

MForce PowerDrive Speed Control



IMS™ INTELLIGENT MOTION SYSTEMS, INC.

by Schneider Electric

Specifications

Electrical Specifications	
Input Voltage (+V) Range*	+12 to +75 VDC
Max Power Supply Current (Per MForce PowerDrive)*	4 A
Output Current (RMS)	5.0 Amps
Output Current (Peak)	7.0 Amps

*Actual Power Supply Current will depend on Voltage and Load.

Environmental Specifications		
Operating Temperature (non-condensing)	Heat Sink	-40°C to +75°C
	Motor	-40°C to +90°C

I/O Specifications	
Analog Inputs	
A/D Resolution	10 Bit
Range (Voltage Mode)	0 to +5VDC, 0 to +10 VDC
Range (Current Mode)	0 to 20 mA, 4 to 20 mA
Range (PWM)	15 to 20 kHz
Stop/Start and Direction	
Range	TTL
Logic Threshold (Logic 0)	< 0.8 VDC
Logic Threshold (Logic 1)	> 2.2 VDC
Internal Pull-Up Resistance	20 kΩ
Protection	Transient
Step/Direction Outputs	
Type	Open Drain
Drain-Source Voltage	+100 VDC
Continuous Drain Current	100 mA
Output Pulse Width (Step Clock)	100 ns to 12.8 μs (550 ns Default)

Communications Specifications	
Protocol	SPI

Motion Specifications	
Velocity	
Oscillator Frequency (Max.)	5 MHz
Resolution	0.5961 Steps/Second
Acceleration/Deceleration	
Range	1.5 x 10 ⁹ Steps/Second ²
Resolution	90.9 Steps/Second ²
Number of Microstep Resolution Settings	20

Available Microsteps Per Revolution									
200	400	800	1000	1600	2000	3200	5000	6400	10000
12800	20000	25000	25600	40000	50000	51200	36000 ¹	21600 ²	25400 ³

1=0.01 deg/μstep 2=1 arc minute/μstep 3=0.001 mm/μstep

Notes and Warnings

Installation, configuration and maintenance must be carried out by qualified technicians only. You must have detailed information to be able to carry out this work. This information can be found in the user manuals.

- Unexpected dangers may be encountered when working with this product!
- Incorrect use may destroy this product and connected components!

The user manuals are not included. You can obtain them from the Internet at: http://www.imshome.com/mforce_powerdrive_mfo.html.

Required for Setup*

- PC running Microsoft® Windows XP Service Pack 2 or greater.
- IMS SPI Motor Interface (available online)
- +12 to +75 VDC unregulated linear or switching power supply. (Recommended: IMS IP806 or ISP300-7)
- NEMA size 23 or 34 stepping motor.
- 10 kΩ Potentiometer for velocity control (or appropriate current source if using current mode)
- Two (2) SPST switches or controller I/O points to control axis direction and the on/off state of the internal clock generator.
- SPI communications interface (Recommended: IMS MD-CC300-001 or MD-CC302-001 Communication Converters)

Depending on your MForce PowerDrive connectors configuration, you may also need:

- I/O, interface to 12-pin wire crimp connector. (Recommended: PD12B-3400-FL3 Prototype Development Cable)
- Power interface to the 2-pin wire crimp connector. (Recommended: PD02-3400-FL3)
- Motor interface to the 4-pin wire crimp connector. (Recommended: PD04-MF34-FL3)

* If you purchased your MForce PowerDrive with a QuickStart Kit, you have received all of the connecting cables needed for initial functional setup and system testing.

Getting Started

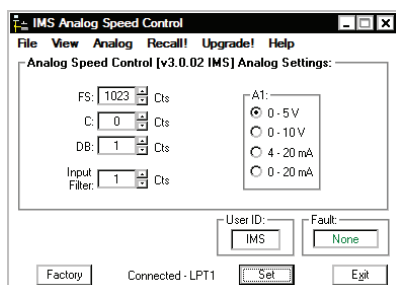
All documentation, software and resources are available online at: http://www.imshome.com/mforce_powerdrive_mfo.html

Connecting Power and I/O

Your MForce PowerDrive may be configured with power and I/O combined on a single connector, or with separate connectors. Please refer to the opposite side of this document for connecting details and available IMS connectivity options including Prototype Development Cables and Mating Connector Kits.

Connecting Communications

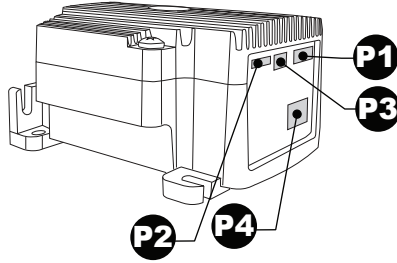
1. Connect IMS USB to SPI communications converter to MForce PowerDrive and PC.
2. Install the communication converter drivers onto PC (available online).
3. Install and open SPI Motor Interface.
4. Apply power to MForce PowerDrive.
5. Parameters may be adjusted via two screens, the Motor Settings screen or the I/O settings screen (shown below), accessible via the View menu.



Setup Parameters

MForce PowerDrive Speed Control Setup Parameters				
Name	Function	Range	Units	Default
ACCL	Acceleration	91 to 1.5 X 10 ⁹	steps/sec ²	1,000,000
C	Joystick Center	0 to 1022	counts	0
DB	Deadband	0 to 255	counts	1
DECL	Deceleration	91 to 1.5 X 10 ⁹	steps/sec ²	1,000,000
DIR	Motor Direction Override	Clockwise/Counterclockwise	—	CW
FAULT	Fault/Checksum Error	Error Code	—	None
FS	Full Scale	1 to 1023 (205 to 1023 – 4 to 20 mA mode)	counts	1023
HCDDT	Hold Current Delay Time	HCDDT + MSDT <= 65535	milliseconds	500
IF	Analog Input Filter	1 to 1000	counts	1
IMODE	Analog Input Mode	0 to +5 VDC, 0 to +10 VDC, 4 to 20 mA, 0 to 20 mA, 15 to 25kHz PWM	—	0 to +5 VDC
MHC	Motor Hold Current	0 to 100	percent	5
MRC	Motor Run Current	1 to 100	percent	25
MSDT	Motor Settling Delay Time	MSDT + HCDDT <= 65535	milliseconds	0
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
STEPW	Output Step Width	Square Wave, 100 ns to 12.8 μs	ns - μs	550 ns
SSD	Stop/Start Debounce	0 to 255	milliseconds	0
VI	Initial Velocity	0 to < VM	steps/sec	1000
VM	Maximum Velocity	VI to 5,000,000	steps/sec	768000
TEMP	Warning Temperature	0 to 85	°C	80
USER ID	User ID	1 to 3 Characters	Viewable ASCII	IMS

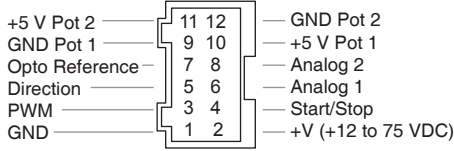
MForce PowerDrive Speed Control Connectivity Options



Connector Style	Function
P1 12-pin Wire Crimp	I/O
P2 10-pin Wire Crimp	Communications
P3 2-pin Wire Crimp	Power
P4 4-pin Wire Crimp	Motor

P1 I/O

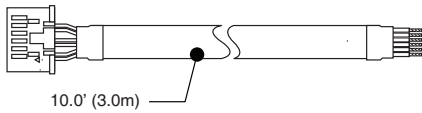
12-pin Wire Crimp



Prototype Development Cable p/n: PD12B-1434-FL3

Speed test and development with pre-wired mating connector.

To MForce PowerDrive
12-pin wire crimp
JST connector

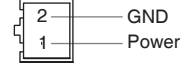


Pair	Wire Colors	Function
1	Black	Direction Out
	Red	Step Out
2	Black	+5V Pot 1
	White	GND Pot 1
3	Black	+5V Pot 2
	Green	GND Pot 2
4	Black	PWM
	Blue	Opto Ref.
5	Black	Start/Stop
	Yellow	Direction In
6	Black	Analog 1
	Brown	Analog 2

To I/O

P3 Power

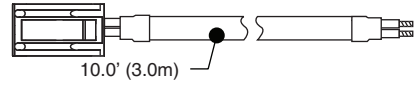
2-pin wire crimp



Prototype Development Cable p/n: PD02-3400-FL3

Function: Power Interface

To MForce PowerDrive
2-pin wire crimp
Molex connector



To Power

Wire Colors	Function
Black	Power Ground
Red	+V

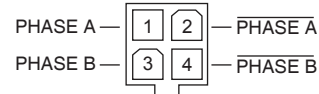
Mating Connector Kit p/n: CK-05

Use to make your own cables, kit contains 5 mating connector shells with crimp pins. Tyco crimp tool recommended.

Molex Parts Shell: 510-67-0200
Pins: 502-17-91011
Crimp Tool: 63811-1200

P4 Motor

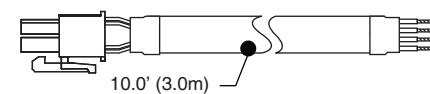
4-pin wire crimp



Prototype Development Cable p/n: PD04-MF34-FL3

Function: Motor Interface

To MForce PowerDrive
4-pin wire crimp
Molex connector



To Motor

Wire Colors	Function
Black (Pair 1)	Phase B
White (Pair 1)	Phase B
Black (Pair 2)	Phase A
White (Pair 2)	Phase A

Note that pairs are marked with the pair number.

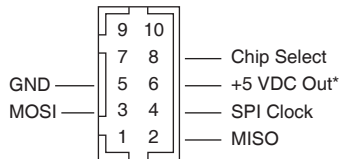
Mating Connector Kit p/n: CK-07

Use to make your own cables, kit contains 5 mating connector shells with crimp pins. Molex crimp tool recommended.

Molex Parts Shell: 39-01-2045
Pins: 44476-3112
Crimp Tool: 0638115000

P2 Communications

10-pin Wire Crimp

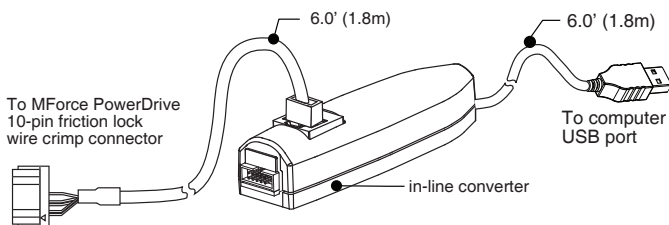


pins not labeled are no connect.

*used to power the MD-CC302-001 only.

Communications Converter p/n: MD-CC302-001

Electrically isolated in-line USB to SPI converter pre-wired with mating connector to conveniently program and set configuration parameters.



Mating Connector Kit p/n: CK-02

Use to make your own cables, kit contains 5 mating connector shells for making interface cables.

Hirose Parts Shell: DF11-10DS-2C
Pins: DF11-2428SC
Crimp Tool: DF11-TA2428HC

Mechanical Specifications

