

# 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 |
|--|----------------|

### 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<br>(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<br>(with 2 kΩ Load to Ground)       |
| <b>Trip Output/Capture Input</b>             |   |
| Logic Threshold                              | +5V TTL Input, TTL Output<br>(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,<br>1MBit/s (default)          |
| Note:                  | 800 kbps not supported by the MD-CC500-000<br>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               |
| 12800                               | 20000 | 25000 | 25600 | 40000 | 50000 | 51200 | 36000 <sup>1</sup> |
|                                     |       |       |       |       |       |       | 21600 <sup>2</sup> |
|                                     |       |       |       |       |       |       | 25400 <sup>3</sup> |

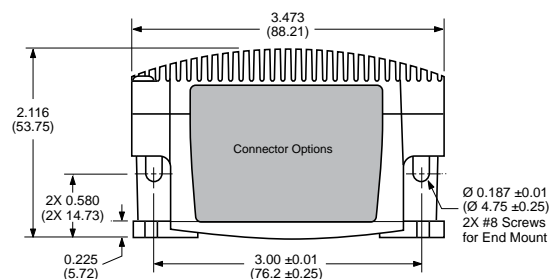
1=0.01 deg/μstep    2=1 arc minute/μstep    3=0.001 mm/μstep

### Software Specifications

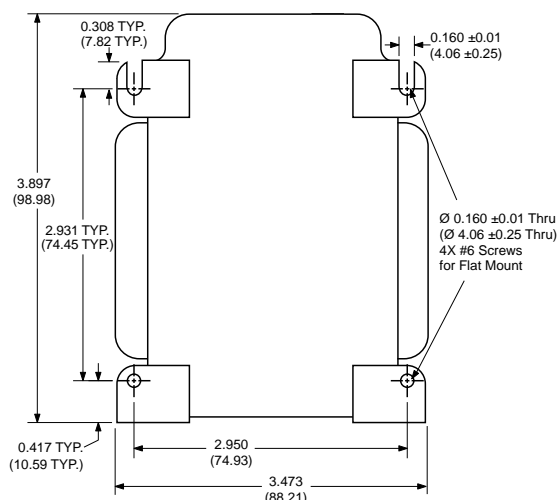
|                                   |                  |
|-----------------------------------|------------------|
| Program Storage Type/Size         | Flash/6384 Bytes |
| User Program Labels and Variables | 192              |
| Party Mode Addresses              | 62               |

## 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

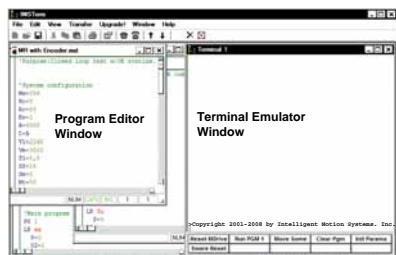
All documentation, software and resources are available online at: [http://www.imshome.com/products/mforce\\_overview.html](http://www.imshome.com/products/mforce_overview.html).

### 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

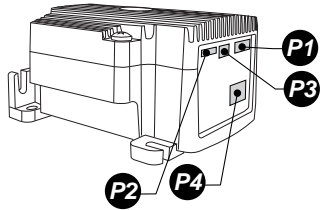
1. Connect RS-422/485 communications converter to MForce and PC.
2. Install the communication converter drivers onto PC (available online).
3. Install and open IMS Terminal.
4. Apply power to MForce PowerDrive.
5. Within IMS Terminal, Click into the terminal window (shown below).
6. Key in CTRL+C. The 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

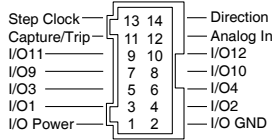


Connector Style                      Function

|           |                        |                                  |
|-----------|------------------------|----------------------------------|
| <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

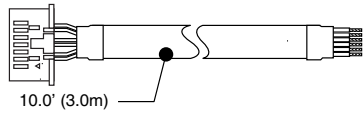


### Prototype Development Cable p/n: PD14-2334-FL3

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

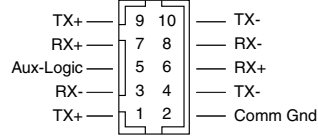
Use to make your own cables, kit contains 5 mating connector shells with crimp pins. JST crimp tool recommended.

JST Parts

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

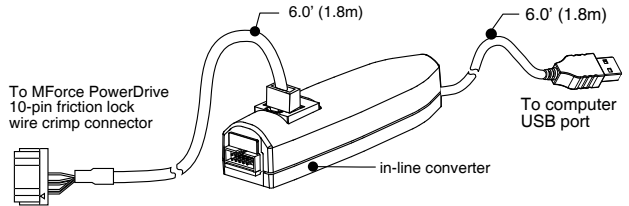
## P2 Communications — RS-422/485

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.

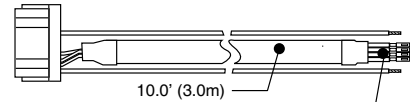


### Prototype Development Cable p/n: PD10-1434-FL3

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

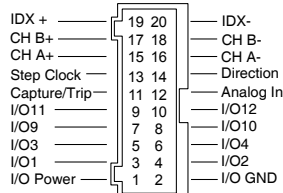


| Wire Colors         | Function  |
|---------------------|-----------|
| White/Red Stripe    | Aux-Logic |
| White/Blue Stripe   | TX+       |
| Blue/White Stripe   | TX-       |
| White/Orange Stripe | RX+       |
| Orange/White Stripe | RX-       |
| Green/White Stripe  | GND       |

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

## P1 I/O & Remote Encoder

20-pin wire crimp

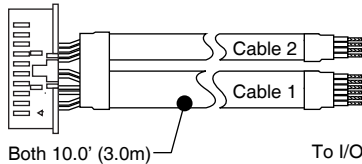


### Prototype Development Cable p/n: PD20-3400-FL3

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

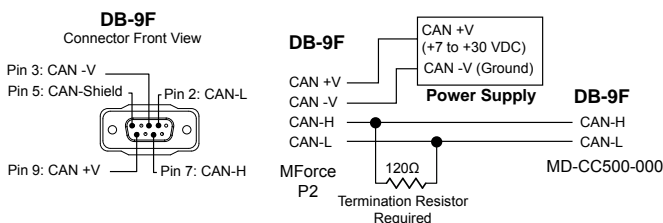
DB-9 (female)

### 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.

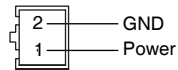
### Mating Cable Requirements

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



## P3 Power

2-pin wire crimp

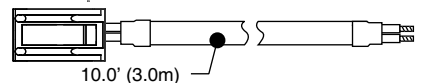


### Prototype Development Cable p/n: PD02-3400-FL3

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

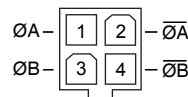
Use to make your own cables, kit contains 5 mating connector shells with crimp pins. Tyco crimp tool recommended.

Molex Parts

Shell: 510-67-0200  
Pins: 502-17-91011

## P4 Motor

4-pin wire crimp



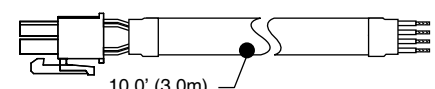
ENSURE PROPER CONNECTION OF THE MOTOR PHASES!

### 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