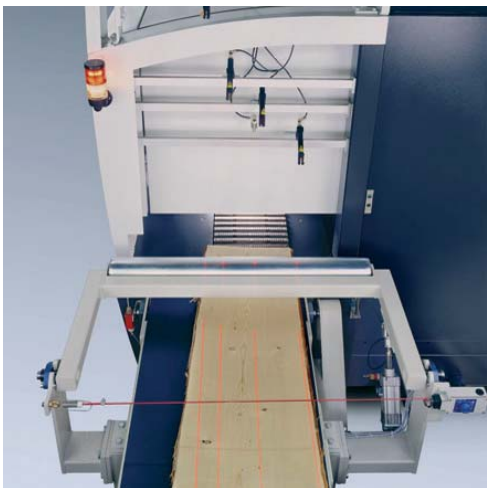# Motion control
Lexium 23 Plus
Servo drives

Packaging application

Woodworking application

Textile application

Presentation

The Lexium 23 Plus offer features a range of servo drives and a range of BCH servo motors.
There are a large number of possible combinations to suit the requirements of motion control applications and optimize the performance of the installation.

The servo drives range covers a wide range of power ratings from 0.1 kW to 7.5 kW, with two types of power supply:
- 200…255 V single phase, 0.1 kW to 1.5 kW
- 170…255 V three-phase, 0.1 kW to 7.5 kW

BCH motors provide a nominal torque from 0.3 Nm to 48 Nm and a nominal speed of between 1000 rpm and 3000 rpm, depending on the model.
They are suitable for a very wide variety of applications due to the four levels of inertia offered (see page 62322/2).

An offer to boost performance

When used with BCH servo motors and with the addition of options and accessories, Lexium 23 Plus servo drives provide a complete, very high performance system, designed in particular for installations equipped with simple machines.
See page 62320/6.

Compact range

The compact dimensions of Lexium 23 Plus servo drives mean they fit very easily into small spaces, thus reducing the size of the installation and the cost of the equipment.

Simple commissioning

Commissioning is simple with the Lexium 23 CT PC commissioning software which has an auto-tuning function enabling extremely fast start-up.
The simplicity of the wiring of Lexium 23 Plus servo drives also makes installation easier and reduces installation costs.

Flexibility

Lexium 23 Plus servo drives have digital and analog I/O as standard, and one of the following communication interfaces, depending on the model:
- Interface for CANopen/CANmotion machine bus (**LXM 23A**)
- Pulse/direction (P/D) interface (**LXM 23D**)

The servo drives incorporate numerous functions, including auto-tuning, position, speed and torque control, etc. (see page 62320/5).

This open communication concept enables integration into numerous different control system architectures.

Applications
- Material handling (conveying, palletizers, warehousing, etc.)
- Assembly (clamping, etc.)
- Printing
- Packaging
- Winding and unwinding
- Machine tools (multi-axis machines, cutting machines, etc.)
- Etc.

Motion control
Lexium 23 Plus
Servo drives

The Lexium 23 Plus servo drive range

Configuration

The drives can be configured via the integrated graphic display terminal or using the Lexium 23 CT PC commissioning software.

Control

Control via CANopen machine bus: Lexium 23A servo drive

The Lexium 23 A servo drive features a CANopen/CANmotion machine bus control interface.

It also has numerous I/O:
- 2 inputs for high performance position capture
- 8 digital inputs
- 4 digital outputs
- 2 analog inputs
- 2 analog outputs

It has a closed loop current regulation function (sampling time 62.5 μs).

It is compatible with PLCopen function blocks which offer applications such as flying shear, rotary knife, etc.

Lexium 23A Plus servo drives with control via CANopen machine bus

Control via I/O: Lexium 23D servo drive

The Lexium 23 D drive can be used in standalone operation, with no axis controller (control via digital I/O).

It can also be used with an axis controller and can therefore be incorporated in numerous architectures.

It provides, for example, the following features:
- Creation of position registers up to 8 positions
- Switching between the speed/position/torque parameters

It has a closed loop current regulation function (sampling time 62.5 μs).
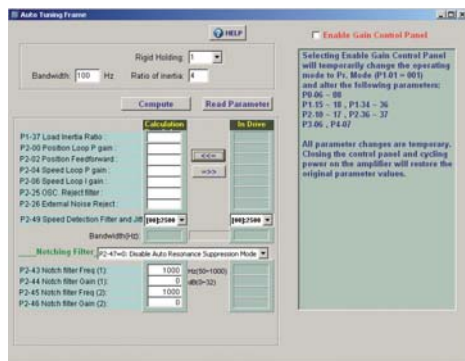
It also has a pulse/direction interface (up to 4 m/s) as well as numerous I/O:
- 8 digital inputs
- 4 digital outputs
- 2 analog inputs
- 2 analog outputs

Lexium 23D Plus servo drives with control via I/O

Commissioning using Lexium 23 CT software

Lexium 23 CT PC commissioning software : for rapid commissioning and easy configuration

The commissioning time for Lexium 23 Plus servo servo drives is considerably reduced using Lexium 23 CT PC software.
It is used for commissioning, parameter setting, diagnostics and maintenance.

It can also be used to install Lexium 23 Plus servo drives in existing installations, keeping downtime to a minimum.

Functions

Lexium 23 CT software includes the following functions:
- Auto-tuning
- Manual tuning
- Entry and display of parameters
- Oscilloscope function
- Fault diagnostics

Auto-tuning

The auto-tuning function can be activated with the Lexium 23 CT software in two ways:
□ Theoretical parameter setting: to calculate the gain parameters according to conditions selected by the user.
□ Dynamic parameter setting: for optimum control, calculating the gain parameters in real time, according to the behaviour of the machine.

Entry and display of parameters

The Lexium 23 CT software can be used to configure all the functions of a given operating mode.

The user interface of the Lexium 23 CT software enables quick, easy navigation. All the parameters can be displayed on a single graphic screen, which gives the experienced user a great deal of flexibility.

Frequency analysis (FFT)

The frequency analysis, based on the Fast Fourier Transform (FFT) algorithm, is used to diagnose noise and vibration in machines.

To carry out the FFT analysis, the motor records the behaviour of the axis in terms of current and speed. Once the movement has been executed, the Lexium 23 CT commissioning software analyses the resonance peaks and displays them on the oscilloscope screen.
It is possible to enter the gain as a numerical value, a variable or an expression in the gain parameter field.

Filters can be applied to reduce resonance.

Oscilloscope function

The Lexium 23 CT PC commissioning software provides an Oscilloscope function which can be used in two ways:
- Realtime mode: to monitor the evolution of a value measured in real time
- Precision mode: to capture a precise moment of the application This function records all the information before displaying it, which enables very precise information to be obtained and very fine tuning to be carried out.

Required configuration

The Lexium 23 CT software runs on a PC with the Microsoft Windows® 2000/XP/Vista operating systems. The servo drive is commissioned via the RS 232 serial link interface.

Downloading

The Lexium 23 CT PC commissioning software can be downloaded from our website www.schneider-electric.com.

Motion control
Lexium 23 Plus
Servo drives

Main functions

Lexium 23 Plus servo drives feature numerous functions enabling them to be used in a wide range of motion control applications.

Main functions of Lexium 23 Plus servo drives

■ Automatic recognition of the motor
■ Filtering:
□ Reduction of resonance
□ Low pass filter for attenuation of high frequency disturbance
□ Command smoothing
■ Monitoring functions:
□ Status monitoring, I/O monitoring
□ Fault log, fault reset
□ Monitoring of closed loop control, etc.

Tuning functions

■ Manual mode (JOG) for position and speed
■ Auto-tuning: This function is used to optimize application performance

Operating modes for the Lexium 23D version (activation/setting parameters of functions via the digital I/O)

Position control

In this mode position and speed control are carried out via a pulse train sent by an axis controller, such as a PLC, a motion controller or a numerical controller.

This mode is particularly suitable for the following applications:
■ Material handling
■ Cutting to length
■ Packaging

Speed control

In this mode the Lexium 23 Plus servo drive is controlled with an axis controller with analog output. It is suitable for any application requiring high-performance speed control.

This mode is particularly suitable for the following applications:
■ Winding
■ Unwinding

Current regulation

Current regulation is required in applications in which servo motor torque control is crucial.

This mode is particularly suitable for the following applications:
■ Printing
■ Winding

Parameter switching

This function enables switching between three sets of parameters:
■ Speed/position
■ Speed/torque
■ Torque/position
This function is specifically for machines with numerous manufacturing processes.

Other functions

■ Speed limiting
■ Torque limiting
■ Encoder simulation (ESIM): control of speed, torque or frequency

Operating modes for the Lexium 23A version (activation/setting parameters of functions via the CANopen machine bus)

The following operating modes are available:
■ Homing (in accordance with functional profile CiA DSP 402)
■ Point-to-point mode (in accordance with functional profile CiA DSP 402)
■ Position gear mode
■ Sync (cyclic)

For details of all the functions integrated in Lexium 23 Plus servo drives, please consult our website www.schneider-electric.com.
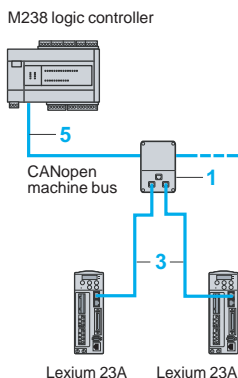
BCH servo motor/Lexium 23 Plus servo drive combinations

Motor		Servo drive				Combination		Motor inertia type
Power indicated on rating plate	Inertia (without brake)	Nominal torque	Maximum peak torque	Maximum speed	Nominal speed	Servo drive	Servo motor	
kW	kgcm²	Nm	Nm	rpm	rpm			
Supply voltage, single phase: 200…255 V or three-phase: 170…255 V 50/60 Hz								
0.1	0.037	0.32	0.96	5000	3000	**LXM23●U01M3X**	BCH0401O●2●1C	Ultra low
0.2	0.177	0.64	1.92	5000	3000	**LXM23●U02M3X**	BCH0601O●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**	BCH0602O●2●1C	Ultra low
0.4	0.68	1.27	3.82	5000	3000	**LXM23●U04M3X**	BCH0801O●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**	BCH0802O●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**	BCH1001O●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 supply voltage: 170…255 V 50/60 Hz								
2	4.45	6.37	19.11	5000	3000	**LXM23●U20M3X**	BCH1002O●2●1C	Low
2	14.59	9.55	26.65	3000	2000	**LXM23●U20M3X**	BCH1304N●2●1C	Medium
2	34.58	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	19.1	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

References

Example	L	X	M	2	3	A	U	0	1	M	3	X
Servo drive **LXM** = Lexium servo drive	**L**	**X**	**M**	2	3	A	U	0	1	M	3	X
Drive type **23** = standard	L	X	M	**2**	**3**	A	U	0	1	M	3	X
Interface **A** = CANopen machine bus **D** = pulse/direction interface	L	X	M	2	3	**A**	U	0	1	M	3	X
Power **U01** = 0.1 kW **U02** = 0.2 kW **U04** = 0.4 kW **U07** = 0.75 kW **U05** = 0.5 kW **U10** = 1 kW **U15** = 1.5 kW **U20** = 2 kW **U30** = 3 kW **U45** = 4.5 kW **U55** = 5.5 kW **U75** = 7.5 kW	L	X	M	2	3	A	**U**	**0**	**1**	M	3	X
Supply voltage **M3X** = 200…240 V ∼ single phase or three-phase	L	X	M	2	3	A	U	0	1	**M**	**3**	**X**

Dimensions (overall in mm)

Servo drives	LXM 23					
	●U01M3X ●U02M3X ●U04M3X	●U07M3X ●U10M3X ●U15M3X	●U20M3X ●U30M3X	●U45M3X	●U55M3X	●U75M3X
W x H	60 x 162	85 x 162	114 x 225	110 x 245	123 x 245	136 x 245
D	146	180	195	205	216.5	

M238 logic controller

5

CANopen
machine bus — **1**

3

Lexium 23A   Lexium 23A

*Example of architecture
with control by M238 logic
controller*

Twido programmable controller +
TWD NC01M

4

CANopen
machine bus

3

2

Lexium 23A   Lexium 23A
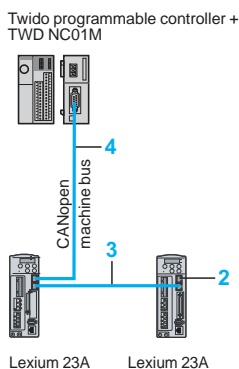
*Example of architecture
with control by Twido
programmable controller*

Lexium Controller
LMC 20 or LMC 20A130●

4

CANmotion
machine bus

3

2

Lexium 23A   Lexium 23A
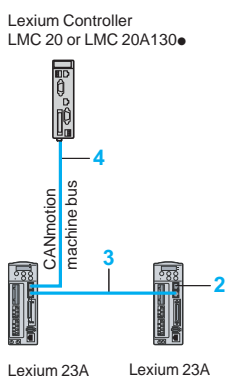
*Example of architecture
with control by LMC Lexium
Controller*

CANopen and CANmotion machine bus for Lexium 23 Plus servo drives

Lexium 23 Plus 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 RJ45 connectors.
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 23 Plus servo drives.

Connection accessories *(1)*

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

Cordsets and cables *(1)*

Description	Use From	To	Item no.	Length m	Reference	Weight kg
CANopen cordsets equipped with 2 RJ45 connectors	VW3 CAN TAP2 junction box LXM 23A servo drive	LXM 23A servo drive	**3**	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 Lexium motion controller LMC 20, LMC 20A130●	LXM 23A servo drive	**4**	1	**VW3 M3 805R010**	–
				3	**VW3 M3 805R030**	–
CANopen cables Standard cables, CE marking Low smoke, zero halogen 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 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 Cables for harsh environments *(2)* or mobile installations, CE marking Low smoke, zero halogen 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 our website www.schneider-electric.com.
(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

Motion control
Lexium 23 Plus
Option: braking resistors for servo drives

Presentation

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.

It enables maximum braking torque.

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. In this case, the internal braking resistor must be deactivated.

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

The degree of protection of the unit is IP 21.

Applications

Machines with high inertia, driving loads and machines with fast cycles.

References

Ohmic value	Continuous power PPr	Peak energy (220 V) EPk	Reference	Weight
Ω	W	Ws		kg
40	400	4000	**VW3 M7 111**	0.930
20	1000	4000	**VW3 M7 112**	2.800

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 23 Plus servo drive (see page 62320/6).*

*Presentation,
references*

Motion control
Lexium 23 Plus
Option: additional EMC input filters for
servo drives

Lexium 23 Plus servo drive
with additional EMC filter
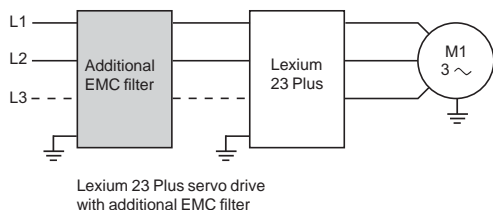
Additional EMC input filters

Applications

Combined with Lexium 23 Plus servo drives, additional EMC input 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/EN 61800-3 edition 2 category C2 or C3 (EMC immunity and conducted and radiated EMC emissions).

The additional EMC filters have tapped holes for mounting in an enclosure.

Use according to the type of line supply

EMC filters can only be used on TN (neutral connection) and TT (neutral to earth) type systems.

Lexium 23 Plus servo drives cannot be used on IT (isolated or impedance earthed neutral) systems. Standard IEC/EN 61800-3, appendix D2.1, states that on IT systems, filters can cause permanent insulation monitors to operate in a random manner.

In addition, the effectiveness of additional filters on this type of system depends on the type of impedance between neutral and earth, and therefore cannot be predicted.

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

Additional EMC filter VW3 A31 401

References

For servo drive	Maximum servo motor shielded cable length conforming to		Reference	Weight
	EN 55011 class A Gr1	EN 55011 class A Gr2		
	IEC/EN 61800-3 category C2 *(1)* in environment 1	IEC/EN 61800-3 category C3 *(1)* in environment 2		
	m	**m**		**kg**
Single phase supply voltage				
LXM23●U01M3X LXM23●U02M3X LXM23●U04M3X	–	–	**VW3 A31 401**	0.600
LXM23●U07M3X LXM23●U10M3X LXM23●U15M3X	–	–	**VW3 A31 403**	0.775
Three-phase supply voltage				
LXM23●U07M3X LXM23●U10M3X LXM23●U15M3X LXM23●U20M3X LXM23●U30M3X	20	40	**VW3 A31 404**	0.900
LXM23●U45M3X LXM23●U55M3X	20	40	**VW3 A31 406**	1.350
LXM23●U75M3X	20	40	**VW3 A31 407**	3.150

(1) Standard IEC/EN 61800-3: EMC immunity and conducted and radiated EMC emissions:
- Category C2 in environment 1: restricted distribution, for domestic use, sale conditional on the competence of the user and the distributor in the reduction of current harmonics.
- Category C3 in environment 2: industrial premises.