

# MDrive<sup>®</sup> Plus MLM•23

NEMA 23 Step & Direction Linear Actuator integrated with 1.8° 2-phase stepper motor & control electronics

CE RoHS REACH IP20



## PRODUCT OVERVIEW

MDrive Linear Actuators are compact linear motion systems. External or non-captive shaft linear mechanicals are integrated with stepper motor and electronics for reliable, repeatable motion.

Step & direction input products integrate 1.8° 2-phase stepper motor linear actuator, drive electronics and optional encoder. Step & direction signals of a master controller, e.g. a motion controller, or A/B signals of an encoder are converted directly into motion. Settings may be changed on-the-fly or downloaded and stored in nonvolatile memory using the SPI Motor Interface software provided.

MDrive product's precision rolled lead screws are manufactured from premium grade stainless steel with optional Teflon<sup>®</sup> coating. Designed specifically for motion control applications, our high quality screws deliver long life and quiet operation.

Simplify machine design and reduce assembly time by replacing multiple components with a single compact integrated motor. Fewer individual system components eliminates multiple potential failure points, and lowers risk of electrical noise by eliminating cabling between motor and drive.

## FEATURES AND BENEFITS

- Cost effective & compact integrated microstepping drive and NEMA 23 1.8° 2-phase stepper motor
- Non-captive and external shaft style available
- Advanced current control with automatic current reduction for exceptional performance and smoothness
- Single supply: +12 to +75 VDC
- 20 microstep resolutions up to 51,200 steps per rev, including: Degrees, Metric, & Arc Minutes
- Optically isolated Universal inputs accept +5 to +24 VDC signals, sourcing or sinking
- Optically isolated Differential inputs accept +5 VDC signals
- IP20 protection rating
- Configurable options include:
  - Motor run/hold current
  - Motor direction via direction input
  - Microstep resolution
  - Clock type (step & direction, quadrature, step up/down, clockwise & counterclockwise)
  - Programmable digital filtering
- Available options include:
  - Encoder
  - Multiple motor stack lengths
  - Long life linear actuators
  - Rear control knob for manual positioning
- Single, double, triple, & quad motor stack lengths available
- Lead screw lengths from 3.0" to 24.0" (77.5 to 610.0 mm) available in 0.1" (2.5mm) increments
- Lead screws with optional threaded or smooth screw ends and Teflon coating available
- Setup parameters may be switched on-the-fly
- Graphical user interface provided for quick and easy parameter setup



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

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



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 at <https://novantaims.com/resources/part-number-builders/>

# MDrive Plus MLM•23 Step & Direction

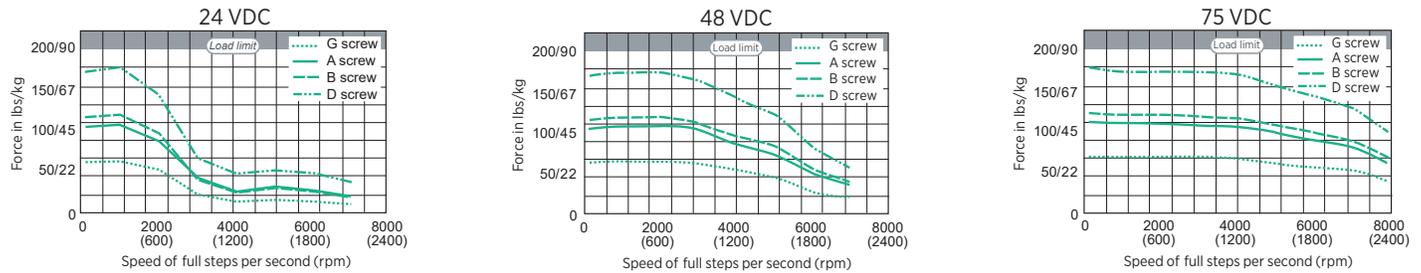
## Motor Performance

		MDrive 23	
Motor		Stack length	Single
Holding torque		oz-in	90
		N-cm	64
Rotor inertia		oz-in-sec <sup>2</sup>	0.0025
		kg-cm <sup>2</sup>	0.18
Weight without screw		oz	22.0
		g	625.0
Maximum screw misalignment		"	±1
Maximum thrust <sup>1</sup>	Non-captive shaft	lbs	200
		kg	91
	External shaft with general purpose nut	lbs	60
		kg	27
Maximum repeatability	External shaft with anti-backlash nut	lbs	25
		kg	11
	General purpose	inch	0.005
		mm	0.127
Anti-backlash <sup>2</sup>	inch	0.0005	
	mm	0.0127	

<sup>1</sup> Performance data for maximum force/load is based on a static load and will vary with a dynamic load.

<sup>2</sup> Only applicable for External shaft linear actuator with anti-backlash nut.

## Motor Speed Force



Test conditions: maximum force/load is based on a static load. This will vary with a dynamic load.

Load limits:  
 non-captive shaft — 50lbs/22kg  
 external shaft — determined by selected nut

## Screws<sup>1</sup>

Screw lengths <sup>2</sup>	minimum	inches	3.0	
		mm	77.5	
	maximum	inches	24.0	
		mm	610.0	
Load Limits <sup>3</sup>	non-captive shaft	lbs	200	
		kg	91	
	external shaft w/ general purpose nut	lbs	60	
		kg	27	
End Options	external shaft w/ anti-backlash nut	lbs	25	
		kg	11	
	threaded	metric	M6 x 1.0 mm thread to within 0.03" / 0.76 mm of shoulder	
		UNC	1/4-20 UNC-2A thread to within 0.05" / 1.3 mm of shoulder	
	smooth	inches	Ø 0.2362 ±0.001	
		mm	Ø 6 ±0.003	
	none	—	—	
Lead/Pitch		Travel	Per Rev	Per Full Step
	screw G	inches	0.375	0.001875
		mm	9.525	0.0476
	screw A	inches	0.20	0.001
		mm	5.08	0.0254
	screw B	inches	0.167	0.000835
		mm	4.233	0.0212
	screw D	inches	0.083	0.0004165
mm		2.116	0.0106	

<sup>1</sup> Stainless steel rolled screws are corrosion resistant and non-magnetic, with Teflon coating available.

<sup>2</sup> Standard 0.1" / 2.5mm screw length increments are available.

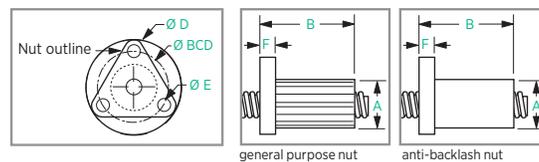
<sup>3</sup> Performance data for maximum force/load is based on a static load and will vary with a dynamic load.

# MDrive Plus MLM•23 Step & Direction

## Nuts<sup>1</sup>

			General Purpose Nuts	Anti-backlash Nuts
Dimensions	A	inches	0.71	0.82
		mm	18.0	20.8
	B	inches (max)	1.5	1.875
		mm (max)	38.1	47.63
	D	inches	1.5	1.5
		mm	38.1	38.1
	E	inches	0.20	0.20
mm		5.08	5.08	
F	inches	0.20	0.20	
	mm	5.08	5.08	
BCD	inches	1.125	1.125	
	mm	28.6	28.6	
Load limit	lbs	60	25	
	kg	27	11	
Drag torque		free wheeling	1-to-3	

<sup>1</sup> External shaft MDrive Linear Actuators employ a nut which moves axially along the threaded shaft as the screw rotates. Two nut styles are available: general purpose and anti-backlash. While anti-backlash nuts provide higher accuracy and low drag torque, general purpose nuts are rated for higher load limits.



## Accessories

Description	Length feet (m)	Part Number
<b>Communication Converters</b>		
Electrically isolated, in-line converter pre-wired with mating connector to conveniently set/program communication parameters for a single MDrivePlus via a PC's USB port.		
Mates to 10-pin non-locking IDC connector	12.0 (3.6)	MD-CC300-001
Mates to 12-pin locking wire crimp connector	12.0 (3.6)	MD-CC303-001
<b>Prototype Development Cables</b>		
Speed test/development with pre-wired mating connector with other cable end open.		
Mates to 12-pin locking wire crimp connector for I/O, communication, & power	10.0 (3.0)	PD12-1434-FL3
<b>Encoder Cables</b>		
Pre-wired mating connector with other cable end open.		
For external single-end optical encoder with non-locking connector	1.0 (0.3)	ES-CABLE-2
For external differential optical encoder with locking connector	6.0 (1.8)	ED-CABLE-6
<b>Mating Connector Kit</b>		
Connectors for the assembly of cables. (Cable material not included). Sold in lots of 5. Manufacturer's crimp tool recommended for crimp connectors		
10-pin non-locking IDC connector for communication	—	CK-01
12-pin locking wire crimp connector for I/O, communication, and power	—	CK-03
<b>Drive Protection Module</b>		
Limits surge current and voltage to a safe level when DC input power to the MDrive Plus is switched on and off		
For all MLM•23 step & direction input products	—	DPM75
<b>Quick Start Kit</b>		
For rapid design verification, all-inclusive QuickStart Kits includes prototype development cables and communication converter for MDrivePlus initial functional setup and system testing.		
For all MLM•23 step & direction input products, add a "K" to the beginning of the part number when ordering		