Motion control
Lexium 32

Catalogue

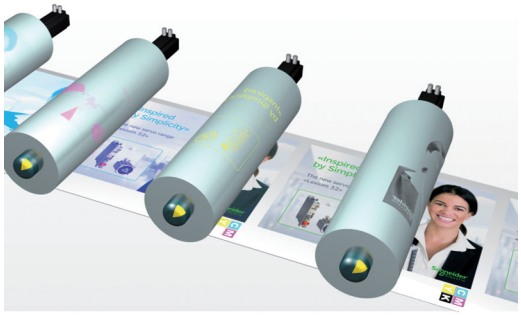
August 2009

Schneider Electric

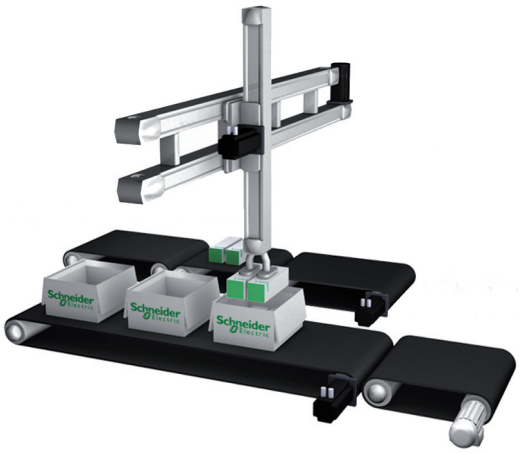
Contents

Lexium 32
motion control

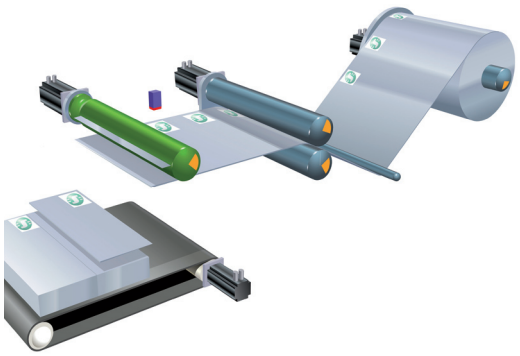
Lexium 32 motion control



LXM 32 servo drive controlling a printing machine



LXM 32 servo drive controlling a pick and place robot



Lexium 32 servo drive controlling a cut to length machine

Presentation

The Lexium 32 range of servo drives includes three servo drive models associated with two servo motor ranges for optimum use which can adapt to demands for high performance, power and simplicity of use in motion control applications.
It covers power ratings between 0.15 and 7 kW.

The Lexium 32 servo drive offer is designed to simplify the life cycle of machines. The SoMove setup software, side-by-side mounting and colour-coded plug-in connectors, easily accessible on the front panel or on top of the servo drives, all make installation, setup and maintenance easier. Maintenance is also quicker and cheaper thanks to the new duplication and backup tools.

Performance is improved by optimised motor control: reduction of vibration with automatic parameter calculation, speed observer, additional band-stop filter. This optimisation increases machine productivity.

The compact size of the servo drives and servo motors provides maximum power in the minimum space, enabling the machine dimensions and costs to be reduced.

A number of standard communication cards and encoders enable adaptation to numerous types of architecture on the market.

Integrated safety function and access to additional safety functions reduce design times and make it easier to comply with safety standards.

Applications for industrial machines

The Lexium 32 servo drive incorporates functions which are suitable for the most common applications, including:

- Printing: cutting, machines with position control, etc.
- Packaging and wrapping: cutting to length, rotary knife, bottling, capsuling, labelling, etc.
- Textiles: winding, spinning, weaving, embroidery, etc.
- Handling: conveying, palletization, warehousing, pick and place, etc.
- Transfer machines (gantry cranes, hoists), etc.
- Clamping, “on the fly” cutting operations (flying shear, printing, marking), etc.

Description

The Lexium 32 range of servo drives covers motor power ratings between 0.15 kW and 7 kW with three types of power supply:
- 110…120 V single-phase, 0.15 kW to 0.8 kW (**LXM 32●●●●M2**)
- 200…240 V single-phase, 0.3 kW to 1.6 kW (**LXM 32●●●●M2**)
- 380…480 V three-phase, 0.4 kW to 7 kW (**LXM 32●●●●N4**)

The entire range conforms to international standards IEC/EN 61800-5-1 and IEC/EN 61800-3, is UL and CSA certified, and has been developed to meet the requirements of directives regarding protection of the environment (RoHS) as well as those of European Directives to obtain the CE marking.

Electromagnetic compatibility (EMC)

The integration of a category C3 EMC filter in Lexium 32 servo drives and compliance with EMC simplify installation and make it very inexpensive to bring the device into conformity to obtain the CE marking.

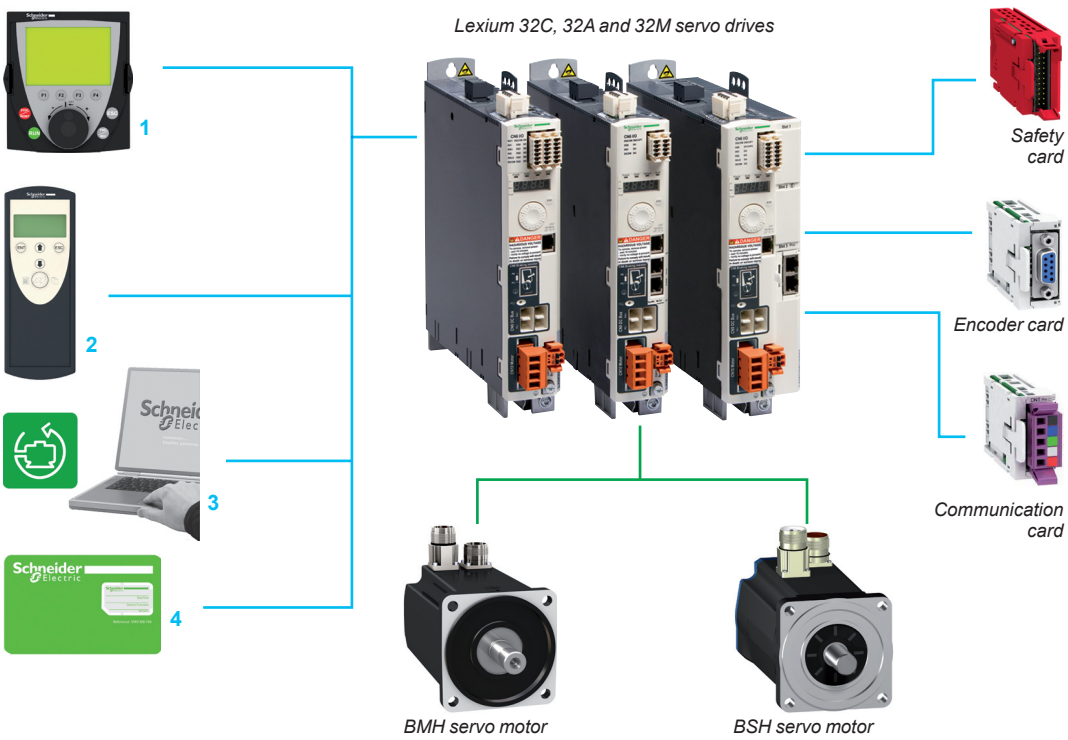
Additional filters, available as an option, can be installed by the customer to reduce the level of emissions (see page 47).

Accessories and options

External accessories and options such as braking resistors, line chokes, etc. complete this offer.

Lexium 32 motion control

Simplicity, from installation to maintenance



Human-Machine Interface (HMI)	The display can be used to control and configure the servo drive, display states and faults, access parameters and modify them in manual mode using the navigation button.
Remote graphic display terminal 1	The Lexium 32 servo drive can be connected to a remote display terminal, available as an option. This terminal can be mounted on an enclosure door with IP 54 degree of protection. It provides access to the same functions as the Human-Machine interface and some additional functions.
Multi-Loader tool 2	The Multi-Loader tool enables configurations to be copied from a PC or a servo drive and loaded onto another servo drive. The servo drives can be powered-down.
SoMove setup software 3	The SoMove setup software is used to configure and optimise control loops with the Oscilloscope function in automatic mode or in manual mode, and also for maintenance of the Lexium 32 servo drive, like all other Schneider Electric drives and starters. It can be used with a direct connection or a Bluetooth® wireless connection.
Memory card 4	This stores all the servo drive parameters. When replacing a Lexium 32 servo drive, this function ensures immediate startup since the programming time has been eliminated. Maintenance time is optimised, and costs reduced.
Auto-tuning	Adapted to each user, the three auto-tuning levels, automatic, semi-automatic and expert, allow your machine to achieve a high level of performance, whatever the application.
Installation and maintenance	Several Lexium 32 servo drives can be mounted side by side to save space. Connecting the servo drives is simplified by colour-coded plug-in connectors, which are easily accessed on the front panel or on top of the drive.

Lexium 32 motion control

Example of control system architecture with CANopen and CANmotion machine bus

Performance

The Lexium 32 servo drive offer increases machine performance due to the following characteristics:
- Overload capacity: the high peak current (up to 4 times the direct current) increases the range of movement
- Power density: the compact size of the servo drives offers maximum efficiency in a small space
- High bandwidth: better speed stability and faster acceleration improve the quality of control
- Motor control: reduction of vibration, speed observer and additional band-stop filter enhance the quality of control

Flexibility

Its versatile specifications provide the Lexium 32 range of servo drives with excellent flexibility for integration in different control system structures.

Depending on the model, the Lexium 32 servo drive has logic or analog inputs and outputs as standard, which can be configured to adapt better to applications.
It also has control interfaces for easy access to the various architecture levels:
- It has a control interface for control via pulse train
- It integrates a combined CANopen/CANmotion port for enhanced control system performance
- It can also be connected to the main communication networks and buses using various communication cards.

The following protocols are available: DeviceNet, EtherNet/IP and PROFIBUS DP V1.

Safety

The Lexium 32 range of servo drives forms part of a control system's safety system since it integrates the “Safe Torque Off” (STO) function, which prevents unintended restarting of the servo motor.
This function complies with standard IEC/EN 61508 level SIL2 governing electrical installations and the power drive systems standard IEC/EN 61800-1.
An additional eSM module is available for accessing enhanced safety functions.

BMH and BSH servo motors: dynamics and power

BMH and BSH servo motors are synchronous three-phase motors.
They feature a SinCos Hiperface® encoder for sending data from the servo motor to the servo drive automatically, and are available with or without a holding brake.

BMH servo motors

BMH servo motors are motors with medium inertia. They are perfectly adapted to high-load applications and allow the movement to be adjusted in a more robust manner.

This product offer covers a continuous stall torque range between 1.2 Nm and 84 Nm for nominal speeds between 1200 and 6000 rpm^{-1}.

BSH servo motors

BSH servo motors satisfy requirements for precision and high dynamic performance, due to the low rotor inertia. They are compact, and offer a high power density.

This product offer covers a continuous stall torque range between 0.5 Nm and 33.4 Nm for nominal speeds between 2500 and 6000 rpm^{-1}.

Main functions

Type of servo drive		LXM 32C	LXM 32A	LXM 32M
Communication	Integrated	Modbus serial link Pulse train	Modbus serial link CANopen, CANmotion machine bus	Modbus serial link Pulse train
	As an option	–	–	CANopen, CANmotion machine bus, DeviceNet, EtherNet/IP, PROFIBUS DP
	Operating modes	Manual mode (JOG) Electronic gearbox Speed control Current control	Homing Manual mode (JOG) Speed control Current control Position control	Homing Manual mode (JOG) Motion sequence Electronic gearbox Speed control Current control Position control
	Functions	Auto-tuning, monitoring, stopping, conversion		
		–	Stop window Rapid entry of position values	Stop window Rapid entry of position values Rotary axes Position register
24 V ⎓ logic inputs *(1)*		6, reassignable	3, reassignable	4, reassignable
24 V ⎓ capture inputs *(1) (2)*		–	1	2
24 V ⎓ logic outputs *(1)*		5, reassignable	2, reassignable	3, reassignable
Analog inputs		2	–	
Pulse control input		1, configurable as: ■ RS 422 link ■ 5 V or 24 V push-pull ■ 5 V or 24 V open collector		
ESIM PTO output		RS 422 link		
Human/Machine Interface	Via integrated display terminal:	Manual mode (positive/negative, fast/slow), auto-tuning, simple startup, display of information and errors, homing for Lexium 32A and 32M		
Safety functions	Integrated	"Safe Torque Off" STO		
	As an option	–		Safe Stop 1 (SS1) and Safe Stop 2 (SS2) Safe Operating Stop (SOS) Safe Limited Speed (SLS)
Sensor	Integrated	SinCos Hiperface® sensor		
	As an option	–		Resolver encoder Analog encoder Digital encoder
Architecture		Control via: ■ Logic or analog I/O	Control via: ■ Motion controller via CANopen and CANmotion machine bus	Control via: ■ Schneider Electric or third-party PLCs via communication buses and networks

Type of servo motor		BMH	BSH
Application type		High load With robust adjustment of the movement	High dynamic range Power density
Flange size		70, 100, 140 and 205	55, 70, 100 and 140
Continuous stall torque		1.2 to 84 Nm	0.5 to 33.4 Nm
Encoder type		Single turn SinCos: ■ 32,768 points/turn and ■ 131,072 points/turn Multiturn SinCos: ■ 32,768 points/turn x 4096 turns and ■ 131,072 points/turn x 4096 turns	Single turn SinCos: ■ 131,072 points/turn Multiturn SinCos: ■ 131,072 points/turn x 4096 turns
Degree of protection	Casing	IP 65 (IP 67 conformity kit as an option)	IP 65
	Shaft end	IP 50 or IP 65 (IP 67 conformity kit as an option)	IP 50 or IP 65

(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).
(2) The capture inputs can be used as standard logic inputs.

Lexium 32 motion control

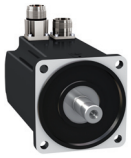
100…120 V single-phase supply voltage

Servo drive/servo motor combinations

Lexium 32 servo drive/BMH or BSH servo motor combinations

Servo motors

Lexium 32C, 32A and 32M servo drives
100…120 V single-phase supply voltage with integrated EMC filter



BMH (IP 50 or IP 65)		BSH (IP 50 or IP 65)		LXM 32●U90M2 Continuous output current: 3 A rms			
				Nominal operating point			Stall torques
Type of servo motor	Rotor inertia	Type of servo motor	Rotor inertia	Nominal torque	Nominal speed	Nominal power	M_0/M_{max} (1)
	kgcm²		kgcm²	Nm	rpm	W	Nm/Nm
		BSH 0551T	0.06	0.49	3000	150	0.5/1.5
		BSH 0552T	0.10	0.77	3000	250	0.8/1.9
		BSH 0553T	0.13				
BMH 0701T	0.59						
		BSH 0701T	0.25				
		BSH 0702T	0.41				
BMH 0702T	1.13						
BMH 0703T	1.67						
		BSH 1001T	1.40				
BMH1001T	3.2						
BMH1002T	6.3						

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

LXM 32●D18M2 Continuous output current: 6 A rms			
Nominal operating point			Stall torques
Nominal torque	Nominal speed	Nominal power	M_0/M_{max} *(1)*
Nm	rpm	W	Nm/Nm
1.14	3000	350	1.2/3.3
1.35	2500	350	1.4/4.2
1.36	2500	350	1.4/3.5

LXM 32●D30M2 Continuous output current: 10 A rms			
Nominal operating point			Stall torques
Nominal torque	Nominal speed	Nominal power	M_0/M_{max} *(1)*
Nm	rpm	W	Nm/Nm
2.07	2500	550	2.2/6.1
2.3	2500	600	2.5/6.4
3.1	2000	650	3.4/8.7
2.75	2500	700	3.3/6.3
3.3	2000	700	3.4/8.9
3.5	2000	750	6/10.3

Lexium 32 motion control

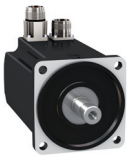
Supply voltage 200…240 V single phase

Servo drive/servo motor combinations

Lexium 32 servo drive/BMH or BSH servo motor combinations

Servo motors

Lexium 32C, 32A and 32M servo drives
200…240 V single-phase supply voltage with integrated EMC filter



BMH (IP 50 or IP 65)		BSH (IP 50 or IP 65)		LXM 32●U45M2 Continuous output current: 1.5 A rms			
				Nominal operating point			Stall torques
Type of servo motor	Rotor inertia	Type of servo motor	Rotor inertia	Nominal torque	Nominal speed	Nominal power	M^0/M_{max} (1)
	kgcm²		kgcm²	Nm	rpm	W	Nm/Nm
		BSH 0551T	0.06	0.45	6000	300	0.5/1.4
		BSH 0552T	0.10				
		BSH 0553T	0.13				
		BSH 0701T	0.25				
BMH 0701T	0.59						
		BSH 0702T	0.41				
		BSH 0703T	0.58				
BMH 0702T	1.13						
		BSH 1001T	1.40				
BMH 0703T	1.67						
BMH 1001T	3.2						
		BSH 1002T	2.31				
BMH 1002T	6.3						
BMH 1003T	9.4						
BMH 1401P	16.5						

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

LXM 32●U90M2 Continuous output current: 3 A rms			
Nominal operating point			Stall torques
Nominal torque	Nominal speed	Nominal power	M_0/M_{max} *(1)*
Nm	rpm	W	Nm/Nm
0.74	6000	450	0.8/2.5
0.84	6000	550	1.2/3
0.94	5000	500	1.3/3.5
1.1	4000	450	1.4/4

LXM 32●D18M2 Continuous output current: 6 A rms			
Nominal operating point			Stall torques
Nominal torque	Nominal speed	Nominal power	M_0/M_{max} *(1)*
Nm	rpm	W	Nm/Nm
1.8	5000	950	2.2/7.2
2.1	4000	900	2.6/7.4
2.1	4000	900	2.5/7.4
2.2	4000	900	2.7/7.5
2.9	3000	900	3.4/10.2
2.8	3000	900	3.4/10.2

LXM 32●D30M2 Continuous output current: 10 A rms			
Nominal operating point			Stall torques
Nominal torque	Nominal speed	Nominal power	M_0/M_{max} *(1)*
Nm	rpm	W	Nm/Nm
3.7	4000	1500	5.8/16.4
4.6	3000	1450	6/18.4
5.6	2500	1450	8.2/22.8
6.9	2000	1450	10.3/30.8

Lexium 32 motion control

380…480 V three-phase supply voltage

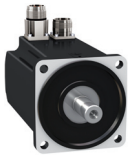
Servo drive/servo motor combinations

Lexium 32 servo drive/BMH or BSH servo motor combinations

Servo motors

Lexium 32C, 32A and 32M servo drives

380…480 V three-phase supply voltage with integrated EMC filter



BMH (IP 50 or IP 65)		BSH (IP 50 or IP 65)		LXM 32●U60N4 Continuous output current: 1.5 A rms				LXM 32●D12N4 Continuous output current: 3 A rms			
				Nominal operating point			Stall torques	Nominal operating point			Stall torques
Motor type	Rotor inertia	Motor type	Rotor inertia	Nominal torque	Nominal speed	Nominal power	M^0/M^{max} (1)	Nominal torque	Nominal speed	Nominal power	M^0/M^{max} (1)
	kgcm²		kgcm²	Nm	rpm	W	Nm/Nm	Nm	rpm	W	Nm/Nm
		BSH 0551P	0.06	0.48	6000	300	0.5/1.5				
		BSH 0552P	0.10	0.65	6000	400	0.8/2.5				
		BSH 0553P	0.13	0.65	6000	400	1.05/3.5				
BMH 0701P	0.59			1.1	3000	350	1.2/4.2				
BMH 0701P	0.59							1.3	5000	700	1.4/4.2
		BSH 0701P	0.25					1.32	5000	700	1.4/3.5
		BSH 0702P	0.41					1.64	5000	850	2.2/7.6
BMH 1001P	3.2							1.9	4000	800	3.3/10.8
BMH 0702P	1.13							2.2	3000	700	2.5/7.4
BMH 0703P	1.67										
		BSH 0703P	0.58								
		BSH 1001P	1.40								
BMH 1001P	3.2										
BMH 1002P	6.3										
		BSH 1002P	2.31								
BMH 1003P	9.4										
		BSH 1003P	3.2								
BMH 1401P	16.5										
		BSH 1004P	4.2								
		BSH 1401P	7.4								
BMH 1402P	32.0										
		BSH 1402T	12.7								
		BSH 1403T	17.9								
BMH 1403P	47.5										
		BSH 1404P	23.7								
BMH 2051P	71.4										
BMH 2052P	129										
BMH 2053P	190										

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

LXM 32●D18N4 Continuous output current: 6 A rms			
Nominal operating point			Stall torques
Nominal torque	Nominal speed	Nominal power	M^0/M^{max} *(1)*
Nm	rpm	W	Nm/Nm
2.4	5000	1300	3.4/10.2
2.44	5000	1300	3.1/11.3
2.7	4000	1100	3.3/9.6
3.1	4000	1300	3.4/10.2
3.9	4000	1600	6.2/18.4
4	4000	1700	5.8/18.3

LXM 32●D30N4 Continuous output current: 10 A rms			
Nominal operating point			Stall torques
Nominal torque	Nominal speed	Nominal power	M^0/M^{max} *(1)*
Nm	rpm	W	Nm
5.2	5000	2700	8.4/25.1
6.3	3000	2000	8/28.3
7.7	3000	2400	10.3/30.8
8.3	2500	2100	10/37.9
9.5	2500	2500	11.1/27

LXM 32●D72N4 (▲) Continuous output current: 24 A rms			
Nominal operating point			Stall torques
Nominal torque	Nominal speed	Nominal power	M^0/M^{max} *(1)*
Nm	rpm	W	Nm
11.2	3000	3500	18.5/55.3
12.3	3000	3900	19.5/59.3
12.9	3000	4100	27.8/90.2
14.9	3000	4700	24/75
19	2500	5000	33.4/103.6
25.8	2000	5400	34.4/103.4
41.6	1500	6500	62.5/170
52.2	1200	6500	84/232

▲ Available
4th quarter 2009

Lexium 32 motion control
Lexium 32 servo drives

General overview of Lexium 32 functions

The Lexium 32 servo drive drive integrates different operating modes, enabling it to be used in a wide range of industrial applications.
There are two main function families:
■ Conventional adjustment modes, such as:
□ Homing
□ Manual mode (JOG) for position or speed
□ Auto-tuning of the servo drive/servo motor combination
■ Operating modes, such as:
□ Position control:
- Point-to-point mode
- Motion sequence mode
- Electronic gearing mode (pulse position and speed control)

□ Speed control:
- Motion sequence mode
- Electronic gearing mode
- Speed control with acceleration/deceleration ramp
- Instantaneous speed control

□ Current control:
- Current control

Two types of operation are possible, in local mode or via communication buses and networks.

In local mode:
The servo drive parameters are defined via:
■ The user interface
■ The remote graphic display terminal
■ The SoMove setup software
Movements are then determined by:
■ Analog signals (± 10 V)
■ PTI 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.

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 access via the user interface
■ The remote display terminal
■ The SoMove setup software

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 modes			
Homing (for Lexium 32A and M)	■	□	Buses and networks or SoMove setup software
Manual mode (JOG)	■	■	Buses and networks, SoMove setup software, user interface or remote display terminal
Auto-tuning	■	■	Buses and networks or SoMove setup software
Operating modes			
Point-to-point mode (for Lexium 32A and M)	■	□	Buses and networks or SoMove setup software
Motion sequence mode (for Lexium 32M)	■	■	Buses and networks or SoMove setup software
Electronic gearing mode (for Lexium 32C and M)	■	■	Pulse/direction (P/D), A/B or CW/CCW signals
Speed control with ramp	■	□	Buses and networks or SoMove setup software
Current control	■	■	Analog input, buses and networks or SoMove setup software

■ Functions available □ Functions not available

Homing

***Note**: Available with Lexium 32A and Lexium 32M servo drives.*

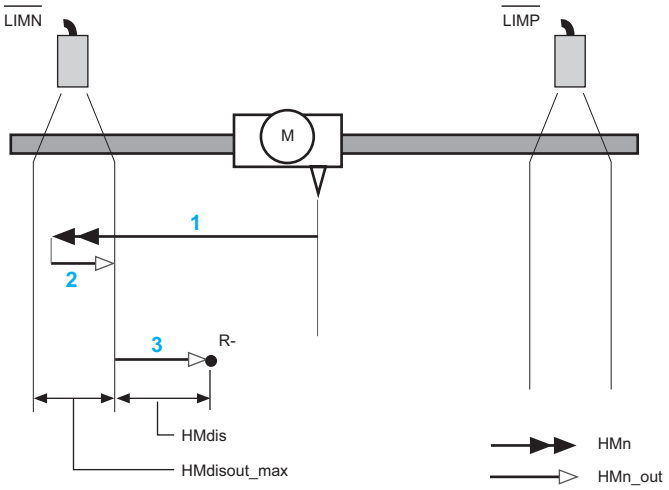
Before performing an absolute movement in point-to-point mode, a homing operation must be carried out.
Homing consists of associating an axis position with a known mechanical position. This position then becomes the reference position for any subsequent movement of the axis.

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.

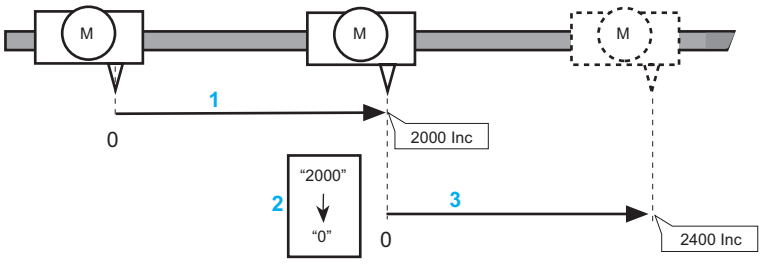


1 Move at search speed HMn
2 Move at output speed HMn_out
3 Clearance at distance HMdis at output speed HMn_out

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

Forced homing

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



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) were not performed, the target position would be 4400 increments (2000+ 2400)).

Forced homing operating mode

Homing parameters

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

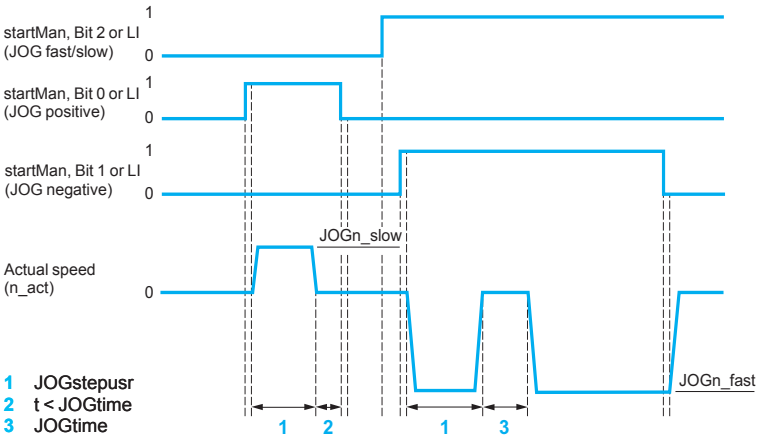
Manual mode (JOG)

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

Various parameters are used to configure the manual movement. They are transmitted via the fieldbus, the SoMove setup software, the servo drive user interface or the remote display terminal.

Setpoint value in manual mode (position JOG)

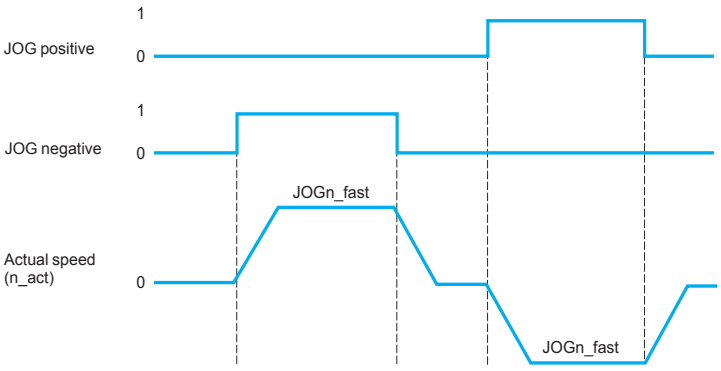
Manual mode works in local mode via the reassignable logic inputs LI● or via communication buses and networks using a bit from the control word (Bit 0, Bit 1, etc.).
When a high logic level is applied to the “JOG positive”, “JOG negative” logic input, or to a rising edge of a bit from the control word (Bit 0, Bit 1), a movement step is carried out at low or high speed. The choice between low and high speed of movement 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).



Machine adjustment in manual mode (position JOG)

Setpoint value in manual mode (speed JOG)

The speed is adjusted by the user. By default, it is defined by the “JOGn_fast” parameter. The acceleration/deceleration ramp is set to the maximum value configured by the user.
The “JOG positive” (positive direction), “JOG negative” (negative direction) command is selected with the “JOGactivate” parameter already activated in position JOG mode.
Activation of a new command does not interrupt an active command.



Machine adjustment in manual mode (speed JOG)

Auto-tuning of the servo drive/servo motor combination

The auto-tuning function integrated in the servo drive enables 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 SoMove setup software

The user has a choice of three auto-tuning modes:
- Automatic mode: This enables automatic tuning of the servo control parameters, without user intervention. This mode is designed for simple applications.
- Semi-automatic mode: This enables automatic tuning of the standard parameters used in the majority of motion applications. It does, however, offer the user the opportunity to modify certain parameters to ensure optimum use of the servo motor/servo drive combination.
- Expert mode: This allows the user to modify the standard configuration by altering each adjustment parameter. This mode is designed for complex applications.

The SoMove setup software also provides access to screens for making servo control adjustments in each of the three modes.

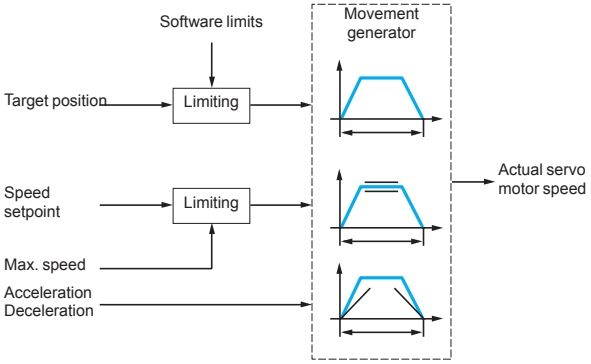
Point-to-point mode

***Note**: Available with Lexium 32A and Lexium 32M servo drives.*

This mode, also referred to as PTP, 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 position: in this case the movement is performed in relation to the current axis position (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 SoMove setup software.



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 16).

Lexium 32 motion control
Lexium 32 servo drives
Operating modes

Motion sequence mode

***Note**: Available with the Lexium 32M servo drive.*

A more sophisticated mode than that for the Lexium 05 servo drive, this 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 motion setpoint can be an relative or absolute movement, and also a speed setpoint. Up to 128 different movements can be configured. Homing positions can also be added to the sequences.
The movement is executed according to the selected acceleration, deceleration and speed parameters.

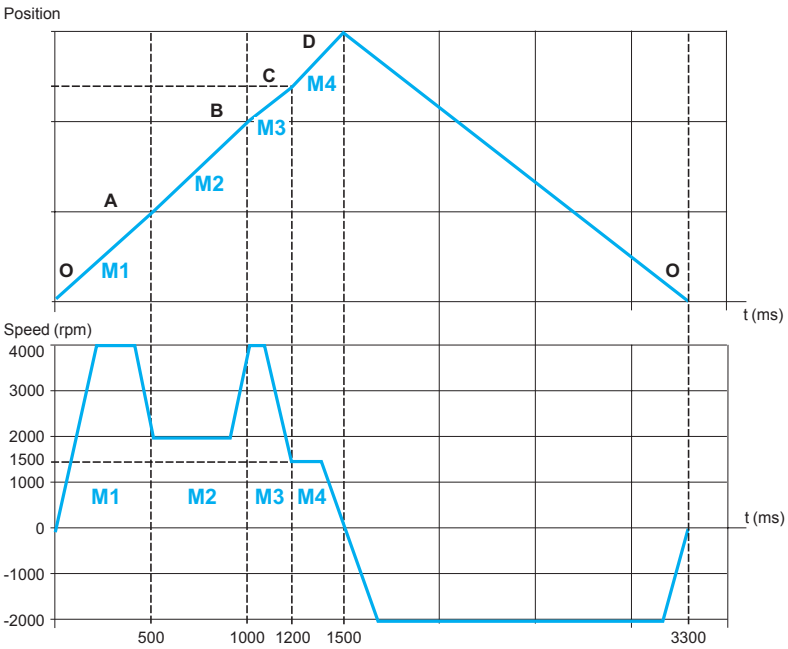
It is also possible to choose the sequencing type and conditions for the various movements.

Sequencing types and conditions

Based on PLCopen, several types of sequencing are available to the user.
It is possible to link movements in sequence without passing through zero speed (linked movements), by aborting the movement during or at the end of execution.
The sequencing conditions are also varied: level or edge of a logic input, request by communication bus, waiting periods. It is also possible to have a logical combination of two conditions.
The “Repeat” option is used to repeat a motion sequence a predefined number of times.

Example of movement sequencing

The movement executed below is made up of 5 configured 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.*

Motion sequence mode (continued)

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.

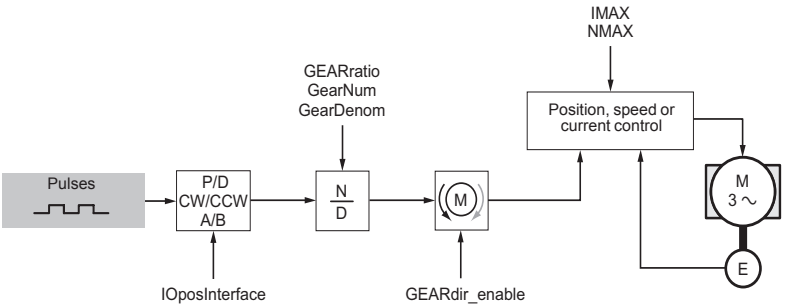
Electronic gearing mode
(pulse position and speed control mode)

***Note**: Available with Lexium 32C and Lexium 32M servo drives.*

In this mode, a master/slave relationship is established between a number of Lexium 32 servo drives or between a Lexium 32 servo drive and an external master (external A/B encoder, pulse/direction signals (P/D)).

This mode is also used for position and speed 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 32 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 utilised.
This reduction ratio, which can be either fixed or variable, is determined by the Lexium 32 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

Speed control with acceleration/deceleration ramp

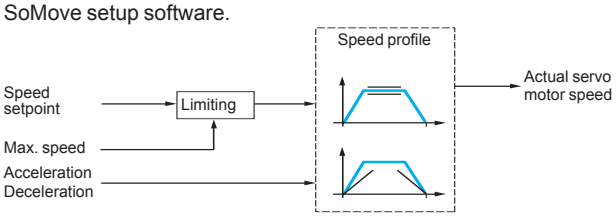
In this operating mode, the speed setpoint is applied according to an acceleration/deceleration ramp that can be adjusted using parameters. The speed setpoint can be modified during the movement. Current limiting is also possible.

The position control that is present in the background allows flexible synchronisation of two axes which are in speed control mode, and enables position control mode to be entered on the fly.

Speed control with acceleration/deceleration ramp (continued)

Setpoint value

The setpoint value is transmitted via the communication bus and networks, or the SoMove setup software.



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, etc.

Instantaneous speed control

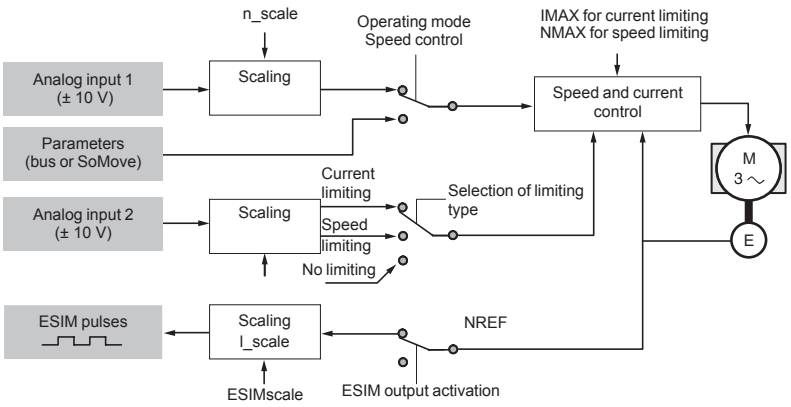
In this mode the Lexium 32 servo drive can be used with an analog output motion controller. It is suitable for all other high-performance speed control requirements.

Setpoint value

The setpoint value is transmitted:
- Via analog input 1 or a parameter for Lexium 32C servo drives
- Via a parameter for the Lexium 32A and 32M servo drive

Speed or current limiting is transmitted:
- Via analog input 2 or a parameter for the Lexium 32C servo drive
- Via a parameter for Lexium 32A and 32M servo drives

***Note:** A reassignable logic input can also be used to limit speed.*



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.

Possible applications

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

Lexium 32 motion control
Lexium 32 servo drives
Operating modes

Current control

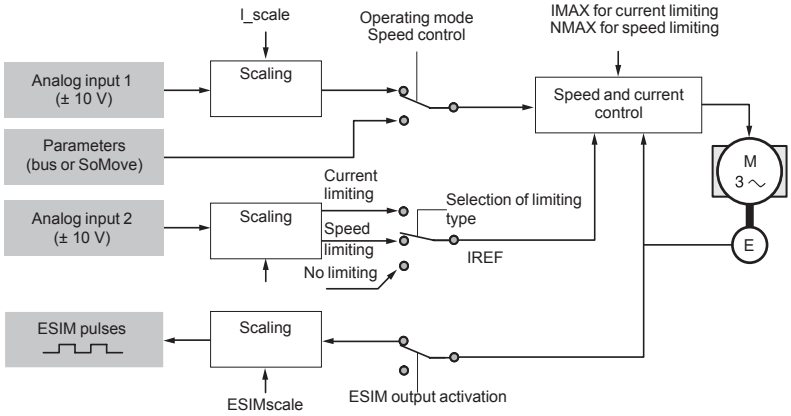
Current control is necessary for servo motor torque control. This mode, which can be added onto the other modes, is used in machine phases where torque control is crucial.

Setpoint value

The setpoint value is transmitted:
- Via analog input 1 or a parameter for Lexium 32C servo drives
- Via a parameter for the Lexium 32A and 32M servo drive

Speed or current limiting is transmitted:
- Via analog input 2 or a parameter for the Lexium 32C servo drive
- Via a parameter for Lexium 32A and 32M 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 communication on the communication buses and networks
- 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 signal logic
- Possible replacement of the servo motor encoder with an external encoder to close the position loop
- Rotary axes (rollover)
- Position register for controlling logic outputs
- Controlling third-party motors

These functions can be activated and configured via:
- Logic I/O, some of which are reassignable
- Communication buses and networks
- The SoMove setup software
- The servo drive user interface
- The remote graphic display terminal

Lexium 32 motion control
Servo drives

Environmental characteristics

Conformity to standards			Lexium 32 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: IEC/EN 61800-5-1 (low voltage) and 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 EMC emissions for servo drives		With integrated filter: ■ IEC/EN 61800-3, environment 2, category C3 ■ EN 55011 class A group 2
			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
	Radiated EMC emissions for servo drives		With integrated filter: ■ IEC/EN 61800-3, environment 2, category C3 ■ EN 55011 class A group 2
CE marking			Lexium 32 servo drives are marked CE according to the European low voltage (2006/95/EC) and EMC (2004/108/EC) directives
Product certification			UL (USA), CSA (Canada) RoHS, TÜV
Degree of protection			IP 20 conforming to IEC/EN 61800-5-1, IEC/EN 60529
Vibration resistance			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			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			Degree 2 conforming to IEC/EN 61800-5-1
Environmental conditions			IEC 60721-3-3 category 3C1
Relative humidity			According to IEC 60721-3-3, category 3K3, 5% to 85%, without condensation
Ambient air temperature around the device	Operation	**°C**	0…+ 50 Temperature derating and limitations: see mounting recommendations page 58
	Storage	**°C**	- 25…+ 70
Type of cooling	LXM 32●U45M2 LXM 32●U90M2 LXM 32●U60N4		Natural convection
	LXM 32●D18M2 LXM 32●D30M2 LXM 32●D12N4 LXM 32●D18N4 LXM 32●D30N4 LXM 32●D72N4		Integrated fan
Maximum operating altitude		**m**	1000 without derating Up to 3000 under the following conditions: ■ Temperature 50°C max. ■ With derating of the motor output current by 1% per additional 100 m ■ Using a voltage limiter above 2000 m
Operating position Maximum permanent angle in relation to the normal vertical mounting position			

Drive characteristics

Switching frequency		**kHz**	8

(1) See table on page 47 to check permitted cable lengths.

Electrical power characteristics

Power supply	Voltages	**V**	110 - 15%...120 + 10% single-phase for LXM 32●●●●M2 200 - 15%...240 + 10% single-phase for LXM 32●●●●M2 380 - 15%...480 + 10% three-phase for LXM 32●●●●N4
	Frequency	**Hz**	50 - 5%...60 + 5%
	Transient overvoltage		Overvoltage category III, conforming to IEC 61800-5-1
	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 on 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 (power supply, braking resistor and servo motor terminals)

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 and servo motor terminals		5 mm² (AWG 10) 0.7 Nm	3 mm² (AWG 12) 0.5 Nm	5 mm² (AWG 10) 0.7 Nm See characteristics of VW3 M5 10● R●●● and VW3 M5 30● R●●●● cables on pages 76, 77 and 104, 105

Control signal characteristics

Type of servo drive			**LXM 32C●●●●●**	**LXM 32A●●●●●**	**LXM 32M●●●●●**
Protection	Inputs		Against reverse polarity		
	Outputs		Against short-circuits		
24 V ⎓ I/O logic			Positive logic (Sink input/Source output) or negative logic (Source input/Sink output). Default setting: positive logic.		
Logic inputs					
Type			24 V ⎓ logic inputs with positive (Sink) or negative (Source) logic		
Number			6, reassignable	3, reassignable	4, reassignable
Power supply		**V ⎓**	24		
Sampling period		**ms**	0.25		
Debounce filtering		**ms**	Configurable between 250 µs and 1.5 ms, in increments of 250 µs		
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		

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

Control signal characteristics (continued)

Type of servo drive			LXM 32C●●●●●	LXM 32A●●●●●	LXM 32M●●●●●
Capture inputs					
Type			24 V ⎓ logic inputs Can be used as standard logic inputs		
Number			–	1	2
Power supply		V ⎓	24		
Safety inputs					
Type			Inputs for the "Safe Torque Off" (STO) safety function		
Number			2 ($\overline{STO\_A}$, $\overline{STO\_B}$)		
Power supply		V ⎓	24		
Response time		ms	≤ 5		
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			5, reassignable	2, reassignable	3, reassignable
Output voltage		V	≤ 30, conforming to standard IEC/EN 61131-2		
Sampling period		µs	250		
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–)	–	
Input resistance		kΩ	≥ 20		
Sampling period		µs	250		
Absolute error			Less than ±0.5%		
Linearity			Less than ±0.5%		
Pulse/direction (P/D), A/B, CW/CCW signals					
Type			5 V, 24 V or RS 422 link		
Number			1 interface for 5 V, 24 V signals or RS 422 link		
Signal input frequency	RS 422 link	kHz	≤ 1000		
	5 V or 24 V push-pull	kHz	≤ 200		
	5 V or 24 V open collector	kHz	≤ 10		
Maximum cable length	RS 422 link	m	100		
	5 V or 24 V push-pull	m	10		
	5 V or 24 V open collector	m	1		
ESIM (Encoder SIMulation) PTO signals					
Type			RS 422 link		
Output frequency		kHz	≤ 500		
Maximum cable length		m	100		
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		

Connection characteristics of the control signal terminals

Servo drive terminals		"Safe Torque Off" STO safety inputs (24 V ⎓ power supply)	Logic inputs (24 V ⎓ power supply)
Maximum wire size		3 mm² (AWG 12)	1 mm² (AWG 16)

Functional safety characteristics

Protection	Of the machine	"Safe Torque Off" (STO) 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	"Safe Torque Off" (STO) 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

Communication port characteristics

CANopen and CANmotion protocols (on LXM 32A●●●●● servo drives)

Protocol type		**CANopen**	**CANmotion**
Structure	Connectors	RJ45 labelled CN4 or CN5	
	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 terminal or the SoMove setup software	
Service	PDOs (Process Data Objects)	Implicit exchange of PDOs: ■ 4 configurable mapping PDOs	Implicit exchange of PDOs: ■ 2 PDOs conforming to DSP 402 (position control mode)
	PDO modes	Event-triggered, Time-triggered, Remotely-requested, Sync (cyclic), Sync (acyclic)	Sync (cyclic)
	Number of SDOs (Service Data Objects)	Explicit exchange of SDOs: ■ 2 receive SDOs ■ 2 transmit SDOs	Explicit exchange of SDOs: ■ 1 receive SDO ■ 1 transmit SDO
	Emergency	Yes	
	Profile	CiA 402: CANopen "Device Profile Drives and Motion Control"	
		Position control, speed profile, torque profile and homing modes	Position control mode
	Communication monitoring	Node guarding, heartbeat	
Diagnostics	Using LEDs	2 LEDs: "RUN" and "ERROR" on integrated display terminal Display of faults Full diagnostics with the SoMove setup software	
Description file		A single eds file for the whole range is available on our website at "www.schneider-electric.com". This file contains the description of the servo drive parameters.	

Modbus protocol (on all servo drive models)

Structure	Connector	RJ45 (labelled CN7)
	Physical interface	2-wire RS 485 multidrop
	Transmission mode	RTU
	Transmission speed	Configurable via the display terminal or the SoMove setup software: 9600 bps, 19.2 kbps or 38.4 kbps for serial links of up to 400 m
	Polarization	No polarization impedances These must be provided by the wiring system (for example, in the master)
	Number of servo drives	31 Lexium 32 servo drives maximum
	Address	1 to 247, configurable via the terminal or the SoMove setup software
Diagnostics		Display of faults on integrated display terminal

Lexium 32 motion control
Servo drives

LXM 32C●●●●●

LXM 32A●●●●●

Lexium 32C, 32A and 32M servo drives

Output current at 8 kHz		Nominal power at 8 kHz	Line current (2)		Max. prospective line Isc	Reference	Weight
Continuous (rms)	Peak (rms) (1)						
A	A	kW	A	A	kA		kg
Single-phase supply voltage: 115 V ∼ 50/60 Hz, with integrated EMC filter (3)							
1.5	3	0.15	2.9		1	**LXM 32CU45M2**	1.600
						LXM 32AU45M2	1.600
						LXM 32MU45M2	1.700
3	6	0.3	5.4		1	**LXM 32CU90M2**	1.700
						LXM 32AU90M2	1.700
						LXM 32MU90M2	1.800
6	10	0.5	8.5		1	**LXM 32CD18M2**	1.800
						LXM 32AD18M2	1.800
						LXM 32MD18M2	1.900
10	15	0.8	12.9		1	**LXM 32CD30M2**	2.000
						LXM 32AD30M2	2.000
						LXM 32MD30M2	2.100
Single-phase supply voltage: 230 V ∼ 50/60 Hz, with integrated EMC filter (3)							
1.5	4.5	0.3	2.9		1	**LXM 32CU45M2**	1.600
						LXM 32AU45M2	1.600
						LXM 32MU45M2	1.700
3	9	0.5	4.5		1	**LXM 32CU90M2**	1.700
						LXM 32AU90M2	1.700
						LXM 32MU90M2	1.800
6	18	1	8.4		1	**LXM 32CD18M2**	1.800
						LXM 32AD18M2	1.800
						LXM 32MD18M2	1.900
10	30	1.6	12.7		1	**LXM 32CD30M2**	2.000
						LXM 32AD30M2	2.000
						LXM 32MD30M2	2.100

(1) Maximum value for 3 seconds
(2) With line choke (see page 49)
(3) Additional EMC filters available as an option (see page 47)

LXM 32M●●●●●

Lexium 32C, 32A and 32M servo drives (continued)

Output current at 8 kHz		Nominal power at 8 kHz	Line current (2)		Max. prospective line Isc	Reference	Weight
Continuous (rms)	Peak (rms)(1)						
A	A	kW	A	A	kA		kg
Three-phase supply voltage: 380 V ∼ 50/60 Hz, with integrated EMC filter (3)							
1.5	6	0.4	1.4		5	**LXM 32CU60N4**	1.700
						LXM 32AU60N4	1.700
						LXM 32MU60N4	1.800
3	12	0.9	3		5	**LXM 32CD12N4**	1.800
						LXM 32AD12N4	1.800
						LXM 32MD12N4	1.900
6	18	1.8	5.5		5	**LXM 32CD18N4**	2.000
						LXM 32AD18N4	2.000
						LXM 32MD18N4	2.100
10	30	3	8.7		5	**LXM 32CD30N4**	2.600
						LXM 32AD30N4	2.600
						LXM 32MD30N4	2.700
24	72	7	18.1		5	**LXM 32CD72N4**	–
						LXM 32AD72N4	–
						LXM 32MD72N4	–
Three-phase supply voltage: 480 V ∼ 50/60 Hz, with integrated EMC filter (3)							
1.5	6	0.4	1.2		5	**LXM 32CU60N4**	1.700
						LXM 32AU60N4	1.700
						LXM 32MU60N4	1.800
3	12	0.9	2.4		5	**LXM 32CD12N4**	1.800
						LXM 32AD12N4	1.800
						LXM 32MD12N4	1.900
6	18	1.8	4.5		5	**LXM 32CD18N4**	2.000
						LXM 32AD18N4	2.000
						LXM 32MD18N4	2.100
10	30	3	7		5	**LXM 32CD30N4**	2.600
						LXM 32AD30N4	2.600
						LXM 32MD30N4	2.700
24	72	7	14.6		5	**LXM 32CD72N4**	–
						LXM 32AD72N4	–
						LXM 32MD72N4	–

(1) Maximum value for 3 seconds
(2) With line choke (see page 49)
(3) Additional EMC filters available as an option (see page 47)

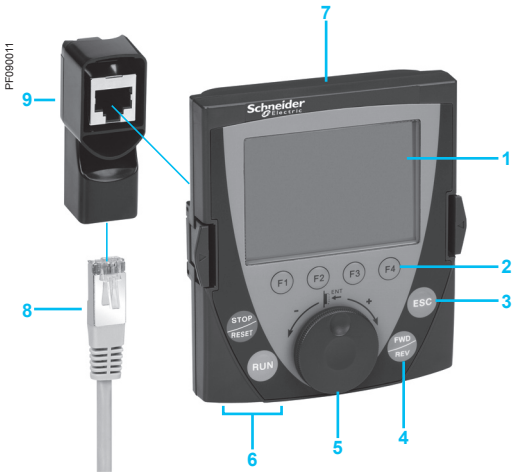
Remote graphic display terminal (to be ordered separately) *(1)*

Lexium 32 servo drives can be connected to a remote graphic display terminal, which can be used remotely using remote mounting accessories. This terminal can be mounted on an enclosure door with IP 54 degree of protection.

This terminal is common to various ranges of variable speed drive or servo drive. It has a graphic screen and accesses the same functions as the integrated display and control keys on the servo drive but also to some additional functions. It can be used for example to:
- Configure, adjust and control the servo drive remotely
- Display the servo drive status and faults remotely
- Override the servo drive I/O
- Execute motion sequences
- Load configurations

Its main characteristics are as follows:
- The graphic screen displays 8 lines of 24 characters of plain text.
- The navigation button provides quick and easy access to the drop-down menus.
- It is supplied with six languages installed as standard (Chinese, English, French, German, Italian and Spanish); other languages can be downloaded to the flash memory using the VW3 A8 121 Multi-Loader configuration tool.

Its maximum operating temperature is 60°C.



Graphic display terminal
+
remote-mounting cordset
+
female/female RJ45 adaptor

Description

1 Graphic display unit:
- 8 lines of 24 characters, 240 x 160 pixels
- Large digit display
- Bar chart display

2 Function keys
3 "**ESC**" key: Aborts a value, a parameter or a menu to return to the previous selection
4 "**FW/REV**" key: Local control for reversing the direction of rotation of the motor
5 Navigation button:
- Rotate ±: Goes to the next or previous line, increases or decreases the value
- Press: Saves the current value ("**ENT**")

6 Motor local control keys:
- "**RUN**": Starts the motor
- "**STOP/RESET**": Local control of motor stopping/drive fault clearing

7 Remote graphic display terminal
8 Remote-mounting cordset
9 Female/female RJ45 adaptor

References

Description	Item no.	Length m	Reference	Weight kg
Remote graphic display terminal A remote-mounting cordset (VW3 A1 104R●●) and an RJ45 adaptor (VW3 A1 105) are also required	7	–	**VW3 A1 101**	–
Remote-mounting cordsets equipped with 2 RJ45 connectors	8	1	**VW3 A1 104R10**	0.050
		3	**VW3 A1 104R30**	0.150
		5	**VW3 A1 104R50**	0.250
		10	**VW3 A1 104R100**	0.500
Female/female RJ45 adaptor	9	–	**VW3 A1 105**	0.010

(1) This terminal may require a software upgrade using the VW3 A8 121 Multi-Loader configuration tool. See page 27.

Documentation

Description	Reference	Weight kg
"Description of the Motion & Drives offer" DVD-ROM *(1)* comprising: ■ Technical documentation (programming manuals, installation manuals, quick reference guides) ■ SoMove Lite setup software ■ Catalogues, brochures	**VW3 A8 200**	0.100
Simplified Lexium 32 user's manual	Available on our website "www.schneider-electric.com"	–

Servo drive name plate

Description	Use	Dimensions cm	Reference	Weight kg
Name plate (sold in lots of 50)	This contains information about the servo drive. To be clipped onto the top right-hand part of the servo drive	38.5 x 13	**VW3 M2 501**	–

Configuration tools

SoMove setup software

VW3 A8 115
USB-Bluetooth adaptor

VW3 A8 121 Multi-Loader configuration tool

VW3 M8 705 memory card

Description	Use	Reference	Weight kg
SoMove setup software and associated accessories			
SoMove setup software	For configuring, adjusting and debugging the Lexium 32 servo drive. Downloadable from our website "www.schneider-electric.com" or available on the "Description of the Motion & Drives Offer" DVD ROM (VW3 A8 200).	See page 50	–
Cordset	This is used to connect the Lexium 32 servo drive to the USB port on the PC. 2.5 m cable equipped with: ■ 1 RJ45 connector (servo drive end) and ■ 1 USB connector (PC end)	**TCS MCNAM 3M002P**	–
Modbus-Bluetooth® adaptor	For establishing a Bluetooth® wireless connection between the Lexium 32 servo drive and a PC equipped with a Bluetooth® wireless link. Supplied with: ■ 1 Bluetooth® adaptor (range 10 m, class 2) with 1 RJ45 connector ■ 1 x 0.1 m cordset with 2 x RJ45 connectors ■ Etc. *(2)*	**VW3 A8 114**	0.155
USB-Bluetooth® adaptor for PC	This is required for a PC that does not have Bluetooth® technology. Connects to the USB port on the PC. Range of 10 m, class 2.	**VW3 A8 115**	0.200
Multi-Loader configuration tool			
Multi-Loader tool	For downloading configurations from a PC or drive and duplicating them on another drive. The drives do not need to be powered-up. Supplied with: ■ 1 cordset equipped with 2 RJ45 connectors ■ 1 cordset equipped with one type A USB connector and one mini B USB connector ■ 1 x 2 GB SD memory card ■ 1 x female/female RJ 45 adaptor ■ 4 AA 1.5 V LR6 round batteries	**VW3 A8 121**	–
Memory card			
Memory card	Used to store parameters of the Lexium 32 servo drive. Another Lexium 32 servo drive can be commissioned immediately if the application is undergoing maintenance or duplication.	**VW3 M8 705**	–
Pack of 25 memory cards	–	**VW3 M8 704**	–
Memory card recorder	Writes data from the Lexium 32 servo drive to the memory card. This recorder is not supplied by Schneider Electric.	See the User's manual	–

(1) The documentation for the servo drives and servo motors is also available on our website "www.schneider-electric.com".
(2) Also includes other components for connecting compatible Schneider Electric devices.

Connection accessories

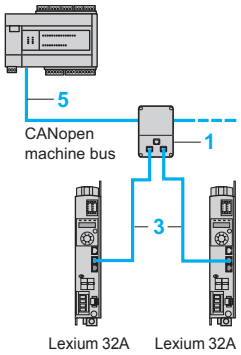
Replacement connectors

Description	Used for	Description	Reference	Weight kg
Connector kit	Lexium 32C	Comprising: ■ 3 connectors for the line supply ■ 1 connector for the DC bus ■ 3 connectors for the I/O ■ 1 connector for the motor power supply ■ 1 connector for the holding brake	**VW3 M2 201**	–
	Lexium 32A	Comprising: ■ 3 connectors for the line supply ■ 1 connector for the DC bus ■ 2 connectors for the I/O ■ 1 connector for the motor power supply ■ 1 connector for the holding brake	**VW3 M2 202**	–
	Lexium 32M	Comprising: ■ 3 connectors for the line supply ■ 1 connector for the DC bus ■ 3 connectors for the I/O ■ 1 connector for the motor power supply ■ 1 connector for the holding brake	**VW3 M2 203**	–
	Lexium 32 (all types)	Comprising: ■ 10 connectors for creating extension cordsets for the DC bus	**VW3 M2 207**	–

Cordsets

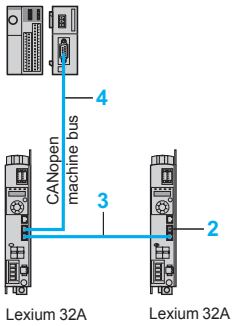
Used for	Description	Length m	Reference	Weight kg
Daisy chain connection of the DC bus between two Lexium 32 servo drives	Equipped with 2 connectors for Lexium 32 servo drive (Sold in lots of 5)	0.1	**VW3 M7 101R01**	–
Daisy chain connection or pulse control for the Lexium 32C and 32M servo drives	Equipped with 2 RJ45 connectors	0.3	**VW3 M8 502R03**	0.025
		1.5	**VW3 M8 502R15**	0.062
	Equipped with 1 RJ45 connector and a free end	3	**VW3 M8 223R30**	–
Adaptor for motor encoder cable (replacement of a Lexium 05 servo drive with a Lexium 32 servo drive)	Equipped with one 10-way Molex connector and one RJ45 connector (Lexium 32 servo drive end). Cable length 1 m	–	**VW3 M8 111R10**	–
Adaptor for motor encoder cable (replacement of a Lexium 15 servo drive with a Lexium 32 servo drive)	Equipped with one 15-way male SUB-D connector and one RJ45 connector (Lexium 32 servo drive end). Cable length 1 m	–	**VW3 M8 112R10**	–

M238 PLC



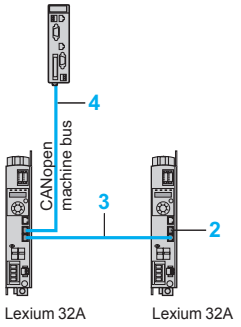
Example of architecture with control by M238 PLC

Twido programmable controller + TWD NC01M



Example of architecture with control by Twido programmable controller

Lexium Controller LMC 20 or LMC 20A130●



Example of architecture with control by LMC Lexium Controller

CANopen and CANmotion machine bus for Lexium 32A servo drives

Lexium 32A servo drives can be connected directly to the CANopen machine bus using an RJ45 connector. To simplify daisy chain connection, each servo drive is equipped with two connectors of this type (marked CN4 and CN5).
The communication function provides access to the servo drive's configuration, adjustment, control and monitoring functions.
Used with a Lexium Controller motion controller, the CANmotion bus can be used to control motion for applications with up to eight Lexium 32A servo drives.

Connection accessories *(1)*

Description	Use	Item no.	Reference	Weight kg
CANopen IP 20 junction box 2 RJ45 ports	Tap-off from trunk cable for RJ45 wiring	1	**VW3 CAN TAP2**	0.480
Line terminator 120 Ω (equipped with one RJ45 connector)	Connection to the RJ45 connector	2	**TCS CAR 013M120**	0.009

Cordsets and cables *(1)*

Description	Use		Item no.	Length	Reference	Weight
	From	To		m		kg
CANopen cordsets *(1)* equipped with 2 RJ45 connectors	VW3 CAN TAP2 junction box LXM 32A servo drive (CN4 and CN5 connectors)	LXM 32A servo drive (CN4 and CN5 connectors)	3	0.3	**VW3 CAN CARR03**	0.320
				1	**VW3 CAN CARR1**	0.500
CANopen cordsets *(1)* equipped with one 9-way female SUB-D connector with integrated line terminator and one RJ45 connector	Twido programmable controller Lexium controller motion controller LMC 20, LMC 20A130●	LXM 32A servo drive (CN4 and CN5 connectors)	4	1	**VW3 M3 805R010**	–
				3	**VW3 M3 805R030**	–
CANopen cables *(1)* Standard cables, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	PLC	VW3 CAN TAP2 junction box	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)	PLC	VW3 CAN TAP2 junction box	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)* Cables for harsh environments *(2)* or mobile installation, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	PLC	VW3 CAN TAP2 junction box	5	50	**TSX CAN CD 50**	3.510
				100	**TSX CAN CD 100**	7.770
				300	**TSX CAN CD 300**	21.700

(1) For other CANopen machine bus connection accessories, please consult the "Machines & installations with CANopen" catalogue.
(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

Lexium 32 motion control
Communication buses and networks
CANopen machine bus

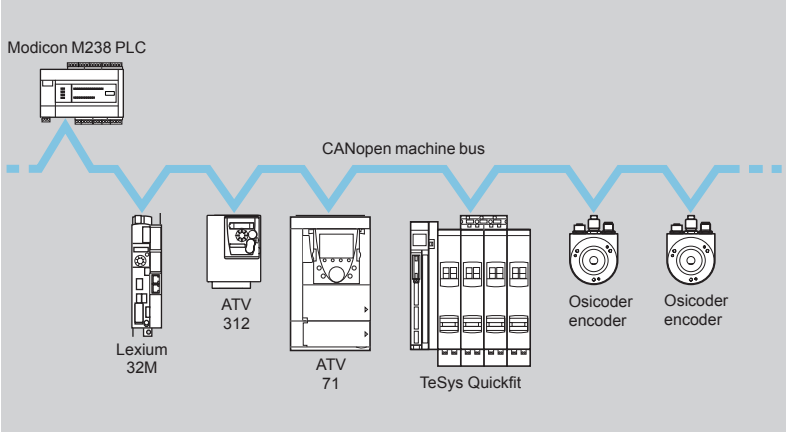
Presentation

Lexium 32A servo drives integrate the CANopen communication protocol as standard (see characteristics on page 23).

If one of the communication cards (available as options) is added, the Lexium 32M servo drive can be connected to the following communication buses and networks:
- CANopen and CANmotion machine bus
- DeviceNet fieldbus
- PROFIBUS DP V1 fieldbus
- EtherNet/IP network

CANopen and CANmotion machine bus

Presentation



The CANopen machine bus is a fieldbus based on the lower layers and components of CAN. It complies with standard ISO 11898. With its standardized 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 real-time 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.

A tiered CANopen connectivity solution reduces costs and optimizes the control system architecture, thanks to:
- Reduced cabling time
- Greater reliability of the load
- Flexibility should you need to add or remove equipment

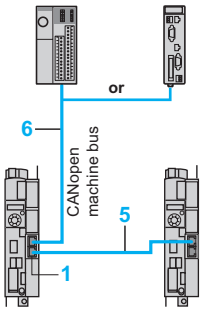
A single communication card provides access to either the CANopen or CANmotion machine bus.

Characteristics of VW3 A3 6●8 CANopen/CANmotion cards

Protocol type		CANopen	CANmotion
Structure	Connectors	2 RJ45 connectors or one 9-way male SUB-D connector	
	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 terminal or SoMove setup software	
Service	PDOs (Process Data Objects)	Implicit exchange of PDOs: ■ 4 configurable mapping PDOs	Implicit exchange of PDOs: ■ 2 PDOs conforming to DSP 402 (position control mode)
	PDO modes	Event-triggered, Time-triggered, Remotely-requested, Sync (cyclic), Sync (acyclic)	Sync (cyclic)
	Number of SDOs (Service Data Objects)	Explicit exchange of SDOs: ■ 2 receive SDOs ■ 2 transmit SDOs	Explicit exchange of SDOs: ■ 1 receive SDO ■ 1 transmit SDO
	Emergency	Yes	
	Device profiles	CiA 402: CANopen “Device Profile Drives and Motion Control”	
		Position control, speed profile, torque profile and homing modes	Position control mode
	Communication monitoring	Node guarding, heartbeat	
Diagnostics	Using LEDs	2 LEDs on the card: “RUN” and “ERROR”	
	Using the graphic display terminal	Fault display Complete diagnostics with SoMove setup software	
Description file		A single eds file for the whole range is available on our website at “www.schneider-electric.com”. This file contains the description of the servo drive parameters.	

Lexium 32 motion control
Communication buses and networks
CANopen machine bus

Twido programmable controller or Lexium Controller



Example of connecting Lexium 32M with VW3 A3 608 card

CANopen/CANmotion machine bus connection components

Communication cards

Description	Type of port	Item no.	Reference	Weight kg
CANopen/CANmotion cards for Lexium 32M servo drives	2 RJ45 connectors	1	**VW3 A3 608**	–
	One 9-way male SUB-D connector	2	**VW3 A3 618**	–

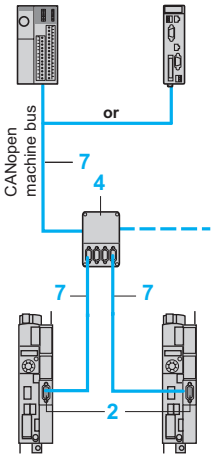
Connection accessories

Description	Type of port	Item no.	Reference	Weight kg
CANopen IP 20 junction boxes *(1)*	2 RJ45 ports	3	**VW3 CAN TAP2**	0.480
	4 SUB-D ports. Line terminator	4	**TSX CAN TDM4**	0.196
Line terminator				
With RJ45 connector	–	–	**TCS CAR 013M120**	0.009
Stripped wires	–	–	**TCS CAR 01NM120**	–
IP20 CANopen connectors *(1)* 9-way female SUB-D type. Line termination switch				
Straight	–	–	**TSX CAN KCDF180T**	0.049
Angled at 90°	–	–	**TSX CAN KCDF90T**	0.046
Angled at 90° with 9-way SUB-D for connecting PC or diagnostic tool	–	–	**TSX CAN KCDF90TP**	0.051

Cordsets *(1)*

Description	Use		Item no.	Length	Reference	Weight
	From	To		m		kg
CANopen cordsets equipped with one RJ45 connector at each end	LXM 32A servo drive VW3 A3 608 card VW3 CAN TAP2 junction box	VW3 A3 608 card LXM 32A servo drive	5	0.3	**VW3 CAN CARR03**	0.320
				1	**VW3 CAN CARR1**	0.500
CANopen cordsets equipped with one 9-way female SUB-D connector with integrated line terminator and one RJ45 connector	Twido programmable controller LMC 20 LMC 20A130 Lexium Controller	VW3 A3 608 card LXM 32A servo drive	6	1	**VW3 M3 805R010**	–
				3	**VW3 M3 805R030**	–
CANopen IP 20 cordsets equipped with one 9-way female SUB-D 9 connector at each end. Standard cables, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	LMC 20 LMC 20A130 Lexium Controller TSX CAN TDM4 junction box	VW3 A3 618 card TSX CAN TDM4 junction box	7	0.3	**TSX CAN CADD 03**	0.091
				1	**TSX CAN CADD 1**	0.143
				3	**TSX CAN CADD 3**	0.295
				5	**TSX CAN CADD 5**	0.440
CANopen IP 20 cordsets equipped with one 9-way female SUB-D 9 connector at each end. Standard cables, UL certification, CE marking Flame retardant (IEC 60332-2)	LMC 20 LMC 20A130 Lexium Controller TSX CAN TDM4 junction box	VW3 A3 618 card TSX CAN TDM4 junction box	7	0.3	**TSX CAN CBDD 03**	0.086
				1	**TSX CAN CBDD 1**	0.131
				3	**TSX CAN CBDD 3**	0.268
				5	**TSX CAN CBDD 5**	0.400

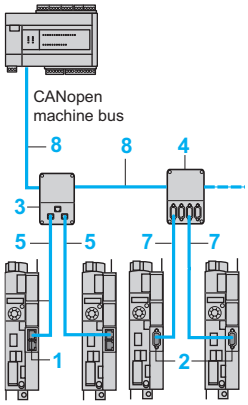
Twido programmable controller or Lexium Controller



Example of connecting Lexium 32M with VW3 A3 618 card

(1) To order other components for connection to the CANopen machine bus, please refer to the "Automation platform Modicon Premium and Unity - PL7 software" and "Machines & installations with CANopen" catalogues.

M238 programmable controller



Example of connecting Lexium 32M with VW3 A3 608 and VW3 A3 618 cards

CANopen/CANmotion machine bus connection components (continued)

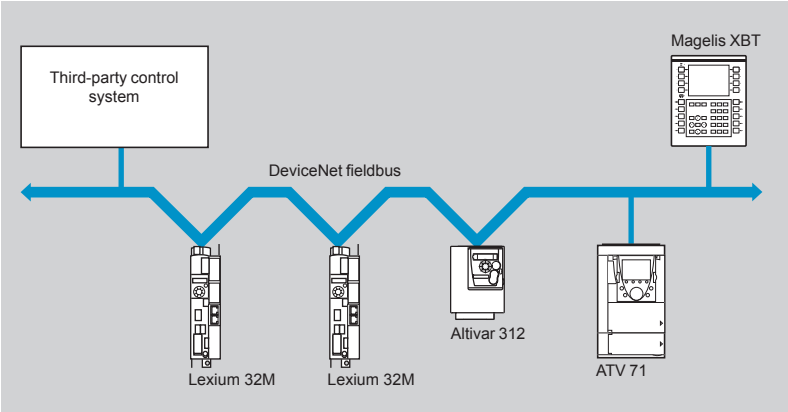
Connection cables *(1)*

Description	Use		Item no.	Length	Reference	Weight
	From	To		m		kg
CANopen cables *(1)* Standard cables, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	TSX CAN KCDF90T connector M238 PLC	TSX CAN KCDF90T connector M238 PLC	8	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)	TSX CAN KCDF90T connector M238 PLC	TSX CAN KCDF90T connector VW3 CAN TAP2 junction box TSX CAN TDM4 junction box	8	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 environment *(2)* or mobile installation, CE marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	TSX CAN KCDF90T connector M238 PLC	TSX CAN KCDF90T connector VW3 CAN TAP2 junction box TSX CAN TDM4 junction box	8	50	**TSX CAN CD 50**	3.510
				100	**TSX CAN CD 100**	7.770
				300	**TSX CAN CD 300**	21.700

(1) To order other CANopen machine bus connection components, please refer to the "Machines & installations with CANopen" catalogue.
(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

DeviceNet fieldbus

Presentation



The DeviceNet fieldbus is a “Producer-Consumer” type bus system, used in industry to manage a large number of devices remotely. It is based on CAN technology (OSI layers 1 and 2).

It can be configured as a master/slave system. DeviceNet supports communication with several hierarchical levels with priority of messages defined by configuration. The physical link is made up of two shielded twisted pairs to which it is possible to connect up to 63 slaves. Each slave constitutes a network node. Each end must have a line terminator.

The connection to the DeviceNet fieldbus allows Lexium 32M servo drives to standardize motion control solutions, while remaining independent of the system controlling the machine.

Characteristics of the VW3 M3 301 DeviceNet card

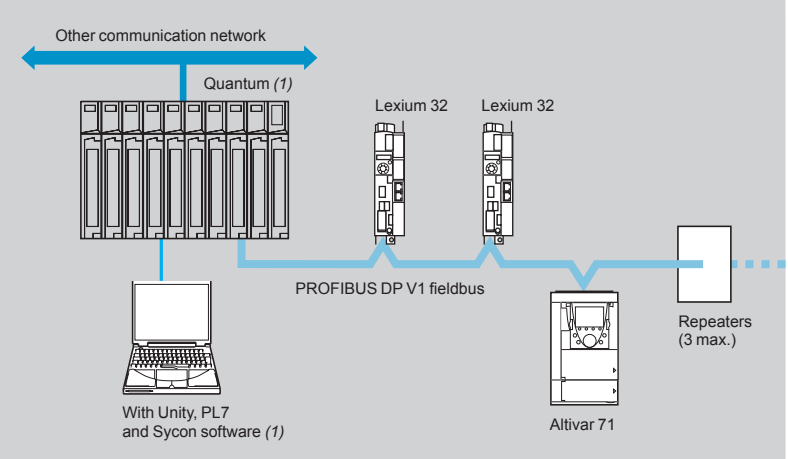
Structure	Connector	One removable screw connector, 5 contacts with 5.08 pitch
	Transmission speed	125 kbps, 250 kbps or 500 kbps, configurable using the graphic display terminal
	Maximum cable length	100 m at 500 kbps, 500 m at 125 kbps
	Address	1 to 63, configurable via the graphic display terminal or using SoMove setup software
Services	I/O data	■ Standard assemblies: Output assembly 101, Input assembly 111 ■ Extended assemblies: Output assembly 102, Input assembly 112 ■ Motion assemblies: Output assembly 100, Input assembly 110
	Periodic exchange mode	Inputs: Polled, Change of state, Cyclic Outputs: Polled
	Device profiles	CIP motion profile Profile compatible with PLCopen libraries
	Auto Device Replacement	Yes
	Communication monitoring	Time out (which can be inhibited) can be set via the DeviceNet bus configurator
Diagnostics	Using LEDs	2 LEDs on the card: “MS” (Module Status: green/red) and “NS” (Network Status)
	Using the graphic display terminal	Control mode received Reference received
Description file		A single eds file for the whole range is available on our website at “www.schneider-electric.com”. This file contains the description of the servo drive parameters.

Reference

Description	Used for	Type of port	Reference	Weight kg
DeviceNet card	Lexium 32M servo drive	1 removable screw connector	**VW3 M3 301**	–

PROFIBUS DP V1 fieldbus

Presentation



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

The Lexium 32M servo drive is connected to the PROFIBUS DP V1 fieldbus via the VW3 A3 607 communication card.

Other devices can be connected to the PROFIBUS DP bus such as PLCs *(1)*, STB I/O *(2)*, Altivar variable speed drives *(3)*, Osicoder rotary encoders *(4)*, etc.

Characteristics of the VW3 A3 607 Profibus DP card

Structure	Connector	One 9-way female SUB-D connector
	Transmission speed	9.6 kbps, 19.2 kbps and 93.75 kbps for bus lengths of 1200 m 187.5 kbps for bus lengths of 1000 m 500 kbps for bus lengths of 400 m 1.5 Mbps for bus lengths of 200 m 3 Mbps, 6 Mbps and 12 Mbps for bus lengths of 100 m
	Address	1 to 126, configurable via the graphic display terminal or using SoMove setup software
Application layer	I/O data	Depends on the application layer
	Messaging	DPV1 acyclic message
Diagnostics	Using LEDs	2 LEDs on the card: “ST” (status) and “DX” (data exchange)
	Using the graphic display terminal	Fault display Complete diagnostics with SoMove setup software
Description file		A single gsd file for the whole range is available on our website at “www.schneider-electric.com”. This file does not contain descriptions of the servo drive parameters.

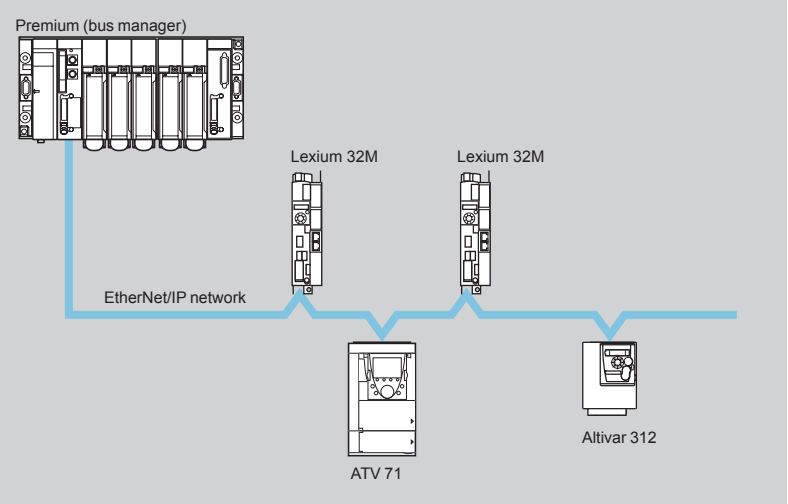
Reference

Description	Used for	Type of port	Reference	Weight kg
Communication card				
PROFIBUS DP V1 card	Lexium 32M servo drives	One 9-way female SUB-D connector	**VW3 A3 607**	0.140

(1) Please refer to the “Automation platform Modicon Quantum and Unity software” catalogue.
(2) Please refer to the “Human-Machine interfaces” catalogue.
(3) Please refer to the “Soft starters and variable speed drives” catalogue.
(4) Please refer to the “Global Detection”catalogue.

EtherNet/IP network

Presentation



EtherNet/IP is an application layer industrial protocol specially designed for the industrial environment.
Based on the CIP (Control & Information Protocol) layer, it uses widely implemented Ethernet protocols: TCP (Transport Control Protocol) and IP (Internet Protocol).
It thus offers an integrated transparent connection system to the company network.
Media access is random.

Thanks to its high speed, the network no longer restricts the application's performance. EtherNet/IP, the pre-eminent open protocol, supports all types of communication:
- Web pages
- File transfers
- Messaging

Characteristics of the VW3 A3 616 EtherNet/IP card

Structure	Connectors	2 RJ45 connectors
	Transmission speed	10/100 Mbps, half duplex and full duplex, by manual selection or auto-negotiation
	Address	Manual assignment via the graphic display terminal or SoMove setup software BOOTP DHCP
	Physical	IEEE 802.3
	Conformity level	Industrial
	Link	LLC: IEEE 802.2 MAC: IEEE 802.3 Automatic switching
	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)

Characteristics of the VW3 A3 616 EtherNet/IP card (continued)

Services	CIP explicit message	Permits access to all the drive's parameters
	Web server	HTTP server: factory-configured and modifiable The memory available for the application is approximately 4 MB. The factory-configured server contains the following pages: ■ Drive monitor: displays the drive status and the state of its I/O, the main measurements (speed, current, etc.) ■ Drive parameters: access to the drive parameters for configuration, adjustment and signalling ■ Drive recorder: displays both drive servo drive parameters (simplified oscilloscope function) ■ Security: configuration of passwords for reading and modification access ■ EtherNet/IP setup: configuration of Ethernet, TCP/IP and CIP parameters ■ EtherNet/IP scanner setup: configuration of I/O data (IO messaging) ■ Ethernet statistics: drive identification (IP addresses, version, etc.), display of Ethernet transmission counters ■ Message statistics: displays the TCP/IP and CIP counters ■ E-mail: configuration of the e-mail function
	E-mail	E-mail sent on alarm, fault or fault reset
	Device profile	Generic
	Network management	SNMP
	File transfer	FTP for Web server
Diagnostics	Using LEDs	5 LEDs on the card: “MS” (Module Status), “NS” (Network Status), “Link” (Link Status), “TX/RX” (Transmit/Receive port 1 and Transmit/Receive port 2)
	Using the graphic display terminal	Control word received Reference received Number of incorrect frames
	Via the Web server	Via the "Drive monitor", "Drive parameters", "Ethernet statistics", "Message statistics" and "Net IO monitoring" pages

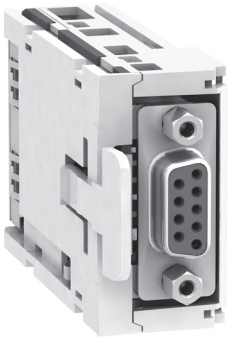
EtherNet/IP network connection components

Description	Used for	Type of port	Length m *(1)*	Reference	Weight kg
Communication card					
EtherNet/IP card	Lexium 32M servo drives	2 RJ45 connectors	–	**VW3 A3 616**	0.300
ConneXium cordsets (conforming to EIA/TIA-568 standard category 5 and IEC 1180/EN 50173, class D)					
Straight shielded twisted pair cables	EtherNet/IP card	2 RJ45 connectors	2	**490 NTW 000 02**	–
			5	**490 NTW 000 05**	–
			12	**490 NTW 000 12**	–
Crossed shielded twisted pair cables	EtherNet/IP card	2 RJ45 connectors	5	**490 NTC 000 05**	–
			15	**490 NTC 000 15**	–
ConneXium cordsets (conforming to UL and CSA 22.1 standards)					
Straight shielded twisted pair cables	EtherNet/IP card	2 RJ45 connectors	2	**490 NTW 000 02U**	–
			5	**490 NTW 000 05U**	–
			15	**490 NTW 000 12U**	–
Crossed shielded twisted pair cables	EtherNet/IP card	2 RJ45 connectors	5	**490 NTC 000 05U**	–
			15	**490 NTC 000 15U**	–

(1) Also exist in 40 and 80 metre lengths.
To order other EtherNet/IP network connection components, please refer to the “Communication networks in machines and installations” catalogue.

Lexium 32 motion control

Option: Encoder cards for Lexium 32M servo drives



VW3 M3 401 encoder card

Presentation

The Lexium 32M servo drive can take an encoder interface card. This has an input available for an additional encoder, thus offering the following advantages:

- Possible to connect to third-party motors, which increases the installation's flexibility
- Possible to improve positioning accuracy by reducing the effect of mechanical backlash thanks to position measurement directly on the machine, and to satisfy the requirements of simple applications or very complex systems which need a very quick response or very accurate path following

Three cards are available depending on the encoder technology:

- Resolver encoder
- Encoder with digital output
- Encoder with analog output

Characteristics

VW3 M3 401 resolver interface card			
Type of connection			9-way female SUB-D connector
VW3 M3 402 interface card for digital output encoder			
Power supply	A/B/I BISS EnDat 2.2	**V**	5 ⎓
	SSI	**V**	12 V ⎓
Type of connection			15-way female high-definition SUB-D connector
VW3 M3 403 interface card for analog output encoder			
Power supply	1 Vpp/Hall 1 Vpp EnDat 2.1	**V**	5 ⎓
	Hiperface	**V**	12 ⎓
Type of connection			15-way female high-definition SUB-D connector

References

Description	Technology type	Encoder type: Machine encoder	Encoder type: Motor encoder	Reference	Weight kg
Resolver card			■	**VW3 M3 401**	–
Interface card for digital output encoder	A/B/I	■		**VW3 M3 402**	–
	SSI	■			
	BISS	■			
	EnDat 2.2	■			
Interface card for analog output encoder	1 Vpp		■	**VW3 M3 403**	–
	1 Vpp/Hall		■		
	EnDat 2.1	■	■		
	Hiperface	■	■		

Connection accessories

Connectors

Description	Composition	Length m	Reference	Weight kg
Connector 9-way male SUB-D For resolver card	–	–	**AEO CON 011**	–

Cordset

Cordset equipped with 15-way high density SUB-D connector For interface card for digital or analog output encoder	–	5	**VW3 M4 705**	–

Connecting cable

Cable for creating cordsets for encoder interface cards	[5 x (2 x 0.25 mm²) + (2 x 0.5 mm²)]	100	**VW3 M8 221R1000**	21.000

Lexium 32 motion control
Option: Encoder cards for Lexium 32M servo drives

Osicoder® machine encoders for VW3 M3 402 encoder card

Presentation

To meet requirements for machine encoders, Schneider Electric offers the Osicoder® range of encoders. They connect to the VW3 M3 402 encoder interface card with digital output.

The Osicoder® offer consists of incremental encoders and absolute encoders.

The proposed incremental encoder, with its configurable resolution, satisfies most requirements for machine encoders with A/B/I output signal.
The proposed absolute encoders are among the most commonly used machine encoders with SSI interface.

For more information about the Osicoder® offer, please refer to the "Rotary encoders – Osicoder®" catalogue.

XCC 1510PSM50X incremental encoder

Ø 58 mm incremental encoder

Operating on the principle of in-line differential optical reading, XCC incremental encoders are extremely rugged, thanks to their technology based on photo-sensitive cells and their triple light source.
The cyclic ratio is maintained even in the event of:
- Failure of one of the sender components
- Reduced efficiency of the sender components (up to 30%)
- Deposit of fine dust on the optical elements

Configurable encoder with Ø 10 mm solid shaft

Resolution	Type of connection	Type of output stage	Supply voltage	Reference	Weight kg
5000…80,000 points	Male M23 radial connector	5 V, RS 422	4.75…30 V	**XCC 1510PSM50X**	0.465

***Note**: XCC incremental encoders can also be used as a master encoder on Lexium 32C and Lexium 32M servo drives, when connected to the PTI input.*

XCC 2510PS81SBN absolute encoder

Ø 58 mm absolute encoders

An absolute encoder continuously delivers a code which is the image of the actual position of the moving part to be controlled. On the first power-up or on return of the power after a power failure, the encoder will deliver a data item which can be used directly by the processing system.

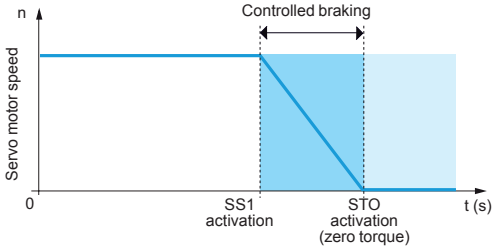
Single turn encoder with Ø 10 mm solid shaft

Resolution	Type of connection	Type of output stage	Supply voltage	Reference	Weight kg
8192 points	Male M23 radial connector	SSI, 13 bits, binary	11…30 V	**XCC 2510PS81SBN**	0.460

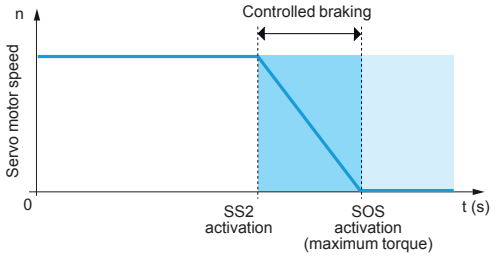
Multiturn encoder with Ø 10 mm solid shaft

8192 points x 4096 turns	Male M23 radial connector	SSI, 25 bits, binary	11…30 V	**XCC 3510PS84SBN**	0.685

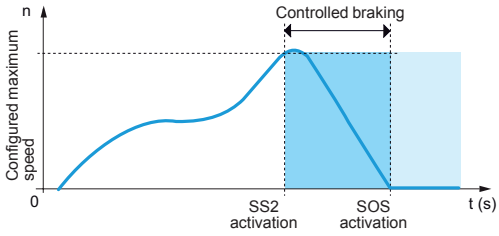
Lexium 32 motion control
Option: Safety card for Lexium 32M servo drives



Activation of the "Safe Stop 1" (SS1) safety function



Activation of the "Safe Stop 2" (SS2) safety function



Activation of the "Safe Limited Speed" (SLS) safety function

Presentation

The eSM safety card allows Lexium 32 servo drives to access additional safety functions, as well as the "Safety Torque Off" (STO) function, thus putting in place a complex safety device, while ensuring reliable monitoring of the installation.

The eSM card optimises the overall cost of the installation by avoiding the addition of external safety products, while conforming to international safety standards. As a result, wiring is cheaper and quicker.

It also improves performance during maintenance by reducing machine or installation stopping times and increases the safety of any work carried out.

It includes safety functions compliant with standard IEC/EN 61800-5-2.
These functions, required in the majority of applications, are as follows:
- "Safe Torque Off" (STO)
- "Safe Stop 1" (SS1)
- "Safe Stop 2" (SS2)
- "Safe Limited Speed" (SLS)
- "Safe Operating Stop" (SOS)

Safety functions

"Safe Stop 1" (SS1) safety function

The SS1 safety function is used to achieve a category 1 safe stop.
After activating the function, the servo motor is braked in a controlled manner, maintaining the power on the actuators. The power is then cut when the actuators stop after the machine has come to a halt.

"Safe Stop 2" (SS2) safety function

The SS2 safety function is used to achieve a category 2 safe stop. After activating the function, the servo motor is braked in a controlled manner, maintaining the power on the actuators. Once the motor has come to a halt, it is immobilised with the "Safe Operating Stop" (SOS) function.

"Safe Limited Speed" (SLS) safety function

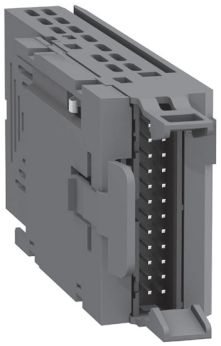
The SLS safety function is used to monitor the configured maximum speed. If this speed is exceeded, the servo motor will be stopped in accordance with SS2.

"Safe Operating Stop" (SOS) safety function

The SOS safety function is used to monitor any deviation from the standstill position, once the servo motor has come to a halt.

Lexium 32 motion control

Option: Safety card for Lexium 32M servo drives



VW3 M3 501 safety card

Electrical characteristics

Power supply	**V**	⎓ 24 (min. 19, max. 30)
Logic inputs		11 x 24 V ⎓ logic inputs Protection against reverse polarity Switching thresholds: ■ Conforming to standard IEC 61131-2 type 1 ■ State 0 if ≤ 5 V ■ State 1 if ≥ 15 V
Logic outputs		7 x 24 V ⎓ open collector logic outputs Short-circuit protection
Conformity to standards		Conforms to the machine safety standard ISO 13849-1, performance level “e” (PL e) Conforms to the functional safety standard IEC/EN 61508, SIL 3 capability Conforms to the functional safety standard IEC/EN 62061, SIL 3 capability

References

Description	Cable length	Reference	Weight
	m		**kg**
eSM safety card for Lexium 32 servo drives	–	**VW3 M3 501**	–
Preassembled cordset with a 24-way female connector (safety card end) and a free end	3	**VW3 M8 801R30**	–

Lexium 32 motion control
Option: braking resistors for servo drives

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.

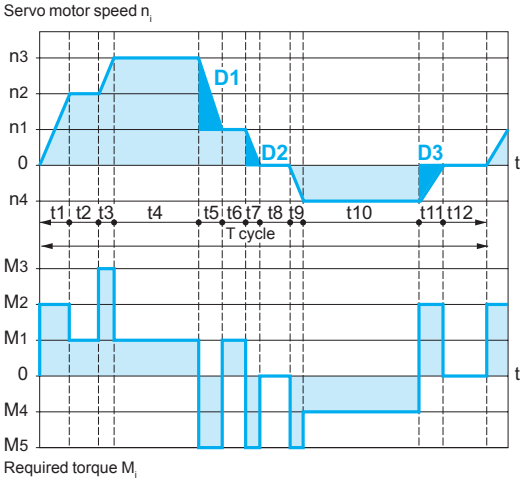
Two or more external braking resistors can be connected in parallel.
The servo drive monitors the power dissipated in the braking resistor.

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 116 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 62 and 88.
The energy E_i of each deceleration 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 kgm^2, 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 44.
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 44. 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 32 motion control
Option: braking resistors for servo drives

Characteristics

Braking resistors used with LXM 32●●●●M2 servo drives with 115 V ∿ power supply

Type of servo drive				LXM 32●U45M2	LXM 32●U90M2	LXM 32●D18M2	LXM 32●D30M2
Number of phases				Single-phase			
Load threshold			V ⎓	430			
Energy absorption of the internal capacitors		Edrive	Joules (Ws)	30	60	89	119
Internal resistor	Resistance		Ω	94	47	20	10
	Continuous power	PPr	W	10	20	40	60
	Peak energy	EPk	Joules (Ws)	82	166	330	550
External resistor	Minimum resistance		Ω	68	36	20	12
	Maximum resistance		Ω	110	55	27	16

Braking resistors used with LXM 32●●●●M2 servo drives with 230 V ∿ power supply

Type of servo drive				LXM 32●U45M2	LXM 32●U90M2	LXM 32●D18M2	LXM 32●D30M2
Number of phases				Single-phase			
Load threshold			V ⎓	430			
Energy absorption of the internal capacitors		Edrive	Joules (Ws)	9	18	26	35
Internal resistor	Resistance		Ω	94	47	20	10
	Continuous power	PPr	W	10	20	40	60
	Peak energy	EPk	Joules (Ws)	82	166	330	550
External resistor	Minimum resistance		Ω	68	36	20	12
	Maximum resistance		Ω	110	55	27	16

Braking resistors used with LXM 32●●●●N4 servo drives with 230 V ∿ power supply

Type of servo drive				LXM 32 ●U60N4	LXM 32 ●D12N4	LXM 32 ●D18N4	LXM 32 ●D30N4	LXM 32 ●D72N4
Number of phases				Three-phase				
Load threshold			V ⎓	780				
Energy absorption of the internal capacitors		Edrive	Joules (Ws)	14	25	50	73	145
Internal resistor	Resistance		Ω	132	60	30	30	10
	Continuous power	PPr	W	20	40	60	100	150
	Peak energy	EPk	Joules (Ws)	200	400	600	1000	2400
External resistor	Minimum resistance		Ω	100	47	33	15	8
	Maximum resistance		Ω	145	73	50	30	12

Braking resistors used with LXM 32●●●●N4 servo drives with 480 V ∿ power supply

Type of servo drive				LXM 32 ●U60N4	LXM 32 ●D12N4	LXM 32 ●D18N4	LXM 32 ●D30N4	LXM 32 ●D72N4
Number of phases				Three-phase				
Load threshold			V ⎓	780				
Energy absorption of the internal capacitors		Edrive	Joules (Ws)	3	5	10	14	28
Internal resistor	Resistance		Ω	132	60	30	30	10
	Continuous power	PPr	W	20	40	60	100	150
	Peak energy	EPk	Joules (Ws)	200	400	600	1000	2400
External resistor	Minimum resistance		Ω	100	47	33	15	8
	Maximum resistance		Ω	145	73	50	30	12

Presentation: page 42 | Sizing: page 42 | References: page 45 | Dimensions: page 52

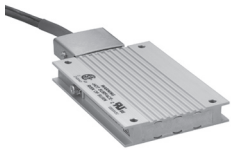
General characteristics

Type of braking resistor			VW3 A7 601 R●●…608 R●●	VW3 A7 70●
Ambient air temperature around the device	Operation	°C	0…+ 50	
	Storage	°C	- 25…+ 85	- 25…+ 70
Conforming to standards			UL (except for VW3 A7 601, 604 and 607 braking resistors)	–
Degree of protection of the casing			IP 65	IP 20

Connection characteristics

Maximum wire size		For servo drive	For temperature-controlled switch
	VW3 A7 601 R●●…608 R●●	Supplied with connection cable	–
	VW3 A7 70●	Connected on a bar, M6	2.5 mm² (AWG 14)

References


539807

VW3 A7 60● R●●

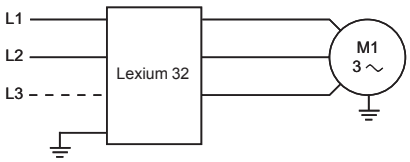
Value	Continuous power PPr	Peak energy EPk 115 V	230 V	380 V	480 V	Length of connection cable	Reference	Weight
Ω	W	Ws	Ws	Ws	Ws	m		kg
10	400	18,800	13,300	7300	7700	0.75	**VW3 A7 601 R07**	1.420
						2	**VW3 A7 601 R20**	1.470
						3	**VW3 A7 601 R30**	1.620
	1000	36,500	36,500	22,500	22,500	–	**VW3 A7 705**	11.000
15	1000	43,100	43,100	26,500	26,500	–	**VW3 A7 704**	11.000
27	100	4200	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	9700	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	25,500	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	5500	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	14,600	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	36,600	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	4400	4400	2900	2900	0.75	**VW3 A7 608 R07**	0.410
						2	**VW3 A7 608 R20**	0.560
						3	**VW3 A7 608 R30**	0.760

***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 32 servo drive (see pages 24 and 25).*

Presentation: page 42 | Sizing: page 42 | Dimensions: page 52

Lexium 32 motion control

Integrated EMC filters and additional EMC input filters for servo drives



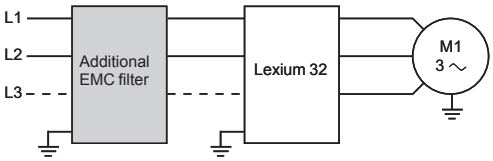
Lexium 32 servo drive
with integrated EMC filter

Integrated EMC filter

Function

Lexium 32 servo drives 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: 8 kHz m
Single-phase supply voltage: 115 V ~ 50/60 Hz	
LXM 32●●●●M2	20 (10 metres in category C2, environment 1)
Single-phase supply voltage: 230 V ~ 50/60 Hz	
LXM 32●●●●M2	20 (10 metres in category C2, environment 1)
Three-phase supply voltage: 380 V ~ 50/60 Hz	
LXM 32●●●●N4	20
Three-phase supply voltage: 480 V ~ 50/60 Hz	
LXM 32●●●●N4	20



Lexium 32 servo drive
with additional EMC filter

Additional EMC input filters

Applications

Used with servo drives, additional EMC input filters can be used to meet more stringent requirements and are designed to cut down conducted emissions on the line supply below the limits of standard IEC/EN 61800-3, edition 2, categories C2 and C3 (see page 47).

Additional EMC filters are mounted on the side of the device. They have tapped holes for mounting in an enclosure.

Use according to the type of line supply

Lexium 32 servo drives cannot be used on IT type supplies.
Integrated or additional EMC filters can only therefore be used on TN (neutral connection) and TT (neutral to earth) type supplies.

If a machine is to be installed on an IT type supply, an isolation transformer must be inserted in order to re-create a TT system on the secondary side.

Lexium 32 motion control
Option: additional EMC input filters for servo drives

Characteristics of servo drive/EMC filter mounting

Conformity to standards			EN 133200
Degree of protection			IP 20
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: ■ Temperature 50°C max. ■ Mounting distance between servo drives > 100 mm
Vibration resistance	Conforming to IEC 60068-2-6		10 Hz to 57 Hz: amplitude 0.075 mm 57 Hz to 150 Hz: 1 gn
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 conditional on the competence of the user and the distributor in terms of EMC compatibility
Category C3 in environment 2		Use in industrial premises

Connection characteristics

Maximum wire size		5 mm^2 (AWG 10)

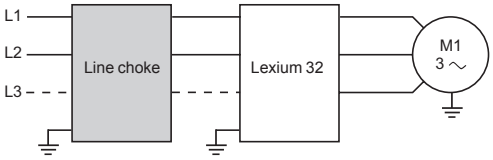
References

For servo drive	**Maximum servo motor cable length conforming to**		**Reference**	**Weight**
	EN 55011 class A Gr1	**EN 55011 class A Gr2**		
	IEC/EN 61800-3 category C2 in environment 1	**IEC/EN 61800-3 category C3 in environment 2**		
	Switching frequency 8 kHz	**Switching frequency 8 kHz**		
	m	**m**		**kg**
Single-phase supply voltage				
LXM 32●U45M2 **LXM 32●U90M2**	50	100	**VW3 A4 420**	0.600
LXM 32●D18M2 **LXM 32●D30M2**	50	100	**VW3 A4 421**	0.775
Three-phase supply voltage				
LXM 32●U60N4 **LXM 32●D12N4** **LXM 32●D18N4** **LXM 32●D30N4**	50	100	**VW3 A4 422**	0.900
LXM 32●D72N4	50	100	**VW3 A4 423**	1.350

Presentation: page 46
Dimensions: page 53

Lexium 32 motion control
Option: Line chokes for servo drives

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 unbalance 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

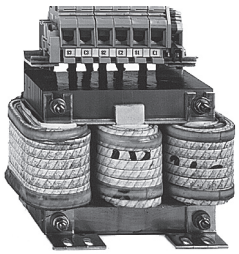
Type of line choke			VZ1 L007UM50	VZ1 L018UM20	VW3 A4 553	VW3 A4 554
Conformity to standards			EN 50178 (VDE 0160 level 1 high-energy overvoltages on the line supply)			
Voltage drop			Between 3% and 5% of the nominal line voltage. Values higher than this will cause loss of torque.			
Degree of protection	Choke		IP 00			
	Terminals		IP 20			IP 10
Inductance value		**mH**	5	2	2	1
Nominal current		**A**	7	18	16	30
Losses		**W**	20	30	75	90

Dimensions:
page 53

Lexium 32 motion control
Option: Line chokes for servo drives

References

536283



VW3 A4 55●

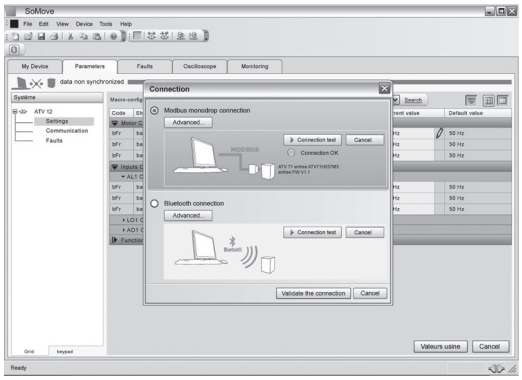
Line chokes

For servo drive	Line current and THD				Reference	Weight
	Without choke		With choke			
	A	%	A	%		kg
Single-phase supply voltage: 115 V ∼ 50/60 Hz						
LXM 32●U45M2	2.9	173	2.6	85	**VZ1 L007UM50**	0.880
LXM 32●U90M2	5.4	159	5.2	90	**VZ1 L018UM20**	1.990
LXM 32●D18M2	8.5	147	9.9	74		
LXM 32●D30M2	12.9	135	9.9	72		
Single-phase supply voltage: 230 V ∼ 50/60 Hz						
LXM 32●U45M2	2.9	181	3.4	100	**VZ1 L007UM50**	0.880
LXM 32●U90M2	4.5	166	6.3	107	**VZ1 L018UM20**	1.990
LXM 32●D18M2	8.4	148	10.6	93		
LXM 32●D30M2	12.7	135	14.1	86		
Three-phase supply voltage: 380 V ∼ 50/60 Hz						
LXM 32●U60N4	1.4	187	1.9	106	**VW3 A4 553**	3.500
LXM 32●D12N4	3	174	3.5	88		
LXM 32●D18N4	5.5	159	7.2	88	**VW3 A4 554**	6.000
LXM 32●D30N4	8.7	146	11.6	74		
LXM 32●D72N4	18.1	124	23.5	43		
Three-phase supply voltage: 480 V ∼ 50/60 Hz						
LXM 32●U60N4	1.2	201	1.6	116	**VW3 A4 553**	3.500
LXM 32●D12N4	2.4	182	2.9	98		
LXM 32●D18N4	4.5	165	6	98	**VW3 A4 554**	6.000
LXM 32●D30N4	7	152	9.6	85		
LXM 32●D72N4	14.6	129	19.5	55		

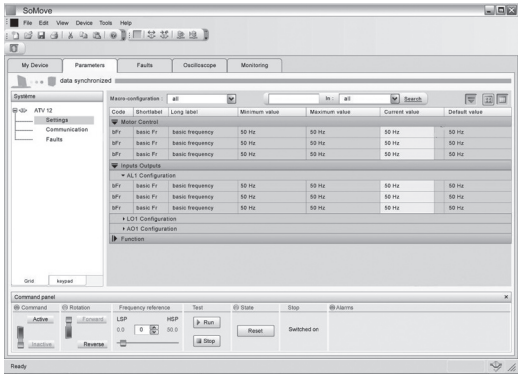
Dimensions:
page 53

SoMove setup software

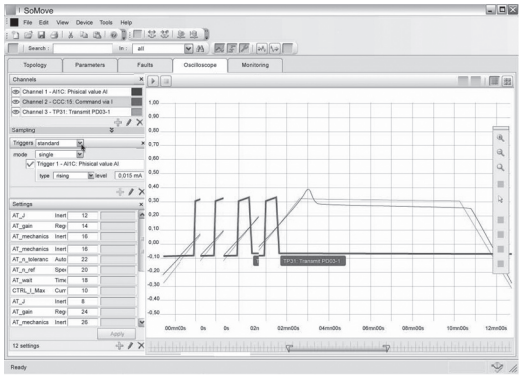
SoMove start page



Connecting the SoMove software to the device



SoMove software control panel



SoMove software oscilloscope function

Presentation

SoMove is user-friendly setup software for PCs, for setting up the following Schneider Electric motor control devices:

- ATV 12, ATV 312, ATV 31, ATV 61 and ATV 71 variable speed drives
- ATS 22 and ATS 48 starters
- TeSys U starter-controllers
- TeSys T motor management system
- Lexium 32 servo drives

SoMove software incorporates various functions for the device setup phases, such as:

- Configuration preparation
- Setup
- Maintenance

To facilitate setup and maintenance, SoMove software can use a direct USB/RJ45 cable link or a Bluetooth® wireless link. SoMove software is also compatible with the Multi-Loader configuration tool and SoMove Mobile software for mobile phones. These tools can save a significant amount of time when loading, duplicating or editing configurations on a device.

SoMove software and all the DTMs (Device Type Managers) associated with the devices can be downloaded from our website www.schneider-electric.com.

Functions

Configuration preparation in disconnected mode

SoMove software has a genuine disconnected mode which provides access to all the device parameters. This mode can be used to generate the device configuration. The configuration can be saved, printed and exported to office automation software. SoMove software checks the consistency of the parameters, validating the configurations created in disconnected mode.

A large number of functions are available in disconnected mode, in particular:

- The device configuration software wizard
- The configuration comparison function
- Saving, copying, printing and creating configuration files for export to Multi-Loader, SoMove Mobile or Microsoft Excel® tools, and sending configurations by e-mail.

Setup

When the PC is connected to the device, SoMove software can be used for:

- Transferring the configuration that has been generated onto the device
- Adjustment and monitoring. This includes such functions as:
  - The oscilloscope
  - Displaying communication parameters
- Easy control using the control panel user interface
- Saving the final configuration

Maintenance

In order to simplify maintenance operations, SoMove software can be used to:

- Compare the configuration of a device currently being used with a configuration saved on the PC
- Transfer a configuration to a device
- Compare oscilloscope curves
- Save oscilloscope curves and faults

User interface

SoMove software provides fast, direct access to all information on the device via 5 tabs:

- My Device: displays all the information on the device (type, reference, software versions, option cards, etc.)
- Parameters: displays all the device adjustment parameters, shown in a table or in the form of diagrams
- Faults: displays a list of the faults that may be encountered with the device, the fault log and current faults or alarms
- Monitoring: provides a dynamic display of the device status, its I/O and all the monitoring parameters. It is possible to create your own control panel by selecting your parameters and how they are to be represented
- Oscilloscope: provides a high-speed oscilloscope (recording traces in the device) or low-speed oscilloscope (recording traces in the software for devices that do not have an integrated oscilloscope).

SoMove setup software

SoMove setup software

PF539785

VW3 A8 114

Functions (continued)

Connections

Modbus serial link

The PC running SoMove software can be connected directly via the RJ45 connector on the device and the USB port on the PC with the USB/RJ45 cable.
See references table below.

Bluetooth® wireless link

SoMove software can communicate via Bluetooth® wireless link with a device equipped with the Modbus-Bluetooth® adaptor. This adaptor is connected to the terminal port or the Modbus network port on the device. It has a 10 m range (class 2).
If the PC does not have Bluetooth® technology, use the USB-Bluetooth® adaptor.
See references table below.

References

Designation	Description	Reference	Weight kg
SoMove setup software	Includes: ■ SoMove setup software for PC in Chinese, English, French, German, Italian and Spanish ■ DTMs (Device Type Managers) and technical documentation for variable speed drives, starters and servo motors	*(1)*	–
USB/RJ45 cable	Used to connect a PC to the device This cable is 2.5 m long, and has a USB connector (PC end) and an RJ45 connector (device end).	**TCSM CNAM 3M002P**	–
Modbus-Bluetooth® adaptor	Enables the device to communicate via Bluetooth® serial link. Includes: ■ 1 Bluetooth® adaptor (range 10 m, class 2) with an RJ45 connector ■ For SoMove: 1 x 0.1 m cable with 2 x RJ45 connectors ■ For TwidoSuite: 1 x 0.1 m cable with 1 RJ45 connector and 1 mini DIN connector	**VW3 A8 114**	0.155
USB-Bluetooth® adaptor for PC	This adaptor is required for a PC that does not have Bluetooth® technology. It is connected to a USB port on the PC. Range 10 m (class 2)	**VW3 A8 115**	0.290

Environments

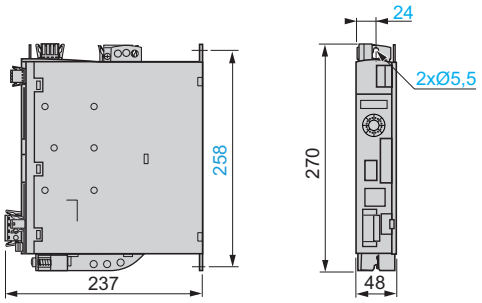
SoMove operates in the following PC environments and configurations:
■ Microsoft Windows® SP3
■ Microsoft Windows® Vista
■ Pentium IV (or equivalent), 1 GHz, hard disk with 1 GB available space, 512 MB of RAM (minimum configuration)

(1) Available on the "Description of the Motion & Drives offer" DVD-ROM, VW3 A8 200, or on our website www.schneider-electric.com.

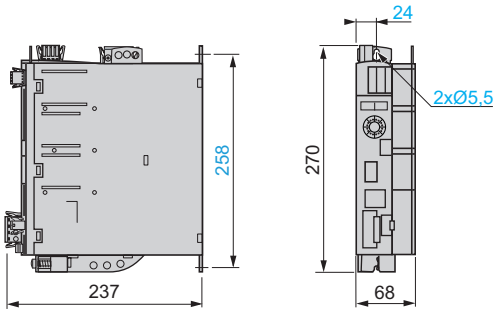
Lexium 32 motion control
Servo drives, remote graphic display terminal and braking resistors

Lexium 32 servo drives

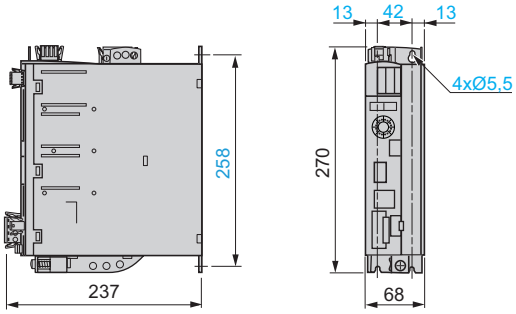
LXM 32CU45M2…CD18N4 and LXM 32AU45M2…AD18N4 servo drives



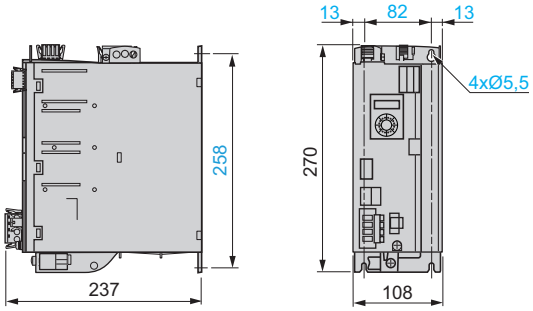
LXM 32MU45M2…MD18N4 servo drives



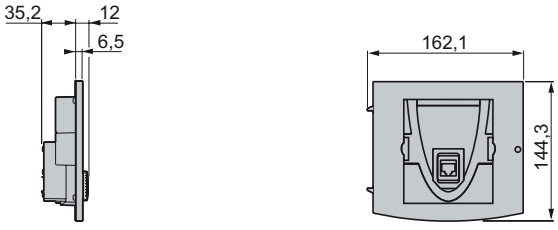
LXM 32●D30N4 servo drives



LXM 32●D72N4 servo drives

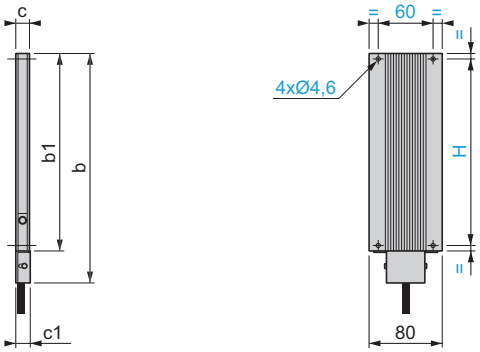


VW3 A1 101 remote graphic display terminal



Braking resistors

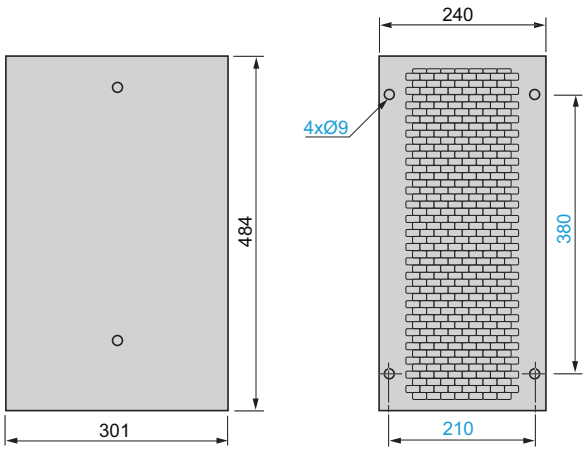
VW3 A7 60● braking resistors



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

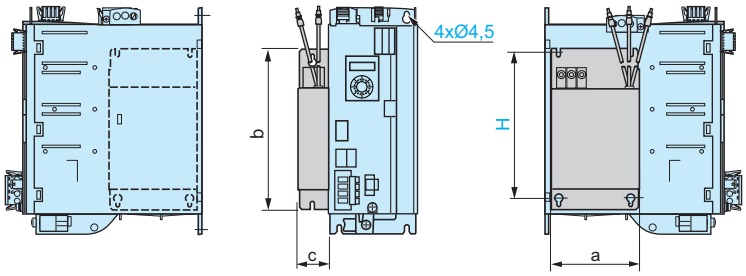
Braking resistors (continued)

VW3 A7 704 and VW3 A7 705 braking resistors



VW3 A4 420…423 additional EMC input filters

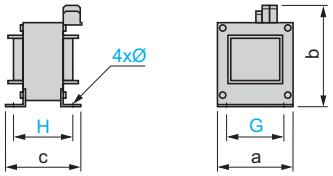
Mounting the filter on the side of the servo drive



VW3	a	b	c	H
A4 420	72	195	37	180
A4 421	107	195	35	180
A4 422	107	195	42	180
A4 423	140	235	50	215

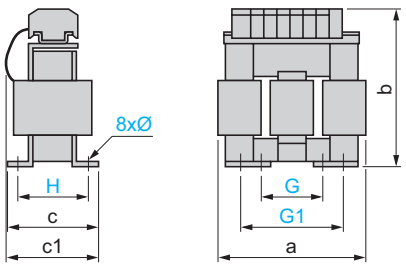
Line chokes

VZ1 L007UM50 and VZ1 L018UM20 single-phase line chokes



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

VW3 A4 553 and VW3 A4 554 three-phase line chokes



VW3	a	b	c	c1	G	G1	H	Ø
A4 553	130	155	85	90	60	80.5	62	6 x 12
A4 554	155	170	115	135	75	107	90	6 x 12

Lexium 32 motion control
Servo drives
Safety requirements

Safe Torque Off (STO) safety function

Lexium 32 servo drives integrate the Safe Torque Off (STO) function which prevents unintended operation 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 follow the setup recommendations could inhibit the SIL capacity of the 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 safe stop requires a Preventa XPS AV-type safety module with time delay *(1)*

The Safe Torque Off function has a redundant electronic architecture *(2)* which is monitored continuously by a diagnostic 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 32 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.

Considerations of the Safe Torque Off function

The Safe Torque Off 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 Safe Torque Off 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. Safe Torque Off active); these are Preventa-type safety module outputs *(1)* which must be integrated into a safety control-signalling circuit.

The information below takes into account conformity with 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

Applications

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

The examples below describe the Lexium 32 servo drive Safe Torque Off function combined with a Preventa safety module to monitor emergency stop circuits.
Examples of connection diagrams are available on our website at “www.schneider-electric.com”.

Machines with short freewheel stopping times (low inertia or high resistive torque).
When the activation command is given on the $\overline{\text{STO}}$ inputs with the servo motor controlled, 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 $\overline{\text{STO}}$ inputs remain activated.
For hoisting applications it is necessary to add a Preventa XPS AC-type safety module *(1)*.
On a Safe Torque Off 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 Safe Torque Off function.

Machines with long freewheel stopping times (high inertia or low resistive torque).
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 Safe Torque Off function is activated by the $\overline{\text{STO}}$ inputs. The servo motor stops according to **category 1** of standard IEC/EN 60204-1 (Safe Stop 1: SS1).

Periodic test
The Safe Torque Off 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 Safe Torque Off 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.

Lexium 32 motion control
Motor starters

LC1 D18●●
+
LXM 32●D30M2

Applications

The combinations listed below can be used to create a complete motor starter unit comprising a contactor and a Lexium 32 servo drive.

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 32 servo drives

Servo drive		Max. prospective line Isc	Contactor
Reference	Nominal power		Reference *(1) (2)*
	kW	kA	
Single-phase supply voltage: 100…120 V ∿ 50/60 Hz			
LXM 32●U45M2	0.15	1	**LC1 D09●●**
LXM 32●U90M2	0.3	1	**LC1 D09●●**
LXM 32●D18M2	0.5	1	**LC1 D12●●**
LXM 32●D30M2	0.8	1	**LC1 D18●●**
Single-phase supply voltage: 200…240 V ∿ 50/60 Hz			
LXM 32●U45M2	0.3	1	**LC1 D09●●**
LXM 32●U90M2	0.5	1	**LC1 D09●●**
LXM 32●D18M2	1	1	**LC1 D12●●**
LXM 32●D30M2	1.6	1	**LC1 D18●●**
Three-phase supply voltage: 400 V ∿ 50/60 Hz			
LXM 32●U60N4	0.4	5	**LC1 D09●●**
LXM 32●D12N4	0.9	5	**LC1 D09●●**
LXM 32●D18N4	1.8	5	**LC1 D09●●**
LXM 32●D30N4	3	5	**LC1 D12●●**
LXM 32●D72N4	7	5	**LC1 D25●●**
Three-phase supply voltage: 480 V ∿ 50/60 Hz			
LXM 32●U60N4	0.4	5	**LC1 D09●●**
LXM 32●D12N4	0.9	5	**LC1 D09●●**
LXM 32●D18N4	1.8	5	**LC1 D09●●**
LXM 32●D30N4	3	5	**LC1 D12●●**
LXM 32●D72N4	7	5	**LC1 D25●●**

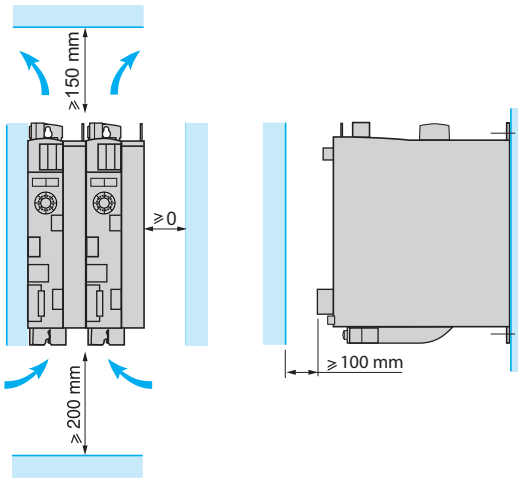
(1) Composition of contactors:
LC1 D●●: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
In certain situations, it is possible to use an LC1 K contactor with 1 "N/C" auxiliary contact.
Please refer to the "Control and protection components" catalogue.
(2) Replace ●● with the control circuit voltage reference given in the table below:

	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 customer care centre.

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 32●U45M2	0.15	4
LXM 32●U90M2	0.3	6
LXM 32●D18M2	0.5	10
LXM 32●D30M2	0.8	15
Single-phase supply voltage: 200…240 V ∿ 50/60 Hz		
LXM 32●U45M2	0.3	4
LXM 32●U90M2	0.5	6
LXM 32●D18M2	1	10
LXM 32●D30M2	1.6	15
Three-phase supply voltage: 400 V ∿ 50/60 Hz		
LXM 32●U60N4	0.4	2
LXM 32●D12N4	0.9	4
LXM 32●D18N4	1.8	8
LXM 32●D30N4	3	10
LXM 32●D72N4	7	20
Three-phase supply voltage: 480 V ∿ 50/60 Hz		
LXM 32●U60N4	0.4	2
LXM 32●D12N4	0.9	3
LXM 32●D18N4	1.8	8
LXM 32●D30N4	3	10
LXM 32●D72N4	7	20



Mounting recommendations

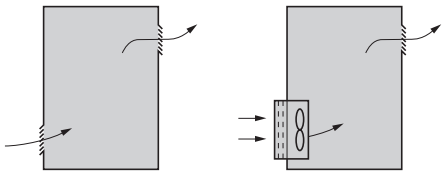
LXM 32●U45M2, ●U90M2 and LXM 32●U60N4 servo drives are cooled by natural convection.
LXM 32●D18M2, ●D30M2, LXM 32 ●D12N4, ●D18N4, ●D30N4 and ●D72N4 servo drives have an integrated fan.

When installing the servo drive in the enclosure, follow the instructions below with regard to the temperature and protection index:
- Provide sufficient cooling of the servo drive
- 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
- Mount the servo drive vertically (± 10%)
- If the servo drive is used above its thermal limits, control stops due to overtemperature

***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.*

Ambient temperature	Mounting distances	Instructions to be followed
0°C…+ 50°C	d ≥ 0 mm	–
+ 50°C…+ 60°C	d ≥ 0 mm	Reduce the output current by 2.2% per °C above 50°C

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



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, otherwise 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.

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

Servo drive	Dissipated power W	Ventilation	Flow rate m³/min
LXM 32●U45M2	10	Natural convection	–
LXM 32●U90M2	18		–
LXM 32●U60N4	20		–
LXM 32●D18M2	34	Integrated fan	0.26
LXM 32●D30M2	38		0.26
LXM 32●D12N4	42		0.26
LXM 32●D18N4	76		0.26
LXM 32●D30N4	129		0.75
LXM 32●D72N4	315		1.45

Mounting in 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 32 servo drives can be installed in an enclosure where the internal temperature must not exceed 60°C.

Calculating the enclosure dimensions

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 on previous page. 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.*

Connections ensuring conformity with EMC standards

Principle

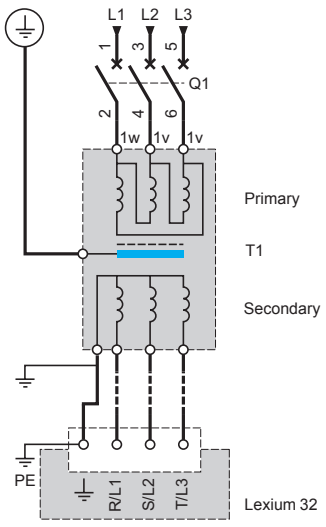
- The earths between the servo drive, servo motor and cable shielding must have "high frequency" equipotentiality.
- Use shielded cables with shielding connected to earth throughout 360° at both ends for the servo motor cable, the braking resistor cable and the control-signalling cables. Metal conduit or ducting can be used for part of the shielding length provided that there is no break in continuity of the earth connections.
- Ensure maximum separation between the power supply cable (line supply) and the 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 on the side of the servo drive and connected directly to the line supply via an unshielded cable. The power supply on the servo drive is via the filter output cable.

Operation on an IT system (isolated or impedance earthed neutral)

Principle

Insert a three-phase LV/LV transformer 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



Connection of a Lexium 32 servo drive to an installation with an IT neutral system

Sizing the three-phase T1 transformer

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.

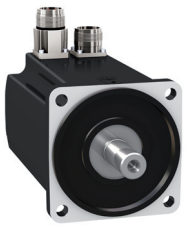
- **Lexium servo drives with common power supply** (one transformer per n servo drives):

$$Pm = \left(\sum Pu\right) / 2$$

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).

Lexium 32 motion control
BMH servo motors

569427



BMH servo motor with straight connectors

569428

BMH servo motor with rotatable angled connectors

Presentation

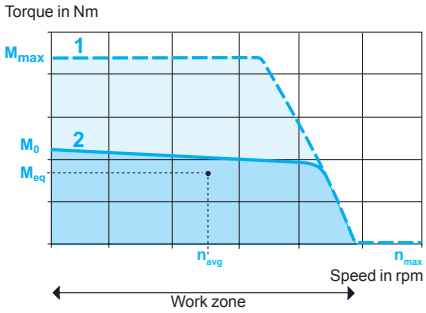
BMH servo motors excel with best-in-class power density to meet the requirements of most compact machine design. With four flange sizes and three different lengths per flange size, there is a suitable solution for most applications, covering a continuous stall torque range from 1.2 to 84 Nm for a maximum speed of 8000 rpm.

Thanks to their medium inertia motor design, the new BMH servo motors enables higher load inertia per motor frame size and increases the gain for settling, thus satisfying the requirements for robust load and plug-and-play motion tuning.

BMH servo motors are available in four flange sizes: 70, 100, 140 and 205 mm. They are certified as "Recognized" by the Underwriters Laboratories and conform to UL 1004 standards as well as to European directives (CE marking).
BMH servo motors are available with the following variants:
- IP 50 or IP 65 degree of protection (IP 67 with compressed air connection kit in option)
- With or without holding brake
- Straight or angled connectors
- Single turn or multiturn SinCos encoder
- Untapped or keyed shaft end

Torque/speed characteristics

BMH 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 116).
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 116.*

Functions

General functions

BMH 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 provided and controlled by the Lexium 32 servo drive via the motor temperature control algorithm
- 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 62
References: page 74
Dimensions: page 78

Functions (continued)

General functions (continued)

■ Degree of protection:
□ Casing: IP 65 in accordance with IEC/EN 60529 (IP 67 with air compressed connection kit in option, see page 75)
□ Shaft end: IP 50 *(1)*, or IP 65 in accordance with IEC/EN 60529 (IP 67 with air compressed connection kit in option, see page 75)
■ Integrated sensor: SinCos Hiperface® single turn or multiturn, medium or high-resolution encoder
■ Untapped or keyed shaft end.

Holding brake

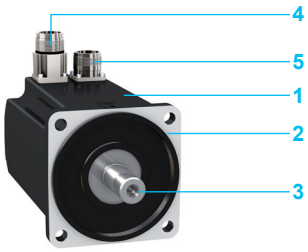
BMH servo motors can be fitted with a failsafe electro-magnetic holding brake.

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

Integrated encoder

BMH servo motors are equipped as standard with an absolute encoder. Four types of encoder are available:
■ High resolution SinCos Hiperface® encoder:
□ monotour (131 072 points/tour) *(2)* ou
□ multitour (131 072 points/tour x 4096 tours) *(2)*,
assurant une précision de position angulaire de l'arbre inférieure à ± 1,3 minutes d'arc,
■ Medium resolution SinCos Hiperface® encoder:
□ Single turn (32,768 points/turn) *(2)* or
□ Multiturn (32,768 points/turn x 4096 turns) *(2)*,
ensuring angular precision of the shaft position, accurate to less than ± 4.8 arc minutes.

This performs the following functions:
■ Gives the absolute motor position so that flows can be synchronized
■ Measures the servo motor speed via the associated Lexium 32 servo drive. This information is used by the speed controller of the servo drive.
■ Measures the position information for the servo drive position controller
■ Sends data from the servo motor to the servo drive, which ensures automatic identification of the motor when the servo drive starts.



Description

BMH servo motors with a three-phase stator and a 10-pole rotor 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 32 servo drives (see page 76).
Schneider Electric has taken particular care to ensure compatibility between BMH servo motors and Lexium 32 servo drives. This compatibility can only be assured by using cables and connectors sold by Schneider Electric (see page 76).

(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 32 servo drive.
(3) Other model with rotatable angled connector.

Characteristics: page 62
References: page 74
Dimensions: page 78

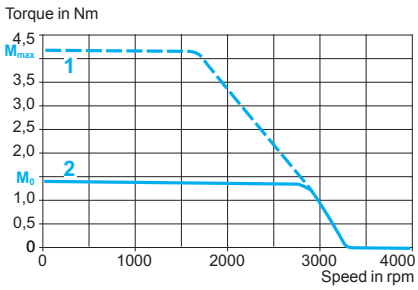
Lexium 32 motion control
BMH servo motors
115 V single-phase supply voltage

Characteristics of BMH 070 servo motor

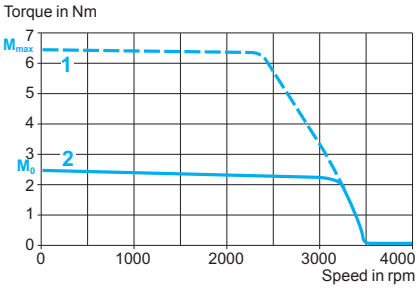
Type of servo motor				BMH 070 1T	BMH 070 2T	BMH 070 3T
Associated with Lexium 32 servo drive				LXM 32●D18M2	LXM 32●D30M2	
Switching frequency			kHz	8		
Torque	Continuous stall	M_0	Nm	1.4	2.5	3.4
	Peak stall	M_{max}	Nm	4.2	6.4	8.7
Nominal operating point	Nominal torque		Nm	1.35	2.3	3.1
	Nominal speed		rpm	2500		2000
	Nominal servo motor output power		W	350	600	650
Maximum current			A rms	9.6	15	
Servo motor characteristics						
Maximum mechanical speed			rpm	8000		
Constants (at 120°C)	Torque		Nm/A rms	0.49	0.46	0.61
	Back emf		V rms/ krpm	31.7	29.6	39.3
Rotor	Number of poles			10		
	Inertia	Without brake J_m	kgcm²	0.59	1.13	1.67
		With brake J_m	kgcm²	0.7	1.24	1.78
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.2	1.15	1.32
	Inductance (phase/phase)		mH	9.1	3.6	4.3

Torque/speed curves

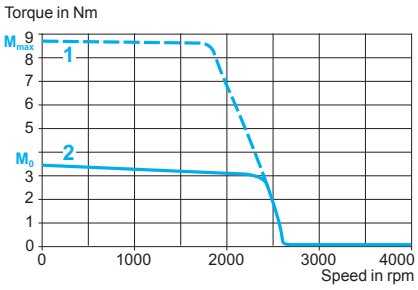
BMH 070 1T servo motor
With LXM 32●D18M2 servo drive



BMH 070 2T servo motor
With LXM 32●D30M2 servo drive



BMH 070 3T servo motor
With LXM 32●D30M2 servo drive



1 Peak torque
2 Continuous torque

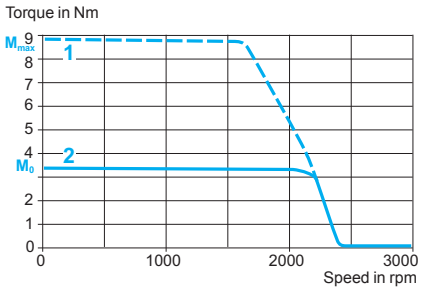
Description: page 60
References: page 74
Dimensions: page 78

Characteristics of BMH 100 servo motor

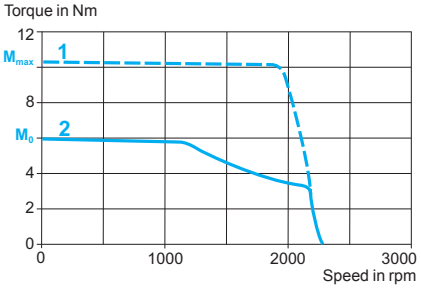
Type of servo motor				BMH 100 1T	BMH 100 2T
Associated with Lexium 32 servo drive				LXM 32●D30M2	
Switching frequency			kHz	8	
Torque	Continuous stall	M_0	Nm	3.4	6
	Peak stall	M_{max}	Nm	8.9	10.3
Nominal operating point	Nominal torque		Nm	3.3	3.5
	Nominal speed		rpm	2000	
	Nominal servo motor output power		W	700	750
Maximum current			A rms	15	
Servo motor characteristics					
Maximum mechanical speed			rpm	6000	
Constants (at 120°C)	Torque		Nm/A rms	0.67	0.72
	Back emf		V rms/krpm	43.3	46.2
Rotor	Number of poles			10	
	Inertia	Without brake J_m	kgcm²	3.19	6.28
		With brake J_m	kgcm²	3.68	6.77
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.19	0.54
	Inductance (phase/phase)		mH	5.3	2.7

Torque/speed curves

BMH 100 1T servo motor
With LXM 32●D30M2 servo drive



BMH 100 2T servo motor
With LXM 32●D30M2 servo drive



1 Peak torque
2 Continuous torque

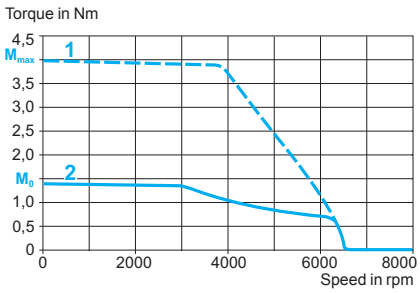
Description: page 60
References: page 74
Dimensions: page 78

Characteristics of BMH 070 servo motor

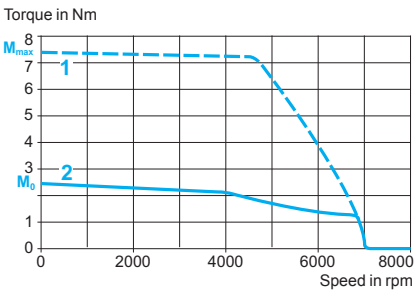
Type of servo motor				BMH 070 1T	BMH 070 2T	BMH 070 3T
Associated with Lexium 32 servo drive				LXM 32●U90M2	LXM 32●D18M2	
Switching frequency			kHz	8		
Torque	Continuous stall	M_0	Nm	1.4	2.5	3.4
	Peak stall	M_{max}	Nm	4	7.4	10.2
Nominal operating point	Nominal torque		Nm	1.1	2.1	2.9
	Nominal speed		rpm	4000		3000
	Nominal servo motor output power		W	450	900	
Maximum current			A rms	9.6	17.7	17.8
Servo motor characteristics						
Maximum mechanical speed			rpm	8000		
Constants (at 120°C)	Torque		Nm/A rms	0.49	0.46	0.61
	Back emf		V rms/ krpm	31.7	29.6	39.3
Rotor	Number of poles			10		
	Inertia	Without brake J_m	kgcm²	0.59	1.13	1.67
		With brake J_m	kgcm²	0.7	1.24	1.78
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.2	1.15	1.32
	Inductance (phase/phase)		mH	9.1	3.6	4.3

Torque/speed curves

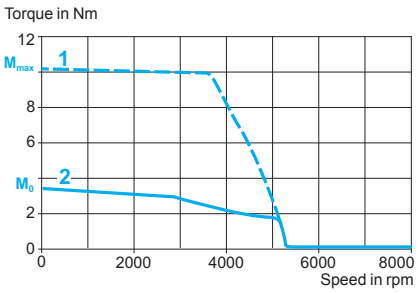
BMH 070 1T servo motor
With LXM 32●U90M2 servo drive



BMH 070 2T servo motor
With LXM 32●D18M2 servo drive



BMH 070 3T servo motor
With LXM 32●D18M2 servo drive



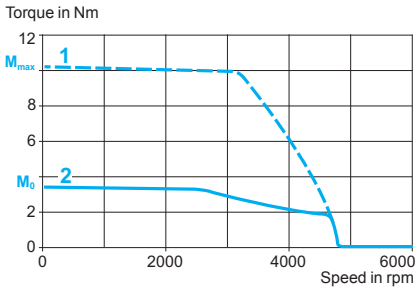
1 Peak torque
2 Continuous torque

Characteristics of BMH 100/140 servo motors

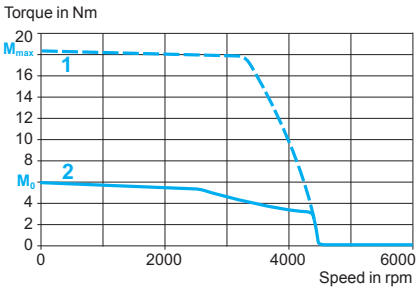
Type of servo motor				BMH 100 1T	BMH 100 2T	BMH 100 3T	BMH 140 1P
Associated with Lexium 32 servo drive				**LXM 32●D18M2**	**LXM 32●D30M2**		
Switching frequency			**kHz**	8			
Torque	Continuous stall	M_0	**Nm**	3.4	6	8.2	10.3
	Peak stall	M_{max}	**Nm**	10.2	18.4	22.8	30.8
Nominal operating point	Nominal torque		**Nm**	2.8	4.6	5.6	6.9
	Nominal speed		**rpm**	3000		2500	2000
	Nominal servo motor output power		**W**	900	1450		
Maximum current			**A rms**	19.4	30		29.8
Servo motor characteristics							
Maximum mechanical speed			**rpm**	6000			4000
Constants (at 120°C)	Torque		**Nm/A rms**	0.67	0.72	0.851	1.2
	Back emf		**V rms/ krpm**	43.3	46.2	54.8	77.4
Rotor	Number of poles			10			
	Inertia	Without brake J_m	**kgcm²**	3.19	6.28	9.37	16.46
		With brake J_m	**kgcm²**	3.68	6.77	10.3	17.96
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.19	0.54	0.47	0.69
	Inductance (phase/phase)		**mH**	5.3	2.7	3	6.7

Torque/speed curves

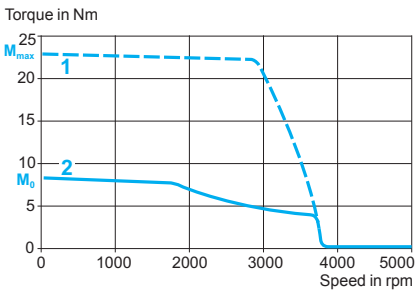
BMH 100 1T servo motor
With LXM 32●D18M2 servo drive



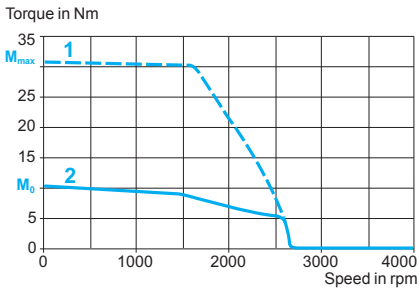
BMH 100 2T servo motor
With LXM 32●D30M2 servo drive



BMH 100 3T servo motor
With LXM 32●D30M2 servo drive



BMH 140 1P servo motor
With LXM 32●D30M2 servo drive



1 Peak torque
2 Continuous torque

Description: page 60
References: page 74
Dimensions: page 78

Lexium 32 motion control
BMH servo motors
400 V 3-phase supply voltage

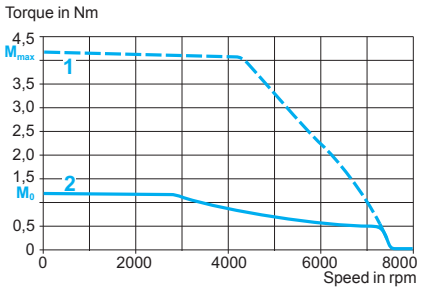
Characteristics of BMH 070 servo motor

Type of servo motor				BMH 070 1P		BMH 070 2P	BMH 070 3P
Associated with Lexium 32 servo drive				LXM 32●U60N4	LXM 32●D12N4		LXM 32●D18N4
Switching frequency			kHz	8			
Torque	Continuous stall	M_0	Nm	1.2	1.4	2.5	3.4
	Peak stall	M_{max}	Nm	4.2		7.4	10.2
Nominal operating point	Nominal torque		Nm	1.1	1.3	2.2	2.4
	Nominal speed		rpm	3000	5000	3000	5000
	Nominal servo motor output power		W	350	700		1300
Maximum current			A rms	6		9.7	12.6
Servo motor characteristics							
Maximum mechanical speed			rpm	8000			
Constants (at 120°C)	Torque		Nm/A rms	0.79		0.84	0.87
	Back emf		V rms/ krpm	50.72		54.08	55.8
Rotor	Number of poles			10			
	Inertia	Without brake J_m	kgcm²	0.59		1.13	1.67
		With brake J_m	kgcm²	0.7		1.24	1.78
Stator (at 20°C)	Resistance (phase/phase)		Ω	8.3		3.8	2.65
	Inductance (phase/phase)		mH	23.4		12.2	8.6

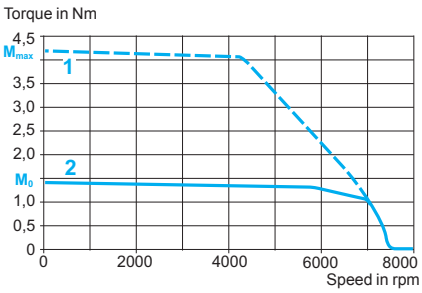
Torque/speed curves

BMH 070 1P servo motor

With LXM 32●U60N4 servo drive

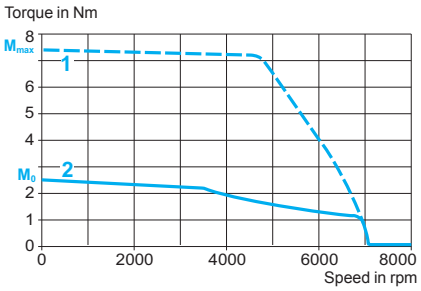


With LXM 32●D12N4 servo drive



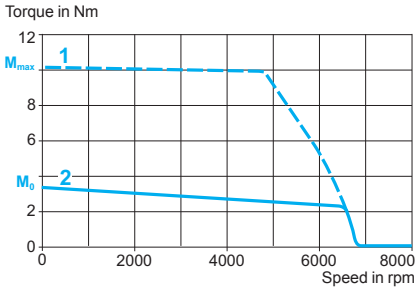
BMH 070 2P servo motor

With LXM 32●D12N4 servo drive



BMH 070 3P servo motor

With LXM 32●D18N4 servo drive



1 Peak torque
2 Continuous torque

Description: page 60
References: page 74
Dimensions: page 78

Lexium 32 motion control
BMH servo motors
400 V 3-phase supply voltage

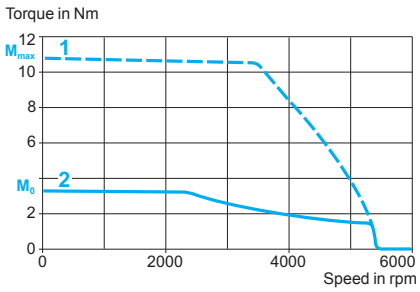
Characteristics of BMH 100 servo motor

Type of servo motor				BMH 100 1P		BMH 100 2P	BMH 100 3P
Associated with Lexium 32 servo drive				LXM 32●D12N4	LXM 32●D18N4		LXM 32●D30N4
Switching frequency			kHz	8			
Torque	Continuous stall	M_0	Nm	3.3	3.4	6.2	8.4
	Peak stall	M_{max}	Nm	10.8		18.4	25.1
Nominal operating point	Nominal torque		Nm	1.9	3.1	3.9	5.2
	Nominal speed		rpm	4000		4000	5000
	Nominal servo motor output power		W	800	1300	1600	2700
Maximum current			A rms	11.9		18	29.1
Servo motor characteristics							
Maximum mechanical speed			rpm	6000			
Constants (at 120°C)	Torque		Nm/A rms	1.1		1.2	1
	Back emf		V rms/ krpm	70.3		77	63.5
Rotor	Number of poles			10			
	Inertia	Without brake J_m	kgcm²	3.2		6.3	9.4
		With brake J_m	kgcm²	3.68		6.77	10.3
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.1		1.51	0.63
	Inductance (phase/phase)		mH	13.9		7.5	4

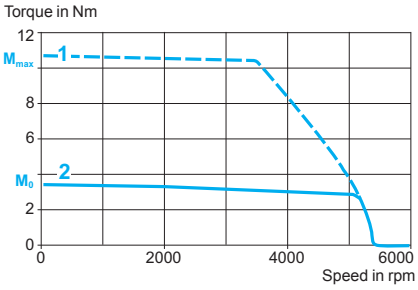
Torque/speed curves

BMH 100 1P servo motor

With LXM 32●D12N4 servo drive

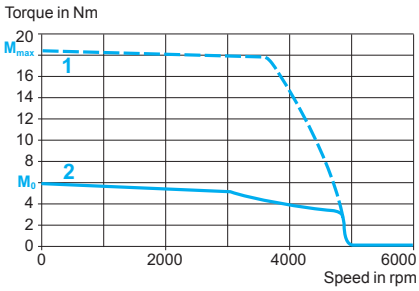


With LXM 32●D18N4 servo drive



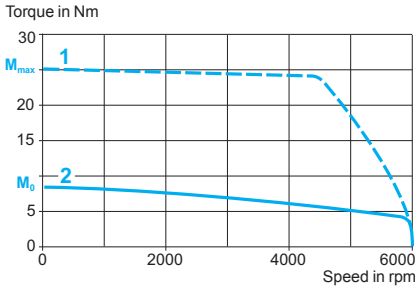
BMH 100 2P servo motor

With LXM 32●D18N4 servo drive



BMH 100 3P servo motor

With LXM 32●D30N4 servo drive



1 Peak torque
2 Continuous torque

Description: page 60
References: page 74
Dimensions: page 78

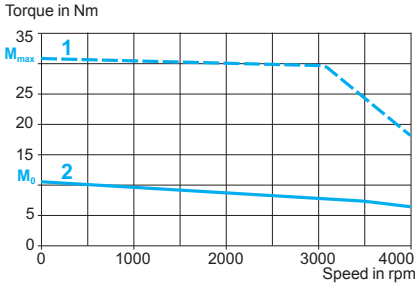
Lexium 32 motion control
BMH servo motors
400 V 3-phase supply voltage

Characteristics of BMH 140/205 servo motors

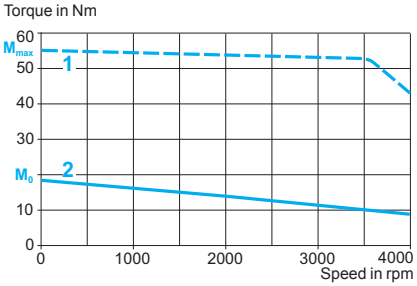
Type of servo motor				BMH 140 1P	BMH 140 2P	BMH 140 3P	BMH 205 1P	BMH 205 2P	BMH 205 3P
Associated with Lexium 32 servo drive				LXM32●D30N4	LXM 32●D72N4				
Switching frequency			kHz	8					
Torque	Continuous stall	M_0	Nm	10.3	18.5	24	34.4	62.5	84
	Peak stall	M_{max}	Nm	30.8	55.3	75	103.4	170	232
Nominal operating point	Nominal torque		Nm	7.7	11.2	14.9	25.8	41.6	52.2
	Nominal speed		rpm	3000			2000	1500	1200
	Nominal servo motor output power		W	2400	3500	4700	5400	6500	
Maximum current			A rms	29.8	57.4	62.3	72		
Servo motor characteristics									
Maximum mechanical speed			rpm	4000			3800		
Constants (at 120°C)	Torque		Nm/A rms	1.2	1.1	1.34	1.6	2.6	3.5
	Back emf		V rms/krpm	77.4	70.7	85.9	104	161	218
Rotor	Number of poles			10					
	Inertia	Without brake J_m	kgcm²	16.5	32	47.5	71.4	129	190
		With brake J_m	kgcm²	17.96	33.5	50.27	87.4	145	206
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.69	0.23	0.22	0.3		0.32
	Inductance (phase/phase)		mH	6.7	3		5.9	5.6	6.9

Torque/speed curves

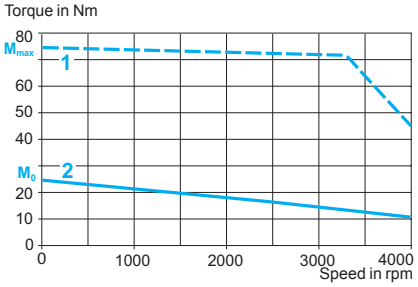
BMH 140 1P servo motor
With LXM 32●D30N4 servo drive



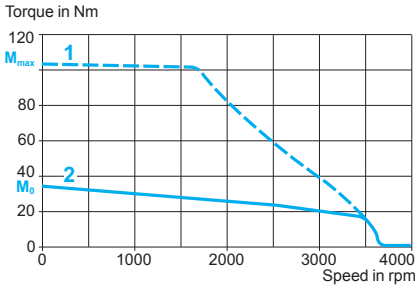
BMH 140 2P servo motor
With LXM 32●D72N4 servo drive



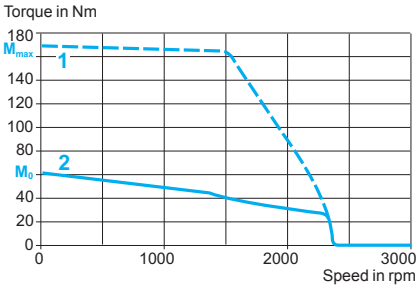
BMH 140 3P servo motor
With LXM 32●D72N4 servo drive



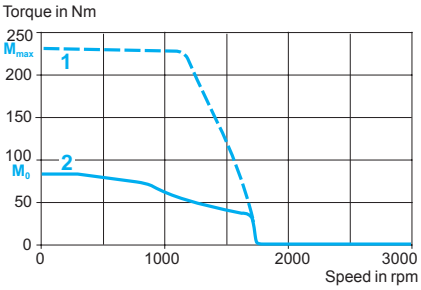
BMH 205 1P servo motor
With LXM 32●D72N4 servo drive



BMH 205 2P servo motor
With LXM 32●D72N4 servo drive



BMH 205 3P servo motor
With LXM 32●D72N4 servo drive



1 Peak torque
2 Continuous torque

Description: page 60
References: page 74
Dimensions: page 78

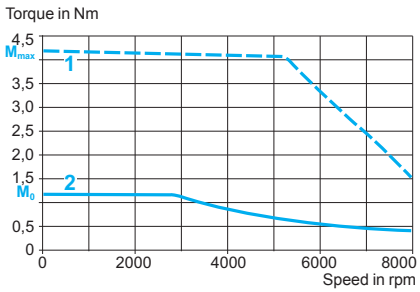
Characteristics of BMH 070 servo motor

Type of servo motor				BMH 070 1P		BMH 070 2P	BMH 070 3P
Associated with Lexium 32 servo drive				LXM 32●U60N4	LXM 32●D12N4		LXM 32●D18N4
Switching frequency			kHz	8			
Torque	Continuous stall	M_0	Nm	1.2	1.4	2.5	3.4
	Peak stall	M_{max}	Nm	4.2		7.4	10.2
Nominal operating point	Nominal torque		Nm	1.1	1.3	2.2	2.4
	Nominal speed		rpm	3000	5000	3000	5000
	Nominal servo motor output power		W	350	700		1300
Maximum current			A rms	6		9.7	12.6
Servo motor characteristics							
Maximum mechanical speed			rpm	8000			
Constants (at 120°C)	Torque		Nm/A rms	0.79		0.84	0.87
	Back emf		V rms/ krpm	50.72		54.08	55.8
Rotor	Number of poles			10			
	Inertia	Without brake J_m	kgcm²	0.59		1.13	1.67
		With brake J_m	kgcm²	0.7		1.24	1.78
Stator (at 20°C)	Resistance (phase/phase)		Ω	8.3		3.8	2.65
	Inductance (phase/phase)		mH	23.4		12.2	8.6

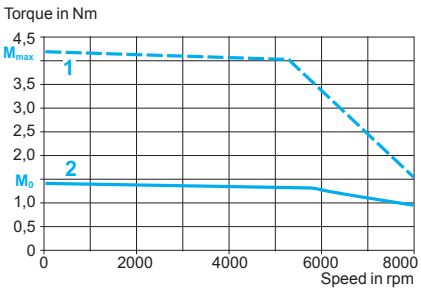
Torque/speed curves

BMH 070 1P servo motor

With LXM 32●U60N4 servo drive

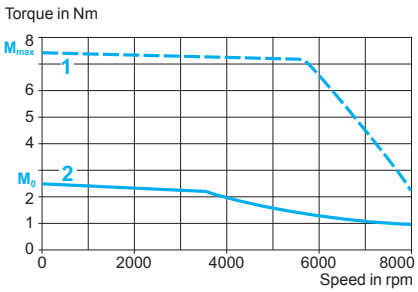


With LXM 32●D12N4 servo drive



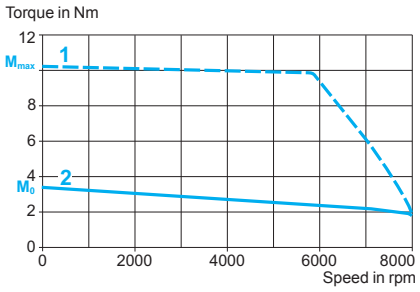
BMH 070 2P servo motor

With LXM 32●D12N4 servo drive



BMH 070 3P servo motor

With LXM 32●D18N4 servo drive



1 Peak torque
2 Continuous torque

Description: page 60
References: page 74
Dimensions: page 78

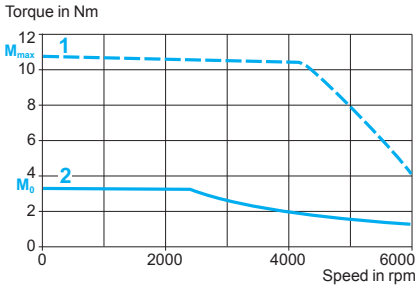
Characteristics of BMH 100 servo motor

Type of servo motor				BMH 100 1P		BMH 100 2P	BMH 100 3P
Associated with Lexium 32 servo drive				LXM 32● D12N4	LXM 32● D18N4		LXM 32● D30N4
Switching frequency			kHz	8			
Torque	Continuous stall	M_0	Nm	3.3	3.4	6.2	8.4
	Peak stall	M_{max}	Nm	10.8		18.4	25.1
Nominal operating point	Nominal torque		Nm	1.9	3.1	3.9	5.2
	Nominal speed		rpm	4000			5000
	Nominal servo motor output power		W	800	1300	1600	2700
Maximum current			A rms	11.9		18	29.1
Servo motor characteristics							
Maximum mechanical speed			rpm	6000			
Constants (at 120°C)	Torque		Nm/A rms	1.1		1.2	1
	Back emf		V rms/ krpm	70.3		77	63.5
Rotor	Number of poles			10			
	Inertia	Without brake J_m	kgcm²	3.2		6.3	9.4
		With brake J_m	kgcm²	3.68		6.77	10.3
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.1		1.51	0.63
	Inductance (phase/phase)		mH	13.9		7.5	4

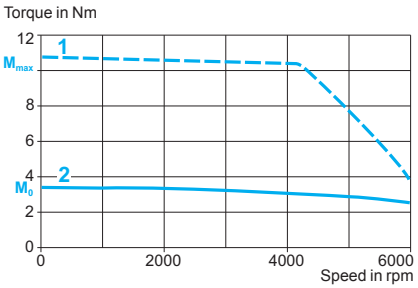
Torque/speed curves

BMH 100 1P servo motor

With LXM 32●D12N4 servo drive

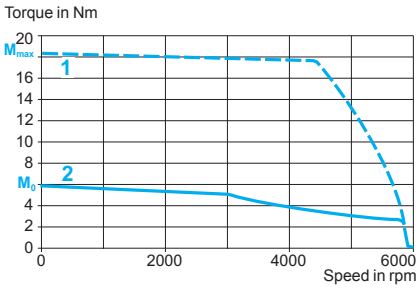


With LXM 32●D18N4 servo drive



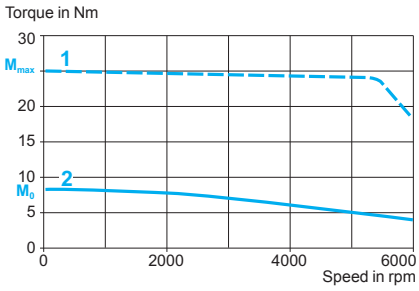
BMH 100 2P servo motor

With LXM 32●D18N4 servo drive



BMH 100 3P servo motor

With LXM 32●D30N4 servo drive



1 Peak torque
2 Continuous torque

Description: page 60
References: page 74
Dimensions: page 78

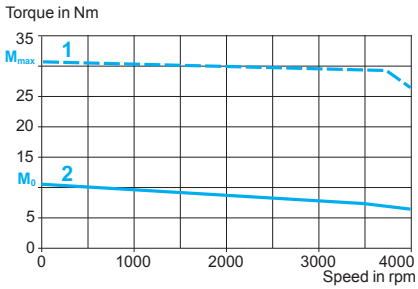
Lexium 32 motion control
BMH servo motors
480 V 3-phase supply voltage

Characteristics of BMH 140/205 servo motors

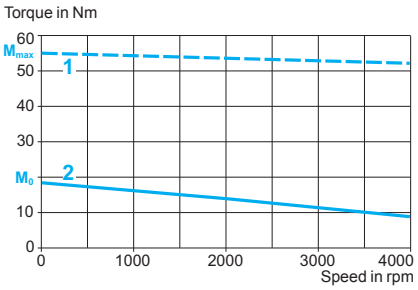
Type of servo motor				BMH 140 1P	BMH 140 2P	BMH 140 3P	BMH 205 1P	BMH 205 2P	BMH 205 3P
Associated with Lexium 32 servo drive				LXM 32● D30N4	LXM 32● D72N4				
Switching frequency			kHz	8					
Torque	Continuous stall	M_0	Nm	10.3	18.5	24	34.4	62.5	84
	Peak stall	M_{max}	Nm	30.8	55.3	75	103.4	170	232
Nominal operating point	Nominal torque		Nm	7.7	11.2	14.9	25.8	41.6	52.2
	Nominal speed		rpm	3000			2000	1500	1200
	Nominal servo motor output power		W	2400	3500	4700	5400	6500	
Maximum current			A rms	29.8	57.4	62.3	72		
Servo motor characteristics									
Maximum mechanical speed			rpm	4000			3800		
Constants (at 120°C)	Torque		Nm/A rms	1.2	1.1	1.34	1.6	2.6	3.5
	Back emf		V rms/ krpm	77.4	70.7	85.9	104	161	218
Rotor	Number of poles			10					
	Inertia	Without brake J_m	kgcm²	16.5	32	47.5	71.4	129	190
		With brake J_m	kgcm²	17.96	33.5	50.27	87.4	145	206
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.69	0.23	0.22	0.3		0.32
	Inductance (phase/phase)		mH	6.7	3		5.9	5.6	6.9

Torque/speed curves

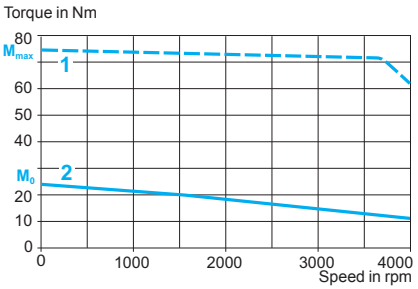
BMH 140 1P servo motor
With LXM 32●D30N4 servo drive



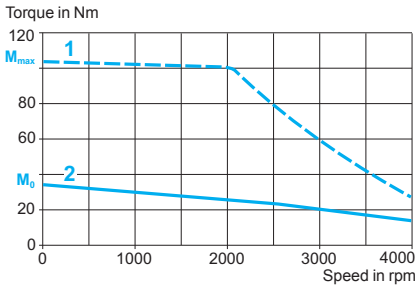
BMH 140 2P servo motor
With LXM 32●D72N4 servo drive



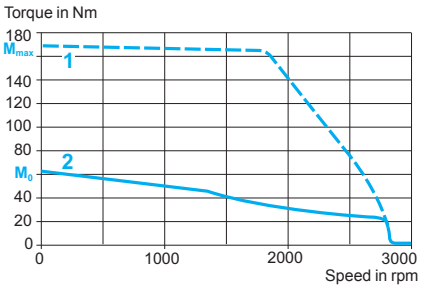
BMH 140 3P servo motor
With LXM 32●D72N4 servo drive



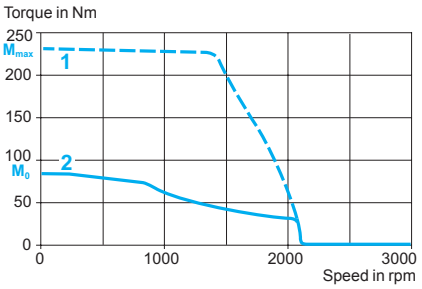
BMH 205 1P servo motor
With LXM 32●D72N4 servo drive



BMH 205 2P servo motor
With LXM 32●D72N4 servo drive

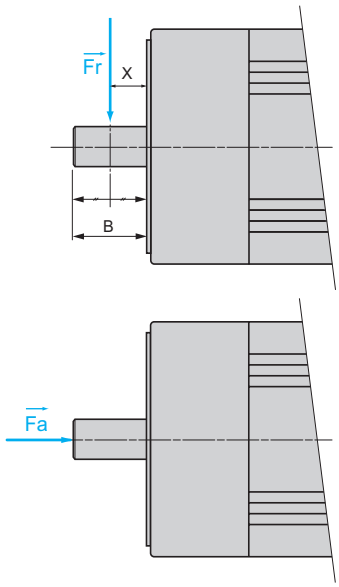


BMH 205 3P servo motor
With LXM 32●D72N4 servo drive



1 Peak torque
2 Continuous torque

Description: page 60
References: page 74
Dimensions: page 78



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 78)

(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**
Servo motor	BMH 0701	**N**	660	520	460	410	380	360
	BMH 0702	**N**	710	560	490	450	410	390
	BMH 0703	**N**	730	580	510	460	430	400
	BMH 1001	**N**	900	720	630	570	530	–
	BMH 1002	**N**	990	790	690	620	580	–
	BMH 1003	**N**	1050	830	730	660	610	–
	BMH 1401	**N**	1930	1530	1340	–	–	–
	BMH 1402	**N**	2240	1780	1550	–	–	–
	BMH 1403	**N**	2420	1920	1680	–	–	–
	BMH 2051	**N**	3730	2960	2580	–	–	–
	BMH 2052	**N**	4200	3330	2910	–	–	–
	BMH 2053	**N**	4500	3570	3120	–	–	–
			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 105		
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 102 R●●●
Type of encoder		SinCos encoder
External sleeve, insulation		PUR green coloured RAL 6018, polypropylen
Number of conductors (shielded)		[3 x (2 x 0.14 mm²) + 1 x (2 x 0.34 mm²)]
External diameter	mm	6.8 ± 0.2
Connector type		1 M23 industrial connector (servo motor side) and 1 RJ45 connector (servo drive side)
Min. curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system
Working voltage	V	300 (0.14 mm² and 0.34 mm²)
Maximum length	m	75 *(1)*
Operating temperature	°C	- 40…+ 80 (fixed), - 20…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

Cables without connectors

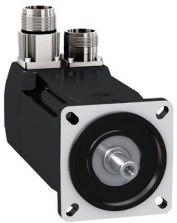
Cable type		VW3 M8 222 R●●●●
Type of encoder		SinCos encoder
External sleeve, insulation		PUR green coloured RAL 6018, polypropylen
Number of conductors (shielded)		[3 x (2 x 0.14 mm²) + 1 x (2 x 0.34 mm²)]
External diameter	mm	6.8 ± 0.2
Connector type		None, see page 105
Min. curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system
Working voltage	V	300 (0.14 mm² and 0.34 mm²)
Maximum length	m	100
Operating temperature	°C	- 40…+ 80 (fixed), - 20…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

(1) For cables longer than 75 m, please consult your customer care center.

Description: page 60
References: page 74
Dimensions: page 78

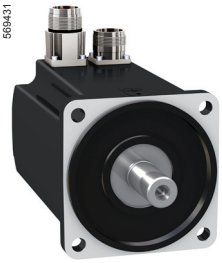
Lexium 32 motion control
BMH servo motors

569430



BMH 070●● ●●●1A

569431



BMH 100●● ●●●1A

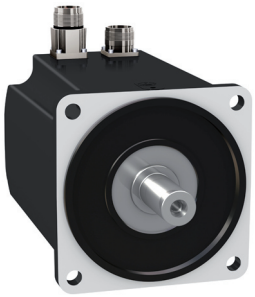
BMH servo motors

The BMH servo motors shown below are supplied without a gearbox.
For GBX gearboxes see page 82.

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed	Maximum mechanical speed	Associated servo drive LXM 32	Reference *(1)*	Weight *(2)*
Nm	Nm	W	rpm	rpm			kg
1.2	4.2	350	3000	8000	●U60N4	**BMH 0701P ●●●●A**	1.600
1.4	4	450	4000	8000	●U90M2	**BMH 0701T ●●●●A**	1.600
	4.2	350	2500	8000	●D18M2	**BMH 0701T ●●●●A**	1.600
		700	5000	8000	●D12N4	**BMH 0701P ●●●●A**	1.600
2.5	6.4	600	2500	8000	●D30M2	**BMH 0702T ●●●●A**	1.800
	7.4	900	4000	8000	●D18M2		
		700	3000	8000	●D12N4	**BMH 0702P ●●●●A**	1.800
3.4	8.7	650	2000	8000	●D30M2	**BMH 0703T ●●●●A**	2.000
	10.2	900	3000	8000	●D18M2	**BMH 0703T ●●●●A**	2.000
		1300	5000	8000	●D18N4	**BMH 0703P ●●●●A**	2.000
3.3	10.8	800	4000	6000	●D12N4	**BMH 1001P ●●●●A**	3.340
3.4	8.9	700	2000	6000	●D30M2	**BMH 1001T ●●●●A**	3.340
	10.8	900	3000	6000	●D18M2		
		1300	4000	6000	●D18N4	**BMH 1001P ●●●●A**	3.340
6	10.3	750	2000	6000	●D30M2	**BMH 1002T ●●●●A**	4.920
	18.4	1450	3000	6000	●D30M2		
6.2	18.4	1600	4000	6000	●D18N4	**BMH 1002P ●●●●A**	4.920
8.2	22.8	1450	2500	6000	●D30M2	**BMH 1003T ●●●●A**	6.500
8.4	25.1	2700	5000	6000	●D30N4	**BMH 1003P ●●●●A**	6.500

(1) To complete each reference see the table on page 75.
(2) Weight of servo motor without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 80.

569432



BMH 1401P ●●●1A

BMH servo motors (continued)

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed	Maximum mechanical speed	Associated servo drive LXM 32	Reference *(1)*	Weight *(2)*
Nm	Nm	W	rpm	rpm			kg
10.3	30.8	1450	2000	4000	●D30M2	**BMH 1401P ●●●●A**	8.000
		2400	3000	4000	●D30N4		
18.5	55.3	3500	3000	4000	●D72N4	**BMH 1402P ●●●●A**	12.000
25	74.8	4700	3000	4000	●D72N4	**BMH 1403P ●●●●A**	16.000
34.4	103.4	5400	2000	3800	●D72N4	**BMH 2051P ●●●●A**	33.000
62.5	170	6500	1500	3800	●D72N4	**BMH 2052P ●●●●A**	44.000
84	232	6500	1200	3800	●D72N4	**BMH 2053P ●●●●A**	67.000

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

			BMH 1401P	●	●	●	●	A
Shaft end	IP 54	Untapped		**0**				
		Keyed		**1**				
	IP 65/IP 67 *(3)*	Untapped		**2**				
		Keyed		**3**				
Integrated sensor	Single turn, SinCos Hiperface® 131,072 points/turn *(4)* 128 sine/cosine periods per turn				**1**			
	Multiturn, SinCos Hiperface® 131,072 points/turn x 4096 turns *(4)* 128 sine/cosine periods per turn				**2**			
	Single turn, SinCos Hiperface® 32,768 points/turn *(4)* 16 sine/cosine periods per turn				**6**			
	Multiturn, SinCos Hiperface® 32,768 points/turn x 4096 turns *(4)* 16 sine/cosine periods per turn				**7**			
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 **BMH 1401P** servo motor. For other servo motors, replace **BMH 1401P** with the relevant reference.*

IP 67 conformity kits

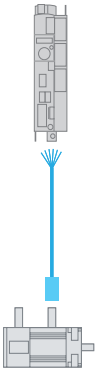
This kit can be used to ensure IP 67 degree of protection. It is fitted in place of the rear motor rating plate.

VW3 M2 302

Description	For servo motors	Reference	Weight kg
IP 67 conformity kits (supplied as an option)	BMH 070●●	**VW3 M2 301**	0.100
	BMH 100●●	**VW3 M2 302**	0.120
	BMH 140●●	**VW3 M2 303**	0.140
	BMH 205●●	**VW3 M2 304**	0.160

(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 80.
(3) IP 67 with the VW3 M2 30● IP 67 conformity kit supplied as an option, see above.
(4) Sensor resolution given for use with a Lexium 32 servo drive.

Presentation: page 60
Characteristics: page 62
Dimensions: page 78



VW3 M5 10● R●●●

Connection elements

Power cordsets

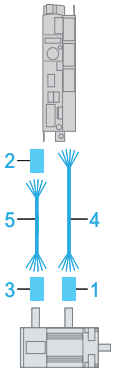
Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
Cables equipped with one M23 industrial connector (servo motor end)	BMH 070●● BMH 100●● BMH 1401P	LXM 32●●●●●● depending on combinations (see pages 62 to 71)	[(4 x 1.5 mm²) + (2 x 1 mm²)]	1.5	**VW3 M5 101 R15**	0.600
				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
	BMH 1402P BMH 1403P	LXM 32●D72N4	[(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 end)	BMH 205●P	LXM 32●D72N4	[(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 M8 102 R●●●

Control cordsets

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
SinCos Hiperface® encoder cables equipped with an M23 industrial connector (servo motor end) **and an RJ45 connector** with 8 + 2 contacts (servo drive end)	BMH ●●●●●	LXM 32●●●●●● depending on combinations (see pages 62 to 71)	[3 x (2 x 0.14 mm²) + (2 x 0.34 mm²)]	1.5	**VW3 M8 102 R15**	0.400
				3	**VW3 M8 102 R30**	0.500
				5	**VW3 M8 102 R50**	0.600
				10	**VW3 M8 102 R100**	0.900
				15	**VW3 M8 102 R150**	1.100
				20	**VW3 M8 102 R200**	1.400
				25	**VW3 M8 102 R250**	1.700
				50	**VW3 M8 102 R500**	3.100
				75	**VW3 M8 102 R750**	4.500

Presentation: page 60
Characteristics: page 62



Connection elements (continued)

Connectors for creating power and control cordsets

Description	Used for	Item no.	For cable cross-section	Reference	Weight
			mm²		kg
M23 industrial connector for creating power cordsets (sold in lots of 5)	BMH 070●●, BMH 100●● and BMH 140●P servo motors	1	1.5 or 2.5	**VW3 M8 215**	0.350
M40 industrial connector for creating power cordsets (sold in lots of 5)	BMH 205●P servo motors	1	4	**VW3 M8 217**	0.850
RJ45 connector with 8 + 2 contacts for creating control cordsets (sold in lots of 5)	LXM 32●●●●●● servo drives (CN3 connector)	2	–	**VW3 M2 208**	0.200
M23 industrial connector for creating control cordsets (sold in lots of 5)	BMH ●●●●● servo motors	3	–	**VW3 M8 214**	0.350

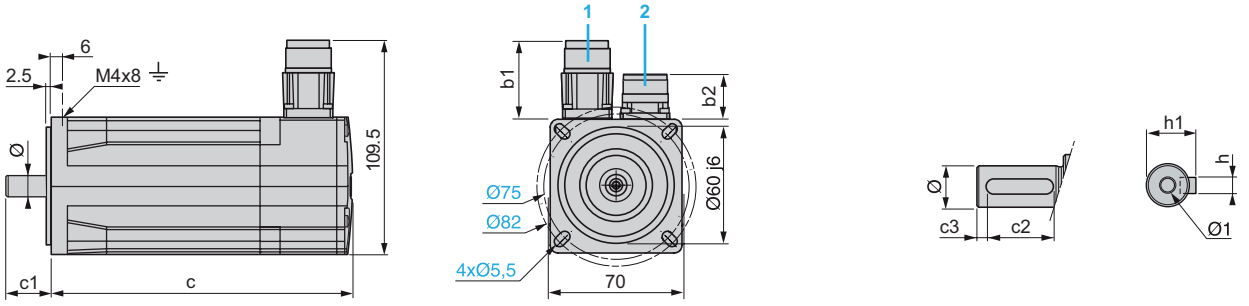
Cables for creating power and control cordsets

Description	From servo motor	To servo drive	Composition	Item no.	Length	Reference	Weight
					m		kg
Cables for creating power cordsets	BMH 070●● BMH 100●● BMH 1401P	LXM 32●●●●●● depending on combinations (see pages 62 to 71)	[(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
	BMH 1402P BMH 1403P	LXM 32●●●●N4	[(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
	BMH 205●P	LXM 32●●●●N4	[(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**	BMH ●●●●●	LXM 32●●●●●● depending on combinations (see pages 62 to 71)	[(3 x (2 x 0.14 mm²) + (2 x 0.34mm²)]	5	25	**VW3 M8 222 R250**	1.400
					50	**VW3 M8 222 R500**	2.800
					100	**VW3 M8 222 R1000**	5.600

Presentation: page 60
Characteristics: page 62

BMH 070 (example with straight connectors: power supply for servo motor/brake 1 and encoder 2)

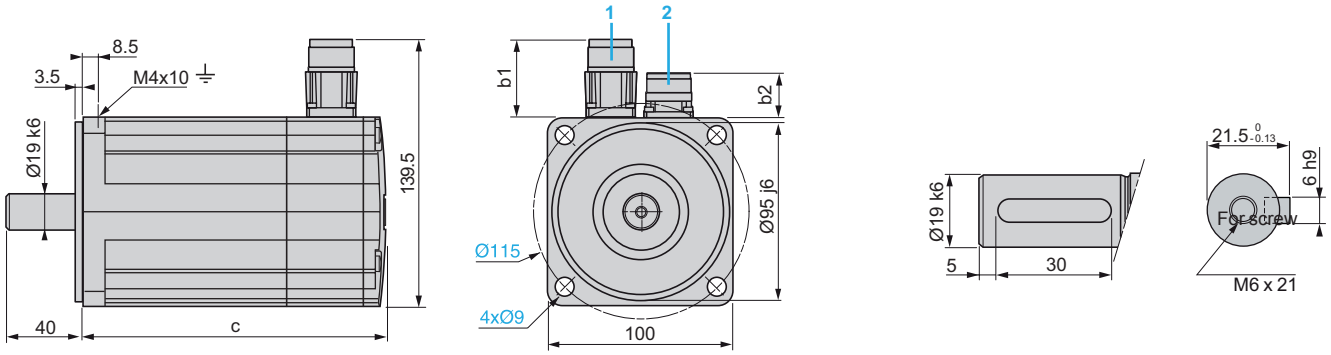
Shaft end, keyed slot (optional)



	Straight connectors		Rotatable angled connectors										
	b1	**b2**	**b1**	**b2**	**c** (without brake)	**c** (with brake)	**c1**	**c2**	**c3**	**h**	**h1**	**Ø**	**Ø1 for screws**
BMH 0701●	39.5	25.5	39.5	39.5	122	161	23	18	2.5	4 h9	12.5^{+0}_{-013}	11 k6	M4 x 14
BMH 0702●	39.5	25.5	39.5	39.5	154	193	23	18	2.5	4 h9	12.5^{+0}_{-013}	11 k6	M4 x 14
BMH 0703●	39.5	25.5	39.5	39.5	186	225	30	20	5	5 h9	16^{+0}_{-013}	14 k6	M5 x 17

BMH 100 (example with straight connectors: power supply for servo motor/brake 1 and encoder 2)

Shaft end, keyed slot (optional)

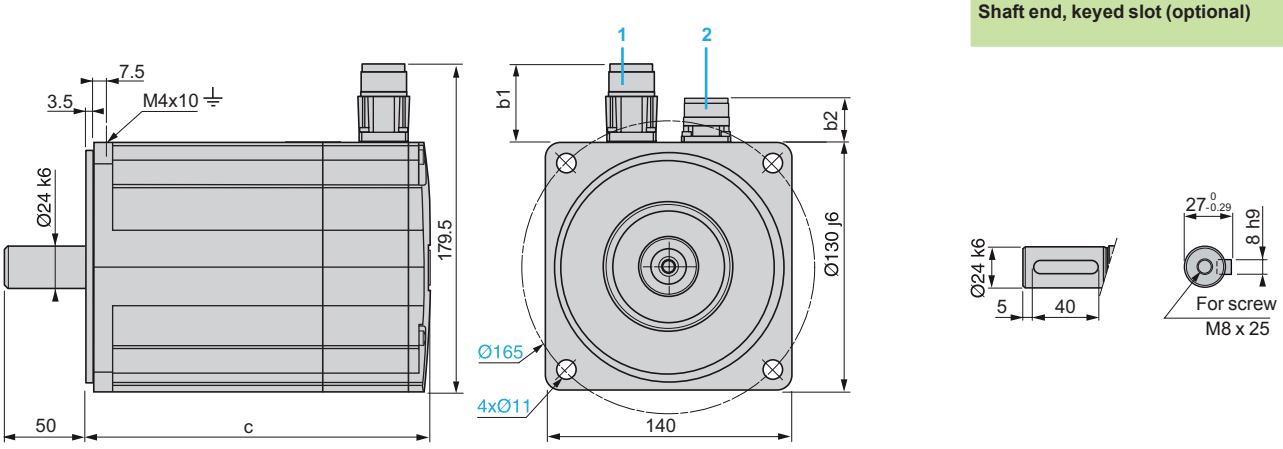


	Straight connectors		Rotatable angled connectors			
	b1	**b2**	**b1**	**b2**	**c** (without brake)	**c** (with brake)
BMH 1001●	39.5	25.5	39.5	39.5	128	170
BMH 1002●	39.5	25.5	39.5	39.5	160	202
BMH 1003●	39.5	25.5	39.5	39.5	192	234

Presentation: page 60
Characteristics: page 62
References: page 74

BMH 140 (example with straight connectors: power supply for servo motor/brake 1 and encoder 2)

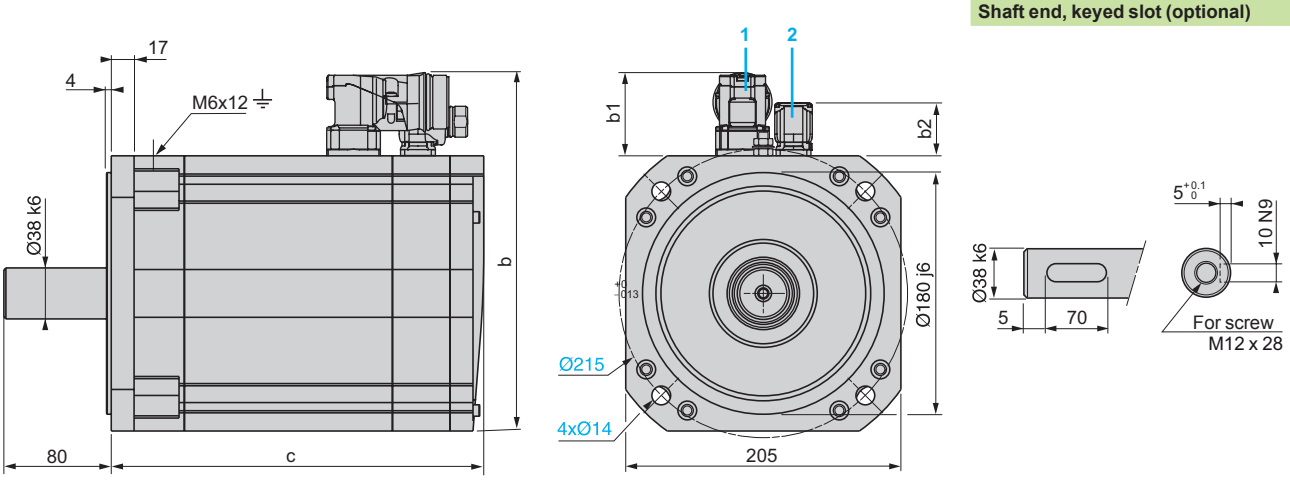
Shaft end, keyed slot (optional)



	Straight connectors		Rotatable angled connectors			
	b	**b1**	**b**	**b1**	**c** (without brake)	**c** (with brake)
BMH 1401●	39.5	25.5	39.5	39.5	152	187
BMH 1402●	39.5	25.5	39.5	39.5	192	227
BMH 1403●	39.5	25.5	39.5	39.5	232	267

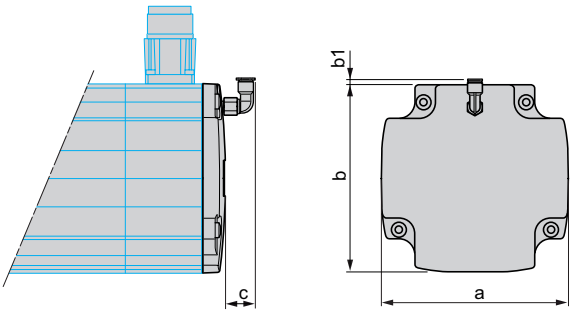
BMH 205 (example with straight connectors: power supply for servo motor/brake 1 and encoder 2)

Shaft end, keyed slot (optional)



	Straight connectors			Rotatable angled connectors				
	b	**b1**	**b2**	**b**	**b1**	**b2**	**c** (without brake)	**c** (with brake)
BMH 2051P	259	54	25.5	265	60	39.5	321	370.5
BMH 2052P	259	54	25.5	265	60	39.5	405	454.5
BMH 2053P	259	54	25.5	265	60	39.5	489	538.5

IP 67 conformity kits (optional)



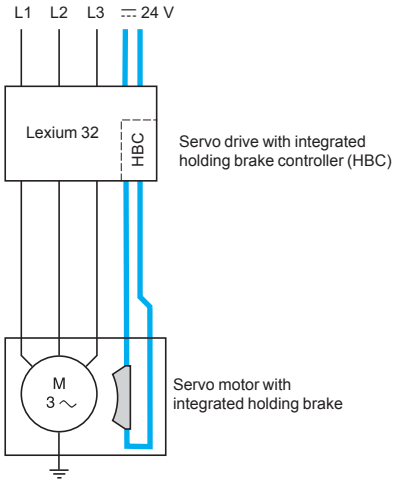
	a	**b**	**b1**	**c**
VW3 M2 301	70	70	2.8	16.8
VW3 M2 302	100	100	3	15.8
VW3 M2 303	140	140	3	14.5
VW3 M2 304	205	205	–	21.8

Presentation: page 60
Characteristics: page 62
References: page 74

Lexium 32 motion control
BMH servo motors
Option: Holding brake integrated in servo motor

Holding brake

Presentation



The holding brake integrated in the BMH servo motor is an electromagnetic pressure spring brake that blocks the servo motor axis once the output current has been switched off.

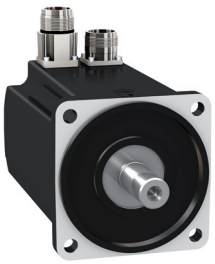
In the event of an emergency, such as a power outage or an Emergency stop, the drive is immobilized, thus significantly increasing safety.
Blocking the servo motor axis is also necessary in cases of torque overload, such as in the event of vertical axis movement.

The servo drive Lexium 32 integrates as standard an holding brake controller which amplifies the braking control signal, so that the brake is deactivated quickly. It then reduces this control signal so as to decrease the power dissipated by the holding brake.

Characteristics

Type of servo motor	BMH	0701, 0702, 0703	1001, 1002	1003	1401, 1402	1403	2051, 2052, 2053
Holding torque M_{Br}	**Nm**	3	5.5	9	18	23	80
Moment of inertia of rotor(brake only) J_{Br}	**kgcm²**	0.11	0.49	0.93	1.5	2.73	16
Electrical clamping power P_{Br}	**W**	7	12	18	18	19	40
Nominal current	**A**	0.29	0.5	0.75	0.75	0.79	1.67
Supply voltage	**V**	24 +5/-15%					24 +6/-10%
Opening time	**ms**	80	70	90	100	100	200
Closing time	**ms**	10	30	25	50	40	50
Weight (to be added to the weight of the servo motor without brake, see page 74)	**kg**	0.3	0.5	0.7	1.1	1.3	3.6

References



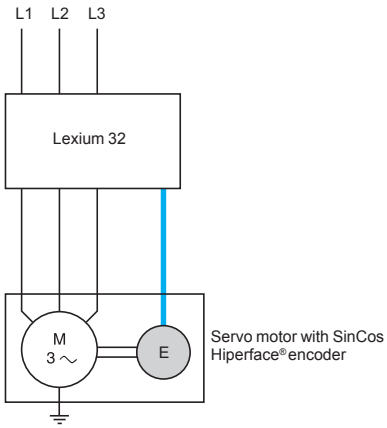
BMH servo motor

For selection of BMH servo motor with or without holding brake, see references on page 75.

Lexium 32 motion control
BMH servo motors
Option: Encoder integrated in servo motor

Encoder integrated in BMH servo motor

Presentation



The standard measurement device is the SinCos Hiperface® single turn or multiturn encoder integrated in BMH servo motors. This measurement device is perfectly suited to the Lexium 32 range of servo drives.

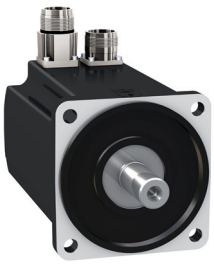
Use of this interface enables:
- Automatic identification of BMH servo motor data by the servo drive
- Automatic initialization of the servo drive's control loops, thus simplifying installation of the motion control device.

Characteristics

Type of encoder		Single turn SinCos		Multiturn SinCos	
Sine/cosine periods per turn		16	128	16	128
Number of points *(1)*		32 768	131,072	32 768 x 4096 turns	131,072 x 4096 turns
Encoder precision	**arc min**	± 4.8	± 1.3	± 4.8	± 1.3
Measurement method		Capacitive, medium resolution	Optical, high resolution	Capacitive, medium resolution	Optical, high resolution
Interface		Hiperface®			
Operating temperature	**°C**	-40…+115	-20…+110	-20…+115	-20…+110

(1) Encoder resolution given for use with a Lexium 32 servo drive.

References

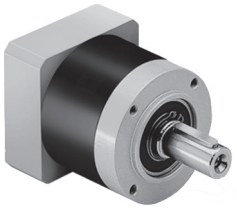


BMH servo motor

For selection of the SinCos Hiperface® single turn or multiturn encoder integrated in the BMH servo motor, see references on page 75.

Lexium 32 motion control
BMH 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 BMH 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 BMH 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.

BMH 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
BMH 0701	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BMH 0702	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 60	GBX 80	GBX 80
BMH 0703	GBX 60	GBX 60	GBX 60	GBX 80	GBX 60	GBX 80	GBX 80	GBX 80
BMH 1001	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BMH 1002	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 80	GBX 120	GBX 120
BMH 1003	GBX 80	GBX 80	GBX 80	GBX 120	GBX 80	GBX 120	GBX 120	GBX 120
BMH 1401	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 160	GBX 160
BMH 1402	GBX 120	GBX 120	GBX 120	GBX 160	–	GBX 160	GBX 160	GBX 160
BMH 1403	GBX 120	GBX 120	GBX 120	GBX 160	–	GBX 160	GBX 160	GBX 160
BMH 2051	–	–	–	–	–	–	–	–
BMH 2052	–	–	–	–	–	–	–	–
BMH 2053	–	–	–	–	–	–	–	–

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
BMH 0701	GBX 80	GBX 80	GBX 80	GBX 80	GBX 120	GBX 120	GBX 120
BMH 0702	GBX 80	GBX 80	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BMH 0703	GBX 80	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BMH 1001	GBX 80	GBX 120	GBX 120	GBX 120	–	–	–
BMH 1002	GBX 120	GBX 160	GBX 160	GBX 160	–	–	–
BMH 1003	GBX 120	GBX 160	GBX 160	GBX 160	–	–	–
BMH 1401	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BMH 1402	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BMH 1403	GBX 160	GBX 160	GBX 160	GBX 160	–	–	–
BMH 2051	–	–	–	–	–	–	–
BMH 2052	–	–	–	–	–	–	–
BMH 2053	–	–	–	–	–	–	–

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 84).*

Lexium 32 motion control
BMH 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	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.

Presentation: page 82 | References: page 85 | Dimensions: page 86 | Mounting: page 87

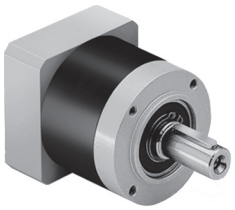
Characteristics of GBX gearboxes (continued)

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 32 motion control
BMH 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**	1.000
	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**	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:

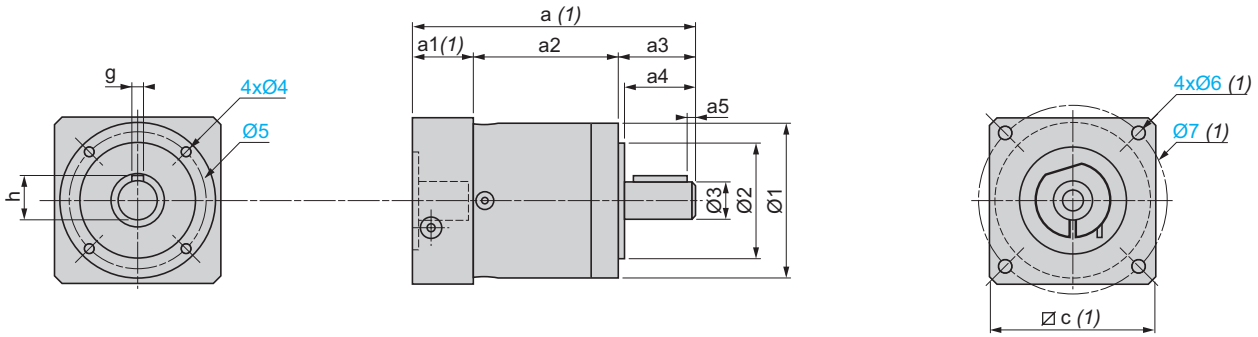
			GBX ●●●	●●●	●●●	●	F
Size	Diameter of the casing (see table of combinations with BMH servo motor on page 82)	40 mm	**040**				
		60 mm	**060**				
		80 mm	**080**				
		120 mm	**120**				
		160 mm	**160**				
Reduction ratio		3:1		**003**			
		4:1		**004**			
		5:1		**005**			
		8:1		**008**			
		9:1		**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 BMH servo motor	Type	BMH 070			**070**		
		BMH 100			**100**		
		BMH 140			**140**		
	Model	BMH ●●●1				**1**	
		BMH ●●●2				**2**	
		BMH ●●●3				**3**	
BMH servo motor adaptation							**F**

Presentation: page 82 | Characteristics: page 83 | Dimensions: page 86 | Mounting: page 87

Lexium 32 motion control
BMH 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/BMH servo motor combination:

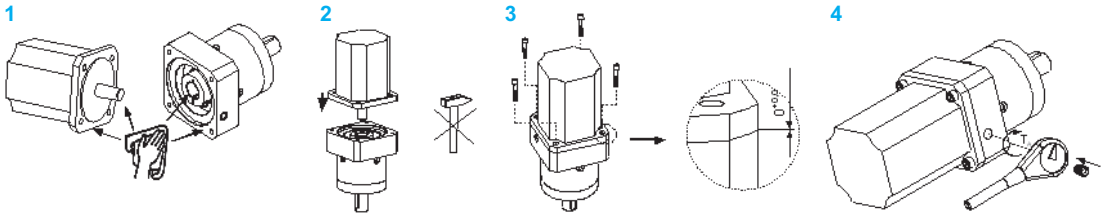
Combinations		Reduction ratios						
Gearbox	**Servo motor**	**3:1 to 8:1**	**9:1 to 40:1**	**60:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**
		a	**a**	**a**	**a1**	**⍁ c**	**Ø6**	**Ø7**
GBX 060	**BMH 0701, 0702**	106	118.5	131.5	24	70	M5	75
GBX 060	**BMH 0703**	113	125.5	138.5	31	70	M5	75
GBX 080	**BMH 070●**	133.5	151	168.5	33.5	80	M5	82
GBX 080	**BMH 1001…1003**	143.5	161	178.5	43.5	100	M8	115
GBX 120	**BMH 070●**	–	203.5	231	47.5	115	M5	75
GBX 120	**BMH 1001…1003**	176.5	203.5	231	47.5	115	M8	115
GBX 120	**BMH 140●**	186.5	213.5	–	57.5	140	M10	165
GBX 160	**BMH 1002, 1003**	–	305	–	64.5	140	M8	115
GBX 160	**BMH 140●**	255.5	305	–	64.5	140	M10	165

Lexium 32 motion control
BMH servo motors
Option: GBX planetary gearboxes

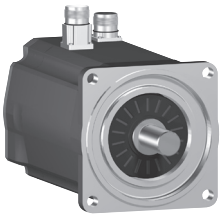
Mounting

No special tool is required for mounting the GBX planetary gearbox on the BMH 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.



Lexium 32 motion control
BSH servo motors



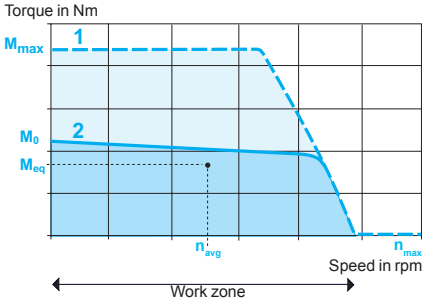
BSH servo motor with straight connectors

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 33.4 Nm for a maximum speed of 9000 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 four flange sizes: 55, 70, 100 and 140 mm. 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 116).
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 116.*

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
- Built-in PTC thermistor probe
- 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 90
References: page 102
Dimensions: page 106

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.

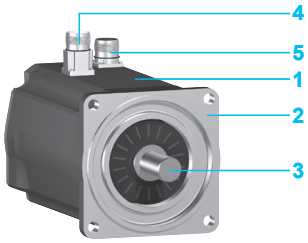
⚠ **Do not use the holding brake as a dynamic brake for deceleration, as this will quickly damage the brake.**

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 absolute motor position so that flows can be synchronized
- Measures the servo motor speed via the associated Lexium 32 servo drive.

This information is used by the speed controller of the servo drive.
- Measures the position information for the servo drive position controller
- Sends data from the servo motor to the servo drive, which ensures automatic identification of the motor when the servo drive starts.



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 32 servo drives (see page 104).
Schneider Electric has taken particular care to ensure compatibility between BSH servo motors and Lexium 32 servo drives. This compatibility can only be assured by using cables and connectors sold by Schneider Electric (see page 104).

(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 32 servo drive.
(3) Other model with rotatable angled connector

Characteristics: page 90
References: page 102
Dimensions: page 106

Lexium 32 motion control
BSH servo motors
115 V single-phase supply voltage

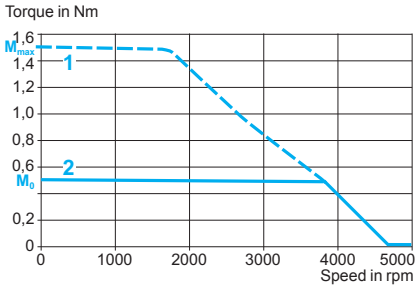
Characteristics of BSH 055 servo motor

Type of servo motor				BSH 055 1T	BSH 055 2T	BSH 055 3T
Associated with Lexium 32 servo drive				LXM 32● U90M2		LXM 32● D18M2
Switching frequency			kHz	8		
Torque	Continuous stall	M_0	Nm	0.5	0.8	1.2
	Peak stall	M_{max}	Nm	1.5	1.9	3.3
Nominal operating point	Nominal torque		Nm	0.49	0.77	1.14
	Nominal speed		rpm	3000		
	Nominal servo motor output power		W	150	250	350
Maximum current			A rms	5.4	6	10
Servo motor characteristics						
Maximum mechanical speed			rpm	9000		
Constants (at 120°C)	Torque		Nm/A rms	0.36		0.39
	Back emf		V rms/krpm	22		
Rotor	Number of poles			6		
	Inertia	Without brake J_m	kgcm²	0.059	0.096	0.134
		With brake J_m	kgcm²	0.0803	0.1173	0.1553
Stator (at 20°C)	Resistance (phase/phase)		Ω	12.2	5.2	3.1
	Inductance (phase/phase)		mH	20.8	10.6	7.4

Torque/speed curves

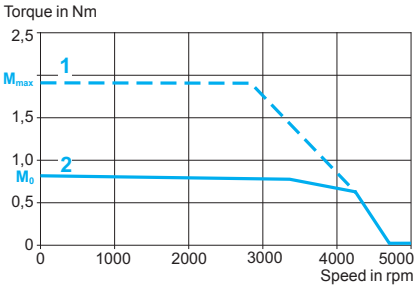
BSH 055 1T servo motor

With LXM 32●U90M2 servo drive



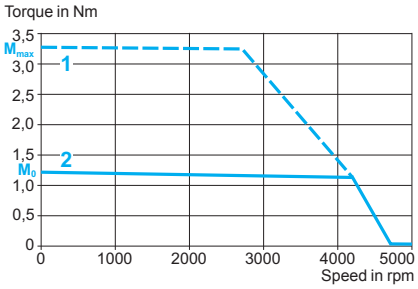
BSH 055 2T servo motor

With LXM 32●U90M2 servo drive



BSH 055 3T servo motor

With LXM 32●D18M2 servo drive



1 Peak torque
2 Continuous torque

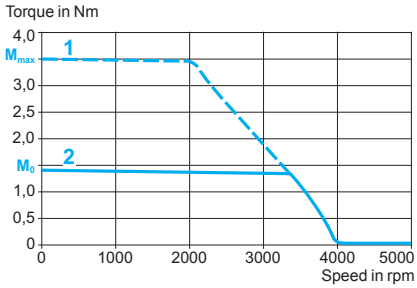
Presentation: page 88
References: page 102
Dimensions: page 106

Characteristics of BSH 055 servo motor

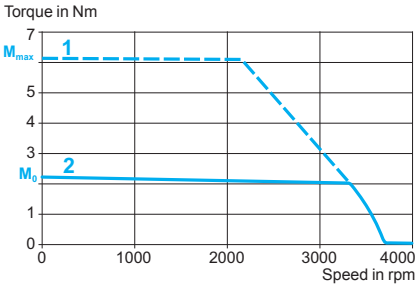
Type of servo motor				BSH 070 1T	BSH 070 2T	BSH 100 1T
Associated with Lexium 32 servo drive				LXM 32● D18M2	LXM 32● D30M2	
Switching frequency			kHz	8		
Torque	Continuous stall	M_0	Nm	1.4	2.2	3.3
	Peak stall	M_{max}	Nm	3.5	6.1	6.3
Nominal operating point	Nominal torque		Nm	1.36	2.07	2.75
	Nominal speed		rpm	2500		
	Nominal servo motor output power		W	350	550	700
Maximum current			A rms	10	15	15
Servo motor characteristics						
Maximum mechanical speed			rpm	8000		6000
Constants (at 120°C)	Torque		Nm/A rms	0.44	0.45	
	Back emf		V rms/ krpm	26	28	29
Rotor	Number of poles			6		8
	Inertia	Without brake J_m	kgcm²	0.25	0.41	1.4
		With brake J_m	kgcm²	0.322	0.482	2.018
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.3	1.5	0.87
	Inductance (phase/phase)		mH	12.3	6.7	4

Torque/speed curves

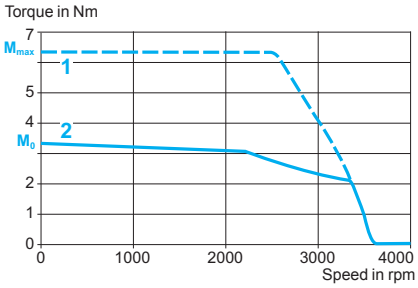
BSH 070 1T servo motor
With LXM 32●D18M2 servo drive



BSH 070 2T servo motor
With LXM 32●D30M2 servo drive



BSH 100 1T servo motor
With LXM 32●D30M2 servo drive



1 Peak torque
2 Continuous torque

Presentation: page 88
References: page 102
Dimensions: page 106

Lexium 32 motion control
BSH servo motors
230 V single-phase supply voltage

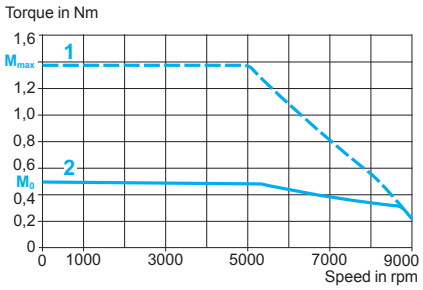
Characteristics of BSH 055/070 servo motors

Type of servo motor				BSH 055 1T	BSH 055 2T	BSH 055 3T	BSH 070 1T	BSH 070 2T	BSH 070 3T
Associated with Lexium 32 servo drive				LXM 32● U45M2	LXM 32● U90M2			LXM 32● D18M2	
Switching frequency			kHz	8					
Torque	Continuous stall	M_0	Nm	0.5	0.8	1.2	1.3	2.2	2.6
	Peak stall	M_{max}	Nm	1.4	2.5	3	3.5	7.2	7.4
Nominal operating point	Nominal torque		Nm	0.45	0.74	0.84	0.94	1.8	2.1
	Nominal speed		rpm	6000			5000		4000
	Nominal servo motor output power		W	300	450	550	500	950	900
Maximum current			A rms	4.5	8.8	9	9	18	
Servo motor characteristics									
Maximum mechanical speed			rpm	9000			8000		
Constants (at 120°C)	Torque		Nm/A rms	0.36		0.39	0.44	0.45	0.44
	Back emf		V rms/ krpm	22			26	28	29
Rotor	Number of poles			6					
	Inertia	Without brake J_m	kgcm²	0.059	0.096	0.134	0.25	0.41	0.58
		With brake J_m	kgcm²	0.0803	0.1173	0.1553	0.322	0.482	0.81
Stator (at 20°C)	Resistance (phase/phase)		Ω	12.2	5.2	3.1	3.3	1.5	0.91
	Inductance (phase/phase)		mH	20.8	10.6	7.4	12.3	6.7	4.4

Torque/speed curves

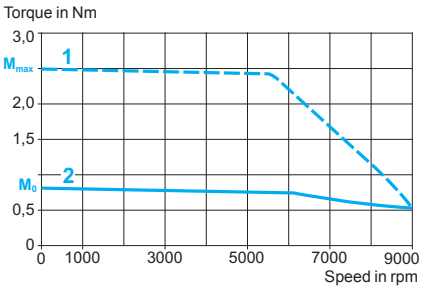
BSH 055 1T servo motor

With LXM 32●U45M2 servo drive



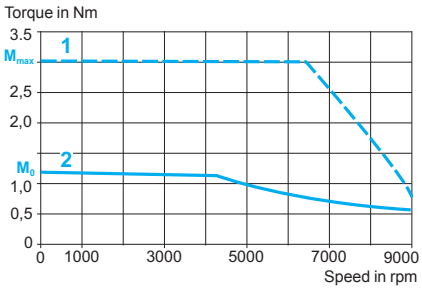
BSH 055 2T servo motor

With LXM 32●U90M2 servo drive



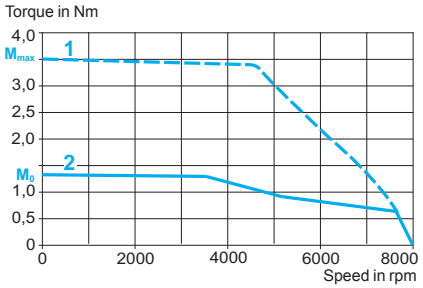
BSH 055 3T servo motor

With LXM 32●U90M2 servo drive



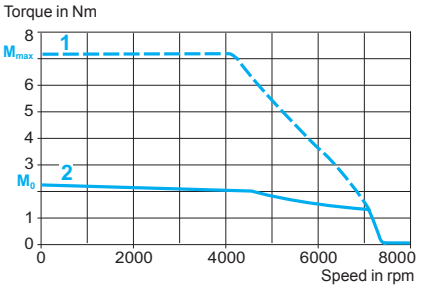
BSH 070 1T servo motor

With LXM 32●U90M2 servo drive



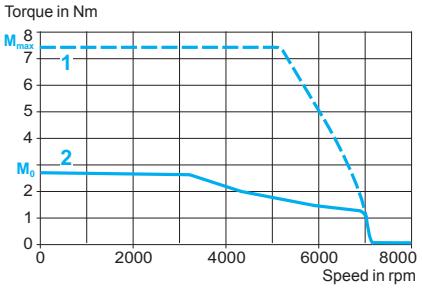
BSH 070 2T servo motor

With LXM 32●D18M2 servo drive



BSH 070 3T servo motor

With LXM 32●D18M2 servo drive



1 Peak torque
2 Continuous torque

Presentation: page 88
References: page 102
Dimensions: page 106

Lexium 32 motion control
BSH servo motors
230 V single-phase supply voltage

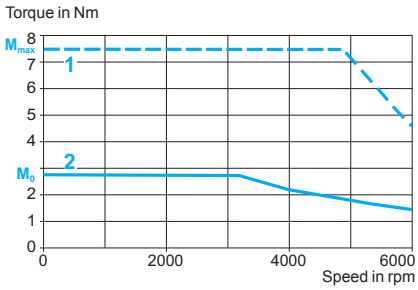
Characteristics of BSH 100 servo motor

Type of servo motor				BSH 100 1T	BSH 100 2T
Associated with Lexium 32 servo drive				LXM 32● D18M2	LXM 32● D30M2
Switching frequency			kHz	8	
Torque	Continuous stall	M_0	Nm	2.7	5.8
	Peak stall	M_{max}	Nm	7.5	16.4
Nominal operating point	Nominal torque		Nm	2.2	3.7
	Nominal speed		rpm	4000	
	Nominal servo motor output power		W	900	1500
Maximum current			A rms	18	30
Servo motor characteristics					
Maximum mechanical speed			rpm	6000	
Constants (at 120°C)	Torque		Nm/A rms	0.45	0.59
	Back emf		V rms/ krpm	29	37
Rotor	Number of poles			8	
	Inertia	Without brake J_m	kgcm²	1.4	2.31
		With brake J_m	kgcm²	2.018	2.928
Stator (at 20°C)	Resistance (phase/phase)		Ω	0.87	0.56
	Inductance (phase/phase)		mH	4	3

Torque/speed curves

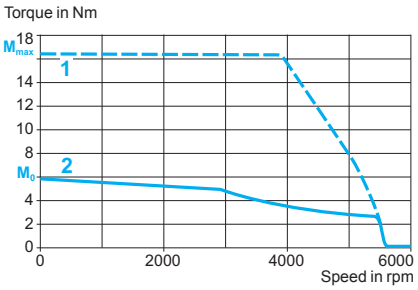
BSH 100 1T servo motor

With LXM 32●D18M2 servo drive



BSH 100 2T servo motor

With LXM 32●D30M2 servo drive



1 Peak torque
2 Continuous torque

Presentation: page 88
References: page 102
Dimensions: page 106

Lexium 32 motion control
BSH servo motors
400 V 3-phase supply voltage

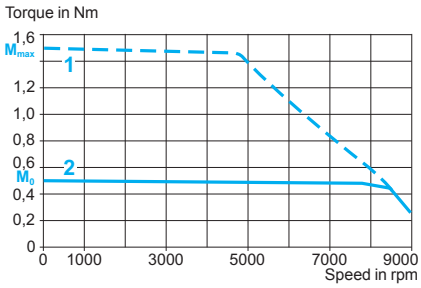
Characteristics of BSH 055/070 servo motors

Type of servo motor				BSH 055 1P	BSH 055 2P	BSH 055 3P	BSH 070 1P	BSH 070 2P	BSH 070 3P
Associated with Lexium 32 servo drive				LXM 32● U60N4			LXM 32● D12N4		LXM 32● D18N4
Switching frequency			kHz	8					
Torque	Continuous stall	M_0	Nm	0.5	0.8	1.05	1.4	2.2	3.1
	Peak stall	M_{max}	Nm	1.5	2.5	3.5	3.5	7.6	11.3
Nominal operating point	Nominal torque		Nm	0.48	0.65		1.32	1.64	2.44
	Nominal speed		rpm	6000			5000		
	Nominal servo motor output power		W	300	400		700	850	1300
Maximum current			A rms	2.9	4.8	6	5.7	11.8	17
Servo motor characteristics									
Maximum mechanical speed			rpm	9000			8000		
Constants (at 120°C)	Torque		Nm/A rms	0.7			0.8	0.77	0.78
	Back emf		V rms/ krpm	40		41	46	48	49
Rotor	Number of poles			6					
	Inertia	Without brake J_m	kgcm²	0.059	0.096	0.134	0.25	0.41	0.58
		With brake J_m	kgcm²	0.083	0.1173	0.1553	0.322	0.482	0.81
Stator (at 20°C)	Resistance (phase/phase)		Ω	41.8	17.4	10.4	10.4	4.2	2.7
	Inductance (phase/phase)		mH	71.5	35.3	25	38.8	19	13

Torque/speed curves

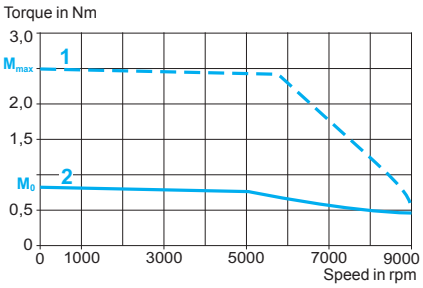
BSH 055 1P servo motor

With LXM 32●U60N4 servo drive



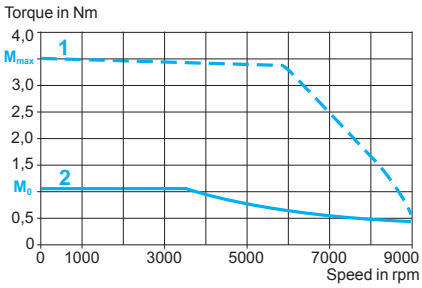
BSH 055 2P servo motor

With LXM 32●U60N4 servo drive



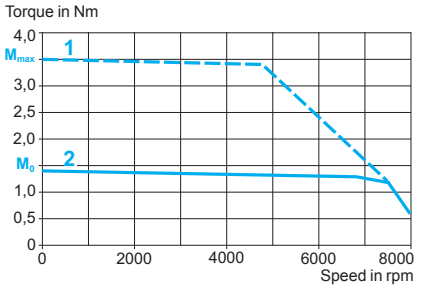
BSH 055 3P servo motor

With LXM 32●U60N4 servo drive



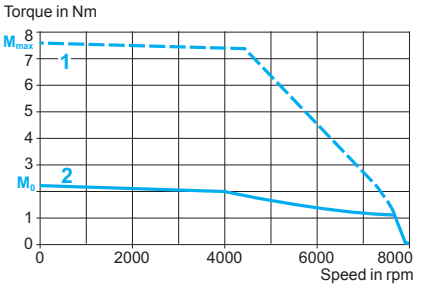
BSH 070 1P servo motor

With LXM 32●D12N4 servo drive



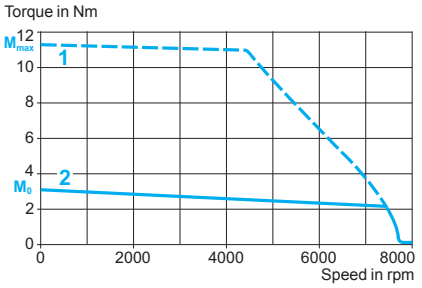
BSH 070 2P servo motor

With LXM 32●D12N4 servo drive



BSH 070 3P servo motor

With LXM 32●D18N4 servo drive



1 Peak torque
2 Continuous torque

Presentation: page 88 References: page 102 Dimensions: page 106

Lexium 32 motion control
BSH servo motors
400 V 3-phase supply voltage

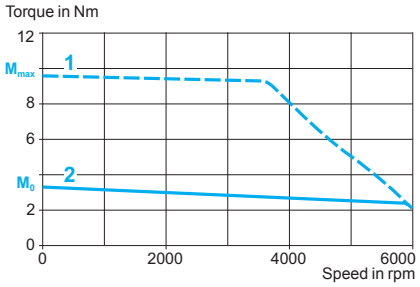
Characteristics of BSH 100 servo motor

Type of servo motor				BSH 100 1P	BSH 100 2P	BSH 100 3P	BSH 100 4P
Associated with Lexium 32 servo drive				LXM 32● D18N4		LXM 32● D30N4	
Switching frequency			kHz	8			
Torque	Continuous stall	M_0	Nm	3.3	5.8	8	10
	Peak stall	M_{max}	Nm	9.6	18.3	28.3	37.9
Nominal operating point	Nominal torque		Nm	2.7	4	6.3	8.3
	Nominal speed		rpm	4000		3000	2500
	Nominal servo motor output power		W	1100	1700	2000	2100
Maximum current			A rms	12	17.1	28.3	30
Servo motor characteristics							
Maximum mechanical speed			rpm	6000			
Constants (at 120°C)	Torque		Nm/A rms	0.89	1.21	1.22	1.62
	Back emf		V rms/ krpm	60	77		103
Rotor	Number of poles			8			
	Inertia	Without brake J_m	kgcm²	1.4	2.31	3.22	4.22
		With brake J_m	kgcm²	2.018	2.928	3.838	5.245
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.8	2.4	1.43	1.81
	Inductance (phase/phase)		mH	17.6	12.7	8.8	11.8

Torque/speed curves

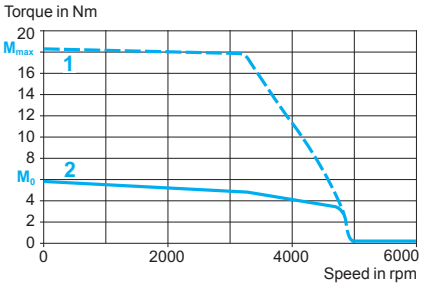
BSH 100 1P servo motor

With LXM 32●D18N4 servo drive



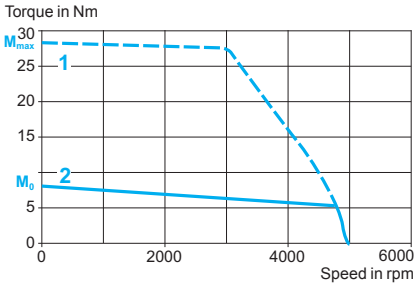
BSH 100 2P servo motor

With LXM 32●D18N4 servo drive



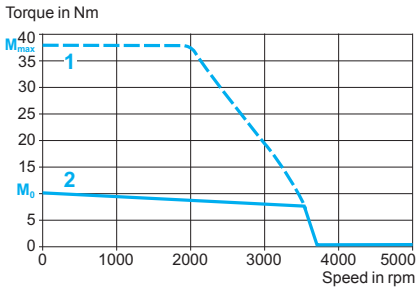
BSH 100 3P servo motor

With LXM 32●D30N4 servo drive



BSH 100 4P servo motor

With LXM 32●D30N4 servo drive



1 Peak torque
2 Continuous torque

Presentation: page 88
References: page 102
Dimensions: page 106

Lexium 32 motion control
BSH servo motors
400 V 3-phase supply voltage

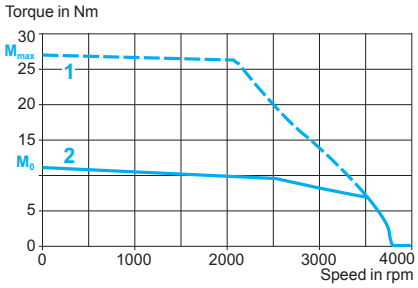
Characteristics of BSH 140 servo motor

Type of servo motor				BSH 140 1P	BSH 140 2T	BSH 140 3T	BSH 140 4P
Associated with Lexium 32 servo drive				LXM 32● D30N4	LXM 32● D72N4		
Switching frequency			kHz	8			
Torque	Continuous stall	M_0	Nm	11.1	19.5	27.8	33.4
	Peak stall	M_{max}	Nm	27	59.3	90.2	103.6
Nominal operating point	Nominal torque		Nm	9.5	12.3	12.9	19
	Nominal speed		rpm	2500	3000		2500
	Nominal servo motor output power		W	2500	3900	4100	5000
Maximum current			A rms	20.8	72		
Servo motor characteristics							
Maximum mechanical speed			rpm	4000			
Constants (at 120°C)	Torque		Nm/A rms	1.43	1.47	1.58	1.57
	Back emf		V rms/ krpm	100	101	105	104
Rotor	Number of poles			10			
	Inertia	Without brake J_m	kgcm²	7.41	12.68	17.94	23.7
		With brake J_m	kgcm²	9.21	14.48	23.44	29.2
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.41	0.6	0.4	0.28
	Inductance (phase/phase)		mH	15.6	7.4	5.1	3.9

Torque/speed curves

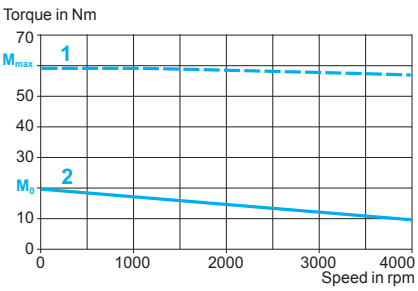
BSH 140 1P servo motor

With LXM 32●D30N4 servo drive



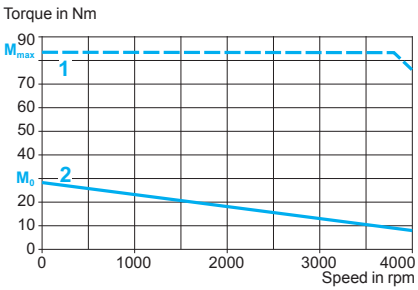
BSH 140 2T servo motor

With LXM 32●D72N4 servo drive



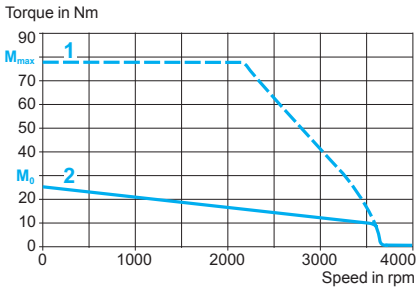
BSH 140 3T servo motor

With LXM 32●D72N4 servo drive



BSH 140 4P servo motor

With LXM 32●D72N4 servo drive



1 Peak torque
2 Continuous torque

Presentation: page 88
References: page 102
Dimensions: page 106

Lexium 32 motion control
BSH servo motors
480 V 3-phase supply voltage

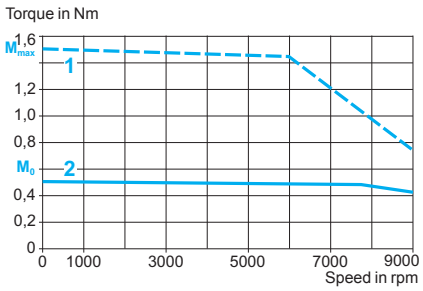
Characteristics of BSH 055/070 servo motors

Type of servo motor				BSH 055 1P	BSH 055 2P	BSH 055 3P	BSH 070 1P	BSH 070 2P	BSH 070 3P
Associated with Lexium 32 servo drive				LXM 32● U60N4			LXM 32● D12N4		LXM 32● D18N4
Switching frequency			kHz	8					
Torque	Continuous stall	M_0	Nm	0.5	0.8	1.05	1.4	2.2	3.1
	Peak stall	M_{max}	Nm	1.5	2.5	3.5	3.5	7.6	11.3
Nominal operating point	Nominal torque		Nm	0.48	0.65		1.32	1.64	2.44
	Nominal speed		rpm	6000			5000		
	Nominal servo motor output power		W	300	400		700	850	1300
Maximum current			A rms	2.9	4.8	6	5.7	11.8	17
Servo motor characteristics									
Maximum mechanical speed			rpm	9000			8000		
Constants (at 120°C)	Torque		Nm/A rms	0.7			0.8	0.77	0.78
	Back emf		V rms/ krpm	40		41	46	48	49
Rotor	Number of poles			6					
	Inertia	Without brake J_m	kgcm²	0.059	0.096	0.134	0.25	0.41	0.58
		With brake J_m	kgcm²	0.0803	0.1173	0.1553	0.322	0.482	0.81
Stator (at 20°C)	Resistance (phase/phase)		Ω	41.8	17.4	10.4	10.4	4.2	2.7
	Inductance (phase/phase)		mH	71.5	35.3	25	38.8	19	13

Torque/speed curves

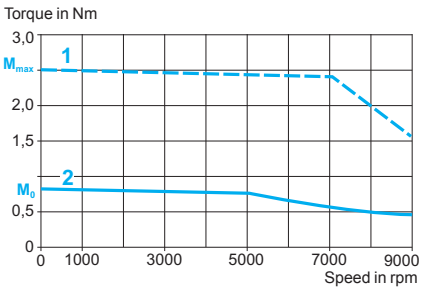
BSH 055 1P servo motor

With LXM 32●U60N4 servo drive



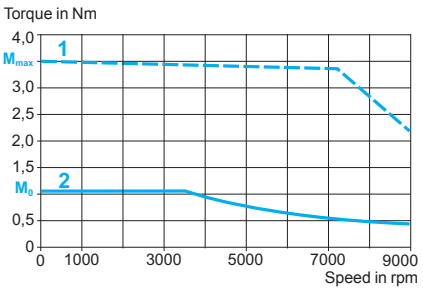
BSH 055 2P servo motor

With LXM 32●U60N4 servo drive



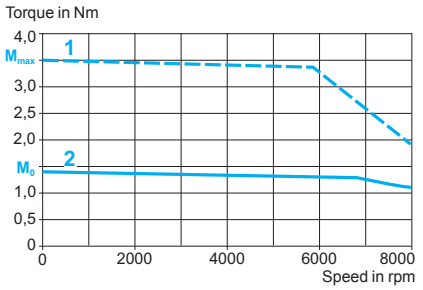
BSH 055 3P servo motor

With LXM 32●U60N4 servo drive



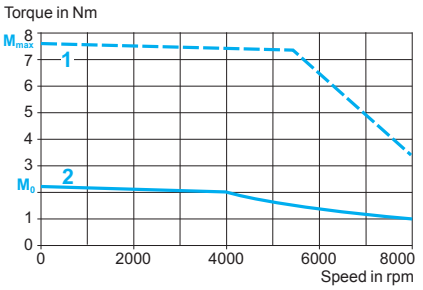
BSH 070 1P servo motor

With LXM 32●D12N4 servo drive



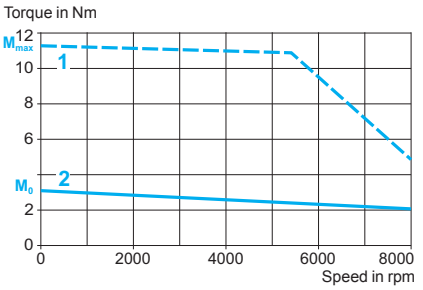
BSH 070 2P servo motor

With LXM 32●D12N4 servo drive



BSH 070 3P servo motor

With LXM 32●D18N4 servo drive



1 Peak torque
2 Continuous torque

Presentation: page 88
References: page 102
Dimensions: page 106

Lexium 32 motion control
BSH servo motors
480 V 3-phase supply voltage

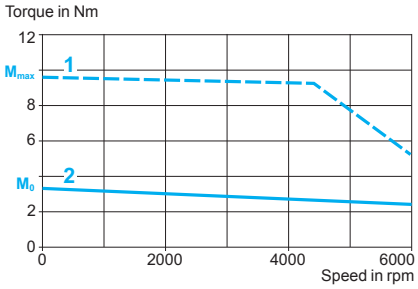
Characteristics of BSH 100 servo motor

Type of servo motor				BSH 100 1P	BSH 100 2P	BSH 100 3P	BSH 100 4P
Associated with Lexium 32 servo drive				LXM 32● D18N4		LXM 32● D30N4	
Switching frequency			kHz	8			
Torque	Continuous stall	M_0	Nm	3.3	5.8	8	10
	Peak stall	M_{max}	Nm	9.6	18.3	28.3	37.9
Nominal operating point	Nominal torque		Nm	2.7	4	6.3	8.3
	Nominal speed		rpm	4000			3000
	Nominal servo motor output power		W	1100	1700	2600	
Maximum current				12	17.1	28.3	30
Servo motor characteristics							
Maximum mechanical speed			rpm	6000			
Constants (at 120°C)	Torque		Nm/A rms	0.89	1.21	1.22	1.62
	Back emf		V rms/ krpm	60	77		103
Rotor	Number of poles			8			
	Inertia	Without brake J_m	kgcm²	1.4	2.31	3.22	4.22
		With brake J_m	kgcm²	2.018	2.928	3.838	5.245
Stator (at 20°C)	Resistance (phase/phase)		Ω	3.8	2.4	1.43	1.81
	Inductance (phase/phase)		mH	17.6	12.7	8.8	11.8

Torque/speed curves

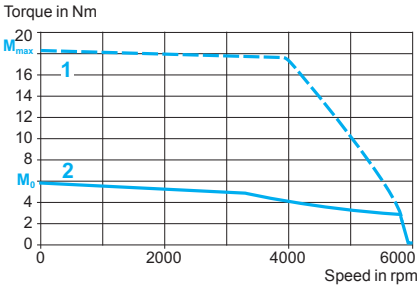
BSH 100 1P servo motor

With LXM 32●D18N4 servo drive



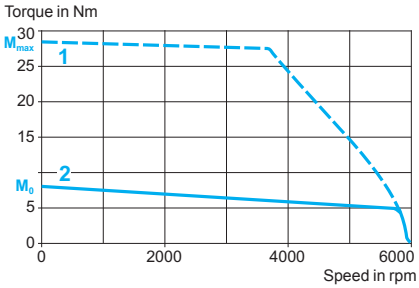
BSH 100 2P servo motor

With LXM 32●D18N4 servo drive



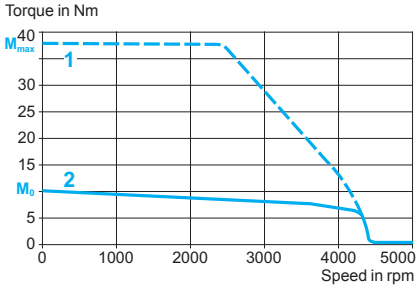
BSH 100 3P servo motor

With LXM 32●D30N4 servo drive



BSH 100 4P servo motor

With LXM 32●D30N4 servo drive



1 Peak torque
2 Continuous torque

Presentation: page 88
References: page 102
Dimensions: page 106

Lexium 32 motion control
BSH servo motors
480 V 3-phase supply voltage

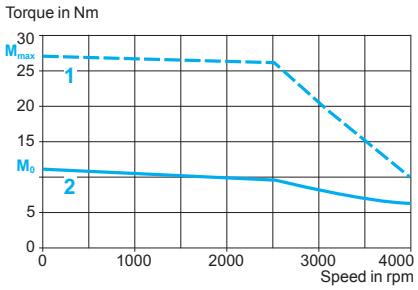
Characteristics of BSH 140 servo motor

Type of servo motor				BSH 140 1P	BSH 140 2T	BSH 140 3T	BSH 140 4P
Associated with Lexium 32 servo drive				LXM 32● D30N4	LXM 32● D72N4		
Switching frequency			kHz	8			
Torque	Continuous stall	M_0	Nm	11.1	19.5	27.8	33.4
	Peak stall	M_{max}	Nm	27	59.3	90.2	103.6
Nominal operating point	Nominal torque		Nm	9.5	12.3	12.9	19
	Nominal speed		rpm	3000			2500
	Nominal servo motor output power		W	3000	3900	4100	5000
Maximum current			A rms	20.8	72		
Servo motor characteristics							
Maximum mechanical speed			rpm	4000			
Constants (at 120°C)	Torque		Nm/A rms	1.43	1.47	1.58	1.57
	Back emf		V rms/ krpm	100	101	105	104
Rotor	Number of poles			10			
	Inertia	Without brake J_m	kgcm²	7.41	12.68	17.94	23.7
		With brake J_m	kgcm²	9.21	14.48	23.44	29.2
Stator (at 20°C)	Resistance (phase/phase)		Ω	1.41	0.6	0.4	0.28
	Inductance (phase/phase)		mH	15.6	7.4	5.1	3.9

Torque/speed curves

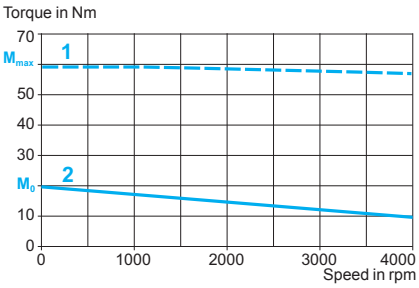
BSH 140 1P servo motor

With LXM 32●D30N4 servo drive



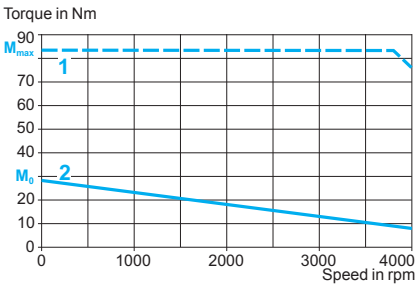
BSH 140 2T servo motor

With LXM 32●D72N4 servo drive



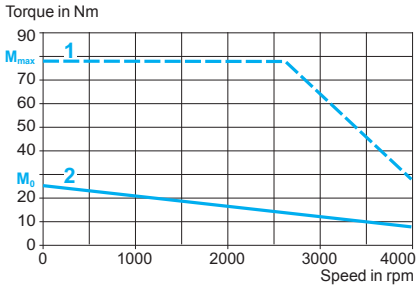
BSH 140 3T servo motor

With LXM 32●D72N4 servo drive



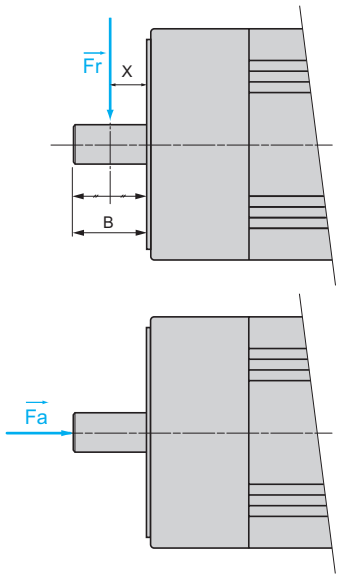
BSH 140 4P servo motor

With LXM 32●D72N4 servo drive



1 Peak torque
2 Continuous torque

Presentation: page 88
References: page 102
Dimensions: page 106



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 106)

(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	–	–	–	–	–
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 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 (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	16.3 ± 0.3
Curvature radius	mm	90, 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 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 4 mm²) + (2 x 1 mm²)]
Connector type		None, see page 105	
External diameter	mm	12 ± 0.2	16.3 ± 0.3
Curvature radius	mm	90, 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 102 R●●●
Type of encoder		**SinCos encoder**
External sleeve, insulation		PUR green coloured RAL 6018, polypropylen
Number of conductors (shielded)		[3 x (2 x 0.14 mm²) + 1 x (2 x 0.34 mm²)]
External diameter	mm	6.8 ± 0.2
Connector type		1 M23 industrial connector (servo motor side) and 1 RJ45 connector (servo drive side)
Min. curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system
Working voltage	V	300 (0.14 mm² and 0.34 mm²)
Maximum length	m	75 *(1)*
Operating temperature	°C	- 40…+ 80 (fixed), - 20…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

Cables without connectors

Cable type		VW3 M8 222 R●●●●
Type of encoder		**SinCos encoder**
External sleeve, insulation		PUR green coloured RAL 6018, polypropylen
Number of conductors (shielded)		[3 x (2 x 0.14 mm²) + 1 x (2 x 0.34 mm²)]
External diameter	mm	6.8 ± 0.2
Connector type		None, see page 105
Min. curvature radius	mm	68, suitable for daisy-chaining, cable-carrier system
Working voltage	V	300 (0.14 mm² and 0.34 mm²)
Maximum length	m	100
Operating temperature	°C	- 40…+ 80 (fixed), - 20…+ 80 (mobile)
Certifications		UL, CSA, VDE, CE, DESINA

(1) For cables longer than 75 m, please consult your customer care center.

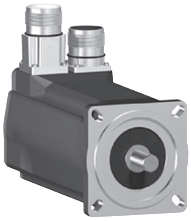
Presentation: page 88
References: page 102
Dimensions: page 106

Lexium 32 motion control
BSH servo motors

105990

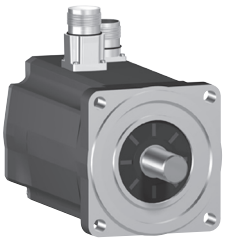
BSH 055●● ●●●1A

105991



BSH 070●● ●●●1A

105992



BSH 100●● ●●●1A

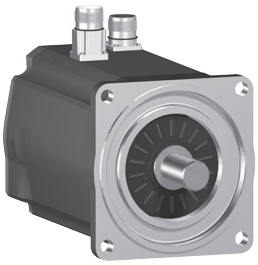
BSH servo motors

The BSH servo motors shown below are supplied without a gearbox.
For GBX gearboxes see page 110.

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed	Maximum mechanical speed	Associated servo drive LXM 32	Reference *(1)*	Weight *(2)*
Nm	Nm	W	rpm	rpm			kg
0.5	1.4	300	6000	9000	●U45M2	**BSH 0551T ●●●●A**	1.160
	1.5	150	3000	9000	●U90M2	**BSH 0551T ●●●●A**	1.160
		300	6000	9000	●U60N4	**BSH 0551P ●●●●A**	1.160
0.8	1.9	250	3000	9000	●U90M2	**BSH 0552T ●●●●A**	1.470
	2.5	450	6000	9000	●U90M2	**BSH 0552T ●●●●A**	1.470
		400	6000	9000	●U60N4	**BSH 0552P ●●●●A**	1.470
1.05	3.5	400	6000	9000	●U60N4	**BSH 0553P ●●●●A**	1.760
1.2	3	550	6000	9000	●U90M2	**BSH 0553T ●●●●A**	1.760
	3.3	350	3000	9000	●D18M2		
1.3	3.5	500	5000	8000	●U90M2	**BSH 0701T ●●●●A**	2.200
1.4	3.5	350	2500	8000	●D18M2	**BSH 0701T ●●●●A**	2.200
		700	5000	8000	●D12N4	**BSH 0701P ●●●●A**	2.200
2.2	6.1	550	2500	8000	●D30M2	**BSH 0702T ●●●●A**	2.890
	7.2	950	5000	8000	●D18M2		
	7.6	850	5000	8000	●D12N4	**BSH 0702P ●●●●A**	2.890
2.6	7.4	900	4000	8000	●D18M2	**BSH 0703T ●●●●A**	3.620
2.7	7.5	900	4000	6000	●D18M2	**BSH 1001T ●●●●A**	4.200
3.1	11.3	1300	5000	8000	●D18N4	**BSH 0703P ●●●●A**	3.620

(1) To complete each reference see the table on page 103.
(2) Weight of servo motor without brake, no packaging. To obtain the weight of the servo motor with holding brake, see page 108.

105993



BSH 1401P ●●●1A

BSH servo motors (continued)

Continuous stall torque	Peak stall torque	Nominal servo motor output power	Nominal speed	Maximum mechanical speed	Associated servo drive LXM 32	Reference *(1)*	Weight *(2)*
Nm	Nm	W	rpm	rpm			kg
3.3	6.3	700	2500	6000	●D30M2	**BSH 1001T ●●●●A**	4.200
	9.6	1100	4000	6000	●D18N4	**BSH 1001P ●●●●A**	4.200
5.8	16.4	1500	4000	6000	●D30M2	**BSH 1002T ●●●●A**	5.900
	18.3	1700	4000	6000	●D18N4	**BSH 1002P ●●●●A**	5.900
8	28.3	2000	3000	6000	●D30N4	**BSH 1003P ●●●●A**	7.400
		2600	4000	6000	●D30N4	**BSH 1003P ●●●●A**	7.400
10	37.9	2100	2500	6000	●D30N4	**BSH 1004P ●●●●A**	9.500
		2600	3000	6000	●D30N4	**BSH 1004P ●●●●A**	9.500
11.1	27	2500	2500	4000	●D30N4	**BSH 1401P ●●●●A**	11.200
		3000	3000	4000	●D30N4	**BSH 1401P ●●●●A**	11.200
19.5	59.3	3900	3000	4000	●D72N4	**BSH 1402T ●●●●P**	16.000
27.8	90.2	4100	3000	4000	●D72N4	**BSH 1403T ●●●●P**	21.200
33.4	103.6	5000	2500	4000	●D72N4	**BSH 1404P ●●●●P**	26.500

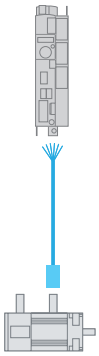
To order a BSH servo motor, complete each reference above with:

			BSH 1401P ●	●	●	●	●
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. For other servo motors, replace **BSH 1401P** with the relevant reference.*

(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 108.
(3) Sensor resolution given for use with a Lexium 32 servo drive.
(4) "A" or "P" depending on the model, see table of references above.

Presentation: page 88
Characteristics: page 90
Dimensions: page 106



VW3 M5 10● R●●●

Connection elements

Power cordsets

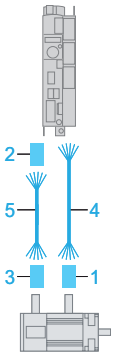
Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
Cables equipped with one M23 industrial connector (servo motor end)	BSH 055●● BSH 070●● BSH 100●● BSH 1401P	LXM 32●●●●●● depending on combinations (see pages 90 to 99)	[(4 x 1.5 mm²) + (2 x 1 mm²)]	1.5	**VW3 M5 101 R15**	0.600
				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
Cables equipped with one M40 industrial connector (servo motor end)	BSH 1402T BSH 1403T BSH 1404P	LXM 32●D30N4, ●D72N4 depending on combinations (see pages 90 to 99)	[(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 M8 102 R●●●

Control cordsets

Description	From servo motor	To servo drive	Composition	Length	Reference	Weight
				m		kg
SinCos Hiperface® encoder cables equipped with an M23 industrial connector (servo motor end) **and an RJ45 connector** with 8+2 contacts (servo drive end)	BSH ●●●●●	LXM 32●●●●●●	[3 x (2 x 0.14 mm²) + (2 x 0.34 mm²)]	1.5	**VW3 M8 102 R15**	0.400
				3	**VW3 M8 102 R30**	0.500
				5	**VW3 M8 102 R50**	0.600
				10	**VW3 M8 102 R100**	0.900
				15	**VW3 M8 102 R150**	1.100
				20	**VW3 M8 102 R200**	1.400
				25	**VW3 M8 102 R250**	1.700
				50	**VW3 M8 102 R500**	3.100
				75	**VW3 M8 102 R750**	4.500

Presentation: page 88
Characteristics: page 90



Connection elements (continued)

Connectors for creating power and control cordsets

Description	Used for	Item no.	For cable cross-section	Reference	Weight
			mm²		kg
M23 industrial connector for creating power cordsets (sold in lots of 5)	BSH 055●●, BSH 070●●, BSH 100●● and BSH 1401P servo motors	1	1.5	**VW3 M8 215**	0.350
M40 industrial connector for creating power cordsets (sold in lots of 5)	BSH 1402T, BSH 1403T and BSH 1404P servo motors	1	4	**VW3 M8 217**	0.850
RJ45 connector with 8 + 2 contacts for creating control cordsets (sold in lots of 5)	LXM 32●●●●●● servo drives (CN3 connector)	2	–	**VW3 M2 208**	0.200
M23 industrial connector for creating control cordsets (sold in lots of 5)	BSH servo motors ●●●●●	3	–	**VW3 M8 214**	0.350

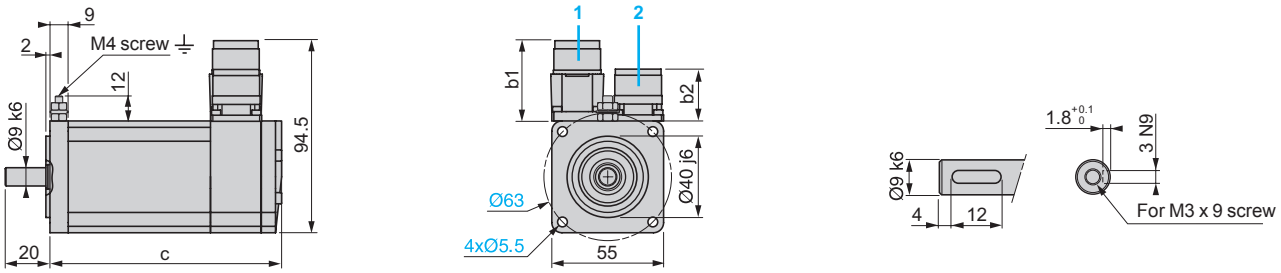
Cables for creating power and control cordsets

Description	From servo motor	To servo drive	Composition	Item no.	Length	Reference	Weight
					m		kg
Cables for creating power cordsets	BSH 055●● BSH 070●● BSH 100●● BSH 1401P	LXM 32●●●●●● depending on combinations (see pages 90 to 99)	[(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 1402T BSH 1403T BSH 1404P	LXM 32●D30N4, ●D72N4	[(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 32●●●●●● depending on combinations (see pages 90 to 99)	[3 x (2 x 0.14 mm²) + (2 x 0.34 mm²)]	5	25	**VW3 M8 222 R250**	1.400
					50	**VW3 M8 222 R500**	2.800
					100	**VW3 M8 222 R1000**	5.600

Presentation: page 88
Characteristics: page 90

BSH 055 (example with straight connectors: power supply for servo motor/brake 1 and encoder 2)

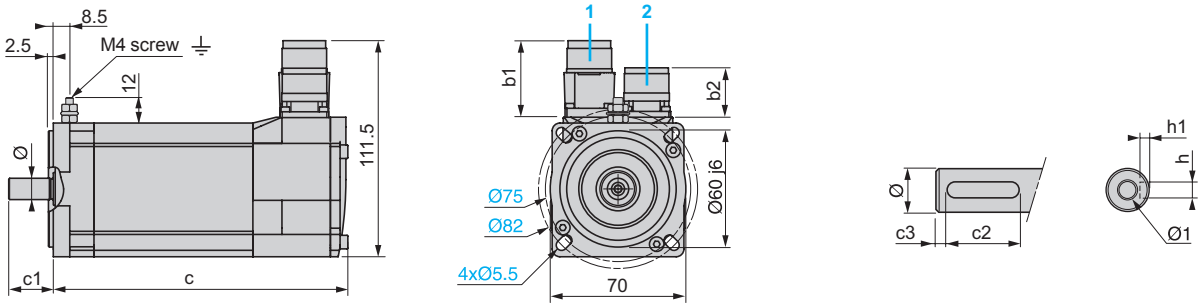
Shaft end, keyed slot (optional)



	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: power supply for servo motor/brake 1 and encoder 2)

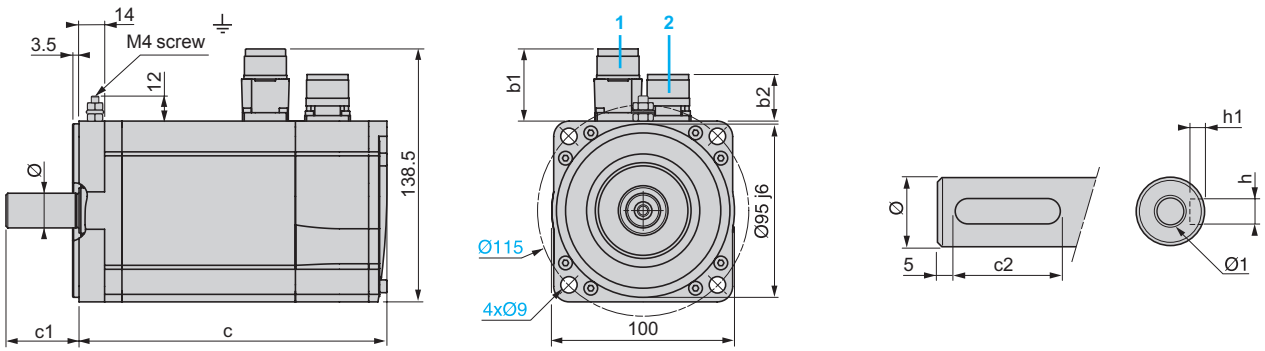
Shaft end, keyed slot (optional)



	Straight connectors		Rotatable angled connectors										
	b1	b2	b1	b2	c (without brake)	c (with brake)	c1	c2	c3	h	h1	Ø	Ø1 for screws
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/brake 1 and encoder 2)

Shaft end, keyed slot (optional)

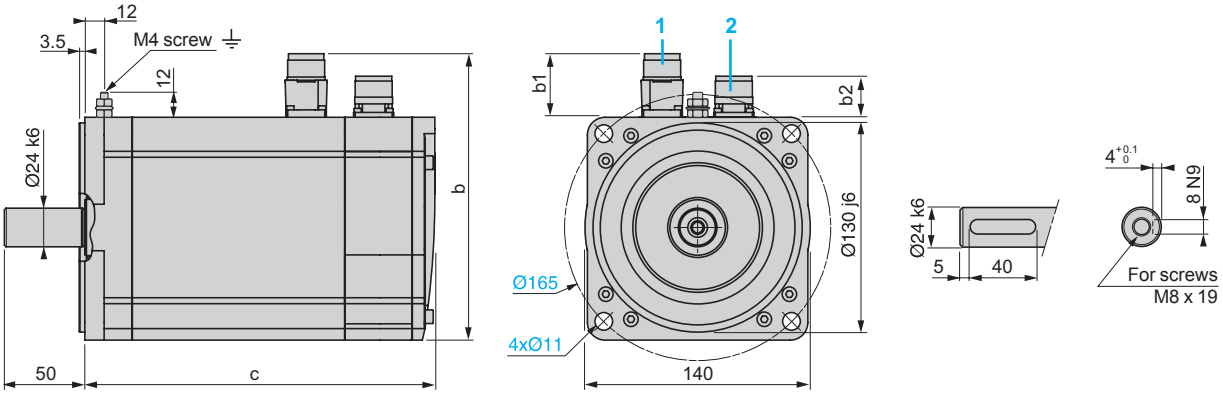


	Straight connectors		Rotatable angled connectors										
	b1	b2	b1	b2	c (without brake)	c (with brake)	c1	c2	h	h1	Ø	Ø1 for screws	
BSH 1001●	39.5	25.5	39.5	39.5	169	200	40	30	6 N9	3.5 +0.1 0	19 k6	M6 x 16	
BSH 1002●	39.5	25.5	39.5	39.5	205	236	40	30	6 N9	3.5 +0.1 0	19 k6	M6 x 16	
BSH 1003●	39.5	25.5	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 88 Characteristics: page 90 References: page 102

BSH 140 (example with straight connectors: power supply for servo motor/brake 1 and encoder 2)

Shaft end, keyed slot (optional)

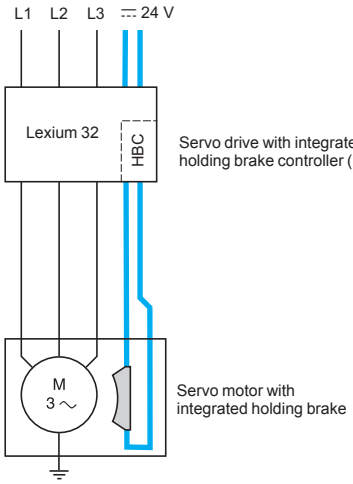


	Straight connectors			Rotatable angled connectors				
	b	**b1**	**b2**	**b**	**b1**	**b2**	**c** (without brake)	**c** (with brake)
BSH 1401P	178	39.5	25.5	178	39.5	39.5	218	256
BSH 1402T	192.5	54	25.5	198.5	60	39.5	273	311
BSH 1403T	192.5	54	25.5	198.5	60	39.5	328	366
BSH 1404P	192.5	54	25.5	198.5	60	39.5	383	421

Lexium 32 motion control
BSH servo motors
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.

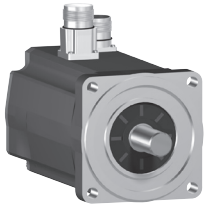
In the event of an emergency, such as a power outage or an Emergency stop, the drive is immobilized, thus significantly increasing safety.
Blocking the servo motor axis is also necessary in cases of torque overload, such as in the event of vertical axis movement.

The servo drive Lexium 32 integrates as standard an holding brake controller which amplifies the braking control signal, so that the brake is deactivated quickly. It then reduces this control signal so as to decrease the power dissipated by the holding brake.

Characteristics

Type of servo motor	BSH	0551, 0552, 0553	0701, 0702	0703	1001, 1002, 1003	1004	1401, 1402	1403, 1404
Holding torque M_{Br}	**Nm**	0.8	2	3	9	12	23	36
Moment of inertia of rotor (brake only) J_{Br}	**kgcm²**	0.0213	0.072	0.227	0.618	1.025	1.8	5.5
Electrical clamping power P_{Br}	**W**	10	11	12	18	17	24	26
Nominal current	**A**	0.42	0.46	0.5	0.75	0.71	1	1.08
Supply voltage	**V**	24 +6/-10%						
Opening time	**ms**	12	25	35	40	45	50	100
Closing time	**ms**	6	8	15	20	20	40	45
Weight (to be added to the weight of the servo motor without brake, see page 102)	**kg**	0.170	0.260	0.450	0.800	0.900	1.400	2.400

References



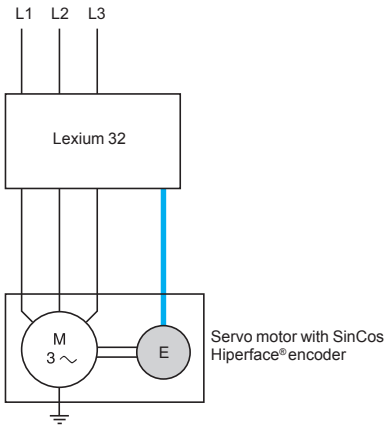
BSH servo motor

For selection of BSH servo motor with or without holding brake, see references on page 104.

Lexium 32 motion control
BSH servo motors
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 32 range of servo drives.

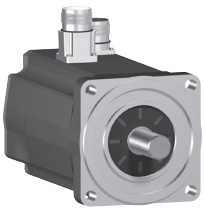
Use of this interface enables:
- Automatic identification of BSH servo motor data by the servo drive
- Automatic initialization of the servo drive's control loops, thus simplifying installation of the motion control device.

Characteristics

Type of encoder		Single turn SinCos	Multiturn SinCos
Sine/cosine 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**	-20…+110	

(1) Encoder resolution given for use with a Lexium 32 servo drive.

References

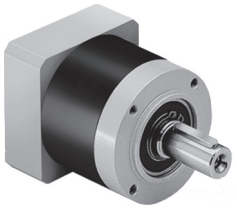


BSH servo motor

For selection of the SinCos Hiperface® single turn or multiturn encoder integrated in the BSH servo motor, see references on page 104.

Lexium 32 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

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	–	–
BSH 0552	GBX 60	GBX 60	GBX 60	–	–	–	–
BSH 0553	GBX 60	–	–	–	–	–	–
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	–	–	–	–	–	–

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 112).

Lexium 32 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	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.

Presentation: page 110 References: page 113 Dimensions: page 114 Mounting: page 115

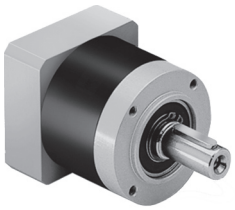
Characteristics of GBX gearboxes (continued)

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 32 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**	1.000
	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**	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:

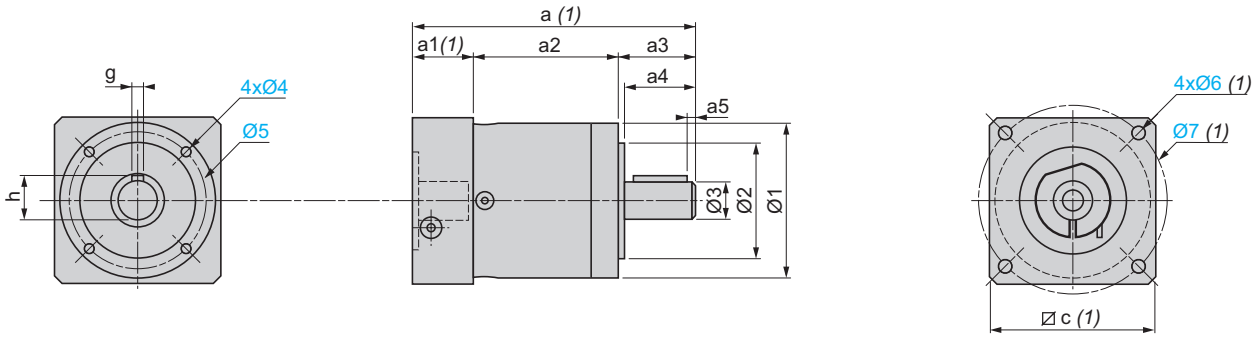
			GBX ●●●	●●●	●●●	●	F
Size	Diameter of the casing (see table of combinations with BSH servo motor on page 110)	40 mm	**040**				
		60 mm	**060**				
		80 mm	**080**				
		120 mm	**120**				
		160 mm	**160**				
Reduction ratio		3:1		**003**			
		4:1		**004**			
		5:1		**005**			
		8:1		**008**			
		9:1		**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**		
	Model	BSH ●●●1				**1**	
		BSH ●●●2				**2**	
		BSH ●●●3				**3**	
		BSH ●●●4				**4**	
BSH servo motor adaptation							**F**

Presentation: page 110 | Characteristics: page 111 | Dimensions: page 114 | Mounting: page 115

Lexium 32 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:

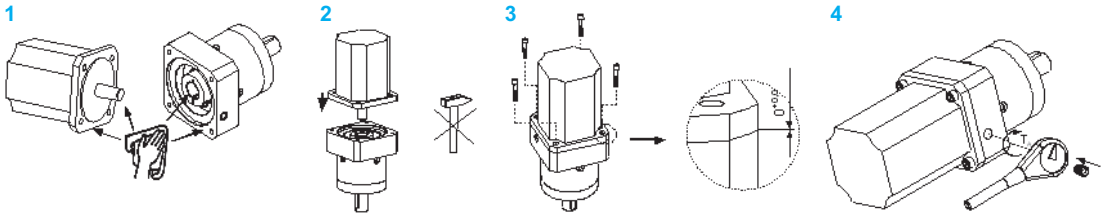
Combinations		Reduction ratios						
Gearbox	**Servo motor**	**3:1 to 8:1**	**9:1 to 40:1**	**60:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**	**3:1 to 100:1**
		a	**a**	**a**	**a1**	**⍁ c**	**Ø6**	**Ø7**
GBX 040	**BSH 055●**	89.5	102.5	–	24.5	60	M4	63
GBX 060	**BSH 055●**	106	118.5	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	**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

Lexium 32 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.



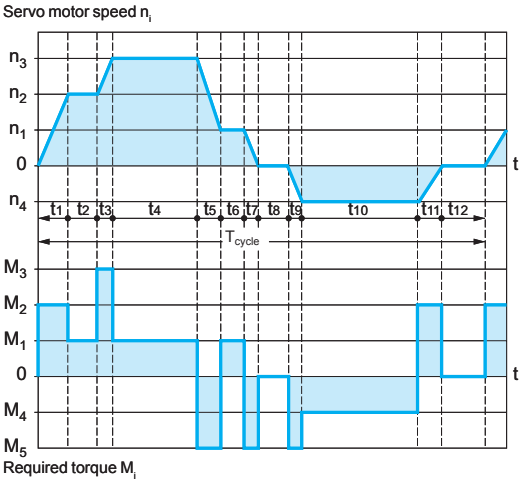
Technical appendices
Sizing a servo motor

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:

$$n_{moy} = \frac{\frac{n_2}{2} \cdot t_1 + n_2 \cdot t_2 + \frac{n_3 + n_2}{2} \cdot t_3 + n_3 \cdot t_4 + \frac{n_3 + n_1}{2} \cdot t_5 + n_1 \cdot t_6 + \frac{n_1}{2} \cdot t_7 + \frac{n_4}{2} \cdot t_9 + n_4 \cdot t_{10} + \frac{n_4}{2} \cdot t_{11}}{T_{cycle}}$$

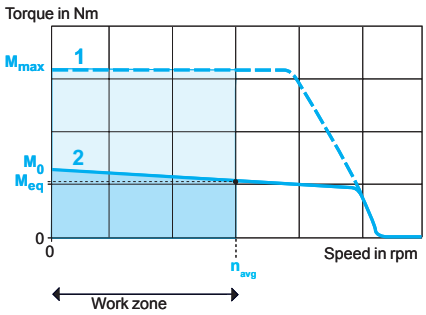
Calculating the equivalent thermal torque M_{eq}

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.

Schneider Electric Industries SAS

www.schneider-electric.com

Head Office
35, rue Joseph Monier
F-92500 Rueil-Malmaison
France

Design: Schneider Electric
Photos: Schneider Electric
Printed by:

DIA7ED2090405EN

ART. 820366

August 2009