



MFORCE™ POWER DRIVE Plus2 SPEED CONTROL

FEATURES

- Highly Integrated, High Performance Microstepping Driver and Variable Speed Controller
- Advanced 2nd Generation Current Control for Exceptional Performance and Smoothness
- Single Supply: +12 to +75 VDC
- Step Clock and Direction Output Signals
- Low Cost
- Extremely Compact
- High Output Current up to 5 Amps RMS, 7 Amps Peak (Per Phase)
- 20 Microstep Resolutions up to 51,200 Steps Per Rev Including: Degrees, Metric, Arc Minutes
- 2 Selectable 10-bit Analog Speed Control Inputs Accept:
 - 0 to +5 VDC
 - 0 to +10 VDC
 - 4 to 20 mA
 - 0 to 20 mA
 - 5 to 25 kHz PWM
- 2 Modes of Operation: Bidirectional or Unidirectional
- Automatic Current Reduction
- Electronically Configurable:
 - Motor Run/Hold Current
 - Microstep Resolution
 - Acceleration/Deceleration
 - Initial and Max Velocity
 - Motor Direction vs. Direction Input
 - Hold Current Delay Time/Motor Settling Delay Time
 - Programmable Filtering for the Stop/Start Input
- Setup Parameters May Be Switched On-The-Fly
- Power and Signal Interface Options:
 - Pluggable Locking Wire Crimp
 - 12.0" (30.5cm) Flying Leads
- Graphical User Interface (GUI) for Quick and Easy Parameter Setup

DESCRIPTION

The **Speed Control MForce PowerDrive** offers system designers a low cost, high performance microstepping driver integrated with a variable speed 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.

Speed 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.

The 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.

Speed Control MForce PowerDrives feature a digital oscillator for accurate velocity control with an output frequency of up to 5 MHz. Output frequency will vary with the signal applied to the speed control input and can be limited by the amount specified by the Maximum Velocity parameter.

Speed can be adjusted using three modes of operation: voltage, current and PWM. Voltage and current modes provide two selectable speed control inputs which may be preset and digitally selected.

Available step clock and direction output signals may be used to control a second motor to follow the speed of the first. This simplifies wiring and controlling machines with large tables or wide conveyors while eliminating drift between motor speeds.

There are two basic methods of controlling the velocity: bidirectional and unidirectional. By moving the center point, both speed and direction are controlled by a potentiometer or joystick. By setting the center point to zero or the lower end of the potentiometer, only velocity is controlled by the speed control input; direction is controlled by a separate digital input.

The Speed Control MForce PowerDrive has 21 setup parameters, which may be configured using the supplied IMS Analog Speed Control GUI, or a user-developed front-end communication over SPI. The setup parameters enable the user to configure operational parameters which are stored in nonvolatile memory.

The versatile Speed Control MForce PowerDrive comes with dual mounting configurations to fit various system needs. All interface connections are accomplished with pluggable locking wire crimp connectors.

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.*

CONFIGURING

The IMS Analog Speed Control is a software GUI for quick and easy parameter setup of the Speed Control MForce PowerDrive from a computer's USB port. GUI access is via the IMS SPI Motor Interface available at www.imshome.com.

IMS Analog Speed Control 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 PowerDrive – SPEED CONTROL

STANDARD SPECIFICATIONS

INPUT VOLTAGE (+V)	Range	+12 to +75 VDC		
SPEED CONTROL	Input	SPEED A1	0 to +5 VDC*, 0 to +10 VDC*, 4 to 20 mA, 0 to 20 mA	
		SPEED A2	0 to +5 VDC*, 0 to +10 VDC*, 4 to 20 mA, 0 to 20 mA	
	A/D Resolution	10 bit		
OUTPUT CURRENT	RMS (Max)	5 Amps		
	Peak (Per Phase)	7 Amps		
LOGIC INPUT	Optically Isolated Inputs	SPEED A1/SPEED A2 Select or PWM (15 to 25 kHz), Start/Stop, Direction		
	Voltage Range	Sourcing or Sinking	+5 to +24 VDC	
LOGIC OUTPUTS	Step Clock/Direction	Open Drain	Drain Source (Max)	+100 VDC
			Continuous Drain Current	100 mA
		Output Pulse Width software configurable	100 nSec to 12.8 µSec	
MOTION	Oscillator Frequency (Max)	5 MHz		
	Microstep Resolution	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)	
THERMAL	Heat Sink Temperature	-40° to +85°C		

* 10 kΩ potentiometer resistance.

SETUP PARAMETERS

	Function	Range	Units	Default
ACCL	Acceleration	91 to 1.5 X 10 ⁹	steps/second ²	1,000,000
C**	Joystick Center	1 to 1022	counts	0
CLK OUT	Clock Out	None, Step/Dir, Quadrature, Up/Down	—	None
DB**	Analog Deadband	0 to 255	counts	1
DECL	Deceleration	91 to 1.5 X 10 ⁹	steps/second ²	1,000,000
DIR	Motor Direction Override	Clockwise (CW) / Counterclockwise (CCW)	—	CW
FAULT	Fault/Checksum Error	Error Code	—	None
FS**	Analog Full Scale	1 to 1023	counts	1023
HCDT	Hold Current Delay Time	HCDT + MSDT <= 65535	milliseconds	500
IF**	Analog Input Filter	1 to 1000	counts	1
IMODE	Source	SPEED A1&A2 or PWM 15 to 25 kHz	—	A1&A2
	Analog Input (SPEEDS A1&A2)	0 to +5 VDC, 0 to +10 VDC, 4 to 20 mA, 0 to 20 mA	volts or current	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 + HCDT <= 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	Step Width	0 (Square Wave), 100 nSec to 12.8 µSec	nSec	550 nSec
SSD	Stop/Start Debounce	0 to 255	milliseconds	0
VI	Initial Velocity	0 to <VM	steps/second	1000
VM	Maximum Velocity	VI to 5,000,000	steps/second	768,000
TEMP	Warning Temperature	0 to 85°C	°C	80°C
USER ID	User ID	Customizable	1-3 characters	IMS

**Separate analog inputs for SPEEDS A1 & A2.

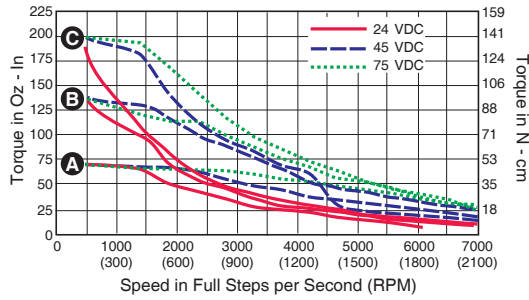
All parameters are set using the supplied IMS SPI Motor Interface GUI and may be changed on-the-fly. An optional Parameter Setup Cable is recommended with first orders.

MOTOR RECOMMENDATIONS

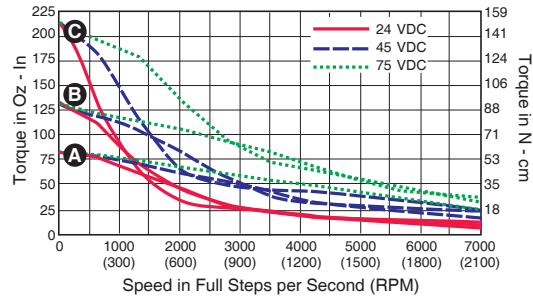
IMS PART NUMBERS	Size 23 (2.4 Amps)	Size 23 (3.0 Amps)	Size 23 (6.0 Amps)	Size 34 (6.4 Amps)
SINGLE LENGTH	M-2218-2.4	M-2218-3.0	M-2218-6.0	M-3424-6.3
DOUBLE LENGTH	M-2222-2.4	M-2222-3.0	M-2222-6.0	M-3431-6.3
TRIPLE LENGTH	M-2231-2.4	M-2231-3.0	M-2231-6.0	M-3447-6.3

MOTOR PERFORMANCE — Speed-Torque

NEMA 23 — 2.4 Amps RMS

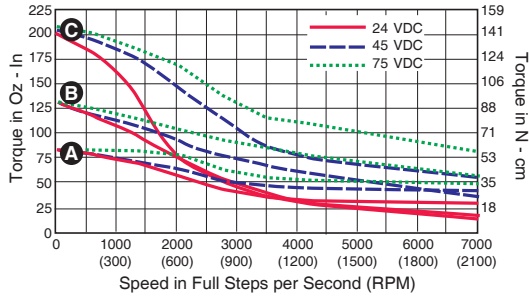


NEMA 23 — 3.0 Amps RMS

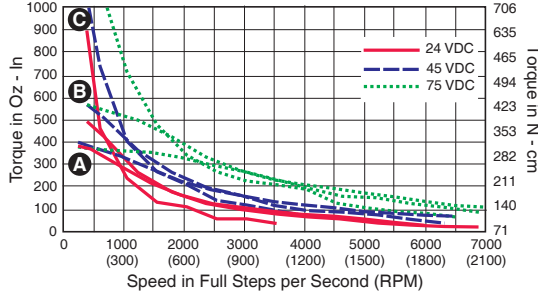


- A** Single Stack
- B** Double Stack
- C** Triple Stack

NEMA 23 — 6.0 Amps RMS



NEMA 34 — 6.3 Amps RMS



PIN ASSIGNMENTS

P1: I/O CONNECTOR	
Locking Wire Crimp	Function
Pin 1	Direction Output
Pin 2	Step Clock Output
Pin 3	SPEED A1/SPEED A2 Select or PWM Input
Pin 4	Stop/Start Input
Pin 5	Direction Input
Pin 6	SPEED A1 Control Input: 0-5V*/0-10V*/4-20mA/0-20mA
Pin 7	Optocoupler Reference
Pin 8	SPEED A2 Control Input: 0-5V*/0-10V*/4-20mA/0-20mA
Pin 9	SPEED A1 Logic Ground (10K pot)
Pin 10	SPEED A1 +5 VDC Output (10K pot)
Pin 11	SPEED A2 +5 VDC Output (10K pot)
Pin 12	SPEED A2 Logic Ground (10K pot)

*10 kΩ potentiometer resistance.

P2: COMM CONNECTOR (SPI)	
Friction Lock Wire Crimp	Function
Pin 1	No Connect
Pin 2	SPI Master In – Slave Out
Pin 3	SPI Master Out – Slave In
Pin 4	SPI Clock
Pin 5	Communications Ground
Pin 6	+5 VDC Output
Pin 7	No Connect
Pin 8	SPI Chip Select
Pin 9	No Connect
Pin 10	No Connect

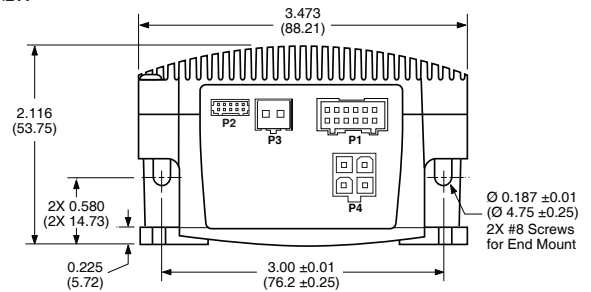
P3: POWER CONNECTOR	
Locking Wire Crimp	Function
Pin 1	+V (+12 to +75 VDC)
Pin 2	Power/Aux Ground

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

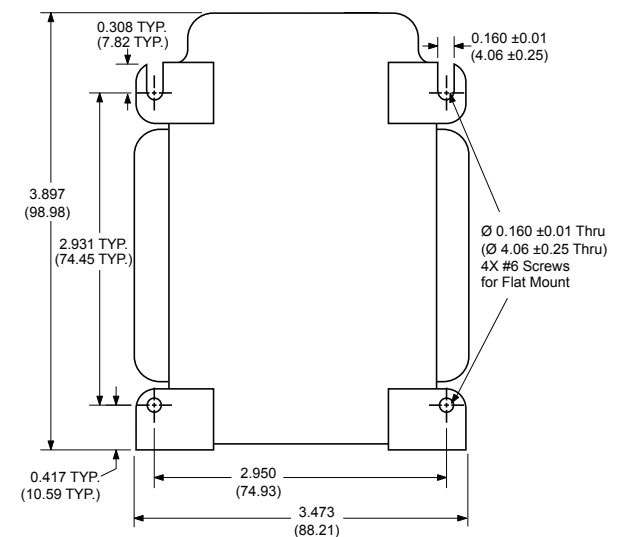
MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)

FRONT VIEW



BOTTOM VIEW



MForce PowerDrive – SPEED CONTROL

CONNECTIVITY

new QuickStart Kit

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.

new Communication Converters

Electrically isolated, in-line converters pre-wired with mating connectors to conveniently set/program communication parameters for a single MDrivePlus via a PC's USB port. Length 12.0" (3.0m).

Mates to connector:

10-Pin Wire Crimp MD-CC302-001

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:

10-Pin Wire Crimp PD10-1434-FL3

2-Pin Wire Crimp PDO2-3400-FL3

12-Pin Wire Crimp PD12B-1434-FL3

4-Pin Wire Crimp PDO4-MF34-FL3

new Mating Connector Kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

10-Pin Wire Crimp CK-02

2-Pin Wire Crimp CK-05

12-Pin Wire Crimp CK-08

4-Pin Wire Crimp CK-07

OPTIONS

Motors


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

Power Supplies

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

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

PART NUMBERING



K MFO3CSL34N7
QuickStart Kit
details above

P2: Communications
10-Pin Friction Lock Wire Crimp

P3: Power
2-Pin Locking Wire Crimp

P1: I/O
12-Pin Locking Wire Crimp

P4: Motor Interface
4-Pin Locking Wire Crimp

Example: Part Number MFO3CSL34N7 is a Speed Control MForce PowerDrive with 12-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.

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