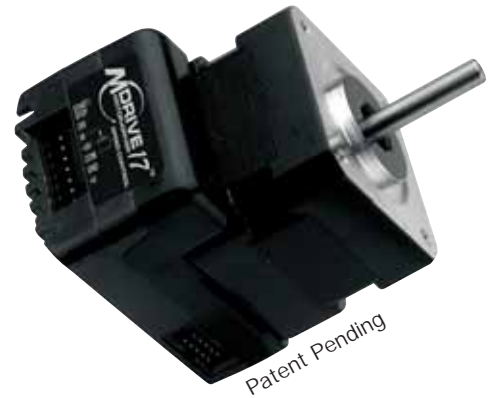


M DRIVE 17™ MOTOR+DRIVER

SPEED CONTROL



FEATURES

- Integrated Variable Speed Controller, Microstepping Driver and NEMA 17 High Torque 1.8° Stepping Motor
- +12 to +48 VDC Input Voltage
- Digital Oscillator for Accurate Speed Control
- Low Cost
- Extremely Compact
- Available Configurations:
 - Single Shaft*
 - Long Life Linear Actuator
 - Optical Encoder*
 - Control Knob for Manual Positioning*
 - Integrated Planetary Gearbox*
- Three Stack Sizes Available*
- Electronically Configurable (Eliminates Potentiometers):
 - Motor Run/Hold Current
 - Acceleration/Deceleration
 - Initial and Max Velocity
 - Speed Control Input Source
 - Microstep Resolution to 256 Microsteps/Full Step
- 2 Modes of Operation: Bidirectional or Unidirectional
- 15-25kHz PWM, 0-20mA, 4-20mA or 0 to +5 VDC Speed Control Input with Programmable Center Point
- Single Supply
- Interface Uses Pluggable Terminal Strip or 12.0" (30.5cm) Flying Leads
- Graphical User Interface (GUI) for Quick and Easy Parameter Setup

* Rotary Motor Only

DESCRIPTION

The MDrive17 Speed Control offers the system designer low cost, intelligent velocity control integrated with a NEMA 17 high torque stepping motor and a +12 to +48 volt microstepping driver.

The MDrive17 Speed Control features a digital oscillator for accurate velocity control with an output frequency of up to 100 kilohertz. Output frequency will vary with the signal applied to the speed control input. Speed can be adjusted by 15-25kHz PWM, 0-20mA, 4-20mA or 0 to +5 volts.

There are two basic modes of operation: bidirectional and unidirectional. By moving the center point, both speed and direction are controlled by the IMS Analog Speed Control GUI. By setting the center point to zero or the lower end of the potentiometer, only velocity is controlled by the speed control input; direction is controlled by a separate digital input.

The MDrive17 Speed Control has 12 setup parameters, configured using the supplied IMS Analog Speed Control GUI. The setup parameters enable the user to configure all MDrive operational parameters which are stored in nonvolatile memory.

The versatile, compact MDrive17 Speed Control is available in multiple configurations to fit various system needs. These options include a single shaft rotary motor, a dual shaft rotary motor available with optical encoder or control knob, a planetary gearbox, or a long life Acme screw linear

actuator. The rotary MDrive17 is available in single, double and triple stack sizes: 13, 15 & 19. Interface connections are accomplished using either a 7 position pluggable terminal strip or 12.0" (30.5cm) flying leads.

CONFIGURING

The IMS Analog Speed Control is a required software GUI for quick and easy parameter setup of the MDrive17 Speed Control from a computer parallel/SPI port. GUI access is via the IMS SPI Interface included on the CD shipped with the product, or download at www.imshome.com. An optional Parameter Setup Cable is available for ease of connecting and configuring the MDrive.

IMS Analog Speed Control features:

- Easy installation.
- Automatic detection of MDrive version and communication configuration.
- Will not set out-of-range values.
- Tool-tips display valid range setting for each option.
- Single screen interface (*below*).



Configuring the MDrive Speed Control is simplified with the IMS Analog Speed Control's single screen interface.

MDRIVE17 SPEED CONTROL SPECIFICATIONS

GENERAL SPECIFICATIONS

Speed Control Input	15 to 25kHz PWM, 0 to 20mA, 4 to 20mA or 0 to +5 VDC
A/D Resolution	10 bit
Speed Control Potentiometer Resistance.....	10 kΩ
Input Voltage (+V) Range*	+12 to +48 VDC
Stop/Start, Direction (Low Level Input)	0 to +1.5 VDC
Stop/Start, Direction (High Level Input)	+3.0 to +5.0 VDC
Input Pull-up Resistance (to +5 VDC) Stop/Start, Direction	4.99 kΩ
Heat Sink Temperature (Max)	85° C
Motor Temperature (Max)	100° C

*Power supply current requirements = 2A (maximum) per MDrive17. Actual power supply current will depend on voltage and load.

PARAMETERS

SETUP PARAMETERS				
NAME	FUNCTION	RANGE	UNITS	DEFAULT
ACCL	Accel/Decel	2000 to 65000	steps/sec ²	2000
C	Joystick Center	0 to 1022	counts	0
DB	Deadband	0 to 255	counts	1
DCLT	Decel Type	Decel at ACCL Rate/No Decel	--	Decel
A1	Input Mode	Volts/4-20mA/0-20mA	--	Volts
FS	Full Scale	1 to 1023	counts	1023
MHC	Motor Hold Current	0 to 100	percent	5
MRC	Motor Run Current	1 to 100	percent	25
MSEL	Microstep Resolution	2, 4, 5, 8, 10, 16, 25, 32, 50, 64, 125, 128, 250, 256	μsteps per step	256
RANGE	VI/VM Range	1 to 8	--	3
VI	Initial Velocity	1 to 100000	steps/sec	400
VM	Maximum Velocity	1 to 100000	steps/sec	20000

All parameters are set using the supplied IMS Analog Speed Control GUI.
An optional Parameter Setup Cable is recommended with first orders.

PIN/WIRE ASSIGNMENTS

CONNECTOR P1 - Pluggable Terminal Strip or Flying Leads		
PIN	FLYING LEADS	FUNCTION
1	Violet	STOP / START INPUT
2	Blue	DIRECTION INPUT
3	Green	SPEED CONTROL INPUT (0-5V (10K POT)/PWM/4-20mA/0-20mA)
4	Yellow	+5 VDC OUTPUT (10K POT)
5	Gray	LOGIC GROUND (10K POT)
6	Black	POWER GROUND
7	Red	+V (+12 TO +48 VDC)

CONNECTOR P2 (SPI) - 10 Pin Pin-Header	
PIN	FUNCTION
4	CHIP SELECT
5	GROUND
6	+5 VDC OUTPUT
7	MASTER OUT - SLAVE IN
8	CLOCK
10	MASTER IN - SLAVE OUT
Omitted numbers are NO CONNECT	

ENCODER PIN ASSIGNMENTS

ENCODER - Single-End	
PIN	FUNCTION
1	GROUND
2	INDEX
3	CHANNEL A
4	+5 VDC INPUT
5	CHANNEL B

ENCODER - Differential			
PIN	FUNCTION	PIN	FUNCTION
1	NO CONNECT	6	CHANNEL A +
2	+5 VDC INPUT	7	CHANNEL B -
3	GROUND	8	CHANNEL B +
4	NO CONNECT	9	INDEX -
5	CHANNEL A -	10	INDEX +

Optional Encoder Cables available.

NOTE: For recommended mating connector information, refer to the product's Quick Reference at www.imshome.com/quick.html

MDRIVE17 MOTOR SPECIFICATIONS

MD1713 Single Stack

Holding Torque32 oz-in / 22.6 N-cm
 Detent Torque1.66 oz-in / 1.17 N-cm
 Rotor Inertia 0.00053 oz-in-sec² / 0.038 kg-cm²
 Weight (Motor+Driver)..... 9.8 oz / 277.8 g

MD1715 Double Stack

Holding Torque60.0 oz-in / 42.4 N-cm
 Detent Torque2.08 oz-in / 1.47 N-cm
 Rotor Inertia 0.00080 oz-in-sec² / 0.057 kg-cm²
 Weight (Motor+Driver)..... 10.5 oz / 297.7 g

MD1719 Triple Stack

Holding Torque74.9 oz-in / 52.9 N-cm
 Detent Torque3.47 oz-in / 2.45 N-cm
 Rotor Inertia 0.00116 oz-in-sec² / 0.082 kg-cm²
 Weight (Motor+Driver)..... 15.1 oz / 428.1 g

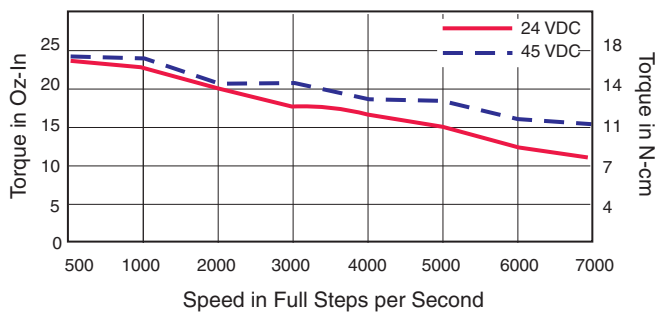
MD1713 Linear Actuator

Maximum Thrust50 lbs / 222 N
 Maximum Screw Deflection ± 1°
 Backlash 0.005 in / 0.127 mm
 Weight (without screw)..... 10.4 oz / 294.8 g

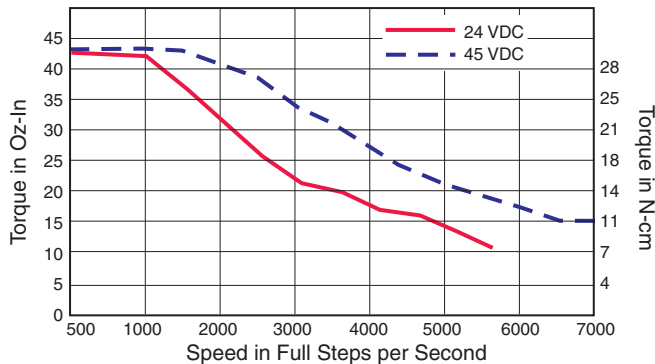
TORQUE-SPEED CURVES

Rotary Motor

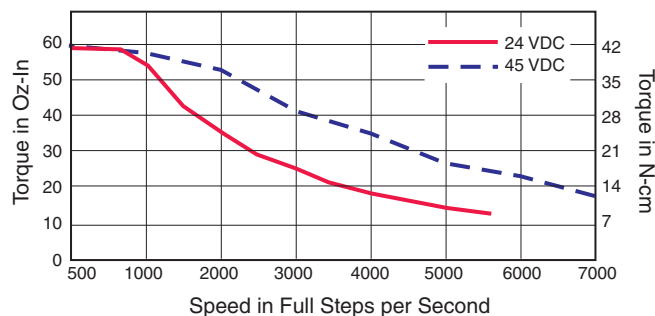
MD1713 Single Stack



MD1715 Double Stack



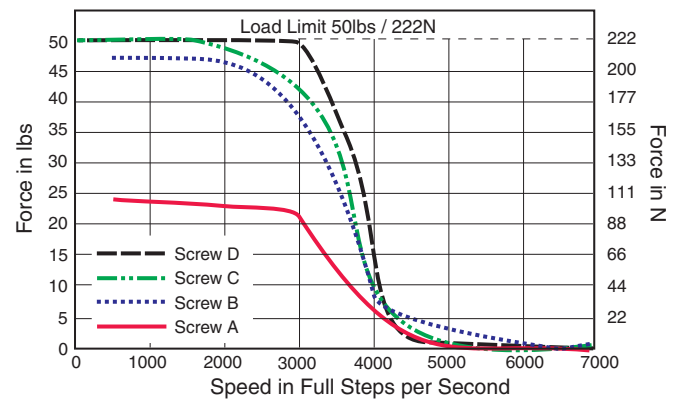
MD1719 Triple Stack



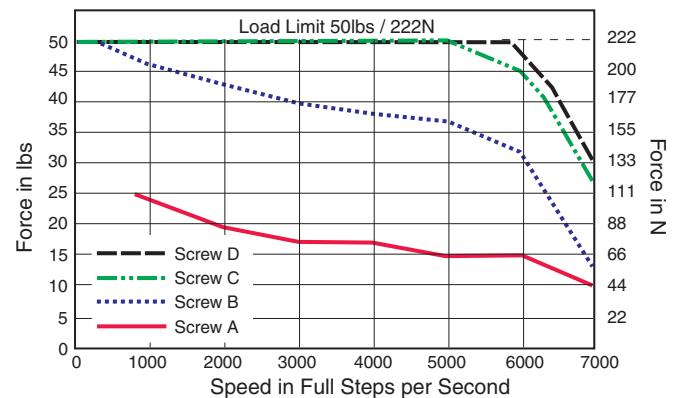
FORCE-SPEED CURVES

Linear Actuator

24 VDC



45 VDC



MDRIVE17 WITH PLANETARY GEARBOX

The MDrive17 is available with a Planetary Gearbox option developed to increase torque at lower speeds, enable better inertia matching and produce finer positional resolutions. These efficient, low maintenance Planetary Gearbox come fully assembled with the MDrive and are offered in a large number of

reduction ratios in 1-, 2- and 3-stage configurations. An optional NEMA Flange allows mounting the Planetary Gearbox to the load using a standard NEMA bolt circle. Planetary Gearbox may be combined with other MDrive17 options, however are unavailable on Linear Actuator versions.

Parameters	1-Stage	2-Stage	3-Stage
Permitted Output Torque (oz-in/Nm)	425/3.0	1062/7.5	2124/15.0
Gearbox Efficiency	0.80	0.75	0.70
Maximum Backlash (degree)	0.80°	0.85°	0.90°

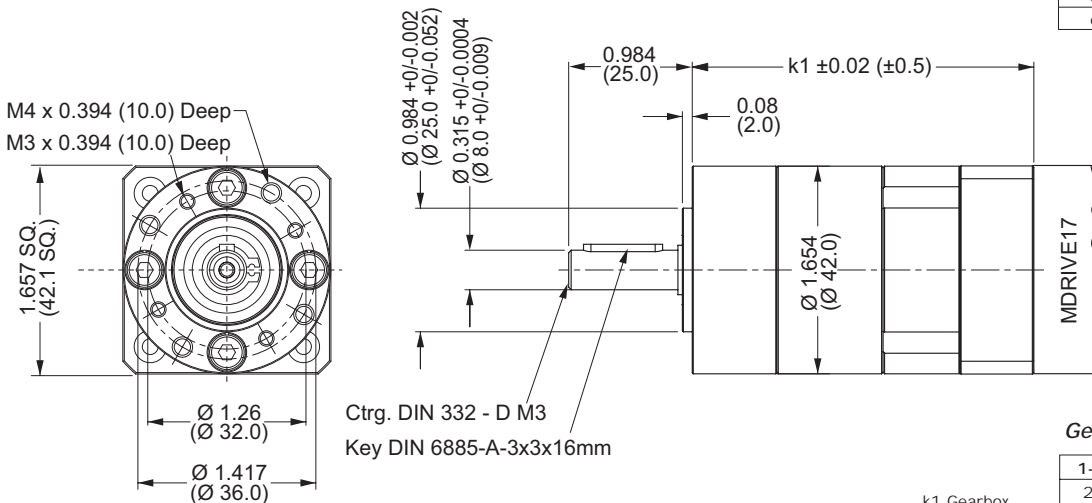
Output Side with Ball Bearing

Maximum Load, Radial (lb-force/N)	36/160	52/230	67.5/300
Maximum Load, Axial (lb-force/N)	11/50	18/80	25/110
Weight - Gearbox Only (oz/g)	14.3/406	17.9/508	21.5/609
Weight - Gearbox & NEMA Flange (oz/g)	14.8/420	18.5/525	22.2/630

PLANETARY GEARBOX MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)

Planetary Gearbox for MDrive17



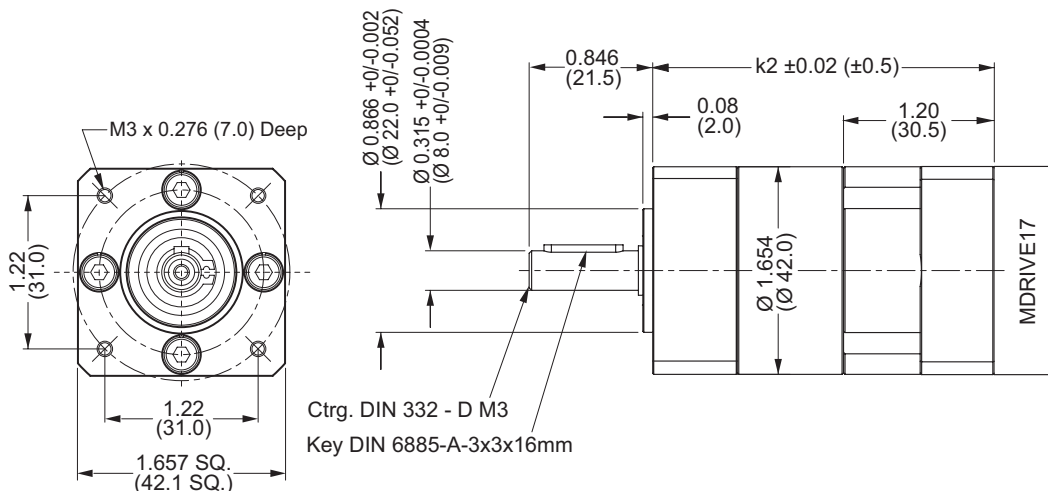
Gearbox Ratios (Rounded)

1-Stage	2-Stage	3-Stage
3.70:1	13.73:1	50.89:1
5.18:1	15.88:1	58.85:1
6.75:1	18.36:1	68.06:1
19.20:1	71.16:1	
22.20:1	78.71:1	
25.01:1	92.70:1	
26.85:1	95.17:1	
28.93:1	99.50:1	
34.97:1	107.20:1	
45.56:1	115.07:1	
123.97:1		
129.62:1		
139.13:1		
149.90:1		
168.84:1		
181.24:1		
195.26:1		
236.09:1		
307.54:1		

Gearbox Lengths Inches (mm)

	1-Stage	2-Stage	3-Stage
k1 Gearbox	2.736 (69.5)	3.248 (82.5)	3.76 (95.5)
k2 Gearbox w/ NEMA Flange	2.858 (72.6)	3.37 (85.6)	3.882 (98.6)

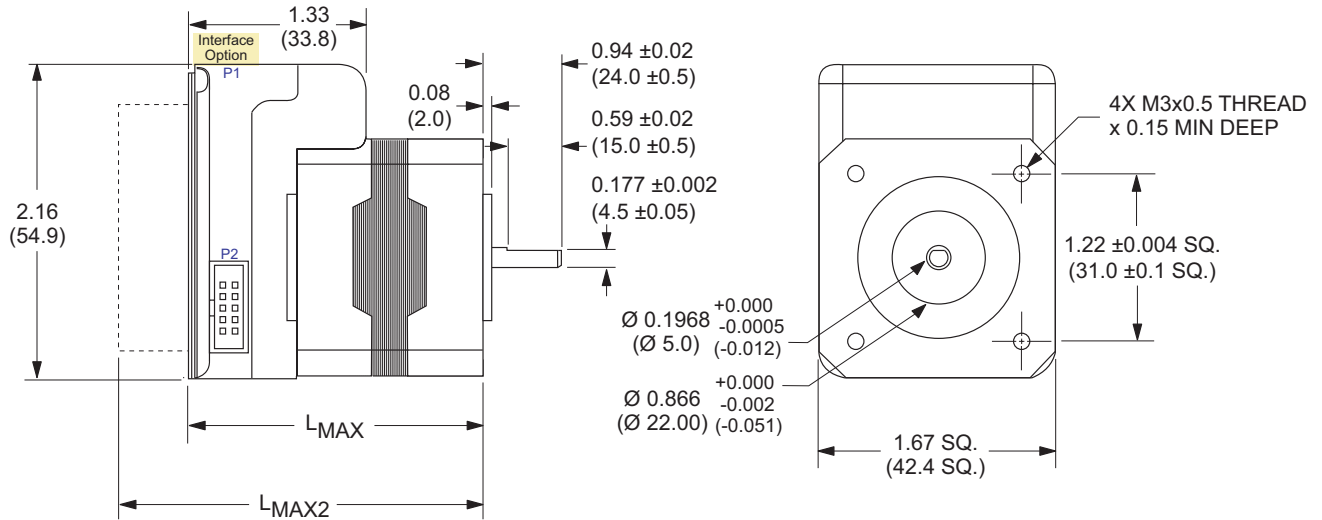
Planetary Gearbox with Optional NEMA Output Flange



MDrive17 SPEED CONTROL - MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)

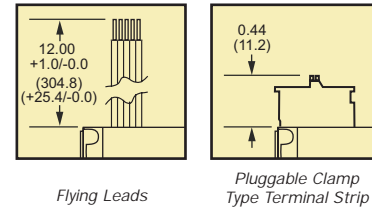
Rotary MDrive17: Single Shaft, Control Knob & Encoder Versions



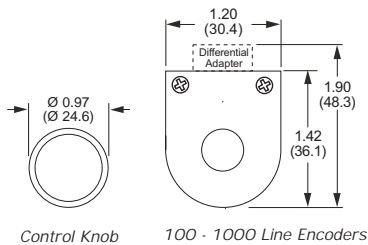
MDrive Lengths Inches (mm)

Stack Size	LMAX	LMAX2
	SINGLE SHAFT VERSION	CONTROL KNOB or ENCODER VERSION
1713	2.20 (55.9)	2.92 (74.2)
1715	2.43 (61.7)	3.15 (80.0)
1719	2.75 (69.8)	3.47 (88.1)

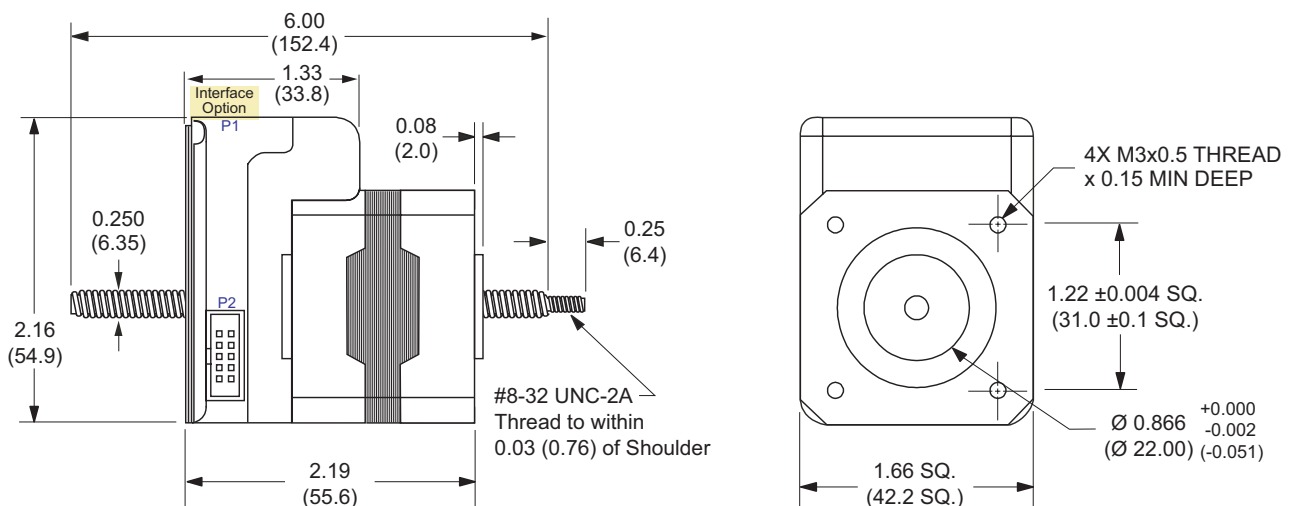
Interface Options



LMAX2 Options



Linear Actuator MDrive17



MDRIVE17 SPEED CONTROL – OPTIONS

Control Knob

The MDrive17 is available with a factory-mounted rear control knob for manual shaft positioning.

Planetary Gearbox

Efficient, low maintenance Planetary Gearbox are offered assembled with the MDrive17. Details inside.

Encoder

The MDrive17 is available with a factory-mounted optical encoder. Available line counts are 100, 200, 250, 400, 500 or 1000. All encoders, except 1000 line, have an index mark. Encoders are available in both single-end and differential configurations. Order optional Encoder Cables separately:

Single-end Cable (12"/30.5cm) ES-CABLE-2
Differential Cable (36"/91.5cm)..... ED-CABLE-2

Linear Actuator

The MDrive17 with long life Acme Screw Linear Actuator is available with the following travel/full step:

Screw A 0.00125"/full step

Screw B 0.000625"/full step

Screw C 0.0003125"/full step

Screw D 0.00015625"/full step

Standard screw length is 6.0" (152.4mm) plus the mounting end thread. Custom lengths from 2.0" to 24.0" are available without mounting end thread.

Linear Actuators are Non-Captive style. Contact the factory regarding Captive Shaft or External styles.

Parameter Setup Cable

A low cost accessory which eliminates the need for users to wire communications. This 6' (1.8m) cable includes built-in logic level shifting circuitry to accommodate the 3.3v ports on some PCs and plugs in easily to connect a standard DB-25 PC parallel/SPI port to the MDrive's 10 pin pin-header (P2). Order Cable Part No. MD-CC100-000.

ORDER INFORMATION

MDRIVE17 SPEED CONTROL	
<p>Stack Sizes</p> <p>13¹ = Single Stack & Linear Actuator 15 = Double Stack 19 = Triple Stack</p> <p>MDO <input type="checkbox"/> 17 <input type="checkbox"/> OPTION <input type="checkbox"/></p> <p>Interface Options</p> <p>F = 12" Flying Leads P = Pluggable Clamp Type Terminal Strip</p>	
<p>Example #1: Part Number MDOP1719 is an MDrive17 Speed Control with Pluggable Interface, NEMA 17 motor, stack size 19.</p>	

OPTIONS		
Control Knob	N	Example #2: MDOP1719N Adds a Control Knob to the part shown in example #1.
Planetary Gearbox	G <input type="text"/> Gearbox Ratio Rounded to Nearest Whole Number	Example #3: MDOP1719G5 Rounding ratio to the nearest whole number, the above adds a Planetary Gearbox with 5.18:1 ratio to the part shown in example #1. Add -F if optional NEMA Flange is desired.
Encoder	E <input type="text"/> S = Single End Line Counts: 100, 200, D = Differential 250, 400, 500, 1000	Example #4: MDOP1719ED500 Adds a 500 line count Differential Encoder to the part shown in example #1.
Linear Actuator†	L <input type="text"/> Screw Type (Travel/Full Step) Custom Screw Length A = 0.00125" Range 2.0" to 24.0" B = 0.000625" Format XX.X C = 0.0003125" eg. 08.5 for an 8.5" Screw D = 0.00015625" (6.0" Screw Length Standard)	Example #5: MDOP1719LC10.5 MDrive17 Speed Control Linear Actuator with a 0.0003125"/Full Step Acme Screw custom cut to 10.5". MAY NOT be combined with other options. <i>Note: MDrive17 Linear Actuator Available ONLY in Stack Size 13</i>

†Linear Actuator Available **ONLY** in Stack Size 13. (MDOX1713LX)



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