REACH **IP65**

MDrive® Plus

MDI•17 programmable Motion Control

Product overview

MDrive® Plus Motion Control products integrate 1.8° 2-phase stepper motor, fully programmable motion controller, drive electronics and optional encoder. Products with encoders include stall detection, position maintenance, and fi nd index mark.

Programming for these stand-alone motion control solutions is via RS-422/485 interface with MCode software using simple 1 to 2 character instructions.

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

MDI•17 MDrive Plus programmable Motion Control products: integrated NEMA17 motor and controls, IP20 & IP65-rated

General features

Compact integrated microstepping drive, programmable motion controller and NEMA17 1.8° 2-phase stepper motor	
Advanced current control 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	
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	RS-422/485
Protection	IP20, IP65 ratings
Programmable	Motor run / hold current
Available options	Motor stack lengths
	Long life linear actuators (1)
	Connector options
	Encoders
	Rear control knob for manual positioning
Graphical user interface provided for quick and easy parameter setup	

(1) Refer to MDrive Linear Actuator documentation.

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Specifications

Communication	Protocol type	RS-422/485	4.8 to 115.2 kbps baud rate
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, IP65
		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
	Plus products	Number	4
		Type	Sourcing or sinking inputs, or sinking outputs
		Logic range	Inputs and outputs tolerant to +24 VDC, inputs TTL level compatible
	Plus^2 products	Number	8 or 4 (2)
		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
Expanded motion Plus^2 products only	Electronic gearing external clock in (3)	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
	Position feedback	Optional	Remote encoder interface required
Software	Program storage	Type/size	Flash/6384 bytes
	User registers		Four 32 bit
	User program labels & variables		192
	Math functions		+. –, x, ÷, >, <, <=, >=, AND, OR, XOR, NOT
	Branch functions		Branch and Call
	General purpose I/O functions	Inputs	home, limit plus, limit minus, go, stop, pause, jog plus, jog minus, general purpose
		Outputs	moving, fault, stall, velocity change, general purpose
	Trip functions		Trip on input, trip on position, trip on time, trip capture, trip on relative position
	Party mode addresses		62
	Encoder functions		Stall detection, position maintenance, find index

(1) Actual power supply current will depend on voltage and load.
(2) I/O is reduced from 8 to 4 for products with remote encoder option.
(3) Adjusting the microstep resolution can increase the range.

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

MDrive Plus

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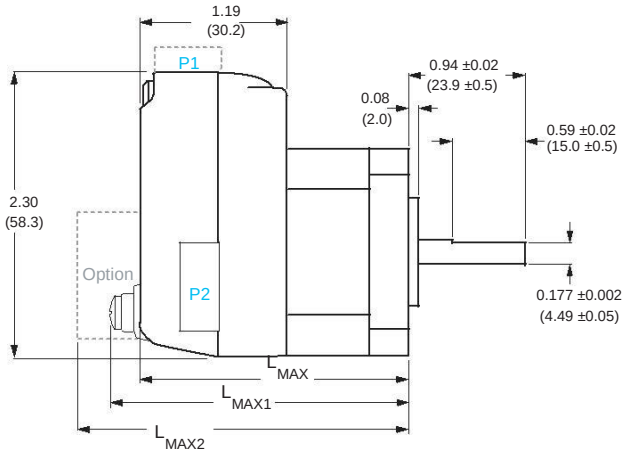
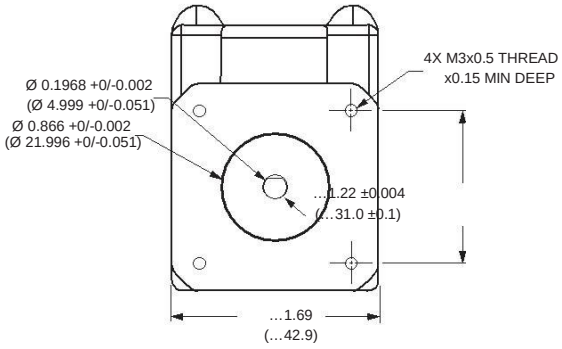
Dimensions

MDI•17 NEMA17 motor, IP20-rated

inches (mm)

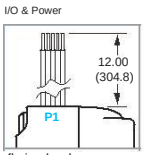




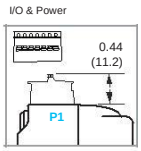
Motor stack length	Lmax	Lmax1 (1)	Lmax2
Single	2.20 (55.9)	2.45 (62.25)	2.79 (70.9)
Double	2.43 (61.7)	2.68 (68.05)	3.02 (76.7)
Triple	2.77 (70.4)	3.02 (76.75)	3.37 (85.6)

(1) Grounding screw is not present on all products.

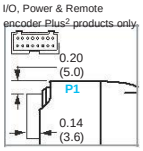
P1 connector options



fl ying leads –
12.0" (305mm)

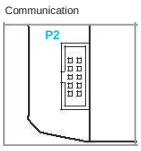


pluggable – 7-pin
non-locking spring
clamp terminal strip

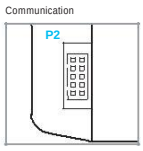


wire crimp –
16-pin locking

P2 connector options

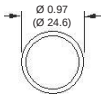


IDC –
10-pin non-locking



wire crimp –
10-pin friction lock

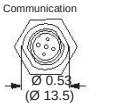
Lmax2 option



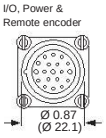
control knob – 20 in-lb /
225 N-cm max torque

MDI•17 NEMA17 motor, IP65-rated

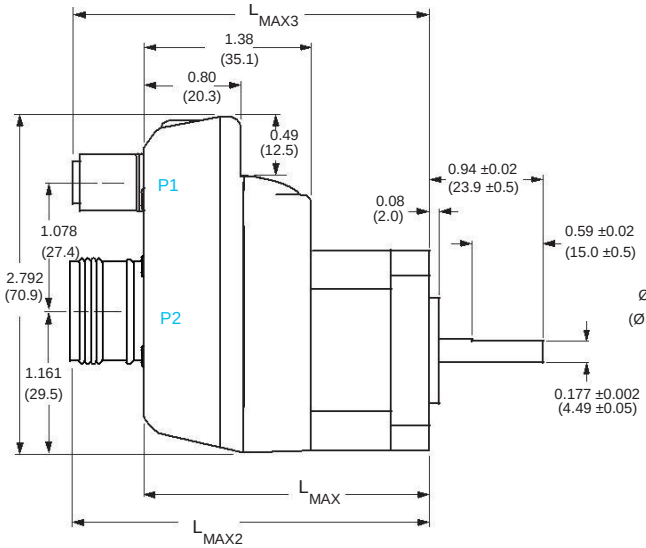
inches (mm)

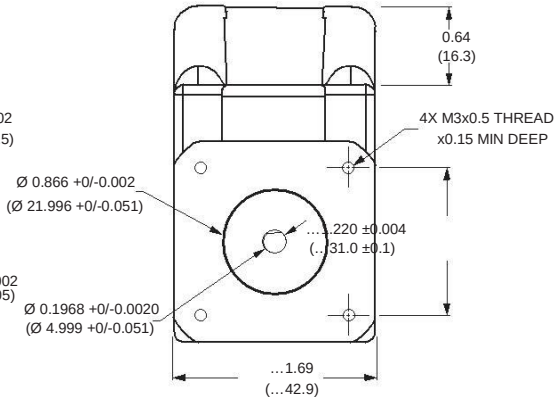


5-pin M12 (female)
industrial connector



19-pin M23 (male)
industrial connector





Motor stack length	Lmax	Lmax2	Lmax3
Single	2.48 (62.71)	3.15 (79.72)	3.08 (77.95)
Double	2.71 (68.55)	3.38 (85.57)	3.31 (83.79)
Triple	3.05 (77.18)	3.72 (94.20)	3.65 (92.42)

MDrive Plus

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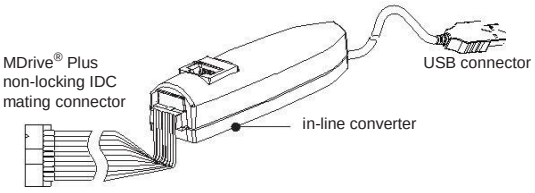
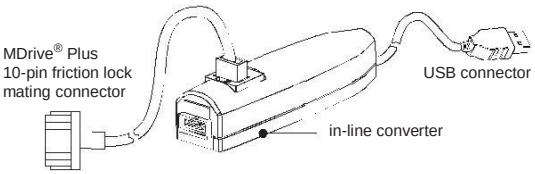
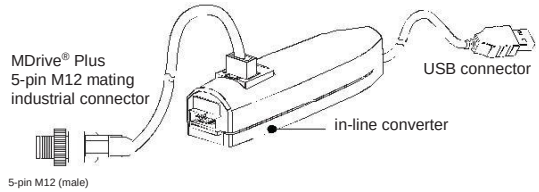


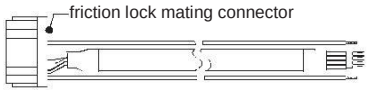
MD-CC400-001



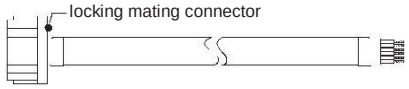
MD-CC402-001



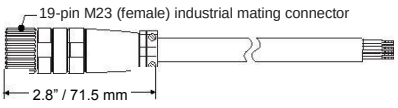
MD-CC401-001



PD10-1434-FL3



PD16-1417-FL3



MD-CS100-000

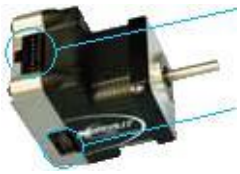
Accessories

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 programmable Motion 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-CC400-001
Mates to 10-pin friction lock wire crimp connector	12.0 (3.6)	MD-CC402-001
Mates to 5-pin female M12 industrial connector	12.0 (3.6)	MD-CC401-001
Prototype development cable Speed test/development with pre-wired mating connector with other cable end open.		
Mates to 10-pin locking wire crimp connector for I/O and remote encoder option	10.0 (3.0)	PD10-1434-FL3
Mates to 16-pin locking wire crimp connector for I/O, power and remote encoder option	10.0 (3.0)	PD16-1417-FL3
Mates to 19-pin male M23 industrial connector with straight termination for I/O, power and remote encoder option	13.0 (4.0)	MD-CS100-000
Mates to 19-pin male M23 industrial connector with right angle termination for I/O, power and remote encoder option	13.0 (4.0)	MD-CS101-000
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
16-pin locking wire crimp connector for I/O, power and remote encoder option	—	CK-10
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 programmable Motion Control products	—	DPM75

MDrive Plus

MDI•17 programmable Motion Control

MDrive® 17 Plus IP20



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

P2: Communication
D = RS-422/485 with 10-pin IDC non-locking connector
L = RS-422/485 with 10-pin friction lock wire crimp connector

MDrive® 17 Plus^2 IP20

P1: I/O & Power, and optional remote encoder
C = 16-pin locking wire crimp connector

P2: Communication
D = RS-422/485 with 10-pin IDC non-locking connector
L = RS-422/485 with 10-pin friction lock wire crimp connector

MDrive® 17 Plus^2 IP65

with industrial connectors

P2: Communication
Q = RS-422/485 with 5-pin M12 female industrial connector

P1: I/O & Power, and optional remote encoder
M = 19-pin M23 male industrial connector

Part numbers

IP20-rated products

example part number	K M D I 1 F R D 1 7 A 4 –N
QuickStart Kit K = kit option, omit from part number if unwanted	K M D I 1 F R D 1 7 A 4 –N
MDrivePlus version MDI = Intelligent — programmable Motion Control	K M D I 1 F R D 1 7 A 4 –N
Input 1 = Plus version with standard features 3 = Plus^2 version with expanded features	K M D I 1 F R D 1 7 A 4 –N
P1 connector F = fl ying leads P = pluggable C = wire crimp (1)	K M D I 1 F R D 1 7 A 4 –N
Communication type R = RS-422/485	K M D I 1 F R D 1 7 A 4 –N
P2 connector D = IDC L = wire crimp	K M D I 1 F R D 1 7 A 4 –N
Motor size 17 = NEMA 17 1.7" / 42mm	K M D I 1 F R D 1 7 A 4 –N
Motor length A = single stack B = double stack C = triple stack	K M D I 1 F R D 1 7 A 4 –N
Drive voltage 4 = +12 to +48 VDC	K M D I 1 F R D 1 7 A 4 –N
Options — omit from part number if unwanted –N = rear control knob for manual positioning –EQ = internal 512-line magnetic encoder w/ index mark –EE (1) = remote differential encoder interface; encoder not supplied	–N

(1) Only available with Plus^2 products.

IP65-rated products

example part number	K M D I 4 M R Q 1 7 A 4 –EQ
QuickStart Kit K = kit option, omit from part number if unwanted	K M D I 4 M R Q 1 7 A 4 –EQ
MDrivePlus version MDI = Intelligent — programmable Motion Control	K M D I 4 M R Q 1 7 A 4 –EQ
Input 4 = Plus^2 version with expanded features	K M D I 4 M R Q 1 7 A 4 –EQ
P1 connector M = M23 industrial connectors	K M D I 4 M R Q 1 7 A 4 –EQ
Communication type R = RS-422/485	K M D I 4 M R Q 1 7 A 4 –EQ
P2 connector Q = M12 industrial connector	K M D I 4 M R Q 1 7 A 4 –EQ
Motor size 17 = NEMA 17 1.7" / 42mm	K M D I 4 M R Q 1 7 A 4 –EQ
Motor length A = single stack B = double stack C = triple stack	K M D I 4 M R Q 1 7 A 4 –EQ
Drive voltage 4 = +12 to +48 VDC	K M D I 4 M R Q 1 7 A 4 –EQ
Options — omit from part number if unwanted –EQ = internal 512-line magnetic encoder w/ index mark –EE = remote differential encoder interface; encoder not supplied	–EQ

MDrive Plus

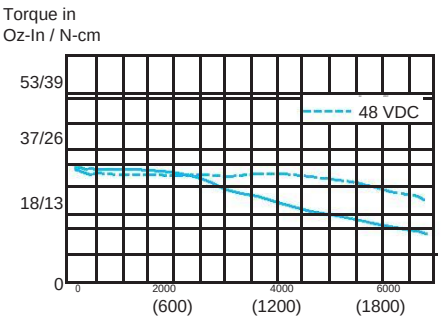
MDI•17 programmable Motion Control

Motor performance

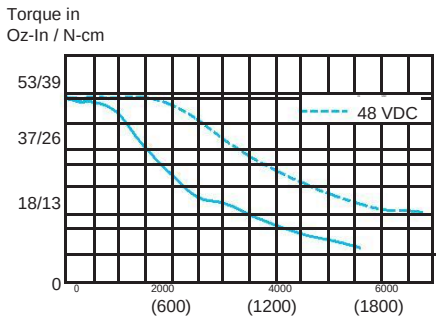
MD•17 NEMA 17 motor specifi cations	Motor	Stack length	Single	Double	Triple
	Holding torque	oz-in	32	60	75
		N-cm	23	42	53
	Detent torque	oz-in	1.7	2.1	3.5
		N-cm	1.2	1.5	2.5
	Rotor inertia	oz-in-sec^2	0.0005	0.0008	0.0012
		kg-cm^2	0.038	0.057	0.082
	Weight (motor+driver)	oz	10.4	12.0	15.2
		g	295	340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

MD•17 NEMA 17 speed torque (1)

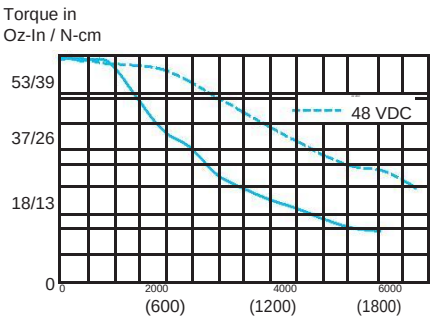
Single stack length



Double stack length



Triple stack length



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

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Intelligent motion systems