

MDrive® Plus

MDI•14 CANopen

Product overview

MDrive® Plus CANopen products integrate 1.8° 2-phase stepper motor, motion controller, drive electronics and optional encoder. Products support CiA DS301 and DSP402 Device Profile for Drives and Motion Control.

Firmware is provided for setup and testing MDrivePlus CANopen products. CANopen Tester software and communication dongle (MD-CC500-000) are also available.

Application areas

MDrivePlus products deliver reliable performance for new and existing motion control applications. Satisfying the requirements for a wide range of machine builders.

Simplify your machine design and reduce cabinet size by replacing multiple components with a

single compact integrated motor. Fewer individual system components eliminates multiple potential failure points, and lowers risk of electrical noise by eliminating cabling between motor and drive.

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



MDrivePlus MDI•14 CANopen products: integrated NEMA14 motor and controls, IP20-rated

General features

Compact integrated microstepping drive, motion controller and NEMA14 1.8° 2-phase stepper motor	
Advanced current control for exceptional performance and smoothness	
+12 up to +48 VDC single supply	
20 microstep resolutions up to 51,200 steps per rev including: Degrees, Metric, Arc Minutes	
Auxiliary logic power supply input	
0 to 5 MHz step clock rate selectable in 0.59 Hz increments	
Up to 8 I/O lines	
One 10 bit selectable analog input	
Communication	CANopen
Protection	IP20 ratings
Programmable	Motor run/hold current
Available options	Motor stack lengths
	Long life linear actuators (1)
	Encoder
	Rear control knob for manual positioning
Graphical user interface provided for quick and easy configuration and programming via optional MD-CC500-000 comm converter	

(1) Refer to MDrive Linear Actuator documentation.

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Specifications

Communication	Type	CANopen CiA DS301 (V3.0), DSP402 (V2.0), 2.0B active		
	Baud rate	Configurable 5 KB to 1 Mb		
	ID	11 and/or 29 bit		
	Isolation	Galvanic		
	Features	Node guarding, heartbeat, SDOs, PDOs (variable mapping)		
Input power	Voltage	VDC	+12...+48	
	Current maximum (1)	Amp	1.0	
Motor	Frame size	NEMA	14	
		inches	1.4	
		mm	35	
	Holding torque	oz-in	18...36	
		N-cm	13...25	
Length	stack sizes	1 & 3		
Thermal	Operating temp non-condensing	Heat sink maximum	85°C	
		Motor maximum	100°C	
Protection	Type	IP rating	IP20	
		I/O warnings	Over temp, short circuit, transient, over voltage, inductive clamp	
Auxiliary logic input	Voltage range	+12 to +24 VDC When input voltage is removed, maintains power only to control and feedback circuits.		
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	Output sinking current	Up to 600 mA		
	Number	8		
	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		
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 to 10 ⁹ steps per second ²	
		Resolution	90.9 steps per second ²	
	Position feedback	Optional	Encoder required	
	Electronic gearing external clock in (2)	Range	0.001 to 2.000	
		Resolution	32 bit	
		Threshold	TTL	
	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 150 nS	
Resolution 32 bit				
		Threshold TTL		
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		
	Trip functions	Trip on input, trip on position, trip on time, trip capture, trip on relative position		

(1) Actual power supply current will depend on voltage and load.

(2) Adjusting the microstep resolution can increase the range.

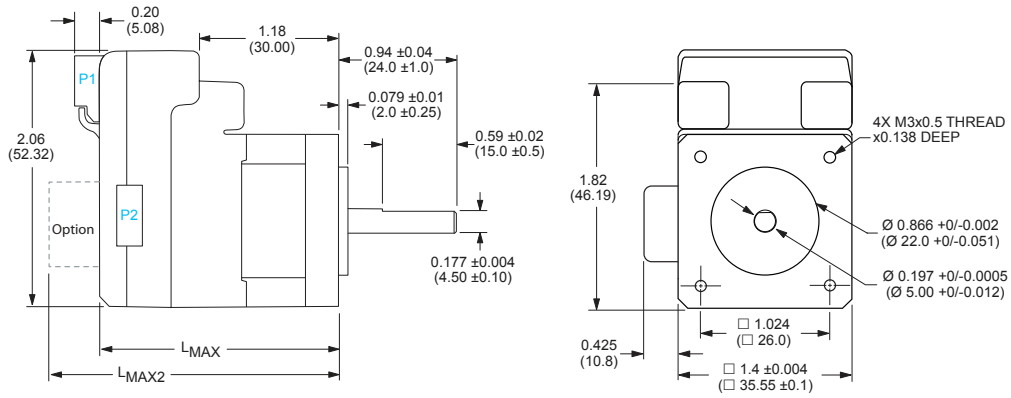
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Dimensions

MDI•14 CANopen NEMA14 motor, IP20-rated

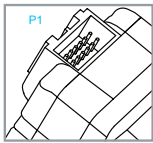
inches (mm)



Motor stack length	L _{max}	L _{max2}
Single	1.93 (49.02)	2.62 (66.55)
Triple	3.03 (76.96)	3.73 (94.74)

P1 connector

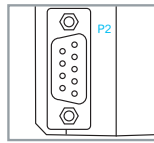
I/O and Power



16-pin locking wire crimp connector

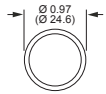
P2 connector

Communication



DB9 (male)

L_{max2} option

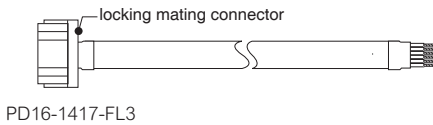
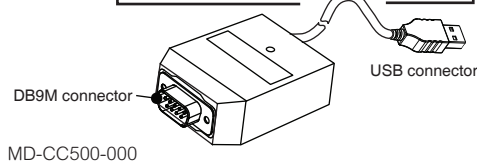
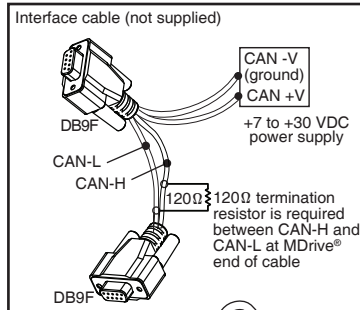


control knob – 20 in-lb / 225 N-cm max torque

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Accessories



description	length feet (m)	part number
<p>Communication converter Electrically isolated, in-line converter pre-wired with mating connector to conveniently set/program communication parameters for a single MDrive Plus via a PC's USB port.</p>		
Interface cable for all CANopen products. Requires mating connector adapter for DB9 connector. Requires power supply, not supplied.	12.0 (3.6)	MD-CC500-000
<p>Prototype development cable Speed test/development with pre-wired mating connector with other cable end open.</p>		
Mates to 16-pin locking wire crimp connector for I/O and power	10.0 (3.0)	PD16-1417-FL3
<p>Mating connector kits Connectors for assembly of cables, cable material not supplied. Sold in lots of 5. Manufacturer's crimp tool recommended for crimp connectors.</p>		
16-pin locking wire crimp connector for I/O and power	—	CK-10
<p>Drive protection module Limits surge current and voltage to a safe level when DC input power is switched on-and-off to an MDrive Plus.</p>		
For all MDrive14 CANopen products	—	DPM75

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MDrive® 14 Plus² IP20



P1: I/O & Power
C = 16-pin locking wire crimp connector

P2: Communication
B = CANopen with DB9 male connector

Part numbers

IP20-rated products

example part number	M	D	I	3	C	C	B	1	4	A	4	-N
MDrivePlus version	M	D	I	3	C	C	B	1	4	A	4	-N
MDI = Intelligent — CANopen												
Input	M	D	I	3	C	C	B	1	4	A	4	-N
3 = Plus ² version with expanded features												
P1 connector	M	D	I	3	C	C	B	1	4	A	4	-N
C = wire crimp												
Communication type	M	D	I	3	C	C	B	1	4	A	4	-N
C = CANopen												
P2 connector	M	D	I	3	C	C	B	1	4	A	4	-N
B = DB9												
Motor size	M	D	I	3	C	C	B	1	4	A	4	-N
14 = NEMA 14 1.4" / 36mm												
Motor length	M	D	I	3	C	C	B	1	4	A	4	-N
A = single stack												
C = triple stack												
Drive voltage	M	D	I	3	C	C	B	1	4	A	4	-N
4 = +12 to +48 VDC												
Options — omit from part number if unwanted												-N
-N = rear control knob for manual positioning												
-EQ = internal 512-line magnetic encoder w/ index mark												

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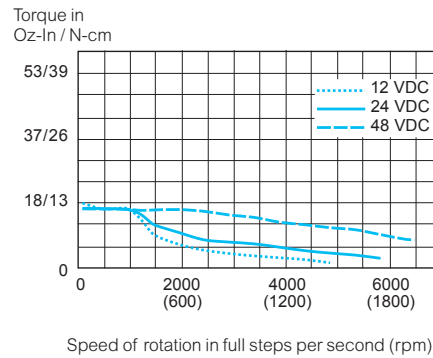
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Motor performance

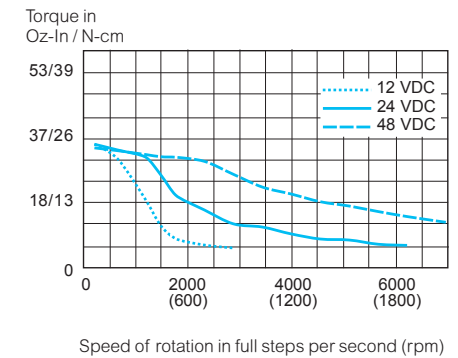
MD•14 NEMA 14 motor specifications	Motor	Stack length	Single	Triple
Holding torque		oz-in	18	36
		N-cm	13	25
Detent torque		oz-in	2.0	4.4
		N-cm	1.4	3.1
Rotor inertia		oz-in-sec ²	0.000198	0.000801
		kg-cm ²	0.014	0.0566
Weight (motor+driver)		oz	5.29	12.8
		g	150	380

MD•14 NEMA 14 speed torque (1)

Single stack length



Triple stack length



(1) Test conditions: 100% current with damper simulating load.