

# Motion Control Lexium 23 Plus

## Catalogue





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Lexium 23 A CANopen version

### A powerful offer

The range of Lexium 23 Plus servo drives, compatible with BCH servo motors constitutes a tailored solution for machines across a wide power and functionality range:

■ **Lexium 23 Plus servo drives :**

- 200... 255 V single phase, 0.1 to 1.5 kW
- 170... 255 V three phase, 0.1 to 7.5 kW<sup>(1)</sup>

■ **BCH servo motor :**

- Rated power : 0.1 to 7.5 kW
- Rated torque : 0.3 to 48 Nm
- Rated speed : 1000 to 3000 rpm depending of the model

### Best-in-class performance

Lexium 23 Plus servo drives wide power range combined with high performance functionalities and extended choice of BCH servo motors is the best suited package for all applications such as material working, material handling, textile, electronics, packaging and printing.



Lexium 23 D I/O version

The Lexium 23 Plus range consists of two different powerful servo drives.

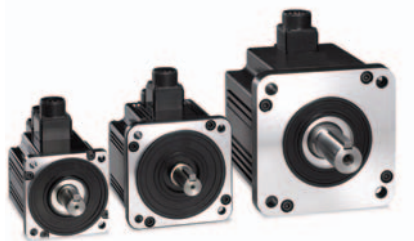
I/O Version (Lexium 23D) and CANopen Version (Lexium 23A ). Lexium 23D can be used in stand alone mode (with digital I/O control) or with external position controller. Lexium 23A can be used via CAN controllers (CAN Open or CAN Open Motion).

■ **Lexium 23 A - Powerful Servo Drive with CAN Open (Motion) Fieldbus system**

- CAN open Motion Field Bus for Synchronous (Real Time) positioning control
- Compatible with PLC open Function Blocks For Camming, Flying Shear, Rotary Knife Etc..
- 62.5 µs Current Control Loop
- 2 x High Speed Latch inputs for fast position capture
- 8 Digital Inputs
- 4 Digital Outputs
- 2 Analogue Inputs
- 2 Analogue Outputs

■ **Lexium 23 D - Power Servo Drive for Pulse & Direction / Analogue & I/O Control**

- Built-in Position Register for up to 8 Positions
- I/O switching between Speed / Position / Torque control registers
- Pulse input up to 4 MPS
- 62.5 µs Current Control Loop
- 8 Digital Inputs
- 4 Digital Outputs
- 2 Analogue Inputs
- 2 Analogue Outputs



BCH servo motor

<sup>(1)</sup> The 3.5KW - 7.5KW will be launched on 2nd quarter 2010.



### Smart software interface

The user-friendly graphical user interface of Lexium 23 Plus SET UP commissioning software shortens tuning and diagnoses time greatly, providing:

- Auto recognition of communication format.
- Quick set up mode and graphical parameter set.
- Auto tuning and manual tuning.
- Resonance point detection using FFT analysis.
- Real time oscilloscope function.

This software provides all functions used to configure, set and debug the Lexium 23 Plus axis as well as comprehensive three languages (English, Simplified Chinese and Traditional Chinese) user interface

### Quick set up mode and graphical parameter set

Lexium 23 Plus SET UP provides quick set up mode to be able to configure all related function to one operating mode. These screens provide easy navigation and comprehensive interface.

All the parameters can be visualized on the same page using the Graphical parameter set. This screen provides to expert user remove high flexibility and high effectiveness.

### Auto tuning

Lexium 23 Plus SET UP provides state of the art auto tuning functionalities offering 2 different modes:

- Off line Auto tuning: This mode permits to calculate the values of the gain parameters according to the conditions selected by user
- On line dynamic tuning: This mode provides the best control for your machine by computing dynamically the gain parameters according to the real response of the machine.

### Resonance point detection (FFT analysis)

FFT analysis is used to detect the resonance point of the machine. Both Current and velocity can be monitored.

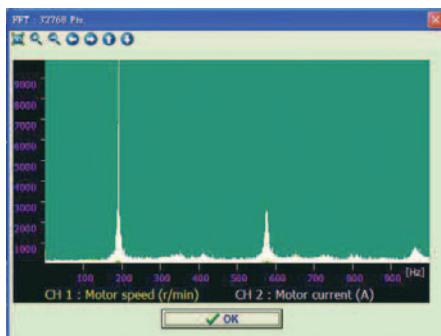
To perform the FFT analysis, the motor will run in one direction according to the position command and record the behaviour of the axis in terms of current or velocity. Once this movement is finished, Lexium 23 Plus SET UP will analyse the resonant frequencies and display it as a peak on the oscilloscope screen.

Notch filter can then be applied to suppress the influence of this resonant frequency.

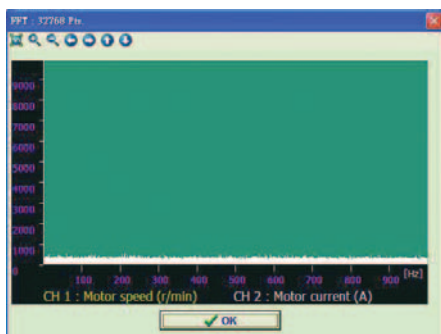
### Oscilloscope fonctionnalités

Lexium 23 Plus SET UP is providing a powerful oscilloscope which can be used in 2 different modes:

- **Fast oscilloscope:** To monitor evolution of the measured values in real-time
- **Fine oscilloscope:** To capture a very accurate moment of the application. This functionality is recording all the information before displaying them therefore the information is more accurate and can be use to make very precise tuning.



Before resonance suppression



After resonance suppression

### BCH servo motor

BCH servo motors are 3 phases synchronous motors.

BCH motor are equipped with a 20 bit high quality encoder.

This 20 bit encoder allows the Lexium 23 Plus to be used on applications requiring high performance for material working, for example machine tools etc.

The BCH Servo motor has been designed to fit the requirement of any types of Machines, with 6 Different flange sizes 40 mm, 60 mm, 80 mm, 100 mm, 130 mm and 180 mm

BCH motor offer a wide choice of inertia from ultra low inertia to high inertia which provide the best match to different kind of machine :

■ **Ultra low inertia motor:**

Power range is 0.1 ~ 0.4 kW, suitable for electronic equipment and small printing machinery.

■ **Low inertia motor:**

Power range is 0.4 ~ 2 kW, suitable for textile and packaging machinery.

■ **Medium inertia motor:**

Power range is 0.3 ~ 3 kW, suitable for material handling and machine tools.

■ **High inertia motor:**

Power range is 2 ~ 7.5 kW, suitable for metal processing and printing machinery.

Type of machine	Ultra Low inertia	Low inertia	Medium Inertia	High inertia
Conveyors				
Packaging machines				
Printing Machines				
Loaders and unloaders				
X-Y Tables				
Press feeders				
Inserters, mounters, bonders				
Printed board hole openers				
In-circuit testers				
Label printer				
Knitting and embroiding machines				
Conveyors				
Special machines				
Winders / Unwinders				
Roll feeders				

Lexium 23 Plus servo drive / BCH servo motor combination								
BCH servo motor output power	BCH servo motor inertia (without brake)	Rated torque	Peak stall torque	Maximum speed	Rated speed	Combination		
						Servo drive Reference	Servo motor Reference	Motor inertia type
kW	kgcm <sup>2</sup>	Nm	Nm	rpm	rpm			
Single phase: 200...255 V ~ 50/60 Hz or three phase: 170...255 V ~ 50/60 Hz								
0.1	0.037	0.32	0.96	5000	3000	LXM23●U01M3X	BCH04010●2●1C	ultra low
0.2	0.177	0.64	1.92	5000	3000	LXM23●U02M3X	BCH06010●2●1C	ultra low
0.3	8.17	2.86	8.59	2000	1000	LXM23●U04M3X	BCH1301M●2●1C	medium
0.4	0.277	1.27	3.82	5000	3000	LXM23●U04M3X	BCH06020●2●1C	ultra low
0.4	0.68	1.27	3.82	5000	3000	LXM23●U04M3X	BCH08010●2●1C	low
0.5	8.17	2.39	7.16	3000	2000	LXM23●U04M3X	BCH1301N●2●1C	medium
0.6	8.41	5.73	17.19	2000	1000	LXM23●U07M3X	BCH1302M●2●1C	medium
0.75	1.13	2.39	7.16	5000	3000	LXM23●U07M3X	BCH08020●2●1C	low
0.9	11.18	8.59	25.78	2000	1000	LXM23●U10M3X	BCH1303M●2●1C	medium
1	2.65	3.18	9.54	5000	3000	LXM23●U10M3X	BCH10010●2●1C	low
1	11.18	4.77	14.32	3000	2000	LXM23●U10M3X	BCH1302N●2●1C	medium
1.5	11.18	7.16	21.48	3000	2000	LXM23●U15M3X	BCH1303N●2●1C	medium
Three phase: 170...255 V ~ 50/60 Hz								
2	4.45	6.37	19.11	5000	3000	LXM23●U20M3X	BCH10020●2●1C	low
2	14.59	9.55	26.65	3000	2000	LXM23●U20M3X	BCH1304N●2●1C	medium
2	34.68	9.55	26.65	3000	2000	LXM23●U20M3X	BCH1801N●2●1C	high
3	54.95	14.32	42.96	3000	2000	LXM23●U30M3X	BCH1802N●2●1C	high
3	54.95	19.10	57.29	3000	1500	LXM23●U30M3X	BCH1802M●2●1C	high
3.5	54.8	16.71	50.31	3000	2000	LXM23●U45M3X	BCH1803N●2●1C	high
4.5	77.75	28.65	71.62	3000	1500	LXM23●U45M3X	BCH1803M●2●1C	high
5.5	99.78	35.01	87.53	3000	1500	LXM23●U55M3X	BCH1804M●2●1C	high
7.5	142.7	47.74	119.36	3000	1500	LXM23●U75M3X	BCH1805M●2●1C	high

Definition of Lexium 23 Plus drive reference

	L	X	M	2	3	A	U	0	1	M	3	X
LXM = Lexium Servo Drive												
23 = Product series												
Interface A = CANopen D = I/O												
Continuous Power U01 = 0.1 KW U02 = 0.2 KW U04 = 0.4 KW U07 = 0.75 KW U10 = 1 KW U15 = 1.5 KW U20 = 2 KW U30 = 3.0 kW U45 = 4.5 kW U55 = 5.5 kW U75 = 7.5 kW												
Mains voltage M3X = 200/240VAC 3-phases (or single phase depending on caliber), no EMC filter												



### Definition of BCH motor reference

	B	C	H	O	4	O	1	O	O	2	A	1	C
<b>BCH = BCH servo motor series</b>													
<b>Flange size</b> 040 = 40mm Flange 060 = 60mm Flange 080 = 80mm Flange 100 = 100mm Flange 130 = 130mm Flange 180 = 180 mm Flange													
<b>Length ( Number of stacks)</b> 1 = one stack 2 = two stacks 3 = three stacks 4 = four stacks 5 = five stacks													
<b>Speed type:</b> M = Low Speed (1000/1500 rpm) N = Medium Speed (2000 rpm) O = High Speed (3000 rpm)													
<b>Shaft</b> 0 = w/o key (smooth) :No Oil Seal (IP40 for shaft end) 1 = with key : No Oil Seal (IP40 for shaft end) 2 = w/o key (smooth) : With Oil seal (IP65 for shaft end) 3 = with key: Oil Seal (IP65 for shaft end)													
<b>Encoder</b> 2 = High resolution incremental encoder 20 Bits													
<b>Brake</b> A = w/o brake F = with brake													
<b>Connection System</b> 1 = flying leads (BCH 040, 060, 080), military connector (BCH 100, 130, 180)													
<b>Mount</b> C = mechanical mount: Asian standard													

### Lexium 23 Plus function presentation

Lexium 23 D and Lexium 23 A drives share the following functionality:

- Automatic recognition of the motor
- Smart and powerful auto tuning function
- Advanced filtering function
- Low pass filter to suppress high frequency perturbations
- Resonance suppression
- Command smoothing

The control and operating modes are different for the two drives:

Lexium 23D:

- Control modes:
- Position control mode:
  - Pulse control (pulse/direction, CW/CCW, AB phase signal)
  - 8 Built-in Motion Sequence
- Speed Control:
  - Analog input ( $\pm 10V$ )
  - 3 Internal Speed registers
- Torque control:
  - Analog input ( $\pm 10V$ )
  - 3 Internal torque registers
- Switching mode:
  - Position control mode, speed control mode and torque control mode can be switched instantly by each other through DI.

Lexium 23A:

- Control modes:
- Position control mode:
  - Pulse control (pulse/direction, CW/CCW, AB phase signal)
  - Cyclic synchronous position mode (DS402)
  - Profile position mode (DS402)
  - Homing mode
  - Position gear mode
- Speed Control:
  - Profile Speed mode (DS402)
  - Jog mode
  - Speed gear mode
- Torque control:
  - Profile torque mode (DS402)

### Auto recognition, auto tuning and filter functions

- Automatic motor recognition  
Lexium 23 Plus servo drives and BCH servo motors are pre-matched according to motor shaft power. During power-up the Lexium 23 Plus automatically identifies the motor attached and adjusts its internal settings.
- Smart and powerful auto-tuning  
Lexium 23 Plus servo drives provide several ways to tune the gain. Most applications can find ideal gain value through the auto-tuning function. The drive estimates the inertia of the load and automatically adjusts the corresponding parameters. In terms of structure, auto-tuning can be divided into PI auto-tuning and PDFF auto-tuning.
- Advanced filtering
  - Low pass filter  
Low-pass filter is usually used to keep away unwanted noise or high-frequency response, also has command smoothing effect.
  - Resonance suppression  
When the mechanical structure comes to resonance phenomenon, it is probably caused by too high rigidity of drive control system or too fast response bandwidth. Resonance can be suppressed by low pass filter and resonance suppression filter without changing control parameters.
  - Command smoothing function  
Position control and speed control both offer command smoothing function to smooth the control command.
- Monitor outputs (two voltage signals)
  - Status display
  - I/O status
- Alarm history, alarm clear
- Gain switching
- Full closed loop control (only when position commands comes from internal registers or via CAN)
- Access via remote keypad

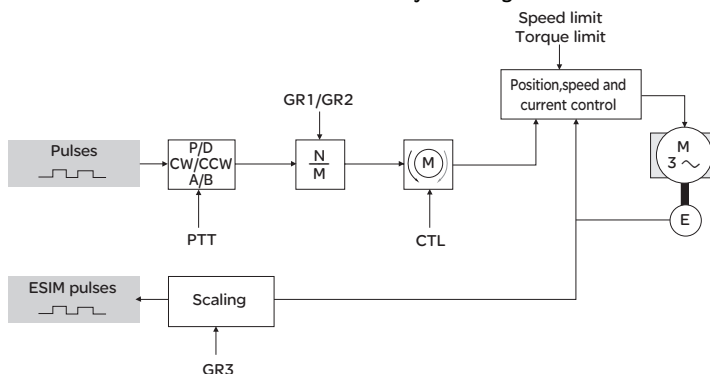
### DC-BUS sharing power supply function

Parallel connection of the DC bus of multiple devices is also possible, this function may improve the energy efficiency in a number of applications. Excess energy that is regenerated when the motor decelerates, is transformed into heat without parallel connection of the DC bus. The energy can be exchanged via a DC bus connection of multiple drives. The regenerated energy can be used to supply other motors. The regenerated power can be used effectively during anti-cyclical operation, i.e. one motor decelerates while another

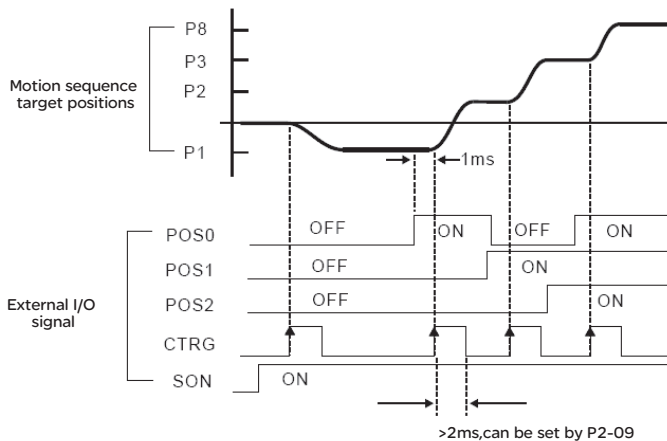
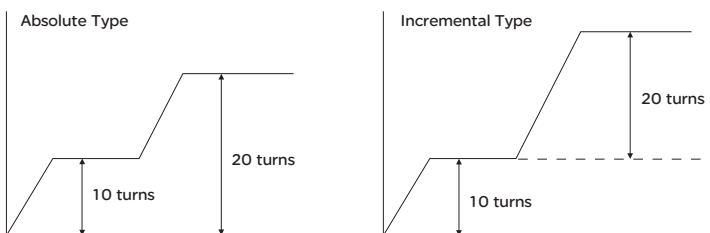
#### I/O version drive - Position control

In this mode, Lexium 23D servo drive is controlled by pulse train (pulse / direction, cw/ccw signal, A/B signal ) sent out by controller (PLC, motion controllers, NC devices, etc.) for position control, Input pulse train can be line driver or open collector type. LXM23 series uses a high speed pulse line driver input, with the maximum input pulse frequency of 4 Mpps. Position control also can be done through 8 built-in motion tasks. The movement can be incremental type or absolute type.

The built-in electronic gear ratio of Lexium 23 Plus servo drive can adapt the input pulse frequency to servo drive. Electronic gear ratio can be defined by elements "N" and the denominator "M". This ratio can easily be changed.



Pulse control mode



Build-in motion sequence  
Position control mode

You can also use S-curve function or low pass filter to smooth position command. The S-Curve Function can run the servo motor more smoothly in response to the a sudden position command. Since the speed and acceleration curve are both continuous and the time for the motor to accelerate is shortened. Using S- curve not only can improve the performance when servo motor accelerate or decelerate but also can make motor to operate more smoothly (from mechanical view). S-curve is only for built-in motion sequence.

#### Possible application

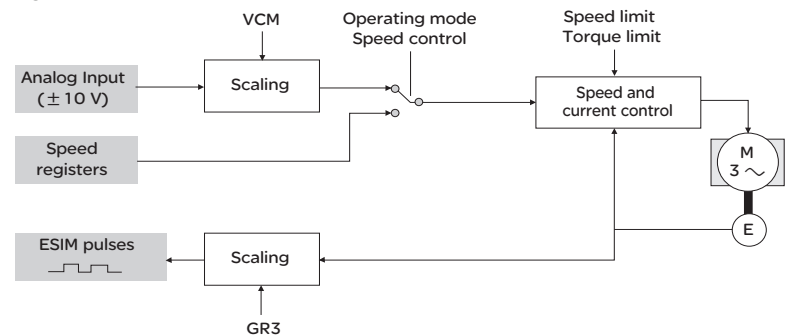
- Material Handling
- Cut to length
- Packaging

#### I/O version drive - Speed control

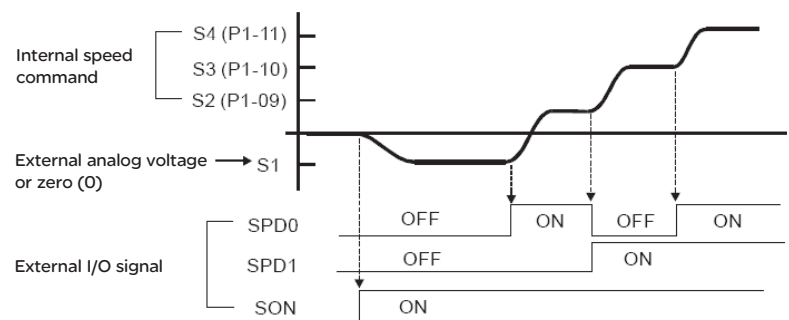
Under this mode, Lexium 23D servo drives are controlled by a controller with an analog output, suitable for high-performance speed control.

#### Settings value

Value can be set through external analog input ( $\pm 10V$  voltage) or 3 build-in speed registers of the drive.



Analog input



Speed register

Speed control mode

You can also use S-curve Filter (for internal speed registers) or analog speed smoothing function (for external analog voltage input) to smooth the input speed command.

#### Using S-curve

Using the S-curve filter will allow the servo motor to run more smoothly in response to a dynamic speed command change. Since the speed and acceleration curve are both continuous, in order to avoid the mechanical resonance and noise may occur due to a sudden speed command (differentiation of acceleration), using S-curve filter not only can improve the performance when servo motor accelerate or decelerate but also can make the motor run more smoothly.

#### Possible application

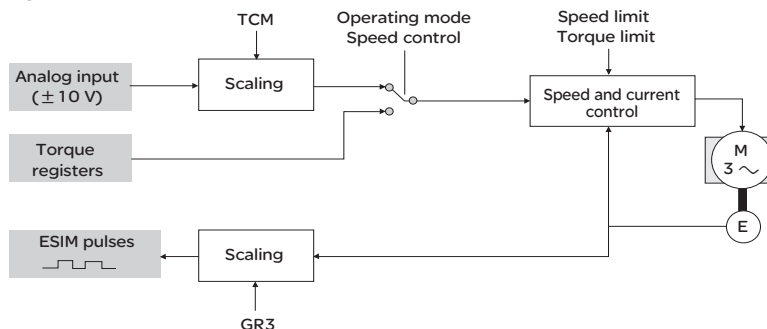
- Winder and unwinder

#### I/O version drive - Torque control

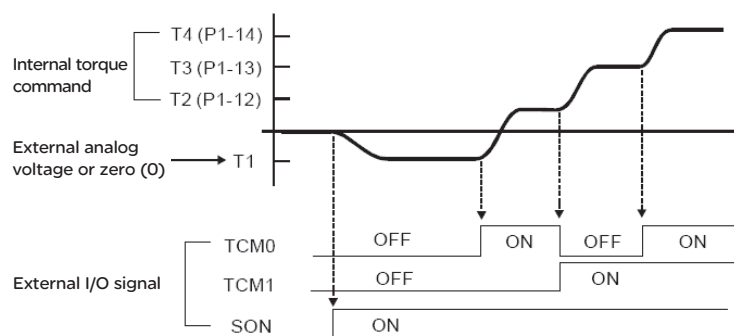
Under this mode, Lexium 23D servo drives control the motor output torque by controlling the servo drive output current. Torque control can work with other modes.

#### Settings value

Value can be set through external analog input ( $\pm 10V$  voltage) or 3 build-in speed registers in the drive.



Analog input



Torque register

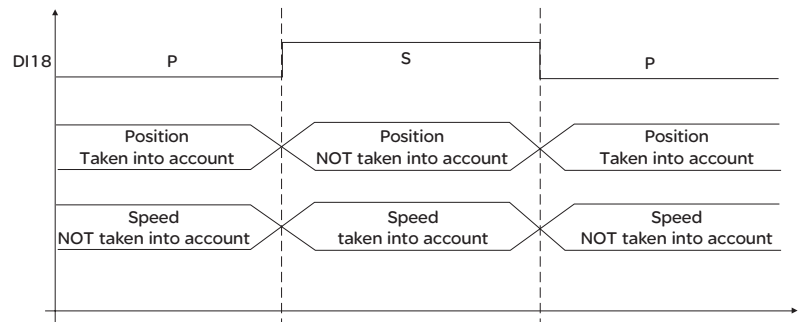
Torque control mode

#### Possible applications

- Printing machine
- Winding machine

#### I/O version drive - Switching Mode

Position control model, speed control mode and torque control mode can be switched instantly through digital input. Lexiums 23D offers three switching modes: speed/position switch mode, speed/torque switch mode and torque /position switch mode.



Switching mode

#### Other functions

- Speed limitation, using under torque control mode
- Torque limitation, using under position or speed control mode
- Encoder simulation (ESIM) monitoring function, Lexium 23 Plus drive provide two simulation channels , which can be used to monitor the speed, torque, command frequency etc.

## CANopen machine bus for the Lexium 23A servo drive

The Lexium 23A servo drive can be connected directly to the CANopen machine bus via a daisy chain RJ45 connector.

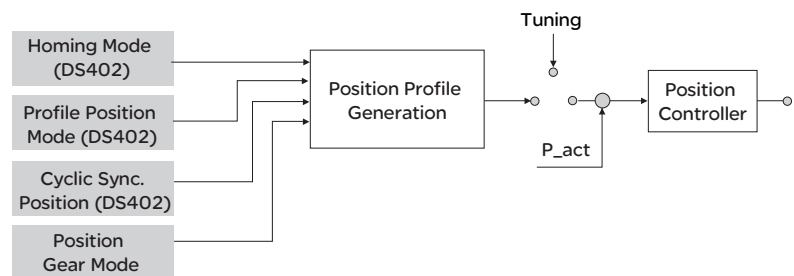
The communication function provides access to the servo drive's configuration, adjustment, control and monitoring functions.

The servo drive does not incorporate a line terminator. Line termination has to be done via a RJ45 line terminator (accessory).

## CANopen version drive - Position control

There are different modes for position control available at the Lexium 23A servo drive. The cyclic synchronous position (CSP) is designated for CAN Motion. Profile position mode (PPM) and homing mode (HM) are implemented as described in CiA DS402. The Position gear mode (PGM) is a manufacturer specific mode.

The following schematic gives an overview of the different modes:



Position control

PLCopen libraries are available.



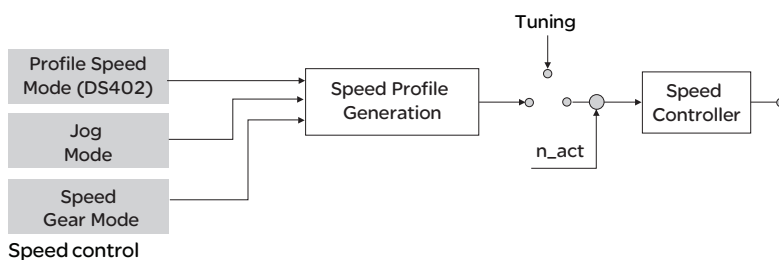
#### CANopen version drive - Speed control

There are different modes for speed control available at the Lexium 23A device.

The profile velocity mode (PVM) is implemented as described in CiA DS402.

The Jog mode (JM) and Speed gearing (SG) are manufacturer specific modes.

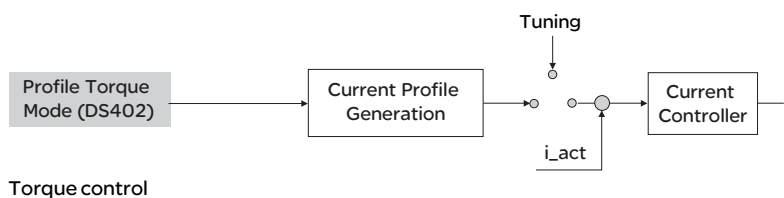
The following schematic gives an overview of the different modes:




#### CANopen version drive - Torque control

The profile torque mode is implemented as described in CiA DS402.

The following schematic gives an overview of the torque control mode:



### Environmental characteristics

Conformity to standards			Lexium 23 Plus servo drives have been developed to conform to the strictest international standards and the recommendations relating to electrical industrial control equipment (IEC, EN), including: low voltage, IEC/EN 61800-5-1, IEC/EN 61800-3(conducted and radiated EMC immunity and emissions)
EMC immunity			IEC/EN 61800-3, environments 1 and 2(with external EMC filter)
			IEC/EN 61000-4-2 level 3
			IEC/EN 61000-4-3 level 3
			IEC/EN 61000-4-4 level 4
			IEC/EN 61000-4-5 level 3
Conducted and radiated EMC emissions for servo drives			IEC/EN 61800-3, environments 1 and 2, categories C2, C3 (with external filter)
Installation Site			Indoor location (no direct sunlight), no corrosive liquid and gas (far away from oil mist, flammable gas, dust)
CE marking			The drives are CE marked in accordance with the European low voltage and EMC directives
Product certification			UL (USA), C-tick
Degree of protection			Degree of protection IEC/EN 61800-5-1, IEC/EN 60529
			IP20
Vibration resistance			3 mm 5m/s² [2..9 Hz] / 1g [9..200 Hz] < 20kg 1,5 mm 10m/s² [2..13 Hz] / 0,6g [13..200 Hz] 20kg ≤ Weight ≤ 100kg
Relative humidity			0-90 %RH (without condensation)
Ambient air temperature	Operation	°C	0...+ 55(if operating temperature is above specified range, forced cooling will be required)
	Storage	°C	-25-70
Type of cooling			Natural convection (< 750 W) Fan (≥ 750 W)
Maximum operating altitude			m 1000 without derating
Atmospheric pressure			kPA 86-106
Power system			TN system (1)
Operating position			10° 10°
Maximum permanent angle in relation to the normal vertical mounting position			

### Control signal characteristic

<b>Protective function</b>			Overcurrent, Overvoltage, Undervoltage, Motor Overheated, Regeneration Error, Overload, Overspeed, Abnormal pulse control command, Encoder error, memory error, Communication error, U,V,W and CN1,CN2 and CN3 terminals with short circuit protection.
<b>Digital Input</b>			Servo ON, Reset, Gain Switching, Pulse Clear, Emergency stop, Forward/Reverse inhibit limit, Internal parameter selection, Torque limit activation, Speed limit activation, Control mode selection (Position / Speed / Torque mode selection, Dual mode selection, Position register), Internal auto running mode, Electronic gear ratio selection.
<b>Digital Output</b>			Encoder Signal output (A,B,Z Line Driver) Servo ready, Servo On, Zero Speed, Speed Reached, Positioning completed, At torque limit, Servo alarm output (Servo Fault), Electromagnetic brake, Home completed, Ready, Overload Alarm.
<b>Communication interface</b>			RS 485

(1) TN system: A power distribution having one point directly earthed, the exposed conductive parts of the installation being connected to that points by protective earth conductor.

Driver features			
Control of main Circuit			SVPWM Control
Tuning Modes			Auto/ Manual
Dynamic brake			Built-in
Electric power features			
Power	Voltage	V	220 VAC single phase or three phase 220 VAC three phase
	Permissible Voltage Range	V	170-255 VAC three phase, 200-255 VAC single phase 170-255 VAC three phase
	Permissible Frequency Range	Hz	50/60 HZ +/- 5%
Control mode			
Position control mode	Max. Input Pulse Frequency	Kpps	Line driver : 4000 Kpps, Open collector : 200 Kpps
	Pulse Type		Pulse/direction, A phase + B phase, CCW Pulse + CW Pulse
	Command Source		External pulse train / Internal parameters
	Smoothing strategy		Low Pass and P-Curve filter
	Electronic Gear		Electronic gear N/M multiple N: 1 -(226-1), M : 1 -(231-1) (1/50<N/M<3200)
	Torque limit operation		Set by parameters
	Feedforward compensation		Set by parameters
Speed control mode	Analog input command Voltage Range	VDC	0-+/- 10 VDC
	Input Resistance	kΩ	10
	Time constant	μs	2.2
	Speed control range (1)		LXM 23●U01M3X...30M3X 1:5000
	Command Source		External Analog signal/Internal parameters
	Smoothing strategy		Low Pass and S-Curve filter
	Torque limit operation		Set by parameters or via Analog input
	Band with characteristics	Hz	LXM 23●U01M3X...30M3X Maximum 550 Hz
	Speed Fluctuation Rate (2)		0,01% or less at load fluctuation 0 to 100% (rated speed) 0,01% or less at power fluctuation +/-10% (rated speed) 0,01% or less at amambient temperature fluctuation 0°C to 50°C (rated speed)
Torque control mode	Analog inputcommand Voltage Range	VDC	0-+/- 10 VDC
	Input Resistance	kΩ	10
	Time constant	μs	2.2
	Permissible time for overload(3)	S	LXM 23●U01M3X...30M3X 8 sec. Under 200% rated output
	Command Source		External Analog signal/Internal parameters / CAN
	Smoothing strategy		Low pass filter
	Speed limit operation		Set by parameters or via Analog input or via CAN
	Analog monitor output		Monitor signal can be set by parameters (Output voltage range : +/- 8V)

(1) During full load, the speed ratio is defined as min. speed (no go and stop)/rated speed.

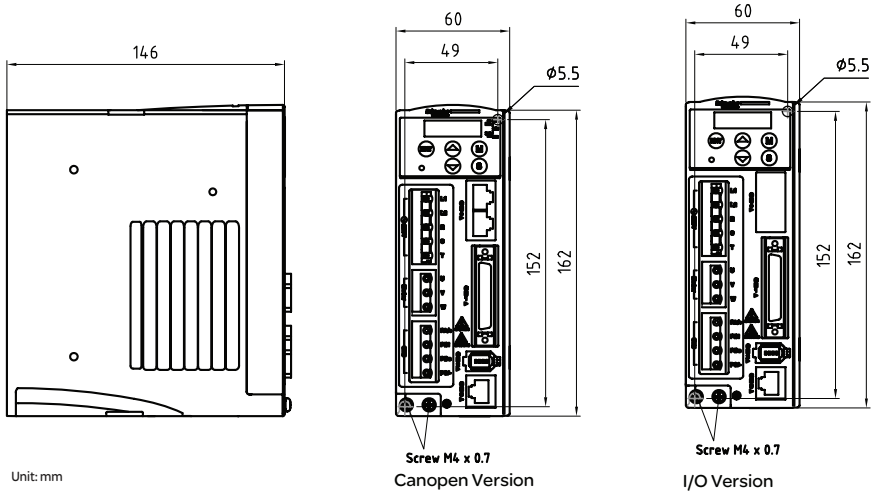
(2) When command is rated speed, speed fluctuation rate is defined as (empty load speed -full load speed)/rated speed.

(3) Pls refer to the over load sector of the user manual.

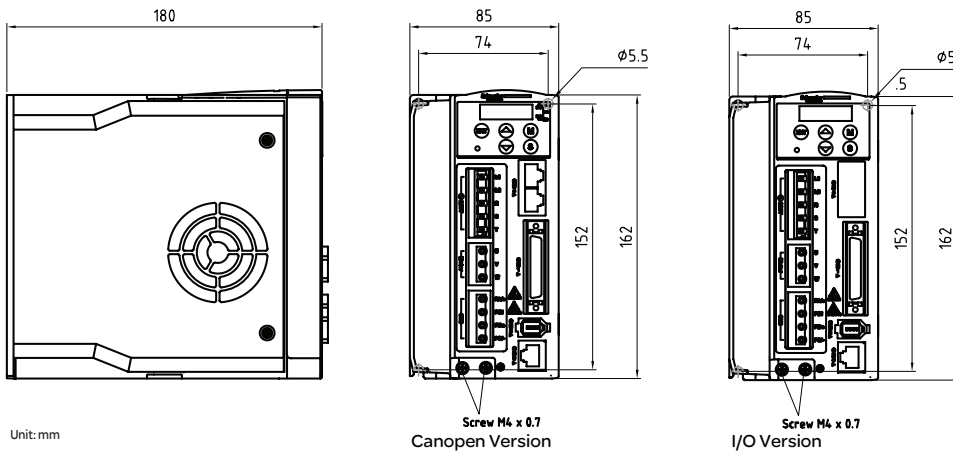
Communication port characteristics			
CANopen and CANopen Motionbus protocols (only applies to LXM 23A●●●●●● servo drives)			
Protocol type		CANopen	CANopen Motionbus
Structure	Connectors	RJ45 (labelled CN4)	
	Network management	Slave	
	Transmission speed	Transmission speed depends on the length of the bus: ■ 125 kbps for bus lengths of up to 500 m ■ 250 kbps for bus lengths of up to 250 m ■ 500 kbps for bus lengths of up to 100 m ■ 1 Mbps for bus lengths of up to 4 m, where no segment is no longer than 0.3 m	
	Address (Node ID)	1 to 127, configurable via the display terminal or the Lexium 23 Plus SET UP software workshop	
	Polarization	Line termination impedances are not integrated in the servo drive	
Service	PDO (Process Data Objects)	Implicit exchange of PDO: ■ 3 PDO conforming to DSP 402 modes (position control and speed profile modes) ■ 1 configurable mapping PDO	Implicit exchange of PDO: ■ 2 PDO conforming to DSP 402 (position control mode)
	PDO modes	Event-triggered, Time-triggered, Remotely-requested, Sync (cyclic), Sync (acyclic)	Sync (cyclic)
	PDO mapping	1 configurable PDO	-
	Number of SDO (Service Data Objects)	Explicit exchange of SDO: ■ 2 receive SDO ■ 2 transmit SDO	Explicit exchange of SDO: ■ 1 receive SDO ■ 1 transmit SDO
	Emergency	Yes	
	Profile	CiA DSP 402: CANopen "Device Profile Drives and Motion Control"	
		Position control and speed profile modes	Position control mode
	Communication monitoring	Node guarding, heartbeat	
Diagnostics	Using LEDs	2 LEDs: "RUN" and "ERROR" on integrated 7-segment display terminal Display of faults Full diagnostics with the Lexium 23 Plus SETUP software workshop	
Description file		A single eds file for the whole range is supplied on the documentation CD-ROM. This file contains the description of the servo drive parameters	
Modbus protocol (LXM 23A●●●●●●, LXM 23D●●●●●● servo drives)			
Structure	Connector	RJ45 (labelled CN3)	
	Physical interface	2-wire RS 485 multidrop	
	Transmission mode	RTU	
	Transmission speed	Configurable via the display terminal or the Lexium 23 Plus SETUP software workshop	
	Format	Configurable via the display terminal or the Lexium 23 Plus SETUP software workshop 0: Modbus ASCII mode, <7,N,2> 1: Modbus ASCII mode, <7,E,1> 2: Modbus ASCII mode, <7,O,1> 3: Modbus ASCII mode, <8,N,2> 4: Modbus ASCII mode, <8,E,1> 5: Modbus ASCII mode, <8,O,1> 6: Modbus RTU mode, <8,N,2> 7: Modbus RTU mode, <8,E,1> 8: Modbus RTU mode, <8,O,1>	
	Polarization	No polarization impedances These must be provided by the wiring system (for example, in the master)	
	Number of servo drives	31, Lexium 23 servo drives maximum	
	Address	1 to 127, configurable via the display terminal or the Lexium 23 Plus SETUP software workshop	
	Services	Communication monitoring	Monitoring function (node guarding) can be activated "Time out" can be set between 1s and 20s
Diagnostics		Display of faults on integrated 7-segment display terminal	

#### Dimensions

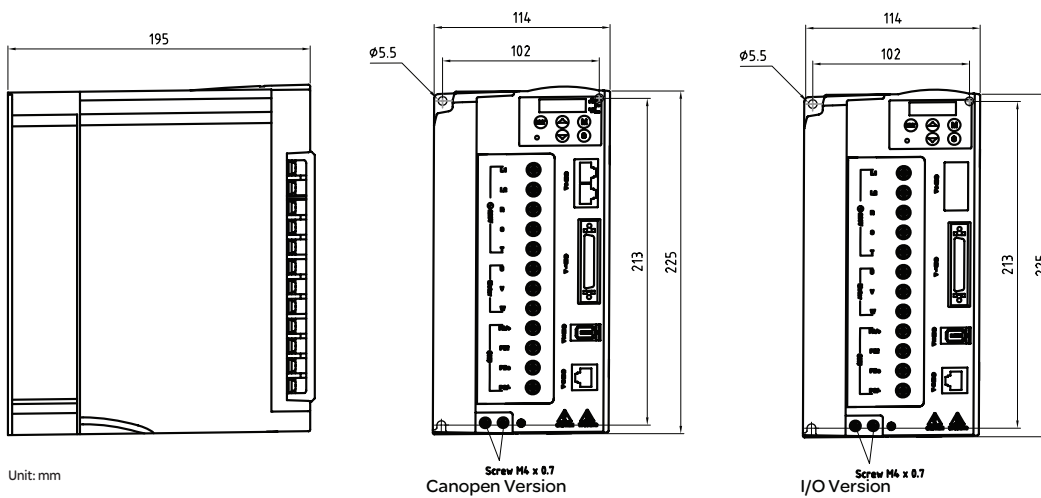
LXM23●U01M3X, ●U02M3X, ●U04M3X



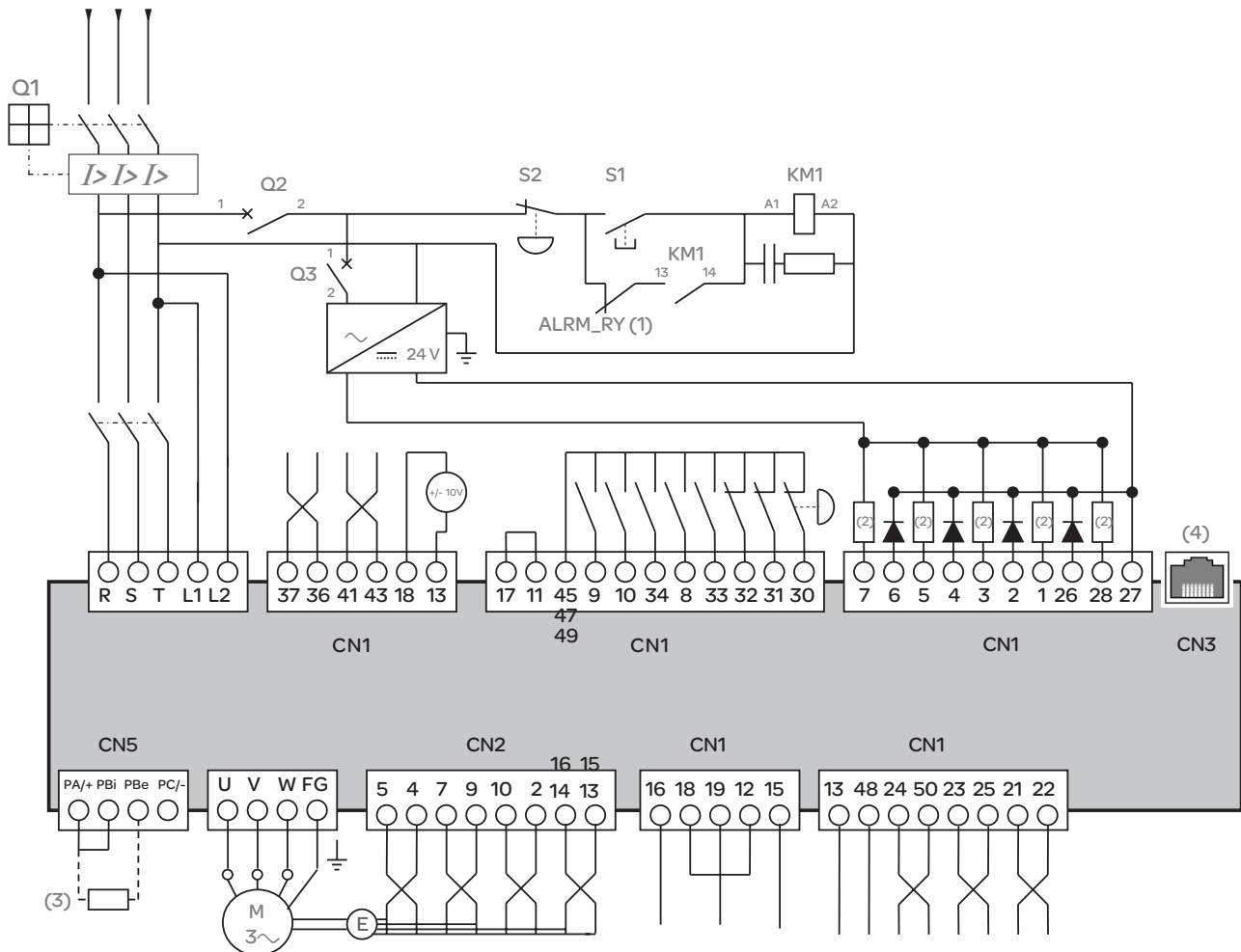
LXM23●U07M3X, ●U10M3X, ●U15M3X



LXM23●U20M3X, ●U30M3X



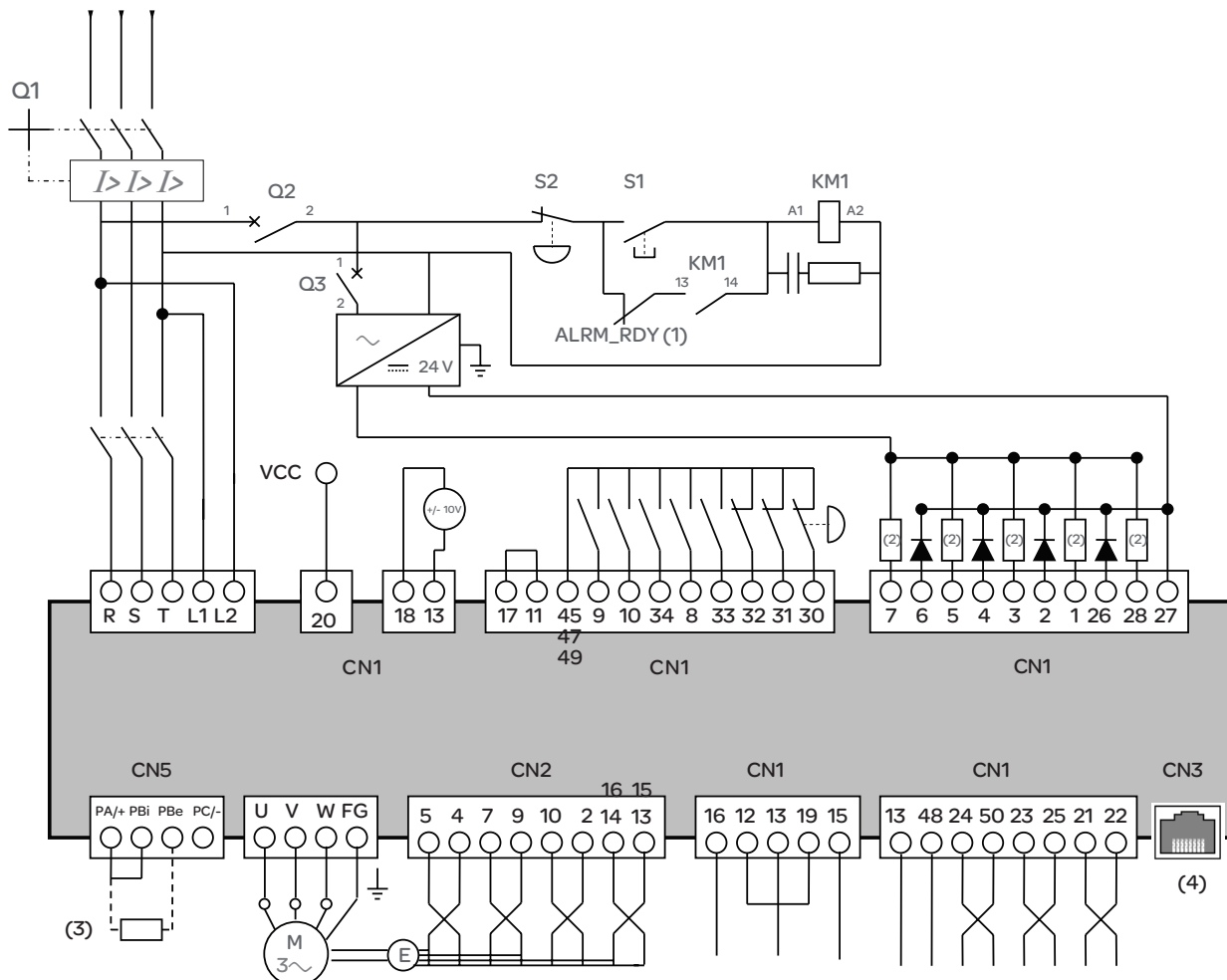
## LXM 23DU●●M3X



Compatible components	
Ref.	Description
<b>A1</b>	Lexium 23 Plus servo drive, see page 6
<b>KM1</b>	Line contact or see motor starter on page 30
<b>Q1</b>	Circuit breaker, see motor starter on page 30
<b>Q2</b>	GV2 L magnetic circuit-breaker
<b>Q3</b>	GB2 CB05 thermal magnetic circuit-breaker
<b>S1, S2</b>	XB4 B or XB5A "Start" and "Emergency stop" push buttons

(1) Contact ALRM-RY is controlled by the output of DO5+(28), on a servo drive fault, KM1 (line contact) open.  
(2) 1.5 k resistor  
(3) External braking resistor (see page 29)  
(4) Modbus serial link, support RS485, be used to connect to a PC terminal( installed Lexium 23 Plus SET UP software)

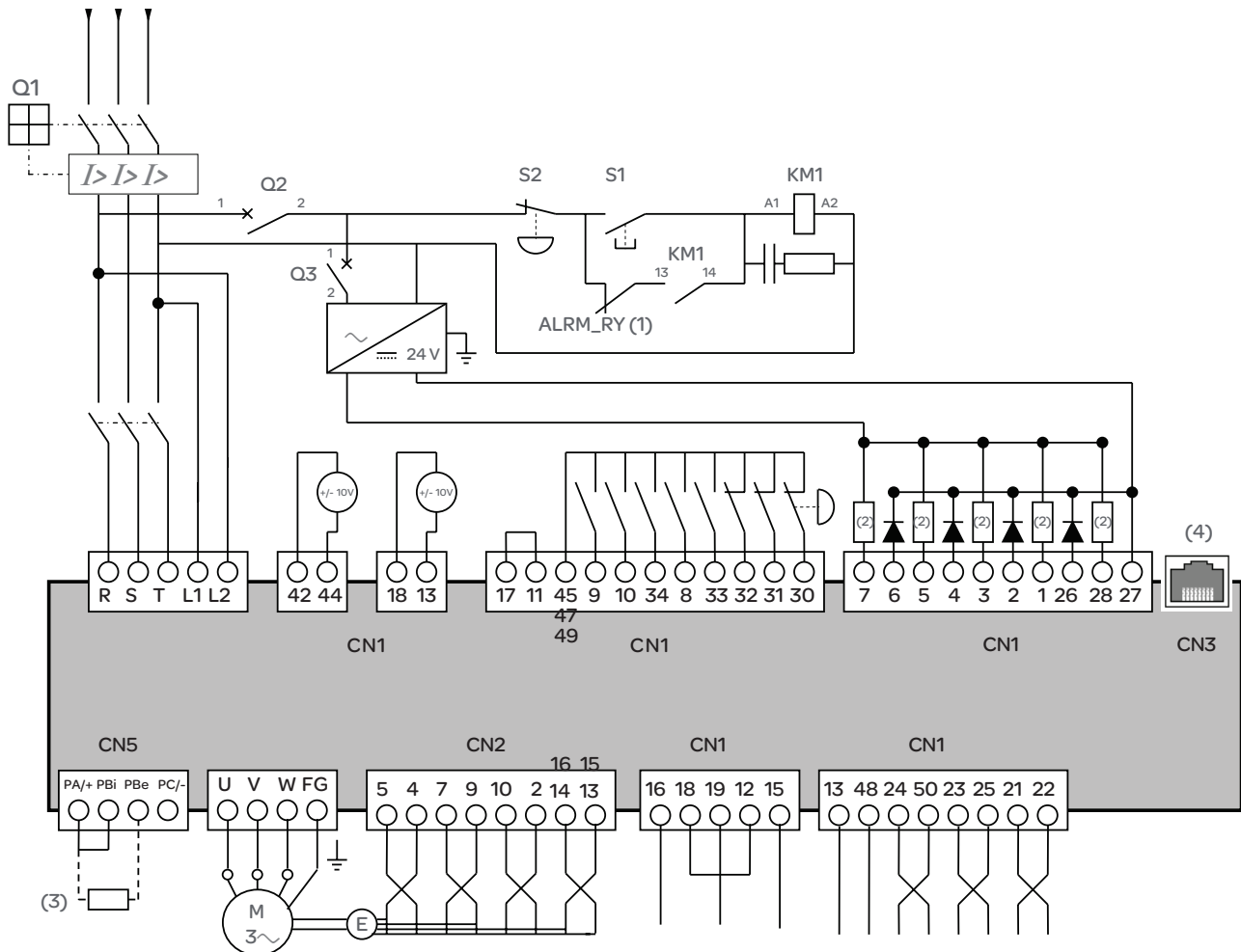
## LXM 23DU●●M3X



Compatible components	
Ref.	Description
<b>A1</b>	Lexium 23 Plus servo drive, see page 6
<b>KM1</b>	Line contact or see motor starter on page 30
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<b>A1</b>	Lexium 23 Plus servo drive, see page 6
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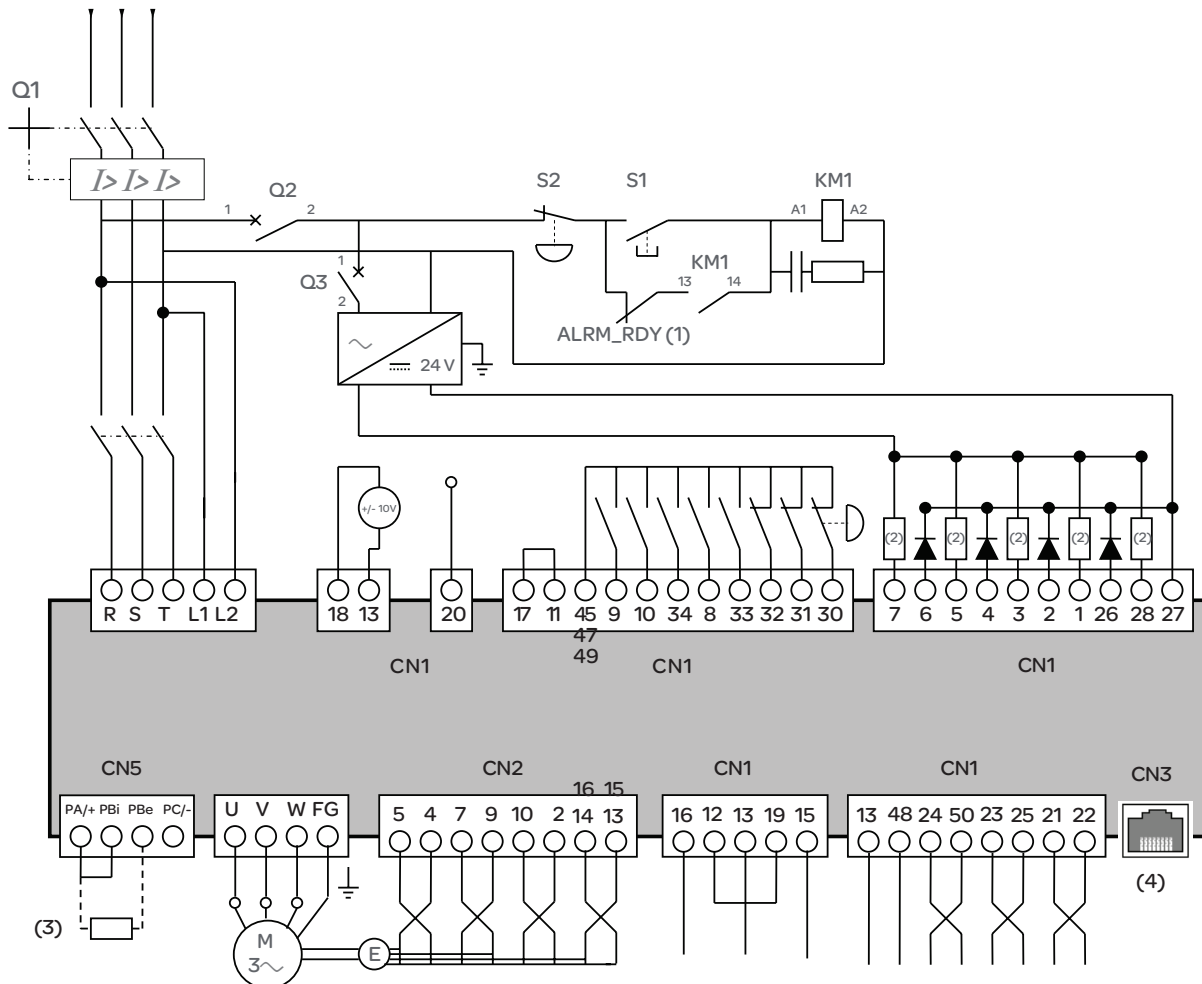
(2) 1.5 k resistor

(3) External braking resistor (see page 29)

(4) Modbus serial link, support RS485, be used to connect to a PC terminal (installed Lexium 23 Plus SET UP software)



## LXM 23DU●●M3X



Ref.	Description
------	-------------

<b>A1</b>	Lexium 23 Plus servo drive, see page 6
<b>KM1</b>	Line contact or see motor starter on page 30
<b>Q1</b>	Circuit breaker, see motor starter on page 30
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<b>S1, S2</b>	XB4 B or XB5A "Start" and "Emergency stop" push buttons

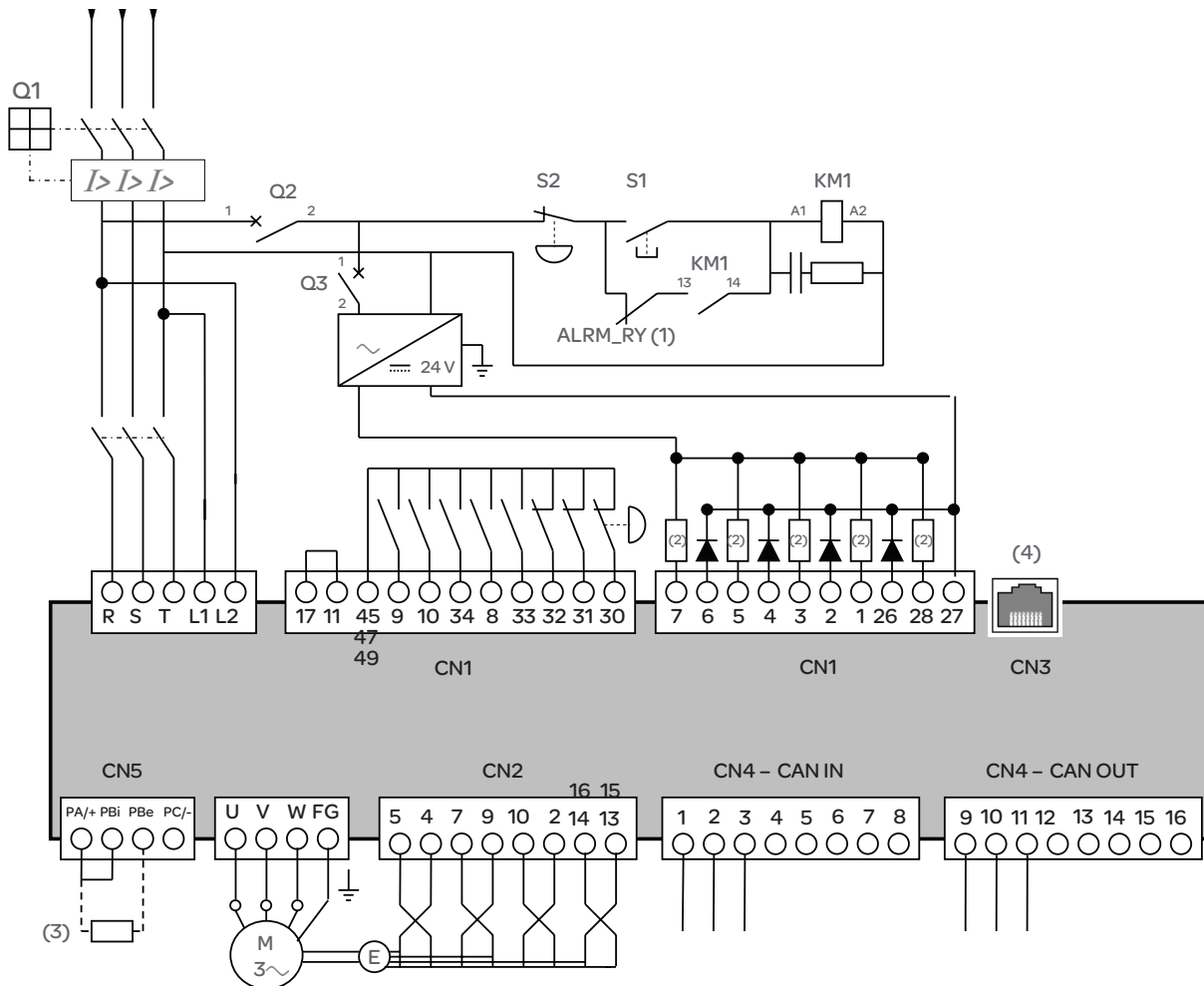
(2) 1.5 k resistor

(3) External braking resistor (see page 29)

(4) Modbus serial link, support RS485, be used to connect to a PC terminal( installed Lexium 23 Plus SET UP software)

### CANopen version control wiring diagram

LXM 23AU●●M3X



#### Compatible components

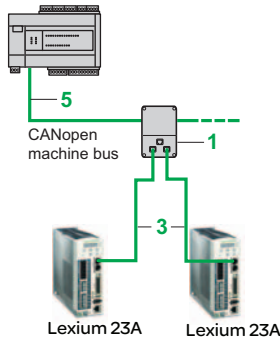
Ref.	Description
A1	Lexium 23 Plus servo drive, see page 6
KM1	Line contact or see motor starter on page 30
Q1	Circuit breaker, see motor starter on page 30
Q2	GV2 L magnetic circuit-breaker
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(1) Contact ALRM-RY is controlled by the output of DO5+(28), on a servo drive fault, KM1 (line contact) open.

(2) 1.5 k resistor

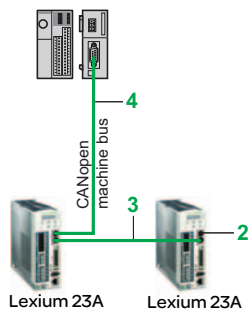
(3) External braking resistor (see page 29)

(4) Modbus serial link, support RS485, be used to connect to a PC terminal (installed Lexium 23 Plus SET UP software)



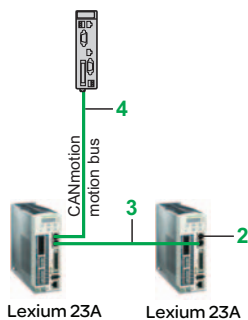
Example of architecture with controlled by M238 PLC

Twido programmable controller + TWD NC01M



Example of architecture with controlled by Twido programmable controller

Lexium Controller LMC 20



Example of architecture with controlled by Lexium Controller

### CANopen and CANmotion machine bus for Lexium 23 Plus servo drives

Lexium 23A type 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).

The communication function provides access to the servo drive's configuration, adjustment, control and monitoring functions.

Used with a Lexium motion controller, the CANmotion bus can be used to control motion for applications with up to eight Lexium 23A type servo drives.

#### Connection accessories (1)

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

#### Cordsets and cables

Description	Use	Item no.	Length m	Reference	Weight kg
	From	To			
<b>CANopen cordsets</b> equipped with 2 RJ45 connectors	VW3 CAN TAP2 junction box	LXM 23 servo drive	3	VW3 CAN CARR03	0.320
	LXM 23 servo drive (CN4 connector)	(CN4 connector)	1	VW3 CAN CARR1	0.500
<b>CANopen cordsets</b> equipped with one 9-way female SUB-D connector with integrated line terminator and one RJ45 connector	Twido programmable controller motion controller LMC 20	LXM 23 servo drive (CN4 connector)	4	VW3 M3 805R010	-
			3	VW3 M3 805R030	-
<b>CANopen cables</b> Standard cables, C€ marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	PLC	VW3 CAN TAP2 junction box	5	TSX CAN CA 50	4.930
			100	TSX CAN CA 100	8.800
			300	TSX CAN CA 300	24.560
<b>CANopen cables</b> UL certification, C€ marking Flame retardant (IEC 60332-2)	PLC	VW3 CAN TAP2 junction box	5	TSX CAN CB 50	3.580
			100	TSX CAN CB 100	7.840
			300	TSX CAN CB 300	21.870
<b>CANopen cables</b> Cables for harsh environments or mobile installation, C€ marking Low smoke emission, halogen-free Flame retardant (IEC 60332-1)	PLC	VW3 CAN TAP2 junction box	5	TSX CAN CD 50	3.510
			100	TSX CAN CD 100	7.770
			300	TSX CAN CD 300	21.700

#### (1) 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

### 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

An external braking resistor is necessary for applications in which the servo motor has to be braked frequently and the internal braking resistor cannot 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.

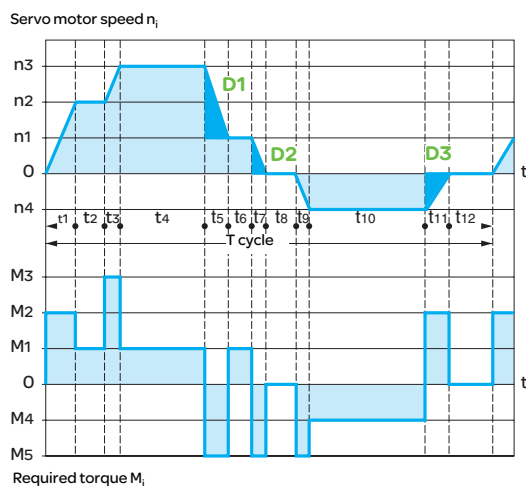
Two or more external braking resistors can be connected in parallel. The servo drive monitors the power dissipated in the braking resistor.

### 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

The curve segments to be taken into account, when the servo drive is decelerating, are marked in blue.



### Sizing the braking resistor (continued)

#### Calculation of the constant deceleration energy

To do this, the user must know the total inertia, defined as follows:

**Jt**: Total inertia

where:

**Jt** = **Jm** (servo motor inertia) + **Jc** (load inertia). For **Jm**, see pages 34 to 43.

The energy  $E_i$  of each deceleration segment is defined as follows:

$$E_i = \frac{1}{2} J_t \cdot \omega_i^2 = \frac{1}{2} J_t \cdot \left( \frac{2\pi n_i}{60} \right)^2$$

Which gives the following for the various segments:

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

$$= \frac{1}{2} J_t \cdot \left( \frac{\pi \Delta n}{60} \right)^2$$

where  $E_i$  is in joules, **Jt** in kgm<sup>2</sup>,  $\omega$  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 on page 28.

In the remainder of the calculation, only take account of the **Di** segments, for which the energy  $E_i$  is greater than the absorption capacities given in the table opposite.

This additional energy **EDi** must be dissipated in the resistor (internal or external):

**EDi** =  $E_i$  - **Edrive** (in joules).

#### Calculation of the continuous power

The continuous power  $P_c$  is calculated for each machine cycle:

$$P_c = \frac{\sum E_{Di}}{T_{cycle}}$$

where **Pc** is in W, **EDi** 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 maximum energy during a braking procedure must be less than the peak energy that can be absorbed by the internal braking resistor: **EDi** < **EPk** and the continuous power of the internal braking resistor must in turn not exceed: **Pc** < **PPr**. If these conditions are met, the internal braking resistor is adequate.
- 2 If one of the above conditions is not met, an external braking resistor must be used to satisfy these conditions.

The value of the external braking resistor must be between the minimum and maximum values given in the table. Otherwise the servo drive may be subject to disturbance and the load will no longer be braked safely.

Characteristics										
			LXM23●U01M 3X	LXM23●U02M 3X	LXM23●U04M 3X	LXM23●U07M 3X	LXM23●U10M 3X	LXM23●U15M 3X		
Supply voltage		V	220							
Number of phases			Single-phase							
Load threshold		V ~	400							
Energy absorption of the internal capacitors		Edrive	Joule (Ws)	0.15	0.89	1.68	5.34	12.86	17.8	
Internal resistor	Resistance	Ω	40							
	Continuous power	PPr	W	30						
	Peak energy	EPk	Joule (Ws)	3	4	8	14	18	18	
External resistor	Min. resistance	Ω	40	40	20	20	20	20		
	Degree of protection		IP21							
			LXM23●U20M3X				LXM23●U30M3X			
Supply voltage		V	220							
Number of phases			Three-phase							
Load threshold		V ~	400							
Energy absorption of the internal capacitors		Edrive	Joule (Ws)	23.24			217.73			
Internal resistor	Resistance	Ω	20							
	Continuous power	PPr	W	60						
	Peak energy	EPk	Joule (Ws)	21			28			
External resistor	Min. resistance	Ω	10							
	Degree of protection		IP21							

### References

#### External braking resistors

Value	Continuous power <i>PPr</i>	Peak energy <i>EPk</i> 220 V	Reference
$\Omega$	W	Ws	
40	400	4000	VW3M7111
20	1000	4000	VW3M7112

### Application

The combinations listed below can be used to create a complete motor starter unit comprising a circuit breaker, a contactor and a Lexium 23 Plus servo drive.

The circuit breaker provides protection against accidental short-circuits, disconnection and, if necessary, isolation.

The contactor starts up 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 23 Plus servo drives

Servo drive	Nominal power	Circuit-breaker		Contactor(1) Add the voltage reference to the basic reference to obtain the full reference (2)
		Reference	Rating	
kW		A		
Single phase:220...255 VAC/three phase:170...255 VAC				
LXM23●U01M3X	0.1	GV2L10	6.3	LC1 K0610●●
LXM23●U02M3X	0.2	GV2L10	6.3	LC1 K0610●●
LXM23●U04M3X	0.4	GV2L14	10	LC1 D09●●
LXM23●U07M3X	0.75	GV2L14	10	LC1 D09●●
LXM23●U10M3X	1	GV2L16	14	LC1 D12●●
LXM23●U15M3X	1.5	GV3L22	25	LC1 D18●●
LXM23●U20M3X	2	GV3L32	30	LC1 D32●●
LXM23●U30M3X	3	GV3L32	30	LC1 D32●●

(1) Composition of contactors:

■ LC1 K06: 3 poles + 1 "N/O" auxiliary contact

■ LC1 D09: 3 poles + 1 "N/O" auxiliary contact + 1 "N/C" auxiliary contact

(2) Usual control circuit voltages, see table below:

AC control circuit							
	Volts ~	24	48	110	220	230	240
LC1-K	50/60 Hz	B7	E7	F7	M7	P7	U7
	Volts ~	24	48	110	220/230	230	230/240
LC1-D	50 Hz	B5	E5	F5	M5	P5	U5
	60 Hz	B6	E6	F6	M6	-	U6
	50/60 Hz	B7	E7	F7	M7	P7	U7

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

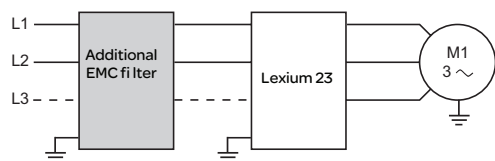


GV2L●●  
+  
LC1 K06●●●●●  
+  
LXM23●U●●●M3X



**Protection using class J fuses (UL standard)**

Servo drive Reference	Nominal power	Fuse to be placed upstream
	kW	A
<b>Single phase: 200...255 VAC/three phase:170...255 VAC</b>		
LXM23●U01M3X	0.1	5
LXM23●U02M3X	0.2	5
LXM23●U04M3X	0.4	20
LXM23●U07M3X	0.75	20
LXM23●U10M3X	1	25
LXM23●U15M3X	1.5	40
LXM23●U20M3X	2	60
LXM23●U30M3X	3	80



### Additional EMC input filters

#### Applications

When combined with LXM 23●U●●M3X servo drives, additional EMC filters can be used to meet more stringent requirements and are designed to reduce conducted emissions on the line supply below the limits of standard IEC 61800-3, edition 2, categories C2 and C3.

#### Use according to the type of line supply

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

The filters must not be used on IT (impedance or isolated neutral) type supplies.

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

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

## Characteristics of servo drive/EMC fi lter mounting

Conforming to standards			EN 133200
Degree of protection			IP 41 on the upper part with protective cover in place IP 20 after removal of the protective cover
Relative humidity			According to IEC 60721-3-3, class 3K3, 5% to 85%, without condensation or dripping water
Ambient air temperature around the device	Operation	°C	0...+ 50
	Storage	°C	- 25...+ 70
Altitude		m	1000 m without derating Up to 2000 m under the following conditions: ■ Max. temperature 40°C ■ Mounting distance between servo drives > 50 mm ■ Protective cover removed
Vibration resistance		Conforming to IEC 60068-2-6	10 Hz to 57 Hz: amplitude 0.075 mm 57 Hz to 150 Hz: 1 g
Shock resistance		Conforming to IEC 60068-2-27	15 gn for 11 ms
Maximum nominal voltage	Single-phase 50/60 Hz	V	120 + 10 % 240 + 10 %
	Three-phase 50/60 Hz	V	240 + 10 %
Application, category: EN 61800-3: 2001-02 ; IEC 61800-3, Ed. 2		Description	
Category C2 in environment 1			Restricted distribution, for domestic use, sale conditioned by the competence of the user and the distributor on the subject of EMC compatibility
Category C3 in environment 2			Use in industrial premises

## References

### Additional EMC input fi lters

For servo drive	Maximum servo motor cable length conforming to		Reference	Weight
	EN 55011 class A Gr1 IEC/EN 61800-3 category C2 in environment 1	EN 55011 class A Gr2 IEC/EN 61800-3 category C3 in environment 2		
	m	m		kg

### Single-phase supply voltage

LXM23●U01M3X LXM23●U02M3X LXM23●U04M3X			VW3 A31401	
LXM23●U07M3X LXM23●U10M3X LXM23●U15M3X			VW3 A31403	0.775

### Three-phase supply voltage

LXM23●U07M3X LXM23●U10M3X LXM23●U15M3X LXM23●U20M3X LXM23●U30M3X	20	40	VW3 A31404	0.900
LXM23●U45M3X LXM23●U55M3X	20	40	VW3 A31406	1.350
LXM23●U75M3X	20	40	VW3 A31407	3.150

105585



VW3 A31401

### BCH04010, BCH06010 ultra low inertia servo motor curve

Servo motor reference				BCH04010		BCH06010	
Compatible Lexium 23 Plus servo drive				LXM23●U01M3X		LXM23●U02M3X	
Supply power			V	Single phase 220			
Torque	Continuous stall	M <sub>0</sub>	Nm	0.32		0.64	
	Peak stall	M <sub>max</sub>	Nm	0.96		1.92	
Rated work point	Rated toruqe		Nm	0.32		0.64	
	Rated speed		rpm	3000			
	Rated power		kW	0.1		0.2	
Peak current			A rms	2.7		4.65	

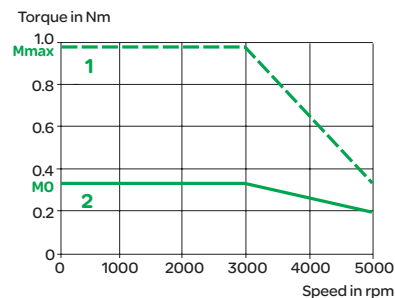
### Servo motor specification

Maximum speed			rpm	5000	
Constant	Torque		Nm/A rms	0.36	0.41
	Inertia	No brake $J_m$	kgcm <sup>2</sup>	0.037	0.177
		With brake $J_m$	kgcm <sup>2</sup>	0.039	0.192
Stator (at 20 °C)	Armature resistance (phase/phase)		Ω	18.6	5.58
	Armature inductance (phase/phase)		mH	48	24.14
	Electrical time constant		ms	2.58	4.3
Brake (depending on reference)				See page 7	

### Torque/speed curve

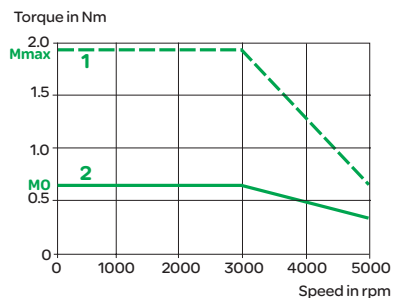
#### BCH04010 servo motor

Control by LXM23●U01M3X servo drive  
Single phase 220 V



#### BCH06010 servo motor

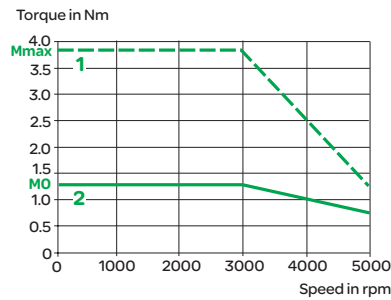
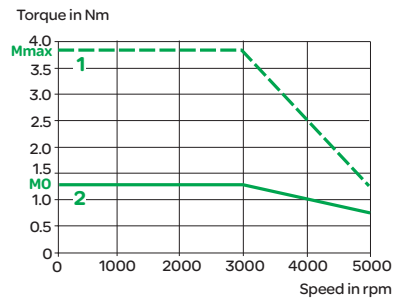
Control by LXM23●U02M3X servo drive  
Single phase 220 V



- 1 Peak torque
- 2 Continuous torque

BCH06020 , BCH08010 ultra low inertia /low inertia servo motor curve						
Servo motor reference			BCH06020		BCH08010	
Compatible Lexium 23 Plus servo drive			LXM23●U04M3X		LXM23●U04M3X	
Supply power			V	Single phase 220		
Torque	Continuous stall	M <sub>0</sub>	Nm	1.27		
	Peak stall	M <sub>max</sub>	Nm	3.82		
Rated work point	Rated torque		Nm	1.27		
	Rated speed		rpm	3000		
	Rated power		kW	0.4		
Peak current			A rms	7.8		
Servo motor specification						
Maximum speed			rpm	5000		
Constant	Torque		Nm/A rms	0.49		
	Inertia	No brake	J <sub>m</sub>	kgcm <sup>2</sup>	0.277	0.68
		With brake	J <sub>m</sub>	kgcm <sup>2</sup>	0.3	0.73
Stator (at 20 °C)	Armature resistance (phase/phase)		Ω	3.10	1.86	
	Armature inductance (phase/phase)		mH	13.42	14.78	
	Electrical time constant		ms	4.3	7.96	
Brake (depending on reference)				See page 7		

Torque/speed curve	
BCH06020 servo motor	BCH08010 servo motor
Control by LXM23●U04M3X servo drive	Control by LXM23●U04M3X servo drive
Single phase 220 V	Single phase 220 V



- 1 Peak torque
- 2 Continuous torque

**BCH08020, BCH10010 low inertia servo motor curve**

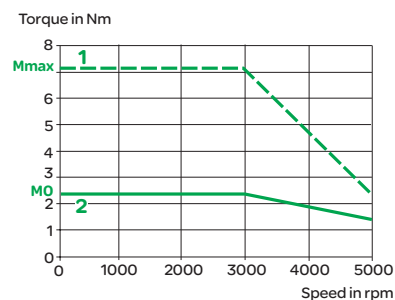
Servo motor reference			BCH08020	BCH10010
Compatible Lexium 23 Plus servo drive			LXM23●U07M3X	LXM23●U10M3X
Supply power		V	Single phase 220	
Torque	Continuous stall	$M_0$	Nm	3.18
	Peak stall	$M_{max}$	Nm	9.54
Rated work point	Rated torque		Nm	3.18
	Rated speed		rpm	3000
	Rated power		kW	1
Peak current		A rms	15.3	21.9

**Servo motor specification**

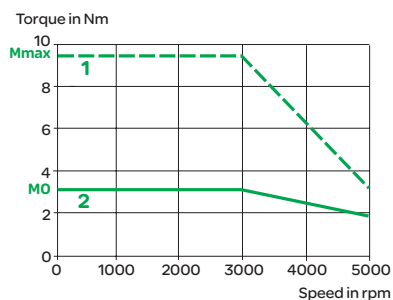
Maximum speed		rpm	5000	
Constant	Torque	Nm/A rms	0.47	0.43
	Inertia	kgcm <sup>2</sup>	1.13	2.65
	With brake	kgcm <sup>2</sup>	1.18	3.33
Stator (at 20 °C)	Armature resistance (phase/phase)	Ω	0.84	0.4
	Armature inductance (phase/phase)	mH	7.06	3.62
	Electrical time constant	ms	8.37	9.3
Brake (depending on reference)			See page 7	

**Torque/speed curve****BCH08020 servo motor**

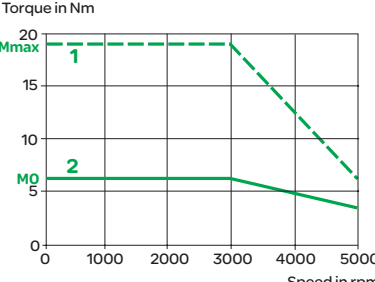
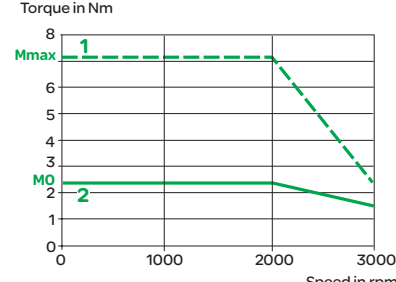
Control by LXM23●U07M3X servo drive  
Single phase 220 V

**BCH10010 servo motor**

Control by LXM23●U10M3X servo drive  
Single phase 220 V



- 1 Peak torque  
2 Continuous torque

BCH1002O , BCH1301N low inertia /medium inertia servo motor curve						
Servo motor reference				BCH1002O		BCH1301N
Compatible Lexium 23 Plus servo drive				LXM23●U20M3X		LXM23●U04M3X
Supply power			V	Three phase 220		Single phase 220
Torque	Continuous stall		$M_0$	Nm	6.37	2.39
	Peak stall		$M_{max}$	Nm	19.11	7.16
Rated work point	Rated torque			Nm	6.37	2.39
	Rated speed			rpm	3000	2000
	Rated power			kW	2	0.5
Peak current			A rms	36.15	8.7	
Servo motor specification						
Maximum speed			rpm	5000	3000	
Constant	Torque			Nm/A rms	0.53	0.83
	Inertia	No brake	$J_m$	kgcm <sup>2</sup>	4.45	8.17
		With brake	$J_m$	kgcm <sup>2</sup>	4.953	8.94
Stator (at 20 °C)	Armature resistance (phase/phase)			Ω	0.26	1.14
	Armature inductance (phase/phase)			mH	3	14.78
	Electrical time constant			ms	11.4	12.96
Brake (depending on reference)				See page 7		
Torque/speed curve						
BCH1002O servo motor				BCH1301N servo motor		
Control by LXM23●U20M3X servo drive				Control by LXM23●U04M3X servo drive		
Three phase 220 V				Single phase 220 V		
<p>Torque in Nm</p> 				<p>Torque in Nm</p> 		
1 Peak torque						
2 Continuous torque						

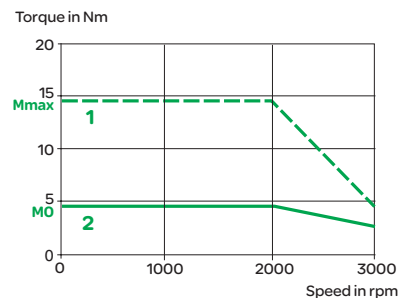
### BCH1302N, BCH1303N medium inertia servo motor curve

Servo motor reference				BCH1302N	BCH1303N
Compatible Lexium 23 Plus servo drive				LXM23●U10M3X	LXM23●U15M3X
Supply power		V		Single phase 220	
Torque	Continuous stall	$M_0$	Nm	4.77	7.16
	Peak stall	$M_{max}$	Nm	14.32	21.48
Rated work point	Rated torque		Nm	4.77	7.16
	Rated speed		rpm	2000	
	Rated power		kW	1	1.5
Peak current		A rms		16.8	24.9
Servo motor specification					
Maximum speed		rpm		3000	
Constant	Torque		Nm/A rms	0.85	0.87
	Inertia	No brake $J_m$	kgcm <sup>2</sup>	8.41	11.18
		With brake $J_m$	kgcm <sup>2</sup>	9.14	11.9
Stator (at 20 °C)	Armature resistance (phase/phase)		Ω	0.94	0.52
	Armature inductance (phase/phase)		mH	11.98	8.02
	Electrical time constant		ms	12.88	15.31
Brake (depending on reference)				See page 7	

### Torque/speed curve

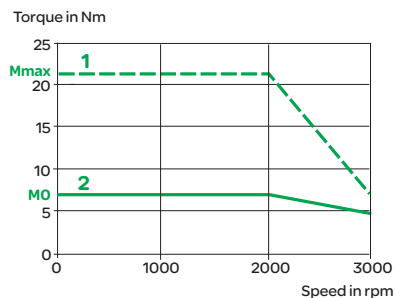
#### BCH1302N servo motor

Control by LXM23●U10M3X servo drive  
Single phase 220 V



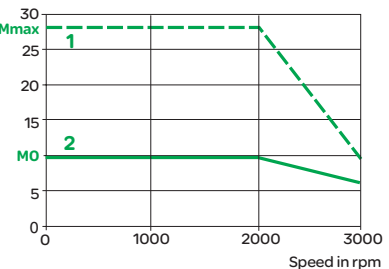
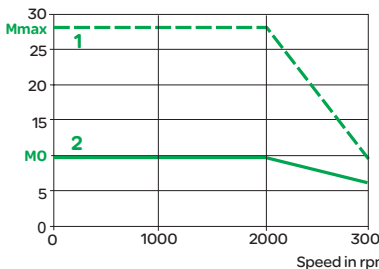
#### BCH1303N servo motor

Control by LXM23●U15M3X servo drive  
Single phase 220 V



- 1 Peak torque
- 2 Continuous torque



BCH1304N , BCH1801N medium inertia /high inertia servo motor curve						
Servo motor reference			BCH1304N		BCH1801N	
Compatible Lexium 23 Plus servo drive			LXM23●U20M3X		LXM23●U20M3X	
Supply power			V	Three phase 220		
Torque	Continuous stall	M <sub>0</sub>	Nm	9.55		
	Peak stall	M <sub>max</sub>	Nm	28.65		
Rated work point	Rated torque		Nm	9.55		
	Rated speed		rpm	2000		
	Rated power		kW	2		
Peak current			A rms	33.03	33.66	
Servo motor specification						
Maximum speed			rpm	3000		
Constant	Torque		Nm/A rms	0.87	0.85	
	Inertia	No brake	J <sub>m</sub>	kgcm <sup>2</sup>	14.59	34.68
		With brake	J <sub>m</sub>	kgcm <sup>2</sup>	15.88	37.86
Stator (at 20 °C)	Armature resistance (phase/phase)		Ω	0.348	0.238	
	Armature inductance (phase/phase)		mH	5.52	5.68	
	Electrical time constant		ms	15.86	23.87	
Brake (depending on reference)				See page 7		
Toruqe/speed curve						
BCH1304N servo motor			BCH1801N servo motor			
Control by LXM23●U20M3X servo drive			Control by LXM23●U20M3X servo drive			
Three phase 220 V			Three phase 220 V			
<p>Torque in Nm</p> 			<p>Torque in Nm</p> 			
1 Peak torque						
2 Continuous torque						

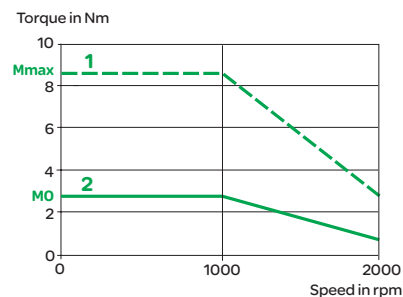
## BCH1301M, BCH1302M medium inertia servo motor curve

Servo motor reference				BCH1301M	BCH1302M	
Compatible Lexium 23 Plus servo drive				LXM23●U04M3X	LXM23●U07M3X	
Supply power			V	Single phase 220		
Torque	Continuous stall	$M_0$	Nm	2.86	5.73	
	Peak stall	$M_{max}$	Nm	8.59	17.19	
Rated work point	Rated torque		Nm	2.86	5.73	
	Rated speed		rpm	1000		
	Rated power		kW	0.3	0.6	
Peak current			A rms	7.5	14.4	
Servo motor specification						
Maximum speed			rpm	2000		
Constant	Torque		Nm/A rms	1.15	1.19	
	Inertia	No brake	$J_m$	kgcm <sup>2</sup>	8.17	8.41
		With brake	$J_m$	kgcm <sup>2</sup>	8.94	9.14
Stator (at 20 °C)	Armature resistance (phase/phase)		Ω	2.12	1.64	
	Armature inductance (phase/phase)		mH	28.58	22.24	
	Electrical time constant		ms	13.55	13.5	
Brake (depending on reference)				See page 7		

## Torque/speed curve

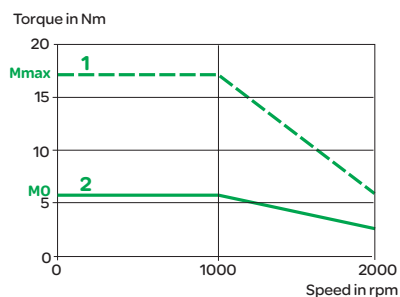
## BCH1301M servo motor

Control by LXM23●U04M3X servo drive  
Single phase 220 V



## BCH1302M servo motor

Control by LXM23●U07M3X servo drive  
Single phase 220 V

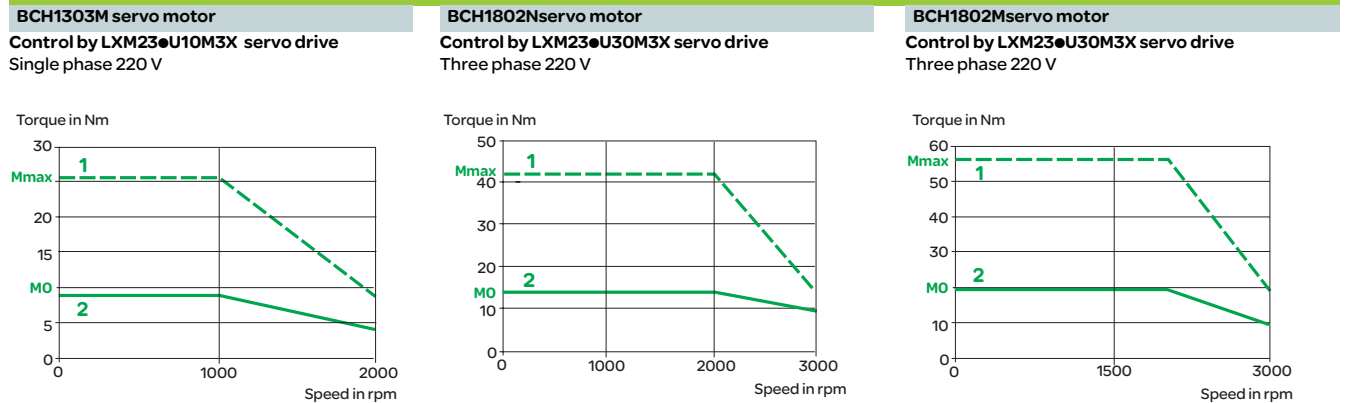


- 1 Peak torque  
2 Continuous torque

### BCH1303M, BCH1802N, BCH1802M medium inertia/high inertia servo motor curve

Servo motor reference				BCH1303M	BCH1802N	BCH1802M
Compatible Lexium 23 Plus servo drive				LXM23●U10M3X	LXM23●U30M3X	LXM23●U30M3X
Supply power				Single phase 220	Three phase 220	
Torque	Continuous stall	$M_0$	Nm	8.59	14.32	19.10
	Peak stall	$M_{max}$	Nm	25.78	42.96	57.29
Rated work point	Rated torque		Nm	8.59	14.32	19.10
	Rated speed		rpm	1000	2000	1500
	Rated power		kW	0.9	3	3
Peak current				A <sub>rms</sub>	48.3	58.2
Servo motor specification						
Maximum speed				rpm	2000	3000
Constant	Torque		Nm/A <sub>rms</sub>	1.15	0.89	0.98
	Inertia	No brake $J_m$	kgcm <sup>2</sup>	11.18	54.95	54.95
		With brake $J_m$	kgcm <sup>2</sup>	11.9	57.06	57.06
Stator (at 20 °C)	Armature resistance (phase/phase)		Ω	0.86	0.104	0.154
	Armature inductance (phase/phase)		mH	13.94	2.76	2.54
	Electrical time constant		ms	16.06	26.39	16.5
Brake (depending on reference)				See page 7		

### Torque/speed curve



- 1 Peak torque  
2 Continuous torque

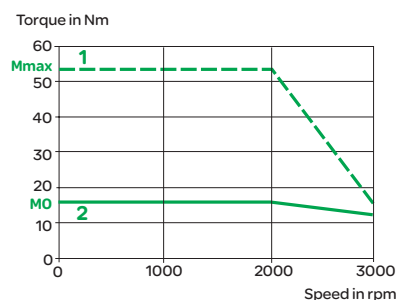
## BCH1803N, BCH1803M high inertia servo motor curve

Servo motor reference				BCH1803N	BCH1803M	
Compatible Lexium 23 Plus servo drive				LXM23●U45M3X	LXM23●U45M3X	
Supply power			V	Three phase 220		
Torque	Continuous stall	$M_0$	Nm	16.71	28.65	
	Peak stall	$M_{max}$	Nm	50.31	71.62	
Rated work point	Rated torque		Nm	16.71	28.65	
	Rated speed		rpm	2000	1500	
	Rated power		kW	3.5	4.5	
Peak current			A rms	57.6	81.3	
Servo motor specification						
Maximum speed			rpm	3000		
Constant	Torque		Nm/A rms	0.87	0.88	
	Inertia	No brake	$J_m$	kgcm <sup>2</sup>	54.8	77.75
		With brake	$J_m$	kgcm <sup>2</sup>	57.06	80.65
Stator (at 20 °C)	Armature resistance (phase/phase)		Ω	0.052	0.032	
	Armature inductance (phase/phase)		mH	1.38	0.89	
	Electrical time constant		ms	26.4	27.8	
Brake (depending on reference)				See page 7		

## Torque/speed curve

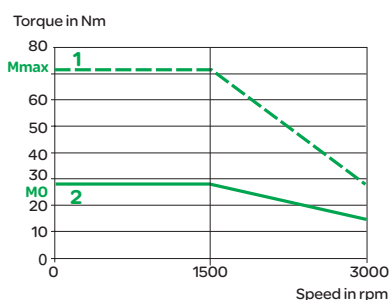
## BCH1803N servo motor

Control by LXM23●U45M3X servo drive  
Three phase 220 V

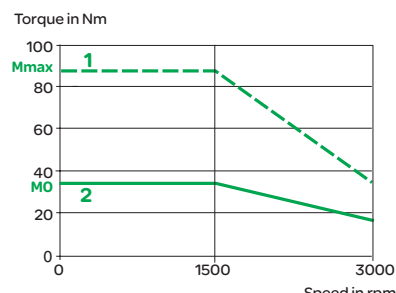
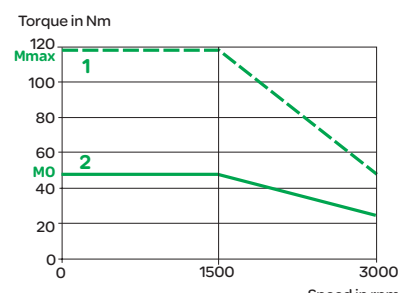


## BCH1803M servo motor

Control by LXM23●U45M3X servo drive  
Three phase 220 V

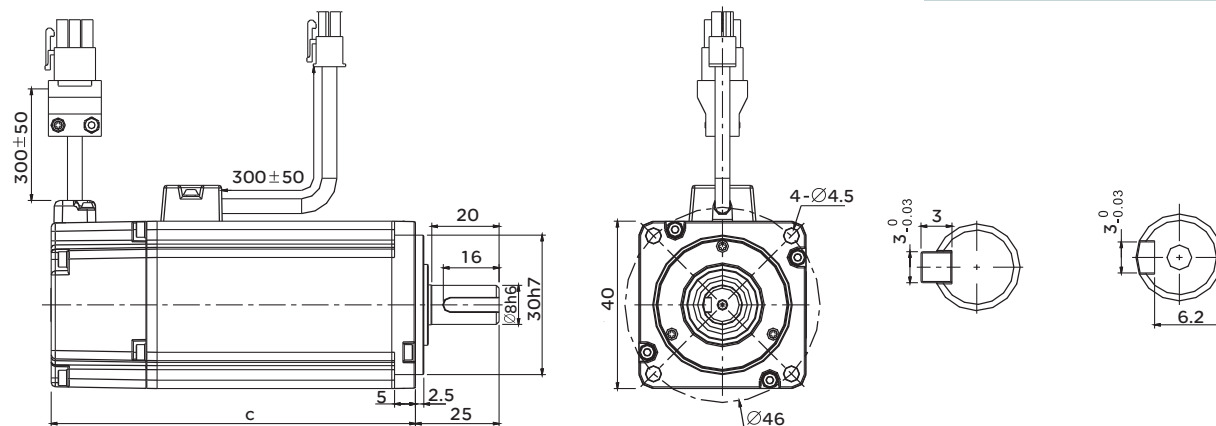


- 1 Peak torque  
2 Continuous torque

BCH1804M, BCH1805M high inertia servo motor curve					
Servo motor reference			BCH1804M		BCH1805M
Compatible Lexium 23 Plus servo drive			LXM23●U55M3X		LXM23●U75M3X
Supply power			V	Three phase 220	
Torque	Continuous stall	M <sub>0</sub>	Nm	35.01	47.74
	Peak stall	M <sub>max</sub>	Nm	87.53	119.36
Rated work point	Rated torque		Nm	35.01	47.74
	Rated speed		rpm	1500	
	Rated power		kW	5.5	7.5
Peak current			A rms	100	118.8
Servo motor specification					
Maximum speed			rpm	3000	
Constant	Torque		Nm/A rms	0.88	1.01
	Inertia	No brake J <sub>m</sub>	kgcm <sup>2</sup>	99.78	142.7
		With brake J <sub>m</sub>	kgcm <sup>2</sup>	102.70	145.55
Stator (at 20 °C)	Armature resistance (phase/phase)		Ω	0.025	0.015
	Armature inductance (phase/phase)		mH	0.6	0.4
	Electrical time constant		ms	24	26.7
Brake (depending on reference)				See page 7	
Toruqe/speed curve					
BCH1804M servo motor			BCH1805M servo motor		
Control by LXM23●U55M3X servo drive			Control by LXM23●U75M3X servo drive		
Three phase 220 V			Three phase 220 V		
Torque in Nm			Torque in Nm		
					
1 Peak torque					
2 Continuous torque					

### BCH040 (Servo motor/brake and Motor Power Connector 1 and Encoder Connector 2)

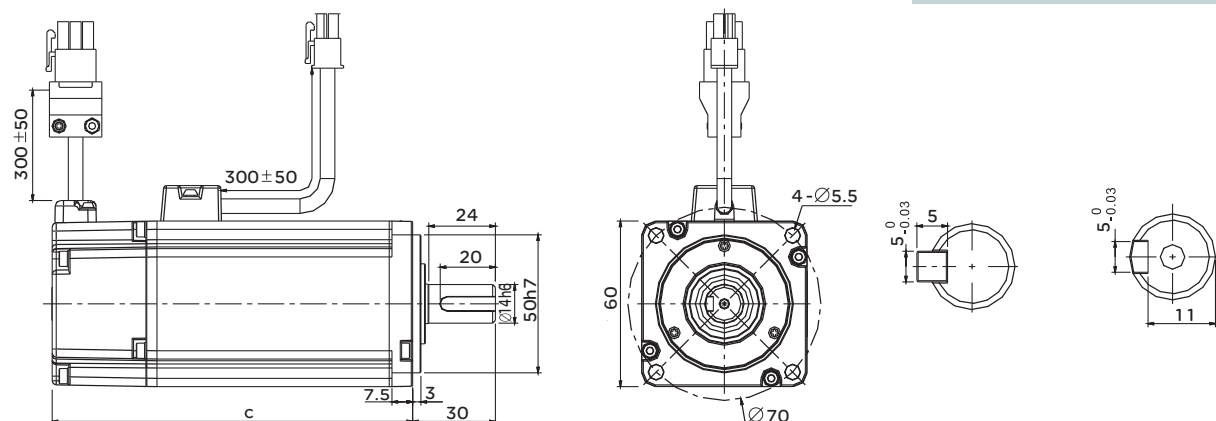
Key shaft (optional)



	c (without brake)	c (with brake)	weight (in kg) (without brake)	weight (in kg) (with brake)
BCH0401	100.6	136.6	0.5	0.8

### BCH060 (Servo motor/brake and Motor Power Connector 1 and Encoder Connector 2)

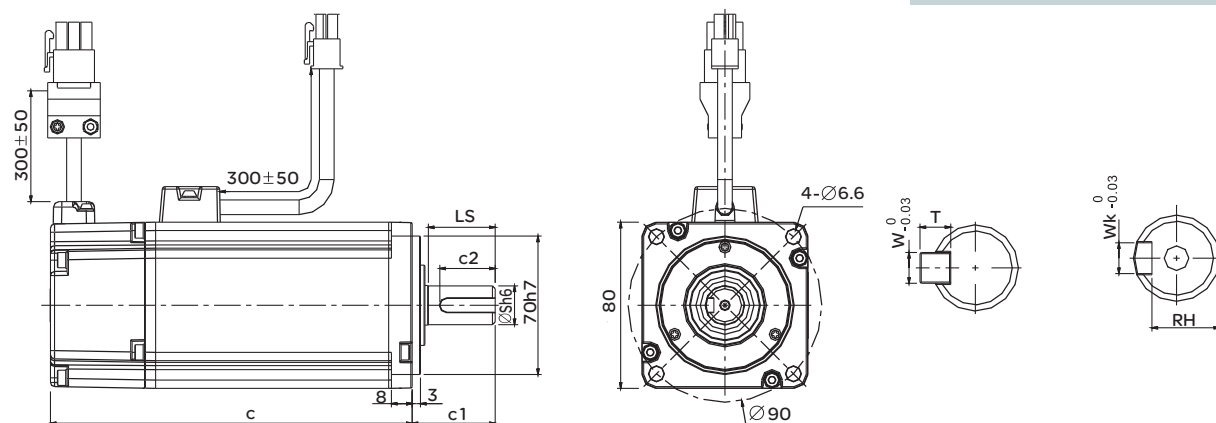
Key shaft (optional)



	c (without brake)	c (with brake)	weight (in kg) (without brake)	weight (in kg) (with brake)
BCH0601	105.5	141.6	1.2	1.5
BCH0602	130.7	166.8	1.6	2.0

### BCH080 (Servo motor/brake and Motor Power Connector 1 and Encoder Connector 2)

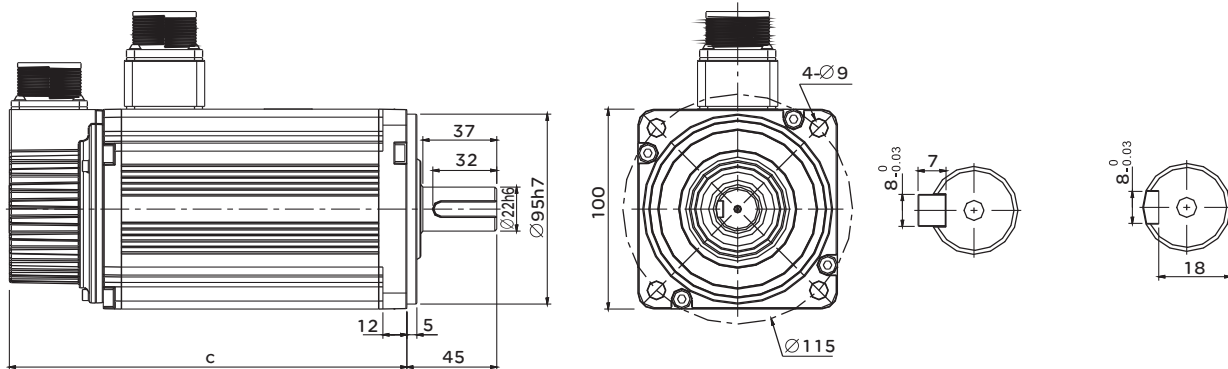
Key shaft (optional)



	c (without brake)	c (with brake)	S	c1	c2	LS	RH	Wk	W	T	weight (in kg) (without brake)	weight (in kg) (with brake)
BCH0801	112.3	152.8	14	30	20	24.5	11	5	5	5	2.1	2.9
BCH0802	138.3	178.0	19	35	25	29.5	15.5	6	6	6	3.0	3.8

### BCH100 (Servo motor/brake and Motor Power Connector 1 and Encoder Connector 2)

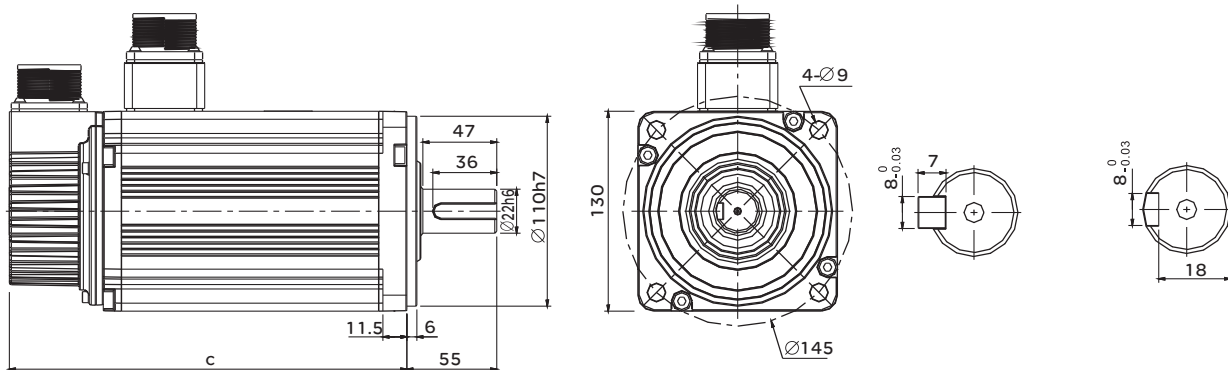
Key shaft (optional)



	c (without brake)	c (with brake)	weight (in kg) (without brake)	weight (in kg) (with brake)
BCH1001	153.5	192.5	4.3	4.7
BCH1002	199.0	226.0	6.2	7.2

### BCH130 (Servo motor/brake and Motor Power Connector 1 and Encoder Connector 2)

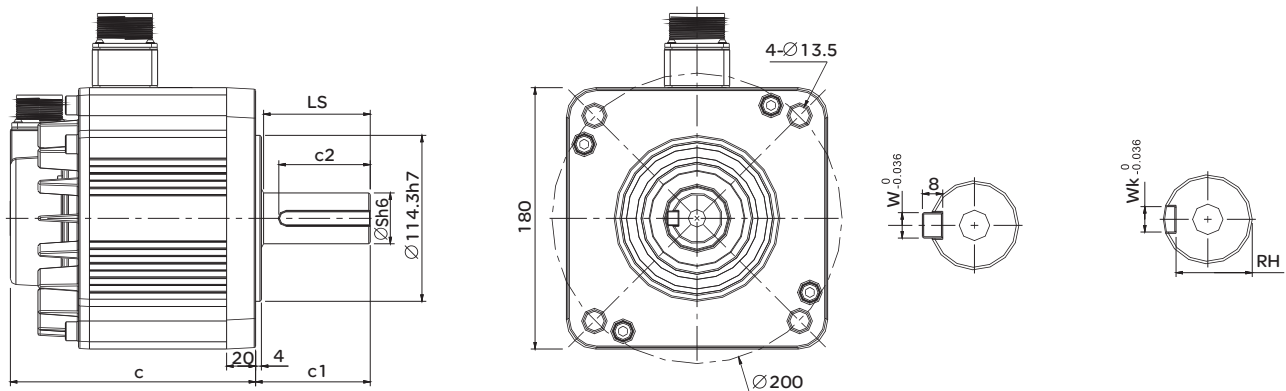
Key shaft (optional)



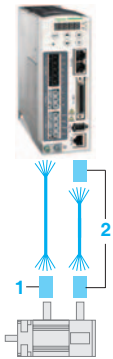
	c (without brake)	c (with brake)	weight (in kg) (without brake)	weight (in kg) (with brake)
BCH1301	147.5	183.5	6.8	8.2
BCH1302	147.5	183.5	7	8.4
BCH1303M	163.5	198.0	7.5	8.9
BCH1303N	167.5	202.0	7.5	8.9
BCH1304	187.5	216.0	7.8	9.2

### BCH180 (Servo motor/brake and Motor Power Connector 1 and Encoder Connector 2)

Key shaft (optional)



	c (without brake)	c (with brake)	S	c1	c2	LS	RH	Wk	W	weight (in kg) (without brake)	weight (in kg) (with brake)
BCH1801	169.0	203.1	35	79	63	73	30	10	10	13.5	17.5
BCH1802N	202.1	235.3	35	79	63	73	30	10	10	18.5	22.5
BCH1802M	202.1	235.3	35	79	63	73	30	10	10	18.5	22.5

**Connector**

Name	Description	Reference
Replacement connector set	Power connector set, drive side (power supply, motor, CN5)	VW3 M4 121
I/O connector	I/O connector of CN1 interface	VW3 M4 112
I/O terminal block module	Terminal block module, with 0.5 m cable	VW3 M4 113
Interface adapter	USB to RJ45(RS485) converter for CN3 interface	VW3 M8 131

**Cable**

Name	Description	Length m	Reference
standard network cable	RJ45 connector on both ends	2	490NTW00002

This cable can be used with the converter VW3M8131 to connect it with CN3 interface.

**Connection accessory****Connector for power cable**

Description	For	Item no.	Reference
For motor with flying cable, no brake	BCH0401O●2A1C BCH0601O●2A1C BCH0602O●2A1C BCH0801O●2A1C BCH0802O●2A1C	1	VW3M5111
For motor with flying cable, with brake	BCH0601O●2F1C BCH0602O●2F1C BCH0801O●2F1C BCH0802O●2F1C	1	VW3M5112
Military connector	BCH1001O●2●1C BCH1301M●2●1C BCH1301N●2●1C BCH1302M●2●1C BCH1302N●2●1C BCH1303M●2●1C BCH1303N●2●1C BCH1002O●2●1C BCH1304N●2●1C	1	VW3M5121
Military connector	BCH1801N●2●1C BCH1802N●2●1C BCH1802M●2●1C BCH1803N●2●1C BCH1803M●2●1C	1	VW3M5131
Military connector	BCH1804M●2●1C BCH1805M●2●1C	1	VW3M5141
Brake connector	BCH1804M●2F1C BCH1805M●2F1C	1	VW3M7151

**Connector for encoder cable**

Description	For	Item no.	Reference
For motor with flying cable	BCH0401O●2●1C BCH0601O●2●1C BCH0602O●2●1C BCH0801O●2●1C BCH0802O●2●1C	2	VW3M8121
For motor with military connector	BCH1001O●2●1C BCH1301M●2●1C BCH1301N●2●1C BCH1302M●2●1C BCH1302N●2●1C BCH1303M●2●1C BCH1303N●2●1C BCH1002O●2●1C BCH1304N●2●1C BCH1801N●2●1C BCH1802N●2●1C BCH1802M●2●1C BCH1803N●2●1C BCH1803M●2●1C BCH1804M●2●1C BCH1805M●2●1C	2	VW3M8122





VW3M5 111/121/131  
112/122/132/133/124 R●●●

### Connection accessory (continue)

#### Power cable

Description	From servo motor	To servo drive	Composition	Length m	Reference
Servo motor side with plastic connector Drive side with flying lead, no brake	BCH0401O●2A1C	LXM23●U01M3X	4 × 0.82 mm <sup>2</sup>	3	VW3M5111R30
	BCH0601O●2A1C	LXM23●U02M3X		5	VW3M5111R50
	BCH0602O●2A1C	LXM23●U04M3X			
	BCH0801O●2A1C	LXM23●U04M3X			
	BCH0802O●2A1C	LXM23●U07M3X			
Servo motor side with plastic connector Drive side with flying lead, with brake	BCH0401O●2F1C	LXM23●U01M3X	6 × 0.82 mm <sup>2</sup>	3	VW3M5112R30
	BCH0601O●2F1C	LXM23●U02M3X		5	VW3M5112R50
	BCH0602O●2F1C	LXM23●U04M3X			
	BCH0801O●2F1C	LXM23●U04M3X			
	BCH0802O●2F1C	LXM23●U07M3X			
Servo motor side with military connector Drive side with flying lead, no brake	BCH1001O●2A1C	LXM23●U10M3X	4 × 1.3 mm <sup>2</sup>	3	VW3M5121R30
	BCH1301M●2A1C	LXM23●U04M3X		5	VW3M5121R50
	BCH1301N●2A1C	LXM23●U04M3X			
	BCH1302M●2A1C	LXM23●U07M3X			
	BCH1302N●2A1C	LXM23●U10M3X			
	BCH1303M●2A1C	LXM23●U10M3X			
	BCH1303N●2A1C	LXM23●U15M3X			
Servo motor side with military connector Drive side with flying lead, with brake	BCH1001O●2F1C	LXM23●U10M3X	6 × 1.3 mm <sup>2</sup>	3	VW3M5131R30
	BCH1301M●2F1C	LXM23●U04M3X		5	VW3M5131R50
	BCH1301N●2F1C	LXM23●U04M3X			
	BCH1302M●2F1C	LXM23●U07M3X			
	BCH1302N●2F1C	LXM23●U10M3X			
	BCH1303M●2F1C	LXM23●U10M3X			
	BCH1303N●2F1C	LXM23●U15M3X			
Servo motor side with military connector Drive side with flying lead, no brake	BCH1002O●2A1C	LXM23●U20M3X	4 × 2.1 mm <sup>2</sup>	3	VW3M5122R30
	BCH1304N●2A1C	LXM23●U20M3X		5	VW3M5122R50
Servo motor side with military connector Drive side with flying lead, with brake	BCH1002O●2F1C	LXM23●U20M3X	6 × 2.1 mm <sup>2</sup>	3	VW3M5132R30
	BCH1304N●2F1C	LXM23●U20M3X		5	VW3M5132R50
Servo motor side with military connector Drive side with flying lead, no brake	BCH1801N●2A1C	LXM23●U20M3X	4 × 3.3 mm <sup>2</sup>	3	VW3M5123R30
	BCH1802N●2A1C	LXM23●U30M3X		5	VW3M5123R50
	BCH1802M●2A1C	LXM23●U30M3X			
	BCH1803N●2A1C	LXM23●U45M3X			
Servo motor side with military connector Drive side with flying lead, with brake	BCH1801N●2F1C	LXM23●U20M3X	6 × 3.3 mm <sup>2</sup>	3	VW3M5133R30
	BCH1802N●2F1C	LXM23●U30M3X		5	VW3M5133R50
	BCH1802M●2F1C	LXM23●U30M3X			
	BCH1803N●2F1C	LXM23●U45M3X			
Servo motor side with military connector Drive side with flying lead, no brake	BCH1803M●2A1C	LXM23●U45M3X	4 × 8.4 mm <sup>2</sup>	3	VW3M5124R30
				5	VW3M5124R50
Servo motor side with military connector Drive side with flying lead, with brake	BCH1803M●2F1C	LXM23●U45M3X	6 × 8.4 mm <sup>2</sup>	3	VW3M5134R30
				5	VW3M5134R50



VW3M8 121/122/123/124 R●●●

#### Encoder cable

Description	From servo motor	To servo drive	Composition	Length m	Reference
Servo motor side and drive side with plastic connector without battery box with battery box, using for absolute position control	BCH0401O●2●1C	LXM23●U01M3X	10 × 0.13 mm <sup>2</sup>	3	VW3M8121R30
	BCH0601O●2●1C	LXM23●U02M3X		5	VW3M8121R50
	BCH0602O●2●1C	LXM23●U04M3X			
	BCH0801O●2●1C	LXM23●U04M3X		3	VW3M8123R30
	BCH0802O●2●1C	LXM23●U07M3X		5	VW3M8123R50
Servo motor side with military connector Drive side with plastic connector	BCH1001O●2●1C	LXM23●U10M3X	10 × 0.13 mm <sup>2</sup>		
	BCH1301M●2●1C	LXM23●U04M3X			
	BCH1301N●2●1C	LXM23●U04M3X			
	BCH1302M●2●1C	LXM23●U07M3X			
	BCH1302N●2●1C	LXM23●U10M3X			
	BCH1303M●2●1C	LXM23●U10M3X		3	VW3M8122R30
	BCH1303N●2●1C	LXM23●U15M3X		5	VW3M8122R50
	BCH1002O●2●1C	LXM23●U20M3X			
	BCH1304N●2●1C	LXM23●U20M3X			
	BCH1801N●2●1C	LXM23●U20M3X		3	VW3M8124R30
without battery box	BCH1802N●2●1C	LXM23●U30M3X		5	VW3M8124R50
	BCH1802M●2●1C	LXM23●U30M3X			
	BCH1803N●2●1C	LXM23●U45M3X			
	BCH1803M●2●1C	LXM23●U45M3X			
	BCH1804M●2●1C	LXM23●U55M3X			
	BCH1805M●2●1C	LXM23●U75M3X			
with battery box, using for absolute position control	BCH1801N●2●1C	LXM23●U20M3X		3	VW3M8124R30
	BCH1802N●2●1C	LXM23●U30M3X		5	VW3M8124R50
	BCH1802M●2●1C	LXM23●U30M3X			
	BCH1803N●2●1C	LXM23●U45M3X			
	BCH1803M●2●1C	LXM23●U45M3X			
	BCH1804M●2●1C	LXM23●U55M3X			
	BCH1805M●2●1C	LXM23●U75M3X			