MDRIVE 34™
MOTOR+DRIVER
MOTION CONTROL

FEATURES

- Integrated Microstepping Driver, Motion Controller and NEMA 34 High Torque 1.8° Stepping Motor
- +24 to +75 VDC Input Voltage
- Low Cost
- Extremely Compact
- Available Configurations:
  - Single Shaft*
  - Linear Actuator
  - Internal Magnetic Encoder for Closed Loop Control*
  - Control Knob for Manual Positioning*
  - Integrated Planetary Gearbox*
- Three Stack Sizes Available*
- Single Supply
- Microstep Resolution up to 51,200 Steps Per Rev
- Open Loop or Optional Closed Loop Control
- Programmable Motor Run and Hold Currents
- Four +5 to +24 VDC I/O Lines
- One 10 Bit Analog Input
- 0 to 5MHz Step Clock Rate Selectable in 0.59Hz Increments
- RS-485 Communications with Selectable Baud Rate to 115K
- 62 Software Addresses for Multi-Drop Communications
- Simple 1 to 2 Character Instructions
- 12.0" (30.5cm) Flying Lead Interface

*Rotary Motor Only

DESCRIPTION

The MDrive34 Motion Control offers the system designer a low cost, intelligent motion controller integrated with a NEMA 34 high torque stepping motor and a +24 to +75 volt microstepping driver.

The MDrive34 Motion Control adds a versatile array of functions by combining a complete programmable motion controller with our already compact and cost effective standard MDrive34, adding little cost and no increase in size. Standard offerings include four +5 to +24 volt general purpose I/O lines, one 10 bit analog input, 0 to 5MHz step clock rate, microstep resolution up to 51,200 steps per revolution, and a full featured easy-to-program instruction set.

The MDrive34 Motion Control communicates over RS-485 which allows for point-to-point or multiple unit configurations utilizing one communication port. Addressing and hardware support up to 62 uniquely addressed units communicating over a single line. Baud rate is selectable from 4,800 to 115K.

The MDrive34 Motion Control is available with optional closed loop control. The closed loop configuration adds a 512 line (2048 edge) magnetic encoder with index mark, internal to the MDrive so there is no increase in length. Functionality increases with the addition of stall detection, position maintenance, and find index mark.

In addition to an encoder option, available motor configurations include a single shaft rotary motor, a dual shaft rotary motor with rear control knob for manual positioning, a planetary gearbox, or a long life Acme screw linear actuator. Rotary versions are available in single, double and triple stack sizes: 24, 31 & 47. Interface connections are accomplished using 12.0" (30.5 cm) flying leads.

The MDrive34 Motion Control is a compact, powerful and inexpensive solution that will reduce system cost, design and assembly time for a large range of stepping motor applications.

MDRIVE34 MOTION CONTROL SPECIFICATIONS

GENERAL SPECIFICATIONS

Input Voltage (+V)
Range.....+24 to +75 VDC
Power supply current requirements = 4 Amps (max) per MDrive34. Actual current depends on voltage and load.

Analog Input
Resolution .....10 Bit
Voltage Range.....0 to +5 VDC or 4-20 mA

General Purpose I/O
Number / Type ..... 4 / Open Collector
Logic Range .....+5 to +24 VDC
Output Sink Current .....700 mA
Protection ..... Over Temp, Short Circuit, Inductive Clamp

Communication
Type RS-485
Baud Rate .....4800 to 115K

Motion
Resolution – Open Loop Configuration
# of Settings.....14
Steps Per Rev..... 400, 800, 1000, 1600, 2000, 3200, 5000, 6400, 10000, 12800, 25000, 25600, 50000, 51200
Resolution – Closed Loop Configuration (optional)
Steps Per Rev.....51200
Encoder (optional)
Type .....Internal, Magnetic
Resolution ..... 512 Lines / 2048 Edges Per Rev
Counters
Type ..... Position, Encoder / 32 Bits
Edge Rate (Max)..... 5MHz
Velocity
Range..... +/- 5,000,000 Steps Per Second
Resolution .....0.5961 Steps Per Second
Accel / Decel
Range..... 1.5×10^9 Steps Per Second^2
Resolution .....90.9 Steps Per Second^2

Software
Program and Data Storage .....Nonvolatile
User Registers.....(4) 32 Bit
User Program Labels and Variables 22
Math Functions .....+, -, ×, ÷, >, =, <, <=, >=, AND, OR, XOR, NOT
Branch Functions ..... Branch & Call (conditional)
Predefined I/O Functions
Inputs ..... Home, Limit Plus, Limit Minus, Go, Stop, Pause, Jog Plus, Jog Minus, Analog In
Outputs..... Moving, Fault, Stall, Velocity Change
Trip Functions ..... Trip on Input & Trip on Position
Party Mode Addresses.....62
Encoder Functions .....Stall Detection, Position Maintenance, Find Index

Thermal
Heat Sink Temperature (Max) ..... 85° C
Motor Temperature (Max)..... 100° C

Protection
Protection ..... Over Voltage

WIRE / PIN ASSIGNMENTS

CONNECTOR P1 – Flying Leads

WIRE COLOR	FUNCTION
White / Yellow	I/O 1
White / Orange	I/O 2
White / Violet	I/O 3
White / Blue	I/O 4
Green	ANALOG INPUT
Black	POWER GROUND
Red	+V (+24 TO +75 VDC)

CONNECTOR P2 (RS-485) – 10 Pin Pin-Header

PIN	FUNCTION
1-5	NO CONNECT
6	RX +
7	RX –
8	TX –
9	TX +
10	GROUND

MDRIVE34 MOTOR SPECIFICATIONS

MD3424 Single Stack
Holding Torque .....381.0 oz-in / 269 N-cm
Detent Torque .....10.9 oz-in / 7.7 N-cm
Rotor Inertia ..... 0.01416 oz-in-sec^2 / 1.0 kg-cm^2
Weight (Motor+Driver)..... 67.4 oz / 1909 g

MD3431 Double Stack
Holding Torque .....575.0 oz-in / 406 N-cm
Detent Torque .....14.16 oz-in / 10.0 N-cm
Rotor Inertia ..... 0.02266 oz-in-sec^2 / 1.6 kg-cm^2
Weight (Motor+Driver).....92.1 oz / 2609 g

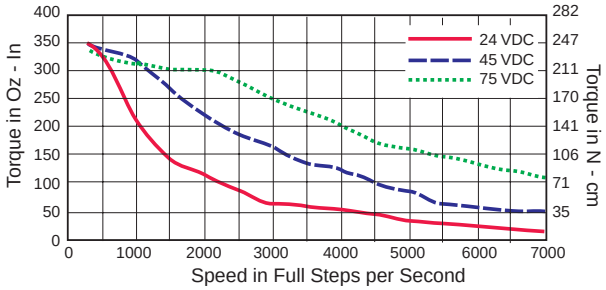
MD3447 Triple Stack
Holding Torque .....1061.0 oz-in / 749 N-cm
Detent Torque .....19.83 oz-in / 14.0 N-cm
Rotor Inertia ..... 0.04815 oz-in-sec^2 / 3.4 kg-cm^2
Weight (Motor+Driver).....148.5 oz / 4209 g

MD3429 Linear Actuator
Maximum Thrust ..... 500 lbs / 2224 N
Maximum Screw Deflection ..... ± 1°
Backlash ..... 0.005 in / 0.127 mm
Weight (without screw)..... 89.0 oz / 2523 g

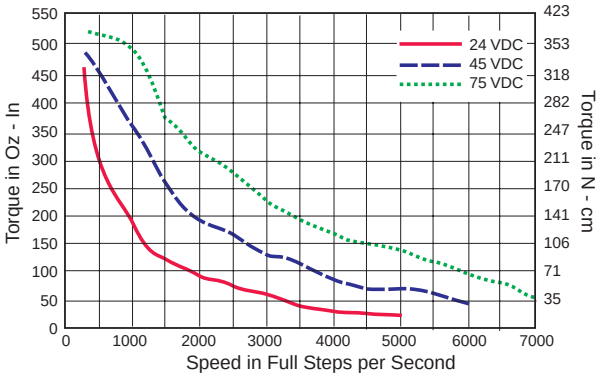
TORQUE-SPEED CURVES

Rotary Motor

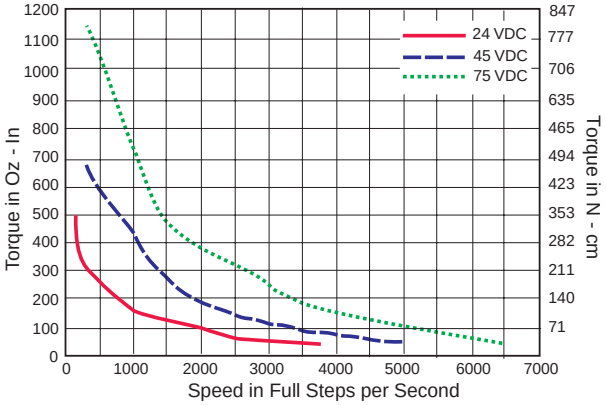
MD3424 Single Stack



MD3431 Double Stack



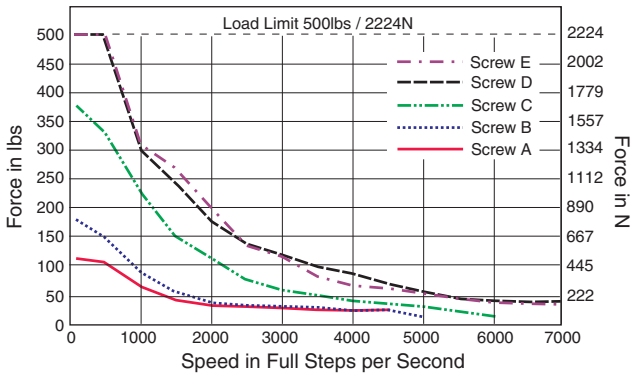
MD3447 Triple Stack



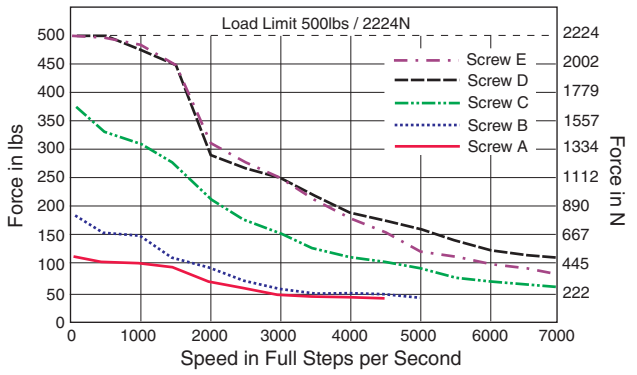
FORCE-SPEED CURVES

Linear Actuator

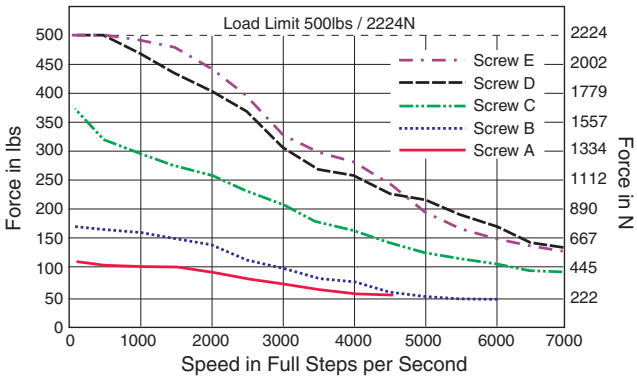
24 VDC



48 VDC



75 VDC



MDRIVE34 WITH PLANETARY GEARBOX

The MDrive34 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 MDrive34 options, however are unavailable on Linear Actuator versions.

Parameters	**1-Stage**	**2-Stage**	**3-Stage**
Permitted Output Torque (oz-in / Nm)	2832 / 20.0	8496 / 60.0	16992 / 120.0
Gearbox Efficiency	0.80	0.75	0.70
Maximum Backlash (degree)	1.0°	1.5°	2.0°
Ouput Side With Ball Bearing			
Maximum Load, Radial (lb-force / N)	90 / 400	135 / 600	225 / 1000
Maximum Load, Axial (lb-force / N)	18 / 80	27 / 120	45 / 200
Weight - Gearbox Only (oz / g)	64.4 / 1827	89.5 / 2538	114.6 / 3248
Weight - Gearbox & NEMA Flange (oz / g)	66.7 / 1890	92.6 / 2625	118.5 / 3360

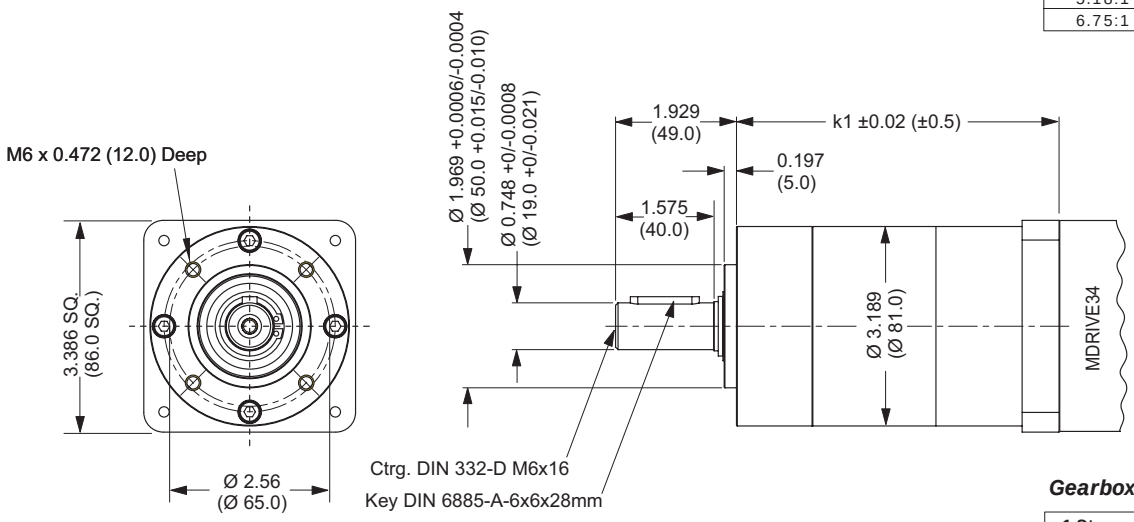
PLANETARY GEARBOX MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)

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

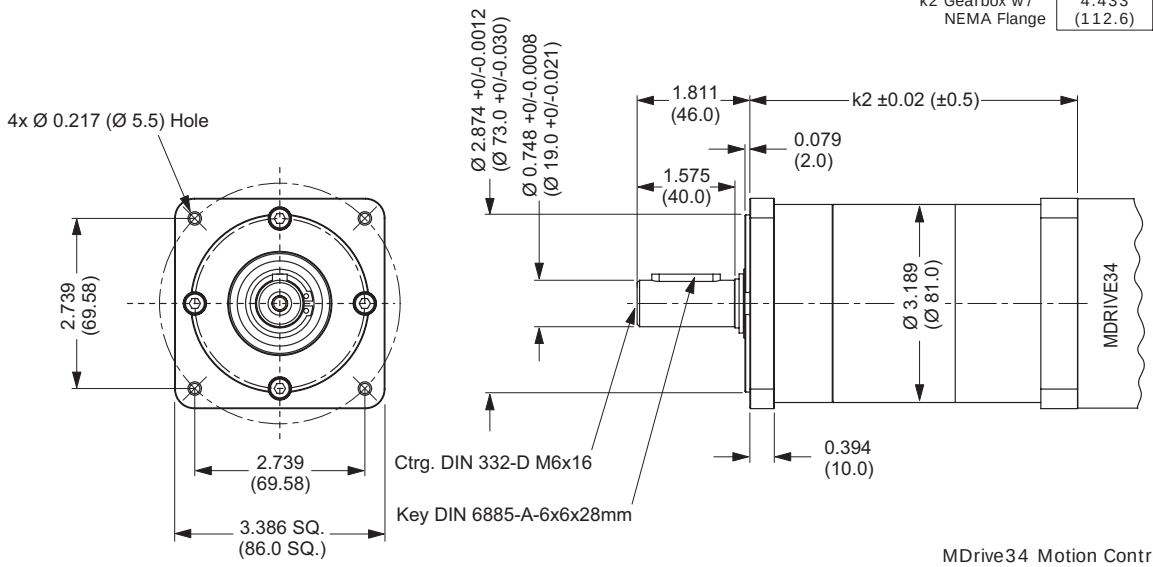
Planetary Gearbox for MDrive34



Gearbox Lengths *Inches (mm)*

	1-Stage	2-Stage	3-Stage
k1 Gearbox	4.315 (109.6)	5.169 (131.3)	6.024 (153.0)
k2 Gearbox w / NEMA Flange	4.433 (112.6)	5.287 (134.3)	6.142 (156.0)

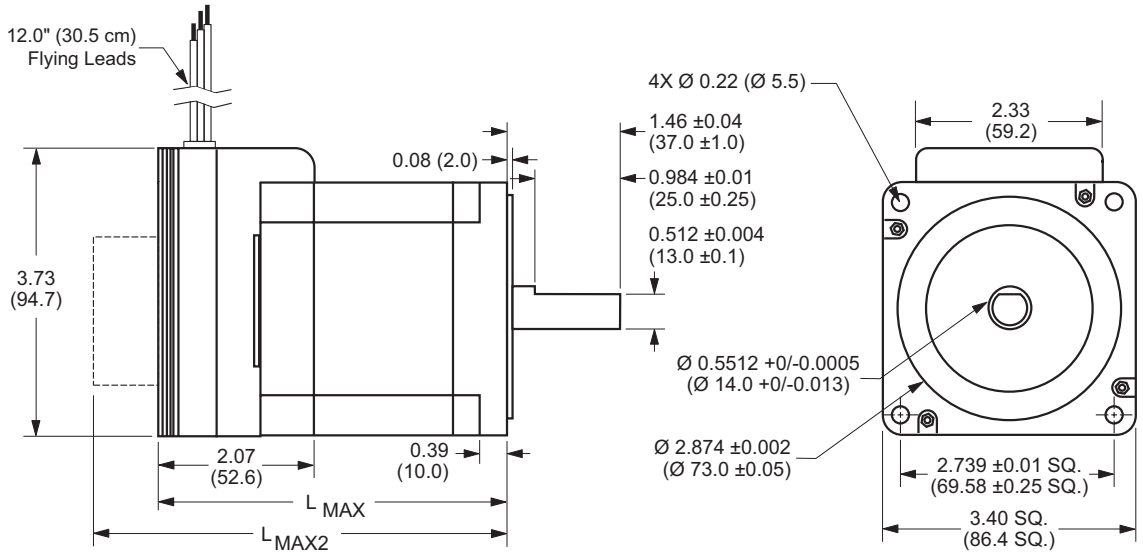
Planetary Gearbox with Optional NEMA Output Flange



MDRIVE34 MOTION CONTROL – MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)

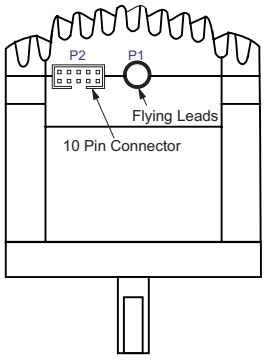
Rotary MDrive34: Single Shaft, Control Knob & Encoder Versions



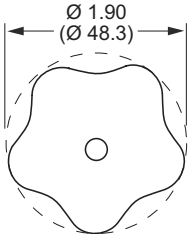
MDrive Lengths *Inches (mm)*

Stack Size	L_{MAX} SINGLE SHAFT or ENCODER VERSION	L_{MAX2} CONTROL KNOB VERSION
3424	3.81 (96.8)	4.97 (126.2)
3431	4.60 (116.8)	5.76 (146.3)
3447	6.17 (156.7)	7.34 (186.4)

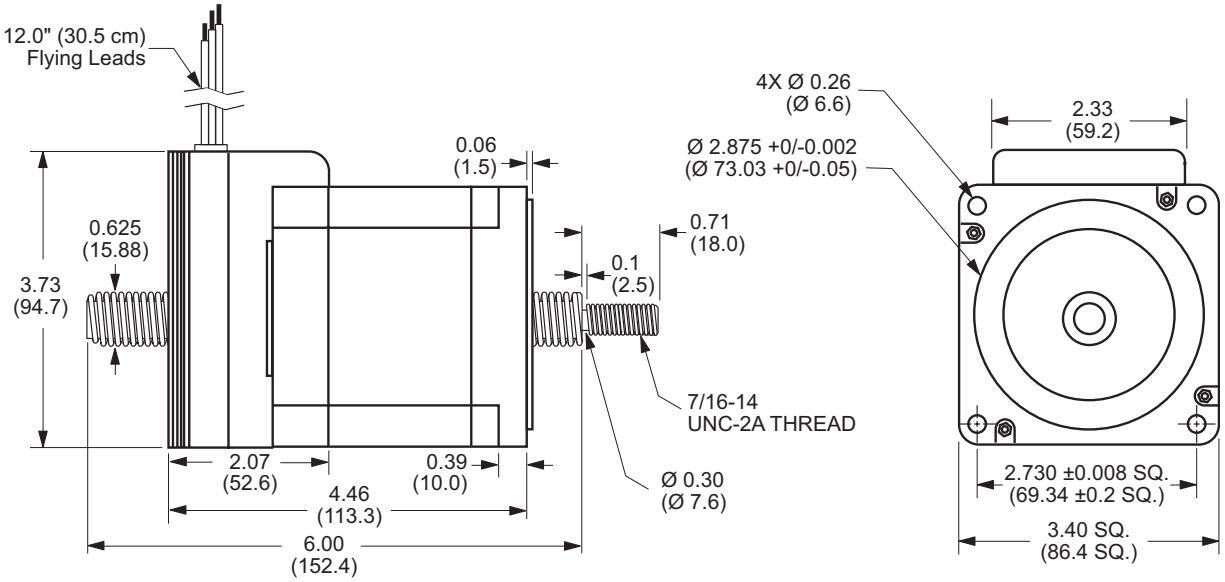
MDrive34 Top View



L_{MAX2} – Control Knob



Linear Actuator MDrive34



MDRIVE34 MOTION CONTROL – OPTIONS

Control Knob

The MDrive34 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 MDrive34. Details inside.

Encoder

The MDrive34 Motion Control is available with an internal 512-line magnetic encoder with index mark.

Linear Actuator

The MDrive34 Motion Control with long life ACME Screw Linear Actuator is available with the following travel / full step:

Screw A ..... 0.005" / full step
Screw B ..... 0.0025" / full step
Screw C ..... 0.00125" / full step
Screw D ..... 0.000625" / full step
Screw E ..... 0.0005" / full step

Standard screw length is 6.0" (152.4mm) plus the mounting end thread. Custom lengths up to 24.0" are available without mounting end thread. Linear Actuators are Non-Captive style. Contact the factory regarding Captive Shaft or External styles.

Communications Converter Cable

This convenient 6' (1.8m) accessory cable connects a PC's standard DB-9 Serial Comm Port to the MDrive's P2 Connector. An in-line RS-232 to RS-485 converter enables parameter setting to a single MDrive Motion Control. Purchase of this cable is recommended with first orders. Part No. MD-CC200-000.

ORDER INFORMATION

MDRIVE34 MOTION CONTROL

Stack Sizes
24 = Single Stack
29 = Linear Actuator †
31 = Double Stack
47 = Triple Stack

MDIF 34 ☐ **OPTION**

Example #1: Part Number **MDIF3431** is an **MD**rive34 Motion Control (**I**) with **F**lying Leads, NEMA **34** motor, stack size **31**.

OPTIONS

Control Knob	**N**	**Example #2: MDIF3431N** Adds a Control Knob to the part shown in example #1.
Planetary Gearbox	**G ☐** Gearbox Ratio Rounded to Nearest Whole Number	**Example #3: MDIF3431G5** 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.
Internal Encoder	**E**	**Example #4: MDIF3431E** Adds a 512-line internal magnetic Encoder to the part shown in example #1.
Linear Actuator†	**L ☐** **☐.☐** Screw Type (Travel/Full Step) A = 0.005" B = 0.0025" C = 0.00125" D = 0.000625" E = 0.0005" Custom Screw Length Range 2.0" to 24.0" Format XX.X eg. 08.5 for an 8.5" Screw (6.0" Screw Length Standard)	**Example #5: MDIF3429LA10.5** MDrive34 Motion Control Linear Actuator with a 0.005"/Full Step Acme Screw custom cut to 10.5". MAY NOT be combined with other options. *Note: MDrive34 Linear Actuator Available ONLY in Stack Size 29*

†*Stack Size 29 is only available as a Linear Actuator and is the **ONLY** size Linear Actuator offered. (MDIF3429LX)*

IMS™ INTELLIGENT MOTION SYSTEMS, INC.
Excellence in Motion™

P.O. Box 457, 370 N. Main Street
Marlborough, CT 06447 U.S.A.

Phone: 860 / 295-6102
Fax: 860 / 295-6107
E-mail: info@imshome.com
Home Page: www.imshome.com

Distributed By:

TECHNICAL SUPPORT
Eastern U.S.
Phone: 860 / 295-6102
Fax: 860 / 295-6107
E-mail: etech@imshome.com
Western U.S.
Phone: 760 / 966-3162
Fax: 760 / 966-3165
E-mail: wtech@imshome.com

IMS MOTORS DIVISION
105 Copperwood Way, Suite H
Oceanside, CA 92054
Phone: 760 / 966-3162
Fax: 760 / 966-3165
E-mail: motors@imshome.com

IMS EUROPE GmbH
Hahnstrasse 10, VS-Schwenningen
Germany D-78054
Phone: +49 / 7720 / 94138-0
Fax: +49 / 7720 / 94138-2
E-mail: info@imseuropehome.com
European Sales Management
4 Quai Des Etroits
69005 Lyon, France
Phone: +33 / 4 7256 5113
Fax: +33 / 4 7838 1537
E-mail: bmartinez@imshome.com
German Sales / Technical Support
Phone: +49 / 35205 / 4587-8
Fax: +49 / 35205 / 4587-9
E-mail: hruhland@imshome.com