MFORCE™ MICRO DRIVE *Plus*
MICROSTEPPING

RoHS CE

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 (per phase) up to
- **new** **3 Amps RMS, 4.2 Amps Peak**
- 20 Microstep Resolutions up to 51,200 Steps Per Rev Including: Degrees, Metric, Arc Minutes
- Optically Isolated Input Options:
  - Universal +5 to +24 VDC Signals, Sourcing or Sinking
  - Differential +5 VDC Signals
- 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 3 Amps RMS, 4.2 Amps Peak, allows the extremely compact MForce MicroDrive to control a broad array of motors from size 11 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.

MForce connectivity has never been easier with options ranging from all-inclusive QuickStart Kits to individual interfacing cables and mating connector kits to build your own cables. *See pg 4.*

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 available at 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 *Power supply current requirements = 3.2A (maximum) per MForce MicroDrive.* *Actual power supply current will depend on voltage and load.*
OUTPUT CURRENT	RMS (Max)	3 Amps
	Peak (Per Phase)	4.2 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)
	Resolution — 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
MHC	Motor Hold Current	0 to 100	percent	5%
MRC	Motor Run Current	1 to 100	percent	25%
MSEL	Microstep Resolution	1, 2, 4, 5, 8, 10, 16, 25, 32, 50, 64, 100, 108, 125, 127, 128, 180, 200, 250, 256	µsteps per full step	256
DIR	Motor Direction Override	0/1	—	CW
HCDT	Hold Current Delay Time	0 or 2–65535	mSec	500
CLK TYPE	Clock Type	Step/Dir, Quadrature, Up/Down	—	Step/Dir
CLK IOF	Clock and Direction Filter	50 nS to 12.9 µS (10 MHz to 38.8 kHz)	nS (MHz)	200 nS (2.5 MHz)
USER ID	User ID	Customizable	1–3 characters	IMS
EN ACT	Enable Active	High/Low	—	High
PWM	Fine-tune Current Output	Selectable	see full product manual for details	

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.

PIN/WIRE ASSIGNMENTS

P1: I/O & POWER CONNECTOR

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

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

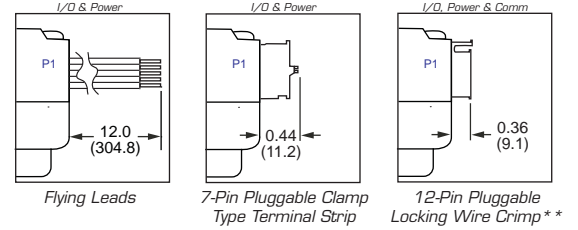| Pluggable Locking Wire Crimp	Function
Pin 1	Phase /A
Pin 2	Phase A
Pin 3	Phase /B
Pin 4	Phase B

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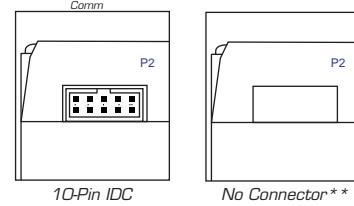
MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)
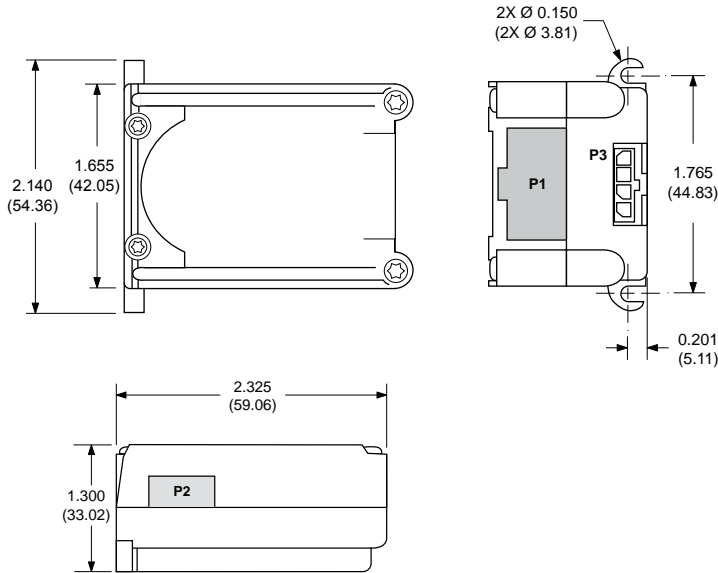
2.140 (54.36)
1.655 (42.05)
2.325 (59.06)
1.300 (33.02)
P2

2X Ø 0.150 (2X Ø 3.81)
P1
P3
1.765 (44.83)
0.201 (5.11)

P1 Connector Options

I/O & Power
P1
12.0 (304.8)
Flying Leads

I/O & Power
P1
0.44 (11.2)
7-Pin Pluggable Clamp Type Terminal Strip

I/O, Power & Comm
P1
0.36 (9.1)
12-Pin Pluggable Locking Wire Crimp * *

P2 Connector Options

Comm
P2
10-Pin IDC
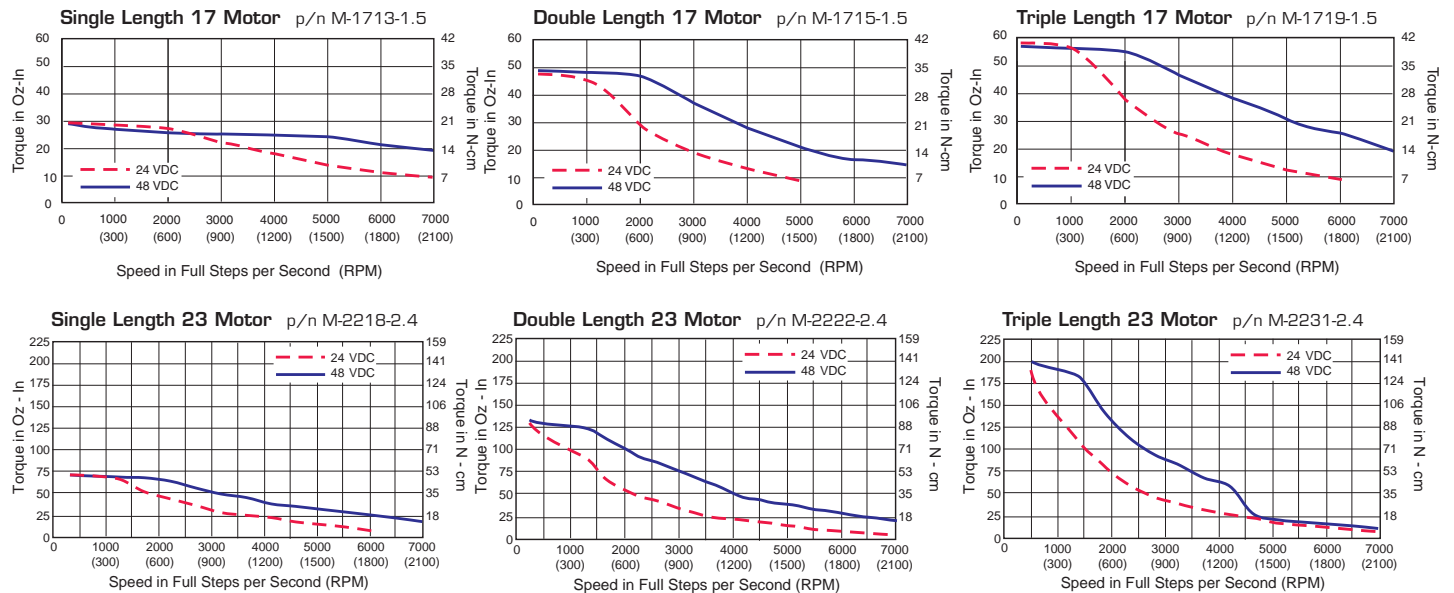
P2
No Connector * *

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

MOTOR RECOMMENDATIONS

IMS PART NUMBERS	Size 14 (0.75 Amps)	Size 17 [1.5 Amps]	Size 23 [2.4 Amps]	Size 23 (3.0 Amps)
SINGLE LENGTH	M-1410-0.75	M-1713-1.5	M-2218-2.4	M-2218-3.0
DOUBLE LENGTH	—	M-1715-1.5	M-2222-2.4	M-2222-3.0
TRIPLE LENGTH	—	M-1719-1.5	M-2231-2.4	M-2231-3.0

MOTOR PERFORMANCE

Speed-Torque

Single Length 17 Motor p/n M-1713-1.5
Torque in Oz-In / Torque in N-cm
24 VDC / 48 VDC
Speed in Full Steps per Second (RPM)

Double Length 17 Motor p/n M-1715-1.5
Torque in Oz-In / Torque in N-cm
24 VDC / 48 VDC
Speed in Full Steps per Second (RPM)

Triple Length 17 Motor p/n M-1719-1.5
Torque in Oz-In / Torque in N-cm
24 VDC / 48 VDC
Speed in Full Steps per Second (RPM)

Single Length 23 Motor p/n M-2218-2.4
Torque in Oz - In / Torque in N - cm
24 VDC / 48 VDC
Speed in Full Steps per Second (RPM)

Double Length 23 Motor p/n M-2222-2.4
Torque in Oz - In / Torque in N - cm
24 VDC / 48 VDC
Speed in Full Steps per Second (RPM)

Triple Length 23 Motor p/n M-2231-2.4
Torque in Oz - In / Torque in N - cm
24 VDC / 48 VDC
Speed in Full Steps per Second (RPM)

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CONNECTIVITY

QuickStart Kit [new]
For rapid design verification, all-inclusive QuickStart Kits have communication converter, prototype development cables, instructions and CD for MForce initial functional setup and system testing.

Communication Converters [new]
Electrically isolated, in-line converters pre-wired with mating connectors to conveniently set/program communication parameters for a single MForce via a PC's USB port. Length 12.0' (3.6m).
Mates to connector:
10-Pin IDC MD-CC300-001
12-Pin Wire Crimp MD-CC303-001

Prototype Development Cables
Speed test/development with pre-wired mating connectors that have flying leads other end. Length 10.0' (3.0m).
Mates to connector:
12-Pin Wire Crimp PD12-1434-FL3
4-Pin Wire Crimp PD04-MF17-FL3

Mating Connector Kits [new]
Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.
Mates to connector:
12-Pin Wire Crimp CK-03
4-Pin Wire Crimp CK-06
Kit contains 5 mating connectors that press fit onto ribbon cable. Cable not supplied.
10-Pin IDC CK-01

OPTIONS

Motors
IMS offers a wide range of motors and accessories, recommended for interface with MForce MicroDrives. For complete specifications on these products, go to www.imshome.com.

Connectivity details: www.imshome.com/mforce_connectivity.html

PART NUMBERING

K **MFM** ☐ ☐ **S** ☐ **17N4**

QuickStart Kit details above

Input Version
1 = Universal
5 = Differential

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: 4-Pin Motor Interface

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

Example: Part Number **MFM1PSD17N4** is a Microstepping MForce MicroDrive with pluggable I/O & power interface, SPI communications with 10-pin IDC connector and 4-pin motor interface.

IMS is becoming **Schneider Electric**

IMS™
INTELLIGENT MOTION SYSTEMS, INC.