LIBERTY MDRIVE LINEAR ACTUATOR

LMD•57 (NEMA 23)

Specifications

Communication	Pulse/Direction		RS-422/485 serial interface, 4 operating mode
	Programmable Motion Control		RS-422/485 programmable with stored memory
	CANopen		CANopen with programmable controller
	Ethernet		EtherNetIP, Profinet, Modbus/TCP
Input power	Voltage	VDC	+12 ...+60
	Current maximum(1)	Amp	3.5
Motor	Frame size	NEMA	23
		inches (mm)	2.3 (57)
	Performance level		Standard torque
	Holding torque	oz-in	103...416
		N-cm	73 ... 294
	Length	stack sizes	Single
Thermal	Temperature Maximums	Power stage maximum	85°C (185°F)
		Motor maximum	100°C (212°F)
	Ambient Operating Conditions	Operating Temperature	-20° to 50°C (-4° to 122°F)
		Temperature Variation	0.5°C (32.9°F) min
		Humidity	5% to 95% (non-condensing)
	Storage & Transport	Temperature	-25° to 70°C (-13° to 158°F)
		Temperature Variation	-25° to 30°C (-13° to 86°F)
		Humidity	0.5°C (32.9°F) min
Altitude	Installation Altitude		Up to 3280 ft (1000 m) above sea level(6)
Protection	Type	Temperature warning	0...84°C, user selectable
		IP rating	IP20
		Earth grounding	Via product chassis ground lug
Hardware 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
	Four 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
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
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
Maximum thrust	General purpose nut	lbs (kg)	25 (11)
	Anti-backlash nut	lbs (kg)	5 (2)
Maximum repeatability	General purpose nut	inch (mm)	0.005 (0.127)
	Anti-backlash nut	inch (mm)	0.0005 (0.0127)
Weight (without screw)		oz (g)	24.8 (703)
Step angle α		°	1.8

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.
5 Closed-loop models with encoder only
6 Installation above 3280 ft (1000 m) may require derating output current and maximum ambient temperature.

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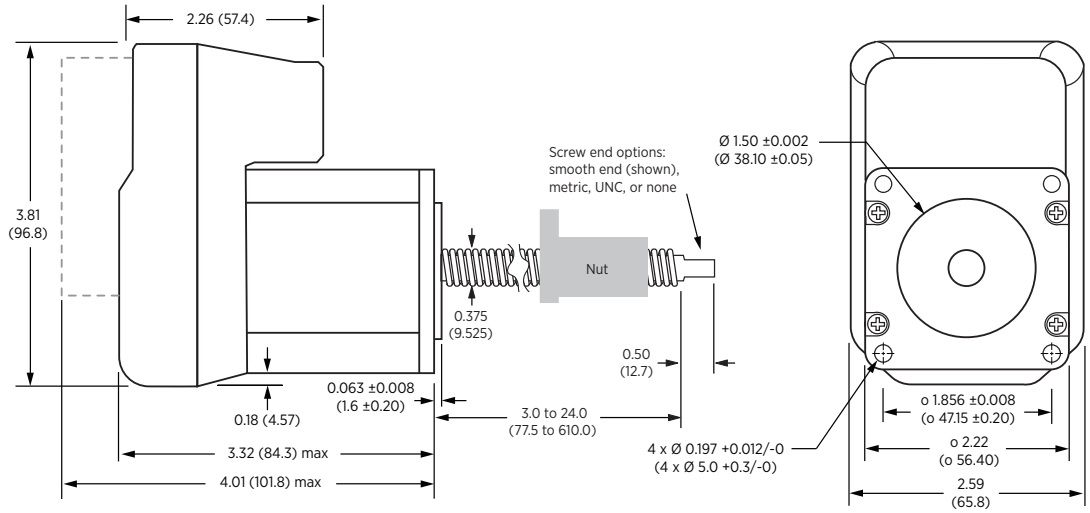
Novanta IMS

LMD Linear Actuator

Dimensions

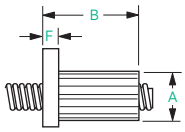
LM•57 Linear - external shaft, NEMA 23 Motor

inches (mm)



Nut Specifications

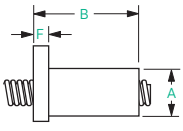
General purpose nut



Purpose: For applications not requiring anti-backlash and wear compensation

Flange shape: round

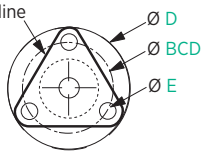
Anti-backlash nut



Purpose: backlash free operation for high accuracy and low drag torque.

Flange shape: triangle

Nut outline



inches (mm)	A	B	D	E	F	BCD	drag torque
General Purpose	0.71 (18.0)	1.50 (38.1)	1.5 (38.1)	0.20 (5.08)	0.20 (5.08)	1.125 (28.6)	free wheeling
Anti-backlash	0.82 (20.8)	1.875 (47.63)	1.5 (38.1)	0.20 (5.08)	0.20 (5.08)	1.125 (28.6)	1-to-3 oz-in / 0.7-2.1 Ncm

Lead Screw Specifications

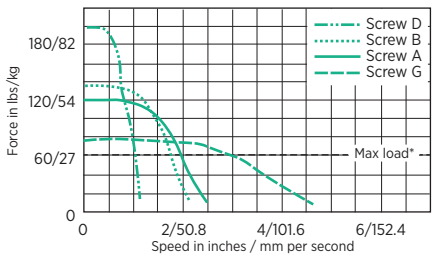
			Screw G	Screw A	Screw B	Screw D
Travel	Per revolution		0.375"/ 9.525 mm	0.20"/ 5.08 mm	0.167"/ 4.233 mm	0.0833"/ 2.116 mm
	Per full step		0.001875"/ 0.0476 mm	0.001"/ 0.0254 mm	0.000835"/ 0.0212 mm	0.0004165"/ 0.0106 mm
Load Limit*	External shaft	General purpose	25 lbs / 11 kg			
		Anti-backlash	5 lbs / 2 kg			

*Performance data for maximum force/load is based on a *static* load and will vary with a *dynamic* load.

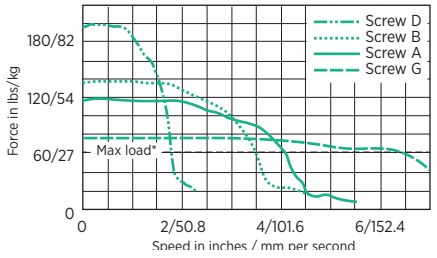
Threaded end	Metric end: M6 x 1.0mm thread to within 0.03"/ 0.76 mm of shoulder	UNC end: 1/4-20 UNC-2A thread to within 0.05"/ 1.3 mm of shoulder
Smooth end	Ø 0.2362" ±0.001 Ø 6mm ±0.003	
None	—	

Speed-Force Curves

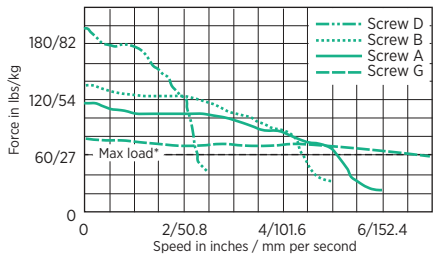
24 VDC



48 VDC



60 VDC



Three-dimensional depictions of this product are available for download from https://novantaims.com/dloads/3dconfigurator/

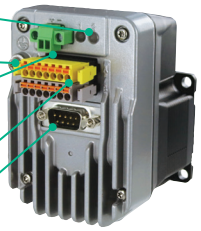
LMD Linear Actuator

Motor Performance

Motor	Stack length	LMD•57 Standard Torque		
		Single	Double	Triple
Holding torque	oz-in	103	159	242
	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

Connector & Indicator Layout

IP20-rated Model



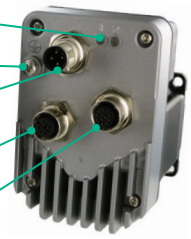
LEDs
Two signal indicators

Chassis Ground
One #6-32 screw

Connectors
P1: Power
One 2-pin screw lock
P2: I/O & Multifunction
Two keyed 7-pin spring lock
P3: Communication
One DB9
(RJ45 for Ethernet model)

IP65-rated Models

Single Comm Port

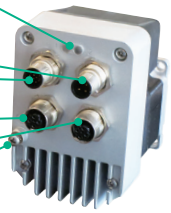


LEDs
Two signal indicators

Chassis Ground
One #6-32 screw

Connectors
P1: Power
One M12 4-pin male
P3: Communication
One M12 5-pin male
P2: I/O & multifunction
One M12 12-pin male

Dual Comm Port



LEDs
two signal indicators

Connectors
P1: Power
M12 4-pin male
P2: I/O & multifunction
M12 12-pin male
P3: Communication
M12 4-pin female
P4: Communication
M12 4-pin female

Chassis ground
one #6-32 screw

Part Number Breakdown

Example part number	L	M	D	C	M	4	2	1	P	-LA	3	M	0	6	0	G	T
Product **LMD** = Liberty MDrive with standard hybrid stepper motor	**L**	**M**	**D**	C	M	4	2	1	P	-LA	3	M	0	6	0	G	T
Control type **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	L	M	D	**C**	M	4	2	1	P	-LA	3	M	0	6	0	G	T
Communication type **P** = Pulse/Direction via RS-422/485 serial interface(2) **M** = Programmable Motion Control via RS-422/485 serial interface **A** = CANopen interface **E** = Single Port EtherNet/IP, Modbus/TCP, Profinet, MCode/TCP **D** = Dual Port EtherNet/IP, Modbus/TCP, Profinet, MCode/TCP	L	M	D	C	**M**	4	2	1	P	-LA	3	M	0	6	0	G	T
Flange size **42** = NEMA 42 1.7" / 42mm	L	M	D	C	M	**4**	**2**	1	P	-LA	3	M	0	6	0	G	T
Motor length **1** = single stack **2** = double stack **3** = triple stack	L	M	D	C	M	4	2	**1**	P	-LA	3	M	0	6	0	G	T
Connector Style **P** = pluggable connectors, IP20 rating **C** = M12 circular connectors, IP20 rating(3)	L	M	D	C	M	4	2	1	**P**	-LA	3	M	0	6	0	G	T
Lead screw **-LA** = 0.25" / 6.35 mm **-LB** = 0.125" / 3.175 mm **-LC** = 0.063" / 1.588 mm	L	M	D	C	M	4	2	1	P	**-LA**	3	M	0	6	0	G	T
Shaft style 3 = external shaft	L	M	D	C	M	4	2	1	P	-LA	**3**	M	0	6	0	G	T
Screw end finish **M** = metric **U** = UNC **S** = smooth **Z** = none	L	M	D	C	M	4	2	1	P	-LA	3	**M**	0	6	0	G	T
Screw length(4) **lengths available in 0.1" increments** **030** = 03.0" / 76 mm minimum **180** = 18.0" / 457 mm maximum	L	M	D	C	M	4	2	1	P	-LA	3	M	**0**	**6**	**0**	G	T
Nut **G** = general purpose **A** = anti-backlash	L	M	D	C	M	4	2	1	P	-LA	3	M	0	6	0	**G**	T
Screw coating **T** = Teflon® **Z** = none	L	M	D	C	M	4	2	1	P	-LA	3	M	0	6	0	G	**T**

1 Closed loop control delivers encoder feedback and hMT enhanced motor performance.
2 Open or closed loop only, not available with absolute encoder.
3 The variation "C" must be added to the part number for Dual Port Products. Dual Port products are only available with M12 circular connectors
4 To calculate screw length:
screw length = [desired stroke length] + [nut length] + [mounting surface plate thickness]

To select from the available features and build the LMD integrated stepper motor to fit your needs, use the Novanta IMS part number builder, available online from https://novantaims.com/resources/part-number-builders/

Additional setup, quick reference information, and supporting documents are available for download from the Novanta IMS download website https://novantaims.com/dloads/