

# Lexium MDrive®

## Robust products for industrial OEMs

### Intelligent motors

OEMs who want to reduce machine size, cost and complexity will find robust Lexium MDrive products deliver exceptional performance and value for many applications, both stepper and servo.

### Lexium MDrive®

Robust Lexium MDrive products integrate 1.8° 2-phase stepper motors with on-board drive electronics, a controller with up to 8 I/O, and 1000 line (4000 count/rev) internal encoder with hMT closed loop performance. This high degree of integration can reduce machine complexity, size and cost in many stepper and servo motor applications. Delivering exceptional performance and smoothness with advanced current control.

Ideal for machine builders who want an optimized motor with on-board electronics, Lexium MDrive products are well suited for industrial applications. Supported communication protocols include:

- Ethernet: EtherNet/IP, Profinet, ModbusTCP
- CANopen
- RS-422/485

### Features

- Built-in protection circuitry
- IP65 rating with M12 connectors
- Input power range from +12 up to +70 VDC
- Auxiliary logic power supply input
- 20 microstep resolutions to 51,200 steps/rev
- Programmable motor run and hold currents
- Extended product warranty

Motor sizes include NEMA 17, 23 & 34, all available in 3 stack lengths. Premium high torque motors are also an option.

Products are offered in two connector versions:

- 1) Pluggable Style - includes mating connectors for direct wiring
- 2) M12 Circular Connector Style - IP65-rated against water and dust ingress



Robust Lexium MDrive products are especially well suited for industrial applications, including an IP65 rated version with circular M12 connectors. All with an industry-leading warranty,

Pictured: NEMA 17, 23 & 34 motor sizes

## hMT closed loop function

Delivers energy savings and enhanced performance.

Increases available motor torque without increasing motor size.

# 50%

Eliminates 50% motor derating typical in preventing stalling, as hMT never loses functional motor control.

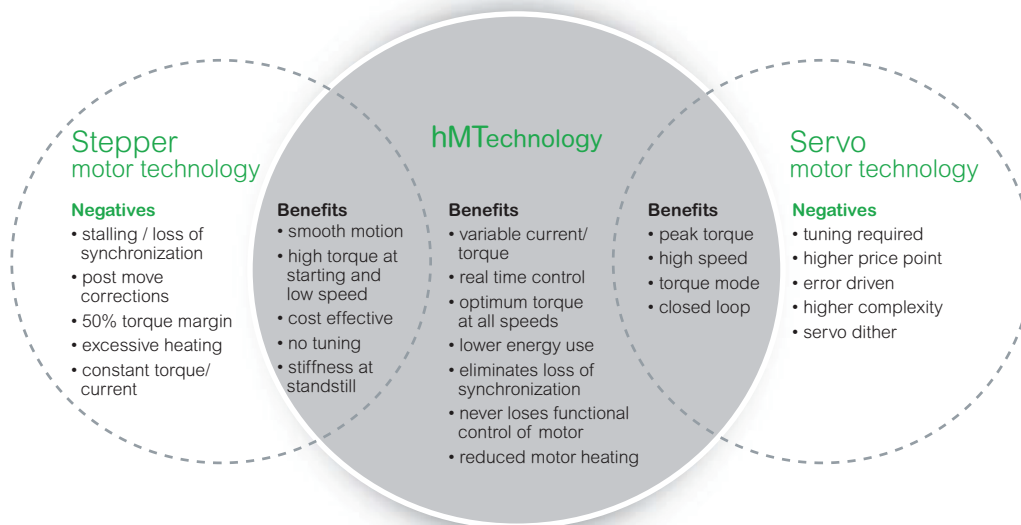
## hMT closed loop performance

Closed loop performance with Hybrid Motion Technology/hMT is available in Lexium MDrive products with encoders. hMT is a proprietary hardware-based system that monitors motor shaft position in sub-microsecond increments, delivering real time closed loop benefits including:

- preventing loss of synchronization/stalling
- allowing use of motor's full torque range
- delivering torque mode control
- reducing motor heat (1)
- lowering energy consumption (1)

(1) Achieved with hMTechnology variable current control.

Product commissioning, parameterization and monitoring are accomplished via a user-friendly software GUI, included free as part of the Lexium MDrive Software Suite. Settings can be downloaded and stored in the product's nonvolatile memory. Optional communication accessories are offered to expedite connecting and prototyping.



Stepper or servo motor? System designers can now have the best of both using Lexium MDrive products with hMT. Closed loop products combine benefits of both stepper and servo motor technologies, while delivering additional capabilities.

# Lexium MDrive®

## Specifications

### Specifications – General

			LM•42	LM•57	LM•85
Input power	Voltage	VDC	+12 ...+48	+12 ...+60	+12 ...+70
	Current maximum (1)	Amp	2.0	3.5	4.0
Motor	Frame size	NEMA	17	23	34
		mm	42	57	85
	Holding torque	oz-in	44 ... 88	103 ... 425	336 ... 920
		N-cm	31 ... 62	73 ... 300	237 ... 650
	Premium high torque motor	Option	no	yes	yes - custom
Length	Stack sizes	1, 2 & 3	1, 2 & 3	1, 2 & 3	
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 ratings	IP20, IP65		
Aux. logic input	Voltage range (2)	VDC	+12 ...+24		
Motion	Microstep resolution	Number of settings	20		
		Steps per revolution	200, 400, 800, 1000, 1600, 2000, 3200, 50 00, 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		
Hardware I/O sourcing or sinking	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	current limited 5-20 volts		
	Power outputs	Current rating	-100 ...+100mA		
		Voltage range	-24 ...+24 VDC		
	High-speed signal output	Protection	over current, transient voltage suppression, inductive clamp		
		Current open collector/emitter	5.5 mA		
		Voltage open collector	+60 VDC		
	Communication	Protocol type	Voltage open emitter	+7 VDC	
Ethernet TCP/IP			Profinet, EtherNet/IP (ODVA compliant), ModbusTCP, MCode/TCP on configuration port 503		
CANopen			CANopen CiA DS301, DSP402, 2.0B active with features: node guarding, heartbeat, SDOs, PDOs (variable mapping)		
RS-422/485			Baud rate 4.8 ... 115.2 kbps		

(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. Not applicable to Pulse/Direction products.

(3) Only with Lexium MDrive closed loop/encoder products.

# Lexium MDrive®

## Specifications

### Specifications – Programmable Motion Control, CANopen & Ethernet products

			LM•M/A/E42 (NEMA 17)	LM•M/A/E57 (NEMA 23)	LM•M/A/E85 (NEMA34)
I/O sourcing or sinking	Number of I/O (1)	Analog input	1	1	1
		Signal inputs	3	4	4
		Power outputs	0	2	2
		Signal outputs	1	1	1
		Analog input	Resolution	12 bit	
	Signal inputs	Voltage range	0 ... +5 VDC, 0 ... +10 VDC, 0 ... 20 mA, 4 ... 20 mA		
		Voltage range	+5 ... +24 VDC, TTL level compatible		
		Protection	current limited 5-20 volts		
	Power outputs	Current rating	-100 ... +100mA		
		Voltage range	-24 ... +24 VDC		
		Protection	over current, transient voltage suppression, inductive clamp		
	High-speed signal output	Current open collector/emitter	5.5 mA		
		Voltage open collector	+60 VDC		
		Voltage open emitter	+7 VDC		
Motion	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 x 10 <sup>9</sup> steps per second <sup>2</sup>		
		Resolution	90.9 steps per second <sup>2</sup>		

(1) Not applicable to Ethernet products.

### Specifications – Pulse/Direction products

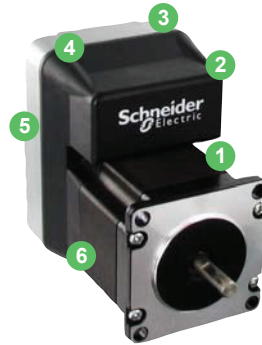
			LM•P42 (NEMA 17)	LM•P57 (NEMA 23)	LM•P85 (NEMA34)
Signal inputs	Number	2			
	Voltage range, isolated	+5 ... +24 VDC sourcing or sinking			
Analog input	Number	1			
	Resolution	12 bit			
	Voltage range	0 ... +5 VDC, 0 ... +10 VDC, 0 ... 20 mA, 4 ... 20 mA			
Attention output	Current	Open collector/emitter	5.5 mA		
		Open collector	+60 VDC		
		Open emitter	+7 VDC		
Motion	Open loop configuration	Operating modes	pulse/direction, speed control, velocity mode		
	Closed loop configuration, requires LMD with encoder	Operating modes	pulse/direction input, variable speed control, constant velocity mode, variable torque mode		
	Encoder	Outputs	6 TTL level compatible		
	Digital filter range	50 nS ... 12.9 μS (10 MHz ... 38.8 kHz)			
	Clock types (step mode)	Step/direction, quadrature, step up/step down, clockwise/counterclockwise			
	Step frequency	Maximum	2.56 MHz		
		Minimum pulse width	100 ns		

# Lexium MDrive®

## Dimensions

### Software interface

The free Lexium MDrive Software Suite includes an intuitive user interface for product commissioning and programming via a PC. Installation accessories, including cables, cordsets and communication converters, speed product prototyping.



- 1 rotary step motors: NEMA 17, 23 & 34 with premium high torque motor option
- 2 microstepping drive
- 3 motion controller
- 4 up to 8 I/O lines
- 5 internal encoder option
- 6 closed loop performance

### Status indicators

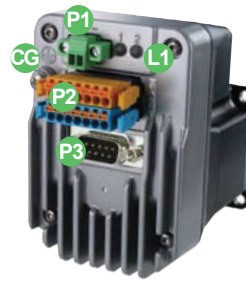
Lexium MDrive products include 2 LED signal indicators. The multi-color LEDs are programmed to indicate a range of pre-defined messages to aid users.

### Grounding

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

### Connectors

- 1) Standard products with pluggable connectors.
- 2) IP65 products with sealed M12 connectors.



pluggable connectors

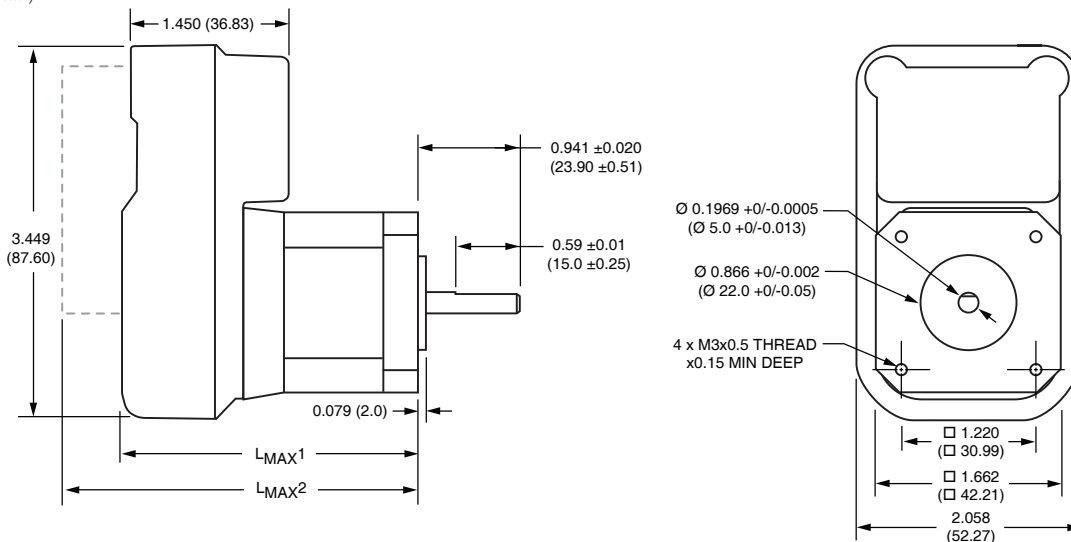


M12 connectors

## Dimensions

### LM•42 NEMA17 motor

inches (mm)



Motor stack length	Lmax1		Lmax2 (1)	
	Pluggable connector	M12 connector	Pluggable connector	M12 connector
Single	2.40 (61.0)	2.78 (70.7)	3.22 (81.8)	3.39 (86.0)
Double	2.64 (67.0)	2.98 (75.7)	3.46 (88.0)	3.58 (91.0)
Triple	2.96 (75.3)	3.33 (84.7)	3.78 (96.0)	3.94 (100.0)

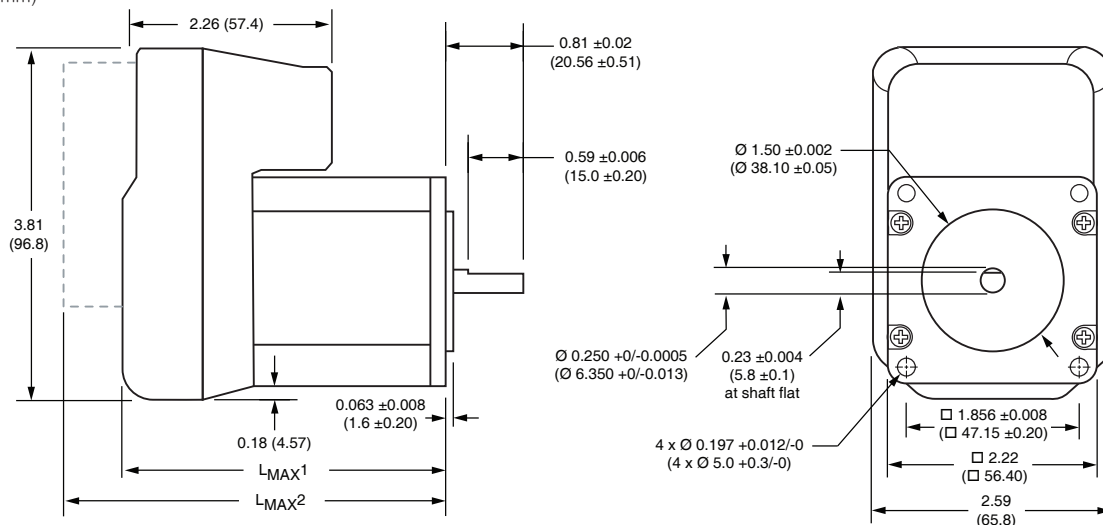
(1) Represents maximum dimension with connectors/options.

# Lexium MDrive®

## Dimensions

### LM•57 NEMA23 motor

inches (mm)

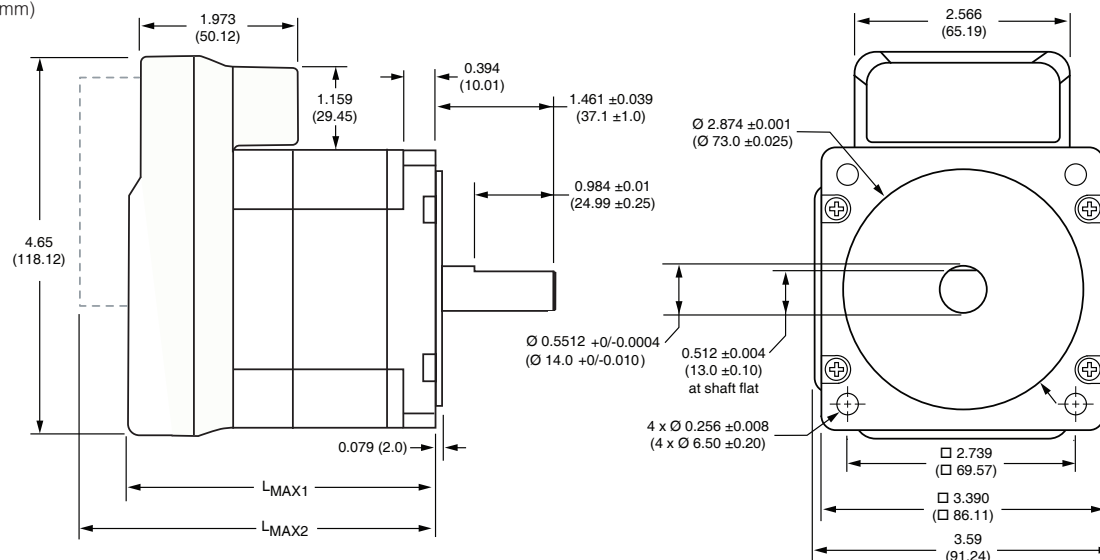


Motor stack length	Lmax1		Lmax2 (1)		High torque motor additional length
	Pluggable connector	M12 connector	Pluggable connector	M12 connector	
Single	3.17 (80.5)	3.32 (84.3)	3.91 (99.3)	4.01 (101.8)	0.15 (3.8)
Double	3.52 (89.4)	3.73 (94.8)	4.26 (108.2)	4.36 (110.7)	0.21 (5.4)
Triple	4.38 (111.3)	4.60 (116.8)	5.13 (130.3)	5.23 (133.0)	0.22 (5.5)

(1) Represents maximum dimension with connectors/options.

### LM•85 NEMA34 motor

inches (mm)



Motor stack length	Lmax1		Lmax2 (1)	
	Pluggable connector	M12 connector	Pluggable connector	M12 connector
Single	3.76 (95.5)	4.04 (102.7)	4.41 (112.0)	4.65 (118.2)
Double	4.33 (110.0)	4.57 (116.2)	4.98 (126.5)	5.18 (131.7)
Triple	5.90 (149.9)	6.14 (156.1)	6.55 (166.4)	6.75 (171.5)

(1) Represents maximum dimension with connectors/options.

# Lexium MDrive®

## Motor performance

LMD•42 NEMA 17 motor specifications	Motor	Stack length	Stack length		
			Single	Double	Triple
Holding torque	oz-in		43.9	58.1	87.8
	N-cm		31	41	62
Detent torque	oz-in		1.7	2.1	3.5
	N-cm		1.2	1.5	2.5
Rotor inertia	oz-in-sec <sup>2</sup>		0.0005	0.0008	0.0012
	kg-cm <sup>2</sup>		0.038	0.057	0.082
Radial load limit, center of shaft	lbs		8.5	8.5	8.5
	kg		3.8	3.8	3.8
Axial load limit @ 1500 rpm (5000 full steps/sec)	lbs		10	10	10
	kg		4.5	4.5	4.5
Weight (motor+driver)	oz		13.6	16.0	18.4
	g		385	454	522

LMD•57 NEMA 23 motor specifications	Motor	Stack length	Single		Double		Triple			
			Torque level		STD	HIGH	STD	HIGH	STD	HIGH
			STD	HIGH	STD	HIGH	STD	HIGH		
Holding torque	oz-in		103	152	159	264	242	416		
	N-cm		73	107	112	186	171	294		
Detent torque	oz-in		3.9	8.5	5.6	14.2	9.72	21.2		
	N-cm		2.7	6.0	3.9	10.0	6.86	15.0		
Rotor inertia	oz-in-sec <sup>2</sup>		0.0025	0.0019	0.0037	0.0030	0.0065	0.0052		
	kg-cm <sup>2</sup>		0.18	0.14	0.26	0.22	0.46	0.37		
Radial load limit, center of shaft	lbs		15	15	15	15	15	15		
	kg		6.8	6.8	6.8	6.8	6.8	6.8		
Axial load limit @ 1500 rpm (5000 full steps/sec)	lbs		20	20	20	20	20	20		
	kg		9	9	9	9	9	9		
Weight (motor+driver)	oz		26.4	26.4	31.2	31.2	44.0	44.0		
	g		748	748	885	885	1247	1247		

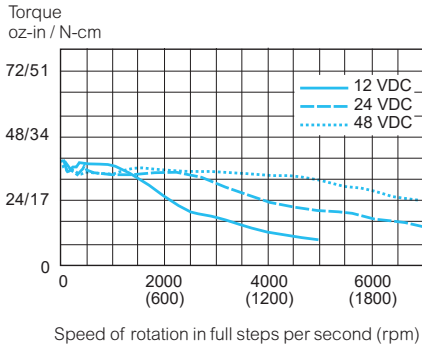
LMD•85 NEMA 34 motor specifications	Motor	Stack length	Single		Double	Triple
			Single	Single	Double	Triple
Holding torque	oz-in		336.0	336.0	480.0	920.0
	N-cm		237.0	237.0	339.0	650.0
Detent torque	oz-in		10.9	10.9	14.16	19.83
	N-cm		7.7	7.7	10.0	14.0
Rotor inertia	oz-in-sec <sup>2</sup>		0.0127	0.0127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

# Lexium MDrive®

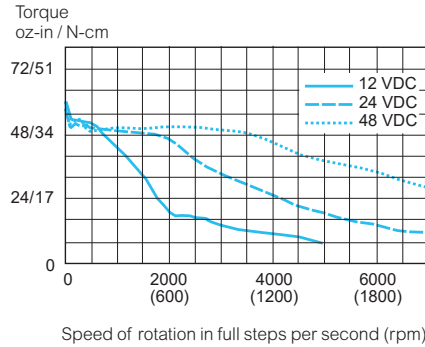
## Motor performance

### LMD•42 NEMA 17 speed torque (1)

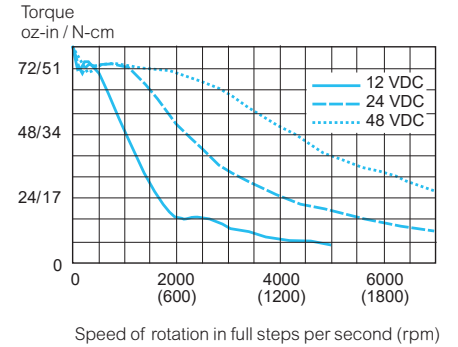
Single stack length



Double stack length

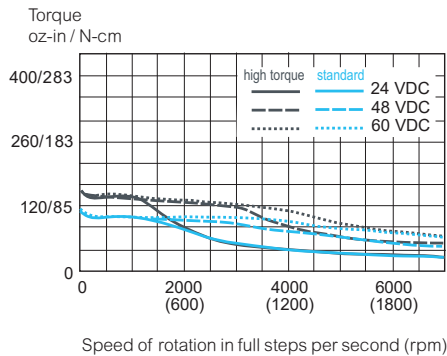


Triple stack length

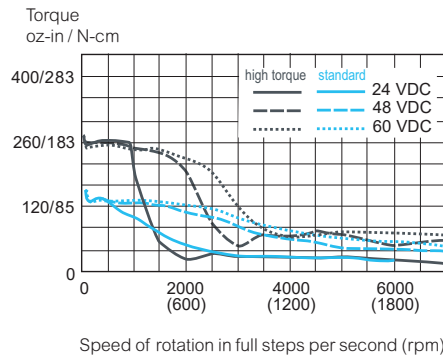


### LMD•57 NEMA 23 speed torque (1)

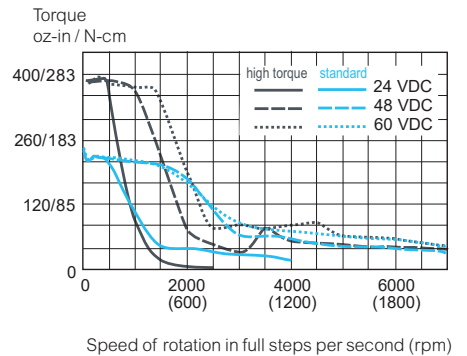
Single stack length



Double stack length

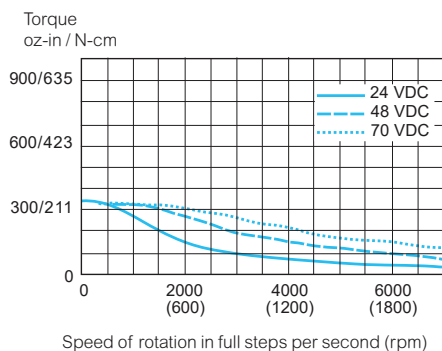


Triple stack length

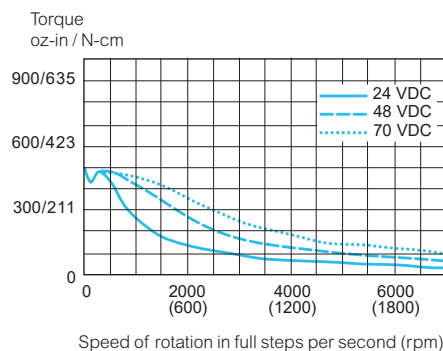


### LMD•85 NEMA 34 speed torque (1)

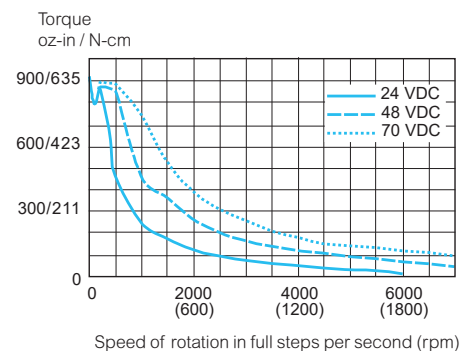
Single stack length



Double stack length



Triple stack length



(1) Test conditions: 100% current with damper simulating load.



# Lexium MDrive®

## Part numbers



example part number	L M D C A 4 2 1 _
<b>MDrive product</b> LM = Lexium MDrive	L M D C A 4 2 1 _
<b>Motor</b> D = hybrid stepper, 1.8° H = premium high torque stepper, 1.8° (1)	L M D C A 4 2 1 _
<b>Control type</b> C = Closed loop / with hMT and encoder (2) O = Open loop / no hMT or encoder	L M D C A 4 2 1 _
<b>Communication type</b> A = CANopen serial interface M = Programmable Motion Control via RS-422/485 serial interface P = Pulse/Direction via RS-422/485 serial interface E = EtherNet/IP, ModbusTCP, MCode/TCP and Profinet	L M D C A 4 2 1 _
<b>Flange size</b> 42 = NEMA 17 1.7 inch 42mm 57 = NEMA 23 2.3 inch 57mm 85 = NEMA 34 3.4 inch 85mm	L M D C A 4 2 1 _
<b>Motor length</b> 1 = single stack 2 = double stack 3 = triple stack	L M D C A 4 2 1 _
<b>Variation</b> - only include for M12 IP65 products, otherwise omit C = IP65 with M12 circular connectors	L M D C A 4 2 1 C

(1) Premium high torque motor option only available in NEMA 23 size.  
 (2) Closed loop control delivers encoder feedback and hMT enhanced motor performance.

For best fit and function in each application, a range of product configurations is offered. To ensure optimum performance in your system, expert technical support is available pre/post sale, free of charge. From application engineering to field service, we are committed to your success.

### Product versions

#### Pulse/Direction

##### Product communication type "P"

Lexium MDrive Pulse/Direction products have an RS-422/485 serial interface. Products operate in 4 modes: pulse/direction input, variable speed control, constant velocity drive, and variable torque control in closed loop products only. Operating in pulse/direction mode requires a separate motion control master. Features include 0 to 2.56 MHz step clock rate selectable in 0.59 Hz increments.

#### Programmable Motion Control

##### Product communication type "M"

Lexium MDrive Motion Control products with RS-422/485 serial interface include fully programmable integrated motion controller and on-board I/O. They are stand-alone motion control solutions that can be used without an external controller. Programming is with MCode, simple 1 to 2 character instructions, using the Lexium MDrive Software Suite provided free of charge.

#### Ethernet

##### Product communication type "E"

Lexium MDrive® Ethernet TCP/IP products are an adapter class device capable of explicit or implicit messaging. These ODVA™ compliant, compact motion control solutions interface with many manufacturer's systems including Siemens, Rockwell, Omron and Schneider Electric. The Ethernet controller supports multi-protocols selected by the user, including: EtherNet/IP, Profinet, and ModbusTCP.

#### CANopen

##### Product communication type "A"

Lexium MDrive Motion CANopen products support CiA DS301 and DSP402 Device Profile for Drives and Motion Control. Interface to CANopen networks is easy with direct configuration of Lexium MDrive 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.

# Lexium MDrive® Accessories



MD-CC404-000



MD-CC501-000



MD-CC405-000



MD-CC502-000



MD-CS660-000



MD-CS600-000



MD-CS610-000



MD-CS620-000



MD-CS630-000



MD-CS640-000



MD-CS650-000

## Pluggable connector products

description	length m	length feet	reference
<b>Communication Converter Kits</b> USB-pluggable converters set/program communication parameters in 32- or 64-bit. Pre-wired DB9 mating cable included			
USB to RS — for RS-422/485 pluggable products	1.8	6.0	MD-CC404-000
USB to CAN — for CANopen pluggable products	1.8	6.0	MD-CC501-000

## Replacement Mating Connector Kits

Kits include one 2-pin power mate, and one set (2 pieces) 7-pin multifunction mates

LM•P• Pulse/Direction products			CK-14
LM•A• CANopen products			CK-15
LM•M• Programmable Motion Control products			CK-15
LM•E• Ethernet products			CK-15

## M12 circular connector products

description	length m	length feet	reference
<b>Communication Converter Kits</b> USB-pluggable converters set/program communication parameters in 32- or 64-bit. Kits include pre-wired shielded cable with M12 connector. CANopen kits also include dongle & terminating resistor			
USB to RS — for RS-422/485 pluggable products	1.5	5.0	MD-CC405-000
USB to CAN — for CANopen pluggable products	1.8	6.0	MD-CC502-000

## Daisy chain, CANopen

Connect multiple CAN units together in sequence with this Y cable. A termination plug 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

## Cordsets

Pre-wired shielded cables with straight M12 connectors

<b>LM•P•C Pulse/Direction products</b>			
Communication	3.0	10.0	MD-CS600-000
Power	3.0	10.0	MD-CS620-000
I/O	3.0	10.0	MD-CS630-000
<b>LM•A•C CANopen products</b>			
Communication	2.0	6.5	MD-CS650-000
Power	3.0	10.0	MD-CS620-000
I/O	3.0	10.0	MD-CS610-000
<b>LM•M•C Programmable Motion Control products</b>			
Communication	3.0	10.0	MD-CS600-000
Power	3.0	10.0	MD-CS620-000
I/O	3.0	10.0	MD-CS610-000
<b>LM•E•C Ethernet products</b>			
Communication	2.0	6.5	MD-CS640-000
Power	3.0	10.0	MD-CS620-000
I/O	3.0	10.0	MD-CS610-000