

# M DRIVE<sup>®</sup> 14 Linear ACTUATORS

MOTOR+DRIVER Plus

MDrive<sup>®</sup> Linear Actuators combine leading all-in-one integrated step motor+driver technology with linear motion to deliver long life, high accuracy and unsurpassed repeatability, all in a package that is extremely compact and affordable.



MDrive<sup>®</sup> 14 Linear Actuators feature high torque NEMA 14 (1.4"/36mm sq.) 1.8° linear actuator step motors integrated with electronics. A broad input voltage range from +12 up to +48 VDC and an extended operating range of -40° to +85°C provide long life, trouble free service in demanding environments.

These linear motion systems deliver high accuracy and unsurpassed repeatability with a load limit of up to 50lbs. Precision rolled lead screws are corrosion resistant stainless steel with an optional coating.

## Linear actuator styles

Two (2) MDrive<sup>®</sup> linear actuator styles are available:

- **Non-captive shaft**  
a threaded shaft extends through the MDrive product and moves axially as the motor rotates
- **External shaft**  
a rotating screw, integral to the MDrive rotor, moves the nut axially along the threaded shaft

## MDrive 14 Plus versions

Two (2) MDrive14Plus integrated motor + driver versions provide a choice of features and capabilities:

- **Microstepping, motor+driver**  
for step and direction input
- **Motion Control, motor+driver+controller**  
fully programmable, RS-485 or CANopen interface stand alone solution can be used without a PLC

Unsurpassed smoothness and performance delivered by MDrive Linear Actuator products are achieved through IMS's advanced 2nd generation current control. By applying innovative techniques to control current flow through the motor, resonance is significantly dampened over the entire speed range and audible noise is reduced. Over-sized input capacitors are used to minimize power line surges, reducing problems that can occur with long cable runs and multiple drive systems.

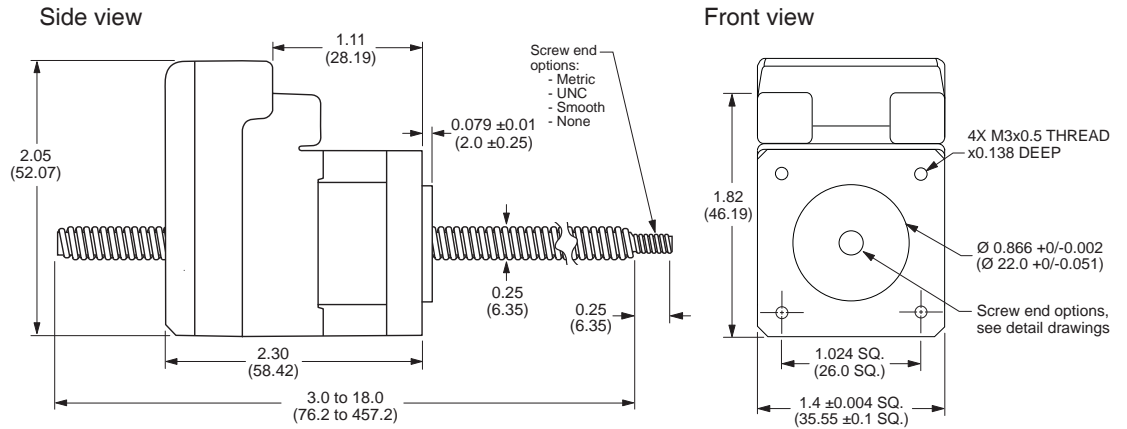
# Non-captive shaft



A threaded shaft extends through the MDrive® product and moves axially as the motor rotates

## Mechanical specifications

Dimensions in inches (mm)



### Load limit

Nominal load limit: 50 lbs (22 kg)\*

\*Screw D: 10 lbs (4.5 kg). Heavier loads will degrade screw life. Consult factory for alternatives.

## Screw specifications

### Screw material

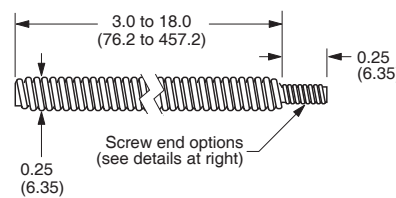
MDrive Linear Actuator precision rolled lead screws are designed specifically for motion control applications to deliver maximum life and quiet operation. Corrosion resistant and non-magnetic, screws are manufactured from premium grade stainless steel.

### Screw coating

An optional teflon screw coating is available for smooth operation and extended life.

### Standard screw

Dimensions in inches (mm)



### Lead options

| inches (mm) | travel per revolution | travel per full step |
|-------------|-----------------------|----------------------|
| Screw A     | 0.250 (6.350)         | 0.00125 (0.0317)     |
| Screw B     | 0.125 (3.175)         | 0.00063 (0.0158)     |
| Screw C     | 0.063 (1.588)         | 0.00031 (0.0079)     |
| Screw D     | 0.031 (0.794)         | 0.00016 (0.0040)     |

### Screw end options

|              |   |  |
|--------------|---|--|
| Threaded end | Metric end:<br>M4 x 0.7mm<br>thread to<br>within 0.03"<br>(0.76mm)<br>of shoulder | UNC end:<br>#8-32 UNC-2A<br>thread to<br>within 0.03"<br>(0.76mm)<br>of shoulder |
| Smooth end   | Ø 0.1967" ± 0.001<br>(Ø 5mm ± 0.003)  |  |
| None         | —   |  |

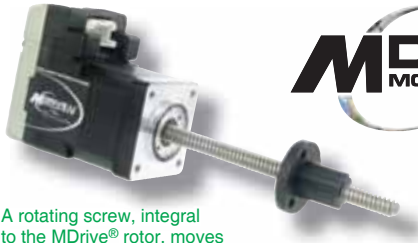
## Cantilevered loads

Unsupported loads and side loading are not recommended for non-captive shaft MDrive® linear actuator products.

## Calculating screw length

Screw length = [mounting surface plate thickness] + [1.40" (35.56mm)] + [desired stroke length]

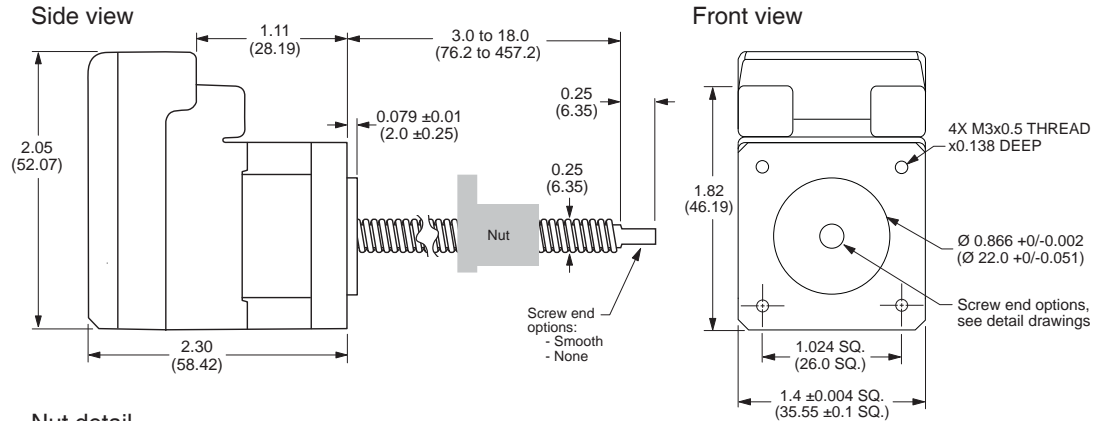
# External shaft



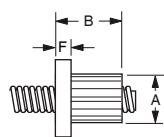
A rotating screw, integral to the MDrive® rotor, moves the nut axially along the threaded shaft

## Mechanical specifications

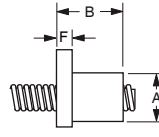
Dimensions in inches (mm)



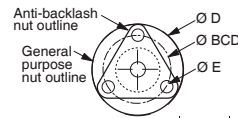
### Nut detail



**General purpose nut**  
Flange shape: round  
Load limit: 25 lbs (11 kg)  
Purpose: for applications not requiring anti-backlash and wear compensation.



**Anti-backlash nut**  
Flange shape: triangle  
Load limit: 5 lbs (2 kg)  
Purpose: backlash free operation for high accuracy and low drag torque.



| inches (mm)     | A           | B              | D          | E            | F           | BCD         | load limit   | 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) | 25lbs/ 11 kg | free wheeling          |
| Anti-backlash   | 0.50 (12.7) | 0.9max (22.86) | 1.0 (25.4) | 0.143 (3.63) | 0.18 (4.57) | 0.75 (19.1) | 5lbs/ 2 kg   | < 1.0 oz-in < 0.7 N-cm |

## Screw specifications

### Screw material

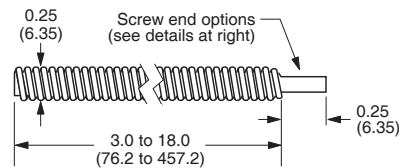
MDrive Linear Actuator precision rolled lead screws are corrosion resistant and non-magnetic, manufactured from premium grade stainless steel.

### Screw coating

An optional teflon screw coating is available for smooth operation and extended life.

### Standard screw

Dimensions in inches (mm)



### Lead options

| inches (mm) | travel per revolution | travel per full step |
|-------------|-----------------------|----------------------|
| Screw A     | 0.250 (6.350)         | 0.00125 (0.0317)     |
| Screw B     | 0.125 (3.175)         | 0.00063 (0.0158)     |
| Screw C     | 0.063 (1.588)         | 0.00031 (0.0079)     |
| Screw D     | 0.031 (0.794)         | 0.00016 (0.0040)     |

### Screw end options

|              |  |   |
|--------------|--|---|
| Threaded end | Metric end: M4 x 0.7mm thread to within 0.03" (0.76mm) of shoulder | UNC end: #8-32 UNC-2A thread to within 0.03" (0.76mm) of shoulder |
| Smooth end   | Ø 0.1967" ± 0.001 (Ø 5mm ± 0.003)                                  |   |
| None         | —  |   |

## Cantilevered loads

Loads for external shaft MDrive® linear actuator products MUST BE supported. Side loading is not recommended.

## Calculating stroke length

Available stroke length = [screw length] – [nut length] – [mounting surface plate thickness]



# MDrive<sup>®</sup> Plus

Leading all-in-one integrated step motor+driver technology combined with linear motion to deliver long life, high accuracy and unsurpassed repeatability all in a package that is extremely compact and affordable.

# Integrated linear motion

MDrivePlus Linear Actuators are compact, powerful, easy to use and low cost, and can reduce machine cost, size and time-to-market.

## Extremely compact design

Motor, mechanicals and electronics form a single, compact unit that dramatically reduces the space requirements in linear motion applications.

## Great versatility

For a wide range of linear motion applications, two (2) MDrivePlus versions provide a rich choice of features at low cost. Unique to the market, a rugged internal encoder integrated with the screw is available.

## Easy installation and setup

Minimized wiring and production time along with user-friendly software contribute to easy integration of MDrive products. Available QuickStart Kits provide everything needed for initial setup and testing.

## Features

| Features   |  | MDrivePlus versions      |                        |
|--|--|--------------------------|------------------------|
|  |  | Microstepping            | Motion Control         |
| Highly integrated microstepping driver and NEMA 14 1.8° single length brushless step linear actuator motor |  | √                        | √                      |
| Integrated fully programmable motion controller  |  |                          | √                      |
| Advanced 2nd generation current control for exceptional performance and smoothness                         |  | √                        | √                      |
| Single supply: +12 to +48 VDC  |  | √                        | √                      |
| Low cost   |  | √                        | √                      |
| Extremely compact  |  | √                        | √                      |
| 20 programmable microstep resolutions to 51,200 steps/rev including: Degrees, Metric, Arc Minutes          |  | √                        | √                      |
| Premium stainless steel lead screws  |  | √                        | √                      |
| Linear actuator styles   | Non-captive shaft                              | √                        | √                      |
|  | External shaft                                 | √                        | √                      |
| Options  | Internal magnetic encoder                      | √                        | √                      |
|  | Anti-backlash (external linear actuators only) | √                        | √                      |
|  | Coated screw                                   | √                        | √                      |
| Interface connectors   | Pluggable locking wire crimp connector         | √ <sup>4</sup>           | √                      |
|  | Pluggable terminal strip connector             | √                        | √                      |
|  | Flying leads — 12.0"/30.5cm long wires         | √                        | √                      |
| Communications type  |  | SPI                      | RS-422/485 or CANopen  |
| Electronically configurable  |  | √ <sup>1</sup>           | √                      |
| Programmable motor run and hold currents   |  | √                        | √                      |
| Interface software included  |  | √                        | √                      |
| Parameters switchable on-the-fly   |  | √                        | √                      |
| Current reduction  |  | Automatic                | Programmable           |
| Noise reduction  |  | Optically isolated input | Programmable filtering |
| Optically isolated logic input options <sup>2</sup>  |  | √                        |                        |
| Up to eight +5 to +24 VDC I/O lines <sup>3</sup>   |  |                          | √                      |
| Selectable 10-bit analog input for motion/speed control  |  |                          | √                      |
| High speed position capture input or trip output   |  |                          | √ <sup>4</sup>         |
| Auxiliary logic power supply input   |  |                          | √                      |
| 0 to 5MHz step clock rate selectable in 0.59Hz increments  |  |                          | √                      |
| 62 software addresses for multi-drop communications  |  |                          | √                      |

<sup>1</sup> Includes: motor direction vs. direction input; clock type - step and direction, quadrature, step up and down; programmable digital filtering for clock and direction inputs

<sup>2</sup> Select either universal +5 to +24 VDC signals (sourcing or sinking) or differential +5 VDC signals

<sup>3</sup> MDrivePlus version offers four +5 to +24 VDC I/O line accepting sourcing or sinking outputs; MDrivePlus2 version with expanded features offer +24 VDC tolerant I/O lines sourcing or sinking, inputs & outputs with either 8 I/O lines with electronic gearing or 4 I/O lines with external/remote encoder for closed loop control

<sup>4</sup> Only with MDrivePlus2 expanded features



Compact intelligence

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More success with innovative linear motion

# General specifications: all versions

|                              | Holding torque        | Rotor inertia  | Maximum screw misalignment | Weight without screw   |
|------------------------------|-----------------------|--|----------------------------|------------------------|
| <b>Linear actuator motor</b> | 18 oz-in<br>(13 N-cm) | 0.0003 oz-in-sec <sup>2</sup><br>(0.021 kg-cm <sup>2</sup> ) | ± 1°                       | 8.0 oz<br>(230.0 g)    |
|                              | Maximum thrust        |  | Maximum repeatability      |                        |
|                              | general purpose       | with anti-backlash nut                                       | general purpose            | with anti-backlash nut |
| <b>Non-captive shaft</b>     | 50 lbs (22 kg)        | —  | 0.005" (0.127mm)           | —                      |
| <b>External shaft</b>        | 25 lbs (11 kg)        | 5 lbs (2 kg)   | 0.005" (0.127mm)           | 0.0005" (0.0127mm)     |

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

|                           |                       |                      |  |
|---------------------------|-----------------------|----------------------|--|
| <b>Input voltage (+V)</b> | Range                 | +12 to +48 VDC       | Power supply current requirements = 1A (max) per MDrive14Plus.<br>Actual power supply current will depend on voltage and load.   |
|                           |                       | Number of settings   | 20   |
| <b>Motion</b>             | Microstep resolution  | Steps per revolution | 200, 400, 800, 1000, 1600, 2000, 3200, 5000, 6400, 10000, 12800, 20000, 25000, 25600, 40000, 50000, 51200, 36000 (0.01 deg/ $\mu$ step), 21600 (1 arc minute/ $\mu$ step), 25400 (0.001mm/ $\mu$ step) |
| <b>Thermal</b>            | Operating temperature | Heat sink            | -40° to +85°C (non-condensing)   |
|                           |                       | Motor                | -40° to +100°C (non-condensing)  |

## Microstepping version with step and direction input

### Standard specifications

|                       |                      |   |
|-----------------------|----------------------|---|
| <b>Isolated input</b> | Universal            | Voltage range: +5 to +24 VDC sourcing or sinking — Step Clock, Direction and Enable |
|                       | Differential         | Voltage range: +5 VDC — Step Clock and Direction                                    |
|                       | Digital filter range | 50 nS to 12.9 $\mu$ S (10 MHz to 38.8 kHz)  |
| <b>Motion</b>         | Clock types          | Step/Direction, Quadrature, Step Up/Step Down                                       |
|                       | Step frequency       | 2 MHz default / 5 MHz maximum   |

### Setup parameters

|                 | Function                   | Range  | Units                     | Default          |
|-----------------|----------------------------|--|---------------------------|------------------|
| <b>MHC</b>      | Motor hold current         | 0 to 100   | percent                   | 5                |
| <b>MRC</b>      | Motor run current          | 1 to 100   | percent                   | 25               |
| <b>MSEL</b>     | Microstep resolution       | 1, 2, 4, 5, 8, 10, 16, 25, 32, 50, 64, 100, 108, 125, 127, 128, 180, 200, 250, 256 | $\mu$ steps per full step | 256              |
| <b>DIR</b>      | Motor direction override   | 0/1  | —                         | CW               |
| <b>HCDT</b>     | Hold current delay time    | 0 or 2-65535   | mSec                      | 500              |
| <b>CLK TYPE</b> | Clock type                 | Step/Dir, Quadrature, Up/Down  | —                         | Step/Dir         |
| <b>CLK IOF</b>  | Clock and direction filter | 50 nS to 12.9 $\mu$ S<br>(10 MHz to 38.8 kHz)                                      | nS (MHz)                  | 200 nS (2.5 MHz) |
| <b>USER ID</b>  | User ID                    | Customizable   | 1-3 characters            | IMS              |
| <b>EN ACT</b>   | Enable active              | High/Low   | —                         | High             |

All parameters are set using the supplied IMS SPI Motor Interface GUI and may be changed on-the-fly. An optional Communication Converter is recommended with first orders.

### Interface wire/pin assignments

| P1<br>I/O, power and communication connector |                           |   |
|--|---------------------------|---|
| 12-pin locking wire crimp                    | Function                  |   |
|  | Universal input           | Differential input<br><i>Clockwise/Counterclockwise</i> |
| Pin 1  | Power ground              | Power ground  |
| Pin 2  | +V (+12 to +48 VDC)       | +V (+12 to +48 VDC)                                     |
| Pin 3  | Optocoupler reference     | CW +  |
| Pin 4  | Step clock input          | CW -  |
| Pin 5  | Enable input              | CCW +   |
| Pin 6  | CW/CCW direction input    | CCW -   |
| Pin 7  | +5 VDC output             | +5 VDC output   |
| Pin 8  | SPI clock                 | SPI clock   |
| Pin 9  | Communications ground     | Communications ground                                   |
| Pin 10                                       | SPI master out - slave in | SPI master out - slave in                               |
| Pin 11                                       | SPI chip select           | SPI chip select   |
| Pin 12                                       | SPI master in - slave out | SPI master in - slave out                               |

# Motion Control version with programmable controller or CANopen

## Standard (Plus) specifications

|                               |                                      |  |  |                              |
|-------------------------------|--------------------------------------|--|--|------------------------------|
| Auxiliary logic input voltage | Range                                | +12 to +24 VDC<br>Maintains power to control and feedback circuits (only) when input voltage is removed. |  |                              |
|                               | Resolution                           | 10 Bit   |  |                              |
| Analog input                  | Voltage range                        | 0 to +5 VDC, 0 to +10 VDC, 0-20 mA, 4-20 mA  |  |                              |
|                               | Number/type                          | 4 sinking outputs/4 sourcing or sinking inputs   |  |                              |
| General purpose I/O           | Logic range                          | Inputs and outputs tolerant to +24VDC, inputs TTL level compatible                                       |  |                              |
|                               | Output sink current                  | Up to 600 mA per channel   |  |                              |
|                               | Protection                           | Over temp, short circuit, transient over voltage, over voltage, inductive clamp                          |  |                              |
| Communication                 | Standard                             | Type   | RS-422/485   |                              |
|                               |                                      | Baud rate  | 4.8 to 115.2kbps   |                              |
|                               | Optional                             | Type   | CANopen DSP-402 (V2.0), DS-301 (V3.0), 2.0B active   |                              |
|                               |                                      | ID   | 11 and/or 29 bit   |                              |
|                               |                                      | Isolation  | Galvanic   |                              |
| Motion                        | Open loop configuration              | 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/ $\mu$ step), 21600 (1 arc minute/ $\mu$ step), 25400 (0.001mm/ $\mu$ step) |                              |
|                               | Closed loop configuration (optional) | Internal encoder   | Type   | Internal, magnetic           |
|                               |                                      |  | Steps per revolution   | 51200                        |
|                               | Counters                             |  | Resolution   | 512 lines/2048 edges per rev |
|                               |                                      |  | Type   | Position, encoder/32 bit     |
|                               | Velocity                             |  | Edge rate (max)  | 5 MHz                        |
| Range                         |                                      |  | +/- 5,000,000 steps per second   |                              |
| Accel/decel                   |                                      | Resolution   | 0.5961 steps per second  |                              |
|                               |                                      | Range  | $1.5 \times 10^9$ steps per second <sup>2</sup>  |                              |
| Software                      | Program storage                      | Type/size  | Flash/6384 bytes   |                              |
|                               |                                      | User registers   | (4) 32 Bit   |                              |
|                               | User program labels and variables    | 192  |  |                              |
|                               | Math functions                       | +, -, $\times$ , $\div$ , >, <, =, <=, >=, AND, OR, XOR, NOT   |  |                              |
|                               | Branch functions                     | Branch and call  |  |                              |
|                               | General purpose I/O functions        | Inputs   | Home, limit plus, limit minus, go, stop, pause, jog plus, jog minus, analog in, general purpose  |                              |
|                               |                                      | Outputs  | Moving, fault, stall, velocity change, general purpose   |                              |
|                               | Trip functions                       | Trip on input, trip on position, trip on time, trip capture  |  |                              |
|                               | Party mode addresses                 | 62   |  |                              |
|                               | Encoder functions                    | Stall detection, position maintenance, find index  |  |                              |

## Expanded (Plus<sup>2</sup>) specifications

|                      |                                      |  |   |  |
|----------------------|--------------------------------------|--|---|--|
| General purpose I/O  | Number/type                          | 8 sourcing or sinking outputs/inputs (or 4 when remote encoder option is selected)                           |   |  |
|                      | Logic range                          | Sourcing outputs +12 to +24 VDC, inputs and sinking outputs tolerant to +24 VDC, inputs TTL level compatible |   |  |
|                      | Output sink/source current           | Up to 600 mA per channel   |   |  |
| Motion               | Electronic gearing                   | Range <sup>†</sup> /resolution/threshold (external clock in)   | 0.001 to 2.000/32 bit/TTL                             |  |
|                      |                                      | Input filter range   | 50 nS to 12.9 $\mu$ S (10 MHz to 38.8 kHz)            |  |
|                      |                                      | Range <sup>†</sup> (secondary clock out)   | 1 to 1  |  |
|                      | High speed I/O                       | Position capture   | Input filter range                                    | 50 nS to 12.9 $\mu$ S (10 MHz to 38.8 kHz) |
|                      |                                      |  | Resolution  | 32 bit                                     |
|                      | Closed loop configuration (optional) | Remote encoder   | Trip output – speed/resolution/threshold              | 150 nS/32 bit/TTL                          |
|                      |                                      |  | Type  | User-supplied differential encoder         |
| Steps per revolution |                                      |  | See above: "Standard specs open loop steps/rev"       |  |
|                      | Resolution                           | User-defined   | Note: $\mu$ step/rev 2X the encoder count/rev minimum |  |

<sup>†</sup> Adjusting the microstep resolution can increase the range.

## Interface wire/pin assignments

| Plus P1<br>I/O, power and communication connector |                           |
|---|---------------------------|
| 12-pin wire crimp                                 | Function                  |
| Pin 1   | Power/aux/comm ground     |
| Pin 2   | +V (+12 to 48 VDC)        |
| Pin 3   | I/O 2                     |
| Pin 4   | I/O 3                     |
| Pin 5   | I/O 4                     |
| Pin 6   | Analog input              |
| Pin 7   | I/O 1                     |
| Pin 8   | Aux-logic (+12 to 24 VDC) |
| Pin 9   | TX +                      |
| Pin 10  | TX -                      |
| Pin 11  | RX -                      |
| Pin 12  | RX +                      |

| Plus <sup>2</sup> P1<br>I/O and power connector |                     |                                    |
|---|---------------------|------------------------------------|
| 16-pin wire crimp                               | Function            |                                    |
|   | Expanded I/O        | Remote encoder closed loop control |
| Pin 1   | I/O power           | I/O power                          |
| Pin 2   | I/O ground          | I/O ground                         |
| Pin 3   | I/O 1               | I/O 1                              |
| Pin 4   | I/O 2               | I/O 2                              |
| Pin 5   | I/O 3               | I/O 3                              |
| Pin 6   | I/O 4               | I/O 4                              |
| Pin 7   | I/O 9               | Channel A +                        |
| Pin 8   | I/O 10              | Channel A -                        |
| Pin 9   | I/O 11              | Channel B +                        |
| Pin 10  | I/O 12              | Channel B -                        |
| Pin 11  | Capture/trip I/O    | Capture/trip I/O                   |
| Pin 12  | Analog in           | Analog in                          |
| Pin 13  | Step/clock I/O      | Index +                            |
| Pin 14  | Direction/clock I/O | Index -                            |
| Pin 15  | +V (+12 to 48 VDC)  | +V (+12 to 48 VDC)                 |
| Pin 16  | Power/aux ground    | Power/aux ground                   |

| Plus <sup>2</sup> P2<br>Communication connector |                           |         |            |
|---|---------------------------|---------|------------|
| RS-422/485                                      |                           | CANopen |            |
| 10-pin wire crimp                               | Function                  | DB9     | Function   |
| Pin 1   | TX +                      | Pin 1   | No connect |
| Pin 2   | Comm ground               | Pin 2   | CAN low    |
| Pin 3   | RX -                      | Pin 3   | CAN -V     |
| Pin 4   | TX -                      | Pin 4   | Aux power  |
| Pin 5   | Aux-logic (+12 to 24 VDC) | Pin 5   | Shield     |
| Pin 6   | RX +                      | Pin 6   | CAN -V     |
| Pin 7   | RX +                      | Pin 7   | CAN high   |
| Pin 8   | RX -                      | Pin 8   | No connect |
| Pin 9   | TX +                      | Pin 9   | CAN +V     |
| Pin 10  | TX -                      |         |            |



# Part numbering

## QuickStart Kits

Order by placing a "K" at front of part number.

All-inclusive QuickStart Kits are for rapid design verification. They include communication converter, prototype development cable(s), instructions and CD for MDrive product initial functional setup and system testing.



### P1

I/O, power & communication connector:

C = locking wire crimp (separate Comm connector on Plus<sup>2</sup> versions)

### P2

Communication connectors Plus<sup>2</sup> versions only:

L = 10-pin locking wire crimp  
B = DB9, only with CANopen Comm

## Microstepping version

**MLM** <sup>P1</sup> **1,5** **C** **SZ14A4** no encoder option available **- L** linear actuator

SPI comm

Input version  
1 = Universal - standard  
5 = Differential - CW/CCW

See details at bottom of page for complete linear actuator part numbers.

## Motion Control version

**MLI1** <sup>P1</sup> **C** <sup>P2</sup> **RZ14A4** - EQ **- L** linear actuator

RS-422/485 comm

**Optional encoder**  
For NO encoder, omit any -E specification from part number

Internal magnetic encoder with 512-line count and index mark.

*Plus<sup>2</sup>* **MLI3** <sup>P1</sup> **C** <sup>P2</sup> **RL14A4** - EQ (see above) or - EE **- L** linear actuator

RS-422/485 comm

*Plus<sup>2</sup>* **MLI3** <sup>P1</sup> **C** <sup>P2</sup> **CB14A4** - L linear actuator

CANopen comm

Plus<sup>2</sup> version only: optional inputs for differential remote encoder (not supplied). May not be combined with internal encoder.

See details at bottom of page for complete linear actuator part numbers.

## Linear actuator styles



Non-captive shaft

**- L** **1**           **Z**  

Screw end  
M = metric  
U = UNC  
S = smooth  
Z = none

Coating  
T = teflon\*  
Z = none

Screw length  
3.0 to 18.0" in 0.1 increments  
ex. 12.5" = 125  
10.0" = 100

Screw lead  
travel per rev  
A = 0.250" (6.35mm)  
B = 0.125" (3.175mm)  
C = 0.063" (1.588mm)  
D = 0.031" (0.794mm)

**Screw length calculation** = desired stroke length + 1.40" (35.56mm) + mounting surface plate thickness

\*Contact factory for availability.



External shaft

**- L** **3**                

Screw end  
M = metric  
U = UNC  
S = smooth  
Z = none

Coating  
T = teflon\*  
Z = none

Nut  
G = general purpose (dynamic load limit to 25lbs/11kg)  
A = anti-backlash (dynamic load limit to 5lbs/2kg)

Screw length  
3.0 to 18.0" in 0.1 increments  
ex. 12.5" = 125  
10.0" = 100

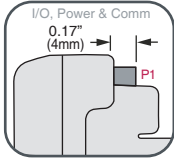
Screw lead  
travel per rev  
A = 0.250" (6.35mm)  
B = 0.125" (3.175mm)  
C = 0.063" (1.588mm)  
D = 0.031" (0.794mm)

**Screw length calculation** = desired stroke length + nut length + mounting surface plate thickness

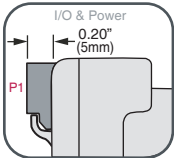
# Connectivity

## Interfacing options

### P1 Connector

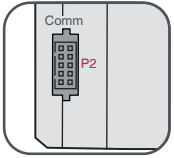


C = locking wire crimp  
12-pin

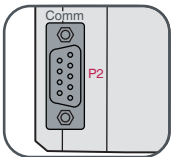


C = locking wire crimp  
16-pin (Plus<sup>2</sup> only)

### P2 Connector



L = 10-pin friction lock  
wire crimp (Plus<sup>2</sup> only)



B = DB9 (CANopen only)

### Microstepping version

#### Communication Converter

Electrically isolated, in-line converter pre-wired with mating connector to conveniently set/program communication parameters for a single MDrive product via a PC's USB port. Length 12.0' (3.6m).

Mates to connector:

P1 12-pin wire crimp.....MD-CC305-001

#### Prototype Development Cables

Speed test/development with pre-wired mating connectors that have flying leads other end. Length 10.0' (3.0m).

Mates to connector:

P1 12-pin.....PD12B-1434-FL3

#### Mating Connector Kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

P1 12-pin wire crimp .....CK-08

### Motion Control version

#### Communication Converters

Electrically isolated, in-line converters pre-wired with mating connectors to conveniently set/program communication parameters for a single MDrive product via a PC's USB port. Length 12.0' (3.6m).

Mates to connector:

P1 12-pin wire crimp.....MD-CC403-001

P2 10-pin wire crimp.....MD-CC402-001

P2 DB9 (*dongle requires adapter & power supply*) ....MD-CC500-000

#### Prototype Development Cables

Speed test/development with pre-wired mating connectors that have flying leads other end. Length 10.0' (3.0m).

Mates to connector:

P1 12-pin wire crimp.....PD12B-1434-FL3

P1 16-pin wire crimp.....PD16-1417-FL3

P2 10-pin wire crimp.....PD10-1434-FL3

#### Mating Connector Kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

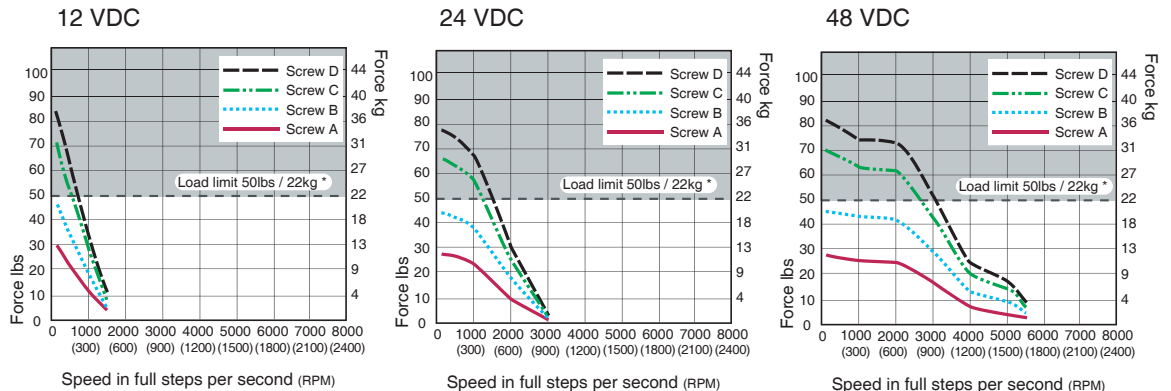
P1 12-pin wire crimp.....CK-08

P1 16-pin wire crimp.....CK-10

P2 10-pin wire crimp.....CK-02

Connectivity details: [www.imshome.com/cables\\_cordsets.html](http://www.imshome.com/cables_cordsets.html)

# Speed-force performance curves



NOTE: Performance data for maximum force/load is based on a static load and will vary with a dynamic load.  
\*For non-captive shaft linear actuators. Load limit for external shaft linear actuators is determined by selected nut.


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