



## FEATURES

- Ultra Compact, High Performance Microstepping Driver
- Advanced 2nd Generation Current Control for Exceptional Performance and Smoothness
- Single Supply: +12 to +48 VDC
- Low Cost
- Extremely Compact
- High Output Current up to 2 Amps RMS, 2.8 Amps Peak (Per Phase)
- 20 Microstep Resolutions up to 51,200 Steps Per Rev Including: Degrees, Metric, Arc Minutes
- 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
  - Microstep Resolution
  - Clock Type: Step and Direction, Quadrature, Step Up and Step Down
  - Programmable Digital Filtering for Clock and Direction Inputs
- Setup Parameters May Be Switched On-The-Fly
- Power and Signal Interface Options:
  - Pluggable Locking Wire Crimp
  - Pluggable Terminal Strip
  - 12.0" (30.5cm) Flying Leads
- Graphical User Interface (GUI) for Quick and Easy Parameter Setup

## DESCRIPTION

The ultra compact Microstepping MForce MicroDrive is a high performance, low cost microstepping driver that delivers unsurpassed smoothness and performance achieved through IMS's advanced 2nd generation current control. By applying innovative techniques to control current flow through the motor, resonance is significantly dampened over the entire speed range and audible noise is reduced.

Microstepping MForce MicroDrives accept a broad input voltage range from +12 to +48 VDC, delivering enhanced performance and speed. Oversized input capacitors are used to minimize power line surges, reducing problems that can occur with long runs and multiple drive systems. An extended operating range of -40° to +85°C provides long life, trouble free service in demanding environments.

The high, per phase output current of up to 2 Amps RMS, 2.8 Amps Peak, allows the extremely compact MForce MicroDrive to control a broad array of motors from size 8 to size 34.

The microstepping drive accepts up to 20 resolution settings from full to 256 microsteps per full step, including: degrees, metric and arc minutes. These settings may be changed on-the-fly or downloaded and stored in nonvolatile 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.

Power and signal interface connections are accomplished with either a pluggable locking wire crimp, terminal strip or 12.0" (30.5cm) flying leads. Motor phases are connected via a pluggable 4-pin locking wire crimp connector. Optional cables are available for ease of connecting and configuring the MForce MicroDrive.

The Microstepping MForce MicroDrive is a compact, powerful and inexpensive solution that will reduce system cost, design and assembly time for a large range of applications.

## CONFIGURING

The IMS SPI Motor Interface software is an easy to install and use GUI for configuring Microstepping MForce from a computer's USB port. GUI access is via the IMS SPI Motor Interface included on the CD shipped with the product, or from [www.imshome.com](http://www.imshome.com).

The IMS SPI Motor Interface features:

- Easy installation.
- Automatic detection of MForce version and communication configuration.
- Will not set out-of-range values.
- Tool-tips display valid range setting for each option.
- Simple screen interfaces.

# MForce MicroDrive – MICROSTEPPING

## STANDARD SPECIFICATIONS

INPUT VOLTAGE (+V)	Range	+12 to +48 VDC <i>Power supply current requirements = 2A (maximum) per MForce MicroDrive. Actual power supply current will depend on voltage and load.</i>		
OUTPUT CURRENT	RMS (Max)	2 Amps		
	Peak (Per Phase)	2.8 Amps		
ISOLATED INPUT	Step Clock, Direction and Enable			
	Voltage Range	+5 to +24 VDC Sourcing or Sinking		
MOTION	Digital Filter Range	50 nS to 12.9 μS (10 MHz to 38.8 kHz)		
	Clock Types	Step/Direction, Quadrature, Step Up/Step Down		
	Step Frequency	2 MHz Default (5 MHz Max)		
		Number of Settings	20	
	Resolution	Steps Per Revolution	200, 400, 800, 1000, 1600, 2000, 3200, 5000, 6400, 10000, 12800, 20000, 25000, 25600, 40000, 50000, 51200, 36000 (0.01 deg/μstep), 21600 (1 arc minute/μstep), 25400 (0.001mm/μstep)	
THERMAL	Heat Sink Temperature	−40° to +85°C		

## SETUP PARAMETERS

	Function	Range	Units	Default
<b>MHC</b>	Motor Hold Current	0 to 67 (67 = max 2.0 Amps RMS Output Current)	percent	5% of 100 (100 = 3.0 Amps)
<b>MRC</b>	Motor Run Current	1 to 67 (67 = max 2.0 Amps RMS Output Current)	percent	25% of 100 (100 = 3.0 Amps)
<b>MSEL</b>	Microstep Resolution	1, 2, 4, 5, 8, 10, 16, 25, 32, 50, 64, 100, 108, 125, 127, 128, 180, 200, 250, 256	$\mu$ steps per full step	256
<b>DIR</b>	Motor Direction Override	0/1	—	CW
<b>HCDT</b>	Hold Current Delay Time	0 or 2-65535	mSec	500
<b>CLK TYPE</b>	Clock Type	Step/Dir, Quadrature, Up/Down	—	Step/Dir
<b>CLK IOF</b>	Clock and Direction Filter	50 nS to 12.9 $\mu$ S (10 MHz to 38.8 kHz)	nS (MHz)	200 nS (2.5 MHz)
<b>USER ID</b>	User ID	Customizable	1-3 characters	IMS
<b>EN ACT</b>	Enable Active	High/Low	—	High

All parameters are set using the supplied IMS SPI Motor Interface GUI and may be changed on-the-fly.  
An optional Parameter Setup Cable is recommended with first orders.

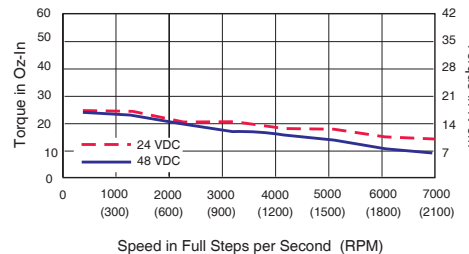
## MOTOR RECOMMENDATIONS

IMS PART NUMBERS	Size 14 (0.75 Amps)	Size 17 (1.5 Amps)	Size 23 (2.4 Amps)
<b>SINGLE LENGTH</b>	M-1410-0.75	M-1713-1.5	M-2218-2.4
<b>DOUBLE LENGTH</b>	—	M-1715-1.5	M-2222-2.4
<b>TRIPLE LENGTH</b>	—	M-1719-1.5	M-2231-2.4

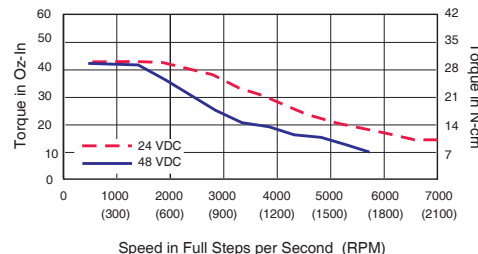
## MOTOR PERFORMANCE

### Speed-Torque

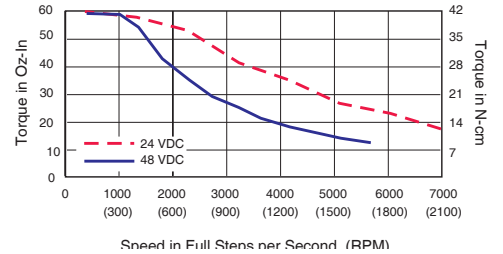
Single Length 17 Motor (IMS p/n M-1713-1.5)



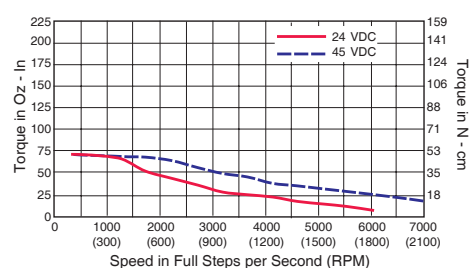
Double Length 17 Motor (IMS p/n M-1715-1.5)



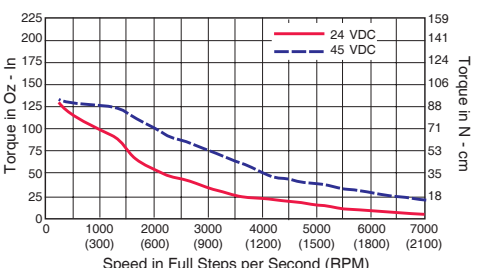
Triple Length 17 Motor (IMS p/n M-1719-1.5)



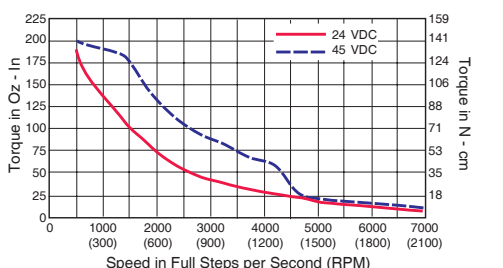
Single Length 23 Motor (IMS p/n M-2218-2.4)



Double Length 23 Motor (IMS p/n M-2222-2.4)



Triple Length 23 Motor (IMS p/n M-2231-2.4)



## PIN/WIRE ASSIGNMENTS

P1: I/O & POWER CONNECTOR			
Pluggable Terminal Strip	Flying Leads Wire Colors	Pluggable Locking Wire Crimp**	Function
Pin 1	White	Pin 3	Optocoupler Reference
Pin 2	—	—	No Connect
Pin 3	Orange	Pin 4	Step Clock Input
Pin 4	Blue	Pin 6	CW/CCW Direction Input
Pin 5	Brown	Pin 5	Enable Input
Pin 6	Black	Pin 1	Power Ground
Pin 7	Red	Pin 2	+V (+12 to +48 VDC)
		Pin 7	+5 VDC Output
		Pin 8	SPI Clock
		Pin 9	Communications Ground
		Pin 10	SPI Master In – Slave Out
		Pin 11	SPI Chip Select
		Pin 12	SPI Master Out – Slave In

P2: COMM CONNECTOR (SPI)**	
10-Pin IDC	Function
Pin 1	No Connect
Pin 2	No Connect
Pin 3	No Connect
Pin 4	SPI Chip Select
Pin 5	Communications Ground
Pin 6	+5 VDC Output
Pin 7	SPI Master Out – Slave In
Pin 8	SPI Clock
Pin 9	No Connect
Pin 10	SPI Master In – Slave Out

P3: MOTOR CONNECTOR	
Pluggable Locking Wire Crimp	Function
Pin 1	Phase /A
Pin 2	Phase A
Pin 3	Phase /B
Pin 4	Phase B

\*\*The 12-Pin Pluggable Locking Wire Crimp connector at P1 eliminates the P2 connector.

## OPTIONS

### Motors and Encoders

IMS offers a wide range of motors, encoders and accessories recommended for interface with the Microstepping MForce MicroDrive. For complete specifications on these products, please visit the IMS web site at [www.imshome.com](http://www.imshome.com).

### Power Supplies

IMS recommends the following power supplies for operating the MForce MicroDrive: IP402, IP404, ISP200-4. Complete power supply specifications at [www.imshome.com](http://www.imshome.com).

## ACCESSORIES

### Parameter Setup Cable and Adapter

The optional 12.0' (3.6m) parameter setup cable MD-CC300-000 facilitates communications interface from the Microstepping MForce MicroDrive to a PC's USB port with pluggable mating connectors. MForce with 12-pin pluggable locking wire crimp connector also require adapter MD-ADP-1723C. Recommended with first order.

### Prototype Development Cables

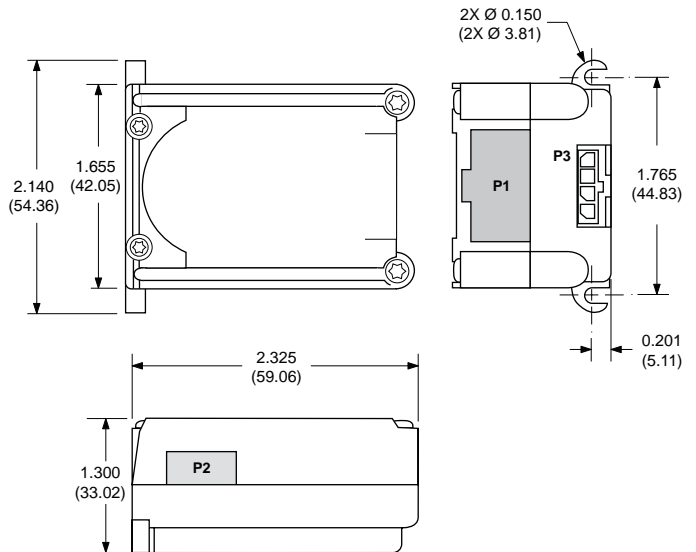
To speed prototyping, development cables are available with locking pluggable wire crimp mates to:

I/O & Power: 12-pin Connector (2 lengths)	
12.0" (30.5cm)	ADP-3512-FL
10.0' (3.0m)	PD12-1434-FL3
Motor Interface: 4-pin Connector	
10.0' (3.0m)	PDO4-MF17-FL3

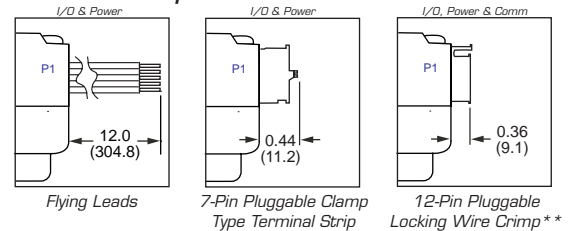
Accessories details at: [www.imshome.com/cables\\_cordsets.html](http://www.imshome.com/cables_cordsets.html)

## MECHANICAL SPECIFICATIONS

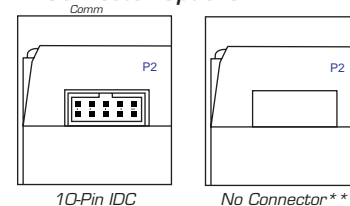
Dimensions in Inches (mm)



### P1 Connector Options



### P2 Connector Options



## ORDER INFORMATION

**MF1M1 S 17N4**

P1: I/O & Power  
F = 12" Flying Leads  
P = Pluggable Clamp Type Terminal Strip  
C = 12-Pin Locking Wire Crimp (Includes I/O, Power and Comm)

P3: Motor Interface  
4-Pin Locking Wire Crimp

P2: Communications  
D = SPI with 10-Pin IDC Connector  
Z = None. Used with 12-Pin Locking Wire Crimp in P1

**Example:** Part Number **MF1M1PSD17N4** is a Microstepping MForce MicroDrive with pluggable I/O & power interface, SPI communications with 10-pin IDC connector and 4-pin motor interface.



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