

## FEATURES

- Integrated Half/Full Step Drive/ NEMA 14 High Torque Motor
- +12 to +48 VDC Input Voltage
- Low Cost
- Extremely Compact
- Optically Isolated Logic Inputs will Accept +5 to +24 VDC Signals, Sourcing or Sinking
- Automatic Current Reduction
- Configurable:
  - Motor Run/Hold Current
  - Motor Direction vs. Direction Input
  - Half/Full Step
- Available Configurations:
  - Single Shaft
  - Factory-Mounted Optical Encoder
  - Double Shaft End with Knob For Manual Positioning
- Current and Resolution May Be Switched On-The-Fly
- Single Supply
- Interface Uses a 12 Position, Pluggable 2mm Pin and Receptacle
- Graphical User Interface (GUI) for Quick and Easy Parameter Setup

## DESCRIPTION

The MDrive NEMA 14 high-torque Integrated Motor and Driver is ideal for designers who want the simplicity of a motor with on-board electronics, but without the expense of an indexer on each axis. The low cost MDrive14 offers the system designer the

best method of control. The MDrive14's integrated electronics eliminates the need to run the motor cabling through the machine, reducing the potential for problems due to electrical noise.

The MDrive14 uses a NEMA 14 frame size 1.8° high torque motor combined with a half/full step drive. Setup parameters include Motor Resolution, Motor Direction with respect to the direction input, and Run/Hold currents. These settings may be changed on-the-fly or downloaded and stored in non-volatile memory with the use of a simple GUI which is provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port located on connector P1. Operating voltage for the MDrive14 ranges from +12 to +48 VDC.

The versatile, compact MDrive14 is available in multiple configurations to fit various system needs. These options include: a single shaft stand-alone device, or a dual shaft rotary motor with either optical encoder or control knob. Interface connections are accomplished using a 12 position keyed and locking pin and receptacle.

The MDrive14 is a compact, powerful and inexpensive solution that will reduce system cost, design and assembly time for a large range of stepping motor applications.

## CONFIGURATION UTILITY

The IMS Motor Interface software is an easy to install and use graphical user interface (GUI) for configuring the MDrive14 from the parallel port on your computer. Access the GUI via the IMS SPI Interface included on the CD shipped with the product, or download at [www.imshome.com](http://www.imshome.com). Optional parameter setup cables are also available for ease of connecting and configuring this MDrive product.

Configuration utility features include:

- 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.
- Ease of use via single screen interface (*shown below*).



The IMS Motor Interface GUI simplifies MDrive configuring with a single screen interface.

# MDRIVE14 SPECIFICATIONS

## ELECTRICAL SPECIFICATIONS

Input Voltage (+V) Range\* ..... +12 to +48 VDC  
 Isolated Inputs ..... Step Clock, Direction & Enable  
 Isolated Input Voltage Range† ..... +5 to +24 VDC  
 Step Frequency (Max) ..... 1 MHz  
 Steps per Revolution ..... 200, 400  
 Protection ..... Thermal

\* Power supply current requirements = 0.6A (MAX) per MDrive14. Actual power supply current will depend on load and duty cycle.

† Sourcing or Sinking

## PARAMETERS

SETUP PARAMETERS				
NAME	FUNCTION	RANGE	UNITS	DEFAULT
MHC	Hold Current	0 to 100	percent	5
MRC	Run Current	1 to 100	percent	25
HFUL	Half Step / Full Step	0 / 1		Full Step
HCDT	Hold Current Delay Time	0 to 65,000	mSec.	500 mSec.
DIR	Motor Direction	0 / 1		CW

All parameters are set using the included Configuration Utility and may be changed on-the-fly. The optional parameter setup cable is recommended with the first order.

## PIN ASSIGNMENTS

CONNECTOR P1	
PIN #	FUNCTION
1	SPI MASTER OUT -- SLAVE IN
2	SPI CHIP SELECT
3	SPI MASTER IN - SLAVE OUT
4	COMMUNICATION GROUND
5	SPI CLOCK
6	+5 VDC OUTPUT
7	CW / CCW DIRECTION INPUT
8	ENABLE INPUT
9	STEP CLOCK INPUT
10	OPTOCOUPLER REFERENCE
11	+V (+12 TO +48 VDC)
12	POWER GROUND

### Mating Connector Information

Manufacturer: Hirose Electric Co., Ltd.  
 www.hirose.com

Part #'s: DF11-12DS-2R26(xx)\*  
 DF11-12DS-2C(xx)\*

\*Please refer to manufacturer's data sheets for additional information.

## ENCODER PIN ASSIGNMENTS

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

ENCODER -- Differential	
1	GROUND
2	+5 VDC INPUT
3	DIRECTION (OUT)
4	STANDBY --
5	CHANNEL A --
6	CHANNEL A +
7	CHANNEL B --
8	CHANNEL B +
9	INDEX --
10	INDEX +

### Recommended Encoder Mating Connectors Listed Below:

#### Single End Encoder (ES)

Dupont/Berg ..... 78211-005<sup>(1)</sup>, 65039-032 (use either housing with Ultra-High Spring Force Mini PV terminals [48257-000], 22-36 AWG)

Molex/Waldom ..... 50-57-9005 (2695 series) (use 16-02-1125 [2759 series] high pressure terminals, 22-30 AWG)

AMP ..... 103975-4<sup>(3)</sup>

#### Differential Encoder (ED)

3M ..... 89110-0101<sup>(1,2)</sup>, 89110-0001<sup>(2)</sup>

AMP ..... 101798-3<sup>(3)</sup>, 87456-6, 101787-1<sup>(1)</sup>, 11918-1, 7462281<sup>(1,2)</sup>, 746290-1<sup>(2)</sup>

Amphenol ..... 842-812-1022-118<sup>(2)</sup>, 842-812-1033-118<sup>(1,2)</sup>

Dupont/Berg ..... 65043-032, 71602-010<sup>(1,2)</sup>

Robinson Nugent ..... IDS-C10NPK-TR<sup>(2)</sup>, IDS-C10PK-TR<sup>(1,2)</sup>

Thomas & Betts ..... 622-1000<sup>(2)</sup>, 622-1030<sup>(1,2)</sup>

Molex/Waldom ..... 22-55-2101

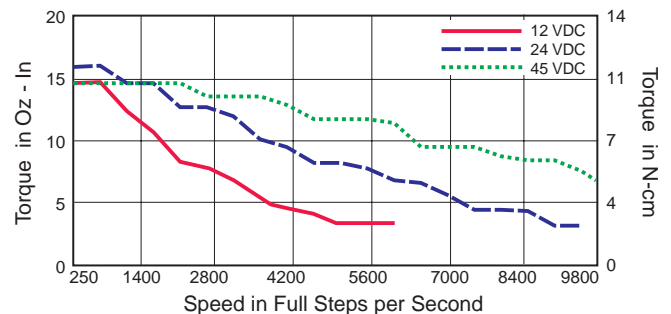
<sup>(1)</sup> Polarized; <sup>(2)</sup> IDC Ribbon Cable; <sup>(3)</sup> IDC (Ultra-High or High Spring Force terminals are recommended)

## MOTOR SPECIFICATIONS

### MD1410

Holding Torque oz-in (N-cm) ..... 10 (7.0)  
 Detent Torque oz-in (N-cm) ..... 1.4 (1.0)  
 Rotor Inertia oz-in-sec<sup>2</sup> (kg-cm<sup>2</sup>) .... 0.00017 (0.012)  
 Weight (Motor+Driver) oz (gm) ..... 5 (141.7)

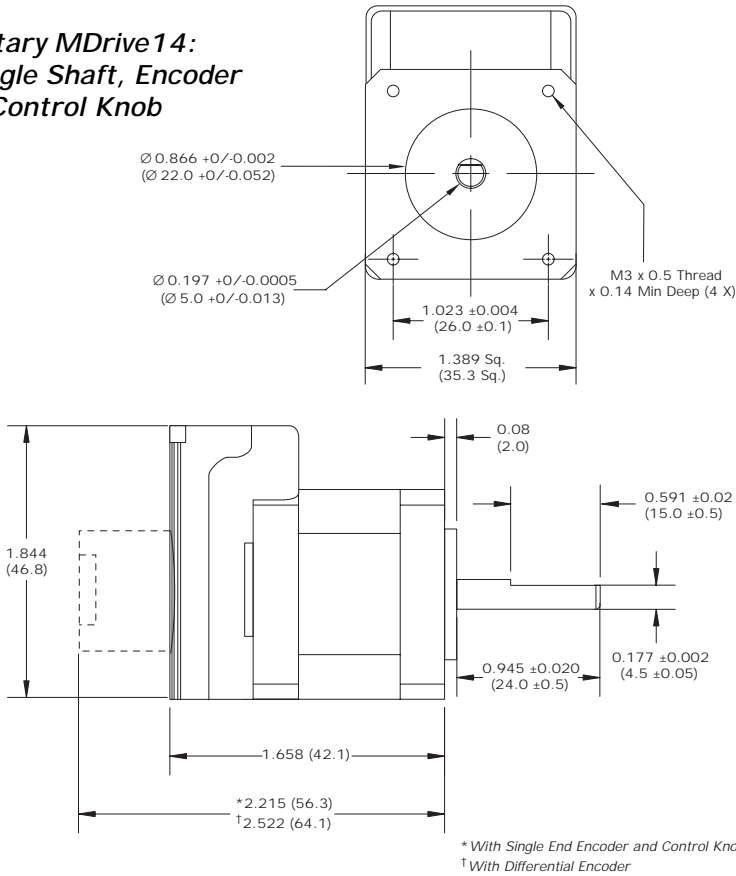
## TORQUE-SPEED CURVES



## MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)

### Rotary MDrive14: Single Shaft, Encoder & Control Knob



## OPTIONS

*Stock Items shown in bold italics.*

*Lead times may apply to other options.*

### PARAMETER SETUP CABLE

A low cost accessory which eliminates the need for the user to wire communications. Included in this cable is built-in logic level shifting circuitry to accommodate the 3.3v ports on some PCs. This cable with an adaptor plugs in easily to connect a standard DB-25 PC parallel port to the MDrive's 12 position pin and receptacle connector. Order Cable Part Number ***MD-CC100-000*** plus Adaptor Part Number ***MD-ADP-14C***.

### PROTOTYPE DEVELOPMENT CABLE

To expedite interface to MDrive14.

Order Cable Part Number ***ADP-2012-FL***.

### FACTORY-MOUNTED ENCODER VERSION

The MDrive14 is available with a factory-mounted optical encoder. Available line counts: 100, ***200***, 300, 400, ***500***. Encoders are available in both single-end and differential configurations. All encoders have an index mark.

### CONTROL KNOB VERSION

The MDrive14 is available with a factory-mounted knob for manual shaft positioning.

## ORDERING INFORMATION

Basic MDrive14	
<b>MDBC-1410</b>	<b>OPTION</b>

OPTIONS	
<i>Add ONE of the options below to the Basic MDrive part number</i>	
<i>Stock items shown in bold italics. Lead times may apply to other versions.</i>	
Control Knob <b>N</b>	<b>Example #2: MDBC-1410N</b> Adds a Control Knob to the part shown in example #1.
Optical Encoder <b>E</b> <input type="checkbox"/> <input type="checkbox"/>	<b>Example #3: MDBC-1410ED500</b> Adds a 500 line Differential Encoder to the part shown in example #1.
S = Single End D = Differential	Line Count 100, <b><i>200</i></b> , 300, 400, <b><i>500</i></b>