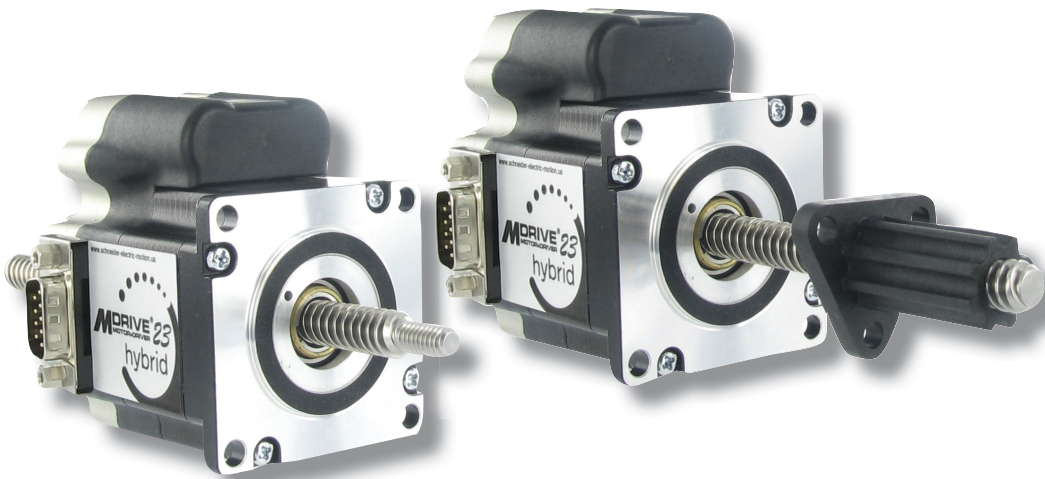
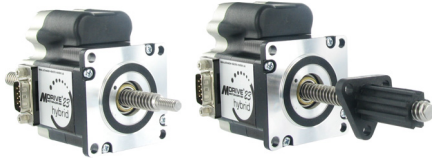


MDrive® Linear Actuator

Compact, integrated all-in-one linear motion systems



MDrive 23 Hybrid Linear Actuator
CANopen



MDrive® Hybrid Linear Actuator with CANopen non-captive and external shaft styles

Presentation

The MDrive® Hybrid Linear Actuator with CANopen interface is a very compact linear motion system that solves many servo applications with a low cost solution. The system includes a 1.8° 2-phase stepper motor linear actuator with on-board controller, drive electronics, internal encoder integral to system operation, and Hybrid Motion Technology™ (HMT). HMT combines the best of servo and stepper motor technologies, while delivering unique capabilities and enhancements over both.

IMS CANopen firmware is provided for MDrive Hybrid Linear Actuator CANopen systems, in addition to CANopen Tester GUI software for interface with the MD-CC500-000 CANopen dongle.

MDrive Hybrid Linear Actuator CANopen systems support CiA DS301 and DSP402 Device Profile for Drives and Motion Control.

Application areas

The MDrive Hybrid Linear Actuator with CANopen interface is ideal for machine builders who want a low cost linear motion alternative to servo motors and brushed DC motors. The compact system converts signals directly from rotary to linear motion, eliminating the need for belts and pulleys, rack and pinion, hydraulics, pneumatics or other mechanical system.

Integrated electronics of the MDrive Hybrid Linear Actuator reduce the potential for problems due to electrical noise by eliminating the cable between motor and drive. This stepper-based linear actuator system requires no tuning, and provides real-time closed loop control through an internal encoder.

These compact, powerful and cost effective linear motion control solutions deliver unsurpassed smoothness and performance that will reduce system cost, design and assembly time for a large range of motor applications — both servo and stepper.

Features

- Highly integrated microstepping drive, controller, and high torque 1.8° 2-phase stepper motor linear actuator
 - Non-captive or external shaft style
 - Load limit up to 200 lbs
 - Precision rolled lead screws
- Hybrid Motion Technology™ control for exceptional performance
- Internal encoder
- CANopen communication
- Single supply: from +12 to +60
- Cost effective
- Extremely compact
- 20 microstep resolutions up to 51,200 steps per rev including: Degrees, Metric, Arc Minutes
- Drive Protection Module option
- Graphical user interface provided for quick and easy configuration and programming via optional MD-CC500-000 communication converter

General specifications			
			MDrive23
Input power	Voltage	VDC	12 to 60
	Current maximum (1)	amp	3.5
Maximum thrust (2)	Non-captive shaft	lbs	200
		kg	91
	External shaft with general purpose nut	lbs	60
		kg	27
		External shaft with anti-backlash nut	lbs
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	-40° to +85°C
		Motor	-40° to +100°C
Auxiliary logic input	Voltage range (4)		+12 to +24 VDC
Analog input	Resolution		10 bit
	Voltage range		0 to +5 VDC, 0 to +10 VDC, 0-20 mA, 4-20 mA
Communication	Type		CANopen CiA DS301 (V3.0), DSP402 (V2.0), 2.0B active
	Baud rate		Configurable 5KB to 1 Mb
	ID		11 and/or 29 bit
	Isolation		Galvanic
	Features		Node guarding, heartbeat, SDOs, PDOs (variable mapping)
Software	Setup parameters		Storable to nonvolatile memory
	Transmit PDOs		3 dynamically mappable
	Receive PDOs		3 dynamically mappable
	Manufacturer specific objects		I/O configuration, run/hold current
	Modes of operation		Profile position, homing mode, profile velocity, torque mode
	Input functions		General purpose, homing mode profiles
	Output functions		General purpose
General purpose I/O	Number		8
	Type		Sourcing or sinking outputs/inputs
	Logic range		Sourcing outputs +12 to +24 VDC, inputs and sinking outputs tolerant to +24 VDC, inputs TTL level compatible
	Output sink current		Up to 600 mA
	Protection		Over temp, short circuit, transient, over voltage, inductive clamp
	Motion	Open loop configuration	Number of settings
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	+/- 5,000,000 steps per second
		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

(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.

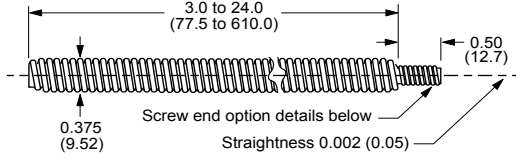
(3) Only applicable for External shaft linear actuator with anti-backlash nut.

(4) When input voltage is removed, maintains power only to control and feedback circuits.



See User Manual for complete details: www.imshome.com/manuals.html

Dimensions in inches (mm)



MDrive23 screw dimensions

Screw specifications

Material

MDrive Linear Actuator precision rolled lead screws are designed specifically for motion control applications to deliver maximum life and quiet operation. Corrosion resistant and non-magnetic, screws are manufactured from premium grade stainless steel.

Coating

An optional Teflon[®] screw coating is available for smooth operation and extended life.

Length

		MDrive 23	
		minimum	maximum
Length (1)	inches	3.0	24.0
	mm	77.5	610.0

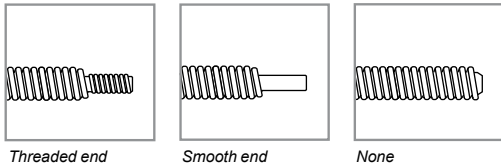
(1) Screw lengths are available in 0.1" (2.5mm) increments.

Lead/pitch options

		MDrive 23	
		per revolution	per full step
Screw G	travel		
	inches	0.3750	0.001875
	mm	9.525	0.0476
Screw A	inches	0.200	0.001
	mm	5.08	0.0254
Screw B	inches	0.1670	0.000835
	mm	4.233	0.0212
Screw D	inches	0.0833	0.0004165
	mm	2.116	0.0106

End options

		MDrive 23
Threaded	metric end	M6 x 1.0 mm 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	inches	Ø 0.2362 ±0.001
	mm	Ø 6 ±0.003
None		—



Load limit

		MDrive 23
Non-captive shaft (2)	lbs	200
	kg	91
External shaft	General	lbs 60
	purpose nut	kg 27
	Anti-backlash	lbs 25
	nut	kg 11

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

Calculating length

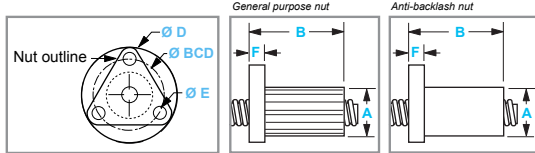
■ Non-captive shaft products
 Screw length = [mounting surface plate thickness] + [desired stroke length] + [1.8" (45.7mm)]

■ External shaft products
 Available stroke length = [screw length] – [nut length] – [mounting surface plate thickness]

Nut specifications

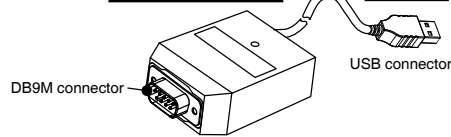
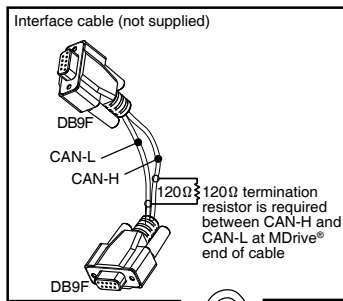
MDrive Linear Actuators with external shaft employ a nut which moves axially along the threaded shaft as the screw rotates. Two nut styles are available: general purpose and anti-backlash. While anti-backlash nuts provide higher accuracy and low drag torque, general purpose nuts are rated for higher load limits but lack wear compensation.

MDrive 23 nuts

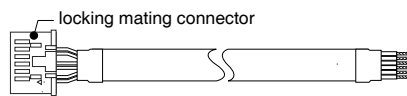


Dimensions and performance

		MDrive23	
nut type		general purpose	anti-backlash
A	inches	0.71	0.82
	mm	18.0	20.8
B	inches	1.50	1.875 max
	mm	38.1	47.63 max
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



MD-CC500-000



PD14-2334-FL3



PD02-2300-FL3

Installation accessories

Description	Length feet (m)	Part number
-------------	-----------------	-------------

Communication converter

Electrically isolated, in-line converter pre-wired with mating connector to conveniently set/program communication parameters for a single MDrive Hybrid Linear Actuator via a PC's USB port.

- Mates to DB9 connector (1) 12.0 (3.6) **MD-CC500-000**

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 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 kit

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 — **CK-09**
- 2-pin locking wire crimp connector for power — **CK-04**

Drive protection module

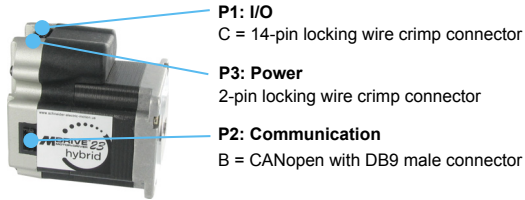
Limits surge current and voltage to a safe level when DC input power is switched on-and-off to an MDrive.

- For all MDrive Linear Actuator systems — **DPM75**

(1) Requires mating connector adapter, not supplied.

MDrive® 23 Hybrid Linear Actuator CANopen

MDrive® 23 Hybrid



Part numbers													
Example:	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
MDrive Hybrid Linear Actuator version	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
MAI = CANopen													
Type	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
3 = Hybrid Motion Technology													
P1 connector	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
C = wire crimp													
Communication	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
C = CANopen													
P2 connector	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
B = DB9													
Motor size	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
23 = NEMA 23 (2.3" / 57 mm)													
Motor length	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
A = single stack													
Drive voltage	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
6 = +12 to +60 VDC													
Encoder	M	A	I	3	C	C	B	2	3	A	6	-EJM	-●
-EJM = 1000-line internal encoder													
Linear actuator specifications													-●
Complete the part number from the table below													

Continued – Part numbers										
Example - linear actuator specifications:	-L	G	1	M	0	6	0	Z	T	
Linear actuator	-L	G	1	M	0	6	0	Z	T	
-L										
Screw lead / pitch	-L	G	1	M	0	6	0	Z	T	
G = 0.375" / 9.525 mm travel per rev										
A = 0.200" / 5.08 mm travel per rev										
B = 0.167" / 4.233 mm travel per rev										
D = 0.083" / 2.116 mm travel per rev										
Shaft style	-L	G	1	M	0	6	0	Z	T	
1 = Non-captive										
3 = External										
Screw end finish	-L	G	1	M	0	6	0	Z	T	
M = metric threaded										
U = UNC threaded										
S = smooth										
Z = none										
Screw length	-L	G	1	M	0	6	0	Z	T	
030 = 3.0" (77.5 mm) minimum up to										
240 = 24.0" (610.0 mm) maximum, in 0.1" (2.5 mm) increments										
Nut	-L	G	1	M	0	6	0	Z	T	
Z = none, only with Non-captive shaft products										
G = general purpose, only with External shaft products (1)										
A = anti-backlash, only with External shaft products (2)										
Coating	-L	G	1	M	0	6	0	Z	T	
T = Teflon										
Z = None										

(1) Dynamic load limit to 60 lbs / 22 kg.
 (2) Dynamic load limit to 25 lbs / 11 kg.

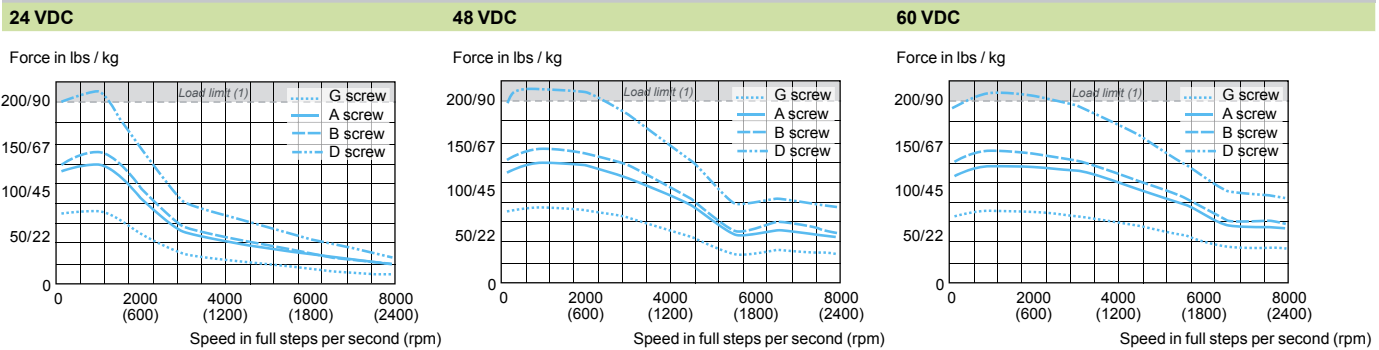


Easy MDrive part numbers via an interactive tool at:
www.imshome.com/MDriveLinear.html

Motor specifications			
Stack length			Single
Holding torque		oz-in	90.0
		N-cm	64.0
Rotor inertia		oz-in-sec ²	0.0025
		kg-cm ²	0.18
Maximum screw misalignment		°	± 1
Weight without screw		oz	22.0
		g	625.0
Maximum thrust (1)	Non-captive shaft	lbs	200
		kg	91
	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.

Speed force characteristics



(1) Load limits are for non-captive shaft linear actuators: 200lbs/91kg.
 Load limits for external shaft linear actuators are determined by the nut selected.
 Note: Performance data for maximum force/load is based on a static load and will vary with a dynamic load.

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