M12 Lexium MDrive®

Simplifying machine building with compact integrated motors

CANopen version with circular connectors
Integrated stepper motors with on-board controller,
I/O, drive electronics, and closed loop performance

CE RoHS REACH **IP65**

Kinetic-Systems
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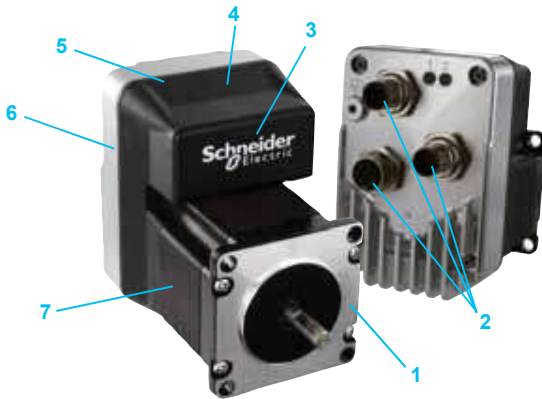**69440 MORNANT**
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M12 Lexium MDrive® CANopen
CANopen interface
integrated 2-phase stepper motor with circular connectors

CE ☑RoHS REACH

1 rotary stepper motor
2 M12 sealed circular connectors
3 microstepping drive
4 motion controller
5 up to 8 I/O lines
6 internal encoder option
7 closed loop performance

Product offer

M12 Lexium MDrive® CANopen products integrate a high-torque 1.8° 2-phase stepper motor with on-board controller, I/O, drive electronics, and closed loop performance with internal encoder option.

M12 Lexium MDrive Motion CANopen products (LMD•A•C) support CiA DS301 and DSP402 Device Profile for Drives and Motion Control. Interface to CANopen networks is easy with direct configuration of LMD products via layer setting services. A Communication Converter Kit (part # MD-CC502-000) with CAN dongle, cables and configuration utility is available to facilitate prototyping.

Closed loop products (LMDCA•C) are equipped with 1000 line (4000 count/rev) encoders internal to the unit, requiring no extra space in an application. Encoders perform stall detection, position maintenance and find index mark, in addition to monitoring motor shaft position for real time closed loop feedback accomplished with hMTechnology.

Unlike traditional motor systems, hMT combines the best of servo and stepper motor technologies, while delivering unique capabilities and enhancements over both, including:
– real time closed loop control   – no loss of synchronization/stalling
– full use of motor torque   – torque mode control
– reduced motor heat *(1)*   – lower energy consumption *(1)*

Application areas

Lexium MDrive CANopen products with circular connectors are ideal for machine builders who want an optimized motor with on-board electronics in a robust, sealed package. LMD closed loop products deliver enhanced performance, providing a lower cost option to servo motors in many applications. Integrated electronics of the Lexium MDrive CANopen products also reduce the potential for problems due to electrical noise by eliminating cabling between motor and drive.

These compact, powerful and cost effective motion control solutions deliver unsurpassed smoothness and performance that will reduce system cost, design and assembly time for a large range of motion applications.

Features

■ Integrated microstepping drive and high torque 1.8° 2-phase NEMA stepper motor
■ Integrated motion controller
■ M12 sealed circular connectors
■ Closed loop control with 1000 line internal encoder and hMTechnology (optional)
    – Prevents motor stalling while delivering numerous performance advantages
    – Variable current control reduces motor heat and lowers energy consumption
■ Advanced current control for exceptional performance and smoothness
■ CANopen interface protocol
■ +12 up to +70 VDC input power range
■ Cost effective
■ Extremely compact
■ Up to 8 I/O
    – Up to four +5 to +24 VDC signal inputs
    – One 12 bit analog input
    – Two 100mA power outputs (only LMD57 & LMD85 products)
    – One 5.5mA high-speed signal output
■ Auxiliary logic power supply input
■ 20 microstep resolutions to 51,200 steps/rev including: Degrees, Metric, Arc Minutes
■ Programmable motor run and hold currents
■ 0 to 2.56 MHz step clock rate selectable in 0.59 Hz increments
■ Motor stack lengths: single, double and triple
■ Graphical user interface available to configure setup parameters and perform firmware upgrades via optional MD-CC502-000 communication converter

(1) Achieved with hMTechnology variable current control.

M12 Lexium MDrive® CANopen
CANopen interface
integrated 2-phase stepper motor with circular connectors

Specifications

			LMD•A57•C (NEMA23)	LMD•A85•C (NEMA34)
Input power	Voltage		+12...+60 VDC	+12...+70 VDC
	Current maximum *(1)*		3.5 A	4.0A
I/O sourcing or sinking	Number of I/O	Analog input	1	1
		Signal inputs	4	4
		Power outputs	2	2
		Signal outputs	1	1
	Analog input	Resolution	12 bit	
		Voltage range	0...+5 VDC, 0...+10 VDC, 0...20 mA, 4...20 mA	
	Signal inputs	Voltage range	+5 ... +24 VDC, TTL level compatible	
		Protection	over temp, short circuit, transient, over voltage, inductive clamp	
	Power outputs	Current rating	-100...+100mA	
		Voltage range	-24...+24 VDC	
	High-speed signal output	Current open collector/emitter	5.5 mA	
		Voltage open collector	+60 VDC	
		Voltage open emitter	+7 VDC	
Thermal	Operating temp non-condensing	Heat sink maximum	85°C	
		Motor maximum	100°C	
Protection	Type	Temp warning	0...84°C, user selectable	
		Earth grounding	via product chassis ground lug	
		IP rating	IP65	IP20
Aux. logic input	Voltage range *(2)*		+12...+24 VDC	
Communication	Type		RS-422/485	
	Baud rate		4.8...115.2 kbps	
Motion	Microstep resolution	Number of settings	20	
		Steps per revolution	200, 400, 800, 1000, 1600, 2000, 3200, 5000, 6400, 10000, 12800, 20000, 25000, 25600, 40000, 50000, 51200, 36000 (0.01 deg/µstep), 21600 (1 arc minute/µstep), 25400 (0.001mm/µstep)	
	Encoder *(3)*	Line count	1000 lines/4000 edges per rev	
		Style	internal, magnetic	
	Counters	Type	position, encoder/32 bit	
		Edge rate maximum	5 MHz	
	Velocity	Range	+/- 2,560,000 steps per second	
		Resolution	0.5961 steps per second	
	Accel/Decel	Range	1.5×10^9 steps per second^2	
		Resolution	90.9 steps per second^2	
Software	Program storage	Type/size	flash / 11,120	
	User registers		four 32 bit	
	User program labels & variables		336	
	Math functions		+, −, ×, ÷, >, <, =, <=, >=, AND, OR, XOR, NOT	
	Branch functions		Branch and Call	
	General purpose I/O functions	Inputs	home, limit plus, limit minus, go, stop, pause, jog plus, jog minus, reset, capture, general purpose	
		Outputs	moving, error, stall, velocity change, general purpose, locked rotor, moving to position, hMT active, make up active, attention	
	Trip functions		trip on input, trip on position, trip on time, trip capture, trip on relative position	
	Party mode addresses		62	
	Encoder functions		stall detection, position maintenance, find index	

(1) Actual power supply current will depend on voltage and load.
(2) When input voltage is removed, maintains power only to control and feedback circuits.
(3) Only with Lexium MDrive closed loop/encoder products.

An optional Communication Converter Kit is available to facilitate prototyping..
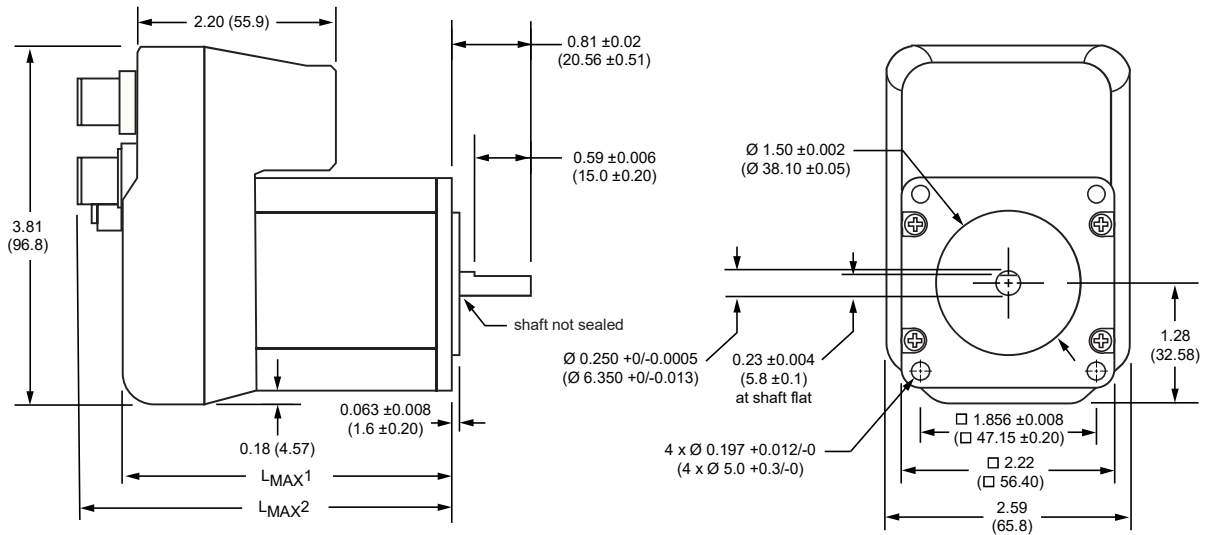
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integrated 2-phase stepper motor with circular connectors

LMD•57•C NEMA23 motor – dimensions in inches (mm)

Motor stack length	Lmax1	Lmax2
Single	3.22 (81.8)	3.83 (97.3)
Double	3.56 (90.4)	4.21 (106.9)
Triple	4.44 (112.7)	5.06 (128.5)

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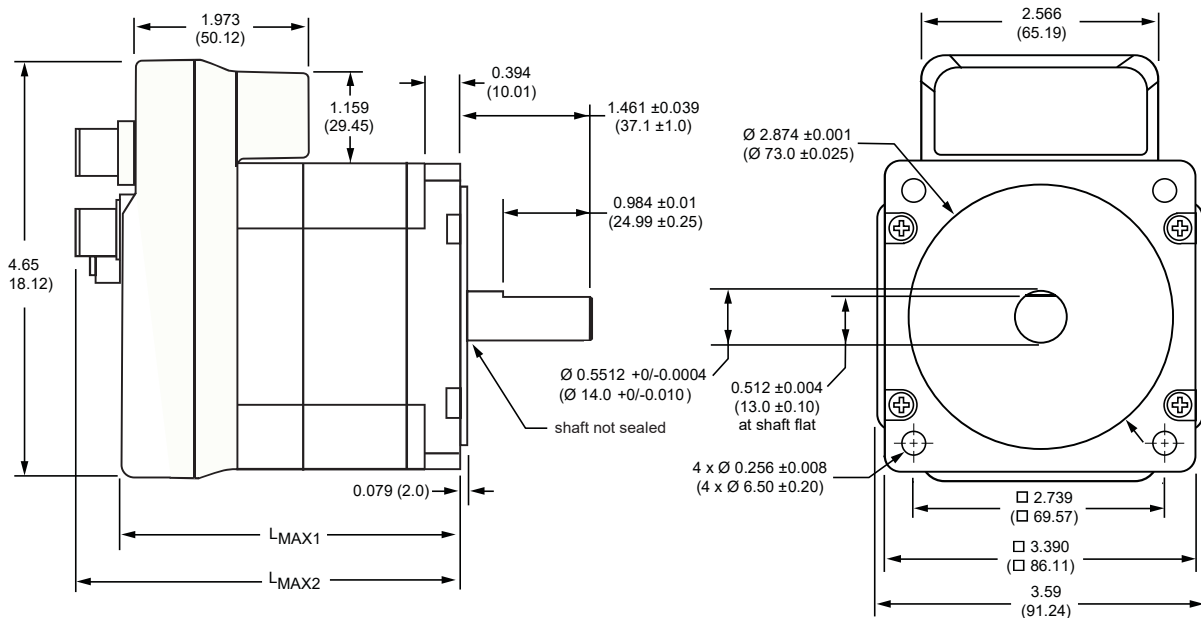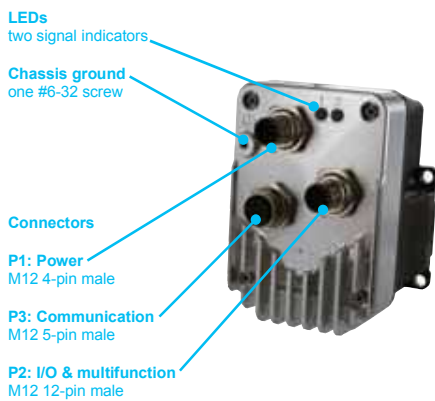**LMD•85•C** NEMA34 motor – dimensions in inches (mm)

1.973
(50.12)

1.159
(29.45)

0.394
(10.01)

1.461 ±0.039
(37.1 ±1.0)

0.984 ±0.01
(24.99 ±0.25)

4.65
18.12)

Ø 0.5512 +0/-0.0004
(Ø 14.0 +0/-0.010)

shaft not sealed

0.079 (2.0)

L MAX1

L MAX2

2.566
(65.19)

Ø 2.874 ±0.001
(Ø 73.0 ±0.025)

0.512 ±0.004
(13.0 ±0.10)
at shaft flat

4 x Ø 0.256 ±0.008
(4 x Ø 6.50 ±0.20)

□ 2.739
(□ 69.57)

□ 3.390
(□ 86.11)

3.59
(91.24)

Motor stack length	Lmax1	Lmax2
Single	4.04 (102.7)	4.65 (118.2)
Double	4.57 (116.2)	5.18 (131.7)
Triple	6.14 (156.1)	6.75 (171.5)

See User Manual for complete details: motion.schneider-electric.com/manuals.html

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Software interface

Interface to CANopen networks is easy with direct configuration of LMD products via layer setting services. An optional Communication Converter Kit is also available to facilitate prototyping.

with CAN dongle, cables and configuration utility

The CANopen Communication Kit (part # MD-CC502-000) includes a USB to CAN dongle, terminator, and cable with M12 5-pin mating connector.

The free Lexium MDrive Software Suite includes a CANopen configuration utility to setup parameters and perform firmware upgrades via a PC.

Connectors

All Lexium MDrive connectors are conveniently grouped on the back of each product. Circular M12 connectors are used consistently on all motor sizes, with gender and keying features for correct connecting. Cordsets and a communication kit are available to facilitate rapid prototyping.

A #6-32 screw lug is provided for earth grounding.

Connector	Style	Assignment
P1	M12 4-pin male	Supply voltage
P2	M12 12-pin male	I/O and multifunction interface
P3	M12 5-pin male	Communication
Chassis ground	#6-32 screw lug	Earth grounding

Status indicators

Lexium MDrive products include 2 LED signal indicators. The multi-color LEDs are programmed to indicate a range of pre-defined messages to aid users. See product user manual for details.

LEDs
two signal indicators

Chassis ground
one #6-32 screw

Connectors

P1: Power
M12 4-pin male

P3: Communication
M12 5-pin male

P2: I/O & multifunction
M12 12-pin male

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LMD•A85•C   *LMD•A57•C*

Part numbers									
Example		**L**	**M**	**D**	**C**	**A**	**5 7**	**1**	**C**
Product **LMD** = Lexium MDrive		**L**	**M**	**D**	C	A	5 7	1	C
Control type **C** = Closed loop / with hMT and encoder *(1)* **O** = Open loop / no hMT or encoder		L	M	D	**C**	A	5 7	1	C
Communication type **A** = CANopen interface		L	M	D	C	**A**	5 7	1	C
Flange size **57** = NEMA 23 / 57mm **85** = NEMA 34 / 85mm		L	M	D	C	A	**5 7**	1	C
Motor length **1** = single stack **2** = double stack **3** = triple stack		L	M	D	C	A	5 7	**1**	C
Variation **C** = M12 circular connectors		L	M	D	C	A	5 7	1	**C**

(1) Closed loop control delivers encoder feedback and hMT enhanced motor performance.

MD-CC502-000

MD-CS660-000   *PLG-M12TP*

MD-CS650-000

MD-CS620-000

MD-CS610-000

Installation accessories			
Description	**Length** m	**Length** feet	**Reference**
Communication			
Communication converter kit, USB to CAN USB-pluggable converter to set/program communication parameters in 32- or 64-bit. Includes CAN dongle, terminating resistor, and pre-wired shielded cable with M12 mating connector.			
■ Mates to M12 5-pin male communication connector	1.8	6.0	**MD-CC502-000**
Daisy chain Connect multiple CAN units together in sequence with this Y cable. A termination plug, sold separately, is required at end of run.			
■ Y cable mates to M12 communication connector	0.3	1.0	**MD-CS660-000**
■ M12 bus termination (resistor) plug	—	—	**PLG-M12TP**
Communication cordset Pre-wired shielded cable with straight M12 connector.			
■ Mates to M12 5-pin male communication connector	2.0	6.5	**MD-CS650-000**
Power cordset			
Pre-wired shielded cable with straight M12 connector.			
■ Mates to M12 4-pin male power connector	3.0	10.0	**MD-CS620-000**
I/O cordset			
Pre-wired shielded cable with straight M12 connector.			
■ Mates to M12 12-pin male I/O connector	3.0	10.0	**MD-CS610-000**

Lexium MDrive®
Motor specifications

LMD•57 NEMA 23 motor specifications	Motor stack length	Single	Double	Triple
Holding torque	oz-in	103.4	158.6	242.2
	N-cm	73.0	112.0	171.0
Detent torque	oz-in	3.9	5.6	9.72
	N-cm	2.7	3.9	6.86
Rotor inertia	oz-in-sec^2	0.0025	0.0037	0.0065
	kg-cm^2	0.18	0.26	0.46
Radial load limit, center of shaft	lbs	15	15	15
	kg	6.8	6.8	6.8
Axial load limit @ 1500 rpm (5000 full steps / sec)	lbs	20	20	20
	kg	9	9	9
Weight (motor+driver)	oz	26.4	31.2	44.0
	g	748	885	1247

LMD•85 NEMA 34 motor specifications	Motor stack length	Single	Double	Triple
Holding torque	oz-in	336.0	480.0	920.0
	N-cm	237.0	339.0	650.0
Detent torque	oz-in	10.9	14.16	19.83
	N-cm	7.7	10.0	14.0
Rotor inertia	oz-in-sec^2	0.0127	0.0191	0.0382
	kg-cm^2	0.90	1.35	2.70
Radial load limit, center of shaft	lbs	65	65	65
	kg	29.4	29.4	29.4
Axial load limit @ 1500 rpm (5000 full steps / sec)	lbs	20	20	20
	kg	9	9	9
Weight (motor+driver)	lb	4.45	5.65	9.0
	kg	2.02	2.56	4.08

Lexium MDrive®
Speed torque characteristics

LMD•57 NEMA 23 speed torque *(1)*

Single stack length	Double stack length	Triple stack length

Torque in Oz-In / N-cm

Speed of rotation in full steps per second (rpm)

Torque in Oz-In / N-cm

Speed of rotation in full steps per second (rpm)

Torque in Oz-In / N-cm

Speed of rotation in full steps per second (rpm)
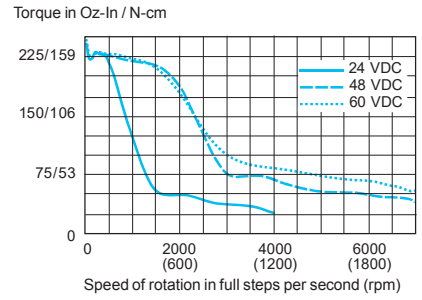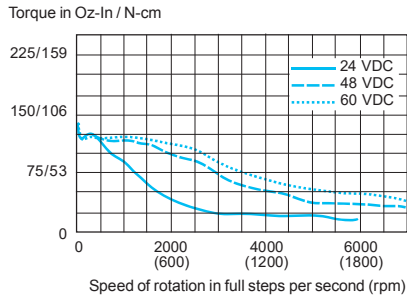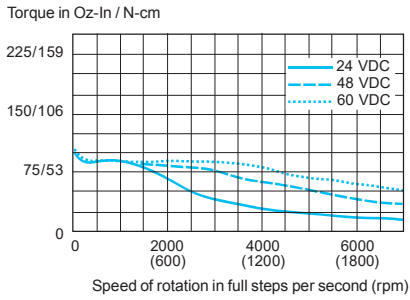
LMD•85 NEMA 34 speed torque *(2)*

Single stack length	Double stack length	Triple stack length

Torque in Oz-In / N-cm

Speed of rotation in full steps per second (rpm)

Torque in Oz-In / N-cm

Speed of rotation in full steps per second (rpm)

Torque in Oz-In / N-cm

Speed of rotation in full steps per second (rpm)

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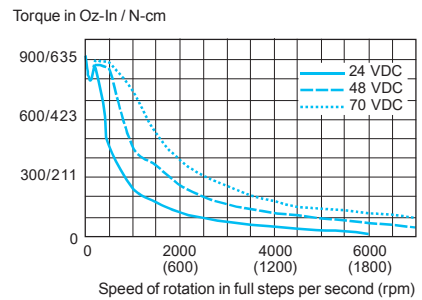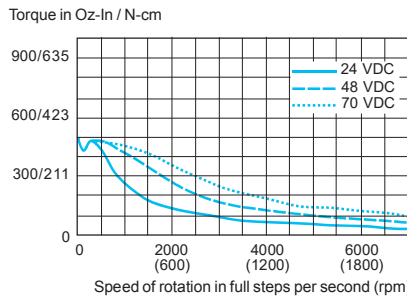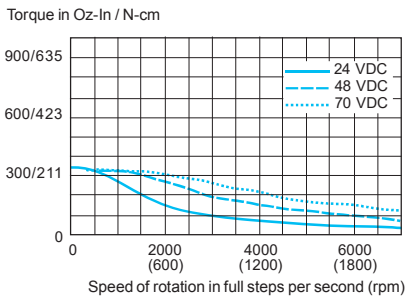
(1) Test conditions: 100% current, 0.84 oz. damper, 0.18589 oz-in² inertia, hMT off
(2) Test conditions: 100% current, 3.7 oz. damper, 4.75670 oz-in² inertia, hMT off