

# **M**DRIVE 23<sup>TM</sup> MOTOR+DRIVER MOTION CONTROL



## **FEATURES**

- Integrated Microstepping Drive/Motion Controller with Optional Encoder/NEMA 23 High Torque Motor
- +12 to +48 VDC Input Voltage
- Low Cost
- Extremely Compact
- Available Configurations:
  - Single Shaft\*
  - Linear Actuator
  - Internal Encoder for Closed Loop Control\*
  - Double Shaft with Knob for Manual Positioning\*
- Three Motor Lengths Available\*
- Single Supply
- Microstep Resolution up to 51,200 Steps Per Rev
- Open 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 5 MHz Step Clock Rate Selectable in .59Hz Increments
- RS-485 Communications with Selectable Baud Rate to 115K
- 62 Software Addresses for Multi-Drop Communications
- Simple 1 to 2 Character Instructions
- Pluggable Terminal Strip or 12" (30.5 cm) Flying Lead Interface

\*Rotary Motor Only

## **DESCRIPTION**

The MDrive23 Motion Control offers the system designer a low cost, intelligent motion controller integrated with a NEMA 23 high torque stepping motor and a +12 to +48 volt microstepping drive.

The MDrive23 Motion Control adds a versatile array of functions by combining a complete programmable motion controller with our already compact and cost effective standard MDrive23, 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 5 MHz step clock rate, microstep resolution up to 51,200 steps per revolution, and a full featured easy-to-program instruction set.

The MDrive23 Motion Control communicates over RS485 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 MDrive23 Motion Control is available with optional closed loop control. The closed loop configuration adds a 512 line (2048 edge) encoder with index mark, internal to the MDrive without increasing the length of the unit. Functionality increases to add stall detection, position maintenance, and find index mark.

Available motor configurations include: single shaft, double shaft with knob, and long life ACME screw linear actuator. Rotary versions are available in three motor lengths: 18, 22 & 31. Interface connections are accomplished using either a 7 position terminal block or optional 12" (30.5 cm) flying leads.

The MDrive23 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.



2.625 (66.68) DBC

1.860 SQ.  
(47.24 SQ.)

2.5

2

1.5

## MOTOR SPECIFICATIONS

### MDI2218

Holding Torque oz-in (N-cm) ..... 90 (64)  
 Detent Torque oz-in (N-cm) ..... 3.5 (2.5)  
 Rotor Inertia oz-in-sec<sup>2</sup> (kg-cm<sup>2</sup>) ..... 0.0025 (0.18)  
 Weight (Motor+Driver) oz (gm) ..... 20.1 (569.8)

### MDI2222

Holding Torque oz-in (N-cm) ..... 144 (102)  
 Detent Torque oz-in (N-cm) ..... 5.6 (3.92)  
 Rotor Inertia oz-in-sec<sup>2</sup> (kg-cm<sup>2</sup>) ..... 0.0037 (0.26)  
 Weight (Motor+Driver) oz (gm) ..... 24.4 (691.7)

### MDI2231

Holding Torque oz-in (N-cm) ..... 239 (169)  
 Detent Torque oz-in (N-cm) ..... 9.7 (6.86)  
 Rotor Inertia oz-in-sec<sup>2</sup> (kg-cm<sup>2</sup>) ..... 0.0065 (0.46)  
 Weight (Motor+Driver) oz (gm) ..... 38.5 (1091.5)

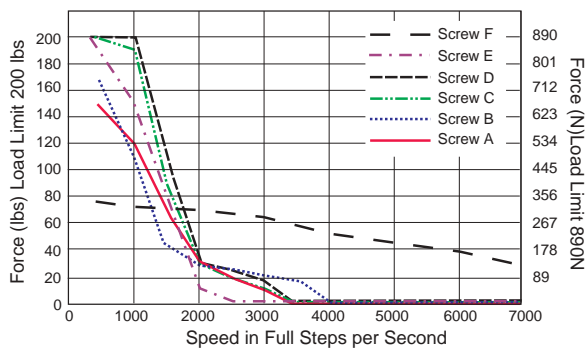
### Linear

Weight (without screw) oz (gm) ..... 20.4 (578.3)  
 Maximum Thrust lbs (kg) ..... 200 (90.7)  
 Maximum Screw Deflection ..... ± 1°  
 Backlash inches (mm) ..... 0.005 (0.127)

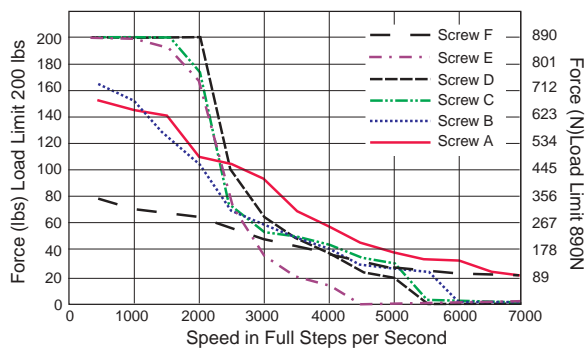
## FORCE-SPEED CURVES

### Linear Actuator

#### 24 VDC



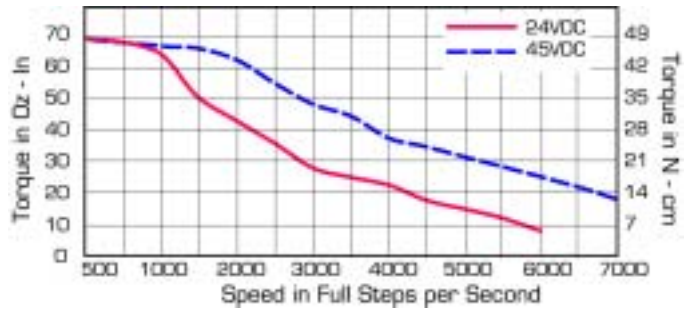
#### 45 VDC



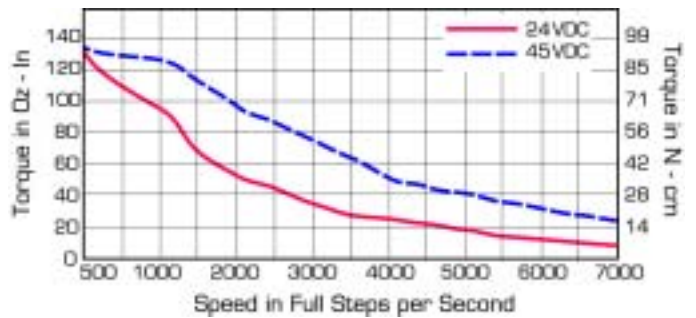
## TORQUE-SPEED CURVES

### Rotary Motor

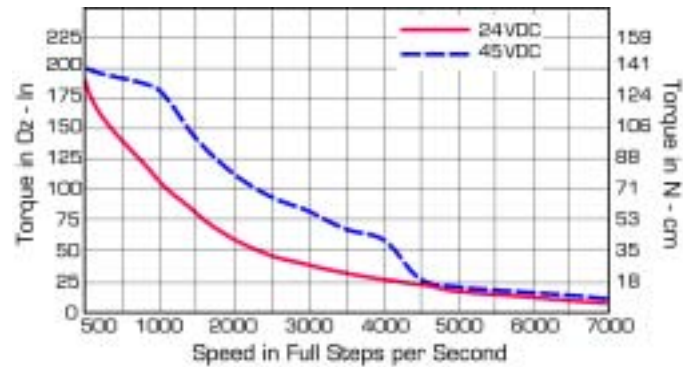
#### MDI2218



#### MDI2222



#### MDI2231



## PIN ASSIGNMENTS

CONNECTOR P1		
Pin #	Flying Lead	Function
1	White/Yellow	I/O 1
2	White/Orange	I/O 2
3	White/Violet	I/O 3
4	White/Blue	I/O 4
5	Green	ANALOG INPUT
6	Black	POWER GROUND
7	Red	+V (+12 TO +48 VDC)

10 PIN PIN-HEADER - P2 (SPI)	
Pin #	Function
1-5	NC (MUST BE LEFT OPEN)
6	RX+
7	RX-
8	TX-
9	TX+
10	GROUND

## OPTIONS

Stock Items shown in bold italics. Lead times may apply to other options.

### CONVERTER COMMUNICATIONS CABLE

This communications accessory is an in-line RS-232 to RS-485 converter with integrated cable. This product is used to communicate to a single MDrive Motion Control Device. The added convenience of the integrated RS-232 to RS-485 converter allows the device to be connected to a PC's standard 9 pin serial port. Order Part Number **MD-CC200-000**

### CONTROL KNOB VERSION

The MDrive23 Motion Control is available with a factory-mounted knob for manual shaft positioning.

### ENCODER OPTION

The MDrive23 Motion Control is available with an internal 512 line magnetic encoder with index mark.

### LINEAR ACTUATOR VERSION

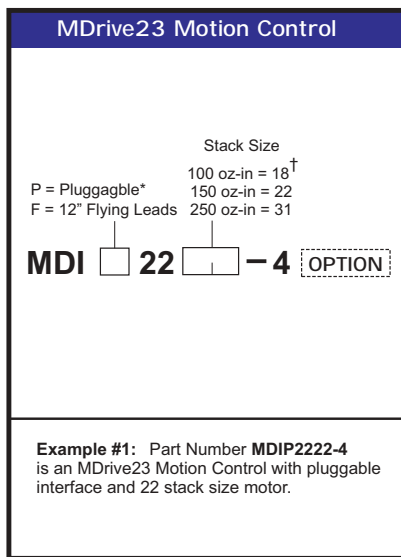
MDrive23 Motion Control with long life ACME Screw Linear Actuator is available with the following travel/full step:

Screw F .....	.002"/full step
Screw A .....	.001"/full step
<b>Screw B .....</b>	<b>.00083"/full step</b>
Screw C .....	.0005"/full step
Screw D .....	.0004167"/full step
<b>Screw E .....</b>	<b>.0003125"/full step</b>

**External linear and captive versions are also available. Consult factory for further information.**

The MDrive23 comes standard with a 6" (152.4mm) screw length plus the mounting end thread. Custom lengths are available from 2.0" to 24.0". Custom length screws do not include a mounting end thread.

## ORDERING INFORMATION



OPTIONS	
Add ONE of the options below to the MDrive Motion Control part number	
Stock items shown in bold italics. Lead times may apply to other versions.	
Control Knob <b>N</b>	<b>Example #2: MDIP2222-4N</b> Adds a Control Knob to the part shown in example #1.
Factory Mounted Encoder <b>E</b>	<b>Example #3: MDIP2222-4E</b> Adds an internal 512 line magnetic encoder to the part shown in example #1.
Linear Actuator <sup>†</sup> <b>L</b> <b>L</b> Screw Type (Travel/Full Step) F = 0.002" A = 0.001" <b>B = 0.00083"</b> C = 0.0005" D = 0.0004167" <b>E = 0.0003125"</b> 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)	<b>Example #4: MDIP2218-4LC105</b> MDrive23 Motion Control Linear Actuator with a 0.005"/Full Step ACME Screw custom cut to 10.5".  <b>Note: Linear Actuator Available ONLY in Stack Size 18</b>

\*Mating terminal block connector supplied with the MDrive23 Motion Control with pluggable interface.

<sup>†</sup>Linear Actuator **ONLY** Available in Stack Size 18. (MDIX2218-4LX)