

Lexium MDrive®

LMD•E57 Ethernet TCP/IP

Product overview

Robust Lexium MDrive® Ethernet TCP/IP products integrate 1.8° 2-phase stepper motors with control electronics including an Ethernet controller that supports user-selectable protocols: Profinet, EtherNet/IP, and ModbusTCP. An optional encoder delivers hMT closed loop performance.

hMT closed loop performance is available in products with either a multi-turn absolute encoder or incremental magnetic encoder. Closed loop performance maintains functional motor control to prevent loss of synchronization, offers variable current control, torque control, and use of the motor's full torque range without derating.

Multi-turn absolute encoders may benefit users by detecting and storing position information, even when powered down. This can eliminate homing routines and reduce setup time at system startup.

Lexium MDrive products are ODVA-compliant adapter class devices capable of explicit or implicit messaging. Compact motion control solutions that interface with many manufacturer's systems.

Application areas

Especially well suited for industrial applications, products include an IP65 rated version with circular M12 connectors. A high torque motor (LMH•M57) is also available, increasing torque up to 50%.

Lexium MDrive products can reduce machine complexity, size and cost in many stepper and servo motor applications. Their high degree of integration can increase system reliability by reducing the number of individual components, eliminating multiple potential failure points.



LMD•E57 Lexium MDrive Ethernet TCP/IP products: integrated NEMA23 motor and controls, IP65 & IP20-rated

Features overview

General	NEMA23 1.8° 2-phase stepper motor integrated with robust control electronics, including programmable motion controller Advanced current control for exceptional performance and smoothness
Input power	+12 to +60 VDC single supply
Communication protocols	EtherNet/IP Profinet ModbusTCP MCode/TCP
Encoder options	Multi-turn absolute or incremental magnetic
Motion	20 microstep resolutions up to 51,200 steps per rev including: Degrees, Metric, Arc Minutes 336 user program labels / 11,120 bytes flash memory 0 to 2.56 MHz step clock rate selectable in 0.59 Hz increments
I/O, sourcing or sinking	+5 to +24 VDC signal inputs 12-bit analog input (1) 100mA power outputs 5.5mA high-speed signal output
Protection	0...84°C temperature warning, user selectable IP20, IP65 ratings
Warranty	4 year, conditional

(1) Not available on products with multi-turn absolute encoder.

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Specifications

Communication	Type	Ethernet TCP/IP		
	Protocols	Profinet		
		EtherNet/IP (ODVA compliant)		
		Modbus TCP		
		MCode/TCP on configuration port		
Baud rate	100 Mbps			
Configuration port	503			
Input power	Voltage	VDC	+12 ...+60	
	Current maximum (1)	Amp	3.5	
Motor	Frame size	NEMA	23	
		inches	2.3	
		mm	57	
	Performance levels	standard torque or premium high torque		
	Holding torque	oz-in	103 ... 416	
N-cm		73 ... 294		
Length	stack sizes	1, 2 & 3		
	Operating temp non-condensing	Heat sink maximum	85°C	
Motor maximum		100°C		
Protection	Type	Temp warning	0...84°C, user selectable	
		IP rating	IP20, IP65	
		Earth grounding	via product chassis ground lug	
I/O sourcing or sinking	One analog input (2)	Resolution	12 bit	
		Voltage range	0 ... +5 VDC, 0 ... +10 VDC, 0 ... 20 mA, 4 ... 20 mA	
	Three signal inputs	Voltage range	+5 ... +24 VDC, TTL level compatible	
		Protection	over temp, short circuit, transient, over voltage, inductive clamp	
	Two power outputs (3)	Current rating	-100 ... +100 mA	
		Voltage range	-24 ... +24 VDC	
	One high-speed signal output	Current open collector/emitter	5.5 mA	
		Voltage open collector	+60 VDC	
Voltage open emitter		+7 VDC		
Aux. logic input	Voltage range (4)	+12 ... +24 VDC		
Encoder options	Multi-turn absolute	Position update / retention	30 days on internal power; 5 years with optional battery pack	
	Incremental magnetic	Line count	1000 lines / 4000 edges per rev	
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)	
	Counters	Type	position, encoder/32 bit	
		Edge rate maximum	5 MHz	
	Velocity	Range	+/- 2,560,000	
		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	
		Types	linear, triangle s-curve, sinusoidal s-curve	
	Software	Program storage	Type/size	flash / 11,120
User registers		Number/resolution	4 / 32-bit	
Floating point registers		Number/precision	8 / double	
Math functions		Arithmetic	+, -, x, ÷, >, <, =, >=, <=	
		Logic	AND, OR, XOR, NOT	
		Trigonometric	ABS, COS, ACOS, LOG2, LOG10, PI, SIN, ASIN, SQRT, TAN, ATAN	
Branch functions		Branch & call		
I/O functions		Inputs	Home, limit plus, limit minus, go, stop, pause, jog plus, jog minus, general purpose, capture	
		Outputs	Moving, error, velocity change,, moving position, trip, attention. general purpose	
Trip functions		Trip on input, trip on position, trip on time, trip capture, trip on relative position, trip on main power loss		
Party-mode addresses		62		
Encoder functions (5)		stall detection, position maintenance, find index, hMT		

(1) Actual power supply current will depend on voltage and load.

(2) Not available on products with multi-turn absolute encoder.

(3) Products with multi-turn absolute encoder have one power output.

(4) When input voltage is removed, maintains power only to control and feedback circuits.

(4) Closed-loop models with encoder only.

An optional Communication Converter is recommended to facilitate prototyping.

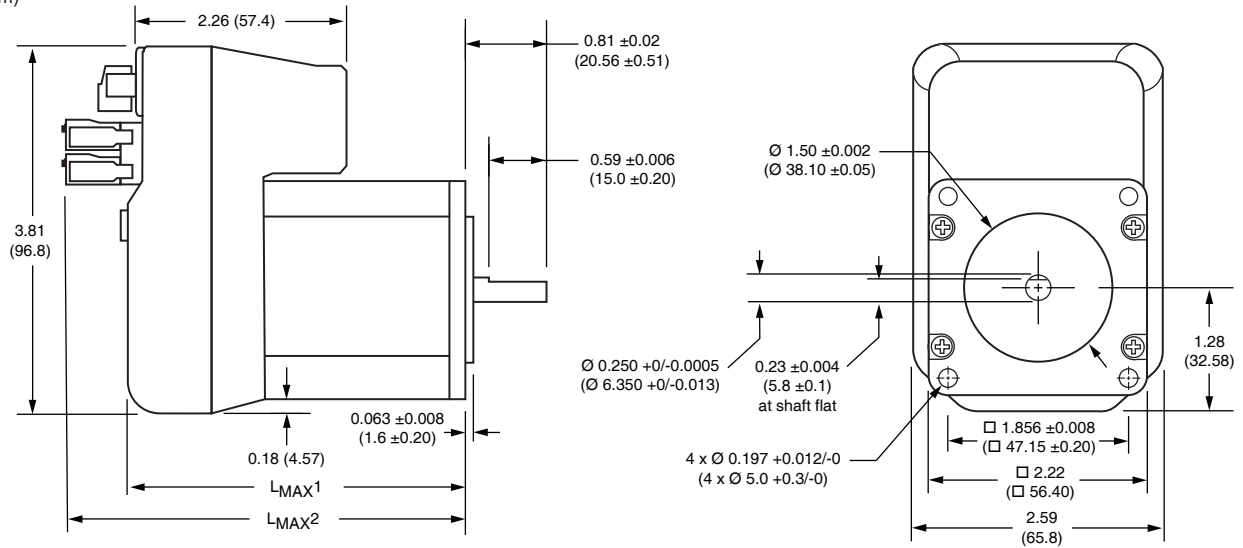
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Dimensions

LM•57 NEMA23 motor, IP20-rated

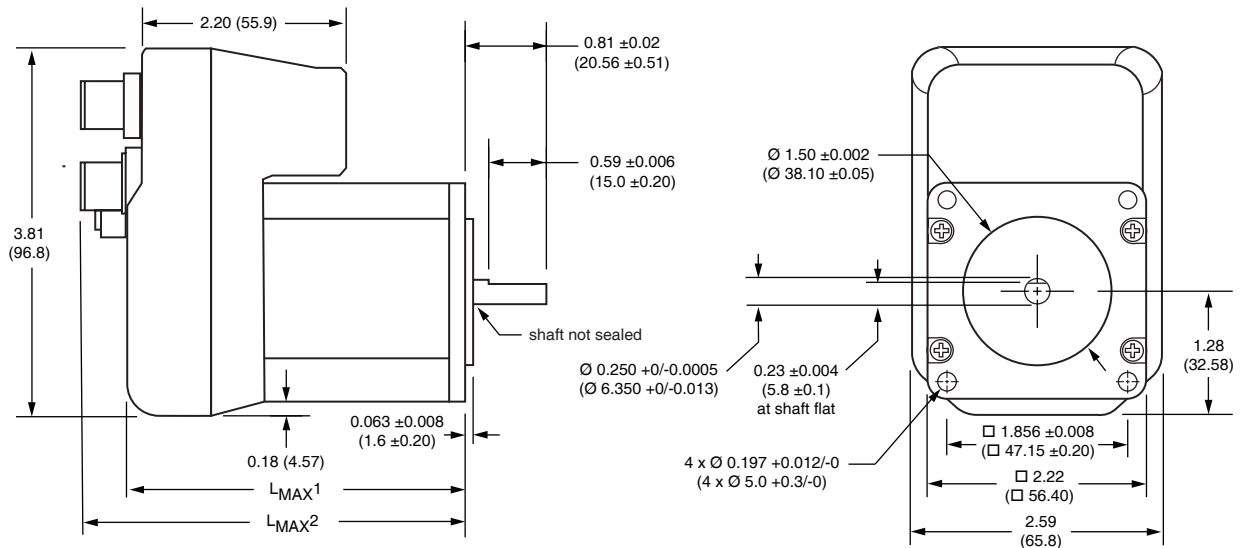
inches (mm)



Motor stack length	Lmax1		Lmax2	
	Standard - LMD	High torque - LMH	Standard - LMD	High torque - LMH
Single	3.17 (80.5)	3.32 (84.3)	3.91 (99.3)	4.01 (101.8)
Double	3.52 (89.4)	3.73 (94.8)	4.26 (108.2)	4.36 (110.7)
Triple	4.38 (111.3)	4.60 (116.8)	5.13 (130.3)	5.23 (133.0)

LM•57•C NEMA23 motor, IP65-rated

inches (mm)



Motor stack length	Lmax1		Lmax2	
	Standard - LMD	High torque - LMH	Standard - LMD	High torque - LMH
Single	3.22 (81.8)	3.32 (84.3)	3.91 (99.3)	4.01 (101.8)
Double	3.63 (92.3)	3.73 (94.8)	4.26 (108.2)	4.36 (110.7)
Triple	4.50 (114.3)	4.60 (116.8)	5.13 (130.3)	5.23 (133.0)

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IP20-rated products

LEDs

two signal indicators

Connector

P1: Power
2-pin screw lock

Chassis ground
one #6-32 screw

Connectors

P2: I/O & multifunction
2 keyed 7-pin spring lock

P3: Communication
RJ45



IP65-rated products

LEDs

two signal indicators

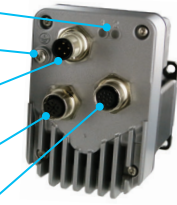
Chassis ground
one #6-32 screw

Connectors

P1: Power
M12 4-pin male

P3: Communication
M12 4-pin female

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



MD-CS640-000

MD-CS620-000

MD-CS610-000



ICP0531

Part numbers

example part number	L	M	D	C	E	5	7	1	C
Product	L	M	D	C	E	5	7	1	C
LMD = Lexium MDrive with standard hybrid stepper motor LMH = Lexium MDrive with high torque stepper motor									
Control type	L	M	D	C	E	5	7	1	C
C = Closed loop / with hMT and incremental magnetic encoder (1) A = Closed loop / with hMT and multi-turn absolute encoder (1) O = Open loop / no hMT or encoder									
Communication type	L	M	D	C	E	5	7	1	C
E = EtherNet/IP, ModbusTCP, Profinet, MCode/TCP									
Flange size	L	M	D	C	E	5	7	1	C
57 = NEMA 23 2.3" / 57mm									
Motor length	L	M	D	C	E	5	7	1	C
1 = single stack 2 = double stack 3 = triple stack									
Variation — omit from part number if unwanted C = M12 circular connectors and IP65 rating	L	M	D	C	E	5	7	1	C

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

Accessories

description	length feet (m)	part number
IP65 cordsets		
Shielded cables pre-wired with straight M12 mating connectors		
Communication cordset mates to 4-pin female connector	6.5 (2.0)	MD-CS640-000
Power cordset mates to 4-pin male connector	10.0 (3.0)	MD-CS620-000
I/O cordset mates to 12-pin male connector	10.0 (3.0)	MD-CS610-000
Back-up battery pack for Absolute Encoder models		
Extend stored position data up to 5-years for 1 to 6 LMDs with absolute encoder		
Battery pack, DIN-rail mount. Uses 3 AA batteries, not provided	—	ICP0531
LMD mating cable(s) with crimp connector to flying lead end	3.3 (1.0)	PD02-0531-FL1
PLC mating cable with crimp connector to flying lead end	3.3 (1.0)	PD04-0531-FL1
Replacement mating connector kit		
Kits are for IP20 products. They include one 2-pin power mate, and one set (2 pieces) 7-pin multifunction mates		
	—	CK-15

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Motor performance

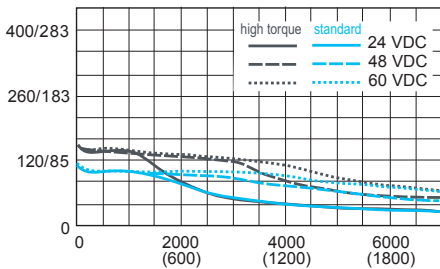
LMD•57 standard torque NEMA 23 motor specifications	Motor	Stack length	Single	Double	Triple	
			Holding torque	oz-in	103	159
		N-cm	73	112	171	
Detent torque			oz-in	3.9	5.6	9.7
			N-cm	2.7	3.9	6.9
Rotor inertia			oz-in-sec ²	0.0025	0.0037	0.0065
			kg-cm ²	0.18	0.26	0.46
Radial load limit, center of shaft			lbs	15	15	15
			kg	6.8	6.8	6.8
Axial load limit @ 1500rpm (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

LMH•57 high torque NEMA 23 motor specifications	Motor	Stack length	Single	Double	Triple	
			Holding torque	oz-in	152	264
		N-cm	107	186	294	
Detent torque			oz-in	8.5	14.2	21.2
			N-cm	6.0	10	15
Rotor inertia			oz-in-sec ²	0.0019	0.0030	0.0065
			kg-cm ²	0.14	0.22	0.46
Radial load limit, center of shaft			lbs	15	15	15
			kg	6.8	6.8	6.8
Axial load limit @ 1500rpm (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

LM•57 NEMA 23 speed torque (1)

Single stack length

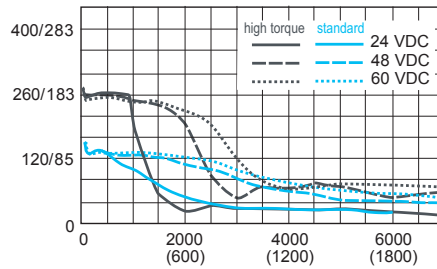
Torque in
Oz-In / N-cm



Speed of rotation in full steps per second (rpm)

Double stack length

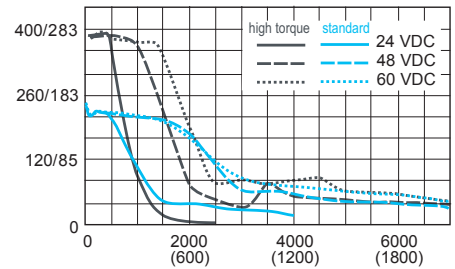
Torque in
Oz-In / N-cm



Speed of rotation in full steps per second (rpm)

Triple stack length

Torque in
Oz-In / N-cm



Speed of rotation in full steps per second (rpm)

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

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