

LIBERTY MD_{RI}VE LINEAR ACTUATOR

LMD•42 (NEMA 17)



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 ... +48 |
| | Current maximum ⁽¹⁾ | Amp | 2.0 |
| Motor | Frame size | NEMA | 17 |
| | | inches (mm) | 1.7 (42.7) |
| | Performance level | | Standard torque |
| | Holding torque | oz-in | 44 ... 88 |
| | | N-cm | 31 ... 62 |
| Thermal | Length | stack sizes | Single |
| | 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/min (0.9°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 | |
| 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 |
| | Three signal inputs | Voltage range | +5 ... +24 VDC, TTL level compatible |
| | | Protection | Over temp, short circuit, transient, over voltage, inductive clamp |
| | 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 ⁽³⁾ | | +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 | Setup parameters | | Storable to nonvolatile memory |
| | Transmit PDOs | | Four (4) dynamically mappable |
| | Receive PDOs | | Four (4) dynamically mappable |
| | Manufacturer specific objects | | I/O configuration, run/hold current |
| | Modes of operation ⁵ | | Profile position, homing mode, profile velocity, profile torque, cyclic synch position |
| | Input functions | | General purpose, homing mode profiles |
| | Output functions | | General purpose |
| 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) | 13.6 (385) |
| 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 When input voltage is removed, maintains power only to control and feedback circuits.

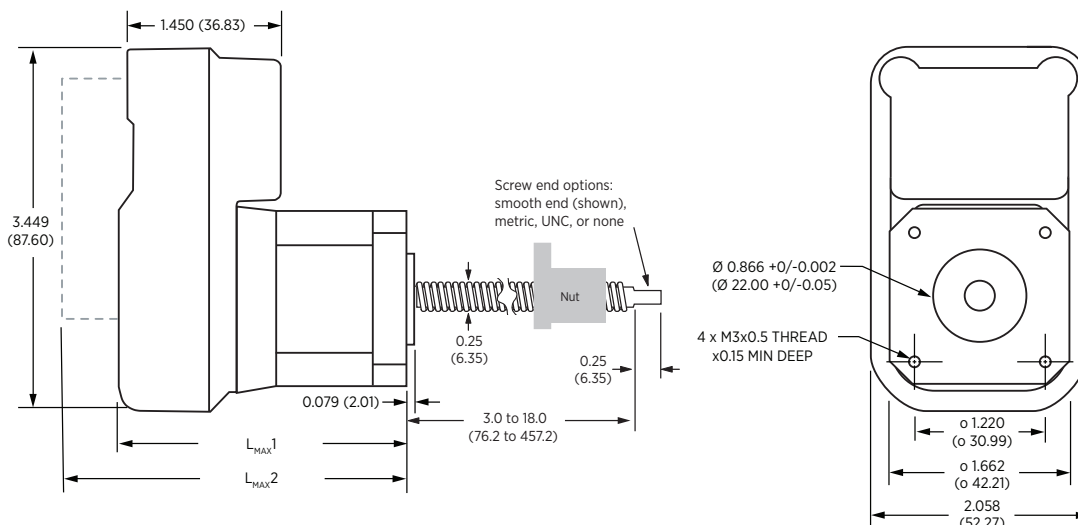
⁴ Installation above 3280 ft (1000 m) may require derating output current and maximum ambient temperature.

LMD Linear Actuator

Dimensions

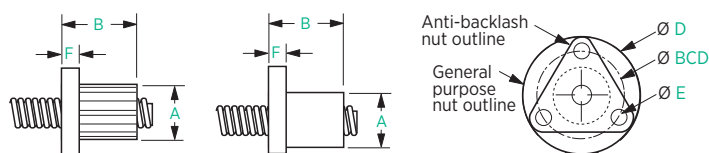
LM•42 NEMA 17 Motor, IP20-rated

inches (mm)



Nut Specifications

General purpose nut Anti-backlash nut



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

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

Flange shape: round

Flange shape: triangle

| inches (mm) | A | B | D | E | F | BCD | drag torque |
|-----------------|-------------|-----------------|------------|--------------|-------------|-------------|-------------------------|
| General Purpose | 0.50 (12.7) | 0.75 (19.1) | 1.0 (25.4) | 0.14 (3.6) | 0.15 (3.81) | 0.75 (19.1) | free wheeling |
| Anti-backlash | 0.50 (12.7) | 0.9 (22.86) max | 1.0 (25.4) | 0.143 (3.63) | 0.18 (4.57) | 0.75 (19.1) | <1.0 oz-in <0.7 N-cm |

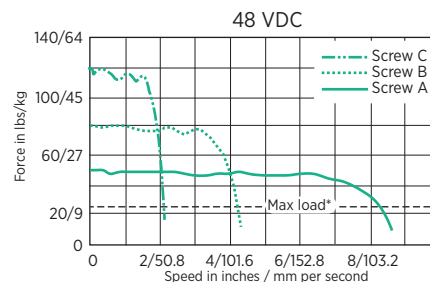
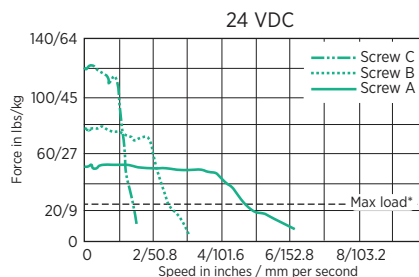
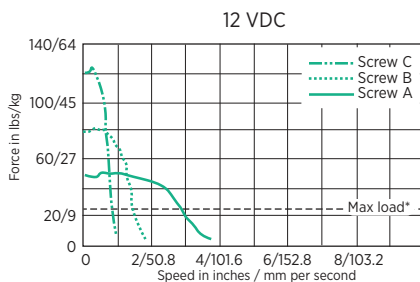
Lead Screw Specifications

| | | Screw A | Screw B | Screw C |
|-------------|----------------|----------------------|----------------------|----------------------|
| Travel | Per revolution | 0.25" / 6.35 mm | 0.125" / 3.175 mm | 0.063" / 1.588 mm |
| | Per full step | 0.00125" / 0.0317 mm | 0.00063" / 0.0158 mm | 0.00031" / 0.0079 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: M4 x 0.7mm thread to within 0.03"/0.76 mm of shoulder | UNC end: #8-32 UNC-2A thread to within 0.03"/0.76 mm of shoulder |
| Smooth end | Ø 0.1967" ±0.001 Ø 5 mm ±0.003 | |
| None | — | |

Speed-Force Curves



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



LMD Linear Actuator

Motor Performance

| Motor | Stack length | LMD•42 Standard Torque | | |
|---|------------------------|------------------------|--------|--------|
| | | Single | Double | Triple |
| Holding torque | oz-in | 44 | 58 | 88 |
| | 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 @ 1500rpm (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 |

Connector & Indicator Layout

IP20-rated Models

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 male
(RJ45 for Ethernet model)



IP65-rated Models

Connector

P1: Power

One M12 4-pin male

Chassis Ground

One #6-32 screw

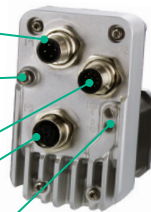
Connectors

P2: I/O & multifunction

One M12 12-pin male

P3: Communication

One M12 5-pin male



LEDs

Two signal indicators

Part Number Breakdown

| Example part number | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
|---|---|---|---|---|---|---|---|---|---|-----|---|---|---|---|---|---|---|
| Product | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 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 | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| C = Closed loop / with hMT and incremental magnetic encoder ¹ | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| A = Closed loop / with hMT and multi-turn absolute encoder ¹ | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 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 | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| P = Pulse/Direction via RS-422/485 serial interface ² | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| M = Programmable Motion Control via RS-422/485 serial interface | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| A = CANopen interface | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| E = 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 | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 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 | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 1 = single stack | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 2 = double stack | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 3 = triple stack | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| Connector Style | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| P = pluggable connectors, IP20 rating | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| C = M12 circular connectors, IP20 rating | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| Lead screw | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| -LA = 0.25" / 6.35 mm | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| -LB = 0.125" / 3.175 mm | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| -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 | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 3 = external shaft | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| Screw end finish | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| M = metric | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| U = UNC | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| S = smooth | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| Z = none | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| Screw length³ | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| lengths available in 0.1" increments | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 030 = 03.0" / 76 mm minimum | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 180 = 18.0" / 457 mm maximum | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| Nut | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| G = general purpose | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| A = anti-backlash | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| Screw coating | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| T = Teflon® | L | M | D | C | M | 4 | 2 | 1 | P | -LA | 3 | M | 0 | 6 | 0 | G | T |
| 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 To calculate screw length:

$$\text{screw length} = [\text{desired stroke length}] + [\text{nut length}] + [\text{mounting surface plate thickness}]$$



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 [draghttps://novantaims.com/resources/part-number-builders/](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/downloads/>