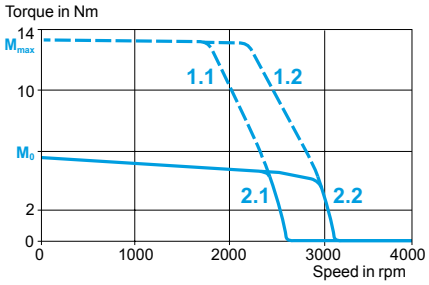
Characteristics of BSH 1002M/1002P/1002T servo motors

Type of servo motor				BSH 1002M	BSH 1002P			BSH 1002T
Associated with Lexium 05 servo drive				LXM 05 ●D14N4	LXM 05 ●D28M2	LXM 05 ●D17M3X	LXM 05 ●D22N4	LXM 05 ●D42M3X
Line supply voltage			V	400/480 3-phase	230 single phase	230 3-phase	400/480 3-phase	230 3-phase
Switching frequency			kHz	4	8			
Torque	Continuous stall	M_0	Nm	5.5				
	Peak stall	M_{max}	Nm	13.3	16	11.23	13.92	16
Nominal operating point	Nominal torque		Nm	4.96			4.4	
	Nominal speed		rpm	1500			3000	
	Nominal servo motor output power		W	780			1400	
Maximum current			A rms	9	17.1			35.4
Servo motor characteristics								
Maximum mechanical speed			rpm	6000				
Constants (at 120°C)	Torque		Nm/A rms	2.32	1.21			0.59
	Back emf		V rms/ krpm	146	77			37
Rotor	Number of poles			8				
	Inertia	Without brake J_m	kgcm²	2.31				
		With brake J_m	kgcm²	2.928				
Stator (at 20°C)	Resistance (phase/phase)		Ω	8.6	2.4			0.56
	Inductance (phase/phase)		mH	45.7	12.7			3
	Electrical time constant		ms	5.31	5.29			5.36
Holding brake (depending on model)				See page 2/144				

Torque/speed curves

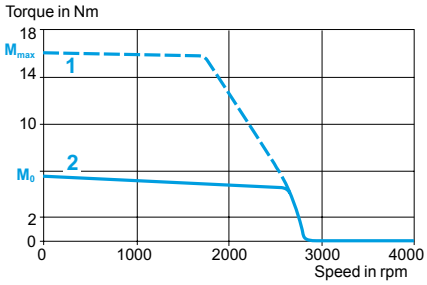
BSH 1002M servo motor

With LXM 05●D14N4 servo drive
400/480 V three-phase

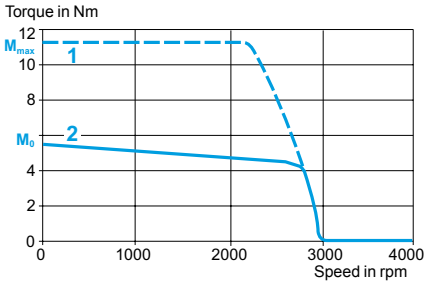


BSH 1002P servo motor

With LXM 05●D28M2 servo drive
230 V single-phase

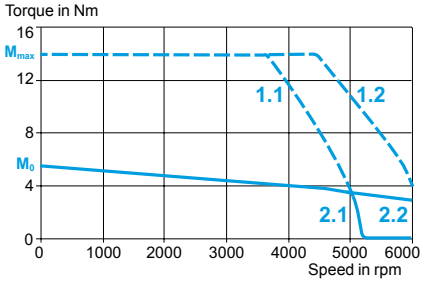


With LXM 05●D17M3X servo drive
230 V 3-phase



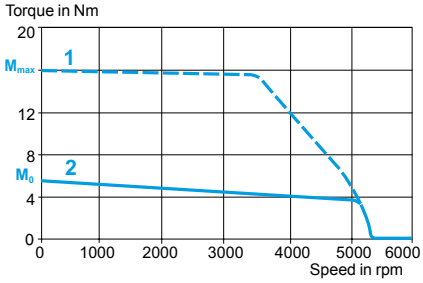
BSH 1002P servo motor(continued)

With LXM 05●D22N4 servo drive
400/480 V three-phase



BSH 1002T servo motor

With LXM 05●D42M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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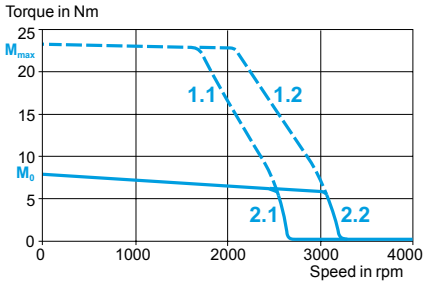
Characteristics of BSH 1003M/1003P servo motors

Type of servo motor				BSH 1003M	BSH 1003P		
Associated with Lexium 05 servo drive				LXM 05 ●D22N4	LXM 05 ●D28M2	LXM 05 ●D42M3X	LXM 05 ●D34N4
Line supply voltage			**V**	400/480 3-phase	230 single phase	230 3-phase	400/480 3-phase
Switching frequency			**kHz**	4			
Torque	Continuous stall	M_0	**Nm**	7.8			
	Peak stall	M_{max}	**Nm**	23.17	19.69	23.17	23.01
Nominal operating point	Nominal torque		**Nm**	6.73			5.7
	Nominal speed		**rpm**	1500			3000
	Nominal servo motor output power		**W**	1100			1800
Maximum current			**A rms**	14.7	28.3		
Servo motor characteristics							
Maximum mechanical speed			**rpm**	6000			
Constants (at 120°C)	Torque		**Nm/A rms**	2.35	1.22		
	Back emf		**V rms/ krpm**	148	77		
Rotor	Number of poles			8			
	Inertia	Without brake J_m	**kgcm²**	3.22			
		With brake J_m	**kgcm²**	3.838			
Stator (at 20°C)	Resistance (phase/phase)		Ω	5.3	1.43		
	Inductance (phase/phase)		**mH**	32.5	8.8		
	Electrical time constant		**ms**	6.13	6.15		
Holding brake (depending on model)				See page 2/144			

Torque/speed curves

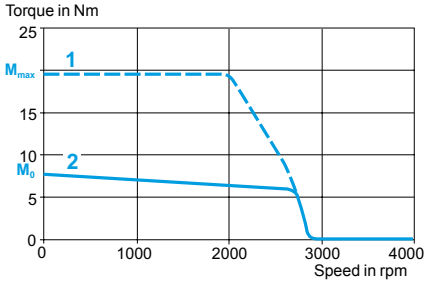
BSH 1003M servo motor

With LXM 05●D22N4 servo drive
400/480 V three-phase

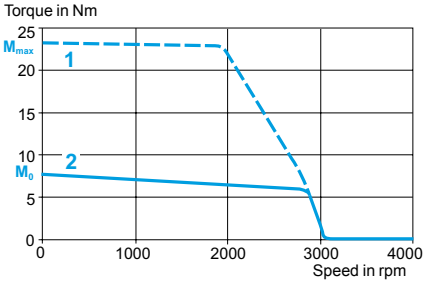


BSH 1003P servo motor

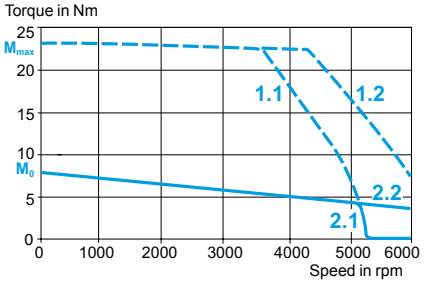
With LXM 05●D28M2 servo drive
230 V single-phase



With LXM 05●D42M3X servo drive
230 V 3-phase



With LXM 05●D34N4 servo drive
400/480 V three-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 2/142

2

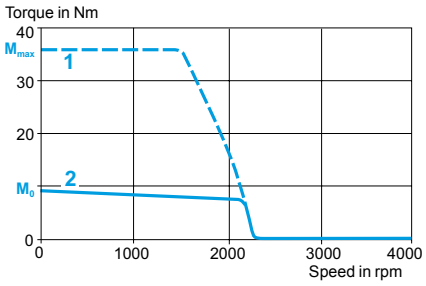
Characteristics of BSH 1004P servo motors

Type of servo motor				BSH 1004P		
Associated with Lexium 05 servo drive				**LXM 05 ●D42M3X**	**LXM 05 ●D34N4**	**LXM 05 ●D57N4**
Line supply voltage			**V**	230 3-phase	400/480 3-phase	400/480 3-phase
Switching frequency			**kHz**	8		
Torque	Continuous stall	M_0	**Nm**	9.31		
	Peak stall	M_{max}	**Nm**	35.7	23.47	35.7
Nominal operating point	Nominal torque		**Nm**	8.22	7.1	
	Nominal speed		**rpm**	1500	3000	
	Nominal servo motor output power		**W**	1300	2200	
Maximum current			**A rms**	32.3		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	1.62		
	Back emf		**V rms/ krpm**	103		
Rotor	Number of poles			8		
	Inertia	Without brake J_m	**kgcm²**	4.22		
		With brake J_m	**kgcm²**	5.245		
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.81		
	Inductance (phase/phase)		**mH**	11.8		
	Electrical time constant		**ms**	6.52		
Holding brake (depending on model)				See page 2/144		

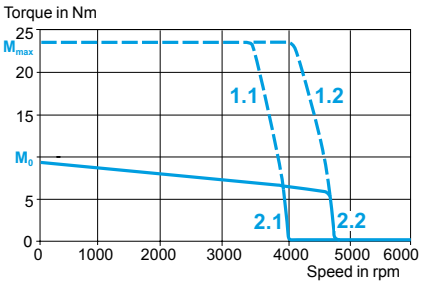
Torque/speed curves

BSH 1004P servo motor

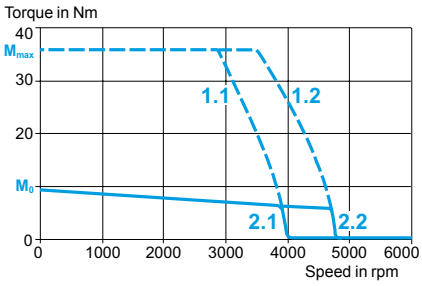
With LXM 05●D42M3X servo drive
115 V single-phase



With LXM 05●D34N4 servo drive
400/480 V three-phase



With LXM 05●D57N4 servo drive
400/480 V three-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

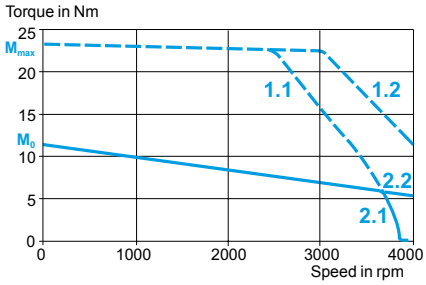
Characteristics of BSH 1401P/1401T servo motors

Type of servo motor				**BSH 1401P**	**BSH 1401T**
Associated with Lexium 05 servo drive				**LXM 05 ●D34N4**	**LXM 05 ●D42M3X**
Line supply voltage			**V**	400/480 3-phase	230 3-phase
Switching frequency			**kHz**	4	
Torque	Continuous stall	M_0	**Nm**	11.4	
	Peak stall	M_{max}	**Nm**	23.33	
Nominal operating point	Nominal torque		**Nm**	6.9	
	Nominal speed		**rpm**	3000	
	Nominal servo motor output power		**W**	2200	
Maximum current			**A rms**	20.8	37.1
Servo motor characteristics					
Maximum mechanical speed			**rpm**	4000	
Constants (at 120°C)	Torque		**Nm/A rms**	1.43	0.8
	Back emf		**V rms/ krpm**	100	56
Rotor	Number of poles			10	
	Inertia	Without brake J_m	**kgcm²**	7.41	
		With brake J_m	**kgcm²**	9.21	
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.41	0.44
	Inductance (phase/phase)		**mH**	15.6	4.9
	Electrical time constant		**ms**	11.06	11.14
Holding brake (depending on model)				See page 2/144	

Torque/speed curves

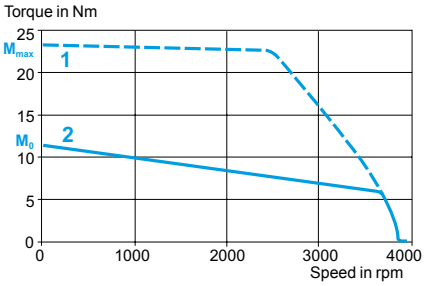
BSH 1401P servo motor

With LXM 05●D34N4 servo drive
400/480 V three-phase



BSH 1401T servo motor

With LXM 05●D42M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque
1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

2

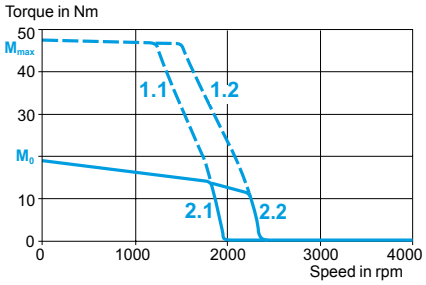
Characteristics of BSH 1402M/1402P/1402T servo motors

Type of servo motor				BSH 1402M	BSH 1402P		BSH 1402T
Associated with Lexium 05 servo drive				LXM 05 ●D34N4	LXM 05 ●D42M3X	LXM 05 ●D57N4	LXM 05 ●D42M3X
Line supply voltage			**V**	400/480 3-phase	230 3-phase	400/480 3-phase	230 3-phase
Switching frequency			**kHz**	4			
Torque	Continuous stall	M_0	**Nm**	19.2			14.4
	Peak stall	M_{max}	**Nm**	47.5	41.94	47.5	24.56
Nominal operating point	Nominal torque		**Nm**	15		10.8	9.2
	Nominal speed		**rpm**	1500		3000	
	Nominal servo motor output power		**W**	2350		3400	2900
Maximum current			**A rms**	22.4	44.1		75.2
Servo motor characteristics							
Maximum mechanical speed			**rpm**	4000			
Constants (at 120°C)	Torque		**Nm/A rms**	2.91	1.47		0.87
	Back emf		**V rms/ krpm**	199	101		59
Rotor	Number of poles			10			
	Inertia	Without brake J_m	**kgcm²**	12.68			
		With brake J_m	**kgcm²**	14.48			
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.32	0.6		0.21
	Inductance (phase/phase)		**mH**	28.6	7.4		2.54
	Electrical time constant		**ms**	12.33			12.1
Holding brake (depending on model)				See page 2/144			

Torque/speed curves

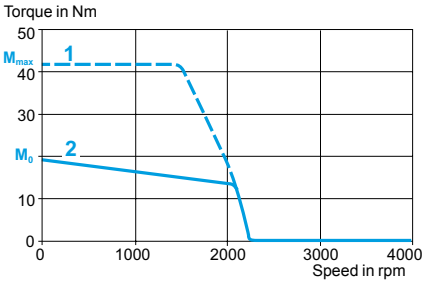
BSH 1402M servo motor

With LXM 05●D34N4 servo drive
400/480 V three-phase

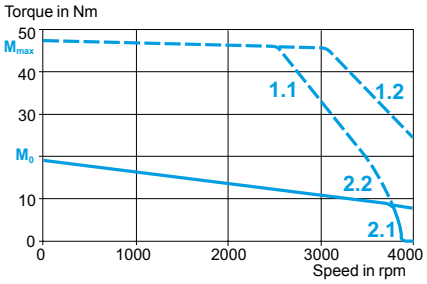


BSH 1402P servo motor

With LXM 05●D42M3X servo drive
230 V 3-phase

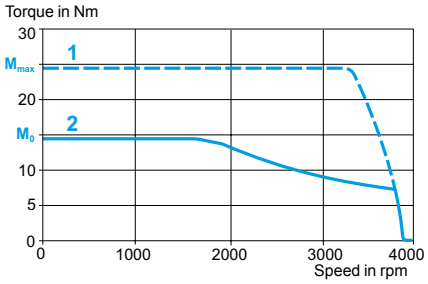


With LXM 05●D57N4 servo drive
230 V 3-phase



BSH 1402T servo motor

With LXM 05●D42M3X servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 2/110
References: page 2/138
Dimensions: page 2/142

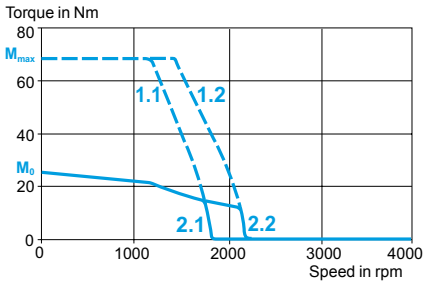
Characteristics of BSH 1403M/1403P servo motors

Type of servo motor				BSH 1403M		BSH 1403P
Associated with Lexium 05 servo drive				LXM 05 ●D34N4	LXM 05 ●D57N4	LXM 05 ●D57N4
Line supply voltage			**V**	400/480 3-phase		
Switching frequency			**kHz**	4		
Torque	Continuous stall	M_0	**Nm**	25.4		
	Peak stall	M_{max}	**Nm**	68	71.7	57.32
Nominal operating point	Nominal torque		**Nm**	17.2	20.3	12.43
	Nominal speed		**rpm**	1500		3000
	Nominal servo motor output power		**W**	2700	3200	3900
Maximum current			**A rms**	31.3		61
Servo motor characteristics						
Maximum mechanical speed			**rpm**	4000		
Constants (at 120°C)	Torque		**Nm/A rms**	3.09		1.58
	Back emf		**V rms/ krpm**	205		105
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	17.94		
		With brake J_m	**kgcm²**	23.44		
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.52		0.4
	Inductance (phase/phase)		**mH**	19.4		5.1
	Electrical time constant		**ms**	12.76		12.75
Holding brake (depending on model)				See page 2/144		

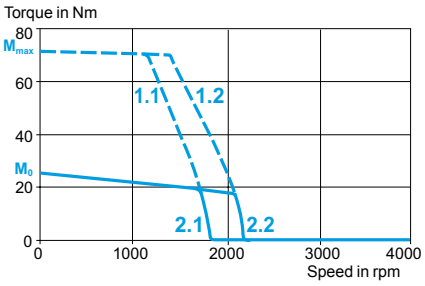
Torque/speed curves

BSH 1403M servo motor

With LXM 05●D34N4 servo drive
400/480 V three-phase

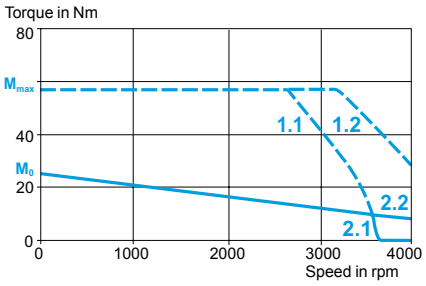


With LXM 05●D57N4 servo drive
400/480 V three-phase



BSH 1403P servo motor

With LXM 05●D57N4 servo drive
400/480 V three-phase



1.1 Peak torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

2

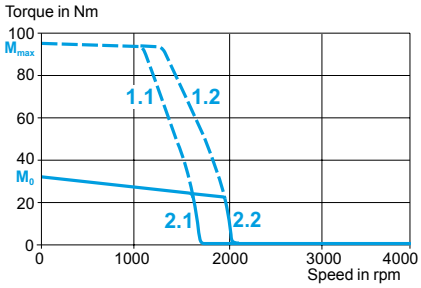
Characteristics of BSH 1404M/1404P servo motors

Type of servo motor				BSH 1404M	BSH 1404P
Associated with Lexium 05 servo drive				LXM 05 ●D57N4	
Line supply voltage			V	400/480 3-phase	
Switching frequency			kHz	4	
Torque	Continuous stall	M_0	Nm	32.1	
	Peak stall	M_{max}	Nm	95	63.09
Nominal operating point	Nominal torque		Nm	24.9	10.8
	Nominal speed		rpm	1500	3000
	Nominal servo motor output power		W	3900	3400
Maximum current			A rms	47.8	95.6
Servo motor characteristics					
Maximum mechanical speed			rpm	4000	
Constants (at 120°C)	Torque		Nm/A rms	3.12	1.57
	Back emf		V rms/krpm	208	104
Rotor	Number of poles			10	
	Inertia	Without brake J_m	kgcm²	23.7	
		With brake J_m	kgcm²	29.2	
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.12	0.28
	Inductance (phase/phase)		mH	15.6	3.9
	Electrical time constant		ms	13.93	
Holding brake (depending on model)				See page 2/144	

Torque/speed curves

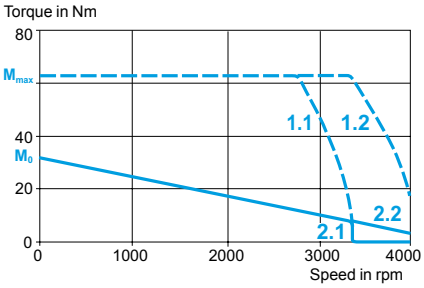
BSH 1404M servo motor

With LXM 05●D57N4 servo drive
400/480 V three-phase



BSH 1404P servo motor

With LXM 05●D57N4 servo drive
400/480 V three-phase



1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

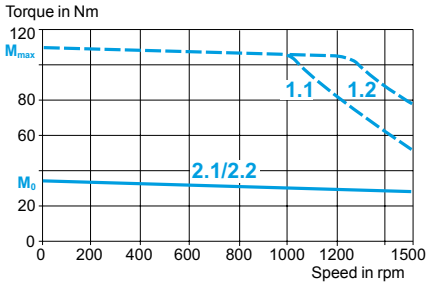
Characteristics of BSH 2051M servo motors

Type of servo motor				**BSH 2051M**
Associated with Lexium 05 servo drive				**LXM 05 ●D57N4**
Line supply voltage			**V**	400/480 3-phase
Switching frequency			**kHz**	4
Torque	Continuous stall	M_0	**Nm**	34.4
	Peak stall	M_{max}	**Nm**	110
Nominal operating point	Nominal torque		**Nm**	28.2
	Nominal speed		**rpm**	1500
	Nominal servo motor output power		**W**	4500
Maximum current			**A rms**	40.4
Servo motor characteristics				
Maximum mechanical speed			**rpm**	3800
Constants (at 120°C)	Torque		**Nm/A rms**	3.1
	Back emf		**V rms/ krpm**	200
Rotor	Number of poles			10
	Inertia	Without brake J_m	**kgcm²**	71.4
		With brake J_m	**kgcm²**	87.4
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.1
	Inductance (phase/phase)		**mH**	21.3
	Electrical time constant		**ms**	19.36
Holding brake (depending on model)				See page 2/144

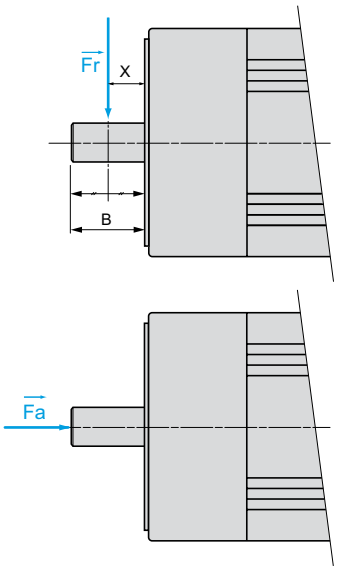
Torque/speed curves

BSH 2051M servo motor

With LXM 05●D57N4 servo drive
400/480 V three-phase



1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase



Radial and axial forces permitted on the motor shaft

Even when the servo motors are used under optimum conditions, their service life is limited by that of the bearings.

Conditions	
Nominal service life of bearings *(1)*	L_{10h} = 20,000 hours
Ambient temperature (bearing temperature ∼ 100°C)	40°C
Force application point	Fr applied at the middle of the shaft end X = B/2 (dimension B, see page 2/142

(1) Hours of use with a failure probability of 10%

⚠ The following conditions must be adhered to:
- Radial and axial forces must not be applied simultaneously
- Shaft end with IP 50 or IP 65 degree of protection
- The bearings cannot be changed by the user as the built-in position sensor must be realigned if the unit is dismantled.

			Maximum radial force Fr							
Mechanical speed		**rpm**	**1000**	**2000**	**3000**	**4000**	**5000**	**6000**	**7000**	**8000**
Servo motor	BSH 0551	**N**	340	270	240	220	200	190	180	170
	BSH 0552	**N**	370	290	260	230	220	200	190	190
	BSH 0553	**N**	390	310	270	240	230	210	200	190
	BSH 0701	**N**	660	520	460	410	380	360	–	–
	BSH 0702	**N**	710	560	490	450	410	390	–	–
	BSH 0703	**N**	730	580	510	460	430	400	–	–
	BSH 1001	**N**	900	720	630	570	530	–	–	–
	BSH 1002	**N**	990	790	690	620	–	–	–	–
	BSH 1003	**N**	1050	830	730	660	–	–	–	–
	BSH 1004	**N**	1070	850	740	–	–	–	–	–
	BSH 1401	**N**	2210	1760	1530	–	–	–	–	–
	BSH 1402	**N**	2430	1930	1680	–	–	–	–	–
	BSH 1403	**N**	2560	2030	1780	–	–	–	–	–
	BSH 1404	**N**	2660	2110	1840	–	–	–	–	–
	BSH 2051	**N**	3730	2960	2580	–	–	–	–	–

Maximum axial force: Fa = 0.2 x Fr

Characteristics of servo motor/servo drive power connection cables

Preassembled cordsets with connector at servo motor end

Type of cordset		VW3 M5 101 R●●●	VW3 M5 102 R●●●	VW3 M5 103 R●●●
External sleeve, insulation		PUR orange coloured RAL 2003, TPM or PP/PE		
Capacity	pF/m	< 70 (conductors/shielding)		
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]	[(4 x 2.5 mm²) + (2 x 1 mm²)]	[(4 x 4 mm²) + (2 x 1 mm²)]
Connector type		1 M23 industrial connector (servo motor side) and 1 end with flying leads (servo drive side)		1 M40 industrial connector (servo motor side) and 1 end with flying leads (servo drive side)
External diameter	mm	12 ± 0.2	14.3 ± 0.3	16.3 ± 0.3
Curvature radius	mm	90, suitable for daisy-chaining, cable-carrier system	110, suitable for daisy-chaining, cable-carrier system	125, suitable for daisy-chaining, cable-carrier system
Working voltage	V	600		
Maximum length	m	75 *(1)*		
Operating temperature	°C	- 40...+ 90 (fixed), - 20…+ 80 (mobile)		
Certifications		UL, CSA, VDE, CE, DESINA		

Cables without connectors

Cable type		VW3 M5 301 R●●●●	VW3 M5 302 R●●●●	VW3 M5 303 R●●●●
External sleeve, insulation		PUR orange coloured RAL 2003, TPM or PP/PE		
Capacity	pF/m	< 70 (conductors/shielding)		
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]	[(4 x 2.5 mm²) + (2 x 1 mm²)]	[(4 x 4 mm²) + (2 x 1 mm²)]
Connector type		None, see page 2/141		
External diameter	mm	12 ± 0.2	14.3 ± 0.3	16.3 ± 0.3
Curvature radius	mm	90, suitable for daisy-chaining, cable-carrier system	110, suitable for daisy-chaining, cable-carrier system	125, suitable for daisy-chaining, cable-carrier system
Working voltage	V	600		
Maximum length	m	100		
Operating temperature	°C	- 40...+ 90 (fixed), - 20…+ 80 (mobile)		
Certifications		UL, CSA, VDE, CE, DESINA		

Characteristics of the servo motor/servo drive control connection cables

Preassembled cordsets with connector at both ends (servo motor and servo drive)

Type of cordset		VW3 M8 101 R●●●
Type of encoder		**SinCos encoder**
External sleeve, insulation		PUR green coloured RAL 6018, polyester
Number of conductors (shielded)		[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]
External diameter	mm	8.8 ± 0.2
Connector type		1 M23 industrial connector (servo motor side) and 1 12-way female Molex connector (servo drive side)
Min. curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system
Working voltage	V	350 (0.25 mm²), 500 (0.5 mm²)
Maximum length	m	75 *(1)*
Operating temperature	°C	- 50…+ 90 (fixed), - 40…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

Cables without connectors

Cable type		VW3 M8 221 R●●●●
Type of encoder		**SinCos encoder**
External sleeve, insulation		PUR green coloured RAL 6018, polyester
Number of conductors (shielded)		[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]
External diameter	mm	8.8 ± 0.2
Connector type		None, see page 2/141
Min. curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system
Working voltage	V	350 (0.25 mm²), 500 (0.5 mm²)
Maximum length	m	100
Operating temperature	°C	- 50…+ 90 (fixed), - 40…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

(1) For cables longer than 75 m, please consult your Regional Sales Office.

Presentation: page 2/110
References: page 2/140
Dimensions: page 2/142

Lexium 05 motion control
BSH servo motors

105990

BSH 055●● ●●●1A

105991

BSH 070●● ●●●1A

BSH servo motor

The BSH servo motors shown below are supplied without a gearbox.
For GBX gearboxes see page 2/149.

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed	Maximum mechanical speed	Associated LXM 05 servo drive	Reference *(1)*	Weight *(2)*
Nm	Nm	W	rpm	rpm			kg
0.5	1.08	150	3000	9000	CU70M2	**BSH 0551T ●●●●A**	1.160
	1.4	150	3000	9000	●D10F1		
		270	6000	9000	●D10M2		
		270	6000	9000	●D10M3X		
0.77	1.31	240	3000	9000	CU70M2	**BSH 0552T ●●●●A**	1.470
0.9	1.77	250	3000	9000	●D10F1		
		450	6000	9000	●D10M2		
		450	6000	9000	●D10M3X		
	2.17	250	3000	9000	CU70M2	**BSH 0552P ●●●●A**	1.470
	2.3	130	1500	9000	CU70M2	**BSH 0552M ●●●●A**	1.470
		130	1500	9000	●D10M2		
		130	1500	9000	●D10M3X		
	2.7	250	3000	9000	●D17F1	**BSH 0552T ●●●●A**	1.470
		250	3000	9000	●D10M2	**BSH 0552P ●●●●A**	1.470
		250	3000	9000	●D10M3X		
		250	3000	9000	●D14N4		
1.3	3.18	350	3000	9000	●D10M2	**BSH 0553P ●●●●A**	1.760
		350	3000	9000	●D10M3X		
	3.31	350	3000	9000	●D17F1	**BSH 0553T ●●●●A**	1.760
		350	3000	9000	●D17M2		
		350	3000	9000	●D17M3X		
	3.5	190	1500	9000	●D10M2	**BSH 0553M ●●●●A**	1.760
		190	1500	9000	●D10M3X		
	3.87	350	3000	9000	●D14N4	**BSH 0553P ●●●●A**	1.760
1.4	2.42	380	3000	8000	●D10F1	**BSH 0701T ●●●●A**	2.200
		400	3000	8000	●D10M3X		
	2.66	210	1500	8000	●D10M3X	**BSH 0701M ●●●●A**	2.200
		400	3000	8000	●D10M2	**BSH 0701P ●●●●A**	2.200
		400	3000	8000	●D10M3X		
	3.19	400	3000	8000	●D17M2	**BSH 0701T ●●●●A**	2.200
		400	3000	8000	●D17M3X		
2.12	4.14	570	3000	8000	●D17F1	**BSH 0702T ●●●●A**	2.890
		600	3000	8000	●D17M2		
	4.57	600	3000	8000	●D10M2	**BSH 0702P ●●●●A**	2.890
		600	3000	8000	●D10M3X		
	5.63	300	1500	8000	●D10M2	**BSH 0702M ●●●●A**	2.890
		300	1500	8000	●D10M3X		
		600	3000	8000	●D17M2	**BSH 0702P ●●●●A**	2.890
		600	3000	8000	●D17M3X		
		600	3000	8000	●D14N4		
	6.8	600	3000	8000	●D28M2	**BSH 0702T ●●●●A**	2.890
		600	3000	8000	●D42M3X		
2.8	7.16	750	3000	8000	●D17M2	**BSH 0703P ●●●●A**	3.620
		750	3000	8000	●D17M3X		
	7.38	750	3000	8000	●D28F1	**BSH 0703T ●●●●A**	3.620
		750	3000	8000	●D28M2		
	8.6	400	1500	8000	●D10M2	**BSH 0703M ●●●●A**	3.620
		400	1500	8000	●D10M3X		
		750	3000	8000	●D14N4		
	8.75	750	3000	8000	●D22N4	**BSH 0703P ●●●●A**	3.620
	10.25	750	3000	8000	●D42M3X	**BSH 0703T ●●●●A**	3.620
	10.3	750	3000	8000	●D28M2	**BSH 0703P ●●●●A**	3.620

(1) To complete each reference see the table on page 2/139.
(2) Weight of servo motor without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 2/144.

Presentation: page 2/110 Characteristics: page 2/112 Dimensions: page 2/142

BSH servo motor (continued)

105992

BSH 100●● ●●●1A

105993

BSH 1401P ●●●1A

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed	Maximum mechanical speed	Associated LXM 05 servo drive	Reference *(1)*	Weight *(2)*
Nm	Nm	W	rpm	rpm			kg
3.4	7.1	500	1500	6000	●D14N4	**BSH 1001M ●●●●A**	4.200
		500	1500	6000	●D17M3X	**BSH 1001P ●●●●A**	4.200
		900	3000	6000	●D22N4		
	8.5	500	1500	6000	●D28F1	**BSH 1001T ●●●●A**	4.200
		900	3000	6000	●D28M2		
		900	3000	6000	●D42M3X		
5.5	11.23	780	1500	6000	●D17M3X	**BSH 1002P ●●●●A**	5.900
	13.3	780	1500	6000	●D14N4	**BSH 1002M ●●●●A**	5.900
	13.92	1400	3000	6000	●D22N4	**BSH 1002P ●●●●A**	5.900
	16	780	1500	6000	●D28M2		
		1400	3000	6000	●D42M3X	**BSH 1002T ●●●●A**	5.900
7.8	19.69	1100	1500	6000	●D28M2	**BSH 1003P ●●●●A**	7.400
	23.01	1800	3000	6000	●D34N4	**BSH 1003P ●●●●A**	7.400
	23.17	1100	1500	6000	●D22N4	**BSH 1003M ●●●●A**	7.400
		1100	1500	6000	●D42M3X	**BSH 1003P ●●●●A**	7.400
9.31	23.47	2200	3000	6000	●D34N4	**BSH 1004P ●●●●A**	9.500
	35.7	1300	1500	6000	●D42M3X		
		2200	3000	6000	●D57N4		
11.4	23.33	2200	3000	4000	●D34N4	**BSH 1401P ●●●●A**	11.200
		2200	3000	4000	●D42M3X	**BSH 1401T ●●●●A**	11.200
14.4	24.56	2900	3000	4000	●D42M3X	**BSH 1402T ●●●●P**	16.000
19.2	41.94	2350	1500	4000	●D42M3X	**BSH 1402P ●●●●A**	16.000
	47.5	2350	1500	4000	●D34N4	**BSH 1402M ●●●●A**	16.000
		3400	3000	4000	●D57N4	**BSH 1402P ●●●●A**	16.000
25.4	57.32	3900	3000	4000	●D57N4	**BSH 1403P ●●●●A**	21.200
	68	2700	1500	4000	●D34N4	**BSH 1403M ●●●●A**	21.200
	71.7	3200	1500	4000	●D57N4		
32.1	63.09	3400	3000	4000	●D57N4	**BSH 1404P ●●●●P**	26.500
	95	3900	1500	4000	●D57N4	**BSH 1404M ●●●●A**	26.500
34.4	110	4500	1500	3800	●D57N4	**BSH 2051M ●●●●A**	35.000

To order a BSH servo motor, complete each reference above with:

			BSH 1401P	●	●	●	●	**A**
Shaft end	IP 50	Untapped		**0**				
		Keyed		**1**				
	IP 65	Untapped		**2**				
		Keyed		**3**				
Integrated sensor	Single turn, SinCos Hiperface® 131,072 points/turn *(3)*				**1**			
	Multiturn, SinCos Hiperface® 131,072 points/turn x 4096 turns *(3)*				**2**			
Holding brake	Without					**A**		
	With					**F**		
Connections	Straight connectors						**1**	
	Rotatable right-angled connectors						**2**	
Flange	International standard							**A or P** *(4)*

***Note:** The example above is for a **BSH 1401P** servo motor. Replace **BSH 1401P** by the relevant reference for other servo motors.*

(1) To complete each reference see the table above.
(2) Weight of servo motor without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 2/144.
(3) Sensor resolution given for use with a Lexium 05 servo drive.
(4) "A" or "P" depending on model, see table of references above.

525626

VW3 M5 10● R●●●

Connection elements

Power cordsets

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
Cables equipped with one M23 industrial connector (servo motor side)	BSH 055●● BSH 070●● BSH 100●● BSH 1401P BSH 1402M BSH 1402P BSH 1403M BSH 1404M	LXM 05●●●●●●●, depending on combinations, see pages 2/112 to 2/135	[(4 x 1.5 mm²) + (2 x 1 mm²)]	3	**VW3 M5 101 R30**	0.810
				5	**VW3 M5 101 R50**	1.210
				10	**VW3 M5 101 R100**	2.290
				15	**VW3 M5 101 R150**	3.400
				20	**VW3 M5 101 R200**	4.510
				25	**VW3 M5 101 R250**	6.200
				50	**VW3 M5 101 R500**	12.325
				75	**VW3 M5 101 R750**	18.450
	BSH 1401T BSH 1403P	LXM 05●D42M3X LXM 05●D57N4	[(4 x 2.5 mm²) + (2 x 1 mm²)]	3	**VW3 M5 102 R30**	1.070
				5	**VW3 M5 102 R50**	1.670
				10	**VW3 M5 102 R100**	3.210
				15	**VW3 M5 102 R150**	4.760
				20	**VW3 M5 102 R200**	6.300
				25	**VW3 M5 102 R250**	7.945
				50	**VW3 M5 102 R500**	16.170
				75	**VW3 M5 102 R750**	24.095
Cables equipped with one M40 industrial connector (servo motor side)	BSH 1402T BSH 1404P BSH 2051M	LXM 05●D42M3X LXM 05●D57N4	[(4 x 4 mm²) + (2 x 1 mm²)]	3	**VW3 M5 103 R30**	1.330
				5	**VW3 M5 103 R50**	2.130
				10	**VW3 M5 103 R100**	4.130
				15	**VW3 M5 103 R150**	6.120
				20	**VW3 M5 103 R200**	8.090
				25	**VW3 M5 103 R250**	11.625
				50	**VW3 M5 103 R500**	23.175
				75	**VW3 M5 103 R750**	34.725

525627

VW3 M8 101 R●●●

Control cordsets

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
SinCos Hiperface® encoder cables equipped with one M23 industrial connector(servo motor side) **and one 12-way female Molex connector** (servo drive side)	BSH ●●●●●	LXM 05●●●●●●●	[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]	3	**VW3 M8 101 R30**	0.800
				5	**VW3 M8 101 R50**	1.200
				10	**VW3 M8 101 R100**	2.250
				15	**VW3 M8 101 R150**	3.450
				20	**VW3 M8 101 R200**	4.350
				25	**VW3 M8 101 R250**	4.950
				50	**VW3 M8 101 R500**	13.300
				75	**VW3 M8 101 R750**	17.650

Presentation:
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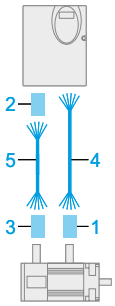
Characteristics:
page 2/137

525628



Connection elements (continued)

Connection accessories for creating power and control cordsets

Description	Used for	Ref.	For cable of cross-section	Reference	Weight
			mm²		kg
M23 industrial connectors for creating power cordsets (sold in lots of 5)	BSH 055●●, BSH 070●●, BSH 100●●, BSH 1401P, BSH 1402M, BSH 1402P, BSH 1403M and BSH 1404M servo motors	1	1.5	**VW3 M8 215**	0.350
	BSH 1401T and BSH 1403P servo motors	1	2.5	**VW3 M8 216**	0.600
M40 industrial connector for creating power cordsets (sold in lots of 5)	BSH 1402T, BSH 1404P and BSH 2051M servo motors	1	4	**VW3 M8 217**	0.850
12-way female Molex connector for creating control cordsets (sold in lots of 5)	LXM 05 servo drives ●●●●●●● (CN2 connector)	2	–	**VW3 M8 213**	–
M23 industrial connector for creating control cordsets (sold in lots of 5)	BSH servo motors ●●●●●	3	–	**VW3 M8 214**	–

Description	From servo motor	To servo drive	Composition	Ref.	Length	Reference	Weight
					m		kg
Cables for creating power cordsets	BSH 055●● BSH 070●● BSH 100●● BSH 1401P BSH 1402M BSH 1402P BSH 1403M BSH 1404M	LXM 05●●●●●●●, depending on combinations, see pages 2/112 to 2/135	[(4 x 1.5 mm²) + (2 x 1 mm²)]	4	25	**VW3 M5 301 R250**	5.550
					50	**VW3 M5 301 R500**	11.100
					100	**VW3 M5 301 R1000**	22.200
	BSH 1401T BSH 1403P	LXM 05●D42M3X LXM 05●D57N4	[(4 x 2.5 mm²) + (2 x 1 mm²)]	4	25	**VW3 M5 302 R250**	7.725
					50	**VW3 M5 302 R500**	15.450
					100	**VW3 M5 302 R1000**	30.900
	BSH 1402T BSH 1404P BSH 2051M	LXM 05●D42M3X LXM 05●D57N4	[(4 x 4 mm²) + (2 x 1 mm²)]	4	25	**VW3 M5 303 R250**	9.900
					50	**VW3 M5 303 R500**	19.800
					100	**VW3 M5 303 R1000**	39.600
Cables for creating control cordsets for SinCos Hiperface® encoders	BSH ●●●●●	LXM 05●●●●●●●	[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]	5	25	**VW3 M8 221 R250**	5.250
					50	**VW3 M8 221 R500**	10.500
					100	**VW3 M8 221 R1000**	21.000

Presentation: page 2/110
Characteristics: page 2/137

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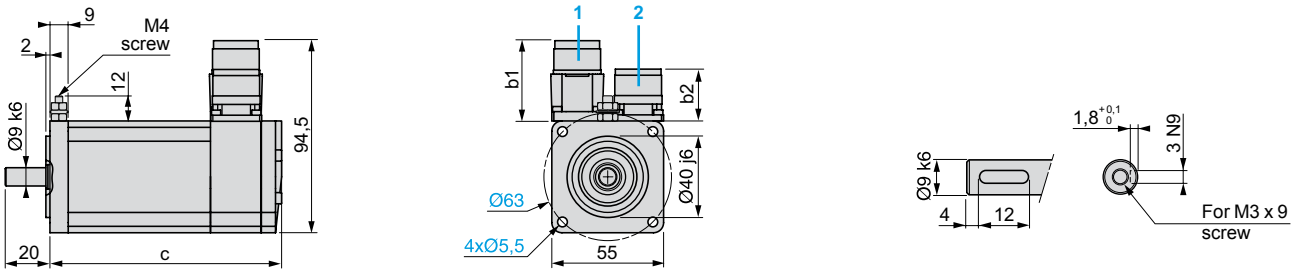
BSH 055 (example with straight connectors: servo motor/brake power supply 1 and encoder 2)

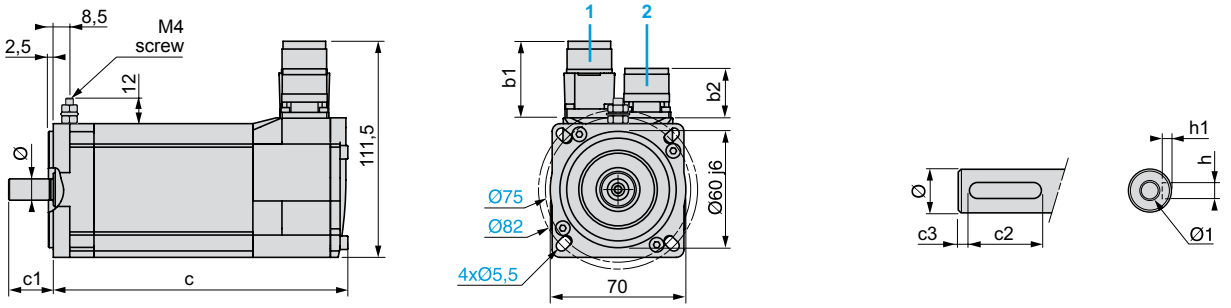
Shaft end, keyed slot (optional)



	Straight connectors		Rotatable angled connectors			
	b1	b2	b1	b2	c (without brake)	c (with brake)
BSH 0551●	39.5	25.5	39.5	39.5	132.5	159
BSH 0552●	39.5	25.5	39.5	39.5	154.5	181
BSH 0553●	39.5	25.5	39.5	39.5	176.5	203

BSH 070 (example with straight connectors: servo motor/brake power supply 1 and encoder 2)

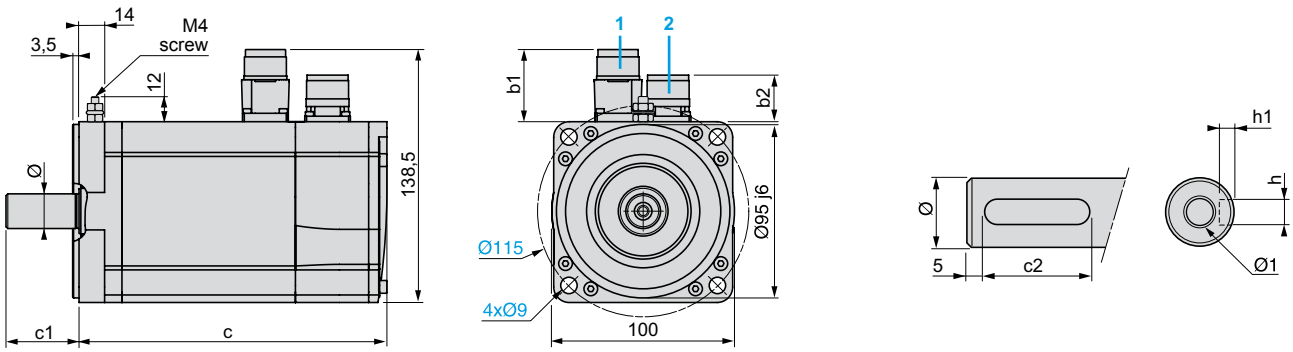
Shaft end, keyed slot (optional)



	Straight connectors		Rotatable angled connectors										
	b1	b2	b1	b2	c (without brake)	c (with brake)	c1	c2	c3	hrs	h1	Ø	Ø1 for screw
BSH 0701●	39.5	25.5	39.5	39.5	154	180	23	18	2.5	4 N9	2.5 +0.1 0	11 k6	M4 x 10
BSH 0702●	39.5	25.5	39.5	39.5	187	213	23	18	2.5	4 N9	2.5 +0.1 0	11 k6	M4 x 10
BSH 0703●	39.5	25.5	39.5	39.5	220	254	30	20	5	5 N9	3 +0.1 0	14 k6	M5 x 12.5

BSH 100 (example with straight connectors: servo motor/brake power supply 1 and encoder 2)

Shaft end, keyed slot (optional)

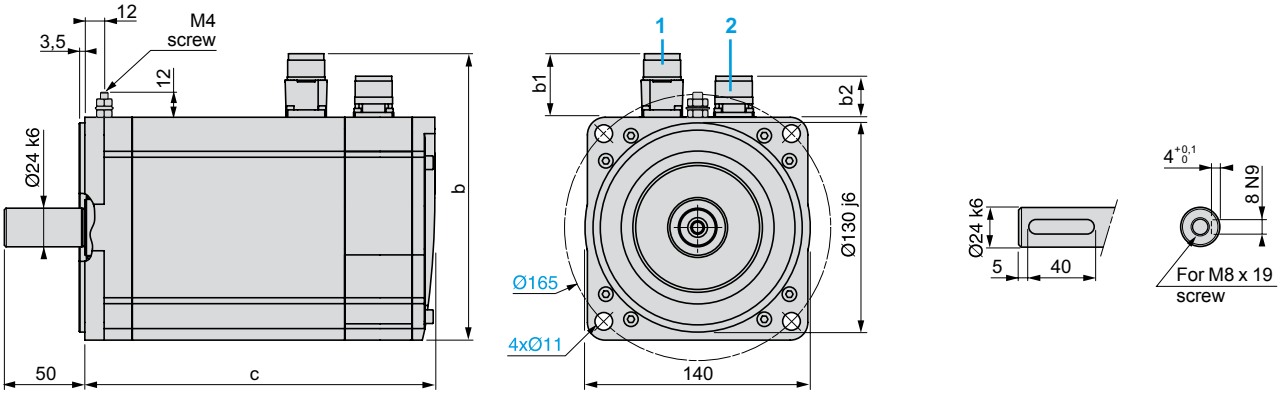


	Straight connectors		Rotatable angled connectors									
	b1	b2	b1	b2	c (without brake)	c (with brake)	c1	c2	hrs	h1	Ø	Ø1 for screw
BSH 1001●	39.5	25.5	39.5	39.5	169	200	40	30	6 N9	3.5 +0.1 0	19 k6	M6 x 16
BSH 1002●	39.5	25.5	39.5	39.5	205	236	40	30	6 N9	3.5 +0.1 0	19 k6	M6 x 16
BSH 1003●	39.5	25.5	39.5	39.5	241	272	40	30	6 N9	3.5 +0.1 0	19 k6	M6 x 16
BSH 1004●	39.5	25.5	39.5	39.5	277	308	50	40	8 N9	4 +0.1 0	24 k6	M8 x 19

Presentation: page 2/110
Characteristics: page 2/112
References: page 2/138

BSH 140 (example with straight connectors: servo motor/brake power supply 1 and encoder 2)

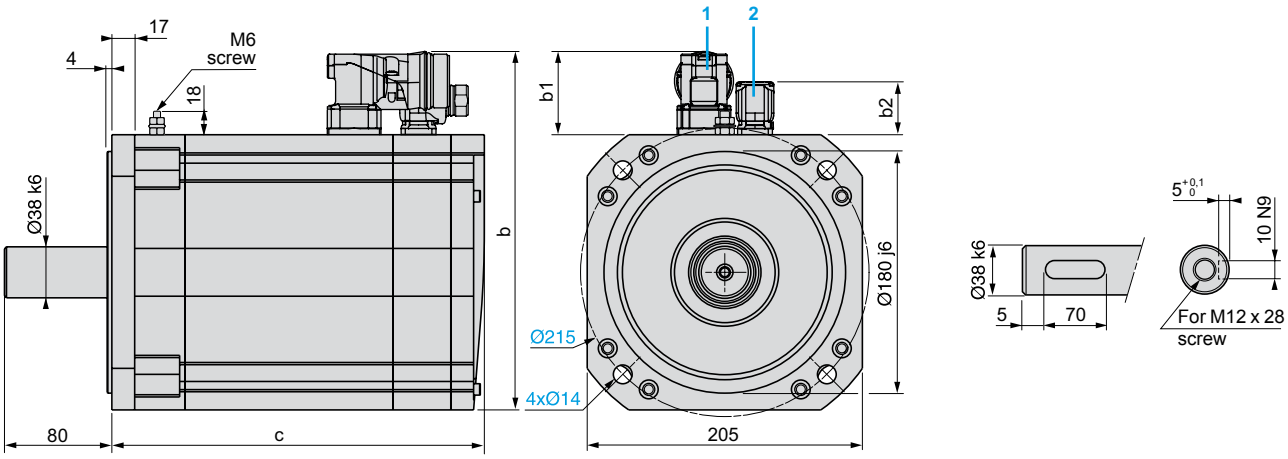
Shaft end, keyed slot (optional)



	Straight connectors			Angled connectors				
	b	**b1**	**b2**	**b**	**b1**	**b2**	**c** (without brake)	**c** (with brake)
BSH 1401●	178	39.5	25.5	178	39.5	39.5	218	256
BSH 1402M, 1402P	178	39.5	25.5	178	39.5	39.5	273	311
BSH 1402T	192.5	54	25.5	198.5	60	39.5	273	311
BSH 1403●	178	39.5	25.5	178	39.5	39.5	328	366
BSH 1404M	178	39.5	25.5	178	39.5	39.5	383	421
BSH 1404P	192.5	54	25.5	198.5	60	39.5	383	421

BSH 2051 (example with rotatable angled connectors: servo motor/brake power supply 1 and encoder 2)

Shaft end, keyed slot (optional)



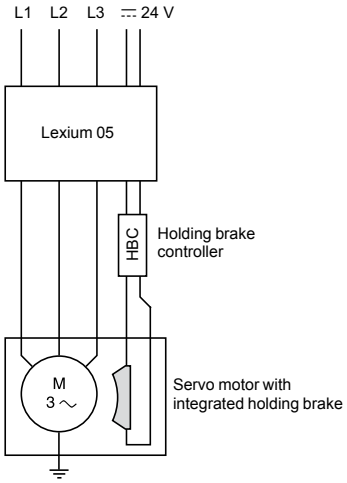
	Straight connectors			Angled connectors				
	b	**b1**	**b2**	**b**	**b1**	**b2**	**c** (without brake)	**c** (with brake)
BSH 2051M	259	54	25.5	265	60	39.5	321	370.5

Presentation: page 2/110
Characteristics: page 2/112
References: page 2/138

Lexium 05 motion control
BSH servo motor
Option: Holding brake integrated in servo motor

Holding brake

Presentation



The holding brake integrated in the BSH servo motor is an electromagnetic pressure spring brake that blocks the servo motor axis once the output current has been switched off.
In the event of an emergency, such as a power outage or an emergency stop, the drive is immobilized, thus significantly increasing safety.
Blocking the servo motor axis is also necessary in cases of torque overload, such as in the event of vertical axis movement.

The holding brake is activated using the holding brake controller (HBC) **VW3 M3 103** (see page 2/43).

The HBC is an external device. It also ensures electrical isolation.

Characteristics

Type of servo motor	BSH	0551, 0552, 0553	0701, 0702	0703	1001, 1002, 1003	1004	1401, 1402	1403, 1404	2051
Holding torque M_{Br}	**Nm**	0.8	2	3	9	12	23	36	80
Moment of inertia of rotor(brake only) J_{Br}	**kgcm²**	0.0213	0.072	0.23	0.618	1.025	1.8	5.5	16
Electrical clamping power P_{Br}	**W**	10	11	12	18	17	24	26	40
Nominal current	**A**	0.4167	0.458	0.5	0.75	0.71	1	1.083	1.667
Supply voltage	**V**	24 +6/-10%							
Opening time	**ms**	12	25	35	40	45	50	100	200
Closing time	**ms**	6	8	15	20	20	40	45	50
Weight (to be added to the weight of the servo motor without brake, see page 2/138)	**kg**	0.170	0.260	0.450	0.800	0.900	1.400	2.400	5.500

References

BSH servo motor

For selection of BSH servo motor with or without holding brake, see references on page 2/139.

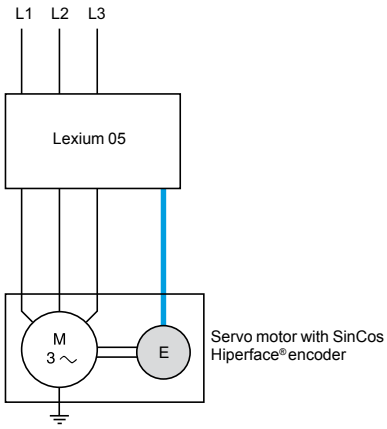
Dimensions:
pages 2/47 and 2/142

Schemes:
page 2/66

Lexium 05 motion control
BSH servo motor
Option: Encoder integrated in servo motor

Encoder integrated in BSH servo motor

Presentation



The standard measurement device is the SinCos Hiperface® single turn or multiturn encoder integrated in BSH servo motors. This measurement device is perfectly suited to the Lexium 05 range of servo drives.

Use of this interface enables:
- Automatic identification of BSH servo motor data by the servo drive
- Automatic initialization of the servo drive's control loops, thus simplifying installation of the motion control device

Characteristics

Type of encoder		Single turn SinCos	Multiturn SinCos
Sine periods per turn		128	
Number of points *(1)*		131,072	131,072 x 4096 turns
Encoder precision	**arc min**	± 1.3	
Measurement method		Optical, high resolution	
Interface		Hiperface®	
Operating temperature	**°C**	-5…+110	

(1) Encoder resolution given for use with a Lexium 05 servo drive.

References

BSH servo motor

For selection of the SinCos Hiperface® single turn or multiturn encoder integrated in the BSH servo motor, see references on page 2/139.

Dimensions:
page 2/142

Lexium 05 motion control
BSH servo motors
Option: GBX planetary gearboxes

Presentation

GBX planetary gearbox

In many cases, motion control requires the use of planetary gearboxes to adapt speeds and torques, while ensuring the precision demanded by the application.

Schneider Electric has chosen to use GBX gearboxes (made by Neugart) with the BSH range of servo motors. These gearboxes are lubricated for life and are designed for applications which are not susceptible to mechanical backlash.
The fact that their use in combination with BSH servo motors has been fully verified and that they are easily assembled, ensures simple, risk-free operation.

The planetary gearboxes are available in 5 sizes (GBX 40...GBX 160) and with 15 reduction ratios (3:1...100:1) (see the table below).

The continuous and peak standstill torques available at the gearbox output are obtained by multiplying the characteristic values of the servo motor by the reduction ratio and efficiency of the gearbox (0.96, 0.94 or 0.9 depending on the reduction ratio).

The table below shows the most suitable servo motor/gearbox combinations. For other combinations, refer to the servo motor data sheets.

BSH servo motor/GBX gearbox combinations

Reduction ratios from 3:1 to 16:1

Type of servo motor	Reduction ratio							
	3:1	4:1	5:1	8:1	9:1	12:1	15:1	16:1
BSH 0551	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40
BSH 0552	GBX 40	GBX 40	GBX 40	GBX 60	GBX 40	GBX 40	GBX 60	GBX 60
BSH 0553	GBX 40	GBX 40	GBX 40	GBX 60	GBX 40	GBX 40	GBX 60	GBX 60
BSH 0701	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BSH 0702	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 60	GBX 80	GBX 80
BSH 0703	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 80	GBX 80	GBX 80
BSH 1001	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BSH 1002	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 120	GBX 120
BSH 1003	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 120	GBX 120	GBX 120
BSH 1004	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 160	GBX 160
BSH 1401	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 160	GBX 160
BSH 1402	GBX 120	GBX 120	GBX 120	GBX 160	–	GBX 160	GBX 160	GBX 160
BSH 1403	GBX 120	GBX 120	GBX 120	GBX 160	–	GBX 160	GBX 160	GBX 160
BSH 1404	GBX 120	GBX 120	GBX 160	GBX 160	–	GBX 160	GBX 160	GBX 160
BSH 2051	*(1)*	*(1)*	*(1)*	*(1)*	–	–	–	–

Reduction ratios from 20:1 to 100:1

Type of servo motor	Reduction ratio						
	20:1	25:1	32:1	40:1	60:1	80:1	100:1
BSH 0551	GBX 40	GBX 60	GBX 60	GBX 60	GBX 60	*(1)*	*(1)*
BSH 0552	GBX 60	GBX 60	GBX 60	*(1)*	*(1)*	*(1)*	*(1)*
BSH 0553	GBX 60	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*
BSH 0701	GBX 80	GBX 80	GBX 80	GBX 80	GBX 120	GBX 120	GBX 120
BSH 0702	GBX 80	GBX 80	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BSH 0703	GBX 80	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BSH 1001	GBX 80	GBX 120	GBX 120	GBX 120	–	–	–
BSH 1002	GBX 120	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1003	GBX 120	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1004	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1401	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1402	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1403	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1404	GBX 160	–	–	–	–	–	–
BSH 2051	–	–	–	–	–	–	–

(1) For this combination, please consult your Regional Sales Office.

GBX 60 *For these combinations, you must check that the application will not exceed the maximum output torque of the gearbox (see the values given on page 2/148).*

Lexium 05 motion control
BSH servo motors
Option: GBX planetary gearboxes

Characteristics of GBX gearboxes

Type of gearbox			GBX 40	GBX 60	GBX 80	GBX 120	GBX 160
Type of gearbox			Planetary gearbox with straight teeth				
Backlash	**3:1… 8:1**	**arc min**	< 24	< 16	< 9	< 8	< 6
	9:1… 40:1		< 28	< 20	< 14	< 12	< 10
	60:1… 100:1		< 30	< 22	< 16	< 14	–
Torsion rigidity	**3:1… 8:1**	**Nm/ arc min**	1	2.3	6	12	38
	9:1… 40:1		1.1	2.5	6.5	13	41
	60:1… 100:1		1	2.5	6.3	12	–
Noise level *(1)*		**dB (A)**	55	58	60	65	70
Casing			Black anodized aluminum				
Shaft material			C 45				
Shaft output dust and damp protection			IP 54				
Lubrication			Lubricated for life				
Average service life *(2)*		**hrs**	30,000				
Mounting position			Any position				
Operating temperature		**°C**	-25…+90				
Efficiency	**3:1…8:1**		0.96				
	9:1…40:1		0.94				
	60:1…100:1		0.9				
Maximum permitted radial force *(2) (3)*	L_{10h} = 10,000 hours	**N**	200	500	950	2000	6000
	L_{10h} = 30,000 hours	**N**	160	340	650	1500	4200
Maximum permitted axial force *(2)*	L_{10h} = 10,000 hours	**N**	200	600	1200	2800	8000
	L_{10h} = 30,000 hours	**N**	160	450	900	2100	6000
Moment of inertia of gearbox	**3:1**	**kgcm²**	0.031	0.135	0.77	2.63	12.14
	4:1	**kgcm²**	0.022	0.093	0.52	1.79	7.78
	5:1	**kgcm²**	0.019	0.078	0.45	1.53	6.07
	8:1	**kgcm²**	0.017	0.065	0.39	1.32	4.63
	9:1	**kgcm²**	0.03	0.131	0.74	2.62	–
	12:1	**kgcm²**	0.029	0.127	0.72	2.56	12.37
	15:1	**kgcm²**	0.023	0.077	0.71	2.53	12.35
	16:1	**kgcm²**	0.022	0.088	0.5	1.75	7.47
	20:1	**kgcm²**	0.019	0.075	0.44	1.5	6.65
	25:1	**kgcm²**	0.019	0.075	0.44	1.49	5.81
	32:1	**kgcm²**	0.017	0.064	0.39	1.3	6.36
	40:1	**kgcm²**	0.016	0.064	0.39	1.3	5.28
	60:1	**kgcm²**	0.029	0.076	0.51	2.57	–
	80:1	**kgcm²**	0.019	0.075	0.5	1.5	–
	100:1	**kgcm²**	0.019	0.075	0.44	1.49	–

(1) Value measured at a distance of 1 m, at no-load for a servo motor speed of 3000 rpm and a reduction ratio of 5:1.
(2) Values given for an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines for an ambient temperature of 30°C.
(3) Force applied at mid-point along the output shaft.

2

Characteristics of GBX gearboxes (continued)

Type of gearbox			GBX 40	GBX 60	GBX 80	GBX 120	GBX 160
Continuous output torque M_{2N} *(1)*	**3:1**	**Nm**	11	28	85	115	400
	4:1	**Nm**	15	38	115	155	450
	5:1	**Nm**	14	40	110	195	450
	8:1	**Nm**	6	18	50	120	450
	9:1	**Nm**	16.5	44	130	210	–
	12:1	**Nm**	20	44	120	260	800
	15:1	**Nm**	18	44	110	230	700
	16:1	**Nm**	20	44	120	260	800
	20:1	**Nm**	20	44	120	260	800
	25:1	**Nm**	18	40	110	230	700
	32:1	**Nm**	20	44	120	260	800
	40:1	**Nm**	18	40	110	230	700
	60:1	**Nm**	20	44	110	260	–
	80:1	**Nm**	20	44	120	260	–
	100:1	**Nm**	20	44	120	260	–
Maximum output torque *(1)*	**3:1**	**Nm**	17.6	45	136	184	640
	4:1	**Nm**	24	61	184	248	720
	5:1	**Nm**	22	64	176	312	720
	8:1	**Nm**	10	29	80	192	720
	9:1	**Nm**	26	70	208	336	–
	12:1	**Nm**	32	70	192	416	1280
	15:1	**Nm**	29	70	176	368	1120
	16:1	**Nm**	32	70	192	416	1280
	20:1	**Nm**	32	70	192	416	1280
	25:1	**Nm**	29	64	176	368	1120
	32:1	**Nm**	32	70	192	416	1280
	40:1	**Nm**	29	64	176	368	1120
	60:1	**Nm**	32	70	176	416	–
	80:1	**Nm**	32	70	192	416	–
	100:1	**Nm**	32	70	192	416	–

(1) Values given for an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines for an ambient temperature of 30°C.

Lexium 05 motion control
BSH servo motors
Option: GBX planetary gearboxes

References

GBX ●●●

Size	Reduction ratio	Reference	Weight kg
GBX 40	3:1, 4:1, 5:1 and 8:1	**GBX 040●●● ●●● ●F**	0.350
	9:1, 12:1, 15:1, 16:1 and 20:1	**GBX 040●●● ●●● ●F**	0.450
GBX 60	3:1, 4:1, 5:1 and 8:1	**GBX 060●●● ●●● ●F**	0.900
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 060●●● ●●● ●F**	1.100
	60:1	**GBX 060●●● ●●● ●F**	1.300
GBX 80	3:1, 4:1, 5:1 and 8:1	**GBX 080●●● ●●● ●F**	2.100
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 080●●● ●●● ●F**	2.600
	60:1, 80:1 and 100:1	**GBX 080●●● ●●● ●F** *(1)*	3.100
GBX 120	3:1, 4:1, 5:1 and 8:1	**GBX 120●●● ●●● ●F**	6.000
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 120●●● ●●● ●F**	8.000
	60:1, 80:1 and 100:1	**GBX 120●●● ●●● ●F**	10.000
GBX 160	5:1 and 8:1	**GBX 160●●● ●●● ●F**	18.000
	12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 160●●● ●●● ●F**	22.000

To order a GBX planetary gearbox, complete each reference above with:

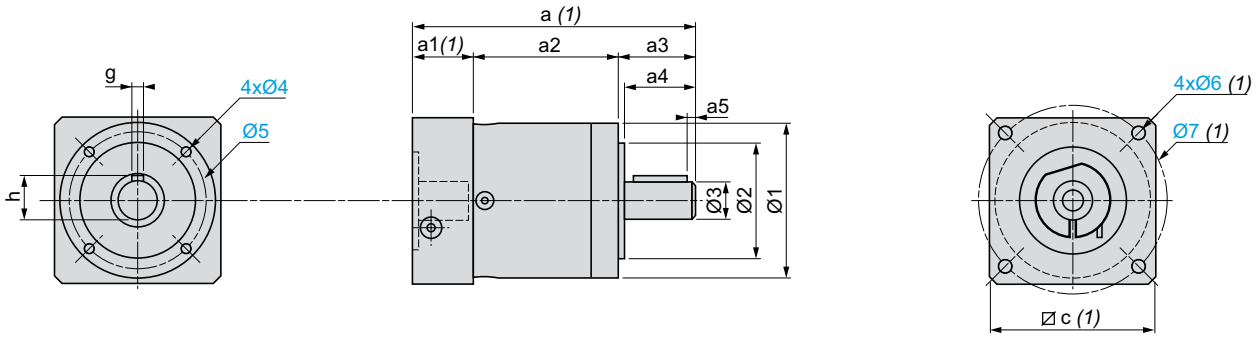
			GBX ●●●	●●●	●●●	●	F
Size	Diameter of the casing (see table of combinations with BSH servo motor on page 2/146)	40 mm	**040**				
		60 mm	**060**				
		80 mm	**080**				
		120 mm	**120**				
		160 mm	**160**				
Reduction ratio		3:1		**003**			
		4:1		**004**			
		5:1		**005**			
		8:1		**008**			
		9:1		**009**			
		12:1		**012**			
		15:1		**015**			
		16:1		**016**			
		20:1		**020**			
		25:1		**025**			
		32:1		**032**			
		40:1		**040**			
		60:1		**060**			
		80:1		**080**			
		100:1		**100**			
Associated BSH servo motor	Type	BSH 055			**055**		
		BSH 070			**070**		
		BSH 100			**100**		
		BSH 140			**140**		
		BSH 205			*(2)*		
	Model	BSH ●●●1				**1**	
		BSH ●●●2				**2**	
		BSH ●●●3				**3**	
		BSH ●●●4				**4**	
BSH servo motor adaptation							**F**

(1) For a GBX 080 gearbox/BSH 055● servo motor combination, please consult your Regional Sales Office.
(2) For a combination with a BSH 2051 servo motor, please consult your Regional Sales Office.

Lexium 05 motion control
BSH servo motors
Option: GBX planetary gearboxes

Dimensions

Servo motor assembly



GBX	a2	a3	a4	a5	hrs	g	Ø1	Ø2	Ø3	Ø4	Ø5
040 003...008	39	26	23	2.5	11.2	3	40	26 h7	10 h7	M4 x 6	34
040 009...020	52	26	23	2.5	11.2	3	40	26 h7	10 h7	M4 x 6	34
060 003...008	47	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
060 009...040	59.5	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
060 060	72	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
080 003...008	60.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
080 009...040	77.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
080 060...100	95	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
120 003...008	74	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
120 009...040	101	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
120 060...100	128	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
160 005, 008	104	87	80	8	43	12	160	130 h7	40 h7	M12 x 20	145
160 012...040	153.5	87	80	8	43	12	160	130 h7	40 h7	M12 x 20	145

(1) Dimensions a, a1, ⍁c, Ø6 and Ø7 depend on the planetary gearbox/BSH servo motor combination:

Combinations		Reduction ratios						
Gearbox	**Servo motor**	**3:1 to 8:1**	**9:1 to 40:1**	**60:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**
		a	**a**	**a**	**a1**	**⍁c**	**Ø6**	**Ø7**
GBX 040	**BSH 055●**	89.5	102.5	–	24.5	60	M4	63
GBX 060	**BSH 055●**	106	118.5	131.5	24	60	M4	63
GBX 060	**BSH 0701, 0702**	106	118.5	131.5	24	70	M5	75
GBX 060	**BSH 0703**	113	125.5	138.5	31	70	M5	75
GBX 080 *(2)*	**BSH 055●** *(2)*	–	151	168.5	33.5	80	M4	63
GBX 080	**BSH 070●**	133.5	151	168.5	33.5	80	M5	82
GBX 080	**BSH 1001…1003**	143.5	161	178.5	43.5	100	M8	115
GBX 120	**BSH 070●**	–	203.5	231	47.5	115	M5	75
GBX 120	**BSH 1001…1003**	176.5	203.5	231	47.5	115	M8	115
GBX 120	**BSH 1004**	186.5	213.5	241	57.5	115	M8	115
GBX 120	**BSH 140●**	186.5	213.5	–	57.5	140	M10	165
GBX 160	**BSH 1002…1004**	–	305	–	64.5	140	M8	115
GBX 160	**BSH 140●**	255.5	305	–	64.5	140	M10	165

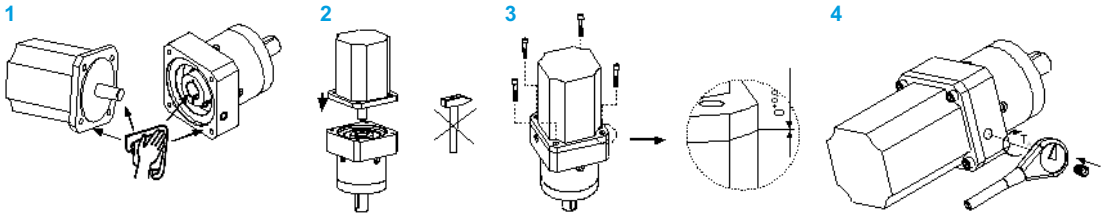
(2) For this combination, please consult your Regional Sales Office.

Lexium 05 motion control
BSH servo motors
Option: GBX planetary gearboxes

Mounting

No special tool is required for mounting the GBX planetary gearbox on the BSH servo motor. The usual rules for mechanical mounting must be followed:
1 Clean the bearing surfaces and seals.
2 Align the shafts that are to be coupled and assemble in vertical position.
3 Uniform adhesive force of the servo motor flange on the gearbox flange, with tightening of the Phillips screws.
4 Correct tightening torque of the TA ring using a torque wrench (2...40 Nm depending on the gearbox model).

For more information, refer to the instruction sheets supplied with the products.



Contents

3 - Lexium 15 motion control

Lexium 15 motion control
Presentation

Lexium 15 LP, 15 MP and 15 HP servo drives

Single axis application

Multi-axis application

Presentation

The compact dimensions of the Lexium 15 servo drive combined with the wide range of power ratings and power supplies available make it the ideal solution to meet the application requirements of all kinds of machinery.

This range is designed to control the torque, speed and/or position of BSH and BDH servo motors.

These motor-drive units are designed for high-performance applications requiring highly precise and dynamic position monitoring algorithms.

Lexium 15 servo drives

Applications

The Lexium 15 range of servo drives is designed to meet the requirements of the following types of application :

■ Single axis :

The integrated position indexer in Lexium 15 servo drives makes it possible to control the operation of a single axis.

■ Master/slave:

Operation in electronic gearing mode synchronizes the movement of several axes.

There are numerous communication bus and network connection possibilities available for both these types of application, including CANopen, Fipio, Modbus Plus, PROFIBUS DP and Modbus TCP, all enabling integration into a distributed automation architecture.

For multi-axis applications, you can also :

■ Connect a Lexium Controller motion controller, which extends the operating capabilities of Lexium 15 servo drives to include applications requiring complex synchronization of several axes, such as flying shear, rotary knife, grouping/ungrouping, clamping with torque control, etc.

■ Add a SERCOS option card, which, when connected to TSX CSY motion control modules on a Premium PLC, means that Lexium 15 servo drives can meet the performance requirements of complex applications

Operating modes

Lexium 15 servo drives feature a large number of operating modes:

■ Conventional adjustment modes:

□ Homing

□ Manual

■ Position control modes:

□ Point-to-point mode

□ Motion tasks

□ Electronic gearing

■ Speed mode:

□ Speed control

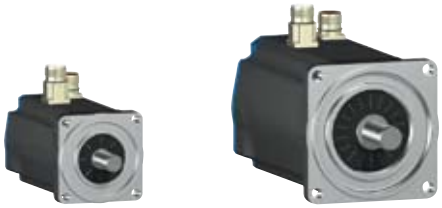
■ Torque mode:

□ Torque control

Configuration and setup

Unilink setup software is used to configure and adjust the parameters of Lexium 15 servo drives.

Lexium 15 motion control
Presentation



BSH 1001, BSH 1401 servo motors

BDH 0701, BDH 1882 servo motors

Lexium 15: A servo drive offer from Schneider Electric

BSH and BDH servo motors

BSH and BDH servo motors are synchronous three-phase motors.

They feature an integrated sensor, which can be a Resolver (BDH servo motor only) or a SinCos Hiperface® absolute encoder.
They can be supplied with or without a holding brake.

Two ranges of motors are offered to meet specific application requirements:
- BSH servo motors satisfy the demands for dynamics and high performance
- BDH servo motors satisfy the demands for compactness and adaptability

BSH servo motors: Dynamics and high performance

Thanks to their new winding technology based on salient poles, BSH servo motors are compact and offer a high power density.
The rotor's low inertia and the slight notching effect make it possible to meet the demands of both precision and dynamics.

The dynamics are enhanced by the fast sampling time of the Lexium 15 servo drive control loops:
- 62.5 µs for the current loop
- 250 µs for the speed loop
- 250 µs for the position loop

BDH servo motors: Compactness and adaptability

The design of the windings based on salient poles has been optimized for BDH servo motors to achieve one of the best torque/size ratios available on the market.

This compactness is available across 7 different flange sizes and, when combined with various measuring systems, offers optimum adaptability when designing your machines.

Lexium 15 motion control

Lexium 15 LP servo drives

LP servo drive/servo motor combinations

Lexium 15 LP servo drive/BDH or BSH servo motor combinations

Servo motors			Lexium 15 LP servo drives					
			200…240 V three-phase supply voltage			208…480 V three-phase supply voltage		
								
BDH (IP 54 or IP 67)	**BSH** (IP 50 or IP 65)	**Max. mechanical speed**	**LXM 15LD13M3**	**LXM 15LD21M3**	**LXM 15LD28M3**	**LXM 15LU60N4**	**LXM 15LD10N4**	**LXM 15LD17N4**
			Continuous output current (RMS)					
		rpm	**3 A**	**6 A**	**10 A**	**1.5 A**	**3 A**	**6 A**
BDH 0401B		8000	0.18/0.61 Nm					
BDH 0402C		8000	0.31/1.08 Nm					
BDH 0403C		8000	0.41/1.46 Nm					
	BSH 0551P	8000	0.5/1.4 Nm			0.5/1.4 Nm		
	BSH 0551T	8000	0.5/1.2/4 Nm					
BDH 0582C		8000				0.84/2.34 Nm		
BDH 0582E		8000	0.87/2.42 Nm					
	BSH 0552M	8000				0.9/2.25 Nm		
	BSH 0552P	8000	0.9/2.5 Nm			0.9/2.26 Nm		
	BSH 0552T	8000	0.9/1.5 Nm					
BDH 0583C		8000				1.13/3.2 Nm		
BDH 0583D		8000	1.16/3.58 Nm				1.16/3.58 Nm	
BDH 0583F		8000		1.18/3.52 Nm				
	BSH 0553M	8000				1.3/3.5 Nm		
	BSH 0553P	8000	1.3/2.7 Nm				1.3/3.87 Nm	
BDH 0584C		8000				1.38/3.94 Nm		
	BSH 0701P	8000	1.4/3.19 Nm	1.4/3.19 Nm		0.7/1.9 Nm	1.4/2.91 Nm	
	BSH 0701T	8000	1.4/2.66 Nm			1.4/2.66 Nm		
BDH 0584D		8000	1.41/4.4 Nm				1.41/4.4 Nm	
BDH 0584F		8000		1.42/4.46 Nm				
BDH 0701C		8000				1.15/3.34 Nm		
BDH 0701E		8000	1.2/3.24 Nm					
BDH 0702C		8000				2/5.74 Nm		
BDH 0702D		8000	2.04/6.51 Nm				2.04/6.51 Nm	
BDH 0702H		8000		2.1/5.36 Nm				
BDH 0703C		8000				2.71/7.83 Nm		
BDH 0703E		8000	2.79/8.55 Nm				2.79/8.55 Nm	
BDH 0703H		8000		2.88/7.35 Nm				
BDH 0841C		6000				1.95/5.12 Nm		
BDH 0841E		6000	2.02/5.33 Nm				2.02/5.13 Nm	
BDH 0841H		6000		2.06/4.78 Nm				
	BSH 0702M	8000				2.12/5.63 Nm		
	BSH 0702P	8000	2.2/5.63 Nm				2.2/4.85 Nm	
	BSH 0702T	8000		2.12/5.45 Nm				2.12/4.47 Nm
	BSH 0703P	8000	2.23/6 Nm	2.83/9.28 Nm		1.1/3.3 Nm	2.4/5.3 Nm	2.83/7.71 Nm
	BSH 0703T	8000			2.83/7.38 Nm			
	BSH 1004T	6000			8.18/15.7 Nm			
	BSH 1401P	4000			11.1/23 Nm			
	BSH 1402P	4000			14.9/28.71 Nm			

0.18/0.61 Nm *The 1st value corresponds to the continuous torque on stopping. The 2nd value corresponds to the peak torque on stopping.*

Selection example:

Servo motor **BDH 0401B** *combined with servo drive* **LXM 15LD13M3** *meets the requirements of applications needing a maximum of 0.18 Nm continuous torque on stopping, 0.61 Nm peak torque on stopping and 8000 rpm mechanical speed.*

Lexium 15 motion control

Lexium 15 LP servo drives

LP servo drive/servo motor combinations

Lexium 15 LP servo drive/BDH or BSH servo motor combinations (continued)

Servo motors			Lexium 15 LP servo drives					
			200…240 V three-phase supply voltage			208…480 V three-phase supply voltage		
BDH (IP 54 or IP 67)	BSH (IP 50 or IP 65)	Max. mechanical speed	LXM 15LD13M3	LXM 15LD21M3	LXM 15LD28M3	LXM 15LU60N4	LXM 15LD10N4	LXM 15LD17N4
			Continuous output current (RMS)					
		rpm	3 A	6 A	10 A	1.5 A	3 A	6 A
BDH 0842C		6000				3.35/9.37 Nm		
	BSH 1001P	6000		3.39/7.08 Nm			3.39/6.19 Nm	3.39/7.08 Nm
	BSH 1001T	6000			3.39/8.5 Nm			
BDH 0842E		6000	3.42/9.72 Nm				3.42/9.41 Nm	
BDH 0842G		6000		3.53/9.56 Nm				3.53/8.66 Nm
BDH 0842J		6000			3.56/7.56 Nm			
BDH 0843E		6000					4.7/11.7 Nm	
BDH 0843G		6000		4.8/13.2 Nm				4.8/11.68 Nm
BDH 0843K		6000			4.9/9.02 Nm			
	BSH 1002P	6000	3.4/5.6 Nm	5.8/14.79 Nm			3.4/8 Nm	5.8/12.13 Nm
	BSH 1002T	6000			5.5/11.59 Nm			
BDH 0844E		6000					5.76/14.1 Nm	
BDH 0844G		6000		5.88/16.1 Nm				5.88/13.97 Nm
BDH 0844J		6000			6/12.18 Nm			
BDH 1081E		6000					4.7/10.71 Nm	
BDH 1081G		6000		4.75/10.82 Nm				4.75/10.82 Nm
BDH 1081K		6000			4.9/9.22 Nm			
	BSH 1003M	6000					7.76/15.19 Nm	7.76/22.95 Nm
	BSH 1003P	6000		6.7/15.5 Nm	7.8/19.69 Nm			6.7/12.5 Nm
BDH 1082E		6000					8.34/18.08 Nm	
BDH 1082G		6000		8.43/19.51 Nm				8.43/19.51 Nm
BDH 1082K		6000			8.6/16.9 Nm			
	BSH 1004M	6000					9.31/19.8 Nm	9.31/29.87 Nm
BDH 1083G		6000						11.4/25.83 Nm
BDH 1083K		6000			11.6/22.9 Nm			
BDH 1084G		6000						14.3/31.7 Nm
BDH 1084K		6000			14.4/28.1 Nm			
BDH 1382G		6000						11.9/25.6 Nm
BDH 1382K		6000			12.2/22.7 Nm			
BDH 1383G		6000						16.5/38.4 Nm
BDH 1383K		6000			16.8/31 Nm			

3.35/9.37 Nm *The 1st value corresponds to the continuous torque on stopping. The 2nd value corresponds to the peak torque on stopping.*

Selection example:

Servo motor **BDH 0842C** *combined with servo drive* **LXM 15LU60N4** *meets the requirements of applications needing a maximum of 3.35 Nm continuous torque on stopping, 9.37 Nm peak torque on stopping and 6000 rpm mechanical speed.*

Lexium 15 motion control

Lexium 15 MP servo drives

MP servo drive/servo motor combinations

Lexium 15 MP servo drive/BDH or BSH servo motor combinations

Servo motors | **Lexium 15 MP servo drives**

208…480 V three-phase supply voltage

BDH (IP 54 or IP 67)	BSH (IP 50 or IP 65)	Max. mechanical speed	LXM 15MD28N4	LXM 15MD40N4	LXM 15MD56N4
			Continuous output current (RMS)		
		rpm	10 A	14 A	20 A
BDH 0842J		6000	3.56/7.56 Nm		
BDH 0843K		6000	4.9/9.02 Nm		
BDH 0844J		6000	6/12.18 Nm		
BDH 1081K		6000	4.9/9.22 Nm		
	BSH 1003P	6000	7.8/19.69 Nm	7.8/23.17 Nm	
BDH 1082K		6000	8.6/16.9 Nm		
BDH 1082M		6000		8.6/16.7 Nm	
	BSH 1004M	6000		9.31/34.17 Nm	
	BSH 1004P	6000	9.31/25.7 Nm	9.31/33.83 Nm	
	BSH 1004T	6000		9.31/21.04 Nm	
BDH 1083K		6000	11.6/22.9 Nm		
BDH 1083M		6000		11.4/22.1 Nm	
BDH 1083P		6000			11.4/22.2 Nm
	BSH 1401M	4000	11.1/26 Nm		
	BSH 1401P	4000	11.1/23.33 Nm	11.1/23.33 Nm	
	BSH 1401T	4000			11.1/23.33 Nm
BDH 1084K		6000	14.4/28.1 Nm		
BDH 1084L		6000		14.1/27.28 Nm	
BDH 1084N		6000			14.1/25.5 Nm
BDH 1382K		6000	12.2/23.53 Nm		
BDH 1382M		6000		12.2/22.8 Nm	
BDH 1382P		6000			12.3/23.2 Nm
BDH 1383K		6000	16.8/31 Nm		
BDH 1383M		6000		17/31.4 Nm	
BDH 1383N		6000			17/34.8 Nm
	BSH 1402M	4000		19.5/47.5 Nm	
	BSH 1402P	4000	14.9/28.71 Nm	19.5/39.3 Nm	19.5/47.5 Nm
BDH 1384K		6000	20.8/41.2 Nm		
BDH 1384L		6000		21/41.9 Nm	
BDH 1384P		6000			20.4/40.2 Nm
BDH 1385K		6000	24.8/46.8 Nm		
BDH 1385M		6000		25/47.6 Nm	
BDH 1385N		6000			24.3/50.2 Nm

3.56/7.56 Nm *The 1st value corresponds to the continuous torque on stopping. The 2nd value corresponds to the peak torque on stopping.*

Selection example:

Servo motor **BDH 0842J** *combined with servo drive* **LXM 15MD28N4** *meets the requirements of applications needing a maximum of 3.56 Nm continuous torque on stopping, 7,56 Nm peak torque on stopping and 6000 rpm mechanical speed.*

Lexium 15 motion control

Lexium 15 MP and Lexium 15 HP servo drives

MP or HP servo drive/servo motor combinations

Lexium 15 MP servo drive/BDH or BSH servo motor combinations (continued)

Servo motors			Lexium 15 MP servo drives 208…480 V three-phase supply voltage		
					
BDH (IP 54 or IP 67)	**BSH** (IP 50 or IP 65)	**Max. mechanical speed**	**LXM 15MD28N4**	**LXM 15MD40N4**	**LXM 15MD56N4**
			Continuous output current (RMS)		
		rpm	**10 A**	**14 A**	**20 A**
	BSH 1403M	4000		27.8/71.76 Nm	
	BSH 1403P	4000		22.2/41.6 Nm	27.8/57.3 Nm
BDH 1882K		6000	29.7/59.4 Nm		
BDH 1882M		6000		30/59.8 Nm	
BDH 1882P		6000			29.4/58.4 Nm
	BSH 1404M	4000		33.4/82.32 Nm	33.4/95 Nm
	BSH 2051M	3800		36/68.33 Nm	36/68.33 Nm
BDH 1883M		6000		42/80.7 Nm	
BDH 1883P		6000			41.6/79.4 Nm
BDH 1884L		6000		53/108 Nm	
BDH 1884P		6000			52.5/106 Nm
	BSH 2051P	3800		22.4/43.8 Nm	32/61.2 Nm

Lexium 15 HP servo drive/BSH servo motor combinations

Servo motors		Lexium 15 HP servo drives 208…480 V three-phase supply voltage	
			
BSH (IP 50 or IP 65)	**Max. mechanical speed**	**LXM 15HC11N4X**	**LXM 15HC20N4X**
		Continuous output current (RMS)	
	rpm	**40 A**	**70 A**
BSH 2051M	3800	36/68.33 Nm	
BSH 2051P	3800	34/110 Nm	
BSH 2052M	3800	62.5/220 Nm	62.5/220 Nm
BSH 2052P	3800	62.5/189.9 Nm	62.5/220 Nm
BSH 2053M	3800	88/330 Nm	80/330 Nm
BSH 2053P	3800		88/330 Nm

36/68.33 Nm *The 1st value corresponds to the continuous torque on stopping. The 2nd value corresponds to the peak torque on stopping.*

Selection example:

Servo motor **BSH 2051M** *combined with servo drive* **LXM 15HC11N4X** *meets the requirements of applications needing a maximum of 36 Nm continuous torque on stopping, 68.33 Nm peak torque on stopping and 3800 rpm mechanical speed.*

Lexium 15 motion control
Lexium 15 LP, 15 MP and 15 HP servo drives

Lexium 15 LP, 15 MP and 15 HP servo drives

BSH 0701 servo motor

BSH 1401 servo motor

BDH 0701 servo motor

BDH 1081 servo motor

An offer tailored to your needs

The Lexium 15 range of servo drives combined with BSH and BDH servo motors constitutes an offer that is perfectly tailored to the requirements of your applications.

This offer covers a wide range of supply voltages and power ratings.
In order to keep costs down and ensure ease of adaptation to different applications, the Lexium 15 range of servo drives comprises 3 models:

■ **Lexium 15 LP servo drives:**
□ 200…240 V single-phase, 0.9 kW to 1.2 kW (LXM 15LD●●M3)
□ 200…240 V three-phase, 1 kW to 3.4 kW (LXM 15LD●●M3)
□ 208…480 V three-phase, 1.1 kW to 4.3 kW (LXM 15L●●●N4)
■ **Lexium 15 MP servo drives:**
□ 208…480 V three-phase, 5.7 kW to 11.4 kW (LXM 15MD●●N4)
■ **Lexium 15 HP servo drives:**
□ 208…480 V three-phase, 22.3 kW to 42.5 kW (LXM 15HC●●N4X)

Lexium servo motors:
■ **BSH servo motors** (see pages 3/200 to 3/203):
□ Nominal torque: 0.41 Nm to 80.2 Nm
□ Nominal speed: 500 to 8000 rpm
■ **BDH servo motors** (see pages 3/138 to 3/141):
□ Nominal torque: 0.17 Nm to 48 Nm
□ Nominal speed: 600 to 8000 rpm

The Lexium 15 motion control offer also includes GBX planetary gearboxes. Easy to mount and lubricated for life, these gearboxes are available in 15 reduction ratios, ranging from 3:1 to 100:1, for BSH servo motors and 12 reduction ratios, ranging from 3:1 to 40:1, for BDH servo motors. GBX gearboxes are economical and are designed for high inertia applications.

Lexium 15 servo drives comply with EN 50178, IEC/EN 61439-1, IEC/EN 60204-1, EN 292, IEC/EN 61800-3 international standards and carry UL (USA) and cUL (Canada) approvals and CE marking.

A complete unit

The Lexium 15 motion control offer integrates functions and components that are usually external, thus saving space and making it easier to integrate the servo drive into enclosures or machines.

Electromagnetic compatibility (EMC)

The incorporation of class A EMC filters in Lexium 15 LP and Lexium 15 MP servo drives is a low-cost means of ensuring machines meet CE marking requirements. Lexium 15 HP servo drives do not include an EMC filter. Filters are available as an option and can be installed by the customer to reduce the level of emissions (see pages 3/48 and 3/49).

Safety

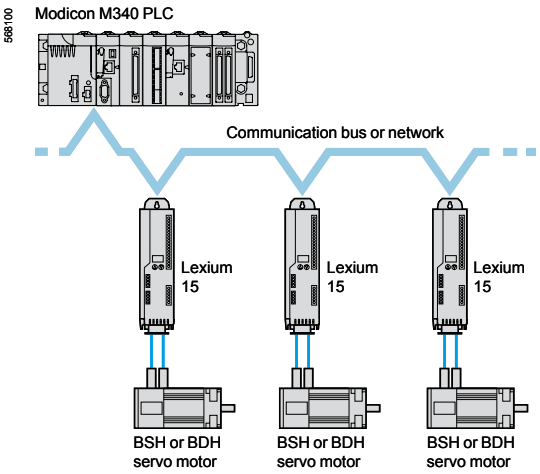
The Lexium 15 servo drive forms part of an installation's safety system. It integrates the Power Removal safety function which prevents unintended operation of the servo motor. This function complies with:
■ Machinery standard EN 954-1 category 3 for Lexium 15 LP servo drives
■ Machinery standard EN 954-1 category 1 for Lexium 15 MP and Lexium 15 HP servo drives

The Power Removal safety function describes the wiring of your safety circuits. The diagrams on pages 3/54 to 3/63 show wiring that complies with standard EN 954-1 categories 1, 2, 3 or 4.

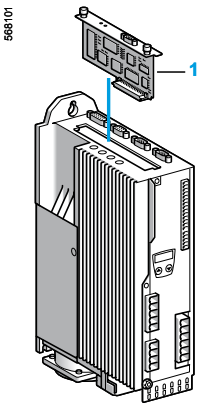
Braking

Lexium 15 LP and Lexium 15 MP servo drives integrate a resistor as standard, which does away with the need to use an external braking resistor in most applications. Lexium 15 HP servo drives do not include an integrated braking resistor. Braking resistors are available as an option.

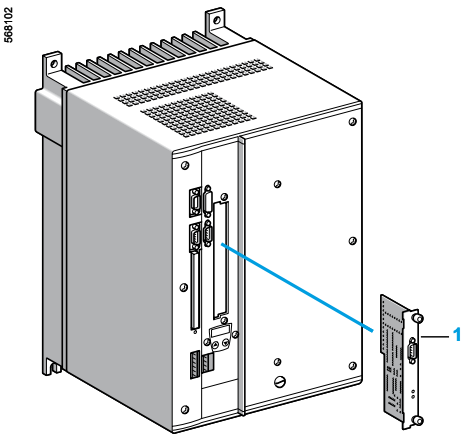
Lexium 15 motion control
Lexium 15 LP, 15 MP and 15 HP servo drives



Example architecture



Lexium 15 LP and 15 MP servo drives: mounting the option card



Lexium 15 HP servo drive: mounting the option card

Control and interfaces

The Lexium 15 multifunction servo drive range can be controlled in a number of ways:

- The programming of motion tasks in its integrated position indexer provides an economical, dynamic solution (10 ms response time and +/- 1 ms“jitter”) for your single-axis applications.
- A wide range of position feedback possibilities for Lexium 15 servo drives (A/B incremental encoder; SSI, EnDat®, Hiperface®, etc., absolute encoders) provides, with no additional option card, infinite openness for simple master/slave applications or for applications which require the use of an external encoder.

In addition to the above possibilities for controlling the Lexium 15 servo drive, there is a wide range of option cards. The additional I/O card and communication cards enable you to get the best from your machine.

The Lexium 15 servo drive also integrates more conventional control functions such as a pulse/direction input and two ± 10 V analog setpoint inputs in order to adapt to all types of axis control card.

The SERCOS option card extends the control possibilities of the servo drive even further, enabling it to meet the requirements of complex multi-axis applications.

Simplicity

Integration

The high level of integration, the compact size and the ability to mount the servo drives side by side mean that enclosures can be smaller.

Setup

Using the SinCos Hiperface® encoder on BSH and BDH servo motors, the Lexium 15 servo drive automatically receives data from the servo motor. The servo motor parameters do not need to be set manually.

The Unilink software graphic interface guides you through the configuration of each of the parameters of your axes.

The ability to program motion tasks enables fast configuration of machines. Simply enter the data of the various sequences of the application and set the parameters of the motion sequence.

With its Oscilloscope and Bode Diagram functions, the Unilink software can be used for accurate setting of the various servo drive filter parameters for optimum machine control.

Options

The Lexium 15 servo drive can take one of the following option cards **1**:

- Communication card (see pages 61009-EN/2 to 61009-EN/13)
- SERCOS card (see page 3/42)
- I/O extension card (see page 3/43)

External options can be used with the Lexium 15 servo drive:

- Braking resistors (see pages 3/44 to 3/47)
- Additional EMC input filters (see pages 3/48 and 3/49)
- Line chokes (see page 3/50)
- Motor chokes (see page 3/51)

Lexium 15 motion control
Lexium 15 servo drives

Motion control applications

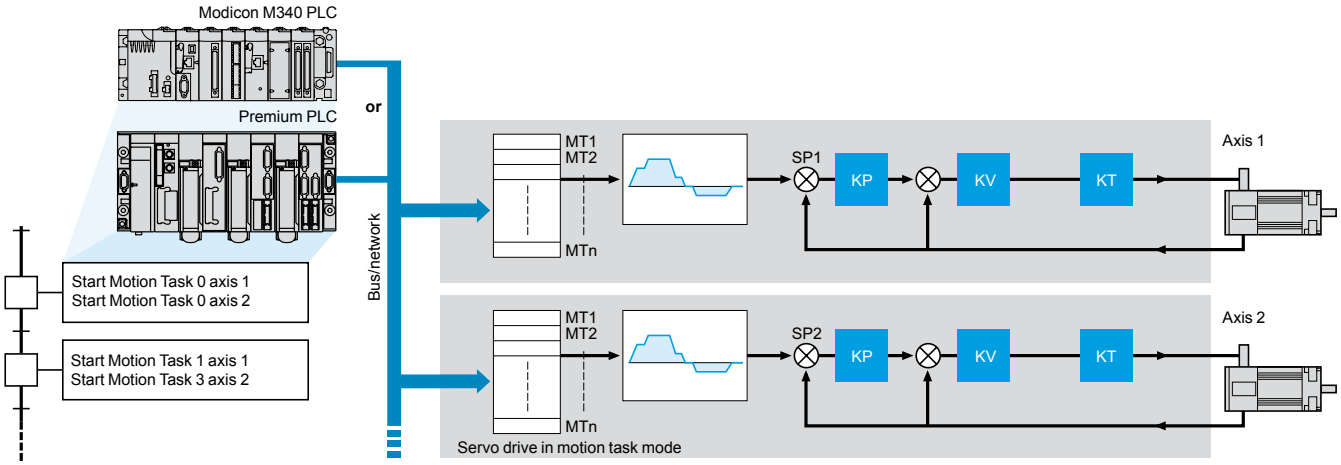
The Lexium 15 servo drive integrates the CANopen protocol as standard.
It is also possible to connect to other communication buses and networks by adding an option card:
- Fipio
- Modbus Plus
- PROFIBUS DP
- Modbus TCP

For applications requiring fast synchronization of axes, the Lexium 15 servo drive can be connected to a SERCOS module using its option card.

This type of architecture provides a high-performance response to four types of application:
- Applications with independent axes controlled by PLC
- Applications with independent axes controlled by motion controller
- Applications with master/slave operation in analog mode
- Applications with synchronized axes

Applications with independent axes controlled by a PLC

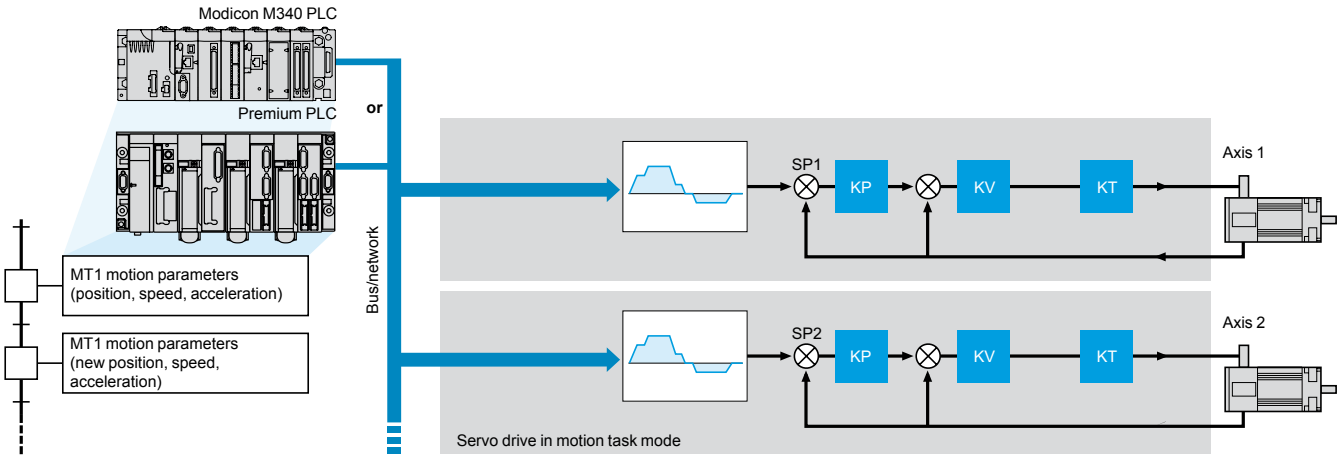
Using Motion Tasks (MT)



The Motion Tasks (MT) for each Lexium 15 servo drive are managed using simple motion task activation/deactivation commands (start, stop, etc.) from the PLC.

Note: *Typical number of servo drives controlled: 16*

Using the Direct Move function

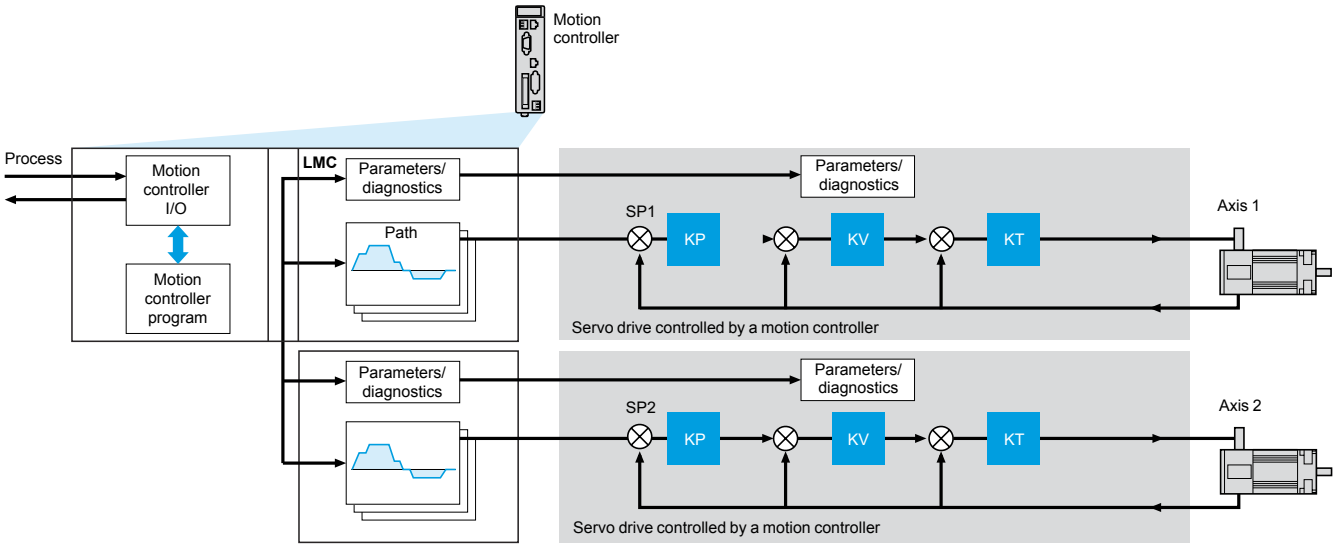


The PLC updates the parameters (position, speed, acceleration) of each Direct Move executed immediately in each Lexium 15 servo drive.

Note: *Typical number of servo drives controlled: 4 to 8*

Motion control applications (continued)

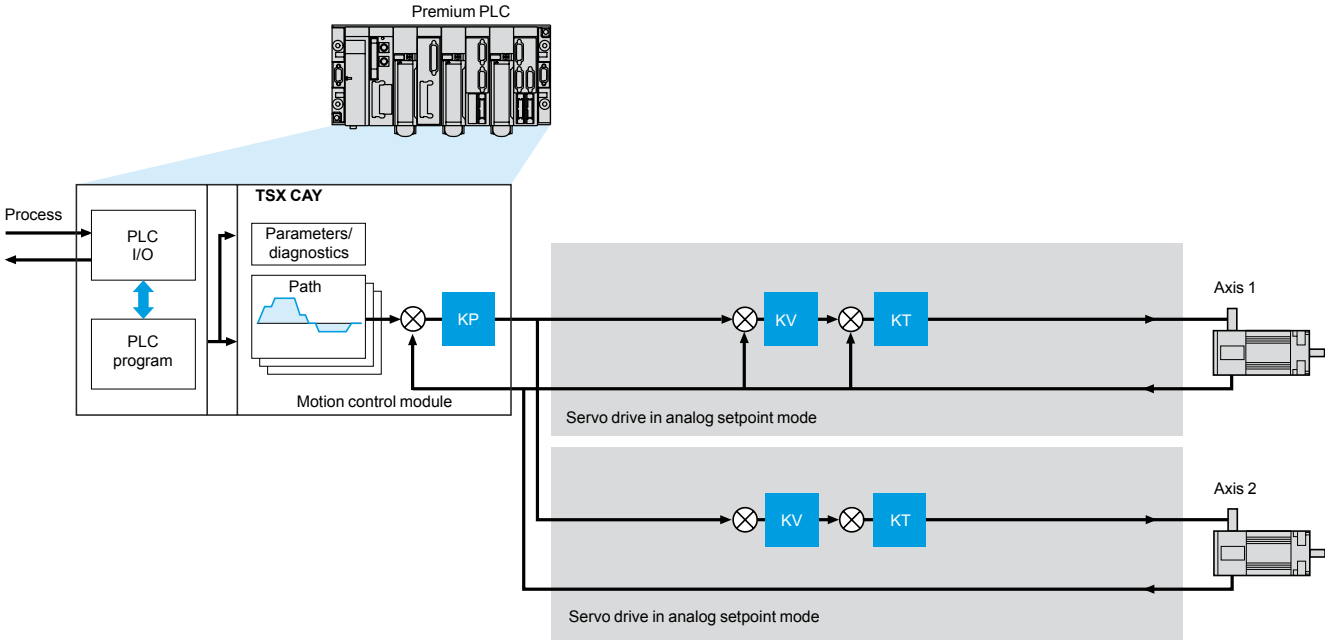
Applications with independent axes controlled by a motion controller



The Lexium Controller coordinates up to 8 independent axes via the CANopen Motionbus and up to 32 independent axes via the CANopen machine bus.
The Lexium 15 servo drive position loop KP, speed loop KV and torque loop KT parameters are configured and adjusted using Unilink software or the Lexium Controller's integrated software solution, Easy Motion.
The Lexium Controller can access all available CANopen machine bus parameters in order to configure or diagnose the Lexium 15 servo drives.

Note: *Typical number of servo drives controlled: 4 to 8*

Applications with master/slave operation in analog mode



The Lexium 15 servo drive with analog setpoint is used with the TSX CAY 2●/33/4● motion control module (with Premium platform).

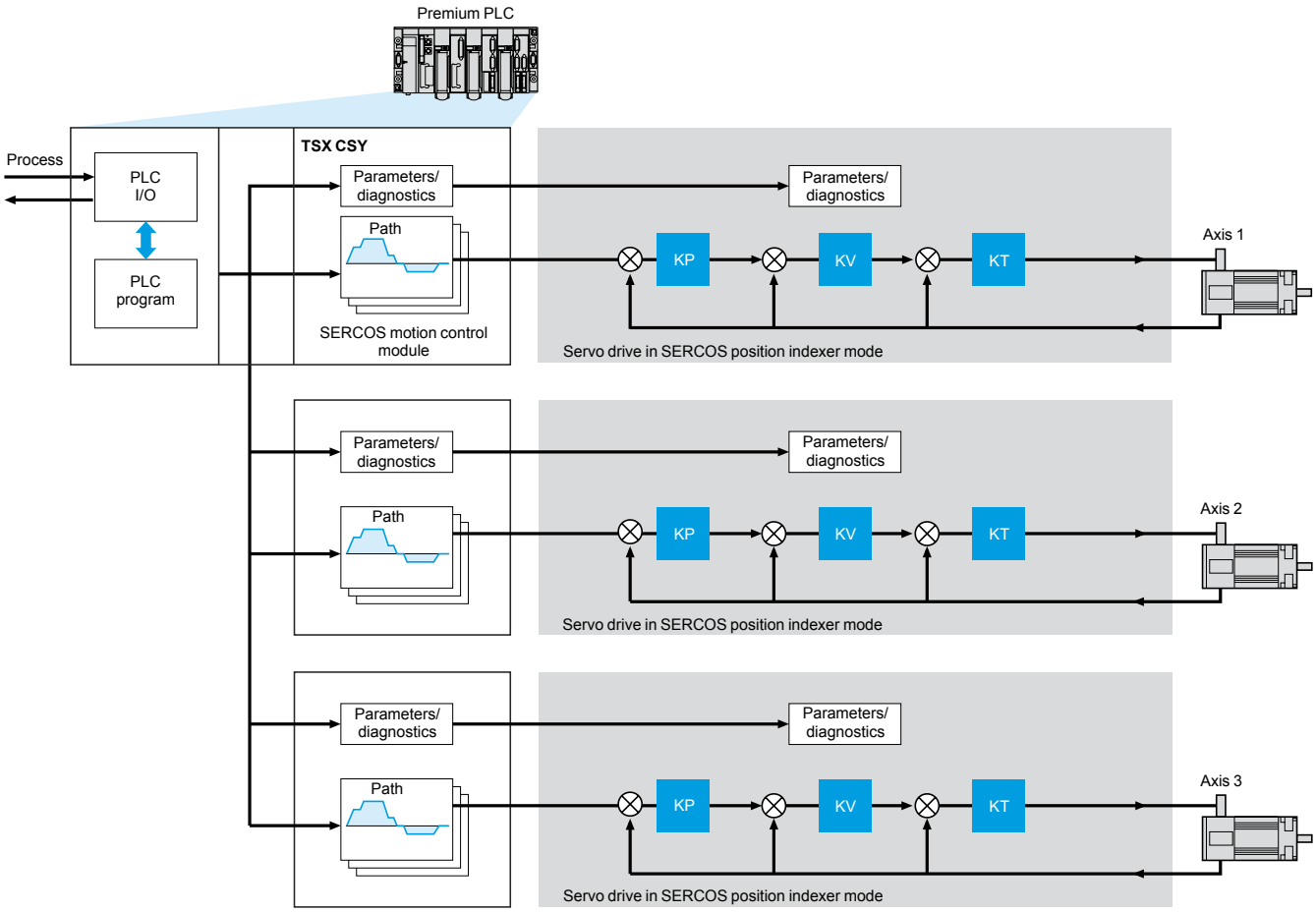
The position loop KP is executed in the automation platform's TSX CAY control module. It is configured and adjusted using PL7 Junior/Pro or Unity Pro programming software.
The Lexium 15 servo drive speed loop KV and torque loop KT parameters are configured and adjusted using Unilink software.
The motion program, which defines the paths, is contained in the Premium platform application program. The position and speed setpoints are calculated by the motion control module.

Note: *Typical number of servo drives controlled: 2 to 4*

Motion control applications (continued)

Applications with synchronized axes

Via Premium PLC and TSX CSY card



The Lexium 15 servo drive equipped with the AM0 SER 001V000 SERCOS option card is used with TSX CSY 84/85 and TSX CSY 164 motion control modules (with Premium platform).

The Lexium 15 servo drive position loop KP, speed loop KV and torque loop KT parameters are configured and adjusted using Unilink software.

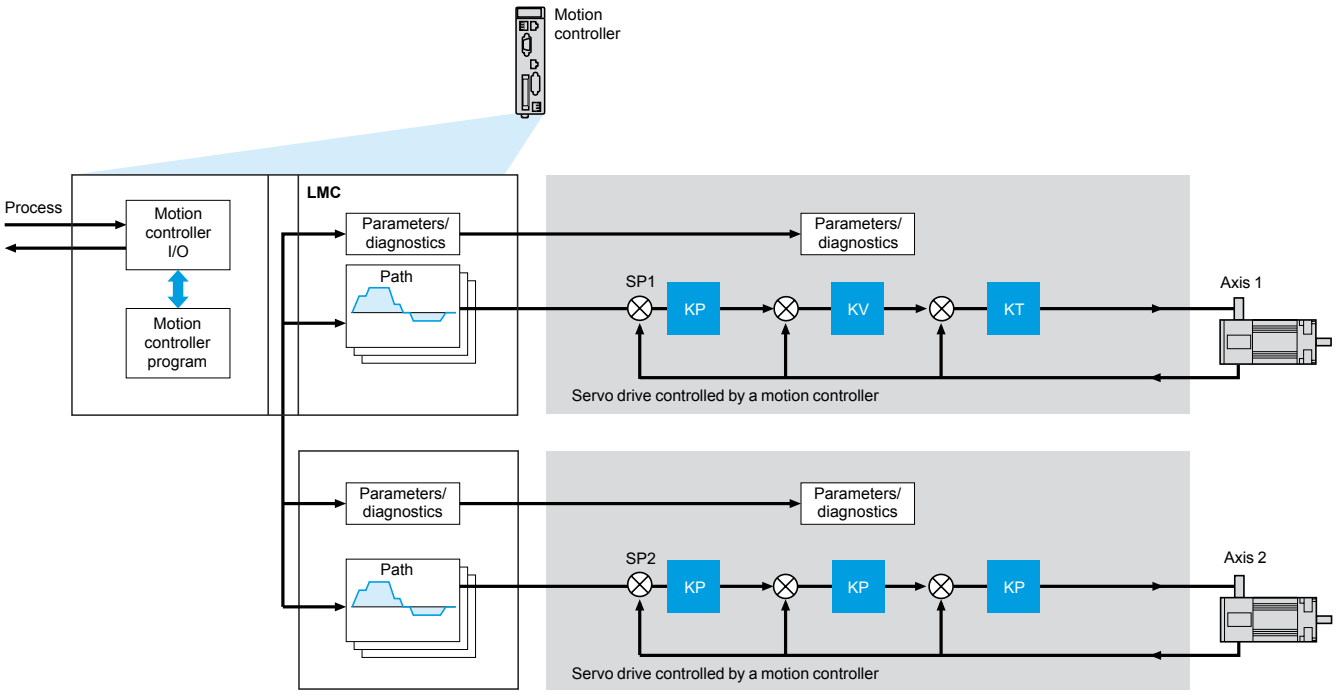
The motion program, which defines the paths, is contained in the Premium platform application program. The position setpoints are calculated by the motion control module (position mode).
The motion control module can also calculate the speed reference (speed mode) or the current reference (torque mode). These two modes can be accessed with the assistance of Schneider application services.

Note: *Typical number of servo drives controlled: 2 to 16*

Motion control applications (continued)

Applications with synchronized axes (continued)

Via motion controller



The Lexium Controller synchronizes up to 8 axes via the CANopen Motionbus.

This architecture allows the Lexium 15 servo drive axes to be controlled according to complex cam profiles and makes use of the application function block library (for flying shear, rotary knife, grouping/ungrouping and clamping with torque control applications).

The Lexium 15 servo drive position loop KP, speed loop KV and torque loop KT parameters are configured and adjusted using Unilink software or the Lexium Controller's integrated software solution, Easy Motion.

The Lexium Controller can access all available CANopen machine bus parameters in order to configure or diagnose the Lexium 15 servo drives.

Note: *Typical number of servo drives controlled: 4 to 8*

Debugging

Unilink, PL7 Junior/Pro or Unity Pro software provide simple solutions for debugging motion control applications.

In the context of programming applications with independent servo drives, Unilink software makes it easier to program motion tasks and configure your network architecture.
It can be used to adjust the following communication bus and network parameters:
- The address of each of the master controller's slave servo drives
- The transmission speed
- The network monitoring parameters

This software also provides access to the debugging and diagnostics screens specific to each communication bus and network.

On the PLC side, in addition to these functions, there are screens specific to the PL7 Junior/Pro and Unity Pro software for debugging and diagnostics of communication buses and networks:
- Access to CANopen Motion Function Blocks under Unity Pro
- Fipio, Modbus Plus and Profibus DP service screens under PL7 Junior/Pro or Unity Pro

In the context of programming applications with master/slave operation or applications with coordinated axes, Unilink software can be used to adjust the control parameters of each of the axes.

On the PLC side, the position parameters are accessed via the TSX CAY and TSX CSY motion control module parameter screens in PL7 Junior/Pro or Unity Pro.

Lexium 15 motion control
Lexium 15 servo drives

Overview of Lexium 15 servo drive functions

Lexium 15 servo drives integrate numerous operating modes, enabling them to be used in a wide range of industrial applications.

These functions include:
■ Conventional adjustment modes:
□ Homing mode
□ Manual mode (JOG)

■ Operating modes:
□ Position control:
- Point-to-point mode
- Motion tasks mode
- Electronic gearing mode

□ Speed control:
- Speed control according to an acceleration/deceleration ramp
- Instantaneous speed control

□ Torque control:
- Torque control

Each of these operating modes is available offline and/or via the communication buses and networks.

Offline
The servo drive parameters are defined using Unilink configuration software. Movements are then controlled by:
■ The position indexer integrated in the servo drive, by programming motion tasks
■ Analog signals (± 10 V) (14 resolution bits)
■ RS 422/485 signals (pulse/direction or A/B signals)
In this mode, limit switches and homing switches are not managed by the servo drive.

Via communication buses and networks
All the servo drive parameters and the parameters associated with the operating modes are accessible via the communication buses and networks as well as via the Unilink configuration software.

The table below shows the control type and the setpoint value sources available for each operating mode.

Operating mode	Control		Transmission of setpoint value
	Via communication buses and networks	Offline	
Adjustment modes			
Homing	■	■	Communication buses and networks or Unilink software
Manual mode (JOG)	■	■	Communication buses and networks, Unilink software, encoder signals, pulse/direction or A/B signals
Operating modes			
Point-to-point mode	■	□	Communication buses and networks
Motion tasks mode	■	■	Communication buses and networks or Unilink software
Electronic gearing mode	■	■	Encoder signals, pulse/direction or A/B signals
Speed control with ramp	■	□	Communication buses and networks
Instantaneous speed control	■	■	Analog input or communication buses and networks
Torque control	■	■	Analog input or communication buses and networks

■ Functions available
□ Functions not available

Homing mode

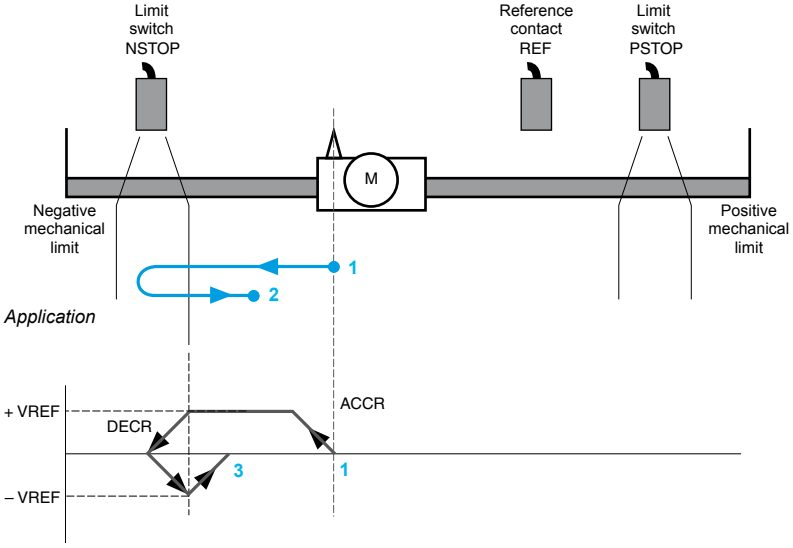
Before executing a movement, a homing operation must be carried out.
Homing consists of associating an axis position with a known mechanical position. This position then becomes the reference position for any subsequent movement of the axis.

Homing is carried out using one of the following methods:
- Searching for a reference sensor
- One servo motor revolution with a “Zero marker”
- Immediate writing of the actual position register (forced homing)

Homing with search for reference sensor

There are five possible types of homing with search for reference sensor:
- Homing on - limit switch, “NSTOP”
- Homing on + limit switch, “PSTOP”
- Homing on reference contact “REF” with initial movement in negative direction of rotation
- Homing on reference contact “REF” with initial movement in positive direction of rotation
- Homing on the mechanical limit of the axis

These homing movements can be executed with or without taking the “Zero marker” pulse into account.



Example of a homing movement on “NSTOP” limit switch with “Zero marker”

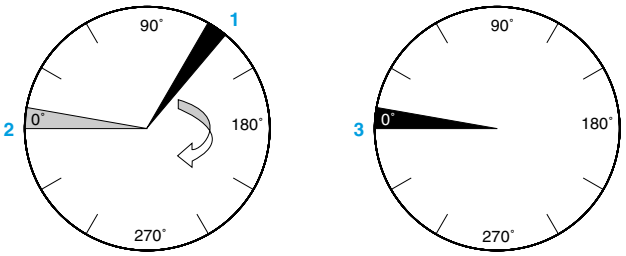
1 Start point of the homing movement
2 New home point of the movement
3 Zero marker
ACCR: Homing acceleration ramp
DECR: Homing deceleration ramp
VREF: Homing speed

3

Homing mode (continued)

Homing on one servo motor revolution with a "Zero marker"

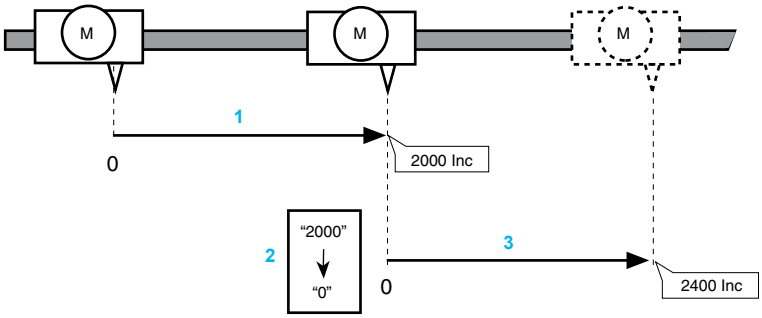
Homing on one revolution consists of setting the "Zero marker" point as the new reference point.



1 Start point of the homing movement
2 Zero marker
3 New home point of the movement

Forced homing

Three types of forced homing are possible:
■ Simple forced homing: The current position of the servo motor is set as the new reference point and the following error is lost.
■ Forced homing without loss of following error: The actual position of the servo motor is set as the new reference point and the following error is retained.
■ Forced homing on SSI encoder: This is simple forced homing specific to SSI encoders. When the application is started, the position is read in the encoder and set as the new reference point.



Operation with forced homing

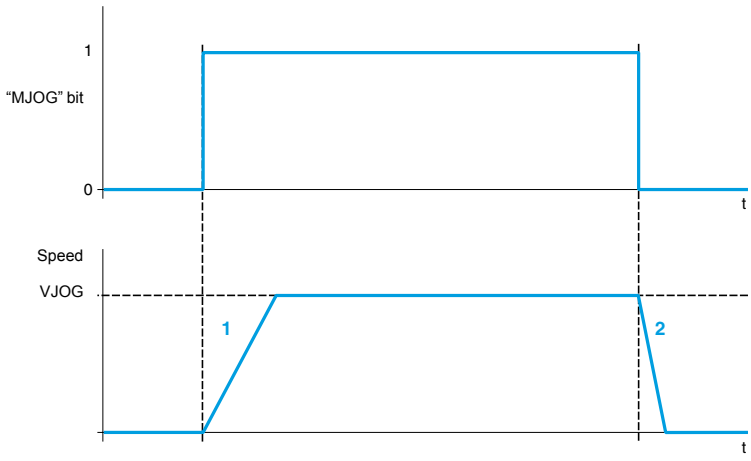
After power-up, the position value is 0.
1 Start towards the home point: the motor is positioned using a relative movement of 2000 increments.
2 Forced homing to value 0 by writing the actual position expressed in user units.
3 Initiation of a command to move 2400 increments to the absolute position. The final position is 2400 increments (4400 increments if forced homing has not been performed).

Manual mode (JOG)

This mode enables an axis to be moved manually when the speed control and motion tasks operating modes are selected. The movement is executed continuously at a constant speed as long as this mode is activated. Various parameters, such as acceleration, movement speed and deceleration are used to configure manual mode.

This adjustment mode can be configured via the communication buses and networks or via Unilink software.

Example



Machine adjustment in manual mode (JOG)

1 The acceleration ramp can be configured via the "ACCR" parameter.
2 The deceleration ramp can be configured via the "DECR" parameter.

On a rising edge of the "MJOG" bit, a movement is executed according to the acceleration ramp "ACCR" up to the manual movement speed "VJOG".
On a falling edge of the "MJOG" bit, the movement speed decreases according to the deceleration ramp "DECR".

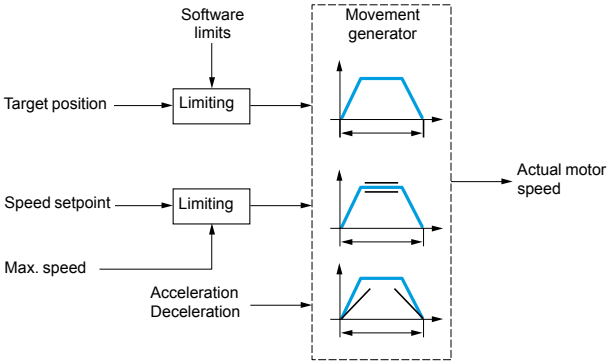
Point-to-point mode

This mode, also referred to as PTP (Point To Point), is used to move the axis from a position A to a position B. The movement can be:
■ Absolute: This consists of expressing position B in relation to a home position. The axis must have previously been referenced.
■ Relative: The movement is performed in relation to the current position A of the axis.

The movement is executed according to the acceleration, deceleration and speed parameters.

Setpoint value

The setpoint values are transmitted via the communication bus or network.



Point-to-point mode, absolute and relative

Possible applications

A motion controller for coordinated axes or a PLC can manage several axes controlled via fieldbus. This mode is often used in material handling, automated inspection, etc.

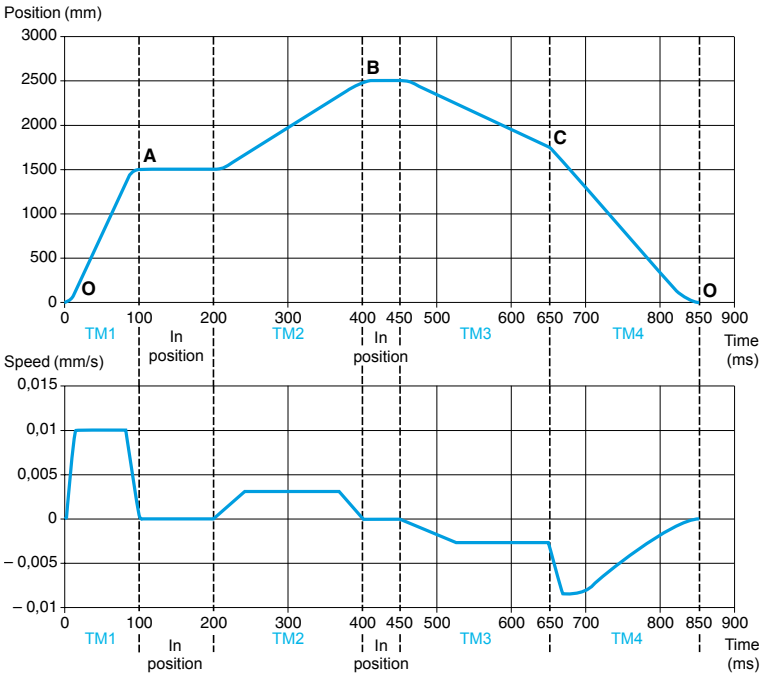
Motion tasks mode

This mode is used for programming the parameters required for executing rapid movements. It allows absolute or relative movement of the axis from a point A to a point B, in accordance with a predefined movement (in this mode, point A can be entered on the fly), and then from point B to a point C, in accordance with another movement.
The movement is executed according to the selected acceleration, deceleration and speed parameters.
It is also possible to choose the type of sequencing for these two movements, as well as the required speed profile (Trapeze or Sine^2).

Motion tasks mode (continued)

Examples of motion tasks

The movement executed below is made up of 4 motion tasks:
- Motion task **TM1** is used to move from the home point O to point A in 100 ms following a Sine² speed profile. The axis remains in position for 100 ms.
- Motion task **TM2** is used to move from point A to point B in 200 ms following a trapezoidal speed profile. The axis remains in position for 50 ms.
- Motion task **TM3** is used to move from point B to point C in 200 ms following a negative trapezoidal speed profile. The movement is then linked directly to the next task.
- Motion task **TM4** is used to move from point C to the home point O in 200 ms following a Sine² speed profile which has a very high deceleration component (smooth approach to the home position O).

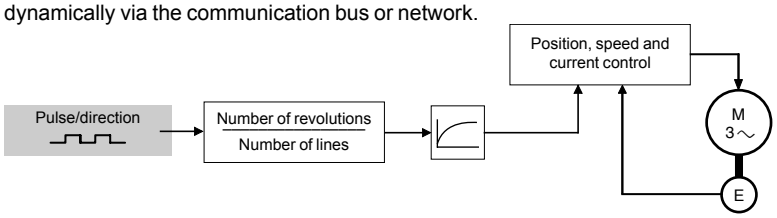


Example of a movement executed using 4 motion tasks

Electronic gearing mode

In this mode a master/slave relationship is established between a number of Lexium 15 servo drives or between a Lexium 15 servo drive (slave) and an external motion controller (master).
This mode can handle five types of control signal:
- External or simulated A/B encoder
- Pulse/direction signals
- EnDAT encoder
- Hiperface® encoder
- External or simulated SSI encoder

This relationship can be assigned a fixed or variable ratio. The ratio and direction of operation parameters can be accessed statically via Unilink software and dynamically via the communication bus or network.



Electronic gearing mode

Possible applications

This mode is used in material handling, conveying or sectional production line applications, as well as in the fields of plastics and fibers.

Lexium 15 motion control

Lexium 15 servo drives

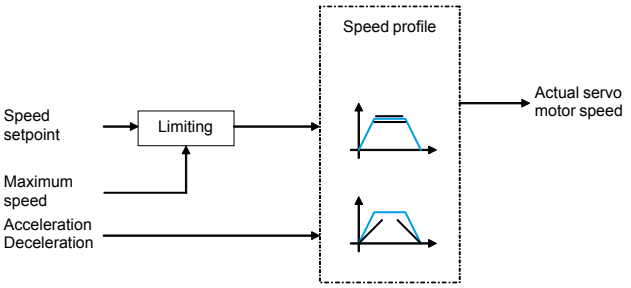
Operating modes

Speed control according to an acceleration/deceleration ramp

In this operating mode, the speed setpoint is applied according to an acceleration/deceleration ramp that can be adjusted using parameters. The speed setpoint can be modified during the movement. Torque limiting is also possible.

Setpoint value

The setpoint value is transmitted via the communication bus or network.



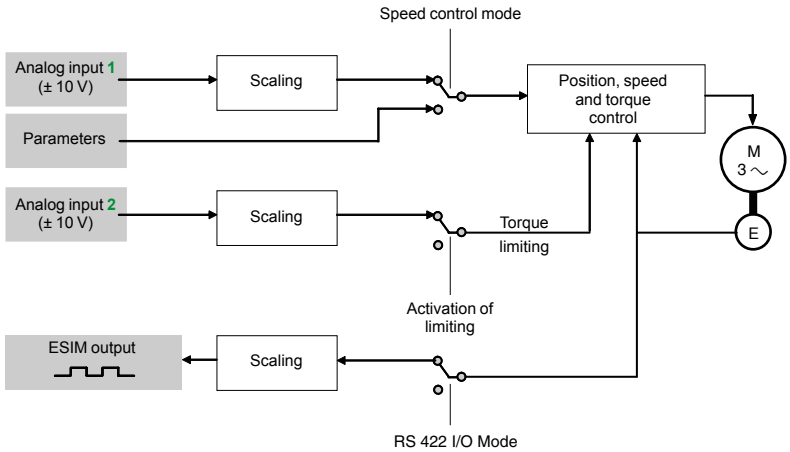
Speed control according to an acceleration/deceleration ramp

Instantaneous speed control

In this mode the Lexium 15 servo drive can be used with a motion controller with analog output. It is suitable for all other high-performance speed control requirements.

Setpoint value

The setpoint value is transmitted via analog input 1 (AI1+/AI1-), the communication bus or the network. Analog input 2 (AI2+/AI2-) can be used to limit the torque or speed, or to fine tune the setpoint.



Instantaneous speed control operating mode

Use with analog output motion controller

Axis position feedback can be supplied to the motion controller by the ESIM (Encoder SIMulation) output on the Lexium 15 servo drive.

Possible applications

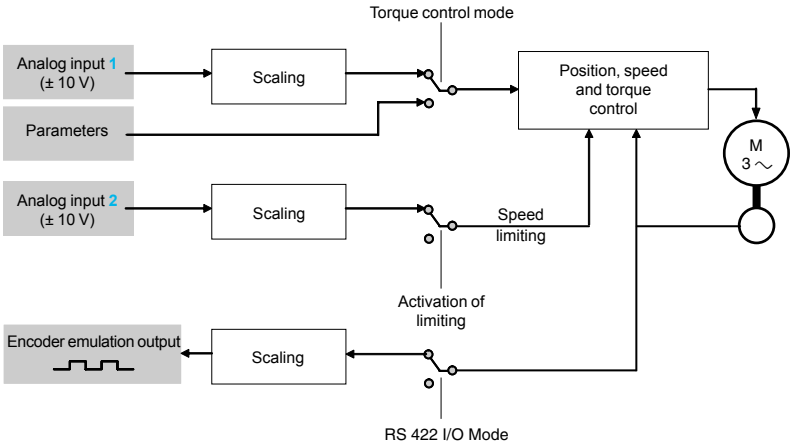
- Material handling
- Cutting to length
- Winding and unwinding applications

Torque control

This mode, which can be added onto the other modes, is used in machine phases where torque control is crucial.

Setpoint value

The setpoint value is transmitted via analog input 1 (AI1+/AI1-), the communication bus or the network. Analog input 2 (AI2+/AI2-) can be used to limit the current.
The position of the servo motor is transmitted to the motion controller by the encoder emulation output (X5) on the Lexium 15 servo drive.



Torque control mode

Possible applications

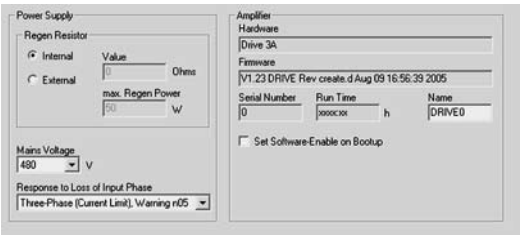
- Car assembly applications (tool fixing machine)
- Special machines

Other functions

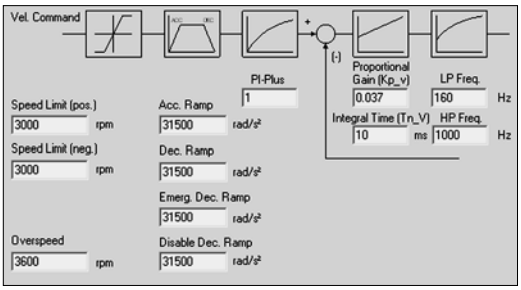
It is possible to activate other functions for setting operating parameters via logic I/O, the communication bus or network, or Unilink software.

- Automatic start
- Programming of emergency stop sequences (categories 0, 1 or 2)
- Position register for controlling logic outputs
- Switching commands on the fly
- Starting motion tasks
- Signalling the end of movement by logic inputs
- Starting a series of ASCII commands on a logic input edge

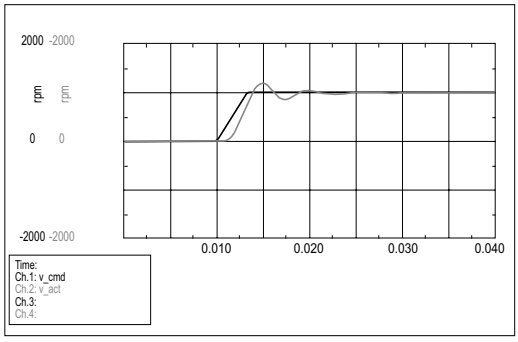
Lexium 15 motion control
Lexium 15 servo drives
Operating modes



Example of parameter setting with Unilink software



Example of adjusting the speed loop with Unilink software



Oscilloscope function

Presentation

Unilink software for PC is a tool for configuring Lexium 15 servo drive operating parameters.
Its simple, easy-to-follow graphic interface helps to reduce setup costs.

It includes various functions designed for setup phases, such as:
- Parameter setting
- Advanced adjustment of the various control loops
- Motion task programming
- Supervision

This software is available in two versions: Unilink L for configuring Lexium 15 LP servo drives and Unilink MH for Lexium 15 MP/15 HP servo drives. It is supplied as standard with the servo drive.

Functions

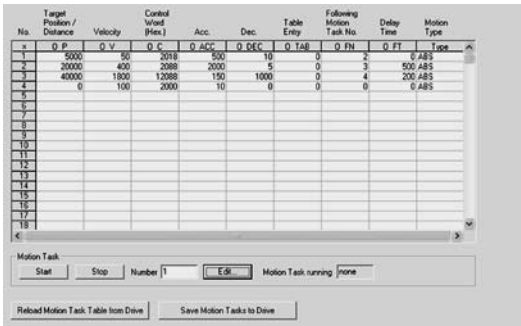
Parameter setting

Unilink software can be used to configure:
- The servo drive parameters, such as the supply voltage, the braking resistance, the ID, the address of the drive on the network, etc.
- BDH and BSH servo motors:
  - Automatically, using the motor parameters stored in the memory of the SinCos Hiperface® absolute encoder
  - Simply, using the Unilink software's motor database, which contains the parameters of all the servo motors sold by Schneider Electric
- The parameters of third-party servo motors by simply entering motor parameters such as the type of position sensor, the maximum speed, the minimum and maximum motor currents, etc.
- Operation in simple master/slave mode by setting the parameters of the incremental (A/B) or SSI absolute encoder emulation output, the encoder input and pulse/direction input
- The functions associated with the logic and analog I/O, such as capturing position registers, controlling motion tasks or adjusting speed, torque and coupling ratios in the context of electronic gearing type applications

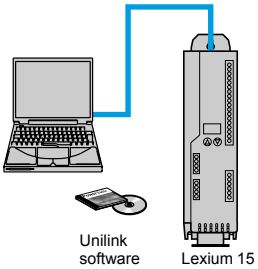
Advanced adjustment of the various control loops

Unilink software can be used to access the following control loop parameters:
- Torque control: The motor database that can be accessed via Unilink software is used to automatically configure the KT gain of the current loop for optimum regulation of the motor torque.
- Speed control: Provides access to the KV gain parameters of the speed loop, as well as to the parameters of the internal PID controller. Other function parameters, such as maximum speed, overspeed threshold, acceleration and deceleration ramps and the emergency stop deceleration time can also be accessed.
- Position control: In integrated position indexer operating mode, the software can be used to optimize the adjustment of the KP gain of the position loop.

With its Oscilloscope and Bode Diagram functions, Unilink software simplifies the optimization of these different control loops.



Example of programming a motion task



PC/Lexium 15 servo drive connection

Functions (continued)

Motion task programming

For each motion task, Unilink software can be used to set the parameters for the type of speed profile, the position to be reached and the setpoint speed.
These motion tasks can be absolute, relative in relation to a known position or relative in relation to a position register.
The sequencing of the motion tasks can be direct, delayed or triggered by a logic input.

Supervision

When the axis is set up, the Unilink software Monitor can be used to supervise the speed, temperature, current, voltage, position and following error parameters that allow the user to check that the application is operating correctly.

Setup and connection

Preparing configurations

Unilink software can be used on its own for configuring the Lexium 15 servo drive. The configurations can be saved, printed, etc.

Online mode

In online mode, it is possible to load the Lexium 15 servo drive parameters to the PC and vice versa via the RS232 link.
It is also possible to supervise the correct operation of the Lexium 15 servo drive and the communication buses and networks in offline mode.

PowerSuite software workshop

For easier setup of applications requiring other types of servo drive (Lexium 05) or variable speed drives (Altivar), Unilink can be launched via the PowerSuite software workshop *(1)*.

(1) This function is available from version 2.40 or later of the PowerSuite software workshop.

Lexium 15 motion control
Lexium 15 servo drives

Environmental characteristics

Conformity to standards				Lexium 15 servo drives have been developed to conform to the strictest levels of international standards and the recommendations relating to electrical industrial control equipment (IEC, EN), including: ■ EN 50178, IEC/EN 61439-1, IEC/EN 60204-1 for low voltage ■ IEC/EN 60204-1, EN 292 for machine safety ■ IEC/EN 61800-3 for conducted and radiated EMC emissions and immunity
	EMC immunity			IEC/EN 61800-3, environment 2 IEC/EN 61000-6-1 level 3 IEC/EN 61000-6-2 level 3
	Conducted and radiated EMC emissions			IEC/EN 61800-3, environments 1 and 2, categories C2 and C3
		LXM 15L●●●●●		EN 55011 class A group 1, IEC/EN 61800-3 category C2 for cable lengths < 10 m EN 55011 class A group 2, IEC/EN 61800-3 category C3 for cable lengths 10…50 m
		LXM 15MD●●N4		IEC/EN 61800-3 category C3
		LXM 15HC●●N4X		With additional EMC filter (1): ■ EN 55011 class A group 1, IEC/EN 61800-3 category C3
CE marking				The servo drives are CE marked in accordance with the European low voltage (2006/95/EC) and EMC (89/336/EEC) directives.
Product certification				UL (USA), cUL (Canada)
Degree of protection				IP 20
Vibration resistance				According to IEC/EN 60068-2-6: 1.5 mm peak to peak from 10…57 Hz 1 gn from 57…150 Hz
Shock resistance				4 gn for 22 ms according to IEC/EN 60028-2-27
Maximum ambient pollution		LXM 15L●●●●●		Degree 2 according to IEC 60664-1
		LXM 15MD●●N4 LXM 15HC●●N4X		Degree 2 according to EN 60204 and EN 50178
Environmental conditions				IEC 60721-3-3 category 3C1
Relative humidity				According to IEC 60721-3-3, category 3K3, 5…85%, without condensation
Ambient air temperature around the device	Operation	LXM 15L●●●●●	**°C**	0…40 without derating 40…55 with derating of the motor output current by 2.5% per additional °C
		LXM 15MD●●N4 LXM 15HC●●N4X	**°C**	0…45 without derating 45…55 with derating of the motor output current by 2.5% per additional °C
	Storage		**°C**	-25…+70
Type of cooling		LXM 15LD13M3 LXM 15LU60N4		Natural convection
		LXM 15LD21M3, LD28M3 LXM 15LD10N4, LD17N4 LXM 15MD●●N4 LXM 15HC●●N4X		Fan
Maximum operating altitude			**m**	0…1000 without derating 1000…2500 with derating of the motor output current by 1.5% per additional 100 m
Operating position Maximum permanent angle in relation to the normal vertical mounting position				

(1) See page 3/49 to check the permitted cable lengths.

Drive characteristics

Switching frequency	**kHz**	8

Control loop characteristics

Torque	**µs**	62.5
Speed	**µs**	250
Position	**µs**	250

Electrical power characteristics

Power supply	Voltages	**V**	200 - 15%…240 + 10% single-phase for LXM 15LD●●M3 200 - 15%…240 + 10% three-phase for LXM 15LD●●M3 208 - 10%…480 + 10% three-phase for LXM 15●●●●N4, LXM 15HC●●N4X
	Frequency	**Hz**	50 - 5%…60 + 5%
	Inrush current	**A**	Internal limitation
	Neutral connection		Compatible with TT and TN connection. For IT connection, an isolation transformer must be used on the power supply (see page 3/65)
External 24 V ⎓ power supply *(1)*	Input voltage	**V**	24…28 20…30 for LXM 15LD13M3, LXM 15LU60N4 used with a servo motor without brake
	Input current (no-load)	**A**	2.5 1 for LXM 15LD13M3, LXM 15LU60N4 used with a servo motor without brake
	Ripple		⩽ 5%
Output voltage			Maximum three-phase voltage equal to line supply voltage
Electrical isolation			Between power and control (inputs, outputs, power supplies)

Connection characteristics (power supply, braking resistor, DC bus and motor terminals)

Servo drive terminals		**R/L1, S/L2, T/L3 (power supply)**	**PA/+, PC/-, PBi, PBe (external braking resistor and DC bus)**	**U/T1, V/T2, W/T3 (motor)**
Maximum wire size and tightening torque of power supply, braking resistor, DC bus and motor terminals	LXM 15L●●●●●	1.5 mm² (AWG 14) 0.6 Nm	1.5 mm² (AWG 14) 0.6 Nm	See characteristics of VW3 M5 10● R●●● cables on pages 3/136 and 3/197
	LXM 15MD28N4	1.5 mm² (AWG 14) 0.5…0.6 Nm	1.5 mm² (AWG 14) 0.5…0.6 Nm	See characteristics of VW3 M5 20● R●●● cables on pages 3/137 and 3/199
	LXM 15MD40N4, MD56N4	4.0 mm² (AWG 12) 0.5…0.6 Nm	4.0 mm² (AWG 12) 0.5…0.6 Nm	See characteristics of VW3 M5 20● R●●● and VW3 M5 21● R●●● cables on pages3/137and 3/199
	LXM 15HC●●N4X	25 mm² (AWG 2) 6…8 Nm	25 mm² (AWG 2) 6…8 Nm	See characteristics of VW3 M5 10● R●●● and VW3 M5 30● R●●● cables on pages 3/137 and 3/199

(1) Please refer to the "Interfaces, I/O splitter boxes and power supplies" catalogue.

Control signal characteristics

Type of servo drive			LXM 15L●●●●●	LXM 15MD●●N4, LXM 15HC●●N4X
Protection	Inputs		Against reverse polarity	
	Outputs		Against short-circuits	
Electrical link			Presence of an electrical link on the 0 V ⎓	
Relay outputs				
Type			Relay output, 1 N/O contact	
Number			1 (R1A, R1C)	
Maximum switching capacity			On resistive load (cos φ = 1): 0.5 A for 125 V ∿ or 30 V ⎓	
Maximum response time		**ms**	4	
Logic inputs				
Type			Logic inputs conforming to standard IEC 61131-2 type 1	
Number			5 including one ENABLE input (LI1, LI2, LI3, LI4)	
Power supply		**V**	20…30 ⎓	
Sampling period		**ms**	0.25	1 in normal cycle, 0.05 in fast cycle
Positive logic (Sink)			State 0 if < 5 V or input not wired State 1 if > 11 V	State 0 if < 7 V or input not wired State 1 if > 12 V
Safety inputs				
Type			Inputs for the Power Removal safety function	
Number			1 (PWR)	2 (PWRI+, PWRI-)
Power supply		**V**	24 ⎓	
Response time		**ms**	1.5	20
Positive logic (Sink)			State 0 if < 5 V or input not wired State 1 if > 15 V Power Removal function Active at state 0 (see pages 3/56 to 3/59)	State 0 if < 7 V or input not wired State 1 if > 12 V Power Removal function Active at state 1 (see pages 3/60 to 3/63)
Logic outputs				
Type			24 V ⎓ logic outputs, positive logic (Source)	24 V ⎓ logic outputs, negative logic (Sink)
Number			2 (LO1, LO2)	
Output voltage		**V**	30 max.	
Sampling period		**ms**	0.25	1
Max. breaking current		**mA**	10	
Analog inputs				
Type			±10 V differential analog inputs	
Number			2 (AI1+/AI1-, AI2+/AI2-)	
Resolution			14 bits (AI1+/AI1-) 12 bits (AI2+/AI2-)	
Input resistance		**kΩ**	20	
Sampling period		**ms**	0.0625	0.25
Analog outputs				
Type			–	±10 V analog inputs
Number			0	2 (Analog Out 1, Analog Out 2)
Resolution		**bit**	–	10
Output impedance		**kΩ**	–	2.2
Response time		**ms**	–	5

Control signal characteristics (continued)

Type of servo drive			LXM 15L●●●●●	LXM 15MD●●N4, LXM 15HC●●N4X
Resolver feedback				
	Type		Resolver feedback input	
	Number		1; 9-way female SUB-D connector (X2)	
Voltages	Sensor power supply		4.75 V ∿, 35 mA max.	
	Resolver input signals		7 V ± 10%	
	Resolution		14 bits	
Input resistance		**kΩ**	24.5	
Motor encoder feedback signals				
Type			Encoder feedback input	
Number			1; 15-way female SUB-D connector (X1)	
Voltages	Encoder power supply		+10 V/100 mA	
	SinCos input signals		1 V_{SS} with 2.5 V offset 0.5 V_{SS} at 100 kHz	
Pulse/direction, A/B encoder signals				
Type			RS 422 and RS 485 link compatible input	
Number			1; 9-way male SUB-D connector (X5)	
Common mode range		**V**	-7…+12	
Input frequency	Pulse/direction	**kHz**	≤ 100	
	A/B signals	**MHz**	≤ 1.5	
ESIM (Encoder SIMulation) output signals				
Type			RS 422 and RS 485 link compatible output	
Number			1; 9-way male SUB-D connector (X5)	
Logic level			0 V or 5 V	
Output frequency		**MHz**	≤ 1.5	

Connection characteristics of the control signal terminals

Servo drive terminals			+24VDC, 0VDC (power supply)	R1●, LI●, Enable, LO●, PWR●, AI● and Analog Out● (I/O)
Maximum wire size and tightening torque	LXM 15L●●●●●		2.5 mm² (AWG 14) -; spring terminal	0.5 mm² (AWG 20) -; spring terminal
	LXM 15MD●●N4		2.5 mm² (AWG 14) 0.5…0.6 Nm	2.5 mm² (AWG 14) 0.5…0.6 Nm
	LXM 15HC●●N4X		2.5 mm² (AWG 14) 0.3 Nm	0.5 mm² (AWG 20) 0.3 Nm

Operational safety characteristics

Machine protection	LXM 15L●●●●●		Power Removal (PWR) safety function, which forces stopping and/or prevents unintended restarting of the motor, conforming to standard EN 954-1 category 3
	LXM 15MD●●N4, LXM 15HC●●N4X		Power Removal (PWR) safety function, which forces stopping and/or prevents unintended restarting of the motor, conforming to standard EN 954-1 category 1

Communication port characteristics

CANopen protocol			
Structure	Connector		9-way male SUB-D
	Network management		Slave
	Transmission speed		125 kbps, for a maximum bus length of 115 m to 1 Mbps, for a maximum bus length of 20 m
	Address (Node ID)		1 to 127, configurable via the terminal or the Unilink software
	Polarization		Impedance line terminators are integrated in the servo drive and are switchable
Services	PDO		Implicit exchange of PDO (Process Data Objects) ■ 3 PDO (position control and speed profile modes) ■ 1 configurable mapping PDO
	Emergency		Yes
	Profile		Position control and speed profile modes
	Communication monitoring		Node guarding, heartbeat
Description file			EDS files supplied on the documentation CD-ROM These files contain the description of the servo drive parameters

Lexium 15 motion control
Lexium 15 LP, 15 MP and 15 HP servo drives

105808

LXM 15LD13M3

Lexium 15 LP servo drives

Output currents *(1)*			Nominal power *(1)*	Line current		Apparent power	Reference	Weight
Continuous (RMS)	Transient (RMS for 2 s)	Transient (peak current)		at U1 *(2)*	at U2 *(2)*			
A	A	A	kW	A	A	kVA		kg
Single-phase supply voltage: 200…240 V ∿ *(2)* 50/60 Hz, with integrated EMC filter								
3	9	13	0.9	7.7	7.6	1.1	**LXM 15LD13M3**	2.600
4	9	13	1.2	10.1	9.9	2.4	**LXM 15LD21M3**	2.600
	9	13	1.2	10.4	10.1	4	**LXM 15LD28M3**	2.600
Three-phase supply voltage: 200…240 V ∿ *(2)* 50/60 Hz, with integrated EMC filter								
3	9	13	1	4.7	4.6	1.1	**LXM 15LD13M3**	2.600
6	15	21	2.1	8.8	8.6	2.4	**LXM 15LD21M3**	2.600
10	20	28	3.4	14	13.7	4	**LXM 15LD28M3**	2.600
Three-phase supply voltage: 208…480 V ∿ *(2)* 50/60 Hz, with integrated EMC filter								
1.5	4.5	6	1.1	2.8	2.5	1.2	**LXM 15LU60N4**	2.700
3	7.5	10	2.1	3.9	4.5	2.5	**LXM 15LD10N4**	2.700
6	12	17	4.3	6.9	8.2	5	**LXM 15LD17N4**	2.700

105810

LXM 15MD28N4

105812

LXM 15MD56N4

Lexium 15 MP servo drives

Output currents *(1)*			Nominal power *(1)*	Line current		Apparent power	Reference	Weight
Continuous (RMS)	Transient (RMS for 5 s)	Transient (peak current)		at U1 *(2)*	at U2 *(2)*			
A	A	A	kW	A	A	kVA		kg
Three-phase supply voltage: 208…480 V ∿ *(2)* 50/60 Hz, with integrated EMC filter								
10	20	28	5.7	9.7	12.6	7	**LXM 15MD28N4**	4.000
14	28	40	7.9	15.4	17.7	10	**LXM 15MD40N4**	5.000
20	40	56	11.4	19.9	24.5	14	**LXM 15MD56N4**	7.500

105813

LXM 15HC20N4X

Lexium 15 HP servo drives

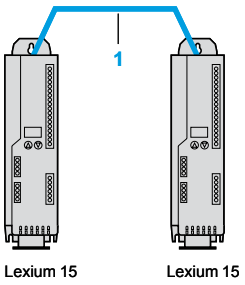
Output currents *(1)*			Nominal power *(1)*	Line current		Apparent power	Reference	Weight
Continuous (RMS)	Transient (RMS for 5 s)	Transient (peak current)		at U1 *(2)*	at U2 *(2)*			
A	A	A	kW	A	A	kVA		kg
Three-phase supply voltage: 208…480 V ∿ *(2)* 50/60 Hz, without integrated EMC filter *(4)* *(5)*								
40	80	112	22.3	35	36.6	30	**LXM 15HC11N4X**	19.500
70	140	198	42.5	60.6	60.9	50	**LXM 15HC20N4X**	21.000

(1) These values are given for a nominal switching frequency of 8 kHz.
(2) Nominal supply voltage, min. U1, max. U2: 200 (U1)…240 V (U2) or 208 (U1)…480 V (U2).
(3) The line currents are given for a connection with line choke. For a connection without line choke, see page 3/50.
(4) EMC filters available as an option (see page 3/49).
(5) When the line supply has a TT or TN load system, a line choke MUST be used (see page 3/50). For an IT system, see page 3/65.

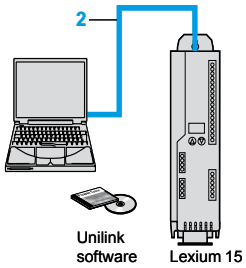
Lexium 15 motion control

Lexium 15 LP, 15 MP and 15 HP servo drives

Option: Accessories



Connection via extension cable



PC/Lexium 15 servo drive connection

Connection accessories

Connectors

Description	Use	Reference	Weight kg
Sets of replacement connectors	Female screw connectors for terminals X0, X3, X4, X8 and X9 for LXM 15LD●●M3	**VW3 M4 501**	–
	Female screw connectors for terminals X0, X3, X4, X8 and X9 for LXM 15L●●●N4	**VW3 M4 502**	–
	Female screw connectors for terminals X3, X4, X7, X8, X0A and X0B for LXM 15MD●●N4	**VW3 M4 503**	–
	Female screw connectors for terminals X3, X4 and X10 for LXM 15HC●●N4X	**VW3 M4 504**	–

Cables

Description	Use		Length	No.	Reference	Weight
	From	To				
			m			kg
Extension cables equipped with two 9-way female SUB-D connectors	Lexium 15	Lexium 15	0.5	1	**VW3 M8 501 R05**	–
			2	1	**VW3 M8 501 R20**	–
			6	1	**VW3 M8 501 R60**	–
PC serial port connection cable equipped with two 9-way female SUB-D connectors	PC serial port	Lexium 15	3	2	**VW3 M8 601 R03**	–

Documentation

Description	Reference	Weight kg
Simplified installation manual and documentation CD-ROM supplied with the Lexium 15 servo drive	–	

Note: *The manuals and quick reference guides for servo drives and servo motors are available on the website: www.schneider-electric.com.*

3

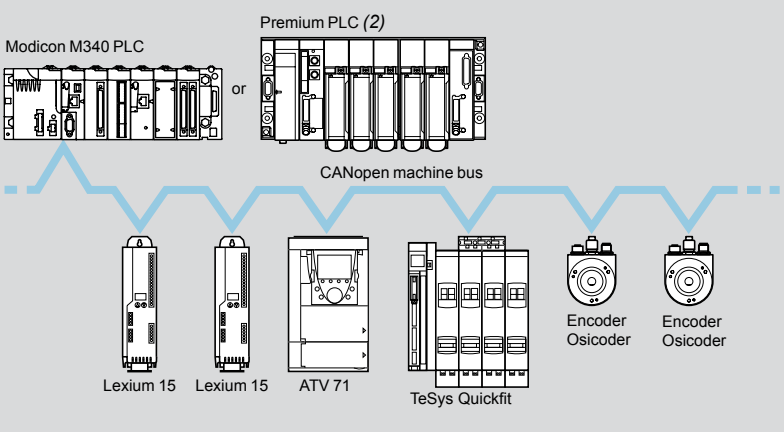
Lexium 15 motion control
Communication buses and networks
CANopen machine bus

Presentation

The Lexium 15 servo drive integrates the CANopen communication protocol as standard *(1)*.

If one of the communication cards (available as options) is added, the Lexium 15 servo drive can also be connected to the following communication buses and networks:
- Modbus TCP network
- Fipio bus
- PROFIBUS DP fieldbus
- Modbus Plus network

CANopen machine bus



The CANopen machine bus is a fieldbus based on CAN low layers and components. It complies with standard ISO 11898. With its standard communication profiles, the CANopen machine bus provides openness and interoperability with various devices (drives, motor starters, smart sensors, etc.).

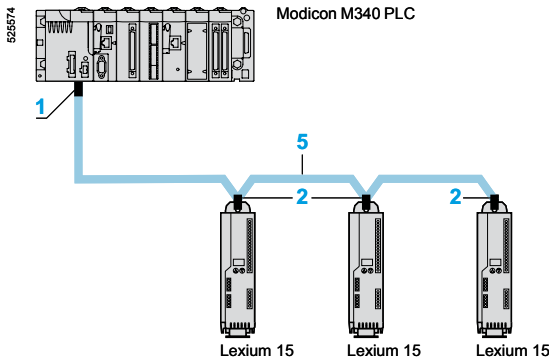
The CANopen machine bus is a multi-master bus, which provides secure, deterministic access to realtime automation device data.
The CSMA/CA type protocol is based on broadcast exchanges, transmitted cyclically or on event, which ensure optimum use of the bandwidth. A messaging channel is also used to set the parameters of the slave devices.

The Lexium 15 servo drive is equipped with a CANopen machine-bus-compatible interface as standard.
The **AM0 2CA 001V000** adapter provides a hardware interface which **complies strictly with the CANopen standard**. This adapter (occupying the slot for the option card) also has a 9-way male SUB-D connector for connecting a PC terminal.

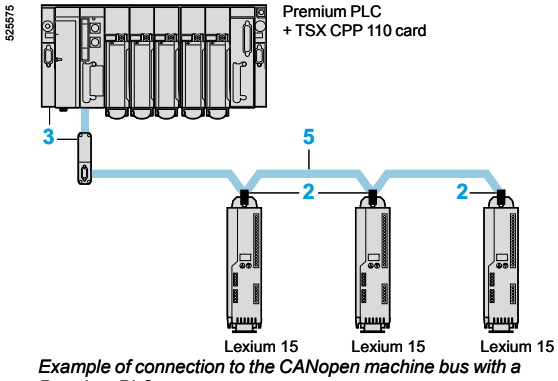
(1) See characteristics page 3/27.
(2) Please consult our "Automation platform Modicon Premium and Unity - PL7 software" specialist catalogue.

Characteristics:
page 3/27

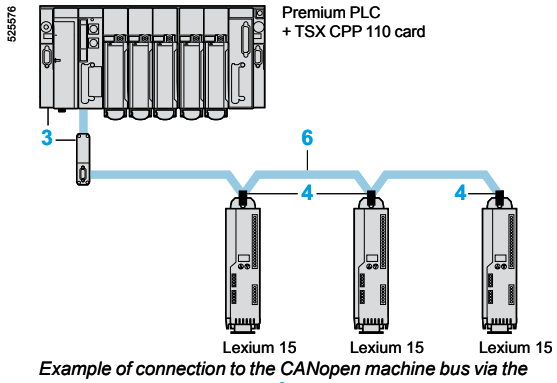
Lexium 15 motion control
Communication buses and networks
CANopen machine bus



Example of connection to the CANopen machine bus with a Modicon M340 PLC



Example of connection to the CANopen machine bus with a Premium PLC



Example of connection to the CANopen machine bus via the AM0 2CA 001V000 adaptor 4

AM0 2CA 001V000

CANopen machine bus connection components *(1)*

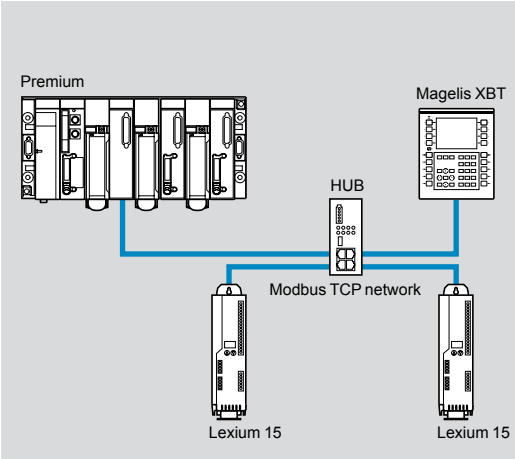
Description	Item no.	Length m	Reference	Weight kg
Connection accessories				
CANopen IP 20 9-way female SUB-D connector. Switch for line terminator				
Straight	1	–	**TSX CAN KCDF 180T**	0.049
Angled at 90°	1	–	**TSX CAN KCDF 90T**	0.046
Angled at 90° with 9-way SUB-D for connecting PC or diagnostics tool	1	–	**TSX CAN KCDF 90TP**	0.051
9-way female SUB-D connector with screw terminals and line terminator	2	–	**VW3 M3 802**	–
CANopen PCMCIA card Type III, supplied with cable and junction box with 9-way male SUB-D connector	3	0.5	**TSX CPP 110**	0.230
CANopen bus adaptor for Lexium 15 Hardware interface conforming to the CANopen standard + one 9-way male SUB-D connector for connecting PC Includes line terminator	4	–	**AM0 2CA 001V000**	0.110
Cables				
CANopen cables *(1)* Standard cables, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	5	50	**TSX CAN CA 50**	4.930
		100	**TSX CAN CA 100**	8.800
		300	**TSX CAN CA 300**	24.560
CANopen cables *(1)* UL certification, CE marking Flame retardant (IEC 60332-2)	5	50	**TSX CAN CB 50**	3.580
		100	**TSX CAN CB 100**	7.840
		300	**TSX CAN CB 300**	21.870
CANopen cables *(1)* Cable for harsh environments (2) or mobile installations, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	5	50	**TSX CAN CD 50**	3.510
		100	**TSX CAN CD 100**	7.770
		300	**TSX CAN CD 300**	21.700
CANopen cables *(1)* equipped with one 9-way male SUB-D connector and one 9-way female SUB-D connector Standard cable, CE marking	6	0.5	**TLA CD CBA 005**	–
		1.5	**TLA CD CBA 015**	–
		3	**TLA CD CBA 030**	–
		5	**TLA CD CBA 050**	–

(1) To order other components for connection to the CANopen bus, please consult our "Automation platform Modicon Premium and Unity - PL7 software", "Automation platform Modicon M340" and "Machines & installations with CANopen" specialist catalogues.
(2) Harsh environment:
- Resistance to hydrocarbons, industrial oils, detergents, solder splashes
- Relative humidity up to 100%
- Saline atmosphere
- Significant temperature variations
- Operating temperature between -10°C and +70°C

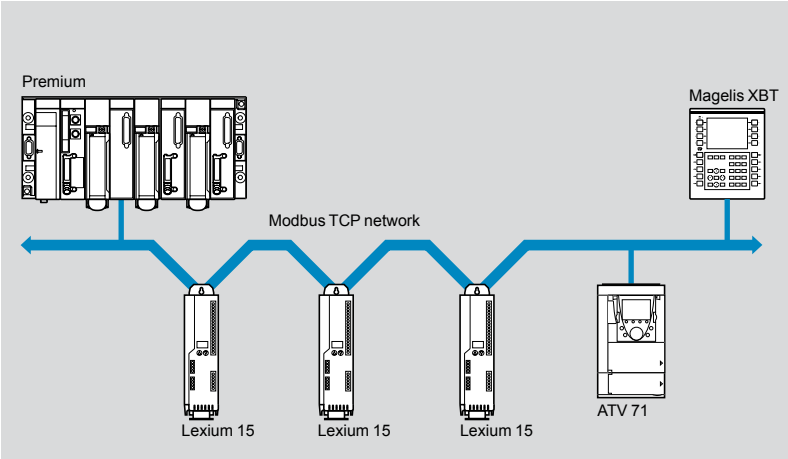
Characteristics:
page 3/27

Lexium 15 motion control
Communication buses and networks
Modbus TCP network

Modbus TCP network
Presentation



Example of connection based on a star topology



Example of connection based on a daisy chain

Introduced by Schneider Electric, the Transparent Ready concept enables transparent communication between control system devices, production and management.
This concept is based on the Modbus TCP industrial standard which proposes a single network from sensors/actuators through to production management systems.

The Lexium 15 servo drive is connected to the Modbus TCP network via the AM0 ETH 001V000 communication card.
This Transparent Ready class A10 card allows the user to access Modbus messaging, I/O scanning and Faulty Device Replacement (FDR) services.

The cost of setting up servo drives on the Modbus TCP network is reduced thanks to the AM0 ETH 001V000 card's internal switch, which makes it possible to use a daisy chain topology. This type of topology, unlike the star topology, does not require a hub or an external industrial switch.

Other devices can be connected to the Modbus TCP network such as Premium PLCs *(1)*, Magelis XBT terminals *(2)*, Altivar variable speed drives *(3)*, Advantys STB I/O *(4)*, etc.

(1) Please consult our "Automation platform Modicon Premium and Unity - PL7 software" specialist catalogue.
(2) Please consult our "Human-Machine interfaces" specialist catalogue.
(3) Please consult our "Soft starters and variable speed drives", "Altivar 61 variable speed drives" and "Altivar 71 variable speed drives" specialist catalogues.
(4) Please consult our "Distributed I/O Advantys STB" specialist catalogue.

Note: *To see the full range of devices which can be connected to the Modbus TCP network, please consult our "Ethernet TCP/IP, Transparent Ready" specialist catalogue.*

Characteristics: page 3/33
Connections: page 3/37
References: page 3/34

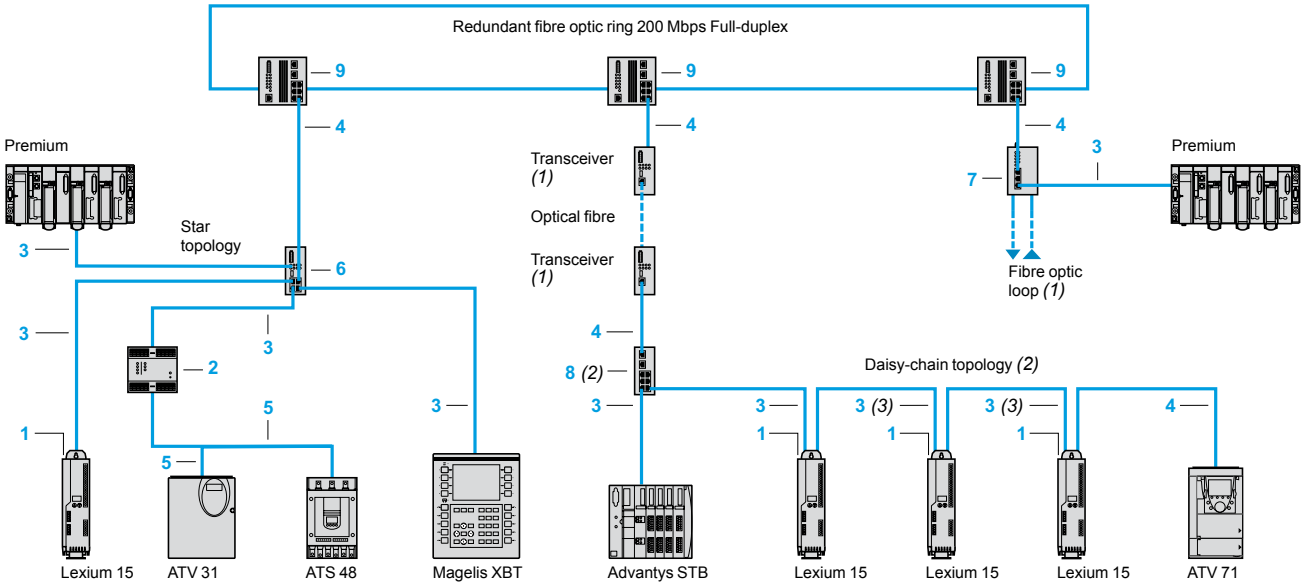
Characteristics of the AM0 ETH 001V000 Modbus TCP card

Structure	Connectors	2 RJ45 connectors
	Transmission speed	10/100 Mbps, half duplex and full duplex
	IP address	Manual assignment via the display terminal or Unilink software BOOTP (dynamic IP address server depending on the IEEE address) DHCP (dynamic address server depending on the Device Name) with automatic reiteration
	Physical	Ethernet 2
	Link	LLC: IEEE 802.2 MAC: IEEE 802.3
	Mains	IP (RFC791)
	Transport	TCP (RFC793), UDP The maximum number of connections is 4 (port 502)
Services	Transparent Ready class *(1)*	A10
	Messaging	Read Holding Registers (03), 125 words maximum Write Multiple Registers (16), 125 words maximum Read/Write Multiple Registers (20) Read Device Identification (43/14) Diagnostics (08/21)
	Input data	I/O scanning service (can be inhibited): ■ 18 state variables ■ 13 control variables The Global Data service is not supported
	FDR (Faulty Device Replacement)	Yes
	Communication monitoring	Time out (which can be inhibited) can be set between 0.01 s and 60 s via the Unilink software
Diagnostics	Using LEDs	3 LEDs on the card: ■ 2 “ACT” LEDs (activity on ports 1 and 2) ■ 1 “STS” LED (Ethernet fault)
	Using the Unilink software	LED statuses Ethernet statistics (number of frames received, number of incorrect frames, collisions, etc.) Modbus statistics (number of frames received, number of frames sent, errors, etc.)

(1) Please consult our “Ethernet TCP/IP Transparent Ready” catalogue.

Lexium 15 motion control
Communication buses and networks
Modbus TCP network

Modbus TCP network wiring system



Modbus TCP network connection components

105218

AM0 ETH 001V000

105636

TSX ETG 100

Description	Use	Item no.	Reference	Weight kg
Card and communication interfaces				
Ethernet card Equipped with 2 RJ45 connectors Ethernet Modbus TCP 10/100 Mbps Class A10	Lexium 15 servo drives, all ratings	1	**AM0 ETH 001V000**	0.140
Modbus TCP/Modbus bridge/router Class B10	ATS 48 soft start/soft stop units ATV 31 variable speed drives	2	**TSX ETG 100**	–
Configuration kit	Used to configure the TSX ETG 100 bridge via the Ethernet port or RS 232. Consists of an RJ45/9-way SUB-D adapter and a CAT5 crossover cable, length 3 m	–	**TCS EAK 0100**	–
PoE power supply (conforming to IEEE 802.3af)	Used to supply the TSX ETG 100 bridge via Ethernet CAT5 cable. Power supply connected via daisy-chain connection. Includes mains cable (Australia, Europe, UK and USA)	–	**TCS EAQ 0100**	–

(1) To order other Modbus TCP network connection components, please consult our "Ethernet TCP/IP, Transparent Ready" specialist catalogue.
(2) We recommend using unmanaged switches for daisy-chain topologies, see page 3/35.
*(3) The AM0 ETH 001V000 Ethernet card's internal switch **1** makes it possible to replace the straight shielded twisted pair cables 490 NTW 000 ●● **3** with crossed shielded twisted pair cables 490 NTC 000 ●● **4**.*

Presentation: page 3/30
Characteristics: page 3/33

Lexium 15 motion control
Communication buses and networks
Modbus TCP network

535957

499 NEH 141 00

Modbus TCP network connection components (1) (continued)

Description	Use		Item no.	Length	Reference (2)	Weight
	From	To		m		kg
ConneXium cables						
Straight shielded twisted pair cables equipped with 2 RJ45 connectors	Lexium 15 servo drives, any other terminal equipment	Hubs 499 N●H 1●● ●0, switches 499 N●S ●●● 0●, TCS ESM 083F2●●●	3	2	**490 NTW 000 02**	–
				5	**490 NTW 000 05**	–
				12	**490 NTW 000 12**	–
				40	**490 NTW 000 40**	–
				80	**490 NTW 000 80**	–
Crossed shielded twisted pair cables equipped with 2 RJ45 connectors	Lexium 15 servo drives	Lexium 15 servo drives, any other terminal equipment	4	5	**490 NTW 000 05**	–
				15	**490 NTC 000 15**	–
	Hubs 499 N●H 1●● ●0, switches 99 NpS ●●● 0●, TCS ESM 083F2●●●, transceivers (1)	Hubs 499 N●H 1●● ●0, switches 499 N●S ●●● 0●, TCS ESM 083F2●●●, transceivers (1)		40	**490 NTC 000 40**	–
				80	**490 NTC 000 80**	–
Cables for Modbus serial link equipped with one RJ45 connector and one stripped end	ATV 31 variable speed drives, ATS 48 soft start/ soft stop units	Ethernet/Modbus bridge TSX ETG 100	5	3	**VW3 A8 306 D30**	–

535958

499 NES 251 00

Description	Number of ports		Managed	Item no.	Reference	Weight
	Copper cable	Optical fibre	(3)			kg
ConneXium Hubs						
Hub - 10 Mbps twisted pair 10BASE-T ports for copper cable, shielded RJ45 connectors	4	–	–	6	**499 NEH 104 10**	0.530
Hub - 100 Mbps twisted pair 100BASE-TX ports for copper cable, shielded RJ45 connectors	4	–	–	6	**499 NEH 141 00**	0.240
Hub - 10 Mbps twisted pair and multimode optical fibre 10BASE-T ports for copper cable, shielded RJ45 connectors 10BASE-FL ports for optical fibre, ST connectors (BFOC)	3	2	–	7	**499 NOH 105 10**	0.900
ConneXium Switches						
Optimized switch, twisted pair 10BASE-T/100BASE-TX copper ports for copper cable, shielded RJ45 connectors	5	–	no	8	**499 NES 251 00**	0.190
Switches, twisted pair 10BASE-T/100BASE-TX ports, for copper cable, shielded RJ45 connectors	8	–	no	8	**499 NES 181 00**	0.230
	8	–	yes	–	**TCS ESM083F23F0**	–
Switches, twisted pair and multimode optical fibre 10BASE-T/100BASE-TX ports, for copper cable, shielded RJ45 connectors 100BASE-FX ports, for optical fibre, SC connectors	4	1	no	–	**499 NMS 251 01**	0.330
	3	2	no	9	**499 NMS 251 02**	0.335
	6	2	yes	9	**TCS ESM083F2CU0**	–
Switches, twisted pair and single-mode optical fibre 10BASE-T/100BASE-TX ports, for copper cable, shielded RJ45 connectors 100BASE-FX ports, for optical fibre, SC connectors	4	1	no	–	**499 NSS 251 01**	0.330
	3	2	no	9	**499 NSS 251 02**	0.335
	6	2	yes	9	**TCS ESM083F2CS0**	–

535959

499 NMS 251 02

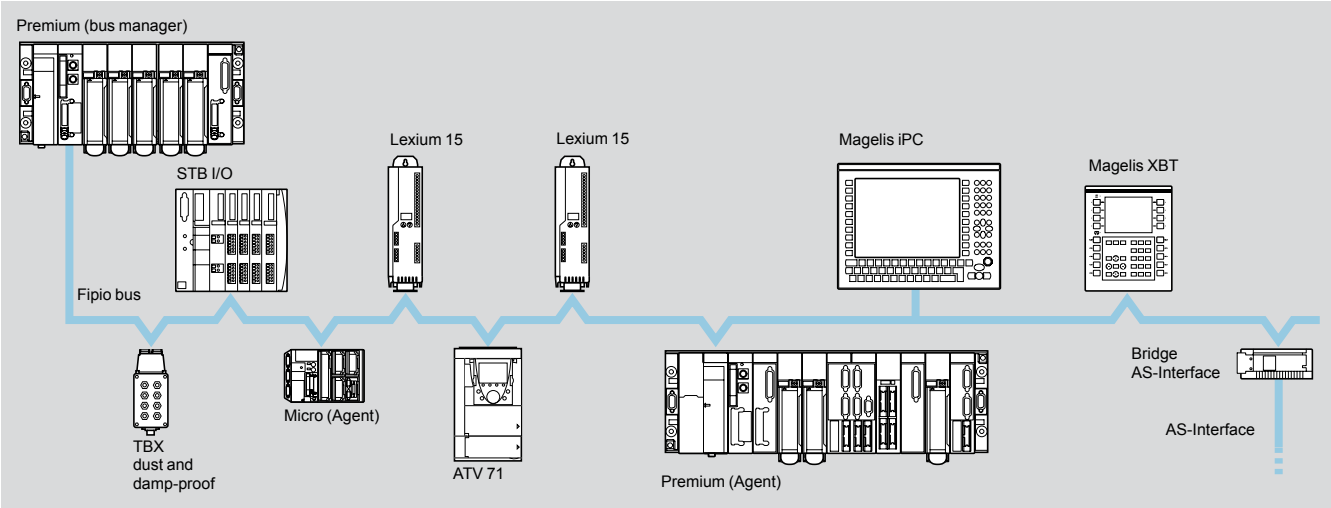
(1) To order other Modbus TCP network connection components, please consult our "Ethernet TCP/IP, Transparent Ready" specialist catalogue.

*(2) Cable conforming to EIA/TIA-568 standard category 5 and IEC 1180/EN 50 173, class D. For UL and CSA 22.1 approved cables, add the letter **U** at the end of the reference. Example: 490 NTW 000 02 becomes **490 NTW 000 02U**.*

(3) We recommend using unmanaged switches for daisy-chain topologies.

Fipio bus

Presentation



The Fipio fieldbus is a standard means of communication between control system components, and conforms to the World FIP standard.

A Premium PLC (bus manager) can control 127 devices (agents) over a distance of 15 km.
The Fipio bus manager is integrated in the PLC processor.

The Lexium 15 servo drive communicates with the Fipio bus via the AM0 FIP 001V000 communication card.

Other devices can be connected to the Fipio bus such as TSX Micro *(1)* and Premium *(2)* PLCs, Magelis XBT terminals *(3)*, Magelis iPC industrial PCs *(3)*, Altivar variable speed drives *(4)* and partner products in the Collaborative Automation program.

Characteristics of the AM0 FIP 001V000 Fipio card

Structure	Connector	One 9-way male SUB-D connector
	Transmission speed	1 Mbps
	Address	1 to 62, configurable via the terminal or the Unilink software
Services	X-Way and Uni-Te services	Read/write access to all Lexium 15 servo drive parameters: ■ Operating mode and fault management status data ■ Operating mode data ■ "Motion Task" movement data (realtime modification of the acceleration, position and speed) ■ External position, speed and torque setpoints ■ Path status data ■ Uploading and downloading of servo drive parameters (128 bytes of data maximum)
	Setup service via Unity Pro or PL7 Junior/Pro software	□ Integrated setup screens (presymbolization of objects, handling of double length words, debugging and diagnostics screens) □ "FDR" (Faulty Device Replacement) service. Restoring the operating context if a drive is replaced.
Diagnostics	Using LEDs	2 LEDs on the card: "ERR" (fault), "COM" (data exchange)

(1) Please consult our "Automation platform Modicon TSX Micro and PL7 software" specialist catalogue.
(2) Please consult our "Automation platform Modicon Premium and Unity - PL7 software" specialist catalogue.
(3) Please consult our "Human-Machine interfaces" specialist catalogue.
(4) Please consult our "Soft starters and variable speed drives" specialist catalogue.

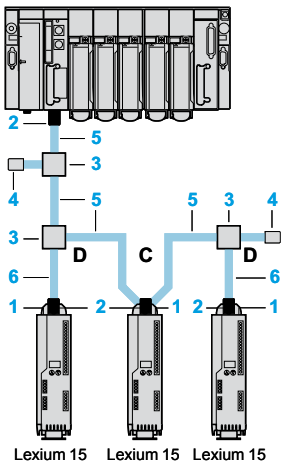
Note: *See also our "Distributed I/O Advantys STB" and "Momentum automation platform" specialist catalogues.*

Connections: page 3/37
References: page 3/37

Lexium 15 motion control
Communication buses and networks
Fipio bus

568161

Premium



D: tap link connection
C: daisy-chain connection

Example of connection to the Fipio bus

108763

AM0 FIP 001V000

523711

TSX FP ACC3

Fipio bus connection components with Premium PLC *(1)*

Description	Use	Item no.	Reference	Weight kg
Card				
Fipio card	For Lexium 15, all ratings	1	**AM0 FIP 001V000**	0.140
Connection accessories				
9-way female SUB-D connector (zamak)	Connection by daisy chain or tap junction, for Premium PLC Connection of a number of Lexium 15 by daisy chain	2	**TSX FP ACC2**	0.080
9-way female SUB-D connector (polycarbonate, IP 20)	Connection by daisy-chain or tap junction, for Premium PLC Connection of a number of Lexium 15 by daisy chain	2	**TSX FP ACC12**	0.040
Junction box (polycarbonate, IP 20) Equipped with two 9-way female SUB-D connectors	Trunk cable tap link Also used to connect 2 devices via 9-way female SUB-D connectors	3	**TSX FP ACC3**	0.090
Junction box (zamak, IP 65) Equipped with one 9-way female SUB-D connector	Trunk cable tap link Also used to connect 1 device via a 9-way female SUB-D connector	3	**TSX FP ACC4**	0.660
Junction box (polycarbonate, IP 20)	Trunk cable tap link	3	**TSX FP ACC14**	0.120
Fipio line terminators (sold in lots of 2)	Fit at the end of each segment	4	**TSX FP ACC7**	0.020

Cables

Description	Use		Item no.	Length m	Reference	Weight kg
	From	To				
Trunk cables 8 mm, 1 shielded twisted pair 150 Ω. In standard environment *(2)* and indoors	Connectors TSX FP ACC2/ ACC12, Junction boxes TSX FP ACC3/ACC4/ ACC14	Connectors TSX FP ACC2/ ACC12, Junction boxes TSX FP ACC3/ACC4/ ACC14	5	100	**TSX FP CA100**	5.680
				200	**TSX FP CA200**	10.920
				500	**TSX FP CA500**	30.000
Trunk cables 9.5 mm, 1 shielded twisted pair 150 Ω. In harsh environments *(3)*, outdoors, or in mobile installations *(4)*	Connectors TSX FP ACC2/ ACC12, Junction boxes TSX FP ACC3/ACC4/ ACC14	Connectors TSX FP ACC2/ ACC12, Junction boxes TSX FP ACC3/ACC4/ ACC14	5	100	**TSX FP CR100**	7.680
				200	**TSX FP CR200**	14.920
				500	**TSX FP CR500**	40.000
Drop cables 8 mm, 2 shielded twisted pair 150 Ω. In standard environment *(2)* and indoors	Connectors TSX FP ACC2/ ACC12	Junction boxes TSX FP ACC3/ACC4/ ACC14	6	100	**TSX FP CC100**	5.680
				200	**TSX FP CC200**	10.920
				500	**TSX FP CC500**	30.000

(1) To order other components for connection to the Fipio bus, please consult our "Automation platform Modicon Premium and Unity - PL7 software" and "Automation platform Modicon TSX Micro and PL7 software" specialist catalogues.
(2) Standard environment:
- No particular environmental restrictions
- Operating temperature between + 5°C and + 60°C
- Fixed installation
(3) Harsh environment:
- Resistance to hydrocarbons, industrial oils, detergents, solder splashes
- Relative humidity up to 100%
- Saline atmosphere
- Significant temperature variations
- Operating temperature between -10°C and 70°C
(4) Mobile installation: cables in accordance with VDE 472 part 603/H:
- Use on a cable-carrier mechanism (cable with minimum 75 mm radius of curvature)
- Use on a gantry, provided that operating conditions such as acceleration, speed, length, etc. are adhered to: Please consult your Regional Sales Office.
- Use on robots or multi-axis applications not authorized

Characteristics:
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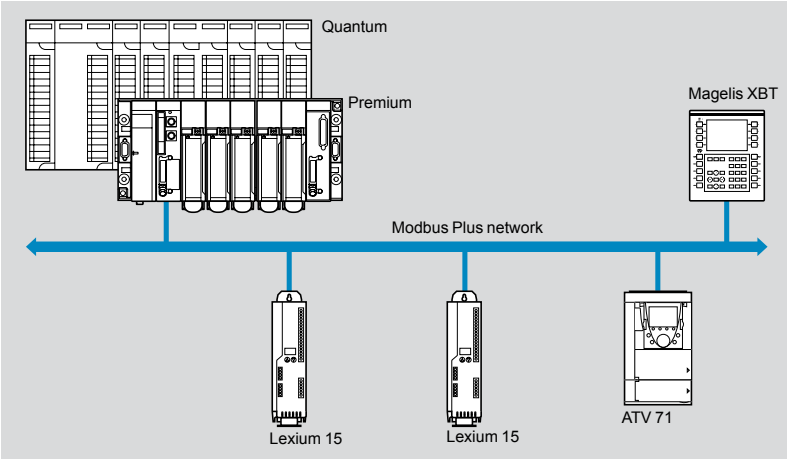
Modbus Plus network

Presentation



The Modbus Plus network is a high-performance industrial local area network which meets the needs of client/server type extended architectures, combining a high data rate (1 Mbps), simple, low cost transmission media and numerous messaging services.

The Lexium 15 servo drive is connected to the Modbus Plus network via the AM0 MBP 001V000 communication card.

Other devices can be connected to the Modbus Plus network such as Quantum *(1)* and Premium *(2)* PLCs, Magelis XBT terminals *(3)*, Altivar variable speed drives *(4)*, etc.

Characteristics of the AM0 MBP 001V000 Modbus Plus card

Structure	Connector	One 9-way female SUB-D connector
	Transmission speed	500...1000 kbps
	Address	1 to 63, configurable via the terminal or the Unilink software
Services	Messaging	Yes, Modbus; point-to-point requests with confirmation: 200 bytes maximum, compatible with all Modbus subscribers
	I/O data	"Peer Cop": 9 registers "Global data": 18 registers
	Communication monitoring	"Time out" adjustable from 0.01…60s via the Unilink software
Diagnostics	Using LEDs	1 LED on the "COM" card (status)

(1) Please consult our "Automation platform Modicon Quantum and Unity software" specialist catalogue.
(2) Please consult our "Automation platform Modicon Premium and Unity - PL7 software" specialist catalogue.
(3) Please consult our "Human-Machine interfaces" specialist catalogue.
(4) Please consult our "Soft starters and variable speed drives" specialist catalogue.

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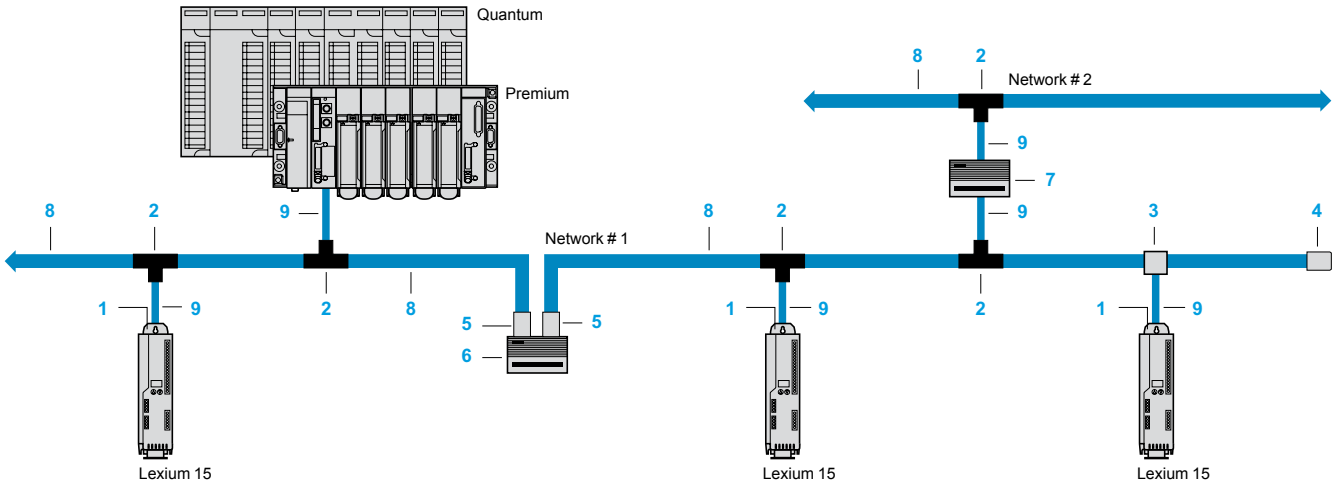
Lexium 15 motion control
Communication buses and networks
Modbus Plus network

Modbus Plus wiring system



AM0 MBP 001V000

Modbus Plus network connection components *(1)*

Description	Use	Item no.	Reference	Weight kg
Card				
Modbus Plus card	For Lexium 15, all ratings	1	**AM0 MBP 001V000**	0.140
Connection accessories				
Modbus Plus tap (IP 20)	Connection by tap junction Provides impedance matching when it is installed at the end of the line (requires wiring tool 043 509 383)	2	**990 NAD 230 00**	0.230
Modbus Plus junction box (zamak, IP 65)	Connection via tap (screw terminals) Equipped with an RJ45 connector for connecting a programming or maintenance terminal. Installed at the end of the line, it requires 990 NAD 230 11 line terminators	3	**990 NAD 230 10**	0.650
Line terminators (sold in lots of 2)	Set of 2 line terminators for 990 NAD 230 10 junction box	4	**990 NAD 230 11**	–
Connectors with Modbus Plus terminator (sold in lots of 2)	Set of 2 connectors for bridge and repeater	5	**AS MBKT 185**	0.260
Modbus Plus electrical repeater	Extension beyond 450 m or up to 64 subscribers	6	**NW RR85 001**	2.677
Modbus Plus bridge with 4 ports	Connection of 4 networks maximum	7	**NW BP85 002**	2.813
Wiring tool	Inserting trunk and drop cables in 990 NAD 230 00 tap	–	**043 509 383**	3.000

Cables

Description	Use		Item no.	Length m	Reference	Weight kg
	From	To				
Modbus Plus trunk cables Shielded twisted pair with shielding drain	Modbus Plus tap 990 NAD 230 00, Modbus Plus junction box 990 NAD 230 10	Modbus Plus 990 NAD 230 00 tap, connector with Modbus Plus terminator AS MBKT 185, Modbus Plus junction box 990 NAD 230 10	8	30.5	**490 NAA 271 01**	1.833
				152.5	**490 NAA 271 02**	10.135
				305	**490 NAA 271 03**	18.940
				457	**490 NAA 271 04**	30.000
				1525	**490 NAA 271 06**	112.950
Drop cables One 9-way male SUB-D connector and one stripped end	Premium and Quantum PLCs, Modbus Plus bridge with 4 ports NW BP85 002, Lexium 15 servo drive	Modbus Plus 990 NAD 230 00 tap	9	2.4	**990 NAD 211 10**	0.169
				6	**990 NAD 211 30**	0.459

(1) To order other components for connection to the Modbus Plus network, please consult our "Automation platform Modicon Premium and Unity - PL7 software" and "Automation platform Modicon Quantum and Unity" specialist catalogues.

Presentation:
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Characteristics:
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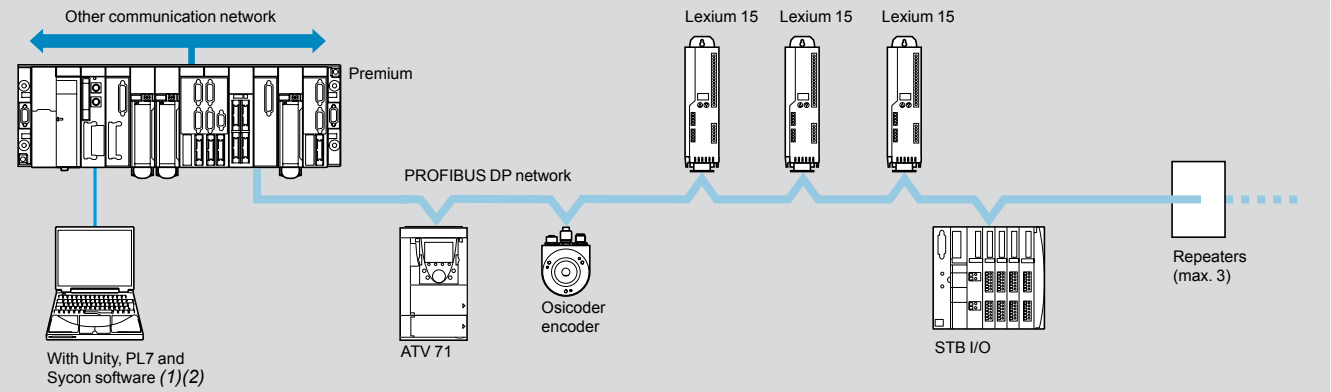
Lexium 15 motion control
Communication buses and networks
PROFIBUS DP fieldbus

PROFIBUS DP fieldbus

Presentation



PROFIBUS DP is a fieldbus for industrial communication.
PROFIBUS DP has a linear bus topology with a master/slave type centralized access procedure.
The physical link is a single shielded twisted pair, but optical interfaces are available for establishing star and ring tree structures.

The Lexium 15 servo drive is connected to the PROFIBUS DP fieldbus via the VW3 M3 306 communication card.

Other devices can be connected to the PROFIBUS DP bus such as Premium *(1)* and Quantum *(2)* PLCs, STB I/O *(3)*, Altivar variable speed drives *(4)*, Osicoder rotary encoders *(5)*, etc.

Characteristics of the VW3 M3 306 PROFIBUS DP card

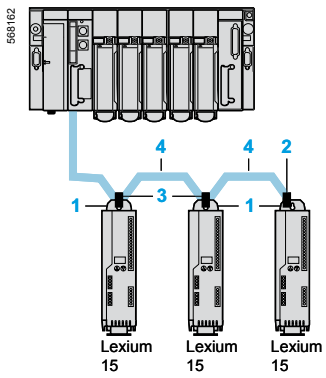
Structure	Connectors	Two 9-way female SUB-D connectors
	Transmission speed	9.6 kbps: 1200 m (4800 m with 3 repeaters) at 12 Mbps: 100 m (400 m with 3 repeaters)
	Address	1 to 62 (32 Lexium 15 servo drives max., without repeater)
Services	I/O data	Type 2 PPO: ■ Access to all the movement parameters and diagnostics parameters (4 PKW words) ■ Control and status words ■ Access to the various “Motion Task” control words ■ External position, speed and torque setpoints
Description file		A single gsd file for the whole range is supplied on the documentation CD-ROM or can be downloaded from the “www.telemecanique.com” website. This file does not contain descriptions of the servo drive parameters.

(1) Please consult our “Automation platform Modicon Quantum and Unity software” specialist catalogue.
(2) Please consult our “Automation platform Modicon Premium and Unity - PL7 software” specialist catalogue.
(3) Please consult our “Human-Machine interfaces” specialist catalogue.
(4) Please consult our “Soft starters and variable speed drives” specialist catalogue.
(5) Please consult our “Electronic and electromechanical detectors” catalogue.

Connections: page 3/41
References: page 3/41

Lexium 15 motion control
Communication buses and networks
PROFIBUS DP fieldbus

Premium



VW3 M3 306

490 NAD 911 03

Components for connection to PROFIBUS DP field bus *(1)*

Description	Use	Item no.	Reference	Weight kg
Card				
PROFIBUS DP card	For Lexium 15, all ratings	1	**VW3 M3 306**	0.140
Connection accessories				
PROFIBUS DP connector One 9-way male SUB-D with line terminator, output at 90°	Line terminator connection	2	**490 NAD 911 03**	–
PROFIBUS DP connector One 9-way male SUB-D, output at 90°	Intermediate connection	3	**490 NAD 911 04**	–
PROFIBUS DP connector One 9-way male SUB-D and one 9-way female SUB-D, output at 90°	Intermediate connection with option to connect a programming terminal to the 9-way SUB-D female connector	3	**490 NAD 911 05**	–

Cables

Description	Use		Item no.	Length	Reference	Weight
	From	To		m		kg
PROFIBUS DP trunk cables	PROFIBUS DP 490 NAD 911 04/05 connectors	PROFIBUS DP 90 NAD 911 03/04/05 connectors	4	100	**TSX PBS CA 100**	–
				400	**TSX PBS CA 400**	–

(1) To order other components for connection to the PROFIBUS DP fieldbus, please consult our "Automation platform Modicon Premium and Unity - PL7 software" and "Automation platform Modicon Quantum and Unity" specialist catalogues.

3

Presentation: page 3/40
Characteristics: page 3/40

Lexium 15 motion control
Option: SERCOS card

Presentation

108762

AM0 SER 001V000

SERCOS (SERial COmmunication System) is a communication standard which defines both an exchange protocol between a motion control module and a number of servo drives and the connection media. This standard is defined in European standard IEC/EN 61491.

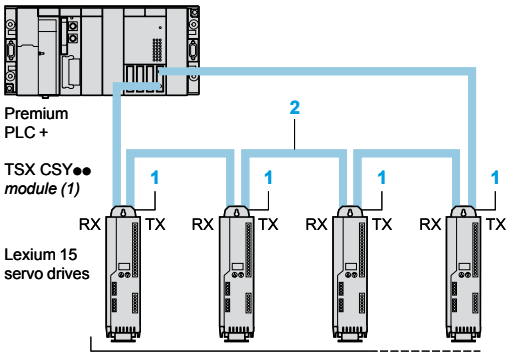
The SERCOS architecture is totally dedicated to the synchronization requirements of complex motion control applications. The ring topology of the SERCOS network is created using optical fibres that provide a very high speed (4 Mbps) and total immunity in disturbed industrial environments.

This bus also allows application I/O (position encoder, emergency stop, etc.) to be connected directly to the servo drives, thus reducing connection costs.

Characteristics *(1)*

Topology	Industrial bus complying with standard EN 61491 Ring connection of servo drives
Rate	4 Mbps by default
Medium	Fibre optic cable
Cycle time	2…4 ms depending on the number of axes, see page 3/80
Maximum number of segments	9…17 depending on the motion control module used, see page 3/80
Segment length	38 m maximum with plastic fibre optic cable 150 m maximum with glass fibre optic cable

References



TX: transmission
RX: reception

SERCOS ring network

Card

Description	Used for	Item no.	Reference	Weight kg
SERCOS card	Lexium 15, all ratings	1	**AM0 SER 001V000**	0.150

Cables

Description	Used for	Item no.	Length m	Reference	Weight kg
Plastic fibre optic cables fitted with SMA connectors (radius of curvature: 25 mm min.)	Connecting Lexium 15 servo drives equipped with card AM0 SER 001V000	2	0.3	**990 MCO 000 01**	0.150
			0.9	**990 MCO 000 03**	0.180
			1.5	**990 MCO 000 05**	0.260
			4.5	**990 MCO 000 15**	0.770
			16.5	**990 MCO 000 55**	2.830
			22.5	**990 MCO 000 75**	4.070
			37.5	**990 MCO 001 25**	5.940

(1) Motion control module, see page 3/85.

Lexium 15 motion control
Option: I/O extension card

105814

AM0 INE 001V000

Presentation

Lexium 15 servo drives can be adapted for applications that require the possibility of control via extended logic I/O by installing an I/O extension card.

This card has 14 logic inputs that can be used for:
- Activating a motion task. The number of this task is coded on 8 bits (X11A-1…X11A-8). Each input represents one bit.
- Connecting a home position referencing sensor (X11A-9)
- Resetting errors to zero (X11A-10)
- Sequencing the next motion task (X11A-11)
- Activation of manual mode (X11A-12)
- Resumption of a previously interrupted motion task (X11B-1)
- Launching the motion task coded on the first 8 inputs (X11B-2).

It also has 8 logic outputs that can be used for:
- Sending the “In position” signal (X11B-3)
- Capturing 6 position registers (X11B-4, X11B-6…X11B10)
- Monitoring the following error (X11B-5)

Electrical characteristics

24 V ⎓ external power supply *(1)*	Voltage	**V**	18…36
	Current	**A**	4
Logic inputs			
Type			Logic inputs conforming to standard IEC 61131-2 type 1
Number			14 (X11A-1…X11A-12, X11B-1, X11B-2)
Power supply			24 V ⎓, 7 mA
Sampling period		**ms**	4
Response time		**ms**	2
Logic state		**A**	State 0 if < 7 V or input not wired State 1 if > 12 V
Logic outputs			
Type			24 V ⎓ logic outputs conforming to standard IEC 61131-2 type 1
Number			8 (X11B-3…X11B-10)
Output voltage		**V**	24
Response time		**ms**	10
Max. breaking current		**mA**	500

Connection characteristics

Type of terminal		**Power supply**	**Logic I/O**
Maximum wire size		1 mm² (AWG 17)	0.5 mm² (AWG 20)

References

Description	**Reference**	**Weight kg**
I/O extension card	**AM0 INE 001V00**	0.180

(1) Please consult our “Interfaces, I/O splitter boxes and power supplies” specialist catalogue.

Lexium 15 motion control
Lexium 15 servo drives
Option: Braking resistors

Presentation

Internal braking resistor

An internal braking resistor is integrated into Lexium 15 LP and Lexium 15 MP servo drives to absorb the braking energy. If the DC bus voltage in the servo drive exceeds a specified value, this braking resistor is activated. The restored energy is converted into heat by the braking resistor.

External braking resistor

For LXM 15HC●●N4X servo drives or for applications requiring the servo motor to perform frequent braking operations, it may be necessary to add an external braking resistor.

If an external braking resistor is used, the internal braking resistor must be deactivated. To do this, the shunt between terminals PBe and PBi must be removed and the external braking resistor connected between terminals PA/+ and PBe.

Two or more external braking resistors can be connected in parallel.
The servo drive monitors the power dissipated in the braking resistor.

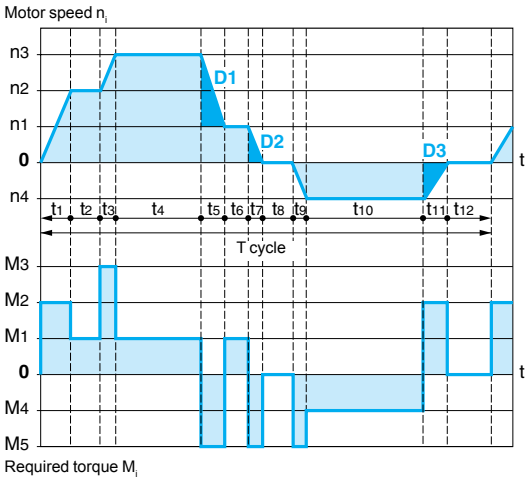
Sizing the braking resistor

During braking or deceleration requested by the servo drive, the kinetic energy of the moving load must be absorbed by the servo drive. The energy generated by deceleration charges the capacitors integrated in the servo drive.

When the voltage at the capacitor terminals exceeds the permitted threshold, the braking resistor (internal or external) will be activated automatically in order to dissipate this energy. In order to calculate the power to be dissipated by the braking resistor, the user needs a knowledge of the timing diagram giving the motor torques and speeds according to the time in order to identify the curve segments in which the servo drive decelerates the load.

Motor cycle timing diagram

These curves are those used on page 6/2 for selecting the size of the servo motor. The curve segments to be taken into account, when the servo drive is decelerating, are marked in blue by D_i.



Characteristics: page 3/46
References: page 3/47
Dimensions: page 3/53

Sizing the braking resistor (continued))

Calculation of the constant deceleration energy

To do this, the user must know the total inertia, defined as follows:
J_t: total inertia
where:
J_t = **Jm** (motor inertia) + **Jc** (load inertia). For **Jm**, see pages 3/90 to 3/135 and 3/160 to 3/196.
The energy E_i of each segment is defined as follows:

$$Ei = \frac{1}{2} Jt \cdot \omega i^2 = \frac{1}{2} Jt \cdot \left(\frac{2\pi ni}{60}\right)^2$$

Which gives the following for the various segments:

$$E1 = \frac{1}{2} Jt \cdot \left(\frac{2\pi[n_3 - n_1]}{60}\right)^2$$

$$E_2 = \frac{1}{2} Jt \cdot \left(\frac{2\pi n_1}{60}\right)^2$$

$$E_3 = \frac{1}{2} J_t \cdot \left(\frac{2\pi n_4}{60}\right)^2$$

where E_i is in joules, J_t in kgm², ω in radians and n_i in rpm.

Energy absorbed by the internal capacitor

The energy absorption capacity **Edrive** (without using an internal or external braking resistor) is given for each servo drive on page 3/46.
In the calculation, only take account of segments D_i for which the energy E_i is greater than the absorption capacities given in the table opposite.
This additional energy E_{Di} must be dissipated in the resistor (internal or external):
$E_{Di} = E_i$ - **Edrive** (in joules).

Calculation of the continuous power

The continuous power Pc is calculated for each machine cycle:

$$Pc = \frac{\Sigma E_{Di}}{T\ cycle}$$

where **Pc** is in W, E_{Di} in joules and **T cycle** in s.

Selecting the braking resistor (internal or external)

Note: *This is a simplified selection method. In extreme applications, for example with vertical axes, this method is inadequate. In this case, please consult your Regional Sales Office.*

The selection is carried out in two steps:

1 The internal braking resistor is adequate if the following two conditions are met:
- The maximum energy during a braking procedure must be less than the peak energy that can be absorbed by the internal braking resistor: $E_{Di} < EPk$
- Continuous power must be lower than the continuous power of the internal braking resistor: **Pc < PPr**.

2 If one of the above conditions is not met, an external braking resistor must be used to satisfy these conditions.
The value of the external braking resistor must be between the minimum and maximum values given in the table on page 3/47.
If this range of values is not respected, the servo drive may be subject to disturbance and the load can no longer be braked safely.

Lexium 15 motion control

Lexium 15 servo drives

Option: Braking resistors

Characteristics of braking resistor/Lexium 15 servo drive combinations

Braking resistors used with Lexium 15 LP servo drives

Type of servo drive		LXM 15		LD13M3	LD21M3	LD28M3	LD13M3	LD21M3	LD28M3
Supply voltage			V	230					
Number of phases				Single-phase			Three-phase		
Load threshold			V ⎓	400					
Energy absorption of the internal capacitors		Edrive	Joule (Ws)	6.2					
Internal resistor	Resistance		Ω	66					
	Continuous power	PPr	W	20	50		20	50	
	Peak energy	EPk	Joule (Ws)	3000					
External resistor	Minimum resistance		Ω	47					
	Maximum resistance *(1)*		Ω	190	95	57	190	95	57

Type of servo drive		LXM 15		LU60N4			LD10N4			LD17N4		
Supply voltage			V	230	400	480	230	400	480	230	400	480
Number of phases				Three-phase								
Load threshold			V ⎓	400	720	840	400	720	840	400	720	840
Energy absorption of the internal capacitors		Edrive	Joule (Ws)	24.8	88.1	127.3	24.8	88.1	127.3	24.8	88.1	127.3
Internal resistor	Resistance		Ω	91								
	Continuous power	PPr	W	20			50					
	Peak energy	EPk	Joule (Ws)	2100	7000	9000	2100	7000	9000	2100	7000	9000
External resistor	Minimum resistance		Ω	85	85	100	85	85	100	85	85	100
	Maximum resistance *(1)*		Ω	285	768	803	114	265	401	95	177	201

Braking resistors used with Lexium 15 MP servo drives

Type of servo drive		LXM 15		MD28N4			MD40N4			MD56N4		
Supply voltage			V	230	400	480	230	400	480	230	400	480
Number of phases				Three-phase								
Load threshold			V ⎓	400	720	840	400	720	840	400	720	840
Energy absorption of the internal capacitors		Edrive	Joule (Ws)	6	23	28	12	46	57	12	46	57
Internal resistor	Resistance		Ω	33								
	Continuous power	PPr	W	200								
	Peak energy	EPk	Joule (Ws)	5000	16,000	21,000	5000	16,000	21,000	5000	16,000	21,000
External resistor	Minimum resistance		Ω	16	28	33	12	21	25	8	14	16
	Maximum resistance *(1)*		Ω	57	106	120	41	76	86	28	53	60

Braking resistors used with Lexium 15 HP servo drives

Type of servo drive		LXM 15		HC11N4X			HC20N4X		
Supply voltage			V	230	400	480	230	400	480
Number of phases				Three-phase					
Load threshold			V ⎓	400	720	840	400	720	840
Energy absorption of the internal capacitors		Edrive	Joule (Ws)	60	150	180	120	300	360
External resistor	Minimum resistance		Ω	15	15	15	10	10	10
	Maximum resistance *(1)*		Ω	15	27	30	10	13	17

(1) Values given for braking at nominal motor torque (M_0).

General characteristics

Type of braking resistor			VW3 A7 601 R●●…608 R●●	VW3 A7 705, 707
Ambient air temperature around the device	Operation	°C	0…+ 50	
	Storage	°C	- 25…+ 85	- 25…+ 70
Degree of protection of the casing			IP 65	IP 20
Thermal protection			Via the servo drive *(1)*	Via the servo drive *(1)* or via temperature-controlled switch *(2)*
Temperature-controlled switch	Activation temperature	°C	–	120
	Max. voltage - max. current		–	250 V ∿ - 1 A
	Min. voltage - min. current		–	24 V ⎓ - 0.1 A
	Maximum switch resistance	mΩ	–	60

Connection characteristics

Type of terminal			For servo drive	For temperature-controlled switch
Maximum wire size	VW3 A7 601 R●●…608 R●●		Supplied with connection cable	–
	VW3 A7 705, 707		Connected on a bar, M6	2.5 mm² (AWG 14)

References

106005

VW3 A7 602 R●●

Value	Continuous power PPr	Peak energy EPk			Length of connection cable	Reference	Weight
		230 V	400 V	480 V			
Ω	W	Ws	Ws	Ws	m		kg
5	1000	45,000	45,000	45,000	–	**VW3 A7 707**	11.000
10	400	13,300	7300	7700	0.75	**VW3 A7 601 R07**	1.420
					2	**VW3 A7 601 R20**	1.470
					3	**VW3 A7 601 R30**	1.620
	1000	45,000	45,000	45,000	–	**VW3 A7 705**	11.000
27	100	3800	1900	1700	0.75	**VW3 A7 602 R07**	0.630
					2	**VW3 A7 602 R20**	0.780
					3	**VW3 A7 602 R30**	0.900
	200	7400	4900	4300	0.75	**VW3 A7 603 R07**	0.930
					2	**VW3 A7 603 R20**	1.080
					3	**VW3 A7 603 R30**	1.200
	400	18,100	11,400	10,500	0.75	**VW3 A7 604 R07**	1.420
					2	**VW3 A7 604 R20**	1.470
					3	**VW3 A7 604 R30**	1.620
72	100	3700	2500	2300	0.75	**VW3 A7 605 R07**	0.620
					2	**VW3 A7 605 R20**	0.750
					3	**VW3 A7 605 R30**	0.850
	200	9600	6600	6000	0.75	**VW3 A7 606 R07**	0.930
					2	**VW3 A7 606 R20**	1.080
					3	**VW3 A7 606 R30**	1.200
	400	24,700	16,200	15,500	0.75	**VW3 A7 607 R07**	1.420
					2	**VW3 A7 607 R20**	1.470
					3	**VW3 A7 607 R30**	1.620
100	100	4500	3000	2700	0.75	**VW3 A7 608 R07**	0.410
					2	**VW3 A7 608 R20**	0.560
					3	**VW3 A7 608 R30**	0.760

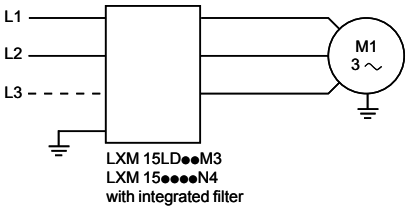
(1) Thermal protection is provided by internal limitation of the servo drive braking power.
(2) The switch should be connected in the sequence (use for signalling or in line contactor control).

Presentation: page 3/44
Dimensions: page 3/53

Lexium 15 motion control

Lexium 15 servo drives

Optional integrated EMC filters and additional filters

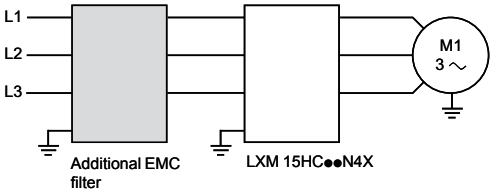


Integrated EMC filters

Function

LXM 15LD●●M3 and LXM 15●●●●N4 servo drives have built-in radio interference input filters to meet the EMC standard for variable speed electrical power drive "products" IEC/EN 61800-3, edition 2, category C2 or C3 in environment 1 or 2 and to comply with the European directive on EMC (electromagnetic compatibility).

For servo drive	Maximum motor cable length conforming to	
	EN 55011, class A, Gr1 IEC/EN 61800-3 category C2	EN 55011, class A, Gr2 IEC/EN 61800-3 category C3
	m	m
Single-phase supply voltage: 200…240 V ~ 50/60 Hz		
LXM 15LD●●M3	10	25, 50 with motor choke
Three-phase supply voltage: 200…240 V ~ 50/60 Hz		
LXM 15LD●●M3	10	25, 50 with motor choke
Three-phase supply voltage: 208…480 V ~ 50/60 Hz		
LXM 15L●●●N4	10	25, 50 with motor choke
LXM 15MD●●N4	10	25, 100 with motor choke



Additional EMC input filters

Applications

An additional EMC filter must be provided for LXM 15HC●●N4X servo drives.

This additional input filter is used to meet the requirements of standard IEC 61800-3, edition 2, category C3 in environment 2.

Use according to the type of line supply

Use of these built-in or additional filters is only possible on TN (neutral connection) and TT (neutral to earth) type networks.

The filters must not be used on IT (impedance or isolated neutral) type networks. For a servo drive with integrated filter (LXM 15LD●●M3 and LXM 15●●●●N4), the filter must be connected to an LV/LV transformer in order to recreate, on the secondary side, a TT system (see page 3/65).

Standard IEC/EN 61800-3, appendix D2.1, states that on IT (isolated or impedance earthed neutral) type networks, filters can adversely affect the operation of the insulation monitors. In addition, the effectiveness of additional filters on this type of network depends on the type of impedance between neutral and earth, and therefore cannot be predicted.

Dimensions:
page 3/53

Lexium 15 motion control

Lexium 15 servo drives

Option: Additional EMC input filters

Characteristics of servo drive/additional EMC input filter mounting

Filter type			VW3 M4 101	VW3 M4 102
Conforming to standards			UL 1283	
Degree of protection			IP 20	
Losses		W	30	50
Maximum nominal voltage	Three-phase 50/60 Hz	V	480 + 10%	
Max. nominal current		A	42	75

Application, category: EN 61800-3: 2001-02 ; IEC 61800-3, Ed. 2		Description
Category C3 in environment 2		Use in industrial premises

Connection characteristics

Maximum wire size		25 mm² (AWG 2)

References

105816

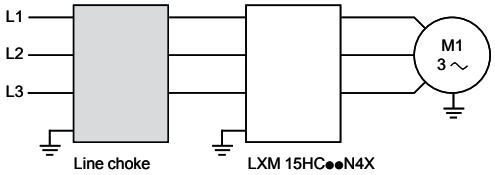
VW3 M4 101

For servo drive	Maximum motor cable length conforming to IEC/EN 61800-3, category C3	Reference	Weight
	m		kg
Three-phase supply voltage: 208…480 V ∼ 50/60 Hz			
LXM 15HC11N4X	100	**VW3 M4 101**	0.600
LXM 15HC20N4X	100	**VW3 M4 102**	0.550

Dimensions:
page 3/53

Lexium 15 motion control
Lexium 15 servo drives
Option: Line chokes

Line chokes



A line choke can be used to provide improved protection against overvoltages on the line supply and to reduce harmonic distortion of the current produced by the servo drive.

The recommended chokes limit the line current.
They have been developed in accordance with standards UL 506 and EN 61558-2-20 (VDE 0570).

The inductance values are defined for a voltage drop between 3% and 5% of the nominal line voltage. Values higher than this will cause loss of torque.

These chokes should be installed upstream of the servo drive.

Applications

In the context of a TT or TN supply system, it is compulsory to use a line choke with LXM 15HC●●N4X servo drives.

Note: *Do not order if an isolation transformer is used with an IT system.*

General characteristics

Type of line choke			VW3 M4 301	VW3 M4 302
Conforming to standards			UL 506, EN 61558-2-20 (VDE 0570)	
Voltage drop			Between 3% and 5% of the nominal supply voltage. Values higher than this will cause loss of torque.	
Degree of protection	Choke		IP 00	
	Terminals		IP 20	
Inductance value		**mH**	0.5	0.4
Nominal current		**A**	60	75
Losses		**W**	145	150

Connection characteristics

Maximum wire size	VW3 M4 301, 302		25 mm² (AWG 2)

References

109002

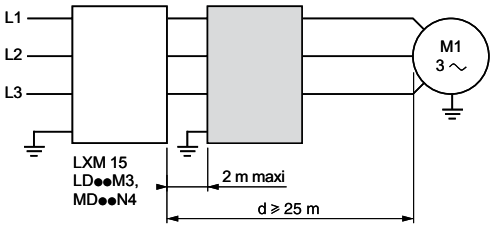
VW3 M4 301

For servo drives	Line current without choke		Line current with choke		Reference	Weight
	208 V	480 V	208 V	480 V		
	A	A	A	A		kg
Three-phase supply voltage: 208…480 V ~ 50/60 Hz						
LXM 15HC11N4X	44	52	35	36.6	**VW3 M4 301**	9.000
LXM 15HC20N4X	84.4	83.5	60.6	60.9	**VW3 M4 302**	10.000

Dimensions:
page 3/53

Lexium 15 motion control
Lexium 15 servo drives
Option: Motor chokes

Motor chokes



The motor choke is used to reduce current ripple generated along the power cable. It enables the servo motor to be operated for motor cable lengths greater than 25 m (limited to 50 or 100 m depending on the rating).

LXM 15HC●●N4X servo drives are designed to allow the use of motor cables up to 100 metres long without the addition of a motor choke.

The motor choke is also used to:
- Protect the servo drive power stage against overvoltages
- Limit ripple to 5% of the nominal current

General characteristics

Type of line choke			AM0 FIL 001V056
Degree of protection	Choke		IP 20
	Terminals		IP 20
Inductance value		**mH**	1.2
Maximum current		**A**	3 x nominal current for 60 s
Losses		**W**	12

Connection characteristics

Maximum wire size		10 mm^2 (AWG 6)

References

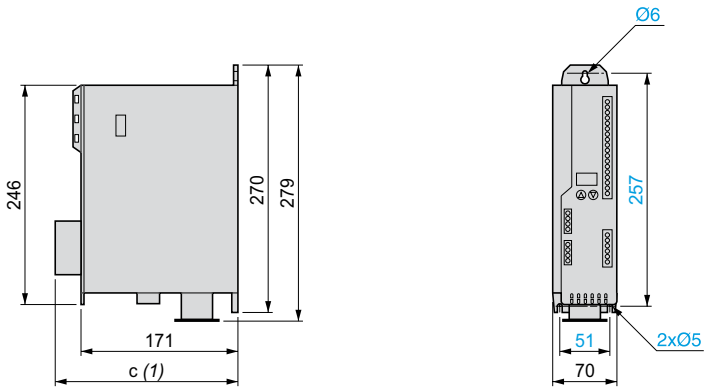
109001

AM0 FIL 001V056

For servo drive	Length of motor cable	Nominal current	Reference	Weight
	m	A		kg
LXM 15LD●●M3 **LXM 15L●●●N4**	25…50	20	**AM0 FIL 001V056**	2.200
LXM 15MD●●N4	25…100	20		

Dimensions:
page 3/53

LXM 15LD13M3…LD28M3, LU60N4…LD17N4 servo drives

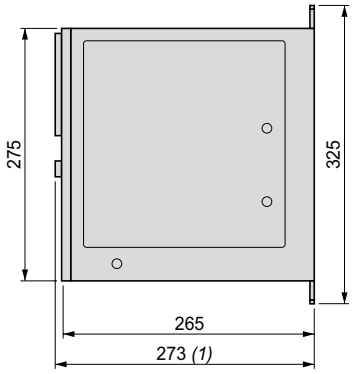


LXM 15	c
LD13M3…LD28M3	200
LU60N4…LD17N4	230

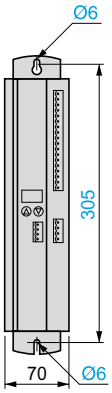
(1) With connectors

LXM 15MD28N4…MD56N4 servo drives

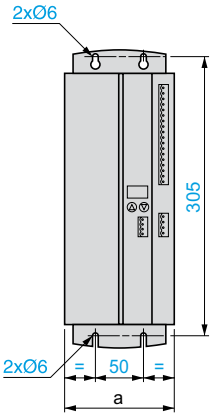
Common side view



LXM 15MD28N4



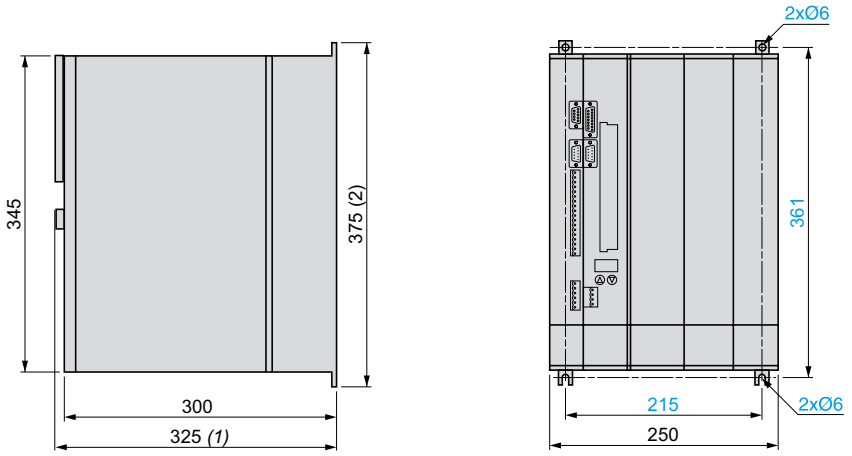
LXM 15MD40N4, MD56N4



LXM 15	a
MD40N4	100
MD56N4	120

(1) With connectors

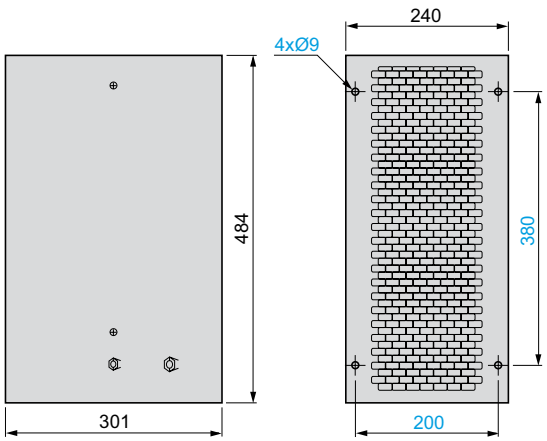
LXM 15HC11N4X, HC20N4X servo drives



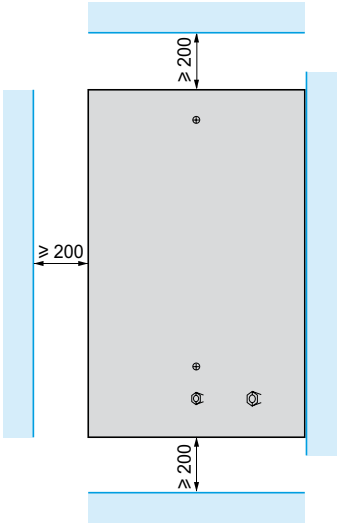
(1) With connectors
(2) 495, with earthing part

Options

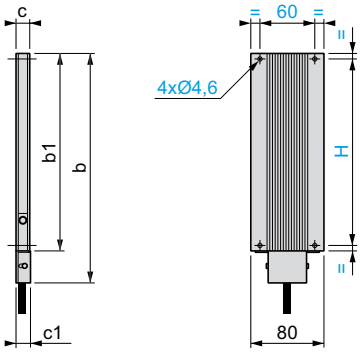
Braking resistors VW3 A7 705, 707



Mounting recommendations

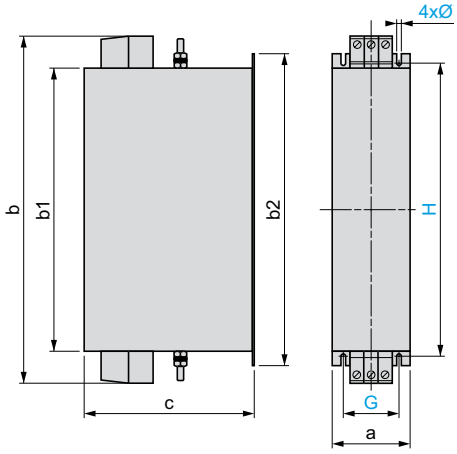


Braking resistors VW3 A7 601R●●…608R●●



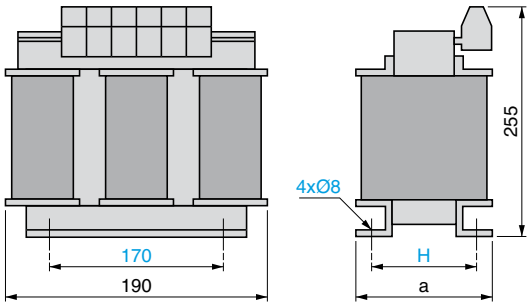
VW3	b	b1	c	c1	H
A7 602, 605, 608	145	110	15	15.5	98
A7 603, 606	251	216	15	15.5	204
A7 601, 604, 607	257	216	30	–	204

Additional EMC input filters VW3 M4 101, 102



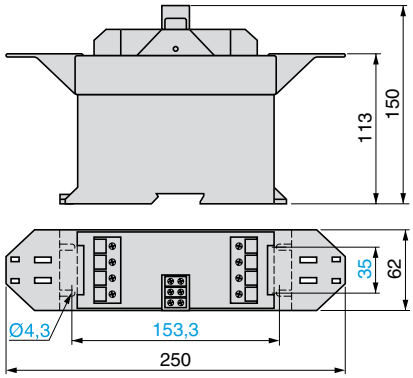
VW3	a	b	b1	b2	c	G	H
M4 101	60	355	305	335	150	35	320
M4 102	80	380	300	330	185	55	314

Line chokes VW3 M4 301, 302



VW3	a	H
M4 301	110	58
M4 302	120	68

Motor choke AM0 FIL 001V056



Presentation: page 3/8
Functions: page 3/14
Characteristics: page 3/24
References: page 3/28

Lexium 15 motion control
Lexium 15 servo drives
Advice on use in accordance
with the machinery safety directive

Categories relating to safety according to EN 954-1

The 5 categories of standard EN 954-1 are used to define the necessary system performance to meet safety requirements.

Categories	Basic safety principles	Control system requirements	Behaviour in the event of a fault
B	Selection of components that comply with the relevant standards	Control according to good engineering practice	Possible loss of the safety function
1	Selection of components and safety principles	Use of tried and tested components and proven safety principles	Possible loss of the safety function with a lower probability than in **B**
2	Selection of components and safety principles	Cyclic testing. The test intervals must be appropriate to both the machine and its application	Fault detected on each test
3	Structure of the safety circuits	A single fault must not result in loss of the safety function. The fault must be detected if this is reasonably possible	Safety function ensured, except in the event of an accumulation of faults
4	Structure of the safety circuits	A single fault must not result in loss of the safety function. The fault must be detected when or before the safety function is next invoked. An accumulation of faults must not result in loss of the safety function.	Safety function always ensured

⚠ **The machine manufacturer is responsible for selecting the safety category. The category depends on the level of risk factors given in standard EN 954-1.**

Lexium 15 servo drives and standard EN 954-1

The table below shows the safety level obtained according to the type of servo drive, with the integrated "Power Removal" safety function and associated equipment (Preventa monitoring module, contactor, etc.)

Safety level	Devices required	For Lexium 15 servo drives	Equipment to be added	Recommended wiring diagram, see page
Category B	–	All ratings	–	3/56 and 3/60
Category 1	1 breaking	All ratings	–	3/56 and 3/60
Category 2	1 breaking and 1 monitoring	All ratings	1 breaking device per PWR function with 1 Preventa monitoring module *(1)*	3/56 and 3/60
Category 3	2 breaking *(2)*	All ratings	1 breaking device per PWR function, 1 breaking device per contactor and 1 Preventa monitoring module *(1)*	3/56 and 3/60
Category 4	2 breaking and 1 monitoring *(2)*	All ratings	1 breaking device per PWR function, 1 breaking device per contactor and 1 Preventa monitoring module *(1)*	3/56 and 3/60

Categories relating to safety according to EN 954-1

The "Power Removal" (PWR) safety function makes it easier to achieve the safety levels defined above.

The "Power Removal" safety function integrated in Lexium 15 LP servo drives consists of a PWR logic input, accessed on the X4 connector. Deactivation of this input in particular initiates locking of the power stage of the servo drive supplying the servo motor, thus depriving the servo motor of energy *(3)*.

The "Power Removal" safety function integrated in Lexium 15 MP and Lexium 15 HP servo drives consists principally of an auxiliary relay that is accessed on the PWRI+ and PWRI- terminals of the X10 connector. When the relay coil is activated by the control system, this locks the servo drive power stage that supplies power to the servo motor, thus depriving the servo motor of energy *(3)*.
The anti-start relay contact, accessed on the PWRO1 and PWRO2 terminals on the X10 connector, enables the application to check the locking command. The state of the relay contact is monitored constantly by the control system, to check that the system is working correctly and ensure strict compliance with the machine stop and locking procedures.
This function is used primarily when the servo motor has to be kept stationary, for example when personnel need to have frequent access to protected areas in which machinery is running, for brief periods of time.

Note: *The use of Lexium 15 servo drives with the integral "Power Removal" safety function simplifies the connection diagrams required to comply with standard EN 954-1.*

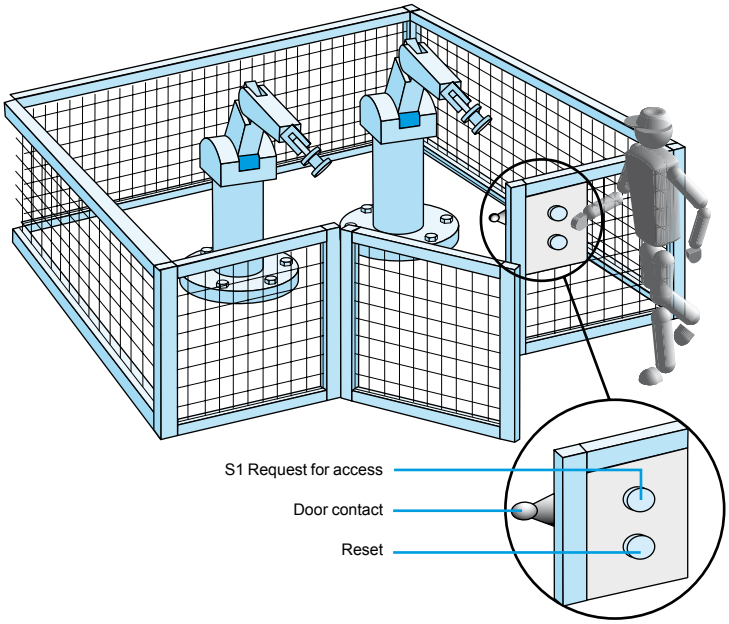
(1) The category of the Preventa safety module must be ≥ the required safety category.
(2) Where there are 2 breaking devices, see also the sections relating to Categories 3 and 4 on pages 3/58, 3/59, 3/62 and 3/63.
(3) Vertical axis immobilization can only be obtained by installing a mechanical locking system (holding brake) on the axes.

Lexium 15 motion control

Lexium 15 servo drives

Recommended wiring diagrams complying with standard EN 954-1

Application with requirement for access to a hazardous area



Presentation

The recommended wiring diagrams on pages 3/56 to 3/63 give an example of an application where access to a hazardous area needs to be protected (space inside and/or around a machine in which an operator is exposed to a hazard).
These diagrams apply to Lexium 15 LP, 15 MP and 15 HP servo drives with integrated “Power Removal” safety function.

Description of the application

Pressing the "Request for access to protected area" spring return pushbutton S1 causes the axes to slow down and stop, and also opens the access door to the protected area (activation of the latch electromagnet).
Depending on the safety level, if all the safety conditions are not met:

- Either the line contactor drops out
- Or the access door to the area remains locked

After operator intervention, the door closes and pressing the “Reset” spring return pushbutton enables the axes to operate again.

Selection criteria for the positions of the breaking contactors

Note: *A contactor can be used to break the power either upstream or downstream of the Lexium 15 servo drive, without compromising safety. Mixed breaking, upstream and downstream, is also possible.*

The positions of the contactors should be selected according to how often access to the hazardous area is required.

Occasional access requests
Breaking via a contactor upstream of the servo drive is recommended.
This type of breaking eliminates any risk of disconnection of the servo drive/servo motor assembly, which can cause overvoltages (only in the event of malfunction of the “Enable control system” input).

Frequent access requests
Breaking via a contactor downstream of the servo drive is preferable.
This type of breaking allows the servo drive input power bridge to remain energized, which enhances the longevity of the servo drive rectifier-filtering stage.

The recommended wiring diagrams on the following pages illustrate the most severe case corresponding to **frequent access requests.**

Note: *As a general rule, the breaking command for upstream KM contactors is instantaneous. The command for downstream KM contactors is delayed to allow the axis to come to a controlled stop (in accordance with parameter “StopMode = 1”).*

Categories 3 and 4

The diagrams for categories 3 and 4 on pages 3/58, 3/59, 3/62 and 3/63 take account of the widest requirements and thus incorporate **double breaking** of the control circuit **and the power circuit.**

Note*: Following specific analysis of machine risks, this redundancy can be limited to the control circuit alone, and thus can be restricted to simply breaking the power circuit.*

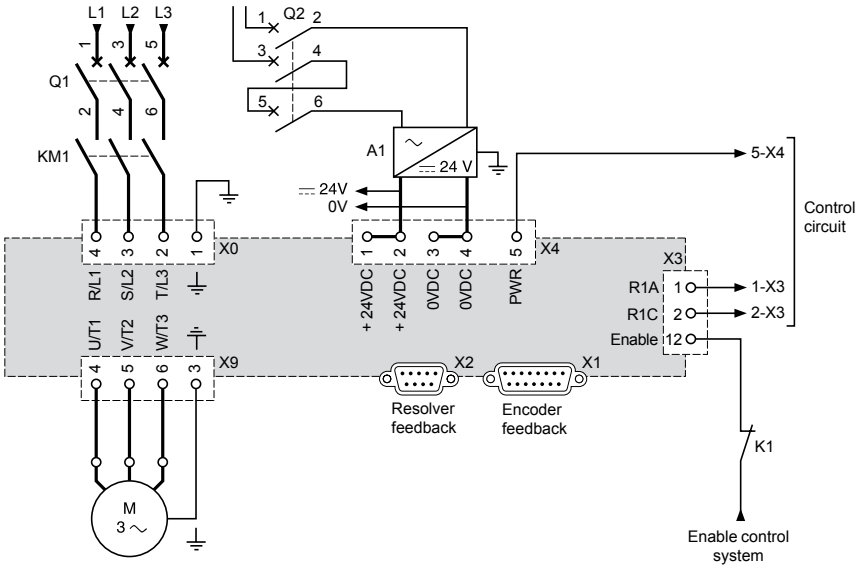
Lexium 15 motion control

Lexium 15 LP servo drives

Recommended wiring diagrams complying with standard EN 954-1

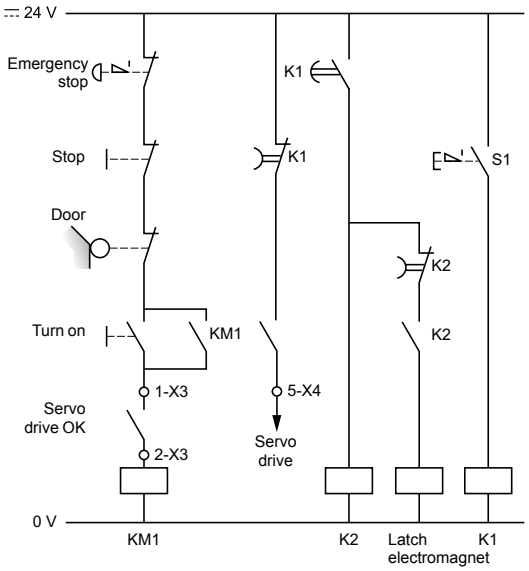
Category 1 safety level in accordance with EN 954-1

Power circuit of LXM 15L●●●●● servo drives

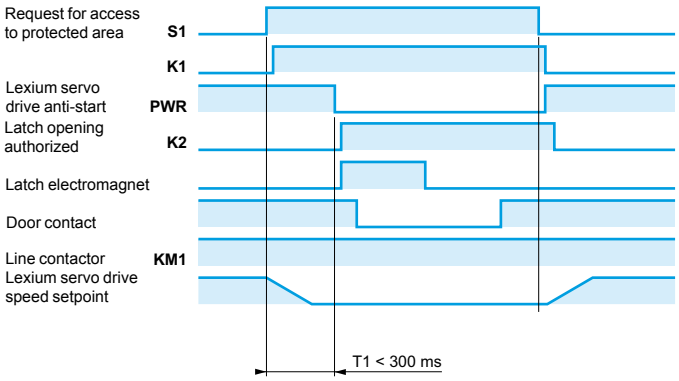


Q1: magnetic circuit breaker, see page 3/66
KM1: contactor, see page 3/66

Control circuit of LXM 15L●●●●● servo drives



Timing diagram



Comments

■ Time delay T1 on the K1 relay must be long enough for the axis to come to a controlled stop.
■ Lexium 15 LP servo drive parameters:
□ StopMode = 0: Axis performs a “freewheel” stop
□ StopMode = 1: Axis comes to a controlled stop according to the emergency deceleration ramp

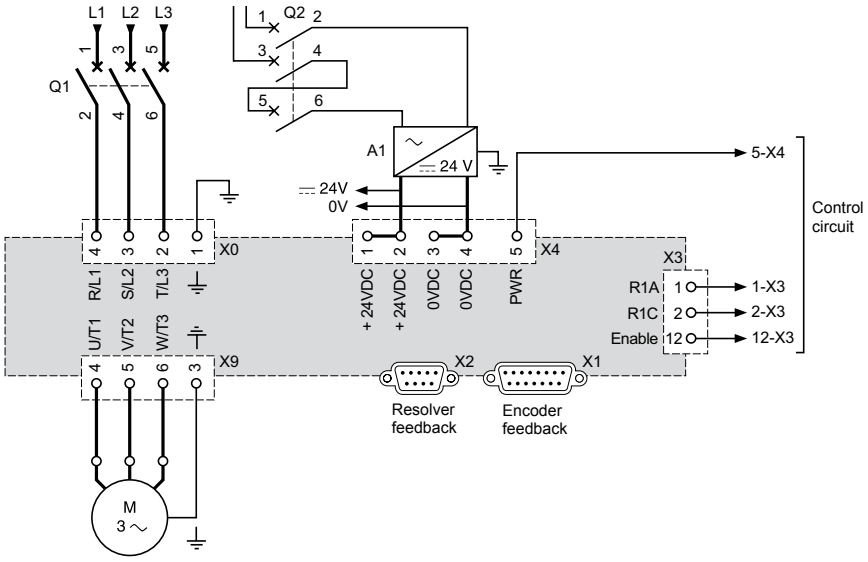
Lexium 15 motion control

Lexium 15 LP servo drives

Recommended wiring diagrams complying with standard EN 954-1

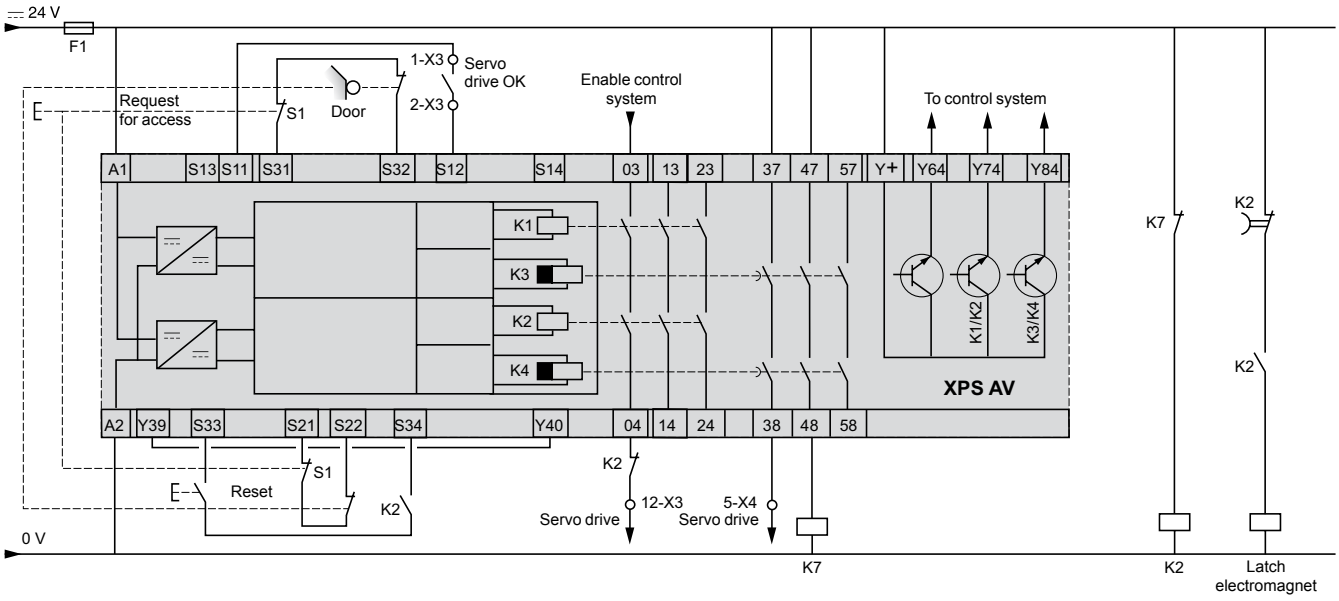
Category 2 safety level in accordance with EN 954-1

Power circuit of LXM 15L●●●●● servo drives



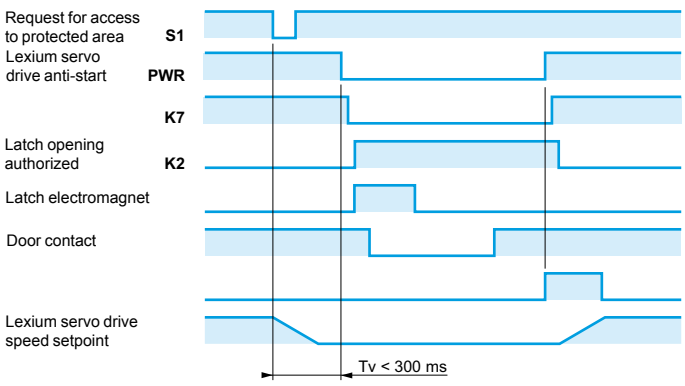
Q1: magnetic circuit breaker, see page 3/66

Control circuit of LXM 15L●●●●● servo drives



XPS AV: Preventa safety module, please consult our “Safety functions and solutions using Preventa” specialist catalogue

Timing diagram



Comments

- Time delay Tv on the XPS AV monitoring module must be long enough for the axis to come to a controlled stop.
- Lexium 15 LP servo drive parameters:
  - StopMode = 0: Axis performs a “freewheel” stop
  - StopMode = 1: Axis comes to a controlled stop according to the emergency deceleration ramp

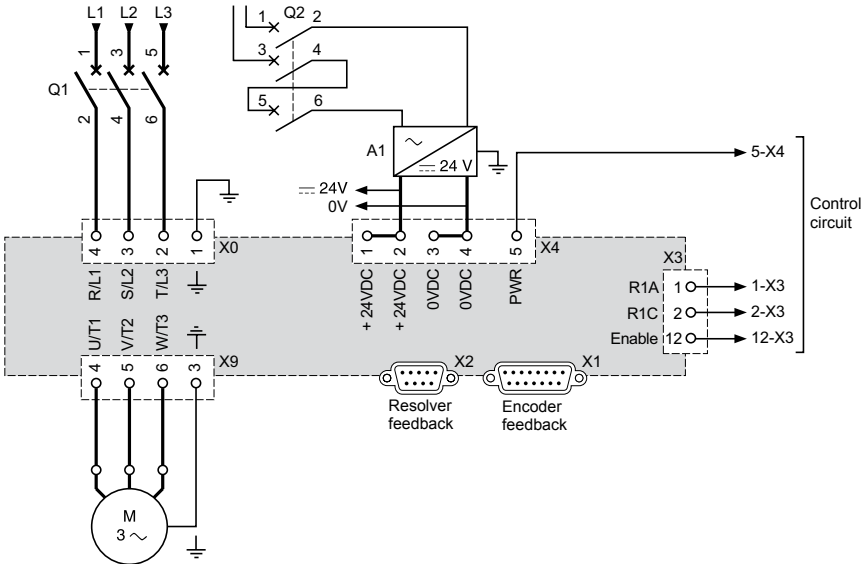
Lexium 15 motion control

Lexium 15 LP servo drives

Recommended wiring diagrams complying with standard EN 954-1

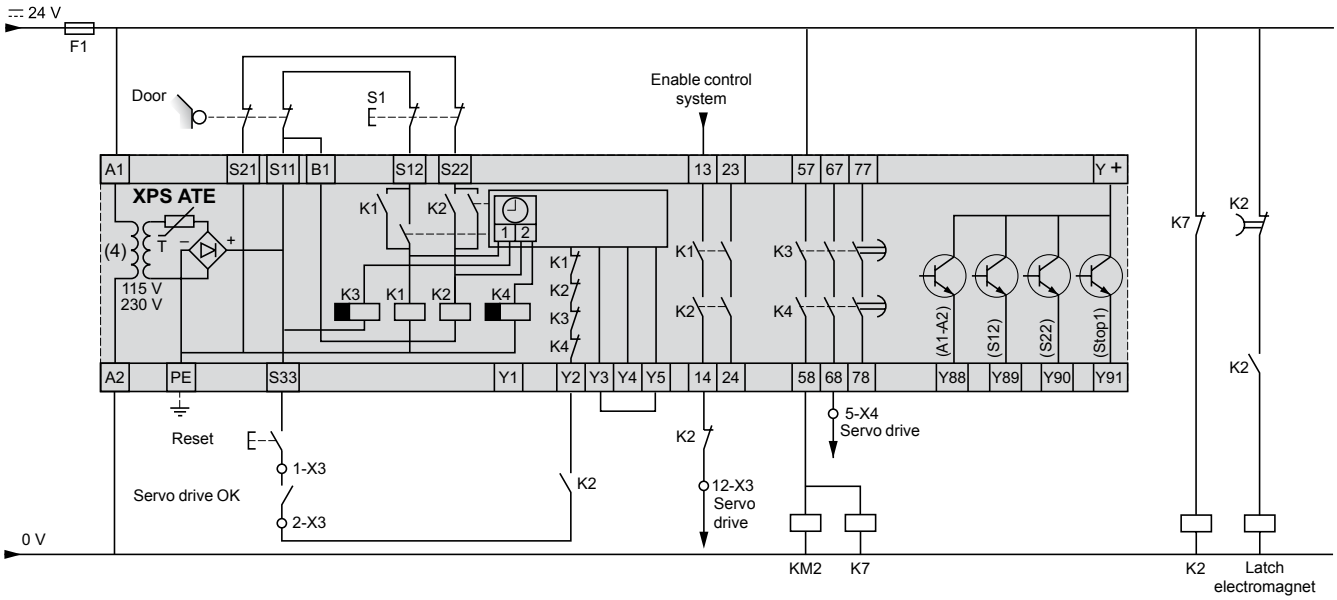
Category 3 safety level in accordance with EN 954-1

Power circuit of LXM 15L●●●●● servo drives



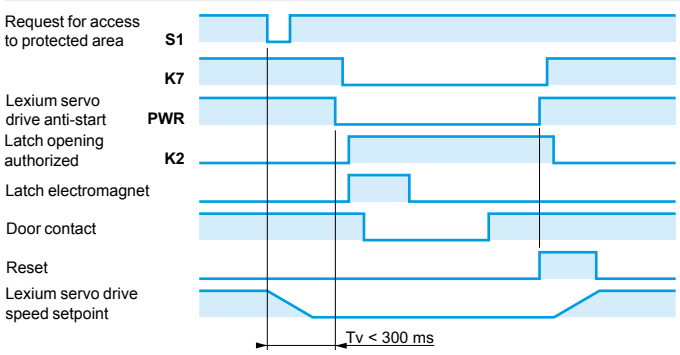
Q1: magnetic circuit breaker, see page 3/66

Control circuit of LXM 15L●●●●● servo drives



XPS ATE: Preventa safety module, please consult our “Safety functions and solutions using Preventa” specialist catalogue

Timing diagram



Comments

■ Time delay Tv on the XPS ATE monitoring module must be long enough for the axis to come to a controlled stop.

■ Lexium 15 LP servo drive parameters:

□ StopMode = 0: Axis performs a “freewheel” stop

□ StopMode = 1: Axis comes to a controlled stop according to the emergency deceleration ramp

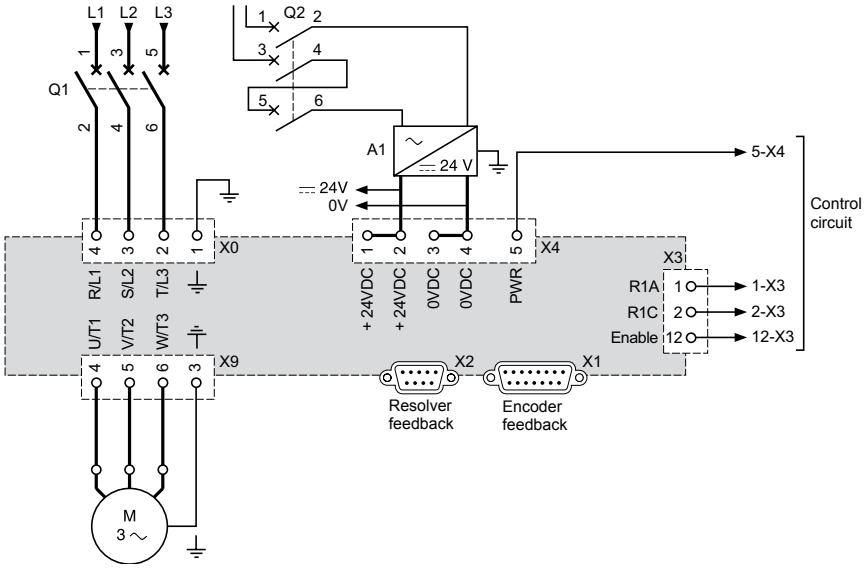
Lexium 15 motion control

Lexium 15 LP servo drives

Recommended wiring diagrams complying with standard EN 954-1

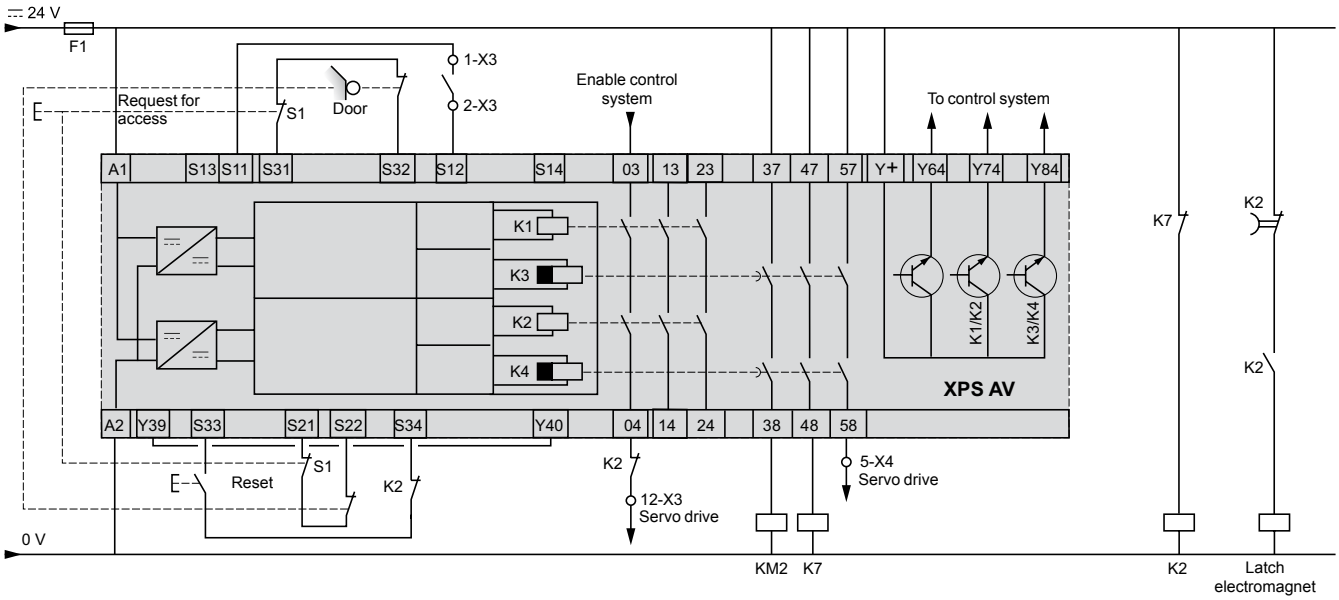
Category 4 safety level in accordance with EN 954-1

Power circuit of LXM 15L●●●●● servo drives



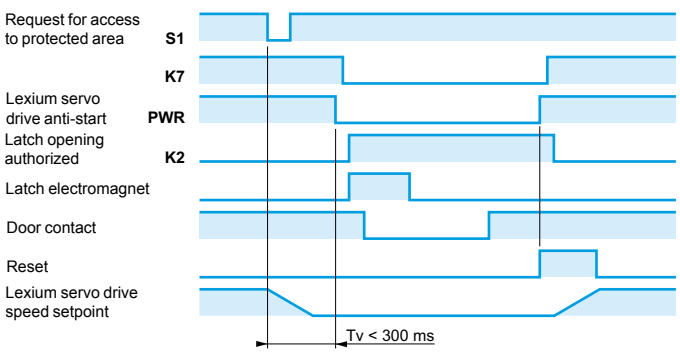
Q1: magnetic circuit breaker, see page 3/66

Control circuit of LXM 15L●●●●● servo drives



XPS AV: Preventa safety module, please consult our “Safety functions and solutions using Preventa” specialist catalogue

Timing diagram



Comments

■ Time delay Tv on the XPS AV monitoring module must be long enough for the axis to come to a controlled stop.

■ Lexium 15 LP servo drive parameters:

□ StopMode = 0: Axis performs a “freewheel” stop

□ StopMode = 1: Axis comes to a controlled stop according to the emergency deceleration ramp

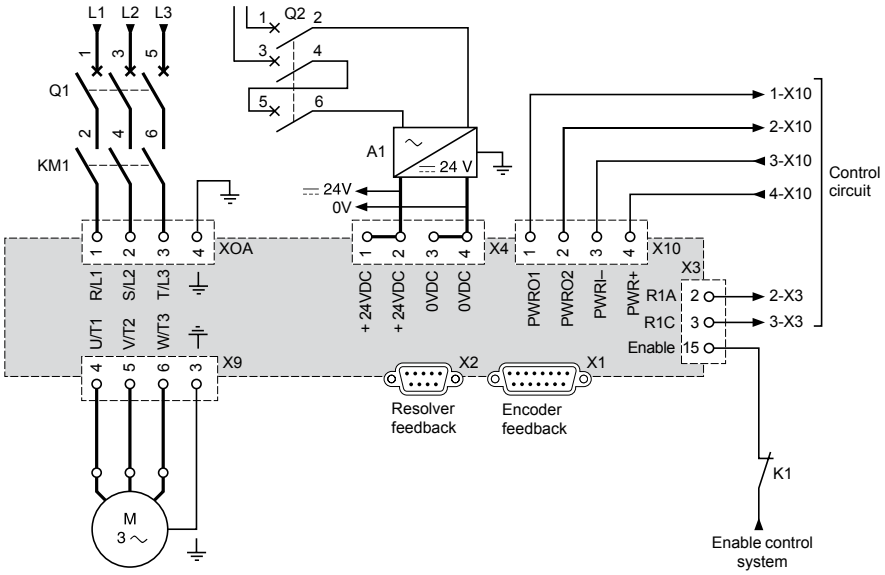
Lexium 15 motion control

Lexium 15 MP and 15 HP servo drives

Recommended wiring diagrams complying with standard EN 954-1

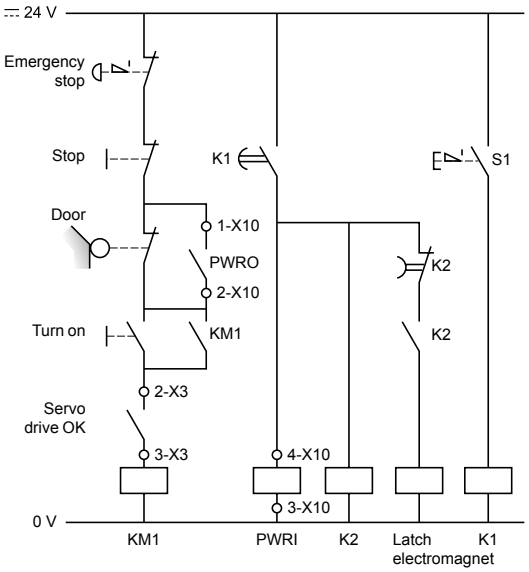
Category 1 safety level in accordance with EN 954-1

Power circuit of LXM 15MD●●N4, LXM 15HC●●N4X servo drives

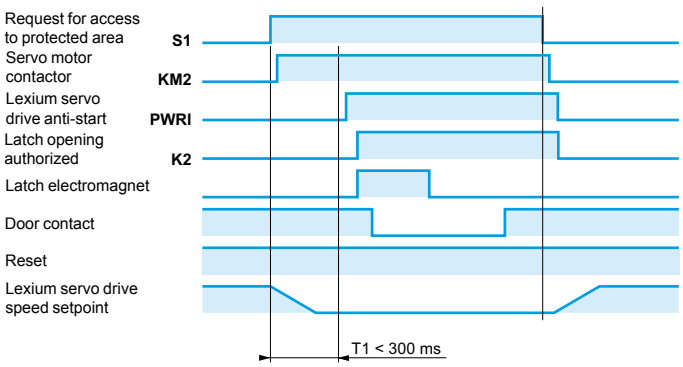


Q1: magnetic circuit breaker, see page 3/66
KM1: contactor, see page 3/66

Control circuit of LXM 15MD●●N4, LXM 15HC●●N4X servo drives



Timing diagram



Comments

■ Time delay T1 on the K1 relay must be long enough for the axis to come to a controlled stop.
■ Lexium 15 MP and 15 HP servo drive parameters:
□ StopMode = 0: Axis performs a “freewheel” stop
□ StopMode = 1: Axis comes to a controlled stop according to the emergency deceleration ramp

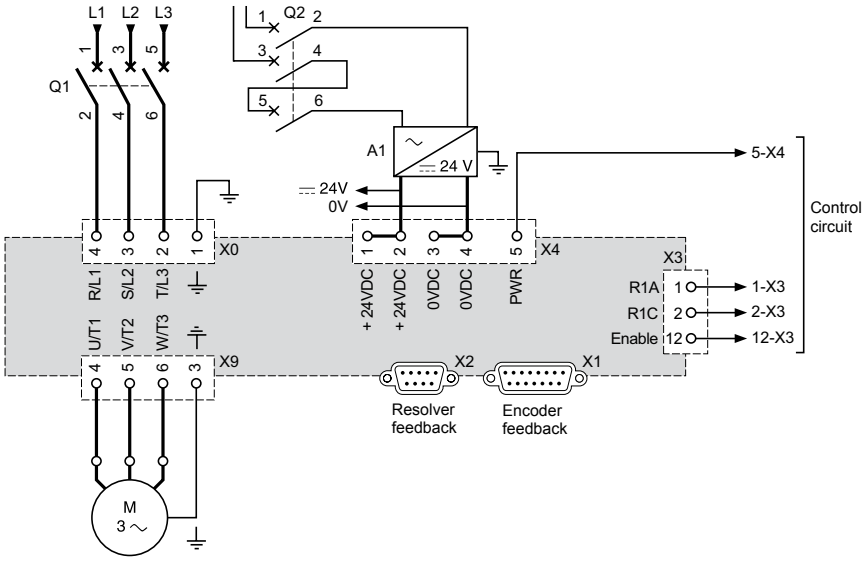
Lexium 15 motion control

Lexium 15 MP and 15 HP servo drives

Recommended wiring diagrams complying with standard EN 954-1

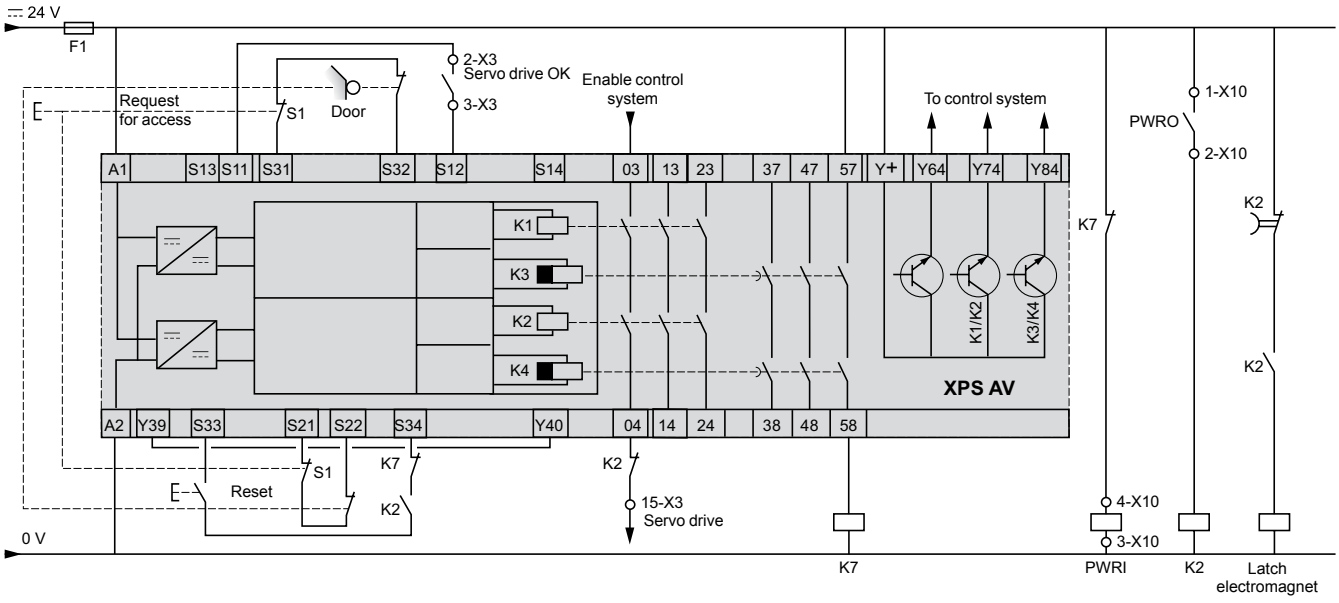
Category 2 safety level in accordance with EN 954-1

Power circuit of LXM 15L●●●●● servo drives



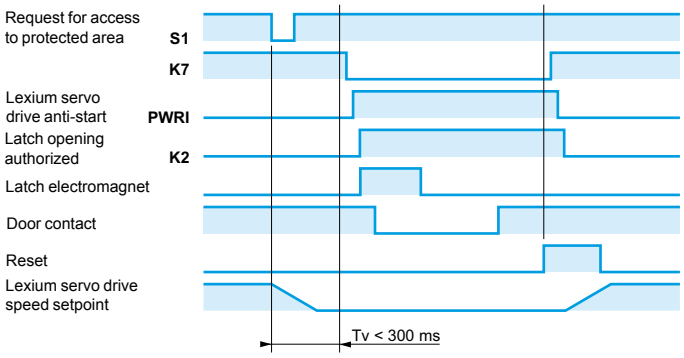
Q1: magnetic circuit breaker, see page 3/66

Control circuit of LXM 15MD●●N4, LXM 15HC●●N4X servo drives



XPS AV: Preventa safety module, please consult our “Safety functions and solutions using Preventa” specialist catalogue

Timing diagram



Comments

- Time delay Tv on the XPS AV monitoring module must be long enough for the axis to come to a controlled stop.
- Lexium 15 MP and 15 HP servo drive parameters:
  - StopMode = 0: Axis performs a “freewheel” stop
  - StopMode = 1: Axis comes to a controlled stop according to the emergency deceleration ramp

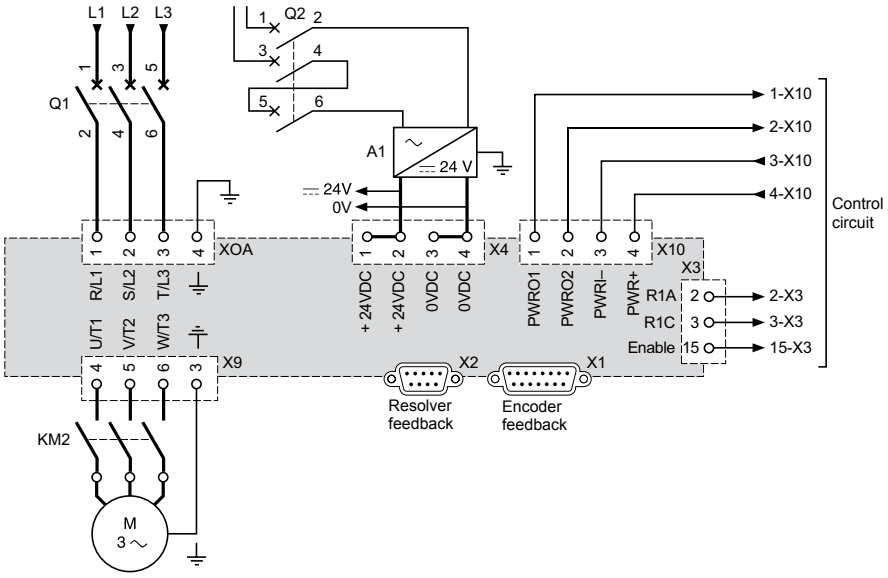
Lexium 15 motion control

Lexium 15 MP and 15 HP servo drives

Recommended wiring diagrams complying with standard EN 954-1

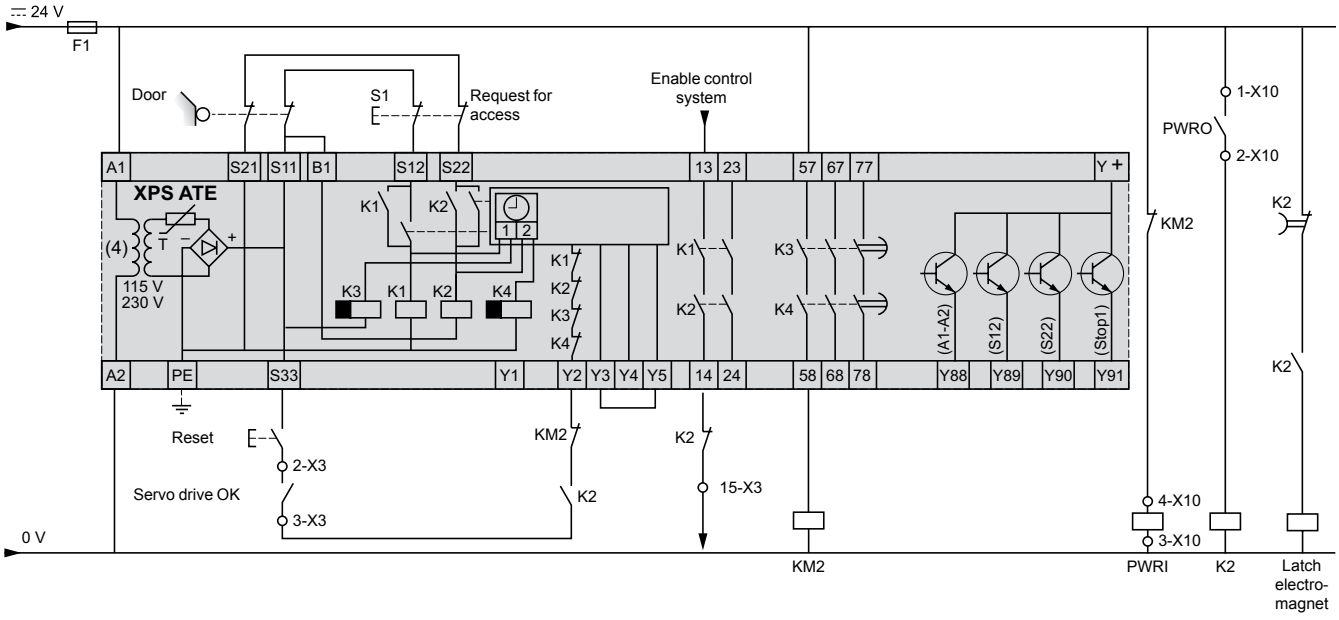
Category 3 safety level in accordance with EN 954-1

Power circuit of LXM 15MD●●N4, LXM 15HC●●N4X servo drives



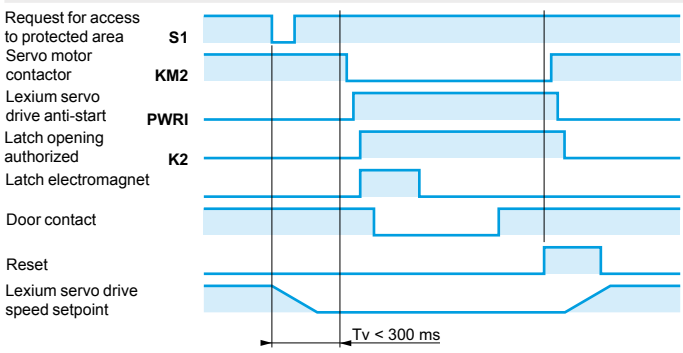
Q1: magnetic circuit breaker, see page 3/66

Control circuit of LXM 15MD●●N4, LXM 15HC●●N4X servo drives



XPS ATE: Preventa safety module, please consult our “Safety functions and solutions using Preventa” specialist catalogue

Timing diagram



Comments

- Time delay Tv on the XPS ATE monitoring module must be long enough for the axis to come to a controlled stop.
- Lexium 15 MP and 15 HP servo drive parameters:
  - StopMode = 0: Axis performs a “freewheel” stop
  - StopMode = 1: Axis comes to a controlled stop according to the emergency deceleration ramp

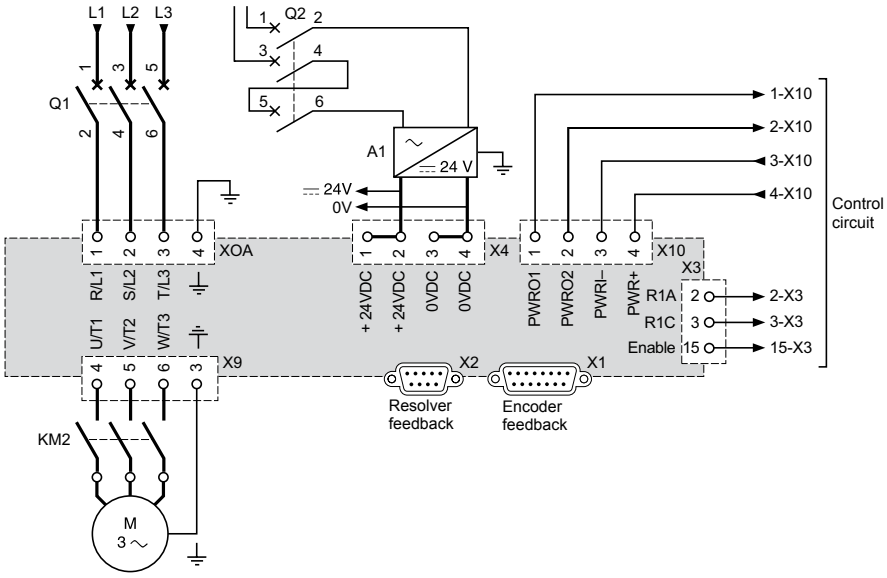
Lexium 15 motion control

Lexium 15 MP and 15 HP servo drives

Recommended wiring diagrams complying with standard EN 954-1

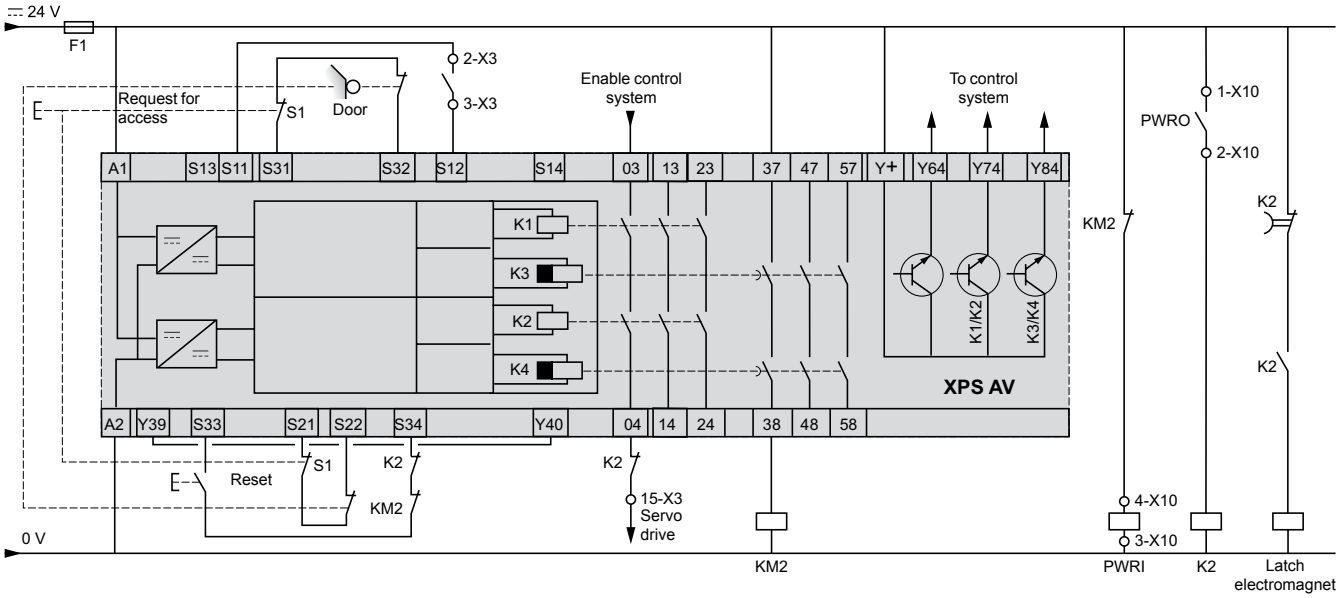
Category 4 safety level in accordance with EN 954-1

Power circuit of LXM 15MD●●N4, LXM 15HC●●N4X servo drives



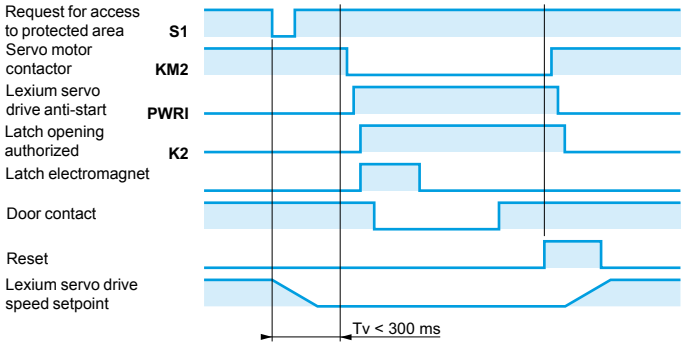
Q1: magnetic circuit breaker, see page 3/66

Control circuit of LXM 15MD●●N4, LXM 15HC●●N4X servo drives



XPS AV: Preventa safety module, please consult our “Safety functions and solutions using Preventa” specialist catalogue

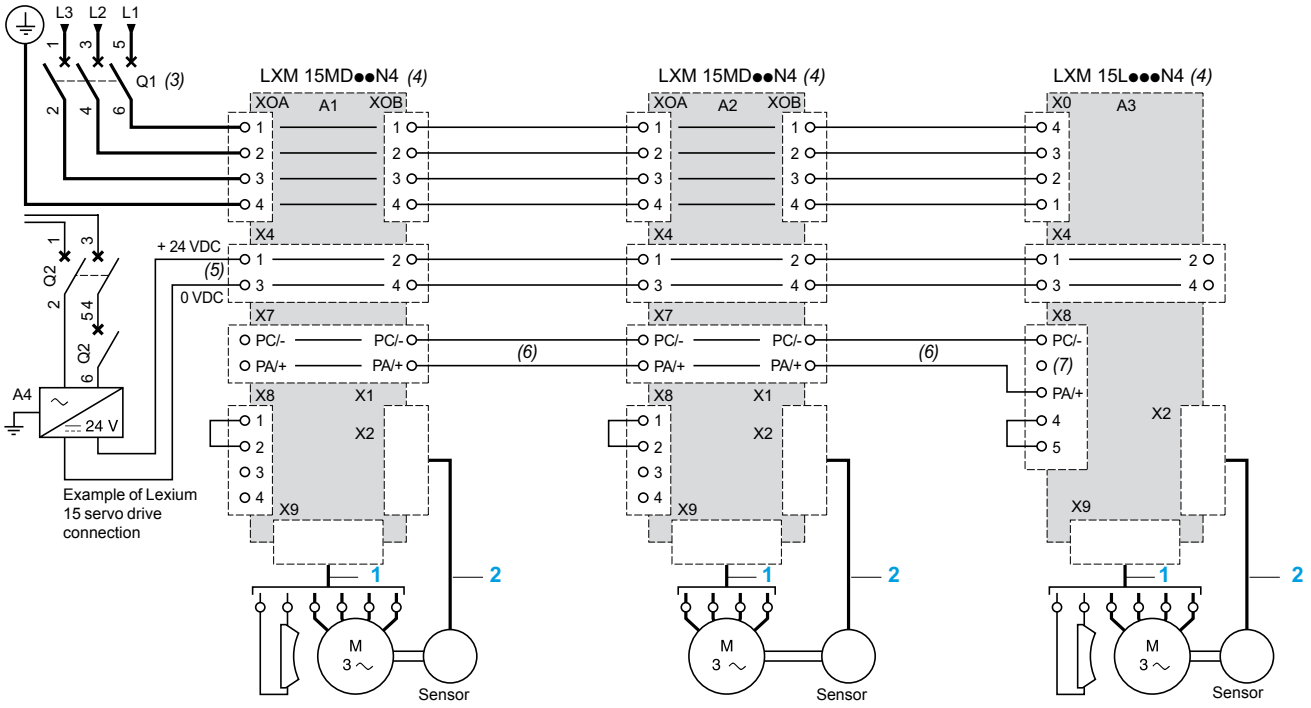
Timing diagram



Comments

- Time delay Tv on the XPS AV monitoring module must be long enough for the axis to come to a controlled stop.
- Lexium 15 MP and 15 HP servo drive parameters:
  - StopMode = 0: Axis performs a “freewheel” stop
  - StopMode = 1: Axis comes to a controlled stop according to the emergency deceleration ramp

Example of connection of a set of two Lexium 15 MP servo drives and one Lexium 15 LP servo drive with distribution of braking energy *(1) (2)*

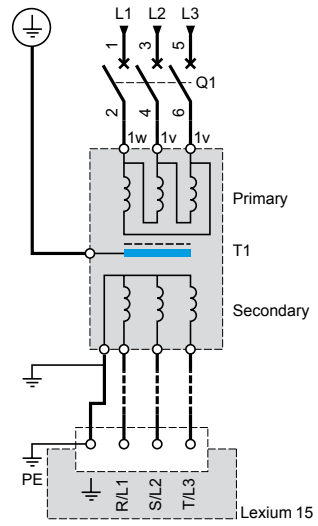


Additional components required (for the complete references, please consult our "Motor starter solutions - Control and protection components" specialist catalogue).

Item no.	Description
A1, A2, A3	Lexium 15 servo drives, see page 3/28. For different power ratings, power A1 ⩾ power A2 ⩾ power A3
A4	Phaseo power supply, please consult our "Interfaces, I/O splitter boxes and power supplies" specialist catalogue.
Q1 *(3)*	Thermal magnetic circuit breaker
Q2	GV2-L circuit breaker rated at twice the nominal current of supply A1
1	Servo motor/servo drive power connection cable, see pages 3/142 and 3/203
2	Servo motor/servo drive control connection cable, depending on type of sensor, see pages 3/143 and 3/205

(1) The same connection principle is possible for connecting Lexium 15 HP servo drive DC buses in parallel. Please consult your Regional Sales Office.
(2) Only servo drives that have the same supply voltage can be connected on the same DC bus.
(3) Thermal magnetic circuit breaker Q1 and the power supply cables must be of sufficient size to provide protection against overloads and short-circuits on each servo drive. Connectors X0, XOA, XOB limit the line current to 20 A rms. For line currents > 20 A rms, use separate power supplies and protection devices for the servo drives.
(4) Lexium 15 servo drives must be connected in descending order in terms of their power ($P_{Servo\ drive\ 1} > P_{Servo\ drive\ 2} > P_{Servo\ drive\ 3} > P_{Servo\ drive\ n}$).
(5) On the X4 connector on the main servo drive (A1), check that the sum of the 24 V ⎓ power supply currents on the servo drives and the holding brakes (optional) is ⩽ 10 A.
(6) Connectors X7 and X8 limit the DC bus current to 20 A.
(7) Not connected

Connection of Lexium 15 servo drives to installation with IT neutral system
(isolated or impedance earthed neutral)



Connection of a servo drive to an installation with an IT neutral system

In this type of installation, a three-phase LV/LV transformer must be inserted in the supply circuit for the servo drives, which thus allows a TT load system to be recreated on the secondary side. This diagram, with a secondary star transformer, thus meets the following requirements:
- Protection of personnel
- Adaptation of the supply voltage

If a Lexium 15 HP servo drive is connected, inserting an isolation transformer eliminates the need for a line choke (VW3 M4 3●●).

Three-phase T1 transformer to be used

The size of the transformers is defined using the following formulae:

■ **Lexium servo drives with independent power supply** (one transformer per servo drive):

$$Pu = \left(\sqrt{3} \times Un \times In \times K\right) \times 1{,}5$$

where Pu: unit power (kVA), Un: nominal input voltage (V), In: continuous current (A), K = 0.9: reduction factor for the servo drive, and factor 1.5: factor taking account of the inrush and peak currents of the servo drives.

■ **Lexium servo drives with common power supply** (one transformer per n servo drives):

$$Pm = \left(\sum Pu\right) / 2$$

If Pm < Pu of the largest servo drive, take Pm = Pu of the largest servo drive. Where Pm: usable power (kVA) and Pu: servo drive unit power (kVA). Formula not applicable for continuous operation (S1 mode).

Selection of transformer with 3 x 400 V rms primary voltage

Lexium 15 servo drives with independent power supply			LXM 15	LU60N4	LD10N4	LD17N4	MD28N4	MD40N4	MD56N4	HC11N4X	HC20N4X	
Required power Pu		400 V rms *(1)*	**kVA**	1.4	2.8	5.6	9.4	13.1	19	38	66	
3-phase LV/LV T1 transformer to be used	Nominal transformer power	400 V rms *(1)*	**kVA**	2.5	4	6.3	10	16	20	40	80	
	Reference	400 V rms		**84030**	**84032**	**84033**	**84035**	**84037**	**84038**	**84041**	**84044**	
Lexium 15 servo drives with common power supply			**kVA**	**2.5**	**4**	**6.3**	**10**	**16**	**20**	**40**	**80**	**160**
Power required Pm	**Reference**	400 V rms		**84030**	**84032**	**84033**	**84035**	**84037**	**84038**	**84041**	**84044**	**84047**

Selection of transformer with 3 x 460 V rms primary voltage

Lexium 15 servo drives with independent power supply			LXM 15	LU60N4	LD10N4	LD17N4	MD28N4	MD40N4	MD56N4	HC11N4X	HC20N4X	
Required power Pu		460 V rms *(1)*	**kVA**	1.4	2.8	5.6	9.4	13.1	19	38	66	
3-phase LV/LV T1 transformer to be used	Nominal transformer power	460 V rms *(1)*	**kVA**	–	–	7.5	11	15	20	40	75	
	Reference	460/460 V rms		**–**	**–**	**7T145 HDIT**	**11T145 HDIT**	**15T145 HDIT**	**20T145 HDIT**	**40T145 HDIT**	**75T145 HDIT**	
Lexium 15 servo drives with common power supply			**kVA**	**2.5**	**4**	**7.5**	**11**	**15**	**20**	**40**	**75**	**145**
Power required Pm	**Reference**	400/460 V rms		*(1)*	*(2)*	**7T145 HDIT**	**7T145 HDIT**	**11T145 HDIT**	**15T145 HDIT**	**20T145 HDIT**	**75T145 HDIT**	**145T145 HDIT**

(1) 3-phase secondary voltage
(2) Please consult your Regional Sales Office.

Note: *Unit equivalent: 1 kW = 0.746 HP*

Lexium 15 motion control
Motor starters
Protection by circuit breaker

535086

103279

105808

GV2 L14
+
LC1 D09●●
+
LXM 15LD21M3

535086

103283

106812

GV2 L22
+
LC1 D32●●
+
LXM 15MD56N4

Applications

The combinations listed below can be used to create a complete motor starter unit comprising a circuit breaker, a contactor and a Lexium 15 servo drive.
The circuit breaker provides protection against accidental short-circuits, disconnection and, if necessary, isolation.
The contactor turns on and manages any safety features, as well as isolating the servo motor on stopping.
The servo drive controls the servo motor, provides protection against short-circuits between the servo drive and the servo motor and protects the motor cable against overloads. The overload protection is provided by the motor thermal protection of the servo drive.

Motor starters for Lexium 15 LP servo drives

Servo drive		Circuit breaker		Contactor
Reference	Nominal power	Reference	Rating	Reference *(1) (2)*
	kW		A	
Single-phase supply voltage: 200…240 V ∿ 50/60 Hz				
LXM 15LD13M3	0.9	**GV2 L14**	10	**LC1 K0610●●**
LXM 15LD21M3	1.2	**GV2 L14**	10	**LC1 K0610●●**
LXM 15LD28M3	1.2	**GV2 L14**	10	**LC1 K0610●●**
Three-phase supply voltage: 200…240 V ∿ 50/60 Hz				
LXM 15LD13M3	1	**GV2 L10**	6.3	**LC1 K0610●●**
LXM 15LD21M3	2.1	**GV2 L14**	10	**LC1 D09●●**
LXM 15LD28M3	3.4	**GV2 L16**	14	**LC1 D12●●**
Three-phase supply voltage: 208…480 V ∿ 50/60 Hz				
LXM 15LU60N4	1.1	**GV2 L10**	6.3	**LC1 K0610●●**
LXM 15LD10N4	2.1	**GV2 L10**	6.3	**LC1 K0610●●**
LXM 15LD17N4	4.3	**GV2 L14**	10	**LC1 D09●●**

Motor starters for Lexium 15 MP servo drives

Servo drive		Circuit breaker		Contactor
Reference	Nominal power	Reference	Rating	Reference *(1) (2)*
	kW		A	
Three-phase supply voltage: 208…480 V ∿ 50/60 Hz				
LXM 15MD28N4	5.7	**GV2 L16**	14	**LC1 D12●●**
LXM 15MD40N4	7.9	**GV2 L22**	25	**LC1 D18●●**
LXM 15MD56N4	4.3	**GV2 L22**	25	**LC1 D32●●**

Motor starters for Lexium 15 HP servo drives

Servo drive		Circuit breaker		Contactor
Reference	Nominal power	Reference	Rating	Reference *(1) (2)*
	kW		A	
Three-phase supply voltage: 208…480 V ∿ 50/60 Hz				
LXM 15HC11N4X	22.3	**GV7 RS50**	50	**LC1 D50●●**
LXM 15HC20N4X	42.5	**GV7 RS100**	100	**LC1 D80●●**

(1) Composition of contactors:
LC1 K06: 3 poles + 1 N/O auxiliary contact
LC1 D●●: 3 poles + 1 N/O auxiliary contact + 1 N/C auxiliary contact
(2) Replace ●● with the control circuit voltage reference given in the table below:

	Volts ∿	24	48	110	220	230	240
LC1 K	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
	Volts ∿	**24**	**48**	**110**	**220/230**	**230**	**230/240**
LC1 D	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**

For other voltages between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.

Protection of Lexium 15 LP servo drives using fuses

Servo drive		Fuse to be installed upstream	
Reference	Nominal power	Type	Current
	kW		A
Single-phase supply voltage: 200…240 V ∿ 50/60 Hz			
LXM 15LD13M3	0.9	aT	10
LXM 15LD21M3	1.2	aT	10
LXM 15LD28M3	1.2	aT	10
Three-phase supply voltage: 200…240 V ∿ 50/60 Hz			
LXM 15LD13M3	1	aT	6
LXM 15LD21M3	2.1	aT	10
LXM 15LD28M3	3.4	aT	16
Three-phase supply voltage: 208…480 V ∿ 50/60 Hz			
LXM 15LU60N4	1.1	aT	6
LXM 15LD10N4	2.1	aT	6
LXM 15LD17N4	4.3	aT	10

Protection of Lexium 15 MP servo drives using fuses

Servo drive		Fuse to be installed upstream	
Reference	Nominal power	Type	Current
	kW		A
Three-phase supply voltage: 208…480 V ∿ 50/60 Hz			
LXM 15MD28N4	5.7	aM	16
LXM 15MD40N4	7.9	aM	20
LXM 15MD56N4	11.4	aM	25

Protection of Lexium 15 HP servo drives using fuses

Servo drive		Fuse to be installed upstream	
Reference	Nominal power	Type	Current
	kW		A
Three-phase supply voltage: 208…480 V ∿ 50/60 Hz			
LXM 15HC11N4X	22.3	aM	40
LXM 15HC20N4X	42.5	aM	63

Mounting recommendations

LXM 15LD13M3 and LXM 15LU60N4 servo drives are cooled by natural convection.
The other servo drives, LXM 15●D●●N4 and LXM 15HC●●N4X have an integrated fan.

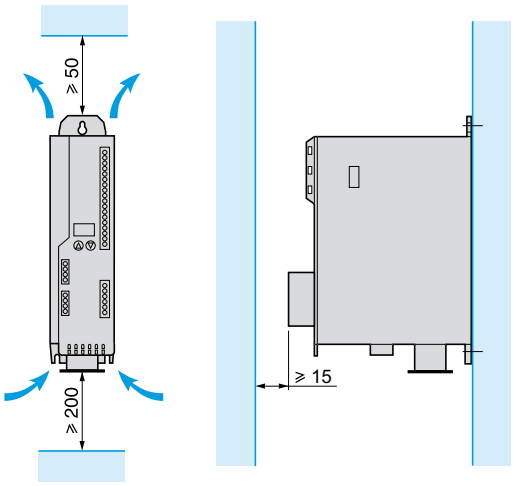
When the servo drive is installed in an enclosure, the following instructions should be followed with regard to the temperature and protection index:
- Provide sufficient cooling of the servo drive by complying with the minimum mounting distances
- Do not mount the servo drive near heat sources
- Do not mount the servo drive on flammable materials
- Do not heat the servo drive cooling air by currents of hot air from other equipment and components, for example from an external braking resistor
- If the servo drive is used above its thermal limits, the control will stop
- Mount the servo drive vertically (± 10%).

Note: *Do not use insulated enclosures, as they have a poor level of conductivity.*

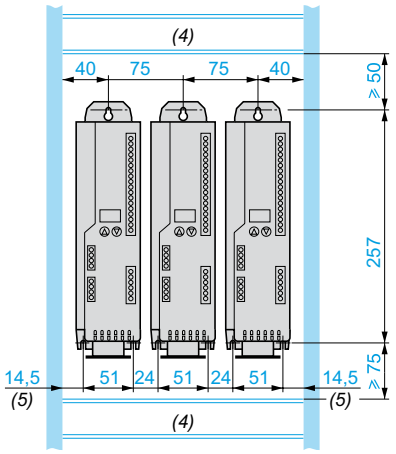
3

Mounting

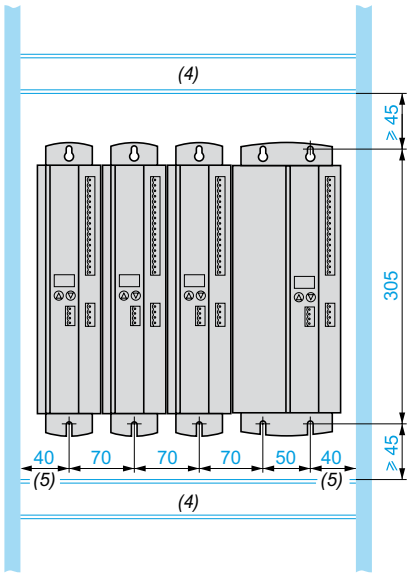
Cooling principle



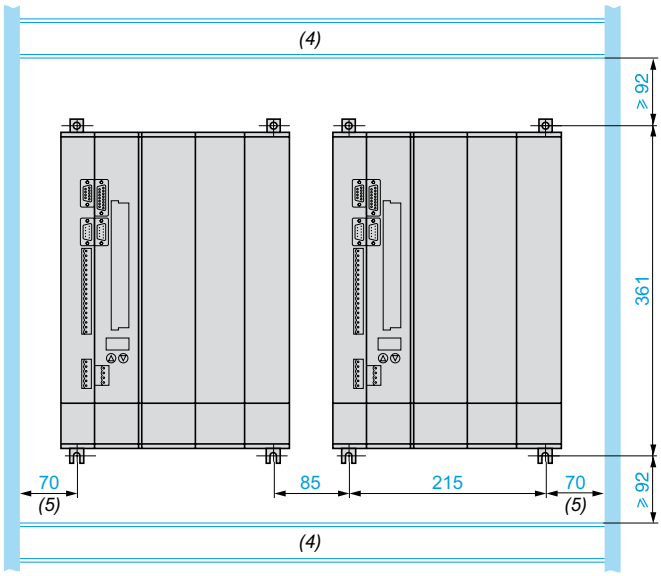
LXM 15L●●●●● *servo drives (1)*



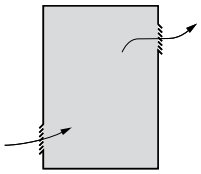
LXM 15MD●●N4 *servo drives (2) (3)*



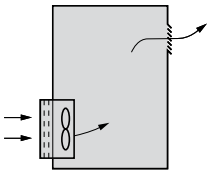
LXM 15HC●●N4X *servo drives (2) (3)*



(1) Ambient air temperature: 0...+ 40°C without derating From + 40…+ 55°C with derating of the motor output current by 2.5% per additional °C.
(2) Ambient air temperature: 0...+ 45°C without derating From + 45…+ 55°C with derating of the motor output current by 2.5% per additional °C.
(3) For easier connection of the power cables, leave a free space ≥ 200 mm beneath the servo drive.
(4) Cable clip or ducting
(5) Minimum distance between the inside panel of the enclosure and the side of the servo drive.



Natural convection



Forced ventilation

Recommendations for mounting in an enclosure

To ensure good air circulation in the servo drive:
- Fit ventilation grilles on the enclosure.
- Ensure that ventilation is adequate: if not install a forced ventilation unit with a filter.
- Any apertures and/or fans must provide a flow rate at least equal to that of the servo drive fans (see below).
- Use special filters with IP 54 protection.

Servo drive	Dissipated power W	Ventilation	Flow rate m3/hour
LXM 15LD13M3	35	Natural convection	–
LXM 15LD21M3	60	Integrated fan	60
LXM 15LD28M3	90	Integrated fan	60
LXM 15LU60N4	40	Natural convection	–
LXM 15LD10N4	60	Integrated fan	60
LXM 15LD17N4	90	Integrated fan	60
LXM 15MD28N4	90	Integrated fan	60
LXM 15MD40N4	160	Integrated fan	110
LXM 15MD56N4	200	Integrated fan	160
LXM 15HC11N4X	400	Integrated fan	340
LXM 15HC20N4X	700	Integrated fan	470

Sealed metal enclosure (IP 54 degree of protection)

The servo drive must be mounted in a dust and damp proof enclosure in certain environmental conditions, such as dust, corrosive gases, high humidity with risk of condensation and dripping water, splashing liquid, etc.
In these cases, Lexium 15 servo drives can be installed in an enclosure where the internal temperature must not exceed 40°C.

Calculating the dimensions of the enclosure

Maximum thermal resistance Rth (°C/W)

The thermal resistance is defined by the following formula:

$$R_{th} = \frac{\theta\times - \theta e}{P}$$

$\theta\times$ = maximum temperature inside enclosure in °C
θe = maximum external temperature in °C
P = total power dissipated in the enclosure in W

Power dissipated by the servo drive: see table above.
Add the power dissipated by the other equipment components.

Useful heat exchange area of enclosure S (m^2)

For an enclosure fixed to the wall, the useful heat exchange area is defined as the sum of the areas of the 2 sides + top + front panel.

$$S = \frac{k}{R_{th}}$$

k = thermal resistance per m^2 of the enclosure

For a metal enclosure:
- k = 0.12 with internal fan
- k = 0.15 without fan

Note: *Do not use insulated enclosures, as they have a poor level of conductivity.*

Lexium 15 motion control
Modicon Premium motion control modules

Application type	**Master/slave (cam profile, flying shear)**		
			
Number of axes	2/4 axes	2/4 axes	2/4 axes
Frequency per axis	Counting: 500 kHz with an incremental encoder	Acquisition: 200 kHz with SSI serial absolute encoder or parallel output absolute encoder	
Counter inputs	Per axis: incremental encoder 5 V ⎓, RS 422/RS 485 or Totem pole SSI serial absolute encoder, 16 to 25 bits, 10…30 V ⎓ Parallel output absolute encoder, 16 to 24 bits, 5/10/30 V ⎓ with Advantys Telefast adaptor sub-base (ABE 7CPA11)		
Command outputs	Per axis: 1 analog output ± 10 V, 13 bits + sign, servo drive setpoint		
Auxiliary I/O	Per axis: 4 x 24 V ⎓ discrete inputs (homing cam, event, recalibration, emergency stop) 1 input/1 output for servo drive control 1 x 24 V ⎓ reflex output		
Function	Servo control on independent linear axis	Servo control on independent infinite axis Follower axis (dynamic ratio) Realtime correction of servo drive offset	Servo control on independent linear or independent infinite axis Linear interpolation on 2 or 3 axes Realtime correction of servo drive offset
Processing	Positioning of a moving part on an axis following the motion control functions supplied by the Premium PLC processor		
	Axis parameter setting, adjustment and debugging using Unity Pro and PL7 Junior/Pro software		
Events	User-definable activation of the event-triggered task		
Connections	Via 9 and 15-way SUB-D connectors for encoder input (direct or TSX TAP S15●● accessories), speed reference Via HE 10 connector for auxiliary inputs Via Advantys Telefast pre-wired system (ABE 7CPA01, ABE 7H16R20, ABE 7CPA11) Via special accessories (TSX TAP MAS)		
Module type	**TSX CAY●1** *(1)*	**TSX CAY●2** *(1)*	**TSX CAY●33** *(1)*
Page	3/75		

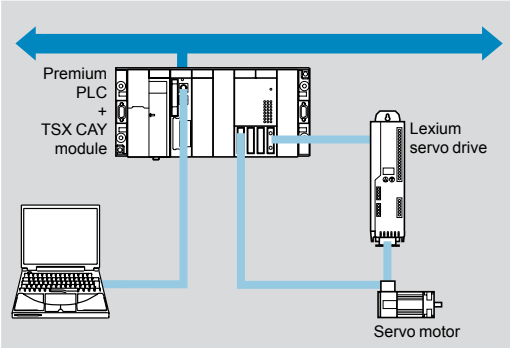
(1) ***TSX CAY●1/●2:*** *Replace the dot ● with* ***2*** *for a 2-axis module, or* ***4*** *for a 4-axis module.*

Synchronized multi-axis

8 axes	16 axes	8 axes
SERCOS ring network: 4 Mbps		
Via SERCOS digital link		
Via SERCOS digital link		
Via SERCOS digital link		
Infinite or linear independent axes Follower axes (6 slaves) by gearing or camming Manual mode (JOG and INC) Special functions (see page 3/80) 4 sets of axes with simple linear interpolation from 2 to 8 axes		
–		Path functions: 2 groups of 3 axes or 3 groups of 2 axes. With linear and circular interpolation with links via polynomial interpolation
Axis parameter setting, adjustment and debugging using Unity Pro and PL7 Junior/Pro software		
User-definable activation of the event-triggered task		
Via 2 SMA connectors for plastic (or glass) fibre optic cable		
TSX CSY 84	**TSX CSY 164**	**TSX CSY 85**
3/85		

Lexium 15 motion control
TSX CAY motion control modules for servo motors

Presentation



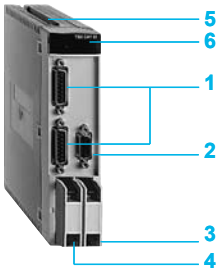
The servo-controlled TSX CAY ●● positioning axis control offer is designed for machines requiring both high-performance servo motion control in conjunction with PLC sequential control.

Depending on the model, the TSX CAY pp modules make it possible to:
- Control 2 independent axes (TSX CAY 21/22)
- Control up to 4 independent axes (TSX CAY 41/42)
- Control 3 linearly interpolated axes (TSX CAY 33)

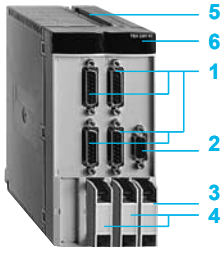
They accept servo drives with ±10 V analog inputs including Lexium 05 and Lexium 15 servo drives.

TSX CAY ●● modules can be inserted, like all application-specific modules, in all Premium PLC or Slot PLC Atrium slots.

Description



TSX CAY 21/22



TSX CAY 41/42

On the front panel of the TSX CAY ●● axis control modules there is:

1 A 15-way SUB-D connector per axis for connection of an incremental or absolute encoder

2 A 9-way SUB-D connector for all axes for connection of an analog output “speed reference” for each axis

3 An HE 10 to 20-way connector for all axesfor connection:
- ◻ of auxiliary servo drive control inputs
- ◻ of external power supply of servo drive inputs/outputs

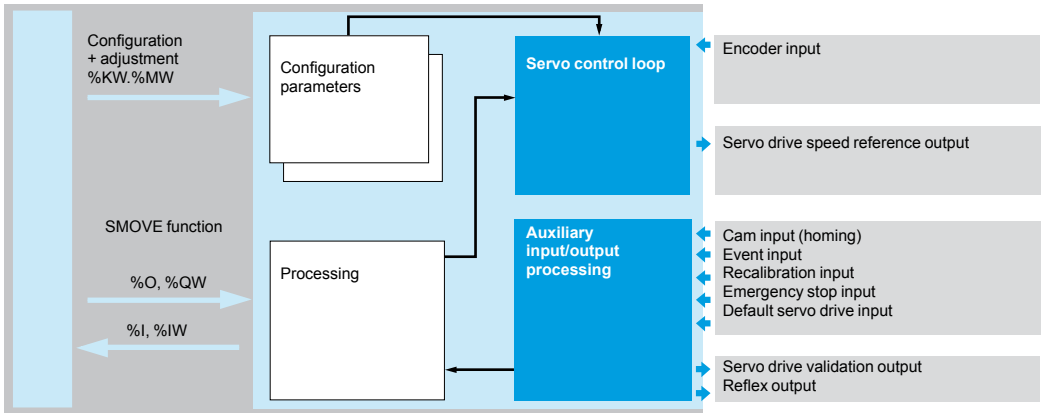
4 An HE 10 to 20-way connector for two axes (0/1 or 2/3) for connection:
- ◻ of auxiliary inputs: homing cam, emergency stop, event, recalibration
- ◻ of reflex outputs
- ◻ external sensor and preactuator power supplies

5 Rigid casing that performs the functions of:
- ◻ supporting electronic cards
- ◻ attaching and locking the module in its slot

6 LEDs for module diagnostics:
- ◻ diagnostics at module level:
  - Green RUN LED: module in operation
  - Red ERR LED: internal fault, module out of service
  - red I/O LED: external fault
- ◻ diagnostics at axis level:
  - Green CH● LED: axis diagnostics present

Operation

Diagram of an axis



Axis control modules are set up using Unity Pro or PL7 Junior/Pro software. Premium TSX P57 ●●3M/4M processors and Atrium TPCX57 ●●3M or TSX PCI 57●●4M slot PLCs are required for TSX CAY 22/42/33 modules.

Characteristics: page 3/73
References: page 3/75
Connections: page 3/77

Lexium 15 motion control
TSX CAY motion control modules
for servo motors

Operating characteristics

Module type			TSX CAY 21/22	TSX CAY 41/42	TSX CAY 33
Servo control loop			Proportional to overshoot compensation and gain switching		
	Period	**ms**	2	4	
Paths	Speed profile		Trapezoid or parabolic		
Resolution	Minimum		0.5 position units per point		
	Maximum		1000 position units per point		
Length of axis	Minimum		**TSX CAY 21**: 32,000 points	**TSX CAY 41**: 32,000 points	**TSX CAY 33**: 256 points
			TSX CAY 22: 256 points	**TSX CAY 42**: 256 points	
	Maximum		32,000,000 points		
Speed	Minimum		54,000 points/min		
	Maximum		270,000 points/min		
Acceleration (Change from 0 to VMAX)	Minimum	**s**	10		
	Maximum	**ms**	8	16	
Operating modes	OFF		Measuring mode, disabling of the servo control loop		
			The module operates by acquiring the position and current speed		
	DIR DRIVE		Servo control is switched off, disabling of the servo control loop		
			The module operates only in analog output		
	MANU		Motion control by an operator: - movement by viewing - incremental movement		
	AUTO		Sequence of movements controlled by a PLC program. The movements are described by a syntax similar to ISO language. The movements can be expressed absolutely or relatively (in relation to the current position or the captured position). Possibility of “step by step” execution, suspension/resumption of movement, changes in speed		
	FOLLOWER		Axis n of the module is servo controlled: - either at the 0 axis of the same module - or at a control profile transmitted by application program		–
	Environment		Encoder coupling, servo drive present, emergency stop		
	Movements		Control of the proper execution of movements (following difference, operational window, software stops)		
	Control		Control consistency check		
	Parameters		Parameter validity check		

Functionalities

Module type		TSX CAY 21	TSX CAY 22	TSX CAY 41	TSX CAY 42	TSX CAY 33
2/3 axes linear interpolation		–				Yes
Limited axes		Yes				
Infinite axes		–	Yes	–	Yes	
Following axes	Static ratio	Yes	–	Yes	–	
	Dynamic ratio	–	Yes	–	Yes	–
Servo drive offset correction		–	Yes	–	Yes	
Cut on the fly	On position or on event with infinite master axis and linearly-limited slave axis	–	Yes *(1)*	–		

(1) The TSX CAY 22 module’s cut on the fly function requires Unity Pro software version ≥ 2.2 or PL7 Junior/Pro software version ≥ 4.1.

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Electrical characteristics

Module type				TSX CAY 21	TSX CAY 22	TSX CAY 41	TSX CAY 42	TSX CAY 33
Modularity				2 axes		4 axes		3 axes
Maximum frequency on the counter inputs	SSI absolute encoder			16 to 25 bits	12 to 25 bits	16 to 25 bits	12 to 25 bits	
	CLK frequency	Transmission	**kHz**	200				
	Incremental encoder	x 1	**kHz**	500				
		x 4	**kHz**	250 kHz in input or 1 MHz in counting				
Consumption		5 V ⎓	**mA**	1100		1500		
		24 V ⎓	**mA**	15		30		
Current consumed by module on the 10/30 V encoder at 24 V (24 V absolute encoder)		Typical	**mA**	11 (20 max)		22 (40 max)		
Power dissipated in the module		Typical	**W**	7.2 (11.5 max)		10 (17 max)		
Control of sensor power supplies				Yes				

Input characteristics

Type of input				**Counter inputs 5 V ⎓** (IA/IB/IZ)	**Servo drive control inputs** (1 per axis)	**Auxiliary inputs** (homing, event, recalibration, emergency stop)
Logic				Positive		
Nominal values	Voltage		**V**	5	24	
	Current		**mA**	18	8	
Limit values	Voltage		**V**	≤ 5.5	19...30 (possible up to 34 V, limited 1 hr per 24 hr)	
	At state 1	Voltage	**V**	≥ 2.4	≥ 11 (OK state)	≥ 11
		Current	**mA**	> 3.7 (for U = 2.4 V)	> 3.5 (for U = 11 V)	> 6 (for U = 11 V)
	At state 0	Voltage	**V**	≤ 1.2	≤ 5 (default state)	≤ 5
		Current	**mA**	< 1 (for U = 1.2 V)	< 1.5 (for U = 5 V)	< 2 (for U = 5 V)
Control of voltage/sensor feedback				Presence check	–	
Input impedance for nominal U			Ω	270	3000	
Type of input				Resistive		Current sinks
Conforming to IEC 1131				–	Type 1	Type 2
2-wire compatibility detector				–		Yes (all 24 V detectors)
3-wire compatibility detector				–		Yes (all 24 V detectors)

Output characteristics

Type of output		**Analog outputs** (1 per axis)	**Servo drive validation** (1 relay output per axis)	**Reflex outputs** (1 per axis)
Range	**V**	± 10, 24	–	
Resolution		13 bits + sign	–	
LSB value	**mV**	1.25	–	
Nominal voltage	**V**	–	24 ⎓	
Voltage limit	**V**	–	5…30	19...30 (possible up to 34 V, limited 1 hr per 24 hr)
Current	**mA**	–		500 nominal
Maximum current	**mA**	1.5	200 (resistive charge under 30 V)	625 (for U = 30 or 34 V)
Minimum permitted load		–	1 V/1 mA	–
Max voltage drop ON		–		< 1
Leakage current		–		< 0.3
Switching time		–	< 5 ms	< 500 µs
Compatibility with d.c. inputs		–		All positive logic inputs for which the input resistance is < 15 kΩ
Conforming to IEC 1131		–		Yes
Short-circuit and overload protection		–		By current limiter and thermal release
Channel overvoltage protection		–		Zener diodes between the outputs and the + 24 V
Protection against reverse polarity		–		By diode in the opposite direction to the power supply

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Lexium 15 motion control
TSX CAY motion control modules for servo motors

TSX CAY 2●

TSX CAY 33

TSX CAY 4●

TSX TAP S15 05

TSX TAP MAS

ABE 7CPA01

ABE 7H16R20

Motion control modules for servo motors *(1)*

Type of input	Characteristics	Function	No. of axes *(2)*	Reference *(3)*	Weight kg
Incremental encoders *(4)* ⎓ 5 V RS 422, ⎓ 10…30 V **Absolute encoders** *(5)* RS 485 serial or parallel *(6)*	500 kHz counter with incremental encoder 200 kHz acquisition with absolute serial encoder	Servo control on independent linear axis	2	**TSX CAY 21**	0.480
			4	**TSX CAY 41**	0.610
		Servo control on independent linear or independent infinite axis Following axes Servo drive realtime offset correction Cut on the fly *(7)*	2	**TSX CAY 22**	0.480
			4	**TSX CAY 42**	0.610
		Servo control on linear or infinite axis Linear interpolation on 2 or 3 axes Servo drive realtime offset correction	3	**TSX CAY 33**	0.610

Connection components

Connection accessories

Description	Connection	Type of connector on module TSX CAY ●●	Item no. *(8)*	Reference	Weight kg
SUB-D connectors (sold in lots of 2)	SSI absolute/incremental encoder	15-way SUB-D (1 per axis)	–	**TSX CAP S15**	0.050
	Speed reference	9-way SUB-D (1 per TSX CAY module)	–	**TSX CAP S9**	0.050
Connection interface for incremental encoder	Incremental encoder ⎓ 5 V RS 422/RS 485	15-way SUB-D (1 per axis)	3	**TSX TAP S15 05**	0.260
Splitter unit	Speed references towards servo drives	9-way SUB-D (1 per TSX CAY module)	–	**TSX TAP MAS**	0.590
Telefast 2 connection bases	Speed references	9-way SUB-D (1 per TSX CAY module)	–	**ABE 7CPA01**	0.300
	Auxiliary inputs, reflex outputs, I/O power supply ⎓24 V, encoder power supplies 5/24 V⎓	10, 20-way HE (1 for 2 axes)	–	**ABE 7H16R20**	0.300
	Servo drive control signals, I/O power supply 24 V⎓	10, 20-way HE (1 per TSX CAY module)	–	**ABE 7H16R20**	0.300
Adaptor base	Absolute encoders with parallel outputs (16 to 24 bit) 5 V ⎓, 10…30 V ⎓	15-way SUB-D	–	**ABE 7CPA11**	0.300

(1) To order other accessories please consult our "Automation platform Modicon Premium and Unity - PL7 software" specialist catalogue.
(2) Double format TSX CAY 41/42/33 modules.
(3) Supplied with a multilingual quick reference guide: in English and French.
(4) Option to use Osicoder® XCC 14 type K, XCC 15 or XCC 19 encoders. Please consult our "Rotary encoders - Osicoder®" specialist catalogue.
(5) Option to use Osicoder® XCC 2 and XCC 3 encoders. Please consult our "Rotary encoders - Osicoder®" specialist catalogue.
(6) Parallel output absolute encoders using the ABE 7CPA11 adaptor base.
(7) Cut on the fly function available with TSX CAY 22 module. Requires Unity Pro software version ≥ 2.2 or PL7 Junior/Pro software version ≥ 4.1.
(8) Item no. see page 3/77.

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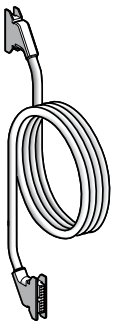
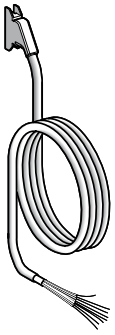
Lexium 15 motion control
TSX CAY motion control modules for servo motors



TSX CDP ●●3



TSX CDP ●01

Connection components (continued)

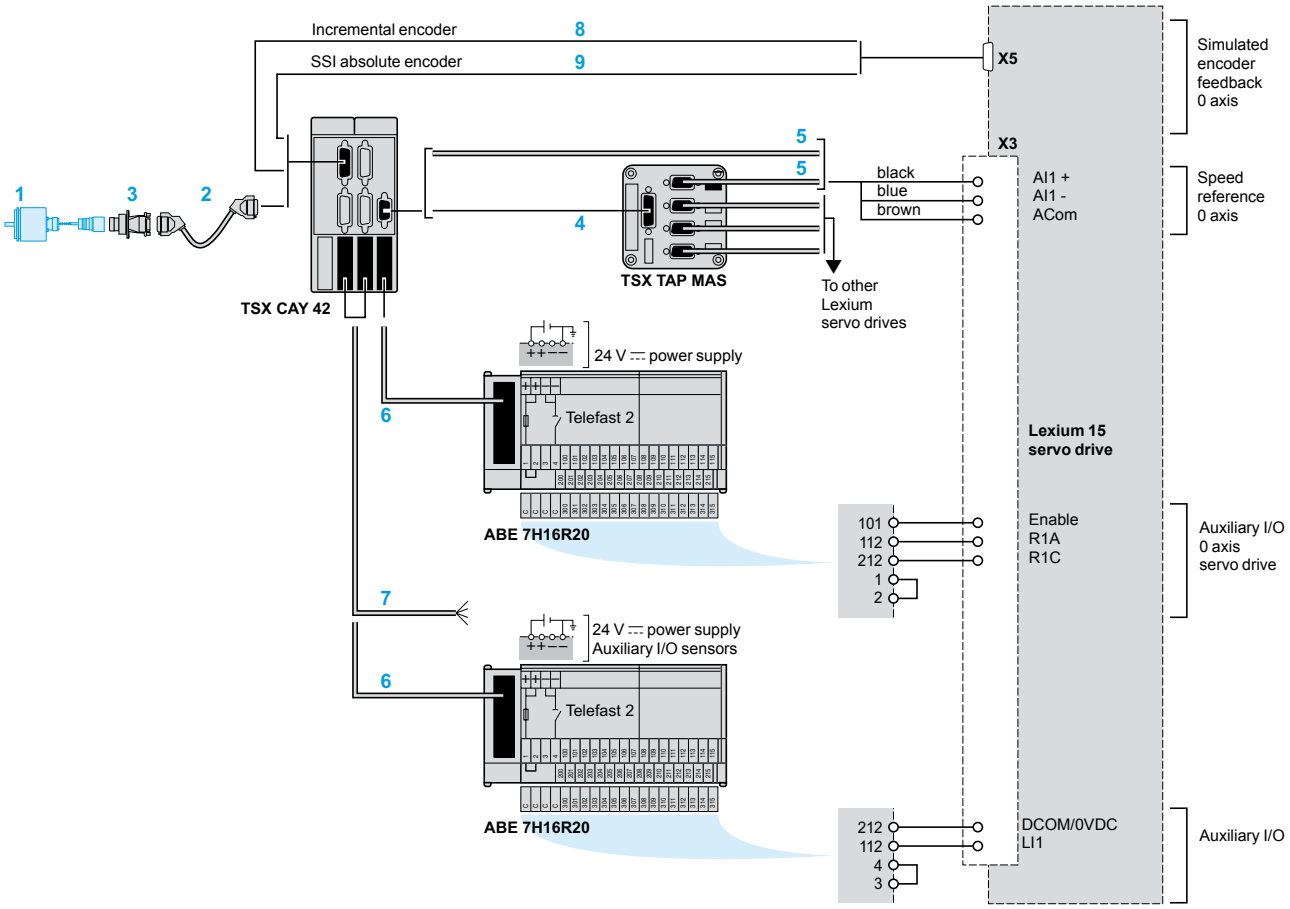
Cables

Description	Use		Item no.	Length	Reference	Weight
	From	To	(1)	m		kg
Cables fitted with SUB-D connectors	TSX CAY ●● module, 15-way SUB-D connector	TSX TAP S15 05 interface, or ABE 7CPA11 adaptor base (15-way SUB-D connector)	2	0.5	**TSX CCP S15 050**	0.110
				1	**TSX CCP S15 100**	0.160
				2.5	**TSX CCP S15**	0.220
	TSX CAY ●● module, 9-way SUB-D connector (speed reference)	ABE 7CPA01 sub-base or TSX TAP MAS splitter unit (15-way SUB-D connector)	4	2.5	**TSX CXP 213**	0.270
				6	**TSX CXP 613**	0.580
Sectors equipped with a SUB-D connector and a free end (servo drive side)	TSX CAY ●● module, or TSX TAP MAS unit	Lexium 05/15 servo drive speed reference, or other drives (section 0.205 mm²)	5	6	**TSX CDP 611**	0.790
Connection cables fitted with HE 10 connectors	TSX CAY ●● module, (cast mould 20-way HE 10 connector)	ABE 7H16R20 sub-base (10, 20-way HE connector) 500 mA max cable	6	0.5	**TSX CDP 053**	0.085
				1	**TSX CDP 103**	0.150
				2	**TSX CDP 203**	0.280
				3	**TSX CDP 303**	0.410
				5	**TSX CDP 503**	0.670
Sectors equipped with an HE 10 connector and a free end (servo drive side)	TSX CAY ●● module, (cast mould 20-way HE 10 connector)	Auxiliary inputs, reflex output, control signals, power supplies (free end) 20-wire 500 mA max sectors	7	3	**TSX CDP 301**	0.400
				5	**TSX CDP 501**	0.660
Cables equipped for Lexium 15 servo drives	TSX CAY ●● module, 15-way SUB-D connector (encoder input)	Simulated incremental encoder feedback (9-way SUB-D connector)	8	2	**TSX CXP 235**	0.210
				6	**TSX CXP 635**	0.470
		Simulated absolute encoder feedback (9-way SUB-D connector)	9	2	**TSX CXP 245**	0.210
				6	**TSX CXP 645**	0.470

(1) Item no. see page 3/77.

Lexium 15 motion control
TSX CAY motion control modules
for servo motors

Example of Lexium 15 servo drive connection for BDH/BSH servo motor



1 XCC 14 type K, XCC 15 or XCC 19 incremental encoder or XCC 2 or XCC 3 absolute encoder
2 TSX CCP S15 ●●● fitted cable (encoder feedback)
3 TSX TAP S15 05 connector
4 TSX CXP 213/613 fitted cable
5 TSX CDP 611 fitted sector
6 TSX CDP ●●3 fitted cable
7 TSX CDP ●01 fitted sector
8 TSX CXP 235/635 fitted cable (simulated incremental encoder feedback)
9 TSX CXP 245/645 fitted cable (simulated SSI absolute encoder feedback)

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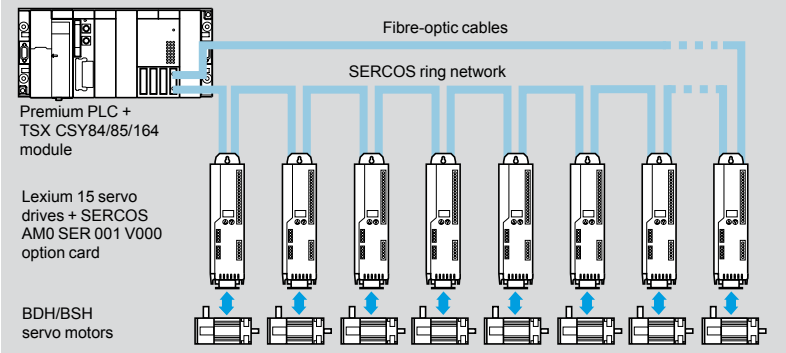
Lexium 15 motion control
SERCOS TSX CSY 84/85/164 motion control modules

Presentation



SERCOS (SERial COmmunication System) is a communication standard which defines the digital link (exchange protocol and medium) between a motion control module and servo drives. This is defined in European standard IEC/EN 61491.
The use of SERCOS distributed architecture allows application I/O (position encoder, emergency stop, etc.) to be connected directly to the servo drives, thus reducing connection costs. The fibre-optic digital link permits high speed exchanges (2 or 4 Mbps) while ensuring a high level of immunity in disturbed industrial environments.

The SERCOS range in the Premium automation platform consists of:
■ TSX CSY 84/85/164 axis control modules *(1)* which can each control up to 8 servo drives (TSX CSY 84/85) and 16 servo drives (the TSX CSY 164) via a SERCOS ring. The module calculates the path and the interpolation for several axes (position mode). Access to the other modes (speed and torque) is possible with the assistance of Schneider Electric application services.

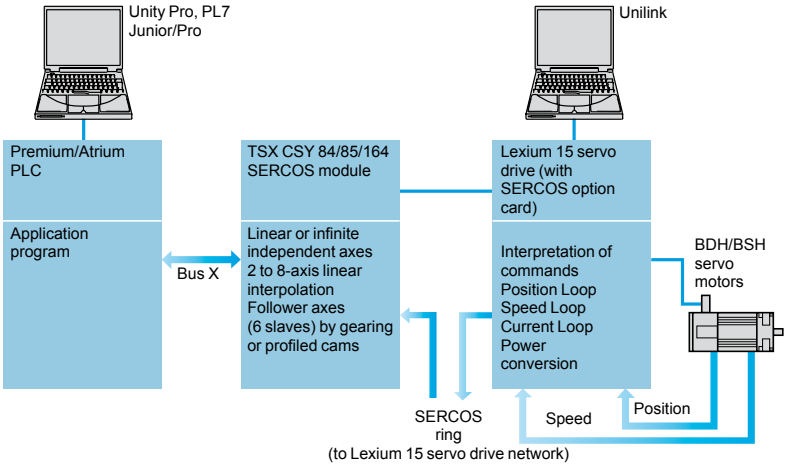
■ 1.5 A to 70 A permanent Lexium 15 servo drives (equipped with SERCOS option card). The servo drives manage the position loop, speed loop and torque loop, and ensure power conversion to control the servo motor. The sensor feedback information is sent to the servo drive (current position, current speed)

■ BDH and BSH servo motors. The motors feature permanent magnets delivering a high power-to-weight ratio, resulting in excellent dynamic speed response in a compact unit.
The Lexium range offers all the accessories required (line chokes, braking resistors, etc.) as well as a full set of connectors.

(1) The TSX CSY 85 module also supports path functions using the TjE path editor software.

System overview

The system overview presents the various functions performed by the different parts of the multi-axis control system.



Lexium 15 motion control
SERCOS TSX CSY 84/85/164 motion control modules

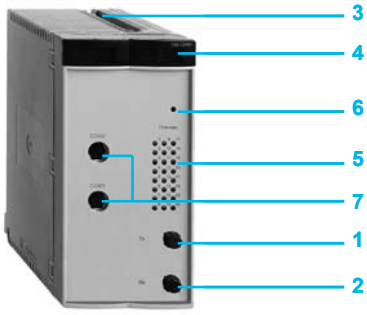
System overview (continued)

PL7 Junior/Pro or Unity Pro software via the Premium platform terminal port can be used to:
- Declare SERCOS TSX CSY 84/85/164 modules in the PLC configuration.
- Configure the functions and define the parameters for the axes used.
- Program the movements in the PLC application.
- Adjust the parameters via the operating codes (parameters, TSX CSY module and Lexium 15 servo drive with SERCOS option card).
- Test and debug the application.

Unilink software, via the Lexium 15 servo drive's RS 232 terminal port (with SERCOS option card) can be used to:
- Define types of Lexium 15 servo drive (with SERCOS option card) and BDH/BSH servo motor.
- Adjust the parameters for Lexium 15 servo drives (with SERCOS option card), back them up in the servo drive EEprom memory and save them on a compatible PC.

Description

TSX CSY 84/164



TSX CSY 85

The TSX CSY 84/85/164 SERCOS axis control modules comprise:
1 An SMA-type connector, marked TX, for connecting the servo drives using the SERCOS ring fibre-optic transmission cable.
2 An SMA-type connector, marked RX, for connecting the servo drives using the SERCOS ring fibre-optic reception cable.
3 Double format rigid casing, in order to:
- Support electronic cards.
- Attach and lock the module in its slot.

4 Module diagnostics LEDs:
- RUN LED (green): LED ON indicates module operating correctly.
- SER LED (yellow): flashing LED indicates data transmission and reception on the SERCOS network.
- ERR LED (red):
  - LED ON indicates internal module fault
  - flashing LED on module start-up indicates communication fault, incompatible configuration or application missing.
- I/O LED (red): LED ON indicates external fault or application fault.
- INI LED (yellow): flashing LED indicates module reinitializing.

5 Channel diagnostic LEDs (green): LED ON indicates axis operating normally; OFF: configuration fault; flashing: serious error on axis:
- 1 to 8: display of 8 real axes *(1)*.
- 9 to 12: display of 4 imaginary axes *(1)*.
- 13 to 16: display of 4 remote axes *(1)*.
- 17 to 20: display of 4 coordinated sets.
- 21 to 24: display of 4 follower sets.

6 A pencil point button to reinitialize the module.
7 Two mini DIN type 8-way connectors for Schneider Electric use.

*(1) 1 to 16: display of 16 axes (real, imaginary or remote) with module **TSX CSY 164**.*

Lexium 15 motion control
SERCOS TSX CSY 84/85/164 motion control modules

Electrical characteristics

Module type			TSX CSY 84		TSX CSY 85		TSX CSY 164	
SERCOS network	Type		Industrial support complying with standard IEC/EN 61491					
	Topology		Ring					
	Medium		Fibre-optic cable					
	Rate		4 Mbps by default					
	Cycle time *(1)* (independent axes)		2 axes	4 axes	8 axes	2/4/8 axes	12 axes	16 axes
		ms	2	2	4	2	3	4
	Max. number of segments		9			17		
	Length of segment	**m**	38 max. with plastic fibre-optic cable, 150 max. with glass fibre-optic cable					
Bus X	Distance	**m**	100 max. *(2)* between TSX CSY 84/85/164 axis control module and Premium processor					
SERCOS certification			TSX CSY 84/164 modules comply with SERCOS IEC/EN 61491 certification and with the tests defined by IGS (SERCOS Interest Group). Certification no. Z00030					
Power consumption for 5 V ⎓ voltage		**A**	1.8					
Power dissipated in the module		**W**	9 (typical)					

Electrical characteristics

Module type			TSX CSY 84	TSX CSY 85	TSX CSY 164
Number of channels			32 configurable (0 to 31), channel 0 used for SERCOS ring configuration		
Type of axes	Real axes (connected to a servo drive)		8 (channels 1 to 8)		16 (channels 1 to 16) may be dynamically configured as real axes, imaginary axes or external encoders
	Imaginary axes		4 (channels 9 to 12)		
	Remote axes (3)		4 (channels 13 to 16)		
Set of axes			4 coordinated (channels 17 to 20) Each set allows simple linear interpolation of 2 to 8 axes		
			4 followers (channels 21 to 24). Each set can have up to 7 axes: 1 master/6 slaves in gearing or camming mode		
Cam profile			7 (channels 25 to 31). Used to create the electronic cams with linear or cubic interpolation between profile points		
Path functions			Simple linear paths, following of auxiliary axes	Linear paths: - with 3° or 5° polynomial links. - with circular link on 2 axes. Circular path TjE path editor software for sets of 2 or 3 axes	Simple linear paths, following of auxiliary axes

(1) 4 ms default value. Values may be programmed according to number of axes.
*(2) Without the use of the **TSX REY 200** bus X remote module.*
(3) Determine external position using an encoder connected to the servo drive position input.

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Main functions of TSX CSY 84/85/164 modules

Programming	Movements	Homing, absolute, relative, or continuous Immediate movement, or queued, to a given position Speed override possible Acceleration and deceleration parameters may be set for each axis motion control Synchronization on start or resynchronization on stop for a slave axis on a master axis in a given position Rollover counter
	Special functions	Position capture and distance measurement between two edges on one or two logic inputs on the servo drive. This can be applied to the real or remote axis (position measurement via external sensor) Count probe: counts the edges on a logic input on the servo drive over a period of time Fast index: starts a movement on an event Registration move: position capture on an edge of the logic input on the servo drive Rotary knife: cuts using a rotary knife. Synchronizes a circular axis on a linear axis and controls a logic output on the servo drive
	Other special functions	It is possible to develop all other special functions with the assistance of our application services. Please consult our Regional Sales Offices.
	Stop/start functions	Fast stop, stop on configured deceleration profile Temporary stop Restart of stopped movement Choice of stop method: ■ on faulty slave: master is not stopped. Master stops normally according to pre-determined deceleration ramp or servo-driven master emergency stop ■ on faulty master: slave stops normally according to pre-determined deceleration ramp or servo-driven slave emergency stop On Emergency Stop: calculation of slave axis deceleration ramp alignment with master axis to obtain synchronized stopping of all axes in the set On Emergency Stop: axes may be allowed to “freewheel” or may be stopped according to a pre-determined ramp
Configuration and adjustment	SERCOS ring	Bus cycle time, traffic on the bus, optical power on the fibre, SERCOS loop diagnostics
	Acceleration/deceleration	Ramp values, ramp type (rectangular, triangular and trapezoid), choice of units, maximum acceleration adjustment
	Speed	Speed units, default speed, maximum speed, speed override
	Other settings	Target window, rollover, software limits
	Set of follower axes	Following of master axis by gearing or camming (cam profile), threshold position of master triggers the following, bias value when synchronizing an axis, monitoring of master/slave positions, master offset for follower axis
	Set of coordinated axes	Type of interpolation: linear
	Cam profile	Value of an existing point of a cam profile, number of points (5000 max.), type of interpolation, table addresses
	State of a movement or axis	Moving, accelerating, decelerating, homing, in position, faulty, etc.
	Diagnostics	Servo drive fault, axis currently reading data, following error, overvoltage, undervoltage, overcurrent, power supply fault Availability of follower axis fault information for a given axis set Multi-axis motion path control according to common tolerance for all axes in the motion, with alarm feature. Only available with the TSX CSY 164 module

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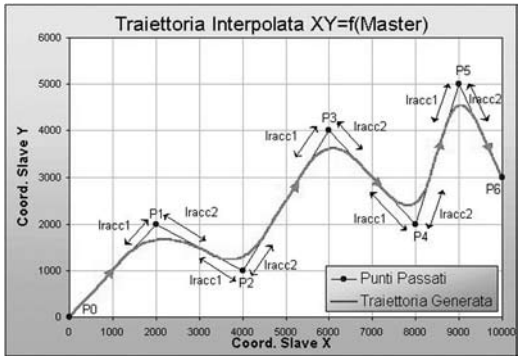
Lexium 15 motion control
SERCOS TSX CSY 84/85/164
motion control modules

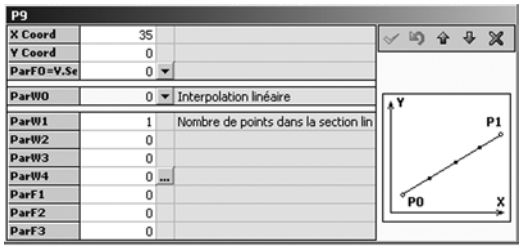
Functions specific to the TSX CSY 85 module

Path creation using TjE editor



All paths, whether simple or complex, are divided into linear or circular segments linked by interpolation laws of 6 possible types. Each segment is characterized by:
- The X and Y coordinates of the point to be reached (in the example on the left, P6) or “tangented” (P1, P2,....P5)
- The movement speed, maximum or limited according to setpoint (parameter "ParF0", see screens below):
  - The type of interpolation (parameter “ParW0”, see screens below)
  - The number of points in the linear segment (min. 1 point)
  - The number of points in the cubic interpolation part of the segment
  - Various other parameters depending on the type of interpolation

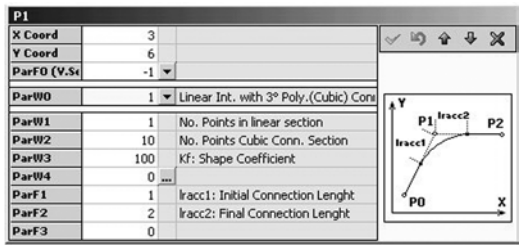
Linear interpolation



This type of interpolation is used to create a rectilinear path between the preceding point P^{i-1} and point Pi defining the segment. The various parameters below are used as follows:
- “ParW1” indicates the number of points in the linear segment. The number of points represents the number of intermediate points that the TSX CSY 85 motion control module must calculate to define the path on the segment (minimum 1).
- “ParW4” is used to indicate that the movement of a third axis will follow the path (here, the linear segment) using tangential mode: positioning according to a constant angle with the path *(1)*.

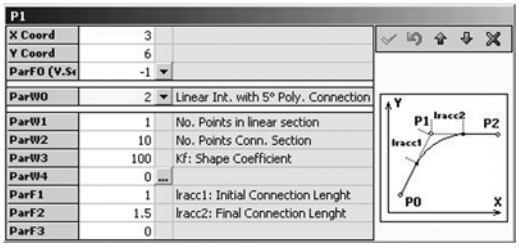
(1) Available in the future version of the TjE software.

Linear interpolation with 3º polynomial interpolation connection



This type of interpolation is used to create a curve between two linear segments in accordance with a 3º interpolation in order to smooth the transitions. The path no longer passes through the defined point P_i (in the example on the left, P1) but follows a curve defined by the following parameters:
- “ParW2” indicates the number of points in the cubic interpolation part (curve)
- “ParW3” defines the shape coefficient of the cubic interpolation enabling the curve to move closer to or further from the defined point P_i
- “Iracc1” and “Iracc2” correspond to the initial and final connection lengths. If these lengths are too great, maximum lengths are calculated by the TSX CSY 85 motion control module as a function of the previous section for Iracc1 and of the following section for Iracc2.

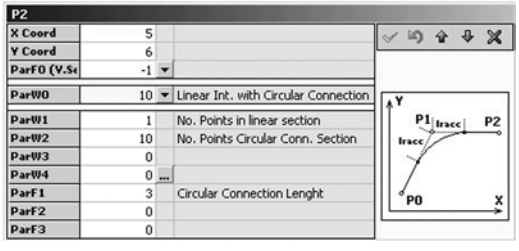
Linear interpolation with 5º polynomial interpolation connection



The type of 5º polynomial interpolation is used to define a path in the same way as that using 3º polynomial interpolation.

Nonetheless, compared to a 3° interpolation, 5° interpolation ensures more flexible movement.
If the acceleration limit in the segment in question is reached, however, the speed on the segment can be reduced for this type of connection.

Linear interpolation with circular interpolation connection



This type of interpolation is used to link segments via a circular path (circle arcs or full circles). The specific parameters defining this type of path are:
- “ParW2” indicates the number of points in the circular interpolation part
- “ParW4” defines whether the arc is greater or less than 180° (defining the arc direction)
- “ParF1” corresponds to the length of the circular interpolation segment

Circular interpolation is only possible for a movement in a plane involving only 2 axes.

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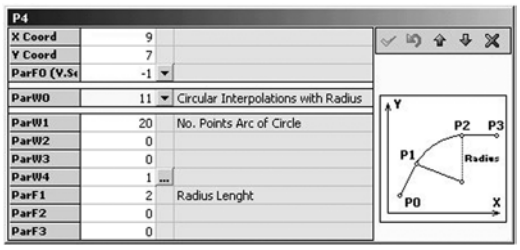
Functions specific to the TSX CSY 85 module (continued))

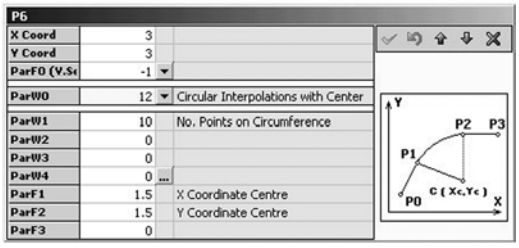
Circular interpolation according to radius



This type of interpolation is used to connect segments via a circular path (circle arcs) by specifying the start and end points, the circle radius and the path direction (clockwise or counter-clockwise). The specific parameters defining this type of path are:
- "ParW1" indicates the number of points in the circle arc
- "ParW4" defines the path direction (clockwise or counter-clockwise)
- "ParF1" corresponds to the radius of the circle arc

Circular interpolation according to radius:
- Is only possible for a movement in a single plane (2 axes only)
- Cannot be used to create paths in a full circle (to do this, use linear interpolation with connection according to circular interpolation)

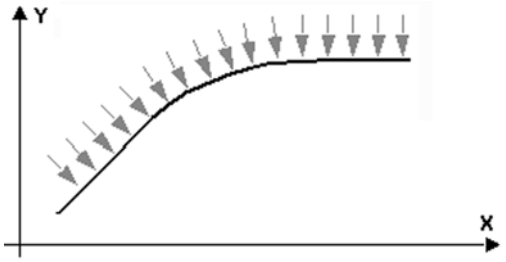
Circular interpolation according to centre



This type of interpolation is also used to connect segments by a circular path (circle arcs or full circles) by specifying the start and end points, the circle centre coordinates and the path direction (clockwise or counter-clockwise). The specific parameters defining this type of path are:
- "ParW1" indicates the number of points in the circle arc
- "ParW4" defines the path direction (clockwise or counter-clockwise)
- "ParF1" indicates the abscissa of the centre of the circle (X)
- "ParF2" indicates the ordinate of the centre of the circle (Y)

Full circular movement is defined as the end point being the same as the start point. Circular interpolation is only possible for a movement in a single plane (2 axes only).

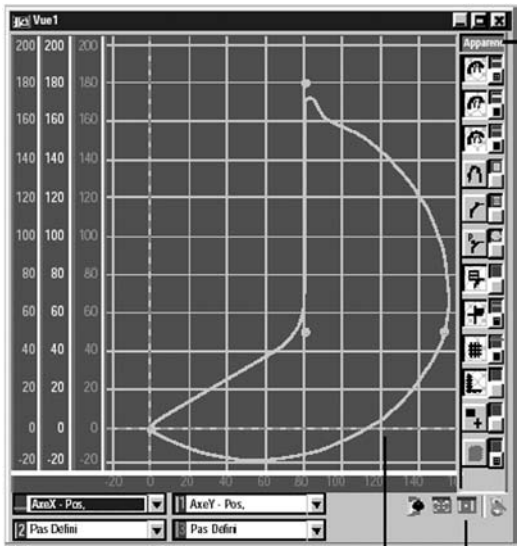
Tangential axis interpolation



Tangential axis interpolation applied to a third angular axis is used to enable it to follow the path defined by the first two axes according to a constant, controlled angle. Tangential mode will be fully available in a future version.

This version V1.0 of the TSX CSY 85 module, however, offers functions for creating tangential mode using the PL7 application.

TjE path editor software



The TjE path editor software supplied with the SERCOS TSX CSY 85 motion control module is used in offline mode to:
- Create master/slave axes and axis sets for use in the paths with a maximum of 3 sets of 2 real axes or 2 sets of 3 axes.
- Each slave axis requires a cam profile selected from the 7 profiles available in the TSX CSY 85 module (with a limit of 10,000 cam points for all the profiles).
- Define paths by setting the parameters for each segment which are linked to the various possible interpolations described in pages 3/82 and above.
- The TjE software validates all the parameters and calculates the paths for each set of axes.

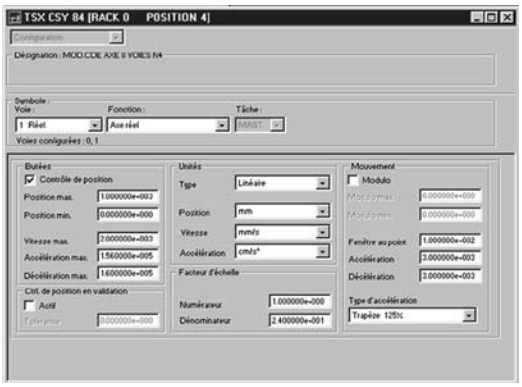
Path display

The TjE software integrates different graphic tools for displaying the previously created paths and the relevant data linked to the axes (making up the paths) with their positions, speeds or accelerations. The paths can be displayed with:
- A choice of curves, colours and scaling
- A choice of scales and offsets
- Display of segment reference points
- Display of points of the master, and calculated points of cam profiles

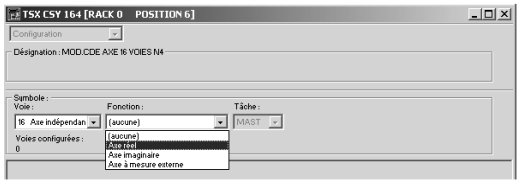
This display enables the user to validate the paths before transferring all the data thus generated to the PL7 Junior/Pro application managing the SERCOS TSX CSY 85 motion control module(s).

*(1) Maximum 8 real axes per **TSX CSY 85** module.*

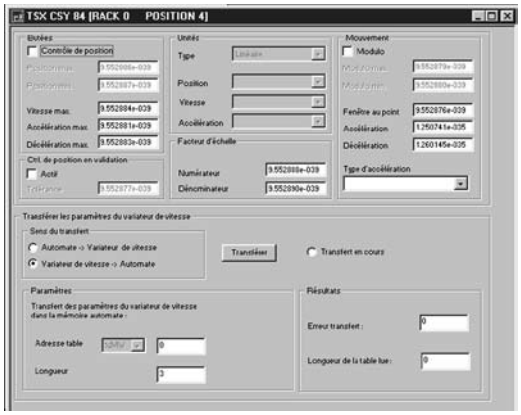
Software setup of TSX CSY 84/85/164 modules



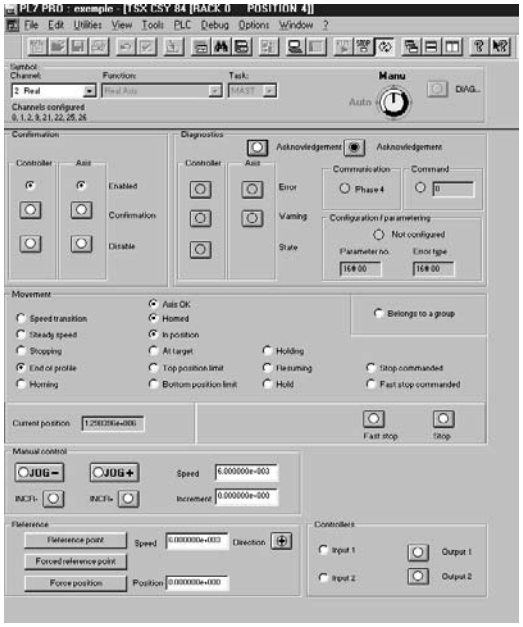
Module configuration



Declaring the axes of the TSX CSY 164 module



Setting the axis parameters



Debugging in PL7 Pro software

When setting up application-specific functions, screens specific to SERCOS motion control functions can be accessed via Unity Pro or PL7 Junior/Pro software, for configuration, adjustment, debugging and documentation of applications. These services are performed by editors which can be directly accessed from the basic screen using icons in the tool bars. Windows relating to the editors can be simultaneously displayed on one screen (example: it is possible to program using the program editor and to simultaneously define the symbols in the variables editor).

Declaring the SERCOS motion control modules
Parameter entry for application-specific functions is accessed via the configuration screen, by clicking on the slot occupied by the module.

Configuring the module
The configuration editor provides assistance with entering and modifying the values of the various axis configuration parameters. These parameters enable the operation of the axis control module to be adapted to the machine which is to be controlled.
The axis configuration parameters are:
- Units of measurement
- Resolution
- Maximum and minimum limit positions
- Maximum speed
- Accelerating/decelerating

This data relates to the machine and cannot be modified by the program.

The configuration screen as shown here can be used to declare the 16 axes as real, imaginary or remote measurement axes in the TSX CSY 164 module.

Adjusting the modules
These parameters are associated with operation of the axes. They generally require the operations on and movements of the moving part to be known. These parameters are adjusted in online mode (they are initialized during configuration, in offline mode).
They concern:
- Maximum speed
- Resolution
- Servo control parameters
- Accelerating/decelerating

Debugging the modules
In online mode, the debugging tool provides the user with a control panel screen, giving a quick display which can be used to control and observe the behaviour of the axis.

The TSX CSY 84/85/164 modules associated with the Unity Pro or PL7 Junior/Pro software provides manual mode for running continual (JOG) or incremental (INC) motion commands without prior programming.

Presentation: page 3/78
Characteristics: page 3/80
References: page 3/85
Connections: page 3/85

Lexium 15 motion control
SERCOS TSX CSY 84/85/164 motion control modules

References *(1)*

TSX CSY 84/164

TSX CSY 85

TSX CSY 84/85/164 multi-axis control modules have 32 application-specific channels which are only counted when they are configured in the Premium PLC application (using PL7 Junior/Pro or Unity Pro software). The maximum number of application-specific channels allowed depends on the type of processor:

Type of processor or slot PLC	TSX 57 1●	TSX 57 2● PCX 57 20 PCI 57 20	TSX 57 3● PCX 57 35 PCI 57 35	TSX 57 4●	TSX 57 5●
Max. number of application-specific channels	8	24	32	64	64

Motion control modules

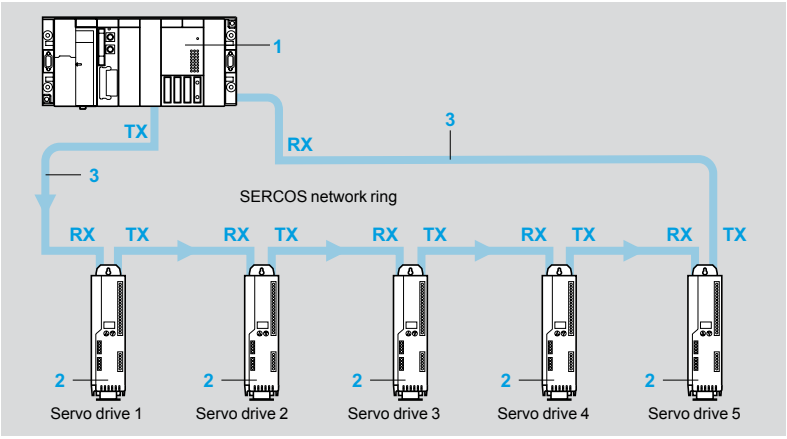
Description	Function	Number of axes	Reference	Weight kg
Multi-axis control modules	SERCOS digital servo drives control	8 real axes 4 imaginary axes 4 remote axes	**TSX CSY 84**	0.520
		8 real axes 4 imaginary axes 4 remote axes TjE path creation function	**TSX CSY 85**	0.520
		16 axes (real, imaginary or remote)	**TSX CSY 164**	0.520

Fibre-optic connection cables

Description	Connection	Length	Reference	Weight kg
Plastic fibre-optic cables fitted with SMA-type connectors (curvature radius: 25 mm min.)	Lexium 15 servo drive (with SERCOS option card)	0.3 m	**990 MCO 000 01**	0.050
		0.9 m	**990 MCO 000 03**	0.180
		1.5 m	**990 MCO 000 05**	0.260
		4.5 m	**990 MCO 000 15**	0.770
		16.5 m	**990 MCO 000 55**	2.830
		22.5 m	**990 MCO 000 75**	4.070
		37.5 m	**990 MCO 001 25**	5.940

Connections

SERCOS ring with five Lexium 15 servo drives (example)



1 **TSX CSY 84/85/164**: multi-axis motion control module for Premium PLC.
2 **LXM 15●●●M3/N4/N4X**: Lexium 15 servo drives fitted with the SERCOS AM SER 001V000 option card, see 3/42.
3 **990 MCO 000 ●●**: plastic fibre-optic cables fitted with SMA-type connectors.
TX Transmission
RX Reception

(1) To order other accessories please consult our "Automation platform Modicon Premium and Unity - PL7 software" specialist catalogue

Lexium 15 motion control
Lexium PAC solution
Lexium Controller motion controllers

536411

LMC 10, LMC 20 and LMC 20A130●
Lexium Controllers

Presentation

The Lexium Controller offer delivers optimized solutions for axis control and positioning, including automation functions. It meets the needs of a wide range of applications in all sectors of industry.

With Lexium Controllers, Lexium 05 and Lexium 15 servo drives and BSH and BDH servo motors, Schneider Electric offers a complete, high-performance and economical solution, namely Lexium PAC.

The Lexium PAC solution can be adapted and integrated into most Schneider Electric or third-party automation platforms.

The software solution provided by Lexium Controllers offers very quick and easy start-up of the machine, thanks to the application model and function block library.

Lexium Controllers are particularly suited to small machines, thanks to:
- Their compact dimensions
- The limited number of models and the integration of function blocks
- Their ease of installation
- The fact that the application can be put into operation immediately thanks to the application model and remote graphic display terminal
- Reduced installation and start-up costs

Furthermore, they satisfy the performance requirements of specialized and modular machines thanks to:
- Their expansion capability (I/O, etc.)
- Their modular software functions
- Their ease of integration into standard automation systems thanks to the possibility of connection to the buses and networks available on the market, such as CANopen, Modbus, PROFIBUS DP, DeviceNet and Modbus TCP.

Applications

The Lexium Controller performs axis coordination and synchronization, via a fieldbus, for applications requiring control of up to 8 synchronized axes.

It includes the following standard motion control functions:
- Speed and torque control
- Relative or absolute positioning
- Cam profiles for slave axes and programmable cam switch control
- Virtual axes
- Electronic gearing function for speed and position
- Linear and circular interpolations (2½D)
- Master axis via external encoder
- Distance measurement and position capture on high-speed (30µs) discrete input
- Optimized movement sequencing (blending)

It is dedicated to the following types of application:
- Handling equipment (conveyors, palletizers, storage and retrieval systems, etc.) and transfer machines (gantry cranes, etc.)
- Assembly machines (shrink fitting, clamping, etc.)
- Inspection and quality control machines
- Machines for working “on the fly” (flying shear, printing, marking etc.).

Lexium 15 motion control
Lexium PAC solution
Lexium Controller motion controllers

536413

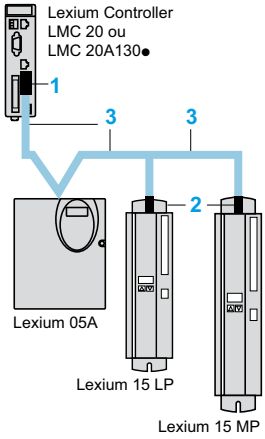
LMC 20

Lexium Controllers *(1)*

Power supply	Number of I/O	Max. number of synchronized axes (via CANopen Motionbus) *(2)*	Integrated communication: CANopen machine bus *(3)*	Modbus serial link	Ethernet network	Third-party bus	Reference	Weight
V								kg
24 ⎓	8/8 24 V ⎓	8	–	Yes	–	–	**LMC 10**	0.666
			Yes	Yes	Yes	–	**LMC 20**	0.697
			Yes	Yes	Yes	PROFIBUS DP	**LMC 20A1307**	1.076
			Yes	Yes	Yes	DeviceNet	**LMC 20A1309**	1.079

Software and documentation pack

Description	Composition	Reference	
Software and documentation pack	The pack comprises: ■ Easy Motion software ■ Motion Pro software ■ Application function block library ■ Technical documentation for setting up the hardware and software	**VW3 M8 702**	–



Connection of servo drives to Lexium Controller

Connection accessories

Description	Description	Item no.	Length m	Reference	Weight kg
For Lexium 05A or Lexium 15 servo drives					
CANopen IP 20 connector for connection to Lexium Controller	One 9-way female SUB-D straight connector Switch for line terminator	1	–	**TSX CAN KCDF 180T**	0.049
Connector for connection to Lexium 05A or Lexium 15 servo drive	One 9-way female SUB-D straight connector with screw terminals Integrated line termination	2	–	**VW3 M3 802**	–
IP 20 CANopen cables *(4)* for connecting Lexium 05A or Lexium 15 servo drive					
Standard cables, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)		3	50	**TSX CAN CA 50**	4.930
			100	**TSX CAN CA 100**	8.800
			300	**TSX CAN CA 300**	24.560
UL certification, CE marking Flame retardant (IEC 60332-2)			50	**TSX CAN CB 50**	3.580
			100	**TSX CAN CB 100**	7.840
			300	**TSX CAN CB 300**	21.870
Cable for harsh environments (2) or mobile installations, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)			50	**TSX CAN CD 50**	3.510
			100	**TSX CAN CD 100**	7.770
			300	**TSX CAN CD 300**	21.700
For SSI serial absolute encoders or incremental encoders *(5)*					
Cable for master encoder input	1 high-density 9-way male SUB-D connector 1 stripped end	–	3	**VW3 M4 701**	–
For Magelis display units and graphic terminals *(6)*					
Cable for Magelis display unit or graphic terminal input	One 25-way male SUB-D connector 1 RJ45 connector	–	3	**XBT Z938**	–
For PC serial port					
Cable for PC serial port via serial link	1 RJ45 connector One 9-way female SUB-D connector	–	3	**VW3 M8 701 R030**	–
Crossed shielded twisted pair cables	2 RJ45 connectors	–	3	**490 NTC 00003**	–
			5	**490 NTC 00005**	–

(1) Lexium Controllers are supplied as standard with a female HE 10 connector for connecting the I/O and with two female 3-pin connectors for the power supply for the Lexium Controller and the encoder. Transparent Ready class: C20.
(2) Cycle time: 2 ms for 4 synchronized axes and 4 ms for 8 synchronized axes
(3) CANopen machine bus for expanding the number of I/O, servo drives, etc., or connecting third-party products
(4) Please consult our "Machines and installations with CANopen" specialist catalogue.
(5) SSI serial absolute encoders or incremental encoders: Please consult our "Osicoder" specialist catalogue or visit "www.schneider-electric.com".
(6) Magelis display units and graphic terminals: Please consult our "Human-Machine interfaces" specialist catalogue or visit "www.schneider-electric.com".

105999

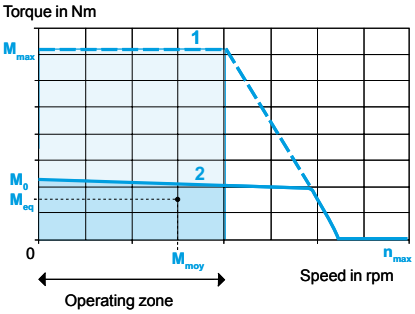
BDH servo motor

Presentation

Thanks to the advanced technology incorporated into their design, BDH servo motors represent a compact and high-performance solution for your machines, offering one of the best torque/size ratios available on the market.
7 flange sizes and multiple winding possibilities mean that these servo motors can be sized to match the requirements of each application.
This product offer covers a continuous stall torque range between 0.18 Nm and 53 Nm for speeds of up to 8000 rpm.

The BDH servo motors come in 7 flange sizes available in IEC or NEMA mounting: 40, 58, 70, 88, 108, 138 and 188 mm. They are fitted as standard with angled connectors, with the exception of the 40 mm flange size which is supplied with remote straight connectors. Thermal protection is provided by a PTC probe integrated into the servo motor.
They are certified as "Recognized" ℛ by the Underwriters Laboratories and conform to UL 1004 standards as well as to European directives (CE marking).

BDH servo motors are available with the following variants:
- IP 54 or IP 67 degree of protection
- with or without holding brake
- resolver, SinCos Hiperface® single turn or multiturn encoder
- untapped or keyed shaft end
- IEC or NEMA mounting



Torque/speed characteristics

The BDH servo motors provide torque/speed curve profiles similar to the example shown on the left with:
1 Peak torque, depending on the servo drive model
2 Continuous torque, depending on the servo drive model
where:
- n_{max} (in rpm) corresponds to the servo motor's maximum speed
- M_{max} (in Nm) represents the peak stall torque value
- M_0 (in Nm) represents the continuous stall torque value

Principle for determining servo motor size according to the application

The torque/speed curves can be used to determine the correct servo motor size:
1 Position the work zone of the application in relation to speed
2 Verify, using the motor cycle diagram, that the torques required by the application during the different cycle phases are located within the area bound by curve 1 in the work zone
3 Calculate the average speed n_{avg} and the equivalent thermal torque M_{eq} (see page 6/2)
4 The point defined by n_{avg} and M_{eq} must be located below curve 2 in the work zone

Note: *Sizing of servo motors, see page 6/2*

Functions

General functions

BDH servo motors have been developed to meet the following requirements:
- Functional characteristics, robustness, safety, etc., in compliance with IEC/EN 60034-1
- Ambient operating temperature:
  - +5...40°C in compliance with EN 50178 climatic class 3K3.
  - Maximum 50°C with derating from 40°C of 1 % per additional °C
- Relative humidity: 95 % without condensation in compliance with EN 50178 climatic class 3K3
- Maximum operating altitude: 1000 m without derating, 2000 m with k = 0.94 *(1)*, 3000 m with k = 0.83
- Storage and transport temperature: - 25...55°C in compliance with EN 50178 climatic class 1K4
- Winding insulation class: F (threshold temperature for windings 155°C) in compliance with DIN 57530
- Power and sensor connection using angled connectors (with the exception of the 40 mm flange size supplied with remote straight connectors)

(1) k: derating factor

Characteristics: page 3/90
References: page 3/138
Dimensions: page 3/144

Functions (continued)

General functions (continued)

■ Thermal protection by built-in PTC thermistor probe, controlled by the Lexium 15 servo drive
■ Out-of-round, concentricity and perpendicularity between flange and shaft in accordance with DIN 42955, class N
■ Flange compliant with standard EN 50347:2001-07
■ Authorized mounting positions: no mounting restriction IMB5, IMV1 and IMV3 in accordance with standard DIN 42950
■ Opaque black lacquer paint RAL 9005
■ Degree of protection:
□ of the frame: IP 65 in accordance with IEC/EN 60529
□ of the shaft end: IP 54 or IP 67 in accordance with standard IEC/EN 60529
■ Integrated sensor: resolver, SinCos Hiperface® high resolution single turn or multiturn encoder
■ Untapped or keyed shaft end in standard sizes (according to standard DIN 748)

Holding brake (depending on model)

The integrated brake fitted to the BDH servo motors (depending on the model) is a failsafe electromagnetic holding brake.

⚠ **Do not use the holding brake as a dynamic brake for deceleration, as this will rapidly damage the brake.**

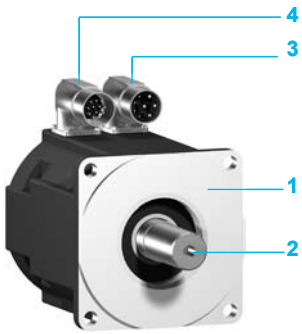
Built-in position sensor

The servo motor is fitted, depending on the model, with a position sensor which can be:
■ A 2-pole resolver providing angular precision of the shaft position, accurate to less than ±30 arc minutes.
■ A SinCos Hiperface® high-resolution single turn (1,048,576 points) or multiturn (1,048,576 points x 4096 turns) *(1)* absolute encoder providing angular precision of the shaft position, accurate to less than ±1.3 arc minutes.

These sensors perform the following functions:
■ Give the angular position of the rotor in such a way that flows can be synchronized
■ Measure the servo motor speed via the associated Lexium 15 servo drive. This information is used by the speed controller of the servo drive
■ Measure the position information for the Lexium 15 servo drive position controller, if necessary
■ Measure and transmit position information in incremental or absolute format for the position return of a motion control module (ESIM - Encoder SIMulator - output of the Lexium 15 servo drive)

Description

BDH servo motors with a 3-phase stator and a 6 to 10-pole rotor (depending on model) with Neodymium Iron Borium (NdFeB) magnets consisting of:
1 An axial flange with 4 fixing points in accordance with standard EN 50347:2001-07
2 Standard shaft end according to DIN 748, untapped or keyed (depending on the model)
3 An angled dust and damp-proof male screw connector for connecting the power cable (with the exception of the 40 mm flange size supplied with remote straight connectors)
4 An angled dust and damp-proof male screw connector for connecting the control (sensor) cable (with the exception of the 40 mm flange size supplied with remote straight connectors)



Cables for connecting to Lexium 15 servo drives must be ordered separately, see pages 3/141 to 3/143.

Schneider Electric has taken particular care to ensure compatibility between BDH servo motors and Lexium 15 servo drives. This compatibility can only be assured by using cables and connectors sold by Schneider Electric (see pages 3/141 to 3/143).

(1) Encoder resolution given for use with a Lexium 15 servo drive

Lexium 15 motion control
BDH servo motors

Characteristics of BDH 0401B/0402C servo motors

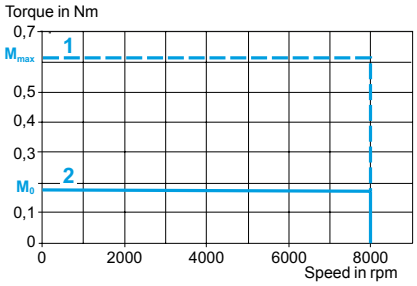
Type of servo motor				BDH 0401B		BDH 0402C	
Associated with Lexium 15 servo drive				LXM 15LD13M3		LXM 15LD13M3	
Line supply voltage			V	230 single-phase	230 3-phase	230 single-phase	230 3-phase
Torque	Continuous stall		M_0 Nm	0.18		0.31	
	Peak stall		M_{max} Nm	0.61		1.08	
Nominal operating point	Nominal torque		Nm	0.17		0.28	
	Nominal speed		rpm	8000			
	Servo motor nominal output power		W	150		230	
Maximum current			A rms	0.82		1.06	
Servo motor characteristics							
Maximum mechanical speed			rpm	8000			
Constants (at 120°C)	Torque		Nm/A rms	0.16		0.21	
	Back emf		V rms/krpm	10.2		13.3	
Rotor	Number of poles			6			
	Inertia	Without brake J_m	kgcm²	0.017		0.031	
		With brake J_m	kgcm²	–			
Stator (at 20°C)	Resistance (phase/phase)		Ω	20.2		12.4	
	Inductance (phase/phase)		mH	12.5		9.1	
	Electrical time constant		ms	0.62		0.73	
Holding brake (depending on model)				See page 3/148			

Torque/speed curves

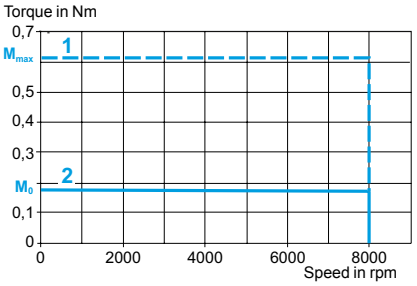
BDH 0401B servo motor

With LXM 15LD13M3 servo drive

230 V single-phase



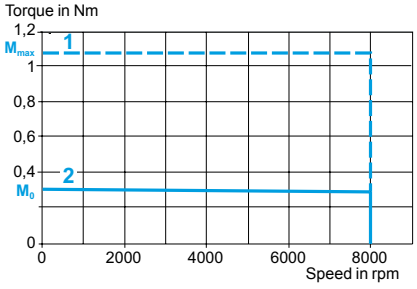
230 V 3-phase



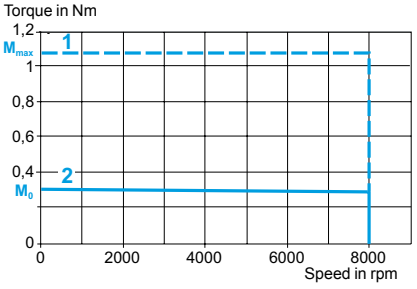
BDH 0402C servo motor

With LXM 15LD13M3 servo drive

230 V single-phase



230 V 3-phase



1 Peak torque
2 Continuous torque

Presentation: page 3/88
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Characteristics of BDH 0403C servo motors

Type of servo motor				**BDH 0403C**	
Associated with Lexium 15 servo drive				**LXM 15LD13M3**	
Line supply voltage			**V**	230 single-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	0.41	
	Peak stall	M_{max}	**Nm**	1.46	
Nominal operating point	Nominal torque		**Nm**	0.36	
	Nominal speed		**rpm**	8000	
	Servo motor nominal output power		**W**	300	
Maximum current			**A rms**	1.04	

Servo motor characteristics

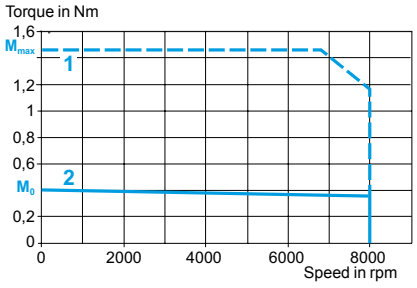
Maximum mechanical speed			**rpm**	8000
Constants (at 120°C)	Torque		**Nm/A rms**	0.28
	Back emf		**V rms/ krpm**	17.9
Rotor	Number of poles			6
	Inertia	Without brake J_m	**kgcm²**	0.045
		With brake J_m	**kgcm²**	–
Stator (at 20°C)	Resistance (phase/phase)		Ω	13.5
	Inductance (phase/phase)		**mH**	10.3
	Electrical time constant		**ms**	0.76
Holding brake (depending on model)				See page 3/148

Torque/speed curves

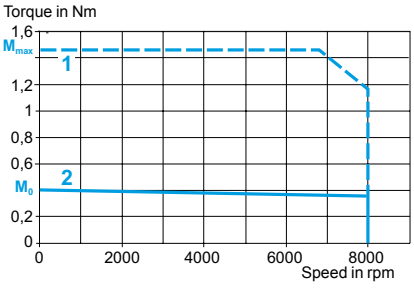
BDH 0403C servo motor

With LXM 15LD13M3 servo drive

230 single-phase



230 3-phase



1 Peak torque
2 Continuous torque

Characteristics of BDH 0582C/0582E servo motors

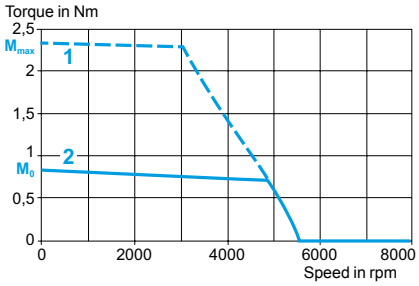
Type of servo motor				**BDH 0582C**			**BDH 0582E**	
Associated with Lexium 15 servo drive				**LXM 15LU60N4**			**LXM 15LD13M3**	
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 single-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	0.84			0.87	
	Peak stall	M_{max}	**Nm**	2.34			2.42	
Nominal operating point	Nominal torque		**Nm**	0.78	0.72	0.69	0.71	
	Nominal speed		**rpm**	3000	6500	7500	6500	
	Servo motor nominal output power		**W**	250	470	560	500	
Maximum current			**A rms**	3.95			7.7	
Servo motor characteristics								
Maximum mechanical speed			**rpm**	8000				
Constants (at 120°C)	Torque		**Nm/A rms**	0.61			0.32	
	Back emf		**V rms/ krpm**	39			20.4	
Rotor	Number of poles			6				
	Inertia	Without brake J_m	**kgcm²**	0.16				
		With brake J_m	**kgcm²**	0.171				
Stator (at 20°C)	Resistance (phase/phase)		Ω	19.4			5.09	
	Inductance (phase/phase)		**mH**	35.5			9.7	
	Electrical time constant		**ms**	1.83			1.91	
Holding brake (depending on model)				See page 3/148				

Torque/speed curves

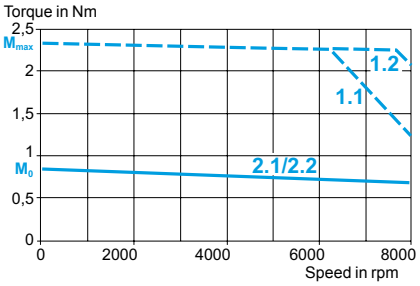
BDH 0582C servo motor

With LXM 15LU60N4 servo drive

230 V 3-phase



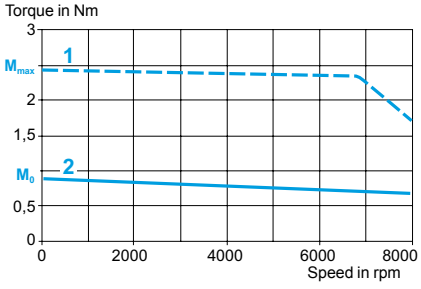
400/480 V 3-phase



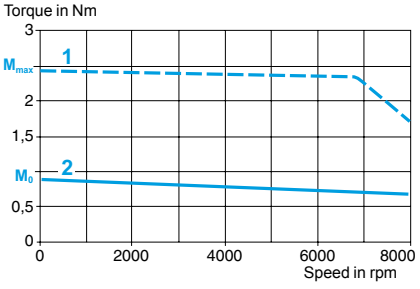
BDH 0582E servo motor

With LXM 15LD13M3 servo drive

230 V single-phase



230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0583C servo motors

Type of servo motor				**BDH 0583C**		
Associated with Lexium 15 servo drive				**LXM 15LU60N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	1.13		
	Peak stall	M_{max}	**Nm**	3.2		
Nominal operating point	Nominal torque		**Nm**	1	0.87	0.82
	Nominal speed		**rpm**	2500	5000	6000
	Servo motor nominal output power		**W**	250	450	520
Maximum current			**A rms**	3.95		

Servo motor characteristics

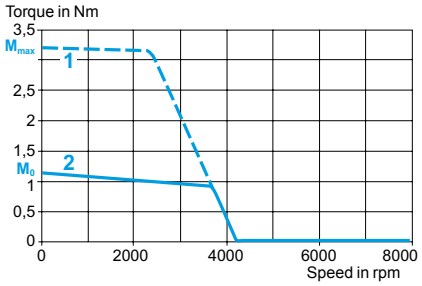
Maximum mechanical speed			**rpm**	8000
Constants (at 120°C)	Torque		**Nm/A rms**	0.8
	Back emf		**V rms/ krpm**	51.8
Rotor	Number of poles			6
	Inertia	Without brake J_m	**kgcm²**	0.22
		With brake J_m	**kgcm²**	0.231
Stator (at 20°C)	Resistance (phase/phase)		Ω	20.3
	Inductance (phase/phase)		**mH**	40.7
	Electrical time constant		**ms**	2
Holding brake (depending on model)				See page 3/148

Torque/speed curves

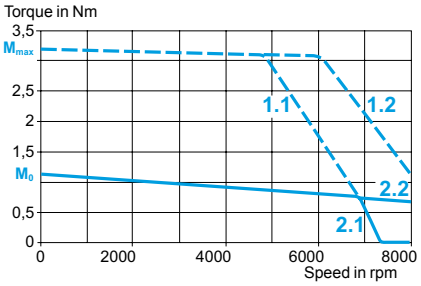
BDH 0583C servo motor

With LXM 15LU60N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BDH 0583D servo motors

Type of servo motor				**BDH 0583D**				
Associated with Lexium 15 servo drive				**LXM 15LD13M3**		**LXM 15LD10N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	1.16				
	Peak stall	M_{max}	**Nm**	3.58				
Nominal operating point	Nominal torque		**Nm**	1.06	1.05	1.06	0.94	
	Nominal speed		**rpm**	4000			7500	8000
	Servo motor nominal output power		**W**	450			750	800
Maximum current			**A rms**	6.22				

Servo motor characteristics

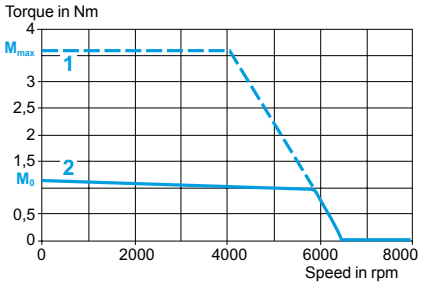
Maximum mechanical speed		**rpm**	8000
Constants (at 120°C)	Torque	**Nm/A rms**	0.52
	Back emf	**V rms/ krpm**	33.8
Rotor	Number of poles		6
	Inertia Without brake J_m	**kgcm²**	0.22
	With brake J_m	**kgcm²**	0.231
Stator (at 20°C)	Resistance (phase/phase)	Ω	8.36
	Inductance (phase/phase)	**mH**	17.3
	Electrical time constant	**ms**	2.07
Holding brake (depending on model)			See page 3/148

Torque/speed curves

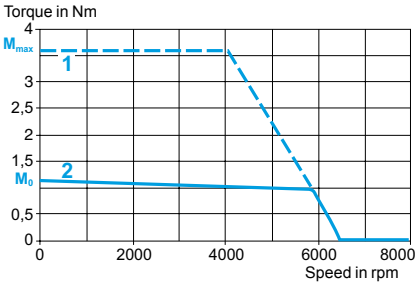
BDH 0583D servo motor

With LXM 15LD13M3 servo drive

230 V single-phase

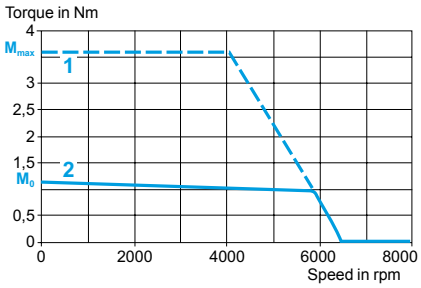


230 V 3-phase

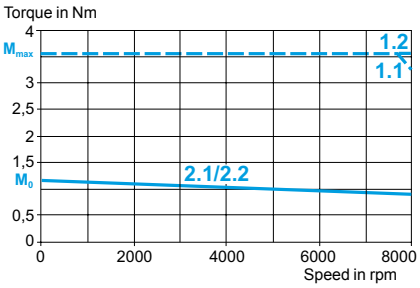


With LXM 15LD10N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0583F/0584C servo motors

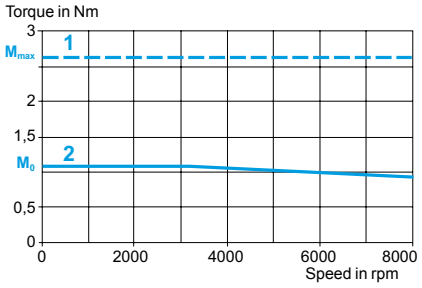
Type of servo motor				**BDH 0583F**		**BDH 0584C**		
Associated with Lexium 15 servo drive				**LXM 15LD21M3**		**LXM 15LU60N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	1.08	1.18	1.38		
	Peak stall	M_{max}	**Nm**	2.62	3.52	3.94		
Nominal operating point	Nominal torque		**Nm**	0.92		1.28	1.18	1.13
	Nominal speed		**rpm**	8000		2000	4000	5000
	Servo motor nominal output power		**W**	770		270	500	600
Maximum current			**A rms**	12.16		4.03		
Servo motor characteristics								
Maximum mechanical speed			**rpm**	8000				
Constants (at 120°C)	Torque		**Nm/A rms**	0.27		0.97		
	Back emf		**V rms/ krpm**	17.6		62.4		
Rotor	Number of poles			6				
	Inertia	Without brake J_m	**kgcm²**	0.22		0.27		
		With brake J_m	**kgcm²**	0.231		0.281		
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.23		20.4		
	Inductance (phase/phase)		**mH**	4.68		43.8		
	Electrical time constant		**ms**	2.10		2.15		
Holding brake (depending on model)				See page 3/148				

Torque/speed curves

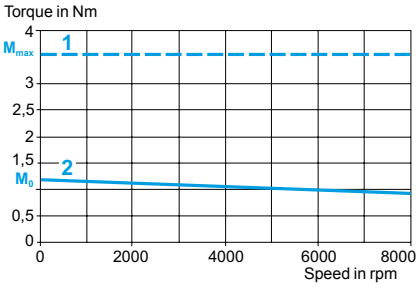
BDH 0583F servo motor

With LXM 15LD21M3 servo drive

230 V single-phase



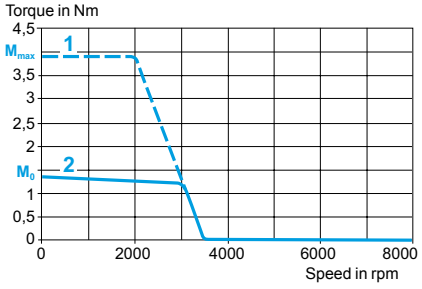
230 V 3-phase



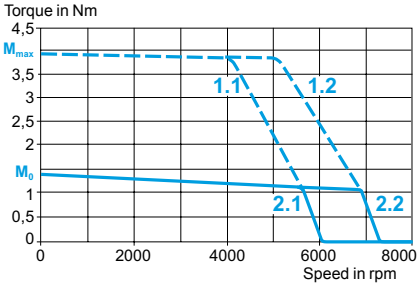
BDH 0584C servo motor

With LXM 15LU60N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0584D servo motors

Type of servo motor				**BDH 0584D**				
Associated with Lexium 15 servo drive				**LXM 15LD13M3**		**LXM 15LD10N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	1.41				
	Peak stall	M_{max}	**Nm**	4.4				
Nominal operating point	Nominal torque		**Nm**	1.18			1	0.92
	Nominal speed		**rpm**	3500			7000	8000
	Servo motor nominal output power		**W**	450			700	770
Maximum current			**A rms**	6.22				

Servo motor characteristics

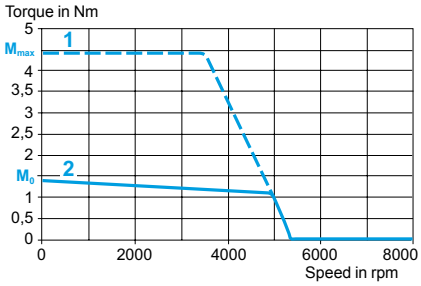
Maximum mechanical speed			**rpm**	8000
Constants (at 120°C)	Torque		**Nm/A rms**	0.63
	Back emf		**V rms/ krpm**	40.8
Rotor	Number of poles			6
	Inertia	Without brake J_m	**kgcm²**	0.27
		With brake J_m	**kgcm²**	0.281
Stator (at 20°C)	Resistance (phase/phase)		Ω	8.4
	Inductance (phase/phase)		**mH**	18.7
	Electrical time constant		**ms**	2.23
Holding brake (depending on model)				See page 3/148

Torque/speed curves

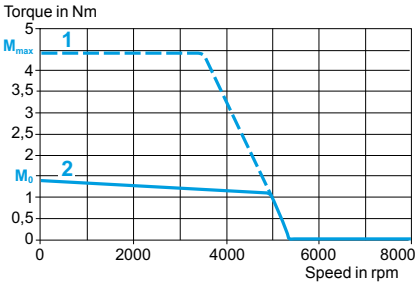
BDH 0584D servo motor

With LXM 15LD13M3 servo drive

230 V single-phase

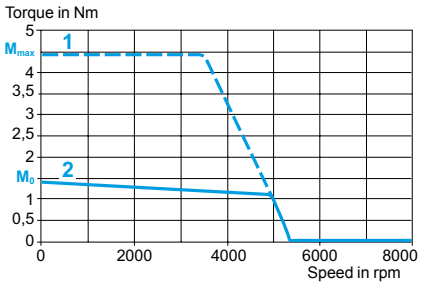


230 V 3-phase

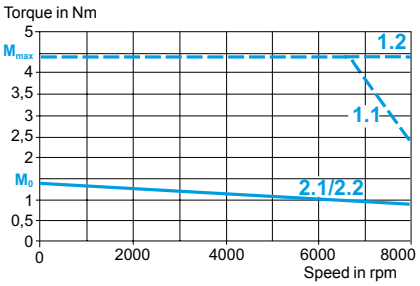


With LXM 15LD10N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0584F servo motors

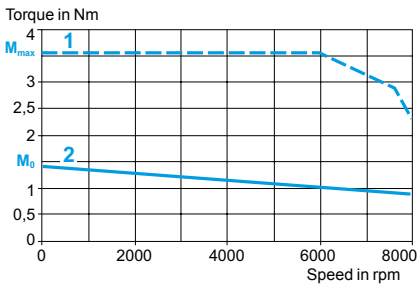
Type of servo motor				**BDH 0584F**	
Associated with Lexium 15 servo drive				**LXM 15LD21M3**	
Line supply voltage			**V**	230 single-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	1.42	
	Peak stall	M_{max}	**Nm**	3.57	4.46
Nominal operating point	Nominal torque		**Nm**	1.06	1.03
	Nominal speed		**rpm**	6000	6500
	Servo motor nominal output power		**W**	670	700
Maximum current			**A rms**	11.03	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	8000	
Constants (at 120°C)	Torque		**Nm/A rms**	0.36	
	Back emf		**V rms/ krpm**	23.4	
Rotor	Number of poles			6	
	Inertia	Without brake J_m	**kgcm²**	0.27	
		With brake J_m	**kgcm²**	0.281	
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.77	
	Inductance (phase/phase)		**mH**	6.16	
	Electrical time constant		**ms**	2.22	
Holding brake (depending on model)				See page 3/148	

Torque/speed curves

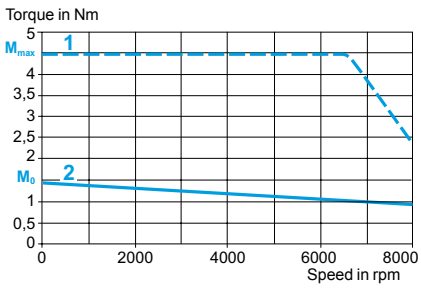
BDH 0584F servo motor

With LXM 15LD21M3 servo drive

230 V single-phase



230 V 3-phase



1 Peak torque
2 Continuous torque

Characteristics of BDH 0701C/0701E servo motors

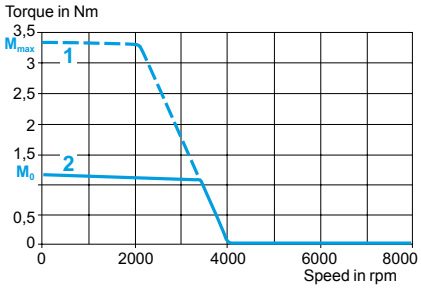
Type of servo motor				**BDH 0701C**			**BDH 0701E**	
Associated with Lexium 15 servo drive				**LXM 15LU60N4**			**LXM 15LD13M3**	
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 single-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	1.15			1.2	
	Peak stall	M_{max}	**Nm**	3.34			3.24	
Nominal operating point	Nominal torque		**Nm**	1.09	1.04	1	1.2	
	Nominal speed		**rpm**	2000	4500	5000		
	Servo motor nominal output power		**W**	250	500	550	650	
Maximum current			**A rms**	3.89			8.48	
Servo motor characteristics								
Maximum mechanical speed			**rpm**	8000				
Constants (at 120°C)	Torque		**Nm/A rms**	0.85			0.41	
	Back emf		**V rms/ krpm**	54.5			26.1	
Rotor	Number of poles			8				
	Inertia	Without brake J_m	**kgcm²**	0.33				
		With brake J_m	**kgcm²**	0.341				
Stator (at 20°C)	Resistance (phase/phase)		Ω	21.4			4.58	
	Inductance (phase/phase)		**mH**	37.5			8.6	
	Electrical time constant		**ms**	1.75			1.88	
Holding brake (depending on model)				See page 3/148				

Torque/speed curves

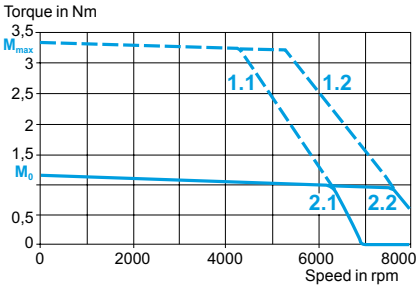
BDH 0701C servo motor

With LXM 15LU60N4 servo drive

230 V 3-phase



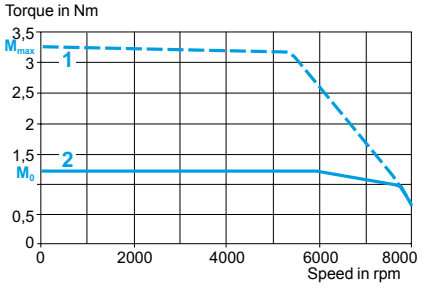
400/480 V 3-phase



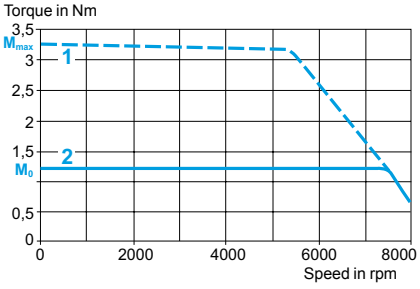
BDH 0701E servo motor

With LXM 15LD13M3 servo drive

230 V single-phase



230 V 3-phase



1 Peak torque
2 Continuous torque
1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0702C servo motors

Type of servo motor				**BDH 0702C**		
Associated with Lexium 15 servo drive				**LXM 15LU60N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	2		
	Peak stall	M_{max}	**Nm**	5.74		
Nominal operating point	Nominal torque		**Nm**	1.85	1.7	1.64
	Nominal speed		**rpm**	1500	3000	3500
	Servo motor nominal output power		**W**	250	500	600
Maximum current			**A rms**	4.03		

Servo motor characteristics

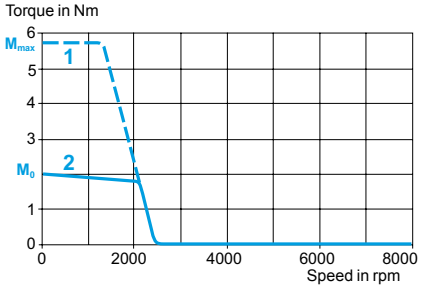
Maximum mechanical speed			**rpm**	8000
Constants (at 120°C)	Torque		**Nm/A rms**	1.4
	Back emf		**V rms/ krpm**	89.8
Rotor	Number of poles			8
	Inertia	Without brake J_m	**kgcm²**	0.59
		With brake J_m	**kgcm²**	0.601
Stator (at 20°C)	Resistance (phase/phase)		Ω	23
	Inductance (phase/phase)		**mH**	46.5
	Electrical time constant		**ms**	2.02
Holding brake (depending on model)				See page 3/148

Torque/speed curves

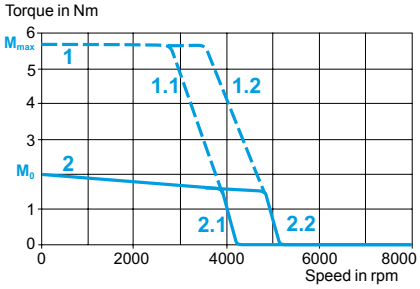
BDH 0702C servo motor

With LXM 15LU60N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque
1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BDH 0702D servo motors

Type of servo motor				**BDH 0702D**				
Associated with Lexium 15 servo drive				**LXM 15LD13M3**		**LXM 15LD10N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	2.04				
	Peak stall	M_{max}	**Nm**	6.51				
Nominal operating point	Nominal torque		**Nm**	1.82			1,6	1.51
	Nominal speed		**rpm**	2300			4500	5500
	Servo motor nominal output power		**W**	450			750	900
Maximum current			**A rms**	6.29				

Servo motor characteristics

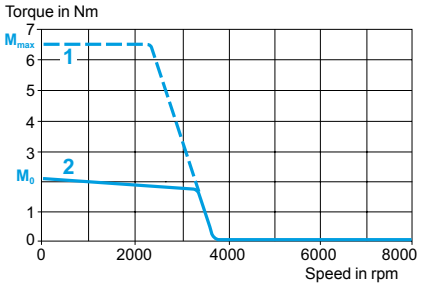
Maximum mechanical speed			**rpm**	8000
Constants (at 120°C)	Torque		**Nm/A rms**	0.92
	Back emf		**V rms/ krpm**	59
Rotor	Number of poles			8
	Inertia	Without brake J_m	**kgcm²**	0.59
		With brake J_m	**kgcm²**	0.601
Stator (at 20°C)	Resistance (phase/phase)		Ω	9.57
	Inductance (phase/phase)		**mH**	20.1
	Electrical time constant		**ms**	2.1
Holding brake (depending on model)				See page 3/148

Torque/speed curves

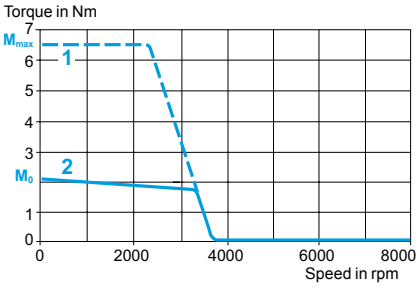
BDH 0702D servo motor

With LXM 15LD13M3 servo drive

230 V single-phase

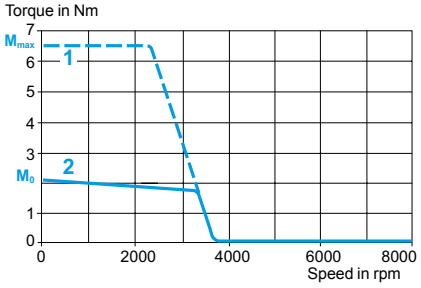


230 V 3-phase

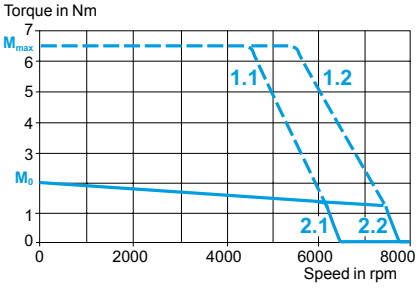


With LXM 15LD10N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0702H servo motors

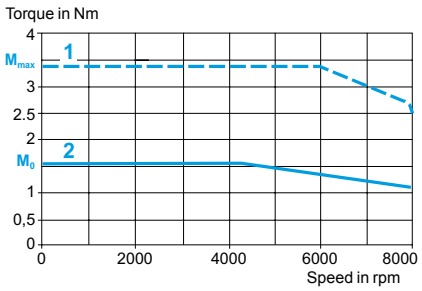
Type of servo motor				**BDH 0702H**	
Associated with Lexium 15 servo drive				**LXM 15LD21M3**	
Line supply voltage			**V**	230 single-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	1.5	2.1
	Peak stall	M_{max}	**Nm**	3.4	5.36
Nominal operating point	Nominal torque		**Nm**	1.56	1.3
	Nominal speed		**rpm**	4500	6500
	Servo motor nominal output power		**W**	700	900
Maximum current			**A rms**	15.56	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	8000	
Constants (at 120°C)	Torque		**Nm/A rms**	0.39	
	Back emf		**V rms/ krpm**	24.8	
Rotor	Number of poles			8	
	Inertia	Without brake J_m	**kgcm²**	0.59	
		With brake J_m	**kgcm²**	0.601	
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.64	
	Inductance (phase/phase)		**mH**	3.55	
	Electrical time constant		**ms**	2.16	
Holding brake (depending on model)				See page 3/148	

Torque/speed curves

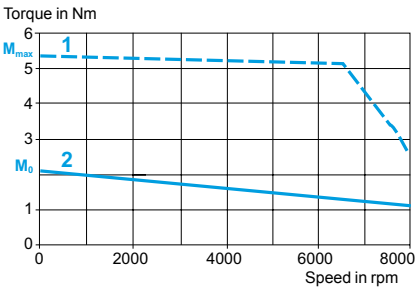
BDH 0702H servo motor

With LXM 15LD21M3 servo drive

230 V single-phase



230 V 3-phase



1 Peak torque
2 Continuous torque

Characteristics of BDH 0703C servo motors

Type of servo motor				**BDH 0703C**		
Associated with Lexium 15 servo drive				**LXM 15LU60N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	2.71		
	Peak stall	M_{max}	**Nm**	7.83		
Nominal operating point	Nominal torque		**Nm**	2.6	2.55	2.51
	Nominal speed		**rpm**	900	2000	2500
	Servo motor nominal output power		**W**	250	550	650
Maximum current			**A rms**	4.17		

Servo motor characteristics

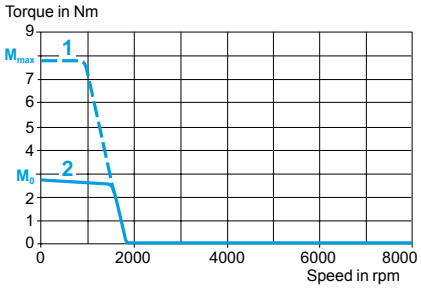
Maximum mechanical speed			**rpm**	8000
Constants (at 120°C)	Torque		**Nm/A rms**	1.86
	Back emf		**V rms/ krpm**	120
Rotor	Number of poles			8
	Inertia	Without brake J_m	**kgcm²**	0.85
		With brake J_m	**kgcm²**	0.861
Stator (at 20°C)	Resistance (phase/phase)		Ω	25.4
	Inductance (phase/phase)		**mH**	53.6
	Electrical time constant		**ms**	2.11
Holding brake (depending on model)				See page 3/148

Torque/speed curves

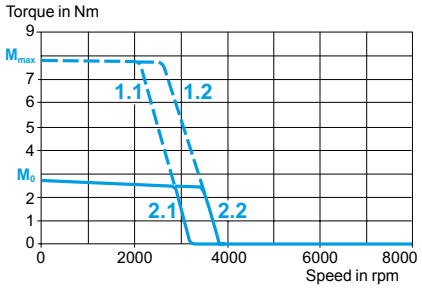
BDH 0703C servo motor

With LXM 15LU60N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BDH 0703E servo motors

Type of servo motor				**BDH 0703E**				
Associated with Lexium 15 servo drive				**LXM 15LD13M3**		**LXM 15LD10N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	2.79				
	Peak stall	M_{max}	**Nm**	8.55				
Nominal operating point	Nominal torque		**Nm**	2.55			2.4	2.3
	Nominal speed		**rpm**	2000			4000	5000
	Servo motor nominal output power		**W**	550			1000	1500
Maximum current			**A rms**	7.28				

Servo motor characteristics

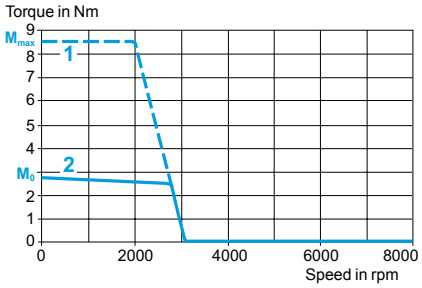
Maximum mechanical speed		**rpm**	8000
Constants (at 120°C)	Torque	**Nm/A rms**	1.1
	Back emf	**V rms/ krpm**	70.6
Rotor	Number of poles		8
	Inertia — Without brake J_m	**kgcm²**	0.85
	Inertia — With brake J_m	**kgcm²**	0.861
Stator (at 20°C)	Resistance (phase/phase)	Ω	8.36
	Inductance (phase/phase)	**mH**	18.5
	Electrical time constant	**ms**	2.21
Holding brake (depending on model)			See page 3/148

Torque/speed curves

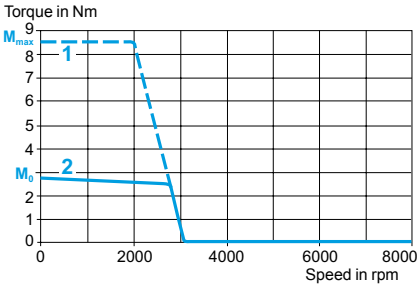
BDH 0703E servo motor

With LXM 15LD13M3 servo drive

230 V single-phase

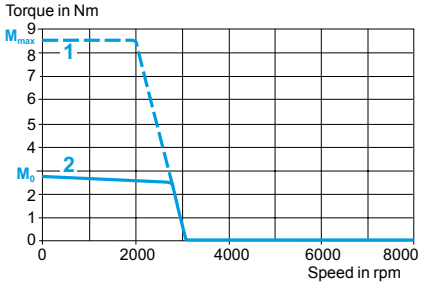


230 V 3-phase

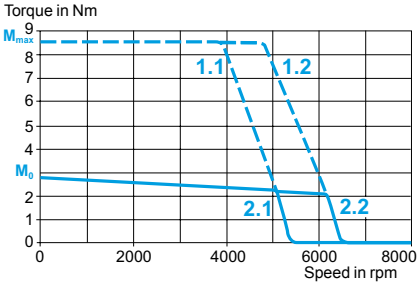


With LXM 15LD10N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0703H servo motors

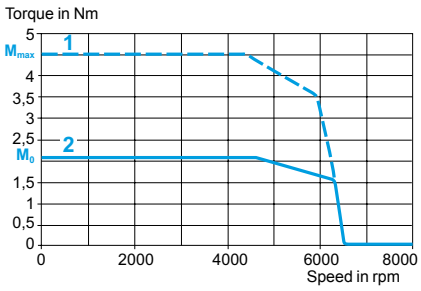
Type of servo motor				**BDH 0703H**	
Associated with Lexium 15 servo drive				**LXM 15LD21M3**	
Line supply voltage			**V**	230 single-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	2.08	2.88
	Peak stall	M_{max}	**Nm**	4.52	7.35
Nominal operating point	Nominal torque		**Nm**	2.08	1.64
	Nominal speed		**rpm**	4500	5000
	Servo motor nominal output power		**W**	1000	850
Maximum current			**A rms**	15.91	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	8000	
Constants (at 120°C)	Torque		**Nm/A rms**	0.52	
	Back emf		**V rms/ krpm**	33.4	
Rotor	Number of poles			8	
	Inertia	Without brake J_m	**kgcm²**	0.85	
		With brake J_m	**kgcm²**	0.861	
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.82	
	Inductance (phase/phase)		**mH**	4.1	
	Electrical time constant		**ms**	2.25	
Holding brake (depending on model)				See page 3/148	

Torque/speed curves

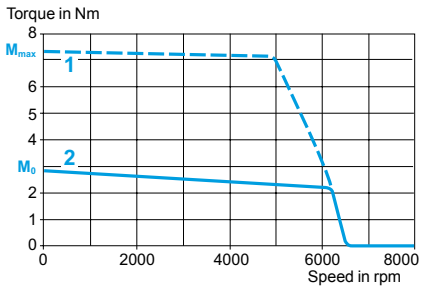
BDH 0703H servo motor

With LXM 15LD21M3 servo drive

230 V single-phase



230 V 3-phase



1 Peak torque
2 Continuous torque

Characteristics of BDH 0841C servo motors

Type of servo motor				**BDH 0841C**		
Associated with Lexium 15 servo drive				**LXM 15LU60N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	1.95		
	Peak stall	M_{max}	**Nm**	5.12		
Nominal operating point	Nominal torque		**Nm**	1.88	1.83	1.8
	Nominal speed		**rpm**	1500	2500	3000
	Servo motor nominal output power		**W**	300	500	600
Maximum current			**A rms**	4.1		

Servo motor characteristics

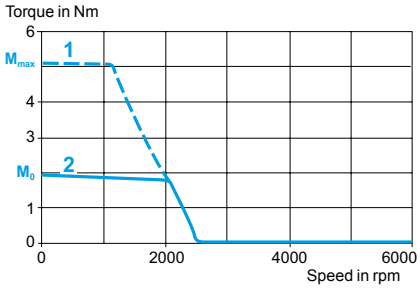
Maximum mechanical speed			**rpm**	6000
Constants (at 120°C)	Torque		**Nm/A rms**	1.34
	Back emf		**V rms/ krpm**	86.3
Rotor	Number of poles			10
	Inertia	Without brake J_m	**kgcm²**	0.81
		With brake J_m	**kgcm²**	0.878
Stator (at 20°C)	Resistance (phase/phase)		Ω	21.7
	Inductance (phase/phase)		**mH**	66.1
	Electrical time constant		**ms**	3.05
Holding brake (depending on model)				See page 3/148

Torque/speed curves

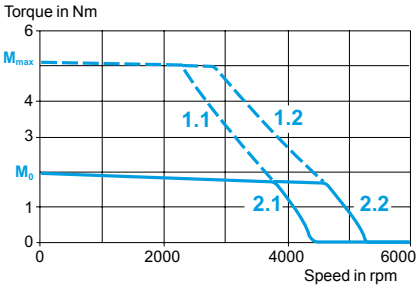
Characteristics of BDH 0841C servo motors

With LXM 15LU60N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BDH 0841E servo motors

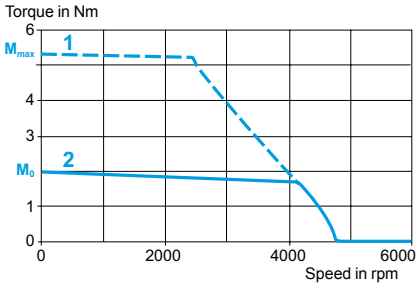
Type of servo motor				**BDH 0841E**				
Associated with Lexium 15 servo drive				**LXM 15LD13M3**		**LXM 15LD10N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	2.02				
	Peak stall	M_{max}	**Nm**	5.33		5.13		
Nominal operating point	Nominal torque		**Nm**	1.84			1.67	1.62
	Nominal speed		**rpm**	2500			5000	5500
	Servo motor nominal output power		**W**	500			800	950
Maximum current			**A rms**	8.06				
Servo motor characteristics								
Maximum mechanical speed			**rpm**	6000				
Constants (at 120°C)	Torque		**Nm/A rms**	0.71				
	Back emf		**V rms/ krpm**	45.6				
Rotor	Number of poles			10				
	Inertia	Without brake J_m	**kgcm²**	0.81				
		With brake J_m	**kgcm²**	0.878				
Stator (at 20°C)	Resistance (phase/phase)		Ω	5.7				
	Inductance (phase/phase)		**mH**	18.4				
	Electrical time constant		**ms**	3.23				
Holding brake (depending on model)				See page 3/148				

Torque/speed curves

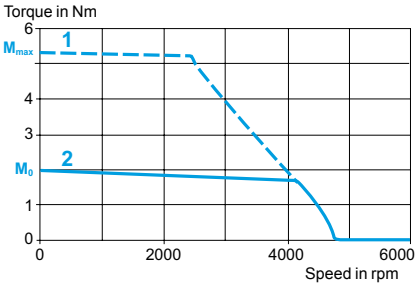
BDH 0841E servo motor

With LXM 15LD13M3 servo drive

230 V single-phase

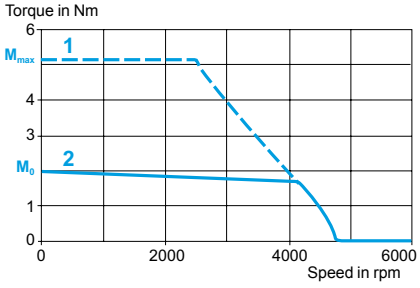


230 V 3-phase

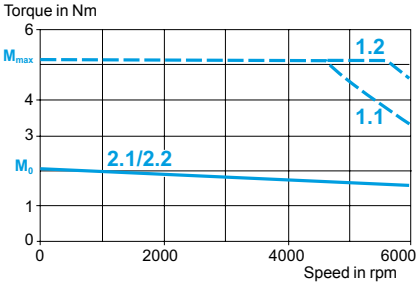


With LXM 15LD10N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0841H/0842C servo motors

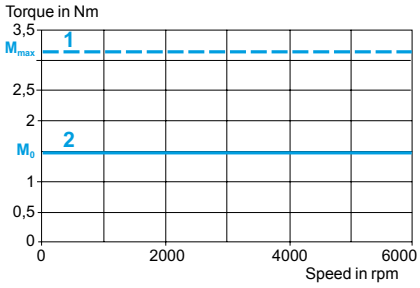
Type of servo motor				**BDH 0841H**		**BDH 0842C**		
Associated with Lexium 15 servo drive				**LXM 15LD21M3**		**LXM 15LU60N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	1.5	2.06	3.35		
	Peak stall	M_{max}	**Nm**	3.14	4.78	9.37		
Nominal operating point	Nominal torque		**Nm**	1.48	1.68	3.25	3.1	3
	Nominal speed		**rpm**	6000	5500	600	1500	2000
	Servo motor nominal output power		**W**	900	950	200	500	600
Maximum current			**A rms**	15.84		3.97		
Servo motor characteristics								
Maximum mechanical speed			**rpm**	6000				
Constants (at 120°C)	Torque		**Nm/A rms**	0.37		2.4		
	Back emf		**V rms/ krpm**	23.7		154		
Rotor	Number of poles			10				
	Inertia	Without brake J_m	**kgcm²**	0.81		1.5		
		With brake J_m	**kgcm²**	0.878		1.568		
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.51		27.5		
	Inductance (phase/phase)		**mH**	5		97.4		
	Electrical time constant		**ms**	3.31		3.54		
Holding brake (depending on model)				See page 3/148				

Torque/speed curves

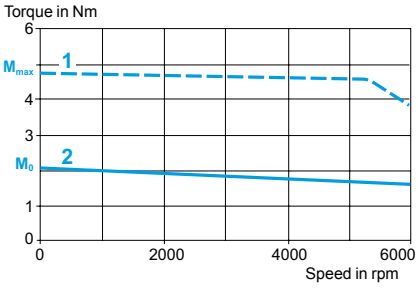
BDH 0841H servo motor

With LXM 15LD21M3 servo drive

230 V single-phase



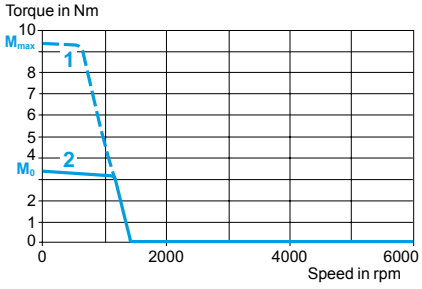
230 V 3-phase



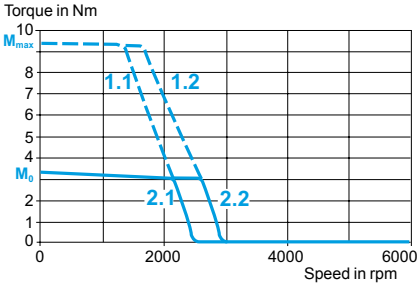
BDH 0842C servo motor

With LXM 15LU60N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0842E servo motors

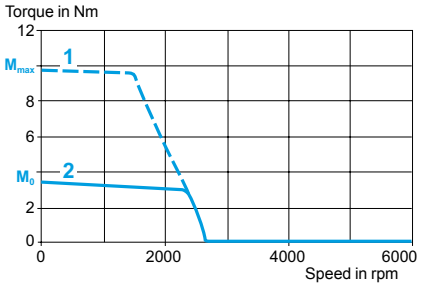
Type of servo motor				**BDH 0842E**				
Associated with Lexium 15 servo drive				**LXM 15LD13M3**		**LXM 15LD10N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	3.42				
	Peak stall	M_{max}	**Nm**	9.72		9.41		
Nominal operating point	Nominal torque		**Nm**	3.15			2.9	2.8
	Nominal speed		**rpm**	1500			3000	3500
	Servo motor nominal output power		**W**	500			900	1000
Maximum current			**A rms**	7.78				
Servo motor characteristics								
Maximum mechanical speed			**rpm**	6000				
Constants (at 120°C)	Torque		**Nm/A rms**	1.26				
	Back emf		**V rms/ krpm**	80.9				
Rotor	Number of poles			10				
	Inertia	Without brake J_m	**kgcm²**	1.5				
		With brake J_m	**kgcm²**	1.568				
Stator (at 20°C)	Resistance (phase/phase)		Ω	7.22				
	Inductance (phase/phase)		**mH**	26.8				
	Electrical time constant		**ms**	3.71				
Holding brake (depending on model)				See page 3/148				

Torque/speed curves

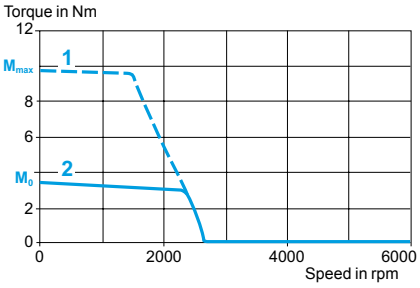
BDH 0842E servo motor

With LXM 15LD13M3 servo drive

230 V single-phase

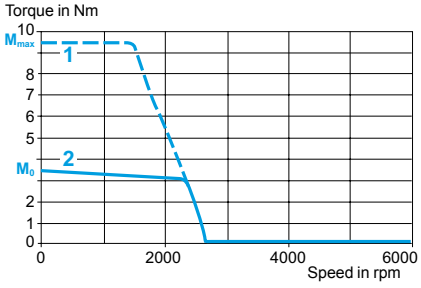


230 V 3-phase

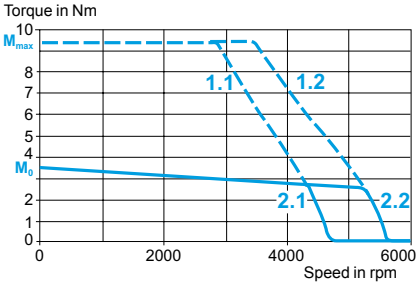


With LXM 15LD10N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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References: page 3/138
Dimensions: page 3/144

Characteristics of BDH 0842G servo motors

Type of servo motor				**BDH 0842G**				
Associated with Lexium 15 servo drive				**LXM 15LD21M3**		**LXM 15LD17N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	2.96	3.53			
	Peak stall	M_{max}	**Nm**	6.54	9.56	8.66		
Nominal operating point	Nominal torque		**Nm**	2.94	2.96		2.5	2.35
	Nominal speed		**rpm**	3000			5000	6000
	Servo motor nominal output power		**W**	900			1300	1500
Maximum current			**A rms**	13.58				

Servo motor characteristics

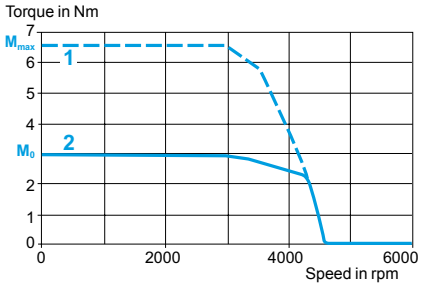
Maximum mechanical speed			**rpm**	6000
Constants (at 120°C)	Torque		**Nm/A rms**	0.74
	Back emf		**V rms/ krpm**	47.5
Rotor	Number of poles			10
	Inertia	Without brake J_m	**kgcm²**	1.5
		With brake J_m	**kgcm²**	1.568
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.38
	Inductance (phase/phase)		**mH**	9.2
	Electrical time constant		**ms**	3.87
Holding brake (depending on model)				See page 3/148

Torque/speed curves

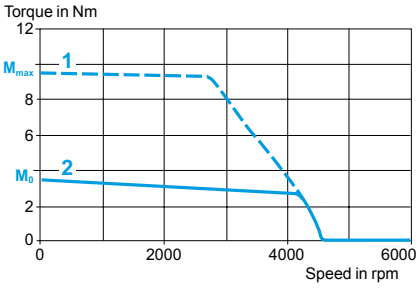
BDH 0842G servo motor

With LXM 15LD21M3 servo drive

230 V single-phase

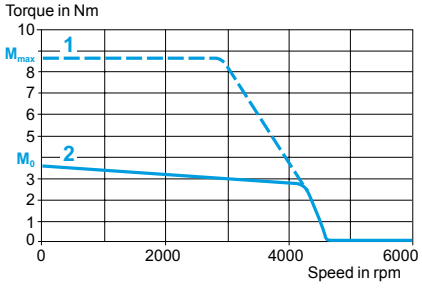


230 V 3-phase

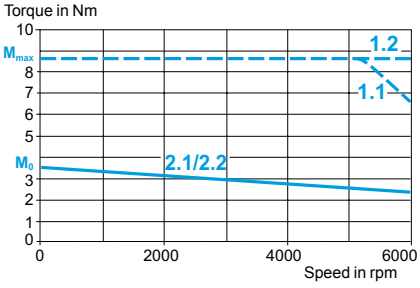


With LXM 15LD17N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/144

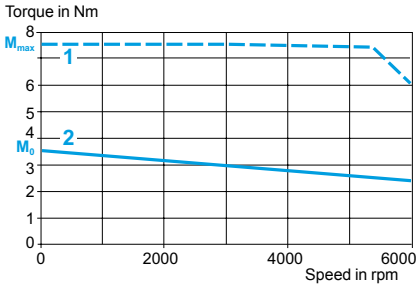
Characteristics of BDH 0842J/0843E servo motors

Type of servo motor				BDH 0842J		BDH 0843E		
Associated with Lexium 15 servo drive				LXM 15LD28M3	LXM 15MD28N4	LXM 15LD10N4		
Line supply voltage			**V**	230 3-phase		230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	3.56		4.7		
	Peak stall	M_{max}	**Nm**	7.56		11.7		
Nominal operating point	Nominal torque		**Nm**	2.5		4.35	4	3.85
	Nominal speed		**rpm**	5500		1000	2500	3000
	Servo motor nominal output power		**W**	1500		500	900	1000
Maximum current			**A rms**	23.83		7.78		
Servo motor characteristics								
Maximum mechanical speed			**rpm**	6000				
Constants (at 120°C)	Torque		**Nm/A rms**	0.43		1.72		
	Back emf		**V rms/ krpm**	27.5		111		
Rotor	Number of poles			10				
	Inertia	Without brake J_m	**kgcm²**	1.5		2.1		
		With brake J_m	**kgcm²**	1.568		2.168		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.8		8.04		
	Inductance (phase/phase)		**mH**	3.1		32.6		
	Electrical time constant		**ms**	3.88		4.05		
Holding brake (depending on model)				See page 3/148				

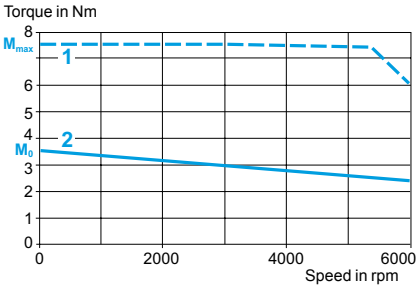
Torque/speed curves

BDH 0842J servo motor

With LXM 15LD28M3 servo drive
230 V 3-phase

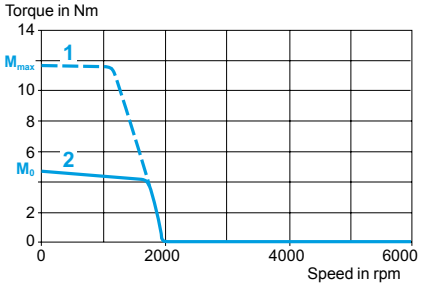


With LXM 15MD28N4 servo drive
230 V 3-phase

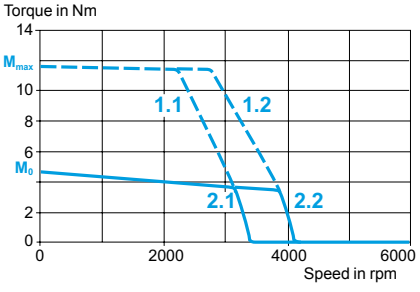


BDH 0843E servo motor

With LXM 15LD10N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 0843G servo motors

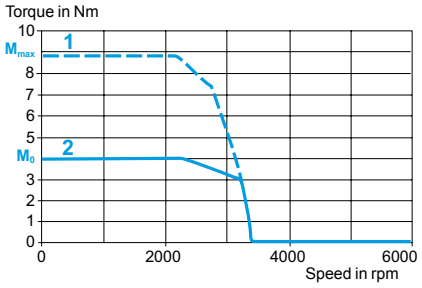
Type of servo motor				**BDH 0843G**				
Associated with Lexium 15 servo drive				**LXM 15LD21M3**		**LXM 15LD17N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	3.96	4.8			
	Peak stall	M_{max}	**Nm**	8.8	13.2	11.68		
Nominal operating point	Nominal torque		**Nm**	3.96	4	3.9	3.25	2.95
	Nominal speed		**rpm**	2500	2000	2500	4000	5000
	Servo motor nominal output power		**W**	1000	900	950	1400	1500
Maximum current			**A rms**	13.79				
Servo motor characteristics								
Maximum mechanical speed			**rpm**	6000				
Constants (at 120°C)	Torque		**Nm/A rms**	0.99				
	Back emf		**V rms/ krpm**	63.9				
Rotor	Number of poles			10				
	Inertia	Without brake J_m	**kgcm²**	2.1				
		With brake J_m	**kgcm²**	2.168				
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.61				
	Inductance (phase/phase)		**mH**	10.8				
	Electrical time constant		**ms**	4.14				
Holding brake (depending on model)				See page 3/148				

Torque/speed curves

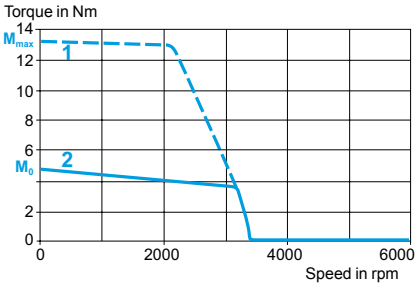
BDH 0843G servo motor

With LXM 15LD21M3 servo drive

230 V single-phase

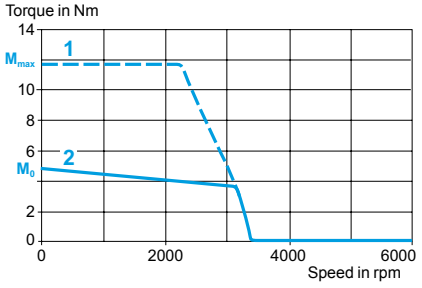


230 V 3-phase

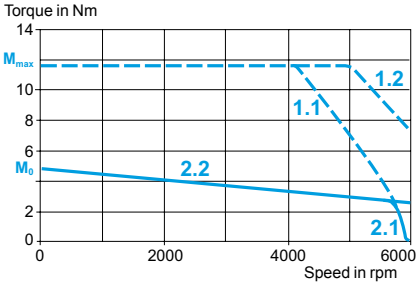


With LXM 15LD17N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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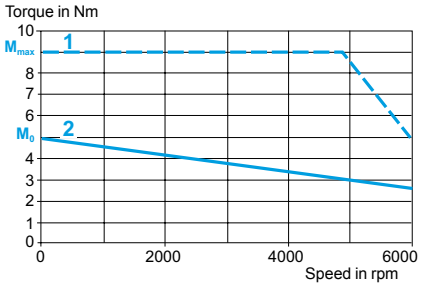
Characteristics of BDH 0843K/0844E servo motors

Type of servo motor				BDH 0843K		BDH 0844E		
Associated with Lexium 15 servo drive				LXM 15LD28M3	LXM 15MD28N4	LXM 15LD10N4		
Line supply voltage			V	230 3-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	Nm	4.9		5.76		
	Peak stall	M_{max}	Nm	9.02		14.1		
Nominal operating point	Nominal torque		Nm	3		5.25	4.85	4.6
	Nominal speed		rpm	5000		1000	2000	2500
	Servo motor nominal output power		W	1600		500	1000	1200
Maximum current			A rms	27.08		8.06		
Servo motor characteristics								
Maximum mechanical speed			rpm	6000				
Constants (at 120°C)	Torque		Nm/A rms	0.52		2.04		
	Back emf		V rms/krpm	33.2		132		
Rotor	Number of poles			10				
	Inertia	Without brake J_m	kgcm²	2.1		2.7		
		With brake J_m	kgcm²	2.168		2.768		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.7		8.08		
	Inductance (phase/phase)		mH	2.9		33.9		
	Electrical time constant		ms	4.14		4.20		
Holding brake (depending on model)				See page 3/148				

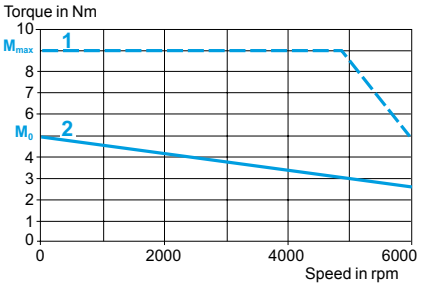
Torque/speed curves

BDH 0843K servo motor

With LXM 15LD28M3 servo drive
230 V 3-phase

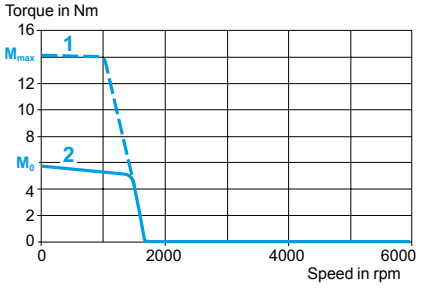


With LXM 15MD28N4 servo drive
230 V 3-phase

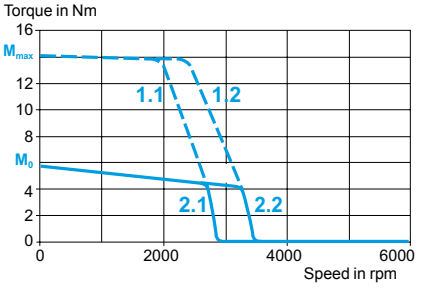


BDH 0844E servo motor

With LXM 15LD10N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 3/88
References: page 3/138
Dimensions: page 3/144

Characteristics of BDH 0844G servo motors

Type of servo motor				**BDH 0844G**				
Associated with Lexium 15 servo drive				**LXM 15LD21M3**		**LXM 15LD17N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	4.76	5.88			
	Peak stall	M_{max}	**Nm**	10.55	16.1	13.97		
Nominal operating point	Nominal torque		**Nm**	4.76	4.9	4.85	3.95	3.5
	Nominal speed		**rpm**	2000		2000	3500	4500
	Servo motor nominal output power		**W**	1000		1000	1500	1600
Maximum current			**A rms**	14.14				

Servo motor characteristics

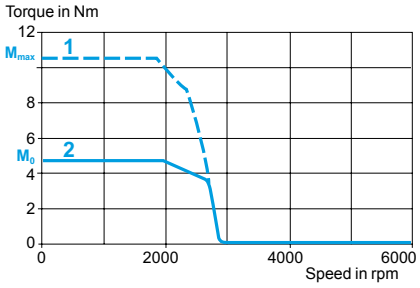
Maximum mechanical speed			**rpm**	6000
Constants (at 120°C)	Torque		**Nm/A rms**	1.19
	Back emf		**V rms/ krpm**	76.6
Rotor	Number of poles			10
	Inertia	Without brake J_m	**kgcm²**	2.7
		With brake J_m	**kgcm²**	2.768
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.65
	Inductance (phase/phase)		**mH**	11.5
	Electrical time constant		**ms**	4.34
Holding brake (depending on model)				See page 3/148

Torque/speed curves

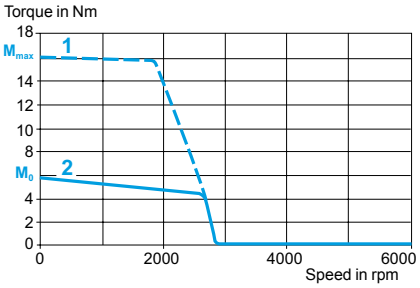
BDH 0844G servo motor

With LXM 15LD21M3 servo drive

230 V single-phase

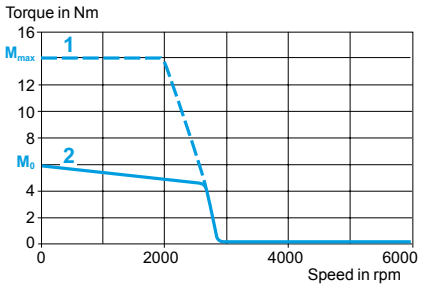


230 V 3-phase

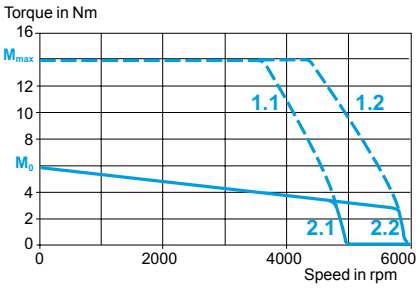


With LXM 15LD17N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/144

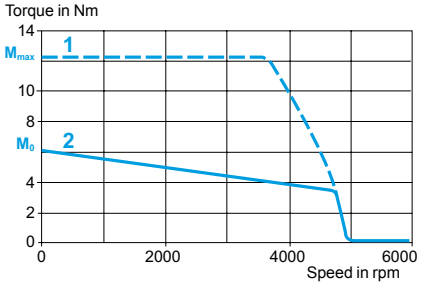
Characteristics of BDH 0844J servo motors

Type of servo motor				**BDH 0844J**	
Associated with Lexium 15 servo drive				**LXM 15LD28M3**	**LXM 15MD28N4**
Line supply voltage			**V**	230 3-phase	
Torque	Continuous stall	M_0	**Nm**	6	
	Peak stall	M_{max}	**Nm**	12.18	
Nominal operating point	Nominal torque		**Nm**	4	
	Nominal speed		**rpm**	3500	
	Servo motor nominal output power		**W**	1500	
Maximum current			**A rms**	24.89	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	6000	
Constants (at 120°C)	Torque		**Nm/A rms**	0.69	
	Back emf		**V rms/ krpm**	44.2	
Rotor	Number of poles			10	
	Inertia	Without brake J_m	**kgcm²**	2.7	
		With brake J_m	**kgcm²**	2.768	
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.88	
	Inductance (phase/phase)		**mH**	3.8	
	Electrical time constant		**ms**	4.32	
Holding brake (depending on model)				See page 3/148	

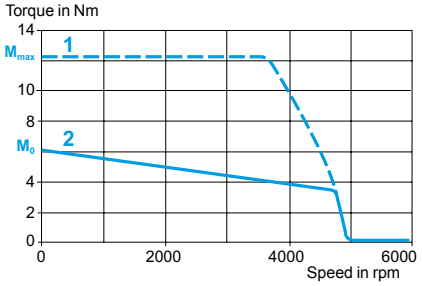
Torque/speed curves

BDH 0844J servo motor

With LXM 15LD28M3 servo drive
230 V single-phase



With LXM 15MD28N4 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

Characteristics of BDH 1081E servo motors

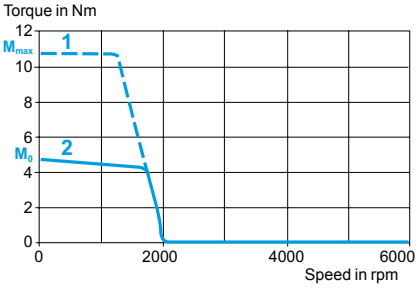
Type of servo motor				**BDH 1081E**		
Associated with Lexium 15 servo drive				**LXM 15LD10N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	4.7		
	Peak stall	M_{max}	**Nm**	10.71		
Nominal operating point	Nominal torque		**Nm**	4.35	4	3.85
	Nominal speed		**rpm**	1500	2500	3000
	Servo motor nominal output power		**W**	700	1000	1200
Maximum current			**A rms**	5.83		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	1.72		
	Back emf		**V rms/ krpm**	110		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	3.4		
		With brake J_m	**kgcm²**	3.573		
Stator (at 20°C)	Resistance (phase/phase)		Ω	8.47		
	Inductance (phase/phase)		**mH**	36.6		
	Electrical time constant		**ms**	4.32		
Holding brake (depending on model)				See page 3/148		

Torque/speed curves

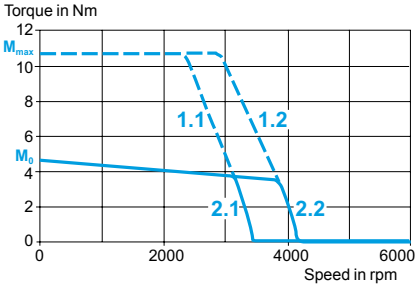
BDH 1081E servo motor

With LXM 15LD10N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BDH 1081G servo motors

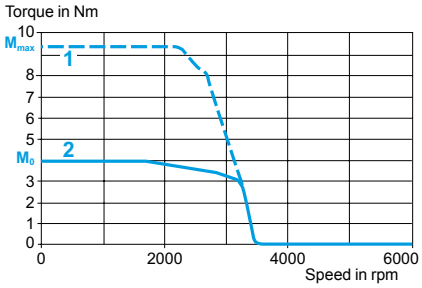
Type of servo motor				**BDH 1081G**				
Associated with Lexium 15 servo drive				**LXM 15LD21M3**		**LXM 15LD17N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	3.96	4.75			
	Peak stall	M_{max}	**Nm**	9.41	10.82			
Nominal operating point	Nominal torque		**Nm**	3.96	3.65		2.75	2.35
	Nominal speed		**rpm**	1500	2500		4500	5000
	Servo motor nominal output power		**W**	600	1000		1300	1200
Maximum current			**A rms**	10.25				
Servo motor characteristics								
Maximum mechanical speed			**rpm**	6000				
Constants (at 120°C)	Torque		**Nm/A rms**	0.99				
	Back emf		**V rms/ krpm**	63.6				
Rotor	Number of poles			10				
	Inertia	Without brake J_m	**kgcm²**	3.4				
		With brake J_m	**kgcm²**	3.573				
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.75				
	Inductance (phase/phase)		**mH**	12.1				
	Electrical time constant		**ms**	4.4				
Holding brake (depending on model)				See page 3/148				

Torque/speed curves

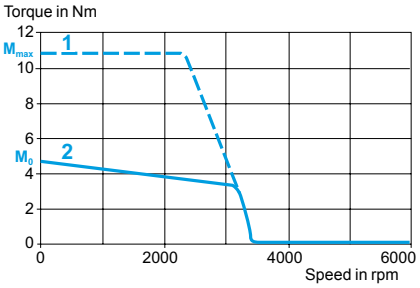
BDH 1081G servo motor

With LXM 15LD21M3 servo drive

230 V single-phase

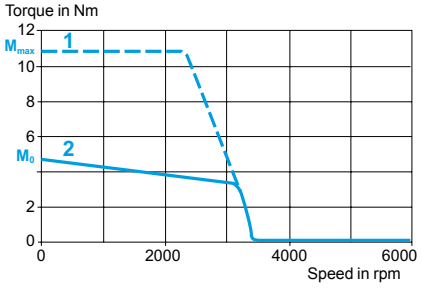


230 V 3-phase

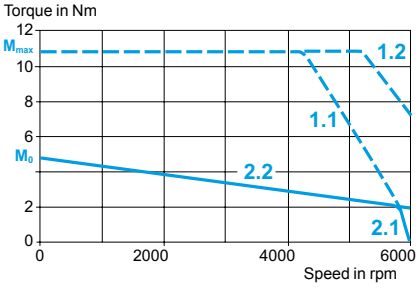


With LXM 15LD17N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 3/88
References: page 3/138
Dimensions: page 3/144

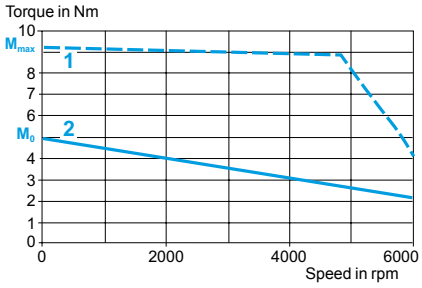
Characteristics of BDH 1081K/1082E servo motors

Type of servo motor				**BDH 1081K**		**BDH 1082E**	
Associated with Lexium 15 servo drive				**LXM 15LD28M3**	**LXM 15MD28N4**	**LXM 15LD10N4**	
Line supply voltage			**V**	230 3-phase		230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	4.9		8.34	
	Peak stall	M_{max}	**Nm**	9.22		18.08	
Nominal operating point	Nominal torque		**Nm**	2.65		7.9	7.5	7.3
	Nominal speed		**rpm**	5000		800	1500	2000
	Servo motor nominal output power		**W**	1400		600	1200	1500
Maximum current			**A rms**	20.01		6.36	
Servo motor characteristics							
Maximum mechanical speed			**rpm**	6000			
Constants (at 120°C)	Torque		**Nm/A rms**	0.52		2.79	
	Back emf		**V rms/ krpm**	33.5		179	
Rotor	Number of poles			10			
	Inertia	Without brake J_m	**kgcm²**	3.4		6.2	
		With brake J_m	**kgcm²**	3.573		6.373	
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.75		8.59	
	Inductance (phase/phase)		**mH**	3.4		44.7	
	Electrical time constant		**ms**	4.53		5.2	
Holding brake (depending on model)				See page 3/148			

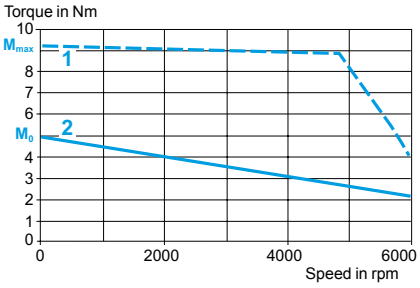
Torque/speed curves

BDH 1081K servo motor

With LXM 15LD28M3 servo drive
230 V 3-phase

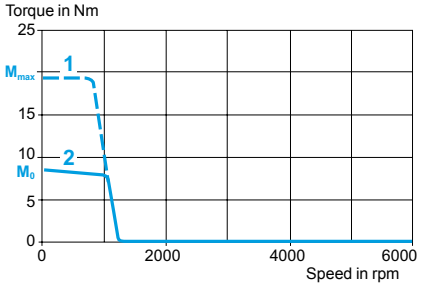


With LXM 15MD28N4 servo drive
230 V 3-phase

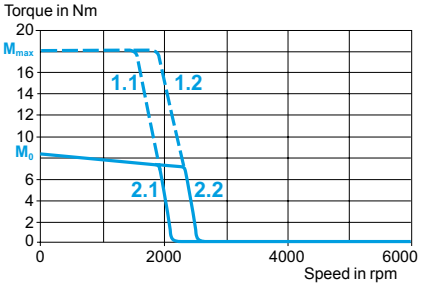


BDH 1082E servo motor

With LXM 15LD10N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 1082G servo motors

Type of servo motor				**BDH 1082G**				
Associated with Lexium 15 servo drive				**LXM 15LD21M3**		**LXM 15LD17N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	7.16	8.43			
	Peak stall	M_{max}	**Nm**	17.31	19.51			
Nominal operating point	Nominal torque		**Nm**	7.16	7.65		7	6.66
	Nominal speed		**rpm**	1000	1500		2500	3000
	Servo motor nominal output power		**W**	750	1200		1800	2000
Maximum current			**A rms**	10.04				

Servo motor characteristics

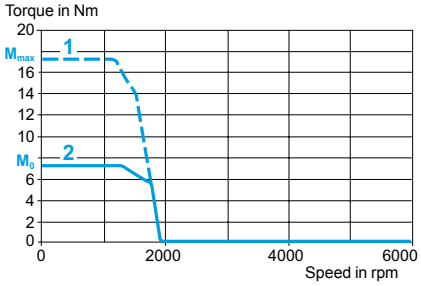
Maximum mechanical speed		**rpm**	6000
Constants (at 120°C)	Torque	**Nm/A rms**	1.79
	Back emf	**V rms/ krpm**	115
Rotor	Number of poles		10
	Inertia Without brake J_m	**kgcm²**	6.2
	With brake J_m	**kgcm²**	6.373
Stator (at 20°C)	Resistance (phase/phase)	Ω	3.47
	Inductance (phase/phase)	**mH**	18.5
	Electrical time constant	**ms**	5.33
Holding brake (depending on model)			See page 3/148

Torque/speed curves

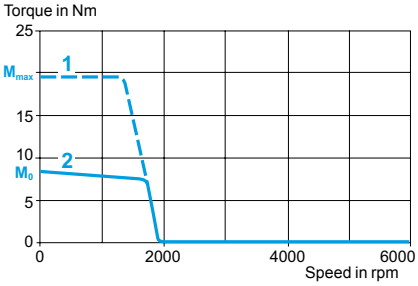
BDH 1082G servo motor

With LXM 15LD21M3 servo drive

230 V single-phase

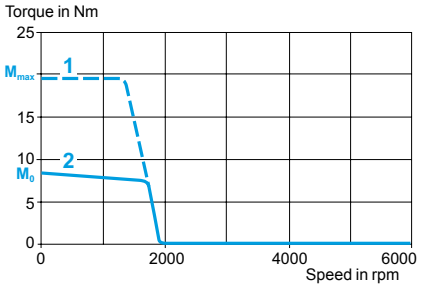


230 V 3-phase

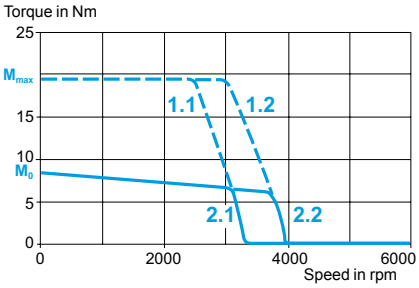


With LXM 15LD17N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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References: page 3/138
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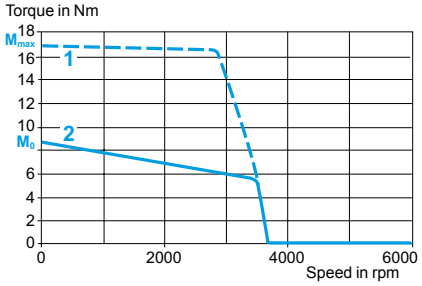
Characteristics of BDH 1082K/1082M servo motors

Type of servo motor				BDH 1082K				BDH 1082M
Associated with Lexium 15 servo drive				LXM 15LD28M3	LXM 15MD28N4			LXM 15MD40N4
Line supply voltage			V	230 3-phase	230 3-phase	400 3-phase	480 3-phase	230 3-phase
Torque	Continuous stall	M_0	Nm	8.6				
	Peak stall	M_{max}	Nm	16.9				16.7
Nominal operating point	Nominal torque		Nm	6		4.16	3.25	5.5
	Nominal speed		rpm	3000		5000	6000	4000
	Servo motor nominal output power		W	1700		2200	2000	2300
Maximum current			A rms	19.66				27.86
Servo motor characteristics								
Maximum mechanical speed			rpm	6000				
Constants (at 120°C)	Torque		Nm/A rms	0.93				0.66
	Back emf		V rms/krpm	60.1				42.4
Rotor	Number of poles			10				
	Inertia	Without brake J_m	kgcm²	6.2				
		With brake J_m	kgcm²	6.373				
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.93				0.48
	Inductance (phase/phase)		mH	5				2.5
	Electrical time constant		ms	5.38				5.21
Holding brake (depending on model)				See page 3/148				

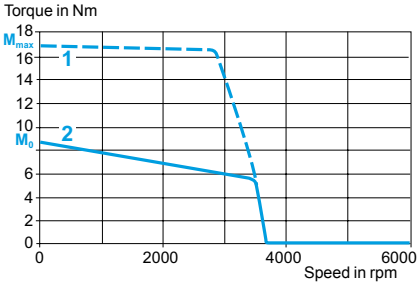
Torque/speed curves

BDH 1082K servo motor

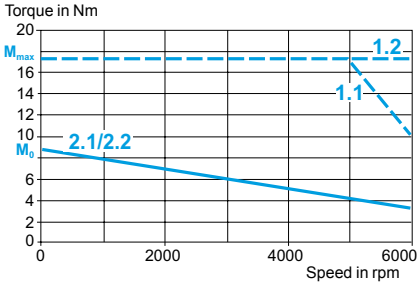
With LXM 15LD28M3 servo drive
230 V 3-phase



With LXM 15MD28N4 servo drive
230 V 3-phase

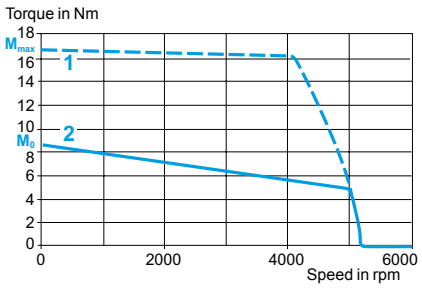


400/480 V 3-phase



BDH 1082M servo motor

With LXM 15MD40N4 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 1083G servo motors

Type of servo motor				**BDH 1083G**		
Associated with Lexium 15 servo drive				**LXM 15LD17N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	11.4		
	Peak stall	M_{max}	**Nm**	25.83		
Nominal operating point	Nominal torque		**Nm**	10.6	9.8	9.5
	Nominal speed		**rpm**	1000	2000	2500
	Servo motor nominal output power		**W**	1100	2000	2400
Maximum current			**A rms**	10.11		

Servo motor characteristics

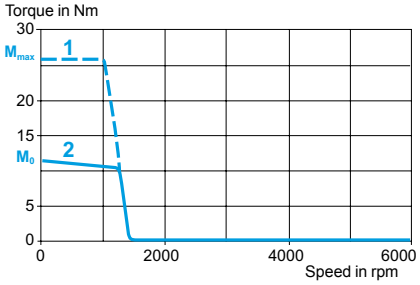
Maximum mechanical speed		**rpm**	6000	
Constants (at 120°C)	Torque	**Nm/A rms**	2.39	
	Back emf	**V rms/ krpm**	154	
Rotor	Number of poles		10	
	Inertia Without brake J_m	**kgcm²**	9.273	
	With brake J_m	**kgcm²**	6.373	
Stator (at 20°C)	Resistance (phase/phase)	Ω	3.75	
	Inductance (phase/phase)	**mH**	21.3	
	Electrical time constant	**ms**	5.68	
Holding brake (depending on model)			See page 3/148	

Torque/speed curves

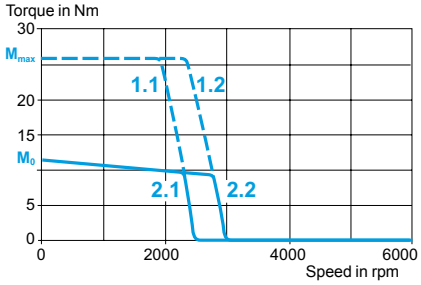
BDH 1083G servo motor

With LXM 15LD17N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/144

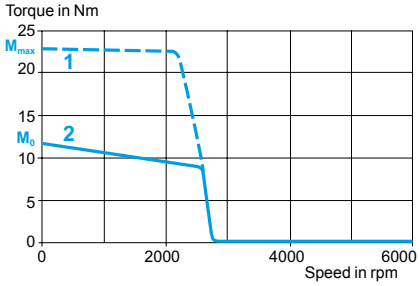
Characteristics of BDH 1083K/1083M/1083P servo motors

Type of servo motor				BDH 1083K				BDH 1083M	BDH 1083P
Associated with Lexium 15 servo drive				LXM 15LD28M3	LXM 15MD28N4			LXM 15MD40N4	LXM 15MD56N4
Line supply voltage			V	230 3-phase	230 3-phase	400 3-phase	480 3-phase	230 3-phase	230 3-phase
Torque	Continuous stall	M_0	Nm	11.6				11.4	
	Peak stall	M_{max}	Nm	22.9				22.1	22.2
Nominal operating point	Nominal torque		Nm	9.4		6.91	6.34	8.5	6.2
	Nominal speed		rpm	2000		4500	5000	3000	5000
	Servo motor nominal output power		W	2000		3300		2800	3000
Maximum current			A rms	19.87				28.5	40.59
Servo motor characteristics									
Maximum mechanical speed			rpm	6000					
Constants (at 120°C)	Torque		Nm/A rms	1.24				0.85	0.6
	Back emf		V rms/krpm	79.8				54.7	38.4
Rotor	Number of poles			10					
	Inertia	Without brake J_m	kgcm²	9.1					
		With brake J_m	kgcm²	9.273					
Stator (at 20°C)	Resistance (phase/phase)		Ω	1				0.51	0.27
	Inductance (phase/phase)		mH	5.7				2.7	1.3
	Electrical time constant		ms	5.7				5.29	4.81
Holding brake (depending on model)				See page 3/148					

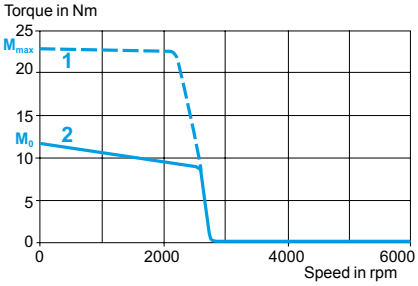
Torque/speed curves

BDH 1083K servo motor

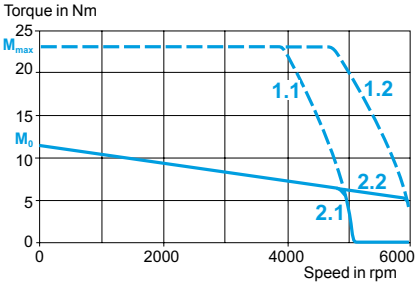
With LXM 15LD28M3 servo drive
230 V 3-phase



With LXM 15MD28N4 servo drive
230 V 3-phase

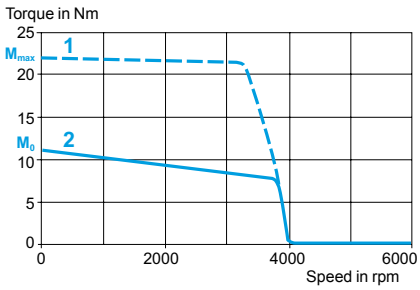


400/480 V 3-phase



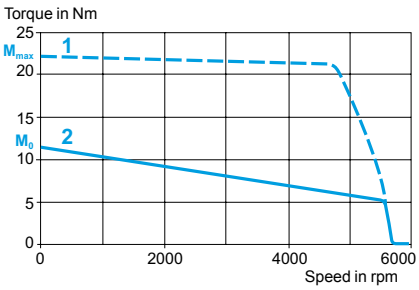
BDH 1083M servo motor

With LXM 15MD40N4 servo drive
230 V 3-phase



BDH 1083P servo motor

With LXM 15MD56N4 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/144

Characteristics of BDH 1084G/1084K servo motors

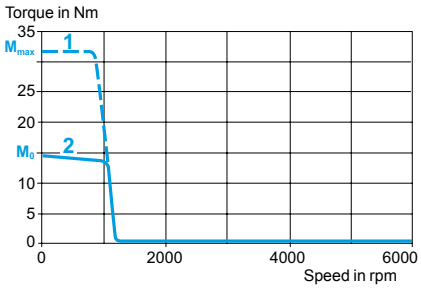
Type of servo motor				**BDH 1084G**			**BDH 1084K**		
Associated with Lexium 15 servo drive				**LXM 15LD17N4**			**LXM 15LD28M3**	**LXM 15MD28N4**	
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	14.3			14.4		
	Peak stall	M_{max}	**Nm**	31.7			28.1		
Nominal operating point	Nominal torque		**Nm**	13.4	12.7	12.3	12.1	9.22	8.61
	Nominal speed		**rpm**	900	1500	2000	2000	4000	4500
	Servo motor nominal output power		**W**	1200	2200	2600	2200	3800	4000
Maximum current			**A rms**	10.54			20.65		
Servo motor characteristics									
Maximum mechanical speed			**rpm**	6000					
Constants (at 120°C)	Torque		**Nm/A rms**	2.88			1.5		
	Back emf		**V rms/ krpm**	185			96.6		
Rotor	Number of poles			10					
	Inertia	Without brake J_m	**kgcm²**	12					
		With brake J_m	**kgcm²**	12.173					
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.8			1.02		
	Inductance (phase/phase)		**mH**	22.9			6.2		
	Electrical time constant		**ms**	6.03			6.08		
Holding brake (depending on model)				See page 3/148					

Torque/speed curves

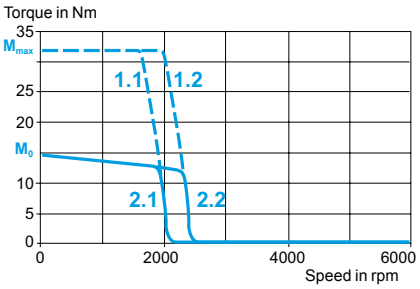
BDH 1084G servo motor

With LXM 15LD17N4 servo drive

230 V 3-phase



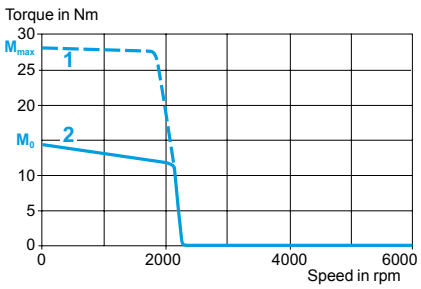
400/480 V 3-phase



BDH 1084K servo motor

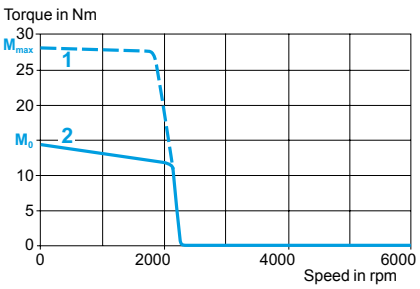
With LXM 15LD28M3 servo drive

230 V 3-phase

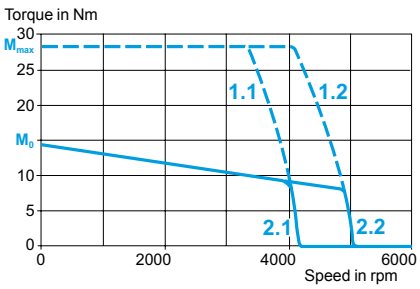


With LXM 15MD28N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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References: page 3/138
Dimensions: page 3/144

Characteristics of BDH 1084L/1084N servo motors

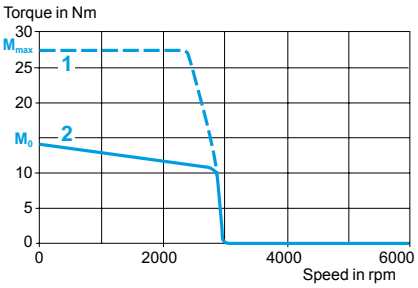
Type of servo motor				**BDH 1084L**		**BDH 1084N**
Associated with Lexium 15 servo drive				**LXM 15MD40N4**		**LXM 15MD56N4**
Line supply voltage			**V**	230 3-phase	400 3-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	14.1		
	Peak stall	M_{max}	**Nm**	27.28		25.5
Nominal operating point	Nominal torque		**Nm**	11.2	9	9.1
	Nominal speed		**rpm**	2500	4000	4000
	Servo motor nominal output power		**W**	2800	4000	3800
Maximum current			**A rms**	37.76		26.52
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	0.8		1.13
	Back emf		**V rms/ krpm**	51.3		72.9
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	12		
		With brake J_m	**kgcm²**	12.173		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.33		0.63
	Inductance (phase/phase)		**mH**	1.8		3.5
	Electrical time constant		**ms**	5.45		5.56
Holding brake (depending on model)				See page 3/148		

Torque/speed curves

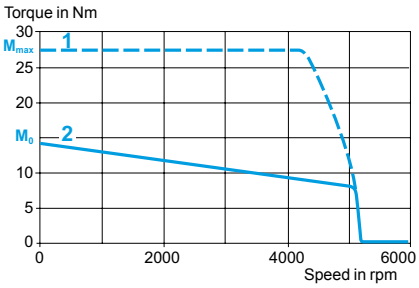
BDH 1084L servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase



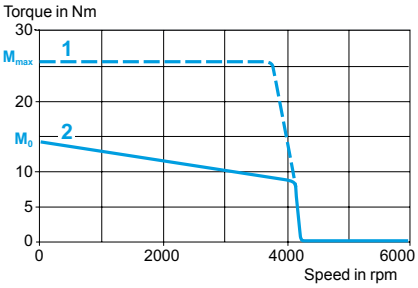
400 V 3-phase



BDH 1084N servo motor

With LXM 15MD56N4 servo drive

230 V 3-phase



1 Peak torque
2 Continuous torque

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Characteristics of BDH 1382G servo motors

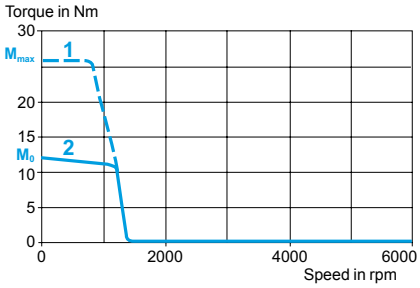
Type of servo motor				**BDH 1382G**		
Associated with Lexium 15 servo drive				**LXM 15LD17N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	11.9		
	Peak stall	M_{max}	**Nm**	25.6		
Nominal operating point	Nominal torque		**Nm**	11.3	10.6	10.4
	Nominal speed		**rpm**	750	1500	2000
	Servo motor nominal output power		**W**	900	1700	2200
Maximum current			**A rms**	10.32		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	2.47		
	Back emf		**V rms/ krpm**	159		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	17		
		With brake J_m	**kgcm²**	17.61		
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.94		
	Inductance (phase/phase)		**mH**	31.7		
	Electrical time constant		**ms**	8.05		
Holding brake (depending on model)				See page 3/148		

Torque/speed curves

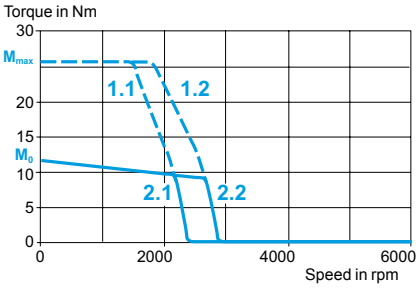
BDH 1382G servo motor

With LXM 15LD17N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BDH 1382K servo motors

Type of servo motor				**BDH 1382K**			
Associated with Lexium 15 servo drive				**LXM 15LD28M3**	**LXM 15MD28N4**		
Line supply voltage			**V**	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	12.2			
	Peak stall	M_{max}	**Nm**	22.7		23.53	
Nominal operating point	Nominal torque		**Nm**	10.4		8.45	7.55
	Nominal speed		**rpm**	2000		4000	5000
	Servo motor nominal output power		**W**	2200		3500	4000
Maximum current			**A rms**	20.29			

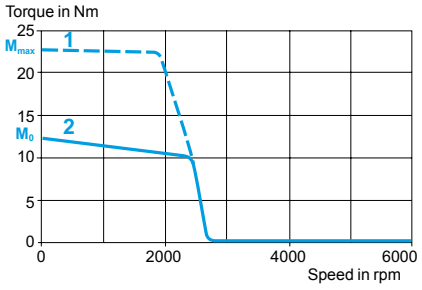
Servo motor characteristics

Maximum mechanical speed			**rpm**	6000
Constants (at 120°C)	Torque		**Nm/A rms**	1.28
	Back emf		**V rms/ krpm**	82.1
Rotor	Number of poles			10
	Inertia	Without brake J_m	**kgcm²**	17
		With brake J_m	**kgcm²**	17.61
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.05
	Inductance (phase/phase)		**mH**	8.5
	Electrical time constant		**ms**	8.10
Holding brake (depending on model)				See page 3/148

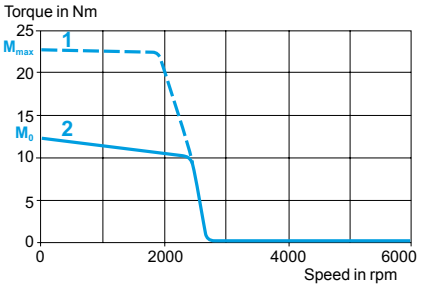
Torque/speed curves

BDH 1382K servo motor

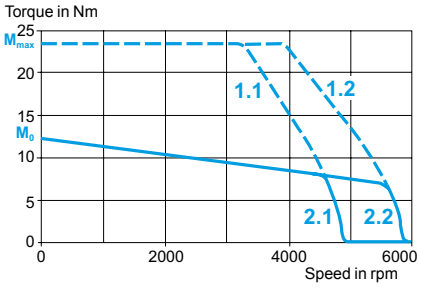
With LXM 15LD28M3 servo drive
230 V 3-phase



With LXM 15MD28N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BDH 1382M/1382P servo motors

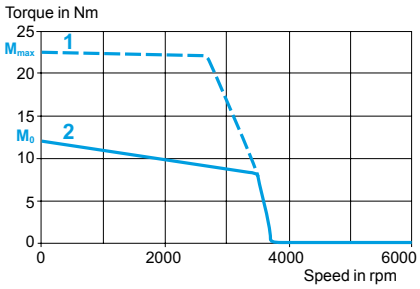
Type of servo motor				**BDH 1382M**			**BDH 1382P**
Associated with Lexium 15 servo drive				**LXM 15MD40N4**			**LXM 15MD56N4**
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	12.2			12.3
	Peak stall	M_{max}	**Nm**	22.8			23.2
Nominal operating point	Nominal torque		**Nm**	9.3	7	5.9	8.7
	Nominal speed		**rpm**	3000	5000	6000	4000
	Servo motor nominal output power		**W**	3000	3700		3600
Maximum current			**A rms**	28.5			39.95
Servo motor characteristics							
Maximum mechanical speed			**rpm**	6000			
Constants (at 120°C)	Torque		**Nm/A rms**	0.91			0.66
	Back emf		**V rms/ krpm**	58.8			42.2
Rotor	Number of poles			10			
	Inertia	Without brake J_m	**kgcm²**	17			
		With brake J_m	**kgcm²**	17.61			
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.55			0.3
	Inductance (phase/phase)		**mH**	4.4			2.2
	Electrical time constant		**ms**	8			7.33
Holding brake (depending on model)				See page 3/148			

Torque/speed curves

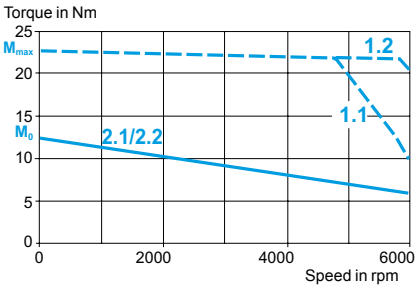
BDH 1382M servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase



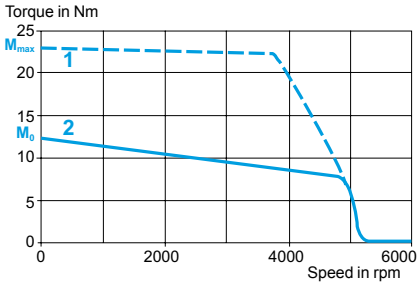
400/480 V 3-phase



BDH 1382P servo motor

With LXM 15MD56N4 servo drive

230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/144

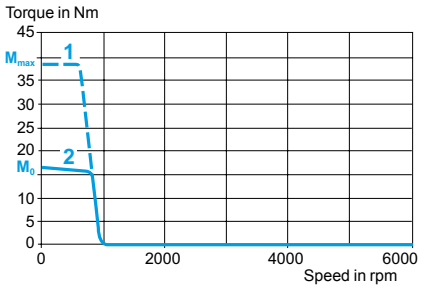
Characteristics of BDH 1383G/1383K servo motors

Type of servo motor				BDH 1383G			BDH 1383K			
Associated with Lexium 15 servo drive				LXM 15LD17N4			LXM 15LD28M3	LXM 15MD28N4		
Line supply voltage			V	230 3-phase	400 3-phase	480 3-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	Nm	16.5			16.8			
	Peak stall	M_{max}	Nm	38.4			31			
Nominal operating point	Nominal torque		Nm	15.7	15	14.6	14.8		12.69	11.29
	Nominal speed		rpm	600	1000	1500	1500		3000	4000
	Servo motor nominal output power		W	1000	1500	2300			4000	4700
Maximum current			A rms	9.48			21			
Servo motor characteristics										
Maximum mechanical speed			rpm	6000						
Constants (at 120°C)	Torque		Nm/A rms	3.7			1.71			
	Back emf		V rms/ krpm	238			110			
Rotor	Number of poles			10						
	Inertia	Without brake J_m	kgcm²	24						
		With brake J_m	kgcm²	24.61						
Stator (at 20°C)	Resistance (phase/phase)		Ω	5.16			1.09			
	Inductance (phase/phase)		mH	43.5			9.3			
	Electrical time constant		ms	8.43			8.53			
Holding brake (depending on model)				See page 3/148						

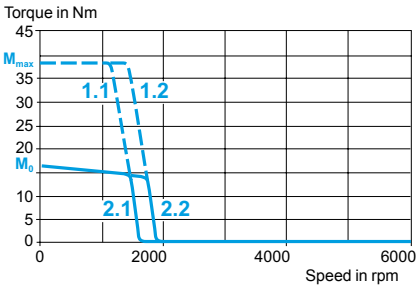
Torque/speed curves

BDH 1383G servo motor

With LXM 15LD17N4 servo drive
230 V 3-phase

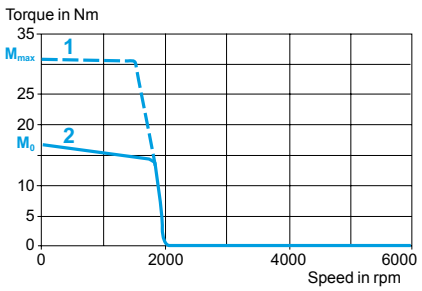


400/480 V 3-phase

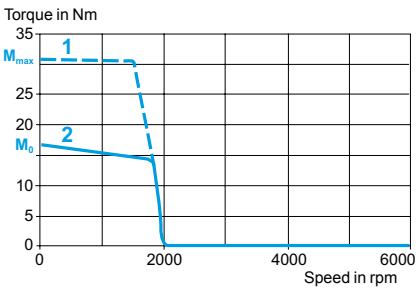


BDH 1383K servo motor

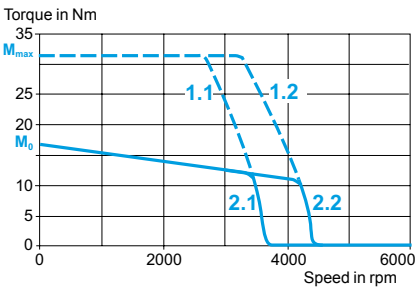
With LXM 15LD28M3 servo drive
230 V 3-phase



With LXM 15MD28N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque
1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 1383M/1383N servo motors

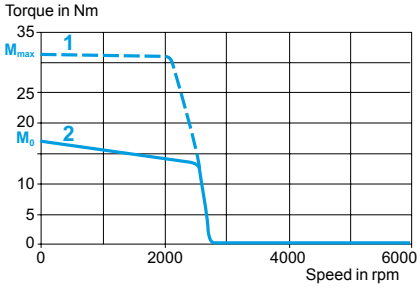
Type of servo motor				BDH 1383M			BDH 1383N		
Associated with Lexium 15 servo drive				LXM 15MD40N4			LXM 15MD56N4		
Line supply voltage			V	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	Nm	17					
	Peak stall	M_{max}	Nm	31.4			34.8		
Nominal operating point	Nominal torque		Nm	14	11.7	10.5	12.7	9.4	7.6
	Nominal speed		rpm	2000	4000	4500	2500	4500	6000
	Servo motor nominal output power		W	3000	4600	5000	3500	4500	4700
Maximum current			A rms	29.27			36.91		
Servo motor characteristics									
Maximum mechanical speed			rpm	6000					
Constants (at 120°C)	Torque		Nm/A rms	1.24			0.98		
	Back emf		V rms/krpm	79.9			63.3		
Rotor	Number of poles			10					
	Inertia	Without brake J_m	kgcm²	24					
		With brake J_m	kgcm²	24.61					
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.58			0.38		
	Inductance (phase/phase)		mH	4.9			3.1		
	Electrical time constant		ms	8.45			8.16		
Holding brake (depending on model)				See page 3/148					

Torque/speed curves

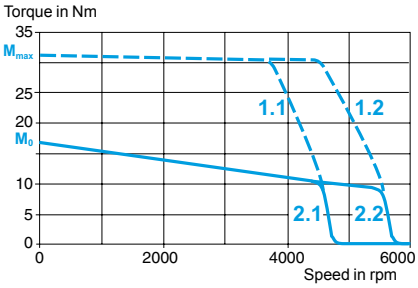
BDH 1383M servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase



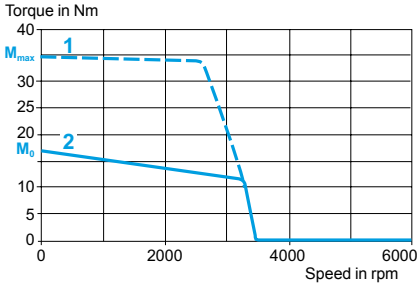
400/480 V 3-phase



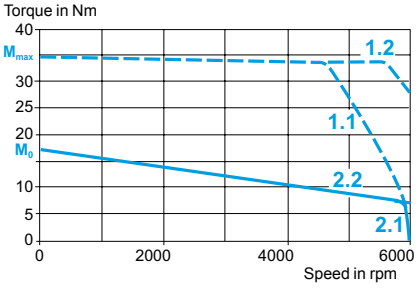
BDH 1383N servo motor

With LXM 15MD56N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/144

Characteristics of BDH 1384K/1384L servo motors

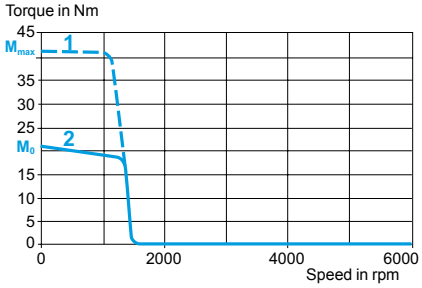
Type of servo motor				**BDH 1384K**			**BDH 1384L**		
Associated with Lexium 15 servo drive				**LXM 15MD28N4**			**LXM 15MD40N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	20.8			21		
	Peak stall	M_{max}	**Nm**	41.2			41.9		
Nominal operating point	Nominal torque		**Nm**	18.8	17	16.5	18	15.6	14.6
	Nominal speed		**rpm**	1000	2000	2500	1500	3000	3500
	Servo motor nominal output power		**W**	2100	3600	4200	3000	4600	5300
Maximum current			**A rms**	19.45			27.15		
Servo motor characteristics									
Maximum mechanical speed			**rpm**	6000					
Constants (at 120°C)	Torque		**Nm/A rms**	2.28			1.66		
	Back emf		**V rms/ krpm**	147			107		
Rotor	Number of poles			10					
	Inertia	Without brake J_m	**kgcm²**	32					
		With brake J_m	**kgcm²**	32.61					
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.34			0.71		
	Inductance (phase/phase)		**mH**	11.8			6.2		
	Electrical time constant		**ms**	8.81			8.86		
Holding brake (depending on model)				See page 3/148					

Torque/speed curves

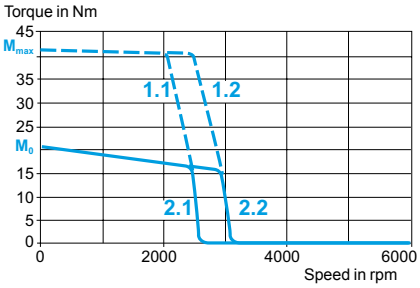
BDH 1384K servo motor

With LXM 15MD28N4 servo drive

230 V 3-phase



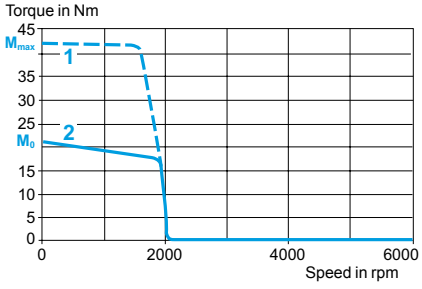
400/480 V 3-phase



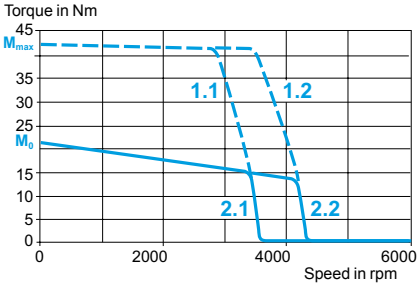
BDH 1384L servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/144

Characteristics of BDH 1384P/1385K servo motors

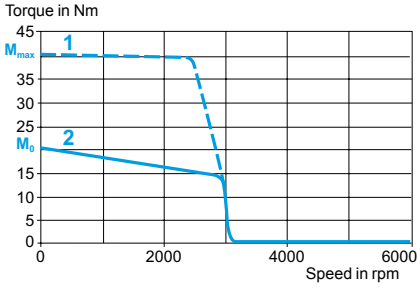
Type of servo motor				**BDH 1384P**			**BDH 1385K**		
Associated with Lexium 15 servo drive				**LXM 15MD56N4**			**LXM 15MD28N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	20.4			24.8		
	Peak stall	M_{max}	**Nm**	40.2			46.8		
Nominal operating point	Nominal torque		**Nm**	15.3	11.3	9.4	19.4	20.5	22.5
	Nominal speed		**rpm**	2500	4500	5000	1000	2000	2000
	Servo motor nominal output power		**W**	4000	5000	5200	2000	4000	4700
Maximum current			**A rms**	39.53			20.79		
Servo motor characteristics									
Maximum mechanical speed			**rpm**	6000					
Constants (at 120°C)	Torque		**Nm/A rms**	1.1			2,54		
	Back emf		**V rms/ krpm**	71			164		
Rotor	Number of poles			10					
	Inertia	Without brake J_m	**kgcm²**	32			40		
		With brake J_m	**kgcm²**	32.61			40.61		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.36			1.27		
	Inductance (phase/phase)		**mH**	2.8			11.4		
	Electrical time constant		**ms**	7.78			8.98		
Holding brake (depending on model)				See page 3/148					

Torque/speed curves

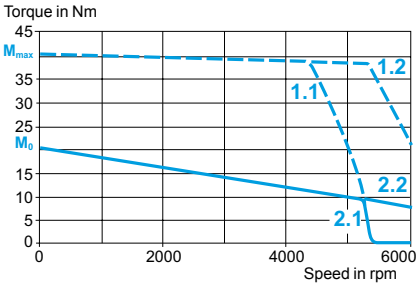
BDH 1384P servo motor

With LXM 15MD56N4 servo drive

230 V 3-phase



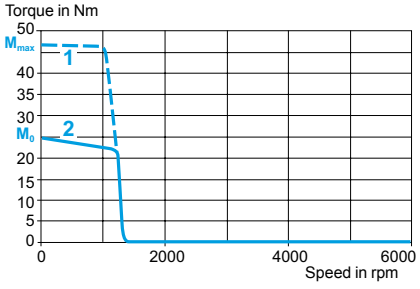
400/480 V 3-phase



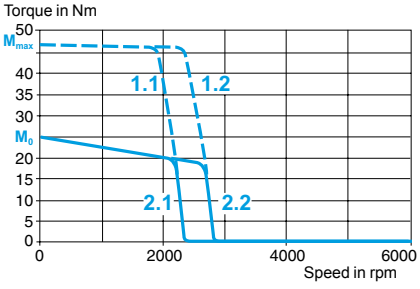
BDH 1385K servo motor

With LXM 15MD28N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/144

Characteristics of BDH 1385M/1385N servo motors

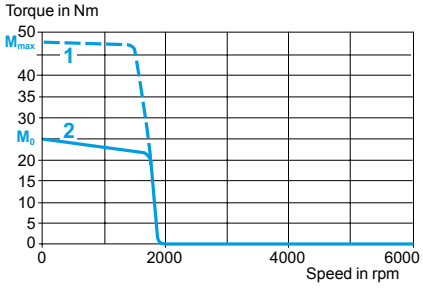
Type of servo motor				**BDH 1385M**			**BDH 1385N**		
Associated with Lexium 15 servo drive				**LXM 15MD40N4**			**LXM 15MD56N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	25			24.3		
	Peak stall	M_{max}	**Nm**	47.6			50.2		
Nominal operating point	Nominal torque		**Nm**	21.7	19	17.55	19.4	16	14
	Nominal speed		**rpm**	1500	2500	3000	2000	3500	4500
	Servo motor nominal output power		**W**	3300	5300	5800	4000	6000	6300
Maximum current			**A rms**	28.92			37.69		
Servo motor characteristics									
Maximum mechanical speed			**rpm**	6000					
Constants (at 120°C)	Torque		**Nm/A rms**	1.85			1.38		
	Back emf		**V rms/ krpm**	119			88.8		
Rotor	Number of poles			10					
	Inertia	Without brake J_m	**kgcm²**	40					
		With brake J_m	**kgcm²**	40.61					
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.68			0.42		
	Inductance (phase/phase)		**mH**	6.1			3.4		
	Electrical time constant		**ms**	8.97			8.10		
Holding brake (depending on model)				See page 3/148					

Torque/speed curves

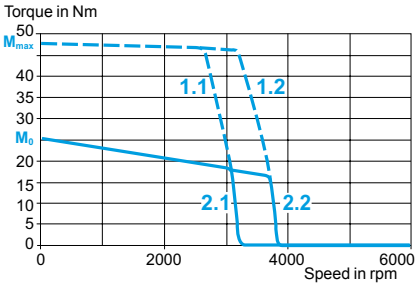
BDH 1385M servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase



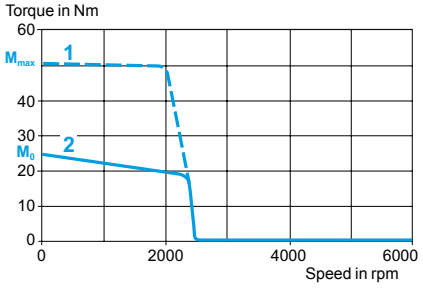
400/480 V 3-phase



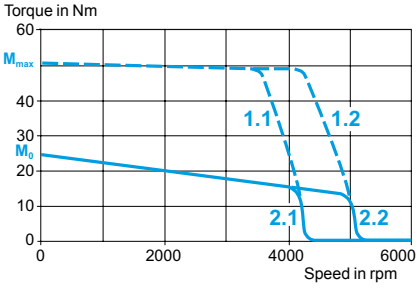
BDH 1385N servo motor

With LXM 15MD56N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque
1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 1882K/1882M servo motors

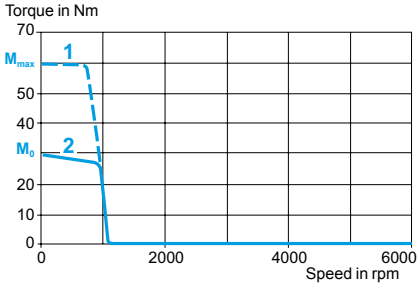
Type of servo motor				**BDH 1882K**			**BDH 1882M**		
Associated with Lexium 15 servo drive				**LXM 15MD28N4**			**LXM 15MD40N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	29.7			30		
	Peak stall	M_{max}	**Nm**	59.4			59.8		
Nominal operating point	Nominal torque		**Nm**	27.5	25.7	24.5	27	24	23
	Nominal speed		**rpm**	700	1500	2000	1000	2000	2500
	Servo motor nominal output power		**W**	2000	4000	5000	3000	5000	6000
Maximum current			**A rms**	19.66			27.51		
Servo motor characteristics									
Maximum mechanical speed			**rpm**	6000					
Constants (at 120°C)	Torque		**Nm/A rms**	3.23			2.33		
	Back emf		**V rms/ krpm**	208			150		
Rotor	Number of poles			10					
	Inertia	Without brake J_m	**kgcm²**	65					
		With brake J_m	**kgcm²**	66.64					
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.22			0.64		
	Inductance (phase/phase)		**mH**	20.7			10.8		
	Electrical time constant		**ms**	16.97			16.88		
Holding brake (depending on model)				See page 3/148					

Torque/speed curves

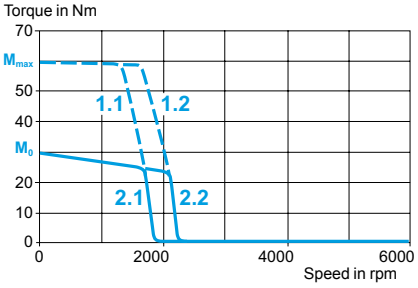
BDH 1882K servo motor

With LXM 15MD28N4 servo drive

230 V 3-phase



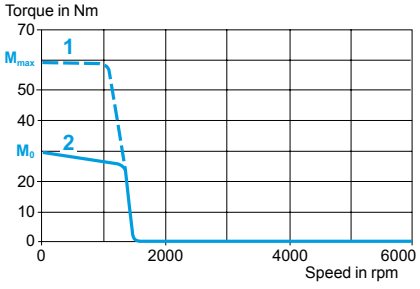
400/480 V 3-phase



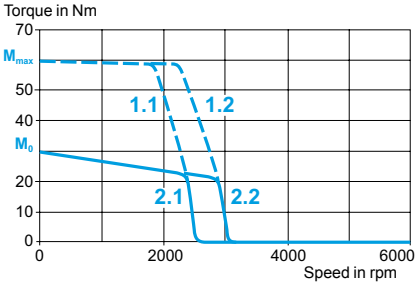
BDH 1882M servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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References: page 3/138
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Characteristics of BDH 1882P/1883M servo motors

Type of servo motor				**BDH 1882P**			**BDH 1883M**		
Associated with Lexium 15 servo drive				**LXM 15MD56N4**			**LXM 15MD40N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	29.4			42		
	Peak stall	M_{max}	**Nm**	58.4			80.7		
Nominal operating point	Nominal torque		**Nm**	24.5	20.5	18.5	37.5	34	32.5
	Nominal speed		**rpm**	1500	3000	3500	700	1500	2000
	Servo motor nominal output power		**W**	3900	6000	6800	2800	5400	6800
Maximum current			**A rms**	39.67			28.85		

Servo motor characteristics

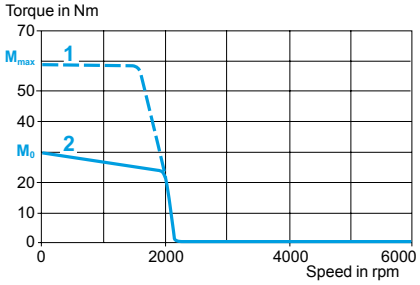
Maximum mechanical speed			**rpm**	6000					
Constants (at 120°C)	Torque		**Nm/A rms**	1.58			3.1		
	Back emf		**V rms/ krpm**	102			200		
Rotor	Number of poles			10					
	Inertia	Without brake J_m	**kgcm²**	65			92		
		With brake J_m	**kgcm²**	66.64			93.64		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.33			0.68		
	Inductance (phase/phase)		**mH**	5			12.4		
	Electrical time constant		**ms**	15.15			18.24		
Holding brake (depending on model)				See page 3/148					

Torque/speed curves

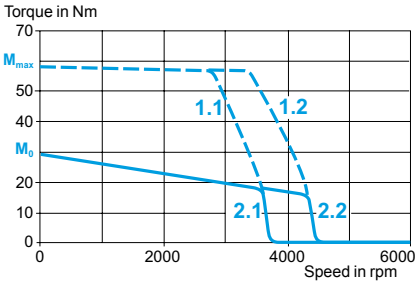
BDH 1882P servo motor

With LXM 15MD56N4 servo drive

230 V 3-phase



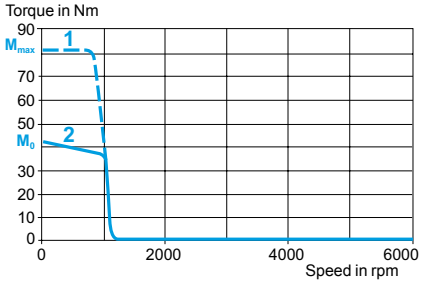
400/480 V 3-phase



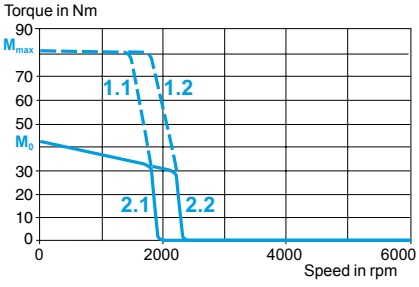
BDH 1883M servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BDH 1883P/1884L servo motors

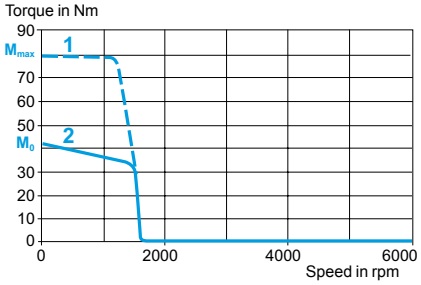
Type of servo motor				BDH 1883P			BDH 1884L		
Associated with Lexium 15 servo drive				LXM 15MD56N4			LXM 15MD40N4		
Line supply voltage			V	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	Nm	41.6			53		
	Peak stall	M_{max}	Nm	79.4			108		
Nominal operating point	Nominal torque		Nm	35	29.5	27.5	48	44	42
	Nominal speed		rpm	1500	2000	2500	600	1000	1500
	Servo motor nominal output power		W	5500	6200	7200	3000	4600	6600
Maximum current			A rms	41.44			27.37		
Servo motor characteristics									
Maximum mechanical speed			rpm	6000					
Constants (at 120°C)	Torque		Nm/A rms	2.13			4.14		
	Back emf		V rms/krpm	137			266		
Rotor	Number of poles			10					
	Inertia	Without brake J_m	kgcm²	92			120		
		With brake J_m	kgcm²	93.64			121.64		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.35			0.85		
	Inductance (phase/phase)		mH	5.9			16.4		
	Electrical time constant		ms	16.86			19.29		
Holding brake (depending on model)				See page 3/148					

Torque/speed curves

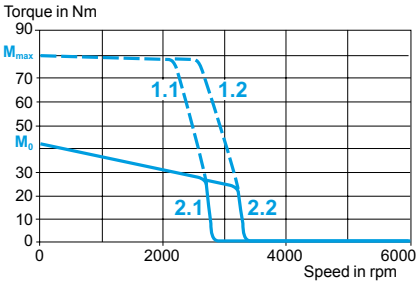
BDH 1883P servo motor

With LXM 15MD56N4 servo drive

230 V 3-phase



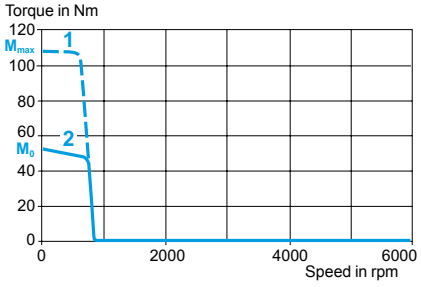
400/480 V 3-phase



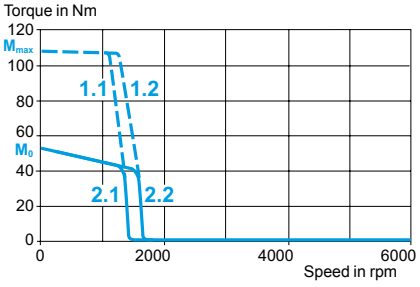
BDH 1884L servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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References: page 3/138
Dimensions: page 3/144

Characteristics of BDH 1884P servo motors

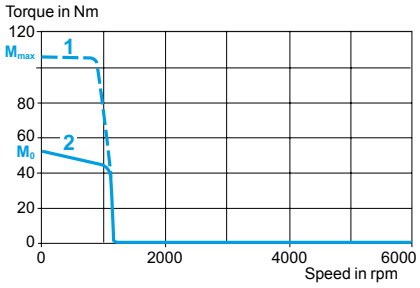
Type of servo motor				**BDH 1884P**		
Associated with Lexium 15 servo drive				**LXM 15MD56N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	52.5		
	Peak stall	M_{max}	**Nm**	106		
Nominal operating point	Nominal torque		**Nm**	45	39	36
	Nominal speed		**rpm**	900	1500	2000
	Servo motor nominal output power		**W**	4200	6100	7500
Maximum current			**A rms**	39.24		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	6000		
Constants (at 120°C)	Torque		**Nm/A rms**	2.84		
	Back emf		**V rms/ krpm**	183		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	120		
		With brake J_m	**kgcm²**	121.64		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.43		
	Inductance (phase/phase)		**mH**	7.7		
	Electrical time constant		**ms**	17.91		
Holding brake (depending on model)				See page 3/148		

Torque/speed curves

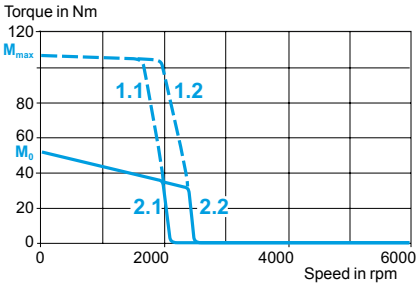
BDH 1884P servo motor

With LXM 15MD56N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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References: page 3/138
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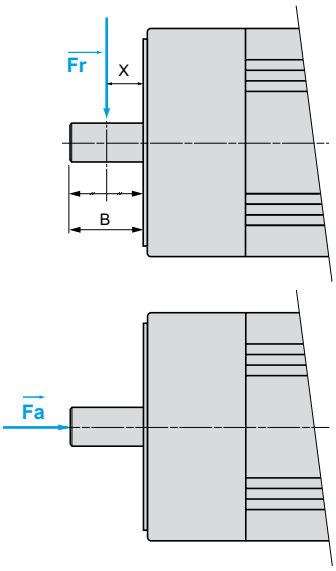

Radial and axial forces permitted on the motor shaft

Even when the servo motors are used under optimum conditions, their service life is limited by that of the bearings.

Conditions	
Nominal service life of bearings *(1)*	L_{10h} = 20,000 hours
Ambient temperature (temperature of bearings ∼ 100°C)	40°C
Force application point	Fr applied at the middle point of the shaft end X = B/2 (dimension B, see pages 3/144 to 3/147)

(1) Hours of service with a failure probability of 10%

⚠ The following conditions must be adhered to:
- Radial and axial forces must not be applied simultaneously
- Shaft end with IP 54 or IP 67 degree of protection
- The bearings cannot be changed by the user as the built-in position sensor must be realigned if the unit is dismantled.

			Maximum radial force Fr							
Mechanical speed		**rpm**	**1000**	**2000**	**3000**	**4000**	**5000**	**6000**	**7000**	**8000**
Servo motor	BDH 040	**N**	46	43	40	37	33	30	27	23
	BDH 058	**N**	138	137	135	133	132	130	128	127
	BDH 070	**N**	300	240	200	180	165	150	–	–
	BDH 084	**N**	460	430	400	370	340	310	–	–
	BDH 108	**N**	425	400	375	350	325	300	–	–
	BDH 138	**N**	1200	900	775	700	650	600	–	–
	BDH 188	**N**	1400	1100	800	–	–	–	–	–

Maximum axial force: Fa = 0.3 x Fr

Characteristics of servo motor/servo drive power connection components

Cables fitted with a connector on servo motor side

Cable type		**VW3 M5 101 R●●●**
External sleeve, insulation		PUR orange coloured RAL 2003, TPM or PP/PE
Capacity	**pF/m**	< 70 (conductors/shielding)
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]
Connector type		1 M23 industrial connector (BDH servo motor side) and 1 free wire end (Lexium 15 LP servo drive side)
External diameter	**mm**	12 ± 0.2
Minimum curvature radius	**mm**	90, suitable for daisy-chaining, cable-carrier system
Working voltage	**V**	600
Maximum usable length	**m**	50, for connection with a Lexium 15 LP servo drive
Operating temperature	**°C**	- 50…+ 90 (fixed), - 40…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

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References: page 3/138
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Characteristics of servo motor/servo drive power connection components (continued)

Cables fitted with a connector on both the servo motor and servo drive sides

Cable type		VW3 M5 201 R●●●	VW3 M5 202 R●●●	VW3 M5 213 R●●●
External sleeve, insulation		PUR orange coloured RAL 2003, TPM or PP/PE		
Capacity	pF/m	< 70 (conductors/shielding)		
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]	[(4 x 2.5 mm²) + (2 x 1 mm²)]	[(4 x 4 mm²) + (2 x 1 mm²)]
Connector type		1 M23 industrial connector (BDH servo motor side) and one 6-way male connector (Lexium 15 MP servo drive side)		
External diameter	mm	12 ± 0.2	14.3 ± 0.3	16.3 ± 0.3
Minimum curvature radius	mm	90, suitable for daisy-chaining, cable-carrier system	110, suitable for daisy-chaining, cable-carrier system	125, suitable for daisy-chaining, cable-carrier system
Working voltage	V	600		
Maximum usable length	m	100, for connection with a Lexium 15 MP servo drive		
Operating temperature	°C	- 40…+ 90 (fixed), - 20…+ 80 (mobile)		
Certifications		UL, CSA, VDE, CE, DESINA		

Cables

Cable type		VW3 M5 301 R●●●●	VW3 M5 302 R●●●●	VW3 M5 303 R●●●●
External sleeve, insulation		PUR orange coloured RAL 2003, TPM or PP/PE		
Capacity	pF/m	< 70 (conductors/shielding)		
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]	[(4 x 2.5 mm²) + (2 x 1 mm²)]	[(4 x 4 mm²) + (2 x 1 mm²)]
Connector type		None (for connectors, see pages 3/142 and 3/143)		
External diameter	mm	12 ± 0.2	14.3 ± 0.3	16.3 ± 0.3
Minimum curvature radius	mm	90, suitable for daisy-chaining, cable-carrier system	110, suitable for daisy-chaining, cable-carrier system	125, suitable for daisy-chaining, cable-carrier system
Working voltage	V	600		
Maximum usable length	m	100		
Operating temperature	°C	- 50…+ 90 (fixed), - 40…+ 80 (mobile)		
Certifications		UL, CSA, VDE, CE, DESINA		

Characteristics of the servo motor/servo drive control connection components

Cables fitted with a connector on both the servo motor and servo drive sides

Cable type		VW3 M8 301 R●●●	VW3 M8 401 R●●●
Encoder type		SinCos encoder	Resolver
External sleeve, insulation		PUR green coloured RAL 6018, polyester	
Number of conductors (shielded)		5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)	
External diameter	mm	8.8 ± 0.2	
Connector type		1 M23 industrial connector (servo motor side) and one 15-way SUB-D male connector (servo drive side)	1 M23 industrial connector (servo motor side) and one 9-way SUB-D male connector (servo drive side)
Minimum curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system	
Working voltage	V	350 (0.25 mm²), 500 (0.5 mm²)	
Maximum usable length	m	75	
Operating temperature	°C	- 50…+ 90 (fixed), - 40…+ 80 (mobile)	
Certifications		UL, CSA, VDE, CE, DESINA	

Cables

Cable type		VW3 M8 221 R●●●●
Encoder type		SinCos encoder
External sleeve, insulation		PUR green coloured RAL 6018, polyester
Number of conductors (shielded)		5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)
External diameter	mm	8.8 ± 0.2
Connector type		None (for connectors, see pages 3/142 and 3/143)
Minimum curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system
Working voltage	V	350 (0.25 mm²), 500 (0.5 mm²)
Maximum usable length	m	100
Operating temperature	°C	- 50…+ 90 (fixed), - 40…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

Lexium 15 motion control
BDH servo motors

105995

BDH 0401●

105997

BDH 0701●

BDH servo motors

The BDH servo motors shown below are supplied without a gearbox. For GBX gearboxes see page 3/156.

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed *(1)*	Maximum mechanical speed	Associated servo drive LXM 15	Reference *(2)*	Weight *(3)*
Nm	Nm	W	rpm	rpm			kg
0.18	0.61	150	8000	8000	LD13M3	**BDH 0401B ●5A2●**	0.350
0.31	1.08	230	8000	8000	LD13M3	**BDH 0402C ●5A2●**	0.490
0.41	1.46	300	8000	8000	LD13M3	**BDH 0403C ●5A2●**	0.630
0.84	2.34	560	7500	8000	LU60N4	**BDH 0582C ●●●2●**	1.100
0.87	2.42	500	6500	8000	LD13M3	**BDH 0582E ●●●2●**	1.100
1.08	2.62	770	8000	8000	LD21M3	**BDH 0583F ●●●2●**	1.380
1.13	3.2	520	6000	8000	LU60N4	**BDH 0583C ●●●2●**	1.380
1.15	3.34	550	5000	8000	LU60N4	**BDH 0701C ●●●2A**	1.550
1.16	3.58	450	4000	8000	LD13M3	**BDH 0583D ●●●2●**	1.380
		800	8000	8000	LD10N4		
1.18	3.52	770	8000	8000	LD21M3	**BDH 0583F ●●●2●**	1.380
1.2	3.24	650	5000	8000	LD13M3	**BDH 0701E ●●●2A**	1.550
1.38	3.94	600	5000	8000	LU60N4	**BDH 0584C ●●●2●**	1.660
1.41	4.4	450	3500	8000	LD13M3	**BDH 0584D ●●●2●**	1.660
		770	8000	8000	LD10N4		
1.42	3.57	670	6000	8000	LD21M3	**BDH 0584F ●●●2●**	1.660
	4.46	700	6560	8000	LD21M3		
1.5	3.14	900	6000	6000	LD21M3	**BDH 0841H ●●●2●**	2.440
1.95	5.12	600	3000	6000	LU60N4	**BDH 0841C ●●●2●**	2.440
2	5.74	600	3500	8000	LU60N4	**BDH 0702C ●●●2A**	2.230
2.02	5.13	950	5500	6000	LD10N4	**BDH 0841E ●●●2●**	2.440
	5.33	500	2500	6000	LD13M3		
2.04	6.51	450	2300	8000	LD13M3	**BDH 0702D ●●●2A**	2.230
		900	5500	8000	LD10N4		
2.06	4.78	950	5500	6000	LD21M3	**BDH 0841H ●●●2●**	2.440
2.08	4.52	1000	4500	8000	LD21M3	**BDH 0703H●●●2A**	2.900
2.1	5.36	900	6500	8000	LD21M3	**BDH 0702H ●●●2A**	2.230
2.71	7.83	650	2500	8000	LU60N4	**BDH 0703C ●●●2A**	2.900
2.79	8.55	550	2000	8000	LD13M3	**BDH 0703E ●●●2A**	2.900
		1500	5000	8000	LD10N4		
2.88	7.35	850	5000	8000	LD21M3	**BDH 0703H ●●●2A**	2.900
2.96	6.54	900	3000	6000	LD21M3	**BDH 0842G ●●●2●**	3.390
3.35	9.37	600	2000	6000	LU60N4	**BDH 0842C ●●●2●**	3.390
3.42	9.41	1000	3500	6000	LD10N4	**BDH 0842E ●●●2●**	3.390
	9.72	500	1500	6000	LD13M3		
3.53	8.66	1500	6000	6000	LD17N4	**BDH 0842G ●●●2●**	3.390
	9.56	900	3000	6000	LD21M3		
3.56	7.56	1500	5500	6000	LD28M3	**BDH 0842J ●●●2●**	3.390
			5500	6000	MD28N4		
3.96	8.8	1000	2500	6000	LD21M3	**BDH 0843G ●●●2●**	4.350
	9.41	600	1500	6000	LD21M3	**BDH 1081G ●●●2●**	4.200
4.7	10.71	1200	3000	6000	LD10N4	**BDH 1081E ●●●2●**	4.200
	11.7	1000	3000	6000	LD10N4	**BDH 0843E ●●●2●**	4.350

(1) Derating possible depending on the power supply voltage (see characteristics pages 3/90 to 3/137).
(2) Complete each reference based on the available options, see table page 3/140.
(3) Servo motor weight without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 3/148.

Lexium 15 motion control
BDH servo motors

105999

BDH 1081●

106001

BDH 1882●

BDH servo motors (continued)

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed *(1)*	Maximum mechanical speed	Associated servo drive LXM 15	Reference *(2)*	Weight *(3)*
Nm	Nm	W	rpm	rpm			kg
4.75	10.82	1000	2500	6000	LD21M3	**BDH 1081G ●●●2●**	4.200
		1200	5000	6000	LD17N4		
4.76	10.55	1000	2000	6000	LD21M3	**BDH 0844G ●●●2●**	5.300
4.8	11.68	1500	5000	6000	LD17N4	**BDH 0843G ●●●2●**	4.350
	13.2	900	2000	6000	LD21M3		
4.9	9.02	1600	5000	6000	LD28M3	**BDH 0843K ●●●2●**	4.350
					MD28N4		
	9.22	1400	5000	6000	LD28M3	**BDH 1081K ●●●2●**	4.200
					MD28N4		
5.76	14.1	1200	2500	6000	LD10N4	**BDH 0844E ●●●2●**	5.300
5.88	13.97	1600	4500	6000	LD17N4	**BDH 0844G ●●●2●**	5.300
	16.1	1000	2000	6000	LD21M3		
6	12.18	1500	3500	6000	LD28M3	**BDH 0844J ●●●2●**	5.300
					MD28N4		
7.16	17.31	1000	1000	6000	LD21M3	**BDH 1082G ●●●2●**	5.800
8.34	18.08	600	2000	6000	LD10N4	**BDH 1082E ●●●2●**	5.800
8.43	19.51	1200	1500	6000	LD21M3	**BDH 1082G ●●●2●**	5.800
		2000	3000	6000	LD17N4		
8.6	16.7	2300	4000	6000	MD40N4	**BDH 1082M ●●●2●**	5.800
	16.9	1700	3000	6000	LD28M3	**BDH 1082K ●●●2●**	5.800
		2000	6000	6000	MD28N4		
11.4	22.1	2800	3000	6000	MD40N4	**BDH 1083M ●●●2●**	7.400
	22.2	3000	5000	6000	MD56N4	**BDH 1083P ●●●2●**	7.400
	25.83	1100	2500	6000	LD17N4	**BDH 1083G ●●●2●**	7.400
11.6	22.9	2000	2000	6000	LD28M3	**BDH 1083K ●●●2●**	7.400
		3300	5000	6000	MD28N4		
11.9	25.6	2200	2000	6000	LD17N4	**BDH 1382G ●●●2●**	8.900
12.2	22.7	2200	2000	6000	LD28M3	**BDH 1382K ●●●2●**	8.900
					MD28N4		
	22.8	3700	6000	6000	MD40N4	**BDH 1382M ●●●2●**	8.900
12.3	23.2	3600	4000	6000	MD56N4	**BDH 1382P ●●●2●**	8.900
14.1	25.5	3800	4000	6000	MD56N4	**BDH 1084N ●●●2●**	9.000
	27.28	2800	4000	6000	MD40N4	**BDH 1084L ●●●2●**	9.000
14.3	31.7	1200	2000	6000	LD17N4	**BDH 1084G ●●●2●**	9.000
14.4	28.1	2200	2000	6000	LD28M3	**BDH 1084K ●●●2●**	9.000
		4000	4500	6000	MD28N4		
16.5	38.4	1000	1500	6000	LD17N4	**BDH1383G ●●●2●**	11.100
16.8	31	2300	1500	6000	LD28M3	**BDH 1383K ●●●2●**	11.100
		4700	4000	6000	MD28N4		
17	31.4	3000	4500	6000	MD40N4	**BDH 1383M ●●●2●**	11.100
	34.8	4700	6000	6000	MD56N4	**BDH 1383N ●●●2●**	11.100
20.4	40.2	5200	5000	6000	MD56N4	**BDH 1384P ●●●2●**	13.300
20.8	41.2	4200	2500	6000	MD28N4	**BDH 1384K ●●●2●**	13.300

(1) Derating possible depending on the power supply voltage (see characteristics pages 3/90 to 3/137).
(2) Complete each reference based on the available options, see table page 3/140.
(3) Servo motor weight without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 3/148.

Lexium 15 motion control
BDH servo motors

BDH servo motors (continued)

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed (1)	Maximum mechanical speed	Associated servo drive LXM 15	Reference (2)	Weight (3)
Nm	Nm	W	rpm	rpm			kg
21	41.9	5300	3500	6000	MD40N4	**BDH 1384L ●●●2●**	13.300
24.3	50.2	4500	4500	6000	MD56N4	**BDH 1385N ●●●2●**	15.400
24.8	46.8	4700	2000	6000	MD28N4	**BDH 1385K ●●●2●**	15.400
25	47.6	5800	3000	6000	MD40N4	**BDH 1385M ●●●2●**	15.400
29.4	58.4	6800	3500	6000	MD56N4	**BDH 1882P ●●●2●**	19.700
29.7	59.4	5000	2000	6000	MD28N4	**BDH 1882K ●●●2●**	19.700
30	59.8	6000	2500	6000	MD40N4	**BDH 1882M ●●●2●**	19.700
41.6	79.4	7200	2500	6000	MD56N4	**BDH 1883P ●●●2●**	26.700
42	80.7	6800	2000	6000	MD40N4	**BDH 1883M ●●●2●**	26.700
52.5	106	7500	2000	6000	MD56N4	**BDH 1884P ●●●2●**	33.600
53	108	6600	1500	6000	MD40N4	**BDH 1884L ●●●2●**	33.600

To order a BDH servo motor complete each reference with:

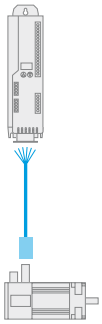
			BDH 0583D	●	●	●	2	●
Shaft end	IP 54	Untapped *(4)*		**0**				
		Keyed *(5) (6)*		**1**				
	IP 67	Untapped *(4)*		**2**				
		Keyed *(5) (6)*		**3**				
Integrated sensor	Single turn, SinCos Hiperface® 1,048,576 points/turn *(7) (8)*				**1**			
	Multiturn, SinCos Hiperface® 1,048,576 points/turn, 4096 turns *(7) (8)*				**2**			
	2-pole resolver 65,536 points/turn *(6)*				**5**			
Holding brake	None					**A**		
	With *(7)*					**F**		
Connection	Angled connectors that can be rotated through 90°						**2**	
Flange	International IEC standard *(6)*							**A**
	NEMA *(5) (6) (9)*							**B**

Note: *The example above is for a* ***BDH 0583D*** *servo motor. Replace* ***BDH 0583D*** *with the relevant reference for other servo motors.*

(1) Derating possible depending on the power supply voltage (see characteristics pages 3/90 to 3/137).
(2) Complete each reference based on the available options, see table above.
(3) Servo motor weight without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 3/148.
(4) Not available in NEMA mounting for BDH 084●●, BDH 108●●, BDH 138●● and BDH 188●● servo motors.
(5) Not available in NEMA mounting for BDH 040●● and BDH 058●● servo motors.
(6) The type of key differs depending on the type of mounting (IEC or NEMA) and the servo motor rating, see pages 3/144 to 3/147:
- *IEC mounting: BDH 040●●, open shaft key; other BDH servo motors, closed shaft key.*
- *NEMA mounting: BDH 084●●, BDH 108●●, BDH 138●● and BDH 188●●, open shaft key. Shaft key option not available for BDH 040●● and BDH 058●●.*

(7) Not available for BDH 040●● servo motors.
(8) Sensor resolution given for use with a Lexium 15 servo drive (parameter PRBASE = 20).
(9) Not available for BDH 070●● servo motors.

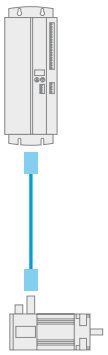
Lexium 15 motion control
BDH servo motors



VW3 M5 101 R●●●

Power supply connection cables

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
Cables fitted with an M23 industrial connector (servo motor side) **and a free end** (servo drive side)	BDH 040●● BDH 058●● BDH 070●● BDH 084●● BDH 108●E BDH 108●G BDH 108●K BDH 138●G BDH 138●K	LXM 15L●●●●●	[(4 x 1.5 mm²) + (2 x 1 mm²)]	3	**VW3 M5 101 R30**	0.810
				5	**VW3 M5 101 R50**	2.290
				10	**VW3 M5 101 R100**	2.290
				15	**VW3 M5 101 R150**	3.400
				20	**VW3 M5 101 R200**	4.510
				25 *(1)*	**VW3 M5 101 R250**	6.200
				50 *(1)*	**VW3 M5 101 R500**	12.325

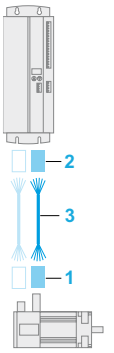


VW3 M5 201/202/213 R●●●

Cables fitted with an M23 industrial connector (servo motor side) **and a 6-way male connector** (servo drive side)	BDH 084●● BDH 108●K BDH 138●K BDH 188●K	LXM 15MD●●N4	[(4 x 1.5 mm²) + (2 x 1 mm²)]	3	**VW3 M5 201 R30**	0.885
				5	**VW3 M5 201 R50**	1.375
				10	**VW3 M5 201 R100**	2.600
				15	**VW3 M5 201 R150**	3.825
				20	**VW3 M5 201 R200**	5.050
				25 *(1)*	**VW3 M5 201 R250**	6.275
				50 *(1)*	**VW3 M5 201 R500**	12.400
				75 *(1)*	**VW3 M5 201 R750**	18.525
	BDH 108●L BDH 108●M BDH 138●L BDH 138●M BDH 188●L BDH 188●M	LXM 15MD●●N4	[(4 x 2.5 mm²) + (2 x 1 mm²)]	3	**VW3 M5 202 R30**	1.137
				5	**VW3 M5 202 R50**	1.795
				10	**VW3 M5 202 R100**	3.430
				15	**VW3 M5 202 R150**	5.085
				20	**VW3 M5 202 R200**	6.730
				25 *(1)*	**VW3 M5 202 R250**	8.375
				50 *(1)*	**VW3 M5 202 R500**	16.600
				75 *(1)*	**VW3 M5 202 R750**	24.825
	BDH 108●N BDH 108●P BDH 138●N BDH 138●P BDH 188●P	LXM 15MD●●N4	[(4 x 4 mm²) + (2 x 1 mm²)]	3	**VW3 M5 213 R30**	1.536
				5	**VW3 M5 213 R50**	2.460
				10	**VW3 M5 213 R100**	4.770
				15	**VW3 M5 213 R150**	7.080
				20	**VW3 M5 213 R200**	9.390
				25 *(1)*	**VW3 M5 213 R250**	11.700
				50 *(1)*	**VW3 M5 213 R500**	23.250
				75 *(1)*	**VW3 M5 213 R750**	34.800

(1) For cables longer than 20 m, a motor choke is compulsory, see page 3/51.

Presentation: page 3/88
Characteristics: page 3/136



VW3 M8 2●●

Separate power connection components

Connectors for implementing power cables

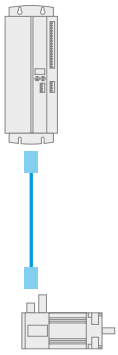
Description	For servo motor	For servo drive	For cable of cross-section	Item no.	Reference	Weight
			mm²			kg
M23 industrial connectors	BDH 040●● BDH 058●● BDH 070●● BDH 084●● BDH 108●E BDH 108●G BDH 108●K BDH 138●G BDH 138●K	–	1.5	1	**VW3 M8 215**	0.350
	BDH 108●L BDH 108●M BDH 138●L BDH 138●M BDH 188●L BDH 188●M	–	2.5	1	**VW3 M8 216**	0.600
	BDH 108●N BDH 108●P BDH 138●N BDH 138●P BDH 188●P	–	4	1	**VW3 M8 227 ▲**	0.600
6-way male connector	–	LXM 15MD●●N4	1.5…4	2	**AEO CON 009**	–

Cables for implementing power cables

Description	From servo motor	To servo drive	Composition	Item no.	Length	Reference	Weight
					m		kg
Cables	BDH, all ratings	LXM 15, all ratings	[(4 x 1.5 mm²) + (2 x 1 mm²)]	3	25	**VW3 M5 301 R250**	5.500
					50	**VW3 M5 301 R500**	11.100
					100	**VW3 M5 301 R1000**	22.200
			[(4 x 2.5 mm²) + (2 x 1 mm²)]	3	25	**VW3 M5 302 R250**	7.725
					50	**VW3 M5 302 R500**	15.450
					100	**VW3 M5 302 R1000**	30.900
			[(4 x 4 mm²) + (2 x 1 mm²)]	3	25	**VW3 M5 303 R250**	9.900
					50	**VW3 M5 303 R500**	19.800
					100	**VW3 M5 303 R1000**	39.600

▲ To be launched 1st quarter 2009

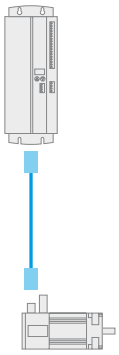
Presentation: page 3/88
Characteristics: page 3/136



VW3 M8 301 R●●●

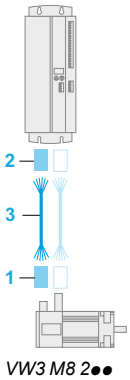
Control connecting cables

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
SinCos Hiperface® encoder cables fitted with an M23 industrial connector (servo motor side) **and a 15-way male SUB-D connector** (servo drive side)	BDH, all ratings	Lexium 15, all ratings	5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)	3	**VW3 M8 301 R30**	–
				5	**VW3 M8 301 R50**	–
				10	**VW3 M8 301 R100**	–
				15	**VW3 M8 301 R150**	–
				20	**VW3 M8 301 R200**	–
				25	**VW3 M8 301 R250**	–
				50	**VW3 M8 301 R500**	–
				75	**VW3 M8 301 R750**	–



VW3 M8 401 R●●●

Resolver cables fitted with an M23 industrial connector (servo motor side) **and a 9-way male SUB-D connector** (servo drive side)	BDH, all ratings	Lexium 15, all ratings	5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)	3	**VW3 M8 401 R30**	–
				5	**VW3 M8 401 R50**	–
				10	**VW3 M8 401 R100**	–
				15	**VW3 M8 401 R150**	–
				20	**VW3 M8 401 R200**	
				25	**VW3 M8 401 R250**	–
				50	**VW3 M8 401 R500**	–
				75	**VW3 M8 401 R750**	–



VW3 M8 2●●

Separate control connection components

Connectors for implementing control cables

Description	For servo motor	For servo drive	Item no.	Reference	Weight
					kg
M23 industrial connectors	BDH, with SinCos Hiperface® encoder, all ratings	–	1	**VW3 M8 214**	–
	BDH, with resolver, all ratings	–	1	**VW3 M8 224** ▲	–
15-way male SUB-D connector for connecting SinCos Hyperface® encoder (servo drive side)	–	Lexium 15, all ratings	2	**AEO CON 010**	–
9-way male SUB-D connector for connecting resolver (servo drive side)	–	Lexium 15, all ratings	2	**AEO CON 011**	–

Cables for implementing control cables

Description	From servo motor	To servo drive	Composition	Item no.	Length	Reference	Weight
					m		kg
Cables for implementing control cables for SinCos Hyperface® encoder or resolver	BDH, all ratings	LXM 15, all ratings	[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]	3	25	**VW3 M8 221 R250**	5.250
					50	**VW3 M8 221 R500**	10.500
					100	**VW3 M8 221 R1000**	21.000

▲ To be launched: 1st quarter 2009

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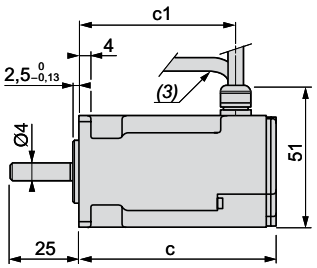
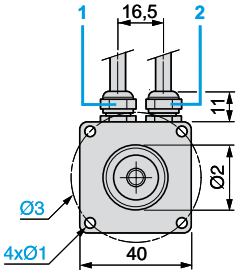
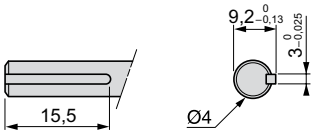
Lexium 15 motion control
BDH servo motors

BDH 040 (angled connectors: power supply for servo motor/brake **2** and sensor **1**) *(1)*

Keyed shaft end (optional) *(2)*





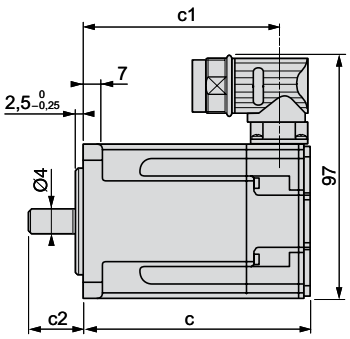


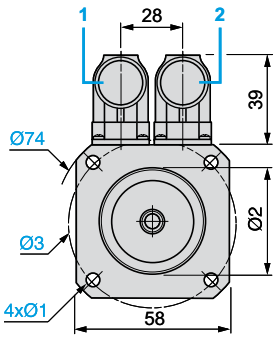
	With resolver		IEC mounting				NEMA mounting			
	c	c1	Ø1	Ø2	Ø3	Ø4	Ø1	Ø2	Ø3	Ø4
BDH 0401	69.6	56.1	4.3	30 h7	46	8 h7	3.56	20.015 +0.025 -0.025	46.69	6.35 0 -0.012
BDH 0402	88.6	75.1	4.3	30 h7	46	8 h7	3.56	20.015 +0.025 -0.025	46.69	6.35 0 -0.012
BDH 0403	107.6	94.1	4.3	30 h7	46	8 h7	3.56	20.015 +0.025 -0.025	46.69	6.35 0 -0.012

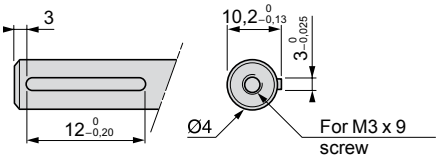
(1) SinCos Hiperface® encoder options and holding brake not available.
(2) Not available in NEMA mounting.
(3) Supplied with remote connectors, connection length: 500 mm

BDH 058 (angled connectors: power supply for servo motor/brake **2** and sensor **1**)

Keyed shaft end (optional) *(1)*





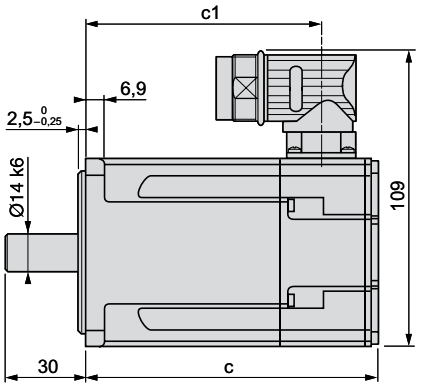


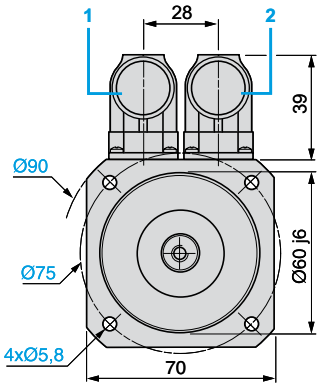
	With resolver		With SinCos encoder				IEC mounting				NEMA mounting				
	c (without brake)	c (with brake)	c (without brake)	c (with brake)	c1	c2	Ø1	Ø2	Ø3	Ø4	c2	Ø1	Ø2	Ø3	Ø4
BDH 0582	105.2	148.5	114.4	148.5	93.6	20	4.8	40 j6	63	9 k6	31.75 +0.79 -0.79	5.1	38.1 +0 -0.005	66.68	9.525 +0 -0.013
BDH 0583	124.2	167.5	133.4	167.5	112.6	20	4.8	40 j6	63	9 k6	31.75 +0.79 -0.79	5.1	38.1 +0 -0.005	66.68	9.525 +0 -0.013
BDH 0584	143.2	186.5	152.4	186.5	131.6	20	4.8	40 j6	63	9 k6	31.75 +0.79 -0.79	5.1	38.1 +0 -0.005	66.68	9.525 +0 -0.013

(1) Not available in NEMA mounting.

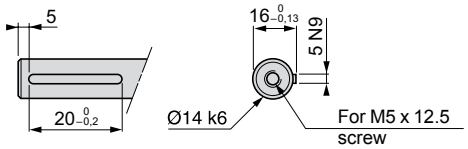
Presentation: page 3/88
Characteristics: page 3/90
References: page 3/138

BDH 070 (angled connectors: power supply for servo motor/brake **2** and sensor **1**) *(1)*





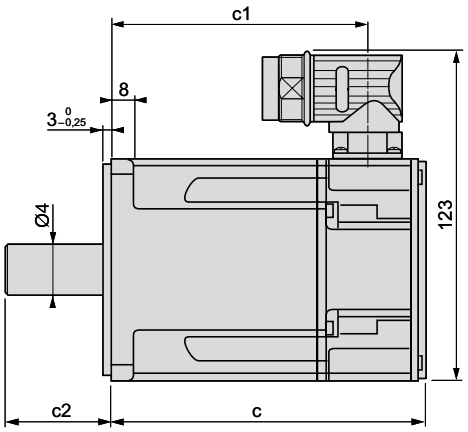
Keyed shaft end (optional)

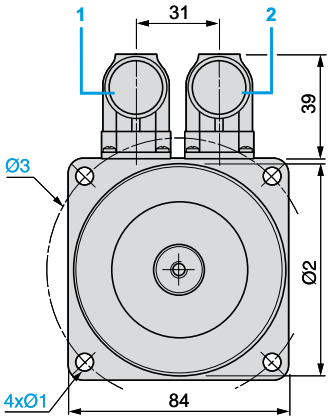


	With resolver or SinCos encoder		
	c (without brake)	**c** (with brake)	**c1**
BDH 0701	109.8	140.3	87.9
BDH 0702	140.8	171.3	118.9
BDH 0703	171.8	202.3	149.9

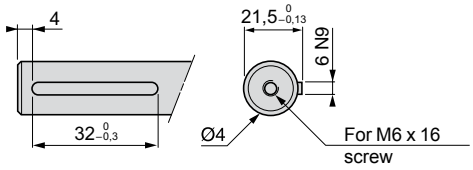
(1) Not available in NEMA mounting.

BDH 084 (angled connectors: power supply for servo motor/brake **2** and sensor **1**)*(1)*

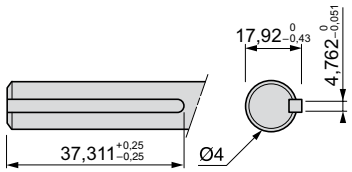




Keyed shaft end, IEC mounting (optional)



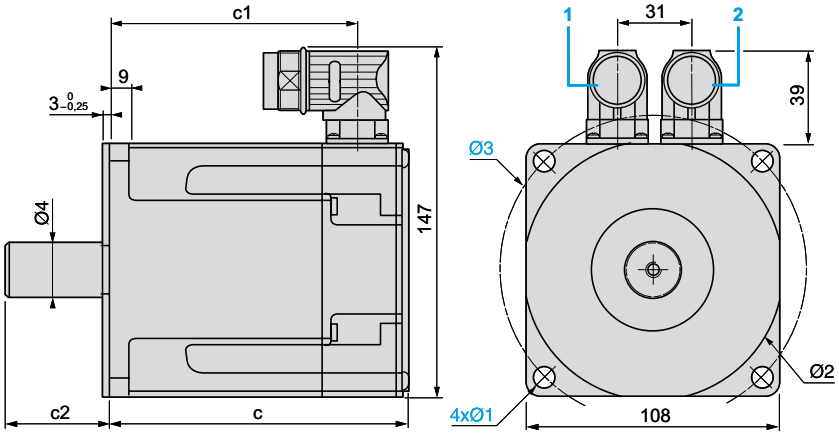
Keyed shaft end, NEMA mounting *(1)*



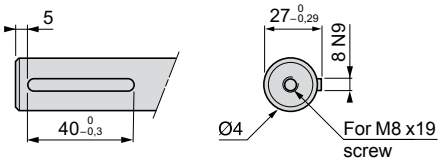
	With resolver or SinCos encoder			IEC mounting					NEMA mounting				
	c (without brake)	**c** (with brake)	**c1**	**c2**	**Ø1**	**Ø2**	**Ø3**	**Ø4**	**c2**	**Ø1**	**Ø2**	**Ø3**	**Ø4**
BDH 0841	118.8	152.3	96.4	40	7	80 j6	100	19 k6	52.4 +0.79 -0.79	5.54	73.025 +0 -0.051	98.43	15.875 +0 -0.013
BDH 0842	147.8	181.3	125.5	40	7	80 j6	100	19 k6	52.4 +0.79 -0.79	5.54	73.025 +0 -0.051	98.43	15.875 +0 -0.013
BDH 0843	194	210.3	154.4	40	7	80 j6	100	19 k6	52.4 +0.79 -0.79	5.54	73.025 +0 -0.051	98.43	15.875 +0 -0.013
BDH 0844	205.8	239.3	183.4	40	7	80 j6	100	19 k6	52.4 +0.79 -0.79	5.54	73.025 +0 -0.051	98.43	15.875 +0 -0.013

(1) The untapped shaft end option is not available in NEMA mounting.

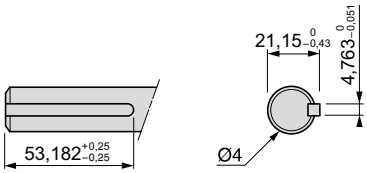
BDH 108 (angled connectors: power supply for servo motor/brake 2 and sensor 1)*(1)*



Keyed shaft end, IEC mounting (optional)



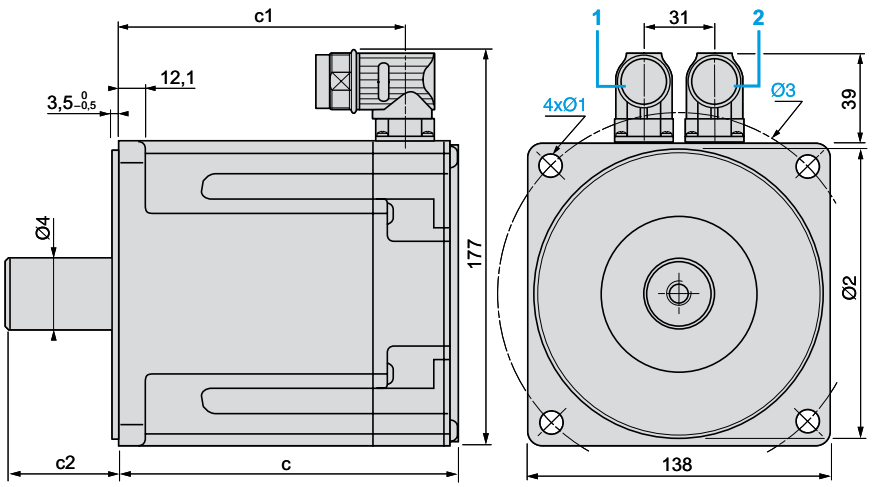
Keyed shaft end, NEMA mounting *(1)*



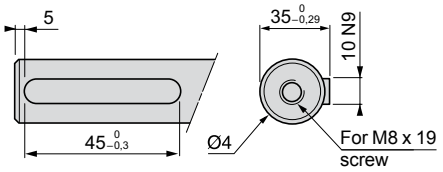
	With resolver		With SinCos encoder			IEC mounting					NEMA mounting				
	c (without brake)	c (with brake)	c (without brake)	c (with brake)	c1	c2	Ø1	Ø2	Ø3	Ø4	c2	Ø1	Ø2	Ø3	Ø4
BDH 1081	127.5	172.5	146	189	105.3	50	9	110 j6	130	24 k6	57.15 +0.79 -0.79	8.33	55.563 +0 -0.051	125.73	19.05 +0 -0.013
BDH 1082	158.5	203.5	177	220	136.3	50	9	110 j6	130	24 k6	57.15 +0.79 -0.79	8.33	55.563 +0 -0.051	125.73	19.05 +0 -0.013
BDH 1083	189.5	234.5	208	251	167.3	50	9	110 j6	130	24 k6	57.15 +0.79 -0.79	8.33	55.563 +0 -0.051	125.73	19.05 +0 -0.013
BDH 1084	220.5	265.5	239	282	196.3	50	9	110 j6	130	24 k6	57.15 +0.79 -0.79	8.33	55.563 +0 -0.051	125.73	19.05 +0 -0.013

(1) The untapped shaft end option is not available in NEMA mounting.

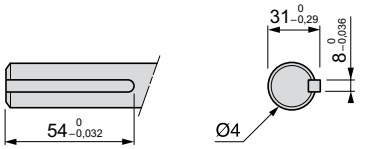
BDH 138 (angled connectors: power supply for servo motor/brake 2 and sensor 1)*(1)*



Keyed shaft end, IEC mounting (optional)



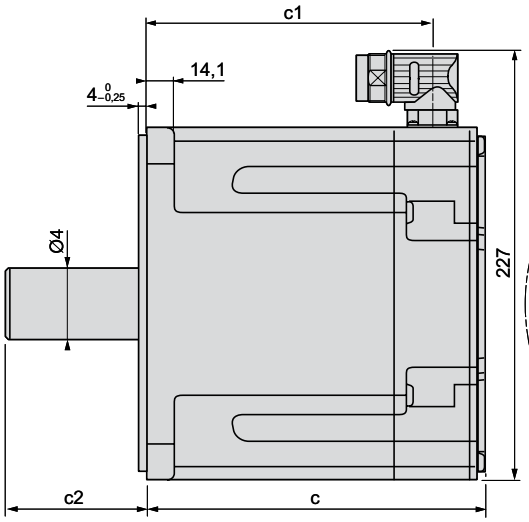
Keyed shaft end, NEMA mounting *(1)*

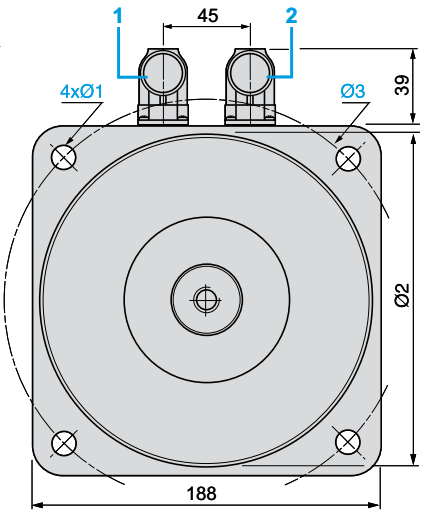


	With resolver		With SinCos encoder			IEC mounting					NEMA mounting				
	c (without brake)	c (with brake)	c (without brake)	c (with brake)	c1	c2	Ø1	Ø2	Ø3	Ø4	c2	Ø1	Ø2	Ø3	Ø4
BDH 1382	153.7	200.7	172.2	218.7	130.5	58	11 +0.36 0	130 j6	165	32 k6	60	9 +0.36 0	110 h7	145	28 h6
BDH 1383	178.7	225.7	197.2	224.7	155.5	58	11 +0.36 0	130 j6	165	32 k6	60	9 +0.36 0	110 h7	145	28 h6
BDH 1384	203.7	250.7	222.2	268.7	180.5	58	11 +0.36 0	130 j6	165	32 k6	60	9 +0.36 0	110 h7	145	28 h6
BDH 1385	228.7	275.7	247.2	294.7	205.5	58	11 +0.36 0	130 j6	165	32 k6	60	9 +0.36 0	110 h7	145	28 h6

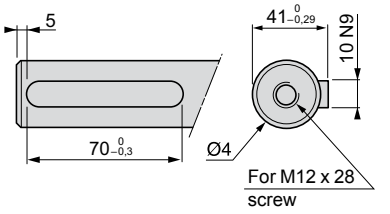
(1) The untapped shaft end option is not available in NEMA mounting.

BDH 188 (angled connectors: power supply for servo motor/brake **2** and sensor **1**)*(1)*

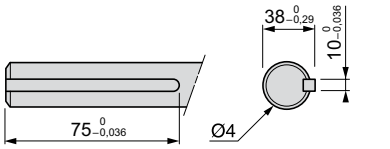




Keyed shaft end, IEC mounting (optional)



Keyed shaft end, NEMA mounting *(1)*



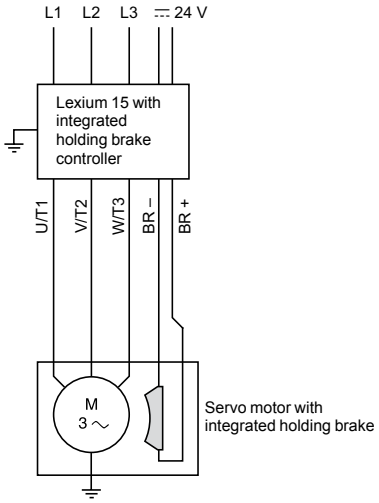
	With resolver		With SinCos encoder			IEC mounting					NEMA mounting				
	c (without brake)	**c** (with brake)	**c** (without brake)	**c** (with brake)	**c1**	**c2**	**Ø1**	**Ø2**	**Ø3**	**Ø4**	**c2**	**Ø1**	**Ø2**	**Ø3**	**Ø4**
BDH 1882	192.5	234.5	201.7	253.3	164.5	80	$13.5^{+0.43}_{0}$	180 j6	215	38 k6	79	$13.5^{+0.43}_{0}$	$114.3^{+0}_{-0.025}$	200	35 h6
BDH 1883	226.5	268.5	235.7	287.3	198.5	80	$13.5^{+0.43}_{0}$	180 j6	215	38 k6	79	$13.5^{+0.43}_{0}$	$114.3^{+0}_{-0.025}$	200	35 h6
BDH 1884	260.5	302.5	269.7	321.3	232.5	80	$13.5^{+0.43}_{0}$	180 j6	215	38 k6	79	$13.5^{+0.43}_{0}$	$114.3^{+0}_{-0.025}$	200	35 h6

(1) The untapped shaft end option is not available in NEMA mounting.

Lexium 15 motion control
BDH servo motors
Option: Integrated holding brake

Holding brake *(1)*

Presentation



The holding brake integrated into the BDH servo motor, depending on the model, is an electromagnetic pressure spring brake that blocks the servo motor axis once the output current has been switched off.

In the event of an emergency, such as a power outage or an emergency stop, the drive is immobilized, significantly increasing safety.
Blocking the servo motor axis is also necessary in cases of torque overload, such as in the event of vertical axis movement.

Activation of the holding brake is directly controlled by the Lexium 15 servo drive.

Characteristics

Type of servo motor	BDH	058	070	084	108	138	188
Holding torque M_{Br}	**Nm**	1.42	2.5	6	14.5	25	53
Inertia of rotor (brake only) J_{Br}	**kgcm²**	0.011	0.011	0.068	0.173	0.61	1.64
Electrical clamping power P_{Br}	**W**	8.4	10.1	12.8	19.5	25.7	35.6
Supply voltage	**V**	⎓ 24 -10…+10%					
Opening time	**ms**	20	27	35	80	105	110
Closing time	**ms**	18	10	15	15	20	35
Weight (to be added to the weight of the servo motor without brake, see page 3/138)	**kg**	0.270	0.350	0.610	1.100	2.000	2.100

References

105998

BDH servo motor

Selection of BDH servo motor with or without holding brake, see references page 3/140.

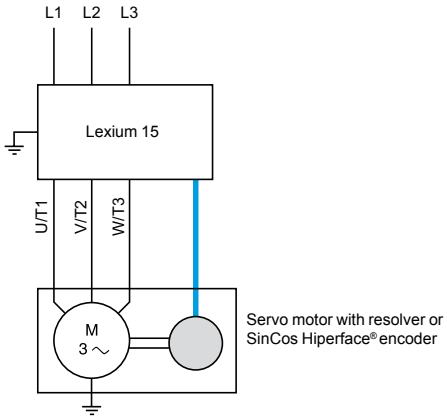
(1) Not available for BDH 040●● servo motors.

Dimensions:
page 3/144

Lexium 15 motion control
BDH servo motors
Option: Integrated sensor

Sensor integrated into BDH servo motors

Presentation



BDH servo motors can be fitted with 2 types of sensor:
- 2-pole resolver
- SinCos high-resolution Hiperface® *(1)* encoder:
  - single turn
  - multiturn

These measurement devices are perfectly adapted to the Lexium 15 range of servo drives.

The use of a resolver allows (at low cost):
- The angular position of the rotor to be identified
- The servo motor speed to be measured

The use of a SinCos Hiperface® *(1)* encoder also allows:
- The BDH servo motor data to be automatically identified by the servo drive
- The servo drive's control loops to be automatically initialized. These functions therefore simplify the installation of the motion control device.

3

Characteristics

Type of sensor		Resolver	Single turn SinCos *(1)*	Multiturn SinCos *(1)*
Number of sinus periods per turn	**Nm**	1	128	
Number of points *(2)*		–	1,048,576	1,048,576 x 4096 turns
Sensor precision	**min. arc**	± 30	± 1.3	
Measurement method		Electromagnetic demodulation	Optical high resolution	
Interface		–	Hiperface®	
Operating temperature	**°C**	+ 55…+ 155	+ 5…+ 110	

References

105998

BDH servo motor

Selection of resolver sensor, type of SinCos Hiperface® encoder integrated into the BDH servo motor (single turn or multiturn), see references page 3/140.

(1) Not available for BDH 040●● servo motors.
(2) Encoder resolution given for use with a Lexium 15 servo drive

Dimensions:
page 3/144

Lexium 15 motion control
BDH servo motors
Option: GBX planetary gearboxes

Presentation

535526

GBX planetary gearbox

In many cases, motion control requires the use of planetary gearboxes to adapt speeds and torques, while ensuring the precision demanded by the application.

Schneider Electric has selected GBX gearboxes made by Neugart to be used in association with the BDH servo motor range. These gearboxes are lubricated for life and are designed for applications which are not susceptible to mechanical backlash. As their association with BDH servo motors has been fully qualified and they are very easy to mount, the gearboxes are simple to put into operation and risk free.

Available in 5 sizes (GBX 40...GBX 160), the planetary gearboxes are offered in 12 gear ratios (3:1...40:1), see tables below and on the following pages.

Continuous stall torques and peak stall torques available from the gearbox are obtained by multiplying the characteristic values of the servo motor by the reduction ratio and gearbox efficiency (0.96, 0.94 or 0.9 depending on the speed reduction ratio).

The tables below and the following pages show the most suitable servo motor/ gearbox combinations. For other combinations, see the servo motor data sheets.

BDH0401B…0844J servo motor/GBX gearbox associations

Speed reduction ratios from 3:1 to 16:1

Type of servo motor	Speed reduction ratio							
	3:1	4:1	5:1	8:1	9:1	12:1	15:1	16:1
BDH 0401B	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40
BDH 0402C	GBX 40	GBX 40	GBX 40	GBX 60	GBX 40	GBX 40	GBX 40	GBX 40
BDH 0403C	GBX 40	GBX 40	GBX 40	GBX 60	GBX 40	GBX 40	GBX 40	GBX 40
BDH 0582C	GBX 60	GBX 60	GBX 60	GBX 60	GBX 40	GBX 60	GBX 60	GBX 60
BDH 0582E	GBX 60	GBX 60	GBX 60	GBX 60	GBX 40	GBX 60	GBX 60	GBX 60
BDH 0583C	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0583D	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0583F	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0584C	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0584D	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0584F	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0701C	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 60	GBX 80	GBX 80
BDH 0701E	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 60	GBX 80	GBX 80
BDH 0702C	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BDH 0702D	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BDH 0702H	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BDH 0703C	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 80	GBX 80
BDH 0703E	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 80	GBX 80
BDH 0703H	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 80	GBX 80
BDH 0841C	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BDH 0841E	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BDH 0841H	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BDH 0842C	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 120	GBX 120
BDH 0842E	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 120	GBX 120
BDH 0842G	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 120	GBX 120
BDH 0842J	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 120	GBX 120
BDH 0843E	GBX 80	GBX 80	GBX 120	GBX 120	GBX 80	GBX 120	GBX 120	GBX 120
BDH 0843G	GBX 80	GBX 80	GBX 120	GBX 120	GBX 80	GBX 120	GBX 120	GBX 120
BDH 0843K	GBX 80	GBX 80	GBX 120	GBX 120	GBX 80	GBX 120	GBX 120	GBX 120
BDH 0844E	GBX 120	GBX 120	GBX 120	GBX 160	GBX 120	GBX 120	GBX 120	GBX 120
BDH 0844G	GBX 120	GBX 120	GBX 120	GBX 160	GBX 120	GBX 120	GBX 120	GBX 120
BDH 0844J	GBX 120	GBX 120	GBX 120	GBX 160	GBX 120	GBX 120	GBX 120	GBX 120

GBX 60

For these associations, you must check that the application does not exceed the maximum output torque of the gearbox, see values page 3/154.

Characteristics: page 3/154 References: page 3/156 Dimensions: page 3/157

BDH 0401B…0844J servo motor/GBX gearbox associations (continued)

Speed reduction ratios from 20:1 to 40:1

Type of servo motor	Speed reduction ratio			
	20:1	25:1	32:1	40:1
BDH 0401B	GBX 40	GBX 40	GBX 40	GBX 60
BDH 0402C	GBX 40	GBX 60	GBX 60	GBX 60
BDH 0403C	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0582C	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0582E	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0583C	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0583D	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0583F	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0584C	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0584D	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0584F	GBX 60	GBX 60	GBX 60	GBX 60
BDH 0701C	GBX 80	GBX 80	GBX 80	GBX 120
BDH 0701E	GBX 80	GBX 80	GBX 80	GBX 120
BDH 0702C	GBX 80	GBX 120	GBX 120	GBX 120
BDH 0702D	GBX 80	GBX 120	GBX 120	GBX 120
BDH 0702H	GBX 80	GBX 120	GBX 120	GBX 120
BDH 0703C	GBX 120	GBX 120	GBX 120	GBX 120
BDH 0703E	GBX 120	GBX 120	GBX 120	GBX 120
BDH 0703H	GBX 120	GBX 120	GBX 120	GBX 120
BDH 0841C	GBX 80	GBX 120	GBX 120	GBX 120
BDH 0841E	GBX 80	GBX 120	GBX 120	GBX 120
BDH 0841H	GBX 80	GBX 120	GBX 120	GBX 120
BDH 0842C	GBX 120	GBX 120	GBX 160	GBX 160
BDH 0842E	GBX 120	GBX 120	GBX 160	GBX 160
BDH 0842G	GBX 120	GBX 120	GBX 160	GBX 160
BDH 0842J	GBX 120	GBX 120	GBX 160	GBX 160
BDH 0843E	GBX 120	GBX 160	GBX 160	GBX 160
BDH 0843G	GBX 120	GBX 160	GBX 160	GBX 160
BDH 0843K	GBX 120	GBX 160	GBX 160	GBX 160
BDH 0844E	GBX 160	GBX 160	GBX 160	GBX 160
BDH 0844G	GBX 160	GBX 160	GBX 160	GBX 160
BDH 0844J	GBX 160	GBX 160	GBX 160	GBX 160

GBX 60

For these associations, you must check that the application does not exceed the maximum output torque of the gearbox, see values page 3/154.

Lexium 15 motion control
BDH servo motors
Option: GBX planetary gearboxes

BDH 1081E…1385N servo motor/GBX gearbox associations

Speed reduction ratios from 3:1 to 16:1

Type of servo motor	Speed reduction ratio							
	3:1	4:1	5:1	8:1	9:1	12:1	15:1	16:1
BDH 1081E	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BDH 1081G	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BDH 1081K	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BDH 1082E	GBX 120	GBX 120	GBX 120	GBX 160	GBX 120	GBX 120	GBX 160	GBX 160
BDH 1082G	GBX 120	GBX 120	GBX 120	GBX 160	GBX 120	GBX 120	GBX 160	GBX 160
BDH 1082K	GBX 120	GBX 120	GBX 120	GBX 160	GBX 120	GBX 120	GBX 160	GBX 160
BDH 1082M	GBX 120	GBX 120	GBX 120	GBX 160	GBX 120	GBX 120	GBX 160	GBX 160
BDH 1083G	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1083K	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1083M	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1083P	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1084G	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1084K	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1084L	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1084N	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1382G	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1382K	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1382M	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1382P	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1383G	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1383K	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1383M	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1383N	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1384K	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1384L	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1384P	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1385K	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1385M	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1385N	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160	GBX 160

GBX 160

For these associations, you must check that the application does not exceed the maximum output torque of the gearbox, see values page 3/154.

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BDH 1081E…1385N servo motor/GBX gearbox associations (continued)

Speed reduction ratios from 20:1 to 40:1

Type of servo motor	Speed reduction ratio			
	20:1	25:1	32:1	40:1
BDH 1081E	GBX 120	GBX 160	GBX 160	GBX 160
BDH 1081G	GBX 120	GBX 160	GBX 160	GBX 160
BDH 1081K	GBX 120	GBX 160	GBX 160	GBX 160
BDH 1082E	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1082G	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1082K	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1082M	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1083G	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1083K	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1083M	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1083P	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1084G	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1084K	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1084L	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1084N	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1382G	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1382K	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1382M	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1382P	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1383G	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1383K	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1383M	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1383N	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1384K	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1384L	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1384P	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1385K	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1385M	GBX 160	GBX 160	GBX 160	GBX 160
BDH 1385N	GBX 160	GBX 160	GBX 160	GBX 160

GBX 160

For these associations, you must check that the application does not exceed the maximum output torque of the gearbox, see values page 3/154.

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Lexium 15 motion control
BDH servo motors
Option: GBX planetary gearboxes

Characteristics of GBX gearboxes

Type of gearbox			GBX 40	GBX 60	GBX 80	GBX 120	GBX 160
Type of gearbox			Planetary gearbox with straight teeth				
Backlash	3:1...8:1	**arc min**	< 30	< 20	< 12	< 8	< 6
	9:1...40:1		< 35	< 25	< 17	< 12	< 10
Torsion rigidity	3:1...8:1	**Nm/arc min**	1.0	2.3	6	12	38
	9:1...40:1		1.1	2.5	6.5	13	41
Noise level		**dB (A)**	55	58	60	65	70
Junction box			Black anodized aluminium				
Shaft material			C 45				
Shaft output dust and damp protection			IP 54				
Lubrication			Lubricated for life				
Average service life *(1)*		**h**	30,000				
Mounting position			All positions				
Operating temperature		**°C**	- 25...+ 90				
Efficiency	3:1...8:1		0.96				
	9:1...40:1		0.94				
Maximum radial force permitted *(1) (2)*	L_{10h} = 10,000 hours	**N**	200	500	950	2000	6000
	L_{10h} = 30,000 hours	**N**	160	340	650	1500	4200
Maximum axial force permitted *(1)*	L_{10h} = 10,000 hours	**N**	200	600	1200	2800	8000
	L_{10h} = 30,000 hours	**N**	160	450	900	2100	6000
Inertia of gearbox	3:1	**kgcm²**	0.031	0.135	0.77	2.63	12.14
	4:1	**kgcm²**	0.022	0.093	0.52	1.79	7.78
	5:1	**kgcm²**	0.019	0.078	0.45	1.53	6.07
	8:1	**kgcm²**	0.017	0.065	0.39	1.32	4.63
	9:1	**kgcm²**	0.030	0.131	0.74	2.62	–
	12:1	**kgcm²**	0.029	0.127	0.72	2.56	12.37
	15:1	**kgcm²**	0.023	0.077	0.71	2.53	12.35
	16:1	**kgcm2**	0.022	0.088	0.50	1.75	7.47
	20:1	**kgcm²**	0.019	0.075	0.44	1.50	6.64
	25:1	**kgcm²**	0.019	0.075	0.44	1.49	5.81
	32:1	**kgcm²**	0.017	0.064	0.39	1.30	6.36
	40:1	**kgcm²**	0.016	0.064	0.39	1.30	5.28

(1) Values refer to an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines and with an ambient temperature of 30°C.
(2) Force applied at mid-distance from the output shaft.

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Characteristics of GBX gearboxes (continued)

Type of gearbox			GBX 40	GBX 60	GBX 80	GBX 120	GBX 160
Continuous output torque *(1)* M_{2N}	3:1	**Nm**	11	28	85	115	400
	4:1	**Nm**	15	38	115	155	450
	5:1	**Nm**	14	40	110	195	450
	8:1	**Nm**	6	18	50	120	450
	9:1	**Nm**	16,5	44	130	210	–
	12:1	**Nm**	20	44	120	260	800
	15:1	**Nm**	18	44	110	230	700
	16:1	**Nm**	20	44	120	260	800
	20:1	**Nm**	20	44	120	260	800
	25:1	**Nm**	18	40	110	230	700
	32:1	**Nm**	20	44	120	260	800
	40:1	**Nm**	18	40	110	230	700
Maximum output torque *(1)*	3:1	**Nm**	17.6	45	136	184	640
	4:1	**Nm**	24	61	184	248	720
	5:1	**Nm**	22	64	176	312	720
	8:1	**Nm**	10	29	80	192	720
	9:1	**Nm**	26	70	208	336	–
	12:1	**Nm**	32	70	192	416	1280
	15:1	**Nm**	29	70	176	368	1120
	16:1	**Nm**	32	70	192	416	1280
	20:1	**Nm**	32	70	192	416	1280
	25:1	**Nm**	29	70	176	368	1120
	32:1	**Nm**	32	70	192	416	1280
	40:1	**Nm**	29	70	176	368	1120

(1) Force applied at mid-distance from the output shaft.

Lexium 15 motion control
BDH servo motors
Option: GBX planetary gearboxes

References

535526

Planetary gearbox GBX ●●●

Size	Speed reduction ratio	Reference (1)	Weight kg
GBX 40	3:1, 4:1, 5:1 and 8:1	**GBX 040 ●●● ●●● ●D**	0.350
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1 and 32:1	**GBX 040 ●●● ●●● ●D**	0.450
GBX 60	3:1, 4:1, 5:1 and 8:1	**GBX 060 ●●● ●●● ●D**	0.900
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 060 ●●● ●●● ●D**	1.100
GBX 80	3:1, 4:1, 5:1 and 8:1	**GBX 080 ●●● ●●● ●D**	2.100
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1 and 32:1	**GBX 080 ●●● ●●● ●D**	2.600
GBX 120	3:1, 4:1, 5:1 and 8:1	**GBX 120 ●●● ●●● ●D**	6.000
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 120 ●●● ●●● ●D**	8.000
GBX 160	3:1, 4:1, 5:1 and 8:1	**GBX 160 ●●● ●●● ●D**	18.000
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 160 ●●● ●●● ●D**	22.000

(1) To order a GBX planetary gearbox, complete each reference with:

			GBX ●●●	●●●	●●●	●	D
Size	Junction box diameter (see associations table with BDH servo motor, pages 3/150 to 3/153)	40 mm	**040**				
		60 mm	**060**				
		80 mm	**080**				
		115 mm	**120**				
		160 mm	**160**				
Speed reduction ratio		3:1		**003**			
		4:1		**004**			
		5:1		**005**			
		8:1		**008**			
		9:1		**009**			
		12:1		**012**			
		15:1		**015**			
		16:1		**016**			
		20:1		**020**			
		25:1		**025**			
		32:1		**032**			
		40:1		**040**			
Associated BDH servo motor	Type	BDH 040			**040**		
		BDH 058			**058**		
		BDH 070			**070**		
		BDH 084			**084**		
		BDH 108			**108**		
		BDH 138			**138**		
	Model	BDH ●●●1				**1**	
		BDH ●●●2				**2**	
		BDH ●●●3				**3**	
		BDH ●●●4				**4**	
		BDH ●●●5				**5**	
BDH servo motor adaptation							**D**

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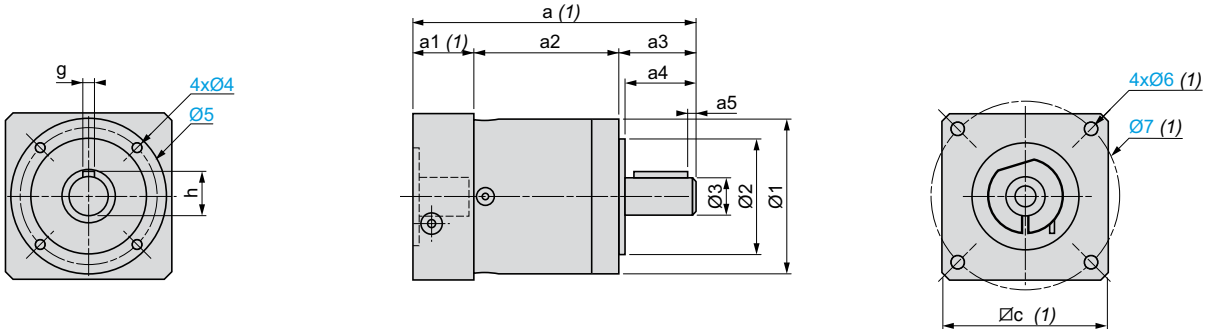
Lexium 15 motion control
BDH servo motors
Option: GBX planetary gearboxes

Dimensions

Servo motor assembly



GBX	a2	a3	a4	a5	h	g	Ø1	Ø2	Ø3	Ø4	Ø5
040 003...008	39	26	23	2.5	11.2	3	40	26 h7	10 h7	M4 x 6	34
040 009...032	52	26	23	2.5	11.2	3	40	26 h7	10 h7	M4 x 6	34
060 003...008	47	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
060 009...040	59	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
080 003...008	60.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
080 009...032	77.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
120 003...008	74	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
120 009...040	101	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
160 003...008	104	87	80	8	43	12	160	130 h7	40 h7	M12 x 20	145
160 009...040	153.5	87	80	8	43	12	160	130 h7	40 h7	M12 x 20	145

(1) Dimensions a, a1, Ø6, Ø7 and Øc depend on the planetary gearbox/BDH servo motor combination:

Associations		Speed reduction ratios	
Gearbox	**Servo motor**	**3:1 to 8:1**	**9:1 to 40:1**
		a	**a**
GBX 040	BDH 0401B…0582E	93.5	106.5
GBX 060	BDH 0582C…0701E	106.5	118.5
GBX 080	BDH 0701C…0843K	134	151
GBX 120	BDH 0701C…1082M	176.5	203.5
GBX 160	BDH 0842C…1385N	255.5	305

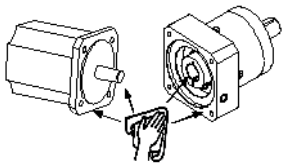
Mounting

No specialized tool is required to install the GBX planetary gearbox on the BDH servo motor. The general usage rules for mechanical mounting must be observed:

1 Clean support areas and joints.
2 Align the shafts to be linked and assemble in vertical position.
3 Join the servo motor flange to the gearbox flange in a uniform manner, with cross tightening of the screws.
4 Using a torque wrench, tighten the TA ring in accordance with the correct tightening torque (2…40 Nm depending on the gearbox model).

For more information, consult the user instructions supplied with the products.

1



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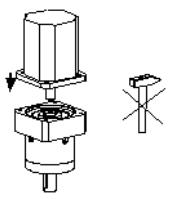

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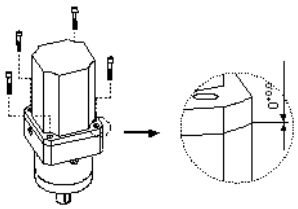

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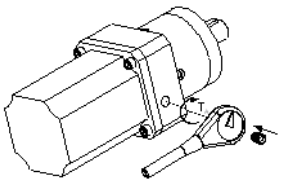

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BSH servo motor with straight connectors

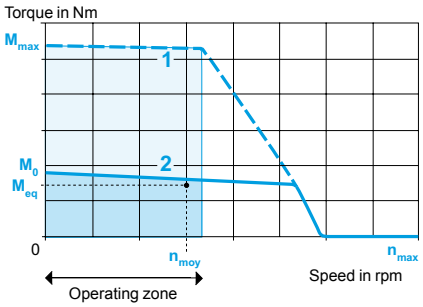
BSH servo motor with angled connectors

Presentation

BSH servo motors offer an excellent solution for dynamics and precision requirements. With five flange sizes and available in a variety of lengths, they are perfectly suited to most applications, covering a continuous stall torque range of 0.5 Nm to 90 Nm and speeds of up to 8000 rpm.
Incorporating the latest technology in their windings, based on salient poles, BSH servo motors are far more compact than conventional servo motors.

BSH servo motors are available in five flange sizes: 55, 70, 100, 140 and 205 mm.
Thermal protection is provided by a temperature probe integrated into the servo motor.
They are certified as "Recognized" ℛ by the Underwriters Laboratories and conform to UL 1004 standards as well as to European directives (CE marking).

BSH servo motors are available with the following variants:
- IP 50 or IP 65 degree of protection
- With or without holding brake
- Straight or angled connectors *(1)*
- SinCos Hiperface® single turn or multiturn encoders
- Untapped or keyed shaft end



Torque/speed characteristics

BSH servo motors provide torque/speed curve profiles similar to the example shown on the left with:
1 Peak torque, depending on the servo drive model
2 Continuous torque, depending on the servo drive model
where:
- n_{max} (in rpm) corresponds to the servo motor's maximum speed
- M_{max} (in Nm) represents the peak stall torque value
- M_0 (in Nm) represents the continuous stall torque value

Principle for determining motor size according to the application

The torque/speed curves can be used to determine the correct servo motor size. For example, for a power supply voltage of 230 V single phase, the curves used are curves 1 and 2. Then:
1 Position the work zone of the application in relation to speed
2 Verify, using the motor cycle trend diagram, that the torques required by the application during the different cycle phases are located within the area bound by curve 1 in the work zone.
3 Calculate the average speed n_{avg} and the equivalent thermal torque M_{eq} (see page 6/2).
4 The point defined by n_{avg} and M_{eq} must be located below curve 2 in the work zone.

Note: *Sizing of servo motors, see page 6/2*

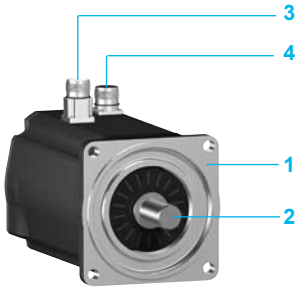
Functions

General functions

BSH servo motors were developed to meet the following requirements:
- Functional characteristics, robustness, safety, etc. in compliance with standard IEC/EN 60034-1
- Ambient operating temperature:
  - □ - 20...40°C in accordance with standard DIN 50019R14.
  - □ Maximum 55°C with derating from 40°C of 1% per additional °C
- Relative humidity: IEC 60721-3-3, category 3K4
- Maximum operating altitude: 1000 m without derating, 2000 m with k = 0.86, 3000 m with k = 0.8 *(2)*
- Storage and transport temperature: - 25...70°C
- Winding insulation class: F (threshold temperature for windings 155°C) in compliance with DIN VDE 0530
- Power and sensor connection using straight or angled connectors *(1)*
- Thermal protection by built-in PTC thermistor probe, controlled by the Lexium 15 servo drive

(1) The BSH 2052● and BSH 2053● servo motors are supplied with a power connection terminal and an angled connector for the sensor connection.
(2) k: derating factor

Characteristics: page 3/160
References: page 3/200
Dimensions: page 3/206



Functions (continued)

General functions (continued)

■ Out-of-round, concentricity and perpendicularity between flange and shaft in accordance with DIN 42955, class N
■ Authorized mounting positions: no mounting restriction IMB5, IMV1 and IMV3 in accordance with standard DIN 42950
■ Polyester resin-based paint: Opaque black paint RAL 9005
■ Degree of protection:
□ of the frame: IP 65 in accordance with standard IEC/EN 60529
□ of the shaft end: IP 50 *(1)* or IP 65 in accordance with standard IEC/EN 60529
■ Integrated sensor: SinCos Hiperface® high-resolution single turn or multiturn encoder
■ Untapped or keyed shaft end

Holding brake

BSH servo motors can be equipped with a failsafe electromagnetic holding brake.

⚠ **Do not use the holding brake as a dynamic brake for deceleration, as this will rapidly damage the brake.**

Integrated encoder

The servo motor is fitted with a SinCos Hiperface® high-resolution single turn (1,048,576 points) *(2)* or multiturn (1,048,576 points x 4096 turns) *(2)* absolute encoder providing angular precision of the shaft position, accurate to less than ±1.3 arc minutes.

This encoder performs the following functions:
■ Gives the angular position of the rotor in such a way that flows can be synchronized
■ Measures the servo motor speed via the associated Lexium 15 servo drive. This information is used by the speed controller of the servo drive
■ Measures the position information for the Lexium 15 servo drive position controller
■ Measures and transmits position information in incremental format for the position return of a motion control module (ESIM - Encoder SIMulation - output of the Lexium 15 servo drive)

Description

BSH servo motors with a 3-phase stator and a 6 to 10-pole rotor (depending on model) with Neodymium Iron Borium (NdFeB) magnets consisting of:
1 An axial flange with 4 fixing points
2 An untapped or keyed shaft end (depending on the model)
3 A straight dust and damp-proof male screw connector for connecting the power cable *(3)*
4 A straight dust and damp-proof male screw connector for connecting the control (encoder) cable *(3)*

Connecting cables must be ordered separately; for connection to Lexium 15 servo drives, see pages 3/203 to 3/205.

Schneider Electric has taken particular care to ensure compatibility between BSH servo motors and Lexium 15 servo drives. This compatibility can only be assured by using cables and connectors sold by Schneider Electric (see pages 3/203 to 3/205).

(1) - IP 50 when motor is mounted in position IMV3 (vertical mounting, shaft end at the top).
- IP54 mounted in position IMV1 (vertical mounting, with shaft end at the bottom) or position IMB5 (horizontal mounting).
(2) Encoder resolution given for use with a Lexium 15 servo drive.
(3) Available in angled version for BSH 055●●, BSH 070●●, BSH 100●●, BSH 140●● and BSH 2051● servo motors. The BSH 2052● and BSH 2053● servo motors are supplied with a power connection terminal and an angled connector for encoder connection.

Lexium 15 motion control
BSH servo motors

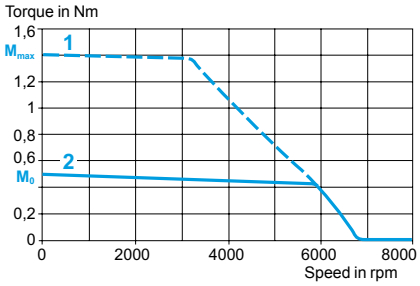
Characteristics of BSH 0551P/0551T servo motors

Type of servo motor				BSH 0551P		BSH 0551T
Associated with Lexium 15 servo drive				LXM 15LD13M3	LXM 15LU60N4	LXM 15LD13M3
Line supply voltage			V	230 single-phase	230 3-phase	230 3-phase
Torque	Continuous stall	M_0	Nm	0.5		
	Peak stall	M_{max}	Nm	1.4		1.24
Nominal operating point	Nominal torque		Nm	0.46		0.41
	Nominal speed		rpm	4000		8000
	Servo motor nominal output power		W	170		340
Maximum current			A rms	3.5		6.2
Servo motor characteristics						
Maximum mechanical speed			rpm	8000		
Constants (at 120°C)	Torque		Nm/A rms	0.5		0.28
	Back emf		V rms/ krpm	32		18
Rotor	Number of poles			6		
	Inertia	Without brake J_m	kgcm²	0.009		
		With brake J_m	kgcm²	0.1113		
Stator (at 20°C)	Resistance (phase/phase)		Ω	33.8		11
	Inductance (phase/phase)		mH	37		12
	Electrical time constant		ms	1.09		
Holding brake (depending on model)				See page 3/210		

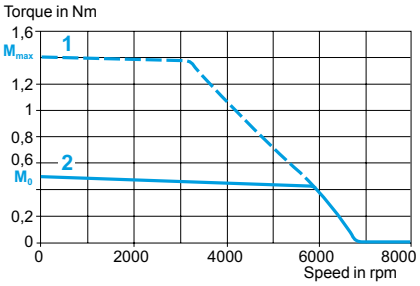
Torque/speed curves

BSH 0551P servo motor

With LXM 15LD13M3 servo drive
230 V single-phase

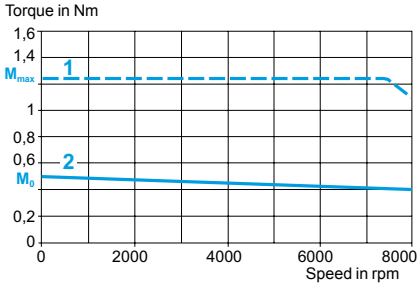


With LXM 15LU60N4 servo drive
230 V 3-phase



BSH 0551T servo motor

With LXM 15LD13M3 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

Presentation: page 3/158
References: page 3/200
Dimensions: page 3/206

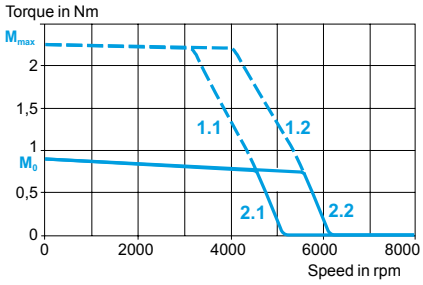
Characteristics of BSH 0552M servo motors

Type of servo motor				**BSH 0552M**	
Associated with Lexium 15 servo drive				**LXM 15LU60N4**	
Line supply voltage			**V**	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	0.9	
	Peak stall	M_{max}	**Nm**	2.25	
Nominal operating point	Nominal torque		**Nm**	0.77	
	Nominal speed		**rpm**	4000	5000
	Servo motor nominal output power		**W**	320	400
Maximum current			**A rms**	2.4	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	8000	
Constants (at 120°C)	Torque		**Nm/A rms**	1.125	
	Back emf		**V rms/ krpm**	74	
Rotor	Number of poles			6	
	Inertia	Without brake J_m	**kgcm²**	0.14	
		With brake J_m	**kgcm²**	0.1613	
Stator (at 20°C)	Resistance (phase/phase)		Ω	62	
	Inductance (phase/phase)		**mH**	76.8	
	Electrical time constant		**ms**	1.24	
Holding brake (depending on model)				See page 3/210	

Torque/speed curves

BSH 0552M servo motor

With LXM 15LU60N4 servo drive
400/480 V 3-phase



1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BSH 0552P servo motors

Type of servo motor				**BSH 0552P**		
Associated with Lexium 15 servo drive				**LXM 15LD13M3**		**LXM 15LU60N4**
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	0.9		
	Peak stall	M_{max}	**Nm**	2.5		2.26
Nominal operating point	Nominal torque		**Nm**	0.75		
	Nominal speed		**rpm**	4000		
	Servo motor nominal output power		**W**	310		
Maximum current			**A rms**	5.9		

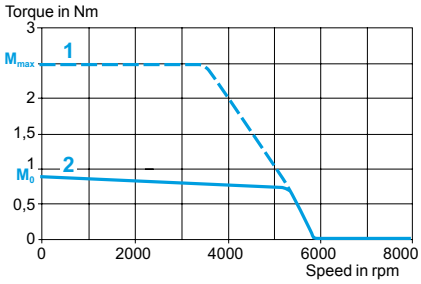
Servo motor characteristics

Maximum mechanical speed		**rpm**	8000
Constants (at 120°C)	Torque	**Nm/A rms**	0.56
	Back emf	**V rms/ krpm**	37
Rotor	Number of poles		6
	Inertia — Without brake J_m	**kgcm²**	0.14
	With brake J_m	**kgcm²**	0.1113
Stator (at 20°C)	Resistance (phase/phase)	Ω	15.5
	Inductance (phase/phase)	**mH**	19.2
	Electrical time constant	**ms**	1.24
Holding brake (depending on model)			See page 3/210

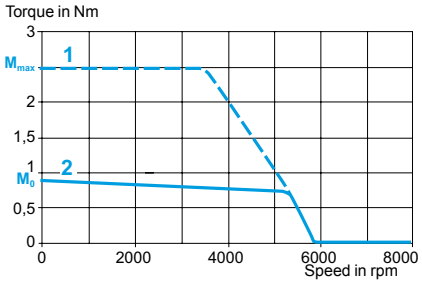
Torque/speed curves

BSH 0552P servo motor

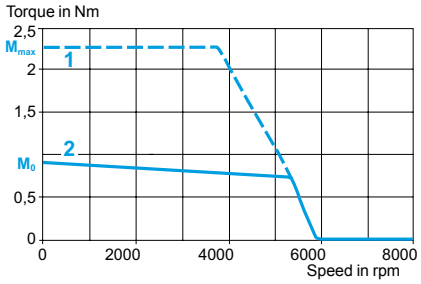
With LXM 15LD13M3 servo drive
230 V single-phase



230 V 3-phase



With LXM 15LU60N4 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BSH 0552T servo motors

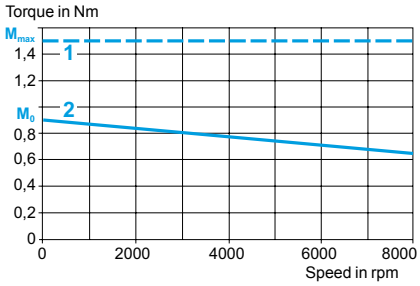
Type of servo motor				**BSH 0552T**	
Associated with Lexium 15 servo drive				**LXM 15LD13M3**	
Line supply voltage			**V**	230 single-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	0.9	
	Peak stall	M_{max}	**Nm**	1.5	
Nominal operating point	Nominal torque		**Nm**	0.72	0.68
	Nominal speed		**rpm**	6000	8000
	Servo motor nominal output power		**W**	450	570
Maximum current			**A rms**	10.3	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	8000	
Constants (at 120°C)	Torque		**Nm/A rms**	0.32	
	Back emf		**V rms/ krpm**	21	
Rotor	Number of poles			6	
	Inertia	Without brake J_m	**kgcm²**	0.14	
		With brake J_m	**kgcm²**	0.1613	
Stator (at 20°C)	Resistance (phase/phase)		Ω	5	
	Inductance (phase/phase)		**mH**	6.2	
	Electrical time constant		**ms**	1.24	
Holding brake (depending on model)				See page 3/210	

Torque/speed curves

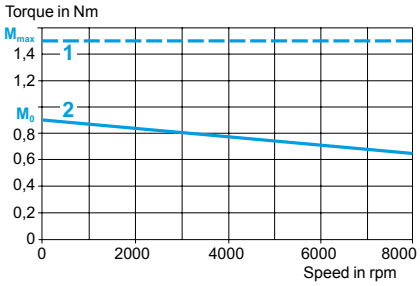
BSH 0552T servo motor

With LXM 15LD13M3 servo drive

230 V single-phase



230 V 3-phase



1 Peak torque
2 Continuous torque

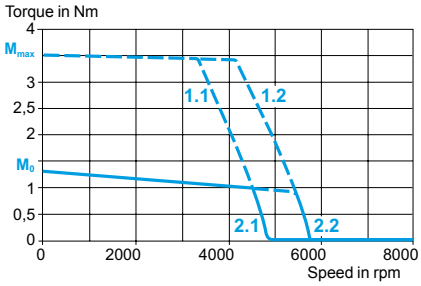
Characteristics of BSH 0553M/0553P servo motors

Type of servo motor				BSH 0553M		BSH 0553P		
Associated with Lexium 15 servo drive				LXM 15LU60N4		LXM 15LD13M3		LXM 15LD10N4
Line supply voltage			V	400 3-phase	480 3-phase	230 single-phase	230 3-phase	400 3-phase
Torque	Continuous stall	M_0	Nm	1.3				
	Peak stall	M_{max}	Nm	3.5		2.7		3.87
Nominal operating point	Nominal torque		Nm	1.1		1.08		0.8
	Nominal speed		rpm	4000	5000	3000		8000
	Servo motor nominal output power		W	460	524	340		670
Maximum current			A rms	3.6		8.7		
Servo motor characteristics								
Maximum mechanical speed			rpm	8000				
Constants (at 120°C)	Torque		Nm/A rms	1.18		0.59		
	Back emf		V rms/krpm	78		39		
Rotor	Number of poles			6				
	Inertia	Without brake J_m	kgcm²	0.19				
		With brake J_m	kgcm²	0.2113				
Stator (at 20°C)	Resistance (phase/phase)		Ω	32		8		
	Inductance (phase/phase)		mH	48		12		
	Electrical time constant		ms	1.5				
Holding brake (depending on model)				See page 3/210				

Torque/speed curves

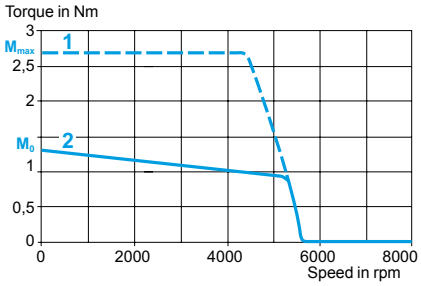
BSH 0553M servo motor

With LXM 15LU60N4 servo drive
400/480 V 3-phase

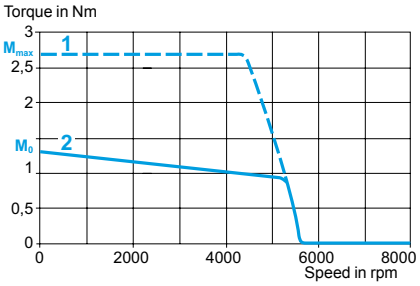


BSH 0553P servo motor

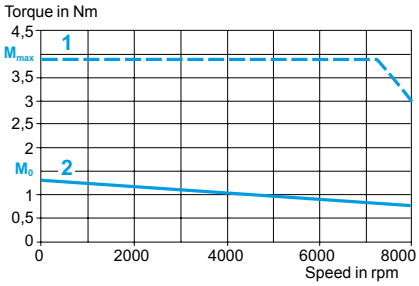
With LXM 15LD13M3 servo drive
230 V single-phase



230 V 3-phase



With LXM 15LD10N4 servo drive
400 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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References: page 3/200
Dimensions: page 3/206

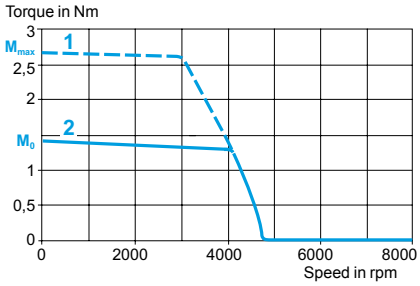
Characteristics of BSH 0701P servo motors

Type of servo motor				**BSH 0701P**	
Associated with Lexium 15 servo drive				**LXM 15LD13M3**	**LXM 15LU60N4**
Line supply voltage			**V**	230 single-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	1.4	
	Peak stall	M_{max}	**Nm**	2.66	
Nominal operating point	Nominal torque		**Nm**	1.31	
	Nominal speed		**rpm**	3000	
	Servo motor nominal output power		**W**	411	
Maximum current			**A rms**	5.3	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	8000	
Constants (at 120°C)	Torque		**Nm/A rms**	0.78	
	Back emf		**V rms/ krpm**	46	
Rotor	Number of poles			6	
	Inertia	Without brake J_m	**kgcm²**	0.25	
		With brake J_m	**kgcm²**	0.322	
Stator (at 20°C)	Resistance (phase/phase)		Ω	38.4	
	Inductance (phase/phase)		**mH**	42.6	
	Electrical time constant		**ms**	4.1	
Holding brake (depending on model)				See page 3/210	

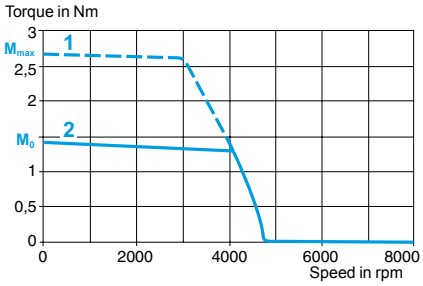
Torque/speed curves

BSH 0701P servo motor

With LXM 15LD13M3 servo drive
230 V single-phase



With LXM 15LU60N4 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

Presentation: page 3/158
References: page 3/200
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Characteristics of BSH 0701T servo motors

Type of servo motor				**BSH 0701T**				
Associated with Lexium 15 servo drive				**LXM 15LD13M3**		**LXM15LD21M3**	**LXM 15LU60N4**	
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	230 3-phase	400/480 3-phase
Torque	Continuous stall	M_0	**Nm**	1.4			0.91	0.7
	Peak stall	M_{max}	**Nm**	3.19			1.9	
Nominal operating point	Nominal torque		**Nm**	1.25			0.7	
	Nominal speed		**rpm**	5000			6000	8000
	Servo motor nominal output power		**W**	654			440	586
Maximum current			**A rms**	9.9				

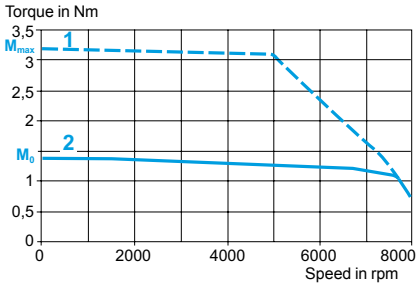
Servo motor characteristics

Maximum mechanical speed		**rpm**	8000
Constants (at 120°C)	Torque	**Nm/A rms**	0.45
	Back emf	**V rms/ krpm**	26
Rotor	Number of poles		6
	Inertia Without brake J_m	**kgcm²**	0.25
	With brake J_m	**kgcm²**	0.322
Stator (at 20°C)	Resistance (phase/phase)	Ω	3.4
	Inductance (phase/phase)	**mH**	14.1
	Electrical time constant	**ms**	4.15
Holding brake (depending on model)			See page 3/210

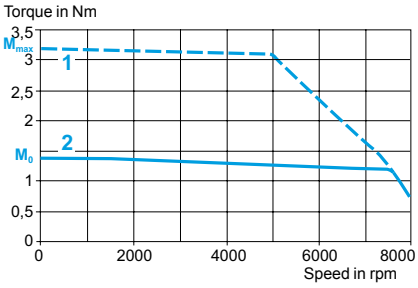
Torque/speed curves

BSH 0701T servo motor

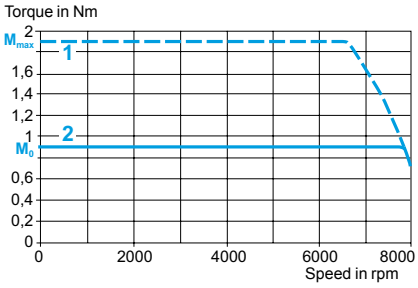
With LXM 15LD13M3 servo drive
230 V single-phase



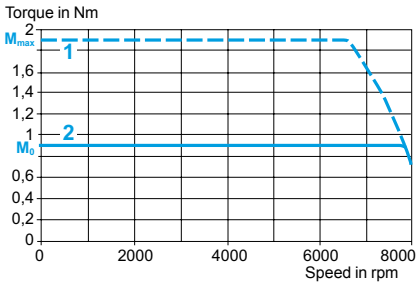
230 V 3-phase



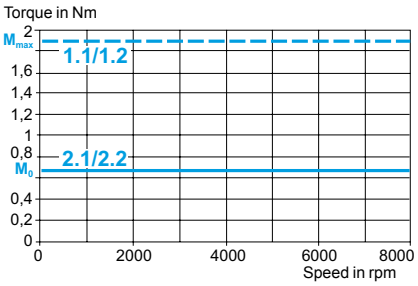
With LXM 15LD21M3 servo drive
400/480 V 3-phase



With LXM 15LU60N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BSH 0701T servo motors (continued)

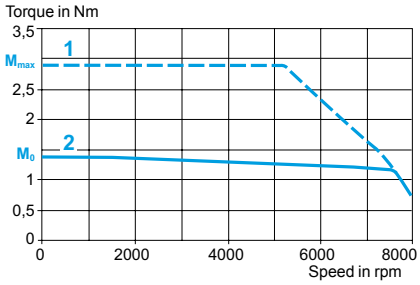
Type of servo motor				**BSH 0701T**	
Associated with Lexium 15 servo drive				**LXM 15LD10N4**	
Line supply voltage			**V**	230 3-phase	400/480 3-phase
Torque	Continuous stall	M_0	**Nm**	1.4	
	Peak stall	M_{max}	**Nm**	2.91	
Nominal operating point	Nominal torque		**Nm**	1.25	1.23
	Nominal speed		**rpm**	5000	8000
	Servo motor nominal output power		**W**	654	1000
Maximum current			**A rms**	9.9	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	8000	
Constants (at 120°C)	Torque		**Nm/A rms**	0.45	
	Back emf		**V rms/ krpm**	26	
Rotor	Number of poles			6	
	Inertia	Without brake J_m	**kgcm²**	0.25	
		With brake J_m	**kgcm²**	0.322	
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.4	
	Inductance (phase/phase)		**mH**	14.1	
	Electrical time constant		**ms**	4.15	
Holding brake (depending on model)				See page 3/210	

Torque/speed curves

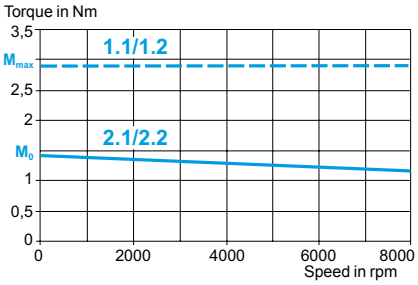
BSH 0701T servo motor

With LXM 15LD10N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BSH 0702M/0702P servo motors

Type of servo motor				BSH 0702M		BSH 0702P			
Associated with Lexium 15 servo drive				LXM 15LU60N4		LXM 15LD13M3	LXM 15LD10N4		
Line supply voltage			V	400 3-phase	480 3-phase	230 single-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	Nm	2.12		2.2			
	Peak stall	M_{max}	Nm	5.63			4.85		
Nominal operating point	Nominal torque		Nm	1.89	1.8	1.9		1.65	1.55
	Nominal speed		rpm	3000	4000	3000		6000	8000
	Servo motor nominal output power		W	594	753	597		1000	1300
Maximum current			A rms	5.9		11.8			

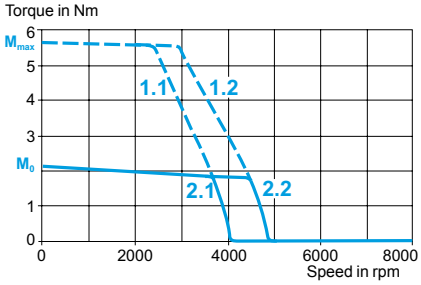
Servo motor characteristics

Maximum mechanical speed		rpm	8000		
Constants (at 120°C)	Torque	Nm/A rms	1.46	0.77	
	Back emf	V rms/krpm	93	48	
Rotor	Number of poles		6		
	Inertia Without brake J_m	kgcm²	0.41		
	With brake J_m	kgcm²	0.482		
Stator (at 20°C)	Resistance (phase/phase)	Ω	17.3	4.2	
	Inductance (phase/phase)	mH	84.4	19	
	Electrical time constant	ms	4.88	4.52	
Holding brake (depending on model)			See page 3/210		

Torque/speed curves

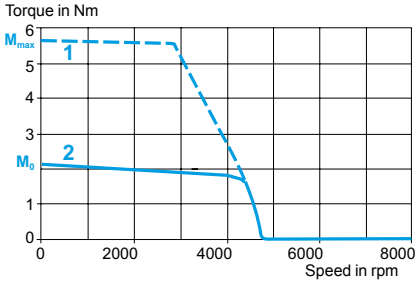
BSH 0702M servo motor

With LXM 15LU60N4 servo drive
400/480 V 3-phase

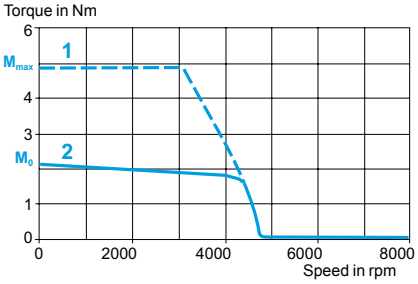


BSH 0702P servo motor

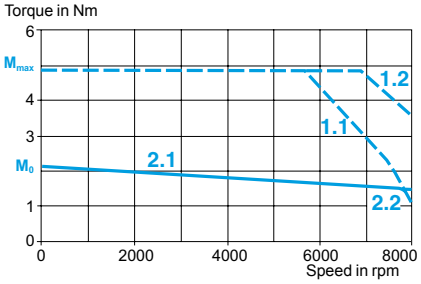
With LXM 15LD13M3 servo drive
230 V single-phase



With LXM 15LD10N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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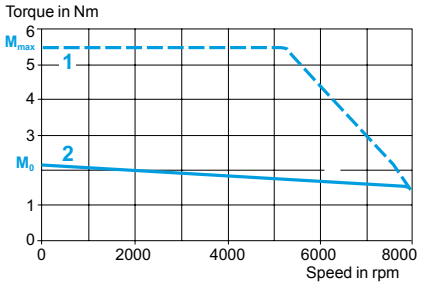
Characteristics of BSH 0702T servo motors

Type of servo motor				**BSH 0702T**	
Associated with Lexium 15 servo drive				**LXM 15LD21M3**	**LXM 15LD17N4**
Line supply voltage			**V**	230 3-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	2.12	
	Peak stall	M_{max}	**Nm**	5.45	4.47
Nominal operating point	Nominal torque		**Nm**	1.66	
	Nominal speed		**rpm**	6000	
	Servo motor nominal output power		**W**	1000	
Maximum current			**A rms**	20.6	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	8000	
Constants (at 120°C)	Torque		**Nm/A rms**	0.42	
	Back emf		**V rms/ krpm**	28	
Rotor	Number of poles			6	
	Inertia	Without brake J_m	**kgcm²**	0.41	
		With brake J_m	**kgcm²**	0.482	
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.5	
	Inductance (phase/phase)		**mH**	6.6	
	Electrical time constant		**ms**	4.5	
Holding brake (depending on model)				See page 3/210	

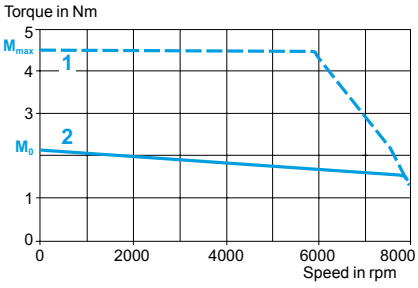
Torque/speed curves

BSH 0702T servo motor

With LXM 15LD21M3 servo drive
230 V 3-phase



With LXM 15LD17N4 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

Characteristics of BSH 0703P servo motors

Type of servo motor				**BSH 0703P**				
Associated with Lexium 15 servo drive				**LXM 15LD13M3**	**LXM 15LD21M3**		**LXM 15LD17N4**	
Line supply voltage			**V**	230 3-phase	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	2.23	2.83			
	Peak stall	M_{max}	**Nm**	6	5.99	9.28	7.71	
Nominal operating point	Nominal torque		**Nm**	2.23	2.4		2	1.96
	Nominal speed		**rpm**	3000			6000	7000
	Servo motor nominal output power		**W**	700	750		1300	1400
Maximum current			**A rms**	15.2				

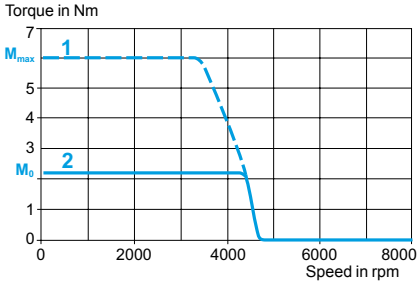
Servo motor characteristics

Maximum mechanical speed		**rpm**	8000
Constants (at 120°C)	Torque	**Nm/A rms**	0.78
	Back emf	**V rms/ krpm**	49
Rotor	Number of poles		6
	Inertia — Without brake J_m	**kgcm²**	0.58
	Inertia — With brake J_m	**kgcm²**	0.81
Stator (at 20°C)	Resistance (phase/phase)	Ω	2.7
	Inductance (phase/phase)	**mH**	14.6
	Electrical time constant	**ms**	5.41
Holding brake (depending on model)			See page 3/210

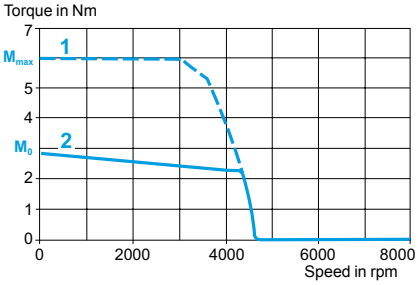
Torque/speed curves

BSH 0703P servo motor

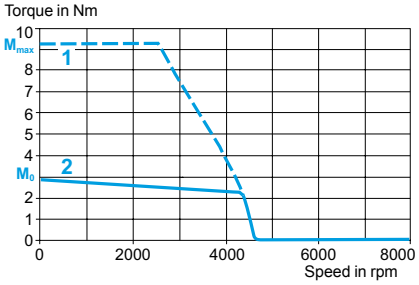
With LXM 15LD13M3 servo drive
230 V 3-phase



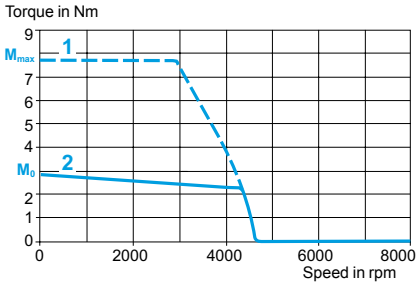
With LXM 15LD21M3 servo drive
230 V single-phase



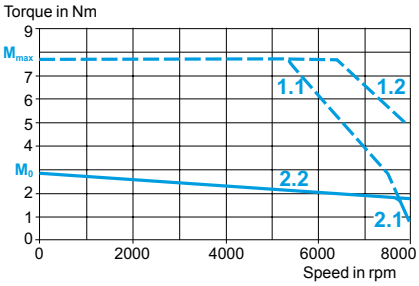
230 V 3-phase



With LXM 15LD17N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BSH 0703P (continued) /0703T servo motors

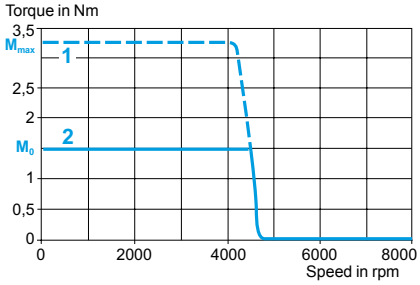
Type of servo motor				BSH 0703P						BSH 0703T
Associated with Lexium 15 servo drive				LXM 15LU60N4			LXM 15LD10N4			LXM 15LD28M3
Line supply voltage			V	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase	230 3-phase
Torque	Continuous stall	M_0	Nm	1.5	1.1		2.4			2.83
	Peak stall	M_{max}	Nm	3.3			5.3			7.38
Nominal operating point	Nominal torque		Nm	1.12			2.4	2	1.8	2
	Nominal speed		rpm	3000	6000	8000	3000	6000	8000	6000
	Servo motor nominal output power		W	350	700	950	750	1250	1500	1250
Maximum current			A rms	15.2						30.9
Servo motor characteristics										
Maximum mechanical speed			rpm	8000						
Constants (at 120°C)	Torque		Nm/A rms	0.78						0.42
	Back emf		V rms/krpm	49						29
Rotor	Number of poles			6						
	Inertia	Without brake J_m	kgcm²	0.58						
		With brake J_m	kgcm²	0.81						
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.7						0.9
	Inductance (phase/phase)		mH	14.6						5
	Electrical time constant		ms	5.41						5.55
Holding brake (depending on model)				See page 3/210						

Torque/speed curves

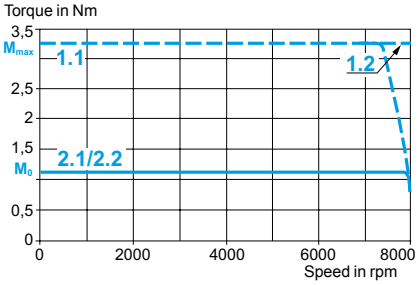
BSH 0703P servo motor

With LXM 15LU60N4 servo drive

230 V 3-phase



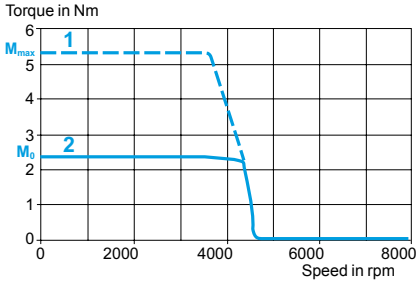
400/480 V 3-phase



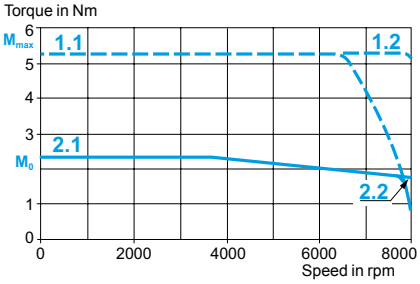
BSH 0703P servo motor *(continued)*

With LXM 15LD10N4 servo drive

230 V 3-phase



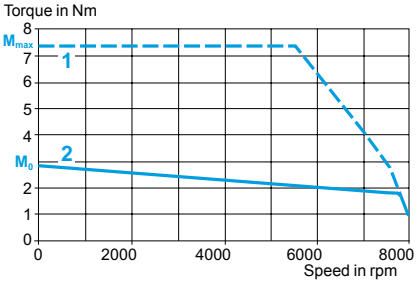
400/480 V 3-phase



BSH 0703T servo motor

With LXM 15LD28M3 servo drive

230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BSH 1001P servo motors

Type of servo motor				**BSH 1001P**				
Associated with Lexium 15 servo drive				**LXM 15LD21M3**		**LXM 15LD10N4**		
Line supply voltage			**V**	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	3.39		2.7	3.39	
	Peak stall	M_{max}	**Nm**	7.08		6.19		
Nominal operating point	Nominal torque		**Nm**	3		2.7		2.5
	Nominal speed		**rpm**	3000		3000	4500	6000
	Servo motor nominal output power		**W**	950		850	1300	1500
Maximum current			**A rms**	12				

Servo motor characteristics

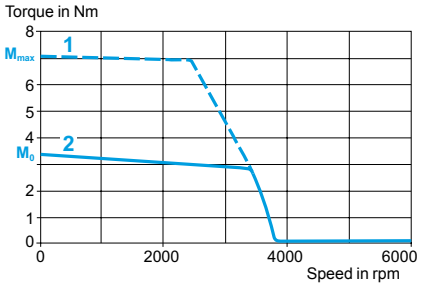
Maximum mechanical speed			**rpm**	6000
Constants (at 120°C)	Torque		**Nm/A rms**	0.89
	Back emf		**V rms/ krpm**	60
Rotor	Number of poles			8
	Inertia	Without brake J_m	**kgcm²**	1.4
		With brake J_m	**kgcm²**	2.018
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.8
	Inductance (phase/phase)		**mH**	19
	Electrical time constant		**ms**	5
Holding brake (depending on model)				See page 3/210

Torque/speed curves

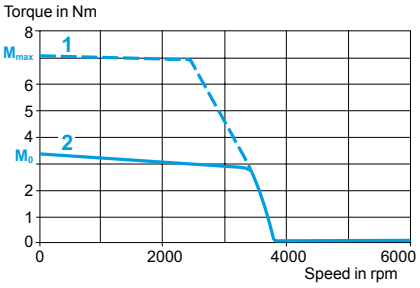
BSH 1001P servo motor

With LXM 15LD21M3 servo drive

230 V single-phase

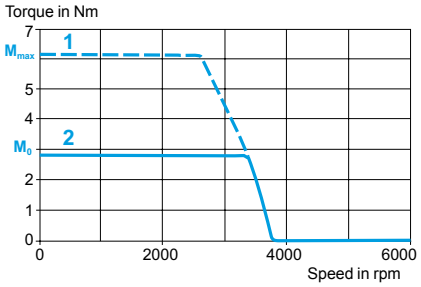


230 V 3-phase

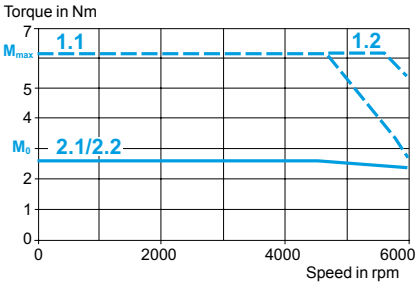


With LXM 15LD10N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/206

Characteristics of BSH 1001P (continued) /1001T servo motors

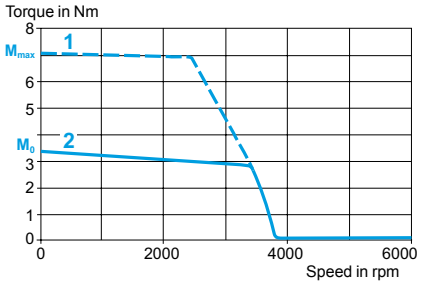
Type of servo motor				BSH 1001P			BSH 1001T
Associated with Lexium 15 servo drive				LXM 15LD17N4			LXM 15LD28M3
Line supply voltage			V	230 3-phase	400 3-phase	480 3-phase	230 3-phase
Torque	Continuous stall	M_0	Nm	3.39			
	Peak stall	M_{max}	Nm	7.08			8.5
Nominal operating point	Nominal torque		Nm	3	2.7	2.5	2.75
	Nominal speed		rpm	3000	4500	6000	4000
	Servo motor nominal output power		W	950	1300	1500	1150
Maximum current			A rms	12			23
Servo motor characteristics							
Maximum mechanical speed			rpm	6000			
Constants (at 120°C)	Torque		Nm/A rms	0.89			0.51
	Back emf		V rms/ krpm	60			28
Rotor	Number of poles			8			
	Inertia	Without brake J_m	kgcm²	1.4			
		With brake J_m	kgcm²	2.018			
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.8			0.9
	Inductance (phase/phase)		mH	19			4.3
	Electrical time constant		ms	5			4.78
Holding brake (depending on model)				See page 3/210			

Torque/speed curves

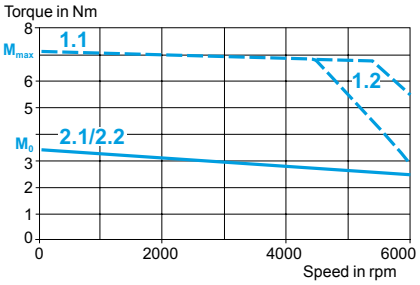
BSH 1001P servo motor

With LXM 15LD17N4 servo drive

230 V 3-phase



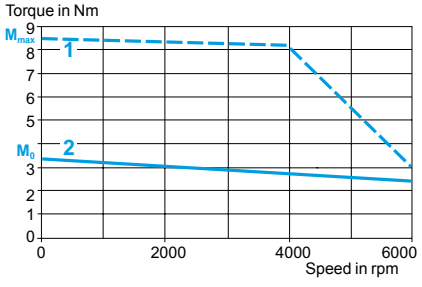
400/480 V 3-phase



BSH 1001T servo motor

With LXM 15LD28M3 servo drive

230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Dimensions: page 3/206

Characteristics of BSH 1002P servo motors

Type of servo motor				**BSH 1002P**					
Associated with Lexium 15 servo drive				**LXM 15LD13M3**	**LXM 15LD21M3**		**LXM 15LD10N4**		
Line supply voltage			**V**	230 3-phase	230 single-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	3.4	4.5	5.8	3.4		
	Peak stall	M_{max}	**Nm**	5.6	9.39	14.79	8		
Nominal operating point	Nominal torque		**Nm**	3.4	4.5	4.8	3.4		
	Nominal speed		**rpm**	2500	2000		2500	4500	6000
	Servo motor nominal output power		**W**	840	950		890	1600	2150
Maximum current			**A rms**	17.1					

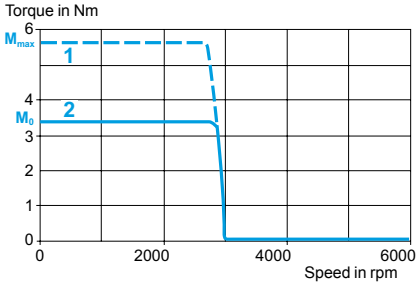
Servo motor characteristics

Maximum mechanical speed		**rpm**	6000
Constants (at 120°C)	Torque	**Nm/A rms**	1.21
	Back emf	**V rms/ krpm**	77
Rotor	Number of poles		8
	Inertia Without brake J_m	**kgcm²**	2.31
	With brake J_m	**kgcm²**	2.928
Stator (at 20°C)	Resistance (phase/phase)	Ω	2.4
	Inductance (phase/phase)	**mH**	13.5
	Electrical time constant	**ms**	5.63
Holding brake (depending on model)			See page 3/210

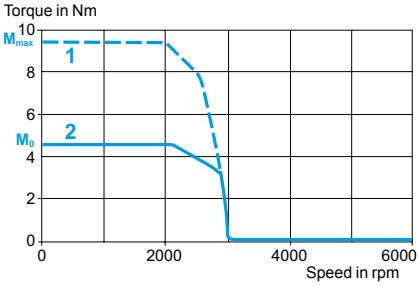
Torque/speed curves

BSH 1002P servo motor

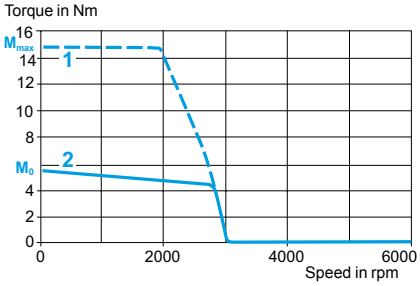
With LXM 15LD13M3 servo drive
230 V 3-phase



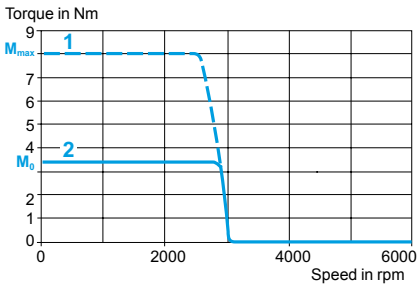
With LXM 15LD21M3 servo drive
230 V single-phase



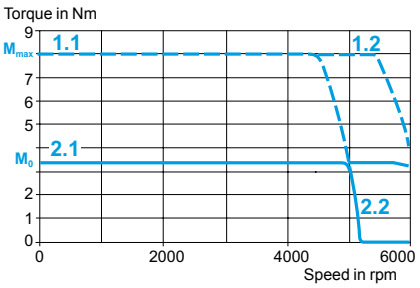
230 V 3-phase



With LXM 15LD10N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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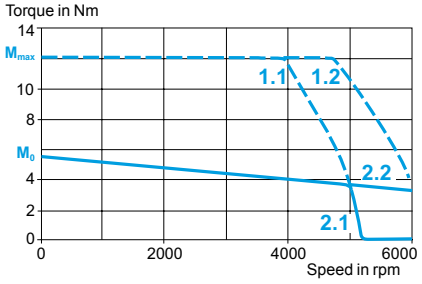
Characteristics of BSH 1002P (continued) /1002T servo motors

Type of servo motor				BSH 1002P		BSH 1002T
Associated with Lexium 15 servo drive				LXM 15LD17N4		LXM 15LD28M3
Line supply voltage			V	400 3-phase	480 3-phase	230 3-phase
Torque	Continuous stall	M_0	Nm	5.8		5.5
	Peak stall	M_{max}	Nm	12.13		11.59
Nominal operating point	Nominal torque		Nm	4	3.7	4
	Nominal speed		rpm	4000	5000	4000
	Servo motor nominal output power		W	1700	1950	1700
Maximum current			A rms	17.1		31.2
Servo motor characteristics						
Maximum mechanical speed			rpm	6000		
Constants (at 120°C)	Torque		Nm/A rms	1.21		0.64
	Back emf		V rms/ krpm	77		33
Rotor	Number of poles			8		
	Inertia	Without brake J_m	kgcm²	2.31		
		With brake J_m	kgcm²	2.928		
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.4		0.6
	Inductance (phase/phase)		mH	13.5		2.9
	Electrical time constant		ms	5.63		4.83
Holding brake (depending on model)				See page 3/210		

Torque/speed curves

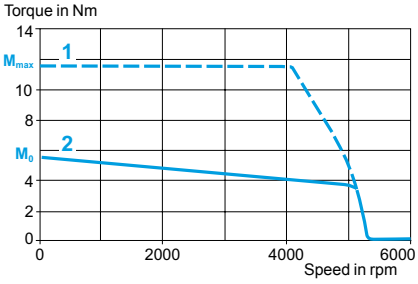
BSH 1002P servo motor

With LXM 15LD17N4 servo drive
400/480 V 3-phase



BSH 1002T servo motor

With LXM 15LD28M3 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 3/158
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Dimensions: page 3/206

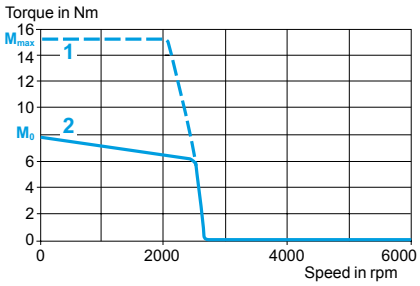
Characteristics of BSH 1003M servo motors

Type of servo motor				**BSH 1003M**			
Associated with Lexium 15 servo drive				**LXM 15LD10N4**	**LXM 15LD17N4**		
Line supply voltage			**V**	400 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	7.76			
	Peak stall	M_{max}	**Nm**	15.19	22.95		
Nominal operating point	Nominal torque		**Nm**	6.36	7	6.5	
	Nominal speed		**rpm**	2000	1000	2000	
	Servo motor nominal output power		**W**	1300	750	1400	
Maximum current			**A rms**	15.6			
Servo motor characteristics							
Maximum mechanical speed			**rpm**	6000			
Constants (at 120°C)	Torque		**Nm/A rms**	2.22			
	Back emf		**V rms/ krpm**	1.44			
Rotor	Number of poles			8			
	Inertia	Without brake J_m	**kgcm²**	3.22			
		With brake J_m	**kgcm²**	3.838			
Stator (at 20°C)	Resistance (phase/phase)		Ω	5.3			
	Inductance (phase/phase)		**mH**	33.7			
	Electrical time constant		**ms**	6.36			
Holding brake (depending on model)				See page 3/210			

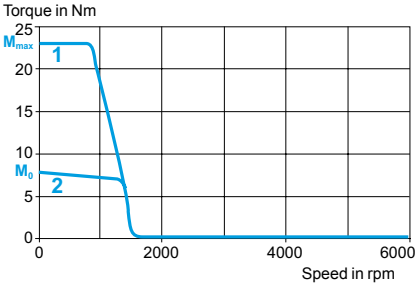
Torque/speed curves

BSH 1003M servo motor

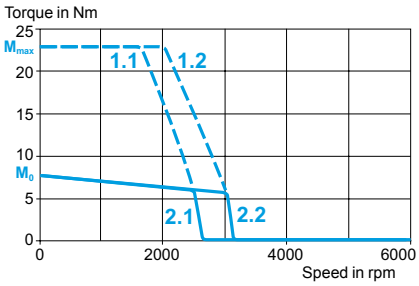
With LXM 15LD10N4 servo drive
400 V 3-phase



With LXM 15LD17N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 3/158
References: page 3/200
Dimensions: page 3/206

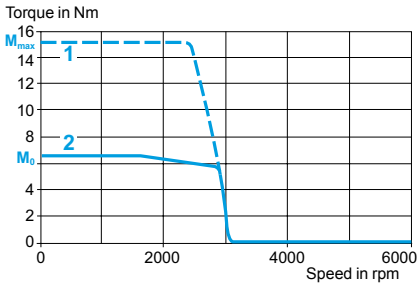
Characteristics of BSH 1003P servo motors

Type of servo motor				**BSH 1003P**							
Associated with Lexium 15 servo drive				**LXM 15LD21M3**	**LXM 15LD28M3**	**LXM 15LD17N4**			**LXM 15MD28N4**		**LXM 15MD40N4**	
Line supply voltage			**V**	230 3-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase	400 3-phase	480 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	6.7	7.8	6.7			7.8			
	Peak stall	M_{max}	**Nm**	15.5	19.69	12.5			19.69		23.17	
Nominal operating point	Nominal torque		**Nm**	6	6.3	6	4.7	3.7	5	4.6	5	4.6
	Nominal speed		**rpm**	2500	2000	2500	4500	6000	4000	4500	4000	4500
	Servo motor nominal output power		**W**	1700	1300	1700	2200	2300	2000	2200	2000	2200
Maximum current			**A rms**	28.3								
Servo motor characteristics												
Maximum mechanical speed			**rpm**	6000								
Constants (at 120°C)	Torque		**Nm/A rms**	1.22								
	Back emf		**V rms/ krpm**	77								
Rotor	Number of poles			8								
	Inertia	Without brake J_m	**kgcm²**	3.22								
		With brake J_m	**kgcm²**	3.838								
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.43								
	Inductance (phase/phase)		**mH**	9.4								
	Electrical time constant		**ms**	6.57								
Holding brake (depending on model)				See page 3/210								

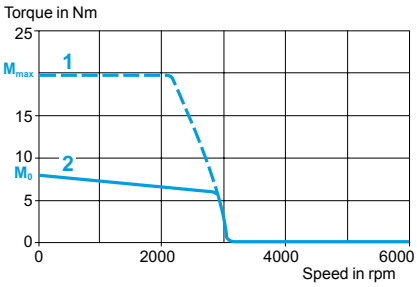
Torque/speed curves

BSH 1003P servo motor

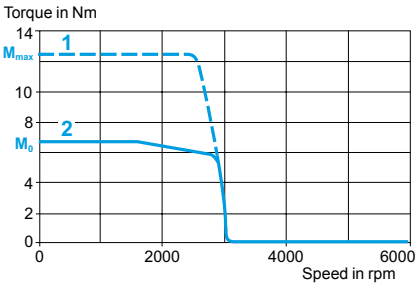
With LXM 15LD21M3 servo drive
230 V 3-phase



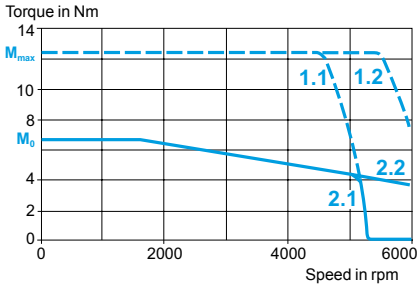
With LXM 15LD28M3 servo drive
230 V 3-phase



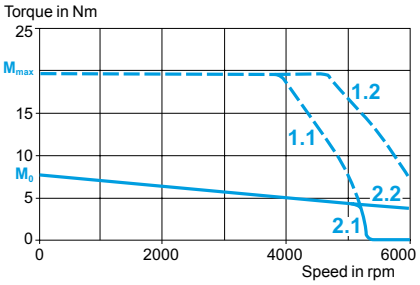
With LXM 15LD17N4 servo drive
230 V 3-phase



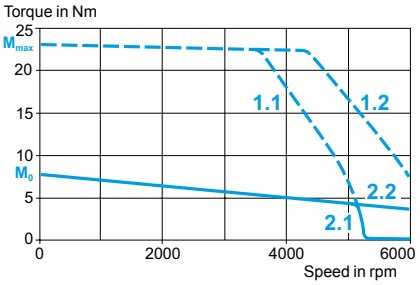
With LXM 15LD17N4 servo drive
400/480 V 3-phase



With LXM 15MD28N4 servo drive
400/480 V 3-phase



With LXM 15MD40N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BSH 1004M servo motors

Type of servo motor				BSH 1004M				
Associated with Lexium 15 servo drive				LXM 15LD10N4	LXM 15LD17N4		LXM 15MD40N4	
Line supply voltage			V	400 3-phase	400 3-phase	480 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	Nm	9.31				
	Peak stall	M_{max}	Nm	19.8	29.87		34.17	
Nominal operating point	Nominal torque		Nm	8.2		8	8.2	8
	Nominal speed		rpm	1500		2000	1500	2000
	Servo motor nominal output power		W	1300		1700	1300	1700
Maximum current			A rms	17.4				

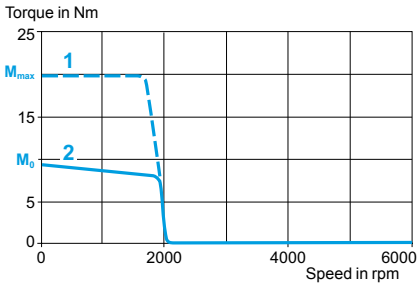
Servo motor characteristics

Maximum mechanical speed			rpm	6000
Constants (at 120°C)	Torque		Nm/A rms	3
	Back emf		V rms/krpm	195
Rotor	Number of poles			8
	Inertia	Without brake J_m	kgcm²	4.22
		With brake J_m	kgcm²	5.245
Stator (at 20°C)	Resistance (phase/phase)		Ω	7.1
	Inductance (phase/phase)		mH	43.9
	Electrical time constant		ms	6.18
Holding brake (depending on model)				See page 3/210

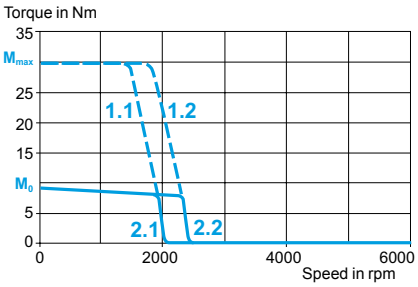
Torque/speed curves

BSH 1004M servo motor

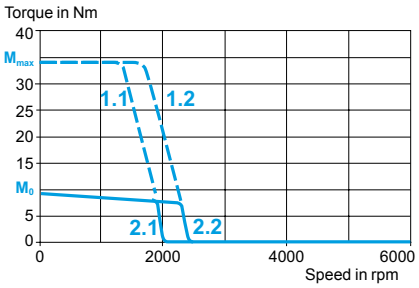
With LXM 15LD10N4 servo drive
400 V 3-phase



With LXM 15LD17N4 servo drive
400/480 V 3-phase



With LXM 15MD40N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

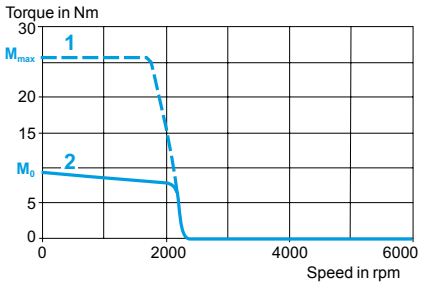
Characteristics of BSH 1004P servo motors

Type of servo motor				**BSH 1004P**						
Associated with Lexium 15 servo drive				**LXM 15LD28M3**	**LXM 15MD28N4**			**LXM 15MD40N4**		
Line supply voltage			**V**	230 3-phase	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	9.31						
	Peak stall	M_{max}	**Nm**	25.7				33.83		
Nominal operating point	Nominal torque		**Nm**	8.22		7	6.5	8.18	7.17	6.69
	Nominal speed		**rpm**	1500		3000	4000	1500	3000	3500
	Servo motor nominal output power		**W**	1300		2200	2700	1300	2300	2400
Maximum current			**A rms**	34.8						
Servo motor characteristics										
Maximum mechanical speed			**rpm**	6000						
Constants (at 120°C)	Torque		**Nm/A rms**	1.62						
	Back emf		**V rms/ krpm**	103						
Rotor	Number of poles			8						
	Inertia	Without brake J_m	**kgcm²**	4.22						
		With brake J_m	**kgcm²**	5.245						
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.81						
	Inductance (phase/phase)		**mH**	13						
	Electrical time constant		**ms**	7.18						
Holding brake (depending on model)				See page 3/210						

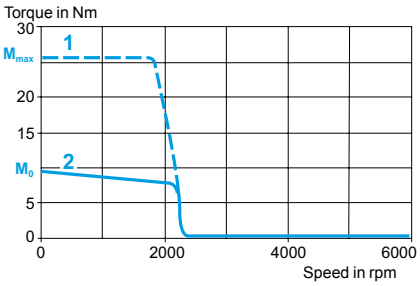
Torque/speed curves

BSH 1004P servo motor

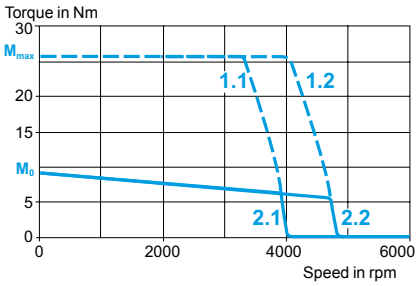
With LXM 15LD28M3 servo drive
230 V 3-phase



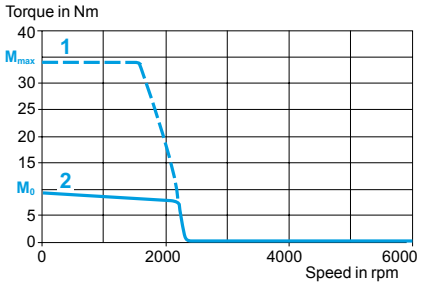
With LXM 15MD28N4 servo drive
230 V 3-phase



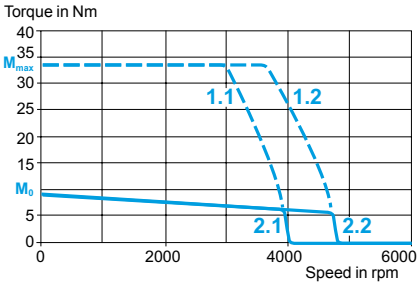
400/480 V 3-phase



With LXM 15MD40N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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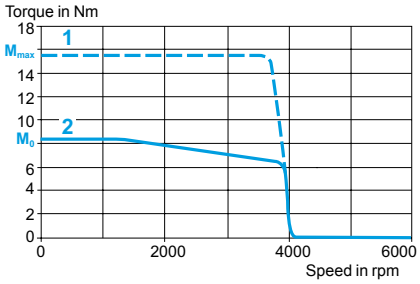
Characteristics of BSH 1004T servo motors

Type of servo motor				BSH 1004T	
Associated with Lexium 15 servo drive				**LXM 15LD28M3**	**LXM 15MD40N4**
Line supply voltage			**V**	230 3-phase	230 3-phase
Torque	Continuous stall	M_0	**Nm**	8.18	9.31
	Peak stall	M_{max}	**Nm**	15.7	21.04
Nominal operating point	Nominal torque		**Nm**	7	
	Nominal speed		**rpm**	3500	
	Servo motor nominal output power		**W**	2500	
Maximum current			**A rms**	34.8	61
Servo motor characteristics					
Maximum mechanical speed			**rpm**	6000	
Constants (at 120°C)	Torque		**Nm/A rms**	1.62	0.86
	Back emf		**V rms/ krpm**	103	50
Rotor	Number of poles			8	
	Inertia	Without brake J_m	**kgcm²**	4.22	
		With brake J_m	**kgcm²**	5.245	
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.81	0.45
	Inductance (phase/phase)		**mH**	13	2.9
	Electrical time constant		**ms**	7.18	6.44
Holding brake (depending on model)				See page 3/210	

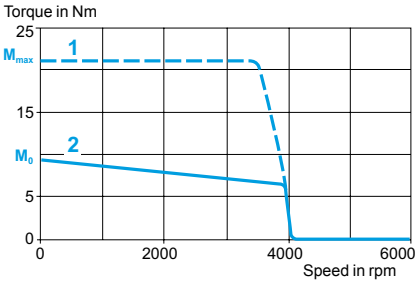
Torque/speed curves

BSH 1004T servo motor

With LXM 15LD28M3 servo drive
230 V 3-phase



With LXM 15MD40N4 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

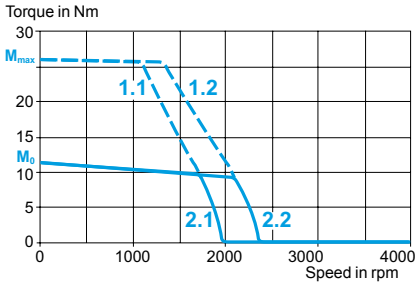
Characteristics of BSH 1401M servo motors

Type of servo motor				**BSH 1401M**	
Associated with Lexium 15 servo drive				**LXM 15MD28N4**	
Line supply voltage			**V**	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	11.1	
	Peak stall	M_{max}	**Nm**	26	
Nominal operating point	Nominal torque		**Nm**	10.4	10.1
	Nominal speed		**rpm**	1000	1500
	Servo motor nominal output power		**W**	1000	1500
Maximum current			**A rms**	10.8	
Servo motor characteristics					
Maximum mechanical speed			**rpm**	4000	
Constants (at 120°C)	Torque		**Nm/A rms**	2.78	
	Back emf		**V rms/ krpm**	194	
Rotor	Number of poles			10	
	Inertia	Without brake J_m	**kgcm²**	7.41	
		With brake J_m	**kgcm²**	8.56	
Stator (at 20°C)	Resistance (phase/phase)		Ω	5.3	
	Inductance (phase/phase)		**mH**	60.85	
	Electrical time constant		**ms**	11.59	
Holding brake (depending on model)				See page 3/210	

Torque/speed curves

BSH 1401M servo motor

With LXM 15MD28N4 servo drive
400/480 V 3-phase



1.1 Peak torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

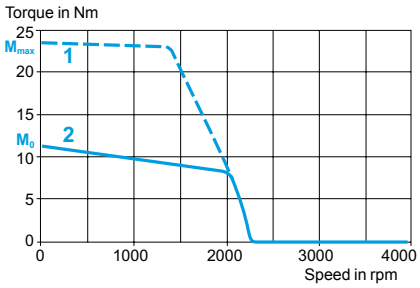
Characteristics of BSH 1401P servo motors

Type of servo motor				BSH 1401P					
Associated with Lexium 15 servo drive				LXM 15LD28M3	LXM 15MD28N4			LXM 15MD40N4	
Line supply voltage			V	230 3-phase	230 3-phase	400 3-phase	480 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	Nm	11.1					
	Peak stall	M_{max}	Nm	23.8		23.33			
Nominal operating point	Nominal torque		Nm	9.1		7.63	6.8	7.63	6.8
	Nominal speed		rpm	1500		2500	3000	2500	3000
	Servo motor nominal output power		W	1400		2000	2150	2000	2150
Maximum current			A rms	20.8					
Servo motor characteristics									
Maximum mechanical speed			rpm	4000					
Constants (at 120°C)	Torque		Nm/A rms	1.43					
	Back emf		V rms/krpm	100					
Rotor	Number of poles			10					
	Inertia	Without brake J_m	kgcm²	7.41					
		With brake J_m	kgcm²	8.56					
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.41					
	Inductance (phase/phase)		mH	16.34					
	Electrical time constant		ms	11.59					
Holding brake (depending on model)				See page 3/210					

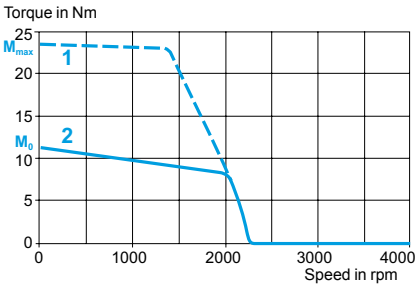
Torque/speed curves

BSH 1401P servo motor

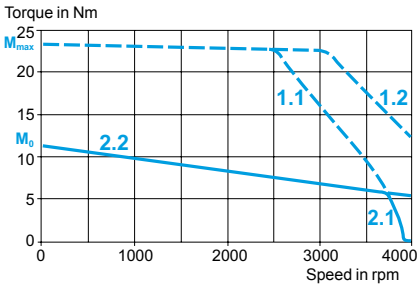
With LXM 15LD28M3 servo drive
230 V 3-phase



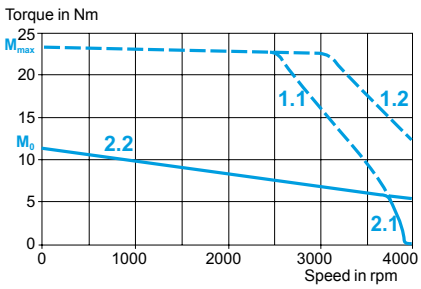
With LXM 15MD28N4 servo drive
230 V 3-phase



400/480 V 3-phase



With LXM 15MD40N4 servo drive
400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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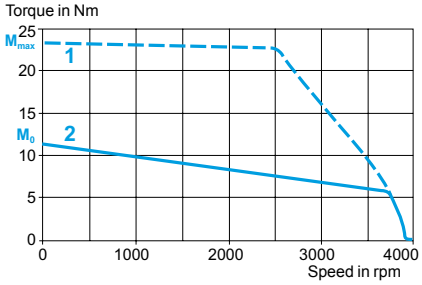
Characteristics of BSH 1401T servo motors

Type of servo motor				**BSH 1401T**
Associated with Lexium 15 servo drive				**LXM 15MD56N4**
Line supply voltage			**V**	230 3-phase
Torque	Continuous stall	M_0	**Nm**	11.1
	Peak stall	M_{max}	**Nm**	23.33
Nominal operating point	Nominal torque		**Nm**	7.63
	Nominal speed		**rpm**	2500
	Servo motor nominal output power		**W**	2000
Maximum current			**A rms**	37.1
Servo motor characteristics				
Maximum mechanical speed			**rpm**	4000
Constants (at 120°C)	Torque		**Nm/A rms**	0.83
	Back emf		**V rms/ krpm**	56
Rotor	Number of poles			10
	Inertia	Without brake J_m	**kgcm²**	7.41
		With brake J_m	**kgcm²**	8.56
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.4
	Inductance (phase/phase)		**mH**	5.15
	Electrical time constant		**ms**	12.88
Holding brake (depending on model)				See page 3/210

Torque/speed curves

BSH 1401T servo motor

With LXM 15MD56N4 servo drive
230 V 3-phase



1 Peak torque
2 Continuous torque

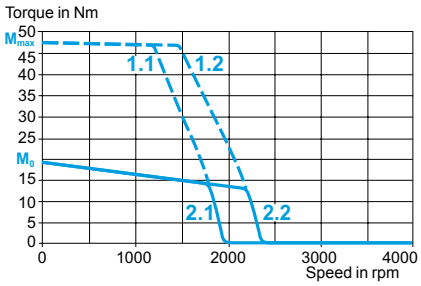
Characteristics of BSH 1402M/1402P servo motors

Type of servo motor				BSH 1402M		BSH 1402P			
Associated with Lexium 15 servo drive				LXM 15MD40N4		LXM 15LD28M3	LXM 15MD28N4		
Line supply voltage			V	400 3-phase	480 3-phase	230 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	Nm	19.5		14.9			
	Peak stall	M_{max}	Nm	47.5		28.71			
Nominal operating point	Nominal torque		Nm	15		15		10.8	8
	Nominal speed		rpm	1500		1500		3000	4000
	Servo motor nominal output power		W	2350				3400	3350
Maximum current			A rms	22.4		44.1			
Servo motor characteristics									
Maximum mechanical speed			rpm	4000					
Constants (at 120°C)	Torque		Nm/A rms	2.91		1.47			
	Back emf		V rms/ krpm	199		101			
Rotor	Number of poles			10					
	Inertia	Without brake J_m	kgcm²	12.68					
		With brake J_m	kgcm²	13.83					
Stator (at 20°C)	Resistance (phase/phase)		Ω	2.3		0.6			
	Inductance (phase/phase)		mH	29.79		7.71			
	Electrical time constant		ms	12.85					
Holding brake (depending on model)				See page 3/210					

Torque/speed curves

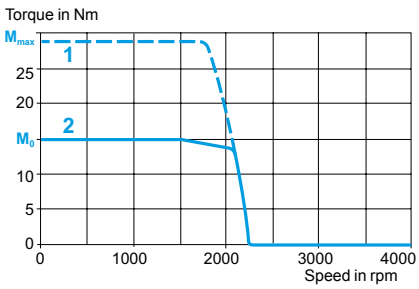
BSH 1402M servo motor

With LXM 15MD40N4 servo drive
400/480 V 3-phase

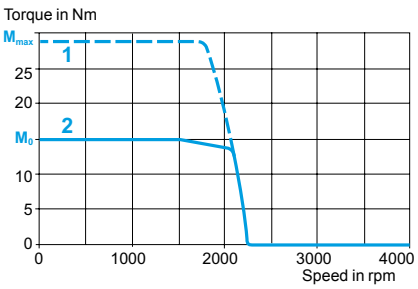


BSH 1402P servo motor

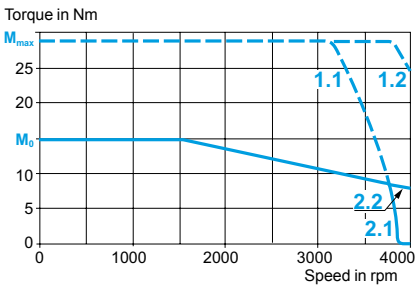
With LXM 15LD28M3 servo drive
230 V 3-phase



With LXM 15MD28N4 servo drive
230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BSH 1402P servo motors (continued)

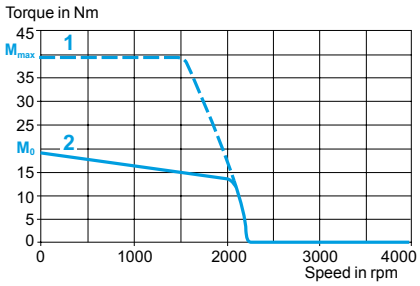
Type of servo motor				BSH 1402P					
Associated with Lexium 15 servo drive				LXM 15MD40N4			LXM 15MD56N4		
Line supply voltage			V	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	Nm	19.5					
	Peak stall	M_{max}	Nm	39.3			47.5		
Nominal operating point	Nominal torque		Nm	15	10.8	8	15	10.8	
	Nominal speed		rpm	1500	3000	4000	1500	3000	
	Servo motor nominal output power		W	2350	3400	3350	2350	3400	
Maximum current			A rms	44.1					
Servo motor characteristics									
Maximum mechanical speed			rpm	4000					
Constants (at 120°C)	Torque		Nm/A rms	1.47					
	Back emf		V rms/krpm	101					
Rotor	Number of poles			10					
	Inertia	Without brake J_m	kgcm²	12.68					
		With brake J_m	kgcm²	13.83					
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.6					
	Inductance (phase/phase)		mH	7.71					
	Electrical time constant		ms	12.85					
Holding brake (depending on model)				See page 3/210					

Torque/speed curves

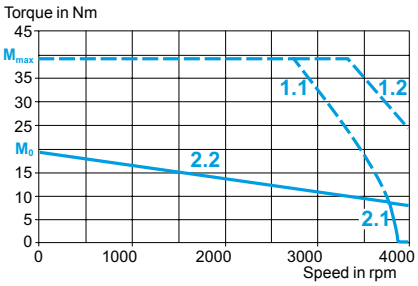
BSH 1402P servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase

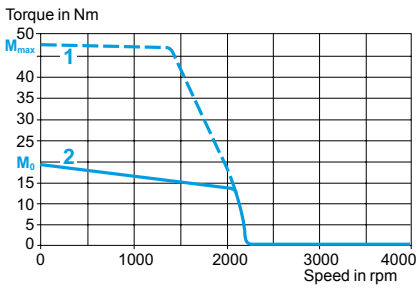


400/480 V 3-phase

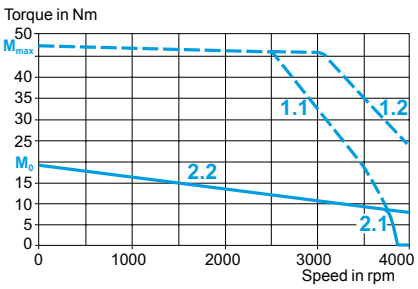


With LXM 15MD56N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BSH 1403M servo motors

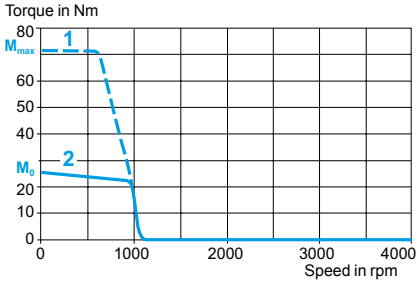
Type of servo motor				**BSH 1403M**		
Associated with Lexium 15 servo drive				**LXM 15MD40N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	25.4	27.8	
	Peak stall	M_{max}	**Nm**	71.7	71.76	
Nominal operating point	Nominal torque		**Nm**	22.8	20	
	Nominal speed		**rpm**	750	1500	
	Servo motor nominal output power		**W**	1800	3150	
Maximum current			**A rms**	31.3		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	4000		
Constants (at 120°C)	Torque		**Nm/A rms**	3.09		
	Back emf		**V rms/ krpm**	205		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	17.94		
		With brake J_m	**kgcm²**	23.44		
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.52		
	Inductance (phase/phase)		**mH**	20.3		
	Electrical time constant		**ms**	13.31		
Holding brake (depending on model)				See page 3/210		

Torque/speed curves

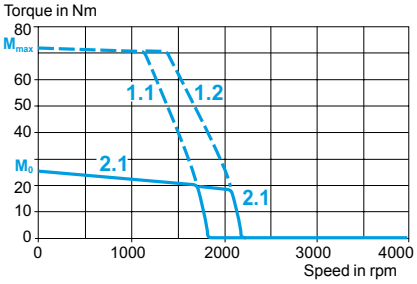
BSH 1403M servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BSH 1403P servo motors

Type of servo motor				**BSH 1403P**					
Associated with Lexium 15 servo drive				**LXM 15MD40N4**			**LXM 15MD56N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	22.2			27.8		
	Peak stall	M_{max}	**Nm**	41.6			57.3		
Nominal operating point	Nominal torque		**Nm**	18.8	12.4	8.1	18.8	12.4	8.1
	Nominal speed		**rpm**	1500	3000	4000	1500	3000	4000
	Servo motor nominal output power		**W**	3000	3900	3400	3000	3900	3400
Maximum current			**A rms**	61					

Servo motor characteristics

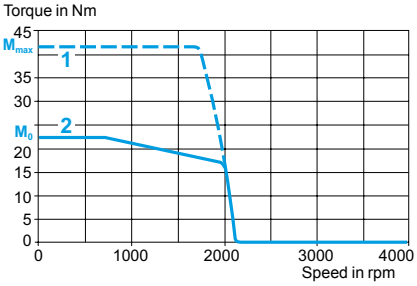
Maximum mechanical speed			**rpm**	4000
Constants (at 120°C)	Torque		**Nm/A rms**	1.59
	Back emf		**V rms/ krpm**	105
Rotor	Number of poles			10
	Inertia	Without brake J_m	**kgcm²**	17.94
		With brake J_m	**kgcm²**	23.44
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.4
	Inductance (phase/phase)		**mH**	5.32
	Electrical time constant		**ms**	13.3
Holding brake (depending on model)				See page 3/210

Torque/speed curves

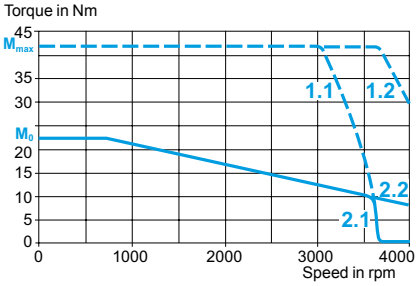
BSH 1403P servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase

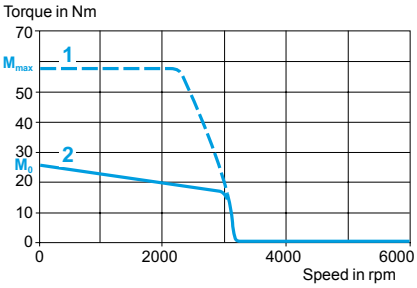


400/480 V 3-phase

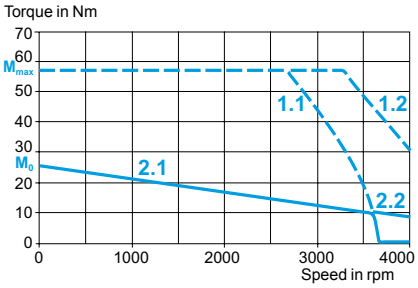


With LXM 15MD56N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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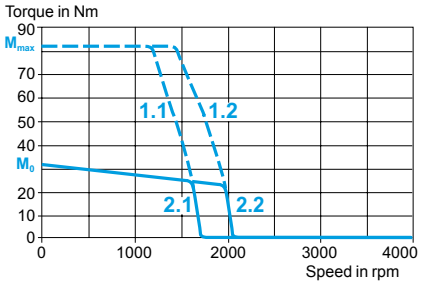
Characteristics of BSH 1404M servo motors

Type of servo motor				**BSH 1404M**			
Associated with Lexium 15 servo drive				**LXM 15MD40N4**		**LXM 15MD56N4**	
Line supply voltage			**V**	400 3-phase	480 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	33.4			
	Peak stall	M_{max}	**Nm**	82.32		95	
Nominal operating point	Nominal torque		**Nm**	27	25	27	25
	Nominal speed		**rpm**	1000	1500	1000	1500
	Servo motor nominal output power		**W**	2800	3900	2800	3900
Maximum current			**A rms**	47.8			
Servo motor characteristics							
Maximum mechanical speed			**rpm**	4000			
Constants (at 120°C)	Torque		**Nm/A rms**	3.12			
	Back emf		**V rms/ krpm**	208			
Rotor	Number of poles			10			
	Inertia	Without brake J_m	**kgcm²**	23.7			
		With brake J_m	**kgcm²**	29.2			
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.12			
	Inductance (phase/phase)		**mH**	16.28			
	Electrical time constant		**ms**	14.54			
Holding brake (depending on model)				See page 3/210			

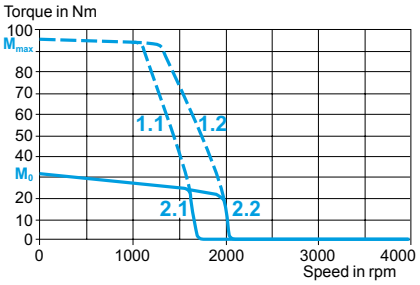
Torque/speed curves

BSH 1404M servo motor

With LXM 15MD40N4 servo drive
400/480 V 3-phase



With LXM 15MD56N4 servo drive
400/480 V 3-phase



1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

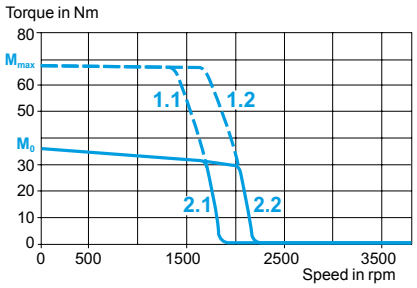
Characteristics of BSH 2051M servo motors

Type of servo motor				**BSH 2051M**					
Associated with Lexium 15 servo drive				**LXM 15MD40N4**		**LXM 15MD56N4**		**LXM 15HC11N4X**	
Line supply voltage			**V**	400 3-phase	480 3-phase	400 3-phase	480 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	36					
	Peak stall	M_{max}	**Nm**	68.33					
Nominal operating point	Nominal torque		**Nm**	32	31.2	32	31.2	32	31.2
	Nominal speed		**rpm**	1500	1700	1500	1700	1500	1700
	Servo motor nominal output power		**W**	5000	5500	5000	5500	5000	5500
Maximum current			**A rms**	40.4					
Servo motor characteristics									
Maximum mechanical speed			**rpm**	3800					
Constants (at 120°C)	Torque		**Nm/A rms**	3.3					
	Back emf		**V rms/ krpm**	208					
Rotor	Number of poles			10					
	Inertia	Without brake J_m	**kgcm²**	77					
		With brake J_m	**kgcm²**	93					
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.1					
	Inductance (phase/phase)		**mH**	21.3					
	Electrical time constant		**ms**	19.4					
Holding brake (depending on model)				See page 3/210					

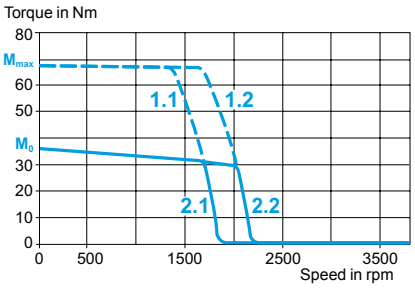
Torque/speed curves

BSH 2051M servo motor

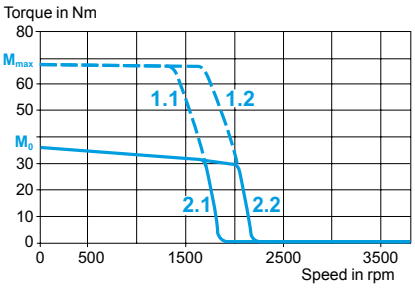
With LXM 15MD40N4 servo drive
400/480 V 3-phase



With LXM 15MD56N4 servo drive
400/480 V 3-phase



With LXM 15HC11N4X servo drive
400/480 V 3-phase



1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase
1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BSH 2051P servo motors

Type of servo motor				**BSH 2051P**					
Associated with Lexium 15 servo drive				**LXM 15MD40N4**			**LXM 15MD56N4**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	22.4			32		
	Peak stall	M_{max}	**Nm**	43.8			61.2		
Nominal operating point	Nominal torque		**Nm**	22.4	21		22.4	21	
	Nominal speed		**rpm**	1500	3000		1500	3000	
	Servo motor nominal output power		**W**	3500	6600		3500	6600	
Maximum current			**A rms**	78.1					

Servo motor characteristics

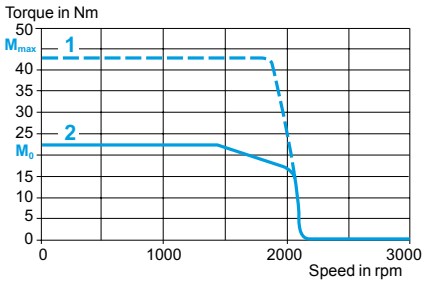
Maximum mechanical speed		**rpm**	3800
Constants (at 120°C)	Torque	**Nm/A rms**	1.1
	Back emf	**V rms/ krpm**	104
Rotor	Number of poles		10
	Inertia Without brake J_m	**kgcm²**	77
	With brake J_m	**kgcm²**	93
Stator (at 20°C)	Resistance (phase/phase)	Ω	0.3
	Inductance (phase/phase)	**mH**	5.7
	Electrical time constant	**ms**	19
Holding brake (depending on model)			See page 3/210

Torque/speed curves

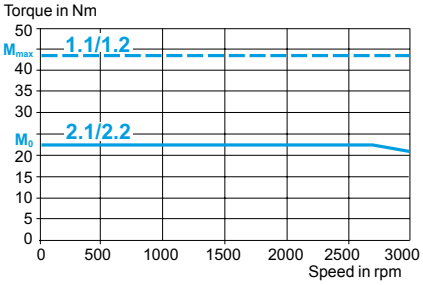
BSH 2051P servo motor

With LXM 15MD40N4 servo drive

230 V 3-phase

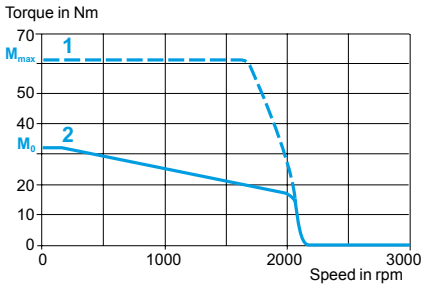


400/480 V 3-phase

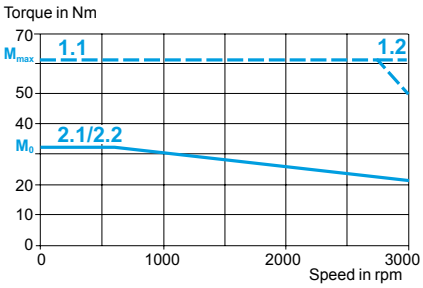


With LXM 15MD56N4 servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BSH 2051P servo motors (continued)

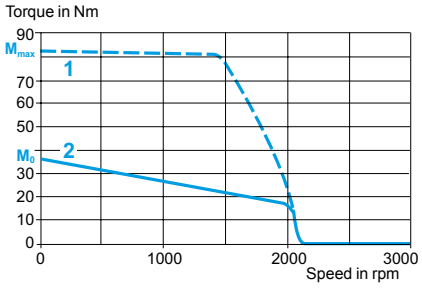
Type of servo motor				**BSH 2051P**		
Associated with Lexium 15 servo drive				**LXM 15HC11N4X**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	36	34	
	Peak stall	M_{max}	**Nm**	82	110	
Nominal operating point	Nominal torque		**Nm**	22.4	21	
	Nominal speed		**rpm**	1500	3000	
	Servo motor nominal output power		**W**	3500	6600	
Maximum current			**A rms**	78.1		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	3800		
Constants (at 120°C)	Torque		**Nm/A rms**	1.6		
	Back emf		**V rms/ krpm**	104		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	77		
		With brake J_m	**kgcm²**	93		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.3		
	Inductance (phase/phase)		**mH**	5.7		
	Electrical time constant		**ms**	19		
Holding brake (depending on model)				See page 3/210		

Torque/speed curves

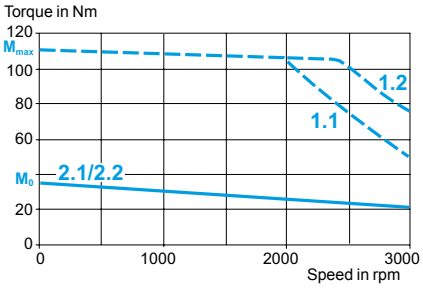
BSH 2051P servo motor

With LXM 15HC11N4X servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 3/158
References: page 3/200
Dimensions: page 3/206

Characteristics of BSH 2052M servo motors

Type of servo motor				**BSH 2052M**					
Associated with Lexium 15 servo drive				**LXM 15HC11N4X**			**LXM 15HC20N4X**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	62.5					
	Peak stall	M_{max}	**Nm**	220					
Nominal operating point	Nominal torque		**Nm**	57.9	51.7	45.6	57.9	51.7	45.6
	Nominal speed		**rpm**	500	1000	1500	500	1000	1500
	Servo motor nominal output power		**W**	3000	5000	7150	3000	5000	7150
Maximum current			**A rms**	49.6					

Servo motor characteristics

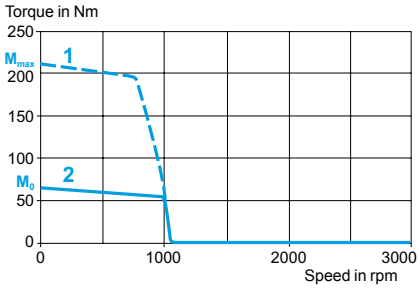
Maximum mechanical speed		**rpm**	3800
Constants (at 120°C)	Torque	**Nm/A rms**	5.04
	Back emf	**V rms/ krpm**	314
Rotor	Number of poles		10
	Inertia Without brake J_m	**kgcm²**	129
	With brake J_m	**kgcm²**	145
Stator (at 20°C)	Resistance (phase/phase)	Ω	1.1
	Inductance (phase/phase)	**mH**	20.6
	Electrical time constant	**ms**	18.72
Holding brake (depending on model)			See page 3/210

Torque/speed curves

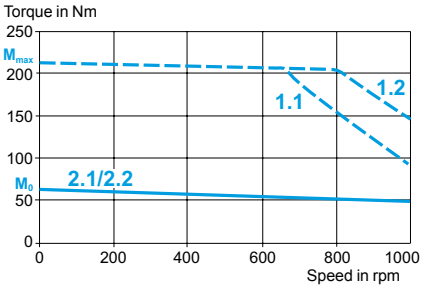
BSH 2052M servo motor

With LXM 15HC11N4X servo drive

230 V 3-phase

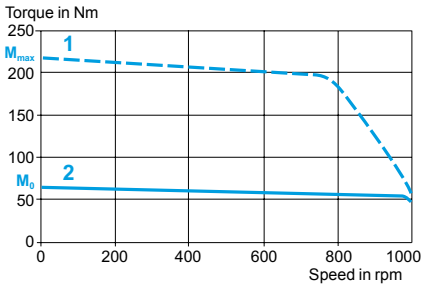


400/480 V 3-phase

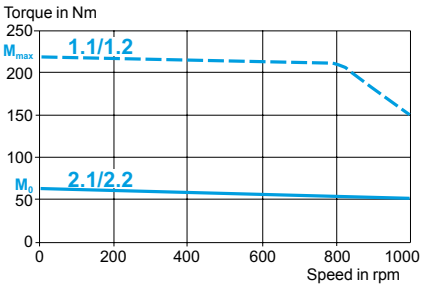


With LXM 15HC20N4X servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 3/158
References: page 3/200
Dimensions: page 3/206

Characteristics of BSH 2052P servo motors

Type of servo motor				**BSH 2052P**					
Associated with Lexium 15 servo drive				**LXM 15HC11N4X**			**LXM 15HC20N4X**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	65	62.5				
	Peak stall	M_{max}	**Nm**	118.54	189.9		193.45	220	
Nominal operating point	Nominal torque		**Nm**	51.7	34		51.7	34	
	Nominal speed		**rpm**	1000	2000		1000	2000	
	Servo motor nominal output power		**W**	5400	7120		5400	7120	
Maximum current			**A rms**	96.8					

Servo motor characteristics

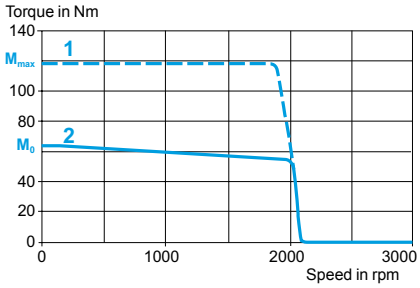
Maximum mechanical speed		**rpm**	3800
Constants (at 120°C)	Torque	**Nm/A rms**	2.58
	Back emf	**V rms/ krpm**	161
Rotor	Number of poles		10
	Inertia Without brake J_m	**kgcm²**	129
	With brake J_m	**kgcm²**	145
Stator (at 20°C)	Resistance (phase/phase)	Ω	0.3
	Inductance (phase/phase)	**mH**	5.4
	Electrical time constant	**ms**	18
Holding brake (depending on model)			See page 3/210

Torque/speed curves

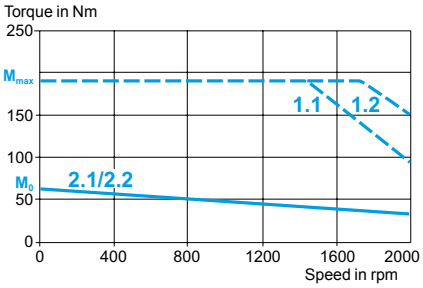
BSH 2052P servo motor

With LXM 15HC11N4X servo drive

230 V 3-phase

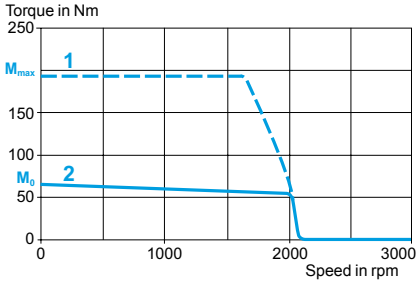


400/480 V 3-phase

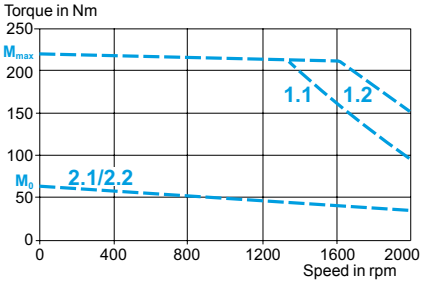


With LXM 15HC20N4X servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 3/158
References: page 3/200
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Characteristics of BSH 2053M servo motors

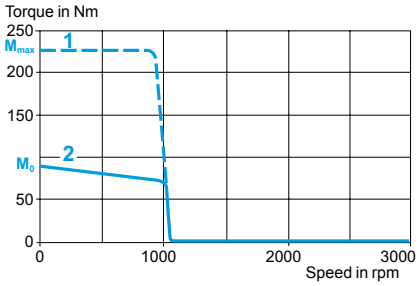
Type of servo motor				**BSH 2053M**		
Associated with Lexium 15 servo drive				**LXM 15HC11N4X**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	90	88	
	Peak stall	M_{max}	**Nm**	227.18	330	
Nominal operating point	Nominal torque		**Nm**	80.2	70.45	64.6
	Nominal speed		**rpm**	500	1000	1300
	Servo motor nominal output power		**W**	4200	7400	8800
Maximum current			**A rms**	68		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	3800		
Constants (at 120°C)	Torque		**Nm/A rms**	5.5		
	Back emf		**V rms/ krpm**	344		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	182		
		With brake J_m	**kgcm²**	196		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.8		
	Inductance (phase/phase)		**mH**	16.8		
	Electrical time constant		**ms**	20		
Holding brake (depending on model)				See page 3/210		

Torque/speed curves

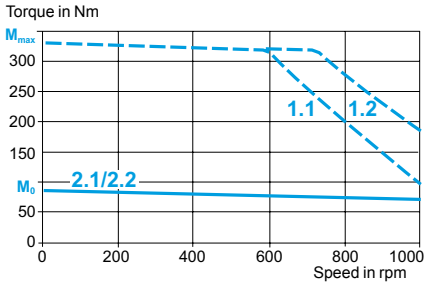
BSH 2053M servo motor

With LXM 15HC11N4X servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

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Characteristics of BSH 2053M servo motors (continued)

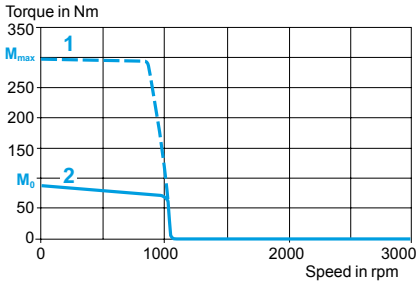
Type of servo motor				**BSH 2053M**		
Associated with Lexium 15 servo drive				**LXM 15HC20N4X**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	90	88	
	Peak stall	M_{max}	**Nm**	300	330	
Nominal operating point	Nominal torque		**Nm**	80.2	70.45	64.6
	Nominal speed		**rpm**	500	1000	1300
	Servo motor nominal output power		**W**	4200	7400	8800
Maximum current			**A rms**	68		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	3800		
Constants (at 120°C)	Torque		**Nm/A rms**	5.5		
	Back emf		**V rms/ krpm**	344		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	182		
		With brake J_m	**kgcm²**	196		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.8		
	Inductance (phase/phase)		**mH**	16.8		
	Electrical time constant		**ms**	20		
Holding brake (depending on model)				See page 3/210		

Torque/speed curves

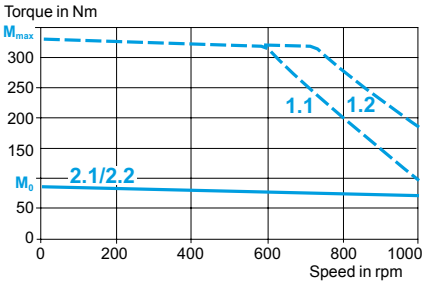
BSH 2053M servo motor

With LXM 15HC20N4X servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Characteristics of BSH 2053P servo motors

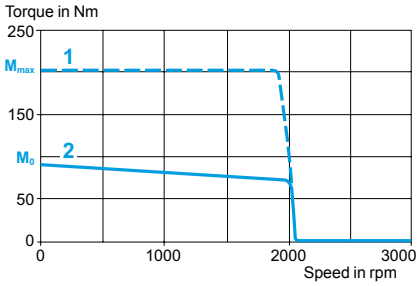
Type of servo motor				**BSH 2053P**		
Associated with Lexium 15 servo drive				**LXM 15HC20N4X**		
Line supply voltage			**V**	230 3-phase	400 3-phase	480 3-phase
Torque	Continuous stall	M_0	**Nm**	90	88	
	Peak stall	M_{max}	**Nm**	202.96	330	
Nominal operating point	Nominal torque		**Nm**	70.45	45	
	Nominal speed		**rpm**	1000	2000	
	Servo motor nominal output power		**W**	7400	9400	
Maximum current			**A rms**	136.1		
Servo motor characteristics						
Maximum mechanical speed			**rpm**	3800		
Constants (at 120°C)	Torque		**Nm/A rms**	2.76		
	Back emf		**V rms/ krpm**	172		
Rotor	Number of poles			10		
	Inertia	Without brake J_m	**kgcm²**	182		
		With brake J_m	**kgcm²**	196		
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.2		
	Inductance (phase/phase)		**mH**	4.2		
	Electrical time constant		**ms**	21		
Holding brake (depending on model)				See page 3/210		

Torque/speed curves

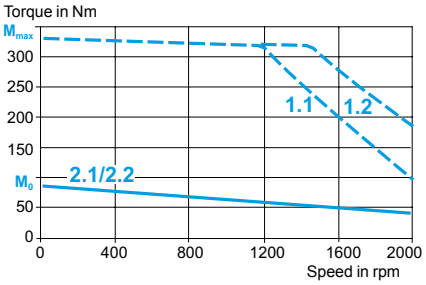
BSH 2053P servo motor

With LXM 15HC20N4X servo drive

230 V 3-phase



400/480 V 3-phase



1 Peak torque
2 Continuous torque

1.1 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 400 V, 3-phase

1.2 Peak torque at 480 V, 3-phase
2.2 Continuous torque at 480 V, 3-phase

Presentation: page 3/158
References: page 3/200
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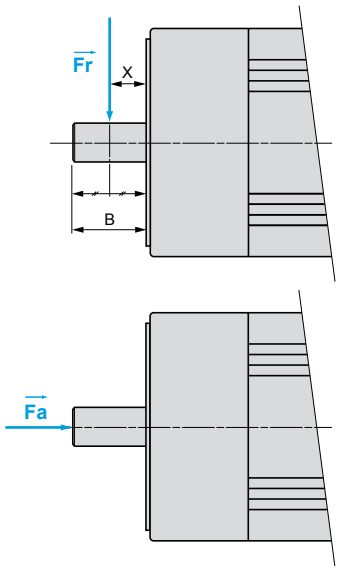

Radial and axial forces permitted on the motor shaft

Even when the servo motors are used under optimum conditions, their service life is limited by that of the bearings.

Conditions	
Nominal service life of bearings *(1)*	L_{10h} = 20,000 hours
Ambient temperature (temperature of bearings ∼ 100°C)	40°C
Force application point	Fr applied at the middle point of the shaft end X = B/2 (dimension B, see pages 3/206 to 3/209)

(1) Hours of use with a failure probability of 10%

⚠ The following conditions must be adhered to:
- Radial and axial forces must not be applied simultaneously
- Shaft end with IP 50 or IP 65 degree of protection
- The bearings cannot be changed by the user as the built-in position sensor must be realigned if the unit is dismantled.

			Maximum radial force Fr							
Mechanical speed		**rpm**	**1000**	**2000**	**3000**	**4000**	**5000**	**6000**	**7000**	**8000**
Servo motor	BSH 0551	**N**	340	270	240	220	200	190	180	170
	BSH 0552	**N**	370	290	260	230	220	200	190	190
	BSH 0553	**N**	390	310	270	240	230	210	200	190
	BSH 0701	**N**	660	520	460	410	380	360	–	–
	BSH 0702	**N**	710	560	490	450	410	390	–	–
	BSH 0703	**N**	730	580	510	460	430	400	–	–
	BSH 1001	**N**	900	720	630	570	530	–	–	–
	BSH 1002	**N**	990	790	690	620	–	–	–	–
	BSH 1003	**N**	1050	830	730	660	–	–	–	–
	BSH 1004	**N**	1070	850	740	–	–	–	–	–
	BSH 1401	**N**	2210	1760	1530	–	–	–	–	–
	BSH 1402	**N**	2430	1930	1680	–	–	–	–	–
	BSH 1403	**N**	2560	2030	1780	–	–	–	–	–
	BSH 1404	**N**	2660	2110	1840	–	–	–	–	–
	BSH 2051	**N**	3730	2960	2580	–	–	–	–	–
	BSH 2052	**N**	4200	3330	2910	–	–	–	–	–
	BSH 2053	**N**	4500	3570	3120	–	–	–	–	–

Maximum axial force: Fa = 0.2 x Fr

Characteristics of servo motor/servo drive power connection components

Cables fitted with a connector on servo motor side

Cable type		**VW3 M5 101 R●●●**	**VW3 M5 103 R●●●**
External sleeve, insulation		PUR orange coloured RAL 2003, TPM or PP/PE	
Capacity	**pF/m**	< 70 (conductors/shielding)	
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]	[(4 x 4 mm²) + (2 x 1 mm²)]
Connector type		1 M23 industrial connector (BSH servo motor side) and 1 free wire end (Lexium 15 LP servo drive side)	1 M40 industrial connector (BSH servo motor side) and 1 free wire end (Lexium 15 HP servo drive side)
External diameter	**mm**	12 ± 0.2	16.3 ± 0.3
Minimum curvature radius	**mm**	90, suitable for daisy-chaining, cable-carrier system	125, suitable for daisy-chaining, cable-carrier system
Working voltage	**V**	600	
Maximum usable length	**m**	50, for connection with a Lexium 15 LP servo drive 100, for connection with a Lexium 15 HP servo drive	
Operating temperature	**°C**	- 50…+ 90 (fixed), - 40…+ 80 (mobile)	
Certifications		UL, CSA, VDE, CE, DESINA	

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References: page 3/200
Dimensions: page 3/206

Characteristics of servo motor/servo drive power connection components (continued)

Cables fitted with a connector on both the servo motor and servo drive sides

Cable type		VW3 M5 201 R●●●	VW3 M5 202 R●●●	VW3 M5 203 R●●●
External sleeve, insulation		PUR orange coloured RAL 2003, TPM or PP/PE		
Capacity	pF/m	< 70 (conductors/shielding)		
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]	[(4 x 2.5 mm²) + (2 x 1 mm²)]	[(4 x 4 mm²) + (2 x 1 mm²)]
Connector type		1 M23 industrial connector (BSH servo motor side) and one 6-way male connector (Lexium 15 MP servo drive side)		1 M40 industrial connector (BSH servo motor side) and one 6-way male connector (Lexium 15 MP servo drive side)
External diameter	mm	12 ± 0.2	14.3 ± 0.3	16.3 ± 0.3
Minimum curvature radius	mm	90, suitable for daisy-chaining, cable-carrier system	110, suitable for daisy-chaining, cable-carrier system	125, suitable for daisy-chaining, cable-carrier system
Working voltage	V	600		
Maximum usable length	m	100, for connection with a Lexium 15 MP servo drive		
Operating temperature	°C	- 40…+ 90 (fixed), - 20…+ 80 (mobile)		
Certifications		UL, CSA, VDE, CE, DESINA		

Cables

Cable type		VW3 M5 301 R●●●●	VW3 M5 302 R●●●●	VW3 M5 303 R●●●●
External sleeve, insulation		PUR orange coloured RAL 2003, TPM or PP/PE		
Capacity	pF/m	< 70 (conductors/shielding)		
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1 mm²)]	[(4 x 2.5 mm²) + (2 x 1 mm²)]	[(4 x 4 mm²) + (2 x 1 mm²)]
Connector type		None (for connectors, see pages 3/203 to 3/205)		
External diameter	mm	12 ± 0.2	14.3 ± 0.3	16.3 ± 0.3
Minimum curvature radius	mm	90, suitable for daisy-chaining, cable-carrier system	110, suitable for daisy-chaining, cable-carrier system	125, suitable for daisy-chaining, cable-carrier system
Working voltage	V	600		
Maximum usable length	m	50, for connection with a Lexium 15 LP servo drive 100, for connection with a Lexium 15 MP servo drive		
Operating temperature	°C	- 50…+ 90 (fixed) - 40…+ 80 (mobile)		
Certifications		UL, CSA, VDE, CE, DESINA		

Cable type		VW3 M5 304 R●●●●
External sleeve, insulation		PUR orange coloured RAL 2003, TPM or PP/PE
Capacity	pF/m	< 70 (conductors/shielding)
Number of conductors (shielded)		[(4 x 10 mm²) + (2 x 1 mm²)]
Connector type		Without connectors; cable for connection of BSH 2052 and BSH 2053 servo motors (terminal) with Lexium 15 HP servo drive (terminal)
External diameter	mm	18 ± 0.3
Minimum curvature radius	mm	135, suitable for daisy-chaining, cable-carrier system
Working voltage	V	600
Maximum usable length	m	100, for connection with a Lexium 15 HP servo drive
Operating temperature	°C	- 40…+ 90 (fixed), - 20…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

Characteristics of the servo motor/servo drive control connection components

Cables fitted with a connector on both the servo motor and servo drive sides

Cable type		VW3 M8 301 R●●●
Encoder type		SinCos encoder
External sleeve, insulation		PUR green coloured RAL 6018, polyester
Number of conductors (shielded)		5 x (2 x 0.25 mm^2) + (2 x 0.5 mm^2)
External diameter	mm	8.8 ± 0.2
Connector type		1 M23 industrial connector (servo motor side) and one 15-way male SUB-D connector (servo drive side)
Minimum curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system
Working voltage	V	350 (0.25 mm^2), 500 (0.5 mm^2)
Maximum usable length	m	75
Operating temperature	°C	- 50…+ 90 (fixed) - 40…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

Cables

Cable type		VW3 M8 221 R●●●●
Encoder type		SinCos encoder
External sleeve, insulation		PUR green coloured RAL 6018, polyester
Number of conductors (shielded)		5 x (2 x 0.25 mm^2) + (2 x 0.5 mm^2)
External diameter	mm	8.8 ± 0.2
Connector type		None (for connectors, see pages 3/203 to 3/205)
Minimum curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system
Working voltage	V	350 (0.25 mm^2), 500 (0.5 mm^2)
Maximum usable length	m	100
Operating temperature	°C	- 50…+ 90 (fixed) - 40…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

Lexium 15 motion control
BSH servo motors

DF525585

BSH 055●●

DF525586

BSH 070●●

BSH servo motors

The BSH servo motors shown below are supplied without a gearbox.
For GBX gearboxes see page 3/214.

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed *(1)*	Maximum mechanical speed	Associated servo drive LXM 15	Reference *(2)*	Weight *(3)*
Nm	Nm	W	rpm	rpm			kg
0.5	1.24	340	8000	8000	LD13M3	**BSH 0551T ●●●●A**	1.160
	1.4	170	4000	8000	LD13M3	**BSH 0551P ●●●●A**	0.800
					LU60N4		
0.7	1.9	586	8000	8000	LU60N4	**BSH 0701T ●●●●A**	2.200
0.9	1.5	570	8000	8000	LD13M3	**BSH 0552T ●●●●A**	1.470
	2.5	310	4000	8000	LD13M3	**BSH 0552P ●●●●A**	1.470
	2.25	400	5000	8000	LU60N4	**BSH 0552M ●●●●A**	1.470
	2.26	310	4000	8000	LU60N4	**BSH 0552P ●●●●A**	1.470
0.91	1.9	440	6000	8000	LU60N4	**BSH 0701T ●●●●A**	2.200
1.1	3.3	950	8000	8000	LU60N4	**BSH 0703P ●●●●A**	3.620
1.3	2.7	340	3000	8000	LD13M3	**BSH 0553P ●●●●A**	1.760
	3.5	524	5000	8000	LU60N4	**BSH 0553M ●●●●A**	1.760
	3.87	670	8000	8000	LD10N4	**BSH 0553P ●●●●A**	1.760
1.4	2.66	411	3000	8000	LD13M3	**BSH 0701P ●●●●A**	2.200
					LU60N4		
	2.91	1000	8000	8000	LD10N4	**BSH 0701T ●●●●A**	2.200
	3.19	654	5000	8000	LD13M3		
					LD21M3		
1.5	3.3	350	3000	8000	LU60N4	**BSH 0703P ●●●●A**	3.620
2.12	4.47	1000	6000	8000	LD17N4	**BSH 0702T ●●●●A**	2.890
	5.45	1000	6000	8000	LD21M3		
	5.63	753	4000	8000	LU60N4	**BSH 0702M ●●●●A**	2.890
2.2	4.85	1300	8000	8000	LD10N4	**BSH 0702P ●●●●A**	2.890
	5.63	597	3000	8000	LD13M3		
2.23	6	700	3000	8000	LD13M3	**BSH 0703P ●●●●A**	3.620
2.4	5.3	1500	8000	8000	LD10N4	**BSH 0703P ●●●●A**	3.620
2.7	6.19	850	3000	6000	LD10N4	**BSH 1001P ●●●●A**	4.200
2.83	5.99	750	3000	8000	LD21M3	**BSH 0703P ●●●●A**	3.620
	7.38	1250	6000	8000	LD28M3	**BSH 0703T ●●●●A**	3.620
	7.71	1400	7000	8000	LD17N4	**BSH 0703P ●●●●A**	3.620
	9.28	750	3000	8000	LD21M3		
3.39	6.19	1500	6000	6000	LD10N4	**BSH 1001P ●●●●A**	4.200
	7.08	950	3000	6000	LD21M3	**BSH 1001P ●●●●A**	4.200
		1500	6000	6000	LD17N4	**BSH 1001P ●●●●A**	4.200
	8.5	1150	4000	6000	LD28M3	**BSH 1001T ●●●●A**	4.200

(1) Derating possible according to the power supply voltage (see characteristics pages 3/160 to 3/196).
(2) To complete each reference see the table on page 3/202.
(3) Weight of servo motor without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 3/210.

Lexium 15 motion control
BSH servo motors

BSH 100●●

BSH 140●●

BSH servo motors (continued)

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed *(1)*	Maximum mechanical speed	Associated servo drive LXM 15	Reference *(2)*	Weight *(3)*
Nm	Nm	W	rpm	rpm			kg
3.4	5.6	840	2500	6000	LD13M3	**BSH 1002P ●●●●A**	5.900
	8	2150	6000	6000	LD10N4		
4.5	9.39	950	2000	6000	LD21M3	**BSH 1002P ●●●●A**	5.900
5.5	11.59	1700	4000	6000	LD28M3	**BSH 1002T ●●●●A**	5.900
5.8	12.13	1950	5000	6000	LD17N4	**BSH 1002P ●●●●A**	5.900
	14.79	950	2000	6000	LD21M3		
6.7	15.5	1700	2500	6000	LD21M3	**BSH 1003P ●●●●A**	7.400
	12.5	2300	6000	6000	LD17N4		
7.76	15.19	1300	2000	6000	LD10N4	**BSH 1003M ●●●●A**	7.400
	22.95	1400	2000	6000	LD17N4		
7.8	19.69	1300	2000	6000	LD28M3	**BSH 1003P ●●●●A**	7.400
		2200	4500	6000	MD28N4		
	23.17	2200	4500	6000	MD40N4		
8.18	15.7	2500	3500	6000	LD28M3	**BSH 1004T ●●●●A**	9.200
9.31	19.8	1300	1500	6000	LD10N4	**BSH 1004M ●●●●A**	9.200
	21.04	2500	3500	6000	MD40N4	**BSH 1004T ●●●●A**	9.200
	25.7	2700	4000	6000	MD28N4	**BSH 1004P ●●●●A**	9.500
	29.87	1700	2000	6000	LD17N4	**BSH 1004M ●●●●A**	9.200
	33.83	2400	3500	6000	MD40N4	**BSH 1004P ●●●●A**	9.500
	34.17	1700	2000	6000	MD40N4	**BSH 1004M ●●●●A**	9.200
11.1	23.33	2000	2500	4000	MD56N4	**BSH 1401T ●●●●A**	11.200
		2150	3000	4000	MD28N4	**BSH 1401P ●●●●A**	11.200
		2150	3000	4000	MD40N4		
	23.8	1400	1500	4000	LD28M3	**BSH 1401P ●●●●A**	11.200
	26	1500	1500	4000	MD28N4	**BSH 1401M ●●●●A**	11.200
14.9	28.71	2350	1500	4000	LD28M3	**BSH 1402P ●●●●A**	16.000
		3350	4000	4000	MD28N4		
19.5	39.3	3350	4000	4000	MD40N4	**BSH 1402P ●●●●A**	16.000
	47.5	2350	1500	4000	MD40N4	**BSH 1402M ●●●●A**	16.000
		3400	3000	4000	MD56N4	**BSH 1402P ●●●●A**	16.000
22.2	41.6	3400	4000	4000	MD40N4	**BSH 1403P ●●●●P**	21.200
22.4	43.8	6600	3000	3800	MD40N4	**BSH 2051P ●●●●A**	33.000
25.4	71.7	1800	750	4000	MD40N4	**BSH 1403M ●●●●P**	21.200
27.8	57.3	3400	4000	4000	MD56N4	**BSH 1403P ●●●●P**	21.200
	71.76	3150	1500	4000	MD40N4	**BSH 1403M ●●●●P**	21.200

(1) Derating possible according to the power supply voltage (see characteristics pages 3/160 to 3/196).
(2) To complete each reference see the table on page 3/202.
(3) Weight of servo motor without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 3/210.


105994

BSH 205●●

BSH servo motors (continued)

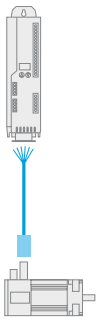
Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed *(1)*	Maximum mechanical speed	Associated servo drive LXM 15	Reference *(2)*	Weight *(3)*
Nm	Nm	W	rpm	rpm			kg
32	61.2	6600	3000	3800	MD56N4	**BSH 2051P ●●●●A**	33.000
33.4	82.32	3900	1500	4000	MD40N4	**BSH 1404M ●●●●P**	26.500
	95	3900	1500	4000	MD56N4		
34	110	6600	3000	3800	HC11N4X	**BSH 2051P ●●●●A**	35.000
36	68.33	5500	1700	3800	MD40N4	**BSH 2051M ●●●●A**	35.000
					MD56N4		
					HC11N4X		
	82	3500	1500	3800	HC11N4X	**BSH 2051P ●●●●A**	35.000
62.5	189.9	7120	2000	3800	HC11N4X	**BSH 2052P ●●●3A** *(4)*	44.000
	193.45	5400	1000	3800	HC20N4X		
	220	7150	1500	3800	HC11N4X	**BSH 2052M ●●●3A** *(4)*	44.000
					HC20N4X		
		7120	2000	3800	HC20N4X	**BSH 2052P ●●●●A** *(4)*	44.000
65	118.54	5400	1000	3800	HC11N4X	**BSH 2052P ●●●3A** *(4)*	44.000
88	330	8800	1300	3800	HC11N4X	**BSH 2053M ●●●3A** *(4)*	56.000
					HC20N4X		
		9400	2000	3800	HC20N4X	**BSH 2053P ●●●3A** *(4)*	56.000
90	202.96	7400	1000	3800	HC20N4X	**BSH 2053P ●●●3A** *(4)*	56.000
	227.18	4200	500	3800	HC11N4X	**BSH 2053M ●●●3A** *(4)*	56.000
	300	4200	500	3800	HC20N4X		

To order a BSH servo motor complete each reference with:

			BSH 0701P	●	●	●	●	**A**
Shaft end	IP 50	Untapped		**0**				
		Keyed		**1**				
	IP 65	Untapped		**2**				
		Keyed		**3**				
Integrated encoder	Single turn, SinCos Hiperface® 1,048,576 points/turn *(5)*				**1**			
	Multiturn, SinCos Hiperface® 1,048,576 *(4)* points/turn, 4096 turns (5)				**2**			
Holding brake	None					**A**		
	With					**F**		
Connection *(4)*	Straight connectors						**1**	
	Rotatable right-angled connectors						**2**	
Flange	International standard							**A or P** *(6)*

***Note:** The example above is for a **BSH 0701P** servo motor. Replace **BSH 0701P** by the relevant reference for other servo motors.*

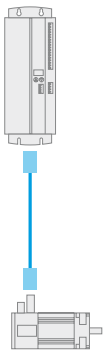
(1) Derating possible according to the power supply voltage (see characteristics pages 3/160 to 3/196).
(2) To complete each reference see the table above.
(3) Weight of servo motor without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 3/210.
(4) BSH 2052● and BSH 2053● servo motors are supplied with a power connection terminal and an angled connector for the control connection (encoder) (see page 3/209).
*The product reference is BSH 205●● ●●●**3**A.*
(5) Encoder resolution given for use with a Lexium 15 servo drive.
(6) "A" or "P" depending on the model, see table of references above or on the previous page.



VW3 M5 101/103 R●●●

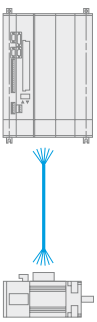
Power cordsets

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
Preassembled cordsets with one industrial M23 connector (servo motor end) **and a free end** (servo drive end)	BSH 055●● BSH 070●● BSH 100●●	LXM 15L●●●●●	[(4 x 1.5 mm²) + (2 x 1 mm²)]	3	**VW3 M5 101 R30**	0.810
				5	**VW3 M5 101 R50**	1.210
				10	**VW3 M5 101 R100**	2.290
				15	**VW3 M5 101 R150**	3.400
				20	**VW3 M5 101 R200**	4.510
				25 *(1)*	**VW3 M5 101 R250**	6.200
				50 *(1)*	**VW3 M5 101 R500**	12.325
Preassembled cordsets with one industrial M40 connector (servo motor end) **and a free end** (servo drive end)	BSH 2051M BSH 2051P	LXM 15HC●●N4X	[(4 x 4 mm²) + (2 x 1 mm²)]	3	**VW3 M5 103 R30**	1.330
				5	**VW3 M5 103 R50**	2.130
				10	**VW3 M5 103 R100**	4.130
				15	**VW3 M5 103 R150**	6.120
				20	**VW3 M5 103 R200**	8.090
				25	**VW3 M5 103 R250**	11.625
				50	**VW3 M5 103 R500**	23.175
				75	**VW3 M5 103 R750**	34.725



VW3 M5 201/202/203 R●●●

Preassembled cordsets with one industrial M23 connector (servo motor end) **and one 6-way male connector** (servo drive end)	BSH 1003P BSH 1004● BSH 1401M BSH 1401P BSH 1402M BSH 1402P BSH 1403M BSH 1404M	LXM 15MD●●N4	[(4 x 1.5 mm²) + (2 x 1 mm²)]	3	**VW3 M5 201 R30**	0.885
				5	**VW3 M5 201 R50**	1.375
				10	**VW3 M5 201 R100**	2.600
				15	**VW3 M5 201 R150**	3.825
				20	**VW3 M5 201 R200**	5.050
				25 *(1)*	**VW3 M5 201 R250**	6.275
				50 *(1)*	**VW3 M5 201 R500**	12.400
				75 *(1)*	**VW3 M5 201 R750**	18.525
	BSH 1401T BSH 1403P	LXM 15MD40N4 LXM 15MD56N4	[(4 x 2.5 mm²) + (2 x 1 mm²)]	3	**VW3 M5 202 R30**	1.137
				5	**VW3 M5 202 R50**	1.795
				10	**VW3 M5 202 R100**	3.430
				15	**VW3 M5 202 R150**	5.085
				20	**VW3 M5 202 R200**	6.730
				25 *(1)*	**VW3 M5 202 R250**	8.375
				50 *(1)*	**VW3 M5 202 R500**	16.600
				75 *(1)*	**VW3 M5 202 R750**	24.825
Preassembled cordsets with one industrial M40 connector (servo motor end) **and one 6-way male connector** (servo drive end)	BSH 2051M BSH 2051P	LXM 15MD40N4 LXM 15MD56N4	[(4 x 4 mm²) + (2 x 1 mm²)]	3	**VW3 M5 203 R30**	1.536
				5	**VW3 M5 203 R50**	2.460
				10	**VW3 M5 203 R100**	4.770
				15	**VW3 M5 203 R150**	7.080
				20	**VW3 M5 203 R200**	9.390
				25 *(1)*	**VW3 M5 203 R250**	11.700
				50 *(1)*	**VW3 M5 203 R500**	23.250
				75 *(1)*	**VW3 M5 203 R750**	34.800



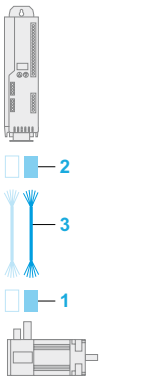
VW3 M5 304 R●●●●

Power connection cables

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
Cables	BSH 2052M BSH 2052P BSH 2053M BSH 2053P	LXM 15HC●●N4X	[(4 x 10 mm²) + (2 x 1 mm²)]	10	**VW3 M5 304 R100**	8.530
				25	**VW3 M5 304 R250**	21.325
				50	**VW3 M5 304 R500**	42.650
				100	**VW3 M5 304 R1000**	85.300

(1) For cables longer than 20 m, a motor choke is compulsory (see page 3/51).

Presentation:
page 3/158



VW3 M● ●●● ●●●●

3

Separate power connection parts

Connectors for creating power cordsets

Description	For servo motor	For servo drive	For cable of cross-section	No.	Reference	Weight
			mm²			kg
M23 industrial connectors	BSH 055●● BSH 070●● BSH 100●● BSH 1401M BSH 1401P BSH 1402M BSH 1402P BSH 1403M BSH 1403P	–	1.5	1	**VW3 M8 215**	0.350
	BSH 1401T BSH 1403 P	–	2.5	1	**VW3 M8 216**	0.600
M40 industrial connector	BSH 2051M BSH 2051P	–	4	1	**VW3 M8 217**	0.850
6-way male SUB-D connector	–	LXM 15MD●●N4	All cross-sections	2	**AEO CON 009**	–

Cables for creating power cordsets

Description	From servo motor	To servo drive	Composition	No.	Length	Reference	Weight
					m		kg
Cables	BSH 055●● BSH 070●● BSH 100●● BSH 1401M BSH 1401P BSH 1402M BSH 1402P BSH 1403M BSH 1404M	LXM 15L●●●●● LXM 15MD●●N4	[(4 x 1.5 mm²) + (2 x 1 mm²)]	3	25	**VW3 M5 301 R250**	5.500
					50	**VW3 M5 301 R500**	11.100
					100	**VW3 M5 301 R1000**	22.200
	BSH 1401T BSH 1403P	LXM 15MD40N4 LXM 15MD56N4	[(4 x 2.5 mm²) + (2 x 1 mm²)]	3	25	**VW3 M5 302 R250**	7.725
					50	**VW3 M5 302 R500**	15.540
					100	**VW3 M5 302 R1000**	30.900
	BSH 2051M BSH 2051P	LXM 15MD40N4 LXM 15MD56N4	[(4 x 4 mm²) + (2 x 1 mm²)]	3	25	**VW3 M5 303 R250**	9.900
					50	**VW3 M5 303 R500**	19.800
					100	**VW3 M5 303 R1000**	39.600

Presentation:
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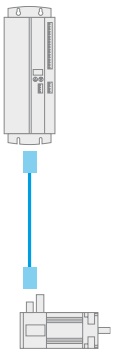
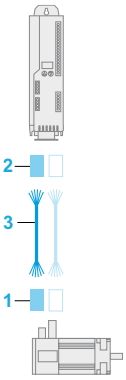
Lexium 15 motion control
BSH servo motors



VW3 M8 301 R●●●

Control cordsets

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
SinCos Hiperface ® encoder cables with one M23 industrial connector (servo motor end) **and one 15-way male SUB-D connector** (servo drive end)	BSH, all ratings	LXM 15, all ratings	[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]	3	**VW3 M8 301 R30**	–
				5	**VW3 M8 301 R50**	–
				10	**VW3 M8 301 R100**	–
				15	**VW3 M8 301 R150**	–
				20	**VW3 M8 301 R200**	–
				25	**VW3 M8 301 R250**	–
				50	**VW3 M8 301 R500**	–
				75	**VW3 M8 301 R750**	–



VW3 M8 2●●

Separate control connection parts

Connectors for creating control cordsets

Description	For servo motor	For servo drive	Composition	No.	Reference	Weight
						kg
M23 industrial connector for creating a control connection for a SinCos Hiperface® encoder (servo motor end)	BSH, all ratings	–	[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]	1	**VW3 M8 214**	–
15-way male SUB-D connector for creating a control connection for a SinCos Hiperface® encoder (servo drive end)	–	LXM 15, all ratings	2 x 0.25 mm²	2	**AEO CON 010**	–

Cables for creating control cordsets

Description	From servo motor	To servo drive	Composition	No.	Length	Reference	Weight
					m		kg
Cables for creating control cordsets for a SinCos Hiperface® encoder	BSH , all ratings	LXM 15, all ratings	[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]	3	25	**VW3 M8 221 R250**	5.250
					50	**VW3 M8 221 R500**	10.500
					100	**VW3 M8 221 R1000**	21.000

Presentation:
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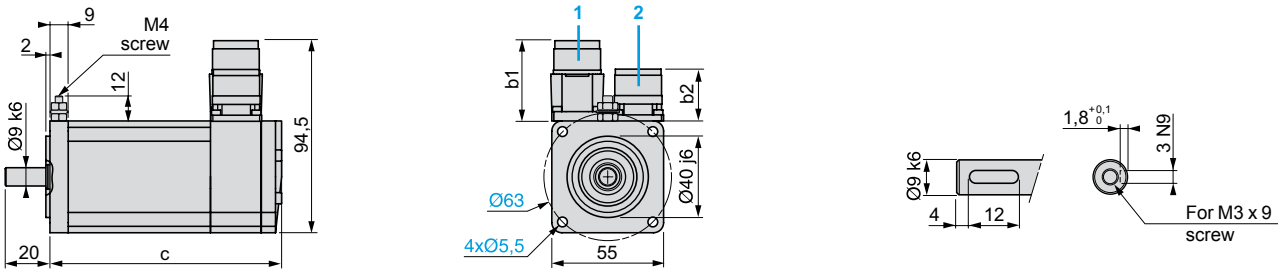
Lexium 15 motion control
BSH servo motors

BSH 055 (example with straight connectors: power supply for servo motor/brake 1 and encoder 2)

Shaft end, keyed slot (optional)

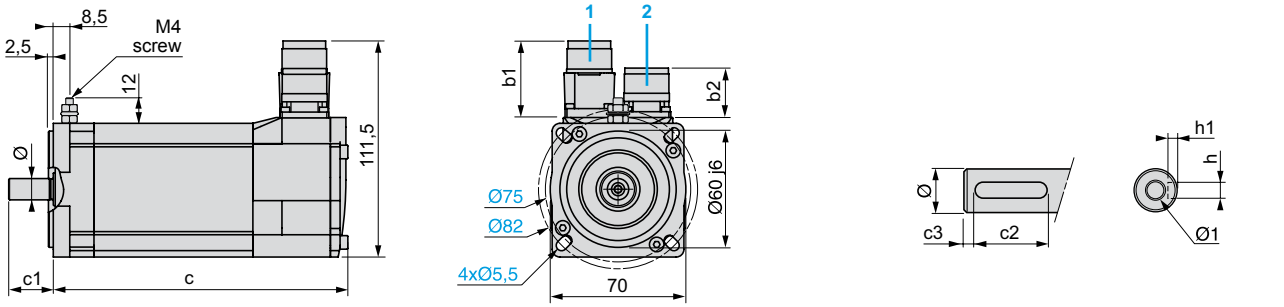


3

	Straight connectors		Rotary angled connectors			
	b1	**b2**	**b1**	**b2**	**c** (without brake)	**c** (with brake)
BSH 0551●	39.5	25.5	39.5	39.5	132.5	159
BSH 0552●	39.5	25.5	39.5	39.5	154.5	181
BSH 0553●	39.5	25.5	39.5	39.5	176.5	203

BSH 070 (example with straight connectors: power supply for servo motor/brake 1 and encoder 2)

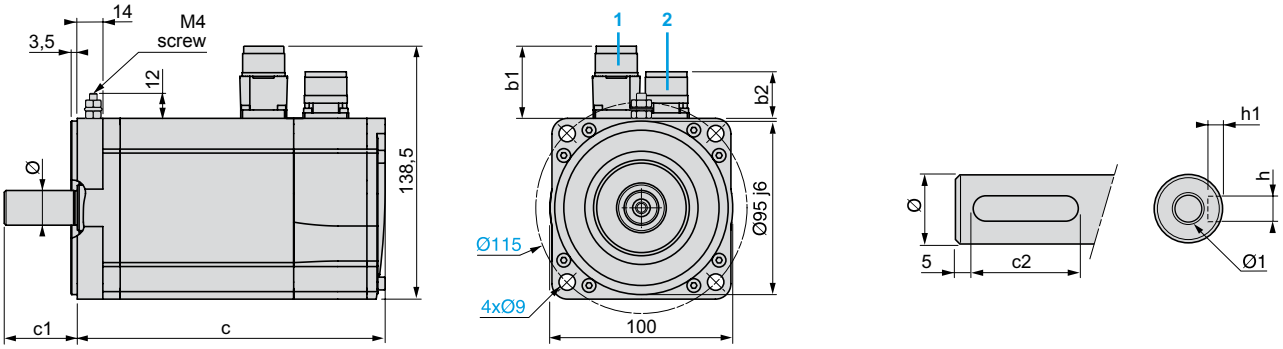
Shaft end, keyed slot (optional)



	Straight connectors		Rotary angled connectors										
	b1	**b2**	**b1**	**b2**	**c** (without brake)	**c** (with brake)	**c1**	**c2**	**c3**	**h**	**h1**	**Ø**	**Ø1 for screw**
BSH 0701●	39.5	25.5	39.5	39.5	154	180	23	18	2.5	4 N9	2.5 +0.1 0	11 k6	M4 x 10
BSH 0702●	39.5	25.5	39.5	39.5	187	213	23	18	2.5	4 N9	2.5 +0.1 0	11 k6	M4 x 10
BSH 0703●	39.5	25.5	39.5	39.5	220	254	30	20	5	5 N9	3 +0.1 0	14 k6	M5 x 12.5

BSH 100 (example with straight connectors: power supply for servo motor/brake1 and encoder 2)

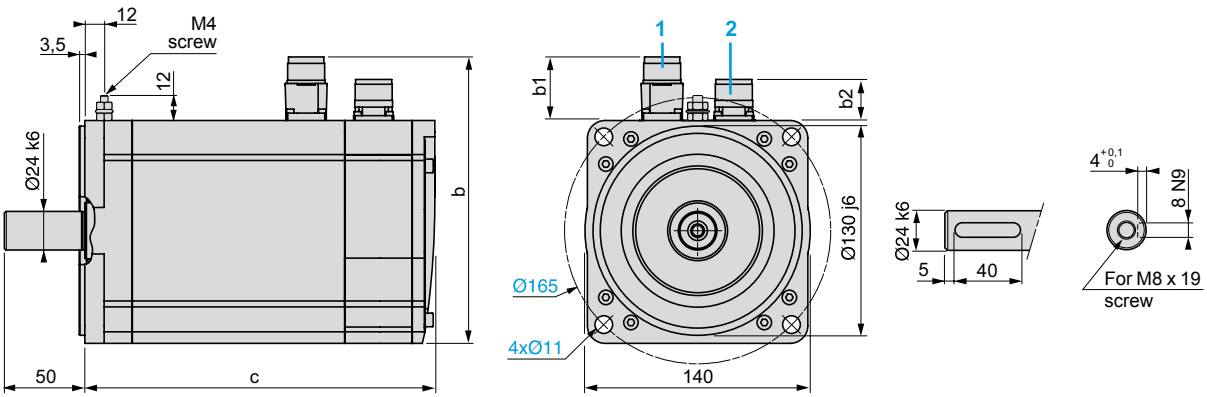
Shaft end, keyed slot (optional)



	Straight connectors		Rotary angled connectors									
	b1	b2	b1	b2	c (without brake)	c (with brake)	c1	c2	h	h1	Ø	Ø1 for screw
BSH 1001●	39.5	25.5	39.5	39.5	169	200	40	30	6 N9	$3.5^{+0.1}_{0}$	19 k6	M6 x 16
BSH 1002●	39.5	25.5	39.5	39.5	205	236	40	30	6 N9	$3.5^{+0.1}_{0}$	19 k6	M6 x 16
BSH 1003●	39.5	25.5	39.5	39.5	241	272	40	30	6 N9	$3.5^{+0.1}_{0}$	19 k6	M6 x 16
BSH 1004●	39.5	25.5	39.5	39.5	277	308	50	40	8 N9	$4^{+0.1}_{0}$	24 k6	M8 x 19

BSH 140 (example with straight connectors: power supply for servo motor/brake 1 and encoder 2)

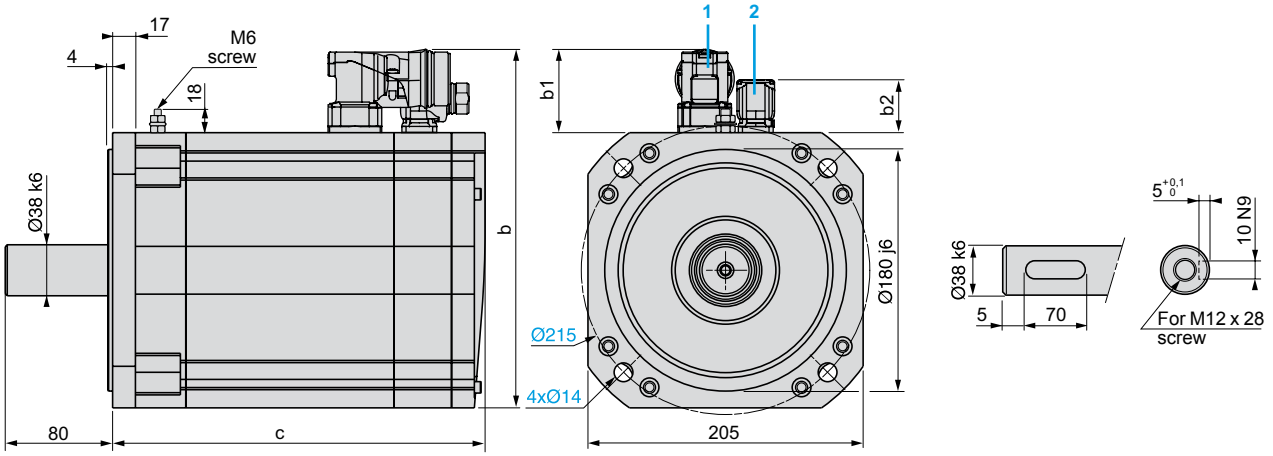
Shaft end, keyed slot (optional)



	Straight connectors			Rotary angled connectors				
	b	b1	b2	b	b1	b2	c (without brake)	c (with brake)
BSH 1401●	178	39.5	25.5	178	39.5	39.5	218	256
BSH 1402M, BSH 1402P	178	39.5	25.5	178	39.5	39.5	273	311
BSH 1403●	192.5	54	25.5	198.5	60	39.5	328	366
BSH 1404M	192.5	54	25.5	198.5	60	39.5	383	421

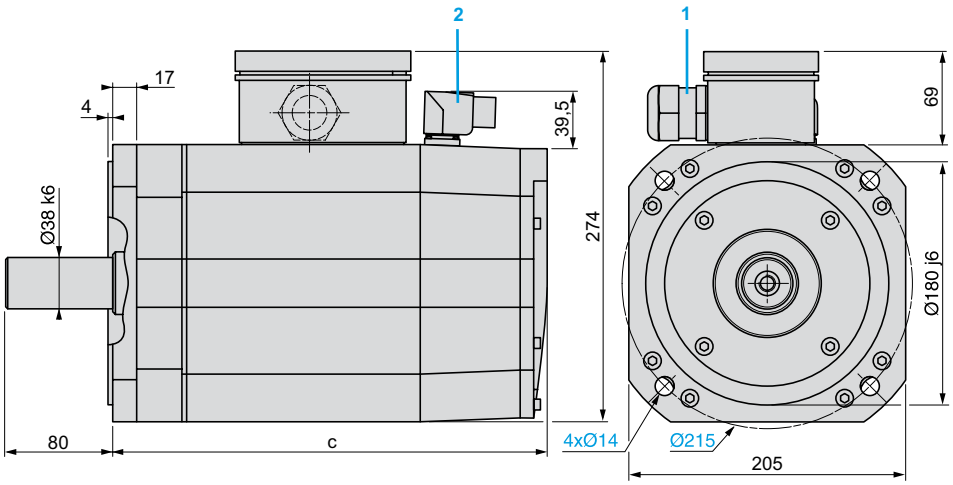
BSH 2051 (example with angled rotary connectors: power supply for servo motor/brake **1** and encoder **2**)

Shaft end, keyed slot (optional)

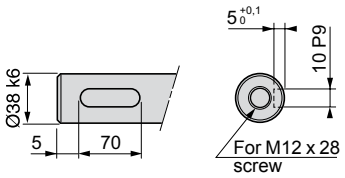


	Straight connectors			Rotary angled connectors				
	b	**b1**	**b2**	**b**	**b1**	**b2**	**c** (without brake)	**c** (with brake)
BSH 2051●	259	54	25.5	265	60	39.5	321	370.5

BSH 2052 and 2053 (example with angled connectors: power supply for servo motor/brake 1 and encoder 2) *(1)*



Shaft end, keyed slot (optional)



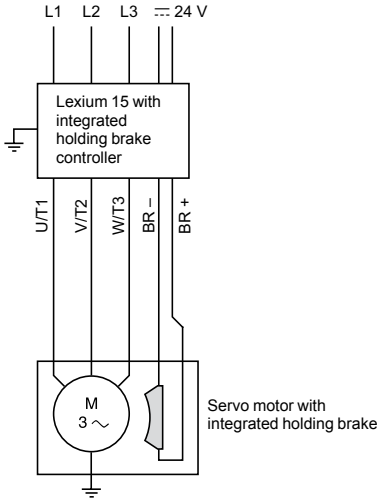
	Connectors angled	
	c (without brake)	**c** (with brake)
BSH 2052●	405	454.5
BSH 2053●	489	538.5

(1) Not available with straight connectors. The power supply cable for servo motor/brake 1 is connected via a terminal.

Lexium 15 motion control
BSH servo motors
Option: integrated holding brake

Holding brake

Presentation



The holding brake integrated into the BSH servo motor, depending on the model, is an electromagnetic pressure spring brake that blocks the servo motor axis once the output current has been switched off.

In the event of an emergency, such as a power outage or an emergency stop, the drive is immobilized, significantly increasing safety.
Blocking the servo motor axis is also necessary in cases of torque overload, such as in the event of vertical axis movement.

Activation of the holding brake is directly controlled by the Lexium 15 servo drive.

Characteristics

Type of servo motor	**BSH**	**0551 0552 0553**	**0701 0702**	**0703**	**1001 1002 1003**	**1004**	**1401 1402**	**1403 1404**	**2051 2052 2053**
Holding torque M_{Br}	**Nm**	0.8	2	3	9	12	23	36	80
Moment of rotor inertia (brake only) J_{Br}	**kgcm²**	0.0213	0.072	0.23	0.618	1.025	1.8	5.5	16
Electrical clamping power P_{Br}	**W**	10	11	12	18	17	24	26	40
Supply voltage	**V**	⎓ 24 -10…+6%							
Opening time	**ms**	12	25	35	40	45	50	100	200
Closing time	**ms**	6	8	15	20	20	40	45	50
Weight (to be added to the weight of the servo motor without brake, see page 3/200)	**kg**	0.080	0.260	0.320	0.450	0.690	1.100	1.790	3.600

References

Selection of BSH servo motor with or without holding brake, see references page 3/202.

105992

BSH servo motor

Dimensions:
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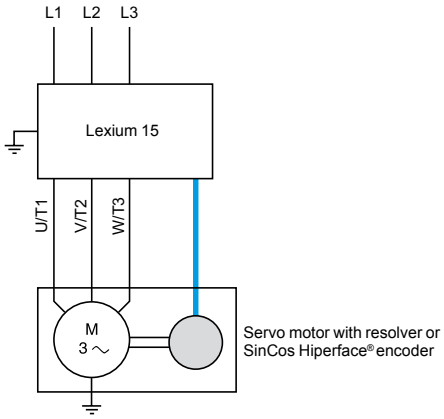
Lexium 15 motion control
BSH servo motors
Option: integrated encoder

Encoder integrated into BSH servo motor

Presentation



The standard measurement device is the SinCos Hiperface® single turn or multiturn encoder integrated into the BSH servo motors. This measurement device is perfectly adapted to the Lexium 15 range of servo drives.

Use of this encoder allows:
- The BSH servo motor data to be automatically identified by the servo drive
- The servo drive's control loops to be automatically initialized. These functions therefore simplify the installation of the motion control device.

Characteristics

Type of encoder		Single turn SinCos	Multiturn SinCos
Number of sinus periods per turn		128	
Number of points *(1)*		1,048,576	1 048 576 x 4096 turns
Encoder precision	**min. arc**	± 1.3	
Measurement method		Optical high resolution	
Interface		Hiperface®	
Operating temperature	**°C**	+5…+110	

(1) Encoder resolution given for use with a Lexium 15 servo drive.

References

Selection of type of SinCos Hiperface® encoder integrated into the BSH servo motor (single turn or multiturn), see references page 3/202.

105992

BSH servo motor

Dimensions:
page 3/206

Lexium 15 motion control
BSH servo motors
Option: GBX planetary gearboxes

Presentation

GBX planetary gearbox

In many cases, motion control requires the use of planetary gearboxes to adapt speeds and torques, while ensuring the precision demanded by the application.

Schneider Electric has selected GBX gearboxes made by Neugart to be used in association with the BSH servo motor range. These gearboxes are lubricated for life and are designed for applications which are not susceptible to mechanical backlash. As their association with BSH servo motors has been thoroughly qualified and they are very easy to mount, the gearboxes are simple to put into operation and risk free.

Available in 5 sizes (GBX 40 toGBX 160), the planetary gearboxes are offered in 15 reduction ratios (3:1 to 100:1), see tables below.
Continuous stall torques and peak stall torques available from the gearbox are obtained by multiplying the characteristic values of the servo motor by the reduction ratio and gearbox efficiency (0.96, 0.94 or 0.9 depending on the speed reduction ratio).

The tables below show the most suitable servo motor/gearbox combinations. For other combinations, consult the servo motor data sheets.

BSH servo motor/GBX gearbox combinations

Reduction ratios from 3:1 to 16:1

Type of servo motor	Speed reduction ratio							
	3:1	4:1	5:1	8:1	9:1	12:1	15:1	16:1
BSH 0551	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40	GBX 40
BSH 0552	GBX 40	GBX 40	GBX 40	GBX 60	GBX 40	GBX 40	GBX 60	GBX 60
BSH 0553	GBX 40	GBX 40	GBX 40	GBX 60	GBX 40	GBX 40	GBX 60	GBX 60
BSH 0701	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BSH 0702	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 60	GBX 80	GBX 80
BSH 0703	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 80	GBX 80	GBX 80
BSH 1001	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BSH 1002	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 120	GBX 120
BSH 1003	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 120	GBX 120	GBX 120
BSH 1004	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 160	GBX 160
BSH 1401	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 160	GBX 160
BSH 1402	GBX 120	GBX 120	GBX 120	GBX 160	–	GBX 160	GBX 160	GBX 160
BSH 1403	GBX 120	GBX 120	GBX 120	GBX 160	–	GBX 160	GBX 160	GBX 160
BSH 1404	GBX 120	GBX 120	GBX 160	GBX 160	–	GBX 160	GBX 160	GBX 160
BSH 2051	*(1)*	*(1)*	*(1)*	*(1)*	–	–	–	–
BSH 2052	–	–	–	–	–	–	–	
BSH 2053	–	–	–	–	–	–	–	

Reduction ratios from 20:1 to 100:1

Type of servo motor	Speed reduction ratio						
	20:1	25:1	32:1	40:1	60:1	80:1	100:1
BSH 0551	GBX 40	GBX 60	GBX 60	GBX 60	GBX 60	*(1)*	*(1)*
BSH 0552	GBX 60	GBX 60	GBX 60	*(1)*	*(1)*	*(1)*	*(1)*
BSH 0553	GBX 60	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*
BSH 0701	GBX 80	GBX 80	GBX 80	GBX 80	GBX 120	GBX 120	GBX 120
BSH 0702	GBX 80	GBX 80	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BSH 0703	GBX 80	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BSH 1001	GBX 80	GBX 120	GBX 120	GBX 120	–	–	–
BSH 1002	GBX 120	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1003	GBX 120	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1004	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1401	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1402	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1403	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BSH 1404	GBX 160	–	–	–	–	–	–
BSH 2051	–	–	–	–	–	–	–
BSH 2052	–	–	–	–	–	–	–
BSH 2053	–	–	–	–	–	–	–

(1) For this combination, please contact your Regional Sales Office.

GBX 60

For these combinations, you must check that the application will not exceed the maximum output torque of the gearbox (see the values given on page 3/213).

Lexium 15 motion control
BSH servo motors
Option: GBX planetary gearboxes

Characteristics of GBX gearboxes

Type of gearbox			GBX 40	GBX 60	GBX 80	GBX 120	GBX 160
Type of gearbox			Planetary gearbox with straight teeth				
Backlash	3:1… 8:1	**arc min**	< 24	< 16	< 9	< 8	< 6
	9:1… 40:1		< 28	< 20	< 14	< 12	< 10
	60:1… 100:1		< 30	< 22	< 16	< 14	–
Torsion rigidity	3:1… 8:1	**Nm/ arc min**	1	2.3	6	12	38
	9:1… 40:1		1.1	2.5	6.5	13	41
	60:1… 100:1		1	2.5	6.3	12	–
Noise level *(1)*		**dB (A)**	55	58	60	65	70
Junction box			Black anodized aluminium				
Shaft material			C 45				
Shaft output dust and damp protection			IP 54				
Lubrication			Lubricated for life				
Average service life *(2)*		**h**	30,000				
Mounting position			All positions				
Operating temperature		**°C**	-25…+90				
Efficiency	3:1…8:1		0.96				
	9:1…40:1		0.94				
	60:1…100:1		0.9				
Maximum permitted radial force *(2) (3)*	L_{10h} = 10,000 hours	**N**	200	500	950	2000	6000
	L_{10h} = 30,000 hours	**N**	160	340	650	1500	4200
Maximum permitted axial force *(2)*	L_{10h} = 10,000 hours	**N**	200	600	1200	2800	8000
	L_{10h} = 30,000 hours	**N**	160	450	900	2100	6000
Moment of gearbox inertia	3:1	**kgcm²**	0.031	0.135	0.77	2.63	12.14
	4:1	**kgcm²**	0.022	0.093	0.52	1.79	7.78
	5:1	**kgcm²**	0.019	0.078	0.45	1.53	6.07
	8:1	**kgcm²**	0.017	0.065	0.39	1.32	4.63
	9:1	**kgcm²**	0.03	0.131	0.74	2.62	–
	12:1	**kgcm²**	0.029	0.127	0.72	2.56	12.37
	15:1	**kgcm²**	0.023	0.077	0.71	2.53	12.35
	16:1	**kgcm²**	0.022	0.088	0.5	1.75	7.47
	20:1	**kgcm²**	0.019	0.075	0.44	1.5	6.64
	25:1	**kgcm²**	0.019	0.075	0.44	1.49	5.81
	32:1	**kgcm²**	0.017	0.064	0.39	1.3	6.36
	40:1	**kgcm²**	0.016	0.064	0.39	1.3	5.28
	60:1	**kgcm²**	0.029	0.076	0.51	2.57	–
	80:1	**kgcm²**	0.019	0.075	0.5	1.5	–
	100:1	**kgcm²**	0.019	0.075	0.44	1.49	–

(1) Value measured at a distance of 1 m, without load, for a servo motor speed of 3000 rpm and a speed reduction ratio of 5:1.
(2) Values refer to an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines for an ambient temperature of 30°C.
(3) Force applied at mid-distance from the output shaft.

Presentation: page 3/212 References: page 3/214 Dimensions: page 3/216 Installation: page 3/217

Lexium 15 motion control

BSH servo motors

Option: GBX planetary gearboxes

Characteristics of GBX gearboxes (continued)

Type of gearbox			GBX 40	GBX 60	GBX 80	GBX 120	GBX 160
Continuous output torque M_{2N} *(1)*	3:1	**Nm**	11	28	85	115	400
	4:1	**Nm**	15	38	115	155	450
	5:1	**Nm**	14	40	110	195	450
	8:1	**Nm**	6	18	50	120	450
	9:1	**Nm**	16.5	44	130	210	–
	12:1	**Nm**	20	44	120	260	800
	15:1	**Nm**	18	44	110	230	700
	16:1	**Nm**	20	44	120	260	800
	20:1	**Nm**	20	44	120	260	800
	25:1	**Nm**	18	40	110	230	700
	32:1	**Nm**	20	44	120	260	800
	40:1	**Nm**	18	40	110	230	700
	60:1	**Nm**	20	44	110	260	–
	80:1	**Nm**	20	44	120	260	–
	100:1	**Nm**	20	44	120	260	–
Maximum output torque *(1)*	3:1	**Nm**	17.6	45	136	184	640
	4:1	**Nm**	24	61	184	248	720
	5:1	**Nm**	22	64	176	312	720
	8:1	**Nm**	10	29	80	192	720
	9:1	**Nm**	26	70	208	336	–
	12:1	**Nm**	32	70	192	416	1280
	15:1	**Nm**	29	70	176	368	1120
	16:1	**Nm**	32	70	192	416	1280
	20:1	**Nm**	32	70	192	416	1280
	25:1	**Nm**	29	64	176	368	1120
	32:1	**Nm**	32	70	192	416	1280
	40:1	**Nm**	29	64	176	368	1120
	60:1	**Nm**	32	70	176	416	–
	80:1	**Nm**	32	70	192	416	–
	100:1	**Nm**	32	70	192	416	–

(1) Values refer to an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines for an ambient temperature of 30°C.

Lexium 15 motion control
BSH servo motors
Option: GBX planetary gearboxes

References

535593

Planetary gearbox GBX ●●●

Size	Speed reduction ratio	Reference	Weight kg
GBX 40	3:1, 4:1, 5:1 and 8:1	**GBX 040●●● ●●● ●F**	0.350
	9:1, 12:1, 15:1, 16:1 and 20:1	**GBX 040●●● ●●● ●F**	0.450
GBX 60	3:1, 4:1, 5:1 and 8:1	**GBX 060●●● ●●● ●F**	0.900
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 060●●● ●●● ●F**	1.100
	60:1	**GBX 060●●● ●●● ●F**	1.300
GBX 80	3:1, 4:1, 5:1 and 8:1	**GBX 080●●● ●●● ●F**	2.100
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 080●●● ●●● ●F**	2.600
	60:1, 80:1 and 100:1	**GBX 080●●● ●●● ●F** *(1)*	3.100
GBX 120	3:1, 4:1, 5:1 and 8:1	**GBX 120●●● ●●● ●F**	6.000
	9:1, 12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 120●●● ●●● ●F**	8.000
	60:1, 80:1 and 100:1	**GBX 120●●● ●●● ●F**	10.000
GBX 160	5:1 and 8:1	**GBX 160●●● ●●● ●F**	18.000
	12:1, 15:1, 16:1, 20:1, 25:1, 32:1 and 40:1	**GBX 160●●● ●●● ●F**	22.000

To order a GBX planetary gearbox, complete each reference with:

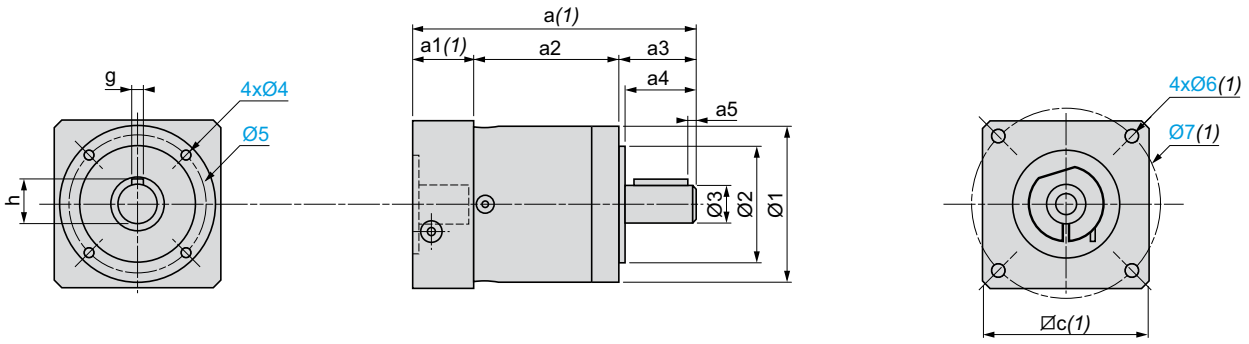
			GBX ●●●	●●●	●●●	●	F
Size	Junction box diameter (see table of combinations with BSH servo motor, page 3/212)	40 mm	**040**				
		60 mm	**060**				
		80 mm	**080**				
		115 mm	**120**				
		160 mm	**160**				
Speed reduction ratio		3:1		**003**			
		4:1		**004**			
		5:1		**005**			
		8:1		**008**			
		9:1		**009**			
		12:1		**012**			
		15:1		**015**			
		16:1		**016**			
		20:1		**020**			
		25:1		**025**			
		32:1		**032**			
		40:1		**040**			
		60:1		**060**			
		80:1		**080**			
		100:1		**100**			
Associated BSH servo motor	Type	BSH 055			**055**		
		BSH 070			**070**		
		BSH 100			**100**		
		BSH 140			**140**		
		BSH 205			*(2)*		
	Model	BSH ●●●1				**1**	
		BSH ●●●2				**2**	
		BSH ●●●3				**3**	
		BSH ●●●4				**4**	
BSH servo motor adaptation							**F**

(1) For a combination of GBX 080 planetary gearbox/BSH 055● servo motor, please consult your Regional Sales Office.
(2) For use with a BSH 205● servo motor, please consult your Regional Sales Office.

Lexium 15 motion control
BSH servo motors
Option: GBX planetary gearboxes

Dimensions

Servo motor assembly



GBX	a2	a3	a4	a5	h	g	Ø1	Ø2	Ø3	Ø4	Ø5
040 003...008	39	26	23	2.5	11.2	3	40	26 h7	10 h7	M4 x 6	34
040 009...020	52	26	23	2.5	11.2	3	40	26 h7	10 h7	M4 x 6	34
060 003...008	47	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
060 009...040	59.5	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
060 060	72	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52
080 003...008	60.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
080 009...040	77.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
080 060...100	95	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70
120 003...008	74	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
120 009...040	101	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
120 060...100	128	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100
160 005, 008	104	87	80	8	43	12	160	130 h7	40 h7	M12 x 20	145
160 012...040	153.5	87	80	8	43	12	160	130 h7	40 h7	M12 x 20	145

(1) Dimensions a, a1, Øc, Ø6 and Ø7 depend on the planetary gearbox/BSH servo motor combination:

Combinations		Reduction ratios						
Gearbox	Servo motor	3:1 to 8:1	9:1 to 40:1	60:1 to 100:1	3:1 to 100:1	3:1 to 100:1	3:1 to 100:1	3:1 to 100:1
		a	a	a	a1	Ø c	Ø6	Ø7
GBX 040	**BSH 055●**	89.5	102.5	115	24.5	60	M4	63
GBX 060	**BSH 055●**	106	118.5	131.5	24	60	M4	63
GBX 060	**BSH 0701, 0702**	106	118.5	131.5	24	70	M5	75
GBX 060	**BSH 0703**	113	125.5	138.5	31	70	M5	75
GBX 080 *(1)*	**BSH 055●** *(1)*	–	151	168.5	33.5	80	M4	63
GBX 080	**BSH 070●**	133.5	151	168.5	33.5	80	M5	82
GBX 080	**BSH 1001...1003**	143.5	161	178.5	43.5	100	M8	115
GBX 120	**BSH 070●**	–	203.5	231	47.5	115	M5	75
GBX 120	**BSH 1001...1003**	176.5	203.5	231	47.5	115	M8	115
GBX 120	**BSH 1004**	186.5	213.5	241	57.5	115	M8	115
GBX 120	**BSH 140●**	186.5	213.5	–	57.5	140	M10	165
GBX 160	**BSH 1002...1004**	–	305	–	64.5	140	M8	115
GBX 160	**BSH 140●**	255.5	305	–	64.5	140	M10	165

(1) For this combination, please consult your Regional Sales Office.

Lexium 15 motion control
BSH servo motors
Option: GBX planetary gearboxes

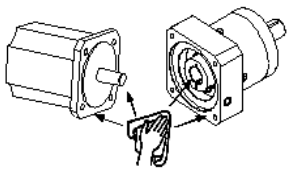
Installation

No specialized tool is required to mount the GBX planetary gearbox on the BSH servo motor. The general usage rules for mechanical mounting must be observed:

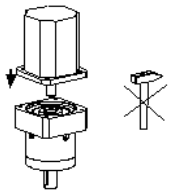
1 Clean support areas and joints.
2 Align the shafts to be linked and assemble in a vertical position.
3 Join the servo motor flange to the gearbox flange in a uniform manner, with cross tightening of the screws.
4 Using a torque wrench, tighten the TA ring following the tightening torque (2 to 40 Nm according to the gearbox model).

For more information, consult the user instructions supplied with the products.

1



2



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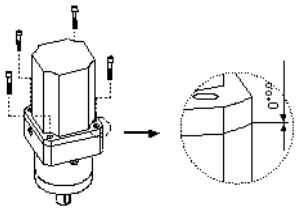

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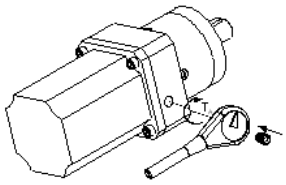


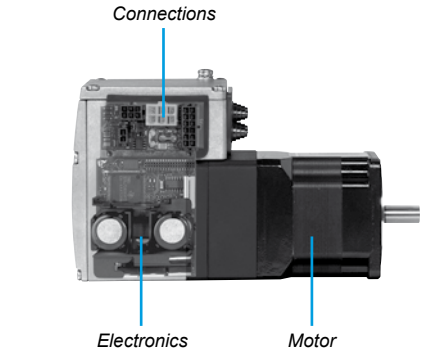
4 - Lexium integrated drives

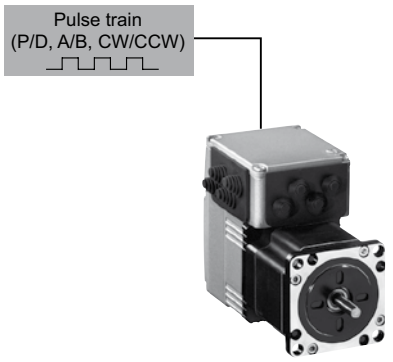
ILS1 integrated drives with I/O interface for motion sequence

ILS1 integrated drives with pulse/direction interface

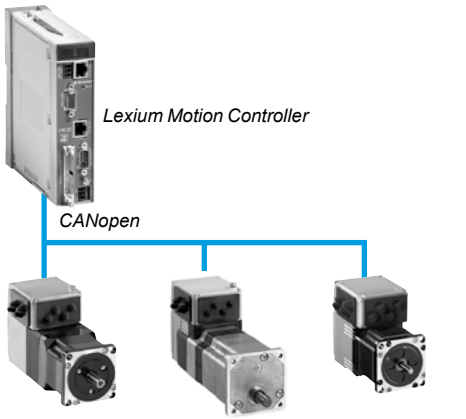
Options and accessories

Lexium integrated drives
Presentation





ILS with stepper motor



ILA with servo motor

ILE with brushless DC motor

ILS with stepper motor

Product offer

Lexium Integrated Drives consist of a motor and control electronics. They are controlled via a fieldbus, pulse/direction or I/O interface (“motion sequence” operating mode). The Lexium Integrated Drives are used as decentralised drives in machine building and automation technology. Together with a motion controller such as Lexium Motion Controller or a PLC, the systems allow for simple and economic implementation of complex automation task. Ready-to-be-used function blocks facilitate motion programming with a Schneider Electric motion controller . The Lexium Integrated Drives from Schneider Electric excel with the following properties:

Compactness

Motor and electronics form a single, compact and small-footprint unit. No space at all is required for the control electronics in the control cabinet and only very little space in the machine.

Simplicity

Integration of motor and electronics reduces the installation costs and simplifies the EMC concept. The user-friendly PC commissioning software allows for rapid commissioning.

Openness

The Lexium Integrated Drives with fieldbus interface are available in two versions:
- for communication via CANopen, PROFIBUS DP, RS 485
- for communication via DeviceNet, EtherCAT, Ethernet Powerlink, Modbus TCP

Lexium Integrated Drives with stepper motors are available with a pulse/direction interface or an I/O interface for motion sequence.

This open communication concept allows for integration into existing system environments.

Flexibility

The Lexium Integrated Drives can be equipped with various motor types: AC synchronous servo motor, brushless DC motor or stepper motor. Each motor type offers specific advantages so that the Lexium Integrated Drives can be used in a large variety of different applications.

Safety

The integrated “Safe Torque Off” (“Power Removal”) safety function enables a stop of category 0 or 1 as per IEC/EN 60204-1 without external power contactors. This reduces the system costs and response times. The drive system fulfils the requirements of IEC 61508 SIL2 as well as of ISO 13849-1 perfomance level “d” (PL “d”) and IEC/EN 61800-5-2 (“STO”) .

Product offer

ILA●	ILE●	ILS●●57	ILS●●85
			

IL●1 with fieldbus interface for CANopen, PROFIBUS DP, RS 485		
ILA1 with AC synchronous servo motor	**ILA1●**	
Torque range	0.26 ... 0.45 Nm; peak torque: 0.4 ... 0.72 Nm (without gearing)	
Range of speed of rotation	Without gearing: up to 7500 rpm	
Positioning resolution	0.02° (singleturn encoder, optional: multiturn encoder with positioning range of 4096 revolutions)	
Interfaces	Fieldbus interface: CANopen, PROFIBUS DP, RS 485 24 V signal interface with 4 freely programmable I/O signals; interface for “Safe Torque Off” safety function (“Power Removal”)	
Operating modes	Homing, jog, profile position, profile velocity, electronic gear *(1)*	
Configuration	Via “Lexium CT” commissioning software or fieldbus	
ILE1 with brushless DC motor	**ILE1●**	
Torque range	Without gearing: 0.17 Nm; with spur wheel gear: 3.1 ... 11 Nm	
Range of speed of rotation	Without gearing: up to 4800 rpm	
Detent torque	0.08 Nm (without gearing); 1 ... 8 Nm (with spur wheel gear)	
Positioning resolution	0.26° ... 1.67° (with spur wheel gear)	
Interfaces	Fieldbus interface: CANopen, PROFIBUS DP, RS 485 24 V signal interface with 4 freely programmable I/O signals; interface for “Safe Torque Off” safety function (“Power Removal”)	
Operating modes	Homing, jog, profile position, profile velocity	
Configuration	Via “Lexium CT” commissioning software or fieldbus	
ILS1 with 3-phase stepper motor	**ILS1●57**	**ILS1●85**
Torque range	Without gearing: 0.45 ... 1.5 Nm	Without gearing: 2 ... 6 Nm
Range of speed of rotation	Without gearing: up to 2000 rpm	Without gearing: up to 1000 rpm
Positioning resolution	0.018°	
Interfaces	Fieldbus interface: CANopen, PROFIBUS DP, RS 485 24 V signal interface with 4 freely programmable I/O signals; interface for “Safe Torque Off” safety function (“Power Removal”)	
Operating modes	Homing, jog, profile position, profile velocity	
Configuration	Via “Lexium CT” commissioning software or fieldbus	

(1) “Electronic gear” operating mode not with ILA1 with multiturn encoder

Supply voltage
Lexium Integrated Drives IL●1 can be operated with a supply voltage of 24 V⎓ or 36 V⎓.

IL●2 with fieldbus interface for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink *(1)*		
ILA2 with AC synchronous servo motor	**ILA2●**	
Torque range	0.31 ... 0.78 Nm; peak torque 0.45 ... 1.62 Nm	
Range of speed of rotation	Without gearing: up to 7000 rpm	
Positioning resolution	0.02° (singleturn encoder, optional: multiturn encoder with positioning range of 4096 revolutions)	
Interfaces	Fieldbus interface: DeviceNet, EtherCAT, Modbus TCP/IP, Ethernet Powerlink 24 V signal interface with 4 freely programmable I/O signals; interface for “Safe Torque Off” safety function (“Power Removal”)	
Operating modes	Profile velocity, jog, profile position, homing, electronic gear *(1)*	
Configuration	Via “Lexium CT” commissioning software or fieldbus	
ILE2 with brushless DC motor	**ILE2●**	
Torque range	Without gearing: 0.26 ... 0.5 Nm; with spur wheel gear: 3.1 ... 11 Nm; with worm gear: 2.5 ... 10.6 Nm	
Range of speed of rotation	Without gearing: up to 6000 rpm; with spur wheel gear: up to 4800 rpm; with worm gear: up to 4000 rpm	
Detent torque	Without gearing: 0.08 ... 0.106 Nm; with spur wheel gear: 1.1 ... 8 Nm; with worm gear: 2.9 ... 16.7 Nm	
Positioning resolution	Without gearing: 30°; with spur wheel gear: 0.26° ... 1.67°; with worm gear: 0.26° ... 1.26°	
Interfaces	Fieldbus interface: DeviceNet, EtherCAT, Modbus TCP/IP, Ethernet Powerlink 24 V signal interface with 4 freely programmable I/O signals; interface for “Safe Torque Off” safety function (“Power Removal”)	
Operating modes	Profile velocity, jog, profile position, homing	
Configuration	Via “Lexium CT” commissioning software or fieldbus	
ILS2 with 3-phase stepper motor	**ILS2●57**	**ILS2●85**
Torque range	Without gearing: 0.45 ... 1.5 Nm	Without gearing: 2 ... 6 Nm
Range of speed of rotation	Without gearing: up to 2000 rpm	Without gearing: up to 1000 rpm
Positioning resolution	0.018°	
Interfaces	Fieldbus interface: DeviceNet, EtherCAT, Modbus TCP/IP, Ethernet Powerlink 24 V signal interface with 4 freely programmable I/O signals; interface for “Safe Torque Off” safety function (“Power Removal”)	
Operating modes	Profile velocity, jog, profile position, homing	
Configuration	Via “Lexium CT” commissioning software or fieldbus	

(1) “Electronic Gear” operating mode not with ILA2 with multiturn encoder

Supply voltage
Lexium Integrated Drives IL●2 can be operated with a supply voltage of 24 V⎓ or 48 V⎓.

IL●1 with I/O interface for motion sequence		
ILS1 with 3-phase stepper motor	**ILS1M57**	**ILS1M85**
Torque range	Without gearing: 0.45 ... 1.5 Nm	Without gearing: 2 ... 6 Nm
Range of speed of rotation	Without gearing: up to 2000 rpm	Without gearing: up to 1000 rpm
Positioning resolution	0.036°	
Interfaces	Multifunction interface for motion sequence; RS 485 commissioning interface; 24 V signal interface; interface for “Safe Torque Off” safety function (“Power Removal”)	
Operating modes	Motion sequence; jog, profile position, homing	
Configuration	With “Lexium CT” commissioning software	

IL●1 with pulse/direction interface		
ILS1 with 3-phase stepper motor	**ILS1●57**	**ILS1●85**
Torque range	Without gearing: 0.45 ... 1.5 Nm	Without gearing: 2 ... 6 Nm
Range of speed of rotation	Without gearing: up to 2000 rpm	Without gearing: up to 1000 rpm
Positioning resolution	0.036°	
Interfaces	Multifunctional interface for pulse/direction or A/B signals (encoder); service interface; 24 V signal interface; interface for “Safe Torque Off” safety function (“Power Removal”)	
Operating modes	Current reduction, blocking detection, I/O signal assignment	
Configuration	Via parameter switch: motor phase current, number of steps, phase current reduction, blocking detection, RS 485 terminating resistor, I/O signal assignment	

Supply voltage
Lexium Integrated Drives IL●1 can be operated with a supply voltage of 24 V⎓ or 36 V⎓.

Lexium integrated drives
IL●1 for CANopen, PROFIBUS DP, RS 485

ILA1 with AC synchronous servo motor

Presentation

The Lexium integrated drives comprise motor, control electronics and a fieldbus interface:
- CANopen DS301 (IL●1F)
- PROFIBUS DP (IL●1B)
- RS 485 (IL●1R)

The IL●1 product group includes:
- ILA1 with AC synchronous servo motor
- ILE1 with brushless DC motor
- ILS1 with 3-phase stepper motor

ILA1 – the Integrated Drive System for dynamic processes
ILA1 has an AC synchronous servo motor. This motor is characterised by high dynamics with the possibility of short-term overcurrent during acceleration.

ILE1 – the Integrated Drive System for automatic format adjustment
ILE1 is fitted with a brushless DC motor.
The brushless DC motors have high detent torque at zero current. This makes a holding brake unnecessary in most applications.
In combination with the electronics, ILE1 has the characteristics of an absolute encoder.

ILS1 – the Lexium integrated drives for short-distance positioning
With its 3-phase stepper motor, ILS1 offers high torque at low speeds of rotation. ILS1 are ideally suited as drives in velocity mode with excellent constant velocity characteristics and also or for high-resolution positioning. Commissioning the stepper motor drives is simple because it is not necessary to adjust the control loop.

Special features

ILA1 with AC synchronous servo motor
- High dynamics and high peak torque
- High-resolution singleturn encoder with a resolution of 16384 increments/revolution (0.02°)
- Optionally with multiturn encoder with a resolution of 16384 increments/revolution (0.02°) with a positioning range of 4096 revolutions
- Optionally with integrated holding brake
- Planetary gear available as options

ILE1 with brushless DC motor
- High detent torque
- Quasi-absolute encoder, therefore, no homing required after switching off and on
- Optionally available with spur wheel gear or worm gear; planetary gear available as options

ILS1 with 3-phase stepper motor
- High continuous stall torque
- Good constant velocity characteristics
- High positioning resolution (0.018°)
- Optionally with holding brake (ILS1●85 only)
- Planetary gear available as options

Electronics

The electronic system comprises control electronics and power amplifier. They have a common power supply. The Lexium integrated drives can be parameterised and controlled via the fieldbus interface.
Four different 24 V signals are also available. They can be used as input or output.

Supply voltage
IL●1 can be operated with a voltage range of 24 V to 36 V.

Connection technologies

IL●1 have the following connections:
- Supply voltage 24 ... 36 V⎓
- Fieldbus interface: CANopen DS301, PROFIBUS DP or RS 485
- 24 V signal interface for four inputs/outputs
- Signal interface for “Safe Torque Off” safety function (“Power Removal”)

Fieldbus interface

The following fieldbuses can be connected to the fieldbus interface depending on the device version:
- CANopen (DS301 protocol)
- PROFIBUS DP-V0 (data format as per Profidrive V2.0 PPO Type 2)
- RS 485 (manufacturer-specific protocol)

The fieldbus interface is used to parameterise and control the Integrated Drive System.
In addition, the Integrated Drive System can be commissioned with a PC connected to the fieldbus interface and the PC commissioning software. This requires a compatible fieldbus converter, such as USB-CANopen, USB-RS 485, RS 232-RS 485 or USB-Profibus (see accessories).

24 V signal interface

Four 24 V signals are available, which can be used either as an input or an output. The 24 V signals are available to the master controller via the fieldbus. They can also be used for predefined functions, such as for connection of limit switches and reference switches.
The 24 V power supply to the outputs is internal via the supply voltage of the Integrated Drive System.

Signal interface for “Safe Torque Off” safety function (“Power Removal”)

The integrated “Safe Torque Off” safety function (“Power Removal”) enables a stop of category 0 or 1 as per IEC/EN 60204-1 without external power contactors. The supply voltage does not have to be interrupted. This reduces the system costs and response times.
The “Safe Torque Off” safety function (“Power Removal”) is activated via two redundant 24 V input signals (low active).

Integrated drive system with printed circuit board connectors

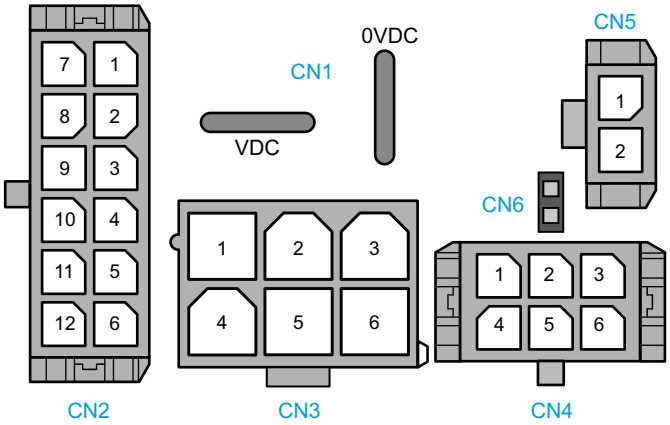
Connection technologies (continued)

Printed circuit board connector

Printed circuit board plug connectors are preferably used for cabling series machines with cable harnesses.

- Fieldbus and I/O signal connection with connector “Molex Micro Fit"
- Power supply connection with “AMP Positive Lock” crimp contacts

Two cable entries are required for cabling the Lexium integrated drives (see accessories, page 4/107).



Printed circuit board connector, overview of connections

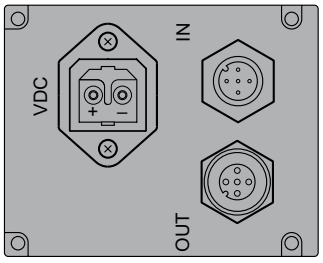
Connection	Assignment
CN1	Supply voltage ⎓ V
CN2	For all IL●1: fieldbus interface for PROFIBUS DP For ILA1●57 only: interface for PROFIBUS DP and “Electronic Gear” operating mode (reference signal)
CN3	Fieldbus interface for CANopen DS301 or RS 485
CN4	24 V signal interface
CN5	Interface for “Safe Torque Off” safety function (“Power Removal”)
CN6	Jumper for disabling “Safe Torque Off” safety function (“Power Removal”)

Integrated drive system with industrial connectors

Industrial connectors (optional)

Lexium integrated drives with industrial connectors are preferably used in special machines and small series.

The device version with industrial connectors has a connector housing cover with two M12 circular connectors for the fieldbus connection and a Hirschmann STASEI 200 connector for connection of the power supply.



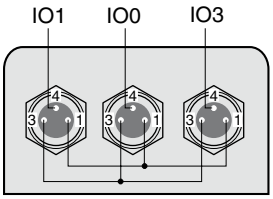
Industrial connector, overview of connections

Connection technologies (continued)

I/O signal inserts

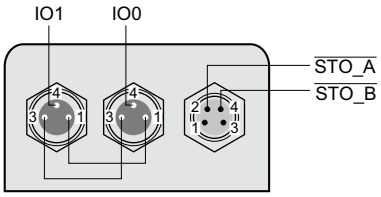
One or two I/O signal inserts with industrial connectors can be ordered for connection of the I/O signals (see accessories, pages 4/109 and 4/110).
The 24 V power supply to the outputs is internal. Different I/O signal inserts are available for this purpose.

I/O signal insert without “Safe Torque Off” safety function (“Power Removal”)

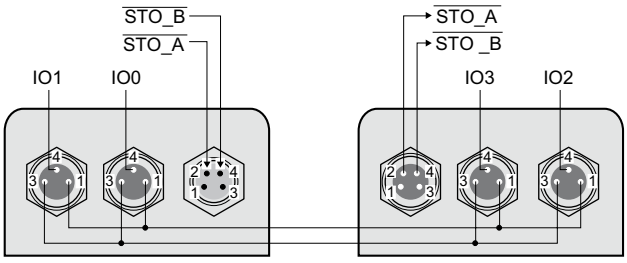


Inserts for three I/O signals

I/O signal inserts with “Safe Torque Off” safety function (“Power Removal”)

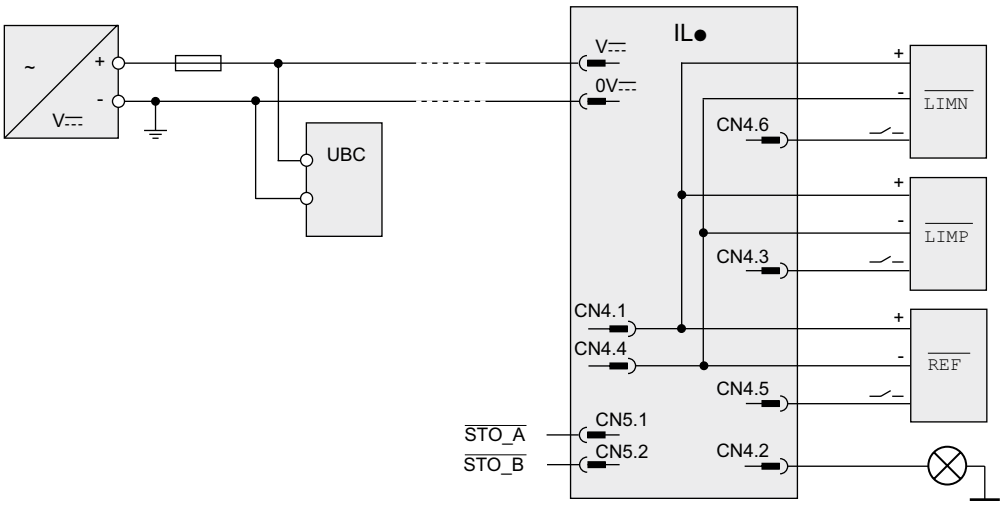


Insert for two I/O signals and STO signals for safety function



Inserts for four I/O signals and STO signals for safety function

Connection example I/O signal



Connection example with four I/O signals

Lexium integrated drives
IL●1 for CANopen, PROFIBUS DP, RS 485

Configuration via parameter switches

The following settings can be made at the Integrated Drive System via parameter switches:

■ PROFIBUS DP
□ Setting fieldbus address
□ Activating terminating resistor
■ CANopen DS301 and RS 485
□ Setting fieldbus address
□ Setting baud rate
□ Activating terminating resistor
□ Setting pulse input for “electronic gear” operating mode (pulse/direction or A/B signals), only with ILA1●57 with singleturn encoder

Operating modes

Overview

The following operating modes can be set via the fieldbus:

■ Electronic gear (only ILA1●57 with singleturn encoder)
■ Profile velocity
■ Jog
■ Profile position
■ Homing

Electronic gear (only ILA1●57 with singleturn encoder)

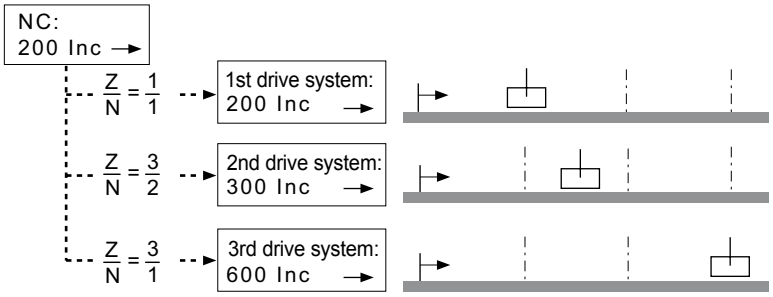
In “Electronic Gear” operating mode with singleturn encoder, the reference signals are supplied from an encoder (A/B signals) or a controller (pulse/direction signals) and a new position reference value is calculated using an adjustable gear ratio.

Reference value setting

The reference values are supplied as pulse/direction or A/B encoder signals (adjustable via parameter switch). In the case of ILA1●57 with PROFIBUS DP, only pulse/direction signals can be used as reference values.

Application example

Synchronisation of motion sequences, e.g. cutting material on a conveyor belt.



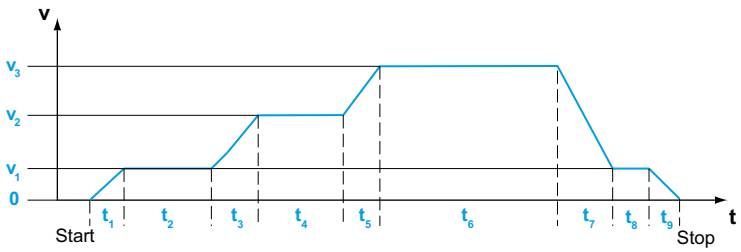
"Electronic Gear" operating mode

Profile velocity

In operating mode “Profile velocity", a reference speed for the motor is set and a movement without a target position is started. This speed is maintained until a different reference speed is specified or the operating mode is changed.

Reference value setting
The reference value is set via fieldbus or PC.

Application example
Application of paint in CD manufacture



Profile velocity

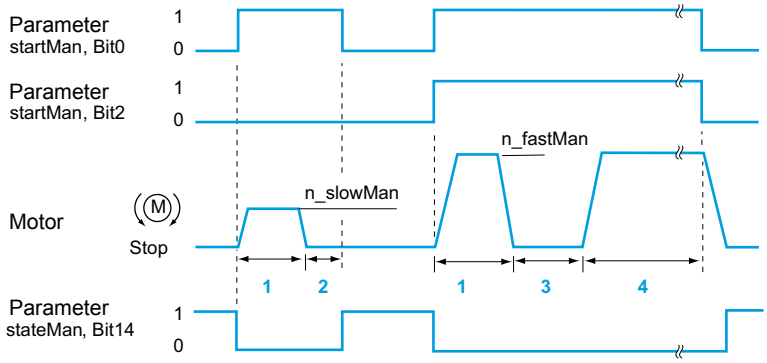
t_1, t_3, t_5 = acceleration
t_2, t_4, t_6, t_8 = constant movement
t_7, t_9 = braking

Jog mode

The motor moves by one distance unit or at constant speed in continuous operation. The value of the distance unit, the speed levels and the change-over time in continuous operation can be adjusted manually.

Reference value setting
The reference value is set via fieldbus or PC.

Application example
Setting up a machine during commissioning



Jog, slow and fast

1 step_Man
2 t < time_Man
3 time_Man
4 Continuous operation

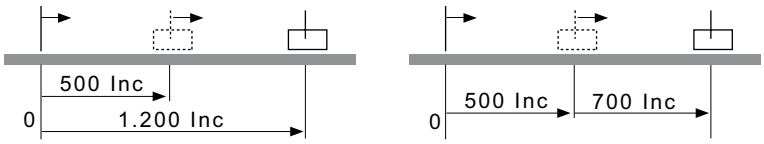
Profile position

In the operating mode “Profile Position", the motor is positioned from a point A to a point B with a positioning command.

Settings
The positioning path can be specified in two ways:
- Absolute positioning, reference point is the zero point of the axis
- Relative positioning, reference point is the current position of the motor

Reference value setting
The reference value is set via fieldbus or PC.

Application example
Pick-and-place with a linear robot



Operating mode “Profile Position", absolute and relative

Homing

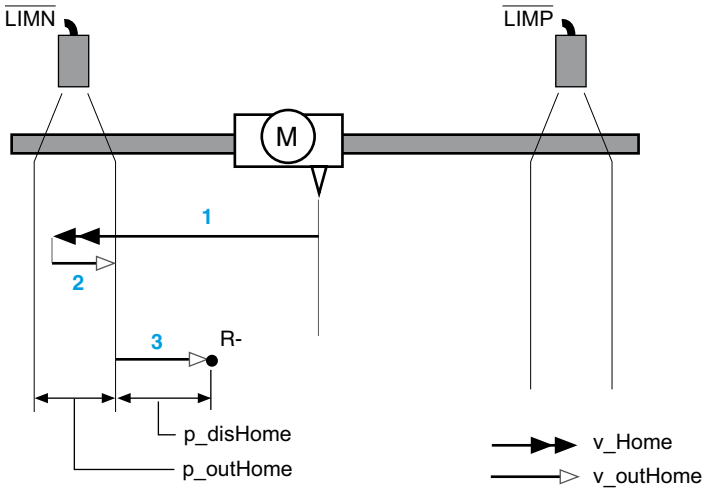
There are two types of the “Homing” operating mode:
- Reference movement
  Specifying the dimension reference by approach to a limit or reference switch
- Position setting
  Specifying the position reference relative to the current motor position

***Note:** In the case of ILA1 with multiturn encoder, a valid actual motor position is available immediately after starting. Therefore, homing to external limit switches is not required.*

Reference movement
During reference movement, the motor moves to a defined position on the axis. The position is defined by a mechanical switch:
- LIMP, LIMN limit switches
- REF reference switch

Types of reference movements
There are six standard reference movements:
- Movement to negative limit switch LIMN
- Movement to positive limit switch LIMP
- Movement to REF reference switch with first movement counterclockwise
- Movement to REF reference switch with first movement clockwise
- Reference movement to index pulse with clockwise or counterclockwise rotation (not with ILE1)
- Reference movement to block = mechanical stop (ILE1 only)

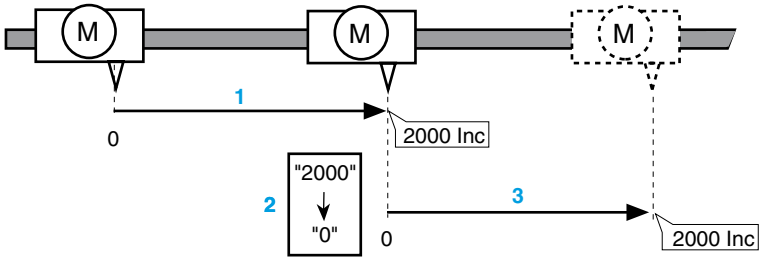
Example 1: reference movement to limit switch



Operating mode "Homing", reference movement to limit switch

1 Movement to limit switch at search speed
2 Movement to switching edge at clearance speed
3 Movement to distance from switching edge at clearance speed

Example 2: position setting
Position setting can be used to execute a continuous motor movement without overtravelling the positioning limits.



Positioning by 4000 increments with position setting

1 The motor is positioned 2000 increments.
2 The current motor position is set to position value 0 by position setting to 0 and the new zero point is defined at the same time.
3 The new target position is 2000 increments after triggering a new travel command by 2000 increments.

This procedure prevents overtravel of the absolute position limits during positioning, because the zero point is continuously made to follow.

Reference value setting
The reference value is set via fieldbus or PC.

Application example
Setting a reference before switching to "Profile Position" mode

Additional operating modes

Additional operating modes can be activated via fieldbus or PC:
- Reversing direction of rotation of motor
- Programming inputs/outputs.
- Setting motion profile via profile generator
- Triggering "Quick Stop" function
- Fast position capture via signal input (Capture)

"Safe Torque Off" ("Power Removal") safety function

The Lexium integrated drive integrates the "Safe Torque Off" ("Power Removal") safety function which prevents unintended restarting of the motor. The motor no longer produces any torque if the safety function is active.

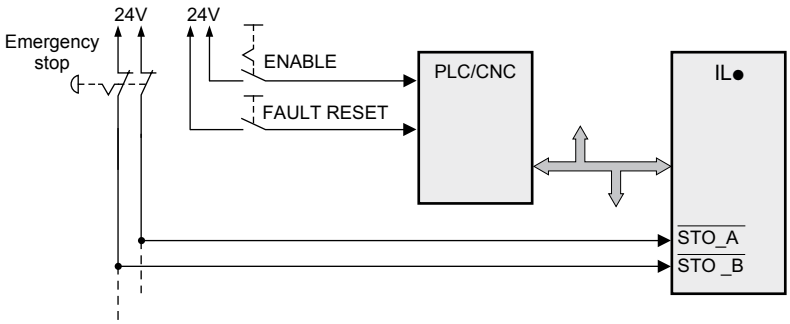
This safety function:
- Complies with the machine safety standard ISO 13849-1, perfomance level "d" (PL d) .
- Complies with the standard for functional safety IEC/EN 61508, SIL2 capability (safety control-signalling applied to processes and systems). The SIL (Safety Integrity Level) capability depends on the connection diagram for the servo drive and for the safety function. Failure to observe the setup recommendations could inhibit the SIL capability of the "Safe Torque Off" ("Power Removal") safety function.
- Complies with product standard IEC/EN 61800-5-2 "Adjustable speed electrical power drive systems – Part 5-2: Safety requirements – Functional" for both stop functions:
  - Safe Torque Off ("STO") corresponds to Category 0 stop according to IEC/EN 60204-1. Standstill by immediate power shutdown to the machine drive elements (i.e. an uncontrolled stop).
  - Safe Stop 1 ("SS1") corresponds to Category 1 stop according to IEC/EN 60204-1. A controlled stop in which the machine drive elements are retained to effect the standstill. The final shutdown is ensured by an external Emergency stop module with safe time delay, e.g. Preventa XPS-AV *(1)*.

The "Safe Torque Off" ("Power Removal") safety function has a redundant electronic architecture *(2)* which is monitored continuously by a diagnostics function.

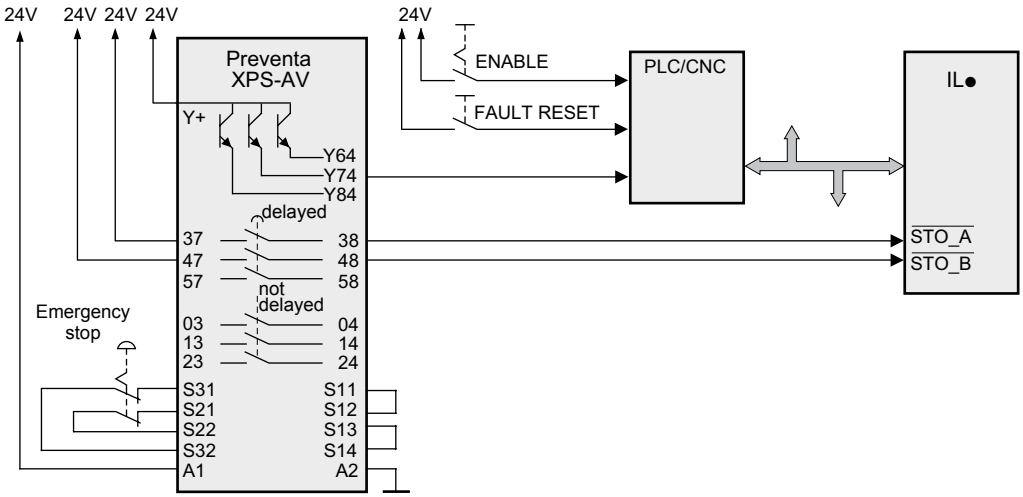
This PL d and SIL2 safety function is certified as conforming to these standards by the TÜV certification body in the context of a voluntary certification.

(1) Please refer to the "Safety functions and solutions using Preventa" catalogue.
(2) Redundant: Consists of mitigating the effects of the failure of one component by means of the correct operation of another, assuming that faults do not occur simultaneously on both.

Examples of applications of the safety function



Example of Category 0 Stop

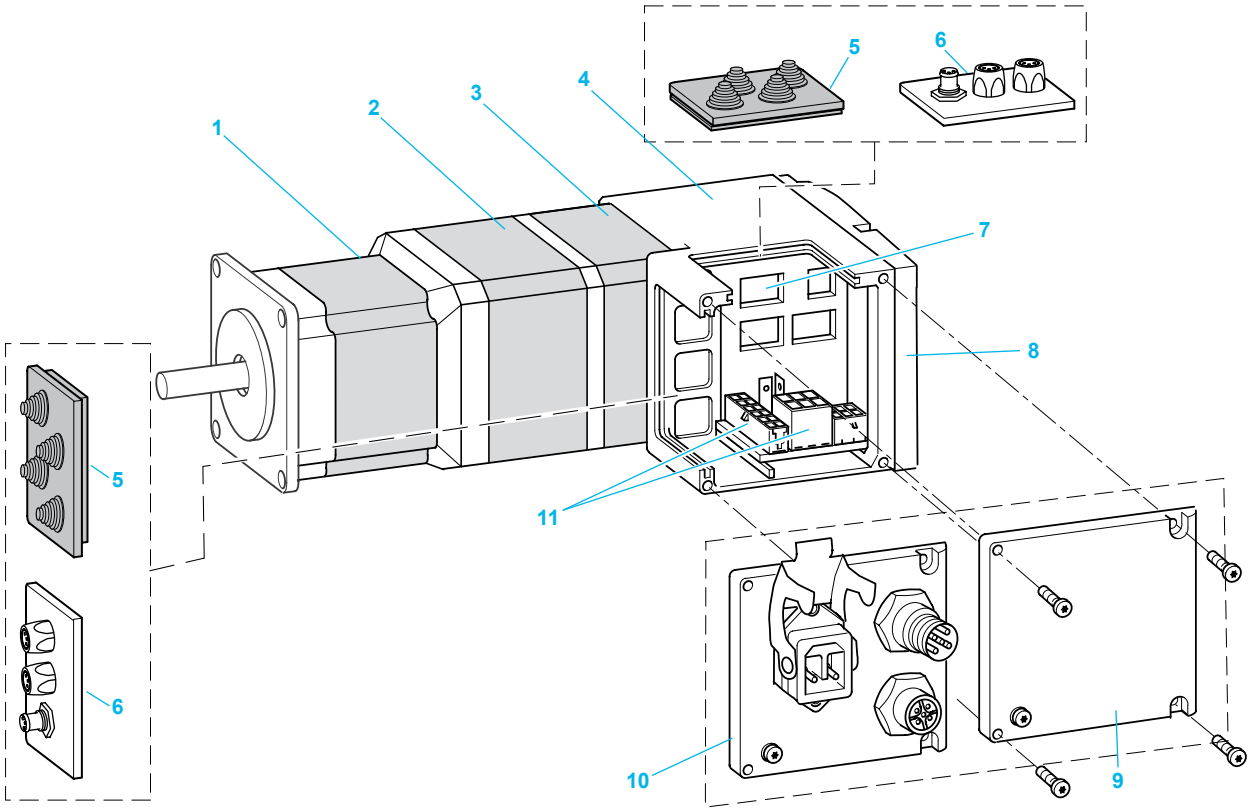


Example of Category 1 Stop

Lexium integrated drives
IL●1 for CANopen, PROFIBUS DP, RS 485
ILA1 with AC synchronous servo motor

Description

ILA1 comprise control electronics with a fieldbus interface for CANopen DS301, PROFIBUS DP or RS 485 and an AC synchronous servo motor. ILA1 is optionally available with printed circuit board connectors or industrial connectors. A multiturn encoder is optionally available for ILA1. A holding brake is optionally available for the ILA1 with a singleturn encoder.



1 Synchronous AC servo motor
2 Holding brake (optional)
3 Singleturn or multiturn encoder (optional)
4 Electronics housing
5 Insert cable entry (accessory)
6 I/O insert with industrial connectors (accessory)
7 Settings via parameter switches
8 Cover for electronics housing
9 Cover for Lexium integrated drives with option “PCB connector"
10 Cover for supply voltage ⎓ V and fieldbus connection for Lexium integrated drives with option “industrial connector”
11 Electrical interfaces

Lexium integrated drives
IL●1 for CANopen, PROFIBUS DP, RS 485
ILA1 with AC synchronous servo motor

Certifications

Conformity to standards			Lexium integrated drives have been developed to comply with the stringent international standards and with the recommendations for adjustable speed power drive systems, specifically: IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals) and IEC/EN 50178 (resistance of devices to vibration).
	EMC immunity		EN 61800-3:2001, second environment
	Conducted and radiated EMC emissions		EN 61800-3:2001-02; IEC 61800-3, Ed.2 ■ Power supplies without external mains filter: □ C3 up to 10 m supply cable length ■ Power supplies with external mains filter: □ C2 up to 20 m supply cable length □ C3 up to 50 m supply cable length
CE marking			The Lexium integrated drives are CE marked in accordance with the European Machinery Directive (98/37/EEC) and the European EMC Directive (2004/108/EEC).
Product certifications			UL (USA), cUL (Canada)
			TÜV certification: Lexium integrated drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*		**°C**	0 ... 65; power reduction by 2%/°C at 50 ... 65
Max. permissible temperature of the power amplifier		**°C**	105
Max. permissible temperature of the motor *(2)*		**°C**	110
Transport and storage temperature		**°C**	-25 ... +70
Installation height without power reduction		**m**	< 1000 m above mean sea level
Relative humidity		**%**	15 ... 85 (not condensing)
Vibration load during operation as per IEC/EN 60068-2-6	Number of cycles		10
	Acceleration amplitude:	**m/s²**	20
	Frequency range	**Hz**	10 ... 500
Continuous shocks as per IEC/EN 60068-2-29	Number of shocks		1000
	Peak acceleration	**m/s²**	150
Shaft wobble and perpendicularity			According to EN 50347 (IEC 60072-1)
Degree of protection as per DIN EN 60034-5			Total except shaft bushing IP54, shaft bushing IP41

Electrical data

Supply voltage (CN1)			Corresponds to PELV according to DIN 19240, not protected against reverse polarity	
Supply voltage range (absolute limit values)		⎓ **V**	18 ... 40	
Nominal supply voltage		⎓ **V**	24 ... 36	
Ripple at nominal voltage		V_{PP}	≤ 3.6	
			ILA1●571	**ILA1●572**
Max. continuous current consumption	■ Winding type T	**A**	7.5	7.5
	■ Winding type P	**A**	5	7
Peak current consumption	■ Winding type T	**A**	11	9
	■ Winding type P	**A**	7	8.5
Inrush current			Inrush current time-dependent by current incline function and depending on device capacitance C = 1500 µF and resistance of connectivity	
External fuse		**A**	10	
Fieldbus interfaces (CN2 and CN3)				
CANopen	Signal inputs/outputs		According to ISO 11898 standard, no galvanic isolation	
	Transmission rate	**kBaud**	50 / 100 / 125 / 250 / 500 / 800 / 1000	
	Transmission protocol		CANopen as per DS301	
PROFIBUS DP	Signal inputs/outputs		According to RS 485, galvanic isolation, 2-wire	
	Transmission rate	**kBaud**	9.6 / 19.2 / 45.45 / 93.75 / 187.5 / 500 / 1500 / 3000 / 6000 / 12000	
	Transmission protocol		PROFIBUS DP-V0 (data format as per Profidrive V2.0 PPO Type 2)	
RS 485	Signal inputs/outputs		According to RS 485, no galvanic isolation, 2-wire	
	Transmission rate	**kBaud**	9.6 / 19.2 / 38.4	
	Transmission protocol		Manufacturer-specific	

(1) Limit values with flanged motor mounted on a steel plate 300 x 300 x 10 mm
(2) Measured at the surface

Electrical data			
24 V signal interface (CN4)			4 signals, can each be used as input or output
24 V signal inputs			Galvanically connected to 0VDC, protected against reverse polarity
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)		**mA**	2
Debounce time	IO0 and IO1	**ms**	0.1
	IO2 and IO3	**ms**	0.01
24 V signal outputs			Switching to plus, short-circuit protected, suitable for inductive load (1000 mH / 100 mA)
Supply voltage range		⎓ **V**	23 ... 25
Max. switching current (total)		**mA**	200
Max. switching current per output		**mA**	100
			The internal power supply unit is protected against: ■ Short circuit of the output voltage ■ Overload of output voltage (limited to 6 W output power)
Interface for safety function "Safe Torque Off" ("Power Removal") (CN5)			No galvanic isolation; corresponds to RS 485 standard
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)	$\overline{STO\_A}$	**mA**	≤ 10
	$\overline{STO\_B}$	**mA**	≤ 3
Debounce time		**ms**	1
Response time (until shutdown of power amplifier)		**ms**	< 50
Max. time offset until detection of signal differences between $\overline{STO\_A}$ and $\overline{STO\_B}$		**S**	< 1
Safety function "Safe Torque Off" ("Power Removal")			
Protection	Of machine		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level "d" (PL d) , and standard IEC/EN 61800-5-2
	Of the system process		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2

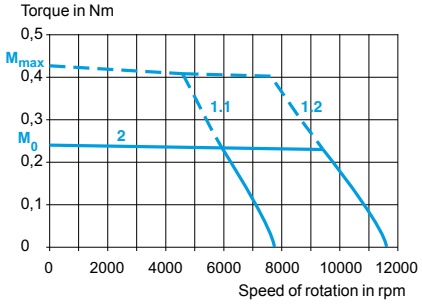
Mechanical data

Type of integrated drive			ILA1●571				ILA1●572			
Winding type			T		P		T		P	
Nominal supply voltage		⎓ V	24	36	24	36	24	36	24	36
Nominal speed of rotation		rpm	5100	7500	3200	5500	3100	5000	2600	4300
Max. torque *(1)*	M_{max}	Nm	0.43		0.6		0.61		0.72	
Continuous torque *(2)*	M_0	Nm	0.26		0.26		0.41		0.45	
Positioning resolution per revolution		Inc.	16384				16384			
Accuracy of positioning sensor		°	±0.05				±0.05			
Rotor inertia		kg·cm²	0.1				0.18			
Mass		kg	1.4				1.7			
Shaft load	Max. radial force *(3)*	N	89				107			
	Max. axial tensile force	N	104				104			
	Max. axial force pressure	N	104				104			
	Nominal bearing service life *(4)*	h	20000				20000			
Holding brake (optional) *(5)*										
Holding torque		Nm	1.2							
Electrical pull-in power		W	10							
Brake release time		ms	14							
Brake application time		ms	13							
Moment of inertia		kg·cm²	0.07							
Multiturn encoder (optional) *(5)*										
Measuring range absolute		rpm	4096							
Positioning resolution per revolution		Inc.	16384							
Accuracy of positioning sensor		°	±0.05							

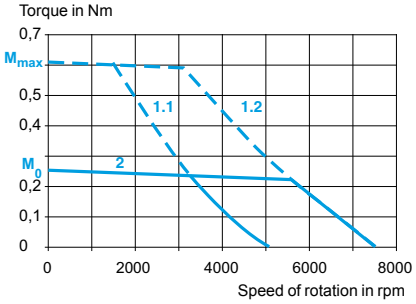
(1) Max. 2.5 s
(2) At 20 rpm; at 0 rpm the continuous torque is reduced to 89% of the specified value
(3) Point of application of radial force: 10 mm distance to flange
(4) Operating hours at a probability of failure of 10%; conditions for shaft load: speed 4000 rpm, 100% duty cycle at continuous torque, ambient temperature 40 °C
(5) Holding brake and multiturn encoder cannot be used in combination.

Torque characteristics

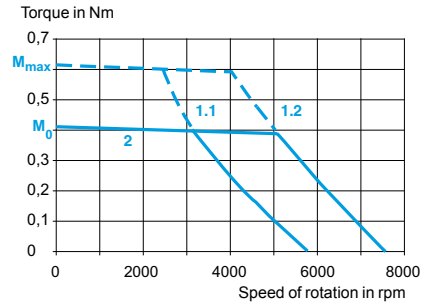
ILA1●571T (winding type T)



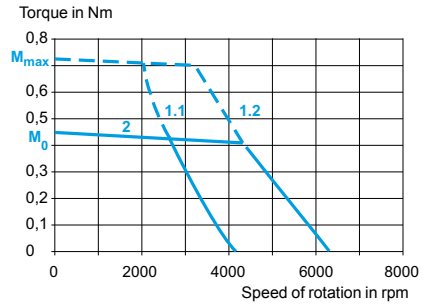
ILA1●571P (winding type P)



ILA1●572T (winding type T)



ILA1●572P (winding type P)



1.1 Max. torque at 24 V
1.2 Max. torque at 36 V
2 Continuous torque

Lexium integrated drives

IL●1 for CANopen, PROFIBUS DP, RS 485

ILA1 with AC synchronous servo motor

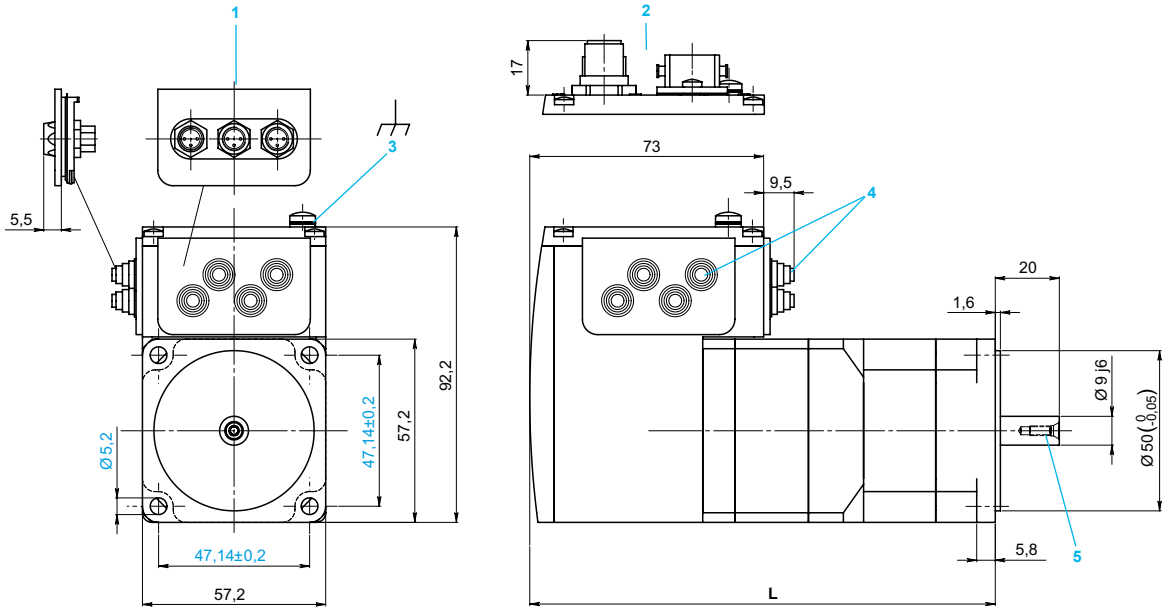
References

Example:	I	L	A	1	B	5	7	1	P	B	1	A
Motor type **A** = AC synchronous servo motor	I	L	**A**	1	B	5	7	1	P	B	1	A
Supply voltage **1** = 24 ... 36 V	I	L	A	**1**	B	5	7	1	P	B	1	A
Communication interface **B** = PROFIBUS DP **F** = CANopen DS301 **R** = RS 485	I	L	A	1	**B**	5	7	1	P	B	1	A
Flange size **57** = 57 mm	I	L	A	1	B	**5**	**7**	1	P	B	1	A
Motor length ("L") *(1)* **1** = motor length ("L") **2** = motor length ("L")	I	L	A	1	B	5	7	**1**	P	B	1	A
Winding type **P** = medium speed of rotation, medium torque **T** = high speed of rotation, medium torque	I	L	A	1	B	5	7	1	**P**	B	1	A
Connection technology **B** = printed circuit board connector **C** = industrial connector	I	L	A	1	B	5	7	1	P	**B**	1	A
Measurement system **1** = singleturn encoder **2** = multiturn encoder *(2)*	I	L	A	1	B	5	7	1	P	B	**1**	A
Holding brake **A** = no holding brake **F** = with holding brake *(2)*	I	L	A	1	B	5	7	1	P	B	1	**A**

(1) The motor length "L" depends on the mechanical characteristics, see pages 4/19 and 4/21.
(2) Holding brake and multiturn encoder cannot be used in combination.

Lexium integrated drives
IL●1 for CANopen, PROFIBUS DP, RS 485
ILA1 with AC synchronous servo motor

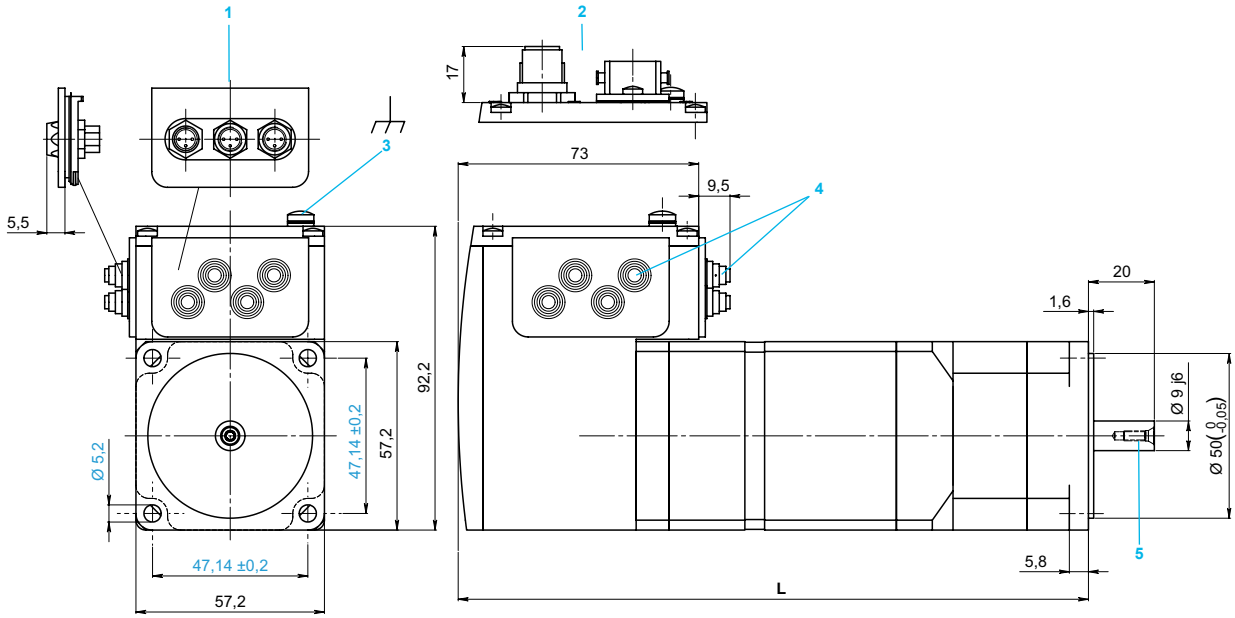
ILA1 integrated drives without holding brake



	L (without multiturn encoder)	L (with multiturn encoder)
ILA1●571	145.3	189.3
ILA1●572	163.8	207.8

1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm
5 Centring hole DIN 332 - DS M3

ILA1 integrated drives with holding brake



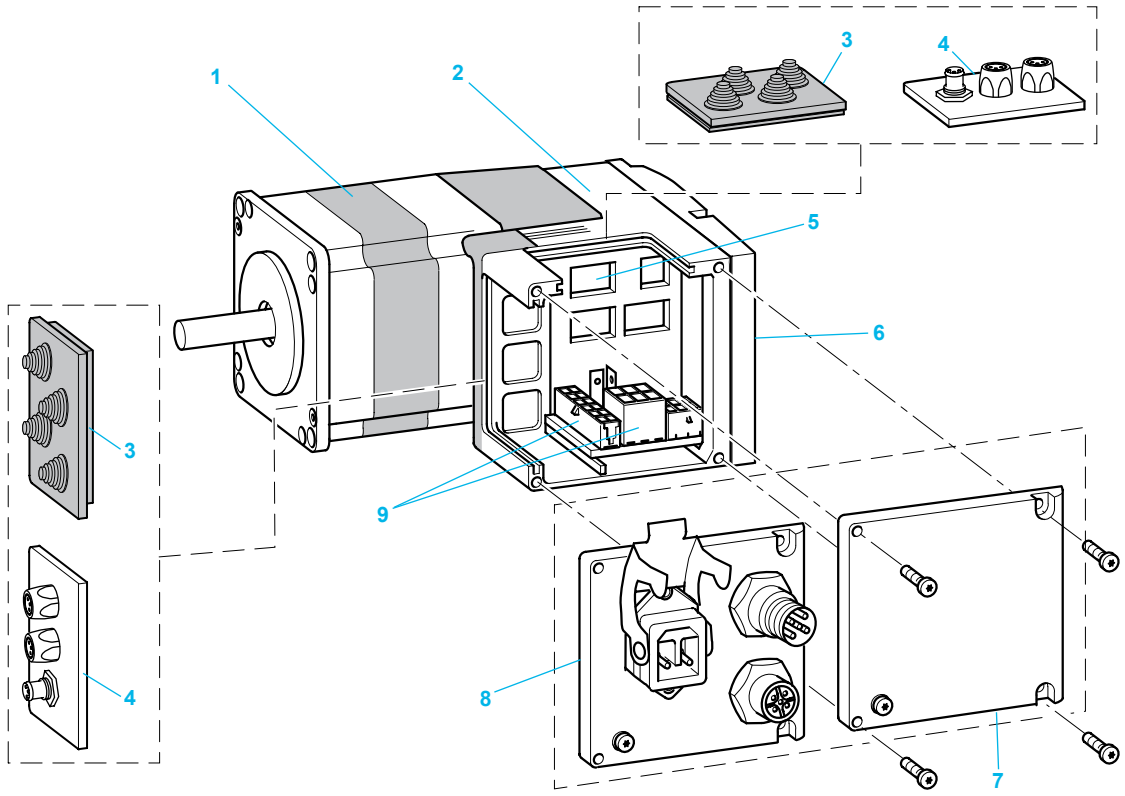
	L
ILA1●571	190.8
ILA1●572	209.3

1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm
5 Centring hole DIN 332 - DS M3

Lexium integrated drives
IL●1 for CANopen, PROFIBUS DP, RS 485
ILE1 with brushless DC motor

Description

ILE1 comprise control electronics with a fieldbus interface for CANopen DS301, PROFIBUS DP or RS 485 and a brushless DC motor. ILE1 is optionally available with straight teeth gear or worm gear and printed circuit board connectors or industrial connectors.



1 Brushless DC motor
2 Electronics housing
3 Insert cable entry (accessory)
4 I/O insert with industrial connectors (accessory)
5 Settings via parameter switches
6 Cover for electronics housing
7 Cover for Lexium integrated drives with option “PCB connector"
8 Cover for supply voltage ⎓ V and fieldbus connection for Lexium integrated drives with option “industrial connector”
9 Electrical interfaces

Lexium integrated drives
IL●1 for CANopen, PROFIBUS DP, RS 485
ILE1 with brushless DC motor

Certifications

Conformity to standards			Lexium integrated drives have been developed to comply with the stringent international standards and with the recommendations for adjustable speed power drive systems, specifically: IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals) and IEC/EN 50178 (resistance of devices to vibration).
	EMC immunity		EN 61800-3:2001, second environment
	Conducted and radiated EMC emissions		EN 61800-3:2001-02; IEC 61800-3, Ed.2 ■ Power supplies without external mains filter: □ C3 up to 10 m supply cable length ■ Power supplies with external mains filter: □ C2 up to 20 m supply cable length □ C3 up to 50 m supply cable length
CE marking			The Lexium integrated drives are CE marked in accordance with the European Machinery Directive (98/37/EEC) and the European EMC Directive (2004/108/EEC).
Product certifications			UL (USA), cUL (Canada)
			TÜV certification: Lexium integrated drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*		**°C**	0 ... 65; power reduction by 2%/°C at 50 ... 65
Max. permissible temperature of the power amplifier		**°C**	105
Max. permissible temperature of the motor *(2)*		**°C**	110
Transport and storage temperature		**°C**	-25 ... +70
Installation height without power reduction		**m**	< 1000 m above mean sea level
Relative humidity		**%**	15 ... 85 (not condensing)
Vibration load during operation as per DIN EN 60068-2-6	Number of cycles		10
	Acceleration amplitude:	**m/s²**	20
	Frequency range	**Hz**	10 ... 500
Continuous shocks as per DIN EN 60068-2-29	Number of shocks		1000
	Peak acceleration	**m/s²**	150
Shaft wobble and perpendicularity			According to EN 50347 (IEC 60072-1)
Degree of protection as per DIN EN 60034-5			Total except shaft bushing IP54, shaft bushing IP41

Electrical data

Supply voltage (CN1)			Corresponds to PELV according to DIN 19240, not protected against reverse polarity
Supply voltage range (absolute limit values)		**⎓ V**	18 ... 40
Nominal supply voltage		**⎓ V**	24 ... 36
Ripple at nominal voltage		**V_{PP}**	≤ 3.6
Max. continuous current consumption		**A**	5,5
Peak current consumption		**A**	7
Inrush current			Charging current for capacitor C=1500 µF
External fuse		**A**	10
Fieldbus interfaces (CN2 and CN3)			
CANopen	Signal inputs/outputs		According to ISO 11898 standard, no galvanic isolation
	Transmission rate	**kBaud**	50 / 100 / 125 / 250 / 500 / 800 / 1000
	Transmission protocol		CANopen as per DS301
PROFIBUS DP	Signal inputs/outputs		According to RS 485, galvanic isolation, 2-wire
	Transmission rate	**kBaud**	9.6 / 19.2 / 45.45 / 93.75 / 187.5 / 500 / 1500 / 3000 / 6000 / 12000
	Transmission protocol		PROFIBUS DP-V0 (data format as per Profidrive V2.0 PPO Type 2)
RS 485	Signal inputs/outputs		According to RS 485, no galvanic isolation, 2-wire
	Transmission rate	**kBaud**	9.6 / 19.2 / 38.4
	Transmission protocol		Manufacturer-specific

(1) Limit values with flanged motor mounted on a steel plate 300 x 300 x 10 mm
(2) Measured at the surface

Electrical data

24 V signal interface (CN4)			4 signals, can each be used as input or output	
24 V signal inputs			Galvanically connected to 0VDC, protected against reverse polarity	
Logic 0 (U_{low})		**V**	-3 ... +4.5	
Logic 1 (U_{high})		**V**	+15 ... +30	
Input current (typical at 24 V)		**mA**	2	
Debounce time	IO0 and IO1	**ms**	0.1	
	IO2 and IO3	**ms**	0.01	
24 V signal outputs			Switching to plus, short-circuit protected, suitable for inductive load (1000 mH / 100 mA)	
Supply voltage range		⎓ **V**	23 ... 25	
Max. switching current (total)		**mA**	200	
Max. switching current per output		**mA**	100	
			The internal power supply unit is protected against: ■ Short circuit of the output voltage ■ Overload of output voltage (limited to 6 W output power)	
Interface for safety function "Safe Torque Off" ("Power Removal") (CN5)			No galvanic isolation; corresponds to RS 485 standard	
Logic 0 (U_{low})		**V**	-3 ... +4.5	
Logic 1 (U_{high})		**V**	+15 ... +30	
Input current (typical at 24 V)	$\overline{STO\_A}$	**mA**	⩽ 10	
	$\overline{STO\_B}$	**mA**	⩽ 3	
Debounce time		**ms**	1	
Response time (until shutdown of power amplifier)		**ms**	< 50	
Max. time offset until detection of signal differences between $\overline{STO\_A}$ and $\overline{STO\_B}$		**S**	< 1	

Safety function "Safe Torque Off" ("Power Removal")

Protection	Of machine		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level "d" (PL d) , and standard IEC/EN 61800-5-2
	Of the system process		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2

Mechanical data ILE1 without gear

Nominal supply voltage		⎓ **V**	24	36
Nominal current		**A**	4.7	5.1
Nominal speed of rotation		**rpm**	4000	4800
Nominal output power		**W**	74	117
Nominal torque		**Nm**	0.175	0.24
Max. torque	M_{max}	**Nm**	0.26	0.36
Max. current with power stage disabled		**A**	0.1	0.06
Detent torque (at zero current)		**Nm**	0.08	
Moment of inertia		**kg·cm²**	0.149	
Max. speed of rotation		**rpm**	5000	
Positioning resolution per revolution		**Inc.**	12	
Accuracy of positioning sensor		**°**	±1	
Mass		**kg**	1.4	
Shaft load	Max. radial force *(1)*	**N**	80	
	Max. axial tensile force	**N**	30	
	Max. axial force pressure	**N**	30	
	Nominal bearing service life *(2)*	**h**	20000	

(1) Point of application of radial force: 12.5 mm distance to flange
(2) Operating hours at a probability of failure of 10%

Mechanical data ILE1●661 with straight teeth gear

			G1		G2		G3		G4	
Ratio			18:1 (160:9)		38:1 (75:2)		54:1 (490:9)		115:1 (3675:32)	
Number of gear stages			3		3		4		4	
Nominal supply voltage		⎓ V	24	36	24	36	24	36	24	36
Nominal current		A	4.5	4	4	3.4	4.3	3.5	2.6	2.1
Nominal speed of rotation of motor		rpm	4000	4800	4000	4800	4000	4800	4000	4800
Nominal output speed of rotation		rpm	225	270	107	128	73	88	35	42
Nominal output torque		Nm	3.1	3.5	5.8	6.0	9.5	10.0	10.0	11.0
Nominal output power		W	74	98	65	81	73	88	38	48
Max. current with power stage disabled		A	0.1	0.06	0.1	0.06	0.1	0.06	0.1	0.06
Detent torque (at zero current)		Nm	1.1		3.0		3.3		8.0	
Moment of inertia output		kg·cm²	48		211		441		1962	
Max. speed of rotation		rpm	281		133		92		44	
Positioning resolution of motor per revolution		Inc.	12							
Positioning accuracy motor		Inc.	±1							
Positioning resolution of output		°	1.667		0.8		0.55		0.26	
Torsional backlash		°	≤ 1							
Mass		kg	1.85							
Shaft load (short-term operation)	Max. radial force *(1)*	N	200							
	Max. axial force	N	80							
	Nominal bearing service life *(2)*	h	2500							
Shaft load (long-term operation)	Max. radial force *(1)*	N	200							
	Max. axial force	N	10							
	Nominal bearing service life *(2)*	h	15000		15000		15000 *(3)*		15000 *(4)*	

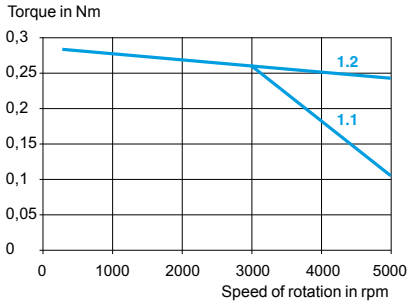
Mechanical data ILE1●661 with worm gear

			G5		G6		G7		G8	
Ratio			24:1 (525:22)		54:1 (1715:32)		92:1 (735:5)		115:1 (3675:32)	
Number of gear stages			2		3		3		3	
Nominal supply voltage		⎓ V	24	36	24	36	24	36	24	36
Nominal current		A	6.8	5.1	6.8	3.8	6.8	3.8	6.8	3.8
Nominal speed of rotation of motor		rpm	4000	4000	4000	4000	4000	4000	4000	4000
Nominal output speed of rotation		rpm	168		75		44		35	
Nominal output torque		Nm	2.5	3.5	5.8	6.0	9.0	9.2	10.2	10.6
Nominal output power		W	45	61	45	47	41	42	37	39
Max. current with power stage disabled		A	0.1							
Detent torque (at zero current)		Nm	2.9		6.5		12.3		16.7	
Moment of inertia output		kg·cm²	90		430		1270		1980	
Max. speed of rotation		rpm	186		93		54		44	
Positioning resolution of motor per revolution		Inc.	12							
Positioning accuracy motor		Inc.	±1							
Positioning resolution of output		°	1.26		0.56		0.33		0.26	
Torsional backlash		°	≤ 1.5		≤ 1.0		≤ 1.0		≤ 1.0	
Mass		kg	2.3							
Shaft load	Max. radial force *(1)*	N	200							
	Max. axial force	N	80							
	Nominal bearing service life *(2)*	h	3000		6000		9000		9000	

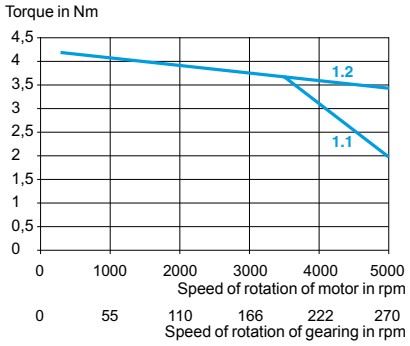
(1) Point of application of radial force: 12.5 mm distance to flange
(2) Operating hours at a probability of failure of 10%
(3) With reduced nominal output torque = 6 Nm; 2500 h at maximum torque
(4) With reduced nominal output torque = 8 Nm; 2500 h at maximum torque

Torque characteristics

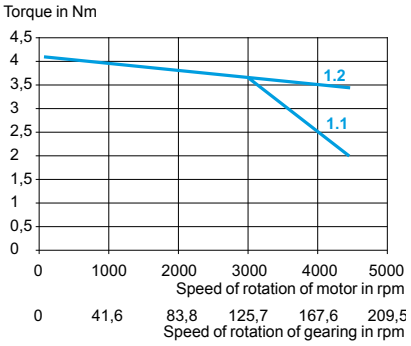
ILE1 without gearing



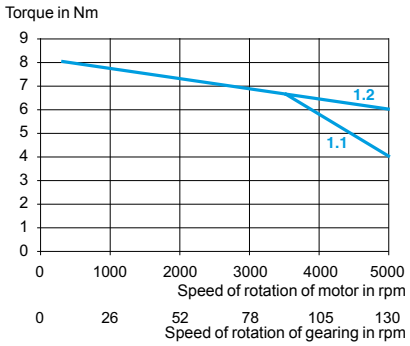
ILE1●661 with straight teeth gear G1



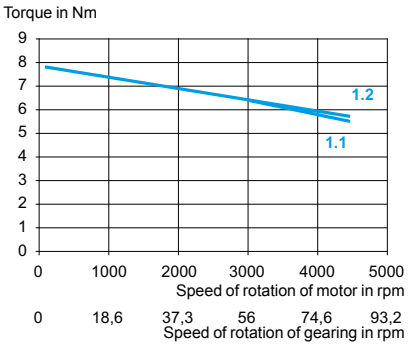
ILE1●661 with worm gear G5



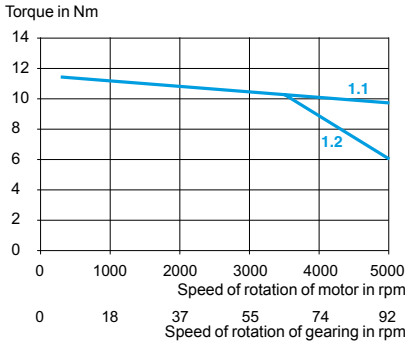
ILE1●661 with straight teeth gear G2



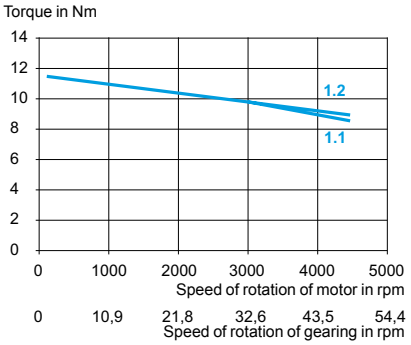
ILE1●661 with worm gear G6



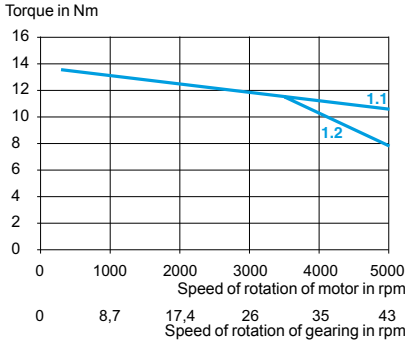
ILE1●661 with straight teeth gear G3



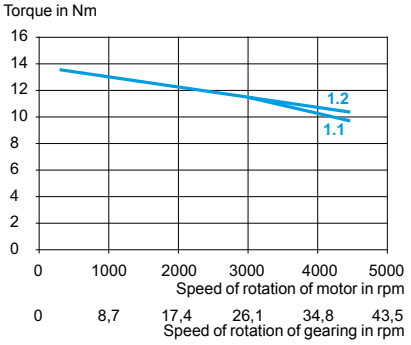
ILE1●661 with worm gear G7



ILE1●661 with straight teeth gear G4



ILE1●661 with worm gear G8



1.1 Max. torque at 24 V
1.2 Max. torque at 36 V

Lexium integrated drives

IL●1 for CANopen, PROFIBUS DP, RS 485

ILE1 with brushless DC motor

References

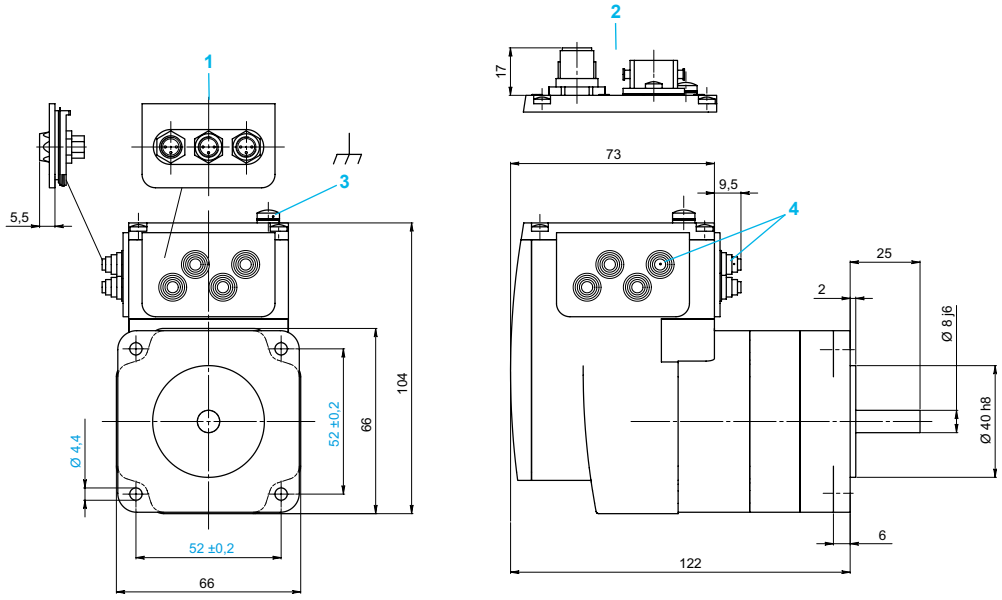
Example:	I	L	E	1	B	6	6	1	P	B	1	A	1
Motor type **E** = brushless DC motor	I	L	**E**	1	B	6	6	1	P	B	1	A	1
Supply voltage **1** = 24 ... 36 V	I	L	E	**1**	B	6	6	1	P	B	1	A	1
Communication interface **B** = PROFIBUS DP **F** = CANopen DS301 **R** = RS 485	I	L	E	1	**B**	6	6	1	P	B	1	A	1
Flange size **66** = 66 mm	I	L	E	1	B	**6**	**6**	1	P	B	1	A	1
Motor length **1** = motor length 1	I	L	E	1	B	6	6	**1**	P	B	1	A	1
Winding type **P** = medium speed of rotation, medium torque	I	L	E	1	B	6	6	1	**P**	B	1	A	1
Connection technology **B** = printed circuit board connector **C** = industrial connector	I	L	E	1	B	6	6	1	P	**B**	1	A	1
Measurement system **1** = BLDC encoder	I	L	E	1	B	6	6	1	P	B	**1**	A	1
Holding brake **A** = no holding brake	I	L	E	1	B	6	6	1	P	B	1	**A**	1
Gearing *(1)*	I	L	E	1	B	6	6	1	P	B	1	A	**1**

Straight teeth gear
1 = ratio 18:1 (160:9)
2 = ratio 38:1 (75:2)
3 = ratio 54:1 (490:9)
4 = ratio 115:1 (3675:32)

Worm gear
5 = ratio 24:1 (525:22)
6 = ratio 54:1 (1715:32)
7 = ratio 92:1 (735:5)
8 = ratio 115:1 (3675:32)

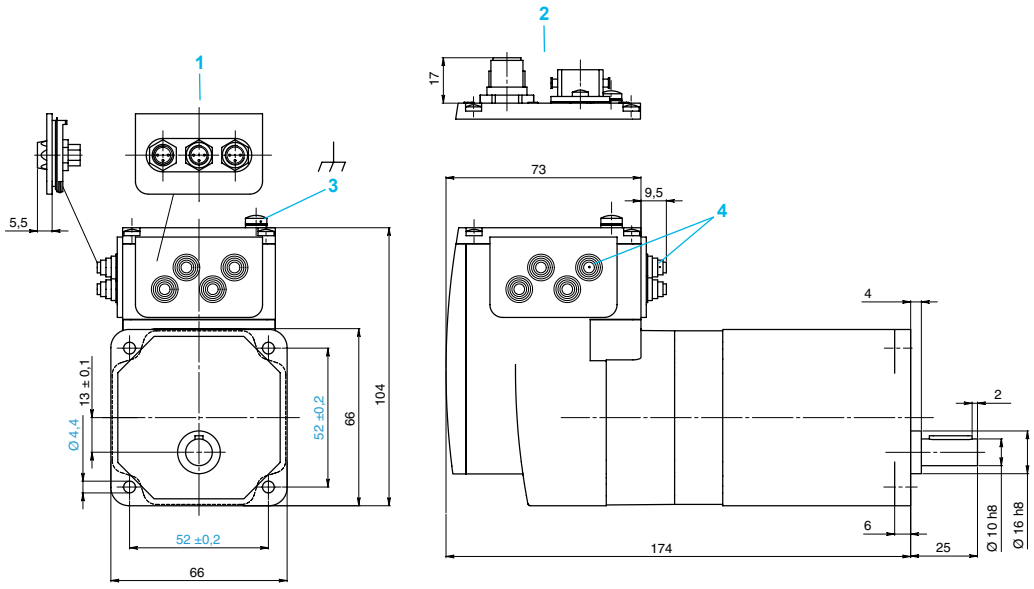
(1) Without gearing: leave out gearing identification in the reference (specify 12 characters only).

ILE1 integrated drives without gearing



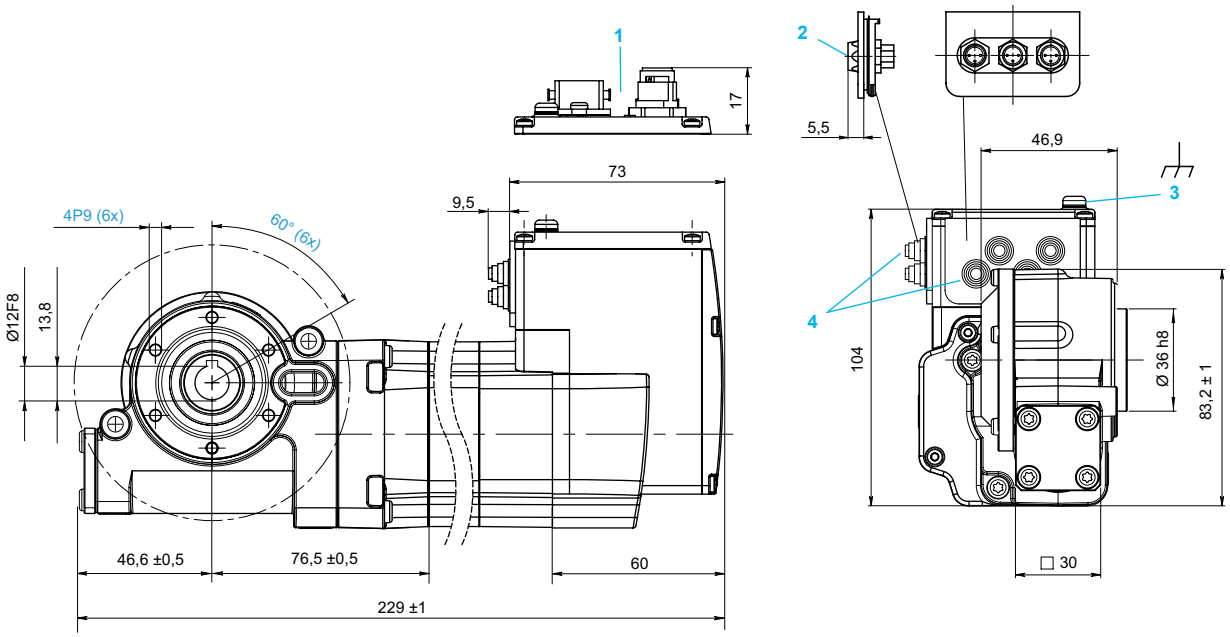
1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

ILE1 integrated drives with straight teeth gear



1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

ILE1 integrated drives with worm gear

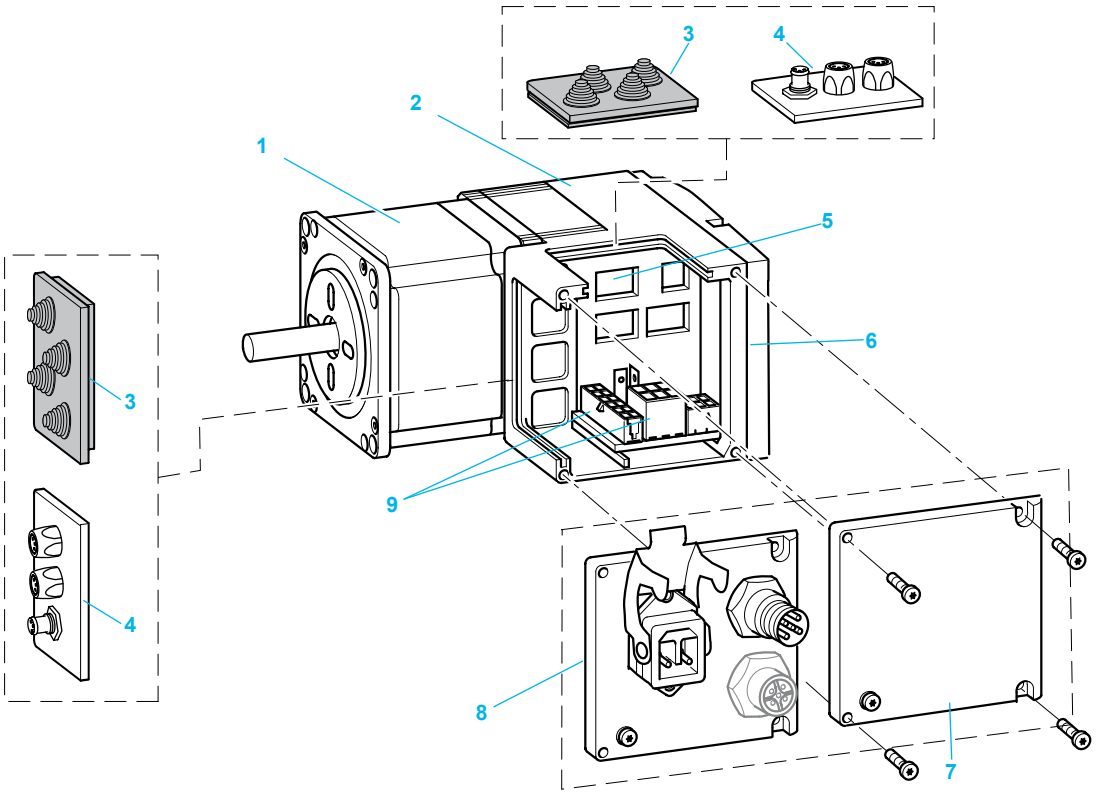


1 Optional: industrial connectors
2 Accessories: I/O signal insert with industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

Lexium integrated drives
IL●1 for CANopen, PROFIBUS DP, RS 485
ILS1 with 3-phase stepper motor

Description

ILS1 comprise control electronics with a fieldbus interface for CANopen DS301, PROFIBUS DP or RS 485 and a 3-phase stepper motor. ILS1 is optionally available with printed circuit board connectors or industrial connectors. A holding brake is optionally available for ILS1●85.



1 3-phase stepper motor
2 Electronics housing
3 Insert cable entry (accessory)
4 I/O insert with industrial connectors (accessory)
5 Settings via parameter switches
6 Cover for electronics housing
7 Cover for Lexium integrated drives with option “PCB connector"
8 Cover for supply voltage ⎓ V and fieldbus connection for Lexium integrated drives with option “industrial connector”
9 Electrical interfaces

Lexium integrated drives
IL●1 for CANopen, PROFIBUS DP, RS 485
ILS1 with 3-phase stepper motor

Certifications

Conformity to standards			Lexium integrated drives have been developed to comply with the stringent international standards and with the recommendations for adjustable speed power drive systems, specifically: IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals) and IEC/EN 50178 (resistance of devices to vibration).
	EMC immunity		EN 61800-3:2001, second environment
	Conducted and radiated EMC emissions		EN 61800-3:2001-02; IEC 61800-3, Ed.2 ■ Power supplies without external mains filter: □ C3 up to 10 m supply cable length ■ Power supplies with external mains filter: □ C2 up to 20 m supply cable length □ C3 up to 50 m supply cable length
CE marking			The Lexium integrated drives are CE marked in accordance with the European Machinery Directive (98/37/EEC) and the European EMC Directive (2004/108/EEC).
Product certifications			UL (USA), cUL (Canada)
			TÜV certification: Lexium integrated drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*		**°C**	0 ... 65; power reduction by 2%/°C at 50 ... 65
Max. permissible temperature of the power amplifier		**°C**	105
Max. permissible temperature of the motor *(2)*		**°C**	110
Transport and storage temperature		**°C**	-25 ... +70
Installation height without power reduction		**m**	< 1000 m above mean sea level
Relative humidity		**%**	15 ... 85 (not condensing)
Vibration load during operation as per DIN EN 60068-2-6	Number of cycles		10
	Acceleration amplitude:	**m/s²**	20
	Frequency range	**Hz**	10 ... 500
Continuous shocks as per DIN EN 60068-2-29	Number of shocks		1000
	Peak acceleration	**m/s²**	150
Shaft wobble and perpendicularity			According to EN 50347 (IEC 60072-1)
Degree of protection as per DIN EN 60034-5			Total except shaft bushing IP54, shaft bushing IP41

Electrical data

Power supply connection (CN1)			Corresponds to PELV according to DIN 19240, not protected against reverse polarity
Supply voltage range (absolute limit values)		⎓ **V**	18 ... 40
Nominal supply voltage		⎓ **V**	24 ... 36
Ripple at nominal voltage		V_{PP}	≤ 3.6
Max. current consumption	ILS1●57	**A**	3.5
	ILS1●851, ILS1●852	**A**	5
	ILS1●853:		
	■ Winding type P	**A**	5
	■ Winding type T	**A**	6
Inrush current			Charging current for capacitor C=1500 µF
External fuse		**A**	10
Fieldbus interfaces (CN2 and CN3)			
CANopen	Signal inputs/outputs		According to ISO 11898 standard, no galvanic isolation
	Transmission rate	**kBaud**	50 / 100 / 125 / 250 / 500 / 800 / 1000
	Transmission protocol		CANopen as per DS301
PROFIBUS DP	Signal inputs/outputs		According to RS 485, galvanic isolation, 2-wire
	Transmission rate	**kBaud**	9.6 / 19.2 / 45.45 / 93.75 / 187.5 / 500 / 1500 / 3000 / 6000 / 12000
	Transmission protocol		PROFIBUS DP-V0 (data format as per Profidrive V2.0 PPO Type 2)
RS 485	Signal inputs/outputs		According to RS 485, no galvanic isolation, 2-wire
	Transmission rate	**kBaud**	9.6 / 19.2 / 38.4
	Transmission protocol		Manufacturer-specific

(1) Limit values with flanged motor mounted on a steel plate 300 x 300 x 10 mm
(2) Measured at the surface

Electrical data			
24 V signal interface (CN4)			4 signals, can each be used as input or output
24 V signal inputs			Galvanically connected to 0VDC, not protected against reverse polarity
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)		**mA**	2
Debounce time	IO0 and IO1	**ms**	0.1
	IO2 and IO3	**ms**	0.01
24 V signal outputs			Switching to plus, short-circuit protected, suitable for inductive load (1000 mH / 100 mA)
Supply voltage range		⎓ **V**	23 ... 25
Max. switching current (total)		**mA**	200
Max. switching current per output		**mA**	100
			The internal power supply unit is protected against: ■ Short circuit of the output voltage ■ Overload of output voltage (limited to 6 W output power)
Interface for safety function "Safe Torque Off" (“Power Removal”) (CN5)			No galvanic isolation; corresponds to RS 485 standard
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)	$\overline{STO\_A}$	**mA**	≤ 10
	$\overline{STO\_B}$	**mA**	≤ 3
Debounce time		**ms**	1
Response time (until shutdown of power amplifier)		**ms**	< 50
Max. time offset until detection of signal differences between $\overline{STO\_A}$ and $\overline{STO\_B}$		**S**	< 1
Safety function “Safe Torque Off” (“Power Removal”)			
Protection	Of machine		“Safe Torque Off” safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level “d” (PL d) , and standard IEC/EN 61800-5-2
	Of the system process		“Safe Torque Off” safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2

Mechanical data ILS1●57

Type of integrated drive			ILS1●571	ILS1●572	ILS1●573
Winding type			P	P	P
Max. torque		**Nm**	0.45	0.9	1.5
Holding torque		**Nm**	0.51	1.02	1.70
Moment of inertia		**kg·cm²**	0.1	0.22	0.38
Positioning resolution per revolution		**Inc.**	20000		
Systematic angle tolerance per step *(1)*		**arcmin**	±6		
Mass		**kg**	1.3	1.6	2.0
Shaft load *(2)*	Max. radial force *(3)*	**N**	24	24	50
	Max. axial tensile force	**N**	100		
	Max. axial force pressure	**N**	8.4		
	Nominal bearing service life *(4)*	**h**	20000		

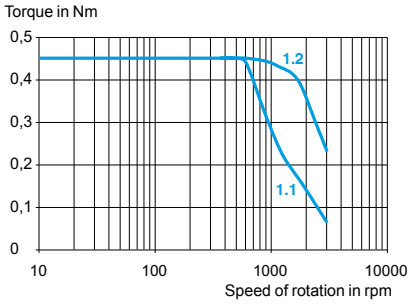
Mechanical data ILS1●85

Type of integrated drive			ILS1●851	ILS1●852	ILS1●853	
Winding type			P	P	P	T
Max. torque		**Nm**	2.0	4.0	6.0	4.5
Holding torque		**Nm**	2.0	4.0	6.0	4.5
Moment of inertia		**kg·cm²**	1.1	2.2	3.3	
Positioning resolution		**Inc.**	20000			
Systematic angle tolerance per step *(1)*		**arcmin**	±6			
Mass		**kg**	2.6	3.6	4.7	
Shaft load *(2)*	Max. radial force *(3)*	**N**	100	100	110	
	Max. axial tensile force	**N**	170			
	Max. axial force pressure	**N**	30			
	Nominal bearing service life *(4)*	**h**	20000			
Holding brake						
Holding torque		**Nm**	6			
Electrical pull-in power		**W**	22			
Brake release time		**ms**	40			
Brake application time		**ms**	20			
Moment of inertia		**kg·cm²**	0.2			
Mass		**kg**	1.8			

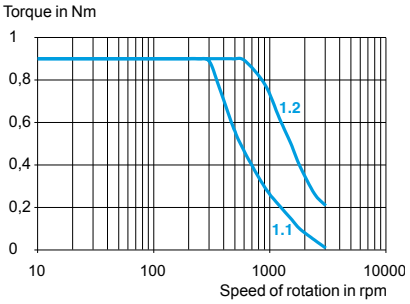
(1) Measured at 1000 steps/revolution
(2) Conditions for shaft load: speed of rotation 60 rpm, 100% duty cycle at continuous torque, ambient temperature 40 °C
(3) Point of application of radial force: 10.5 mm distance to flange
(4) Operating hours at a probability of failure of 10%

Torque characteristics ILS1●57

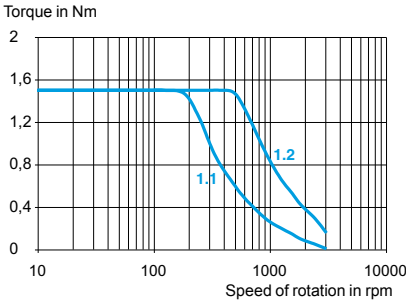
ILS1●571P (winding type P)



ILS1●572P (winding type P)

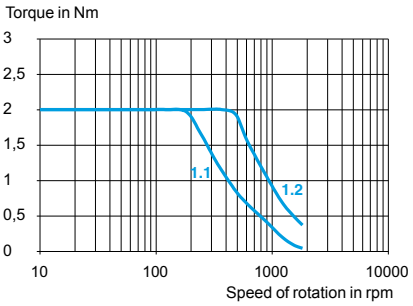


ILS1●573P (winding type P)

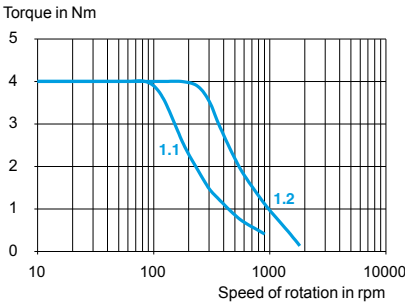


Torque characteristics ILS1●85

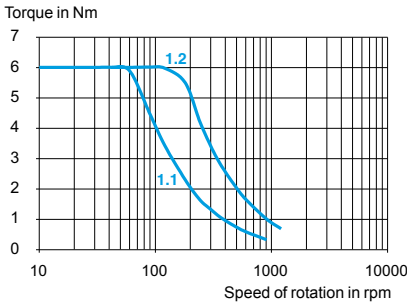
ILS1●851P (winding type P)



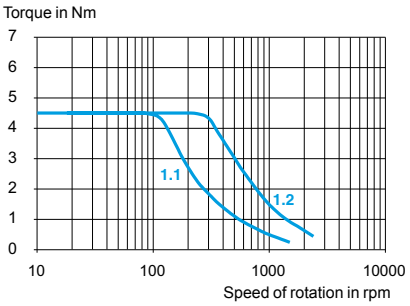
ILS1●852P (winding type P)



ILS1●853P (winding type P)



ILS1●853T (winding type T)



1.1 Max. torque at 24 V
1.2 Max. torque at 36 V

Lexium integrated drives

IL●1 for CANopen, PROFIBUS DP, RS 485

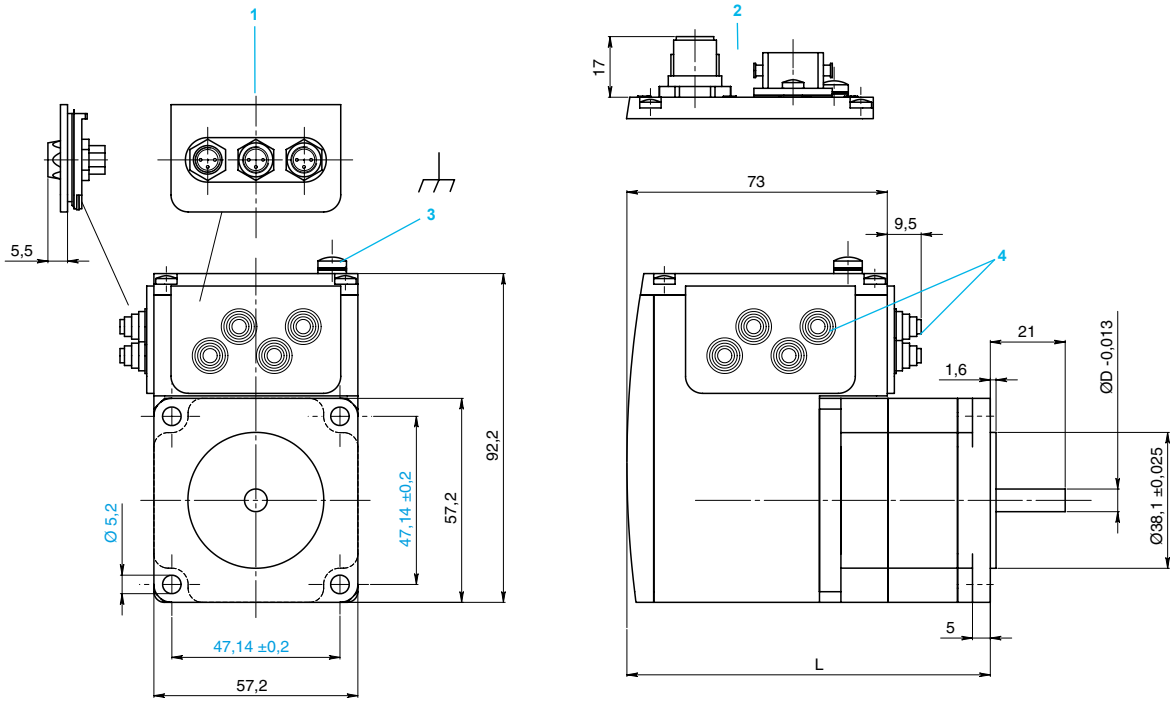
ILS1 with 3-phase stepper motor

References

Example:	I	L	S	1	B	5	7	1	P	B	1	A
Motor type **S** = 3-phase stepper motor	I	L	**S**	1	B	5	7	1	P	B	1	A
Supply voltage **1** = 24 ... 36 V	I	L	S	**1**	B	5	7	1	P	B	1	A
Communication interface **B** = PROFIBUS DP **F** = CANopen DS301 **R** = RS 485	I	L	S	1	**B**	5	7	1	P	B	1	A
Flange size **57** = 57 mm **85** = 85 mm	I	L	S	1	B	**5**	**7**	1	P	B	1	A
Motor length ("L") *(1)* **1** = motor length ("L") **2** = motor length ("L") **3** = motor length ("L")	I	L	S	1	B	5	7	**1**	P	B	1	A
Winding type **P** = medium speed of rotation, medium torque **T** = high speed of rotation, medium torque *(2)*	I	L	S	1	B	5	7	1	**P**	B	1	A
Connection technology **B** = printed circuit board connector **C** = industrial connector	I	L	S	1	B	5	7	1	P	**B**	1	A
Measurement system **1** = index pulse	I	L	S	1	B	5	7	1	P	B	**1**	A
Holding brake **A** = no holding brake **F** = with holding brake *(3)*	I	L	S	1	B	5	7	1	P	B	1	**A**

(1) The motor length "L" depends on the mechanical characteristics, see pages 4/33, 4/36 and 4/37.
(2) Winding type T only with ILS1●853.
(3) Holding brake only with ILS1●85.

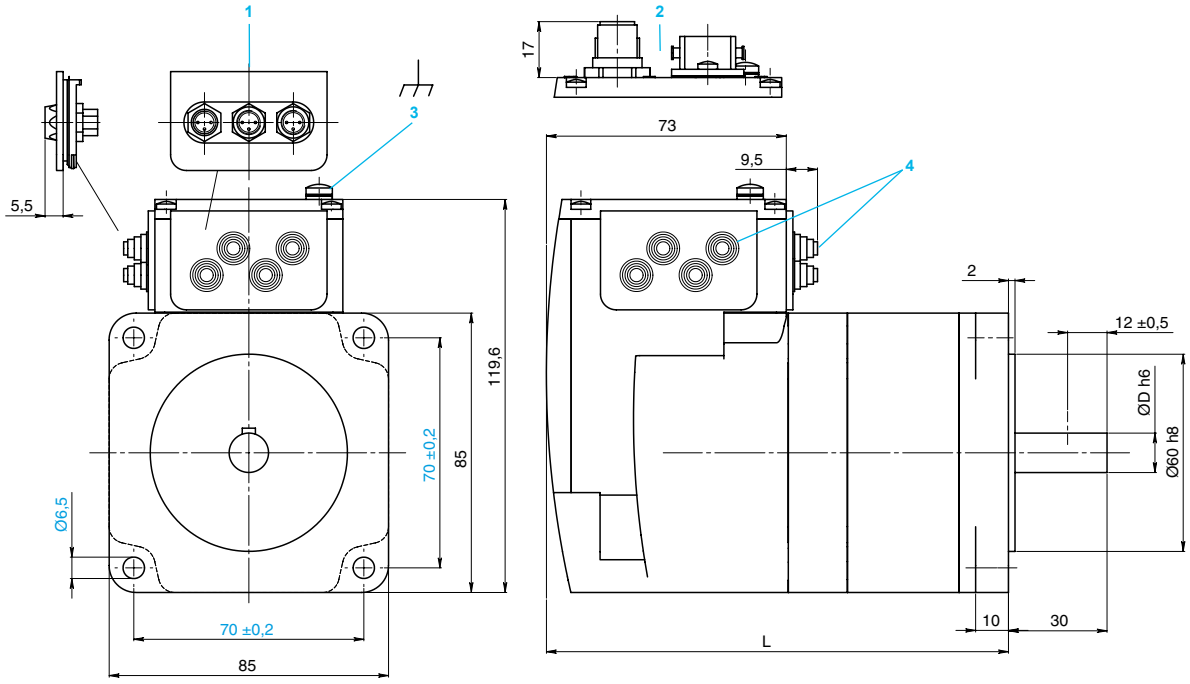
ILS1●57 integrated drives



	L	D
ILS1●571	101.9	6.35
ILS1●572	115.9	6.35
ILS1●573	138.9	8.00

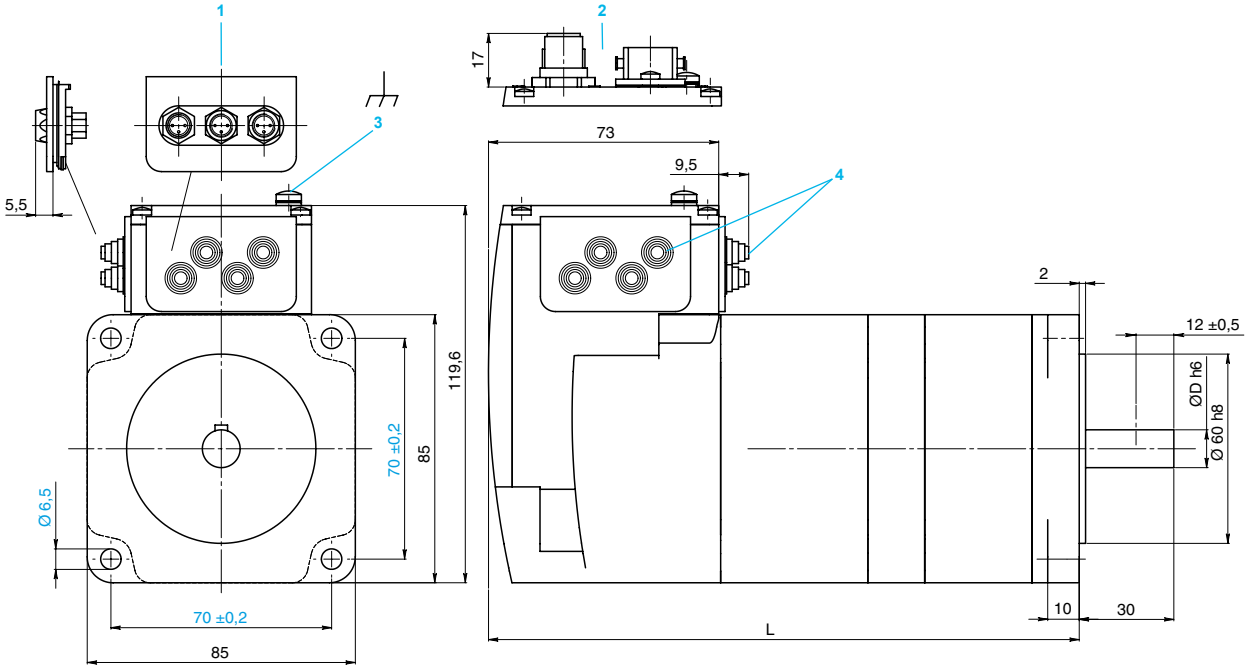
1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal

ILS1●85 integrated drives without holding brake



	L	D
ILS1●851	140.6	12
ILS1●852	170.6	12
ILS1●853	200.6	14

ILS1●85 integrated drives with holding brake



	L	D
ILS1●851	187.3	12
ILS1●852	217.3	12
ILS1●853	247.3	14

1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

Lexium integrated drives
IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILA2 with AC synchronous servo motor

Presentation

IL●2 comprise motor, control electronics and a fieldbus interface for DeviceNet, EtherCAT, Modbus TCP and Ethernet Powerlink.

The IL●2 product group includes:
- ILA2 with AC synchronous servo motor
- ILE2 with brushless DC motor
- ILS2 with 3-phase stepper motor

ILA2 – the Integrated Drive System for dynamic processes
ILA2 has an AC synchronous servo motor. This motor is characterised by high dynamics with the possibility of short-term overcurrent during acceleration.

ILE2 – the Integrated Drive System for automatic format adjustment
ILE2 is fitted with a brushless DC motor. The brushless DC motors have high detent torque at zero current. This makes a holding brake unnecessary in most applications. In combination with the electronics ILE2 has the characteristics of an absolute value encoder.

ILS2 – the Integrated Drive System for short-distance positioning
With its 3-phase stepper motor, ILS2 offers high torque at low speeds of rotation. ILS2 are ideally suited as drives in velocity mode with excellent constant velocity characteristics and also or for high-resolution positioning Commissioning the stepper motor drives is simple because it is not necessary to adjust the control loop.

Special features

ILA2 with AC synchronous servo motor
- High dynamics and high peak torque
- High-resolution singleturn encoder with a resolution of 16384 increments/revolution
- Optionally with multiturn encoder with a resolution of 16384 increments/revolution with a positioning range of 4096 revolutions
- Optionally with integrated holding brake
- Planetary gear available as options

ILE2 with brushless DC motor
- High detent torque
- Quasi-absolute encoder, therefore, no homing required after switching off and on
- Optionally available with spur wheel gear or worm gear; planetary gear available as options

ILS2 with 3-phase stepper motor
- High continuous stall torque
- Good constant velocity characteristics
- High positioning resolution (0.018°)
- Optionally with holding brake (ILS2●85 only)
- Planetary gear available as options

Electronics

The electronic system comprises control electronics and power amplifier. They have a common power supply. The Lexium integrated drives can be parameterised and controlled via the fieldbus interface.
Four different 24 V signals are also available. They can be used as input or output.

Supply voltage
These Lexium integrated drives can be operated with a supply voltage from 24 V up to 48 V.

Connection technologies

IL●2 have the following connections:
- Supply voltage ⎓ V
- Fieldbus interface: DeviceNet, EtherCAT, Ethernet Powerlink, Modbus TCP/IP
- RS 485 commissioning interface
- 24 V signal interface for four inputs/outputs
- Signal interface for “Safe Torque Off” safety function (“Power Removal”)

Fieldbus interface

The following fieldbuses can be connected to the fieldbus interface depending on the device version:
- DeviceNet (DeviceNet Standard)
- EtherCAT (as per IEEE 802.3 standard)
- Ethernet Powerlink (as per IEEE 802.3 standard)
- Modbus TCP (as per IEEE 802.3 standard)

The fieldbus interface is used to parameterise and control the Integrated Drive System.
IL●2 with DeviceNet interface support the ADR function (Automatic Device Replacement). This function enables easy replacement of drive systems with automatic parameterisation.
In addition, the Integrated Drive System can be commissioned with a PC connected to the fieldbus interface and the PC commissioning software. This requires an appropriate fieldbus converter.

RS 485 commissioning interface

An RS 485 commissioning interface is available in addition to the fieldbus interface. The RS 485 commissioning interface is also used for commissioning the drive system.
The drive system can also be monitored during operation with the RS 485 commissioning interface and the “Lexium CT” commissioning software.
Simultaneous fieldbus and RS 485 connections are possible.

24 V signal interface

Four 24 V signals are available, which can be used either as an input or an output. The 24 V signals are available to the master controller via the fieldbus. They can also be used for predefined functions, such as for connection of limit switches and reference switches.
The 24 V power supply to the signal outputs is internal via the supply voltage of the Integrated Drive System.

Signal interface for “Safe Torque Off” safety function (“Power Removal”)

The integrated “Safe Torque Off” safety function (“Power Removal”) enables a stop of category 0 or 1 as per IEC/EN 60204-1 without external power contactors. The supply voltage does not have to be interrupted. This reduces the system costs and response times.
The safety function is activated via two redundant 24 V input signals (low active).

Integrated drive system with printed circuit board connectors

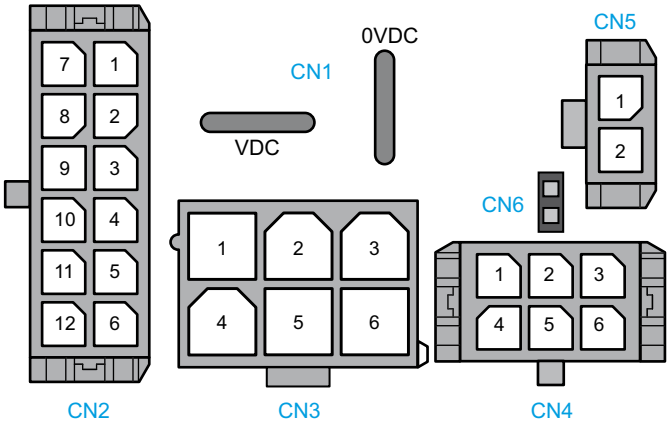
Connection technologies (continued)

Printed circuit board connector

Printed circuit board plug connectors are preferably used for cabling series machines with cable harnesses.

- Fieldbus and I/O signal connection with connector “Molex Micro Fit"
- Power supply connection with “AMP Positive Lock” crimp contacts

Two cable entries are required for cabling the Lexium integrated drives (see accessories, page 4/107).

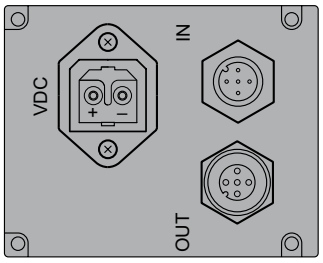


Printed circuit board connector, overview of connections

Connection	Assignment
CN1	Supply voltage ⎓ V
CN2	Fieldbus interface
CN3	RS 485 commissioning interface
CN4	24 V signal interface
CN5	Interface for “Safe Torque Off” safety function (“Power Removal”)
CN6	Jumper for disabling “Safe Torque Off” safety function (“Power Removal”)

Industrial connectors (optional)

Lexium integrated drives with industrial connectors are preferably used in special machines and small series.
The device version with industrial connectors has a connector housing with M12 circular connectors (5 poles) for the fieldbus connection and a Hirschmann STASEI 200 connector for connection of the power supply.



Industrial connector, overview of connections

Integrated drive system with industrial connectors

Note:

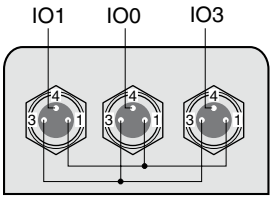
- *DeviceNet and Modbus TCP: 1 circular connector for IN and OUT signals*
- *EtherCAT and Ethernet Powerlink: 2 circular connectors (1 circular connector each for IN and OUT signals)*

Connection technologies (continued)

I/O signal inserts

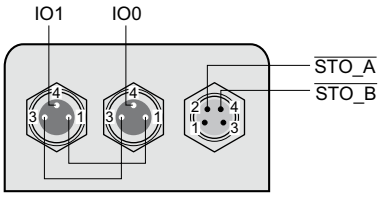
One or two I/O signal inserts with industrial connectors can be ordered for connection of the I/O signals (see accessories, pages 4/109 and 4/110).
The 24 V power supply to the signal outputs is internal. Different I/O signal inserts are available for this purpose.

I/O signal inserts without “Safe Torque Off” safety function (“Power Removal”)

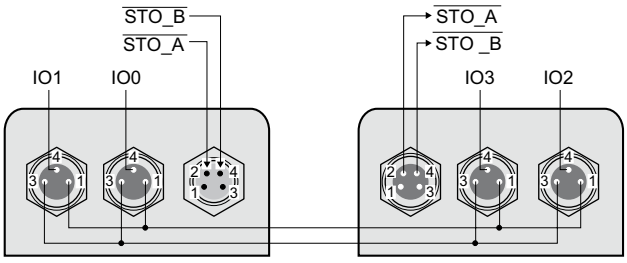


Inserts for three I/O signals

I/O signal inserts with “Safe Torque Off” safety function (“Power Removal”)

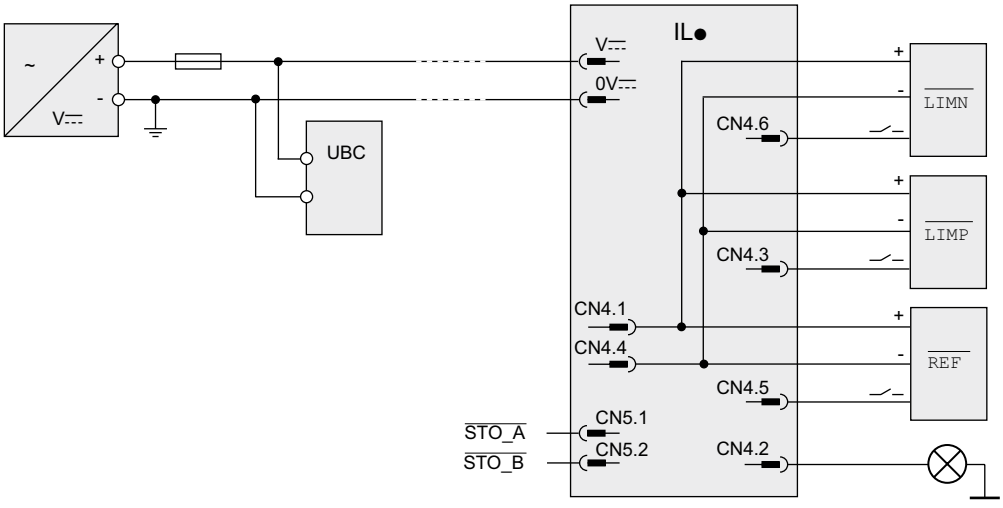


Insert for two I/O signals and STO signals for safety function



Inserts for four I/O signals and STO signals for safety function

Connection example I/O signal



Connection example with four I/O signals

Lexium integrated drives
IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

Configuration via parameter switches

The following settings can be made at the Integrated Drive System via parameter switches:
- ■ Ethernet
- □ Setting IP address
- ■ DeviceNet
- □ Setting fieldbus address

Operating modes

Overview

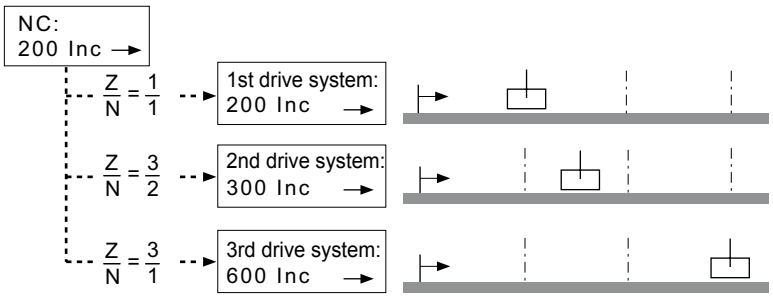
The following operating modes can be set via the fieldbus:
- ■ Electronic gear (only ILA2 with singleturn encoder)
- ■ Profile velocity
- ■ Jog
- ■ Profile position
- ■ Homing

Electronic gear (only ILA2 with singleturn encoder)

In “Electronic Gear” operating mode with singleturn encoder, the reference signals are supplied from an encoder (A/B signals) or a controller (pulse/direction signals) and a new position reference value is calculated using an adjustable gear ratio.

Reference value setting
The reference value are supplied as pulse/direction or A/B encoder signals.

Application example
Synchronisation of motion sequences, e.g. cutting material on a conveyor belt.



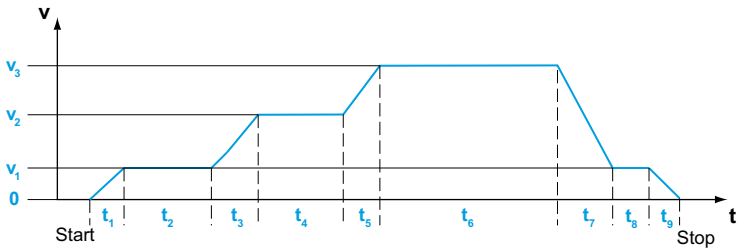
"Electronic Gear" operating mode

Profile velocity

In operating mode “Profile velocity", a reference speed for the motor is set and a movement without a target position is started. This speed is maintained until a different reference speed is specified or the operating mode is changed.

Reference value setting
The reference value is set via fieldbus or PC.

Application example
Application of paint in CD manufacture



Profile velocity

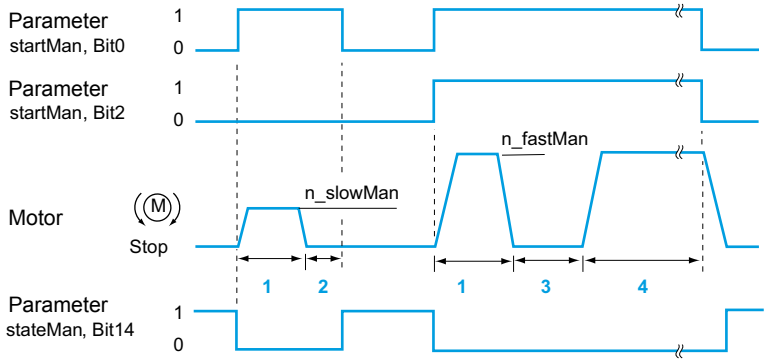
t_1, t_3, t_5 = acceleration
t_2, t_4, t_6, t_8 = constant movement
t_7, t_9 = braking

Jog mode

The motor moves by one distance unit or at constant speed in continuous operation. The value of the distance unit, the speed levels and the change-over time in continuous operation can be adjusted manually.

Reference value setting
The reference value is set via fieldbus or PC.

Application example
Setting up a machine during commissioning



Jog, slow and fast

1 step_Man
2 t < time_Man
3 time_Man
4 Continuous operation

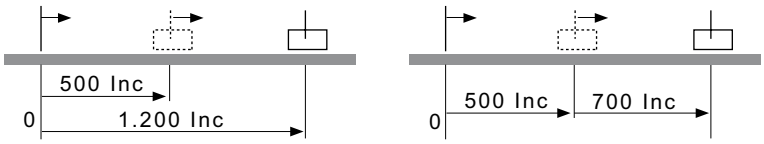
Profile position

In the operating mode “Profile Position", the motor is positioned from a point A to a point B with a positioning command.

Settings
The positioning path can be specified in two ways:
- Absolute positioning, reference point is the zero point of the axis
- Relative positioning, reference point is the current position of the motor

Reference value setting
The reference value is set via fieldbus or PC.

Application example
Pick-and-place with a linear robot



Operating mode “Profile Position", absolute and relative

Homing

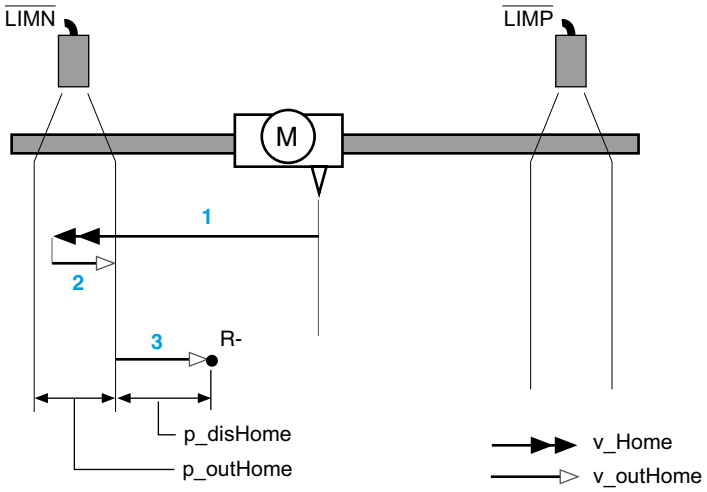
There are two types of the “Homing” operating mode:
- Reference movement
  Specifying the dimension reference by approach to a limit or reference switch
- Position setting
  Specifying the position reference relative to the current motor position

***Note:** In the case of ILA2 with multiturn encoder, a valid actual motor position is available immediately after starting. Therefore, homing to external limit switches is not required.*

Reference movement
During reference movement, the motor moves to a defined position on the axis. The position is defined by a mechanical switch:
- LIMN, LIMP limit switches
- REF reference switch

Types of reference movements
There are six standard reference movements:
- Movement to negative limit switch LIMN
- Movement to positive limit switch LIMP
- Movement to REF reference switch with first movement counterclockwise
- Movement to REF reference switch with first movement clockwise
- Reference movement to index pulse with clockwise or counterclockwise rotation (not with ILE2)
- Reference movement to block = mechanical stop (ILE2 only)

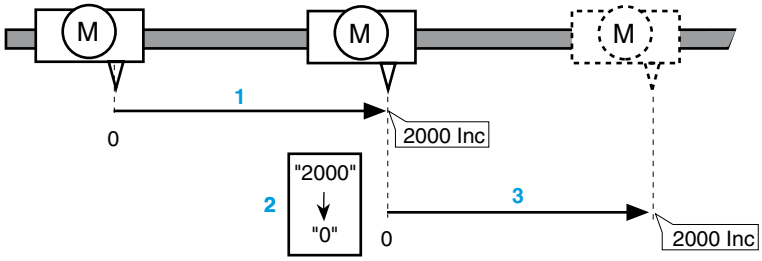
Example 1: reference movement to limit switch



Operating mode "Homing", reference movement to limit switch

1 Movement to limit switch at search speed
2 Movement to switching edge at clearance speed
3 Movement to distance from switching edge at clearance speed

Example 2: position setting
Position setting can be used to execute a continuous motor movement without overtravelling the positioning limits.



Positioning by 4000 increments with position setting

1 The motor is positioned 2000 increments.
2 The current motor position is set to position value 0 by position setting to 0 and the new zero point is defined at the same time.
3 The new target position is 2000 increments after triggering a new travel command by 2000 increments.

This procedure prevents overtravel of the absolute position limits during positioning, because the zero point is continuously made to follow.

Reference value setting
The reference value is set via fieldbus or PC.

Application example
Prior to absolute positioning in "Profile Position" mode.

Additional operating modes
Additional operating modes can be activated via fieldbus or PC:
- Brake function
- Reversing direction of rotation of motor
- Setting motion profile via profile generator
- Setting motor phase current
- Triggering "Quick Stop" function
- Fast position capture via signal input (Capture)
- Programming signal inputs/outputs.
- Translation of user-defined units (scaling)
- Monitoring functions

"Safe Torque Off" ("Power Removal") safety function

The Lexium integrated drive integrates the "Safe Torque Off" ("Power Removal") safety function which prevents unintended restarting of the motor. The motor no longer produces any torque if the safety function is active.

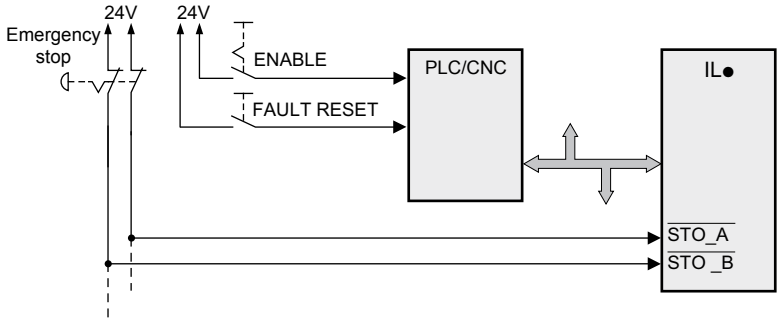
This safety function:
- Complies with the machine safety standard ISO 13849-1, perfomance level "d" (PL d) .
- Complies with the standard for functional safety IEC/EN 61508, SIL2 capability (safety control-signalling applied to processes and systems). The SIL (Safety Integrity Level) capability depends on the connection diagram for the servo drive and for the safety function. Failure to observe the setup recommendations could inhibit the SIL capability of the "Safe Torque Off" ("Power Removal") safety function.
- Complies with product standard IEC/EN 61800-5-2 "Adjustable speed electrical power drive systems – Part 5-2: Safety requirements – Functional" for both stop functions:
  - Safe Torque Off ("STO") corresponds to Category 0 stop according to IEC/EN 60204-1. Standstill by immediate power shutdown to the machine drive elements (i.e. an uncontrolled stop).
  - Safe Stop 1 ("SS1") corresponds to Category 1 stop according to IEC/EN 60204-1. A controlled stop in which the machine drive elements are retained to effect the standstill. The final shutdown is ensured by an external Emergency stop module with safe time delay, e.g. Preventa XPS-AV *(1)*.

The "Safe Torque Off" ("Power Removal") safety function has a redundant electronic architecture *(2)* which is monitored continuously by a diagnostics function.

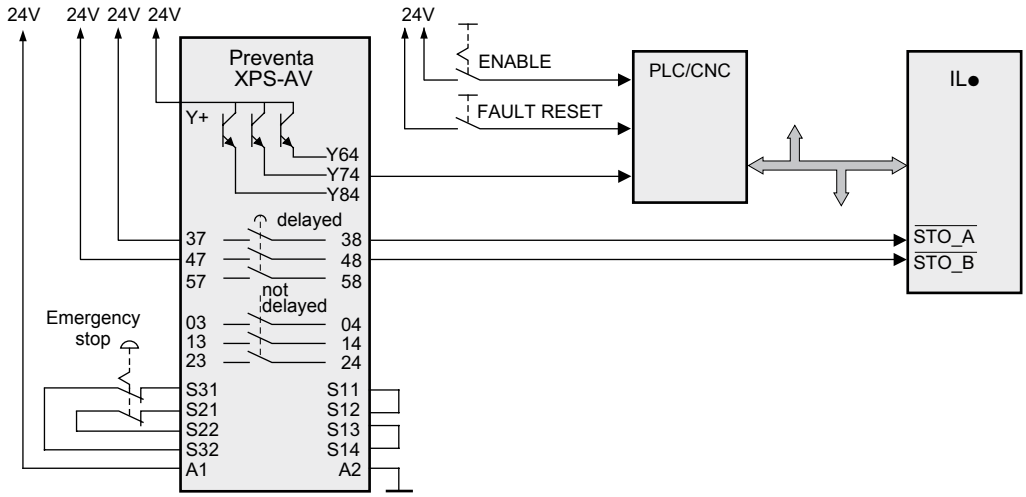
This PL d and SIL2 safety function is certified as conforming to these standards by the TÜV certification body in the context of a voluntary certification.

(1) Please refer to the "Safety functions and solutions using Preventa" catalogue.
(2) Redundant: Consists of mitigating the effects of the failure of one component by means of the correct operation of another, assuming that faults do not occur simultaneously on both.

Examples of applications of the safety function



Example of Category 0 Stop



Example of Category 1 Stop

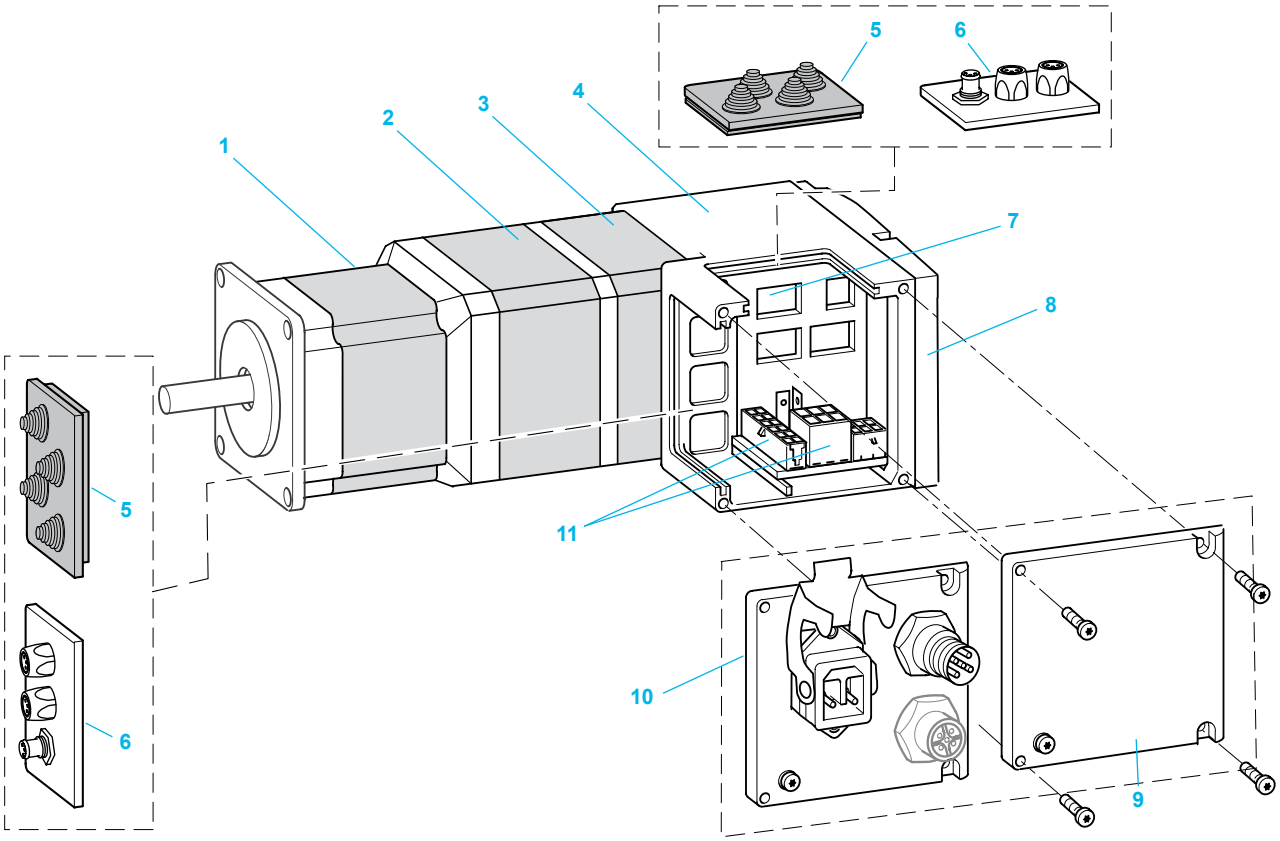
Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILA2 with AC synchronous servo motor

Description

ILA2 comprise control electronics with a fieldbus interface for DeviceNet, EtherCAT, Modbus TCP or Ethernet Powerlink and an AC synchronous servo motor. ILA2 is optionally available with printed circuit board connectors or industrial connectors. A multiturn encoder is optionally available for ILA2. A holding brake is optionally available for the ILA2 with a singleturn encoder.



1 Synchronous AC servo motor
2 Holding brake (optional)
3 Singleturn or multiturn encoder (optional)
4 Electronics housing
5 Insert cable entry (accessory)
6 I/O insert with industrial connectors (accessory)
7 Settings via parameter switches
8 Cover for electronics housing
9 Cover for Lexium integrated drives with option “PCB connector"
10 Cover for supply voltage ⎓ V and fieldbus connection for Lexium integrated drives with option “industrial connector”
11 Electrical interfaces

Note:

- *DeviceNet and Modbus TCP: 1 circular connector for IN and OUT signals*
- *EtherCAT and Ethernet Powerlink: 2 circular connectors (1 circular connector each for IN and OUT signals)*

Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILA2 with AC synchronous servo motor

Certifications

Conformity to standards			Lexium integrated drives have been developed to comply with the stringent international standards and with the recommendations for adjustable speed power drive systems, specifically: IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals) and IEC/EN 50178 (resistance of devices to vibration).
	EMC immunity		EN 61800-3:2001, second environment
	Conducted and radiated EMC emissions		EN 61800-3:2001-02; IEC 61800-3, Ed.2 ■ Power supplies without external mains filter: □ C3 up to 10 m supply cable length ■ Power supplies with external mains filter: □ C2 up to 20 m supply cable length □ C3 up to 50 m supply cable length
CE marking			The Lexium integrated drives are CE marked in accordance with the European Machinery Directive (98/37/EEC) and the European EMC Directive (2004/108/EEC).
Product certifications			UL (USA), cUL (Canada)
			TÜV certification: Lexium integrated drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*		**°C**	0 ... 55; power reduction by 2%/°C at 40 ... 55
Max. permissible temperature of the power amplifier		**°C**	105
Max. permissible temperature of the motor *(2)*		**°C**	110
Transport and storage temperature		**°C**	-25 ... +70
Installation height without power reduction		**m**	< 1000 m above mean sea level
Relative humidity		**%**	15 ... 85 (not condensing)
Vibration load during operation as per DIN EN 60068-2-6	Number of cycles		10
	Acceleration amplitude:	**m/s²**	20
	Frequency range	**Hz**	10 ... 500
Continuous shocks as per DIN EN 60068-2-29	Number of shocks		1000
	Peak acceleration	**m/s²**	150
Shaft wobble and perpendicularity			According to EN 50347 (IEC 60072-1)
Degree of protection as per DIN EN 60034-5			Total except shaft bushing IP54, shaft bushing IP41

Electrical data

Supply voltage (CN1)			Corresponds to PELV according to DIN 19240, protected against reverse polarity	
Supply voltage range (absolute limit values)		**⎓ V**	18 ... 55.2	
Nominal supply voltage		**⎓ V**	24 / 48	
Ripple at nominal voltage		**V_{PP}**	≤ 3.6	
			ILA2●571	ILA2●572
Max. continuous current consumption	■ Winding type T	**A**	7.5	7.5
	■ Winding type P	**A**	5	7
Peak current consumption	■ Winding type T	**A**	11	9
	■ Winding type P	**A**	7	8.5
Inrush current			Inrush current time-dependent by current incline function and depending on device capacitance C = 1500 µF and resistance of connectivity	
External fuse		**A**	16	
Fieldbus interface (CN2)				
DeviceNet	Signal inputs/outputs		According to OVDA, galvanic isolation	
	Transmission rate	**kBaud**	125 / 250 / 500	
	Transmission protocol		DeviceNet Position Controller Profile	
EtherCAT	Signal inputs/outputs		According to IEEE 802.3 standard, no galvanic isolation	
	Transmission rate	**MBit**	100	
	Transmission protocol		EtherCAT	
Modbus TCP	Signal inputs/outputs		According to IEEE 802.3 standard, no galvanic isolation	
	Transmission rate	**MBit**	10 / 100	
	Transmission protocol		Modbus TCP	
Ethernet Powerlink	Signal inputs/outputs		According to IEEE 802.3 standard, no galvanic isolation	
	Transmission rate	**MBit**	100	
	Transmission protocol		Ethernet Powerlink	

(1) Limit values with flanged motor mounted on a steel plate 300 x 300 x 10 mm
(2) Measured at the surface

Electrical data

RS 485 commissioning interface (CN3)			
RS 485	Signal inputs/outputs		According to RS 485, no galvanic isolation, 2-wire
	Transmission rate	**kBaud**	9.6 / 19.2 / 38.4
	Transmission protocol		Modbus TCP
24 V signal interface (CN4)			4 signals, can each be used as input or output
24 V signal inputs			Galvanically connected to 0VDC, protected against reverse polarity
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)		**mA**	2
Debounce time	LIO1 ... LIO4	**ms**	1.25 ... 1.5
24 V signal outputs			Switching to plus, short-circuit protected, suitable for inductive load (1000 mH / 100 mA)
Nominal voltage		**⎓ V**	24
Supply voltage range		**⎓ V**	23 ... 25
Max. switching current (total)		**mA**	200
Max. switching current per output		**mA**	100
Voltage drop at 50 mA load		**V**	≤ 1
			The internal power supply unit is protected against: ■ Short circuit of the output voltage ■ Overload of output voltage (limited to 6 W output power)
Interface for safety function "Safe Torque Off" ("Power Removal") (CN5)			No galvanic isolation; corresponds to RS 485 standard
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)		**mA**	10
Debounce time		**ms**	1 ... 5
Response time (until shutdown of power amplifier)		**ms**	< 50
Max. time offset until detection of signal differences between $\overline{\text{STO\_A}}$ and $\overline{\text{STO\_B}}$ *(1)*		**S**	< 1
Safety function "Safe Torque Off" ("Power Removal")			
Protection	Of machine		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level "d" (PL d) , and standard IEC/EN 61800-5-2
	Of the system process		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2

(1) Switching process must be simultaneous for both signal inputs (time offset < 1 s).

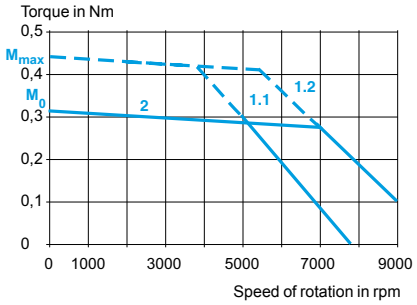
Mechanical data

Type of integrated drive			ILA2●571				ILA2●572			
Winding type			T		P		T		P	
Nominal supply voltage		⎓ V	24	48	24	48	24	48	24	48
Nominal speed of rotation		rpm	5000	7000	3200	5100	3000	5100	1600	3400
Max. torque *(1)*	M_{max}	Nm	0.45		0.62		0.85		1.62	
Continuous torque *(2)*	M_0	Nm	0.31		0.44		0.57		0.78	
Positioning resolution per revolution		Inc.	16384				16384			
Accuracy of positioning sensor		°	±0.05				±0.05			
Rotor inertia		kg·cm²	0.095				0.173			
Mass		kg	1.4				1.7			
Shaft load	Max. radial force *(3)*	N	89				107			
	Max. axial tensile force	N	104				104			
	Max. axial force pressure	N	104				104			
	Nominal bearing service life *(4)*	h	20000				20000			
Holding brake (optional) *(5)*										
Holding torque		Nm	1.2							
Electrical pull-in power		W	10							
Brake release time		ms	14							
Brake application time		ms	13							
Moment of inertia		kg·cm²	0.07							
Multiturn encoder (optional) *(5)*										
Measuring range absolute		rpm	4096							
Positioning resolution per revolution		Inc.	16384							
Accuracy of positioning sensor		°	±0.05							

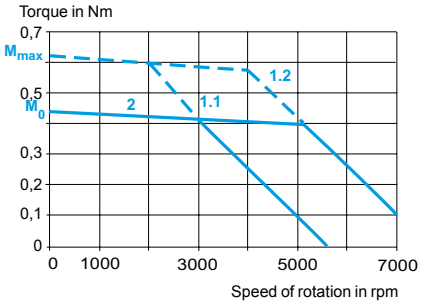
(1) Max. 2.5 s
(2) At 20 rpm; at 0 rpm the continuous torque is reduced to 89% of the specified value
(3) Point of application of radial force: 10 mm distance to flange
(4) Operating hours at a probability of failure of 10%; conditions for shaft load: speed 4000 rpm, 100% duty cycle at continuous torque, ambient temperature 40 °C
(5) Holding brake and multiturn encoder cannot be used in combination.

Torque characteristics

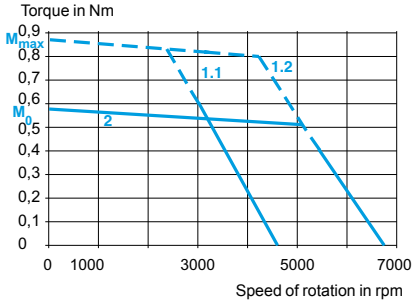
ILA2●571T (winding type T)



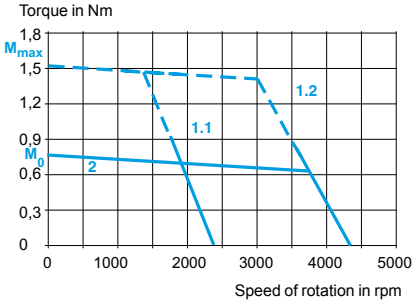
ILA2●571P (winding type P)



ILA2●572T (winding type T)



ILA2●572P (winding type P)



1.1 Max. torque at 24 V
1.2 Max. torque at 48 V
2 Continuous torque

Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILA2 with AC synchronous servo motor

References

Example:	I	L	A	2	D	5	7	1	P	B	1	A
Motor type **A** = AC synchronous servo motor	I	L	**A**	2	D	5	7	1	P	B	1	A
Supply voltage **2** = 24 ... 48 V	I	L	A	**2**	D	5	7	1	P	B	1	A
Communication interface **D** = DeviceNet **E** = EtherCAT **P** = Ethernet Powerlink **T** = Modbus TCP	I	L	A	2	**D**	5	7	1	P	B	1	A
Flange size **57** = 57 mm	I	L	A	2	D	**5**	**7**	1	P	B	1	A
Motor length ("L") *(1)* **1** = motor length ("L") **2** = motor length ("L")	I	L	A	2	D	5	7	**1**	P	B	1	A
Winding type **P** = medium speed of rotation, medium torque **T** = high speed of rotation, medium torque	I	L	A	2	D	5	7	1	**P**	B	1	A
Connection technology **B** = printed circuit board connector **C** = industrial connector	I	L	A	2	D	5	7	1	P	**B**	1	A
Measurement system **1** = singleturn encoder **2** = multiturn encoder *(2)*	I	L	A	2	D	5	7	1	P	B	**1**	A
Holding brake **A** = no holding brake **F** = with holding brake *(2)*	I	L	A	2	D	5	7	1	P	B	1	**A**

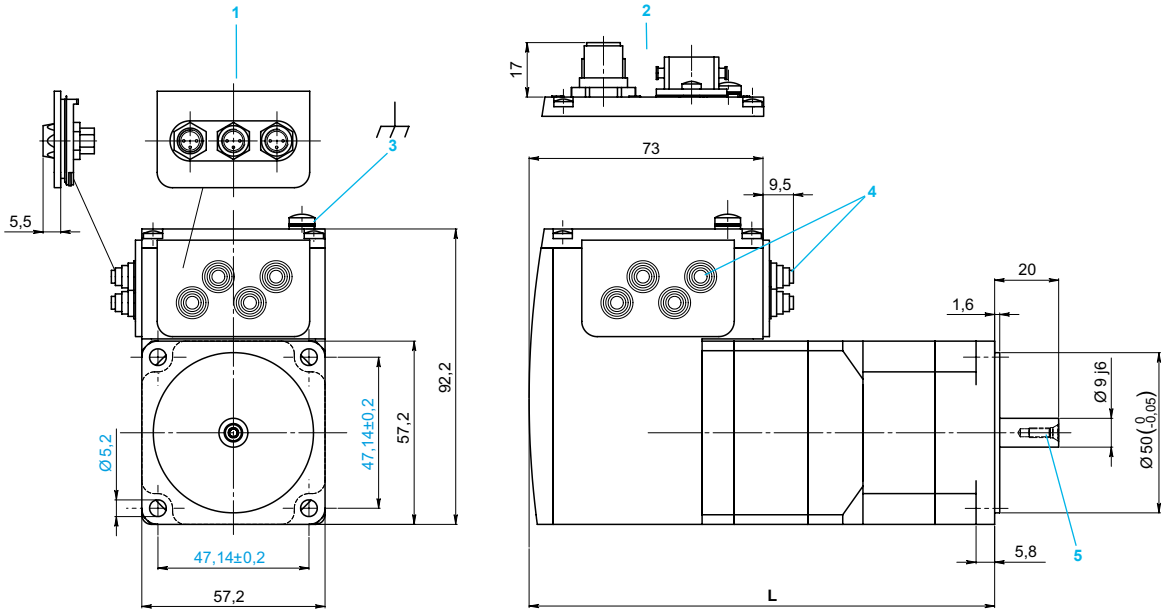
(1) The motor length "L" depends on the mechanical characteristics, see pages 4/51 and 4/53.
(2) Holding brake and multiturn encoder cannot be used in combination.

Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILA2 with AC synchronous servo motor

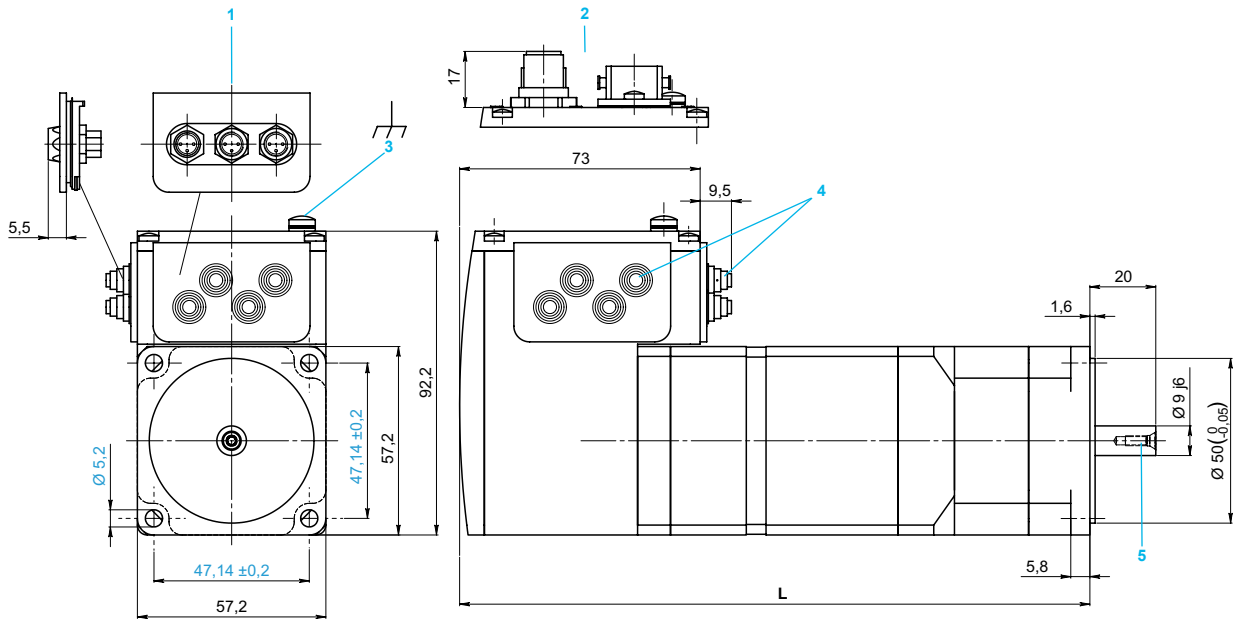
ILA2 integrated drives without holding brake



	L (without multiturn encoder)	L (with multiturn encoder)
ILA2●571	145.3	189.3
ILA2●572	163.8	207.8

1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm
5 Centring hole DIN 332 - DS M3

ILA2 integrated drives with holding brake



	L
ILA2●571	190.8
ILA2●572	209.3

1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm
5 Centring hole DIN 332 - DS M3

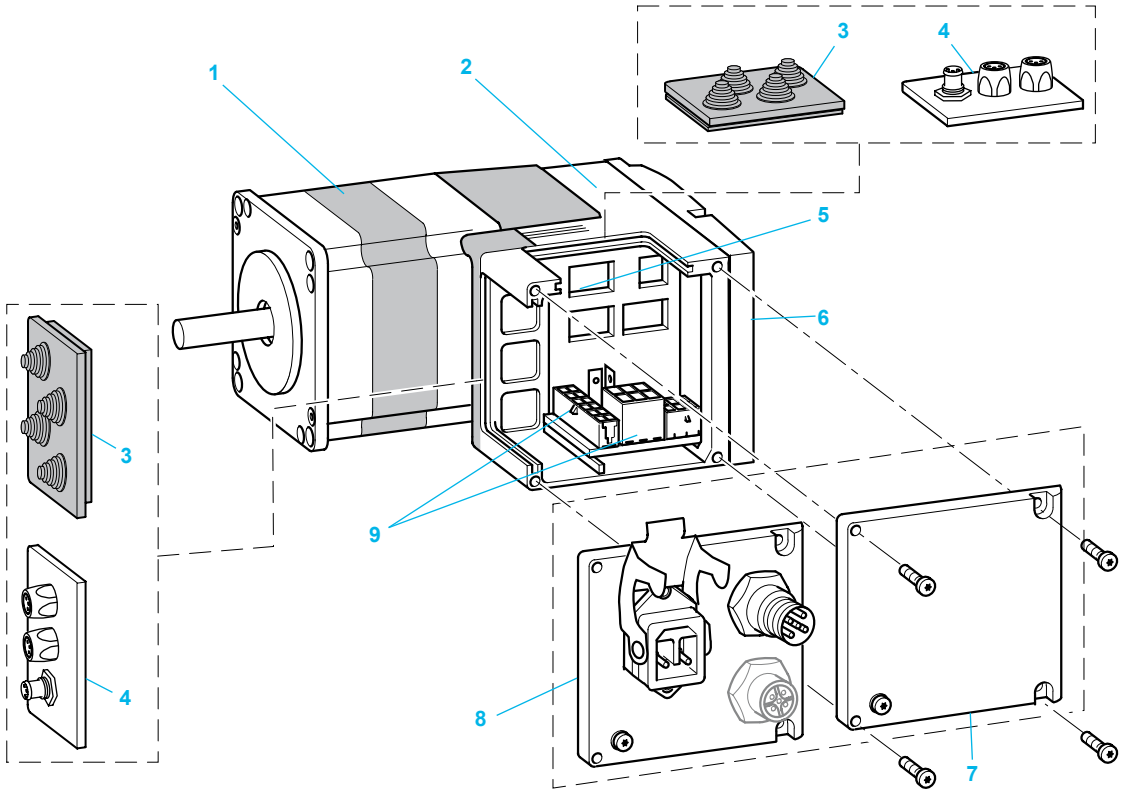
Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILE2 with brushless DC motor

Description

ILE2 comprise control electronics with a fieldbus interface for DeviceNet, EtherCAT, Modbus TCP or Ethernet Powerlink and a brushless DC motor. ILE2 is optionally available with straight teeth gear or worm drive and printed circuit board connectors or industrial connectors.



1 Brushless DC motor
2 Electronics housing
3 Insert cable entry (accessory)
4 I/O insert with industrial connectors (accessory)
5 Settings via parameter switches
6 Cover for electronics housing
7 Cover for Lexium integrated drives with option “PCB connector"
8 Cover for supply voltage ⎓ V and fieldbus connection for Lexium integrated drives with option “industrial connector”
9 Electrical interfaces

Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILE2 with brushless DC motor

Certifications

Conformity to standards			Lexium integrated drives have been developed to comply with the stringent international standards and with the recommendations for adjustable speed power drive systems, specifically: IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals) and IEC/EN 50178 (resistance of devices to vibration).
	EMC immunity		EN 61800-3:2001, second environment
	Conducted and radiated EMC emissions		EN 61800-3:2001-02; IEC 61800-3, Ed.2 ■ Power supplies without external mains filter: □ C3 up to 10 m supply cable length ■ Power supplies with external mains filter: □ C2 up to 20 m supply cable length □ C3 up to 50 m supply cable length
CE marking			The Lexium integrated drives are CE marked in accordance with the European Machinery Directive (98/37/EEC) and the European EMC Directive (2004/108/EEC).
Product certifications			UL (USA), cUL (Canada)
			TÜV certification: Lexium integrated drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*		**°C**	0 ... 55; power reduction by 2%/°C at 40 ... 55
Max. permissible temperature of the power amplifier		**°C**	105
Max. permissible temperature of the motor *(2)*		**°C**	110
Transport and storage temperature		**°C**	-25 ... +70
Installation height without power reduction		**m**	< 1000 m above mean sea level
Relative humidity		**%**	15 ... 85 (not condensing)
Vibration load during operation as per DIN EN 60068-2-6	Number of cycles		10
	Acceleration amplitude:	**m/s²**	20
	Frequency range	**Hz**	10 ... 500
Continuous shocks as per DIN EN 60068-2-29	Number of shocks		1000
	Peak acceleration	**m/s²**	150
Shaft wobble and perpendicularity			According to EN 50347 (IEC 60072-1)
Degree of protection as per DIN EN 60034-5			Total except shaft bushing IP54, shaft bushing IP41

Electrical data

Supply voltage (CN1)			Corresponds to PELV according to DIN 19240, protected against reverse polarity
Supply voltage range (absolute limit values)		**⎓ V**	18 ... 55.2
Nominal supply voltage		**⎓ V**	24 / 48
Ripple at nominal voltage		**V_{PP}**	≤ 3.6
Max. continuous current consumption		**A**	5,5
Peak current consumption		**A**	7
Inrush current			Charging current for capacitor C=1500 µF
External fuse		**A**	16
Fieldbus interface (CN2)			
DeviceNet	Signal inputs/outputs		According to OVDA, galvanic isolation
	Transmission rate	**kBaud**	125 / 250 / 500
	Transmission protocol		DeviceNet Position Controller Profile
EtherCAT	Signal inputs/outputs		According to IEEE 802.3 standard, no galvanic isolation
	Transmission rate	**MBit**	100
	Transmission protocol		EtherCAT
Modbus TCP	Signal inputs/outputs		According to IEEE 802.3 standard, no galvanic isolation
	Transmission rate	**MBit**	10 / 100
	Transmission protocol		Modbus TCP
Ethernet Powerlink	Signal inputs/outputs		According to IEEE 802.3 standard, no galvanic isolation
	Transmission rate	**MBit**	100
	Transmission protocol		Ethernet Powerlink

(1) Limit values with flanged motor mounted on a steel plate 300 x 300 x 10 mm
(2) Measured at the surface

Electrical data

RS 485 commissioning interface (CN3)			
RS 485	Signal inputs/outputs		According to RS 485, no galvanic isolation, 2-wire
	Transmission rate	**kBaud**	9.6 / 19.2 / 38.4
	Transmission protocol		Modbus TCP
24 V signal interface (CN4)			4 signals, can each be used as input or output
24 V signal inputs			Galvanically connected to 0VDC, protected against reverse polarity
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)		**mA**	2
Debounce time LIO1 ... LIO4		**ms**	1.25 ... 1.5
24 V signal outputs			Switching to plus, short-circuit protected, suitable for inductive load (1000 mH / 100 mA)
Supply voltage range		**⎓ V**	23 ... 25
Max. switching current (total)		**mA**	200
Max. switching current per output		**mA**	100
			The internal power supply unit is protected against: ■ Short circuit of the output voltage ■ Overload of output voltage (limited to 6 W output power)
Interface for safety function "Safe Torque Off" ("Power Removal") (CN5)			No galvanic isolation; corresponds to RS 485 standard
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)	$\overline{STO\_A}$	**mA**	≤ 10
	$\overline{STO\_B}$	**mA**	≤ 3
Debounce time		**ms**	1
Response time (until shutdown of power amplifier)		**ms**	< 50
Max. Time offset until detection of signal differences between $\overline{STO\_A}$ and $\overline{STO\_B}$		**S**	< 1

Safety function "Safe Torque Off" ("Power Removal")

Protection	Of machine		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level "d" (PL d) , and standard IEC/EN 61800-5-2
	Of the system process		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2

Mechanical data of ILE2 without gear

Type of integrated drive			**ILE2●661**		**ILE2●662**	
Nominal supply voltage		**⎓ V**	**24**	**48**	**24**	**48**
Nominal current		**A**	6.8	3.8	9.5	7
Nominal speed of rotation		**rpm**	4800	6000	3100	5000
Nominal output power		**W**	131	163	162	262
Nominal torque		**Nm**	0.26		0.5	
Max. torque	M_{max}	**Nm**	0.43		0.8	
Max. current with power stage disabled		**A**	0.1			
Detent torque (at zero current)		**Nm**	0.08		0.106	
Moment of inertia		**kg·cm²**	0.17		0.34	
Max. speed of rotation		**rpm**	6500	7000	5000	7000
Positioning resolution per revolution		**Inc.**	12			
Accuracy of positioning sensor		**°**	±0.5			
Mass		**kg**	1.4		1.75	
Shaft load	Max. radial force *(1)*	**N**	80			
	Max. axial tensile force	**N**	30			
	Max. axial force pressure	**N**	30			
	Nominal bearing service life *(2)*	**h**	20000			

(1) Point of application of radial force: 12.5 mm distance to flange
(2) Operating hours at a probability of failure of 10 %

Mechanical data of ILE2●661 with straight teeth gear

			G1		G2		G3		G4	
Ratio			18:1 (160:9)		38:1 (75:2)		54:1 (490:9)		115:1 (3675:32)	
Number of gear stages			3		3		4		4	
Nominal supply voltage		⎓ V	24	48	24	48	24	48	24	48
Nominal current		A	6.8	3.8	6.8	3.8	6.8	3.8	6.8	3.8
Nominal speed of rotation of motor		rpm	4000	5000	4000	5000	4000	5000	4000	5000
Nominal output speed of rotation		rpm	225	281	107	133	73	92	35	44
Nominal output torque		Nm	3.5		7,3		10		12	
Nominal output power		W	95	119	95	119	90	112	54	68
Max. current with power stage disabled		A	0.1							
Detent torque (at zero current)		Nm	1.42		3.00		4.36		9.19	
Moment of inertia output		kg·cm²	48		211		441		1962	
Max. speed of rotation		rpm	281		133		92		44	
Positioning resolution of motor per revolution		Inc.	12							
Positioning accuracy motor		Inc.	±0.5							
Positioning resolution of output		°	1.667		0.8		0.55		0.26	
Torsional backlash		°	≤1							
Mass		kg	1.85							
Shaft load (short-term operation)	Max. radial force *(1)*	N	200							
	Max. axial force	N	80							
	Nominal bearing service life *(2)*	h	2500							
Shaft load (long-term operation)	Max. radial force *(1)*	N	200							
	Max. axial force	N	10							
	Nominal bearing service life *(2)*	h	15000		15000		15000 *(3)*		15000 *(4)*	

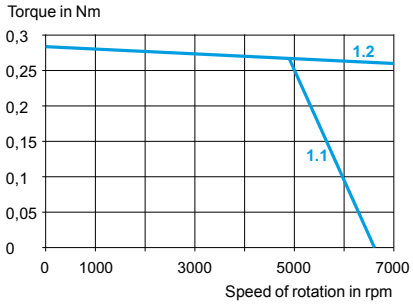
Mechanical data of ILE2●661 with worm gear

			G5		G6		G7		G8	
Ratio			24:1 (525:22)		54:1 (1715:32)		92:1 (735:5)		115:1 (3675:32)	
Number of gear stages			2		3		3		3	
Nominal supply voltage		⎓ V	24	48	24	48	24	48	24	48
Nominal current		A	6.8	3.8	6.8	2.7	6.8	2.6	6.8	2.9
Nominal speed of rotation of motor		rpm	4000	4000	4000	4000	4000	4000	4000	4000
Nominal output speed of rotation		rpm	168		75		44		35	
Nominal output torque		Nm	3.8		6.0		9.2		10.6	
Nominal output power		W	45	66	45	47	41	42	37	39
Max. current with power stage disabled		A	0.1							
Detent torque (at zero current)		Nm	2.9		6.5		12.3		16.7	
Moment of inertia output		kg·cm²	90		430		1270		1980	
Max. speed of rotation		rpm	186		93		54		44	
Positioning resolution of motor per revolution		Inc.	12							
Positioning accuracy motor		Inc.	±1							
Positioning resolution of output		°	1.26		0.56		0.33		0.26	
Torsional backlash		°	≤ 1.5		≤ 1.0		≤ 1.0		≤ 1.0	
Mass		kg	2.3							
Shaft load	Max. radial force *(1)*	N	200							
	Max. axial force	N	80							
	Nominal bearing service life *(2)*	h	3000		6000		9000		9000	

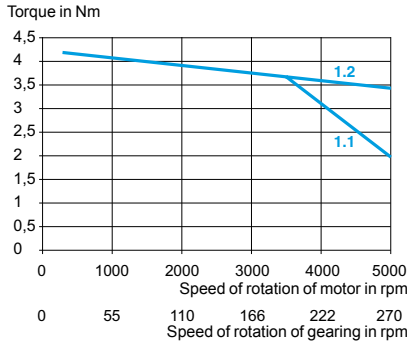
(1) Point of application of radial force: 12.5 mm distance to flange
(2) Operating hours at a probability of failure of 10%
(3) With reduced nominal output torque = 6 Nm; 2500 h at maximum torque
(4) With reduced nominal output torque = 8 Nm; 2500 h at maximum torque

Torque characteristics ILE2●66

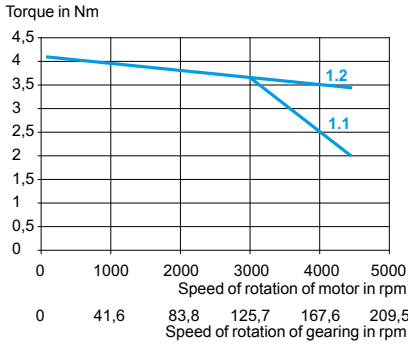
ILE2●661 without gearing



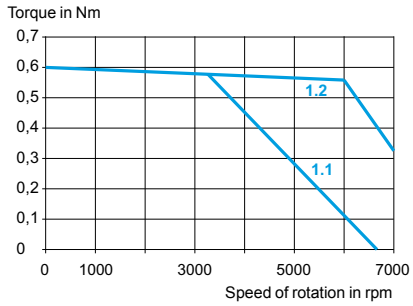
ILE2●661 with straight teeth gear G1



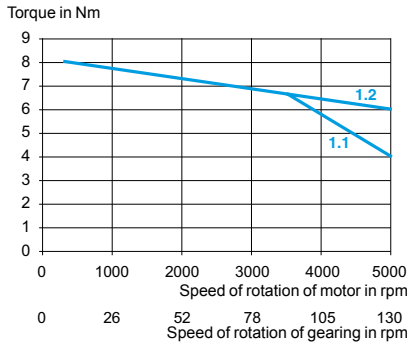
ILE2●661 with worm gear G5



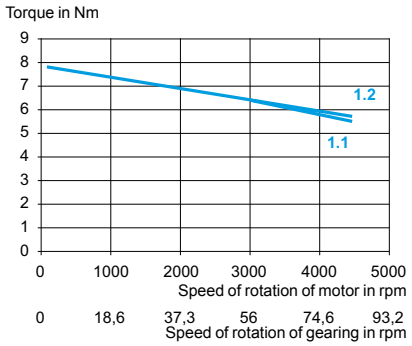
ILE2p662 without gearing



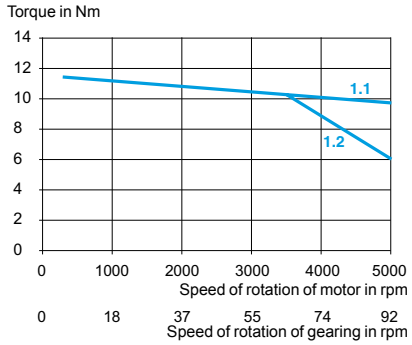
ILE2●661 with straight teeth gear G2



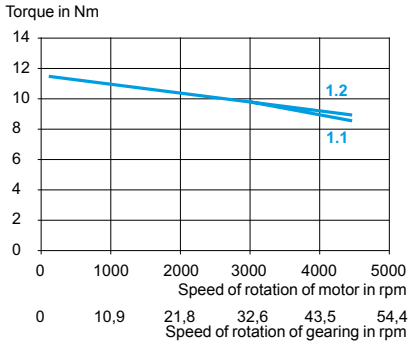
ILE2●661 with worm gear G6



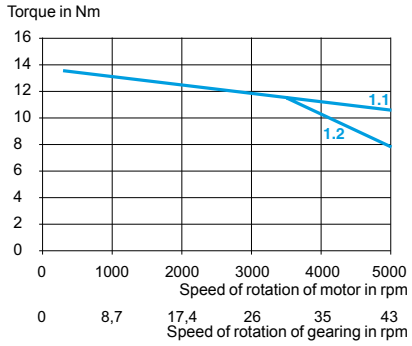
ILE2●661 with straight teeth gear G3



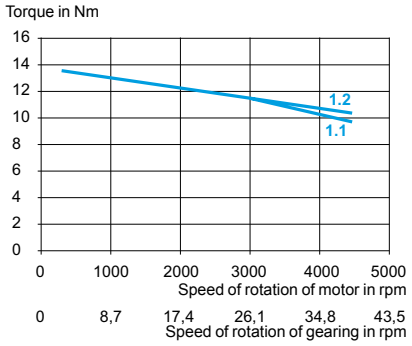
ILE2●661 with worm gear G7



ILE2●661 with straight teeth gear G4



ILE2●661 with worm gear G8



1.1 Max. torque at 24 V
1.2 Max. torque at 48 V

Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILE2 with brushless DC motor

References

Example:	I	L	E	2	D	6	6	1	P	B	1	A	1
Motor type **E** = brushless DC motor	I	L	**E**	2	D	6	6	1	P	B	1	A	1
Supply voltage **2** = 24 ... 48 V	I	L	E	**2**	D	6	6	1	P	B	1	A	1
Communication interface **D** = DeviceNet **E** = EtherCAT **P** = Ethernet Powerlink **T** = Modbus TCP	I	L	E	2	**D**	6	6	1	P	B	1	A	1
Flange size **66** = 66 mm	I	L	E	2	D	**6**	**6**	1	P	B	1	A	1
Motor length ("L") *(1)* **1** = motor length ("L") **2** = motor length ("L")	I	L	E	2	D	6	6	**1**	P	B	1	A	1
Winding type **P** = medium speed of rotation, medium torque	I	L	E	2	D	6	6	1	**P**	B	1	A	1
Connection technology **B** = printed circuit board connector **C** = industrial connector	I	L	E	2	D	6	6	1	P	**B**	1	A	1
Measurement system **1** = BLDC encoder	I	L	E	2	D	6	6	1	P	B	**1**	A	1
Holding brake **A** = no holding brake	I	L	E	2	D	6	6	1	P	B	1	**A**	1
Gearing *(2) (3)* Straight teeth gear **1** = ratio 18:1 (160:9) **2** = ratio 38:1 (75:2) 3 = ratio 54:1 (490:9) 4 = ratio 115:1 (3675:32) Worm gear **5** = ratio 24:1 (525:22) **6** = ratio 54:1 (1715:32) **7** = ratio 92:1 (735:5) **8** = ratio 115:1 (3675:32)	I	L	E	2	D	6	6	1	P	B	1	A	**1**

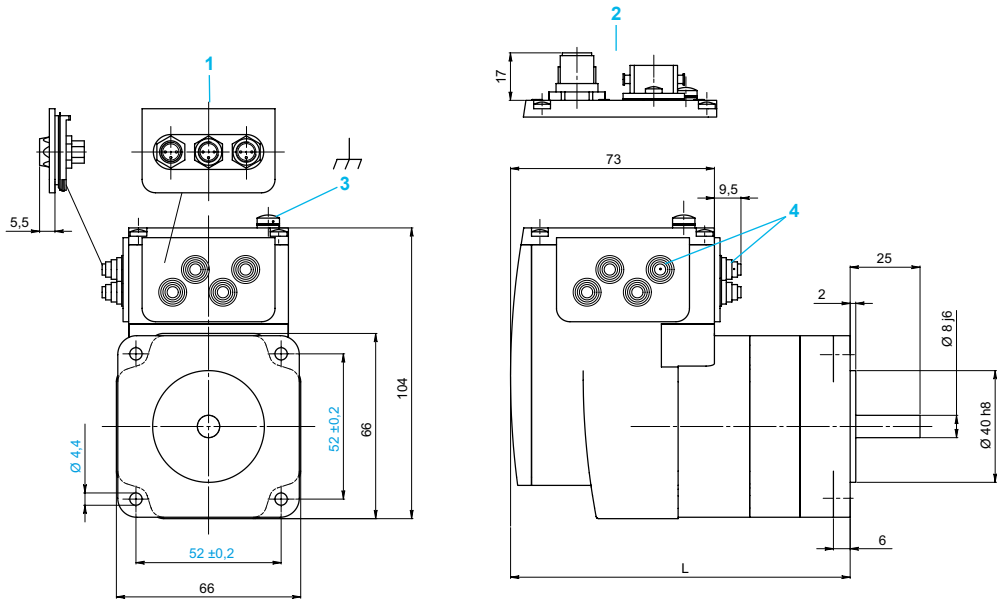
(1) The motor length "L" depends on the mechanical characteristics, see pages 4/56, 4/57, 4/60 and 4/61.
(2) Gearing only with ILE2●661.
(3) Without gearing: leave out gearing identification in order code (specify 12 characters only).

Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILE2 with brushless DC motor

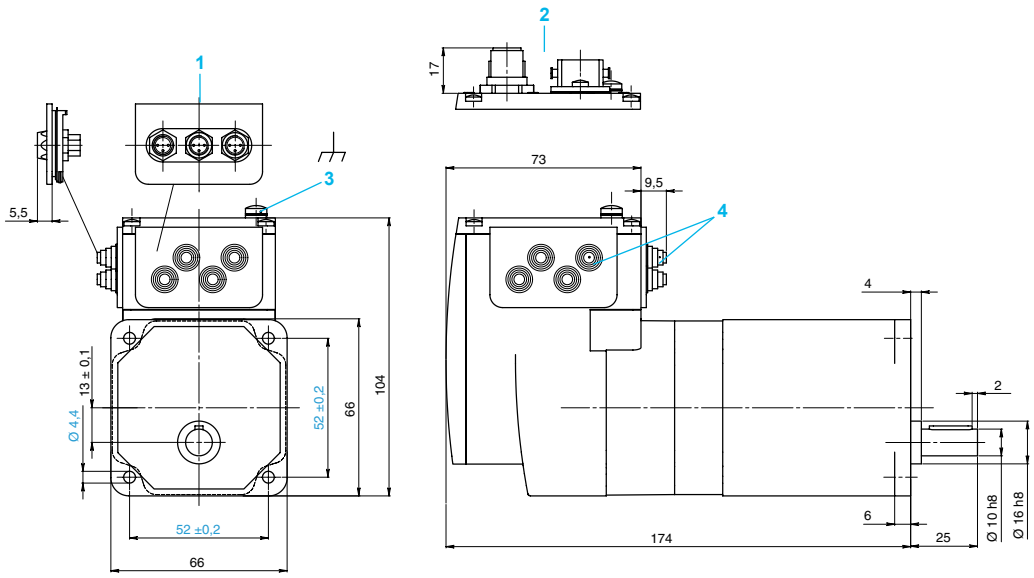
ILE2 integrated drives without gearing



	L
ILE2●661	122
ILE2●662	140

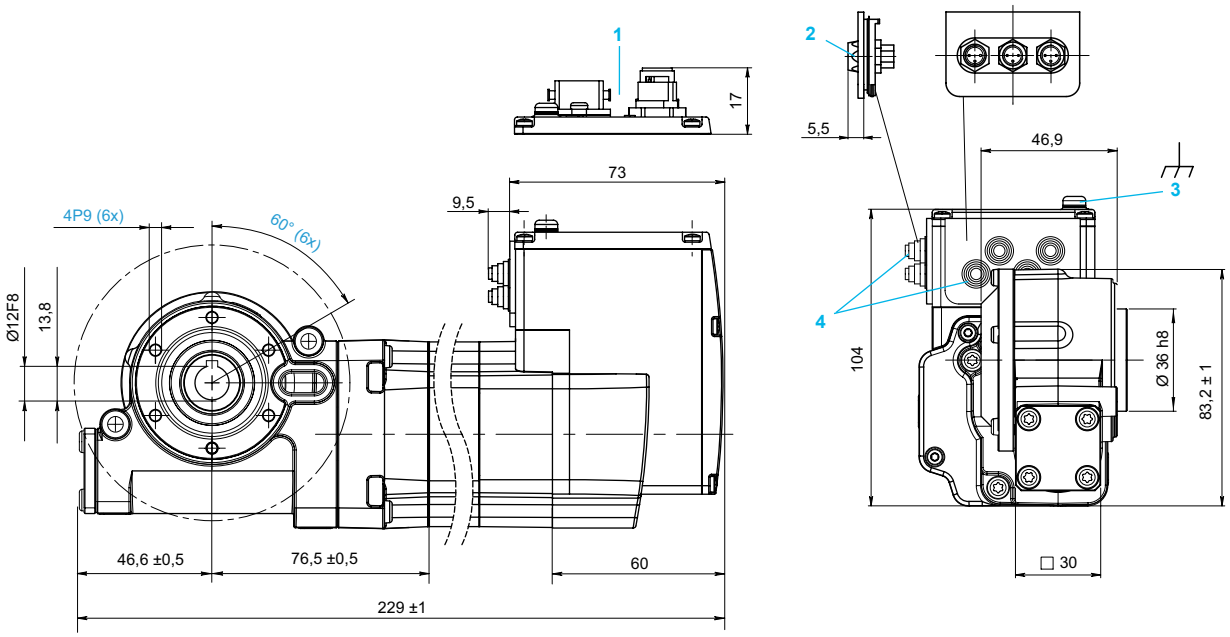
1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

ILE2 integrated drives with straight teeth gear



1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

ILE2 integrated drives with worm gear



1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

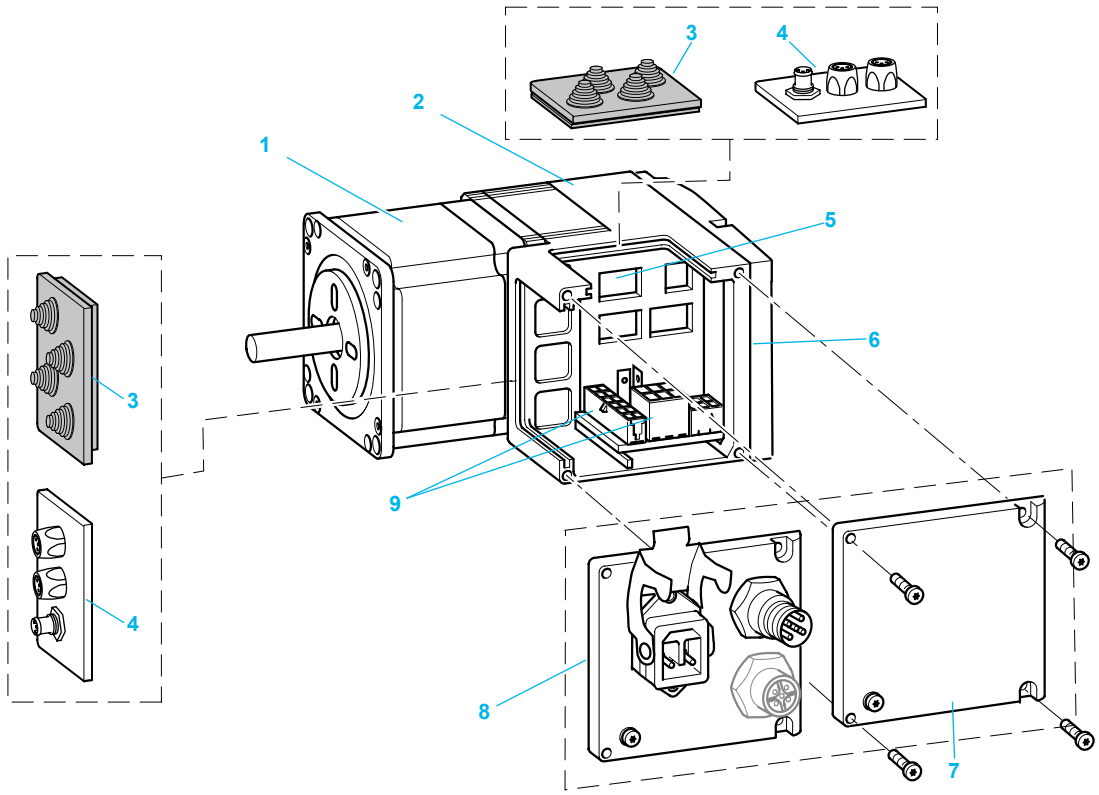
Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILS2 with 3-phase stepper motor

Description

ILS2 comprise control electronics with a fieldbus interface for DeviceNet, EtherCAT, Modbus TCP or Ethernet Powerlink and a 3-phase stepper motor. ILS2 is optionally available with printed circuit board connectors or industrial connectors. A holding brake is optionally available for ILS2●85.



1 3-phase stepper motor
2 Electronics housing
3 Insert cable entry (accessory)
4 Insert with industrial connectors (accessory)
5 Settings via parameter switches
6 Cover for electronics housing
7 Cover for Lexium integrated drives with option “PCB connector"
8 Cover for supply voltage ⎓ V and fieldbus connection for Lexium integrated drives with option “industrial connector”
9 Electrical interfaces

Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

ILS2 with 3-phase stepper motor

Certifications

Conformity to standards			Lexium integrated drives have been developed to comply with the stringent international standards and with the recommendations for adjustable speed power drive systems, specifically: IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals) and IEC/EN 50178 (resistance of devices to vibration).
	EMC immunity		EN 61800-3:2001, second environment
	Conducted and radiated EMC emissions		EN 61800-3:2001-02; IEC 61800-3, Ed.2 ■ Power supplies without external mains filter: □ C3 up to 10 m supply cable length ■ Power supplies with external mains filter: □ C2 up to 20 m supply cable length □ C3 up to 50 m supply cable length
CE marking			The Lexium integrated drives are CE marked in accordance with the European Machinery Directive (98/37/EEC) and the European EMC Directive (2004/108/EEC).
Product certifications			UL (USA), cUL (Canada)
			TÜV certification: Lexium integrated drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*		**°C**	0 ... 55; power reduction by 2%/°C at 40 ... 55
Max. permissible temperature of the power amplifier		**°C**	105
Max. permissible temperature of the motor *(2)*		**°C**	110
Transport and storage temperature		**°C**	-25 ... +70
Installation height without power reduction		**m**	< 1000 m above mean sea level
Relative humidity		**%**	15 ... 85 (not condensing)
Vibration load during operation as per DIN EN 60068-2-6	Number of cycles		10
	Acceleration amplitude:	**m/s²**	20
	Frequency range	**Hz**	10 ... 500
Continuous shocks as per DIN EN 60068-2-29	Number of shocks		1000
	Peak acceleration	**m/s²**	150
Shaft wobble and perpendicularity			According to EN 50347 (IEC 60072-1)
Degree of protection as per DIN EN 60034-5			Total except shaft bushing IP54, shaft bushing IP41

Electrical data

Supply voltage (CN1)			Corresponds to PELV according to DIN 19240, protected against reverse polarity
Supply voltage range (absolute limit values)		⎓ **V**	18 ... 55
Nominal supply voltage		⎓ **V**	24 / 48
Ripple at nominal voltage		V_{PP}	≤ 3.6
Max. current consumption	ILS2●57	**A**	3.5
	ILS2●851, ILS2●852	**A**	5
	ILS2●853:		
	■ Winding type P	**A**	5
	■ Winding type T	**A**	6
External fuse		**A**	16
Fieldbus interface (CN2)			
DeviceNet	Signal inputs/outputs		According to ODVA, galvanic isolation
	Transmission rate	**kBaud**	125 / 250 / 500
	Transmission protocol		DeviceNet Position Controller Profile
EtherCAT	Signal inputs/outputs		According to IEEE 802.3 standard, galvanic isolation
	Transmission rate	**MBit**	100
	Transmission protocol		EtherCAT
Modbus TCP	Signal inputs/outputs		According to IEEE 802.3 standard, galvanic isolation
	Transmission rate	**MBit**	10 / 100
	Transmission protocol		Modbus TCP
Ethernet Powerlink	Signal inputs/outputs		According to IEEE 802.3 standard, galvanic isolation
	Transmission rate	**MBit**	100
	Transmission protocol		Ethernet Powerlink

(1) Limit values with flanged motor mounted on a steel plate 300 x 300 x 10 mm
(2) Measured at the surface

Electrical data			
RS 485 commissioning interface (CN3)			
RS 485	Signal inputs/outputs		According to RS 485, no galvanic isolation, 2-wire
	Transmission rate	**kBaud**	9.6 / 19.2 / 38.4
	Transmission protocol		Modbus TCP
24 V signal interface (CN4)			4 signals, can each be used as input or output
24 V signal inputs			Galvanically connected to 0VDC, protected against reverse polarity
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)		**mA**	2
Debounce time	IO0 ... IO3	**ms**	1.25 ... 1.5
	IO0 and IO1 *(1)*	**ms**	0.01
Jitter	IO0 and IO1 *(1)*	**µs**	< 2
24 V signal outputs			Switching to plus, short-circuit protected, suitable for inductive load (1000 mH / 100 mA)
Supply voltage range		⎓ **V**	23 ... 25
Max. switching current (total)		**mA**	200
Max. switching current per output		**mA**	100
Voltage drop at 50 mA load		**V**	≤ 1
			The internal power supply unit is protected against: ■ Short circuit of the output voltage ■ Overload of output voltage (limited to 6 W output power)
Interface for safety function "Safe Torque Off" ("Power Removal") (CN5)			No galvanic isolation; corresponds to RS 485 standard
Logic 0 (U_{low})		**V**	-3 ... +4.5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)		**mA**	10
Debounce time		**ms**	1
Response time (until shutdown of power amplifier)		**ms**	< 50
Max. Time offset until detection of signal differences between $\overline{\text{STO\_A}}$ and $\overline{\text{STO\_B}}$		**S**	< 1
Safety function "Safe Torque Off" ("Power Removal")			
Protection	Of machine		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level "d" (PL d) , and standard IEC/EN 61800-5-2
	Of the system process		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2

(1) When the "Fast position capture" function is used

Mechanical data ILS2●57

Type of integrated drive			ILS2●571	ILS2●572	ILS2●573
Winding type			P	P	P
Max. torque		**Nm**	0.45	0.9	1.5
Holding torque		**Nm**	0.45	0.9	1.5
Moment of inertia		**kg·cm²**	0.1	0.22	0.38
Positioning resolution per revolution		**Inc.**	20000		
Systematic angle tolerance per step *(1)*		**arcmin**	±6		
Mass		**kg**	1.3	1.6	2.0
Shaft load *(2)*	Max. radial force *(3)*	**N**	24	24	50
	Max. axial tensile force	**N**	100		
	Max. axial force pressure	**N**	8.4		
	Nominal bearing service life *(4)*	**h**	20000		

Mechanical data ILS2●85

Type of integrated drive			ILS2●851	ILS2●852	ILS2●853	
Winding type			P	P	P	T
Max. torque		**Nm**	2.0	4.0	6.0	4.5
Holding torque		**Nm**	2.0	4.0	6.0	4.5
Moment of inertia		**kg·cm²**	1.1	2.2	3.3	
Positioning resolution		**Inc.**	20000			
Systematic angle tolerance per step *(1)*		**arcmin**	±6			
Mass		**kg**	2.6	3.6	4.7	
Shaft load *(2)*	Max. radial force *(3)*	**N**	100	100	110	
	Max. axial tensile force	**N**	170			
	Max. axial force pressure	**N**	30			
	Nominal bearing service life *(4)*	**h**	20000			

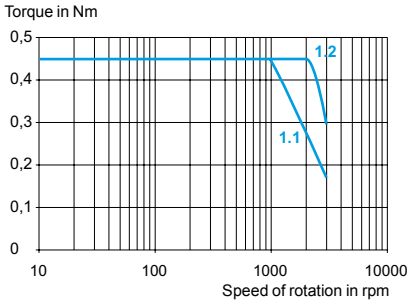
Holding brake

Holding torque	**Nm**	6
Electrical pull-in power	**W**	22
Brake release time	**ms**	40
Brake application time	**ms**	20
Moment of inertia	**kg·cm²**	0.2
Mass	**kg**	1.8

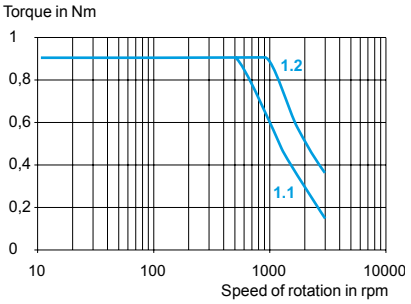
(1) Measured at 1000 steps/revolution
(2) Conditions for shaft load: speed of rotation 60 rpm, 100% duty cycle at continuous torque, ambient temperature 40 °C
(3) Point of application of radial force: 10.5 mm distance to flange
(4) Operating hours at a probability of failure of 10%

Torque characteristics ILS2●57

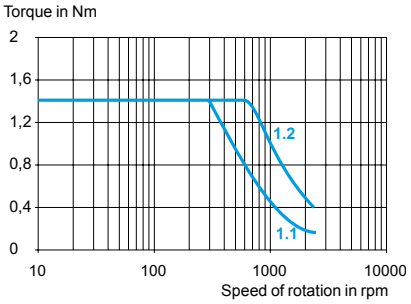
ILS2●571P (winding type P)



ILS2●572P (winding type P)

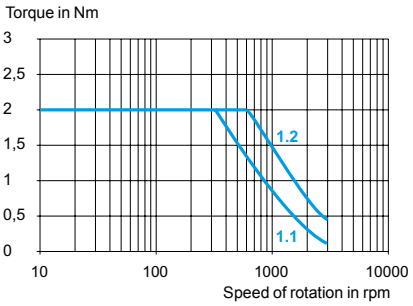


ILS2●573P (winding type P)

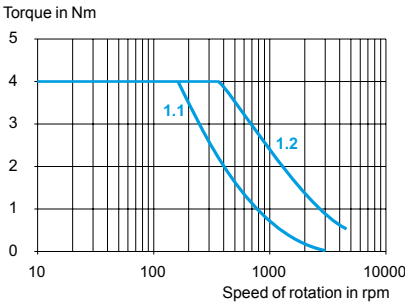


Torque characteristics ILS2●58

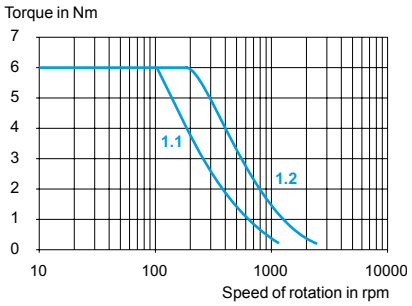
ILS2●851P (winding type P)



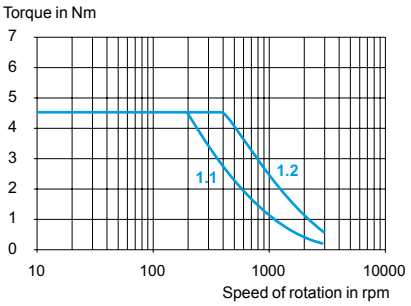
ILS2●852P (winding type P)



ILS2●853P (winding type P)



ILS2●853T (winding type T)



1.1 Max. torque at 24 V
1.2 Max. torque at 48 V

Lexium integrated drives

IL●2 for DeviceNet, EtherCAT, Modbus TCP, Ethernet Powerlink

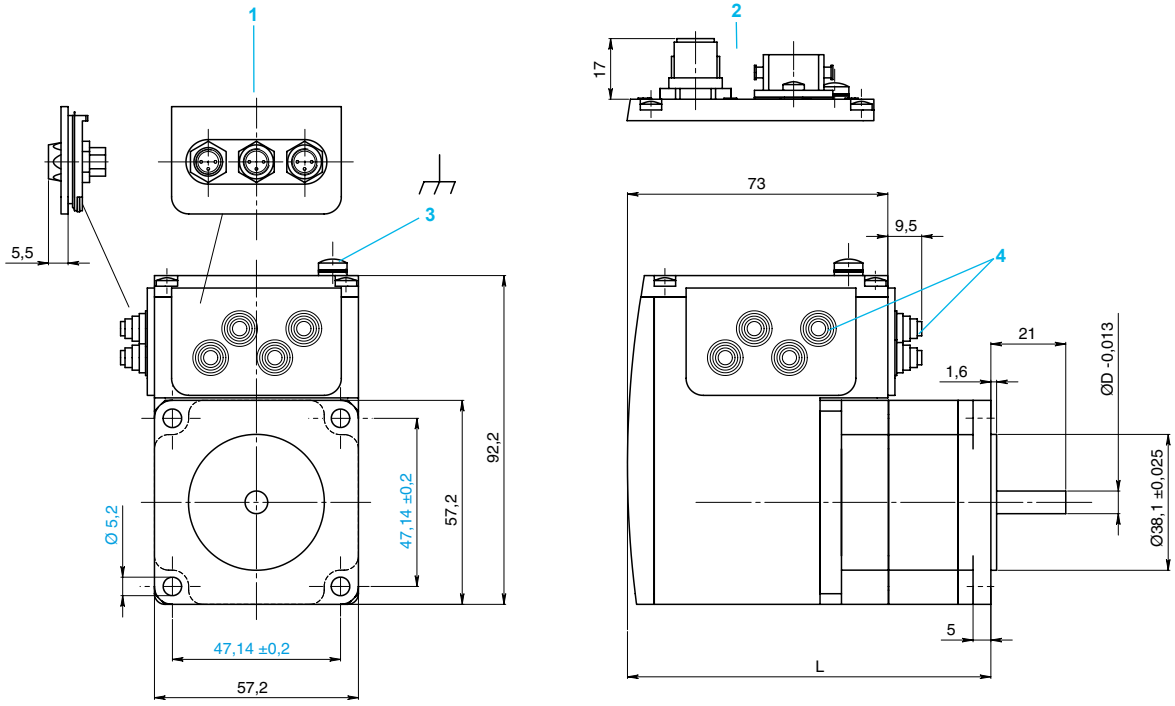
ILS2 with 3-phase stepper motor

References

Example:	I	L	S	2	D	5	7	1	P	B	1	A
Motor type **S** = 3-phase stepper motor	I	L	**S**	2	D	5	7	1	P	B	1	A
Supply voltage **2** = 24 ... 48 V	I	L	S	**2**	D	5	7	1	P	B	1	A
Communication interface **D** = DeviceNet **E** = EtherCAT **P** = Ethernet Powerlink **T** = Modbus TCP	I	L	S	2	**D**	5	7	1	P	B	1	A
Flange size **57** = 57 mm **85** = 85 mm	I	L	S	2	D	**5**	**7**	1	P	B	1	A
Motor length (“L”) *(1)* **1** = motor length (“L”) **2** = motor length (“L”) **3** = motor length (“L”)	I	L	S	2	D	5	7	**1**	P	B	1	A
Winding type **P** = medium speed of rotation, medium torque **T** = high speed of rotation, medium torque *(2)*	I	L	S	2	D	5	7	1	**P**	B	1	A
Connection technology **B** = printed circuit board connector **C** = industrial connector	I	L	S	2	D	5	7	1	P	**B**	1	A
Measurement system **1** = index pulse	I	L	S	2	D	5	7	1	P	B	**1**	A
Holding brake **A** = no holding brake **F** = with holding brake	I	L	S	2	D	5	7	1	P	B	1	**A**

(1) The motor length “L” depends on the mechanical characteristics, see pages 4/65, 4/68 and 4/69.
(2) Winding type T only with ILS2●853.
(3) Holding brake only with ILS2●85.

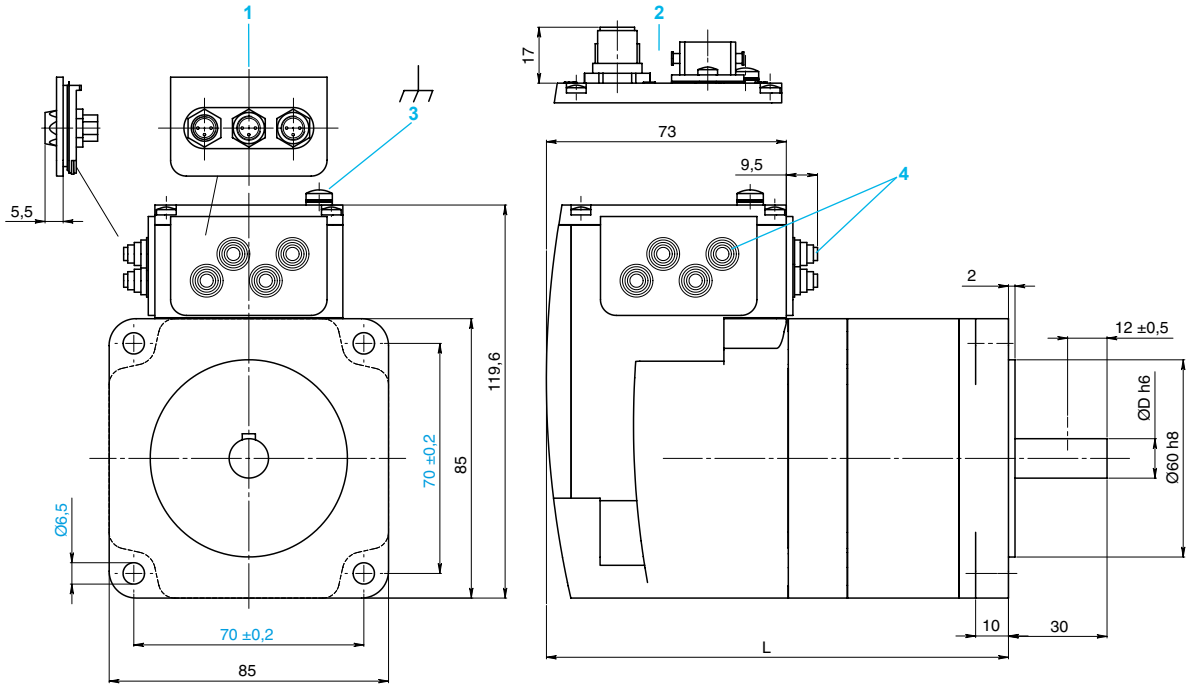
ILS2●57 integrated drives



	L	D
ILS2●571	101.9	6.35
ILS2●572	115.9	6.35
ILS2●573	138.9	8.00

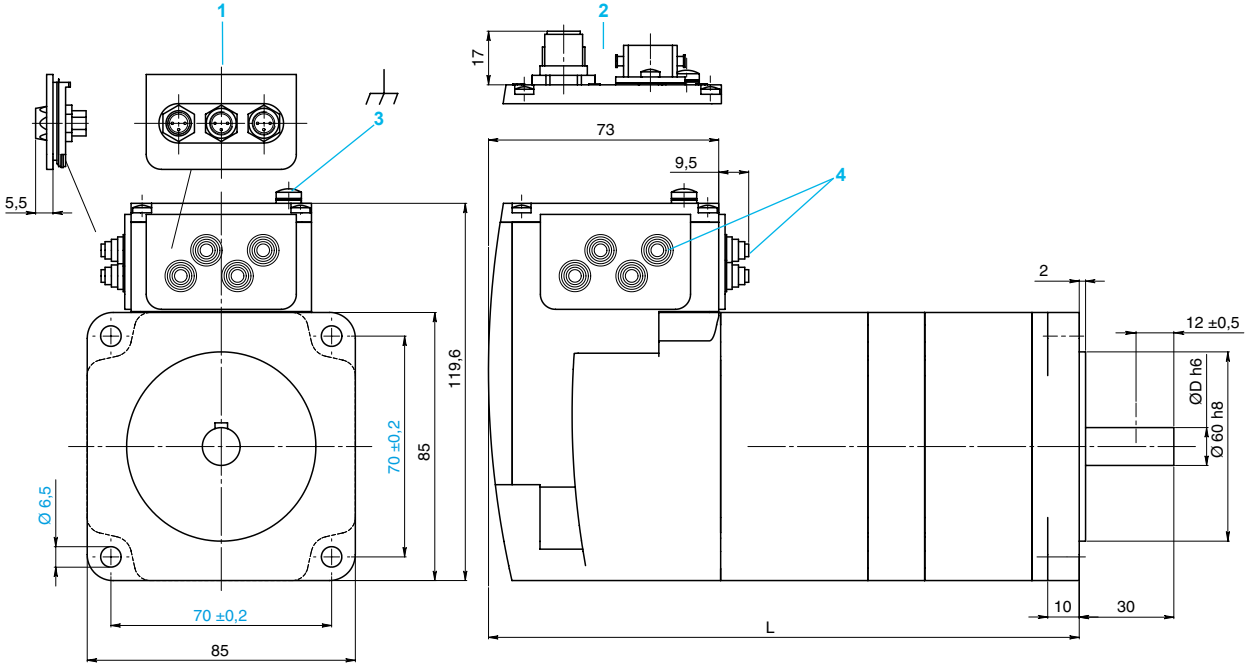
1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

ILS2●85 integrated drives without holding brake



	L	D
ILS2●851	140.6	12
ILS2●852	170.6	12
ILS2●853	200.6	14

ILS2●85 integrated drives with holding brake



	L	D
ILS2●851	187.3	12
ILS2●852	217.3	12
ILS2●853	247.3	14

1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

Lexium integrated drives
ILS1 with I/O interface for motion sequence

ILS1 with 3-phase stepper motor

Presentation

The ILS1 with I/O interface for motion sequence consist of a 3-phase stepper motor and integrated electronics. The drive system has integrated interfaces, control electronics, holding brake (optional) and power amplifier.

Application areas

Lexium integrated drives with 3-phase stepper motors offer high torque at low speed of rotation. These Lexium integrated drives are ideally suited as drives in velocity mode with excellent constant velocity characteristics and also or for high-resolution positioning. Commissioning the stepper motor drives is simple because it is not necessary to adjust the controller.

Special features

- High continuous stall torque
- Good constant velocity characteristics
- High positioning resolution (0.018°)
- Optionally with holding brake

Control

Up to 16 movement commands can be selected and started directly or sequentially via digital signal inputs. The movement commands can include reference movements or positioning commands. This way, motion sequences can be saved in the drive system and controlled via a master PLC.

The PC commissioning software is used to enter data sets and parameterise the drive system.

Electronics

The electronic system comprises control and power electronics. They have a common power supply and are not galvanically isolated. Four 24 V signals are also available. The assignment of the signal inputs and outputs can be set via parameters.
The electronics are thermally decoupled from the motor by a plastic element.

Supply voltage
These Lexium integrated drives can be operated with a supply voltage of 24 V⎓ or 36 V⎓.

Connection technologies

ILS1 with I/O interface for motion sequence have the following connections:
- Supply voltage ⎓V
- Multifunction interface
- RS 485 commissioning interface
- 24 V signal interface
- Signal interface for “Safe Torque Off” safety function (“Power Removal”)

Printed circuit board connectors are used for cabling.

Multifunction interface

Up to 16 data sets with movement commands can be selected and started via digital signals of the multifunctional interface.
In addition. two additional signal outputs can be parameterised with special functions.

RS 485 commissioning interface

The RS 485 commissioning interface is used to connect the RS 485 bus for commissioning purposes. A PC can be connected to the commissioning interface via an RS 485-RS 232 converter. The “Lexium CT” commissioning software can be used for tasks such as reading the error memory or monitoring the temperature.

24 V signal interface

Four digital 24 V signals are available. They can be used as signal input or output. The 24 V signals are available to the master controller. However, they can also be parameterised for special functions, e.g. for connection of limit switches.
The 24 V power supply is internal via the supply voltage of the Integrated Drive System.

Signal interface for “Safe Torque Off” safety function (“Power Removal”)

The integrated “Safe Torque Off” safety function (“Power Removal”) enables a stop of category 0 or 1 as per IEC/EN 60204-1 without external power contactors. The supply voltage does not have to be interrupted. This reduces the system costs and response times.
The “Safe Torque Off” safety function (“Power Removal”) is activated via two redundant 24 V input signals (low active).

Integrated drive system with printed circuit board connectors

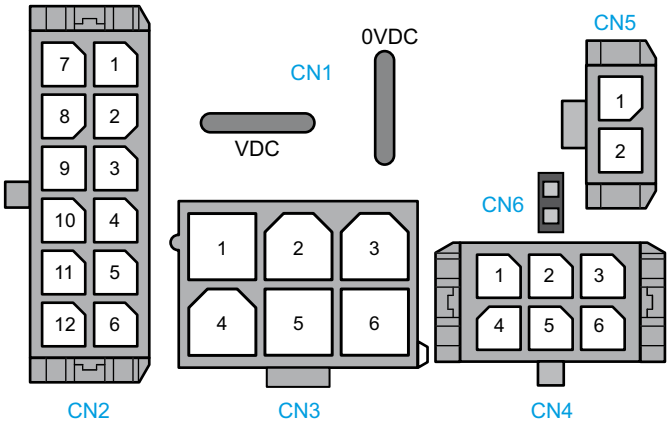
Connection technologies (continued)

Printed circuit board connector

Printed circuit board connectors are preferably used for cabling series machines with cable harnesses.

- Fieldbus and I/O signal connection with connector “Molex Micro Fit"
- Power supply connection with “AMP Positive Lock” crimp contacts

Two cable entries are required for cabling the Lexium integrated drives (see accessories, page 4/107).



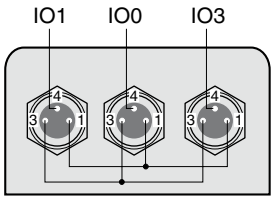
Printed circuit board connector, overview of connections

Connection	Assignment
CN1	Supply voltage ⎓ V
CN2	Multifunction interface
CN3	RS 485 commissioning interface
CN4	24 V signal interface
CN5	Interface for “Safe Torque Off” safety function (“Power Removal”)
CN6	Jumper for disabling “Safe Torque Off” safety function (“Power Removal”)

I/O signal inserts

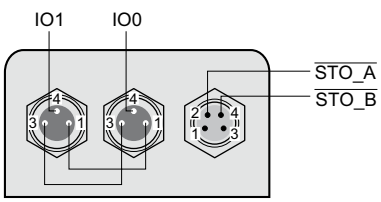
The signals for the “Safe Torque Off” safety function (“Power Removal”) and the freely usable signal input and outputs use industrial connectors.
The 24 V power supply to the signal outputs is internal. Different I/O signal inserts are available for this purpose.

I/O signal insert without “Safe Torque Off” safety function (“Power Removal”)



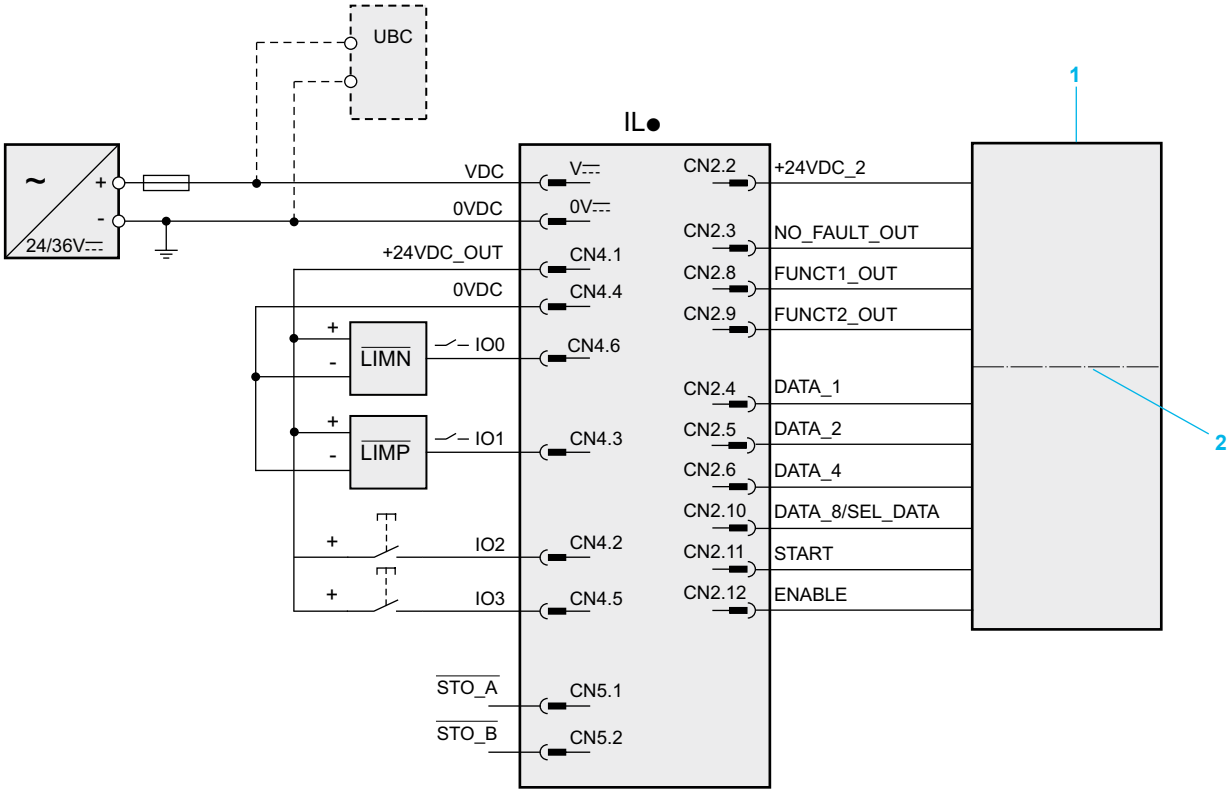
Inserts for three I/O signals

I/O signal insert with “Safe Torque Off” safety function (“Power Removal”)



Insert for two I/O signals and STO signals for safety function

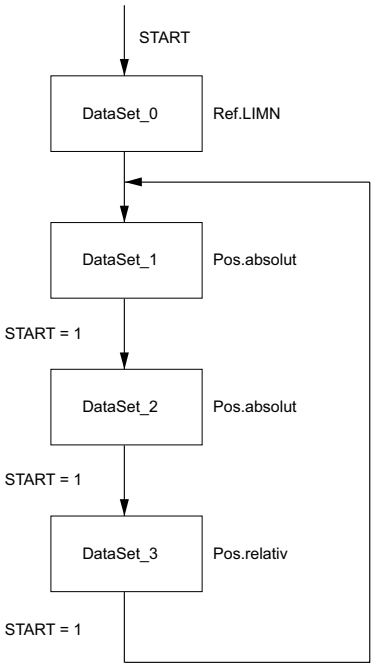
Connection example I/O signal connection



Connection example with four I/O signals

1 PLC
2 Galvanic isolation

Lexium integrated drives
ILS1 with I/O interface for motion sequence



Example of sequential selection of movement commands

"Motion Sequence" operating mode

General

In the "Motion Sequence" operating mode, up to 16 data sets with movement commands can be activated directly or sequentially with a PC, fieldbus or digital inputs. The movement commands can include reference movements or positioning commands. This way, a motion sequence can be saved in the drive system and controlled via a master PLC.
The "Lexium CT" PC commissioning software or the fieldbus is used to enter data sets and parameterise the drive system.

Direct selection of movement commands

The direct selection of movement commands is used if a master controller (e.g. PLC) controls the time coordination of the various data sets. The data set to be processed is selected via signal inputs and then activated by a start signal.

Sequential selection of movement commands

The sequential selection of movement commands is used to process simple motion sequences. The time coordination is programmed in the individual data sets via specification of a wait time, a transition condition and the subsequent data set. A transition condition can be, for instance, a rising edge at the START signal input.
A motion sequence can also be executed cyclically with or without return to the initial position.

Processing status of a movement command

The processing status of a movement command can be output via the handshake output. In addition, an internal processing status such as "drive system in motion" can be output via an additional signal output.

Selection of the motion profile

Speeds and accelerations are saved in motion profiles. One of the motion profiles can be assigned to every movement command data set.

Operating modes

Overview

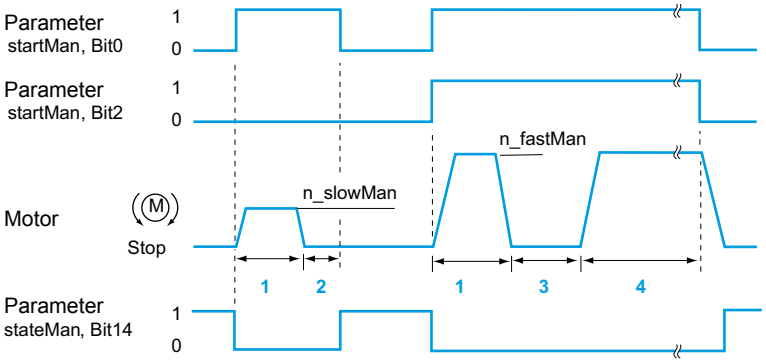
The following operating modes can be set via the fieldbus:
- Jog
- Profile position
- Homing

Jog mode

The motor moves by one distance unit or at constant speed in continuous operation. The value of the distance unit, the speed levels and the change-over time in continuous operation can be adjusted manually.

Reference value setting
The reference value is set via PC.

Application example
Setting up a machine during commissioning



Jog, slow and fast

1 step_Man
2 t < time_Man
3 time_Man
4 Continuous operation

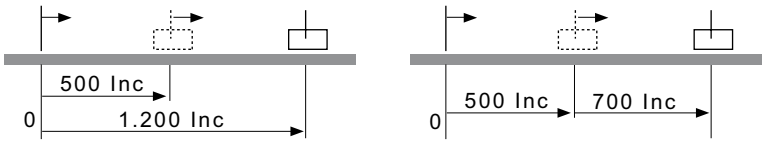
Profile position

In the operating mode “Profile Position", the motor is positioned from a point A to a point B with a positioning command.

Settings
The positioning path can be specified in two ways:
- Absolute positioning, reference point is the zero point of the axis
- Relative positioning, reference point is the current position of the motor

Reference value setting
The reference value is set via PC.

Application example
Pick-and-place with a linear robot



Operating mode “Profile Position", absolute and relative

Homing

There are two types of homing:
- Reference movement
  Specifying the dimension reference by approach to a limit or reference switch
- Position setting
  Specifying the position reference relative to the current motor position

Reference movement

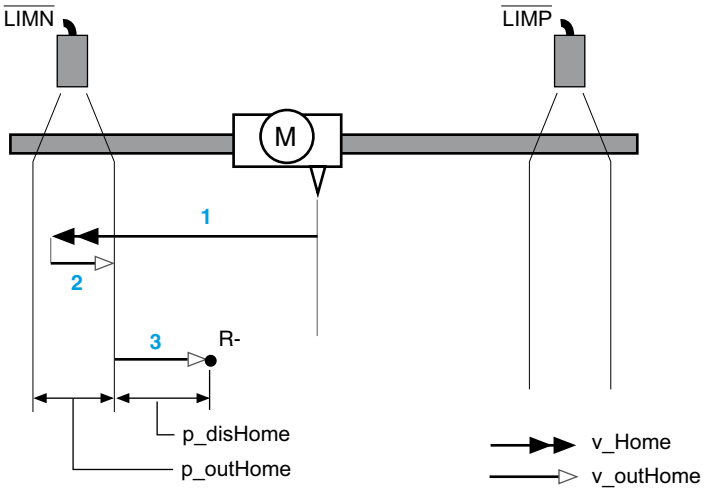
During reference movement, the motor moves to a defined position on the axis. The position is defined by a mechanical switch:
- LIMN, LIMP limit switches
- REF reference switch

Types of reference movements

There are five standard reference movements:
- Movement to negative limit switch LIMN
- Movement to positive limit switch LIMP
- Movement to REF reference switch with first movement counterclockwise
- Movement to REF reference switch with first movement clockwise
- Reference movement to index pulse with clockwise or counterclockwise rotation

These standard reference movements can be executed without and with index pulse.

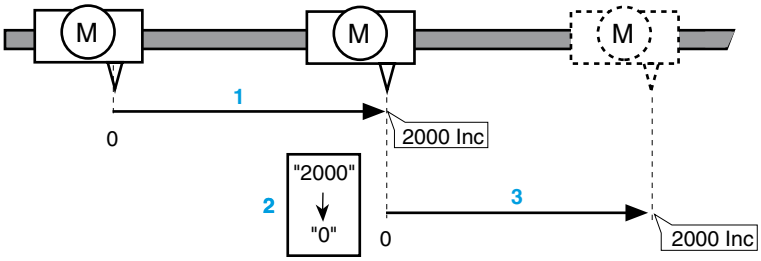
Example 1: reference movement to limit switch



Operating mode "Homing", reference movement to limit switch

1 Movement to limit switch at search speed
2 Movement to switching edge at clearance speed
3 Movement to distance from switching edge at clearance speed

Example 2: position setting
Position setting can be used to execute a continuous motor movement without overtravelling the positioning limits.



Positioning by 4000 increments with position setting

1 The motor is positioned by 2000 increments.
2 The current motor position is set to position value 0 by position setting to 0 and the new zero point is defined at the same time.
3 The new target position is 2000 increments after a new movement command by 2000 increments is triggered.

This procedure prevents overtravel of the absolute position limits during positioning, because the zero point is continuously made to follow.

Reference value setting
The reference value is set via PC.

Application example
Prior to absolute positioning in “Profile Position” mode.

Additional operating modes

Additional operating modes can be activated via PC.
- Reversing direction of rotation of motor
- Setting motion profile via profile generator
- Triggering Quick Stop function
- Function of holding brake
- Programming inputs/outputs.

"Safe Torque Off" ("Power Removal") safety function

The Lexium integrated drive integrates the "Safe Torque Off" ("Power Removal") safety function which prevents unintended restarting of the motor. The motor no longer produces any torque if the safety function is active.

This safety function:

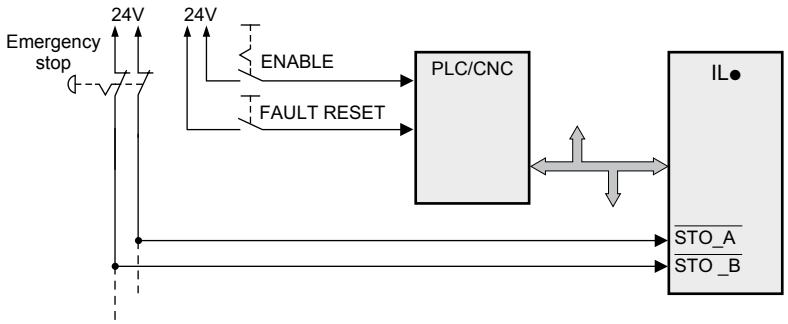
- Complies with the machine safety standard ISO 13849-1, perfomance level "d" (PL d)
- Complies with the standard for functional safety IEC/EN 61508, SIL2 capability (safety control-signalling applied to processes and systems). The SIL (Safety Integrity Level) capability depends on the connection diagram for the servo drive and for the safety function. Failure to observe the setup recommendations could inhibit the SIL capability of the "Safe Torque Off" ("Power Removal") safety function.
- Complies with product standard IEC/EN 61800-5-2 "Adjustable speed electrical power drive systems – Part 5-2: Safety requirements – Functional" for both stop functions:
  - Safe Torque Off ("STO") corresponds to Category 0 stop according to IEC/EN 60204-1. Standstill by immediate power shutdown to the machine drive elements (i.e. an uncontrolled stop).
  - Safe Stop 1 ("SS1") corresponds to Category 1 stop according to IEC/EN 60204-1. A controlled stop in which the machine drive elements are retained to effect the standstill. The final shutdown is ensured by an external Emergency stop module with safe time delay, e.g. Preventa XPS-AV *(1)*.

The "Safe Torque Off" ("Power Removal") safety function has a redundant electronic architecture *(2)* which is monitored continuously by a diagnostics function.

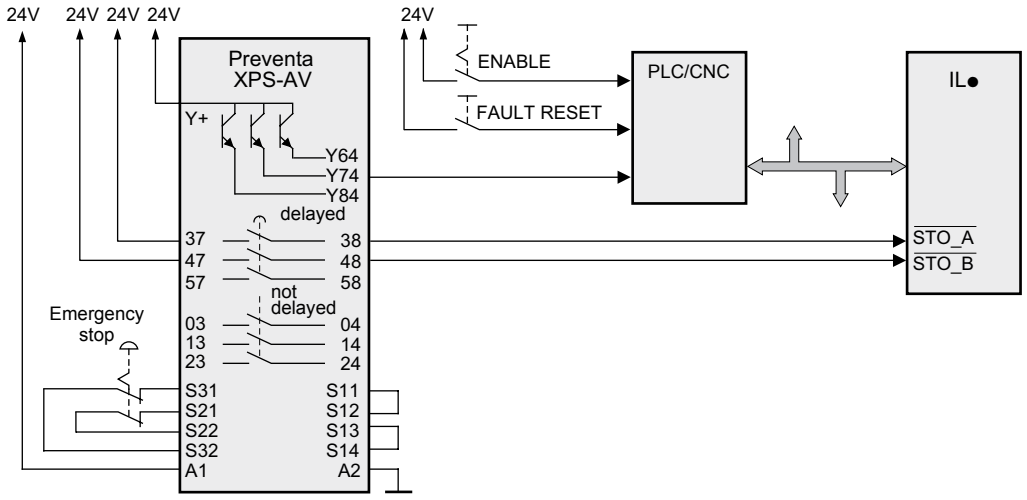
This PL d and SIL2 safety function is certified as conforming to these standards by the TÜV certification body in the context of a voluntary certification.

(1) Please refer to the "Safety functions and solutions using Preventa" catalogue.
(2) Redundant: Consists of mitigating the effects of the failure of one component by means of the correct operation of another, assuming that faults do not occur simultaneously on both.

Examples of applications of the safety function



Example of Category 0 Stop

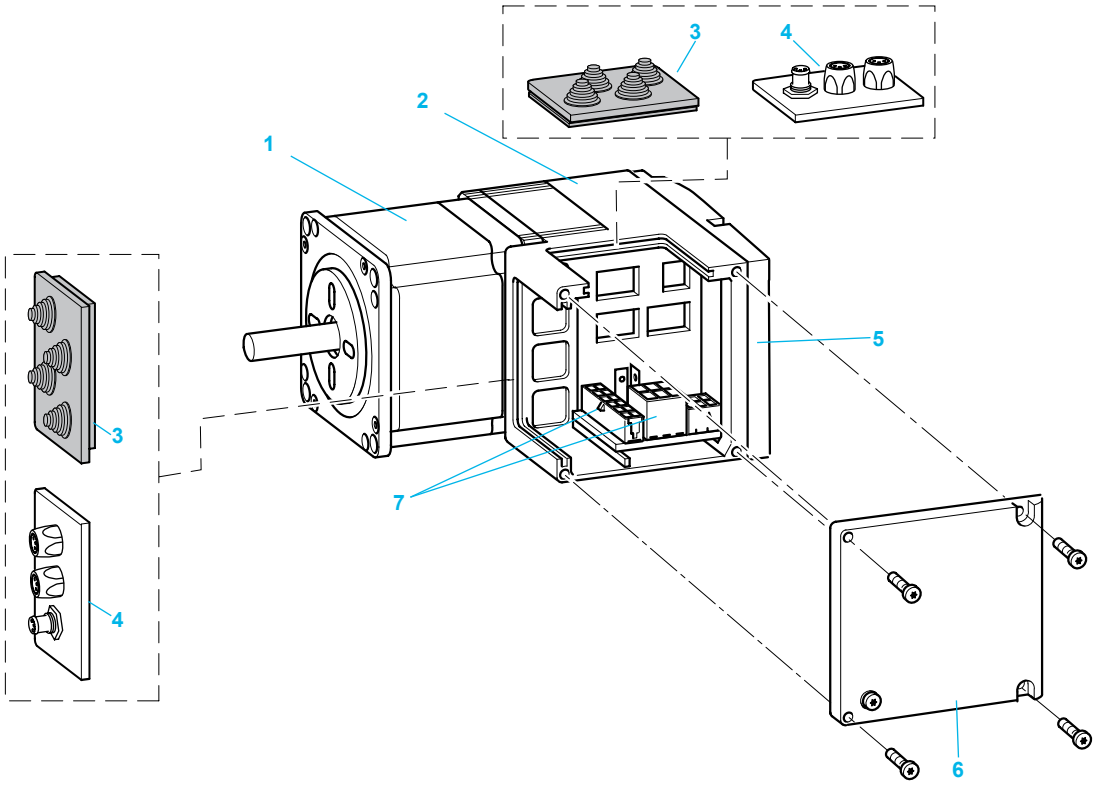


Example of Category 1 Stop

Lexium integrated drives
ILS1 with I/O interface for motion sequence
ILS1 with 3-phase stepper motor

Description

ILS1 with I/O interface for motion sequence consist of control electronics and a 3-phase stepper motor. ILS1 for motion sequence is available with printed circuit board connectors. A holding brake is optionally available for ILS1●85.



1 3-phase stepper motor
2 Electronics housing
3 Insert cable entry (accessory)
4 I/O insert with industrial connectors (accessory)
5 Cover for electronics housing
6 Cover for connector housing
7 Electrical interfaces

Lexium integrated drives
ILS1 with I/O interface for motion sequence
ILS1 with 3-phase stepper motor

Certifications

Conformity to standards			Lexium integrated drives have been developed to comply with the stringent international standards and with the recommendations for electronic control systems in the industry (IEC, EN), specifically: low-voltage switchgear, IEC/EN 61800-5-1, IEC/EN 50178, IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals)
	EMC immunity		EN 61800-3:2001, second environment
	Conducted and radiated EMC emissions		EN 61800-3:2001-02; IEC 61800-3, Ed.2 ■ Power supplies without external mains filter: □ C3 up to 10 m supply cable length ■ Power supplies with external mains filter: □ C2 up to 20 m supply cable length □ C3 up to 50 m supply cable length
CE **marking**			The Lexium integrated drives are CE marked in accordance with the European Machinery Directive (98/37/EEC) and the European EMC Directive (89/336/EEC).
Product certifications			UL (USA), cUL (Canada)
			TÜV certification: Lexium integrated drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*		**°C**	0 ... 65; power reduction by 2%/°C at 50 ... 65
Max. permissible motor temperature *(2)*		**°C**	110
Installation height without power reduction		**m**	< 1000 m above mean sea level
Transport and storage temperature		**°C**	-25 ... +70
Relative humidity		**%**	15 ... 85 (not condensing)
Vibration load during operation as per DIN EN 60028-2-6	Number of cycles		10
	Acceleration amplitude:	**m/s²**	20
	Frequency range	**Hz**	10 ... 500
Continuous shocks as per DIN EN 60028-2-29	Number of shocks		1000
	Peak acceleration	**m/s²**	150
Thermal class as per DIN EN 60034-1			155 (F)
Shaft wobble and perpendicularity			According to EN 50347 (IEC 60072-1)
Degree of protection as per DIN EN 60034-5			Total except shaft bushing IP54, shaft bushing IP41

Electrical data

Power supply connection (CN1)			Corresponds to PELV according to DIN 19240, not protected against reverse polarity
Supply voltage range		⎓ **V**	18 ... 40
Nominal supply voltage		⎓ **V**	24 / 36
Ripple at nominal voltage		V_{PP}	≤ 3.6
Max. current consumption	ILS1M57	**A**	3.5
	ILS1M851, ILS1M852	**A**	5
	ILS1M853		
	■ Winding type P	**A**	5
	■ Winding type T	**A**	6
Inrush current			Charging current for capacitor C=1500 µF
External fuse		**A**	10
Multifunction interface (CN2)			Galvanically isolated from supply voltage VDC; suitable for inductive load (1000 mH)
Voltage supply range		⎓ **V**	10 ... 30
Max. switching current per output		**mA**	50
RS 485 commissioning interface (CN3)			No galvanic isolation; corresponds to RS 485 standard
Transmission rate		**kBaud**	9.6 / 19.2 / 38.4
24 V signal interface (CN4)			4 signals, each usable as input or output, galvanically connected to 0VDC, not protected against reverse polarity
24 V signal inputs			
Logic 0 (U_{low})		**V**	-3 ... +5
Logic 1 (U_{high})		**V**	+15 ... +30
Input current (typical at 24 V)		**mA**	10
Debounce time IO0..IO3		**ms**	1 ... 1.5

(1) Limit values with flanged motor mounted on a steel plate 300 x 300 x 10 mm.
(2) Measured at the surface.

Electrical data (continued)

24 V signal outputs			Switching to plus, short-circuit protected, suitable for inductive load (1000 mH / 100 mA)
Supply voltage range		⎓ V	10 ... 30
Max. switching current (total)		mA	200
Max. switching current per output		mA	100
Interface for safety function "Safe Torque Off" (CN5)			No galvanic isolation; corresponds to RS 485 standard
Logic 0 (U_{low})		V	-3 ... +4.5
Logic 1 (U_{high})		V	+15 ... +30
Input current (typical at 24 V)	$\overline{STO\_A}$	mA	≤ 10
	$\overline{STO\_B}$	mA	≤ 3
Debounce time		ms	1
Response time (until shutdown of power amplifier)		ms	< 50
Max. Time offset until detection of signal differences between $\overline{STO\_A}$ and $\overline{STO\_B}$		S	< 1

Safety function "Safe Torque Off" ("Power Removal")

Protection	Of machine		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level "d" (PL d) , and standard IEC/EN 61800-5-2
	Of the system process		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2

Mechanical data ILS1●57

Type of integrated drive			**ILS1●571**	**ILS1●572**	**ILS1●573**
Winding type			P	P	P
Max. torque	M_{max}	Nm	0.45	0.90	1.50
Holding torque		Nm	0.51	1.02	1.70
Rotor inertia		kg·cm²	0.1	0.22	0.38
Positioning resolution per revolution			20000		
Systematic angle tolerance per step *(1)*		arcmin	±6	±6	±6
Mass		kg	1.3	1.6	2.0
Shaft load *(2)*	Max. radial force *(3)*	N	24	24	50
	Max. axial tensile force	N	100		
	Max. axial force pressure	N	8.4		
	Nominal bearing service life *(4)*	h	20000		

Mechanical data ILS1●85

Type of integrated drive			**ILS1●851**	**ILS1●852**	**ILS1●853**	
Winding type			P	P	P	T
Max. torque	M_{max}	Nm	2.0	4.0	6.0	4.5
Holding torque		Nm	2.0	4.0	6.0	4.5
Rotor inertia		kg·cm²	1.1	2.2	3.3	
Positioning resolution per revolution			20000			
Systematic angle tolerance per step *(1)*		arcmin	±6			
Mass		kg	2.6	3.6	4.7	
Shaft load *(2)*	Max. radial force *(3)*	N	100	100	110	
	Max. axial tensile force	N	170			
	Max. axial force pressure	N	30			
	Nominal bearing service life *(4)*	h	20000			

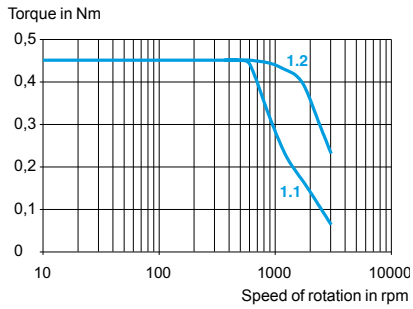
Holding brake

Holding torque	Nm	6
Electrical pull-in power	W	22
Brake release time	ms	40
Brake application time	ms	20
Moment of inertia	kg·cm²	0.2
Mass	kg	1.8

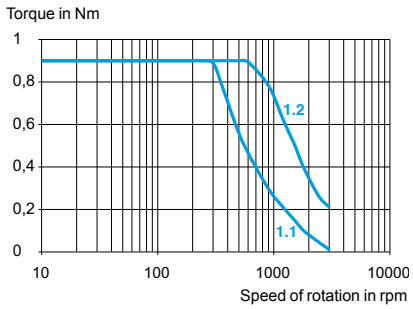
(1) Measured at 1000 steps/revolution, unit: minutes of arc
(2) Conditions for shaft load: speed of rotation 60 rpm, duty cycle at torque, ambient temperature 40 °C
(3) Point of application of radial force: 10.5 mm distance to flange
(4) Operating hours at a probability of failure of 10 %

Torque characteristics ILS1●57

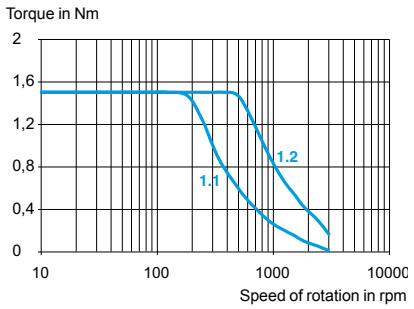
ILS1●571P (winding type P)



ILS1●572P (winding type P)

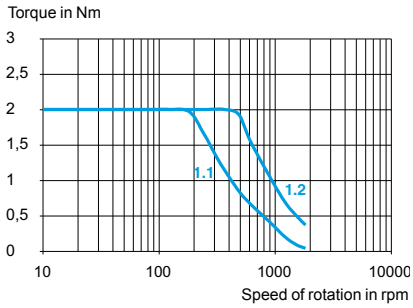


ILS1●573P (winding type P)

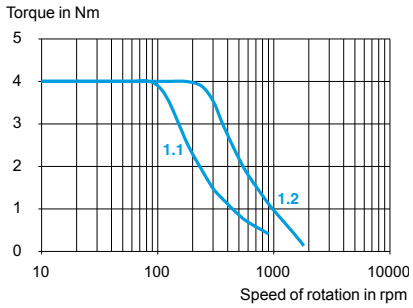


Torque characteristics ILS1●85

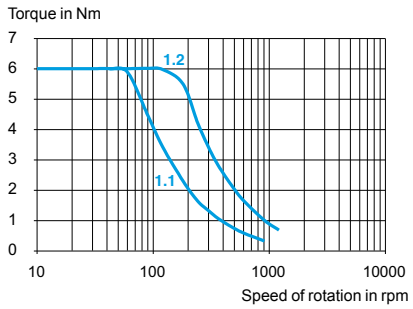
ILS1●851P (winding type P)



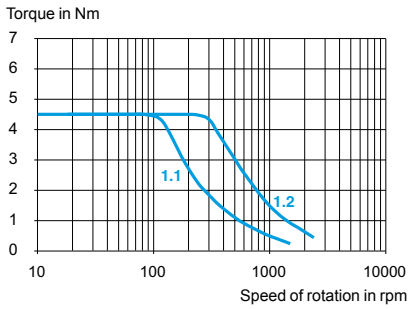
ILS1●852P (winding type P)



ILS1●853P (winding type P)



ILS1●853T (winding type T)



1.1 Max. torque at 24 V
1.2 Max. torque at 36 V

Lexium integrated drives

ILS1 with I/O interface for motion sequence

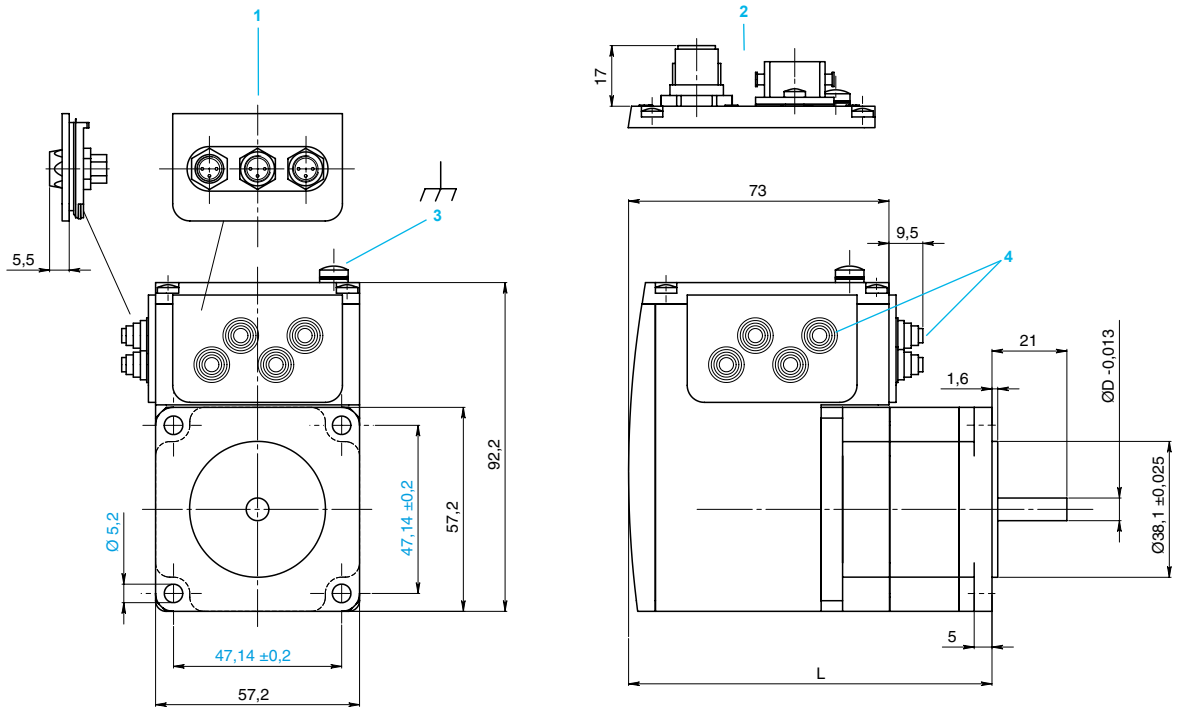
ILS1 with 3-phase stepper motor

References

Example:	I	L	S	1	M	5	7	1	P	B	1	A
Motor type **S** = 3-phase stepper motor	I	L	**S**	1	M	5	7	1	P	B	1	A
Supply voltage **1** = 24 ... 36 V	I	L	S	**1**	M	5	7	1	P	B	1	A
Communication interface **M** = I/O interface for motion sequence	I	L	S	1	**M**	5	7	1	P	B	1	A
Flange size **57** = 57 mm **85** = 85 mm	I	L	S	1	M	**5**	**7**	1	P	B	1	A
Motor length ("L") *(1)* **1** = motor length "L" **2** = motor length "L" **3** = motor length "L"	I	L	S	1	M	5	7	**1**	P	B	1	A
Winding type **P** = medium speed of rotation, medium torque **T** = high speed of rotation, medium torque *(2)*	I	L	S	1	M	5	7	1	**P**	B	1	A
Connection technology **B** = printed circuit board connector **C** = industrial connector	I	L	S	1	M	5	7	1	P	**B**	1	A
Measurement system **1** = index pulse	I	L	S	1	M	5	7	1	P	B	**1**	A
Holding brake **A** = no holding brake **F** = with holding brake *(3)*	I	L	S	1	M	5	7	1	P	B	1	**A**

(1) The motor length "L" depends on the mechanical characteristics, see pages 4/82, 4/85 and 4/87.
(2) Winding type T only with ILS1M853.
(3) Holding brake only with ILS1M85.

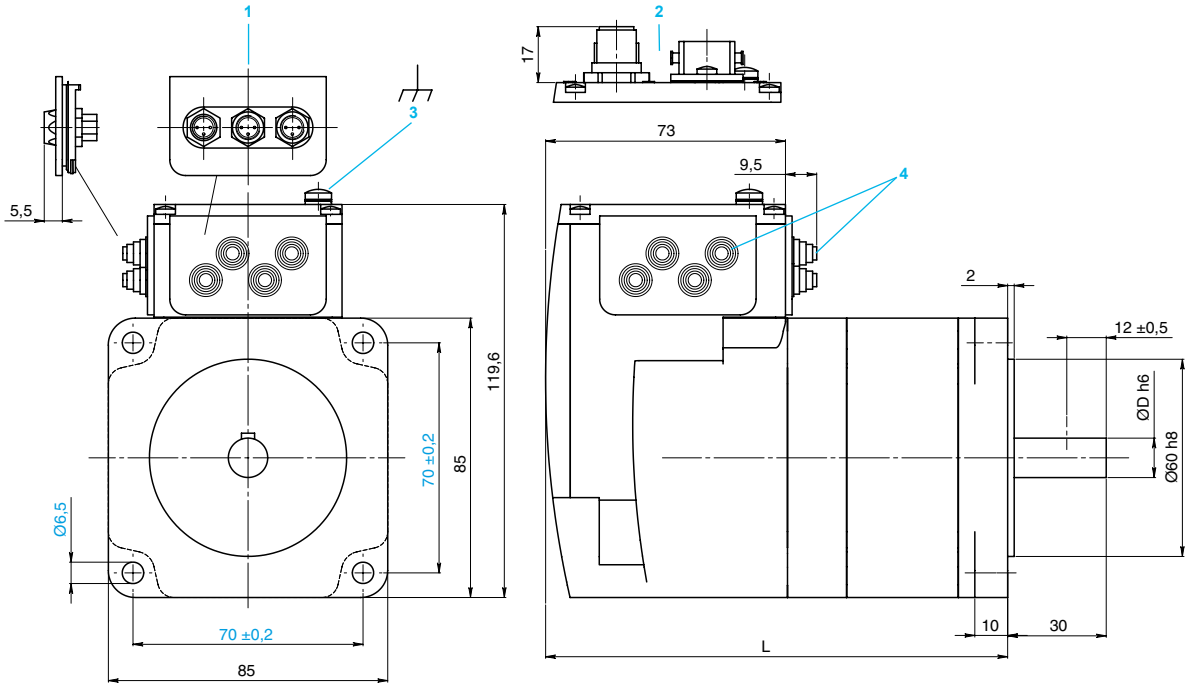
ILS1●57 integrated drives



	L	D
ILS1●571	101.9	6.35
ILS1●572	115.9	6.35
ILS1●573	138.9	8.00

1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

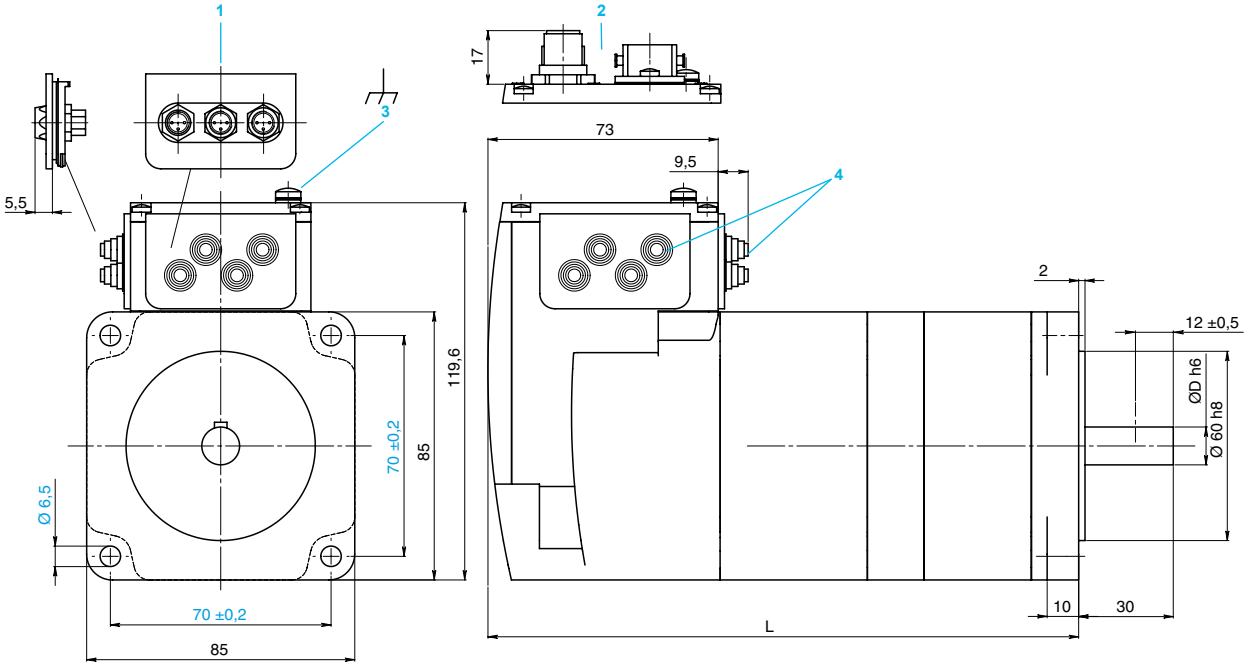
ILS1●85 integrated drives without holding brake



	L	D
ILS1●851	140.6	12
ILS1●852	170.6	12
ILS1●853	200.6	14

1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

ILS1●85 integrated drives with holding brake



	L	D
ILS1●851	187.3	12
ILS1●852	217.3	12
ILS1●853	247.3	14

1 Accessories: I/O signal insert with industrial connectors
2 Option: industrial connectors
3 Earth (ground) terminal
4 Accessories: cable entries Ø = 3 ... 9 mm

4

Lexium integrated drives
ILS1 with pulse/direction interface

ILS1●57 with 3-phase stepper motor

Presentation

ILS1 contain a 3-phase stepper motor and control electronics with pulse/direction interface. Pulse/direction signals of a master controller, e.g. a motion controller, or A/B signals of an encoder are converted directly into motion.

Application areas

Lexium integrated drives with 3-phase stepper motors offer high torque at low speed of rotation. These Lexium integrated drives are ideally suited as drives in velocity mode with excellent constant velocity characteristics and also or for high-resolution positioning. Commissioning the stepper motor drives is simple because it is not necessary to adjust the controller.

Special features

- High continuous stall torque
- Good constant velocity characteristics
- High positioning resolution (0.018°)
- Holding brake (option for ILS1●85)

Control

ILS1 moves the stepper motor according to a reference value. The reference value signal is generated by a controller or an encoder and is sent to the multifunction interface as a pulse signal.
The number of steps (steps per revolution) is set with a parameter switch.

Electronics

The electronic system comprises control and power electronics. They have a common power supply and are not galvanically isolated. Four 24 V signals are also available. The assignment of the signal inputs and outputs can be adjusted via parameter switches.
The electronics are thermally decoupled from the motor by a plastic element.

Connection technologies

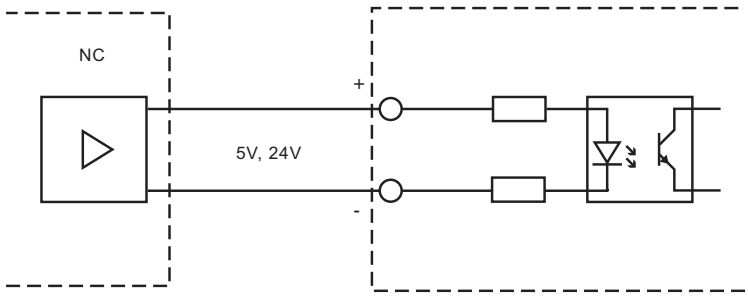
ILS1 have the following connections:
- Power supply
- Multifunction interface
- Service interface
- 24 V signal interface for four signal inputs/outputs
- Signal interface for safety function “Safe Torque Off” (“Power Removal”)

Printed circuit board connectors are used for cabling.

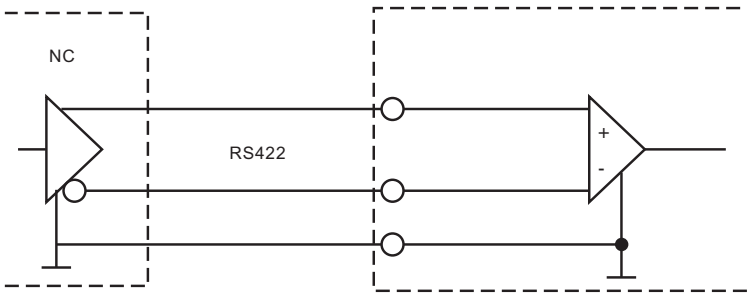
Multifunction interface

The multifunction interface operates at one of the following signal levels depending on the device model:
- 5V signals opto-isolated (ILS1V)
- 5 V differential signals without galvanic isolation (ILS1W)
- 24 V signals opto-isolated (ILS1U)

The reference pulses are supplied via two of the signal inputs, either as pulse/direction signals or as A/B signals. The other signal inputs have the functions “power amplifier enable/pulse blocking” and “step size switching/PWM motor current control".



Circuit of signal inputs of ILS1U and ILS1V



Circuit of signal inputs of ILS1W

Connection technologies (continued)

Service interface

The service interface is used to connect the RS 485 bus for service purposes. A PC can be connected to the service interface via an RS 485-RS 232 converter. The “Lexium CT” commissioning software can be used for tasks such as reading the error memory or monitoring the temperature.

24 V signal interface

Two signal inputs and two signal outputs are available. The signal inputs have the functions “step size switching” and “power amplifier enable/pulse blocking". The signal outputs have the functions “power amplifier standby” and “fault output/index pulse".
The 24 V power supply to the signal outputs is internal via the supply voltage of the Integrated Drive System.

Signal interface for “Safe Torque Off” safety function (“Power Removal”)

The integrated “Safe Torque Off” safety function (“Power Removal”) enables a stop of category 0 or 1 as per IEC/EN 60204-1 without external power contactors. The supply voltage does not have to be interrupted. This reduces the system costs and response times.
The “Safe Torque Off” safety function (“Power Removal”) is activated via two redundant 24 V input signals (low active).

Integrated drive system with printed circuit board connectors

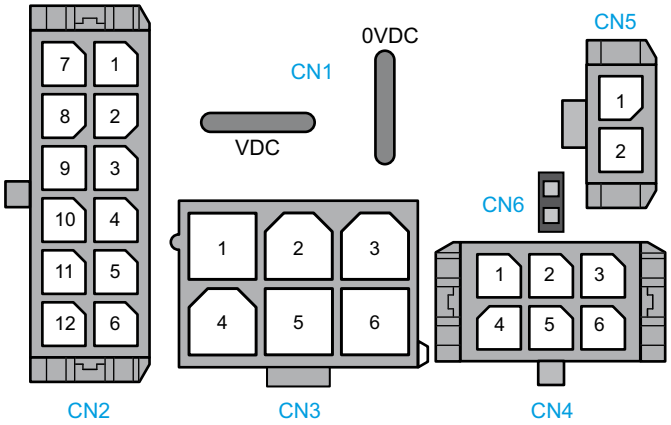
Connection technologies (continued)

Printed circuit board connector

Printed circuit board connectors are preferably used for cabling series machines with cable harnesses.

- Fieldbus and I/O signal connection with connector “Molex Micro Fit"
- Power supply connection with “AMP Positive Lock” crimp contacts

Two cable entries are required for cabling the Lexium integrated drives (see accessories, page 4/107).



Printed circuit board connector, overview of connections

Connection	Assignment
CN1	Supply voltage ⎓ V
CN2	Multifunction interface
CN3	Service interface
CN4	24 V signal interface
CN5	Interface for safety function “Safe Torque Off"
CN6	Jumper for disabling “Safe Torque Off” safety function (“Power Removal”)

Lexium integrated drives
ILS1 with pulse/direction interface

Functions

Overview

The following functions can be set on ILS1 with the parameter switches:
- ■ Number of steps: 200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000
- ■ Motor phase current (25% ... 100% of nominal current)
- ■ Idle current reduction to 70% of specified motor phase current
- ■ Functions of signal inputs
- □ Reference pulses supplied as pulse/direction or A/B encoder signals (PULSE/DIR / A/B signal input)
- □ Enable or block power amplifier (ENABLE / GATE signal input)
- □ Enable or block reference pulse (ENABLE / GATE signal input)
- □ Control motor phase current with PWM signal (PWM / STEP2_INV signal input)
- □ Increase or reduce number of steps by a factor of 10, e. g. 200/2000 (PWM / STEP2_INV signal input)
- ■ Functions of signal outputs
- □ Output error signal (FAULT / INDEXPULSE signal output)
- □ Output index pulse signal (FAULT / INDEXPULSE signal output)
- □ The operating readiness is signalled via the ACTIVE signal output.
- ■ Activate blocking detection. If the actual position deviates more than one revolution from the reference position, an error is generated and the compact drive system is de-energised. The motor has no torque in this operating status.
- ■ Switch on RS 485 terminating resistor
- ■ Switch on/off safety function “Safe Torque Off"

Setting the number of steps

The number of steps per axis revolution can be set via the number of steps function.

Example:
At a number of steps of 1000, the Integrated Drive System executes exactly one complete motor revolution at 1000 pulses. At a pulse frequency of 1 kHz this corresponds to a speed of 1 s^{-1} = 60 rpm.
The STEP2_INV setting at the parameter switch can be inverted via the input signal STEP2_INV of the multifunction interface or the 24 V signal interface.

Settings via parameter switch
Number of steps: 200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000 per revolution

Setting the motor phase current

The motor phase current is set with a rotary switch. A high motor phase current generates a high motor torque.

Settings via rotary switch
Motor phase current (25% ... 100% (in increments of 5%) of nominal current

Activating the motor phase reduction

If the full holding torque is not required, the motor phase current reduction can be used to reduce the holding torque.
Advantage: motor and electronics heat up less and efficiency is improved.
The motor phase current is reduced to approximately 70% of the set motor phase current value 100 ms after the last pulse edge is received.
The motor phase current is set with a rotary switch. A high motor phase current generates a high motor torque.

Settings via parameter switch
Activate/deactivate motor phase current reduction

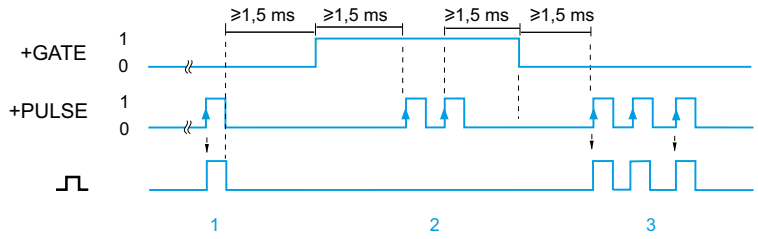
Setting the function of the ENABLE/GATE signal input

The ENABLE/GATE signal is available at the following interfaces:
- 24 V signal interface
- Multifunction interface

The ENABLE/GATE signal can have two functions:

ENABLE function: enable/block power amplifier
The ENABLE function enables the power amplifier so that the motor can be controlled.

GATE function: enable/block the pulse input
The GATE function blocks the pulses at the reference input without switching off the operating readiness. In a multi-axis system, individual axes can be selected with the GATE function.



Signal sequences when the Integrated Drive System is switched on with the GATE function

1 Motor step
2 No motor steps
3 Motor steps

The diagram shows the motor movement with activated GATE function. No pulse may be applied for 1.5 ms before and after the GATE signal changes to ensure that the Integrated Drive System can follow the preset pulse step by step. If the time interval is not kept, the LED signals a warning. The warning does not affect the operating readiness of the Integrated Drive System.

Settings via parameter switch
Set the function of the ENABLE/GATE signal input

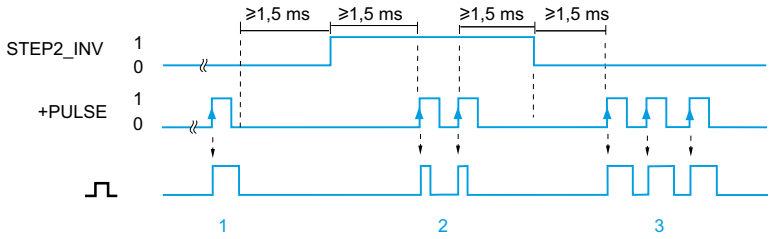
Setting the function of the STEP2_INV / PWM signal input

The STEP2_INV/PWM signal is available at the following interfaces:
- Multifunction interface
- 24 V signal interface (only STEP2_INV)

The STEP2_INV/PWM signal can have two functions:

STEP2_INV function

The STEP2_INV function can be used if a high positioning accuracy is required but the output frequency of the master controller is limited.
The number of steps can be increased or reduced by a factor of 10 with the STEP2_INV / PWM signal.
If the STEP2_INV function is activate, the setting of the parameter switch 1.1 is inverted.



Signal sequences when the STEP2_INV signal changes

1 Large motor step
2 Motor steps decreased by a factor of 10
3 Large motor steps

PWM function

The PWM (pulse width modulation) function can be used to reduce the motor phase current and, by implication, the torque to a value between 0% and 100% of the motor phase current that is set at the HEX rotary switch.
At constant level HIGH, motor phase current does not flow (current set to zero).
At constant level LOW, the motor operates with the adjusted maximum motor phase current.
If rectangular pulse signals are supplied, the motor phase current can be set using the pulse-pause ratio.

Settings via parameter switch

Set the function of the STEP2_INV / PWM signal input

Setting the function of the FAULT/INDEX PULSE signal output

The index pulse signal can be made available at the FAULT / INDEXPULSE signal output.
The FAULT/INDEX PULSE signal is available at the following interfaces:
■ 24 V signal interface
The FAULT/INDEX PULSE signal can have two functions:

FAULT function
The FAULT function displays an error status. An error can be reset by blocking and enabling the power amplifier (ENABLE: LOW → HIGH signal).

INDEXPULSE function
If the integrated Drive System is equipped with the optional internal Hall sensor at the motor shaft, the Hall sensor sends the INDEXPULSE signal per revolution.

Settings via parameter switch
Set the function of the FAULT/INDEX PULSE signal output

Activating blocking detection.

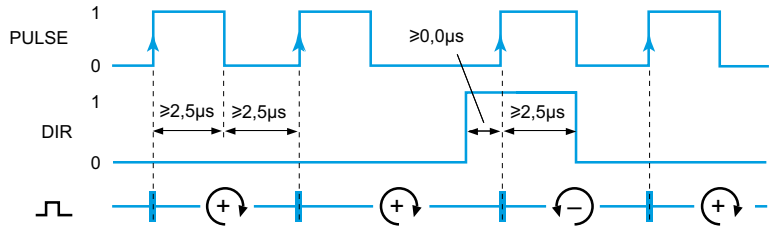
The blocking detection responds if the actual position of the axis deviates from the reference position by more than one revolution.
When the blocking detection responds, the Integrated Drive System is de-energised and the FAULT signal output is set.

Settings via parameter switch
Activate/deactivate blocking detection

Setting the function of the DIR/A and PULSE/B signal inputs

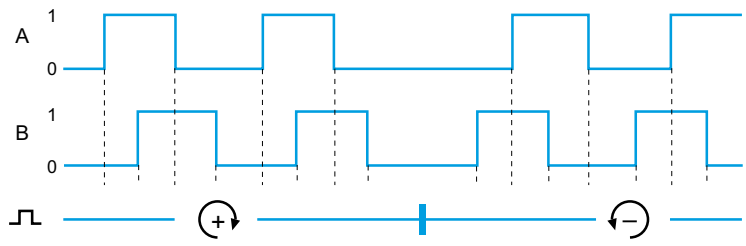
The reference position values can be supplied to the multifunction interface as pulse/direction signals or as A/B encoder signals. The Integrated Drive System converts the input signals into a motor movement.
Two interface modes are available:

PULSE/DIR interface mode
The motor executes an angle step with the rising edge of the PULSE signal. The direction of rotation is controlled by the DIR signal.



Pulse/direction signals

A/B interface mode
In A/B interface mode, A/B encoder signals are supplied as reference values.



A/B encoder signals

Settings via parameter switch
Set the function of the DIR / A and PULSE / B signal inputs

"Safe Torque Off" ("Power Removal") safety function

The Lexium integrated drive integrates the "Safe Torque Off" ("Power Removal") safety function which prevents unintended restarting of the motor. The motor no longer produces any torque if the safety function is active.

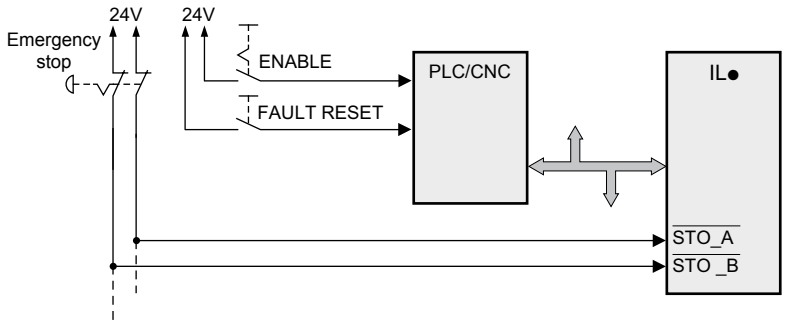
This safety function:
- Complies with the machine safety standard ISO 13849-1, perfomance level "d" (PL d).
- Complies with the standard for functional safety IEC/EN 61508, SIL2 capability (safety control-signalling applied to processes and systems). The SIL (Safety Integrity Level) capability depends on the connection diagram for the servo drive and for the safety function. Failure to observe the setup recommendations could inhibit the SIL capability of the "Safe Torque Off" ("Power Removal") safety function.
- Complies with product standard IEC/EN 61800-5-2 "Adjustable speed electrical power drive systems – Part 5-2: Safety requirements – Functional" for both stop functions:
  - Safe Torque Off ("STO") corresponds to Category 0 stop according to IEC/EN 60204-1. Standstill by immediate power shutdown to the machine drive elements (i.e. an uncontrolled stop).
  - Safe Stop 1 ("SS1") corresponds to Category 1 stop according to IEC/EN 60204-1. A controlled stop in which the machine drive elements are retained to effect the standstill. The final shutdown is ensured by an external Emergency stop module with safe time delay, e.g. Preventa XPS-AV *(1)*.

The "Safe Torque Off" ("Power Removal") safety function has a redundant electronic architecture *(2)* which is monitored continuously by a diagnostics function.

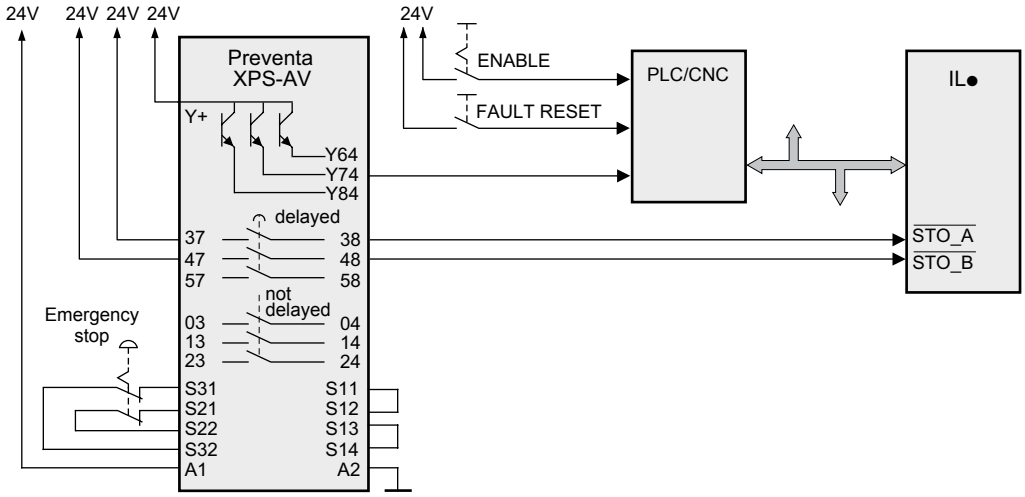
This PL d and SIL2 safety function is certified as conforming to these standards by the TÜV certification body in the context of a voluntary certification.

(1) Please refer to the "Safety functions and solutions using Preventa" catalogue.
(2) Redundant: Consists of mitigating the effects of the failure of one component by means of the correct operation of another, assuming that faults do not occur simultaneously on both.

Examples of applications of the safety function



Example of Category 0 Stop

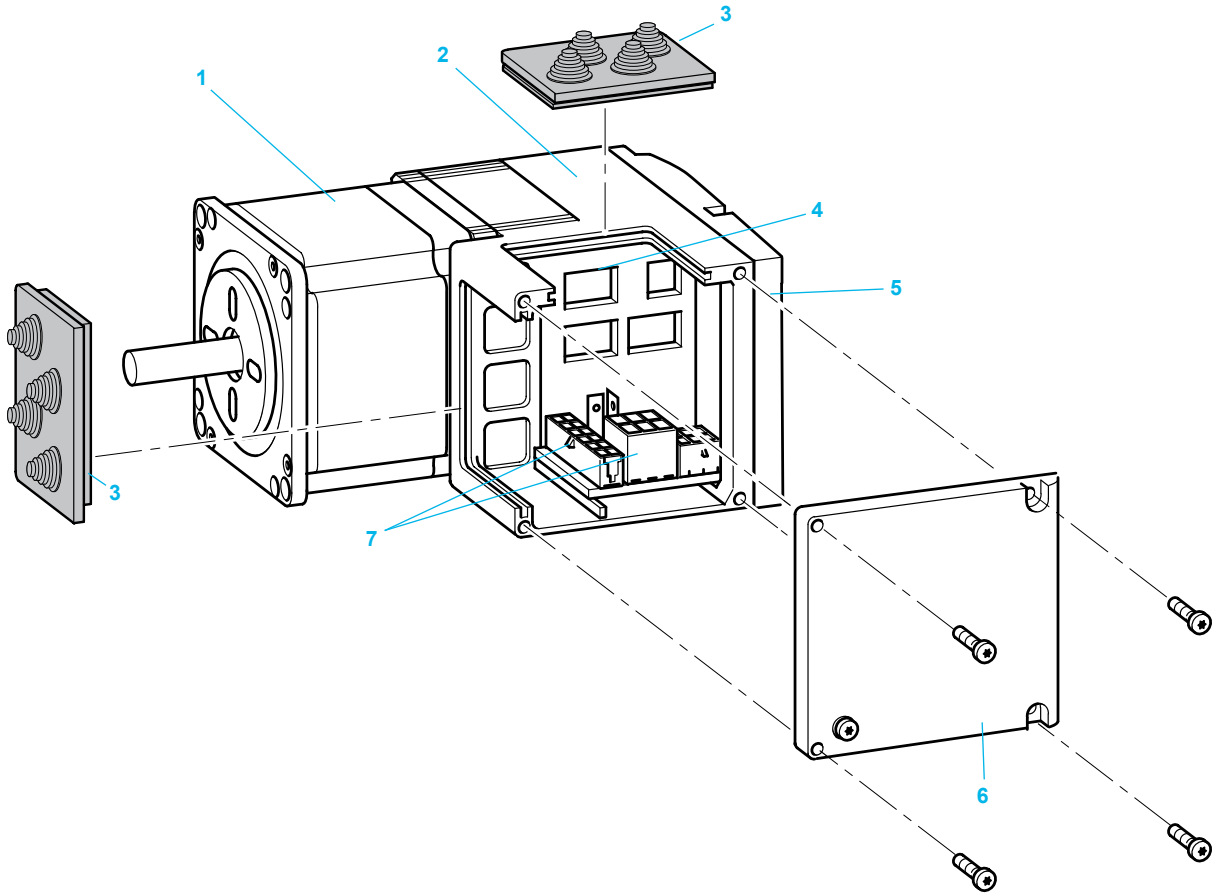


Example of Category 1 Stop

Lexium integrated drives
ILS1 with pulse/direction interface
ILS1 with 3-phase stepper motor

Description

ILS1 consist of control electronics with pulse/direction interface and a 3-phase stepper motor. ILS1 is optionally available with printed circuit board connectors or industrial connectors. A holding brake is optionally available for ILS1●85.



1 3-phase stepper motor
2 Electronics housing
3 Insert cable entry (accessory)
4 Settings via parameter switches
5 Cover for electronics housing
6 Cover for connector housing
7 Electrical interfaces

Lexium integrated drives
ILS1 with pulse/direction interface
ILS1 with 3-phase stepper motor

Certifications

Conformity to standards			Lexium integrated drives have been developed to comply with the stringent international standards and with the recommendations for adjustable speed power drive systems, specifically: IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals) and IEC/EN 50178 (resistance of devices to vibration).
	EMC immunity		EN 61800-3:2001, second environment
	Conducted and radiated EMC emissions		EN 61800-3:2001-02; IEC 61800-3, Ed.2 ■ Power supplies without external mains filter: □ C3 up to 10 m supply cable length ■ Power supplies with external mains filter: □ C2 up to 20 m supply cable length □ C3 up to 50 m supply cable length
CE marking			The Lexium integrated drives are CE marked in accordance with the European Machinery Directive (98/37/EEC) and the European EMC Directive (2004/108/EEC).
Product certifications			UL (USA), cUL (Canada)
			TÜV certification: Lexium integrated drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*		**°C**	0 ... 65; power reduction by 2%/°C at 50 ... 65
Max. permissible temperature of the power amplifier		**°C**	105
Max. permissible temperature of the motor *(2)*		**°C**	110
Transport and storage temperature		**°C**	-25 ... +70
Installation height without power reduction		**m**	< 1000 m above mean sea level
Relative humidity		**%**	15 ... 85 (not condensing)
Vibration load during operation as per DIN EN 60068-2-6	Number of cycles		10
	Acceleration amplitude:	**m/s²**	20
	Frequency range	**Hz**	10 ... 500
Continuous shocks as per DIN EN 60068-2-29	Number of shocks		1000
	Peak acceleration	**m/s²**	150
Shaft wobble and perpendicularity			According to EN 50347 (IEC 60072-1)
Degree of protection as per DIN EN 60034-5			Total except shaft bushing IP54, shaft bushing IP41

Electrical data

Power supply connection (CN1)

			Corresponds to PELV according to DIN 19240, not protected against reverse polarity
Supply voltage range		**⎓ V**	18 ... 40
Nominal supply voltage		**⎓ V**	24 / 36
Ripple at nominal voltage		**V_{PP}**	≤ 3.6
Max. current consumption	ILS1●57	**A**	3.5
	ILS1●851, ILS1●852	**A**	5
	ILS1●853		
	■ with winding type T	**A**	6
	■ with winding type P	**A**	5
Inrush current			Charging current for capacitor C=1500 µF
External fuse		**A**	10

Multifunction interface (CN2)

Type of integrated drive			**ILS1V (5 V)**	**ILS1W (5 V RS 422)**	**ILS1U (24 V)**
Signal inputs	Galvanically isolated		yes	no	yes
	Logic 0 (U_{low})	**V**	-5.25 ... +0.4	RS 422	-3 ... +3
	Logic 0 (U_{high})	**V**	+2.5...+5.25	RS 422	+20 ... +30
	Permissible voltage range	**V**	-5.25 ... +5.25	-2 ... +26 *(3)*	-3 ... 30
	Input resistance	**Ω**	140	5000	2000
	PULSE/DIR frequency input	**kHz**	≤ 200	≤ 200	≤ 200
	Frequency input PWM current reduction	**kHz**	6 ... 25	6 ... 25	6 ... 25
Signal outputs			Short-circuit protected, protected against reverse polarity up to 100 mA, suitable for inductive load (1000 mH / 100 mA)		
	Galvanically isolated		yes	no	yes
	Max. switching voltage	**V**	30	30	30
	Max. switching current	**mA**	100	100	100
	Internal voltage drop at 10 mA / 100 mA	**V**	≤ 1.6 / 1.9	≤ 0.2 / 0.2	≤ 1.6 / 1.9

(1) Limit values with flanged motor mounted on a steel plate 300 x 300 x 10 mm
(2) Measured at the surface
(3) Voltage relating to 0V ⎓

Electrical data		
24 V signal interface (CN4)		4 signals, can each be used as input or output GND galvanically connected to GND supply voltage, not protected against reverse polarity
24 V signal inputs		
Logic 0 (U_{low})	**V**	-3 ... +3
Logic 1 (U_{high})	**V**	+20 ... +30
Permissible voltage range	**V**	-3 ... 30
Input resistance	**Ω**	2000
Debounce time IO0..IO3	**ms**	0.1
Debounce time IO2, IO3 with capture function	**ms**	0.01
24 V signal outputs		Switching to plus, short-circuit protected, suitable for inductive load (1000 mH / 100 mA)
Supply voltage range	**⎓ V**	23 ... 25
Max. switching current (total)	**mA**	200
Max. switching current per output	**mA**	100
		The internal power supply unit is protected against: ■ Short circuit of the output voltage ■ Overload of output voltage (limited to 6 W output power)
Interface for safety function "Safe Torque Off" (CN5)		No galvanic isolation; corresponds to RS 485 standard
Logic 0 (U_{low})	**V**	-3 ... +4.5
Logic 1 (U_{high})	**V**	+15 ... +30
Input current (typical at 24 V)	**mA**	10
Debounce time	**ms**	1 ... 5
Response time (until shutdown of power amplifier)	**ms**	< 50
Max. Time offset until detection of signal differences between $\overline{\text{STO\_A}}$ and $\overline{\text{STO\_B}}$ *(1)*	**S**	< 1
Safety function "Safe Torque Off" ("Power Removal")		
Protection Of machine		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level "d" (PL d) , and standard IEC/EN 61800-5-2
Of the system process		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2

(1) Switching process must be simultaneous for both signal inputs (time offset < 1 s).

Mechanical data ILS1●57

Type of integrated drive			ILS1●571	ILS1●572	ILS1●573
Winding type			P	P	P
Max. torque	M_{max}	**Nm**	0.45	0.90	1.50
Holding torque		**Nm**	0.51	1.02	1.70
Rotor inertia		**kg·cm²**	0.1	0.22	0.38
Number of steps			200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000		
Step angle		**°**	1.8 / 0.9 / 0.72 / 0.36 / 0.18 / 0.09 / 0.072 / 0.036		
Systematic angle tolerance per step *(1)*		**arcmin**	±6	±6	±6
Mass		**kg**	1.3	1.6	2.0
Shaft load *(2)*	Max. radial force *(3)*	**N**	24	24	50
	Max. axial tensile force	**N**	100		
	Max. axial force pressure	**N**	8.4		
	Nominal bearing service life *(4)*	**h**	20000		

Mechanical data ILS1●85

Type of integrated drive			ILS1●851	ILS1●852	ILS1●853	
Winding type			P	P	P	T
Max. torque	M_{max}	**Nm**	2.0	4.0	6.0	4.5
Holding torque		**Nm**	2.0	4.0	6.0	4.5
Rotor inertia		**kg·cm²**	1.1	2.2	3.3	
Number of steps			200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000			
Step angle		**°**	1.8 / 0.9 / 0.72 / 0.36 / 0.18 / 0.09 / 0.072 / 0.036			
Systematic angle tolerance per step *(1)*		**arcmin**	±6			
Mass		**kg**	2.6	3.6	4.7	
Shaft load *(2)*	Max. radial force *(3)*	**N**	100	100	110	
	Max. axial tensile force	**N**	170			
	Max. axial force pressure	**N**	30			
	Nominal bearing service life *(4)*	**h**	20000			

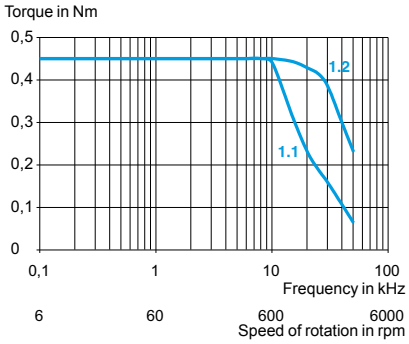
Holding brake

Holding torque	**Nm**	6
Electrical pull-in power	**W**	22
Brake release time	**ms**	40
Brake application time	**ms**	20
Moment of inertia	**kg·cm²**	0.2
Mass	**kg**	1.8

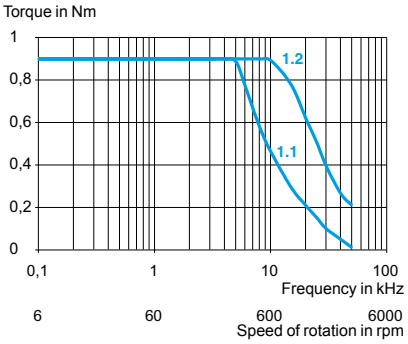
(1) Measured at 1000 steps/revolution
(2) Conditions for shaft load: speed of rotation 60 rpm, duty cycle at torque, ambient temperature 40 °C
(3) Point of application of radial force: 10.5 mm distance to flange
(4) Operating hours at a probability of failure of 10 %

Torque characteristics ILS1●57

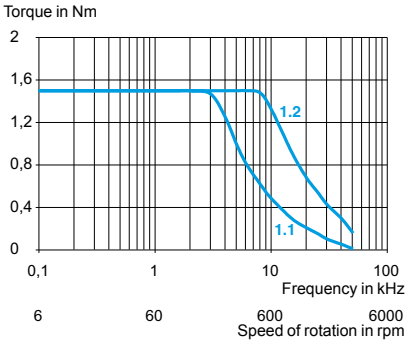
ILS1●571P (winding type P)



ILS1●572P (winding type P)

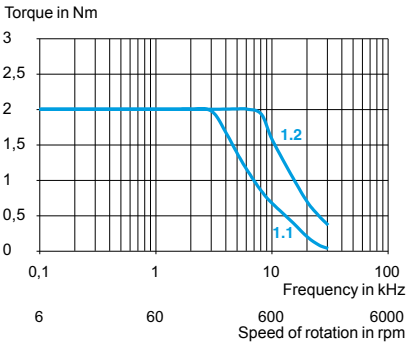


ILS1●573P (winding type P)

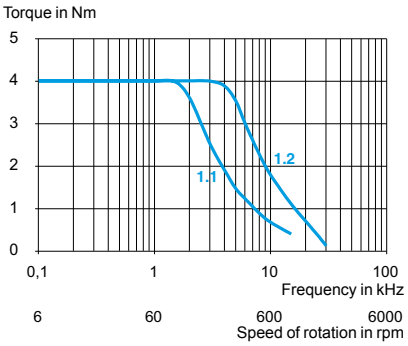


Torque characteristics ILS1●85

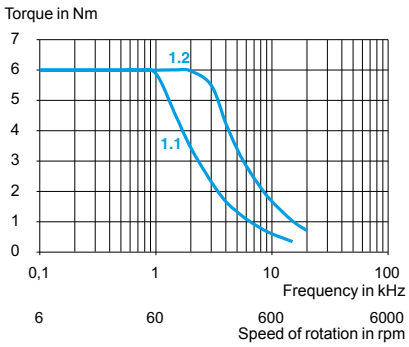
ILS1●851P (winding type P)



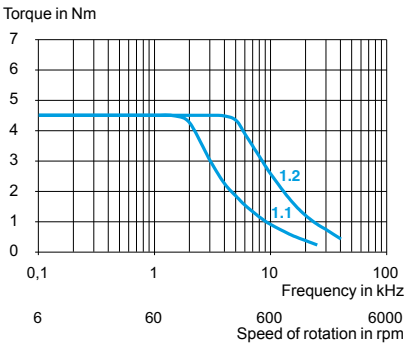
ILS1●852P (winding type P)



ILS1●853P (winding type P)



ILS1●853T (winding type T)



1.1 Max. torque at 24 V
1.2 Max. torque at 36 V

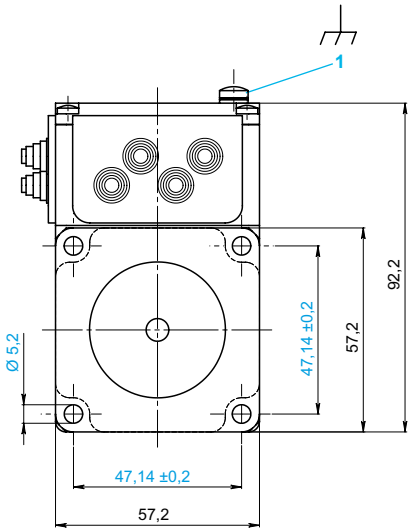
Lexium integrated drives
ILS1 with pulse/direction interface
ILS1 with 3-phase stepper motor

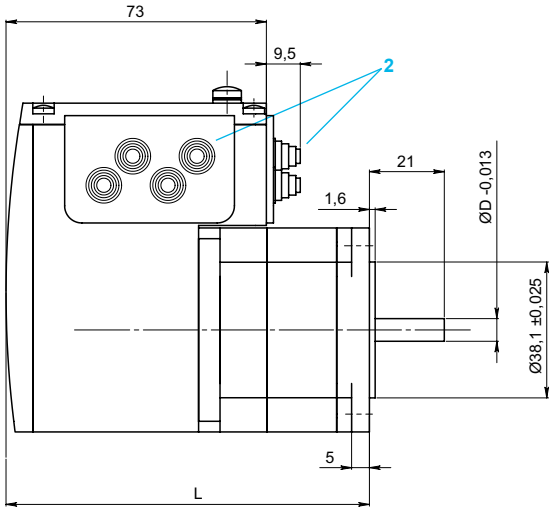
References

Example:	I	L	S	1	U	5	7	1	P	B	1	A
Motor type **S** = 3-phase stepper motor	I	L	**S**	1	U	5	7	1	P	B	1	A
Supply voltage **1** = 24 ... 36 V	I	L	S	**1**	U	5	7	1	P	B	1	A
Communication interface **U** = pulse/direction 24 V, opto-isolated **V** = pulse/direction 5 V, opto-isolated **W** = pulse/direction 5 V RS 422	I	L	S	1	**U**	5	7	1	P	B	1	A
Flange size **57** = 57 mm **85** = 85 mm	I	L	S	1	U	**5**	**7**	1	P	B	1	A
Motor length ("L") *(1)* **1** = motor length "L" **2** = motor length "L" **3** = motor length "L"	I	L	S	1	U	5	7	**1**	P	B	1	A
Winding type **P** = medium speed of rotation, medium torque **T** = high speed of rotation, medium torque *(2)*	I	L	S	1	U	5	7	1	**P**	B	1	A
Connection technology **B** = printed circuit board connector **C** = industrial connector	I	L	S	1	U	5	7	1	P	**B**	1	A
Measurement system **1** = index pulse	I	L	S	1	U	5	7	1	P	B	**1**	A
Holding brake **A** = no holding brake **F** = with holding brake *(3)*	I	L	S	1	U	5	7	1	P	B	1	**A**

(1) The motor length "L" depends on the mechanical characteristics, see pages 4/101, 4/104 and 4/105.
(2) Winding type T only with ILS1●853.
(3) Holding brake only with ILS1●85.

ILS1●57 integrated drives

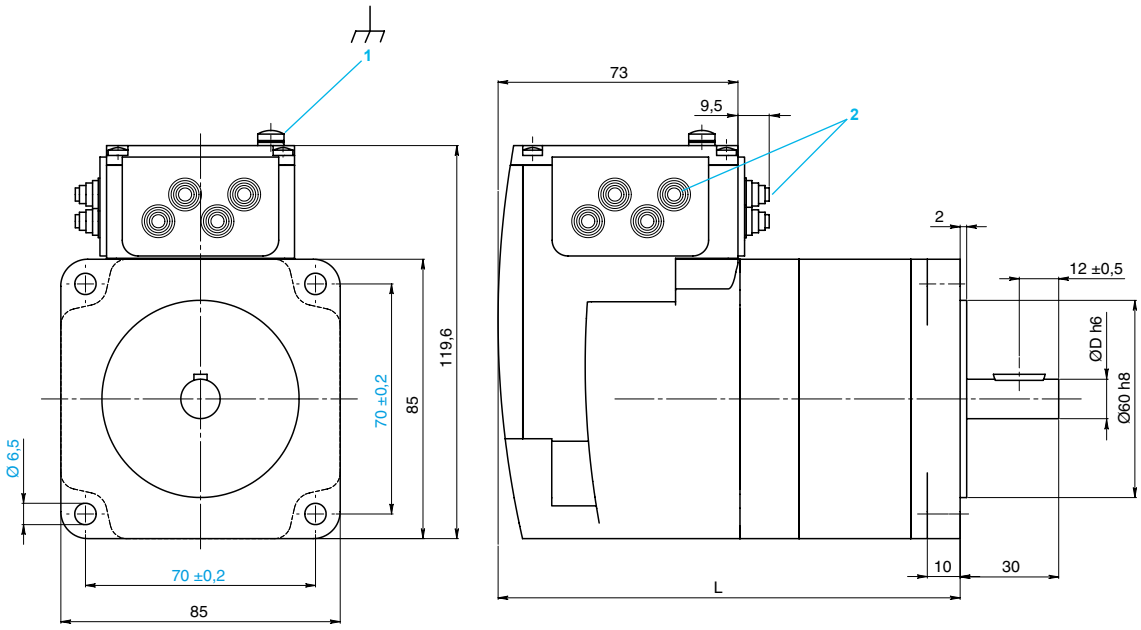




	L	D
ILS1●571	101.9	6.35
ILS1●572	115.9	6.35
ILS1●573	138.9	8.00

1 Earth (ground) terminal
2 Accessories: cable entries Ø = 3 ... 9 mm

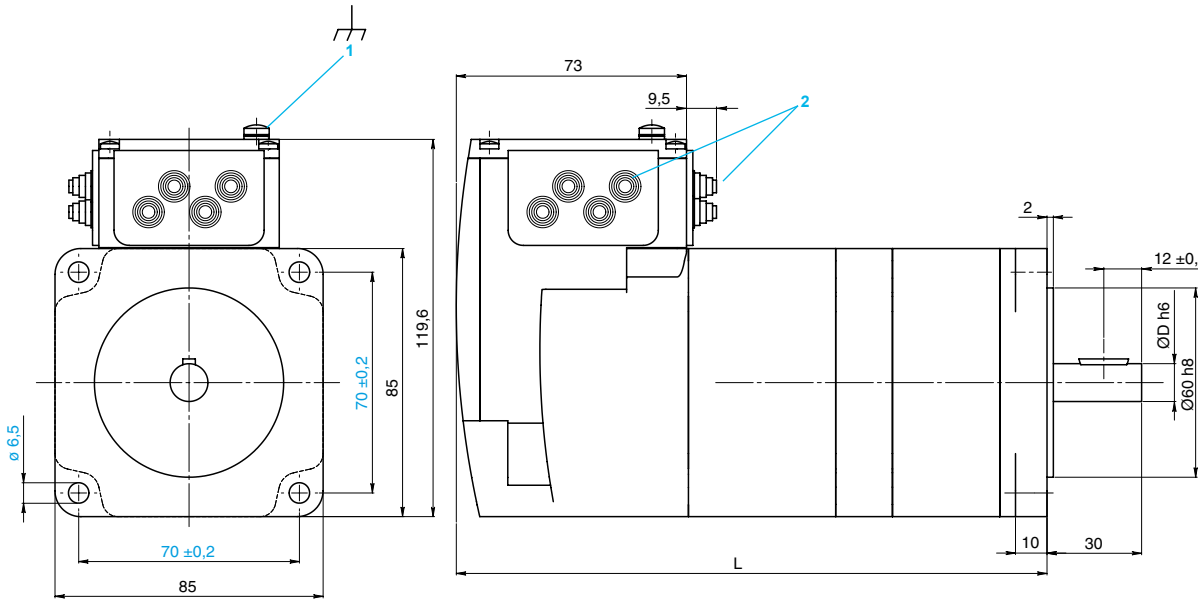
ILS1●85 integrated drives without holding brake



	L	D
ILS1●851	140.6	12
ILS1●852	170.6	12
ILS1●853	200.6	14

1 Earth (ground) terminal
2 Accessories: cable entries Ø = 3 ... 9 mm

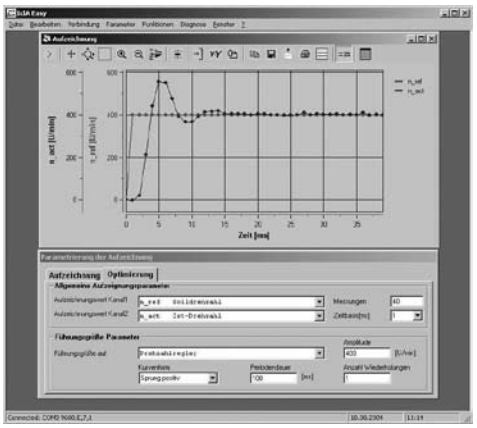
ILS1●85 integrated drives with holding brake



	L	D
ILS1●851	187.3	12
ILS1●852	217.3	12
ILS1●853	247.3	14

1 Earth (ground) terminal
2 Accessories: cable entries Ø = 3 ... 9 mm

Lexium integrated drives
Option: Commissioning software “Lexium CT”



Presentation

Functions

The “Lexium CT” commissioning software includes the following functions:
- Input and display device parameters
- Archive and duplicate device parameters
- Display status and device information
- Position the motor with the PC
- Trigger reference movements
- Access all documented parameters
- Diagnostics of malfunctions
- Controller optimisation (ILA only)

Requirements and interfaces

"Lexium CT” commissioning software runs on a PC under Microsoft Windows® 2000/XP/Vista. The Lexium integrated drives are connected via the CN3 interface for commissioning.
Fieldbus converters, e.g. NuDAM ND-6530 and ND-6520 from Acceed, can be used, please consult your Regional Sales Office.

Integrated drive/PC interface

Integrated drive system interface	PC interface
RS 485	USB
	RS 232
CANopen	USB
	Parallel
PROFIBUS DP	PCMCIA
	PCI
	USB

Lexium integrated drives with EtherCAT, Ethernet Powerlink and Modbus TCP fieldbuses can also be configured directly via the Ethernet connection.

Source

The latest version of the “Lexium CT” PC commissioning software is available for download on our website at www.schneider-electric.com.

Reference

“Lexium CT” PC commissioning software

Description	Reference	Weight kg
CD-ROM, multilingual; Contents: ■ Technical documentation, multilingual ■ Commissioning software “Lexium CT” ■ EPlan macros ■ CAD drawings ■ EDS and GSD files	**VW3M8703**	–

Lexium integrated drives
Accessories for integrated drives

VW3L10100N●

Installation accessories

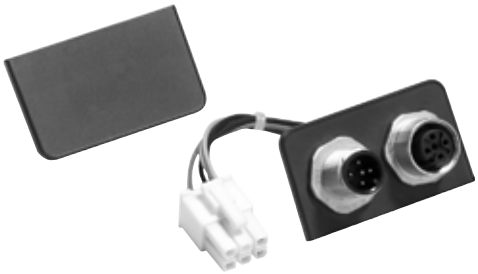
Description	Sold in lots of	Reference	Weight kg
Cable entries			
For up to 4 cables with a diameter of 3 to 9 mm. Two cable entries per integrated drive system are required. The cable entries are for sealing, strain relief and shield connection.	2	**VW3L10100N2**	–
	10	**VW3L10100N10**	–

VW3L10000N●●

Insert for sealing IP 54			
For closing the cutouts for the inserts.	10	**VW3L10000N10**	–
	20	**VW3L10000N20**	–
	50	**VW3L10000N50**	–

VW3L10222

Cable entry IP 54			
1 insert for variable use for signals and power supply via 2 x M16 cable entries and 1 insert for sealing (IP 54). For two cables with a diameter of 5 to 9 mm.	1	**VW3L10222**	–

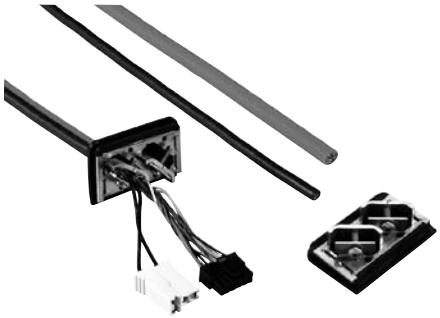


VW3L1R000

Insert for commissioning interface			
1 insert for connection of RS 485 (IN/OUT) with circular connector and 1 insert for sealing (IP 54). Contents: ■ 1 insert □ 1 M12 socket (5 poles) □ 1 M12 plug (5 poles) ■ 1 insert for sealing	1	**VW3L1R000**	–
Suitable accessories			
CANopen/RS 485 connector kit	1	**VW3L5F000**	–

VW3L10111

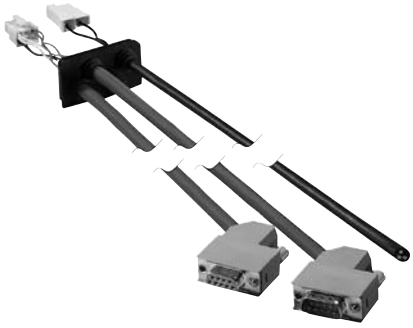
Installation kit			
Installation kit for customised cabling of fieldbus, power supply and “Safe Torque Off” safety function (“Power Removal”) Contents: ■ Cable entries ■ Crimp contacts ■ Crimp connectors ■ Connector housings ■ Shielding foil	1	**VW3L10111**	–



VW3L2U001R●●

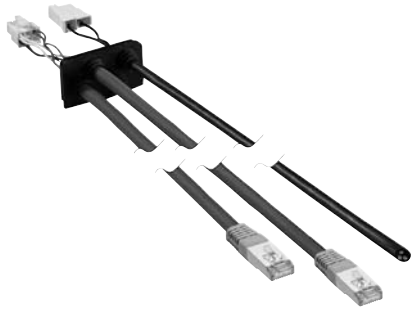
Accessories for Lexium integrated drives with printed circuit board connectors

Description	Length m	Reference	Weight kg
Cable kit for Lexium integrated drives ILS1 with pulse/direction interface			
Cable equipped with: ■ Drive end of cable pre-assembled and with strain relief. For power supply and pulse/direction signals or A/B signals. ■ Other cable end open.	3	**VW3L2U001R30**	–
	5	**VW3L2U001R50**	–
	10	**VW3L2U001R100**	–
	15	**VW3L2U001R150**	–
	20	**VW3L2U001R200**	–



VW3L2●001R30

Description		Length m	Reference	Weight kg
Cable kits for fieldbus interfaces (CANopen, PROFIBUS DP, RS 485, DeviceNet) and power supply				
Cable equipped with: ■ Drive end of cable pre-assembled and with strain relief For power supply and fieldbus. ■ Other cable end: power supply open, fieldbus with SubD (9 poles)	CANopen	3	**VW3L2F001R30**	–
	PROFIBUS DP	3	**VW3L2B001R30**	–
	RS 485	3	**VW3L2R001R30**	–
	DeviceNet	3	**VW3L2D001R30**	



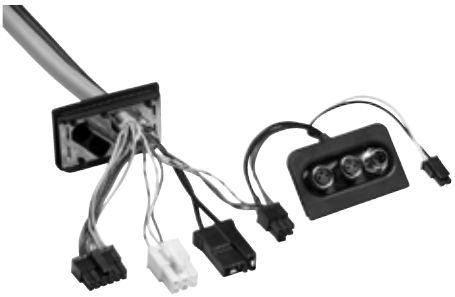
VW3L2●03001

Description		Length m	Reference	Weight kg
Cable kits for fieldbus interfaces (power supply, EtherCAT, Ethernet Powerlink, Modbus TCP)				
Cable equipped with: ■ Drive end of cable pre-assembled and with strain relief. For power supply and fieldbus. ■ Other cable end: power supply open, fieldbus with RJ45	EtherCAT	3	**VW3L2E03001**	–
	Ethernet Powerlink	3	**VW3L2P03001**	–
	Modbus TCP	3	**VW3L2T03001**	–

VW3L2M001R●●

Accessories for Lexium integrated drives with printed circuit board connectors (continued)

Description	Length m	Reference	Weight kg
Cable kit for Lexium integrated drives ILS1 with I/O interface for motion sequence			
Cable equipped with: ■ Drive end of cable pre-assembled and with strain relief, for data set mode. For power supply and I/O signals. ■ Other cable end open.	3	**VW3L2M001R30**	–
	5	**VW3L2M001R50**	–
	10	**VW3L2M001R100**	–
	15	**VW3L2M001R150**	–
	20	**VW3L2M001R200**	–



VW3L2M211R●●

Cable kit for Lexium integrated drives with motion sequence and insert with 2 I/O, 1 STO			
Cable equipped with: ■ Drive end of cable pre-assembled and with strain relief, for data set mode. For power supply and I/O signals. ■ Other cable end open. Additional insert equipped with: ■ 2 I/O and 1 "Safe Torque Off" via M8 circular connector.	3	**VW3L2M211R30**	–
	5	**VW3L2M211R50**	–
	10	**VW3L2M211R100**	–
	15	**VW3L2M211R150**	–
	20	**VW3L2M211R200**	–

VW3L40300

Accessories for Lexium integrated drives with industrial connectors

Insert for 3 I/O signals			
Contents: ■ 1 insert with 3 M8 sockets (3 poles) for connection of 3 I/O signals ■ 1 blind insert		**VW3L40300**	–
Suitable accessories			
Connector kit 3 I/O		**VW3L50300**	–

VW3L40210

Inserts for 2 I/O signals and signals for "Safe Torque Off" safety function ("Power Removal")			
Contents: ■ 1 insert □ 2 M8 sockets (3 poles) for connection of 2 I/O signals □ 1 M8 plug (4 poles) for connection of signals for Safe Torque Off ■ 1 insert for sealing (IP 54)		**VW3L40210**	–
Suitable accessories			
Connector kit 2 I/O		**VW3L50200**	–
Cable (STO M8x4)		**VW3L30010R●●●**	

4

VW3L400200

Accessories for Lexium integrated drives with industrial connectors (continued)

Description	Reference	Weight kg
Insert with 2 signals for "Safe Torque Off" safety function ("Power Removal")		
Contents: ■ 2 M8 plugs (4 poles) for connection of signals for Safe Torque Off ■ 1 blind insert	**VW3L400200**	–
Suitable accessories		
Cable for STO"	**VW3L30010R●●●**	–

VW3L50200

Connector kit 2 I/O		
Connector kit for assembly of cables for 2 I/O signals Contents: ■ 2 M8 circular connector (3-pin)	**VW3L50200**	–

VW3L50300

Connector kit 3 I/O		
Connector kit for assembly of cables for 3 I/O signals Contents: ■ 3 M8 circular connector (3 poles)	**VW3L50300**	–

VW3L50010

Connector 1 STO output		
Connector for assembly of cables for transmitting the signals for the "Safe Torque Off" safety function ("Power Removal") Contents: ■ 1 M8 circular connector (4-pin)	**VW3L50010**	–

VW3L30001R●●

Accessories for Lexium integrated drives with industrial connectors (continued)

Description	Length m	Reference	Weight kg
Cable (power supply, STAK)			
For connection of power supply; for drag chain applications; complies with DESINA standard This cable is suitable only for Lexium integrated drives with fieldbus interface.	3	**VW3L30001R30**	–
	5	**VW3L30001R50**	–
	10	**VW3L30001R100**	–
	15	**VW3L30001R150**	–
	20	**VW3L30001R200**	–

VW3L30010R●●

Cable (STO M8x4)			
Cable with M8 socket (4 poles) for connection of signals for “Safe Torque Off” safety function (“Power Removal”)	3	**VW3L30010R30**	–
	5	**VW3L30010R50**	–
	10	**VW3L30010R100**	–
	15	**VW3L30010R150**	–
	20	**VW3L30010R200**	–

VW3L5B000

Connector kits for IL●1 for PROFIBUS DP			
For assembly of PROFIBUS DP cables Contents: ■ 1 M12 circular connector (B-coded) ■ 1 M12 circular socket (B-coded) ■ 1 M12 protective cap		**VW3L5B000**	–

VW3L5F000

Connector kits for IL●1 for CANopen / RS 485			
For assembly of CANopen cables or RS 485 cables Contents: ■ 1 M12 circular connector (A-coded) ■ 1 M12 circular socket (A-coded) ■ 1 M12 protective cap		**VW3L5F000**	–

VW3L5E000

VW3L5P000

VW3L5D000

VW3L5T000

VW3L40420

Accessories for Lexium integrated drives with industrial connectors (continued)

Description	Reference	Weight kg
Connector kit EtherCAT		
For assembly of EtherCAT cables Contents: ■ 2xM12 circular connector (D-coded, 4 poles) ■ 1 M12 protective cap	**VW3L5E000**	–
Connector kit Ethernet Powerlink		
For assembly of Ethernet Powerlink cables Contents: ■ 2xM12 circular connector (D-coded, 4 poles) ■ 1 M12 protective cap	**VW3L5P000**	–
Socket DeviceNet		
Socket DeviceNet M12, 5 poles, female, A coded	**VW3L5D000**	–
Socket Modbus TCP		
Socket Modbus TCP M12 (D-coded, 4 poles), female	**VW3L5T000**	–
Inserts with 4 I/O signals and 2 signals for "Safe Torque Off" safety function ("Power Removal")		
Contents: ■ 1 insert □ 2 M8 sockets (3 poles) for connection of 2 I/O signals □ 1 M8 plug (4 poles) for connection of signals for "Safe Torque Off" ■ 1 insert □ 2 M8 sockets (3 poles) for connection of 2 I/O signals □ 1 M8 socket (4 poles) for transmitting the signals for "Safe Torque Off"	**VW3L40420**	–

Suitable accessories		
Connector kit 2 I/O (2x)	**VW3L50200**	–
STO connector	**VW3L50010**	–
Cable (STO M8x4)	**VW3L30010R●●●**	–

Lexium integrated drives
Option: GBX planetary gearboxes

GBX planetary gearbox

Presentation

In many cases the axis controller requires the use of a planetary gearbox for adjustment of speed of rotation and torque; the accuracy required by the application must be maintained.

To meet these requirements, Schneider Electric has decided to use the Neugart GBX planetary gearbox which are specially tuned to the Lexium integrated drives. This gearing features lifetime lubrication. The GBX planetary gearboxes are easy to install and operate.

The GBX planetary gearboxes – depending on the power of the Lexium integrated drives – are available in three sizes (GBX 40, GBX 60, GBX 80) and with five reduction ratios (3:1 ... 40:1) (see table below).

The values for the continuous torque and the peak torque at standstill which are available at the output shaft, are calculated by multiplying the motor characteristics with the gear ratio and the efficiency of the gearing (0.96 or 0.94 depending on the reduction ratio).

The following table shows the suitable GBX planetary gearbox for the Lexium integrated drives.

Assignment of integrated drive system and GBX planetary gearbox

Type of integrated drive	Reduction ratio				
	3:1	5:1	8:1	16:1	40:1
ILA1●571T	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
ILA1●571P	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
ILA1●572T	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
ILA1●572P	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
ILA2●571T	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
ILA2●571P	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
ILA2●572T	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
ILA2●572P	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
ILE1●661P	GBX 40	GBX 40	GBX 40	GBX 60	GBX 60
ILE2●661P	GBX 40	GBX 40	GBX 40	GBX 60	GBX 60
ILE2●662P	GBX 40	GBX 40	GBX 40	GBX 60	GBX 60
ILS1●571P	GBX 60	GBX 60	GBX 60	–	–
ILS1●572P	GBX 60	GBX 60	GBX 60	–	–
ILS1●573P	GBX 60	GBX 60	GBX 60	–	–
ILS1●851P	GBX 80	GBX 80	GBX 80	–	–
ILS1●852P	GBX 80	GBX 80	GBX 80	–	–
ILS1●853P	GBX 80	GBX 80	GBX 80	–	–
ILS1●573T	GBX 80	GBX 80	GBX 80	–	–
ILS2●571P	GBX 60	GBX 60	GBX 60	–	–
ILS2●572P	GBX 60	GBX 60	GBX 60	–	–
ILS2●573P	GBX 60	GBX 60	GBX 60	–	–
ILS2●851P	GBX 80	GBX 80	GBX 80	–	–
ILS2●852P	GBX 80	GBX 80	GBX 80	–	–
ILS2●853P	GBX 80	GBX 80	GBX 80	–	–
ILS2●573T	GBX 80	GBX 80	GBX 80	–	–

GBX 60 *For these combinations, you must check that the application will not exceed the maximum output torque of the gearbox, see page 4/114.*

Lexium integrated drives
Option: GBX planetary gearboxes

Characteristics

Type			GBX 40	GBX 60	GBX 80
Version			Planetary gearbox with straight teeth		
Backlash	3:1 ... 8:1	**arcmin**	< 24	< 16	< 9
	16:1 ... 40:1		< 28	< 20	< 14
Torsional rigidity	3:1 ... 8:1	**Nm/ arcmin**	1	2.3	6
	16:1 ... 40:1		1.1	2.5	6.5
Noise level *(1)*		**dB(A)**	55	58	60
Casing			Black anodized aluminium		
Shaft material			C 45		
Shaft output dust and dump protection			IP 54		
Lubrication			Lubricated life		
Average service life *(2)*		**h**	30,000		
Mounting position			Any position		
Operating temperature		**°C**	-25 ... +90		
Efficiency	3:1 ... 8:1		0.96		
	16:1 ... 40:1		0.94		
Maximum permitted radial force *(2) (3)*	L_{10h} = 10,000 h	**N**	200	500	950
	L_{10h} = 30,000 h	**N**	160	340	650
Maximum permitted axial force *(2)*	L_{10h} = 10,000 h	**N**	200	600	1200
	L_{10h} = 30,000 h	**N**	160	450	900
Moment of inertia of gearbox	3:1	**kgcm²**	0.031	0.135	0.77
	5:1	**kgcm²**	0.019	0.078	0.45
	8:1	**kgcm²**	0.017	0.065	0.39
	16:1	**kgcm²**	0.022	0.088	0.5
	40:1	**kgcm²**	0.016	0.064	0.39
Continuous output torque *(2)*	3:1	**Nm**	11	28	85
	5:1	**Nm**	14	40	110
	8:1	**Nm**	6	18	50
	16:1	**Nm**	20	44	120
	40:1	**Nm**	18	40	110
Maximum output torque *(2)*	3:1	**Nm**	17.6	45	136
	5:1	**Nm**	22	64	176
	8:1	**Nm**	10	29	80
	16:1	**Nm**	32	70	192
	40:1	**Nm**	29	64	176

(1) Value measured at a distance of 1 m, at no-load for a servo motor speed of 3000 rpm and a reduction ratio of 5:1.
(2) Values given for an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines for an ambient temperature of 30 °C.
(3) Force applied at mid-distance from the output shaft.

Lexium integrated drives
Option: GBX planetary gearboxes

References

GBX ●●● planetary gearbox

Size	Reduction ratio	Reference (1)	Weight
			kg
GBX 40	3:1, 5:1, 8:1	**GBX 040 ●●● ●●● ●L**	0.350
GBX 60	3:1, 5:1, 8:1	**GBX 060 ●●● ●●● ●L**	0.900
	16:1, 40:1	**GBX 060 ●●● ●●● ●L**	1.100
GBX 80	3:1, 5:1, 8:1	**GBX 080 ●●● ●●● ●L**	2.100
	16:1, 40:1	**GBX 080 ●●● ●●● ●L**	2.600

(1) To order a GBX planetary gearbox, complete each reference above with:

			GBX	●●●	●●●	●●●	●	L
Size	Diameter of the housing *(2)*	40 mm		**040**				
		60 mm		**060**				
		80 mm		**080**				
Reduction ratio		3:1			**003**			
		5:1			**005**			
		8:1			**008**			
		16:1			**016**			
		40:1			**040**			
Associated integrated drive	Type	ILA●●57				**A57**		
		ILE●●66				**E66**		
		ILS●●57				**S57**		
		ILS●●85				**S85**		
	Motor length *(3)*	1					**1**	
		2					**2**	
		3					**3**	
Integrated drive system adaptation								**L**

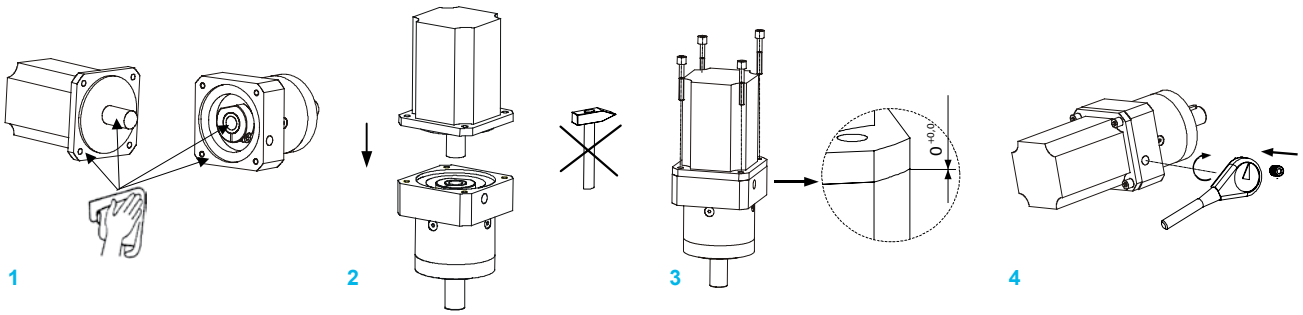
(2) See table of combinations with Lexium integrated drive on page 4/113.
(3) See reference of the corresponding integrated drive system for possible motor lengths.

Mounting recommendations

Special tools are not required for mounting the GBX planetary gear to the integrated drive system. Note the following requirements:

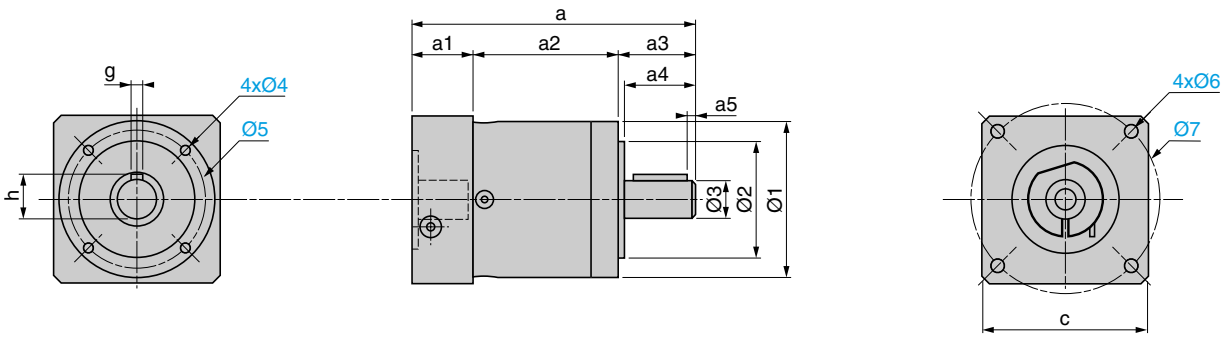
1 Clean grease off contact areas and seals.
2 If possible, mount the motor in a vertical position. Fit motor into gearing.
3 Motor flange must be in contact with gearing flange. Tighten screws crosswise.
4 Tighten clamping ring with torque spanner.

More information can be found in the instructions supplied with the product.



GBX planetary gearboxes

Mounting at motor side

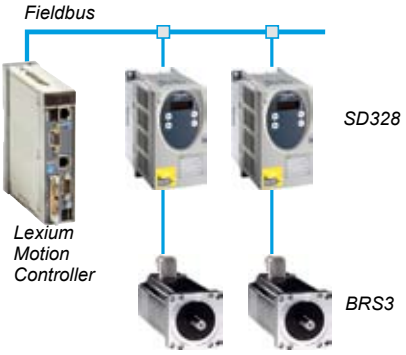


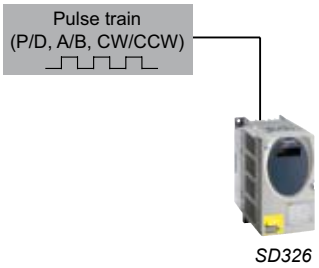
	c	a	a1	a2	a3	a4	a5	h	g	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7
GBX 040 003/005/008	40	93.5	28.5	39	26	23	2.5	11.2	3	40	26 h7	10 h7	M4 x 6	34	M4 x 10	46
GBX 060 003/005/008	60	106.5	24.5	47	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52	M5 x 12	63
GBX 060 016/040	60	118.5	24.5	59.5	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52	M5 x 12	63
GBX 080 003/005/008	90	134	33.5	60.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70	M6 x 15	100
GBX 080 016/040	90	151	33.5	77.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70	M6 x 15	100

Contents

5 - Lexium SD3 motion control

Lexium SD3 motion control
Lexium stepper motor drives





Product offer

A Schneider Electric stepper motor drive system comprises of an SD3 stepper motor drive and a BRS3 3-phase stepper motor.
Reference values are set and, if applicable, monitored by a master PLC or a Schneider Electric Motion Controller (e.g. Lexium Motion Controller).
Together with Schneider Electric BRS3 stepper motors, SD3 is a very compact, high-performance drive system.

Compactness

With its small dimensions (H x W x D: 145 mm x 72 mm x 140 mm), the SD3 stepper motor drive requires very little space in the control cabinet.

Simplicity

Simple cabling and parameterisation of the SD326 allow for easy and quick commissioning. Commissioning software is not required.
The SD328 drives are convenient to configure via the integrated control panel (HMI), via fieldbus or with the Lexium CT PC commissioning software.

Flexibility

SD3 stepper motor drives are available in two power classes: 2.5 A and 6.8 A. The SD3 stepper motor drives are delivered with the following components depending on the device type:

- An opto-isolated signal interface for 5 V and 24 V input signals (SD326)
- An RS422 interface for pulse/direction signals or A/B encoder signals (SD328)
- A fieldbus interface for SD328: CANopen and Modbus (SD328A) or PROFIBUS DP (SD328B):
  The CANopen interface of the SD328A can be used for connection to a CANopen AutomationBus or a CANopen MotionBus.
  Movements of up to eight drive axes can be synchronously controlled by one Motion Controller (e.g. Lexium Motion Controller) via the CANopen MotionBus.
- Analogue reference value input ±10 V (SD328)
- A power supply unit for single-phase mains voltages of 115 V~ and 230 V~
- Integrated mains filter

The SD326 can optionally be shipped with an electronic system for rotation monitoring and brake control.

Application areas

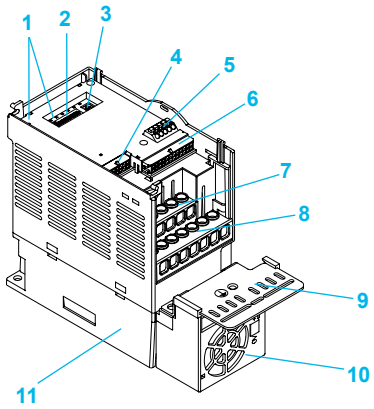
A stepper motor drive system from Schneider Motion has excellent constant velocity characteristics, which are required for applications such as scanning or exposure.
Due to the high torque at low speeds of rotation, the SD3 stepper drive system is particularly suited for short-distance positioning.
Another advantage is its high holding torque at standstill. This allows for the highly economic implementation of automation tasks such as "pick and place".

Assignment of BRS3 3-phase stepper motors and SD3 stepper motor drives

BRS3 3-phase stepper motors	SD326●U25 SD328●U25	SD326●U68 SD328●U68
	115 V / 230 V; 2.5 A; including mains filter	115 V / 230 V; 6.8 A; including mains filter and fan
	 	 
BRS368	**1.7 Nm / 1.5 Nm** *(1)*	
BRS397	**2.3 Nm / 2.0 Nm**	
BRS39A	**4.5 Nm / 4.0 Nm**	
BRS39B	**6.8 Nm / 6.0 Nm**	
BRS3AC		**13.5 Nm / 12.0 Nm**
BRS3AD		**19.7 Nm / 16.5 Nm**

(1) The 1st value is the holding torque M_H when the stepper motor is at a standstill, the 2nd value is the nominal torque M_N when the motor is in operation.

Lexium SD3 motion control
SD326 stepper motor drives



Description

1 LED for status display
2 Parameter switch for configuration of the stepper motor drive
3 Rotary switch for adjustment of the motor current
4 CN2 rotation monitoring (12-pole socket, optional)
5 24 V CN3 interface (spring terminals, optional)
- 24 V controller supply voltage
- 24 V outputs (holding brake and encoder errors)

6 CN1 signal interface (24-pole socket)
- 5 V inputs, opto-isolated
- 24 V inputs, opto-isolated
- Output Readiness

7 Screw terminals for connecting the mains supply
8 Screw terminals for connecting the motor
9 EMC mounting plate (included)
10 Fan (included with SD326●U68)
11 Heat sink

Drive system

The SD326 is a universally applicable stepper motor drive. Reference values are typically preset and monitored by a master PLC or a motion controller. Together with selected Schneider Electric stepper motors, SD326 is a very compact, high-performance drive system.

Control

The reference value is supplied incrementally as a pulse signal via the signal interface. Control signals are also sent to enable the power amplifier and to change the step resolution and the current reference value. An output signal reports operating readiness.

Rotation monitoring / motor monitoring (option)

If a stepper motor with integrated encoder is connected, the following functions can be activated:

- Rotation monitoring
  The calculated reference position and the actual position of the motor are compared. If a defined deviation is exceeded, a rotation monitoring error is signalled.
- Line monitoring
  The encoder cable is monitored by a line monitoring system. A cable error is signalled if a defective or missing cable is detected.
- Motor temperature monitoring
  The stepper motor drive shuts off if the temperature is too high.

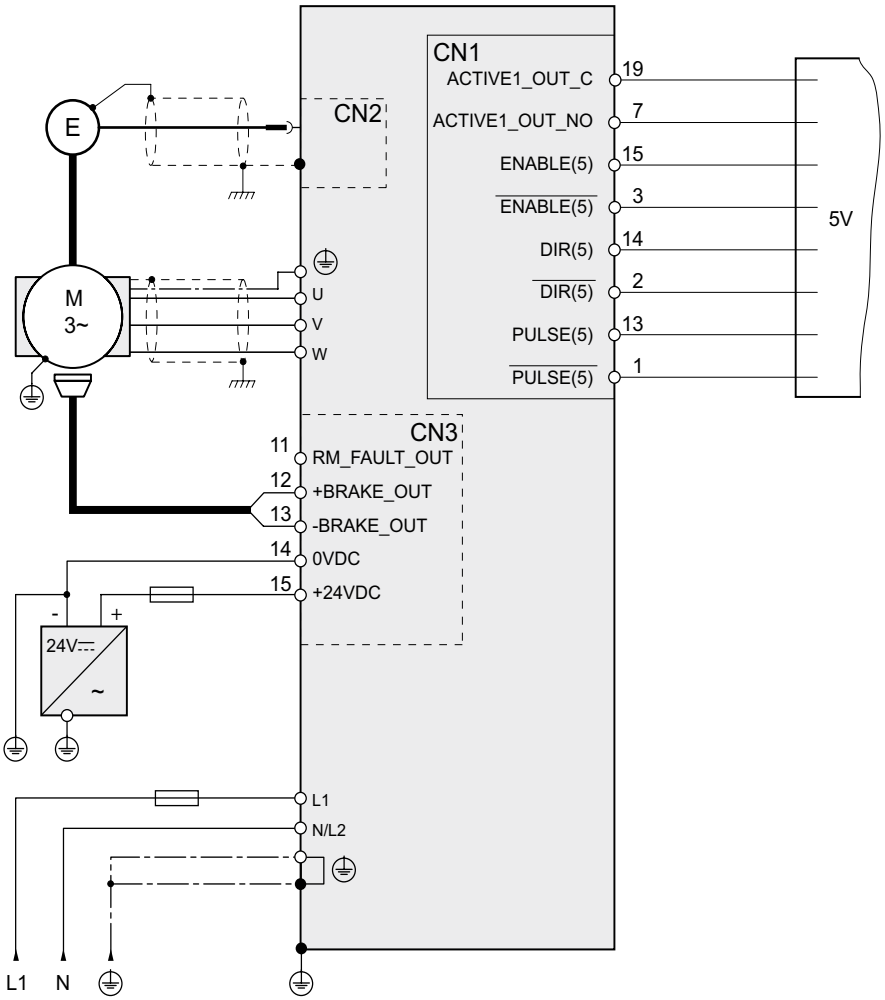
Rotation monitoring is an optional feature of the SD326 stepper motor drive. The controller supply voltage (+24 V⎓) must be connected if rotation monitoring is used.

Holding brake output (option)

The SD326 stepper motor drive has an output for direct connection of an optional holding brake. The controller supply voltage (+24 V⎓) must be connected if a holding brake is used.

Schemes

SD326 connection example



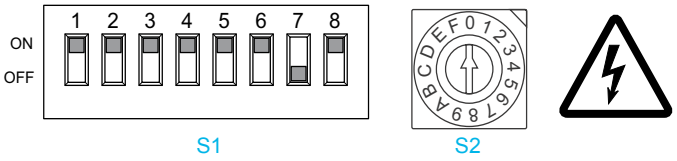
5

Functions

Parameterisation

The following functions can be activated via the parameter switch of the SD326:

- ■ Motor phase current
- ■ Number of steps
- ■ Current reduction during standstill
- ■ SOFTSTEP
- ■ Rotation monitoring (only for device version SD236R with rotation monitoring)
- ■ Function of signal inputs
- □ ENABLE / GATE
- □ PULSE / DIR or CW / CCW



Parameter switches

Setting motor phase current

The motor phase current is set with rotary switch S2. The motor phase current should not exceed the nominal current of the motor, because the motor may otherwise overheat. A low motor phase current produces a low torque.

Settings with rotary switch

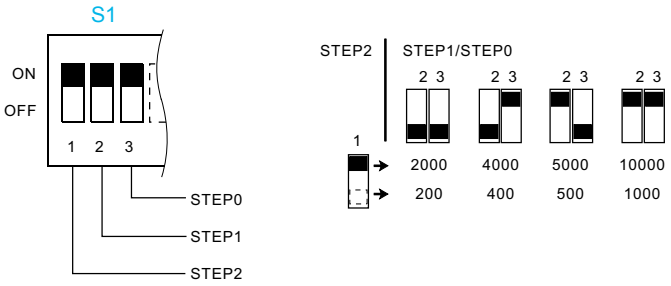
Switch position S2	Motor phase current [A]	
	SD326●U25	SD326●U68
0 (factory setting)	0.6	1.7
1	0.8	2.0
2	0.9	2.4
3	1.0	2.7
4	1.1	3.1
5	1.3	3.4
6	1.4	3.7
7	1.5	4.1
8	1.6	4.4
9	1.8	4.8
A	1.9	5.1
B	2.0	5.4
C	2.1	5.8
D	2.3	6.1
E	2.4	6.5
F	2.5	6.8

Setting number of steps

The resolution of the stepper motor drive system is set via the number of steps.

Example
At a number of steps of 1000 and at 1000 pulses, the stepper motor drive turns the motor exactly one complete revolution. At a pulse frequency of 1 kHz this results in a speed of rotation of 60 rpm.

Settings via parameter switch
Number of steps: 200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000 per revolution.



Setting the number of steps

Activating motor phase current reduction at standstill

If the full holding torque is not required at standstill, the “motor phase current reduction” function can be used to reduce the holding torque. Motor and electronics heat up less and the efficiency is improved.
The motor phase current is reduced to approximately 60% of the set current value 100 ms after the last pulse edge is received.

Settings via parameter switch
Activate/deactivate motor phase current reduction.

Activating the “Softstep” function

If the Softstep function is activated, the reference value is internally set to a higher resolution. The motor then runs much more smoothly, in particular at low speeds or sudden changes in the reference value.
The motor accelerates and decelerates virtually without jerking. The transitions are smoothed, i.e. the motor can follow the reference values much more easily with fast changes of frequency.

Settings via parameter switch
Activate/deactivate “Softstep” function

Activating the rotation monitoring function (only for SD326R with rotation monitoring)

The calculated reference position and the actual position of the motor are compared for rotation monitoring. If a defined deviation is exceeded, a rotation monitoring error is signalled.
For rotation monitoring, the stepper motor must be equipped with electronics for rotation monitoring and the stepper motor must have an encoder with a resolution of 1000 increments/rotation.

Settings via parameter switch
Activate/deactivate “Rotation monitoring” function

Signal inputs

All signal inputs are available as 5 V or 24 V optocoupler signal inputs.

Reference value setting via the PULSE/DIR or CW/CCW signal input

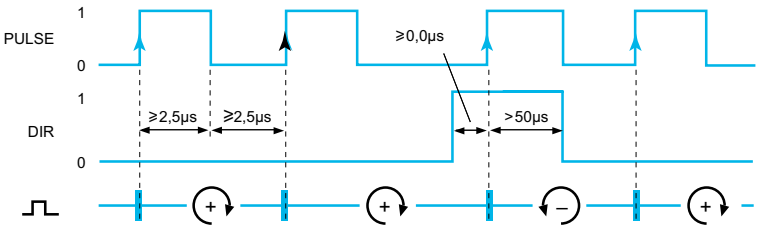
The reference value can alternatively be set via one of the two following interface modes:

- PULSE/DIR
- CW/CCW

The maximum pulse frequency is 200 kHz.

PULSE/DIR interface mode

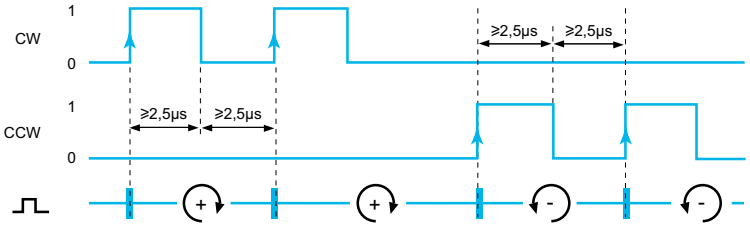
The motor executes an angler step with the rising edge of the PULSE signal. The direction of rotation is controlled by the DIR signal.



PULSE/DIR interface mode

Interface mode CW/CCW

The motor executes a clockwise angle step with the rising edge of the CW signal. The motor executes a counterclockwise angular step with the rising edge of the CCW signal.



Interface mode CW/CCW

Settings via parameter switches

Setting the function of the PULSE/DIR or CW/CCW signal input.

5

Setting the function of the ENABLE/GATE signal input

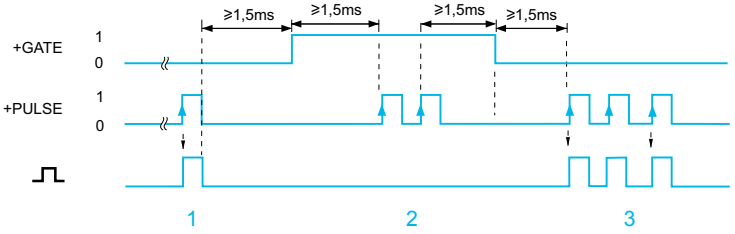
The ENABLE/GATE signal input can have two functions:

ENABLE function: enable/disable power amplifier

The ENABLE function enables the power amplifier to allow control of the motor.

GATE function: enable/disable the pulse input

The GATE function blocks the pulses of the reference value input without disabling the operating readiness. In a multi-axis system, individual axes can be selected with the GATE function.



Signal sequences in case of activation via the GATE function

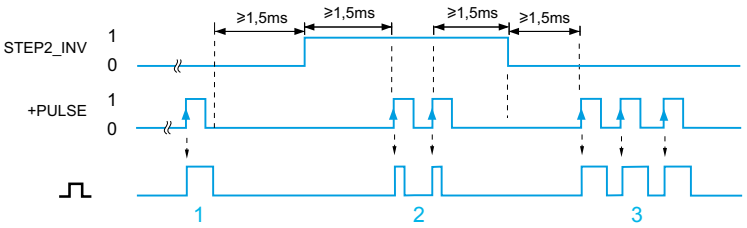
1 Motor step
2 No motor steps
3 Motor steps

Settings via parameter switch

Setting the function of the ENABLE/GATE signal input

Changing the number of steps with the STEP2_INV signal input

The STEP2_INV signal input can be used if a high positioning accuracy is required, but the output frequency of the master controller is limited.
The number of steps can be increased or reduced by a factor of 10 with the STEP2_INV signal.



Signal sequences when the STEP2_INV signal changes

1 Large motor step
2 Number of motor steps reduced by a factor of 10
3 Large motor steps

Controlling the motor phase current via the PWM signal input

The motor phase current can be changed between 0 % and 100 % of the maximum current set with the rotary switch by means of the pulse/pause ratio of a rectangular signal at the signal input “PWM” (PWM: pulse width modulation). The frequency of the rectangular signal must be between 6 kHz and 25 kHz.
No motor phase current flows at constant 1-level (current set to zero).
The motor operates at the specified maximum motor phase current at constant 0-level.

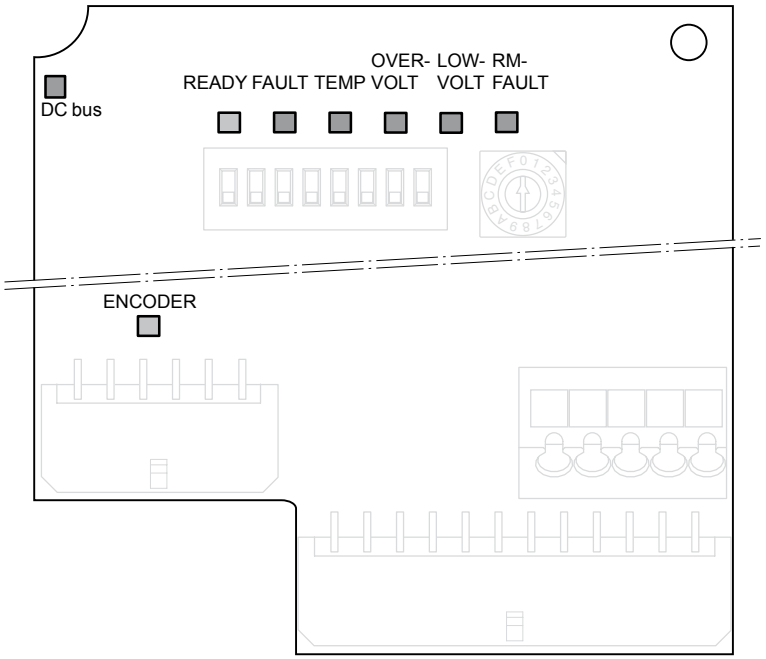
Signal outputs

The following signal outputs are available:

- Electronic ACTIVE_OUT relay contact to signal operating readiness
- 24 V signal output +BRAKE_OUT to control a motor holding brake (optional, only for SD326R)
- 24 V signal output RM-FAULT_OUT to signal an error during rotation monitoring (optional, only for SD326R)

Status indication

The LEDs indicate the current operating status.



Status indication

LED	Description
READY	Ready, power amplifier enabled, motor with current (1-level at ENABLE input signal)
FAULT	Short circuit between two motor phases or between motor phase and PE (ground)
TEMP (static)	Power amplifier overtemperature
TEMP (flashing) *(1)*	Motor overtemperature
OVER-VOLT	Overvoltage (> 410 V)
LOW-VOLT	Undervoltage (< 200 V)
RM-FAULT *(1)*	Error signal from rotation monitoring
OVER-VOLT, LOW-VOLT	Power amplifier disabled, motor without current
FAULT, TEMP, OVER-VOLT, LOW-VOLT	Frequency at signal interface too high

(1) SD326R only

Lexium SD3 motion control
SD326 stepper motor drives

Certifications			
Conformity to standards			Lexium Stepper Motor Drive SD3 have been developed to conform to the strictest international standards and with the recommendations for electronic control systems in the industry, specifically: low-voltage switchgear, IEC/EN 61800-5-1, IEC/EN 50178, IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals).
	EMC immunity		IEC/EN 61800-3, environments 1 and 2; IEC/EN 61000-4-2 level 3; IEC/EN 61000-4-3 level 3; IEC/EN 61000-4-4 level 4; IEC/EN 61000-4-5 level 3;
	Conducted and radiated EMC emissions		IEC/EN 61800-3, environments 1 and 2, categories C2, C3 ■ Devices without external mains filter: □ C3 up to 10 m motor cable length ■ Devices without external mains filter: □ C2 up to 20 m motor cable length □ C3 up to 50 m motor cable length
CE marking			The drives are CE marked in accordance with the European low voltage (2006/95/EC) and EMC (89/336/EEC) directives.
Product certification			UL (USA), cUL (Canada)
Ambient conditions			
Operating temperature *(1)*		**°C**	0 ... +50
Operating temperature when used in accordance with UL *(1)*		**°C**	0 ... +40
Transport and storage temperature		**°C**	-25 ... +70
Pollution degree			Level 2
Relative humidity		**%**	5 ... 85%, no condensation allowed
Max. installation height over m.s.l. without power loss		**m**	< 1000
		m	< 2000 at max. ambient temperature 40°C, no protective film and a lateral distance of > 50mm
Vibration test as per IEC/EN 60068-2-6			3 ... 13 Hz: 1.5 mm peak
			13 ... 150 Hz: 1 gn
Shock test as per IEC/EN 60068-2-27			15 gn for 11 ms
Degree of protection			IP 20
			IP 40 restricted: only from above without removal of protective film.

Electrical data				
Mains supply			**SD326●U25**	**SD326●U28**
Nominal voltage (switchable)		**V**	115 / 230 (1~)	
Max. nominal motor current		**A**	2.5	6.8
Nominal power (115 V / 230 V)		**W**	180 / 270	280 / 420
Max. permissible short circuit current of mains		**kA**	0.5	0.5
Fuse to be connected upstream (115V/230V)		**A**	6 / 6	10 / 6
Voltage range and tolerance	115 V~	**V**	100 - 15 % ... 120 + 10 %	
	230 V~	**V**	200 - 15 % ... 240 + 10 %	
Frequency		**Hz**	47 ... 63	
Transient overvoltages			Overvoltage category III	
Inrush current		**A**	< 60	
Leakage current (as per IEC 60990-3)		**mA**	< 30	
Signal interface (CN1)				
5 V optocoupler input signals				
Logic 1 (U_{high})		**V**	+2.5...+5.25	
Logic 0 (U_{low})		**V**	≤ 0.5	
Input current		**mA**	≤ 25	
Max. input frequency		**kHz**	≤ 200	
24 V optocoupler input signals				
Logic 1 (U_{high})		**V**	+15 ... +30	
Logic 0 (U_{low})		**V**	≤ 5	
Input current		**mA**	≤ 7	
Max. input frequency		**kHz**	≤ 200	
"Readiness" signal output			Electronic relay	
Max. switching voltage		**⎓V**	≤ 30	
Max. switching current		**mA**	≤ 200	
Voltage drop at 50 mA load		**V**	≤ 1	
Rotation monitoring interface (CN2, option)				
ENC_A/ENC_B signal input				
Voltage symmetrical		**V**	As per RS 422	
Input frequency		**kHz**	≤ 400	
ENC+5V_OUT signal output			Sense-controlled, short-circuit-proof, overload-proof	
Supply voltage		**V**	4.75 ... 5.25	
Max. output current		**mA**	≤ 100	
Voltage drop at 50 mA load		**V**	≤ 1	

(1) No icing

Electrical data (continued)			
24 V interface (CN3, option)			
24 V control voltage		As per IEC 61131-2	
Input voltage	**V**	24 -15% / +20%	
Current consumption	**A**	≤ 0.2	
Residual ripple	**%**	≤ 5	
24 V output signals		As per IEC 61131-2	
Output voltage	**V**	≤ 30	
Max. Switching current RM-FAULT_OUT	**V**	≤ 50	
Max. switching current +BRAKE_OUT	**A**	≤ 1.7	
Voltage drop at 50 mA load	**V**	≤ 1	
Mechanical data			
		SD326●U25	**SD326●U28**
Dimensions (W x H x D)	**mm**	72 x 145 x 140	
Mass	**kg**	1.1	1.2
Type of cooling		Convection	Fan
Max. speed of rotation of motor	**rpm**	3000	

Lexium SD3 motion control
SD326 stepper motor drives

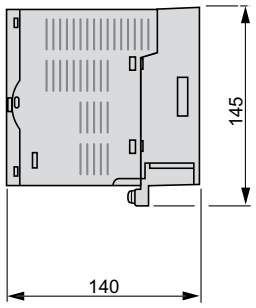
SD326 stepper motor drive

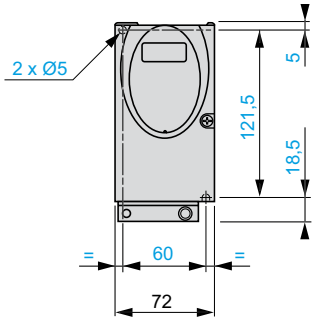
References

Example:	SD3	26	D	U25	S2
Product designation **SD3** = stepper motor drive 3-phase	**SD3**	26	D	U25	S2
Product type **26** = standard stepper motor drive	SD3	**26**	D	U25	S2
Interfaces **D** = pulse/direction without rotation monitoring **R** = pulse/direction with rotation monitoring and holding brake connection	SD3	26	**D**	U25	S2
Max. nominal motor current **U25** = 2.5A **U68** = 6.8A	SD3	26	D	**U25**	S2
Power amplifier supply voltage **S2** = 1~, 115 V~ / 230 V~ (switchable)	SD3	26	D	U25	**S2**

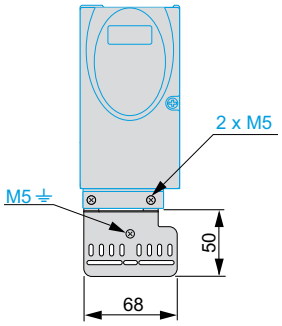
Dimensions

SD326, dimensions in mm





EMC mounting plate (included)



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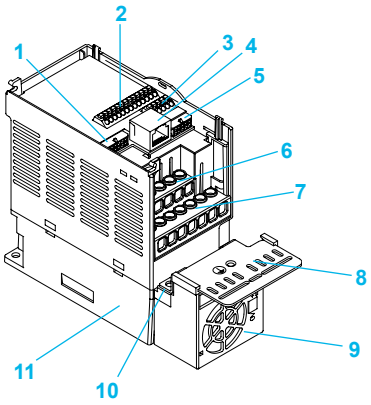
Lexium SD3 motion control
SD328 stepper motor drives



Description

Components and interfaces

1 12-pole socket CN2 for motor encoder
2 I/O signal connection CN1 (spring terminals)
- Analogue reference value input ±10 V in oscillator operating mode (SD328A only)
- CANopen for fieldbus control (SD328A only)
- PROFIBUS DP for fieldbus control (SD328B only)
- Eight digital inputs/outputs. The assignment depends on the selected operating mode.

3 Connection CN3 for 24 V power supply and holding brake
4 RJ45 socket CN4 for connection of:
- Fieldbus: Modbus or CANopen (SD328A only)
- PC with Lexium CT commissioning software
- Remote terminal

5 10-pole socket CN5 for input of pulse/direction or A/B encoder signals in "electronic gear" operating mode
6 Screw terminals for connecting the mains supply
7 Screw terminals for connecting the motor and external braking resistors
8 EMC mounting plate
9 Fan (SD328●U68 only)
10 Base for fastening of the EMC mounting plate
11 Heat sink

Drive system

The SD328 is a universally applicable stepper motor drive.
Reference values are typically preset and monitored by a master PLC or a Schneider Electric Motion Controller, e.g. LMC.
Together with selected Schneider Electric stepper motors, the unit is a very compact, high-performance drive system.

Control

Reference values are supplied via:
- CANopen, Modbus (SD328A) or PROFIBUS DP (SD328B):
  The CANopen interface of the SD328A can be used for connection of a CANopen AutomationBus or CANopen MotionBus.
  Movements of up to eight drive axes can be synchronously controlled by one Motion Controller (e.g. Lexium Motion Controller) via the CANopen MotionBus.
- ±10 V analogue signals for "Oscillator" operating mode (SD328A)
- Pulse/direction signals or A/B encoder signals for implementing an electronic gear

Rotation monitoring / motor monitoring

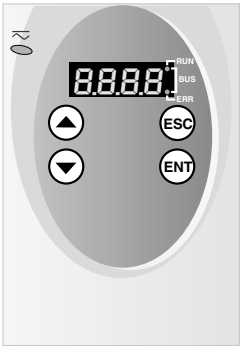
If a stepper motor with integrated encoder is connected to the stepper motor drive, the following functions can be activated:
- Rotation monitoring
  The calculated reference position and the actual position of the motor are compared. If a defined deviation is exceeded, a rotation monitoring error is signalled.
- Line monitoring:
  A cable error is signalled if a defective or missing cable is detected.
- Motor temperature monitoring:
  The device shuts off if the motor temperature is too high.

Holding brake output

The stepper motor drive has an output for direct connection of an optional holding brake.

"Safe Torque Off" safety function (Power Removal "PWRR")

The integrated "Safe Torque Off" safety function enables a category 0 or 1 stop as per IEC/EN 60204-1 without external power contactors. The supply voltage does not have to be interrupted. This reduces the system costs and response times.
The drive system fulfils the requirements of IEC/EN 61508 SIL2 as well as of ISO 13849-1, performance level "d" (PL d), and IEC/EN 61800-5-2 ("STO").



Integrated control panel (HMI)

Remote terminal

Lexium CT PC commissioning software

Local communication

Overview

The SD328 stepper motor drive can be operated locally as follows:
- Integrated control panel (HMI - Human Machine Interface) an the SD328 with keys and display
- Remote terminal
- Lexium CT PC commissioning software

Integrated control panel (HMI)

The integrated control panel (HMI) allows the user to edit parameters. It is also possible to display the results of diagnostics functions.
Among other things, the integrated control panel (HMI) provides the following features:
- Initial settings:
  - Motor selection
  - Fieldbus address and baud rate
  - Logic type of digital inputs and outputs (SD328A only)
- Device settings:
  - Special ratios
  - Phase current components for standstill, acceleration and constant movement
- Device configuration
  - Processing the motor encoder position
  - Signal selection at position interface
  - Definition of direction of rotation
  - Time delay for releasing and applying the holding brake
- Jog motor manually
- Error display
- Status information:
  - Status of digital inputs and outputs
  - Actual speed of rotation and actual position of the motor
  - DC bus voltage of power amplifier supply voltage
  - Temperature of stepper motor drive and motor
  - Saved warnings and monitoring signals
  - Operating hours counter

Remote terminal

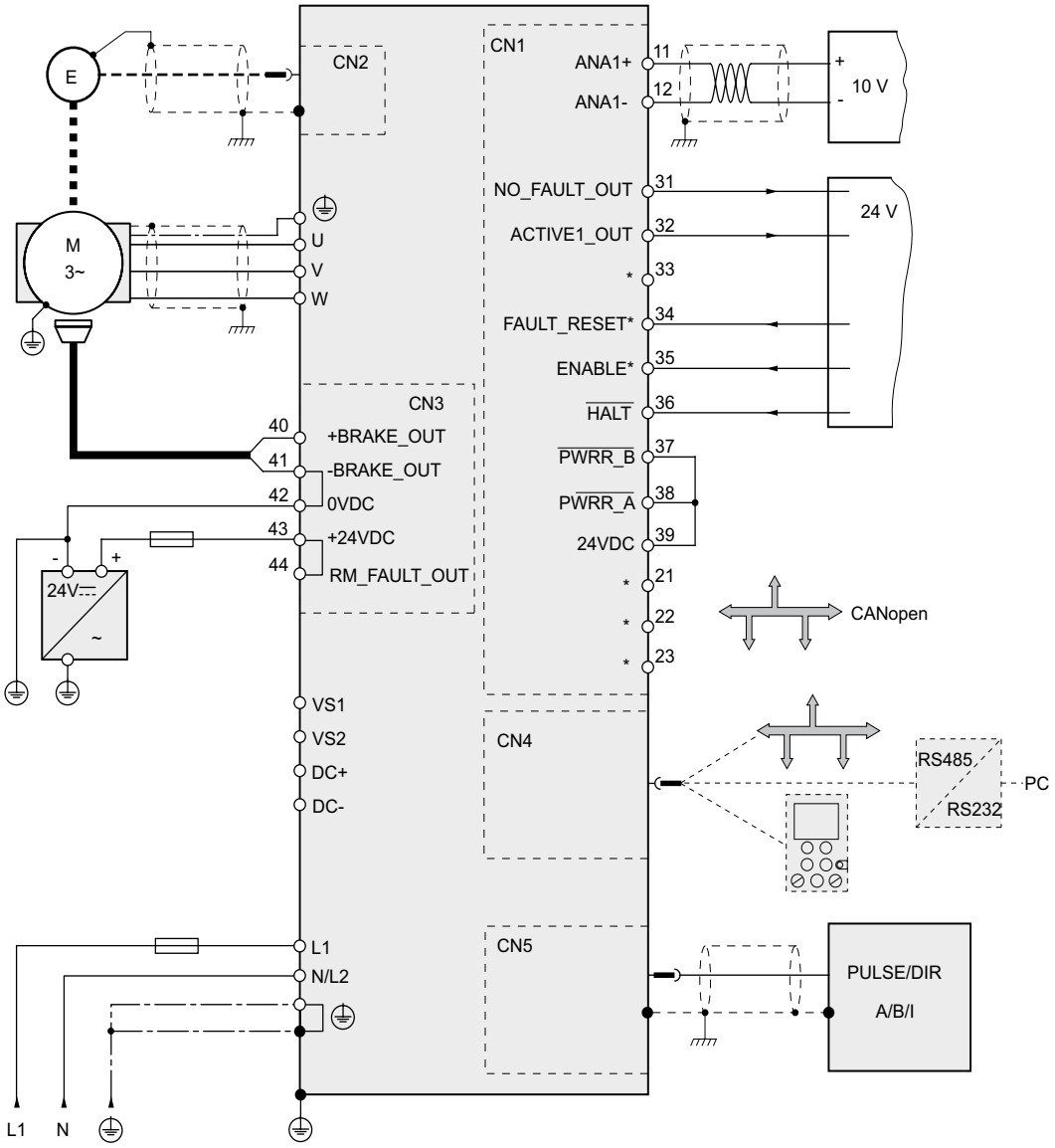
A remote terminal can be connected to the SD328 stepper motor drive, which can be mounted to a control cabinet door with a seal with IP 65 degree of protection.
The remote terminal has a display and enables access to the same functions as the control panel (HMI) integrated into the stepper motor drive.

Lexium CT PC commissioning software

The Windows-based Lexium CT PC commissioning software is used for easy commissioning, parameterisation, simulation and diagnostics of the SD328 stepper motor drive.
The Lexium CT PC commissioning software allows the user to load and save controller parameters and motor data.
As compared to the integrated control panel (HMI), the Lexium CT PC commissioning software offers additional features such as:
- Graphical user interface for parameterisation and status display
- Comprehensive diagnostics tools for optimisation and maintenance
- Long-term recording as an aid to assessing operational behaviour
- Testing input and output signals
- Tracking signal sequences on the monitor
- Archiving of all device settings and recordings (with export functions for data processing).

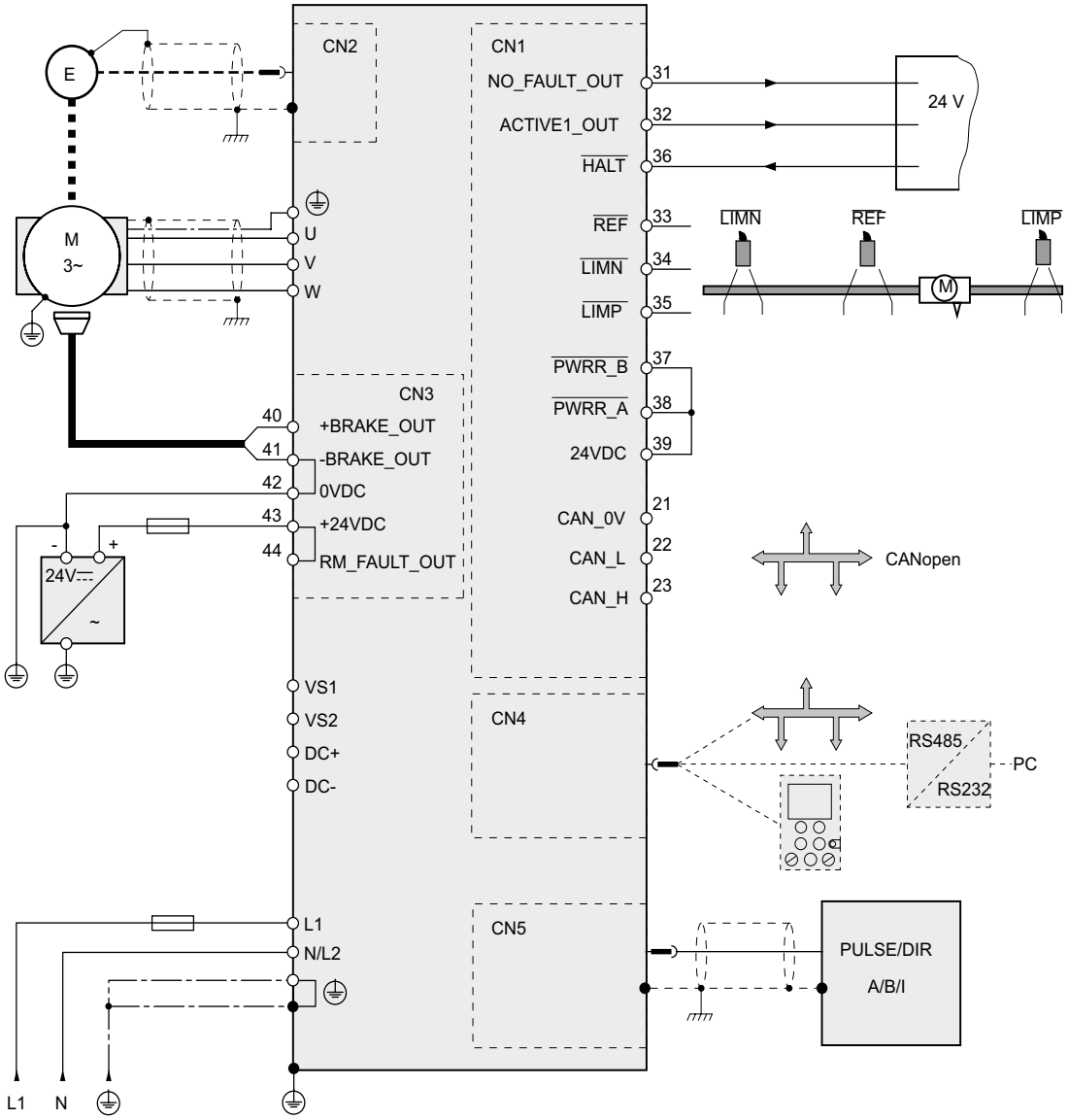
Lexium SD3 motion control
SD328 stepper motor drives

Schemes
SD328A connection example with local control



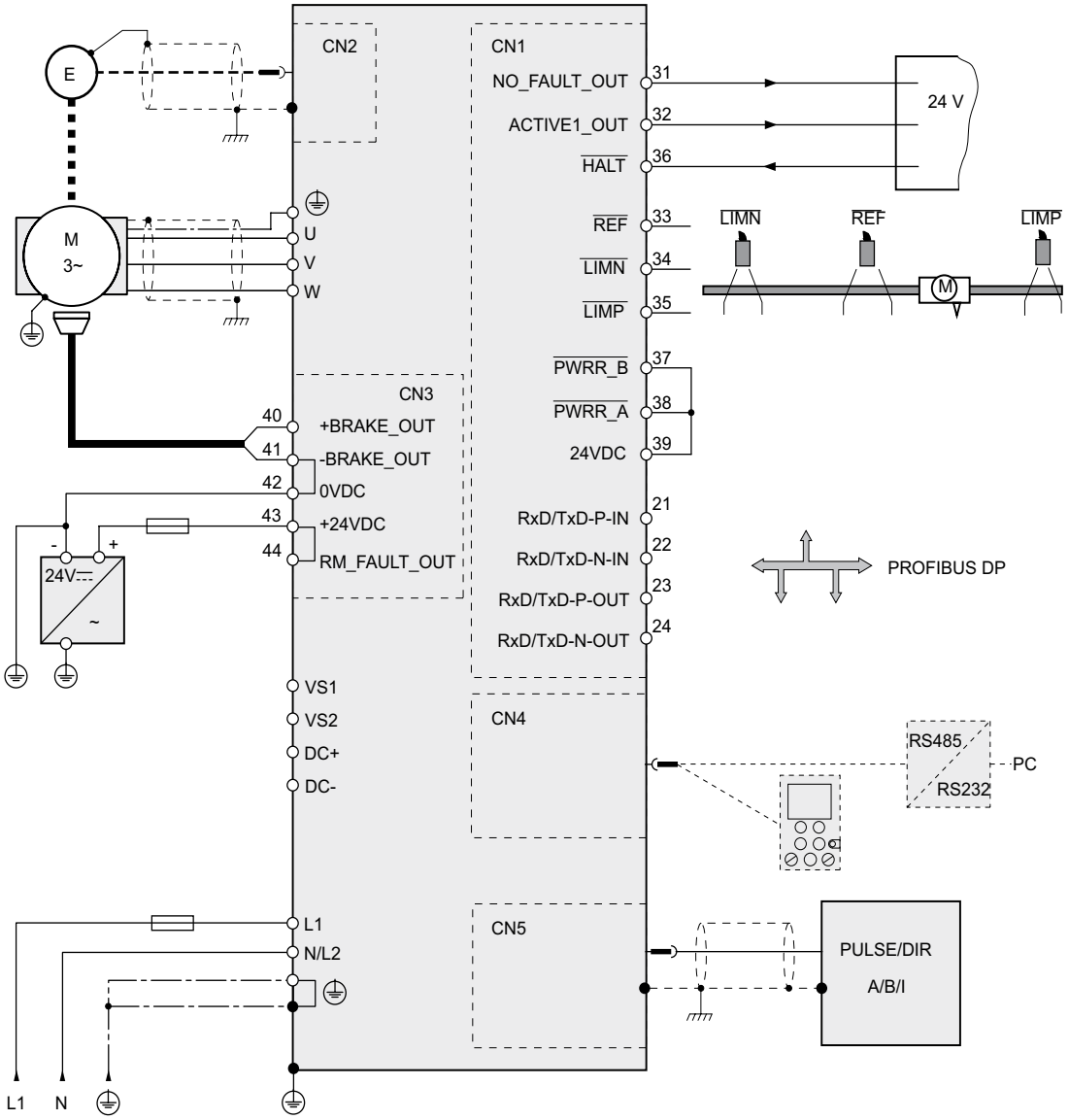
SD328A connection example with local control via ±10 V analogue signals

SD328A connection example with fieldbus control



SD328A connection example with fieldbus control (CANopen)

SD328B connection example with fieldbus control



SD328B connection example with fieldbus control (PROFIBUS DP)

Lexium SD3 motion control
SD328 stepper motor drives

Commissioning functions

The following tools can be used to commission the device:
- Integrated control panel (HMI)
- Remote terminal
- Lexium CT PC commissioning software
- Fieldbus

Two important commissioning functions of the SD328A are explained below. Please refer to the documentation for the stepper motor drive for a detailed description of the commissioning functions.

Control via fieldbus or local (SD328A only)

When the stepper motor drive is started for the first time, the user must specify whether access and parameterisation will be via local control or via fieldbus. This setting can only be modified by restoring the factory settings. The operating modes available for the stepper motor drive also depend on this setting.

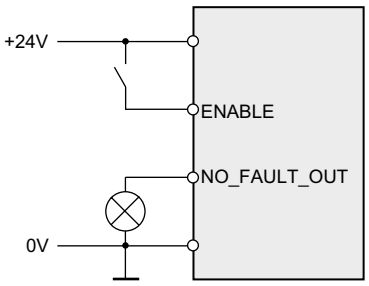
In the case of local control, the integrated control panel (HMI), the remote terminal (equivalent to the integrated control panel in terms of functions) or the Lexium CT PC commissioning software is used for parameterisation. Movements are then preset with a ±10 V analogue signal or with RS 422 signals (pulse/direction signals). Limit switches or reference switches cannot be connected in the case of local control.

In fieldbus control mode, all communication takes place via fieldbus commands.

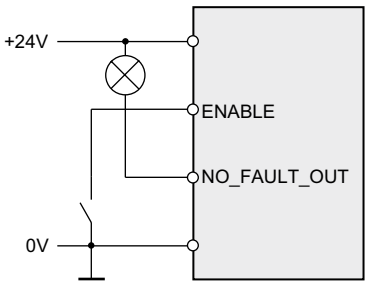
Determining the logic type of signals (SD328A only)

The signal logic (positive or negative) of the 24 V inputs and outputs can be defined during commissioning.
This setting affects the wiring and the way sensors are controlled and must be clarified in the engineering phase with regard to the application.
The SD328A can switch the ⎓ 24 V signal inputs and outputs as follows:
- "Source" logic type:
  signal output supplies current, current flows into the signal input
- "Sink" logic type:
  signal output draws current, current flows from the signal input

By default the device is set to the "Source" logic type.
The PWRR_A and PWRR_B signal inputs for the "Safe Torque Off" safety function (Power Removal "PWRR") always have the "Source" logic type regardless of the setting.



Logic type (Source)



Logic type (Sink)

Operating modes

Overview of operating modes

Operating mode	with SD3..		Control via		Reference value set via
	28 A	28B	Fieldbus	Local	
Jog	■	■	■	■	Fieldbus, Lexium CT PC commissioning software, integrated control panel (HMI)
Oscillator	■	■	■	■	Fieldbus, Lexium CT PC commissioning software, ±10 V analogue signals
Electronic gear	■	■	■	■	Pulse/direction signals, A/B encoder signals
Profile position mode	■	■	■	■	Fieldbus, Lexium CT PC commissioning software
Profile velocity	■	■	■	■	Fieldbus, Lexium CT PC commissioning software
Homing	■	■	■	■	Fieldbus, Lexium CT PC commissioning software
Motion sequence	■	■	■	■	Fieldbus, Lexium CT PC commissioning software

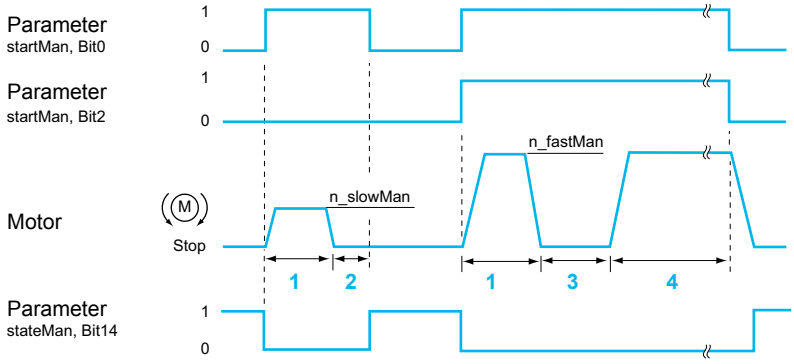
■ Operating mode available
■ Operating mode not available

Jog

The motor moves by one distance unit or at constant speed in continuous operation. The length of the distance unit, the speed levels and the change-over time in continuous operation can be adjusted manually.

Reference value setting
The reference values are set via fieldbus, with the Lexium CT PC commissioning software or the integrated control panel (HMI).

Application example
Setting up a machine during commissioning



Jog, slow and fast

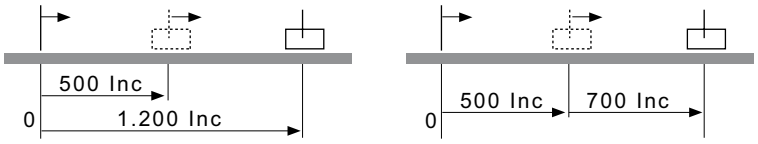
1 JOGstepusr
2 t < JOGtime
3 t > JOGtime
4 Continuous operation

Jog distance, wait time and jog speed can be set. If the jog distance is zero, jog starts directly with continuous movement irrespective of the wait time.

Profile position mode

In the operating mode “Profile Position”, the motor is positioned from a point A to a point B with a positioning command.

Settings
The positioning path can be specified in two ways:
- Absolute positioning, reference point is the zero point of the axis
- Relative positioning, reference point is the current position of the motor



Operating mode “Profile Position”, absolute and relative

Reference value setting
The reference values are set via fieldbus or with the Lexium CT PC commissioning software.

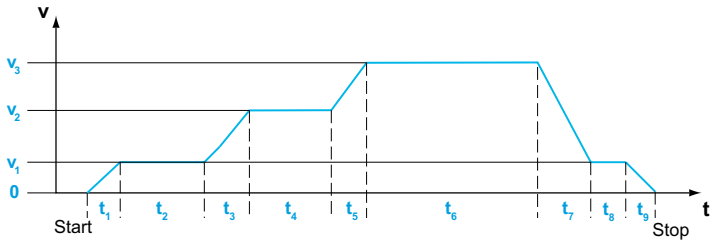
Application example
Pick-and-place with a linear robot

Profile velocity

In operating mode “Profile velocity”, a reference speed for the motor is set and a movement without a target position is started. This speed is maintained until a different reference speed is specified or the operating mode is changed.

Reference value setting
The reference values are set via fieldbus or with the Lexium CT PC commissioning software.

Application example
Paint application in CD manufacture



Profile velocity

t1, t3, t5 = acceleration
t2, t4, t6, t8 = constant movement
t7, t9 = braking

5

5

Homing

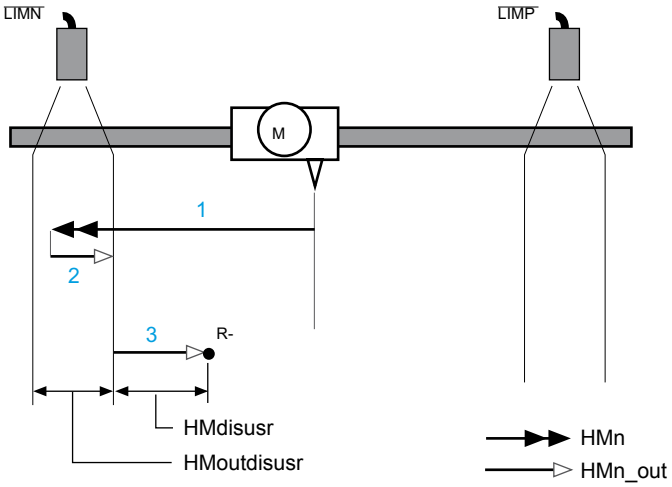
There are two types of homing:
- Reference movement
  Specifying the dimension reference by approach to a limit or reference switch
- Position setting
  Specifying the position reference relative to the current motor position

Reference movement
During reference movement, the motor moves to a defined position on the axis. The defined position is defined with a mechanical switch:
- LIMN and LIMP limit switches
- REF reference switch

Types of reference movements
4 standard reference movements are available
- Movement to negative limit switch LIMN
- Movement to positive limit switch LIMP
- Movement to reference switch REF with counterclockwise direction of rotation
- Movement to reference switch REF with clockwise direction of rotation

In addition, a reference movement can be with or without index pulse.
- Reference movement without index pulse
- Movement from switching edge to a parameterisable distance from the switching edge
- Reference movement with index pulse
- Movement from the switching edge to the physical index pulse of the motor

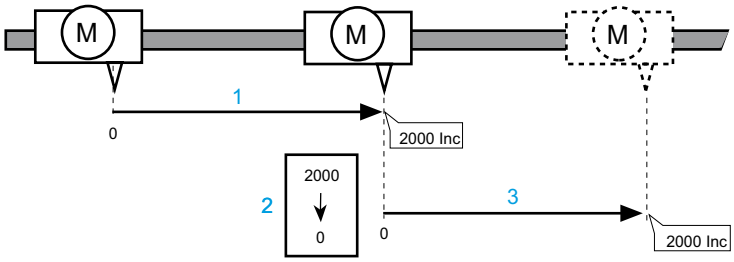
Example 1: Reference movement to limit switch



Operating mode "Homing", reference movement to the negative limit switch

1 Movement to limit switch at search speed
2 Movement to switching edge at clearance speed
3 Movement to distance from switching edge at clearance speed

Example 2: position setting
Position setting can be used to execute a continuous motor movement without overtravelling the positioning limits.



Positioning by 4000 increments with position setting

1 The motor is positioned by 2000 increments.
2 The current motor position is set to position value 0 by position setting to 0 and the new zero point is defined at the same time.
3 The new target position is 2000 increments after a new movement command by 2000 increments is triggered.

This procedure prevents overtravel of the absolute position limits during positioning, because the zero point is set continuously.

Reference value setting
The reference values are set via fieldbus or with the Lexium CT PC commissioning software.

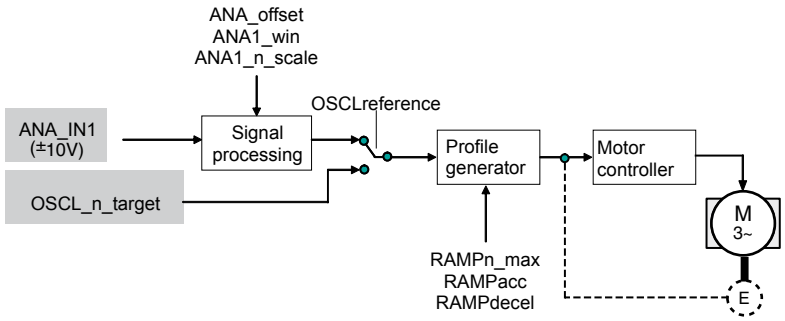
Application example
Prior to absolute positioning in “Profile Position” mode.

Oscillator (SD328A only)

In “Oscillator” operating mode, the speed of rotation of the motor is set via a ±10-V analogue signal or via fieldbus parameters.

Reference value setting
The reference values are set via fieldbus, with the Lexium CT PC commissioning software or ±10-V analogue signals.

Application example
Roller control in roller conveyors.



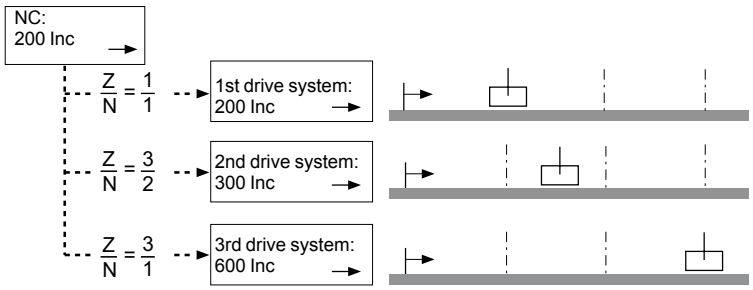
Overview of “Oscillator” operating mode

Electronic gear

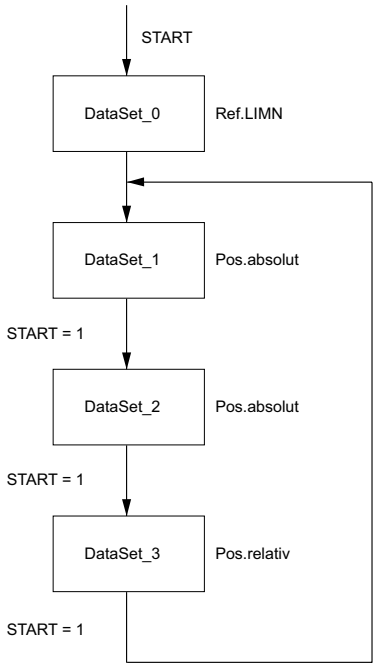
In “Electronic Gear” operating mode, the reference signals are supplied from an encoder (A/B signals) or a controller (pulse/direction signals) and a new position reference value is calculated using an adjustable gear ratio.

Reference value setting
The reference values are supplied as pulse/direction or A/B encoder signals.

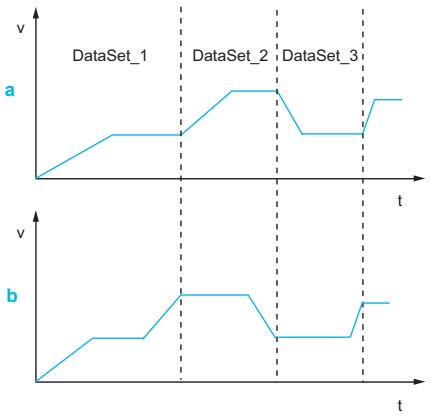
Application example
Synchronisation of motion sequences, e.g. cutting material on a conveyor belt.



“Electronic gear” operating mode



Example of sequential selection of movement commands



Blended movement

"Motion Sequence" operating mode

Presentation

In the "Motion Sequence" operating mode, up to 16 data sets with movement commands can be activated directly or sequentially with a PC, fieldbus or digital inputs. The movement commands can include reference movements or positioning commands. This way, a motion sequence can be saved in the drive system and controlled via a master PLC.
The Lexium CT PC commissioning software or the fieldbus is used to enter data sets and parameterise the drive system.

Direct selection of movement commands

The direct selection of movement commands is used if a master controller (e.g. PLC) controls the time coordination of the various data sets. The data set to be processed is selected via signal inputs and then activated by a start signal.

Sequential selection of movement commands

Sequential selection of the movement commands is used for processing simple motion sequences. The time coordination is programmed in the individual data sets via specification of a wait time, a transition condition and the subsequent data set. A transition condition can be, for instance, a rising edge at the START signal input.
A motion sequence can also be executed cyclically with or without return to the initial position.

Processing status of a movement command

The processing status of a movement command can be output via the handshake output. In addition, an internal processing status such as "drive system in motion" can be output via an additional signal output.

Selection of the motion profile

Speeds and accelerations are saved in motion profiles. One of the motion profiles can be assigned to every movement command data set.

Blended movement

In the case of sequential selection of movement commands, a blended movement can be specified as a transition condition in the data set. When the target position is reached, the drive accelerates or decelerates to the speed of the subsequent data set.
There are two types of blended movement:

Blended movement a
After reaching the target position, the drive switches to the speed of the subsequent data set.

Blended movement b
When the target position is reached, the drive is to have speed of the subsequent data set.

"Safe Torque Off" ("Power Removal") safety function

The SD328 stepper motor drive integrates the "Safe Torque Off" ("Power Removal") safety function which prevents unintended operation of the servo motor. The servo motor no longer produces any torque if the safety function is active.

This safety function:

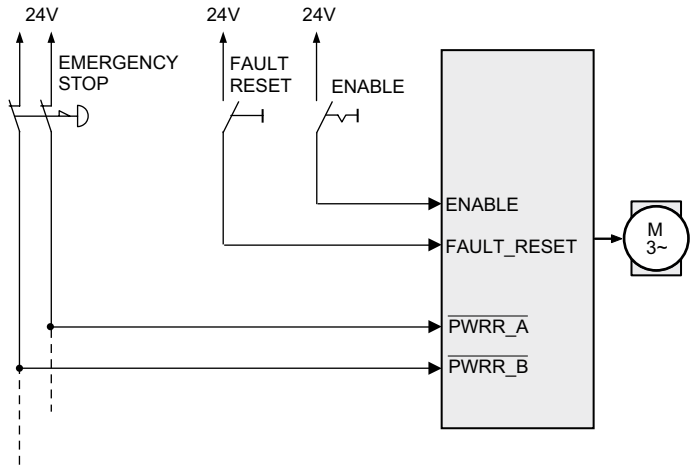
- Complies with the machine safety standard ISO 13849-1, perfomance level "d" (PL d).
- Complies with the standard for functional safety IEC/EN 61508, SIL2 capability (safety control-signalling applied to processes and systems). The SIL (Safety Integrity Level) capability depends on the connection diagram for the servo drive and for the safety function. Failure to observe the setup recommendations could inhibit the SIL capability of the "Safe Torque Off" ("Power Removal") safety function.
- Complies with the product standard IEC/EN 61800-5-2 "Adjustable speed electrical power drive systems – Part 5-2: Safety requirements – Functional" for both stop functions:
  - Safe Torque Off ("STO") corresponds to Category 0 stop according to IEC/EN 60204-1. Standstill by immediate power shutdown to the machine drive elements (i.e. an uncontrolled stop).
  - Safe Stop 1 ("SS1") corresponds to Category 1 stop according to IEC/EN 60204-1. A controlled stop in which the machine drive elements are retained to effect the standstill. The final shutdown is ensured by an external Emergency stop module with safe time delay, e.g. Preventa XPS-AV *(1)*.

The "Safe Torque Off" ("Power Removal") safety function has a redundant electronic architecture which is monitored continuously by a diagnostics function *(2)*.

This PL d and SIL2 safety function is certified as conforming to these standards by the TÜV certification body in the context of a voluntary certification.

(1) Please refer to the "Safety functions and solutions using Preventa" catalogue.
(2) Redundant: Consists of mitigating the effects of the failure of one component by means of the correct operation of another, assuming that faults do not occur simultaneously on both.

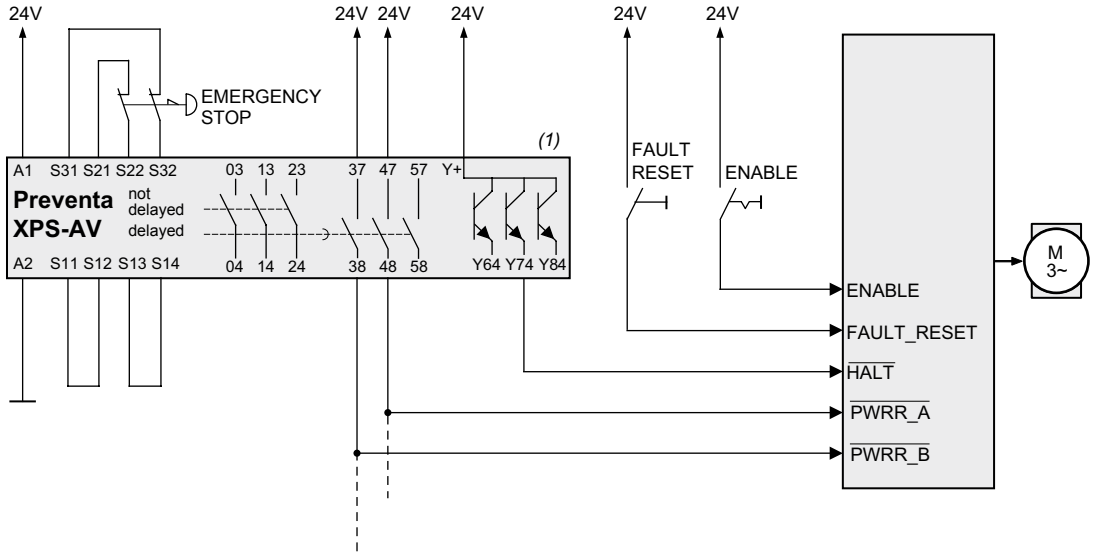
Examples of applications of the safety function



Example category 0 stop

"Safe Torque Off" ("Power Removal") safety function (continued)

Examples of applications of the safety function



Example category 1 stop

Additional operating functions

Additional monitoring and operating functions can be activated via fieldbus, the Lexium CT PC commissioning software or the integrated control panel (HMI):

- ■ Setting motor phase current
- ■ Monitoring functions
- □ Status monitoring during movements
- □ Monitoring of axis signals
- □ Monitoring of internal device signals
- □ Earth (ground) fault and short-circuit monitoring
- ■ Scaling for conversion of user-defined units to internal units
- ■ Setting motion profile via profile generator
- ■ Triggering Quick Stop function
- ■ Setting HALT signal
- ■ Fast position capture
- ■ Velocity window
- ■ Triggering brake functions for motors with holding brake
- ■ Configurable inputs and outputs
- ■ Reversing direction of rotation of motor
- ■ Restoring default values

(1) Preventa XPS-AV, please refer to the "Safety functions and solutions using Preventa" catalogue.

Lexium SD3 motion control
SD328 stepper motor drives

Certifications

Conformity to standards			Lexium Stepper Motor Drive SD3 have been developed to conform to the strictest international standards and with the recommendations for electronic control systems in the industry (IEC, EN), specifically: low-voltage switchgear, IEC/EN 61800-5-1, IEC/EN 50178, IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals)
	EMC immunity		IEC/EN 61800-3, environments 1 and 2; IEC/EN 61000-4-2 level 3; IEC/EN 61000-4-3 level 3; IEC/EN 61000-4-4 level 4; IEC/EN 61000-4-5 level 3;
	Conducted and radiated EMC emissions		IEC/EN 61800-3: 2001-02 ; IEC 61800-3, ed.2 ■ Devices without external mains filter: □ C3 up to 10m motor cable length ■ Devices without external mains filter: □ C2 up to 20m motor cable length □ C3 up to 50m motor cable length
CE marking			The drives are CE marked in accordance with the European low voltage (2006/95/EC) and EMC (89/336/EEC) directives.
Product certification			UL (USA), cUL (Canada)
			TÜV certification: SD328 stepper motor drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*	**°C**	0 ... +50
Transport and storage temperature	**°C**	-25 ... +70
Pollution degree		Level 2
Relative humidity	**%**	5 ... 85, no condensation allowed
Installation height over m.s.l. without power loss	**m**	< 1000
	m	< 2000 at max. ambient temperature 40°C, no protective film and a lateral distance of > 50mm
Vibration test as per IEC/EN 60068-2-6		3 ... 13 Hz: 1.5 mm peak
		13 ... 150 Hz: 1 gn
Shock test as per IEC/EN 60068-2-27		15 gn for 11 ms
Degree of protection		IP 20
		IP 40 restricted: only from above without removal of protective film.

Electrical data

Mains supply		**SD328●U25**	**SD328●U28**
Nominal voltage (switchable)	**V**	115 / 230 (1~)	115 / 230 (1~)
Current consumption (115 V/230 V)	**A**	4 / 3	7 / 5
Max. nominal motor current	**A**	2.5	6.8
Max. speed of rotation of motor	**rpm**	3000	3000
Nominal power (115 V / 230 V)	**W**	180 / 270	280 / 420
Max. permissible short circuit current of mains	**kA**	0.5	0.5
Power loss	**W**	≤ 26	≤ 65
Fuse to be connected upstream (115V/230V) *(2)*	**A**	6 / 6	10 / 6
Voltage range and tolerance 115 V~	**V**	100 - 15 % ... 120 + 10 %	
230 V~	**V**	200 - 15 % ... 240 + 10 %	
Frequency	**Hz**	50 - 5% ... 60 + 5%	
Transient overvoltages		Overvoltage category III	
Inrush current	**A**	< 60	
Leakage current (as per IEC 60990-3; motor cable length < 10 m)	**mA**	<30	
Fan			
Input voltage	**V⎓**	–	24
Current consumption	**mA**	–	130

(1) No icing
(2) Fuses: class CC fuses or as per UL 248-4, alternatively automatic circuit breakers with B or C characteristic

Electrical data (continued)		
Signal interface (CN1)		
Analogue input signals (SD328A only)		
Differential input voltage range	**V**	-10 ... +10
Resistance	**kΩ**	≥ 10
Resolution ANA1	**bit**	14
Sampling time ANA1	**ms**	0.25
Interface for rotation monitoring (CN2)		
ENC+5V_OUT signal output		sense-controlled, short-circuit-proof, overload-proof
Supply voltage	**V**	4.75 ... 5.25
Max. output current	**mA**	≤ 100
Signal input ENC_A, ENC_B, ENC_I		
Voltage symmetrical	**V**	As per RS 422
Input frequency A/B	**kHz**	≤ 400
Input frequency pulse/direction	**kHz**	≤ 200
24 V interface (CN3)		
24 V control voltage		As per IEC 61131-2
Input voltage	**V**	24 -15% / +20%
Current consumption *(1)*	**A**	≤ 0.2
Residual ripple	**%**	< 5
24 V input signals		As per IEC 61131-2
Logic 1 (U_{high})	**V**	+15 ... +30
Logic 0 (U_{low})	**V**	-3 ... +5
Input current (typical)	**mA**	≤ 10
Debounce time *(2)*	**ms**	1 ... 1.5
Debounce time PWRR_A and PWRR_B	**ms**	1 ... 5
Max. time offset until detection of signal differences between PWRR_A and PWRR_B	**s**	≤ 1
Debounce time CAP1 and CAP2	**µs**	1 ... 10
24 V output signals		As per IEC 61131-2
Output voltage	**V**	≤ 30
Max. switching current	**mA**	≤ 50
Voltage drop at 50 mA load	**V**	≤ 1
Pulse/direction interface (CN5)		
Symmetrical		As per RS 422
Resistance	**kΩ**	5
Pulse/direction frequency	**kHz**	≤ 200
A/B frequency	**kHz**	< 400
CANopen interface (CN1 or CN4) (SD328A only)		
Connections		RJ45 connector (CN4); spring terminals (CN1)
Network management		Slave
Baud rate	**kbps**	125 / 250 / 500 / 1024
Address (node ID)		1 ... 127; configurable with the integrated control panel (HMI) or the Lexium CT PC commissioning software
Max. number of connected stepper motor drives		127
Polarisation		A switchable line terminal resistor is integrated into the stepper motor drives.
Device file		The EDS device file can be downloaded from www.schneider-electric.com.

(1) Without load at the outputs
(2) Except for PWRR_A, PWRR_B, CAP1 and CAP2

Electrical data (continued)

Services		
PDO (Process Data Objects)		Implicit exchange of PDOs (Process Data Objects) ■ 3 PDOs as per DSP 402 (operating modes “Profile Position” and “Profile Velocity”) ■ 1 PDO with freely configurable assignment
PDO operating modes		Event triggering, time triggering, remotely requested; sync, cyclic and acyclic
PDO mapping		1 PDO configurable
SDO		Explicit exchange of SDOs (Service Data Objects) ■ 2 SDO receive ■ 2 SDO send
Emergency		Yes
Profile		CiA DSP 402: CANopen device profile drives and axis control, “Profile Position” and “Profile Velocity” operating modes
Communication monitoring		Node monitoring “Node Guarding”, “Heartbeat”
Diagnostics		2 LED RUN (operation) and ERR (error) on integrated control panel (HMI); Errors are displayed on the integrated control panel (HMI) with the 7-segment display; complete diagnostics data with the Lexium CT PC commissioning software
PROFIBUS DP interface (CN1) (SD328B only)		
Signals		The PROFIBUS DP signals comply with the Profibus standard and are short-circuit protected.
Modbus interface (CN4) (SD328A only)		
Connections		RJ45 connector (CN4)
Physical interface		2-wire, multipoint RS 485
Transmission mode		RTU
Baud rate	**bps**	9600 / 19200 / 38400
Address (node ID)		1 ... 247; configurable with the integrated control panel (HMI) or the Lexium CT PC commissioning software
Max. number of connected stepper motor drives		31
Polarisation		No polarisation impedance. Must be supplied by the wiring system, e.g. in master.
Format		Configurable with the integrated control panel (HMI) or the Lexium CT PC commissioning software ■ 8 bit, odd parity, 1 stop bit ■ 8 bit, even parity, 1 stop bit ■ 8 bit, no parity, 1 stop bit ■ 8 bit, no parity, 2 stop bits
Diagnostics		Errors are displayed by the 7-segment display on the integrated HMI.
Message administration		■ Read hold register (03), max. 63 words ■ Write single register (06) ■ Write multiple registers (16), max. 61 words ■ Read/write multiple registers (23), max. 63/59 words ■ Read device ID (43) ■ Diagnostics (08)
Communication monitoring		Monitoring function (node guarding) can be activated. The timeout can be set from 0.1 s to 10 s.

"Safe Torque Off" safety function (Power Removal "PWRR")			
Protection	Of the machine		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level "d" (PL d), and standard IEC/EN 61800-5-2.
	Of the system process		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2.

Mechanical data			
		SD328●U25	**SD328●U28**
Dimensions (W x H x D)	**mm**	72 x 145 x 140	
Mass	**kg**	1.1	1.2
Type of cooling		Convection	Fan
Max. speed of rotation of motor	**rpm**	3000	

Lexium SD3 motion control
SD328 stepper motor drives

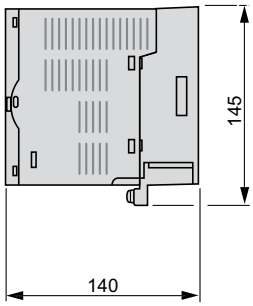
SD328 stepper motor drive

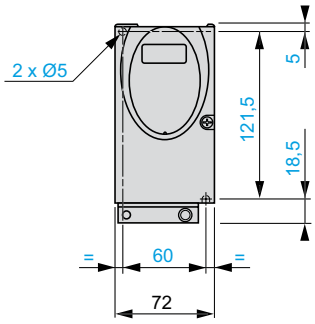
References

Example:	SD3	28	A	U25	S2
Product designation **SD3** = stepper motor drive 3-phase	**SD3**	28	A	U25	S2
Product type **28** = standard stepper motor drive for fieldbus	SD3	**28**	A	U25	S2
Interfaces **A** = CANopen fieldbus, Modbus fieldbus and analogue input **B** = PROFIBUS DP fieldbus	SD3	28	**A**	U25	S2
Max. motor phase current **U25** = 2.5A **U68** = 6.8A	SD3	28	A	**U25**	S2
Power amplifier supply voltage **S2** = 1~, 115 V~ / 230 V~ (switching)	SD3	28	A	U25	**S2**

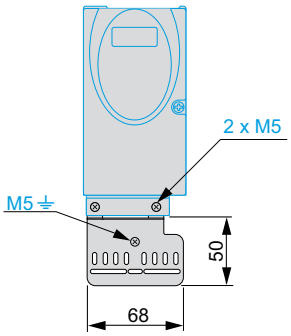
Dimensions

SD328, dimensions in mm





EMC mounting plate (included)



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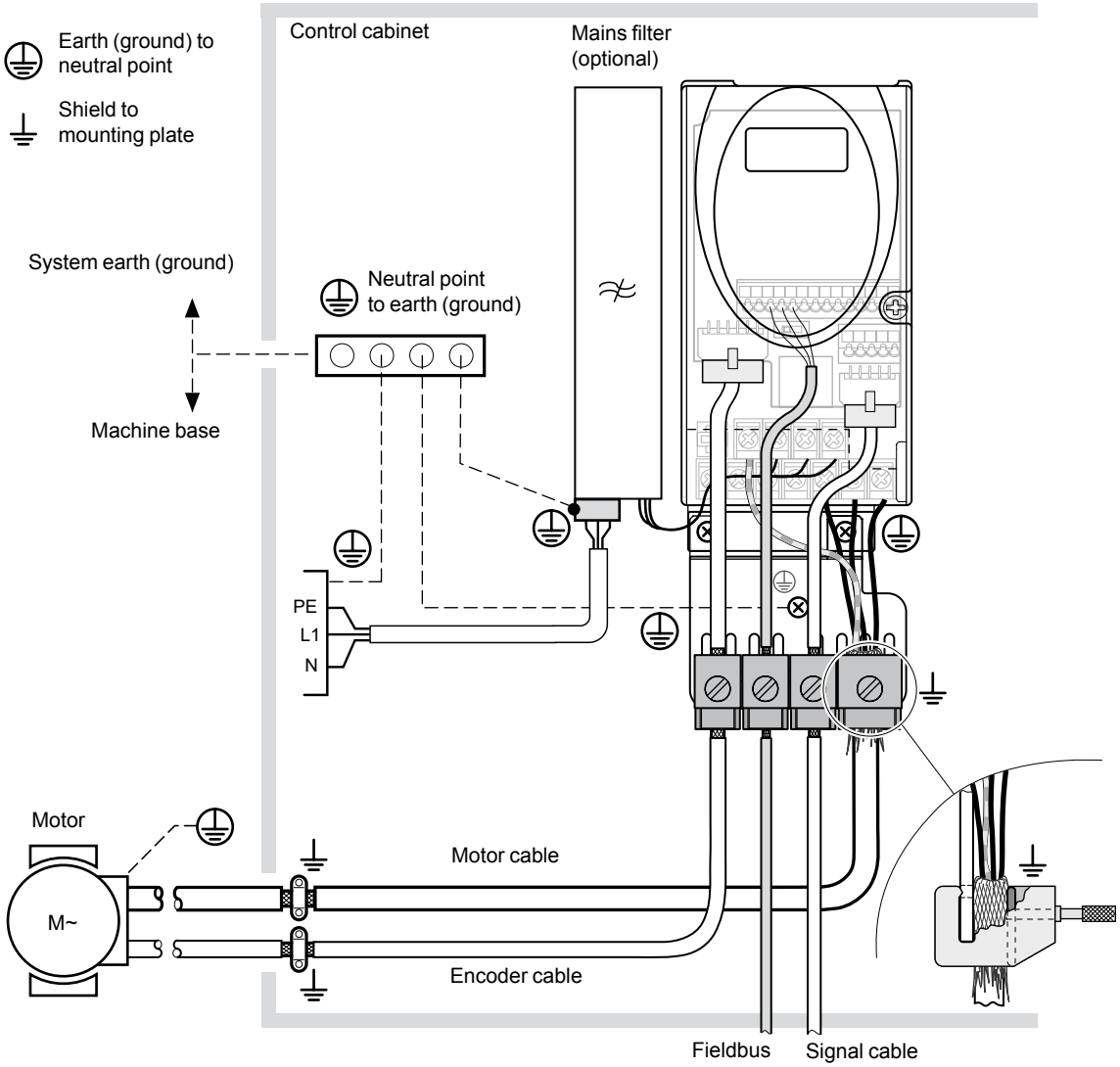
Mounting and installation recommendations

EMC-compliant installation

The SD3 stepper motor drive meets the EMC requirements for the second environment as per IEC 61800-3.
An EMC-compliant design is required to comply with the specified limit values. Depending on the application, better results can be achieved with the following measures:

- Upstream mains reactors. Information on current harmonics can be obtained on request.
- Upstream external mains filters, particularly to comply with the limit values for the first environment (residential area, category C2)
- EMC-compliant design, e.g. in an enclosed control cabinet with 15 dB damping of radiated interference

EMC measures for SD3 stepper motor drive systems

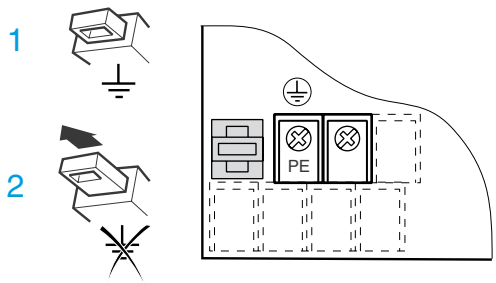


Operation in IT mains

An IT mains is characterised by a neutral conductor that is isolated or earthed through a high impedance. If permanent isolation monitoring is used, it must be suitable for non-linear loads (e.g. type XM200 from Schneider Electric). If an error is signalled in spite of correct wiring, the earth connection of the Y capacitors of products with an integrated mains filter can be disconnected (deactivate Y capacitors).

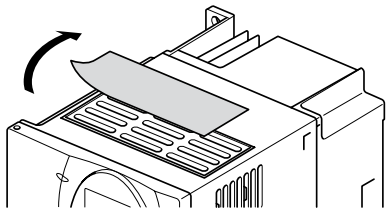
In the case of all other mains systems except for IT mains the earth connection via the Y capacitors remain effective.

If the earth connection of the Y capacitors is disconnected, the specifications for radiation of electromagnetic interference are no longer complied with! Always ensure compliance with national regulations and standards by means of separate measures.



Operation in IT mains

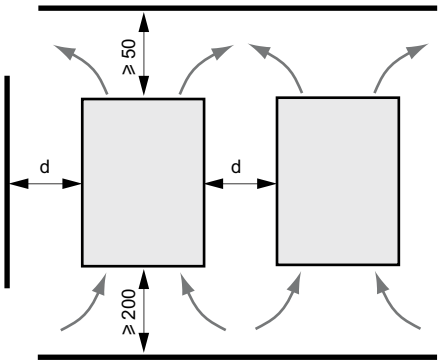
Isolation monitoring error
1 Y capacitors of the internal filter effective (standard)
2 Y capacitors of the internal filter deactivated (IT mains)

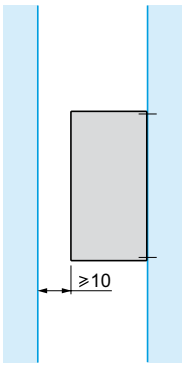


Mounting distances and ventilation

The SD32●●U25 stepper motor drives are ventilated by air circulation from bottom to top. A fan is included with the SD32●●U68 stepper motor drives, which must be mounted to the bottom side of the stepper motor drive.
Note the following when positioning the stepper motor drive in the control cabinet:

- Adequate cooling of the stepper motor drive must be ensured by complying with the minimum installation distances. Prevent heat accumulation.
- The stepper motor drive must not be installed close to heat sources or mounted on flammable materials.
- The warm airflow from other devices and components must not heat the air used for cooling the stepper motor drive.
- The stepper motor drive will switch off as a result of overtemperature when operated above the thermal limits.

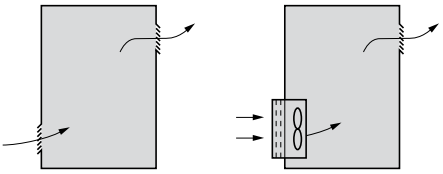




Ambient temperature	Mounting distances	Mounting recommendations	
		Without protective film *(1)*	With protective film
0 ... +40 °C	d > 50 mm	None	None
	d < 50 mm	None	d > 10 mm
+40 ... +50 °C	d > 50 mm	None	Reduce nominal current and continuous current by 2.2 % per °C above 40°C
	d < 50 mm	Reduce nominal current and continuous current	Operation not possible

(1) Recommendation: remove protective film after installation.

The connector cables are routed out of the housing at the bottom. At least 200 mm of free space is required below the stepper motor drive to ensure that cables can be routed without excessive bending.
An alternative to fastening the unit directly to the control cabinet mounting plate is a mounting plate (accessory) for snap-mounting to DIN rails. In this case, EMC filters cannot be attached directly beside or behind the stepper motor drive.



Mounting in housing or control cabinet

Please observe the instructions on mounting in “Mounting distances and ventilation” page 5/38.
Proceed as follows to ensure adequate ventilation of the stepper motor drive:

- Provide air inlet vents on the housing.
- The air inlet vents per stepper motor drive must allow an air flow of a minimum of 0.3 m³/min (SD32●●U25S2) or 0.55 m³/min (SD32●●U68S2). If the air throughput is less, external ventilation units must be installed.
- Use IP 54 special filter.
- Remove the cover on the top of the stepper motor drive.
- The throughput of the fan must be at least 0.3 m³/min.

Steel sheet housing and control cabinet (degree of protection IP 54)

The SD3 stepper motor drive must be installed in a sealed housing under the following ambient conditions: dust, corrosive gases, high humidity with the danger of condensation and surface water, etc. Observe the maximum permissible ambient temperature of the stepper motor drive when installing it in a sealed housing.

Calculation of housing dimensions

Maximum heat resistance R_{th} in °C/W

$R_{th} = (\theta - \theta_e)/P$

θ = maximum temperature (°C) inside the housing
θ_e = maximum outside temperature (°C)
P = total power loss (W) in the housing

See “Characteristics” for the power loss of the stepper motor drives.
Consider the power loss of the other components.

Usable heat dissipation surface of housing A in m²

(for wall mounting: side surfaces + top + front)

$A = K/R_{th}$

K = heat resistance, based on the housing surface
Steel sheet housing: K = 0.12 with fan, K = 0.15 without fan

Note: *because of the poor heat dissipation, insulating material housings must not be used.*

Lexium SD3 motion control
BRS3 3-phase stepper motors

Stepper motor drive system

Presentation

A stepper motor drive system consists of a stepper motor and the matching stepper drive. The 3-phase stepper motors from Schneider Electric are extremely robust, maintenance-free motors. They carry out precise step-by-step movements that are controlled by a stepper motor drive. Maximum power can only be obtained if motor and electronics are perfectly tuned to each other.

The 3-phase stepper motors can be operated at very high resolutions depending on the stepper motor drive.

Options such as rotation monitoring and holding brake as well as robust, planetary gears with little backlash extend the application possibilities.

Special features

Quiet

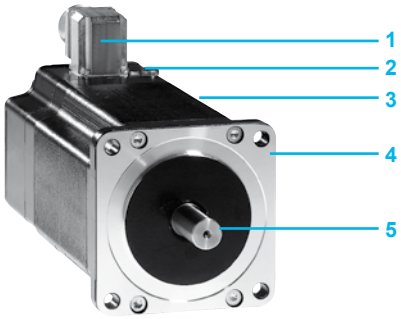
As a result of the sine commutation and the special mechanical design of the motors, the stepper motors are very quiet and run virtually without resonance.

Strong

The optimised internal geometry of the motor ensures a high power density;

Flexible

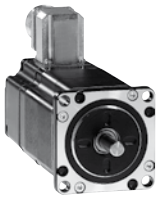
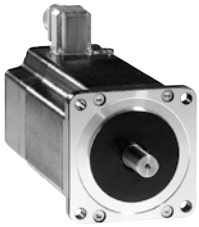
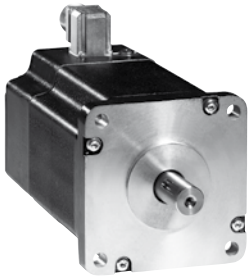
With the flexible modular system and modern variant management, a wide variety of motor types can be manufactured and delivered in a very short time.



Description

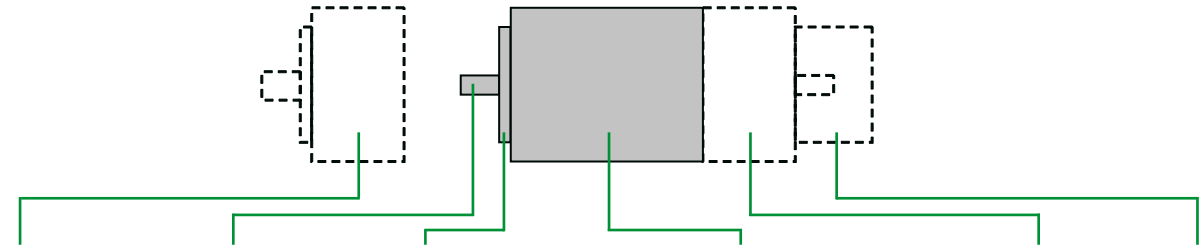
1 Motor connection, here a version with an angular connector
2 Additional terminal for protective conductor
3 Housing, with black protective coating
4 Axial flange with four mounting points as per DIN 42918
5 Smooth shaft end as per DIN 42918

Product offer

3-phase stepper motors		BRS368	BRS39●	BRS3A●
				
Size		6	9	A
Max. torque M_{max}	Nm	1.50	2.0...6.0	12.0...16.5
Holding torque M_H	Nm	1.70	2.26 ... 6.78	13.5 ... 19.7
Number of steps z *(1)*		200 / 500 / 1000 / 2000 / 4000 / 5000 / 10000		
Step angle α *(1)*	°	1.8 / 0.9 / 0.72 / 0.36 / 0.18 / 0.09 / 0.072 / 0.036		

(1) The 1st value is the holding torque M_H when the stepper motor is at a standstill, the 2nd value is the nominal torque M_N when the motor is in operation.

Motor types



Planetary gearox *(1)*	Shaft version		Centring collar	Flange size	Length (without shaft)	Winding	Motor connection	Options *(2)*
BRS368								
GBX 60	Smooth shaft	Ø 6.35 mm Ø 8 mm	Ø 38.1 mm	6 (57.2 mm)	8 (79 mm)	W	Terminal box Connector	2nd shaft end Holding brake Encoder
BRS39●								
GBX 80	Smooth shaft with woodruff key *(3)*	Ø 9.5 mm *(5)* Ø 12 mm *(5)* Ø 14 mm *(5)*	Ø 60 mm Ø 73 mm	9 (85 mm)	7 (68 mm) 10 (98 mm) 13 (128 mm)	W	Terminal box Connector	2nd shaft end Holding brake Encoder
BRS3A●								
GBX 120 GBX 160	Smooth shaft with parallel key *(4)*	Ø 19 mm	Ø 56 mm	11 (110 mm)	17 (180 mm) 22 (228 mm)	W	Terminal box Connector	2nd shaft end Holding brake Encoder

(1) Planetary gearbox with various ratios available as accessory see page 5/65
(2) The 2nd shaft end and holding brake options cannot be selected in combination. An encoder can only be used with motors with "connector" type motor connection.
(3) Conforming to DIN 6888.
(4) Conforming to DIN 6885.
(5) Ø 9.5 mm and Ø 12 mm with BRS397 and BRS39A; Ø 14 mm with BRS39B

Lexium SD3 motion control
BRS3 3-phase stepper motors

Ambient conditions

Ambient temperature		**°C**	-25 ... +40
Max. installation height over m.s.l. without power loss		**m**	< 1000
Transport and storage temperature		**°C**	-25 ... +70
Relative humidity		**%**	15 ... 85, no condensation allowed
Vibration grade during operation conforming to IEC/EN 60034-14			A
Max. vibration load		**m/s²**	20
Degree of protection conforming to IEC/EN 60034-5	Total except shaft bushing		IP 56
	Shaft bushing		IP 41
Thermal class			155 (F)
Shaft wobble and perpendicularity			DIN EN 50 347 (IEC 60072-1)
Max. rotary acceleration		**rad/s²**	200000

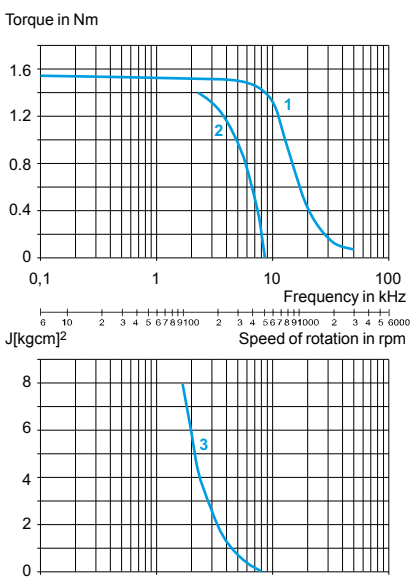
Electrical and mechanical data

BRS motor type			**368**	**397**	**39A**	**39B**	**3AC**	**3AD**
Max. supply voltage	U_{max}	≂ **V**	230					
Nominal voltage DC bus	U_N	⎓ **V**	325					
Nominal torque	M_N	**Nm**	1.50	2	4	6	12	16.5
Holding torque	M_H	**Nm**	1.70	2.26	4.52	6.78	13.5	19.7
Rotor inertia	J_R	**kgcm²**	0.38	1.1	2.2	3.3	10.5	16
Number of steps	z		200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000					
Step angle	α	°	1.8 / 0.9 / 0.72 / 0.36 / 0.18 / 0.09 / 0.072 / 0.036					
Systematic angle tolerance *(1)*	$\Delta\alpha_s$	**arcmin**	±6					
Max. starting frequency	f_{Aom}	**kHz**	8.5	5.3			4.7	
Phase current	I_N	A_{rms}	0.9	1.75	2	2.25	4.1	4.75
Winding resistance	R_W	Ω	25	6.5	5.8	6.5	1.8	1.9
Current rise time constant	ζ	**ms**	4.6	≈7	≈9	≈10	≈22	≈22
Mass *(2)*	m	**kg**	2.0	2.1	3.2	4.3	8.2	11.2
Shaft load *(3)* Max. radial force 1st shaft end *(4)*		**N**	50	100		110	300	
Max. radial force 2nd shaft end (optional) *(4)*		**N**	25	50			150	
Max. axial tensile force		**N**	100	175			330	
Max. axial force pressure		**N**	8.4	30			60	
Nominal bearing service life *(5)*	L_{10h}	**h**	20000	20000			20000	

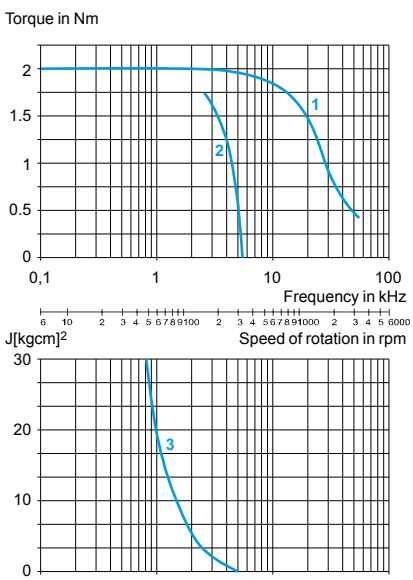
(1) Measured at 1000 steps/revolution.
(2) Mass of the motor version with cable gland and connector.
(3) Conditions for shaft load: speed of rotation 600 rpm, 100% duty cycle at nominal torque, ambient temperature 40 °C (bearing temperature ≈ 80 °C).
(4) Point of application of radial force: centre of shaft end.
(5) Operating hours with a probability of failure of 10%.

Characteristic curves

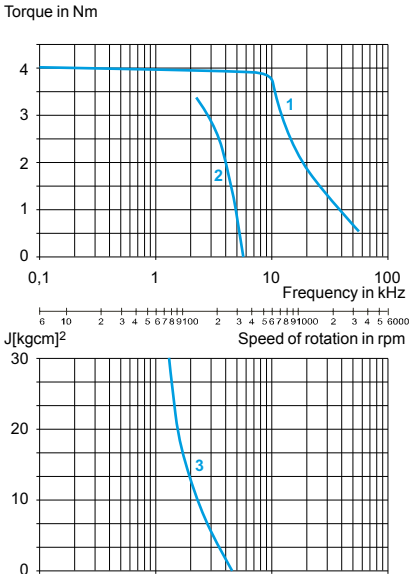
BRS368



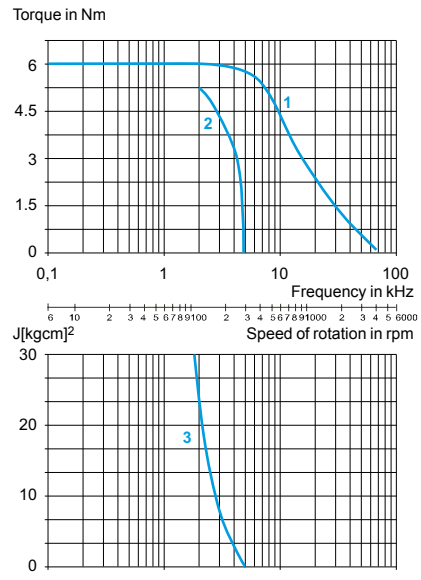
BRS397



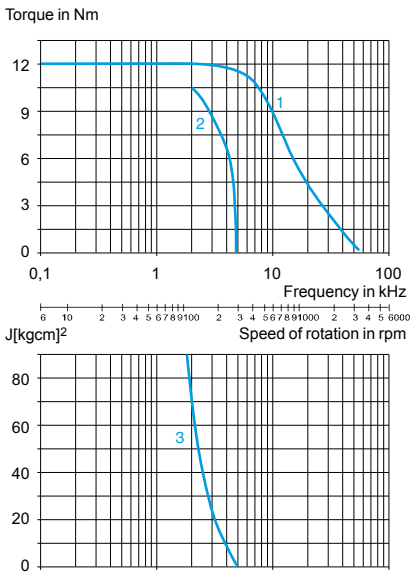
BRS39A



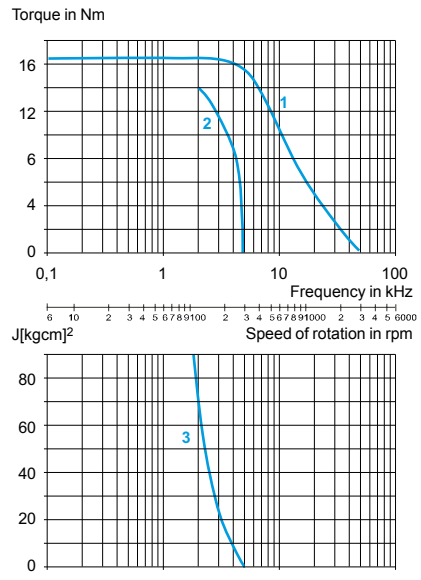
BRS39B



BRS3AC



BRS3AD



1 Pull-out torque
2 Pull-in torque
3 Maximum load inertia

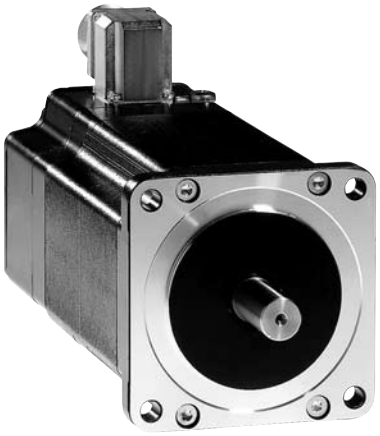
Measurement at 1000 steps/revolution, nominal voltage DC bus U_N and phase current I_N

Lexium SD3 motion control
BRS3 3-phase stepper motors

BRS368 3-phase stepper motor

Stepper motor BRS368

Example:	B	R	S	3	6	8	W	1	3	0	A	B	A
Motor type **S** = stepper motor	B	R	**S**	3	6	8	W	1	3	0	A	B	A
Motor phases **3** = 3-phase stepper motor	B	R	S	**3**	6	8	W	1	3	0	A	B	A
Size **6** = 57.2 mm	B	R	S	3	**6**	8	W	1	3	0	A	B	A
Motor length **8** = 79 mm	B	R	S	3	6	**8**	W	1	3	0	A	B	A
Maximum voltage **W** = 230 V~ (325 V⎓)	B	R	S	3	6	8	**W**	1	3	0	A	B	A
Shaft version **0** = smooth shaft (Ø 6.35 mm, IP 41) **1** = smooth shaft (Ø 8 mm, IP 41)	B	R	S	3	6	8	W	**1**	3	0	A	B	A
Centring collar **3** = 38 mm	B	R	S	3	6	8	W	1	**3**	0	A	B	A
Position capture **0** = without encoder **1** = with encoder (1000 inc/rev)	B	R	S	3	6	8	W	1	3	**0**	A	B	A
Holding brake **A** = without holding brake **B** = with holding brake	B	R	S	3	6	8	W	1	3	0	**A**	B	A
Connection type **B** = terminal box **C** = connector	B	R	S	3	6	8	W	1	3	0	A	**B**	A
Second shaft **A** = without second shaft **B** = with second shaft	B	R	S	3	6	8	W	1	3	0	A	B	**A**



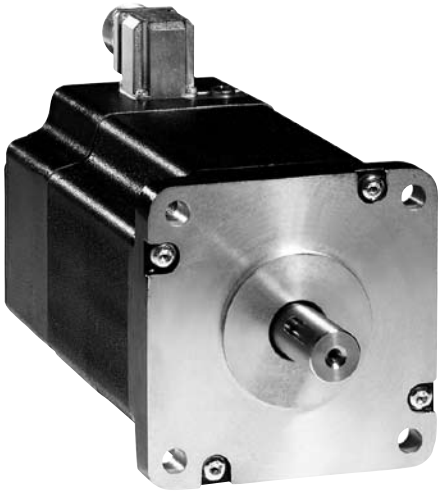
BRS39● 3-phase stepper motor

Stepper motor BRS39●

Example:	B	R	S	3	9	7	W	2	6	0	A	B	A
Motor type **S** = stepper motor	B	R	**S**	3	9	7	W	2	6	0	A	B	A
Motor phases **3** = 3-phase stepper motor	B	R	S	**3**	9	7	W	2	6	0	A	B	A
Size **9** = 85 mm	B	R	S	3	**9**	7	W	2	6	0	A	B	A
Motor length **7** = 68 mm **A** = 98 mm **B** = 128 mm	B	R	S	3	9	**7**	W	2	6	0	A	B	A
Maximum voltage **W** = 230 V~ (325 V⎓)	B	R	S	3	9	7	**W**	2	6	0	A	B	A
Shaft version *(1)* **2** = smooth shaft (Ø 9.5 mm, IP 41) **3** = smooth shaft (Ø 12 mm, IP 41) **4** = smooth shaft (Ø 14 mm, IP 41) **5** = woodruff key (Ø 9.5 mm, IP 41) **6** = woodruff key (Ø 12 mm, IP 41) **7** = woodruff key (Ø 14 mm, IP 41) **A** = smooth shaft (Ø 9.5 mm, IP 56) **B** = smooth shaft (Ø 12 mm, IP 56) **C** = smooth shaft (Ø 14 mm, IP 56) **K** = woodruff key (Ø 14 mm, IP 56) **L** = woodruff key (Ø 9.5 mm, IP 56) **M** = woodruff key (Ø 12 mm, IP 56)	B	R	S	3	9	7	W	**2**	6	0	A	B	A
Centring collar **6** = 60 mm **7** = 73 mm	B	R	S	3	9	7	W	2	**6**	0	A	B	A
Position capture **0** = without encoder **1** = with encoder (1000 Inc/rev)	B	R	S	3	9	7	W	2	6	**0**	A	B	A
Holding brake **A** = without holding brake **F** = with holding brake	B	R	S	3	9	7	W	2	6	0	**A**	B	A
Connection type **B** = terminal box **C** = connector	B	R	S	3	9	7	W	2	6	0	A	**B**	A
Second shaft **A** = without second shaft end **B** = with second shaft end	B	R	S	3	9	7	W	2	6	0	A	B	**A**

(1) Possible combinations of motor length and shaft version:
motor length **7** = 2, 3, 5, 6, A, B, K, L;
motor length **A** = 2, 3, 5, A, B, K, L;
motor length **B** = 4, 7, C, M

Lexium SD3 motion control
BRS3 3-phase stepper motors

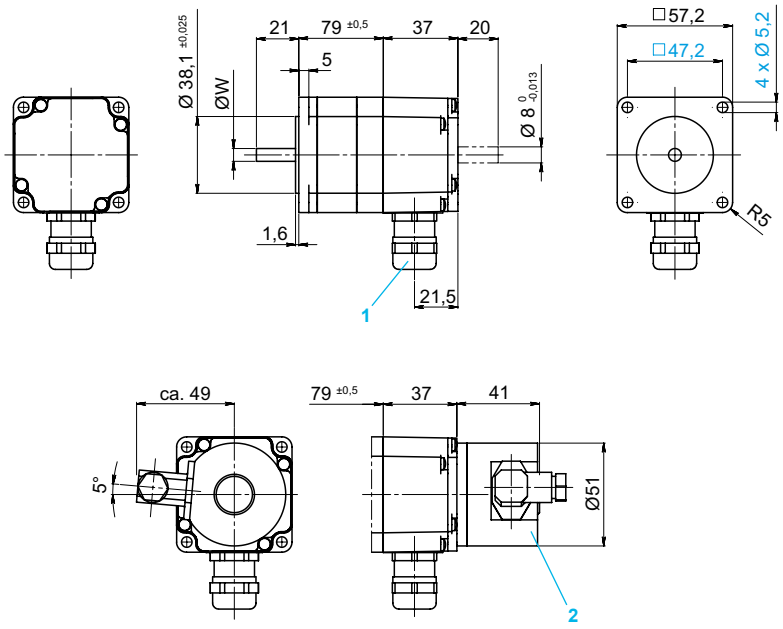


BRS3A● 3-phase stepper motor

Stepper motor BRS3A●													
Example:	**B**	**R**	**S**	**3**	**A**	**C**	**W**	**8**	**5**	**0**	**A**	**B**	**A**
Motor type **S** = stepper motor	B	R	**S**	3	A	C	W	8	5	0	A	B	A
Motor phases **3** = 3-phase stepper motor	B	R	S	**3**	A	C	W	8	5	0	A	B	A
Size **A** = 110 mm	B	R	S	3	**A**	C	W	8	5	0	A	B	A
Motor length **C** = 180 mm **D** = 230 mm	B	R	S	3	A	**C**	W	8	5	0	A	B	A
Maximum voltage **W** = 230 V~ (325 V⎓)	B	R	S	3	A	C	**W**	8	5	0	A	B	A
Shaft version **8** = parallel key (Ø 19 mm, IP 41)	B	R	S	3	A	C	W	**8**	5	0	A	B	A
Centring collar **5** = 56 mm	B	R	S	3	A	C	W	8	**5**	0	A	B	A
Position capture **0** = without encoder **1** = with encoder (1000 Inc/rev)	B	R	S	3	A	C	W	8	5	**0**	A	B	A
Holding brake **A** = without holding brake **F** = with holding brake	B	R	S	3	A	C	W	8	5	0	**A**	B	A
Connection type **B** = terminal box **C** = connector	B	R	S	3	A	C	W	8	5	0	A	**B**	A
Second shaft **A** = without second shaft end **B** = with second shaft end	B	R	S	3	A	C	W	8	5	0	A	B	**A**

Dimensions

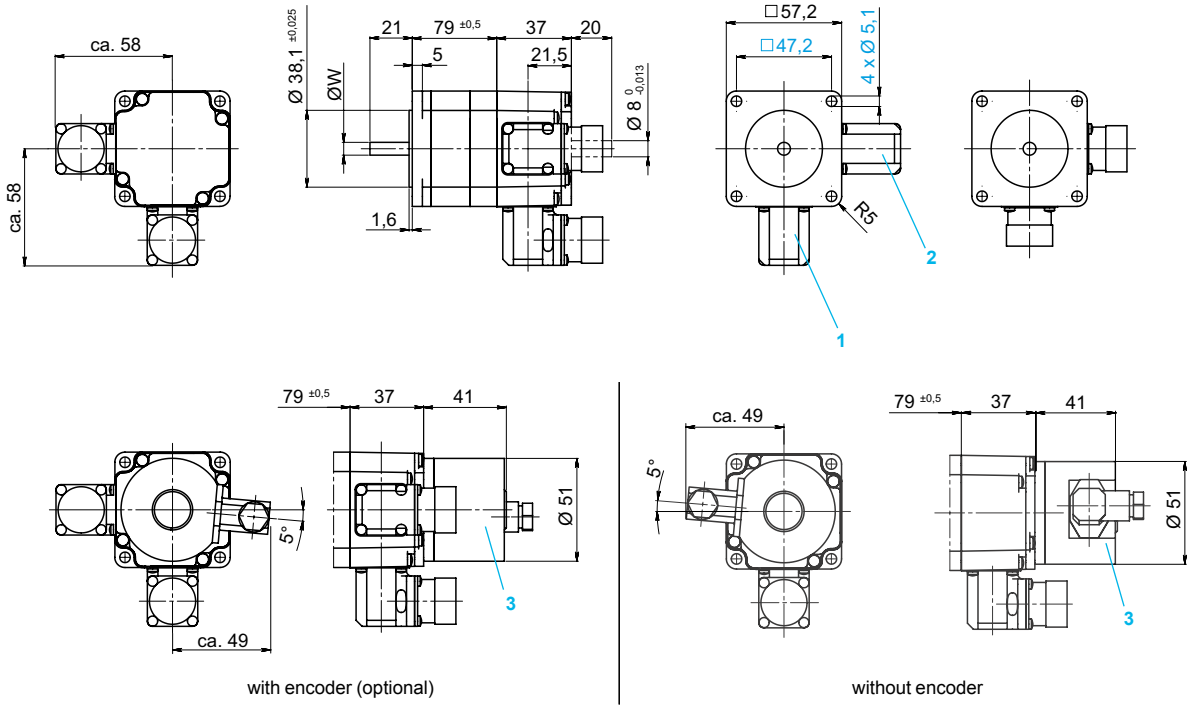
BRS368 3-phase stepper motor in terminal box version



	Shaft diameter ØW
BRS368	6.35 ±0,013
	8 ±0.013

1 Cable gland M20 x 1.5 for cable Ø 9 ... 13
2 Holding brake (optional)

BRS368 3-phase stepper motor in connector version



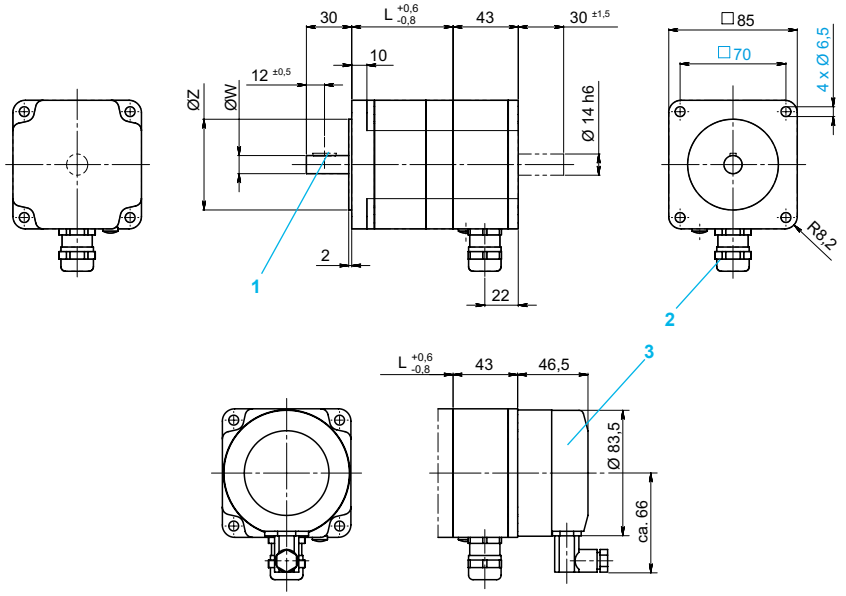
with encoder (optional)

without encoder

	Shaft diameter ØW
BRS368	6.35 ±0.013
	8 ±0.013

1 Plug connection encoder (optional) 12 poles
2 Plug connection motor 6 poles
3 Holding brake (optional)

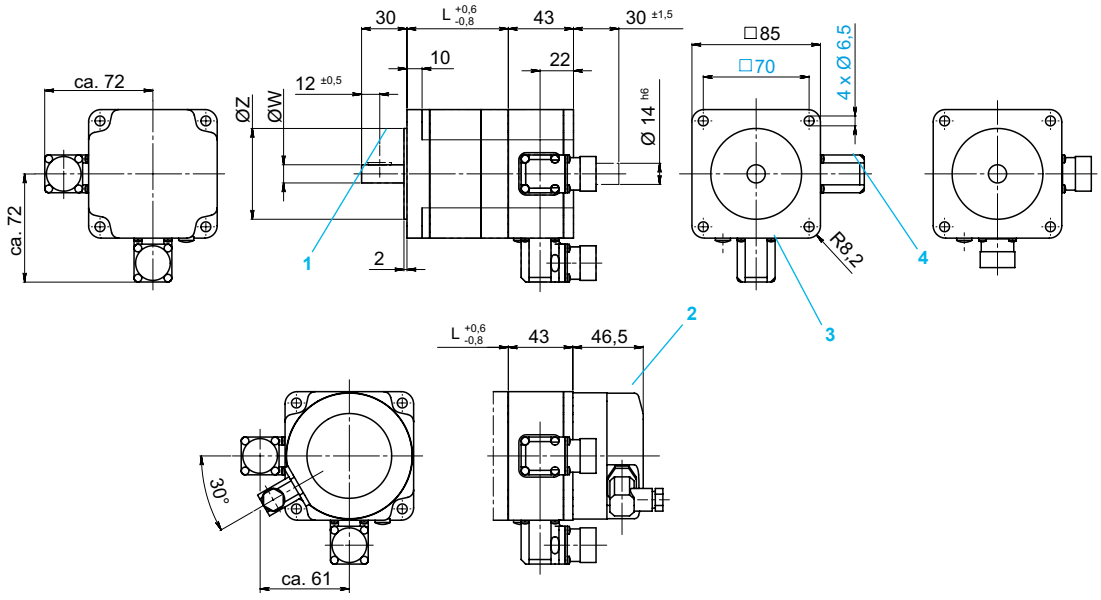
BRS39● 3-phase stepper motor in terminal box version



	Length L	Shaft diameter ØW		Centring collar ØZ	
BRS397	67.5	9.5 h6	12 h6	60 h8	73 h8
BRS39A	97.5	9.5 h6	12 h6	60 h8	73 h8
BRS39B	127.5	14 h6		60 h8	73 h8

1 Woodruff key DIN 6888 (optional): shafts Ø 9.5: 3 x 5; shafts Ø 12: 4 x 6.5; shafts Ø 14: 5 x 6.5
2 Cable gland M20 x 1,5 for cable Ø 9 ... 13
3 Holding brake (optional)

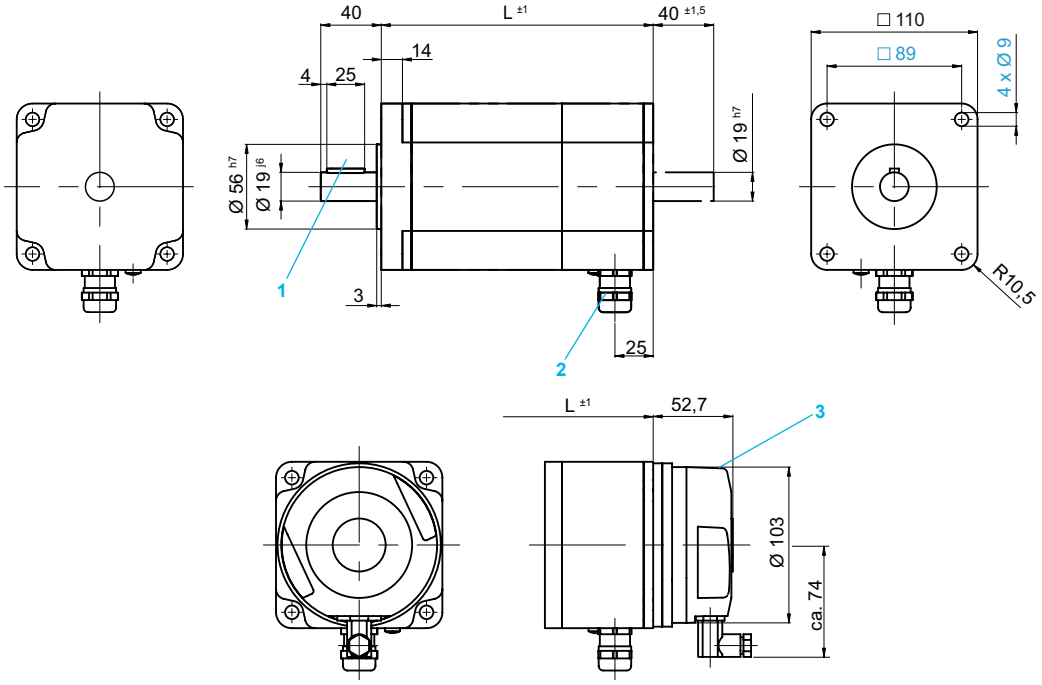
BRS39● 3-phase stepper motor in connector version



	Length L	Shaft diameter ØW		Centring collar ØZ	
BRS397	67.5	9,5 h6	12 h6	60 h8	73 h8
BRS39A	97.5	9.5 h6	12 h6	60 h8	73 h8
BRS39B	127.5	14 h6		60 h8	73 h8

1 Woodruff key DIN 6888 (optional): shafts Ø 9.5: 3 x 5; shafts Ø 12: 4 x 6.5; shafts Ø 14: 5 x 6.5
2 Holding brake (optional)
3 Motor connection 6 poles
4 Motor connection (optional) 12 poles

BRS3A● 3-phase stepper motor in terminal box version

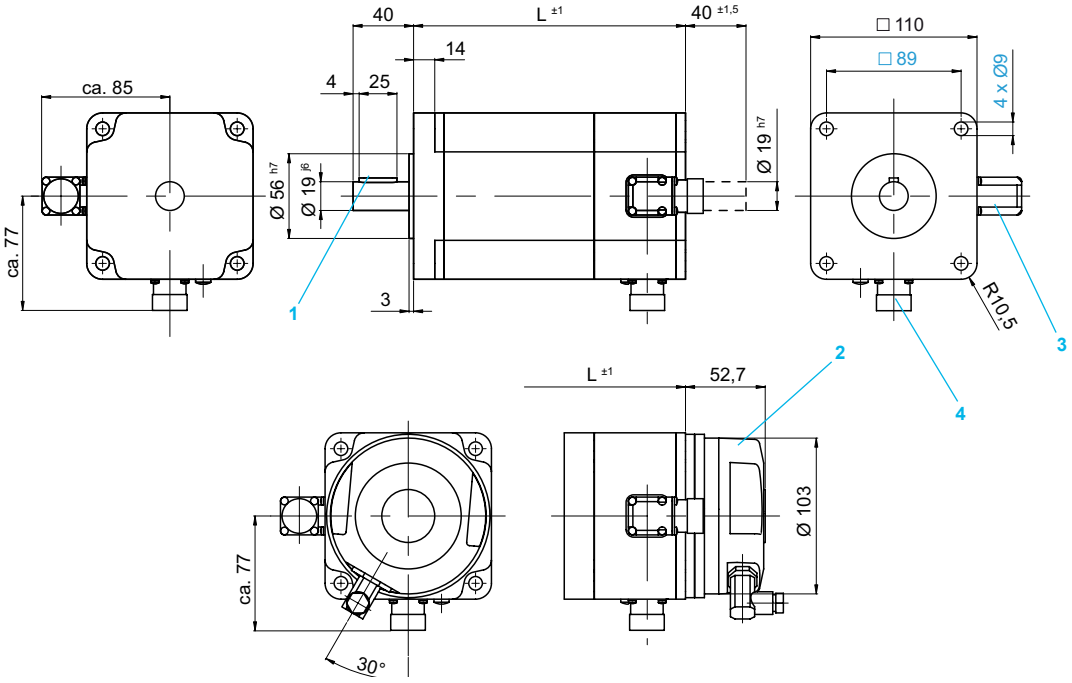


	Length L
BRS3AC	180
BRS3AD	228

1 Parallel key DIN 6885: A 6 x 6 x 25
2 Cable gland M20 x 1.5 for cable Ø 9 ... 13
3 Holding brake (optional)

5

BRS3A● 3-phase stepper motor in connector version



	Length L
BRS3AC	180
BRS3AD	228

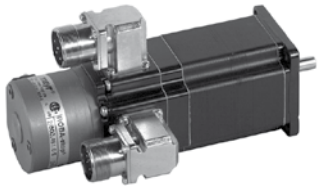
1 Parallel key DIN 6885: A 6 x 6 x 25
2 Holding brake (optional)
3 Plug connection encoder (optional) 12 poles
4 Plug connection motor 6 poles

5

Lexium SD3 motion control

BRS3 3-phase stepper motors

Option: Holding brake



Holding brake

Presentation

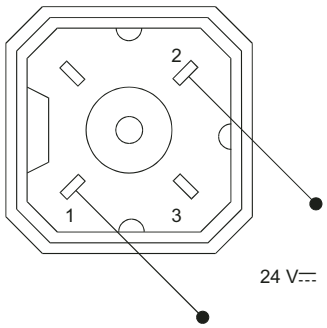
The holding brake is an electromagnetic spring force brake and fixes the motor shaft after the motor current is switched off (e.g. in case of power failure or Emergency stop).
The motor shaft must be fixed if torque loads resulting from weights act on it, e.g. in the case of Z axes in handling systems.

Characteristics

Holding brake for motor type		BRS368	BRS39●	BRS3A●
Nominal voltage	**V**	24	24	24
Holding torque	**Nm**	1	6	16
Electrical pull-in power	**W**	8	24	28
Moment of inertia	**kgcm²**	0.016	0.2	0.35
Brake release time	**ms**	58	40	60
Brake application time	**ms**	14	20	30
Mass	**kg**	0.5	1.5	2.0

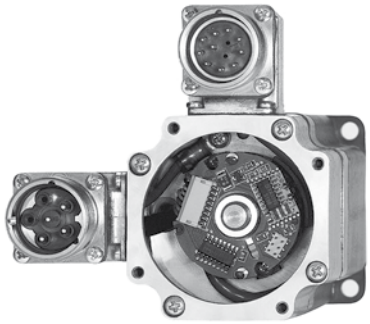
Note: *In order to ensure the safe function of the holding brake for Z-axes, the static load torque must be no greater than 25% of the holding torque of the motor.*

Wiring diagram



The connector is part of the scope of delivery.
Connector designation: Hirschmann type G4 A 5M

Lexium SD3 motion control
BRS3 3-phase stepper motors
Option: Encoder



Encoder

Presentation

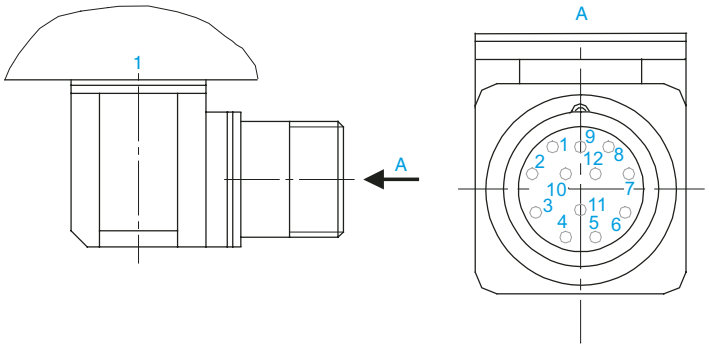
The BRS3 3-phase stepper motors from Schneider Electric can be fitted with an encoder. If the stepper motor drive is fitted with rotation monitoring electronics, the encoder operates as a measurement system for signalling the actual position of the rotor.
The calculated reference position and the actual position of the motor are compared. If a defined deviation is exceeded, a rotation monitoring error is signalled. For example, this enables detection of mechanical overload of the motor.

Note: *an encoder can only be used with motors with connector. A temperature sensor is integrated to protect the encoder from high temperatures.*

Characteristics

Resolution	**Inc/rev.**	1000
Index pulse	**Inc/rev.**	1
Output		RS 422
Signals		A; B; I
Signal shape		Rectangular
Supply voltage	**V**	5 ± 5%
Supply current	**A**	Max. 0.125

Wiring diagram



Wiring diagram of encoder plug on BRS3●●

1 Motor housing

Pin	Designation
1	A
2	A negated
3	B
4	B negated
5	C, I
6	C negated, I negated
7	5 V_{GND}
8	+ 5
9	-SENSE
10	+SENSE
11	Temperature sensor
12	Not connected

Lexium SD3 motion control

Integrated and optional additional EMC filters for stepper motor drives SD3

Presentation

EMC filter

A filter is integrated in the SD3 as standard equipment so the devices complies with the IEC/EN 61800-3 electromagnetic compatibility (EMC) standards. These standards must be complied with for CE marking under the EMC directive.
With the additional filter it is possible to meet more rigid requirements.
This drive system meets the EMC requirements for the second environment according to IEC 61800-3, if the described measures are taken into account during installation. If the device is not used within the context of this application area, the following must be noted:
Better values can be achieved depending on the device and the application as well as the design, e.g. if the unit is mounted in a closed control cabinet.
If the limit values for the first environment (public mains, category C2) are required, external filters must be connected upstream.
The following limit values for conducted interference are met if the design is EMC-compatible:

Without external filter	C3 up to 10 m motor cable length
With external filter	C2 up to 20 m motor cable length C3 up to 50 m motor cable length

The owner/operator must ensure compliance with the EMC directives.

Usage depending on the mains type

This filter can only be used in TN networks (connection to neutral conductor) and TT networks (neutral conductor connected to earth (ground)).
The filters cannot be used in IT mains (isolated neutral conductor or neutral conductor earthed (grounded) via high impedance).
IEC 61800-3, Annex D2.1, states that the filters may not be used for this mains type because correct operation of the isolation monitoring equipment cannot be guaranteed.
In addition, the efficiency of the filter in this mains type depends on the type of impedance between neutral conductor and earth (ground). Therefore, the efficiency is not predictable.
An isolating transformer is required for machines that must be installed in an IT mains to allow the machine to be operated locally as in a TN or TT system.

Characteristics

Compliance with the standards			EN 133200
Degree of protection			IP 21 and IP 41 in upper section
Maximum relative humidity		**%**	93 without condensation and surface water accumulation conforming to IEC 60068-2-3
Ambient temperature	Operating temperature	**°C**	0 ... +50
	Transport and storage temperature	**°C**	-25 ... +70
Max. Installation height over m.s.l. without power loss		**m**	1000 (above 1000 m: decrease the current by 1% per additional 100 m)
Vibration test conforming to IEC/EN 80068-2-6			3 ... 13 Hz: 1.5 mm peak 13 ... 150 Hz: 1 gn peak
Shock test conforming to IEC/EN 60068-2-27			15 gn for 11 ms
Maximum rated voltage	50/60 Hz, single-phase	**V**	240 + 10%
	50/60 Hz, 3-phase	**V**	240 + 10% 500 + 10% 600 + 10%

Application case, category: **EN 61800-3:2001-02; IEC 61800-3, Ed.2**	**Description**
First environment, general availability; category C1	Installation in residential area, sale e.g. through hardware shop
First environment, limited availability; category C2	Installation in residential area, sale through specialised dealer only
Second environment; category C3	Operation in industrial mains

Lexium SD3 motion control

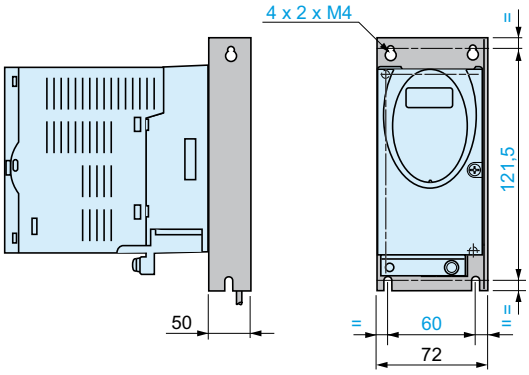
Integrated and optional additional EMC filters for stepper motor drives SD3

Reference

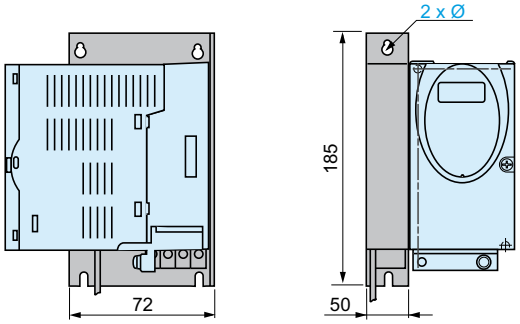
Designation	Description	Reference
EMC filter	EMC filter single-phase, 9 A, 115/230 V~	**VW3A31401**

Dimensions

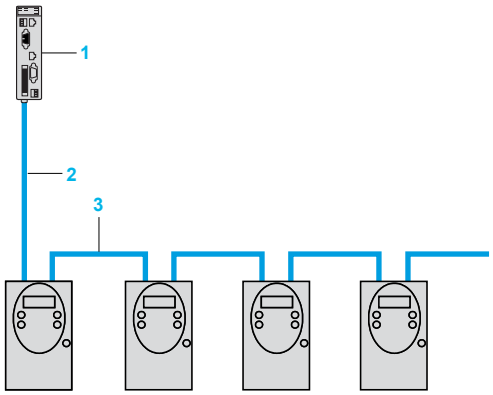
Mounting of the filter behing the stepper motor drive



Mounting of the filter next to the stepper motor drive



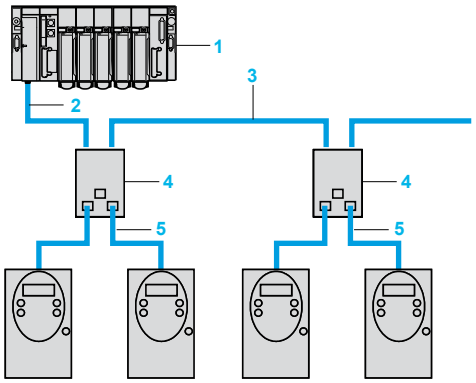
Presentation



SD328A

CANopen MotionBus connection

1 Motion controller, e.g. LMC
2 CANopen cable VW3M3805R010
3 CANopen cable TSXCAN●●



SD328A

CANopen connection with junction box

1 PLC, e.g. Twido or Premium
2 TSXCAN●● cable with SubD connector TSX CAN KCDF 90T
3 CANopen cable TSXCAN●●
4 CANopen junction box VW3CANTAP2
5 CANopen cable VW3CANCARR●●

The SD328A stepper motor drive can be connected directly to a CANopen fieldbus via two interfaces (CN1 or CN4).
Interface CN1 provides three pins as spring clamp terminals and three connections. Interface CN4 is an RJ45 connector.
A CANopen bus consists of several networked participants are interconnected via one bus cable. Every network participant must be configured before it can operate on the network. The baud rate must be the same for all devices on the fieldbus. Address and baud rate are set during commissioning.
The devices at the two ends of a bus cable must be terminated with terminating resistors. A terminating resistor is integrated in the stepper motor drive; the resistor is activated with the S1 switch.

5

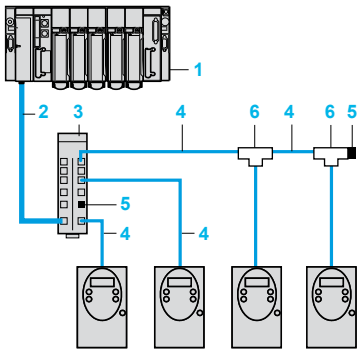
References

Designation	Description	Length m	Reference
CANopen cables	Both ends with 1 RJ45 connector	0.3	**VW3CANCARR03**
		1	**VW3CANCARR1**
	With 1 9-pole SubD socket with integrated terminating resistor and 1 RJ45 connector	1	**VW3M3805R010**
CANopen cables IP 20	Standard cable, CE marking, zero halogen, flame-retardant (IEC 60332-1)	50	**TSXCANCA50**
		100	**TSXCANCA100**
		300	**TSXCANCA300**
	UL-approved, CE marking, flame-retardant (IEC 60332-1)	50	**TSXCANCB50**
		100	**TSXCANCB100**
		300	**TSXCANCB300**
	For difficult environments *(1)* or portable installations, CE marking, low smoke, zero halogen, flame-retardant (IEC 60332-1)	50	**TSXCANCD50**
		100	**TSXCANCD100**
		300	**TSXCANCD300**
CANopen junction box	With 2 RJ45 ports for trunk line junction, for connection via RJ45 cable		**VW3CANTAP2**
Terminal adapter	With 3 RJ45 connectors and 1 cable	3	**TCSCTN023F13M03**
SubD connector IP 20 CANopen (Twido-end)	90° angled 9-pole SubD socket. Switch for adapting to wire end		**TSXCANKCDF90T**

(1) Difficult ambient conditions:
- Resistant to hydrocarbons, industrial oils, cleaning agents, solder splash
- Relative humidity up to 100%
- Saline environment
- High temperature variations
- Operating temperatures between -10 °C and +70 °C

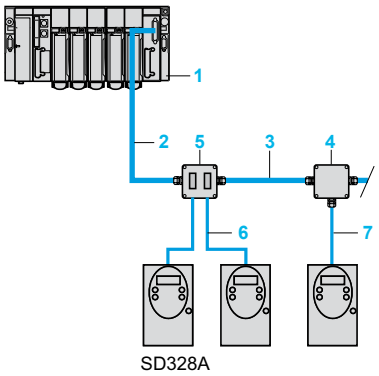
Lexium SD3 motion control
Communication and networks
Modbus serial link for stepper motor drives SD328A

Presentation



Connection via connection modules and RJ45 connectors (1)

1 PLC
2 Modbus cable, depending on the types of control unit or PLC
3 Modbus LU9GC3 connection module
4 Modbus cable VW3A8306R●●
5 RC terminal adapter VW3A8306RC
6 Modbus T junction module VW3A8306TF●●.



Connection via junction boxes (1)

1 PLC
2 Modbus cable, depending on the types of control unit or PLC
3 Modbus cable TSX CSA●●●
4 Modbus junction box TSXSCA50
5 Modbus 2-way junction box TSXSCA62
6 Modbus cable VW3A8306
7 Modbus cable VW3A8306D30

(1) Connection via screw terminals:
In this case one Modbus VW3A8306D30 cable and one RC VW3A8306DRC terminal adapter are required.

The SD328A stepper motor drive can be connected directly to a Modbus fieldbus via the CN4 interface.
In a Modbus bus, several networked participants are interconnected via one bus cable. Every network participant must be configured before it can operate on the network. Every device is assigned a unique node address.
The baud rate must be the same for all devices on the fieldbus.

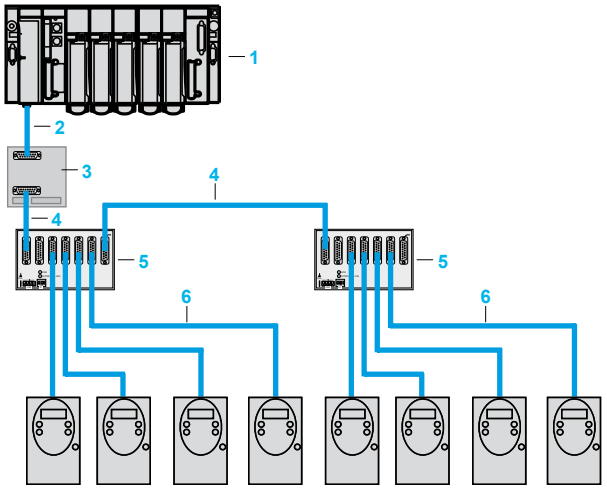
5

References

Designation	Description		Length m	Reference
Modbus junction box	3 screw terminal strips, RC terminal adapter, for connection with VW3A8306D30 cable		–	**TSXSCA50**
Modbus 2-way junction box	2 15-pole SubD sockets, 2 screw terminal strips, RC terminal adapter, for connection with VW3A8306 cable		–	**TSXSCA62**
Modbus connection module	10 RJ45 connectors, 1 screw terminal strip			**LU9GC3**
Modbus RC terminal adapters	For RJ45 connectors	120 Ω, 1 nF	–	**VW3A8306RC**
		150 Ω	–	**VW3A8306R**
	For screw terminal strip	120 Ω, 1 nF	–	**VW3A8306DRC**
		150 Ω	–	**VW3A8306DR**
Modbus T junction modules	With integrated cable		0.3	**VW3A8 306TF03**
			1	**VW3A8306TF10**
Modbus cables	With 1 RJ45 connector, 1 end stripped, for Modbus junction box TSXSCA50		3	**VW3A8306D30**
	With 1 RJ45 connector, 1 15-pole SubD connector, for Modbus 2-way junction box TSXSCA62		3	**VW3A8306**
	2 RJ45 connectors		0.3	**VW3A8306R03**
			1	**VW3A8306R10**
			3	**VW3A8306R30**
	4-wire, shielded and twisted, RS 485, without connector		100	**TSXCSA100**
			200	**TSXCSA200**
			500	**TSXCSA500**

Lexium SD3 motion control
Pulse/direction interface for stepper motor drives SD328

Presentation



1 PLC
2 Connection cable VW3M8210R●●
3 RS 422 interface adapter USIC VW3M3102
4 Cascading cable VW3M8211R05
5 Reference value adapter VW3M3101
6 Connection cable VW3M8209R●●

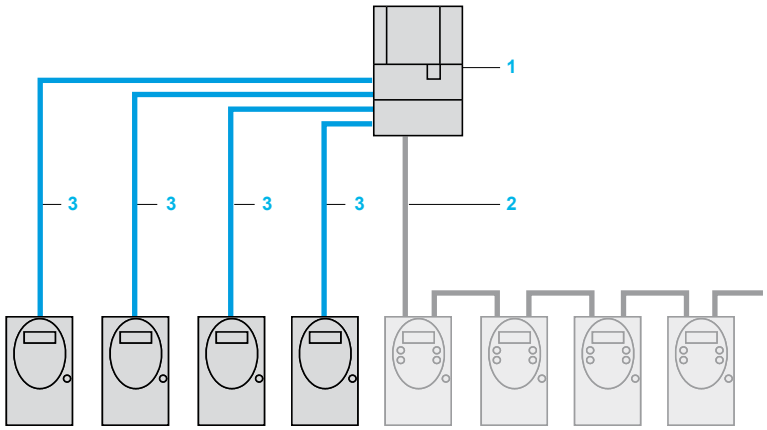
The SD328 stepper motor drives can be externally supplied with reference values in the form of pulse/direction signals. This is required for the "Electronic Gear" operating mode. In this case, the CN5 pulse/direction interface is used for supplying the reference signals (pulse/direction) or A/B encoder signals.

5

References

Designation	Description	Length m	Reference
Reference value adapter	For distribution of A/B encoder signals or pulse/direction signals to 5 devices with 24 V⎓ power supply unit for 5 V⎓ encoder power supply; for mounting to DIN rail		**VW3M3101**
Cascading cable	For reference value adapter RVA VW3M3101; with 2 15-pole SubD15 sockets	0.5	**VW3M8211R05**
RS 422 interface adapter USIC (Universal Signal Interface Converter)	For adaptation of control signals to RS 422 standard		**VW3M3102**
Pulse/direction connection cables for connecting a PLC to USIC	Shielded; USIC end with SubD15 socket,other cable end open	0.5	**VW3M8210R05**
		1.5	**VW3M8210R15**
		3	**VW3M8210R30**
		5	**VW3M8210R50**
Cables for pulse/direction, ESIM, A/B	Device end with 10-pole Molex connector, other cable end open	0.5	**VW3M8201R05**
		1.5	**VW3M8201R15**
		3	**VW3M8201R30**
		5	**VW3M8201R50**
Pulse/direction connection cables to Schneider Electric Premium motion control modules TSX CFY	Device end with 10-pole Molex plug, CFY end with 15-pole SubD connector	0.5	**VW3M8204R05**
		1.5	**VW3M8204R15**
		3	**VW3M8204R30**
		5	**VW3M8204R50**
Pulse/direction connection cable to Siemens programmable controller S5 IP247	Device end with 10-pole Molex connector, IP247 end with SubD9 connector	3	**VW3M8205R30**
Pulse/direction connection cable to Siemens programmable controller S5 IP267	Device end with 10-pole Molex connector, IP267 end with SubD9 connector	3	**VW3M8206R30**
Pulse/direction connection cable to Siemens programmable controller S7-300 FM353	Device end with 10-pole Molex connector, FM353 end with SubD15 connector	3	**VW3M8207R30**
Pulse/direction connection cables, A/B to reference value adapter, USIC	Device end with 10-pole Molex connector, other cable end with SubD15 socket	0.5	**VW3M8209R05**
		1.5	**VW3M8209R15**
		3	**VW3M8209R30**
		5	**VW3M8209R50**

Presentation



SD326 SD328A

1 PLC or Motion Controller
2 CANopen cable
3 Connection cable VW3S8208R●●

The CN1 signal interface of the SD326 stepper motor drive is used for supplying the reference signals (pulse/direction).

References

Designation	Description	Length m	Reference
Pulse/direction cables	5 V, shielded; Device end with 24-pole Molex plug; other cable end open	0.5	**VW3S8201R05**
		1.5	**VW3S8201R15**
		3	**VW3S8201R30**
		5	**VW3S8201R50**
	24 V, shielded; Device end with 24-pole Molex plug; other cable end open	0.5	**VW3S8202R05**
		1.5	**VW3S8202R15**
		3	**VW3S8202R30**
		5	**VW3S8202R50**
Pulse/direction connection cables to Schneider Electric Premium motion control modules TSX CFY	Device end with 24-pole Molex plug; CFY end with 15-pole SubD connector	1.5	**VW3S8204R15**
		3	**VW3S8204R30**
Pulse/direction connection cables to Siemens programmable controller S7-300 FM353	Device end with 24-pole Molex plug; FM353 end with SubD15 socket	1.5	**VW3S8206R15**
		3	**VW3S8206R30**
Pulse/direction connection cables to Schneider Electric motion controller TLM2	Device end with 24-pole Molex plug; other cable end with SubD15 socket	0.5	**VW3S8208R05**
		1.5	**VW3S8208R15**
		3	**VW3S8208R30**
		5	**VW3S8208R50**

Lexium SD3 motion control

Option: Remote display terminal for stepper motor drives SD328

Presentation

A remote terminal can be connected to the SD328 stepper motor drive, which can be attached to a control cabinet door with an IP 65 seal. The terminal has a display and enables access to the same functions as the control panel of the stepper motor drive (HMI).

Description

1 Display
- Four 7-segment displays
- Display of numeric values and codes
- Save values when display flashes
- Flashing display on device fault

2 ESC
- Exit a menu or parameter
- Return from currently displayed to most recently saved value

3 Red LED lights up: DC bus under voltage

4 ENT
- Display a menu or parameter
- Save the displayed value

5 Quick Stop (Software Stop)

6 Error reset (Continue)

7 No function

8 Down arrow
- Go to next menu or parameter
- Decrease the displayed value

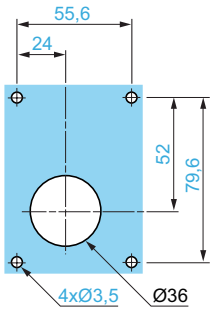
9 Up arrow
- Go to previous menu or parameter
- Increase the displayed value

5

Reference

Designation	Description	Reference
Remote terminal	Incl. cable with 2 connectors, seal and screws for mounting to control cabinet door, degree of protection IP 65	**VW3A31101**

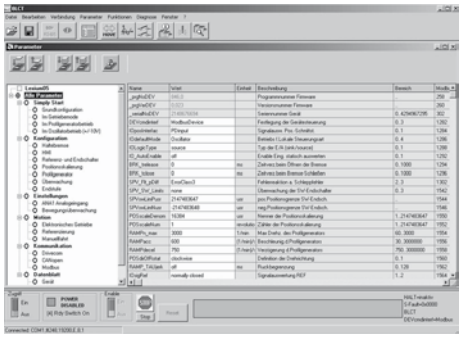
Dimensions

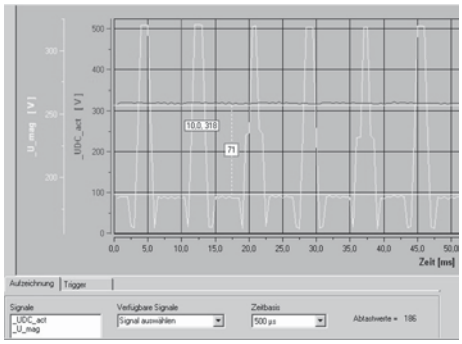


Lexium SD3 motion control

Option: “Lexium CT” commissioning software for stepper motor drives SD328

Presentation





Description

The Windows-based “Lexium CT” commissioning software is used for easy commissioning, parameterisation, simulation and diagnostics of the SD328 stepper motor drive.

As compared to the integrated control panel (HMI), the “Lexium CT” commissioning software offers additional features such as:

- Graphical user interface for parameterisation and status display
- Comprehensive diagnostics tools for optimisation and maintenance
- Long-term recording as an aid to assessing operational behaviour
- Testing input and output signals
- Tracking signal sequences on the monitor
- Archiving of all device settings and records (with export functions for data processing)

System requirements

You will need a PC or laptop with a free serial interface and MS Windows® 2000 or later

Download

The current version of the “Lexium CT” commissioning software can be downloaded from www.schneider-electric.com.

Connection accessory

Designation	Length m	Reference
RJ45 programming cable with RS 485/RS 232 adapter	3	**VW3A8106**

Lexium SD3 motion control

Accessory: Mounting plate for stepper motor drives SD3

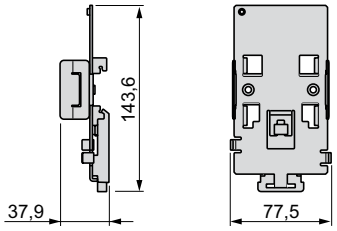
Presentation

The mounting plate is used for mounting the SD3 to a DIN rail.

Reference

Designation	Description	Reference
Mounting plate	For mounting to DIN rail	**VW3A11851**

Dimensions



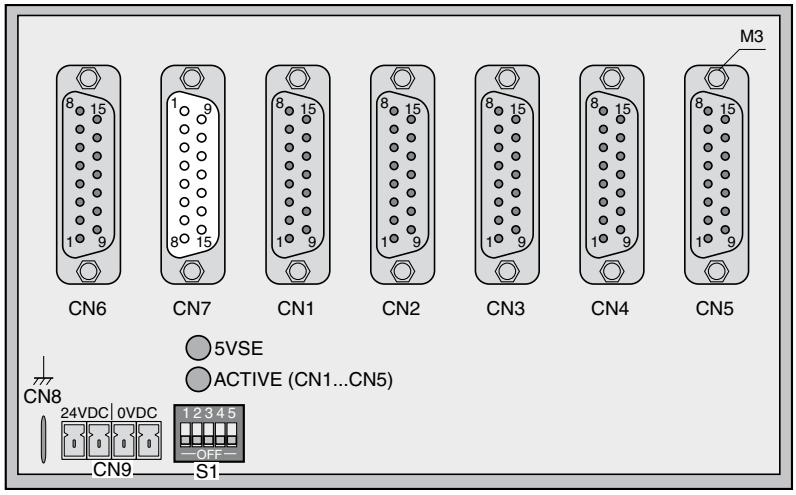
Lexium SD3 motion control
Option: Reference value adapter (RVA) for stepper motor drives SD328

Presentation

Reference signals from a master can be sent simultaneously to up to five devices using the RVA (Reference Value Adapter). This adapter also provides the supply voltage (5V, monitored with SENSE lines) for the encoder. Correct power supply is indicated by a “5VSE” LED.
An external encoder (A/B signals) or an encoder simulation (ESIM) can be used as a master. Pulse/direction signals can also be sent from a master controller.

The RVA reference value adapter is supplied with 24 V via the CN9 connections. A master controller (pulse/direction) can be connected to CN6. An external encoder or an ESIM signal can be supplied via CN7.

Connections



Reference value adapter RVA, connections

Characteristics

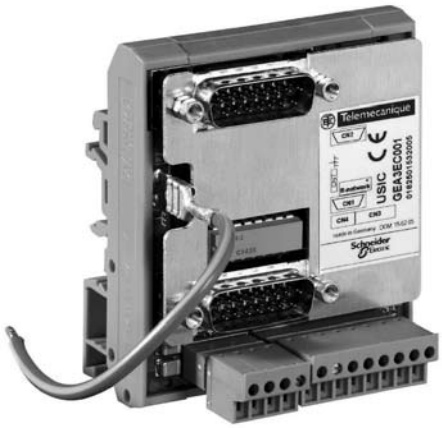
Dimensions (W x H x D)	**mm**	77 x 135 x 37
Input		
Supply voltage	**V⎓**	19.2 ... 30
Current consumption	**mA**	15 ... 150
5VSE no load	**mA**	50
5VSE 300 mA	**mA**	150
Output, encoder		Sense-controlled, short-circuit-proof, overload-proof
5VSE	**V⎓**	4.75 ... 5.25
Max. output current	**mA**	300

References

Designation	Description	Length m	Reference
Reference value adapter	For distribution of A/B encoder signals or pulse/direction signals to 5 devices with 24 V⎓ power supply unit for 5 V⎓ encoder power supply; for mounting to DIN rail	–	**VW3M3101**
Cascading cable	For reference value adapter VW3M3101	0.5	**VW3M8211R05**

Lexium SD3 motion control
Option: RS 422 interface adapter (USIC) for stepper motor drives SD328

Presentation



RS 422 interface adapter USIC

The USIC (Universal Signal Interface Converter) is an interface adapter which is used for universal adaptation of pulse/direction interface to a master controller (e.g. PLC).
A USIC is recommended in the following cases:
- If 24 V signals are to be connected to 5 V signal inputs.
- If the signals must be galvanically isolated (e.g. incorrect reference potential, strong interference in environment).
- If signals with an open collector are connected over distances greater than 3 m or if the frequency is greater than 50 kHz.

The USIC has the following features:
- 24 V or 5 V signal inputs (optocoupler) are available as required.
- Control signals are adapted for products with inputs according to RS 422.
- Galvanic isolation of signals

Note: *A power supply (24 V corresponding to PELV) must be provided by the customer.*

Characteristics

Dimensions (W x H x D)		**mm**	77 x 135 x 37
Degree of protection conforming to EN 60529			IP 00
Supply voltage		**V**	⎓ 20 ... 30
Current consumption		**A**	15 ... 150
Residual ripple		**V_{SS}**	< 2
Signal inputs			Opto-isolated, protected against reverse polarity
Resistance network, plugged			75 Ω, factory standard
	Level		5 V level (U_S: 2.5 ... 5.25 V)
	Max. input voltage	**V**	5.25
	Turn-on voltage U_E	**V**	2.5
	Turn-off voltage U_A	**V**	0.4
	Typical input current at nominal voltage	**mA**	10
Resistance network	Level		24V level (U_S: 20 ... 30 V)
	Max. input voltage	**V**	30
	Turn-on voltage U_E	**V**	20
	Turn-off voltage U_A	**mA**	3
	Typical input current at nominal voltage		10
Signal outputs			Open collector outputs, short-circuit protected
Open collector outputs			Short-circuit protected
	Max. output voltage	**V**	30
	Max. output current	**mA**	50
RS 422 signal outputs			Short-circuit protected
Ambient conditions			
Operating temperature *(1)*		**°C**	0 ... +50
Transport and storage temperature		**°C**	-25 ... +70
Pollution degree			Step 2
Rel. humidity conforming to IEC 60721-3-3, class 3K3		**%**	5 ... 85%, no condensation allowed
Vibration test conforming to IEC/EN 60068-2-6			3 ... 13 Hz: 1.5 mm peak 13 ... 150 Hz: 1 gn peak
Shock test conforming to IEC/EN 60068-2-27			15 gn for 11 ms

(1) No icing

References

Designation	Description	Length m	Reference
USIC (Universal Signal Interface Converter)	For adaptation of control signals to RS 422 standard	–	**VW3M3102**
Pulse/direction connection cables for connecting a PLC to USIC	Shielded; USIC end with SubD15 socket, other cable end open	0.5	**VW3M8210R05**
		1.5	**VW3M8210R15**
		3	**VW3M8210R30**
		5	**VW3M8210R50**

Lexium SD3 motion control
Option: GBX planetary gearboxes

Presentation

GBX planetary gearbox

In many cases the axis controller requires the use of a planetary gearbox for adjustment of speed of rotation and torque; the accuracy required by the application must be maintained.

To meet these requirements, Schneider Electric has decided to use the Neugart GBX planetary gears which are specially tuned to the BRS stepper motors. This planetary gearbox features lifetime lubrication. GBX planetary gears are easy to install and operate.

The planetary gears are – depending on the power of the stepper motors – available in four sizes (GBX 60 ... GBX160) and with ten gear ratios (3:1 ... 25:1) (see table below).

The values for the continuous torque and the peak torque at standstill available at the output shaft are calculated by multiplying the characteristic values of the motor by the gear ratio and the efficiency of the gearing (0.96 or 0.94 depending on the gear ratio).

The following table shows the optimum combination of BRS stepper motor and GBX planetary gearbox.

BRS stepper motor and GBX planetary gearbox combinations

Stepper motor *(1)*	Reduction ratio									
	3:1	4:1	5:1	8:1	9:1	12:1	15:1	16:1	20:1	25:1
BRS368W13 (W = 8 mm, Z = 38 mm)	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BRS397W36 (W = 12 mm, Z = 60 mm)	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BRS39AW36 (W = 12 mm, Z = 60 mm)	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BRS39BW46 (W = 14 mm, Z = 60 mm)	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BRS3ACW85 (W = 19 mm, Z = 56 mm)	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BRS3ADW85 (W = 19 mm, Z = 56 mm)	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 160

(1) GBX planetary gearboxes can be mounted to stepper motors with the specified shaft version (W) and the specified centring collar (Z).

GBX 80 *For these combinations, you must check that the application will not exceed the maximum output torque of the gearbox, see page 5/64.*

Lexium SD3 motion control
Option: GBX planetary gearboxes

Characteristics

Type of gearbox			GBX 60	GBX 80	GBX 120	GBX 160
Version			Planetary gearbox with straight teeth			
Backlash	3:1 ... 8:1	**arcmin**	< 16	< 9	< 8	< 6
	9:1 ... 25:1		< 20	< 14	< 12	< 10
Torsional rigidity	3:1 ... 8:1	**Nm/ arcmin**	2.3	6	12	38
	9:1 ... 25:1		2.5	6.5	13	41
Noise level *(1)*		**dB(A)**	58	60	65	70
Casing			Black anodized aluminium			
Shaft material			C 45			
Shaft output dust and damp protection			IP 54			
Lubrication			Lubricated life			
Average service life *(2)*		**h**	30,000			
Mounting position			Any position			
Operating temperature		**°C**	-25 ... +90			
Efficiency	3:1 ... 8:1		0.96			
	9:1 ... 25:1		0.94			
Maximum permitted radial force *(2) (3)*	L_{10h} = 10,000 h	**N**	500	950	2000	6000
	L_{10h} = 30,000 h	**N**	340	650	1500	4200
Maximum permitted axial force *(2)*	L_{10h} = 10,000 h	**N**	600	1200	2800	8000
	L_{10h} = 30,000 h	**N**	450	900	2100	6000
Moment of inertia of gearbox	3:1	**kgcm²**	0.135	0.77	2.63	12.14
	4:1	**kgcm²**	0.093	0.52	1.79	7.78
	5:1	**kgcm²**	0.078	0.45	1.53	6.07
	8:1	**kgcm²**	0.065	0.39	1.32	4.63
	9:1	**kgcm²**	0.131	0.74	2.62	–
	12:1	**kgcm²**	0.127	0.72	2.56	12.37
	15:1	**kgcm²**	0.077	0.71	2.53	12.35
	16:1	**kgcm²**	0.088	0.50	1.75	7.47
	20:1	**kgcm²**	0.075	0.44	1.50	6.65
	25:1	**kgcm²**	0.075	0.44	1.49	5.81
Continuous output torque *(2)*	3:1	**Nm**	28	85	115	400
	4:1	**Nm**	38	115	155	450
	5:1	**Nm**	40	110	195	450
	8:1	**Nm**	18	50	120	450
	9:1	**Nm**	44	130	210	–
	12:1	**Nm**	44	120	260	800
	15:1	**Nm**	44	110	230	700
	16:1	**Nm**	44	120	260	800
	20:1	**Nm**	44	120	260	800
	25:1	**Nm**	40	110	230	700
Maxium output torque *(2)*	3:1	**Nm**	45	136	184	640
	4:1	**Nm**	61	184	248	720
	5:1	**Nm**	64	176	312	720
	8:1	**Nm**	29	80	192	720
	9:1	**Nm**	70	208	336	–
	12:1	**Nm**	70	192	416	1280
	15:1	**Nm**	70	176	368	1120
	16:1	**Nm**	70	192	416	1280
	20:1	**Nm**	70	192	416	1280
	25:1	**Nm**	64	176	368	1120

(1) Value measured at a distance of 1 m, at no-load for a servo motor speed of 3000 rpm and a reduction ratio of 5:1.
(2) Values given for an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines for an ambient temperature of 30 °C.
(3) Force applied at mid-distance from the output shaft.

References

GBX planetary gearbox

Size	Reduction ratio	Reference *(1)*	Weight kg
GBX 60	3:1... 8:1	**GBX 060 ●●● ●●● ●S**	0.900
	9:1 ... 25:1	**GBX 060 ●●● ●●● ●S**	1.100
GBX 80	3:1... 8:1	**GBX 080 ●●● ●●● ●S**	2.100
	9:1 ... 25:1	**GBX 080 ●●● ●●● ●S**	2.600
GBX 120	3:1... 8:1	**GBX 120 ●●● ●●● ●S**	6.000
	9:1 ... 25:1	**GBX 120 ●●● ●●● ●S**	8.000
GBX 160	25:1	**GBX 160 ●●● ●●● ●S**	22.000

(1) To order a GBX planetary gearbox, complete each reference above with:

		GBX	●●●	●●●	●●●	●	S
Size	Diameter of casing *(2)*	60 mm	**060**				
		80 mm	**080**				
		120 mm	**120**				
		160 mm	**160**				
Reduction ratio		3:1		**003**			
		4:1		**004**			
		5:1		**005**			
		8:1		**008**			
		9:1		**009**			
		12:1		**012**			
		15:1		**015**			
		16:1		**016**			
		20:1		**020**			
		25:1		**025**			
Associated stepper motor	Type	BRS36●			**060**		
		BRS39●			**090**		
		BRS3A●			**110**		
	Model	BRS368				**1**	
		BRS397				**2**	
		BRS39A, BRS39B				**3**	
		BRS3AC, BRS3AD				**4**	
BRS stepper motor adaptation							**S**

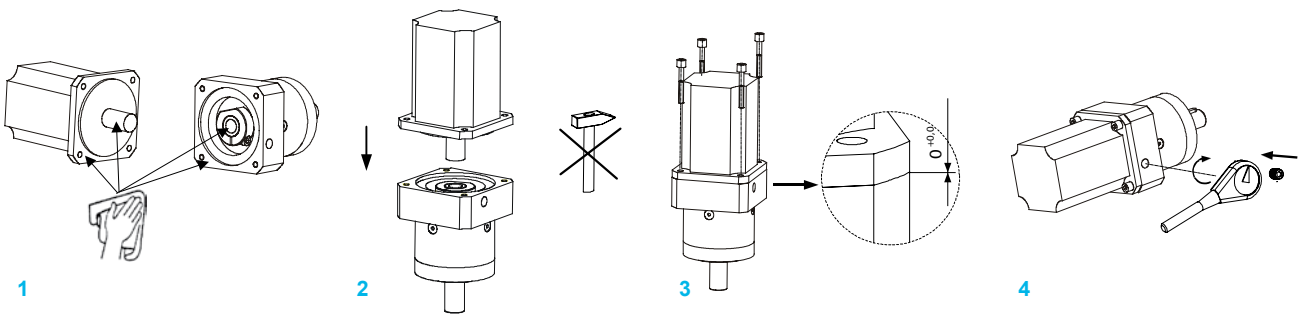
(2) See table of combinations with BRS stepper motor on page 5/63.

Mounting recommendations

Special tools are not required for mounting the GBX planetary gearbox to the motor. Note the following requirements:

1 Clean grease off contact surfaces and seals.
2 If possible, mount the motor in a vertical position. Fit motor into gearing.
3 Motor flange must be in contact with gearing flange. Tighten screws crosswise.
4 Tighten clamping ring with torque spanner.

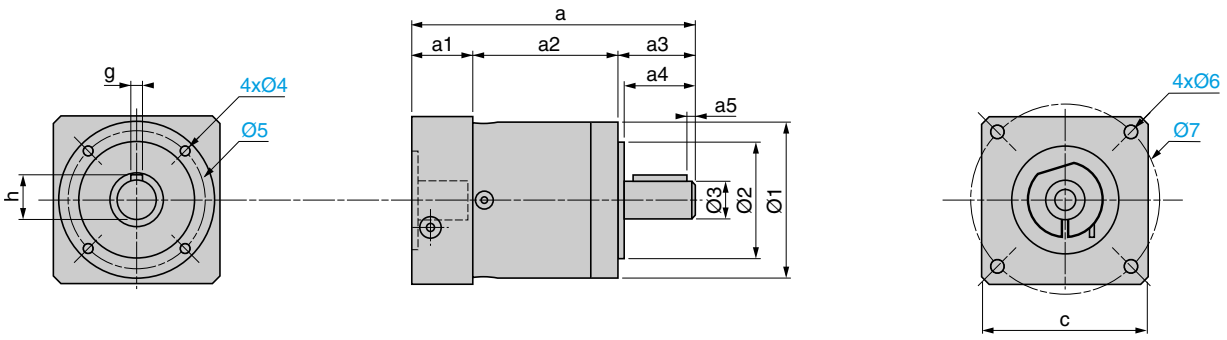
More information can be found in the user's manual supplied with the product.



Lexium SD3 motion control
Option: GBX planetary gearboxes

Dimensions

Mounting at motor side



GBX	c	A	a1	a2	a3	a4	a5	h	g	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7
060 003 ... 008	60	106.5	24.5	47	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52	M5 x 12	63
060 009 ... 025	60	118.5	24.5	59	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52	M5 x 12	63
080 003 ... 008	90	134	33.5	60.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70	M6 x 15	100
080 009 ... 025	90	151	33.5	77.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70	M6 x 15	100
120 003 ... 008	115	176.5	47.5	74	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100	M8 x 20	115
120 009 ... 025	115	203.5	47.5	101	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100	M8 x 20	115
160 025	140	305	64.5	153.5	87	80	8	43	12	160	130 h7	40 h7	M12 x 20	145	M10 x 25	165

Lexium SD3 motion control
Options and accessories
Overview

Designation	Description	Length	For SD3			Reference
			26	28 A	28B	
		m				
EMC filter	EMC filter single-phase, 9 A, 115/230 V_{AC}		x	x	x	**VW3A31401**
CANopen machine bus						
CANopen cables	Both ends with 1 RJ45 connector	0.3		x		**VW3CANCARR03**
		1		x		**VW3CANCARR1**
CANopen cable	With 1 9-pole SubD socket with integrated terminating resistor and 1 RJ45 connector	1		x		**VW3M3805R010**
CANopen cables IP 20	Standard cable, CE marking, zero halogen, flame-retardant (IEC 60332-1)	50		x		**TSXCANCA50**
		100		x		**TSXCANCA100**
		300		x		**TSXCANCA300**
	UL-approved, CE marking, flame-retardant (IEC 60332-1)	50		x		**TSXCANCB50**
		100		x		**TSXCANCB100**
		300		x		**TSXCANCB300**
	For difficult ambient conditions *(1)* or portable installations, CE marking, low smoke, zero halogen, flame-retardant (IEC 60332-1)	50		x		**TSXCANCD50**
		100		x		**TSXCANCD100**
		300		x		**TSXCANCD300**
CANopen junction box	With 2 RJ45 ports for trunk line junction, for connection via RJ45 cable	–		x		**VW3CANTAP2**
Terminal adapter	With 3 RJ45 connectors and 1 cable	0.3		x		**TCSCTN023F13M03**
SubD connector IP 20 CANopen (Twido-end)	90° angled 9-pole SubD socket. Switch for adapting to wire end	–		x		**TSXCANKCDF90T**
Modbus serial link						
Modbus junction box	3 screw terminal strips, RC terminal adapter, for connection with VW3A8306D30 cable	–		x		**TSXSCA50**
Modbus 2-way junction box	2 15-pole SubD sockets, 2 screw terminal strips, RC terminal adapter, for connection with VW3A8306 cable	–		x		**TSXSCA62**
Modbus connection module	10 RJ45 connectors, 1 screw terminal strip	–		x		**LU9GC3**
Modbus RC terminal adapters	For RJ45 connectors 120 Ω, 1 nF	–		x		**VW3A8306RC**
	150 Ω	–		x		**VW3A8306R**
	For screw terminal strip 120 Ω, 1 nF	–		x		**VW3A8306DRC**
	150 Ω	–		x		**VW3A8306DR**
Modbus T junction modules	With integrated cable	0.3		x		**VW3A8306TF03**
		1		x		**VW3A8306TF10**
Modbus cables	With 1 RJ45 connector, 1 end stripped, for Modbus junction box TSXSCA50	3		x		**VW3A8306D30**
	With 1 RJ45 connector, 1 15-pole SubD connector, for Modbus 2-way junction box TSXSCA62	3		x		**VW3A8306**
	2 RJ45 connectors	0.3		x		**VW3A8306R03**
		1		x		**VW3A8306R10**
		3		x		**VW3A8306R30**
	4-wire, shielded and twisted, RS 485, without connector	100		x		**TSXCSA100**
		200		x		**TSXCSA200**
		500		x		**TSXCSA500**

(1) Difficult ambient conditions:
- *Resistant to hydrocarbons, industrial oils, cleaning agents, solder splash*
- *Relative humidity up to 100%*
- *Saline environment*
- *High temperature variations*
- *Operating temperatures between -10 °C and +70 °C*

Designation	Description	Length	For SD3			Reference
			26	28 A	28B	
		m				
Pulse/direction interface						
Reference value adapter	For distribution of A/B encoder signals or pulse direction signals to 5 devices with 24 VDC power supply unit for 5 VDC encoder power supply; for mounting to DIN rail	–		x	x	**VW3M3101**
Cascading cable	For reference value adapter VW3M3101	0.5		x	x	**VW3M8211R05**
RS 422 interface adapter USIC (Universal Signal Interface Converter)	For adaptation of control signals to RS 422 standard	–		x	x	**VW3M3102**
Pulse/direction connection cables for connecting a PLC to USIC	Shielded; USIC end with SubD15 socket,other cable end open	0.5		x	x	**VW3M8210R05**
		1.5		x	x	**VW3M8210R15**
		3		x	x	**VW3M8210R30**
		5		x	x	**VW3M8210R50**
Cables for pulse/direction, ESIM, A/B	Device end with 10-pole Molex connector, other cable end open	0.5		x	x	**VW3M8201R05**
		1.5		x	x	**VW3M8201R15**
		3		x	x	**VW3M8201R30**
		5		x	x	**VW3M8201R50**
Pulse/direction connection cables to Schneider Electric Premium motion control modules TSX CFY	Device end with 10-pole Molex connector, CFY end with 15-pole SubD connector	0.5		x	x	**VW3M8204R05**
		1.5		x	x	**VW3M8204R15**
		3		x	x	**VW3M8204R30**
		5		x	x	**VW3M8204R50**
Pulse/direction connection cable to Siemens programmable controller S5 IP247	Device end with 10-pole Molex connector, IP247 end with SubD9 connector	3		x	x	**VW3M8205R30**
Pulse/direction connection cable to Siemens programmable controller S5 IP267	Device end with 10-pole Molex connector, IP267 end with SubD9 connector	3		x	x	**VW3M8206R30**
Pulse/direction connection cable to Siemens programmable controller S7-300 FM353	Device end with 10-pole Molex connector, FM353 end with SubD15 connector	3		x	x	**VW3M8207R30**
Pulse/direction connection cables, A/B to reference value adapter, USIC or TLM2	Device end with 10-pole Molex connector, other cable end with SubD15 socket	0.5		x	x	**VW3M8209R05**
		1.5		x	x	**VW3M8209R15**
		3		x	x	**VW3M8209R30**
		5		x	x	**VW3M8209R50**
Signal interface						
Pulse/direction cables	5 V, shielded; Device end with 24-pole Molex plug; other cable end open	0.5	x			**VW3S8201R05**
		1.5	x			**VW3S8201R15**
		3	x			**VW3S8201R30**
		5	x			**VW3S8201R50**
	24 V, shielded; Device end with 24-pole Molex plug; other cable end open	0.5	x			**VW3S8202R05**
		1.5	x			**VW3S8202R15**
		3	x			**VW3S8202R30**
		5	x			**VW3S8202R50**
Pulse/direction connection cables to Schneider Electric Premium motion control modules TSX CFY	Device end with 24-pole Molex plug; CFY end with 15-pole SubD connector	1.5	x			**VW3S8204R15**
		3.0	x			**VW3S8204R30**
Pulse/direction connection cables to Siemens programmable controller S7-300 FM353	Device end with 24-pole Molex plug; FM353 end with SubD15 socket	1.5	x			**VW3S8206R15**
		3	x			**VW3S8206R30**
Pulse/direction connection cables on Schneider Electric motion controller TLM2	Device end with 24-pole Molex plug; other cable end with SubD15 socket	0.5	x			**VW3S8208R05**
		1.5	x			**VW3S8208R15**
		3	x			**VW3S8208R30**
		5	x			**VW3S8208R50**
Motor cables						
Cables for 3-phase stepper motor	4 x 1.5 mm², shielded; motor end with 6-pole circular connector; other cable end open	3	x	x	x	**VW3S5101R30**
		5	x	x	x	**VW3S5101R50**
		10	x	x	x	**VW3S5101R100**
		15	x	x	x	**VW3S5101R150**
		20	x	x	x	**VW3S5101R200**
Encoder cables						
Encoder cables	Configured for stepper motor; shielded; motor end with 12-pole encoder plug; device end with 12-pole Molex plug	3	x	x	x	**VW3S8101R30**
		5	x	x	x	**VW3S8101R50**
		10	x	x	x	**VW3S8101R100**
		15	x	x	x	**VW3S8101R150**
		20	x	x	x	**VW3S8101R200**

Designation	Description	Length	For SD3			Reference
			26	28 A	28B	
		m				
Programming cable						
RJ45 programming cable with RS 485/RS 232 adapter		3		x	x	**VW3A8106**
Reference value adapter RVA						
Reference value adapter RVA	For distribution of A/B encoder signals or pulse/direction signals to 5 devices with 24 VDC power supply unit for 5 VDC encoder power supply; for mounting to DIN rail	–		x	x	**VW3M3101**
Cascading cable	For reference value adapter VW3M3101	0.5		x	x	**VW3M8211R05**
RS 422 interface adapter USIC						
RS 422 interface adapter USIC (Universal Signal Interface Converter)	For adaptation of control signals to RS 422 standard	–		x	x	**VW3M3102**
Pulse/direction connection cables for connecting a PLC to USIC	Shielded; USIC end with SubD15 socket,other cable end open	0.5		x	x	**VW3M8210R05**
		1.5		x	x	**VW3M8210R15**
		3		x	x	**VW3M8210R30**
		5		x	x	**VW3M8210R50**
Other accessories						
Remote terminal	Incl. cable with 2 connectors, seal and screws for mounting to control cabinet door, degree of protection IP 65	–		x	x	**VW3A31101**
Mounting plate	For mounting to DIN rail	–	x	x	x	**VW3A11851**
Connector kit	With 5 24-pole Molex plugs; with crimp contacts	–	x	x	x	**VW3S8212**
	With 5 12-pole Molex plugs; with crimp contacts	–	x	x	x	**VW3S8213**
	With 5 10-pole Molex plugs; with crimp contacts	–	x	x	x	**VW3S8214**
Fan kit	Fan kit 24 ⎓ V	–	x	x	x	**VW3S3101**
Technical documentation	CD-ROM, multilingual; Contents: ■ Technical documentation, multilingual ■ Lexium CT commissioning software ■ EPlan macros ■ CAD drawings ■ EDS and GSD files	–	x	x	x	**VW3M8703**

Contents

6 - Appendices

Technical appendices

6

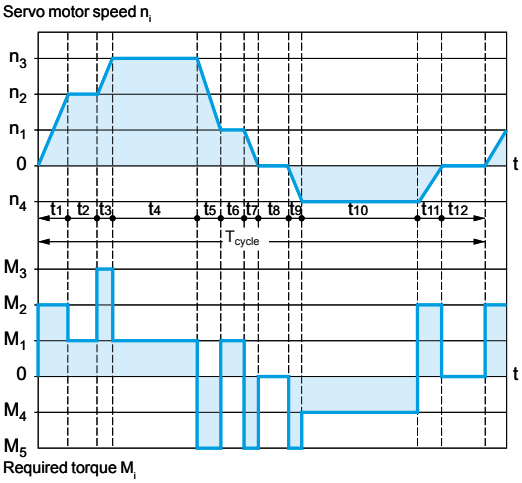
Technical appendices
Sizing a servo motor

Sizing the servo motor

The “Lexium Sizer” sizing tool is available at **www.schneider-electric.com** to help you size your servo motor.

These 2 pages are provided to help you understand the calculation method used.

To be able to size the servo motor you need to know the equivalent thermal torque and the average speed required by the mechanism to be used with the servo motor. Both values are calculated using the motor cycle timing diagram and should be compared with the speed/torque curves given for each servo motor (see the characteristics of the servo motor/servo drive combinations).



Motor cycle timing diagram

The motor cycle is made up of several sub-cycles, the duration of which is known. Each sub-cycle is divided into phases which correspond to the periods of time during which the motor torque is constant (1 to 3 phases maximum per sub-cycle).

This division into phases can be used to calculate the following for each phase:
- Duration (t_j)
- Speed (n_i)
- Required torque value (M_i)

The curves on the left show the four phase types:
- Constant acceleration during times t_1, t_3 and t_9
- At work during times t_2, t_4, t_6 and t_{10}
- Constant deceleration during times t_5, t_7 and t_{11}
- Motor stopped during times t_8 and t_{12}

The total duration of the cycle is:

$T_{cycle} = t_1 + t_2 + t_3 + t_4 + t_5 + t_6 + t_7 + t_8 + t_9 + t_{10} + t_{11} + t_{12}$

Calculating the average speed n_{avg}

The average speed is calculated using the formula: $n_{moy} = \frac{\sum |n_i| \cdot t_j}{\sum t_j}$

- n_i corresponds to the different work speeds
- $\frac{n_i}{2}$ corresponds to the average speeds during the constant acceleration and deceleration phases.

In the timing diagram above:

Duration t_j	t_1	t_2	t_3	t_4	t_5	t_6	t_7	t_8	t_9	t_{10}	t_{11}	t_{12}
Speed $\lvert n_i \rvert$	$\frac{\lvert n_2 \rvert}{2}$	$\lvert n_2 \rvert$	$\frac{\lvert n_3 \rvert + \lvert n_2 \rvert}{2}$	$\lvert n_3 \rvert$	$\frac{\lvert n_3 \rvert + \lvert n_1 \rvert}{2}$	$\lvert n_1 \rvert$	$\frac{\lvert n_1 \rvert}{2}$	0	$\frac{\lvert n_4 \rvert}{2}$	$\lvert n_4 \rvert$	$\frac{\lvert n_4 \rvert}{2}$	0

The average speed is calculated as follows:

$$n_{moy} = \frac{\frac{n_2}{2} \cdot t_1 + n_2 \cdot t_2 + \frac{n_3 + n_2}{2} \cdot t_3 + n_3 \cdot t_4 + \frac{n_3 + n_1}{2} \cdot t_5 + n_1 \cdot t_6 + \frac{n_1}{2} \cdot t_7 + \frac{n_4}{2} \cdot t_9 + n_4 \cdot t_{10} + \frac{n_4}{2} \cdot t_{11}}{T_{cycle}}$$

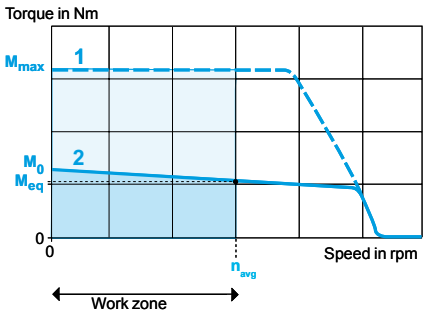
Calculating the equivalent thermal torque M_{eq}

The equivalent thermal torque is calculated using the formula:

$$M_{eq} = \sqrt{\frac{\sum M_i^2 \cdot t_j}{T_{cycle}}}$$

In the timing diagram above, this formula gives the following calculation:

$$M_{eq} = \sqrt{\frac{M_2^2 \cdot t_1 + M_1^2 \cdot t_2 + M_3^2 \cdot t_3 + M_1^2 \cdot t_4 + M_5^2 \cdot t_5 + M_1^2 \cdot t_6 + M_5^2 \cdot t_7 + M_5^2 \cdot t_9 + M_4^2 \cdot t_{10} + M_2^2 \cdot t_{11}}{T_{cycle}}}$$



1 Peak torque
2 Continuous torque

Sizing the servo motor (continued)

Determining the size of the servo motor

The point defined by the two preceding calculations (average speed and equivalent thermal torque) where the:

- horizontal axis represents the average speed n_{avg}
- vertical axis represents the thermal torque M_{eq}

must be within the area bounded by curve 2 and the work zone.

The motor cycle timing diagram should also be used to ensure that all torques M_i required for the different speeds n_i during the various cycle phases are within the area bounded by curve 1 and the work zone.

Technical appendices
Conversion tables

Conversion tables

Moment of inertia

Units	lb·in²	lb·ft²	lb·in·s²	lb·ft·s² slug·ft²	kg·cm²	kg·cm·s²	g·cm²	g·cm·s²	oz·in²	oz·in·s²
lb·in²	–	6.94×10^{-3}	2.59×10^{-3}	2.15×10^{-4}	2.926	2.98×10^{-3}	2.92×10^{3}	2.984	16	4.14×10^{-2}
lb·ft²	144	–	0.3729	3.10×10^{-2}	421.40	0.4297	4.21×10^{5}	429.71	2304	5.967
lb·in·s²	386.08	2.681	–	8.33×10^{-2}	1.129×10^{3}	1.152	1.129×10^{6}	1.152×10^{3}	6.177×10^{3}	16
lb·ft·s² slug·ft²	4.63×10^{3}	32.17	12	–	1.35×10^{4}	13.825	1.355×10^{7}	1.38×10^{4}	7.41×10^{4}	192
kg·cm²	0.3417	2.37×10^{-3}	8.85×10^{-4}	7.37×10^{-6}	–	1.019×10^{-3}	1000	1.019	5.46	1.41×10^{-2}
kg·cm·s²	335.1	2.327	0.8679	7.23×10^{-2}	980.66	–	9.8×10^{5}	1000	5.36×10^{3}	13.887
g·cm²	3.417×10^{-4}	2.37×10^{-6}	8.85×10^{-7}	7.37×10^{-8}	1×10^{-3}	1.01×10^{-6}	–	1.01×10^{-3}	5.46×10^{-3}	1.41×10^{-6}
g·cm·s²	0.335	2.32×10^{-3}	8.67×10^{-4}	7.23×10^{-5}	0.9806	1×10^{-3}	980.6	–	5.36	1.38×10^{-2}
oz·in²	0.0625	4.3×10^{-4}	1.61×10^{-6}	1.34×10^{-6}	0.182	1.86×10^{-4}	182.9	0.186	–	2.59×10^{-3}
oz·in·s²	24.3	0.1675	6.25×10^{-2}	5.20×10^{-3}	70.615	7.20×10^{-2}	7.06×10^{4}	72	386.08	–

Torque

Units	lb·in	lb·ft	oz·in	Nm	kg·m	kg·cm	g·cm	dyne·cm
lb·in	–	8.333×10^{-2}	16	0.113	1.152×10^{-2}	1.152	1.152×10^{3}	1.129×10^{6}
lb·ft	12	–	192	1.355	0.138	13.825	1.382×10^{4}	1.355×10^{7}
oz·in	6.25×10^{-2}	5.208×10^{-3}	–	7.061×10^{-3}	7.200×10^{-4}	7.200×10^{-2}	72.007	7.061×10^{4}
Nm	8.850	0.737	141.612	–	0.102	10.197	1.019×10^{4}	1×10^{7}
kg·m	86.796	7.233	1.388×10^{3}	9.806	–	100	1×10^{5}	9.806×10^{7}
kg·cm	0.8679	7.233×10^{-2}	13.877	9.806×10^{-2}	1×10^{-2}	–	1000	9.806×10^{5}
g·cm	8.679×10^{-4}	7.233×10^{-6}	1.388×10^{-2}	9.806×10^{-6}	1×10^{-5}	1×10^{-3}	–	980.665
dyne·cm	8.850×10^{-7}	7.375×10^{-8}	1.416×10^{-5}	1×10^{-7}	1.019×10^{-8}	1.0197×10^{-6}	1.019×10^{-6}	–

Power

Units	HP	W
HP	–	745.7
W	1.31×10^{-3}	–

Speed of rotation

Units	min^{-1} (tr/min)	rad/sec	deg/sec
min^{-1} (tr/min)	–	0.105	6.0
rad/sec	9.55	–	57.30
deg/sec	0.167	1.745×10^{-2}	–

Temperature

Units	°F	°C
°F	–	$(\vartheta - 32) \times {}^{5}/_{9}$
°C	$\vartheta \times {}^{9}/_{5} + 32$	–

Conversion tables (continued)

Length

Units	in	ft	yd	m	cm	mm
in	–	0.0833	0.028	0.0254	2.54	25.4
ft	12	–	0.333	0.3048	30.48	304.8
yd	36	3	–	0.914	91.44	914.4
m	39.37	3.281	1.09	–	100	1000
cm	0.3937	0.03281	1.09×10^{-2}	0.01	–	10
mm	0.03937	0.00328	1.09×10^{-3}	0.001	0.1	–

Mass

Units	lb	oz	slug	kg	g
lb	–	16	0.0311	0.453592	453.592
oz	6.35×10^{-2}	–	1.93×10^{-3}	0.028349	28.35
slug	32.17	514.8	–	14.5939	1.459×10^{4}
kg	2.20462	35.274	0.0685218	–	1000
g	2.205×10^{-3}	35.27×10^{-3}	6.852×10^{-5}	0.001	–

Force

Units	lb	oz	gf	dyne	N
lb	–	16	453.592	4.448×10^{5}	4.4482
oz	0.0625	–	28.35	2.780×10^{4}	0.27801
gf	2.205×10^{-3}	0.03527	–	980.665	N.A.
dyne	2.248×10^{-6}	35.9×10^{-6}	1.02×10^{-3}	–	0.00001
N	0.22481	3.5967	N.A.	100,000	–

Conversion example:
Conversion of 10 inches to metres:
1 Search for “in” (inches) in the left column of the “length” table and “m” (metres) in the header row.
2 The table cell at the intersection of column and row gives you the conversion factor: “0.0254”.
3 Multiply 10 inches by 0.0254 and you have the value in metres: 10 in x 0.0254 = 0.254 m.

Technical information
Protective treatment of equipment according to climatic environment

Depending on the climatic and environmental conditions in which the equipment is placed, Schneider Electric can offer specially adapted products to meet your requirements.

In order to make the correct choice of protective finish, two points should be remembered:
- the prevailing climate of the country is never the only criterion,
- only the atmosphere in the immediate vicinity of the equipment need be considered.

All climates treatment “TC”

This is the standard treatment for Schneider-electric brand equipment and is suitable for the vast majority of applications. It is the equivalent of treatments described as “Klimafest”, “Climateproof”.
In particular, it meets the requirements specified in the following publications:
- Publication UTE C 63-100 (method I), successive cycles of humid heat at:
+ 40 °C and 95 % relative humidity.
- DIN 50016 - Variations of ambient conditions within a climatic chamber:
+ 23 °C and 83 % relative humidity,
+ 40 °C and 92 % relative humidity.

It also meets the requirements of the following marine classification societies: BV-LR-GL-DNV-RINA.

Characteristics

- Steel components are usually treated with zinc. When they have a mechanical function, they may also be painted.
- Insulating materials are selected for their high electrical, dielectric and mechanical characteristics.
- Metal enclosures have a stoved paint finish, applied over a primary phosphate protective coat, or are galvanised (e.g. some prefabricated busbar trunking components).

Limits for use of “TC” (All climates) treatment

- “TC” treatment is suitable for the following temperatures and humidity:

Temperature (°C)	**Relative humidity** (%)
20	95
40	80
50	50

“TC” treatment is therefore suitable for all latitudes and in particular tropical and equatorial regions where the equipment is mounted in normally ventilated industrial premises. Being sheltered from external climatic conditions, temperature variations are small, the risk of condensation is minimised and the risk of dripping water is virtually non-existent.

Extension of use of “TC” (All climates) treatment

In cases where the humidity around the equipment exceeds the conditions described above, or in equatorial regions if the equipment is mounted outdoors, or if it is placed in a very humid location (laundries, sugar refineries, steam rooms, etc.), “TC” treatment can still be used if the following precautions are taken:
- The enclosure in which the equipment is mounted must be protected with a “TH” finish (see next page) and must be well ventilated to avoid condensation and dripping water (e.g. enclosure base plate mounted on spacers).
- Components mounted inside the enclosure must have a “TC” finish.
- If the equipment is to be switched off for long periods, a heater must be provided (0.2 to 0.5 kW per square decimetre of enclosure), that switches on automatically when the equipment is turned off. This heater keeps the inside of the enclosure at a temperature slightly higher than the outside surrounding temperature, thereby avoiding any risk of condensation and dripping water (the heat produced by the equipment itself during normal running is sufficient to provide this temperature difference).
- Special considerations for “Operator dialog” and “Detection” products:
for certain pilot devices, the use of “TC” treatment can be extended to outdoor use provided their enclosure is made of light alloys, zinc alloys or plastic material. In this case, it is also essential to ensure that the degree of protection against penetration of liquids and solid objects is suitable for the applications involved.

Technical information
Protective treatment of equipment according to climatic environment

"TH" treatment for hot and humid environments

This treatment is suitable for hot and humid atmospheres where installations are regularly subject to condensation, dripping water and the risk of fungi.

In addition, plastic insulating components are resistant to attacks from insects such as termites and cockroaches. These properties have often led to this treatment being described as "Tropical Finish", but this does not mean that all equipment installed in tropical and equatorial regions must systematically have undergone "TH" treatment. On the other hand, certain operating conditions in temperate climates may well require the use of "TH" treated equipment (see limitations for use of "TC" treatment).

Special characteristics of "TH" treatment

■ All insulating components are made of materials which are either resistant to fungi or treated with a fungicide, and which have increased resistance to creepage (Standards IEC 60112, NF C 26-220, DIN 5348).

■ Metal enclosures receive a top-coat of stoved, fungicidal paint, applied over a rust inhibiting undercoat. Components with "TH" treatment may be subject to a surcharge *(1)*. Please consult your Regional Sales Office.

Protective treatment selection guide

Surrounding environment	Duty cycle	Internal heating of enclosure when not in use	Type of climate	Protective treatment of equipment	Protective treatment of enclosure
Indoors					
No dripping water or condensation	Unimportant	Not necessary	Unimportant	"TC"	"TC"
Presence of dripping water or condensation	Frequent switching off for periods of more than 1 day	No	Temperate	"TC"	"TH"
			Equatorial	"TH"	"TH"
		Yes	Unimportant	"TC"	"TH"
	Continuous	Not necessary	Unimportant	"TC"	"TH"
Outdoors (sheltered)					
No dripping water or dew	Unimportant	Not necessary	Temperate	"TC"	"TC"
			Equatorial	"TH"	"TH"
Exposed outdoors or near the sea					
Frequent and regular presence of dripping water or dew	Frequent switching off for periods of more than 1 day	No	Temperate	"TC"	"TH"
			Equatorial	"TH"	"TH"
		Yes	Unimportant	"TC"	"TH"
	Continuous	Not necessary	Unimportant	"TC"	"TH"

These treatments cover, in particular, the applications defined by methods I and II of guide UTE C 63-100.

Special precautions for electronic equipment

Electronic products always meet the requirements of "TC" treatment. A number of them are "TH" treated as standard.

Some electronic products (for example: programmable controllers, flush mountable controllers CCX and flush mountable operator terminals XBT) require the use of an enclosure providing a degree of protection to at least IP 54, as defined by standards IEC 60664 and NF C 20 040, for use in industrial applications or in environmental conditions requiring "TH" treatment.

These electronic products, including flush mountable products, must have a degree of protection to at least IP 20 (provided either by their own enclosure or by their installation method) for restricted access locations where the degree of pollution does not exceed 2 (a test booth not containing machinery or other dust producing activities, for example).

Special treatments

For particularly harsh industrial environments, Schneider Electric is able to offer special protective treatments. Please consult your Regional Sales Office.

(1) A large number of the Schneider-electric brand products are "TH" treated as standard and are, therefore, not subject to a surcharge.

Technical information
Product standards and certifications

Standardisation

Conformity to standards

Schneider Electric products satisfy, in the majority of cases, national (for example: BS in Great Britain, NF in France, DIN in Germany), European (for example: CENELEC) or international (IEC) standards. These product standards precisely define the performance of the designated products (such as IEC 60947 for low voltage equipment).
When used correctly, as designated by the manufacturer and in accordance with regulations and correct practices, these products will allow users to build equipment, machine systems or installations that conform to their appropriate standards (for example: IEC 60204-1, relating to electrical equipment used on industrial machines).
Schneider Electric is able to provide proof of conformity of its production to the standards it has chosen to comply with, through its quality assurance system.
On request, and depending on the situation, Schneider Electric can provide the following:
- a declaration of conformity,
- a certificate of conformity (ASEFA/LOVAG),
- a homologation certificate or approval, in the countries where this procedure is required or for particular specifications, such as those existing in the merchant navy.

Code	Certification authority		Country
	Name	Abbreviation	
ANSI	American National Standards Institute	ANSI	USA
BS	British Standards Institution	BSI	Great Britain
CEI	Comitato Elettrotecnico Italiano	CEI	Italy
DIN/VDE	Verband Deutscher Electrotechniker	VDE	Germany
EN	Comité Européen de Normalisation Electrotechnique	CENELEC	Europe
GOST	Gosudarstvenne Komitet Standartov	GOST	Russia
IEC	International Electrotechnical Commission	IEC	Worldwide
JIS	Japanese Industrial Standards Committee	JISC	Japan
NBN	Institut Belge de Normalisation	IBN	Belgium
NEN	Nederlands Normalisatie Institut	NNI	Netherlands
NF	Union Technique de l'Electricité	UTE	France
SAA	Standards Association of Australia	SAA	Australia
UNE	Asociacion Española de Normalizacion y Certificacion	AENOR	Spain

European EN standards

These are technical specifications established in conjunction with, and with approval of, the relative bodies within the various CENELEC member countries (European Union, European Free Trade Association and many central and eastern European countries having «member» or «affiliated» status). Prepared in accordance with the principle of consensus, the European standards are the result of a weighted majority vote. Such adopted standards are then integrated into the national collection of standards, and contradictory national standards are withdrawn.
European standards incorporated within the French collection of standards carry the prefix NF EN. At the 'Union Technique de l'Electricité' *(Technical Union of Electricity)* (UTE), the French version of a corresponding European standard carries a dual number: European reference (NF EN …) and classification index (C …).
Therefore, the standard NF EN 60947-4-1 relating to motor contactors and starters, effectively constitutes the French version of the European standard EN 60947-4-1 and carries the UTE classification C 63-110.
This standard is identical to the British standard BS EN 60947-4-1 or the German standard DIN EN 60947-4-1.
Whenever reasonably practical, European standards reflect the international standards (IEC).
With regard to automation system components and distribution equipment, in addition to complying with the requirements of French NF standards, Schneider Electric brand components conform to the standards of all other major industrial countries.

Regulations

European Directives

Opening up of European markets assumes harmonisation of the regulations pertaining to each of the member countries of the European Union.
The purpose of the European Directive is to eliminate obstacles hindering the free circulation of goods within the European Union, and it must be applied in all member countries. Member countries are obliged to transcribe each Directive into their national legislation and to simultaneously withdraw any contradictory regulations. The Directives, in particular those of a technical nature which concern us, only establish the objectives to be achieved, referred to as "essential requirements".
The manufacturer must take all the necessary measures to ensure that his products conform to the requirements of each Directive applicable to his production.
As a general rule, the manufacturer certifies conformity to the essential requirements of the Directive(s) for his product by affixing the CE mark.
The CE mark is affixed to Schneider Electric brand products concerned, in order to comply with French and European regulations.

Significance of the CE mark
- The CE mark affixed to a product signifies that the manufacturer certifies that the product conforms to the relevant European Directive(s) which concern it; this condition must be met to allow free distribution and circulation within the countries of the European Union of any product subject to one or more of the E.U. Directives.
- The CE mark is intended solely for national market control authorities.
- The CE mark must not be confused with a conformity marking.

Technical information
Product standards and certifications

European Directives (continued)

For electrical equipment, only conformity to standards signifies that the product is suitable for its designated function, and only the guarantee of an established manufacturer can provide a high level of quality assurance.
For Schneider Electric brand products, one or several Directives are likely to be applicable, depending on the product, and in particular:

- the Low Voltage Directive 2006/95/EC: the CE mark relating to this Directive has been compulsory since 16th January 2007.
- the Electromagnetic Compatibility Directive 89/336/EEC, amended by Directives 92/31/EEC and 93/68/EEC: the CE mark on products covered by this Directive has been compulsory since 1st January 1996.

ASEFA-LOVAG certification

The function of ASEFA (Association des Stations d'Essais Française d'Appareils électriques - *Association of French Testing Stations for Low Voltage Industrial Electrical Equipment)* is to carry out tests of conformity to standards and to issue certificates of conformity and test reports.
ASEFA laboratories are authorised by the French authorisation committee (COFRAC).
ASEFA is now a member of the European agreement group LOVAG (Low Voltage Agreement Group). This means that any certificates issued by LOVAG/ASEFA are recognised by all the authorities which are members of the group and carry the same validity as those issued by any of the member authorities.

Quality labels

When components can be used in domestic and similar applications, it is sometimes recommended that a "Quality label" be obtained, which is a form of certification of conformity.

Code	Quality label	Country
CEBEC	Comité Electrotechnique Belge	Belgium
KEMA-KEUR	Keuring van Electrotechnische Materialen	Netherlands
NF	Union Technique de l'Electricité	France
ÖVE	Österreichischer Verband für Electrotechnik	Austria
SEMKO	Svenska Electriska Materiel Kontrollanatalten	Sweden

Product certifications

In some countries, the certification of certain electrical components is a legal requirement. In this case, a certificate of conformity to the standard is issued by the official test authority.
Each certified device must bear the relevant certification symbols when these are mandatory:

Code	Certification authority	Country
CSA	Canadian Standards Association	Canada
UL	Underwriters Laboratories	USA
CCC	China Compulsory Certification	China

Note on certifications issued by the Underwriters Laboratories (UL). There are two levels of approval:

"Recognized" ( ) The component is fully approved for inclusion in equipment built in a workshop, where the operating limits are known by the equipment manufacturer and where its use within such limits is acceptable by the Underwriters Laboratories.
The component is not approved as a "Product for general use" because its manufacturing characteristics are incomplete or its application possibilities are limited.
A "Recognized" component does not necessarily carry the certification symbol.

"Listed" (UL) The component conforms to all the requirements of the classification applicable to it and may therefore be used both as a "Product for general use" and as a component in assembled equipment. A "Listed" component must carry the certification symbol.

Marine classification societies

Prior approval (= certification) by certain marine classification societies is generally required for electrical equipment which is intended for use on board merchant vessels.

Code	Classification authority	Country
BV	Bureau Veritas	France
DNV	Det Norske Veritas	Norway
GL	Germanischer Lloyd	Germany
LR	Lloyd's Register	Great Britain
NKK	Nippon Kaiji Kyokaï	Japan
RINA	Registro Italiano Navale	Italy
RRS	Register of Shipping	Russia

Note

For further details on a specific product, please refer to the "Characteristics" pages in this catalogue or consult your Regional Sales Office.

Technical information
Degrees of protection provided by enclosures
IP code

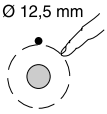
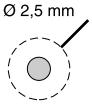
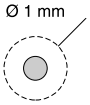
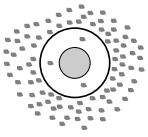
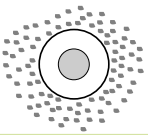
Degrees of protection against the penetration of solid bodies, water and personnel access to live parts

The European standard EN 60529 dated October 1991, IEC publication 529 (2nd edition - November 1989), defines a coding system (IP code) for indicating the degree of protection provided by electrical equipment enclosures against accidental direct contact with live parts and against the ingress of solid foreign objects or water.
This standard does not apply to protection against the risk of explosion or conditions such as humidity, corrosive gasses, fungi or vermin.
Certain equipment is designed to be mounted on an enclosure which will contribute towards achieving the required degree of protection (example : control devices mounted on an enclosure).
Different parts of an equipment can have different degrees of protection (example : enclosure with an opening in the base).
Standard NF C 15-100 (May 1991 edition), section 512, table 51 A, provides a cross-reference between the various degrees of protection and the environmental conditions classification, relating to the selection of equipment according to external factors.
Practical guide UTE C 15-103 shows, in the form of tables, the characteristics required for electrical equipment (including minimum degrees of protection), according to the locations in which they are installed.

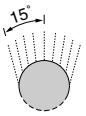
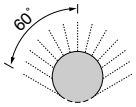
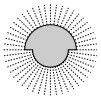
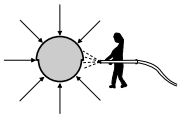
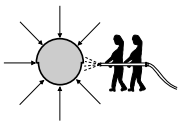
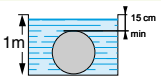
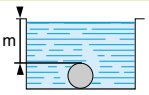
IP ●●● code

The IP code comprises **2 characteristic numerals** (e.g. **IP 55**) and may include **an additional letter** when the actual protection of personnel against direct contact with live parts is better than that indicated by the first numeral (e.g. IP 20C).
Any characteristic numeral which is unspecified is replaced by an X (e.g. IP XXB).

1st characteristic numeral:
corresponds to protection of the equipment against penetration of solid objects and protection of personnel against direct contact with live parts.

	Protection of the equipment		Protection of personnel
0	Non-protected		Non-protected
1	Ø 50 mm 	Protected against the penetration of solid objects having a diameter greater than or equal to 50 mm	Protected against direct contact with the back of the hand (accidental contacts).
2	Ø 12,5 mm 	Protected against the penetration of solid objects having a diameter greater than or equal to 12.5 mm.	Protected against direct finger contact.
3	Ø 2,5 mm 	Protected against the penetration of solid objects having a diameter greater than or equal to 2.5 mm.	Protected against direct contact with a Ø 2.5 mm tool.
4	Ø 1 mm 	Protected against the penetration of solid objects having a diameter > 1 mm.	Protected against direct contact with a Ø 1 mm wire.
5		Dust protected (no harmful deposits).	Protected against direct contact with a Ø 1 mm wire.
6		Dust tight.	Protected against direct contact with a Ø 1 mm wire.

2nd characteristic numeral:
corresponds to protection of the equipment against penetration of water with harmful effects.

0	Non-protected	
1		Protected against vertical dripping water, (condensation).
2		Protected against dripping water at an angle of up to 15°.
3		Protected against rain at an angle of up to 60°.
4		Protected against splashing water in all directions.
5		Protected against water jets in all directions.
6		Protected against powerful jets of water and waves.
7		Protected against the effects of temporary immersion.
8		Protected against the effects of prolonged immersion under specified conditions.

Additional letter:
corresponds to protection of personnel against direct contact with live parts.

A	With the back of the hand.
B	With the finger.
C	With a Ø 2.5 mm tool.
D	With a Ø 1 mm wire.

Technical information
Degrees of protection provided by enclosures
IK code

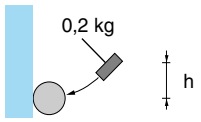
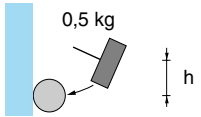
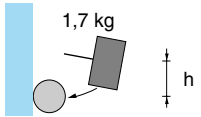
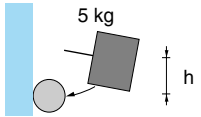
Degrees of protection against mechanical impact

The European standard EN 50102 dated March 1995 defines a coding system (IK code) for indicating the degree of protection provided by electrical equipment enclosures against external mechanical impact.
Standard NF C 15-100 (May 1991 edition), section 512, table 51 A, provides a cross-reference between the various degrees of protection and the environmental conditions classification, relating to the selection of equipment according to external factors.
Practical guide UTE C 15-103 shows, in the form of tables, the characteristics required for electrical equipment (including minimum degrees of protection), according to the locations in which they are installed.

IK ●● code

The IK code comprises **2 characteristic numerals** (e.g. **IK 05**).

2 characteristic numerals:
corresponding to a value of impact energy.

		h (cm)	Energy (J)
00	Non-protected		
01		7.5	0.15
02		10	0.2
03		17.5	0.35
04		25	0.5
05		35	0.7
06		20	1
07		40	2
08		30	5
09		20	10
10		40	20

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