

MDrive® Linear Actuator

MLI•23 Ethernet

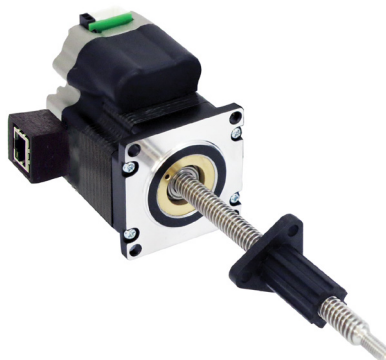
Product overview

MDrive® Linear Actuators are compact linear motion systems. ODA-compliant EtherNet/IP products integrate external shaft linear mechanicals with a NEMA23 1.8° 2-phase stepper motor, motion controller, drive electronics, and optional encoder.

As adapter class devices, MDrive EtherNet/IP products are capable of explicit or implicit messaging. ModbusTCP protocol is also supported, operating in immediate mode.

MDrive product's precision rolled lead screws are manufactured from premium grade stainless steel with optional Teflon® 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.



MDrive Linear Actuator MLI•23 Ethernet products: integrated NEMA23 motor, controls and mechanicals, external shaft style, IP20-rated

Specifications

Communication	Protocol type		EtherNet/IP, ModbusTCP, MCode/TCP
Input power	Voltage	VDC	+12 ... +75
	Current maximum (1)	Amp	2.0
Motor	Frame size	NEMA	23
		inches	2.3
		mm	57
	Length	stack size	single
Maximum thrust (2)	External shaft with general purpose nut	lbs	60
		kg	27
	External shaft with anti-backlash nut	lbs	25
Maximum repeatability	General purpose	inch	0.005
		mm	0.127
	Anti-backlash (3)	inch	0.0005
		mm	0.0127
Thermal	Operating temp non-condensing	Heat sink maximum	85°C
		Motor maximum	100°C
Protection	Type	IP rating	IP20
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)

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

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

(3) Only applicable for External shaft linear actuator with anti-backlash nut.

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Screws (1)

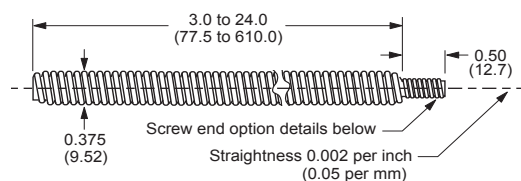
Screw lengths (2)	minimum	inches	3.0	
		mm	77.5	
	maximum	inches	24.0	
		mm	610.0	
Load limits (3)	external shaft w/ general purpose nut	lbs	60	
		kg	27	
	external shaft w/ anti-backlash nut	lbs	25	
		kg	11	
End options	threaded	metric	M6 x 1.0mm thread to within 0.03"/0.76mm of shoulder	
		UNC	1/4-20 UNC-2A thread to within 0.05"/1.3mm of shoulder	
	smooth	inches	$\varnothing 0.2362 \pm 0.001$	
		mm	$\varnothing 6 \pm 0.003$	
none	-	-		
Lead / pitch	screw G	travel	per rev	per full step
		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

(1) Stainless steel rolled screws are corrosion resistant and non-magnetic, with Teflon coating available.

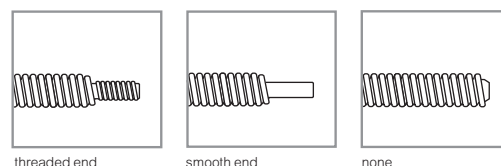
(2) Standard 0.1" / 2.5mm screw length increments are available.

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

screw dimensions



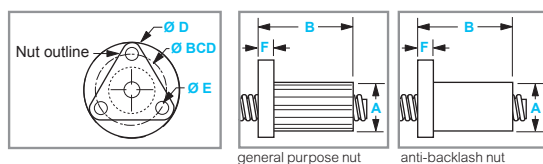
end options



Nuts (4)

			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

(4) 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.



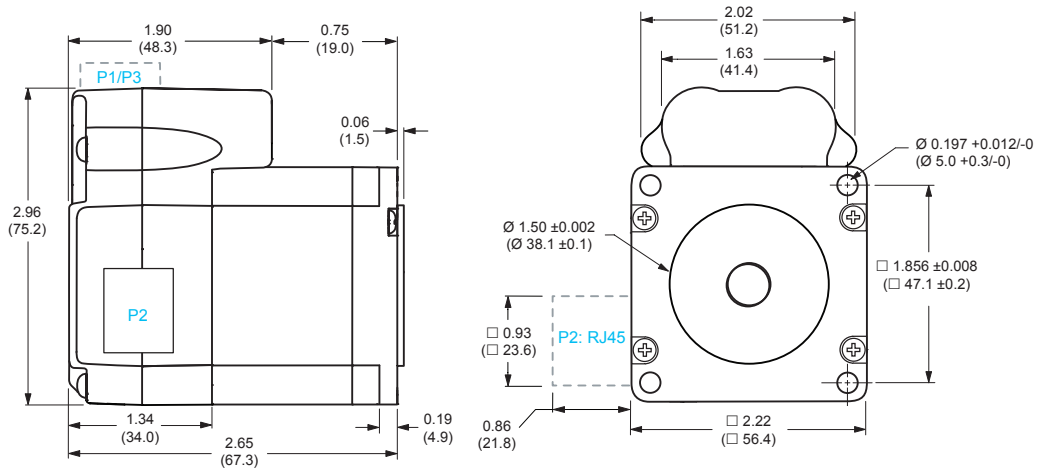
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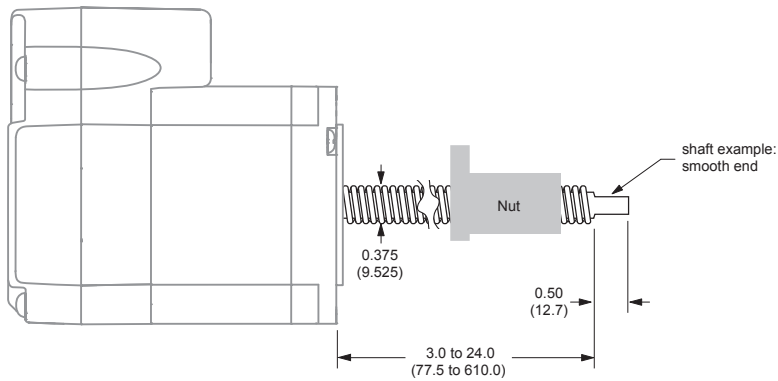
Dimensions

inches (mm)

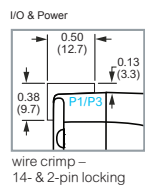
MDrive body



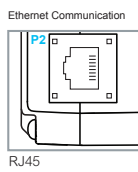
external shaft



P1/P3 connectors



P2 connector

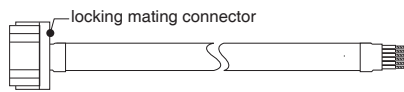


MDrive Plus

MLI•23 Ethernet

Accessories

description	length feet (m)	part number
<p>QuickStart Kit For rapid design verification, all-inclusive QuickStart Kits includes prototype development cables and a communication converter for MDrivePlus initial functional setup and system testing.</p>		
For all MLI•23 Ethernet products	—	add "K" to part number



PD14-2334-FL3



PD02-2300-FL3

Prototype development cable

Speed test/development with pre-wired mating connector with other cable end open.

Mates to 14-pin locking wire crimp connector for I/O and remote encoder option	10.0 (3.0)	PD14-2334-FL3
Mates to 2-pin locking wire crimp connector for power	10.0 (3.0)	PD02-2300-FL3

Mating connector kits

Connectors for assembly of cables, cable material not supplied. Sold in lots of 5. Manufacturer's crimp tool recommended for crimp connectors.

14-pin locking wire crimp connector for I/O and remote encoder option	—	CK-09
2-pin locking wire crimp connector for power	—	CK-04

Drive protection module

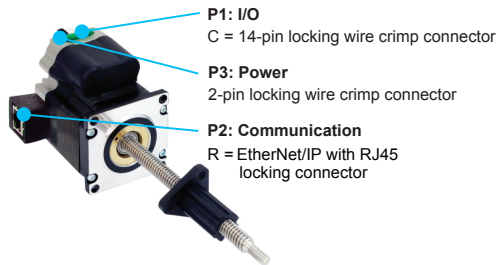
Limits surge current and voltage to a safe level when DC input power is switched on-and-off to an MDrivePlus.

For all MDrive linear actuator Ethernet products	—	DPM75
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MDrive Plus

MLI•23 Ethernet

MDrive® 23 Ethernet Linear Actuator IP20



Part numbers

IP20-rated products

example part number	K M L I 3 C I R 2 3 A 7 -EQ -●
QuickStart Kit K = kit option, omit from part number if unwanted	K M L I 3 C I R 2 3 A 7 -EQ -●
MDrive Linear Actuator version MLI = Intelligent — Ethernet	K M L I 3 C I R 2 3 A 7 -EQ -●
Input 3 = Plus ² version with expanded features	K M L I 3 C I R 2 3 A 7 -EQ -●
P1 connector C = wire crimp	K M L I 3 C I R 2 3 A 7 -EQ -●
Communication type I = EtherNet/IP	K M L I 3 C I R 2 3 A 7 -EQ -●
P2 connector R = RJ45	K M L I 3 C I R 2 3 A 7 -EQ -●
Motor size 23 = NEMA 23 2.3" / 57mm	K M L I 3 C I R 2 3 A 7 -EQ -●
Motor length A = single stack	K M L I 3 C I R 2 3 A 7 -EQ -●
Drive voltage 7 = +12 to +75 VDC	K M L I 3 C I R 2 3 A 7 -EQ -●
Options — omit from part number if unwanted -EQ = internal 512-line magnetic encoder w/ index mark	-EQ -●
Linear actuator specifications Complete the part number from the table below	-●

—● continued

example part number — linear actuator specifications	-L G 3 M 0 6 0 G T
Linear actuator -L	-L G 3 M 0 6 0 G T
Screw lead / pitch by travel per rev G = 0.375" / 9.525mm A = 0.200" / 5.08mm B = 0.167" / 4.233mm C = 0.083" / 2.116mm	-L G 3 M 0 6 0 G T
Shaft style 3 = external (1)	-L G 3 M 0 6 0 G T
Screw end finish M = metric threaded U = UNC threaded S = smooth Z = none	-L G 3 M 0 6 0 G T
Screw length (2) 030 = minimum 3.0" / 77.5mm 240 = maximum 24.0" / 610.0mm	-L G 3 M 0 6 0 G T
Nut G = general purpose — for external shaft products A = anti-backlash — for external shaft products	-L G 3 M 0 6 0 G T
Coating T = Teflon® Z = none	-L G 3 M 0 6 0 G T

(1) Loads must be supported. Side loading is not recommended.
(2) Screw lengths specified in 0.1" / 2.5mm increments.

MDrive Plus

MLI•23 Ethernet

Motor performance

ML•23 NEMA 23 motor specifications		Motor	Stack length	Single
Holding torque			oz-in	90
			N-cm	64
Rotor inertia			oz-in-sec ²	0.0025
			kg-cm ²	0.18
Weight without screw			oz	22.0
Maximum screw misalignment			°	±1
Maximum thrust (1)	External shaft with general purpose nut		lbs	60
			kg	27
	External shaft with anti-backlash nut		lbs	25
			kg	11
Maximum repeatability	General purpose		inch	0.005
			mm	0.127
	Anti-backlash (2)		inch	0.0005
			mm	0.0127

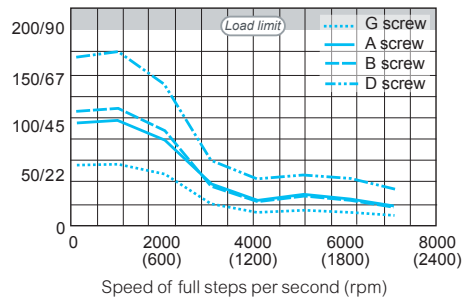
(1) Performance data for maximum force/load is based on a static load and will vary with a dynamic load.

(2) Only applicable for External shaft linear actuator with anti-backlash nut.

ML•23 NEMA 23 speed force

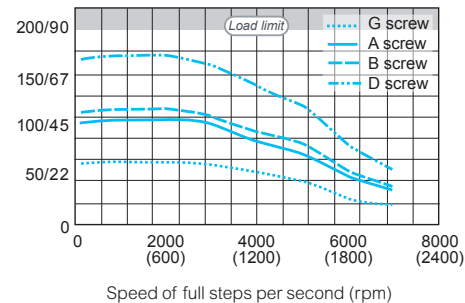
24 VDC

Force in lbs/kg



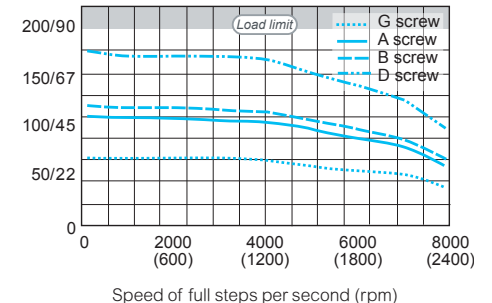
48 VDC

Force in lbs/kg



75 VDC

Force in lbs/kg



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

Load limits – non-captive shaft: 200 lbs/91kg

– external shaft: determined by selected nut

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Intelligent motion systems

