ภาคผนวก ช
เอกสารที่เกี่ยวข้อง

เอซีเซอร์โวมอเตอร์ (AC Servo Motor)

Product data sheet
Characteristics

BMH0701T12A1A
servo motor BMH - 1.4 Nm - 8000 rpm - keyed shaft - without brake - IP54

Green Premium™

Main

Product or component type	Servo motor
Device short name	BMH
Maximum mechanical speed	8000 rpm
Continuous stall torque	1.4 N.m for LXM32.U90M2 3 A at 230 V single phase 1.4 N.m for LXM32.D18M2 6 A at 115 V single phase
Peak stall torque	4 N.m for LXM32.U90M2 3 A at 230 V single phase 4.2 N.m for LXM32.D18M2 6 A at 115 V single phase
Nominal output power	450 W for LXM32.U90M2 3 A at 230 V single phase 350 W for LXM32.D18M2 6 A at 115 V single phase
Nominal torque	1.1 N.m for LXM32.U90M2 3 A at 230 V single phase 1.35 N.m for LXM32.D18M2 6 A at 115 V single phase
Nominal speed	4000 rpm for LXM32.U90M2 3 A at 230 V single phase 2500 rpm for LXM32.D18M2 6 A at 115 V single phase
Product compatibility	LXM32.U90M2 at 230 V single phase LXM32.D18M2 at 115 V single phase
Shaft end	Keyed
IP degree of protection	IP54 (standard)
Speed feedback resolution	131072 points/turn x 4096 turns
Holding brake	Without
Mounting support	International standard flange
Electrical connection	Straight connectors

Complementary

Range compatibility	Lexium 32
[Us] rated supply voltage	240 V
Network number of phases	Three phase
Continuous stall current	2.85 A
Continuous power	1.05 W
Maximum current Irms	9.6 A for LXM32.U90M2 9.6 A for LXM32.D18M2
Maximum permanent current	9.56 A
Second shaft	Without second shaft end
Shaft diameter	11 mm
Shaft length	23 mm
Key width	18 mm
Feedback type	Multiturn SinCos Hiperface
Motor flange size	70 mm
Number of motor stacks	1
Torque constant	0.49 N.m/A at 120 °C
Back emf constant	31.17 V/krpm at 120 °C

Number of motor poles	10
Rotor inertia	0.59 kg.cm²
Stator resistance	3.2 Ohm at 20 °C
Stator inductance	9.1 mH at 20 °C
Stator electrical time constant	2.8 ms at 20 °C
Maximum radial force Fr	360 N at 6000 rpm 380 N at 5000 rpm 410 N at 4000 rpm 460 N at 3000 rpm 520 N at 2000 rpm 660 N at 1000 rpm
Maximum axial force Fa	0.2 x Fr
Type of cooling	Natural convection
Length	122 mm
Centring collar diameter	60 mm
Centring collar depth	2.5 mm
Number of mounting holes	4
Mounting holes diameter	5.5 mm
Circle diameter of the mounting holes	82 mm
Product weight	1.6 kg

Offer Sustainability

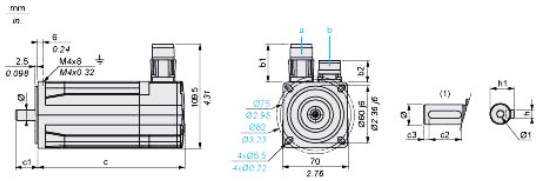
Sustainable offer status	Green Premium product
REACh	Reference not containing SVHC above the threshold
Product environmental profile	Available Download Product Environmental
Product end of life instructions	Need no specific recycling operations

Product data sheet
Dimensions Drawings

BMH0701T12A1A

Servo Motors Dimensions

Example with Straight Connectors



a: Power supply for servo motor brake
b: Power supply for servo motor encoder
(1) Shaft end, keyed slot (optional)

Dimensions in mm

Straight connectors		Rotatable angled connectors		c (without brake)	c (with brake)	c1	c2	c3	h	h1	Ø	Ø1 for screws
b1	b2	b1	b2									
39.5	25.5	39.5	39.5	122	161	23	18	2.5	4 h9	$12.5^{+0}_{-0.13}$	11 k6	M4 x 14

Dimensions in in.

Straight connectors		Rotatable angled connectors		c (without brake)	c (with brake)	c1	c2	c3	h	h1	Ø	Ø1 for screws
b1	b2	b1	b2									
1.55	1	1.55	1.55	4.80	6.33	0.90	0.70	0.09	0.16 h9	$0.49^{+0}_{-0.0051}$	0.43 k6	M4 x 0.55

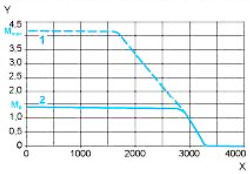
Product data sheet
Performance Curves

BMH0701T12A1A

115 V Single-Phase Supply Voltage

Torque/Speed Curves

Servo motor with LXM32•D18M2 servo drive

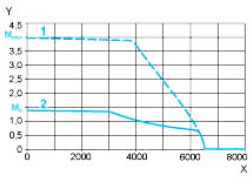


X Speed in rpm
Y Torque in Nm
1 Peak torque
2 Continuous torque

230 V Single-Phase Supply Voltage

Torque/Speed Curves

Servo motor with LXM32•U90M2 servo drive



X Speed in rpm
Y Torque in Nm
1 Peak torque
2 Continuous torque

ชุดขับเคลื่อนมอเตอร์ (Drive Servo Amplifier)

Product data sheet
Characteristics

LXM32AU90M2
motion servo drive - Lexium 32- single phase supply voltage 115/230V - 0.3/0.5kW

Main

Range of product	Lexium 32
Product or component type	Motion servo drive
Device short name	LXM32A
Format of the drive	Book
Network number of phases	Single phase
[Us] rated supply voltage	200...240 V (- 15...10 %) 100...120 V (- 15...10 %)
Supply voltage limits	170...264 V 85...132 V
Supply frequency	50/60 Hz (- 5...5 %)
Network frequency	47.5...63 Hz
EMC filter	Integrated
Continuous output current	3 A (f = 8 kHz)
Output current 3s peak	9 A at 230 V for 5 s 6 A at 115 V for 5 s
Maximum continuous power	900 W at 230 V 300 W at 115 V
Nominal power	0.5 kW at 230 V (f = 8 kHz) 0.3 kW at 115 V (f = 8 kHz)
Line current	4.5 A, THDI of 166 % at 230 V, without line choke 5.4 A, THDI of 159 % at 115 V, without line choke 6.3 A, THDI of 107 % at 230 V, with external line choke of 2 mH 5.2 A, THDI of 90 % at 115 V, with external line choke of 2 mH

Complementary

Switching frequency	8 kHz
Overvoltage category	III
Leakage current	< 30 mA
Output voltage	<= power supply voltage
Electrical isolation	Between power and control
Type of cable	Single-strand IEC cable (for θ = 50 °C) conductor material: copper 90 °C ,wire insulation material: XLPE/EPR
Electrical connection	Terminal cable 5 mm² AWG 10 (CN10) Terminal cable 5 mm² AWG 10 (CN1) Terminal cable 3 mm² AWG 12 (CN8)
Tightening torque	0.7 N.m (CN10) 0.7 N.m (CN1) 0.5 N.m (CN8)
Discrete input number	4 logic 2 safety 1 capture
Discrete input type	Safety (compliment of STO_A, compliment of STO_B) Logic (DI) Capture (CAP)
Sampling duration	0.25 ms (DI) for discrete
Discrete input voltage	24 V DC for safety 24 V DC for logic 24 V DC for capture

Discrete input logic	Positive or negative (DI) at State 0: < 5 V at State 1: > 15 V conforming to EN/IEC 61131-2 type 1 Positive (DI) at State 0: > 19 V at State 1: < 9 V conforming to EN/IEC 61131-2 type 1 Positive (compliment of STO_A, compliment of STO_B) at State 0: < 5 V at State 1: > 15 V conforming to EN/IEC 61131-2 type 1
Response time	<= 5 ms (compliment of STO_A, compliment of STO_B)
Discrete output number	2
Discrete output type	Logic (DO) 24 V DC
Discrete output voltage	<= 30 V DC
Discrete output logic	Positive or negative (DO) conforming to EN/IEC 61131-2
Contact bounce time	0.25 µs...1.5 ms (DI) 2 µs (CAP) <= 1 ms (compliment of STO_A, compliment of STO_B)
Braking current	50 mA
Response time on output	250 µs (DO) discrete
Control signal type	Servo motor encoder feedback
Protection type	Against short-circuits :outputs signal Against reverse polarity :inputs signal
Safety function	STO (safe torque off), integrated
Safety level	PL = e conforming to ISO 13849-1 SIL 3 conforming to EN/IEC 61508
Communication interface	Integrated Modbus Integrated CANopen Integrated CANmotion
Type of connector	RJ45 (labelled CN7) :Modbus RJ45 (labelled CN4 or CN5) :CANopen RJ45 (labelled CN4 or CN5) :CANmotion
Method of access	Slave
Commissioning port	2-wire RS485 multidrop Modbus
Transmission rate	9600, 19200, 38400 bps for bus length of <= 40 m Modbus 500 kbps for bus length of <= 100 m CANopen, CANmotion 50 kbps for bus length of <= 1000 m CANopen, CANmotion 250 kbps for bus length of <= 250 m CANopen, CANmotion 125 kbps for bus length of <= 500 m CANopen, CANmotion 1 Mbps for bus length of <= 4 m CANopen, CANmotion
Number of addresses	1...247 Modbus 1...127 CANopen, CANmotion
Communication service	Sync CANmotion Position control, speed profile, torque profile and homing mode CANopen Position control mode CANmotion Node guarding, heartbeat CANopen Event-triggered, time-triggered, remotely requested,sync (cyclic), sync(acyclic) CANopen Emergency CANopen, CANmotion Display of faults on integrated display terminal Modbus CANopen device profile drives and motion control CANopen, CANmotion 4 configurable mapping PDOs CANopen 2 SDOs send CANopen 2 SDOs receive CANopen 2 PDOs conforming to DSP 402 CANmotion 1 transmit SDO CANmotion 1 receive SDO CANmotion
Status LED	1 LED RUN 1 LED error 1 LED (red) servo drive voltage
Signalling function	Display of faults in 7 segments
Marking	CE
Operating position	Vertical +/- 10 degree
Product compatibility	Servo motor BSH (55 mm, 2 motor stacks) Servo motor BSH (55 mm, 1 motor stacks) Servo motor BSH (55 mm, 3 motor stacks) Servo motor BSH (70 mm, 1 motor stacks) Servo motor BMH (70 mm, 1 motor stacks)
Width	48 mm
Height	270 mm
Depth	237 mm
Product weight	1.7 kg

Environment

Electromagnetic compatibility	Radiated EMC at category C3 conforming to EN/IEC 61800-3 Radiated EMC at class A group 2 conforming to EN 55011 Electrical fast transient/burst immunity test at level 4 conforming to EN/IEC 61000-4-4 1.2/50 µs shock waves immunity test at level 3 conforming to EN/IEC 61000-4-5 Susceptibility to electromagnetic fields at level 3 conforming to EN/IEC 61000-4-3 Electrostatic discharge immunity test at level 3 conforming to EN/IEC 61000-4-2 Conducted EMC at environments 1 and 2 conforming to EN/IEC 61800-3 Conducted EMC at category C2 conforming to EN/IEC 61800-3 Conducted EMC at environment 2 category C3 conforming to EN/IEC 61800-3 Conducted EMC at class A group 2 conforming to EN 55011 Conducted EMC at class A group 1 conforming to EN 55011
Standards	EN/IEC 61800-3 EN/IEC 61800-5-1
Product certifications	CSA RoHS TÜV UL
IP degree of protection	IP20 conforming to EN/IEC 61800-5-1 IP20 conforming to EN/IEC 60529
Vibration resistance	1.5 mm peak to peak (f = 3...13 Hz) conforming to EN/IEC 60068-2-6 1 gn (f = 13...150 Hz) conforming to EN/IEC 60068-2-6
Shock resistance	15 gn for 11 ms conforming to EN/IEC 60028-2-27
Pollution degree	2 conforming to EN/IEC 61800-5-1
Environmental characteristic	Classes 3C1 conforming to IEC 60721-3-3
Relative humidity	Class 3K3 (5 to 85 %) without condensation conforming to IEC 60721-3-3
Ambient air temperature for operation	0...50 °C conforming to UL
Ambient air temperature for storage	-25...70 °C
Type of cooling	Natural convection
Operating altitude	> 1000...3000 m with conditions <= 1000 m without derating

Offer Sustainability

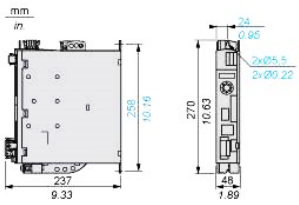
Sustainable offer status	Not Green Premium product
REACh	Reference not containing SVHC above the threshold
Product environmental profile	Available Download Product Environmental

Product data sheet
Dimensions Drawings

LXM32AU90M2

Lexium 32 Servo Drive

Dimensions

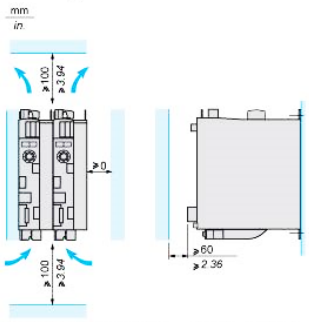


Product data sheet
Mounting and Clearance

LXM32AU90M2

Lexium 32 Motion Control Servo Drives

Mounting Recommendations



LXM32•U45M2, •U90M2 and LXM32•U60N4 servo drives are cooled by natural convection. LXM32•D18M2, •D30M2, LXM32 •D12N4, •D18N4, •D30N4 and •D72N4servo 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/7.87 in. is required under the unit to comply with the bending radius of the connection cables.

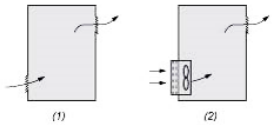
Ambient temperature	Mounting distances	Instructions to be followed
0°C...+ 50°C	d ≥ 0 mm	–
+ 50°C...+ 60°C	d ≥ 0 mm	Reduce the output current by 2.2% per °C above 50°C

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

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.



(1) Natural convection
(2) Forced ventilation

- Any apertures and/or fans must provide a flow rate at least equal to that of the servo drive fans (refer to characteristics).
- Use special filters with IP 54 protection.

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.

พีแอลซี (Programmable Logic Control : PLC)

Product data sheet
Characteristics

TM258LF42DT4L
compact base M258 - 42 + 4 I/O - 24 V DC - CANopen

Green Premium™

Main

Range of product	Modicon M258
Product or component type	Logic controller
Product specific appli-cation	-
Discrete I/O number	42
Analogue input number	4
Discrete output number	4 for fast output 12 for output

Complementary

Discrete input number	4 for regular input 12 for input 10 for fast input
Discrete input logic	Source for input Sink for regular input Sink for fast input
Discrete input voltage	24 V
Discrete input voltage type	DC
Analogue input type	Voltage +/- 10 V Current 4...20 mA Current 0...20 mA
Analogue input resolution	12 bits
Voltage state1 guaranteed	>= 15 V for regular input >= 15 V for fast output >= 15 V for fast input
Current state 1 guaranteed	>= 2 mA for regular input >= 2 mA for fast output >= 2 mA for fast input
Voltage state 0 guaranteed	<= 5 V for regular input <= 5 V for fast output <= 5 V for fast input
Current state 0 guaranteed	<= 1.5 mA for regular input <= 1.5 mA for fast output <= 1.5 mA for fast input
Discrete input current	4 mA for regular input 4 mA for fast input
Input impedance	6 kOhm for regular input 6 kOhm for fast input
Configurable filtering time	4 ms for fast input/regular input and fast output 12 ms for fast input/regular input and fast output 1.5 ms for fast input/regular input and fast output 0 ms for fast input/regular input and fast output
Anti bounce filtering	2 µs...4 ms (configurable)fast input/regular input and fast output
Cable length	<= 30 m regular input <= 30 m fast output <= 30 m fast input
Isolation between channels and internal logic	500 Vrms AC
Isolation between channels	None
Discrete output logic	Source

Discrete output voltage	24 V DC
Output voltage limits	19.2...28.8 V
Discrete output current	4 mA for fast output
[Us] rated supply voltage	24 V DC for main supply 24 V DC for I/O power segment 24 V DC for embedded expert modules power
Supply voltage limits	20.4...28.8 V
[In] rated current	10 A for I/O power segment 0.31 A for main supply 0.04 A for embedded expert modules power
Peak current	1.2 A during > 70 s main supply <= 50 kA during <= 150 s embedded expert modules power <= 25 kA during <= 500 s I/O power segment <= 100 kA during <= 70 s main supply
Power consumption	<= 14.14 W
Execution time per instruction	Boolean: 22 ns
Memory description	Internal RAM 64 MB Flash 128 MB
Realtime clock	Without any user calibration realtime clock, drift: < 30 s/month at 25 °C With user calibration realtime clock, drift: <= 6 s/month
Data backed up	Variables of type retain and retain persistent CR2477M Renata, 1.5 years autonomy
Integrated connection type	2 free slots PCI 1 isolated serial link USB type A, 480 Mbit/s 1 isolated serial link mini B USB, 480 Mbit/s 1 isolated serial link female RJ45, Modbus master/slave RTU/ASCII or character mode ASCII (RS232/RS485), 300...115200 bps 1 isolated serial link female RJ45, Ethernet Modbus TCP/IP slave (10BASE-T/100BASE-TX) 1 CANopen male SUB-D 9, CANopen master
Transmission rate	800 kbit/s for bus length of 25 m, CANopen 20 kbit/s for bus length of 2500 m, CANopen 1000 kbit/s for bus length of 4 m, CANopen 10 kbit/s for bus length of 5000 m, CANopen 500 kbit/s for bus length of 100 m, CANopen 50 kbit/s for bus length of 1000 m, CANopen 250 kbit/s for bus length of 250 m, CANopen 125 kbit/s for bus length of 500 m, CANopen
Counting input number	8 counting input(s)200 kHz
Local signalling	1 LED red for BATT (battery status) 1 LED green/yellow for Eth LA (Ethernet activity) 1 LED green/red for USB host 1 LED green/red for RUN/MS (module status) 1 LED green/red for Eth ST (Ethernet status) 1 LED green/red for Eth NS (Ethernet network status) 1 LED green/red for APP1 1 LED green/red for APP0 1 LED for MBS COM 1 LED for CAN0 STS 1 LED per channel for I/O state
Marking	CE
Mounting support	Symmetrical DIN rail
Width	237.5 mm
Height	99 mm
Depth	85 mm
Product weight	0.77 kg

Environment

Standards	CSA C22.2 No 142 IEC 61131-2 UL 508 CSA C22.2 No 213
Product certifications	CSA C-Tick CULus GOST-R
Ambient air temperature for operation	0...60 °C with derating factorhorizontal installation 0...55 °C without derating factorhorizontal installation 0...50 °C vertical installation
Ambient air temperature for storage	-25...70 °C
Relative humidity	5...95 % without condensation
IP degree of protection	IP20 conforming to IEC 61131-2
Pollution degree	2 conforming to IEC 60664
Operating altitude	0...2000 m
Storage altitude	0...3000 m
Vibration resistance	3.5 mm 5...8.4 Hz DIN rail 1 gn 8.4...150 Hz DIN rail
Shock resistance	15 gn for 11 ms
Resistance to electrostatic discharge	8 kV in air conforming to EN/IEC 61000-4-2 4 kV on contact conforming to EN/IEC 61000-4-2
Resistance to electromagnetic fields	10 V/m 80...2000 MHz conforming to EN/IEC 61000-4-3 1 V/m 2...2.7 GHz conforming to EN/IEC 61000-4-3
Resistance to fast transients	2 kV power lines conforming to EN/IEC 61000-4-4 1 kV shielded cable conforming to EN/IEC 61000-4-4 1 kV I/O conforming to EN/IEC 61000-4-4
Surge withstand	1 kV common mode conforming to EN/IEC 61000-4-5 0.5 kV differential mode conforming to EN/IEC 61000-4-5
Disturbance radiated/conducted	CISPR 11

Offer Sustainability

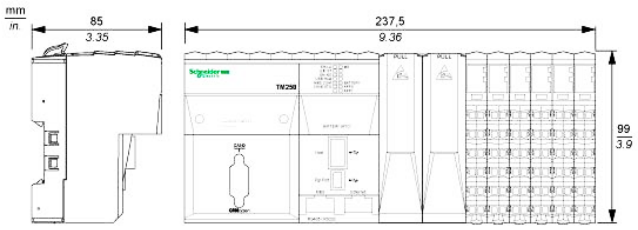
Sustainable offer status	Green Premium product
Product environmental profile	Available Download Product Environmental
Product end of life instructions	Available Download End Of Life Manual

Product data sheet
Dimensions Drawings

TM258LF42DT4L

Controller

Dimensions



Product data sheet
Connections and Schema

TM258LF42DT4L

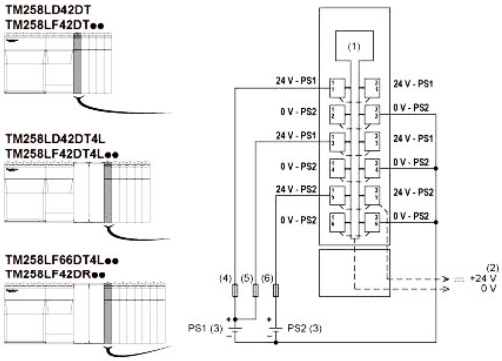
TM5 System Wiring Recommendations

Wire Sizes to Use with Removable Spring Terminal Blocks

mm / in. 3 / 0.35				
mm^2	0,08...2,5	0,25...2,5	0,25...1,5	2 x 0,25...2 x 0,75
AWG	28...14	24...14	24...16	2 x 24...2 x 18

External Power Supplies

Wiring Diagram of the Controller Power Distribution Module



(1) Internal electronics
(2) 24 Vdc I/O power segment integrated into the bus bases
(3) PS1/PS2: External isolated SELV power supply 24 Vdc
(4) External fuse, **T**ype **T** slow-blow, 3 A 250 V
(5) External fuse, **T**ype **T** slow-blow, 2 A 250 V
(6) External fuse, **T**ype **T** slow-blow, 10 A max., 250 V