

Lexium MDrive®

Simplifying machine building with
compact integrated motors



Ethernet TCP/IP versions: Profinet; EtherNet/IP & ModbusTCP; MCode/TCP

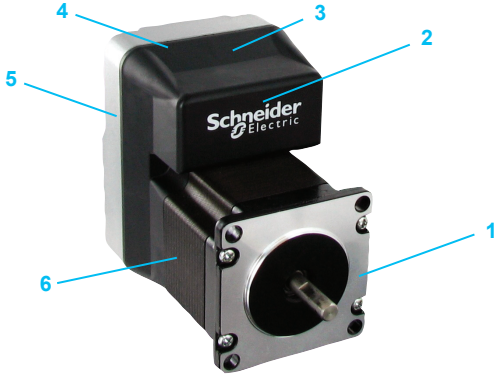
Integrated stepper motors with Ethernet TCP/IP controller
for multi-protocol support, and closed loop performance

CE  REACH *EtherNet/IP™*
conformance tested

Description

Lexium MDrive® Ethernet TCP/IP

Profinet; EtherNet/IP & ModbusTCP; MCode/TCP
integrated 2-phase stepper motor



- 1 rotary stepper motor
- 2 microstepping drive
- 3 Ethernet TCP/IP controller
- 4 up to 8 I/O lines
- 5 internal encoder option
- 6 closed loop performance

Product offer

Lexium MDrive® Ethernet TCP/IP products integrate a high-torque 1.8° 2-phase stepper motor with on-board I/O, drive electronics, Ethernet controller, and closed loop performance with internal encoder option. The Ethernet controller supports multi-protocols including Profinet (LMD•N), or EtherNet/IP and ModbusTCP (LMD•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.

Lexium MDrive Ethernet TCP/IP closed loop products (LMDC•) 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 Ethernet products are ideal for machine builders who want an optimized motor with on-board electronics and support for the widely used Ethernet industrial protocol.

Lexium MDrive products are compact motion control solutions that can reduce system cost, design and assembly time for a wide range of motion applications.

Features

- Integrated microstepping drive and high torque 1.8° 2-phase NEMA stepper motor
- Ethernet controller with multi-protocol support
- 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
- +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
- Motor stack lengths: single, double and triple
- Graphical user interface provided for quick and easy configuration
- Extended 4 year product warranty

(1) Achieved with hMTechnology variable current control.



Specifications

Lexium MDrive® Ethernet TCP/IP

Profinet; EtherNet/IP & ModbusTCP; MCode/TCP
integrated 2-phase stepper motor

Specifications					
		LMD•E42/N42 (NEMA17)	LMD•E57/N57 (NEMA23)	LMD•E85/N85 (NEMA34)	
Input power	Voltage	+12 ...+48 VDC			
	Current maximum (1)	2.5 A	3.5 A	4.0A	
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	20		
Aux. logic input	Voltage range (2)	+12 ...+24 VDC			
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	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			
Communication	Type	Ethernet TCP/IP			
	Protocols	Profinet			
		EtherNet/IP (ODVA compliant)			
		ModbusTCP			
		MCode/TCP on configuration port			
Baud rate	100 Mbps				
Configuration port	503				
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		
Profinet software (4)	IO data	Output	Slot 1		
		Size	128 bytes		
		Registers	38		
	Input	Slot 2			
		Size	128 bytes		
		Registers	34		
		Register mapping	Variable, user defined		
EtherNet/IP software (5)	Device class	adapter			
	Message types	explicit or implicit			
	Assembly object 0x04	Output (T→O)	instance 100		
		Output (O→T)	instance 112		
		Mapping to MCode	dynamic		
	Device profile	Identity object	0x01		
		Assembly object	0x04		
		TCP object	0xF5		
Ethernet link object		0xF6			
Manufacturer specific objects		0x64: Setup 0x65: Miscellaneous 0x66: Motion	0x67: Hardware inputs/outputs 0x68: Position 0x69: Encoder	0x6A: hMTechnology	
Modbus TCP software (5)	Device ID	43/14d (0x2B/0x0E)			
	Function codes	Public	02d (0x02), 01d (0x01), 05d (0x05), 03d (0x03), 16d (0x10)		
		Manufacturer specific	65d (0x41), 66d (0x42)		
MCode/TCP	Proprietary software	Programming over Ethernet			

(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.

(4) With Profinet (LMD•N) products.

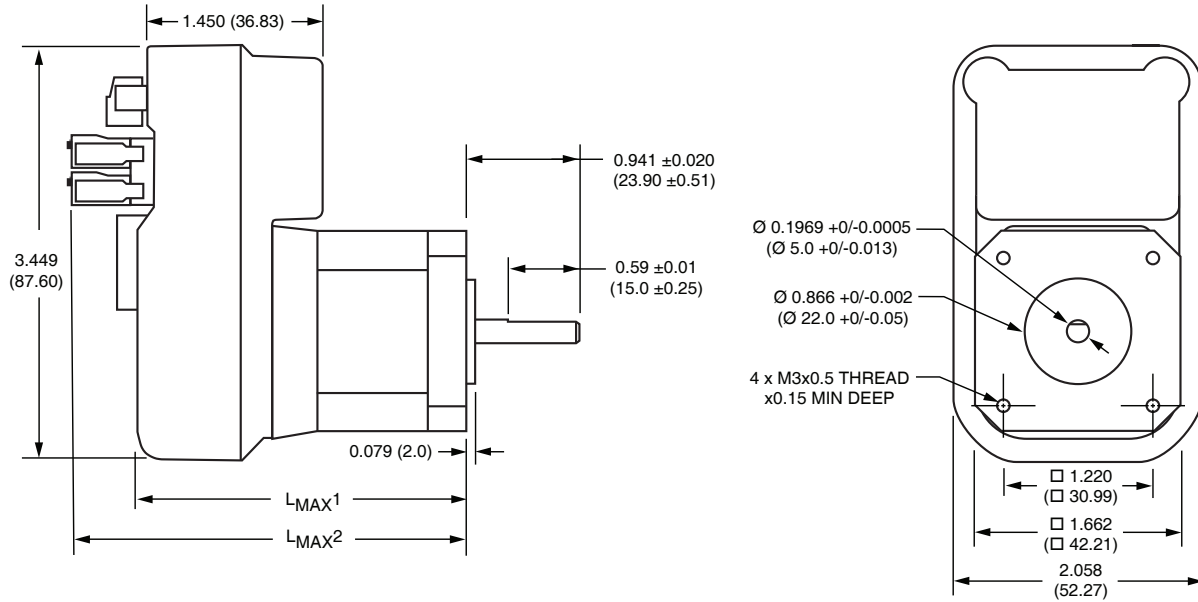
(5) With EtherNet/IP-ModbusTCP (LMD•E) products.

Dimensions

Lexium MDrive® Ethernet TCP/IP

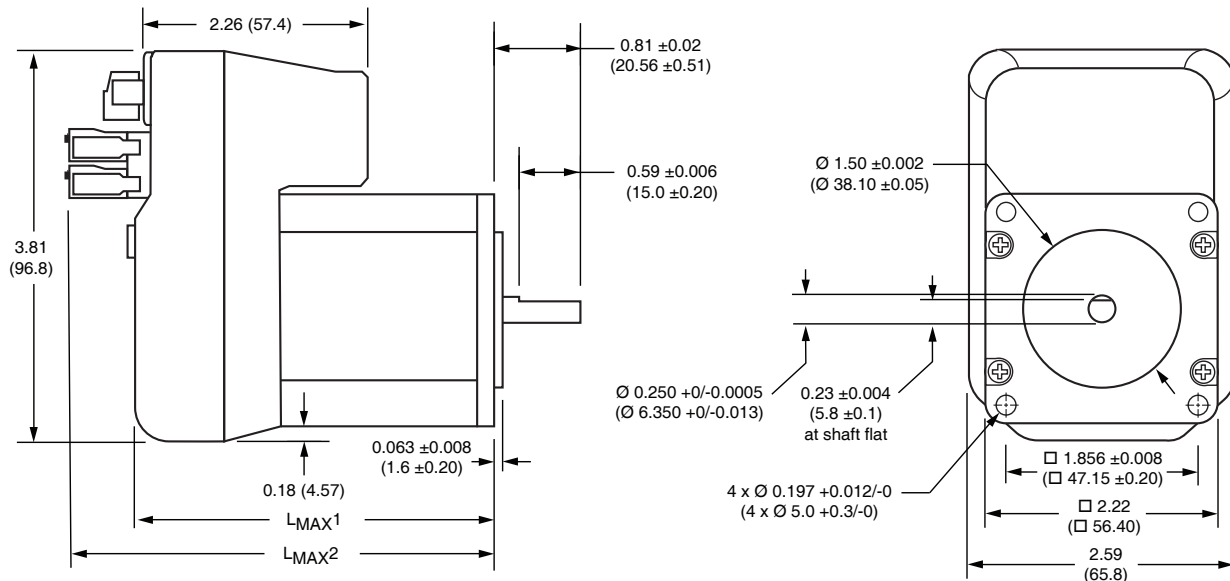
Profinet; EtherNet/IP & ModbusTCP; MCode/TCP
integrated 2-phase stepper motor

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



Motor stack length	L _{max1}	L _{max2}
Single	2.40 (61.0)	3.22 (81.8)
Double	2.64 (67.0)	3.46 (88.0)
Triple	2.96 (75.3)	3.78 (96.0)

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



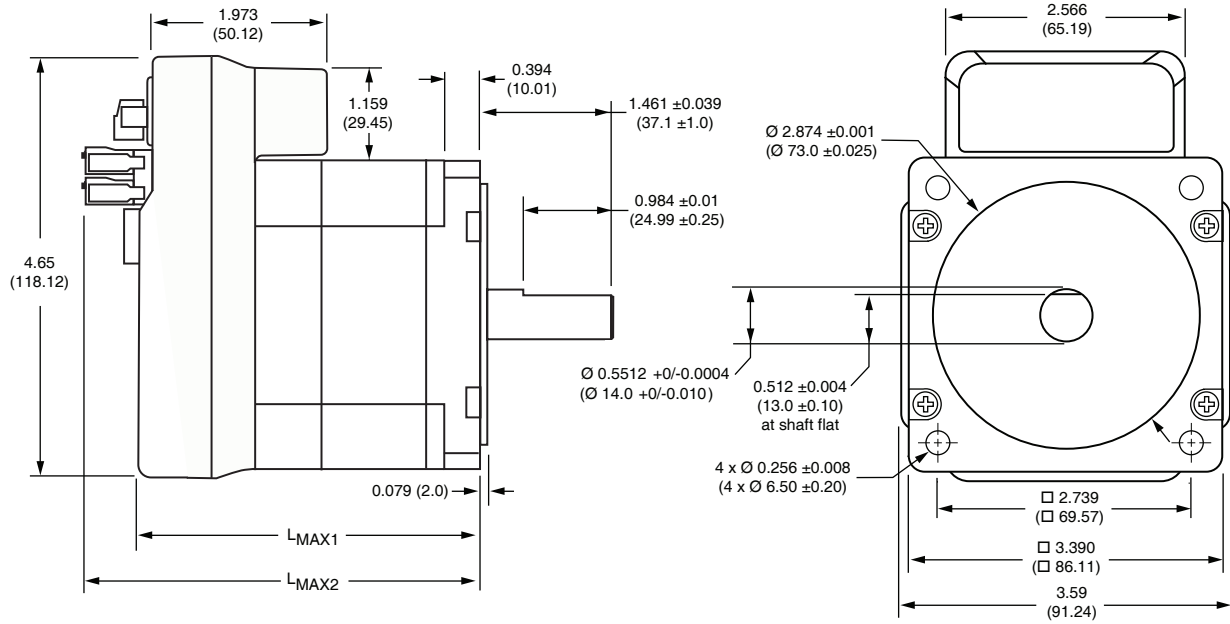
Motor stack length	L _{max1}	L _{max2}
Single	3.17 (80.5)	3.91 (99.3)
Double	3.52 (89.4)	4.26 (108.2)
Triple	4.38 (111.3)	5.13 (130.3)

Dimensions

Lexium MDrive® Ethernet TCP/IP

Profinet; EtherNet/IP & ModbusTCP; MCode/TCP
integrated 2-phase stepper motor

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



Motor stack length	Lmax1	Lmax2
Single	3.76 (95.5)	4.41 (112.0)
Double	4.33 (110.0)	4.98 (126.5)
Triple	5.90 (149.9)	6.55 (166.4)

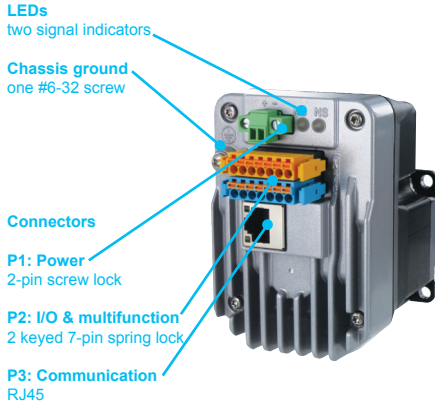


See User Manual for complete details: motion.schneider-electric.com/manuals.html

Connectivity and signal indicators

Lexium MDrive® Ethernet TCP/IP

Profinet; EtherNet/IP & ModbusTCP; MCode/TCP integrated 2-phase stepper motor



Software interface

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

Connectors

All Lexium MDrive connectors are conveniently grouped in the same location at the back of each product. The same style locking connectors are also used consistently on all motor sizes of Lexium MDrive products.

Mating connectors for P1 and P2 are provided, and extra connectors may be ordered. A #6-32 screw lug is provided for earth grounding.

Connector	Style	Assignment
P1	2-pin screw lock	Supply voltage
P2	2 keyed 7-pin spring lock, color coded for ease of use	I/O and multifunction interface
P3	RJ45	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

Lexium MDrive® Ethernet TCP/IP

Profinet; EtherNet/IP & ModbusTCP; MCode/TCP integrated 2-phase stepper motor



LMD•E85
LMD•N85

LMD•E57
LMD•N57

LMD•E42
LMD•N42

Part numbers									
Example	L	M	D	C	E	4	2	1	
Product LMD = Lexium MDrive	L	M	D		C	E	4	2	1
Control type C = Closed loop / with hMT and encoder (1) O = Open loop / no hMT or encoder	L	M	D	C	E	4	2	1	
Communication type E = EtherNet/IP, ModbusTCP, MCode/TCP N = Profinet, MCode/TCP	L	M	D	C	E	4	2	1	
Flange size 42 = NEMA 17 / 42mm 57 = NEMA 23 / 57mm 85 = NEMA 34 / 85mm	L	M	D	C	E	4	2	1	
Motor length 1 = single stack 2 = double stack 3 = triple stack	L	M	D	C	E	4	2	1	

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

Installation accessories		
Description	Quantity	Reference
Mating connector kit		
Mating connectors for power and multifunction interface are included with each new product. If additional mating connectors are needed for Lexium MDrive Ethernet products, a single mating connector kit is offered which includes the following:		CK-15
■ 2-pin screw lock mate (DC voltage supply)	1 pc	
■ 7-pin locking mates (multifunction), keyed	2 pcs - 1 blue, 1 orange	

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

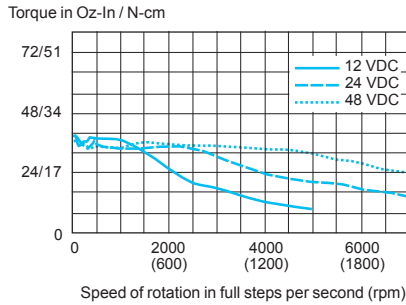
System performance

Lexium MDrive®

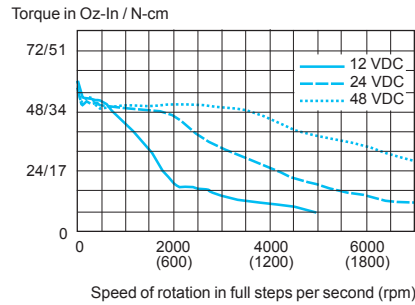
Speed torque characteristics

LMD•42 NEMA 17 speed torque (1)

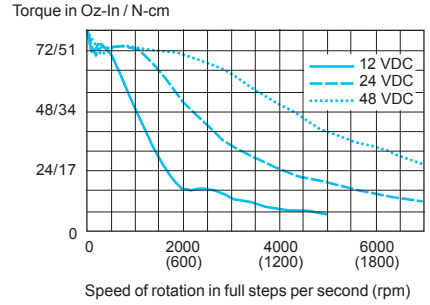
Single stack length



Double stack length

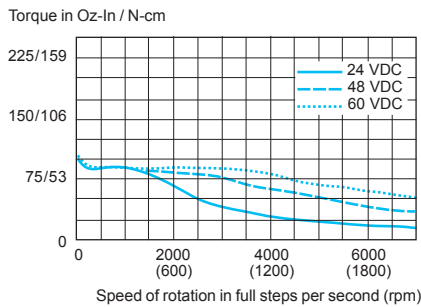


Triple stack length

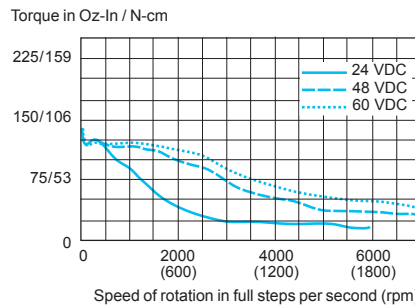


LMD•57 NEMA 23 speed torque (1)

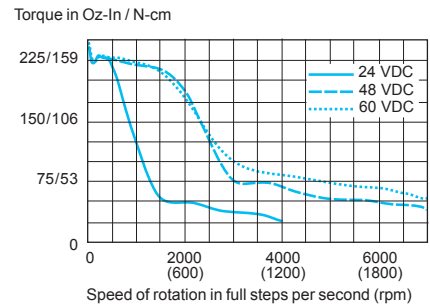
Single stack length



Double stack length

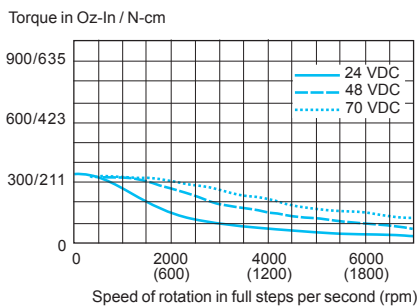


Triple stack length

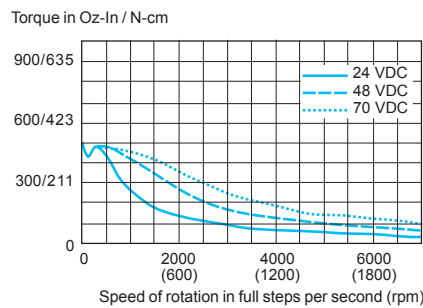


LMD•85 NEMA34 speed torque (2)

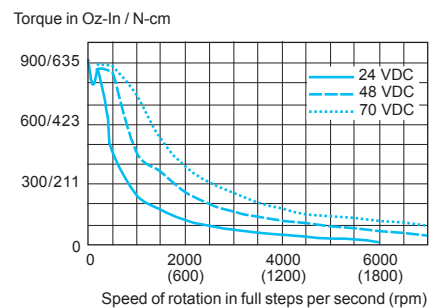
Single stack length



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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