

MDrive[®] Plus

Stepper motors with integrated electronics



MDrive Plus 34 CANopen

IMS
INTELLIGENT MOTION
SYSTEMS, INC.

Schneider
Electric



MDrive® Plus CANopen

Presentation

The MDrive® Plus with CANopen interface is a 1.8° 2-phase stepper motor with on-board controller, drive electronics and optional encoder.

IMS CANopen firmware is provided for MDrive Plus CANopen products, in addition to CANopen Tester GUI software for interface with the MD-CC500-000 CANopen dongle.

MDrive Plus CANopen products support CiA DS301 and DSP402 Device Profile for Drives and Motion Control.

Application areas

The MDrive Plus with CANopen interface is ideal for machine builders who want an optimized motor with on-board electronics. The integrated electronics of the MDrive Plus with CANopen interface reduces the potential for problems due to electrical noise by eliminating the cable between motor and drive.

These compact, powerful and cost effective motion control solutions deliver unsurpassed smoothness and performance that will reduce system cost, design and assembly time for a large range of 2-phase stepper motor applications.

Features

Standard Plus

- Highly integrated microstepping drive and high torque 1.8° 2-phase stepper motor
- Advanced current control for exceptional performance and smoothness
- Single supply: from +12 up to +75 VDC or 120 and 240 VAC
- Cost effective
- Extremely compact
- 20 microstep resolutions to 51,200 steps/rev including: Degrees, Metric, Arc Minutes
- Auxiliary logic power supply input
- Open or optional closed loop control
- Programmable motor run and hold currents
- Four +5 to +24 VDC I/O lines accept sourcing or sinking outputs
- One 10 bit analog input selectable: 0 to +10 VDC, 0 to +5 VDC, 0-20 mA, 4-20 mA
- 0 to 5 MHz step clock rate selectable in 0.59 Hz increments
- CANopen communication
- Available options:
 - Long life linear actuators (1)
 - Hybrid Motion Technology™ (1)
 - Encoders
 - Control knob for manual positioning
 - Industrial connectors with IP54 rating (2)
- Several motor stack lengths available
- Graphical user interface provided for quick and easy configuration and programming

Expanded Plus²

- +24 VDC tolerant I/O sourcing or sinking, inputs and outputs with up to 8 I/O lines and electronic gearing
- Closed loop control available with external / remote encoder option (3)
- High speed position capture input or trip output

(1) See separate documentation.

(2) Industrial connectors are unavailable for MDrive14 or MDrive34 products.

(3) Remote encoder interface unavailable on MDrive14 or MDrive34ac products

Standard Plus specifications

			MDrive 14 (1)	MDrive 17	MDrive 23 (2)	MDrive 23 (2)	MDrive 34 (1)	MDrive 34ac (1)		
Input power	Voltage	VDC	12 to 48	12 to 48	12 to 75	12 to 60	12 to 75	—	—	
		VAC	—	—	—	—	—	120	240	
	Current maximum (3)		1A	2A	2A	3.5A	4A	95 to 132 VAC @ 50/60 Hz	95 to 264 VAC @ 50/60 Hz	
Thermal	Operating temp non-condensing	Heat sink	-40° to +85°C				-40° to +75°C			
		Motor	-40° to +100°C				-40° to +90°C			
Protection	Type		not applicable					- Thermal - Over voltage/current		

Aux. logic input voltage	Range	+12 to +24 VDC <i>When input voltage is removed, maintains power only to control and feedback circuits.</i>								
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	4								
	Type	sourcing or sinking inputs, or sinking outputs								
	Logic range	Inputs and outputs tolerant to +24 VDC, inputs TTL level compatible								
	Output sink current	Up to 600 mA								
	Protection	Over temp, short circuit, transient over voltage, over voltage, inductive clamp								
Communication	Type	CANopen CiA DS301 (V3.0), DSP402 (V2.0), 2.0B active (4)								
	Baud rate	Configurable 5 KB to 1 Mb								
	ID	11 and/or 29 bit								
	Isolation	Galvanic								
	Features	Node guarding, heartbeat, SDOs, PDOs (variable mapping)								
Motion	Open 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)							
	Counters	Type	position, encoder/32 bit							
		Edge rate maximum	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								
Software	Setup parameters	Storable to nonvolatile memory								
	Transmit PDOs	3 dynamically mappable								
	Receive PDOs	3 dynamically mappable								
	Manufacturer specific objects	I/O configuration, run/hold current								
	Modes of operation	Profile position, homing mode, profile velocity								
	Input functions	General purpose, homing mode profiles								
	Output functions	General purpose								

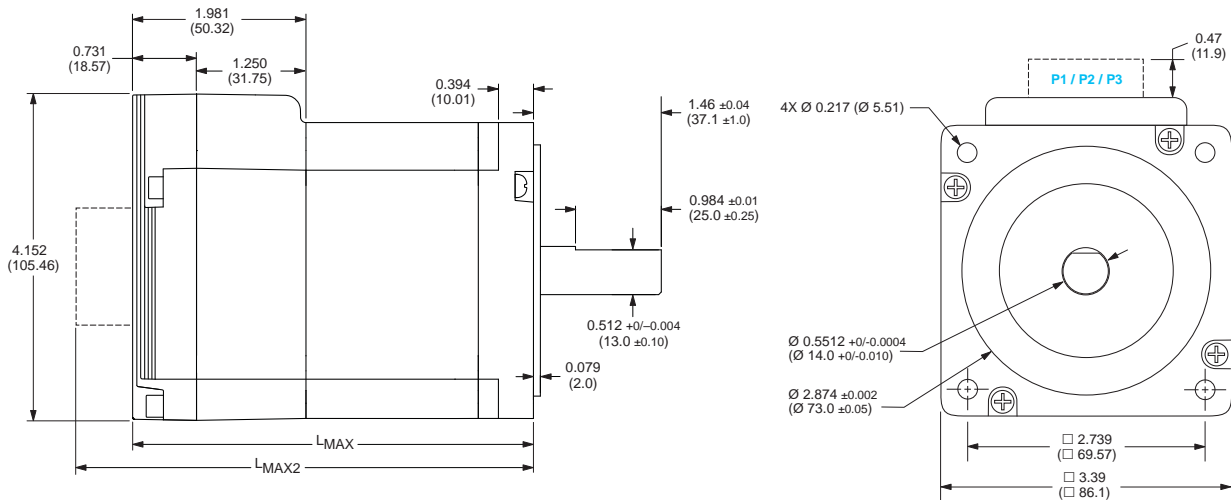
Expanded Plus² specifications

General purpose I/O	Number	8 (or 4 when remote encoder option is selected) (5)								
	Type	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 sinking current	Up to 600 mA								
Motion	Electronic gearing	Range/resolution/ threshold – external clock in (4)			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 (4)			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					

(1) CANopen available only with Plus² versions of MDrive14, MDrive34 and MDrive34ac products.
 (2) Only quad stack NEMA 23 motors have +12 to +60 VDC drives, all other NEMA 23 motors have +12 to +75 VDC drives.
 (3) Actual power supply current will depend on voltage and load.
 (4) Adjusting the microstep resolution can increase the range.
 (5) Remote encoder interface unavailable on MDrive 14 or MDrive34ac products



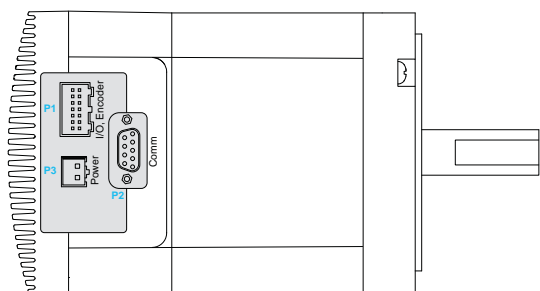
– Plus² – mechanical specifications, dimensions in inches (mm)



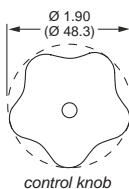
Motor stack length	L _{max} (1)	L _{max2} (2)
Single	3.81 (96.77)	4.52 (114.81)
Double	4.60 (116.84)	5.31 (134.87)
Triple	6.17 (156.72)	6.88 (174.75)

(1) Single shaft or internal encoder.
 (2) Control knob.

Connectors

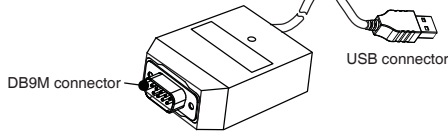
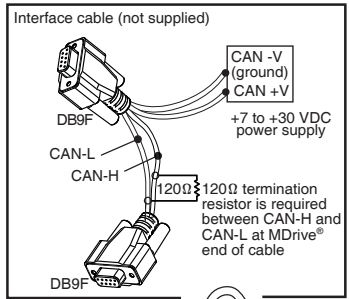


L_{max2} option

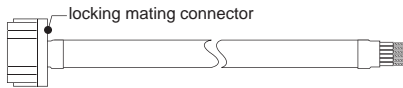


Pluggable interface version:
 14-pin* and 2-pin locking wire crimp and
 DB9 male connectors

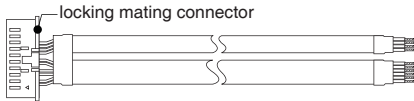
* 14-pin replaced by 20-pin locking wire crimp
 connector when optional remote encoder is
 included



MD-CC500-000



PD14-2334-FL3



PD20-3400-FL3



PD02-3400-FL3

Installation accessories

Description	Length feet (m)	Part number
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Communication converter

Electrically isolated, in-line converter pre-wired with mating connector to conveniently set/program communication parameters for a single MDrivePlus via a PC's USB port.

- Mates to DB9 connector (1) 12.0 (3.6) **MD-CC500-000**

Prototype development cable

Speed test/development with pre-wired mating connector with other cable end open.

- Mates to 14-pin locking wire crimp connector for I/O and optional internal encoder 10.0 (3.0) **PD14-2334-FL3**
- Mates to 20-pin locking wire crimp connector for I/O and remote encoder option 10.0 (3.0) **PD20-3400-FL3**
- Mates to 2-pin locking wire crimp connector for power 10.0 (3.0) **PD02-3400-FL3**

Mating connector kit

Connectors for assembly of cables, cable material not supplied. Sold in lots of 5. Manufacturer's crimp tool recommended for crimp connectors.

- 14-pin locking wire crimp connector for I/O and optional internal encoder — **CK-09**
- 20-pin locking wire crimp connector for I/O and remote encoder option — **CK-11**
- 2-pin locking wire crimp connector for power — **CK-05**

Drive protection module

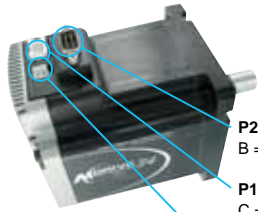
Limits surge current and voltage to a safe level when DC input power is switched on-and-off to an MDrivePlus.

- For all MDrive34 CANopen products — **DPM75**

(1) Requires mating connector adapter and power supply, not supplied.



MDrive® 34 Plus²
pluggable interface



- P2: Communication**
B = CANopen with DB9 male connector
- P1: I/O, and optional remote encoder**
C = 14-pin locking wire crimp connector (20-pin with remote encoder option)
- P3: Power**
2-pin locking wire crimp connector

Part numbers												
Example:	M	D	I	3	C	C	B	3	4	A	7	-EQ
MDrive Plus version	M	D	I	3	C	C	B	3	4	A	7	-EQ
MDI = CANopen												
Input	M	D	I	3	C	C	B	3	4	A	7	-EQ
3 = Plus², expanded features												
P1 connector	M	D	I	3	C	C	B	3	4	A	7	-EQ
C = pluggable												
Communication	M	D	I	3	C	C	B	3	4	A	7	-EQ
C = CANopen												
P2 connector	M	D	I	3	C	C	B	3	4	A	7	-EQ
B = DB9												
Motor size	M	D	I	3	C	C	B	3	4	A	7	-EQ
34 = NEMA 34 (3.4" / 86 mm)												
Motor length	M	D	I	3	C	C	B	3	4	A	7	-EQ
A = single stack												
B = double stack												
C = triple stack												
Drive voltage	M	D	I	3	C	C	B	3	4	A	7	-EQ
7 = +12 to +75 VDC												
Options												-EQ
Leave blank if not wanted												
Options may be combined, unless noted												
-EQ = internal encoder, 512-line internal magnetic encoder with index mark												
-EE = remote encoder interface, differential encoder to be provided by user <i>May not be combined with internal encoder option.</i>												
-N = rear control knob for manual positioning												



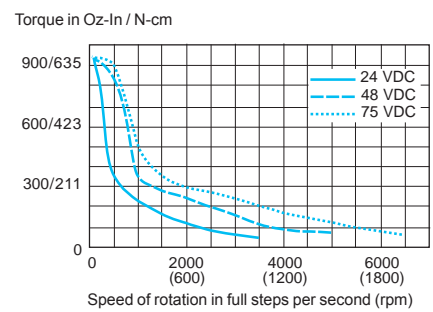
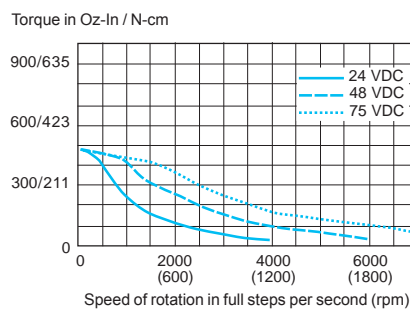
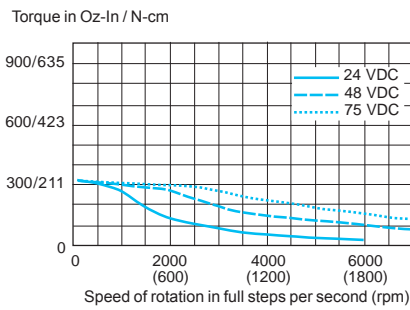
Easy MDrive part numbers via an interactive tool at:
www.imshome.com/MDrivePlus.html

Motor specifications MDrive 34

		Holding torque	Detent torque	Rotor inertia	Weight (motor + driver)
Motor stack length	Single	381.0 oz-in / 269.0 N-cm	10.9 oz-in / 7.7 N-cm	0.01416 oz-in-sec ² / 1.0 kg-cm ²	4.1 lb / 1.9 kg
	Double	575.0 oz-in / 406.0 N-cm	14.16 oz-in / 10.0 N-cm	0.02266 oz-in-sec ² / 1.6 kg-cm ²	5.5 lb / 2.5 kg
	Triple	1061.0 oz-in / 749.0 N-cm	19.83 oz-in / 14.0 N-cm	0.04815 oz-in-sec ² / 3.4 kg-cm ²	8.8 lb / 4.0 kg

Speed torque characteristics MDrive 34

Single stack length	Double stack length	Triple stack length
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