

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.

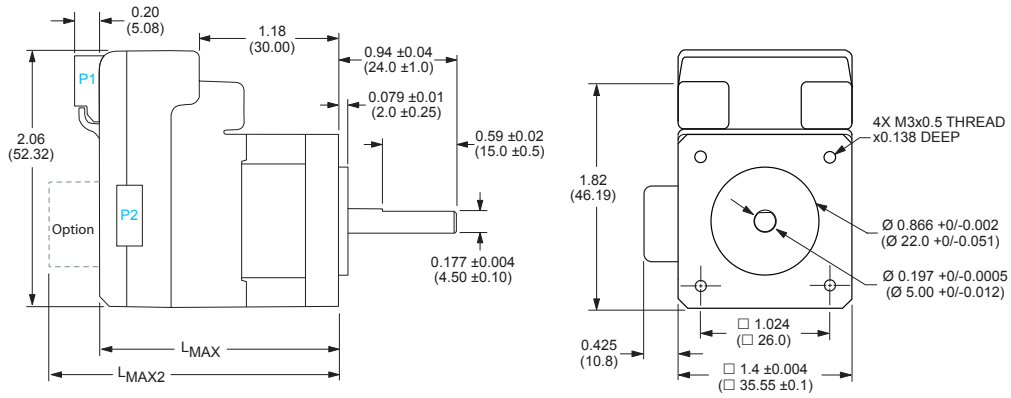
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Dimensions

MDI•14 CANopen NEMA14 motor, IP20-rated

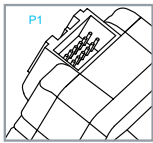
inches (mm)



| 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

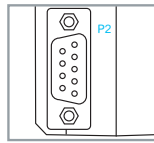
I/O and Power



16-pin locking wire crimp connector

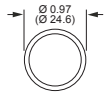
P2 connector

Communication



DB9 (male)

L_{max2} option

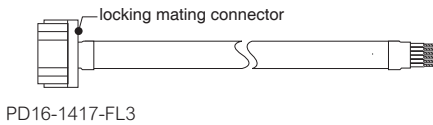
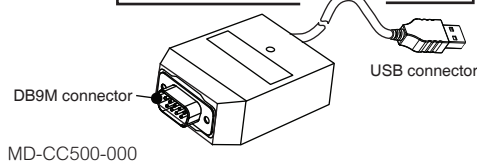
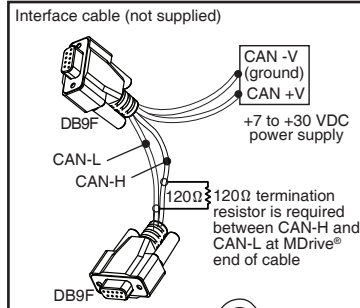


control knob – 20 in-lb / 225 N-cm max torque

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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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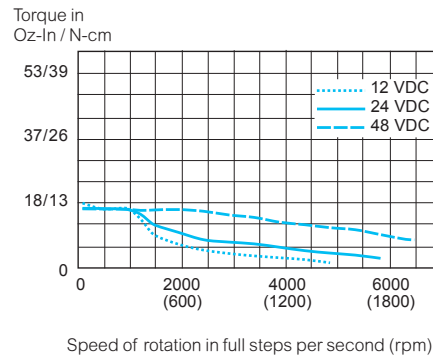
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Motor performance

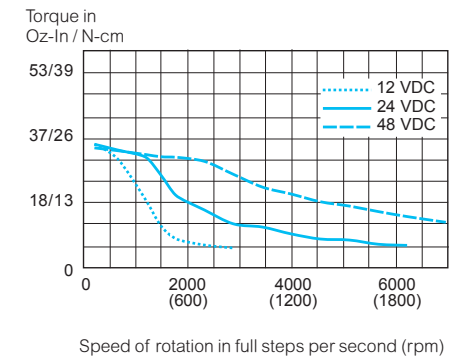
| MD•14 NEMA 14 motor specifications | Motor | Stack length | Single | Triple |
|------------------------------------|-------|------------------------|----------|----------|
| | | | | |
| Holding torque | | oz-in | 18 | 36 |
| | | N-cm | 13 | 25 |
| Detent torque | | oz-in | 2.0 | 4.4 |
| | | N-cm | 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.