

# MDrive® Linear Actuator

## MLI•14 CANopen

### 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. Customization is available for volume opportunities.

CANopen products integrate 1.8° 2-phase stepper motor linear actuator, motion controller and drive electronics, supporting CiA DS301 and DSP402 Device Profile for Drives and Motion Control. Options include encoder, and CANopen dongle MD-CC500-000 for product setup and testing.

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•14 CANopen products: integrated NEMA14 motor, controls and mechanicals, non-captive and external shaft styles, IP20-rated

### Specifications

Communication	Protocol type		CANopen
Input power	Voltage	VDC	+12 ... +48
	Current maximum (1)	Amp	1.0
Motor	Frame size	NEMA	14
		inches	1.4
		mm	35
	Length	stack size	single
Maximum thrust (2)	Non-captive shaft	lbs	50
		kg	22
	External shaft with general purpose nut	lbs	25
		kg	11
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.

See User Manual for complete details: [www.motion.schneider-electric.com/manuals.html](http://www.motion.schneider-electric.com/manuals.html)

# MDrive Linear Actuator

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## Screws (1)

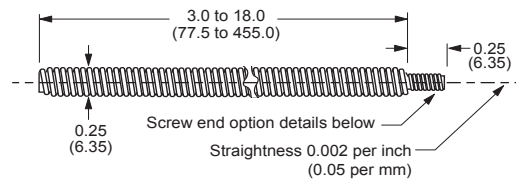
Screw lengths (2)	minimum	inches	3.0	
		mm	77.5	
	maximum	inches	18.0	
		mm	455.0	
Load limits (3)	non-captive shaft	lbs	50	
		kg	22	
	external shaft w/ general purpose nut	lbs	25	
		kg	11	
	external shaft w/ anti-backlash nut	lbs	5	
		kg	2	
End options	threaded	metric	M4 x 0.7 mm thread to within 0.03"/0.76 mm of shoulder	
		UNC	#8-32 UNC-2A thread to within 0.03"/0.76 mm of shoulder	
	smooth	inches	Ø 0.1967 ±0.001	
		mm	Ø 5 ±0.003	
	none	–	–	
		–	–	
Lead / pitch	screw A	travel	per rev	per full step
		inches	0.250	0.00125
		mm	6.350	0.0317
	screw B	inches	0.125	0.00063
		mm	3.175	0.0158
	screw C	inches	0.063	0.00031
		mm	1.588	0.0079

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

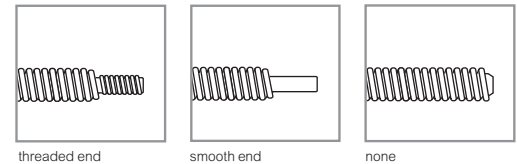
(2) Standard 0.1" / 2.5mm screw length increments are available.

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

### screw dimensions



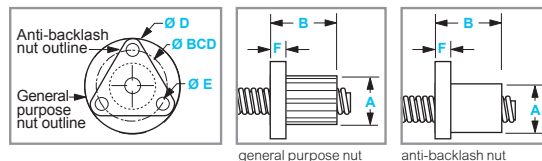
### end options



## Nuts (4)

			general purpose nuts	anti-backlash nuts
Dimensions	A	inches	0.50	0.50
		mm	12.7	12.7
	B	inches max	0.75	0.9
		mm max	19.1	22.86
	D	inches	1.0	1.0
		mm	25.4	25.4
	E	inches	0.14	0.14
		mm	3.6	3.6
	F	inches	0.15	0.18
		mm	3.81	4.57
BCD	inches	0.75	0.75	
	mm	19.1	19.1	
Load limit	lbs		25	5
	kg		11	2
Drag torque			free wheeling	< 1.0 oz-in < 0.7 N-cm

(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.



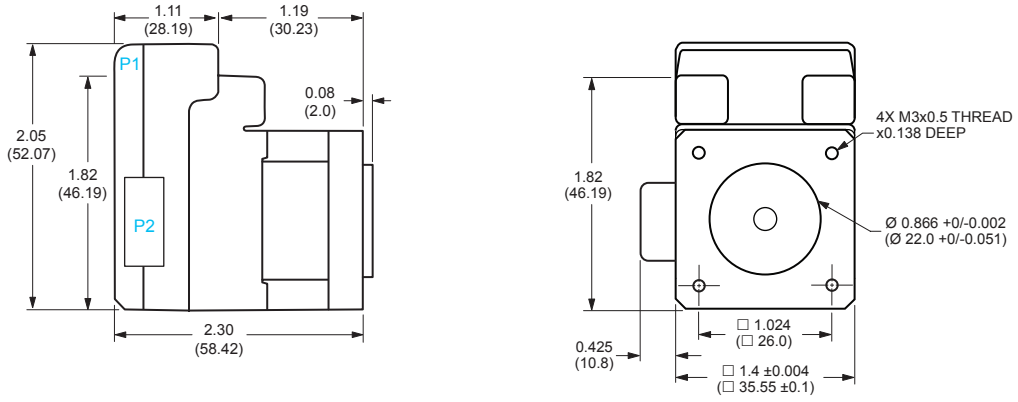
# MDrive Linear Actuator

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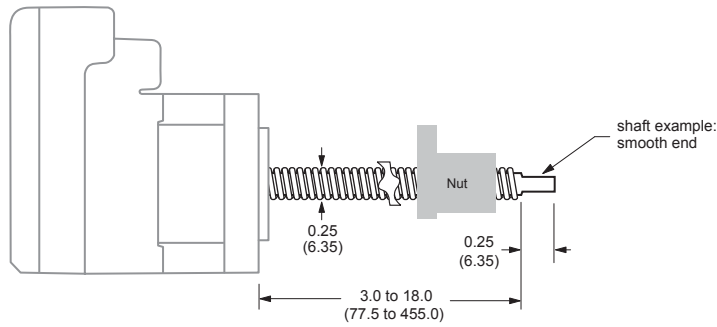
## Dimensions

inches (mm)

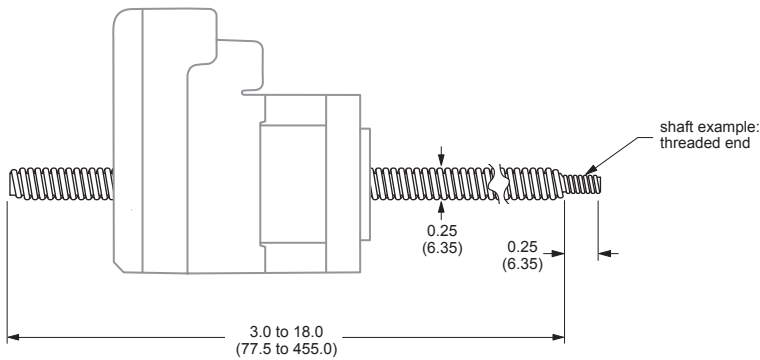
### MDrive body



### external shaft

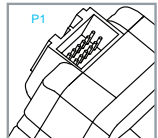


### non-captive shaft



### P1 connector

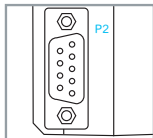
I/O & Power



16-pin locking wire crimp connector

### P2 connector

Communication

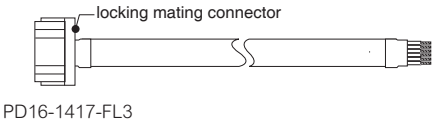
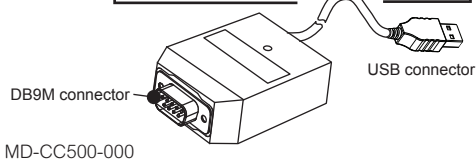
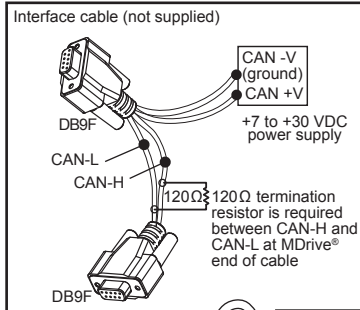


DB9 (male)

# MDrive Plus

## MLI•14 CANopen

### Accessories



description	length feet (m)	part number
<p><b>Communication converter</b> Electrically isolated, in-line converter pre-wired with mating connector to conveniently set/program communication parameters for a single MDrive Plus via a PC's USB port.</p>		
Interface cable for all CANopen products. Requires mating connector adapter for DB9 connector. Requires power supply, not supplied.	12.0 (3.6)	MD-CC500-000
<p><b>Prototype development cable</b> Speed test/development with pre-wired mating connector with other cable end open.</p>		
Mates to 16-pin locking wire crimp connector for I/O and power	10.0 (3.0)	PD16-1417-FL3
<p><b>Mating connector kits</b> Connectors for assembly of cables, cable material not supplied. Sold in lots of 5. Manufacturer's crimp tool recommended for crimp connectors.</p>		
16-pin locking wire crimp connector for I/O and power	—	CK-10
<p><b>Drive protection module</b> Limits surge current and voltage to a safe level when DC input power is switched on-and-off to an MDrive Plus.</p>		
For all MDrive Plus linear actuator products	—	DPM75

# MDrive Plus

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MDrive® 14 Plus² IP20



**P1: I/O & Power, and optional remote encoder**  
C = 16-pin locking wire crimp connector

**P2: Communication**  
B = CANopen with DB9 male connector

## Part numbers

### IP20-rated products

example part number	M L I 3 C C B 1 4 A 4 -EQ -●
MDrive Linear Actuator version MLI = Intelligent — CANopen	M L I 3 C C B 1 4 A 4 -EQ -●
Input 3 = Plus² version with expanded features	M L I 3 C C B 1 4 A 4 -EQ -●
P1 connector C = wire crimp	M L I 3 C C B 1 4 A 4 -EQ -●
Communication type C = CANopen	M L I 3 C C B 1 4 A 4 -EQ -●
P2 connector B = DB9	M L I 3 C C B 1 4 A 4 -EQ -●
Motor size 14 = NEMA 14 1.4" / 35mm	M L I 3 C C B 1 4 A 4 -EQ -●
Motor length A = single stack	M L I 3 C C B 1 4 A 4 -EQ -●
Drive voltage 4 = +12 to +48 VDC	M L I 3 C C B 1 4 A 4 -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



Non-captive shaft style

External shaft style

example part number — linear actuator specifications	-L A 1 M 0 6 0 Z T
Linear actuator -L	-L A 1 M 0 6 0 Z T
Screw lead / pitch by travel per rev A = 0.250" / 6.35mm B = 0.125" / 3.175mm C = 0.063" / 1.588mm	-L A 1 M 0 6 0 Z T
Shaft style 1 = non-captive (2) 3 = external (3)	-L A 1 M 0 6 0 Z T
Screw end finish M = metric threaded U = UNC threaded S = smooth Z = none	-L A 1 M 0 6 0 Z T
Screw length (4) 030 = minimum 3.0" / 77.5mm 180 = maximum 18.0" / 455.0mm	-L A 1 M 0 6 0 Z T
Nut Z = none — for non-captive shaft products G = general purpose — for external shaft products A = anti-backlash — for external shaft products	-L A 1 M 0 6 0 Z T
Coating T = Teflon® Z = none	-L A 1 M 0 6 0 Z T

(2) Unsupported loads and side loading are not recommended.  
(3) Loads must be supported. Side loading is not recommended.  
(4) Screw lengths specified in 0.1" / 2.5mm increments.

# MDrive Plus

## MLI•14 CANopen

### Motor performance

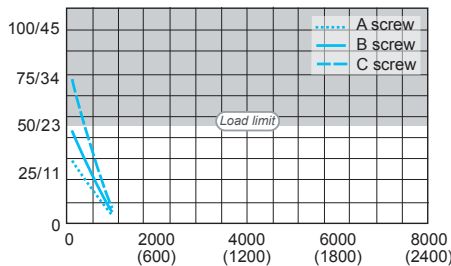
ML•14 NEMA 14 motor specifications		Motor	Stack length	Single
Holding torque			oz-in	18
			N-cm	13
Rotor inertia			oz-in-sec <sup>2</sup>	0.0003
			kg-cm <sup>2</sup>	0.021
Weight without screw			oz	8.0
			g	230.0
Maximum screw misalignment			°	±1
Maximum thrust (1)	Non-captive shaft		lbs	50
			kg	22
	External shaft with general purpose nut		lbs	25
			kg	11
	External shaft with anti-backlash nut		lbs	5
			kg	2
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•14 NEMA 14 speed force

12 VDC

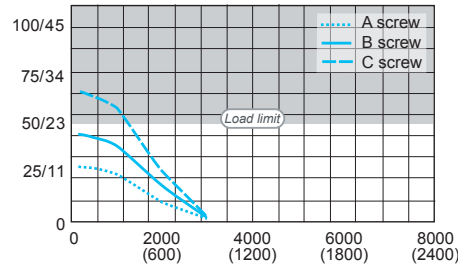
Force in lbs/kg



Speed of full steps per second (rpm)

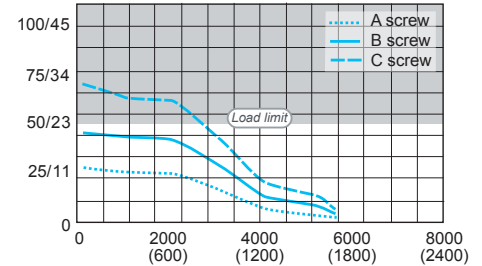
24 VDC

Force in lbs/kg



Speed in full steps per second (rpm)

48 VDC



Speed in full steps per second (rpm)

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

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Intelligent motion systems

