



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
 - 15 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. Optional cables are available for ease of connecting and configuring the MForce, and are recommended with first order.

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 included on the CD shipped with the product, or from 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.

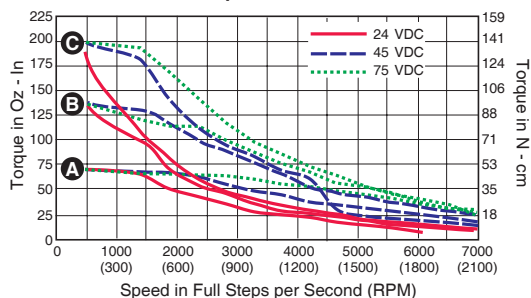
All parameters are set using the supplied IMS SPI Motor Interface GUI and may be changed on-the-fly. An optional Parameter Setup Cable is recommended with first orders.

MOTOR RECOMMENDATIONS

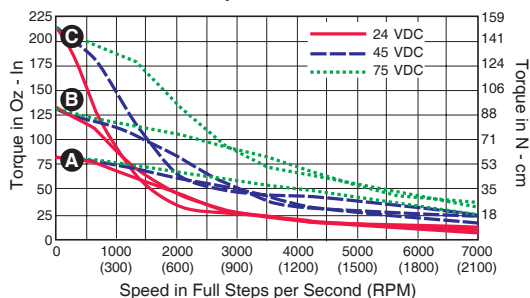
IMS PART NUMBERS	Size 23 (2.4 Amps)	Size 23 (3.0 Amps)	Size 23 (6.0 Amps)	Size 34 (6.4 Amps)
SINGLE LENGTH	M-2218-2.4	M-2218-3.0	M-2218-6.0	M-3424-6.3
DOUBLE LENGTH	M-2222-2.4	M-2222-3.0	M-2222-6.0	M-3431-6.3
TRIPLE LENGTH	M-2231-2.4	M-2231-3.0	M-2231-6.0	M-3447-6.3

MOTOR PERFORMANCE — Speed-Torque

NEMA 23 — 2.4 Amps RMS

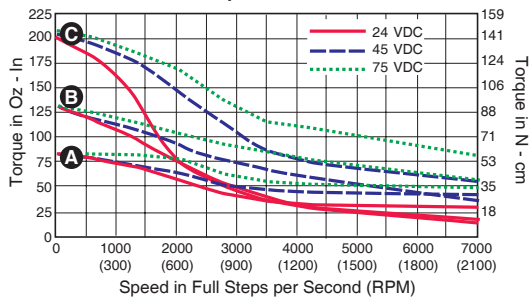


NEMA 23 — 3.0 Amps RMS

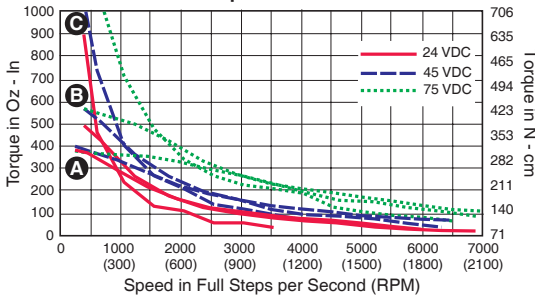


- A** Single Stack
- B** Double Stack
- C** Triple Stack

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

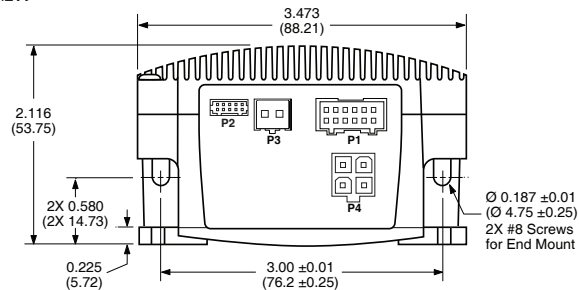
P3: POWER CONNECTOR	
Locking Wire Crimp	Function
Pin 1	+V (+12 to +75 VDC)
Pin 2	Power/Aux Ground

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

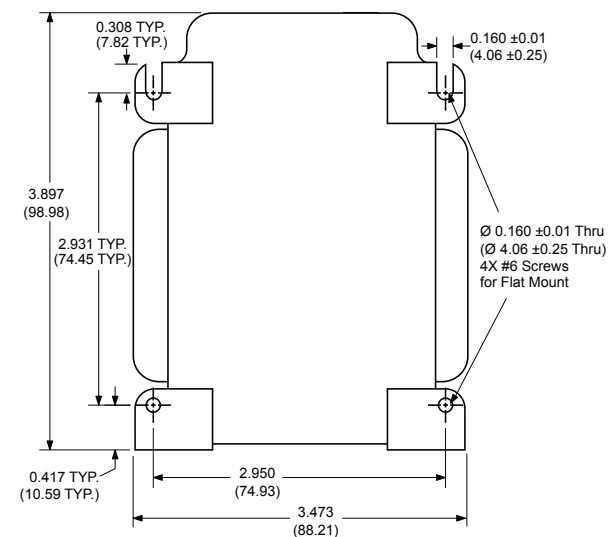
MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)

FRONT VIEW



BOTTOM VIEW



OPTIONS

Motors and Encoders

IMS offers a wide range of motors, encoders and accessories recommended for interface with the Speed 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. Complete power supply specifications at www.imshome.com.

ACCESSORIES

Parameter Setup Cable and Adapter

The optional 12.0' (3.6m) parameter setup cable part number MD-CC300-000 with adapter MD-ADP-H facilitates communications interface and is recommended with first order. It connects the Speed Control MForce PowerDrive's P2 connector to a PC's USB port with pluggable mating connectors.

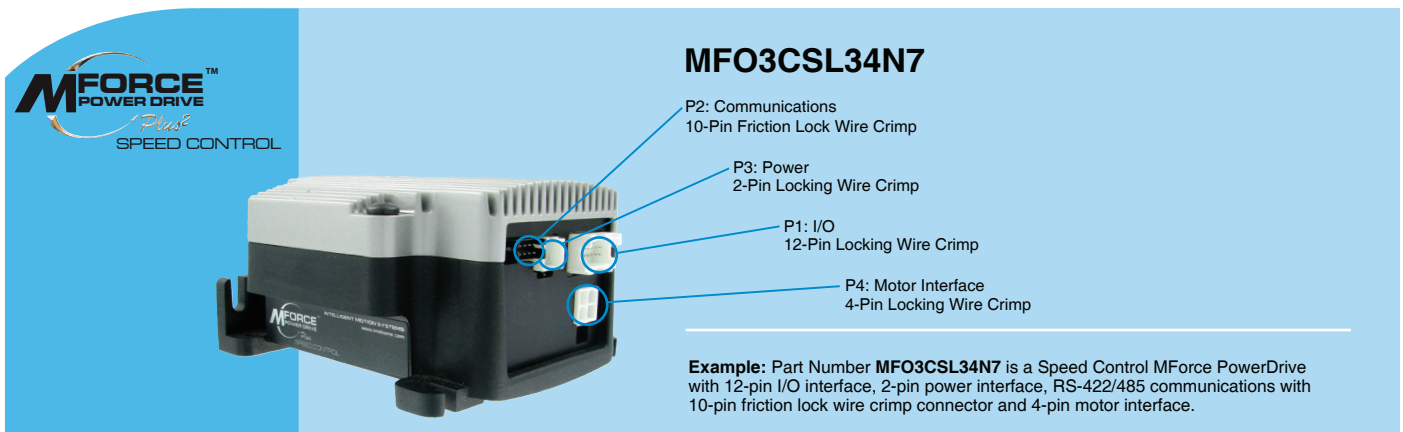
Prototype Development Cables

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

I/O: 12-pin ConnectorPD12B-1434-FL3
Power: 2-pin ConnectorPDO2-3400-FL3
Comm: 10-pin ConnectorPD10-1434-FL3
Motor Interface: 4-pin ConnectorPDO4-MF34-FL3

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

ORDER INFORMATION



MFO3CSL34N7

- 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.



INTELLIGENT MOTION SYSTEMS, INC.

Excellence in Motion™

www.imshome.com

370 N. Main St., P.O. Box 457
Marlborough, CT 06447 U.S.A.
Phone: 860/295-6102
Fax: 860/295-6107
E-mail: info@imshome.com

TECHNICAL SUPPORT

Phone: 860/295-6102 (U.S.A.)
Fax: 860/295-6107
E-mail: etech@imshome.com

Germany/UK

Phone: +49/7720/995858-3
Fax: +49/7720/995858-9
E-mail: mweber@imshome.com

DISTRIBUTED BY:

IMS UK Ltd.

25 Barnes Wallis Road
Segensworth East
Fareham, Hampshire PO15 5TT
Phone: +44/0 1489-889825
Fax: +44/0 1489-889857
E-mail: mcheckley@imshome.com

IMS ASIA PACIFIC OFFICE

30 Raffles Pl., 23-00 Caltex House
Singapore 048622
Phone: +65/6233/6846
Fax: +65/6233/5044
E-mail: wlee@imshome.com

IMS EUROPE GmbH

Niedereschacher Strasse 54
78083 Dauchingen Germany
Phone: +49/7720/995858-0
Fax: +49/7720/995858-9
E-mail: info@imseuropehome.com

European Sales Management

4 Quai Des Etoiles
69005 Lyon, France
Phone: +33/4 7256 51 13
Fax: +33/4 7838 1537
E-mail: bmartinez@imshome.com

Germany Sales

Phone: +49/35205/4587-8
Fax: +49/35205/4587-9
E-mail: hruhland@imshome.com

Germany/UK Technical Support

Phone: +49/7720/995858-3
Fax: +49/7720/995858-9
E-mail: mweber@imshome.com

U.S.A. SALES OFFICES

Eastern Region

Phone: 862/208-9742
Fax: 973/661-1275
E-mail: jroake@imshome.com

Central Region

Phone: 260/402-6016
Fax: 419/858-0375
E-mail: dwaksman@imshome.com

Western Region

Phone: 602/578-7201
E-mail: dweisenberger@imshome.com

IMS MOTORS DIVISION

105 Copperwood Way, Suite H
Oceanside, CA 92054
Phone: 760/966-3162
Fax: 760/966-3165
E-mail: motors@imshome.com