

# Quick Reference MForce PowerDrive Motion Control



## General 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
Aux-Logic Input Voltage**	+12 to +24 VDC
Aux-Logic Input Current**	230 mA Max

\*Actual Power Supply Current will depend on voltage and load.  
 \*\*Used to power logic circuitry in the absence of +V.

### Environmental Specifications

Operating Temperature — measured at the heat sink (non-condensing)	-40°C to +85°C
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### I/O Specifications

<b>General Purpose I/O - Number and Type</b>	
I/O Points 1-4, 9-12	8 I/O programmable as inputs or outputs (sinking or sourcing)
<b>General Purpose I/O - Electrical</b>	
Inputs	TTL up to +24 VDC
Sinking Outputs	Up to +24 VDC
Sourcing Outputs	+12 to +24 VDC
Output Sink Current	up to 600 mA (One Channel in each I/O Bank)
Logic Threshold (Logic 0)	< 0.8 VDC
Logic Threshold (Logic 1)	> 2.2 VDC
Protection (Sinking)	Over Temp, Short Circuit
Protection (Sourcing)	Transient Over Voltage, Inductive Clamp
<b>Analog Input</b>	
Resolution	10 Bit
Range (Voltage Mode)	0 to +5 VDC, 0 to +10 VDC
Range (Current Mode)	4 to 20 mA, 0 to 20mA
<b>Clock I/O</b>	
Types	Step/Direction, Up/Down, Quadrature
Logic Threshold	+5V TTL Input, TTL Output (with 2 kΩ Load to Ground)
<b>Trip Output/Capture Input</b>	
Logic Threshold	+5V TTL Input, TTL Output (with 2 kΩ Load to Ground)

### Communications Specifications

Protocol	RS-422/RS-485
BAUD Rate	4.8k, 9.6k, 19.2k, 38.4k, 115.2 kbps
<b>CANopen Option</b>	
Protocol	CAN 2.0B Active
Communications Profile	CiA DS-301
BAUD Rate	10, 20, 50, 125, 250, 500, 800 kBit/s, 1MBit/s (default)
Note: 800 kbps not supported by the MD-CC500-000 USB to CANopen dongle.	

### Motion Specifications

<b>Microstep Resolution - Open Loop</b>	
Number of Resolutions	20

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

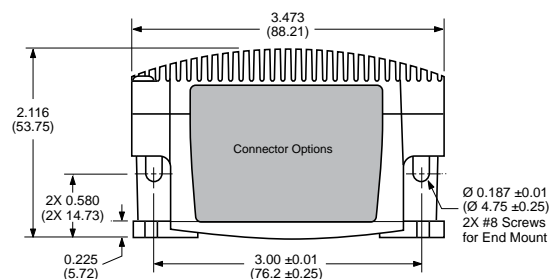
1=0.01 deg/μstep 2=1 arc minute/μstep 3=0.001 mm/μstep

### Software Specifications

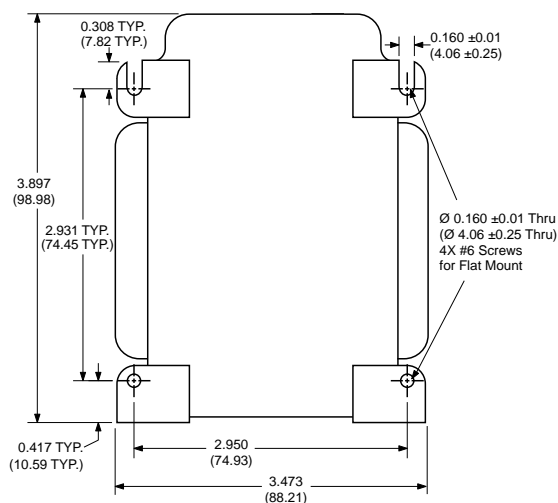
Program Storage Type/Size	Flash/6384 Bytes
User Program Labels and Variables	192
Party Mode Addresses	62

## Mechanical Specifications

FRONT VIEW



BOTTOM VIEW



## 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, but may be obtained from the Internet at: <http://www.imshome.com/downloads/manuals.html>.

## Required for Setup\*

- PC running Microsoft® Windows XP Service Pack 2 or greater.
- IMS Terminal integrated program editor and terminal emulator (available online).
- +12 to +75 VDC unregulated linear or switching power supply.
- NEMA size 23 or 34 stepping motor.
- RS-422/485 communications interface (recommended: MD-CC402-001 communication converter). CANopen communications converter (recommended: MD-CC500-000).

Depending on your connector configuration, you may also need:

- I/O or I/O and encoder interface to 14-pin or 20-pin wire crimp connector (recommended: PD14-2334-FL3 or PD20-3400-FL3 prototype development cable).
- Power interface to 2-pin wire crimp connector (recommended: PD02-3400-FL3 prototype development cable).
- Motor interface to 4-pin wire crimp connector (recommended: PD04-MF34-FL3 prototype development cable).

\* 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

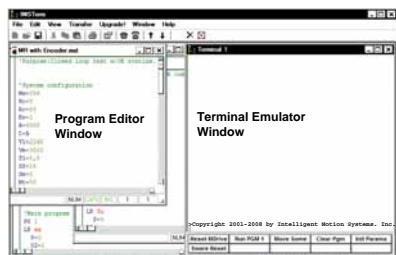
All documentation, software and resources are available online at: [http://www.imshome.com/products/mforce\\_overview.html](http://www.imshome.com/products/mforce_overview.html).

### Connecting the Motor, Power and I/O

Your MForce PowerDrive is configured with power, I/O and motor on separate connectors. Please refer to the opposite side of this document for connecting details and available connectivity options including prototype development cables and mating connector kits.

### Connecting Communications — RS-422/485

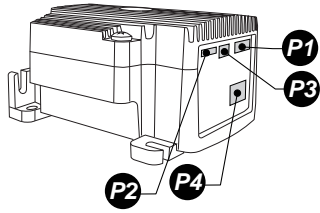
1. Connect RS-422/485 communications converter to MForce and PC.
2. Install the communication converter drivers onto PC (available online).
3. Install and open IMS Terminal.
4. Apply power to MForce PowerDrive.
5. Within IMS Terminal, Click into the terminal window (shown below).
6. Key in CTRL+C. The sign-on message: "Copyright 2001-2008 by Intelligent Motion Systems, Inc." should appear, verifying that communications is active.



### Connecting Communications — CANopen

A "Getting Started" tutorial using the CANopen Tester GUI with the MD-CC500-000 USB to CANopen dongle is located in the CANopen implementation manual, available online.

# MForce PowerDrive Motion Control Connectivity Options

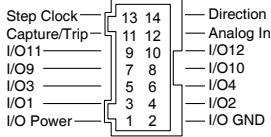


Connector Style Function

<b>P1</b>	14-pin Wire Crimp.....	I/O
	20-pin Wire Crimp.....	I/O and Remote Encoder
<b>P2</b>	10-pin Wire Crimp.....	Communications
	DB-9F .....	Communications (CANopen version)
<b>P3</b>	2-Pin Wire Crimp.....	Power
<b>P4</b>	4-Pin Wire Crimp.....	Motor

## **P1** I/O

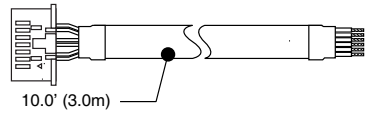
14-pin wire crimp



### Prototype Development Cable p/n: PD14-2334-FL3

Speed test and development with pre-wired mating connector.

To MForce PowerDrive  
14-pin wire crimp  
JST connector



To I/O

Pair	Wire Colors	Function
1	White	Step Clock
	Black	Direction
2	Green	Capt/Trip
	Black	Analog In
3	Blue	I/O11
	Black	I/O12
4	Yellow	I/O9
	Black	I/O10
5	Brown	I/O3
	Black	I/O4
6	Orange	I/O1
	Black	I/O2
7	Red	I/O Power
	Black	I/O Ground

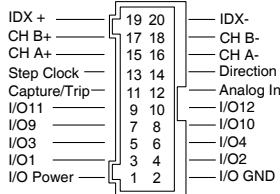
### Mating Connector Kit p/n: CK-09

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

JST Parts Shell: PADP-14V-1-S  
Pins: SPH-001T-P0.5L

## **P1** I/O & Remote Encoder

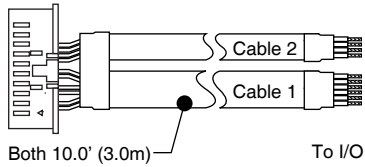
20-pin wire crimp



### Prototype Development Cable p/n: PD20-3400-FL3

Speed test and development with pre-wired mating connector.

To MForce PowerDrive  
20-pin wire crimp  
JST connector



To Encoder

Pair	Wire Colors	Function
<b>Cable 1</b>		
1	White	Step Clock
	Black	Direction
2	Green	Capt/Trip
	Black	Analog In
3	Blue	I/O11
	Black	I/O12
4	Yellow	I/O9
	Black	I/O10
5	Brown	I/O3
	Black	I/O4
6	Orange	I/O1
	Black	I/O2
7	Red	I/O Power
	Black	I/O Ground
<b>Cable 2</b>		
1	White w/Blue Stripe	CH A+
	Blue w/White Stripe	CH A-
2	White w/Orange Stripe	CH B+
	Orange w/White Stripe	CH B-
3	White w/Green Stripe	IDX+
	Green w/White Stripe	IDX-

### Mating Connector Kit p/n: CK-11

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

JST Parts Shell: PADP-20V-1-S  
Pins: SPH-001T-P0.5L

## **P2** Communications — CANopen Version

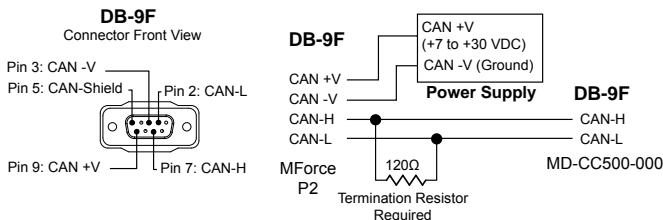
DB-9 (female)

### Communications Converter p/n: MD-CC500-000

Electrically isolated in-line USB to CANopen converter. USB "A" Type connector to DB-9 (male). An interface cable must be constructed by the user.

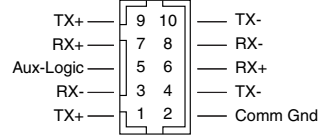
### Mating Cable Requirements

Parts required: (2) DB-9 (female) connectors, +7 to +30 VDC power supply and (1)120 Ω 1% terminating resistor.



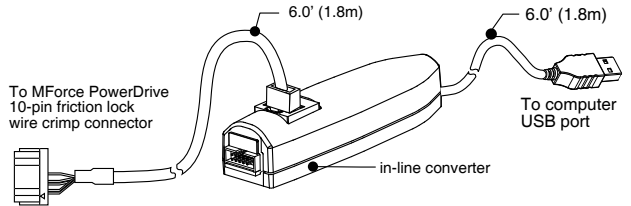
## **P2** Communications — RS-422/485

10-pin wire crimp



### Communications Converter p/n: MD-CC402-001

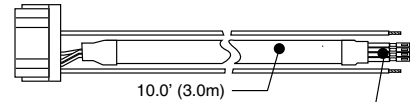
Electrically isolated in-line USB to RS-422/485 converter pre-wired with mating connector to conveniently program and set configuration parameters.



### Prototype Development Cable p/n: PD10-1434-FL3

Speed test and development with pre-wired mating connector. Recommended for multi-drop systems, can be used in conjunction with the MD-CC402-001.

To MForce PowerDrive  
10-pin friction lock  
wire crimp connector



To Communications

Wire Colors	Function
White/Red Stripe	Aux-Logic
White/Blue Stripe	TX+
Blue/White Stripe	TX-
White/Orange Stripe	RX+
Orange/White Stripe	RX-
Green/White Stripe	GND

Flying leads terminated by crimp pins for multidrop connection (see product manual)

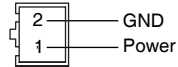
### Mating Connector Kit p/n: CK-02

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

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

## **P3** Power

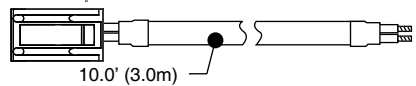
2-pin wire crimp



### 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

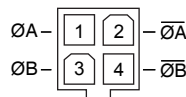
### Mating Connector Kit p/n: CK-05

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

## **P4** Motor

4-pin wire crimp

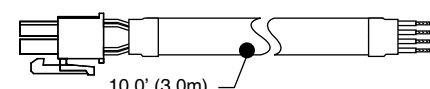


ENSURE PROPER CONNECTION OF THE MOTOR PHASES!

### Prototype Development Cable p/n: PD04-MF347-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