CE RoHS REACH

MDrive® Plus

MDO•17 Speed Control

Product overview

MDrive® Plus Speed Control products integrate 1.8° 2-phase stepper motor, programmable velocity control, drive electronics and optional encoder. Programmable velocity control uses voltage, current, or PWM analog input signal modes.

Product settings 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

MDrive Plus 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 unsurpassed smoothness and performance that can reduce system cost, design and assembly time for a large range of 2-phase stepper motor applications.

MDO•17 MDrive Plus Speed Control products: integrated NEMA17 motor and controls, IP20-rated

General features

Compact integrated microstepping drive, programmable velocity control and NEMA17 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	
Electronically configurable	
Communication	SPI
Protection	IP20 rating
10 bit analog speed control input	0 to +5 VDC
	0 to +10 VDC
	4 to 20 mA
	0 to 20 mA
Available options	Motor stack lengths
	Connector options
	Encoders
	Rear control knob for manual positioning
Graphical user interface provided for quick and easy parameter setup	

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Specifications

Communication	Protocol type		SPI
Input power	Voltage	VDC	+12...+48
	Current maximum (1)	Amp	2.0
Motor	Frame size	NEMA	17
		inches	1.7
		mm	42
	Holding torque	oz-in	32...75
		N-cm	23 ... 53
	Length	stack sizes	1, 2 & 3
Thermal	Operating temp non-condensing	Heat sink maximum	85°C
		Motor maximum	100°C
Protection	Type	IP rating	IP20
Speed control (2)	A/D resolution		10 bit
	Input		0 to +5 VDC, 0 to +10 VDC, 0-20 mA, 4-20 mA
Logic input	Low level		0 to +0.8 VDC
	High level		+2.0 to +5.0 VDC
	Internal pull-up resistance		20 kΩ (to +3.3 VDC)
	Optically isolated		no
	Configurable		sinking
Logic output	Step clock/direction		not applicable
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)
Setup parameters (2)	Function	Default setting / units	Range
	A1/analog input mode	0 to +5 VDC	0 to +5 VDC, 0 to +10 VDC, 4 to 20 mA, or 0 to 20 mA
	ACCL/acceleration	1,000,000 steps/sec^2	91 to 1.5 X 10^9
	DB/analog deadband	1 count	0 to 255
	DECL/deceleration	500 mSec	91 to 1.5 X 10^9
	DIR/motor direction override	cw	clockwise (cw)/counterclockwise (ccw)
	FAULT/checksum error	none	error code
	FS/analog full scale	1023 counts	1 to 1023
	HCDT/hold current delay time	500 milliseconds	HCDT + MSDT <= 65535
	IF/analog input filter	1 count	1 to 1000
	MHC/motor hold current	5 %	0 to 100%
	MRC/motor run current	25 %	1 to 100%
	MSDT/motor settling delay time	0 milliseconds	MSDT + HCDT <= 65535
	MSEL/µstep resolution	256 µstep per full step	1, 2, 4, 5, 8, 10, 16, 25, 32, 50, 64, 100, 108, 125, 127, 128, 180, 200, 250, 256
	SSD/stop/start debounce	0 milliseconds	0 to 255
	VI/initial velocity	1000 steps/sec	0 to <VM
	VM/maximum velocity	768,000 steps/sec	VI to 5,000,000
	USER ID/user ID	IMS / 1-3 characters	customizable

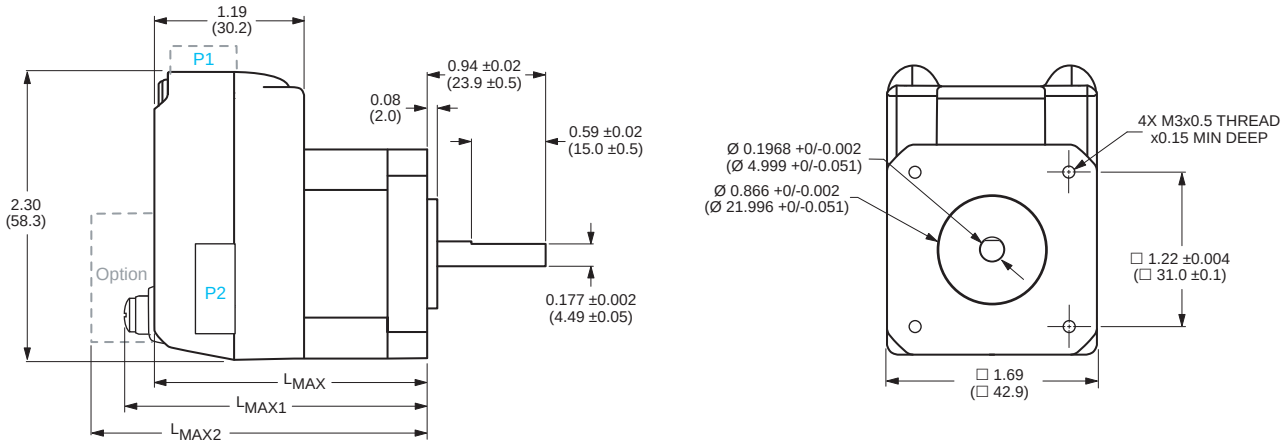
(1) Actual power supply current will depend on voltage and load.
(2) All parameters are set using the supplied SPI Motor Interface GUI and may be changed on-the-fly. An optional Communication Converter is recommended with first orders.

See User Manual for complete details: www.motion.schneider-electric.com/manuals.html

Dimensions

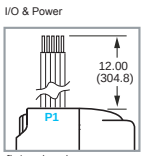
MDO•17 NEMA17 motor, IP20-rated

inches (mm)

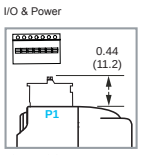


Motor stack length	Lmax	Lmax1	Lmax2
Single	2.20 (55.9)	2.45 (62.25)	2.79 (70.9)
Double	2.43 (61.7)	2.68 (68.05)	3.02 (76.7)
Triple	2.77 (70.4)	3.02 (76.75)	3.37 (85.6)

P1 connector options

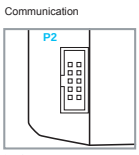


flying leads –
12.0" (305mm)

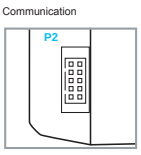


pluggable – 7-pin
non-locking spring
clamp terminal strip

P2 connector options

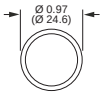


IDC –
10-pin non-locking

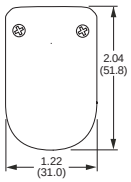


wire crimp –
10-pin friction lock

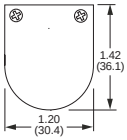
Lmax2 options



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



external encoder –
differential style



external encoder –
single-end style

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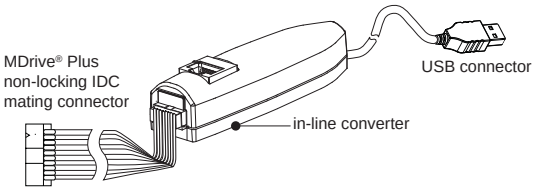
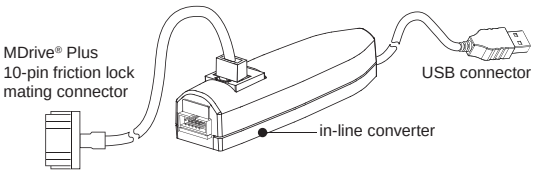


MD-CC300-001



MD-CC302-001

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 MDrive17 Speed Control 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 10-pin non-locking IDC connector	12.0 (3.6)	MD-CC300-001
Mates to 10-pin friction lock wire crimp connector	12.0 (3.6)	MD-CC302-001
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.		
10-pin friction lock wire crimp connector for communication	—	CK-02
10-pin non-locking IDC connector for communication	—	CK-01
Encoder cables Pre-wired mating connector with other cable end open.		
For external single-end encoder	1.0 (0.3)	ES-CABLE-2
For external differential encoder, locking cable	6.0 (1.8)	ED-CABLE-6
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 MDrive17 Speed Control products	—	DPM75

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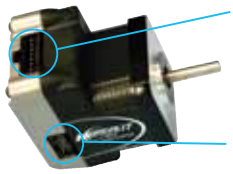
MDrive® 17 Plus IP20



P1: I/O & Power
F = 12" flying leads
P = non-locking spring clamp terminal strip

P2: Communication
D = SPI with 10-pin IDC non-locking connector
L = SPI with 10-pin friction lock wire crimp connector

Part numbers

IP20-rated products

example part number	K	M	D	O	1	F	S	D	1	7	A	4	–N
QuickStart Kit K = kit option, omit from part number if unwanted	K	M	D	O	1	F	S	D	1	7	A	4	–N
MDrivePlus version MDO = Speed Control	K	M	D	O	1	F	S	D	1	7	A	4	–N
Input 1 = Plus version with standard features	K	M	D	O	1	F	S	D	1	7	A	4	–N
P1 connector F = flying leads P = pluggable	K	M	D	O	1	F	S	D	1	7	A	4	–N
Communication type S = SPI	K	M	D	O	1	F	S	D	1	7	A	4	–N
P2 connector D = IDC L = wire crimp	K	M	D	O	1	F	S	D	1	7	A	4	–N
Motor size 17 = NEMA 17 1.7" / 42mm	K	M	D	O	1	F	S	D	1	7	A	4	–N
Motor length A = single stack B = double stack C = triple stack	K	M	D	O	1	F	S	D	1	7	A	4	–N
Drive voltage 4 = +12 to +48 VDC	K	M	D	O	1	F	S	D	1	7	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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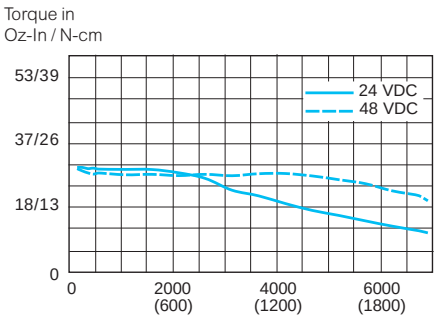
Motor performance

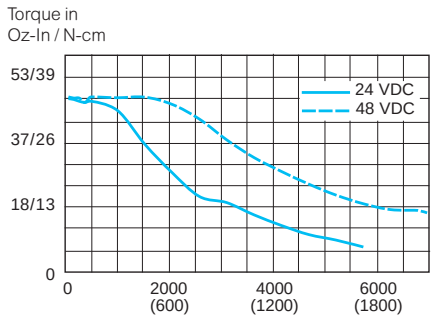
MD•17 NEMA 17 motor specifications	Motor	Stack length	Single	Double	Triple
	Holding torque	oz-in	32	60	75
		N-cm	23	42	53
	Detent torque	oz-in	1.7	2.1	3.5
		N-cm	1.2	1.5	2.5
	Rotor inertia	oz-in-sec^2	0.0005	0.0008	0.0012
		kg-cm^2	0.038	0.057	0.082
	Weight (motor+driver)	oz	10.4	12.0	15.2
		g	295	340	431

MD•17 NEMA 17 speed torque (1)

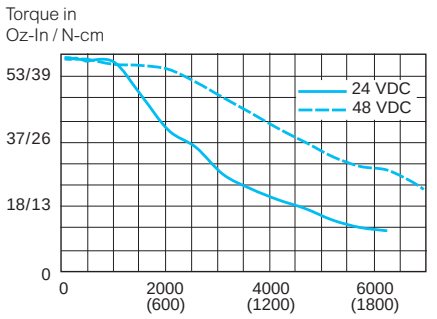
Single stack length



Double stack length



Triple stack length



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

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