

MDRIVE 23TM 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.

MDRIVE23 MOTION CONTROL SPECIFICATIONS

GENERAL SPECIFICATIONS

Input Voltage (+V)*
 Range +12 to +48 VDC

Analog Input
 Resolution 10 Bit
 Voltage Range 0 to +5 VDC

General Purpose I/O
 Number/Type 4/Open Collector
 Voltage Range 0 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†
 Steps Per Rev 51200
Encoder†
 Type Internal, Magnetic
 Resolution 512 Lines/2048 Edges Per Rev
Counters
 Type Position, Encoder/32 Bits
 Edge Rate (Max) 5 MHz
Velocity
 Range +/- 5,000,000 Steps Per Second
 Resolution 0.5961 Steps Per Second
Accel/Decel
 Range 1.5×10^9 Steps Per Second²
 Resolution 90.9 Steps Per Second²

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

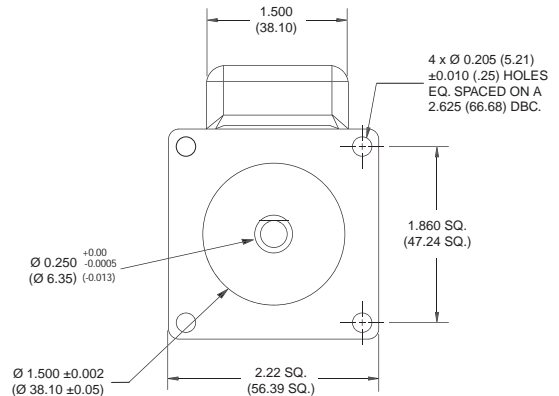
Protection Thermal

† Optional

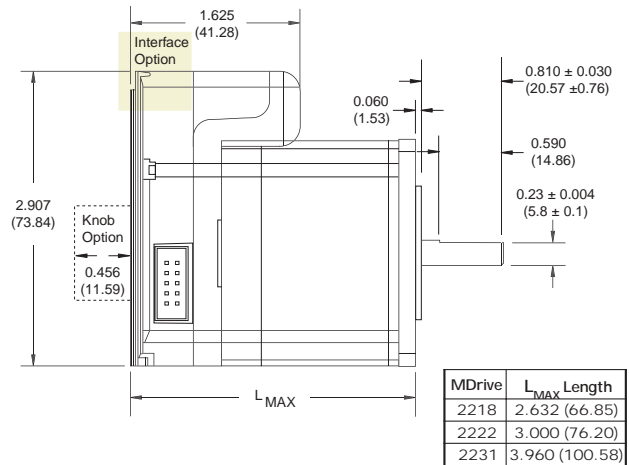
* Max power supply current per MDrive23: 2 Amps
 (Actual power supply current will depend on load and duty cycle.)

MECHANICAL SPECIFICATIONS

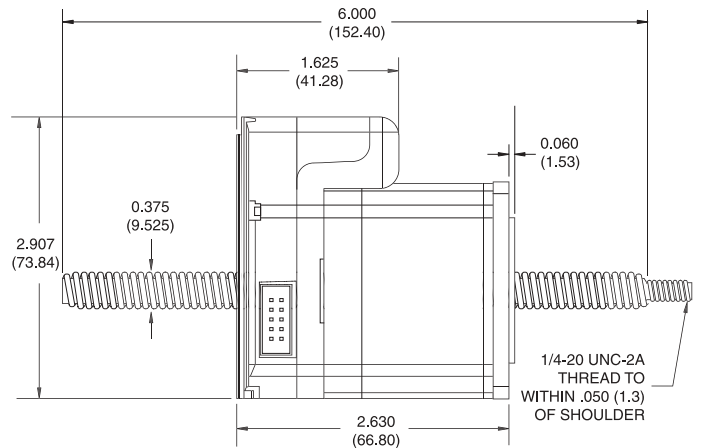
Dimensions in Inches (mm)



Rotary MDrive23 - Single Shaft & Control Knob

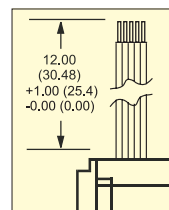


Linear Actuator MDrive23

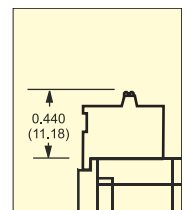


Interface Options - All Versions

Flying Leads



Pluggable Clamp Type Terminal Block



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-sec² (kg-cm²) 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-sec² (kg-cm²) 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-sec² (kg-cm²) 0.0065 (0.46)
 Weight (Motor+Driver) oz (gm) 38.5 (1091.5)

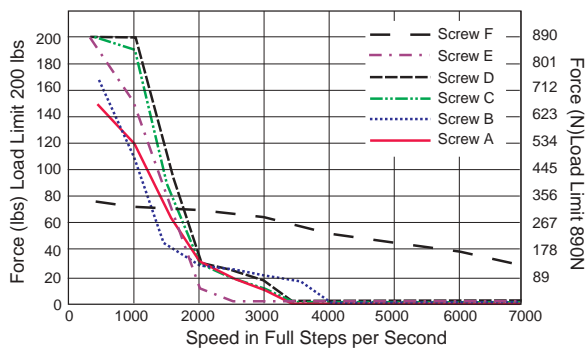
Linear

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)

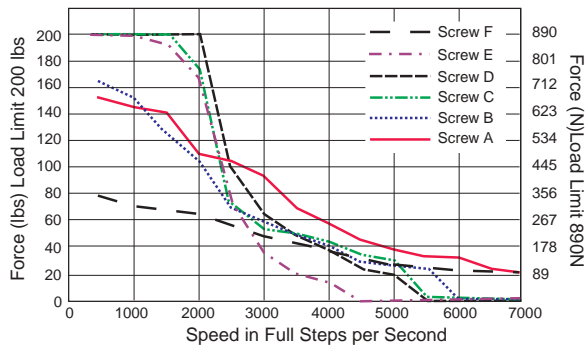
FORCE-SPEED CURVES

Linear Actuator

24 VDC



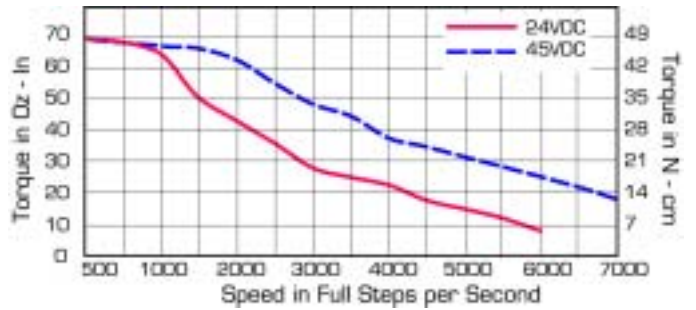
45 VDC



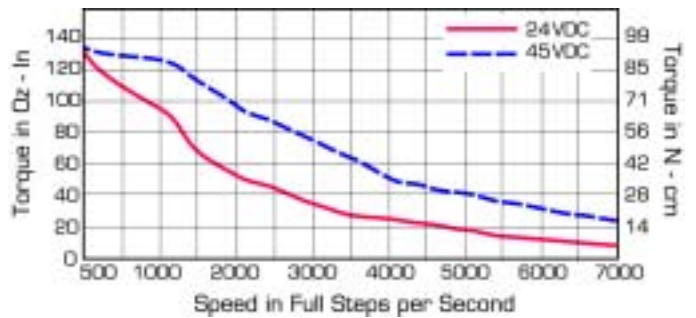
TORQUE-SPEED CURVES

Rotary Motor

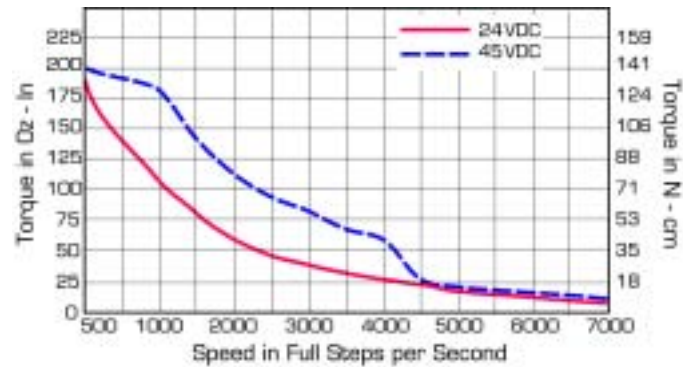
MDI2218



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 F002" /full step
Screw A001" /full step
<i>Screw B</i>	<i>.00083" /full step</i>
Screw C0005" /full step
Screw D0004167" /full step
<i>Screw E</i>	<i>.0003125" /full step</i>

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

MDrive23 Motion Control		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.			
<p>Stack Size</p> <p>P = Pluggable* 100 oz-in = 18[†]</p> <p>F = 12" Flying Leads 150 oz-in = 22</p> <p> 250 oz-in = 31</p> <p>MDI <input type="checkbox"/> 22 <input type="checkbox"/> -4 <input type="checkbox"/> OPTION</p>		<p>Control Knob</p> <p>N</p> <p>Example #2: MDIP2222-4N Adds a Control Knob to the part shown in example #1.</p>	
<p>Factory Mounted Encoder</p> <p>E</p>		<p>Example #3: MDIP2222-4E Adds an internal 512 line magnetic encoder to the part shown in example #1.</p>	
<p>Linear Actuator[†]</p> <p>L <input type="checkbox"/> <input type="checkbox"/></p> <p>Screw Type (Travel/Full Step)</p> <p>F = 0.002" A = 0.001" <i>B = 0.00083"</i> C = 0.0005" D = 0.0004167" <i>E = 0.0003125"</i></p> <p>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)</p>		<p>Example #4: MDIP2218-4LC105 MDrive23 Motion Control Linear Actuator with a 0.005"/Full Step ACME Screw custom cut to 10.5".</p> <p>Note: Linear Actuator Available ONLY in Stack Size 18</p>	
<p>Example #1: Part Number MDIP2222-4 is an MDrive23 Motion Control with pluggable interface and 22 stack size motor.</p>			

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

[†]Linear Actuator **ONLY** Available in Stack Size 18. (MDIX2218-4LX)