

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 find 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.

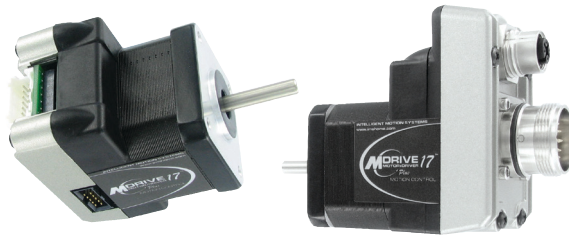
Application areas

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	
Software	Position feedback	Optional	Remote encoder interface required	
	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.

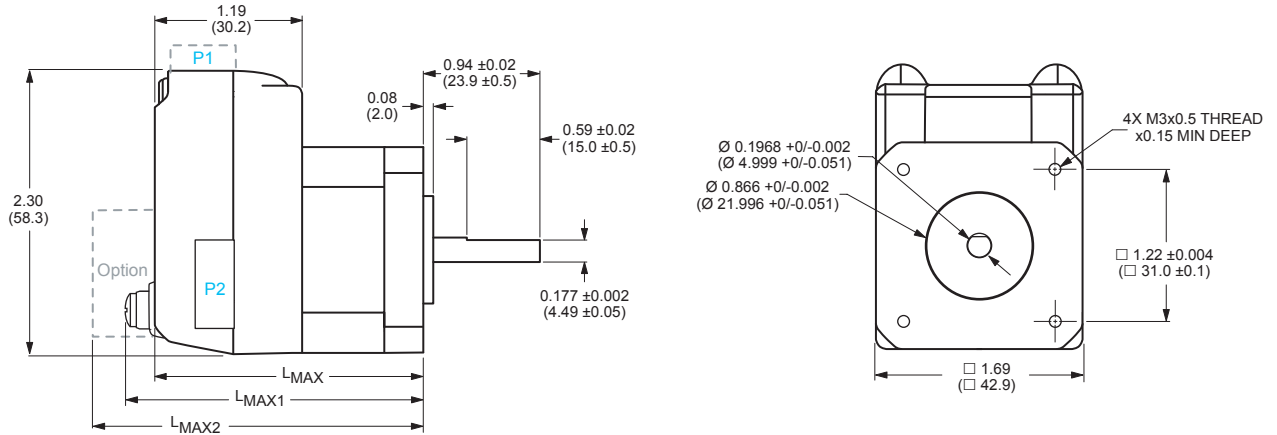
MDrive Plus

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Dimensions

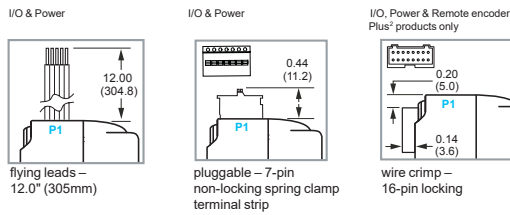
MDI-17 NEMA17 motor, IP20-rated

inches (mm)

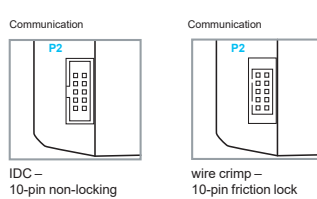


Motor stack length	Lmax	Lmax1	Lmax2
Single	2.20 (55.9)	2.45 (62.25)	2.79 (70.9)
Double	2.43 (61.7)	2.68 (68.05)	3.02 (76.7)
Triple	2.77 (70.4)	3.02 (76.75)	3.37 (85.6)

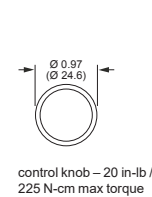
P1 connector options



P2 connector options

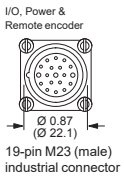
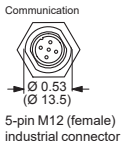
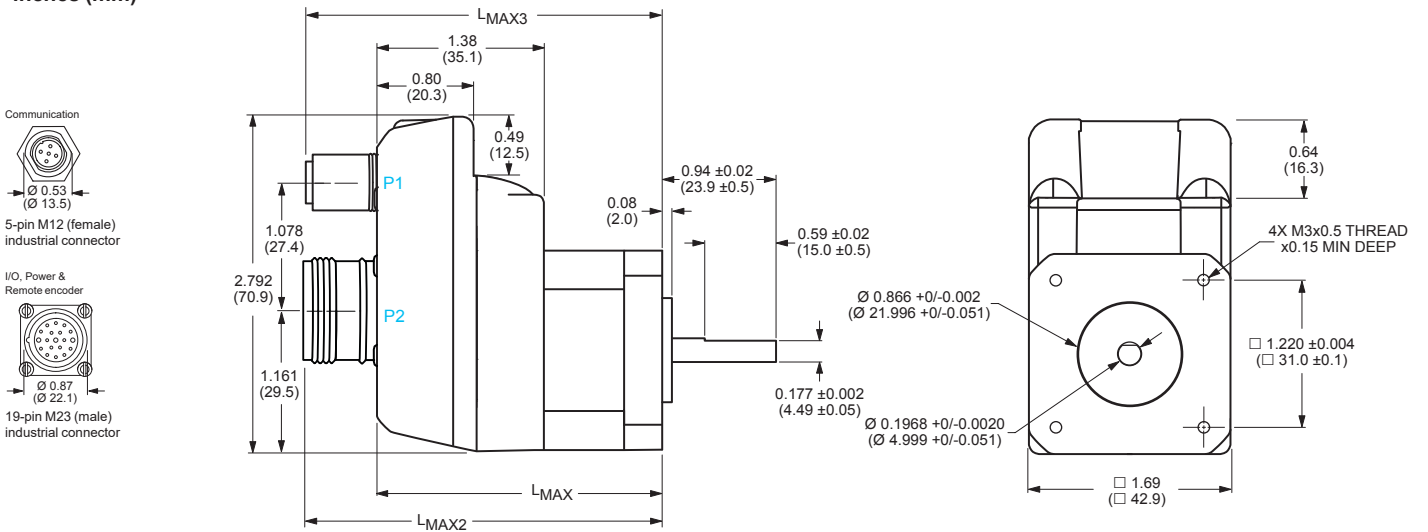


Lmax2 option



MDI-17 NEMA17 motor, IP65-rated

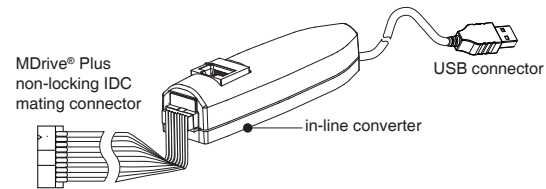
inches (mm)



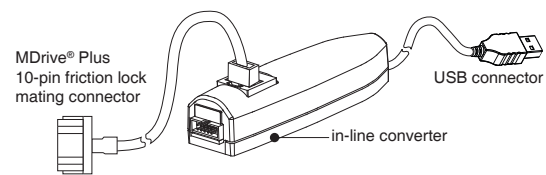
Motor stack length	Lmax	Lmax2	Lmax3
Single	2.48 (62.71)	3.15 (79.72)	3.08 (77.95)
Double	2.71 (68.55)	3.38 (85.57)	3.31 (83.79)
Triple	3.05 (77.18)	3.72 (94.20)	3.65 (92.42)

MDrive Plus

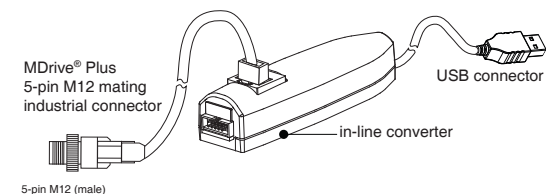
MDI•17 programmable Motion Control



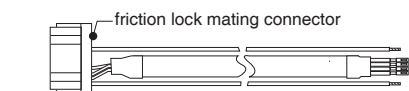
MD-CC400-001



MD-CC402-001



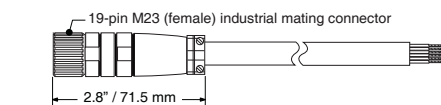
MD-CC401-001



PD10-1434-FL3



PD16-1417-FL3



MD-CS100-000

Accessories

description	length feet (m)	part number
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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
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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

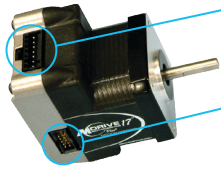
Limits surge current and voltage to a safe level when DC input power is switched on-and-off to an MDrive Plus.

For all MDrive17 programmable Motion Control products	—	DPM75
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MDrive Plus

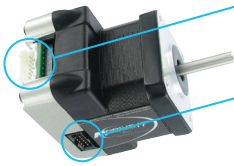
MDI•17 programmable Motion Control

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 Plus² 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 Plus² 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 = Plus² version with expanded features	K	M	D	I	1	F	R	D	1	7	A	4	-N
P1 connector F = flying 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	K	M	D	I	1	F	R	D	1	7	A	4	-N

(1) Only available with Plus² 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 = Plus² 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	K	M	D	I	4	M	R	Q	1	7	A	4	-EQ

MDrive Plus

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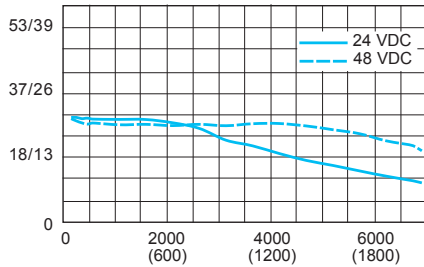
Motor performance

MD•17 NEMA 17 motor specifications	Motor	Stack length	Single	Double	Triple
			Holding torque	oz-in	32
	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

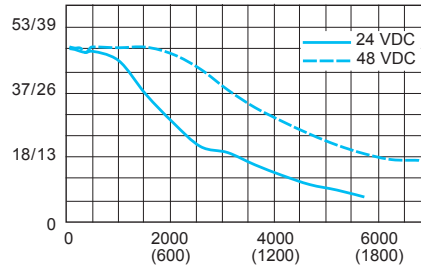
Torque in
Oz-In / N-cm



Speed of rotation in full steps per second (rpm)

Double stack length

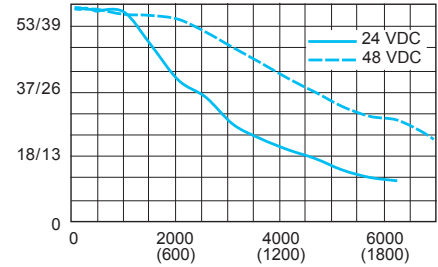
Torque in
Oz-In / N-cm



Speed of rotation in full steps per second (rpm)

Triple stack length

Torque in
Oz-In / N-cm



Speed of rotation in full steps per second (rpm)

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

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