

MDrive® Plus

MDM•23 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.

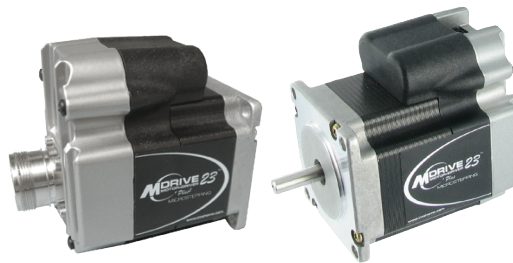
Settings for MDrive Plus step/direction input products may be changed on-the-fly or downloaded and stored in nonvolatile memory using the SPI Motor Interface software provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port.

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•23 MDrive Plus Step/direction input products: integrated NEMA23 motor and controls, IP65 & IP20-rated

General features

Cost effective compact integrated microstepping drive and NEMA23 1.8° 2-phase stepper motor	
Advanced current control, with automatic current reduction, for exceptional performance and smoothness	
+12 to +75 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, IP65 ratings
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 counterclockwise
	Programmable digital filtering for clock and direction inputs
Available options	Motor stack lengths
	Long life linear actuators (1)
	Connector options
	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

MDM•23 Step/direction input

Specifications

Communication	Protocol type	SPI		
Input power	Voltage	VDC	+12...+75 for motor stack lengths: single, double, triple +12...+60 for motor stack length: quad	
	Current maximum (1)	Amp	2.0 for motor stack lengths: single, double, triple 3.5 for motor stack length: quad	
Motor	Frame size	NEMA	23	
		inches	2.3	
		mm	57	
	Holding torque	oz-in	90...283	
N-cm		64 ... 200		
Length	stack sizes	1, 2, 3 & 4		
	Operating temp non-condensing	Heat sink maximum	85°C	
Thermal		Motor maximum	100°C	
	Protection	Type	Temp warning	na
		IP rating	IP20, IP65	
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 μS (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	μSteps 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 μS (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: www.motion.schneider-electric.com/manuals.html

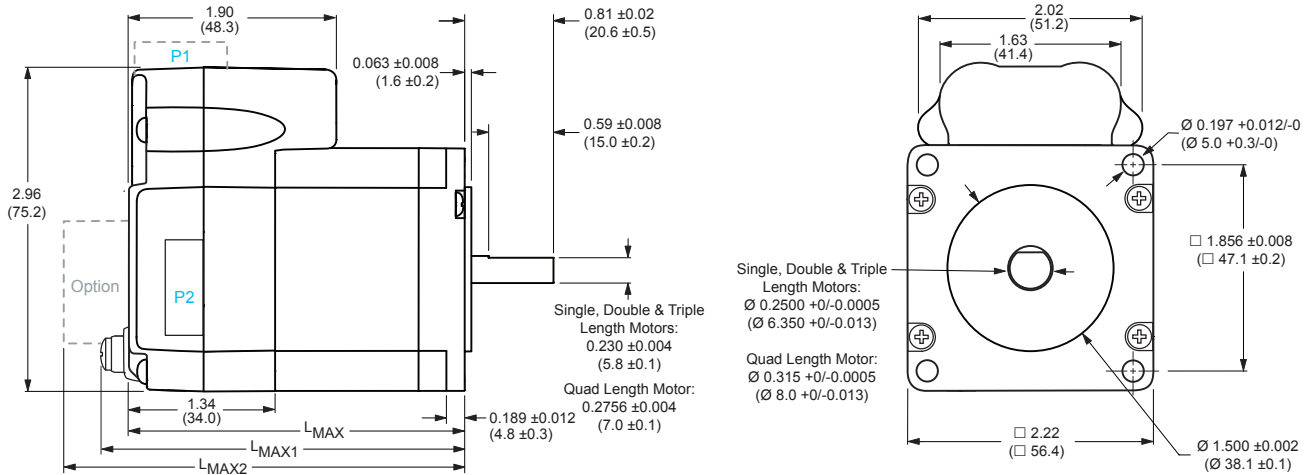
MDrive Plus

MDM•23 Step/direction input

Dimensions

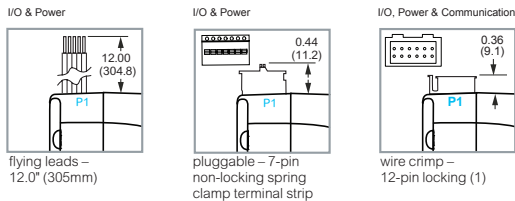
MDM•23 NEMA23 motor, IP20-rated

inches (mm)

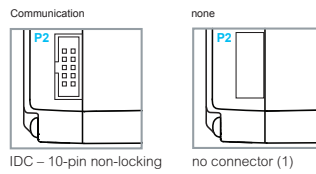


Motor stack length	Lmax	Lmax1	Lmax2
Single	2.65 (67.31)	2.85 (72.39)	3.36 (85.34)
Double	3.02 (76.71)	3.22 (81.79)	3.73 (94.74)
Triple	3.88 (98.55)	4.08 (103.63)	4.59 (116.59)
Quad	5.28 (134.15)	5.48 (139.19)	5.99 (152.19)

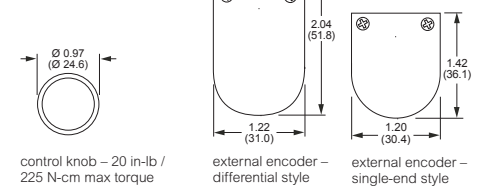
P1 connector options



P2 connector options



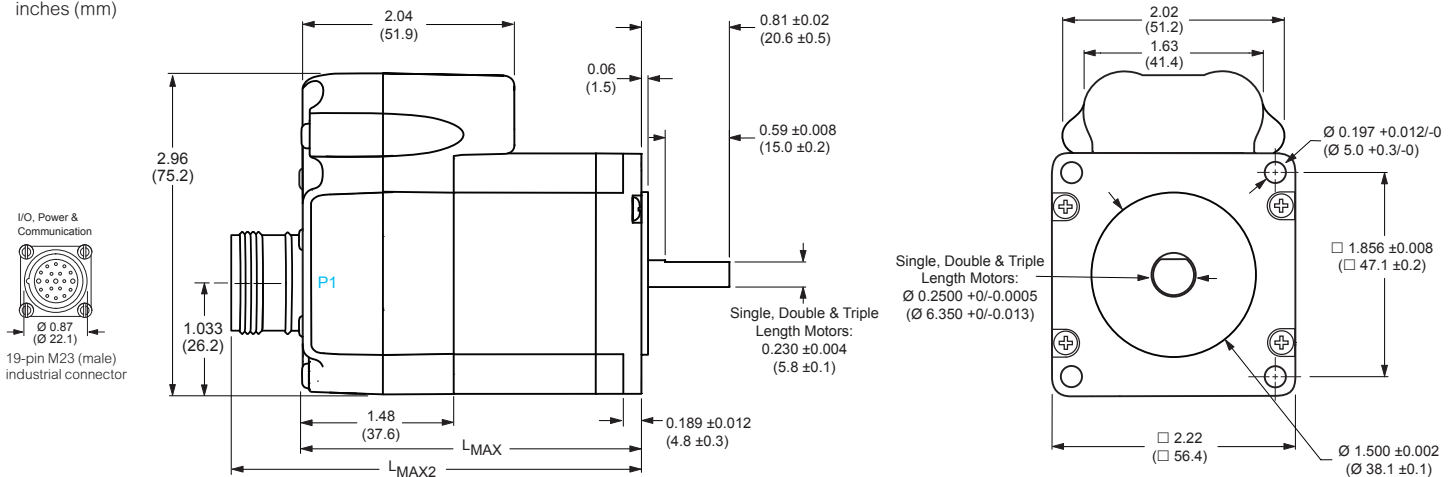
Lmax2 options



(1) When P1 is a 12-pin connector there is no P2 connector

MDM•23 NEMA23 motor, IP65-rated

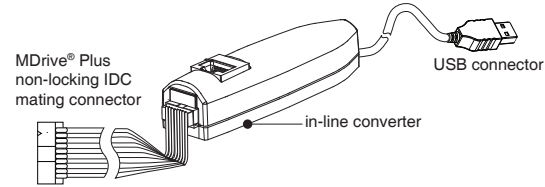
inches (mm)



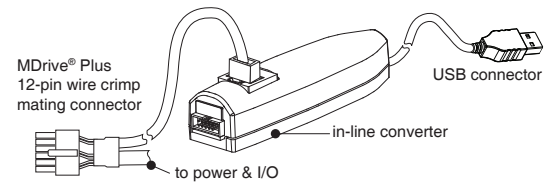
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MDrive Plus

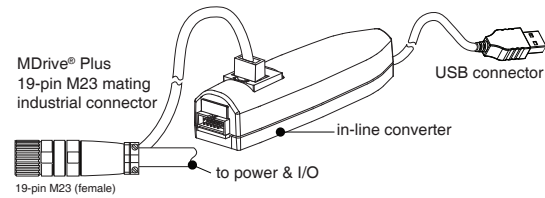
MDM•23 Step/direction input



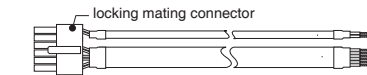
MD-CC300-001



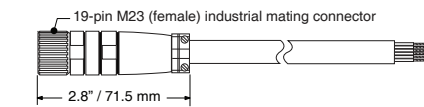
MD-CC303-001



MD-CC301-001



PD12-1434-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 MDrivePlus initial functional setup and system testing.

For all MDrive23 step/direction input 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-CC300-001
Mates to 12-pin locking wire crimp connector	12.0 (3.6)	MD-CC303-001
Mates to 19-pin male M23 industrial connector	12.0 (3.6)	MD-CC301-001

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)	PD12-1434-FL3
Mates to 19-pin male M23 industrial connector with straight termination for I/O, communication and power	13.0 (4.0)	MD-CS100-000
Mates to 19-pin male M23 industrial connector with right angle termination for I/O, communication and power	13.0 (4.0)	MD-CS101-000

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 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 non-locking IDC connector for communication	—	CK-01
12-pin locking wire crimp connector for I/O, communication and power	—	CK-03

Drive protection module

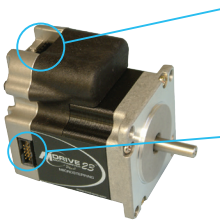
Limits surge current and voltage to a safe level when DC input power is switched on-and-off to an MDrive Plus.

For all MDrive23 step/direction input products	—	DPM75
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MDrive Plus

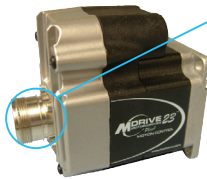
MDM•23 Step/direction input

MDrive® 23 Plus IP20



- P1: I/O & Power**
 F = 12" flying leads
 P = non-locking spring clamp terminal strip
 C = 12-pin locking wire crimp (includes I/O, Power & Comm)
- P2: Communication**
 D = SPI with 10-pin IDC non-locking connector
 Z = None. Used with 12-pin locking wire crimp in position P1, which includes communication.

MDrive® 23 Plus IP65 with industrial connector



- P1: I/O, Power & Communication**
 19-pin M23 male industrial connector

Part numbers

IP20-rated products

example part number	K	M	D	M	1	F	S	D	2	3	A	7	-N
QuickStart Kit K = kit option, omit from part number if unwanted	K	M	D	M	1	F	S	D	2	3	A	7	-N
MDrivePlus version MDM = Step/direction input	K	M	D	M	1	F	S	D	2	3	A	7	-N
Input 1 = Plus version with universal input 5 = Plus version with differential CW/CCW input	K	M	D	M	1	F	S	D	2	3	A	7	-N
P1 connector F = flying leads P = pluggable C = wire crimp	K	M	D	M	1	F	S	D	2	3	A	7	-N
Communication type S = SPI	K	M	D	M	1	F	S	D	2	3	A	7	-N
P2 connector D = IDC Z = none (1)	K	M	D	M	1	F	S	D	2	3	A	7	-N
Motor size 23 = NEMA 23 2.3" / 57mm	K	M	D	M	1	F	S	D	2	3	A	7	-N
Motor length A = single stack B = double stack C = triple stack D = quad stack	K	M	D	M	1	F	S	D	2	3	A	7	-N
Drive voltage (2) 7 = +12 to +75 VDC 6 = +12 to +60 VDC	K	M	D	M	1	F	S	D	2	3	A	7	-N
Options — omit from part number if unwanted	K	M	D	M	1	F	S	D	2	3	A	7	-N
-N = rear control knob for manual positioning	K	M	D	M	1	F	S	D	2	3	A	7	-N
-E_ = external optical encoder w/ index mark	K	M	D	M	1	F	S	D	2	3	A	7	-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				

(1) P2 is Z=none with P1 wire crimp connector.

(2) Only quad stack motors have +12 to +60 VDC drives, all other motors have +12 to +75 VDC drives.

IP65-rated products

example part number	K	M	D	M	2	M	S	Z	2	3	A	7
QuickStart Kit K = kit option, omit from part number if unwanted	K	M	D	M	2	M	S	Z	2	3	A	7
MDrivePlus version MDM = Step/direction input	K	M	D	M	2	M	S	Z	2	3	A	7
Input 2 = Plus version with universal input	K	M	D	M	2	M	S	Z	2	3	A	7
P1 connector M = M23 industrial connector	K	M	D	M	2	M	S	Z	2	3	A	7
Communication type S = SPI	K	M	D	M	2	M	S	Z	2	3	A	7
P2 connector Z = none	K	M	D	M	2	M	S	Z	2	3	A	7
Motor size 23 = NEMA 23 2.3" / 57mm	K	M	D	M	2	M	S	Z	2	3	A	7
Motor length A = single stack B = double stack C = triple stack	K	M	D	M	2	M	S	Z	2	3	A	7
Drive voltage 7 = +12 to +75 VDC	K	M	D	M	2	M	S	Z	2	3	A	7

MDrive Plus

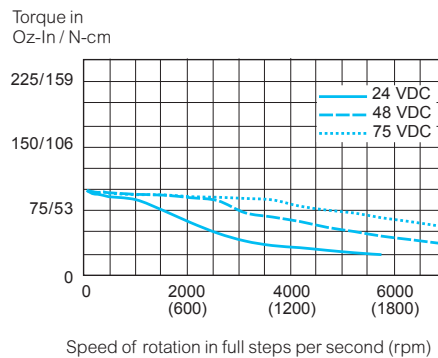
MDM•23 Step/direction input

Motor performance

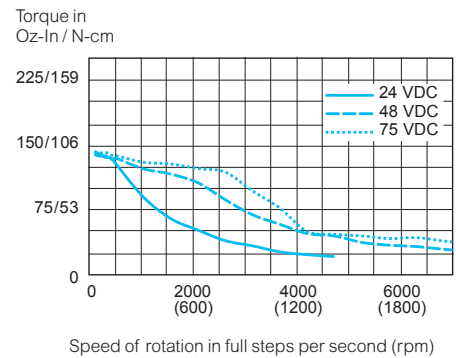
MD•23 NEMA 23 motor specifications	Motor	Stack length	Single	Double	Triple	Quad
Holding torque		oz-in	90	144	239	283
		N-cm	64	102	169	200
Detent torque		oz-in	3.9	5.6	9.7	14.2
		N-cm	2.7	3.9	6.9	10.0
Rotor inertia		oz-in-sec ²	0.0025	0.0037	0.0065	0.0108
		kg-cm ²	0.18	0.26	0.46	0.76
Weight (motor+driver)		oz	21.6	26.4	39.2	62
		g	612	748	1111	1746

MD•23 NEMA 23 speed torque (1)

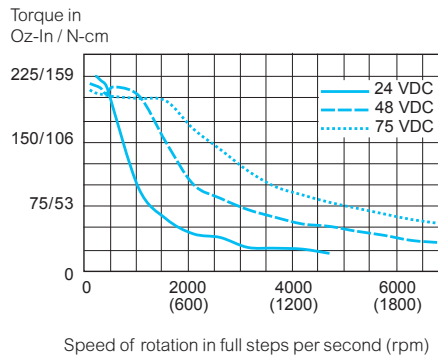
Single stack length



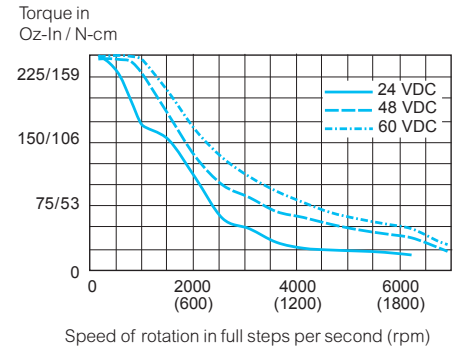
Double stack length



Triple stack length



Quad stack length



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