M12 Lexium MDrive®

Simplifying machine building with compact integrated motors

Programmable Motion Control version: M12 connectors & IP65 rating

Integrated stepper motors with on-board programmable motion controller for stand-alone operation and closed loop performance

CE RoHS REACH **IP65**

Schneider Electric

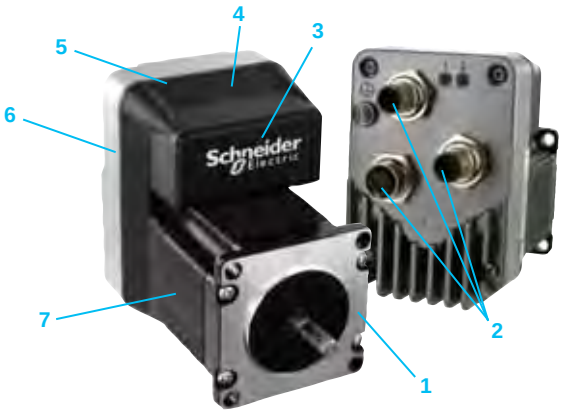
Description

M12 Lexium MDrive® Motion Control

Fully programmable, RS-422/485

IP65-rated integrated 2-phase stepper motor

CE RoHS REACH **IP65**



1	rotary stepper motor
2	M12 sealed circular connectors and IP65 certified protection
3	microstepping drive
4	programmable motion controller
5	up to 8 I/O lines
6	internal encoder option
7	closed loop performance

Product offer

M12 Lexium MDrive® Motion Control products are certified with an IP65 rating against water and dust ingress. These integrated high-torque 1.8° 2-phase stepper motors include on-board I/O and fully programmable motion controller, drive electronics, and closed loop performance with internal encoder option. This means programmable Motion Control products are stand-alone motion control solutions that can be used without an external controller.

M12 Lexium MDrive Motion Control products (LMD•M•C) have an RS-422/485 serial interface. Programming is with MCode, simple 1 to 2 character instructions, using the Lexium MDrive Software Suite provided free of charge. An optional Communication Converter Kit (part # MD-CC405-000) is recommended to facilitate prototyping.

Closed loop products (LMDCM•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
– full use of motor torque
– reduced motor heat *(1)*
– no loss of synchronization/stalling
– torque mode control
– lower energy consumption *(1)*

Application areas

Lexium MDrive Motion Control 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 fully programmable Lexium MDrive Motion Control 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
- Fully programmable integrated motion controller
- M12 sealed circular connectors
- IP65 certified protection
- 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
- RS-422/485 serial interface
- +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
- 62 software addresses for multi-drop communications
- 336 user program labels / 11,120 bytes flash memory
- 0 to 2.56 MHz step clock rate selectable in 0.59 Hz increments
- Motor stack lengths: single, double and triple
- Graphical user interface provided for quick and easy configuration

(1) Achieved with hMTechnology variable current control.

Specifications

M12 Lexium MDrive® Motion Control

Fully programmable, RS-422/485

IP65-rated integrated 2-phase stepper motor

Specifications

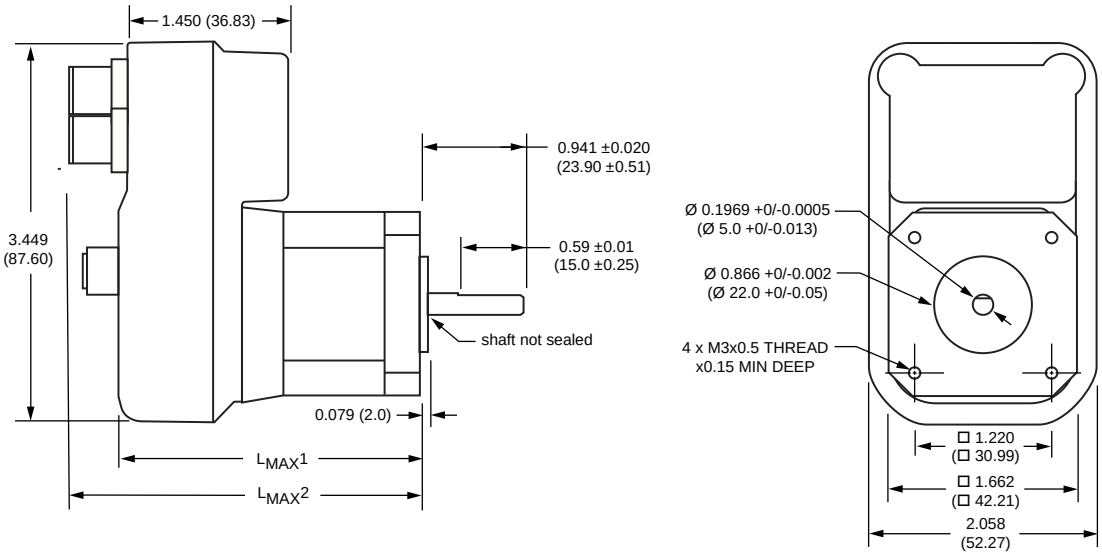
			LMD•M42•C (NEMA17)	**LMD•M57•C** (NEMA23)	**LMD•M85•C** (NEMA34)
Input power	Voltage		+12...+48 VDC	+12...+60 VDC	+12...+70 VDC
	Current maximum *(1)*		2.5 A	3.5 A	4.0A
I/O sourcing or sinking	Number of I/O	Analog input	1	1	1
		Signal inputs	3	4	4
		Power outputs	0	2	2
		Signal outputs	1	1	1
	Analog input	Resolution	12 bit		
		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		
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 x 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 recommended to facilitate prototyping.

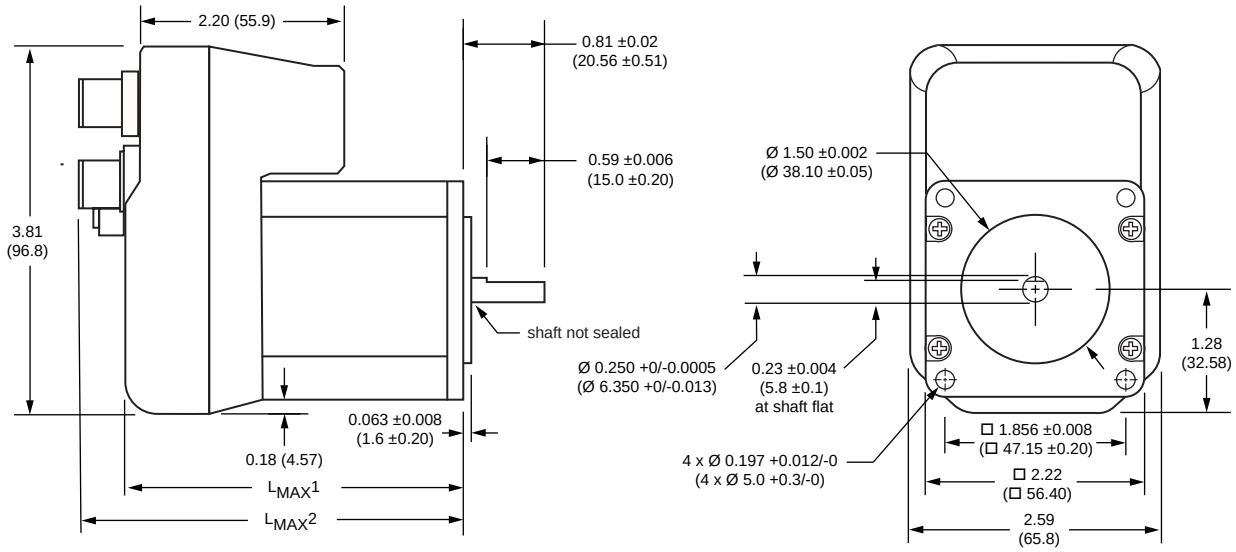
See User Manual for complete details: motion.schneider-electric.com/manuals.html

LMD•42•C NEMA17 motor – dimensions in inches (mm)



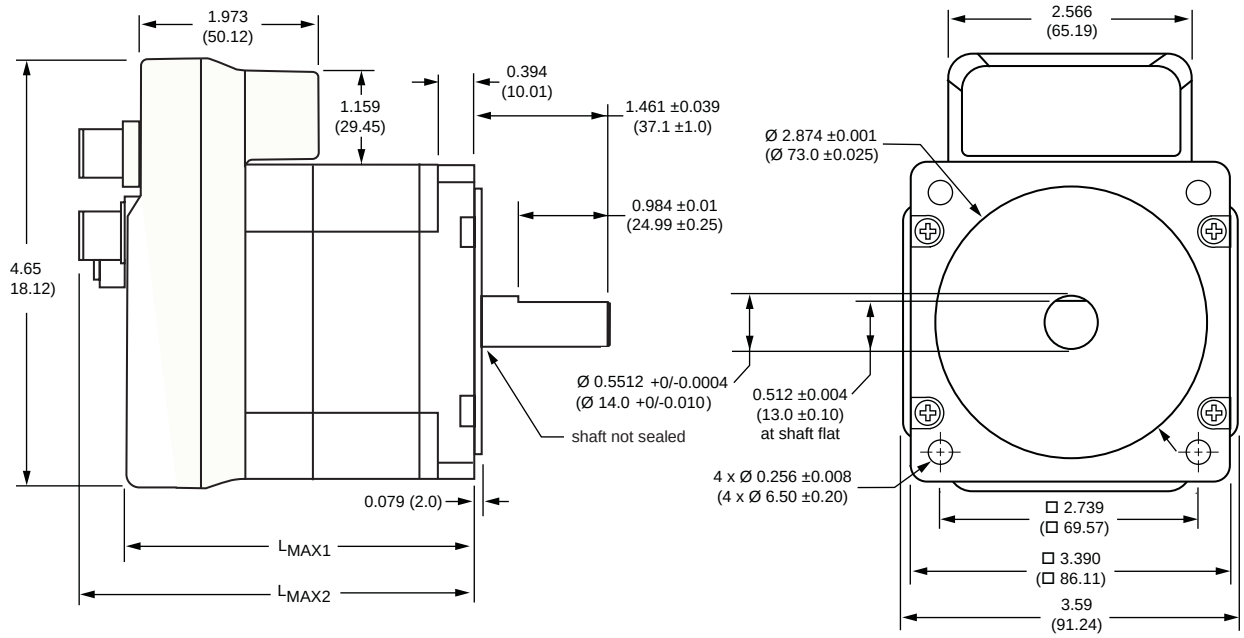
Motor stack length	Lmax1	Lmax2
Single	2.78 (70.7)	3.39 (86.0)
Double	2.98 (75.7)	3.58 (91.0)
Triple	3.33 (84.7)	3.94 (100.0)

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)

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



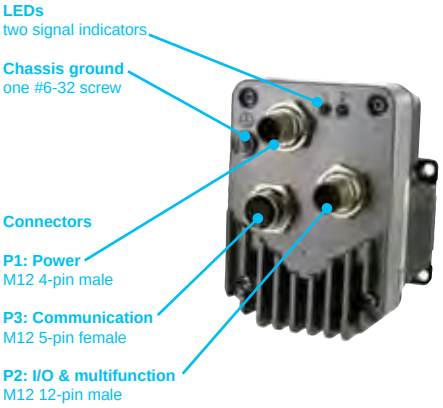
Motor stack length	Lmax1	Lmax2
Single	4.04 (102.7)	4.65 (118.2)
Double	4.57 (116.2)	5.18 (131.7)
Triple	6.14 (156.1)	6.75 (171.5)

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

Connectivity and signal indicators

M12 Lexium MDrive® Motion Control

Fully programmable, RS-422/485
IP65-rated integrated 2-phase stepper motor



Software interface

The free Lexium MDrive Software Suite includes a user interface GUI for product commissioning and programming via a PC.

PC interface is easily accomplished using the USB to RS-422/485 Communication Converter Kit (part # MD-CC405-000). Compatible with 32- and 64-bit Windows, Mac OS, and Linux operating systems. Each kit includes a communication converter and 5.0'/1.5m cordset with M12 mating connector.

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 Converter 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 female	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.

Part numbers

M12 Lexium MDrive® Motion Control

Fully programmable, RS-422/485

IP65-rated integrated 2-phase stepper motor

LMD•M85•C *LMD•M57•C* *LMD•M42•C*

Part numbers

Example	L	M	D	C	M	4	2	1	C
Product **LMD** = Lexium MDrive	**L**	**M**	**D**	C	M	4	2	1	C
Control type **C** = Closed loop / with hMT and encoder *(1)* **O** = Open loop / no hMT or encoder	L	M	D	**C**	M	4	2	1	C
Communication type **M** = Motion Control via RS-422/485 serial interface	L	M	D	C	**M**	4	2	1	C
Flange size **42** = NEMA 17 / 42mm **57** = NEMA 23 / 57mm **85** = NEMA 34 / 85mm	L	M	D	C	M	**4**	**2**	1	C
Motor length **1** = single stack **2** = double stack **3** = triple stack	L	M	D	C	M	4	2	**1**	C
Variation **C** = M12 circular connectors and IP65 rating	L	M	D	C	M	4	2	1	**C**

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

MD-CC405-000

Installation accessories

Description	Length m	Length feet	Reference
Communication converter kit, USB to RS			
For RS-422/485 products. USB-pluggable converter to set/program communication parameters in 32- or 64-bit. Kit includes communication converter and pre-wired shielded cable with M12 mating connector.			
■ Mates to M12 5-pin female communication connector	1.5	5.0	**MD-CC405-000**

MD-CS600-000

Communication cordset			
Shielded cable with straight M12 5-pin male connector.			
■ Mates to M12 5-pin female communication connector	3.0	10.0	**MD-CS600-000**

MD-CS620-000

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**

MD-CS610-000

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•42 NEMA 17 motor specifications

	Motor 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^2	0.0005	0.0008	0.0012
	kg-cm^2	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
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

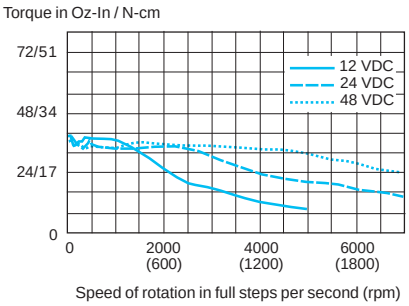
LMD•85 NEMA34 motor specifications

	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

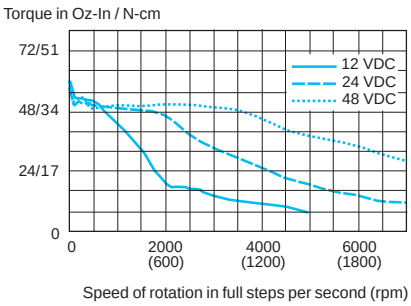
Lexium MDrive®
Speed torque characteristics

LMD•42 NEMA 17 speed torque *(1)*

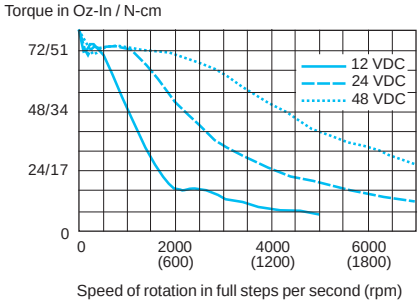
Single stack length



Double stack length

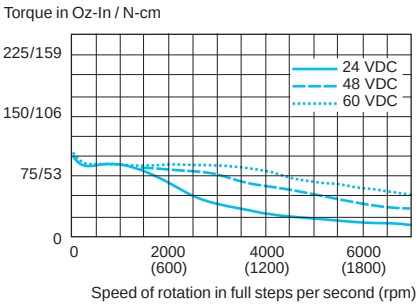


Triple stack length

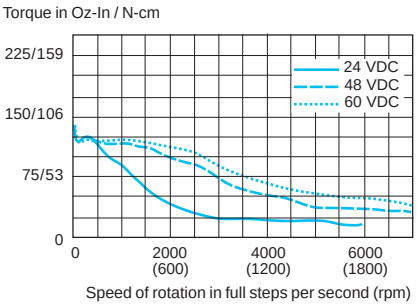


LMD•57 NEMA 23 speed torque *(1)*

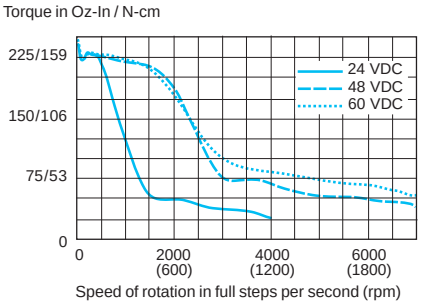
Single stack length



Double stack length

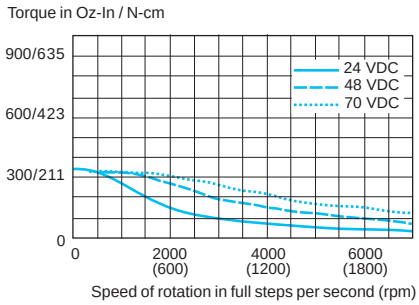


Triple stack length

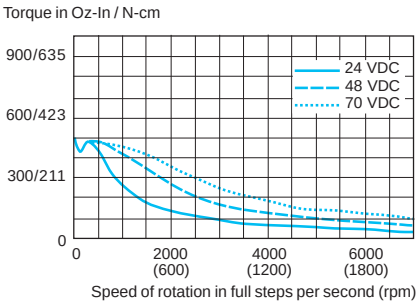


LMD•85 NEMA34 speed torque *(2)*

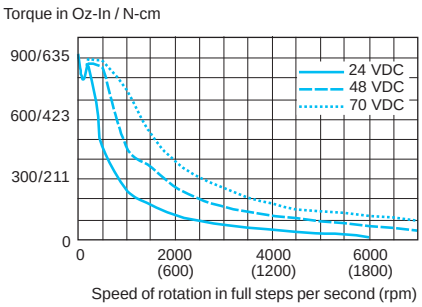
Single stack length



Double stack length



Triple stack length



(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

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