



MOTION CONTROL [with optional CANopen]

FEATURES

- Highly Integrated, High Performance Microstepping Driver and Motion Controller
- Advanced 2nd Generation Current Control for Exceptional Performance and Smoothness
- Single Supply: +12 to +75 VDC
- Low Cost
- Compact Package
- High Output Current up to 5 Amps RMS, 7 Amps Peak (Per Phase)
- Auxiliary Logic Power Supply Input
- 20 Microstep Resolutions up to 51,200 Steps Per Rev Including: Degrees, Metric, Arc Minutes
- Open or Optional Closed Loop Control
- Programmable Motor Run and Hold Currents
- One 10 Bit Analog Input Selectable: 0 to +10VDC, 0 to +5VDC, 0-20mA, 4-20mA
- 0 to 5MHz Step Clock Rate Selectable in 0.59Hz Increments
- RS-422/485 or Optional CANopen* Communications
- 62 Software Addresses for Multi-Drop Communications
- Simple 1 to 2 Character Instructions
- 8 I/O Lines, +24 VDC Tolerant, Sourcing or Sinking, Inputs and Outputs
- Electronic Gearing
- Open Loop or Optional External/Remote Encoder for Closed Loop Control
- High Speed Position Capture Input or Trip Output
- Dual Mounting Configurations
- Pluggable Locking Wire Crimp Interface

DESCRIPTION

The Motion Control MForce PowerDrive offers system designers a low cost, high performance microstepping driver integrated with an intelligent, programmable motion controller.

The unsurpassed smoothness and performance delivered by MForce PowerDrives are 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.

Motion Control MForce PowerDrives accept a broad input voltage range from +12 to +75 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.

A high, per phase output current of up to 5 Amps RMS, 7 Amps Peak, allows the compact MForce PowerDrive to control a broad array of motors from size 23 to size 42.

Standard features include eight +5 to +24 volt general purpose I/O lines and the capability of electronic gearing by following a rotary or linear axis at an electronically controlled ratio, or an output clock can be generated fixed to the internal step clock. Also included are one 10 bit analog input, 0 to 5MHz step clock rate, 20 microstep resolutions up to 51,200 steps per revolution, and full featured easy-to-program instruction set.

MForce PowerDrives are available with optional closed loop control. This increases functionality by adding stall detection, position maintenance and find index mark. The closed loop configuration offers an expanded choice of line counts and resolutions by interfacing to a remotely mounted user-supplied external encoder.

Motion Control MForce PowerDrives communicate over RS-422/485 which allows for point-to-point or multiple unit configurations utilizing one communication port. Addressing and hardware support up to 62 uniquely addressed units communicating over a single line. Baud rate is selectable from 4.8 to 115.2kbps.

Optional communication protocols include CANopen. The CAN bus is 2.0B active (11 and/or 29 bit) and is capable of all standard frequencies from 10kHz to 1MHz. CANopen features include node guarding, heartbeat producer, SDOs and PDOs. Highlights include variable PDO mapping and extended node identifier.*

The versatile Motion Control MForce PowerDrive comes with dual mounting configurations to fit various system needs. All interface connections are accomplished using pluggable locking wire crimp connectors, with the exception of the CANopen option which uses a DB9 connector. Optional cables are available for ease of connecting and configuring the MForce, and are recommended with first order.

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

*CANopen may not support some objects.

MForce PowerDrive – MOTION CONTROL

STANDARD SPECIFICATIONS

INPUT VOLTAGE (+V)	Range	+12 to +75 VDC		
AUX. LOGIC INPUT VOLTAGE	Range	+12 to +24 VDC <i>Maintains power to control and feedback circuits (only) when input voltage is removed.</i>		
OUTPUT CURRENT	RMS (Max)	5 Amps		
	Peak (Per Phase)	7 Amps		
ANALOG INPUT	Resolution	10 Bit		
	Voltage Range	0 to +5 VDC, 0 to +10 VDC, 0-20 mA, 4-20 mA		
GENERAL PURPOSE I/O	Number/Type	8 Sourcing or Sinking Outputs/Inputs		
	Logic Range	Sourcing Outputs +12 to +24 VDC, Inputs and Sinking Outputs Tolerant to +24 VDC, Inputs TTL Level Compatible		
	Output Sink Current	Up to 600 mA per Channel		
	Protection	Over Temp, Short Circuit, Transient Over Voltage, Over Voltage, Inductive Clamp		
COMMUNICATION	Type (Standard)	RS-422/485		
	Baud Rate	4.8 to 115.2kbps		
	Type (Optional)	CANopen DSP-402 (V2.0), DS-301 (V3.0), 2.OB Active		
	ID	11 and/or 29 Bit		
	Isolation	Galvanic		
	Features	Node Guarding, Heartbeat, SDOs, PDOs (Variable Mapping)		
MOTION	Open Loop Configuration or Optional Closed Loop Configuration	Number of Settings	20	
		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)	
	Optional Remote Encoder Closed Loop Configuration	Type	User-Supplied Differential Encoder	
		Resolution	User-Defined Note: μstep/rev 2X the encoder count/rev minimum	
	Counters	Type	Position, Encoder/32 Bit	
		Edge Rate (Max)	5 MHz	
	Velocity	Range	+/- 5,000,000 Steps Per Second	
		Resolution	0.5961 Steps Per Second	
	Accel/Decel	Range	1.5 x 10 ⁹ Steps Per Second ²	
		Resolution	90.9 Steps Per Second ²	
	Electronic Gearing	Range [‡] /Resolution/Threshold (External Clock In)	0.001 to 2.000/32 Bit/TTL	
		Input Filter Range	50 nS to 12.9 μS (10 MHz to 38.8 kHz)	
Range [‡] (Secondary Clock Out)		1 to 1		
High Speed I/O	Position Capture	Input Filter Range	50 nS to 12.9 μS (10 MHz to 38.8 kHz)	
		Resolution	32 Bit	
	Trip Output – Speed/Resolution/Threshold	150 nS/32 Bit/TTL		
SOFTWARE	Program Storage	Type/Size	Flash/6384 Bytes	
	User Registers	(4) 32 Bit		
	User Program Labels and Variables	192		
	Math Functions	+, -, x, ÷, >, <, =, <=, >=, AND, OR, XOR, NOT		
	Branch Functions	Branch & Call		
	General Purpose I/O Functions	Inputs	Home, Limit Plus, Limit Minus, Go, Stop, Pause, Jog Plus, Jog Minus, Analog In, General Purpose	
		Outputs	Moving, Fault, Stall, Velocity Change, General Purpose	
	Trip Functions	Trip on Input, Trip on Position, Trip on Time, Trip Capture		
	Party Mode Addresses	62		
Encoder Functions	Stall Detection, Position Maintenance, Find Index			
THERMAL	Heat Sink Temperature	-40° to +85°C		

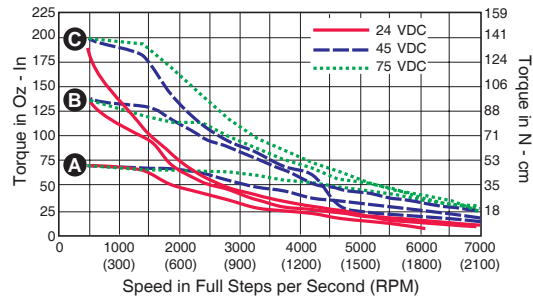
[‡] Adjusting the microstep resolution can increase the range.

MOTOR RECOMMENDATIONS

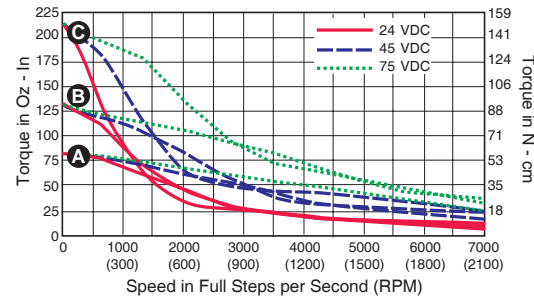
IMS PART NUMBERS	Size 23 (2.4 Amps)	Size 23 (3.0 Amps)	Size 23 (6.0 Amps)	Size 34 (6.4 Amps)
SINGLE LENGTH	M-2218-2.4	M-2218-3.0	M-2218-6.0	M-3424-6.3
DOUBLE LENGTH	M-2222-2.4	M-2222-3.0	M-2222-6.0	M-3431-6.3
TRIPLE LENGTH	M-2231-2.4	M-2231-3.0	M-2231-6.0	M-3447-6.3

MOTOR PERFORMANCE — Speed-Torque

NEMA 23 — 2.4 Amps RMS

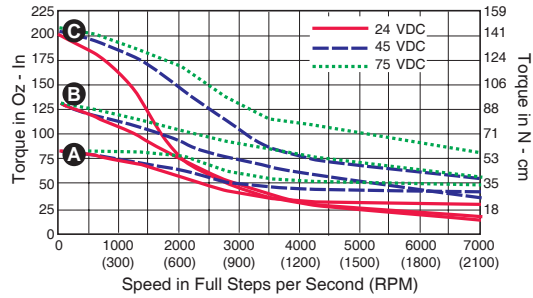


NEMA 23 — 3.0 Amps RMS

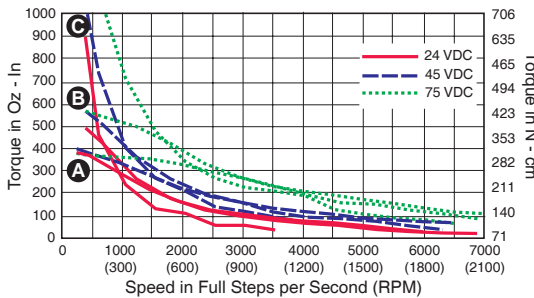


- A** Single Stack
- B** Double Stack
- C** Triple Stack

NEMA 23 — 6.0 Amps RMS



NEMA 34 — 6.3 Amps RMS



PIN ASSIGNMENTS

P1: I/O CONNECTOR		
Pluggable Locking Wire Crimp	Function	
	Standard	With Optional Remote Encoder Closed Loop Control
Pin 1	I/O Power	I/O Power
Pin 2	I/O Ground	I/O Ground
Pin 3	I/O 1	I/O 1
Pin 4	I/O 2	I/O 2
Pin 5	I/O 3	I/O 3
Pin 6	I/O 4	I/O 4
Pin 7	I/O 9	I/O 9
Pin 8	I/O 10	I/O 10
Pin 9	I/O 11	I/O 11
Pin 10	I/O 12	I/O 12
Pin 11	Capture/Trip I/O	Capture/Trip I/O
Pin 12	Analog In	Analog In
Pin 13	Step/Clock I/O	Step/Clock I/O
Pin 14	Direction/Clock I/O	Direction/Clock I/O
Pin 15	not applicable	Channel A +
Pin 16		Channel A -
Pin 17		Channel B +
Pin 18		Channel B -
Pin 19		Index +
Pin 20		Index -

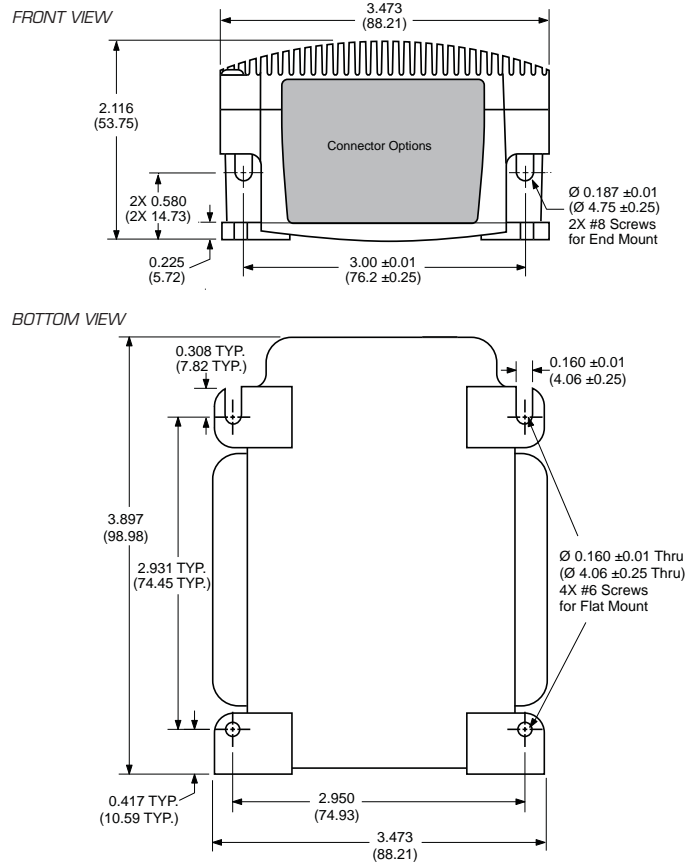
P2: COMM CONNECTOR			
RS-422/485		CANopen	
Friction Lock Wire Crimp	Function	DB9	Function
Pin 1	TX +	Pin 1	No Connect
Pin 2	Comm Ground	Pin 2	CAN Low
Pin 3	RX -	Pin 3	CAN -V
Pin 4	TX -	Pin 4	Aux Power
Pin 5	Aux-Logic (+12 to +24 VDC)	Pin 5	Shield
Pin 6	RX +	Pin 6	CAN -V
Pin 7	RX +	Pin 7	CAN High
Pin 8	RX -	Pin 8	No Connect
Pin 9	TX +	Pin 9	CAN +V
Pin 10	TX -		

P3: POWER CONNECTOR	
Wire Crimp	Function
Pin 1	+V (+12 to +75 VDC)
Pin 2	Power/Aux Ground

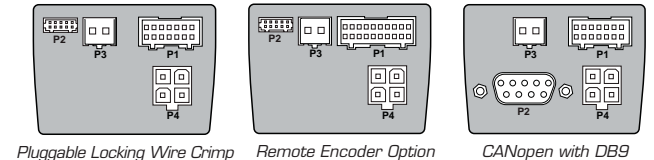
P4: MOTOR CONNECTOR	
Wire Crimp	Function
Pin 1	Phase A
Pin 2	Phase /A
Pin 3	Phase B
Pin 4	Phase /B

MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)



Connector Options



MForce PowerDrive – MOTION CONTROL

OPTIONS

Remote Encoder

For optional closed loop control, Motion Control MForce PowerDrives are available with differential encoder inputs for use with a remote encoder (not supplied).

Motors and Encoders

IMS offers a wide range of motors, encoders and accessories recommended for interface with the Motion Control MForce PowerDrive. For complete specifications on these products, please visit the IMS web site at www.imshome.com.

Power Supplies

IMS recommends the following power supplies for operating the MForce PowerDrive: IP804, IP806, ISP300-7. For complete power supply specifications, visit the IMS web site at www.imshome.com.

ACCESSORIES

Communications Converter Cable and Adapter

With an in-line RS-422 converter, this optional 12.0' (3.6m) cable and adapter, MD-CC400-000 and MD-ADP-H, facilitate the parameter setting of a single Motion Control MForce PowerDrive from its P2 connector to a PC's USB port with plug-gable mating connectors. Recommended with first order.


Prototype Development Cables

To speed prototyping, 10.0' (3.0m) development cables are available with pluggable locking wire crimp mates to:

- I/O: 14-pin Connector PD14-2334-FL3
- I/O: 20-pin Remote Encoder Connector PD20-3400-FL3
- Power: 2-pin Connector PDO2-3400-FL3
- Comm: 10-pin Connector PD10-1434-FL3
- Motor Interface: 4-pin Connector PDO4-MF34-FL3

Accessories details at: www.imshome.com/cables_cordsets.html

ORDER INFORMATION



MFI3C **34N7** – **OPTION EE**

P2: Communications
RL = RS-422/485 with 10-Pin Friction Lock Wire Crimp
CB = CANopen with DB9 Connector

P3: Power
2-Pin Locking Wire Crimp

P1: I/O
14-Pin Locking Wire Crimp
(20-Pin with Remote Encoder)

P4: Motor Interface
4-Pin Locking Wire Crimp

OPTION EE
Remote Encoder Interface
For Closed Loop Control
(Encoder Not Supplied)

Example: Part Number **MFI3CRL34N7** is a Motion Control MForce PowerDrive with 14-pin I/O interface, 2-pin power interface, RS-422/485 communications with 10-pin friction lock wire crimp connector and 4-pin motor interface.

Option: Include -EE to part number for optional interface to remote encoder (not supplied).



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