MDrive®Plus

MDM•14 Step/direction input

Product overview

The MDrive® Plus with step/direction input is a 1.8° 2-phase stepper motor with on-board control electronics. Step/direction signals of a master controller, e.g. a motion controller, or A/B signals of an encoder are converted directly into motion.

Settings for MDrive Plus step/direction input products may be changed on-the-fly or downloaded and stored in nonvolatile memory using the SPI Motor Interface software provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port.

Application areas

The MDrive Plus with step/direction input is ideal for machine builders who want an optimized motor with on-board electronics. The integrated electronics of these products reduces the potential for problems due to electrical noise by eliminating the cable between motor and drive. Fewer individual system components also eliminate multiple potential failure points.

Compact, powerful and cost effective, these 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.

MDM•14 MDrive Plus Step/direction input product: integrated NEMA14 motor and controls, IP20-rated

General features

Cost effective compact integrated microstepping drive and NEMA14 1.8° 2-phase stepper motor	
Advanced current control, with automatic current reduction, for exceptional performance and smoothness	
+12 to +48 VDC single supply	
20 microstep resolutions up to 51,200 steps per rev including: Degrees, Metric, Arc Minutes	
Optically isolated input styles	Universal +5 to +24 VDC signals, sourcing or sinking
	Differential +5 VDC signals
Protection	IP20 rating
Configurable	Motor run/hold current
	Motor direction via direction input
	Microstep resolution
	Clock type: step and direction, quadrature, step up and step down, clockwise and counter-clockwise
	Programmable digital filtering for clock and direction inputs
Available options	Motor stack lengths
	Long life linear actuators (1)
	Encoder
	Rear control knob for manual positioning
Setup parameters may be switched on-the-fly	
Graphical user interface provided for quick and easy parameter setup	

(1) Refer to MDrive Linear Actuator documentation.

MDrive Plus

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Specifications

Communication	Protocol type		SPI
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	Temp warning	na
		IP rating	IP20
Isolated input	Voltage range	Universal	+5 to +24 VDC sourcing or sinking step clock, direction and enable
		Differential	+5 VDC clockwise and counterclockwise
Motion	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)
	Digital filter range		50 nS to 12.9 mS (10 MHz to 38.8 kHz)
	Clock types		Step/direction, quadrature, step up/step down, clockwise/counterclockwise
	Step frequency		2 MHz default / 5 MHz maximum
	Encoder	External optical style	Single-end or differential, with index mark

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

Setup parameters (2)

SPI communication	Command	Function	Range	Units	Default
	MHC	Motor hold current	0 to 100	percent	5
	MRC	Motor run current	1 to 100	percent	25
	MSEL	Microstep resolution	1, 2, 4, 5, 8, 10, 16, 25, 32, 50, 64, 100, 108, 125, 127, 128, 180, 200, 250, 256	mSteps per full step	256
	DIR	Motor direction override	0 / 1	—	CW
	HCDT	Hold current delay time	0 or 2 – 65535	mSec	500
	CLK TYPE	Clock type	Step/Dir, Quadrature, Up/Down, CW/CCW	—	Step/Dir
	CLK IOF	Clock and direction filter	50 nS to 12.9 mS (10 MHz to 38.8 kHz)	nS (MHz)	200 nS (2 MHz)
	USER ID	User ID	Customizable	1-3 characters	IMS
	EN ACT	Enable active	High/Low	—	High

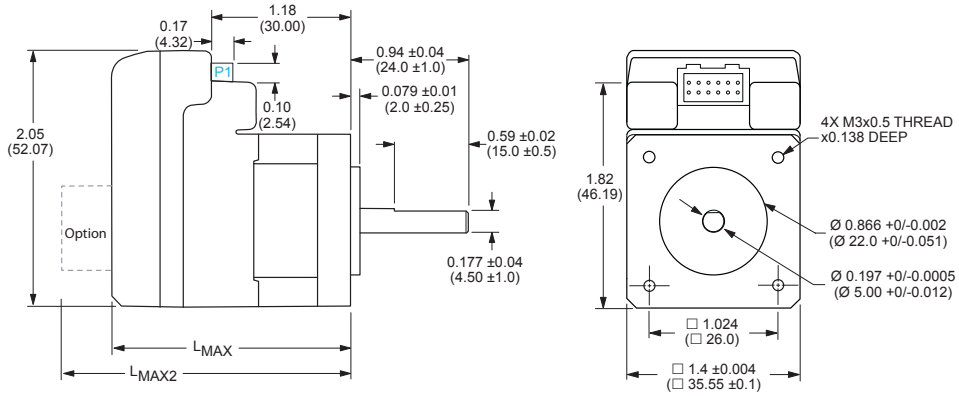
(2) All parameters are set using the supplied SPI Motor Interface GUI and may be changed on-the-fly.
An optional Communication Converter is recommended with first orders.

See User Manual for complete details: https://novantaims.com/dloads/product-literature/manuals-3/

Dimensions

MDM•14 NEMA14 motor, IP20-rated

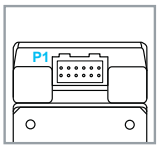
inches (mm)



Motor stack length	Lmax	Lmax2
Single	1.93 (49.02)	2.62 (66.55)
Triple	3.03 (76.96)	3.73 (94.74)

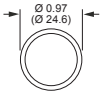
P1 connector

I/O, Power & Communication

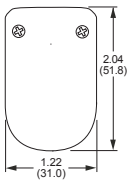


12-pin locking wire crimp connector

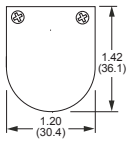
Lmax2 options



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



external encoder – differential style



external encoder – single-end style

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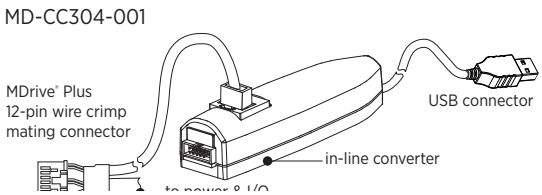
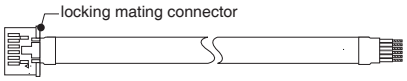


MD-CC305-001



PD12B-1434-FL3

Accessories

description	length feet (m)	part number
QuickStart Kit For rapid design verification, all-inclusive QuickStart Kits includes prototype development cables and a communication converter for MDrive Plus initial functional setup and system testing.		
For all MDrive14 step / direction input products	—	add "K" to part number
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.		
Mates to 12-pin locking wire crimp connector	12.0 (3.6)	MD-CC305-001
Prototype development cable Speed test/development with pre-wired mating connector with other cable end open.		
Mates to 12-pin locking wire crimp connector for I/O, communication and power	10.0 (3.0)	PD12B-1434-FL3
Encoder cables Pre-wired mating connector with other cable end open.		
For external single-end optical encoder with non-locking connector	1.0 (0.3)	ES-CABLE-2
For external differential optical encoder with locking connector	6.0 (1.8)	ED-CABLE-6
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.		
12-pin locking wire crimp connector for I/O, communication and power	—	CK-08
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.		
For all MDrive14 step / direction input products	—	DPM75

MDrive Plus

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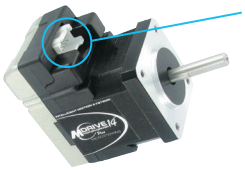
MDrive® 14 Plus IP20



P1: I/O, Power & Communication
C = 12-pin locking wire crimp connector

Part numbers

IP20-rated products

example part number	K	M	D	M	1	C	S	Z	1	4	A	4	–N
QuickStart Kit K = kit option, omit from part number if unwanted	K	M	D	M	1	C	S	Z	1	4	A	4	–N
MDrivePlus version MDM = Step/direction input	K	M	D	M	1	C	S	Z	1	4	A	4	–N
Input 1 = Plus version with universal input 5 = Plus version with differential CW/CCW input	K	M	D	M	1	C	S	Z	1	4	A	4	–N
P1 connector C = wire crimp	K	M	D	M	1	C	S	Z	1	4	A	4	–N
Communication type S = SPI	K	M	D	M	1	C	S	Z	1	4	A	4	–N
P2 connector Z = none	K	M	D	M	1	C	S	Z	1	4	A	4	–N
Motor size 14 = NEMA 14 1.4" / 36mm	K	M	D	M	1	C	S	Z	1	4	A	4	–N
Motor length A = single stack C = triple stack	K	M	D	M	1	C	S	Z	1	4	A	4	–N
Drive voltage 4 = +12 to +48 VDC	K	M	D	M	1	C	S	Z	1	4	A	4	–N
Options — omit from part number if unwanted –N = rear control knob for manual positioning –E__ = external optical encoder w/ index mark													–N

line count	100	200	250	256	400	500	512	1000	1024
single-end part #	E1	E2	E3	EP	E4	E5	EQ	E6	ER
differential part #	EAL	EBL	ECL	EWL	EDL	EHL	EXL	EJL	EYL

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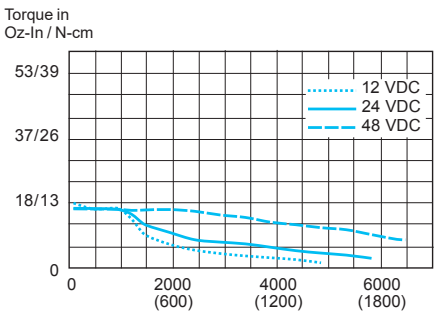
Motor performance

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

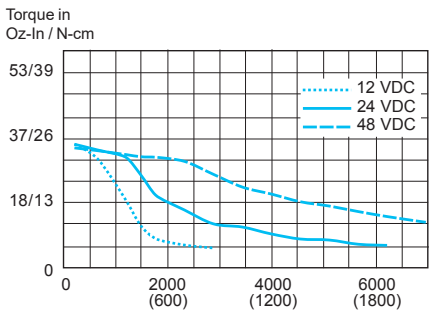
MD•14 NEMA 14 speed torque (1)

Single stack length



Speed of rotation in full steps per second (rpm)

Triple stack length



Speed of rotation in full steps per second (rpm)

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

Novanta IMS
370 North Main Street
Marlborough, CT 06447
Phone: (860) 295-6102
Fax: (860) 295-6107
www.novantaims.com