CE RoHS REACH **IP65**

MDrive® Plus

MDI•23 CANopen

Product overview

MDrive® Plus CANopen products integrate 1.8° 2-phase stepper motor, motion controller, drive electronics and optional encoder. Products support CiA DS301 and DSP402 Device Profile for Drives and Motion Control.

Firmware is provided for setup and testing MDrive Plus CANopen products. CANopen Tester software and communication dongle (MD-CC500-000) are also available.

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.

MDrive Plus MDI•23 CANopen products: integrated NEMA23 motor and controls, IP65 & IP20-rated

General features

Compact integrated microstepping drive, motion controller and NEMA23 1.8° 2-phase stepper motor	
Advanced current control for exceptional performance and smoothness	
+12 up to +75 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	CANopen
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 configuration and programming via optional MD-CC500-000 comm converter	

(1) Refer to MDrive Linear Actuator documentation.

MDrive Plus

MDI•23 CANopen

Specifications

Communication	Type		CANopen CiA DS301 (V3.0), DSP402 (V2.0), 2.0B active
	Baud rate		Configurable 5 KB to 1 Mb
	ID		11 and/or 29 bit
	Isolation		Galvanic
	Features		Node guarding, heartbeat, SDOs, PDOs (variable mapping)
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
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
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	Setup parameters		Storable to nonvolatile memory
	Transmit PDOs		3 dynamically mappable
	Receive PDOs		3 dynamically mappable
	Manufacturer specific objects		I/O configuration, run/hold current
	Modes of operation		Profile position, homing mode, profile velocity
	Input functions		General purpose, homing mode profiles
	Output functions		General purpose

(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

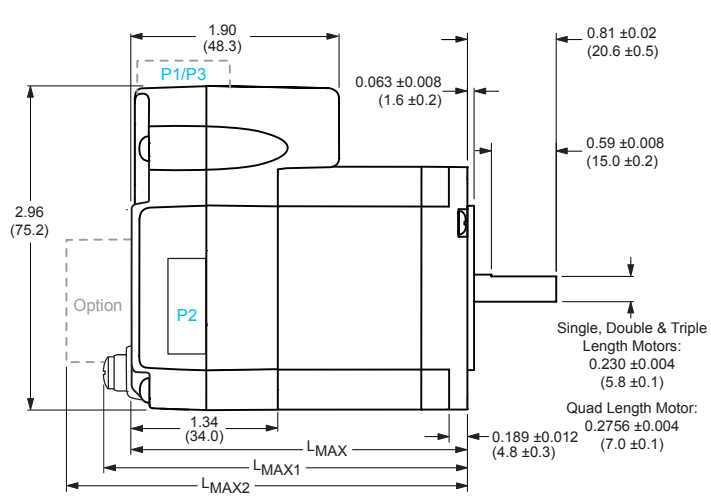
MDrive Plus

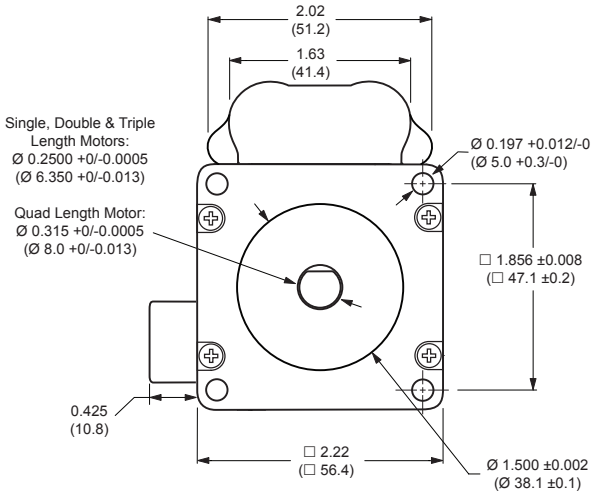
MDI•23 CANopen

Dimensions

MDI•23 CANopen NEMA23 motor, IP20-rated

inches (mm)



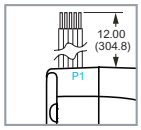


Motor stack length	Lmax	Lmax1 (1)	Lmax2
Single	2.65 (67.31)	2.85 (72.39)	3.36 (85.34)
Double	3.02 (76.71)	3.22 (81.79)	3.73 (94.74)
Triple	3.88 (98.55)	4.08 (103.63)	4.59 (116.59)
Quad	5.28 (134.15)	5.48 (139.19)	5.99 (152.19)

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

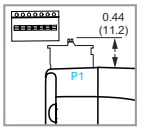
P1/P3 connector options

I/O & Power



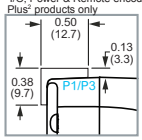
flying leads –
12.0" (305mm)

I/O & Power



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

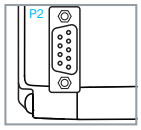
I/O, Power & Remote encoder Plus² products only



wire crimp –
14- & 2-pin locking

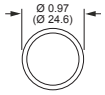
P2 connector

Communication



DB9 (male)

Lmax2 option



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

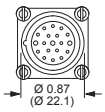
MDI•23 CANopen NEMA23 motor, IP65-rated

inches (mm)

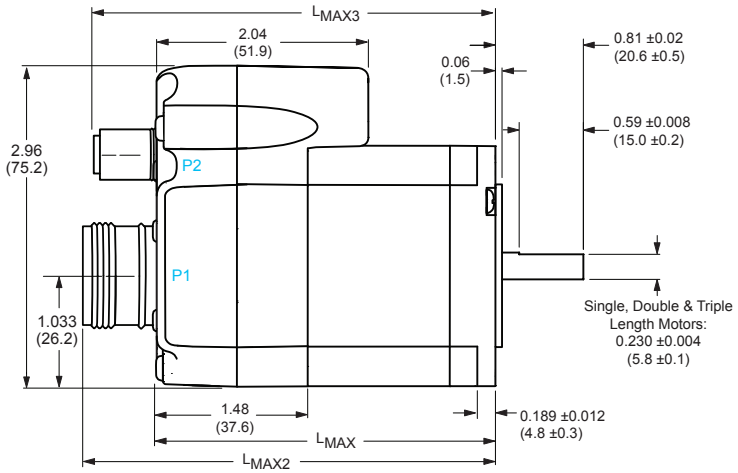
Communication

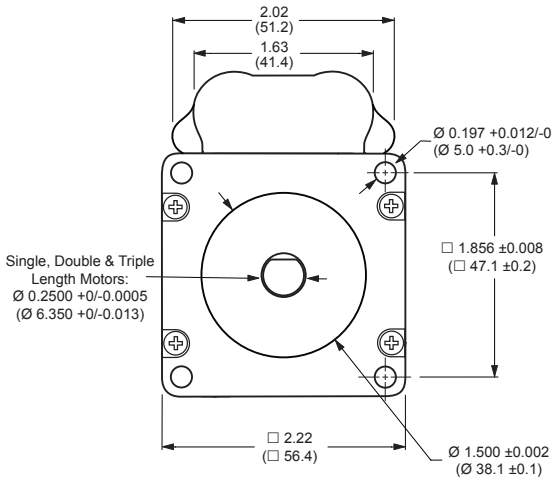
5-pin M12 (female)
industrial connector

I/O, Power &
Remote encoder



19-pin M23 (male)
industrial connector

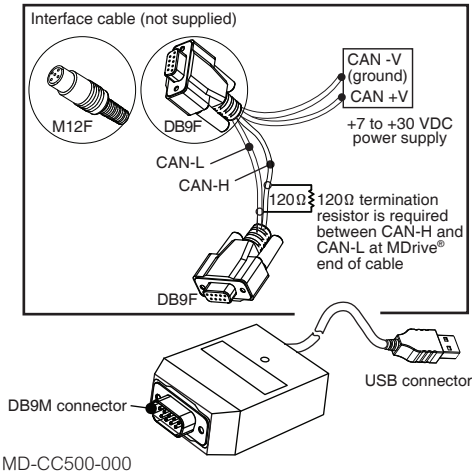




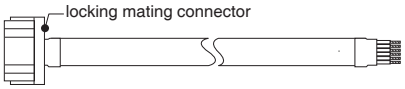
Motor stack length	Lmax	Lmax2	Lmax3
Single	2.82 (71.63)	3.48 (88.39)	3.42 (86.87)
Double	3.16 (80.26)	3.82 (97.03)	3.76 (95.5)
Triple	4.02 (102.11)	4.67 (118.62)	4.62 (117.35)

MDrive Plus

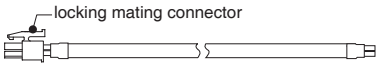
MDI•23 CANopen



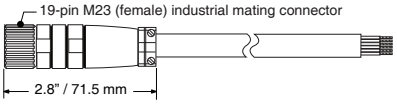
MD-CC500-000



PD14-2334-FL3



PD02-2300-FL3



MD-CS100-000

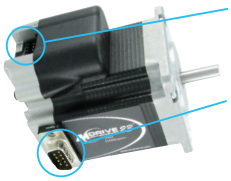
Accessories

description	length feet (m)	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.		
Interface cable for all CANopen products. Requires mating connector adapter for DB9 or M12 industrial connector. Requires power supply, not supplied.	12.0 (3.6)	MD-CC500-000
Prototype development cable Speed test/development with pre-wired mating connector with other cable end open.		
Mates to 14-pin locking wire crimp connector for I/O and remote encoder option	10.0 (3.0)	PD14-2334-FL3
Mates to 2-pin locking wire crimp connector for power	10.0 (3.0)	PD02-2300-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.		
14-pin locking wire crimp connector for I/O and remote encoder option	—	CK-09
2-pin locking wire crimp connector for power	—	CK-04
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 CANopen products	—	DPM75

MDrive Plus

MDI•23 CANopen

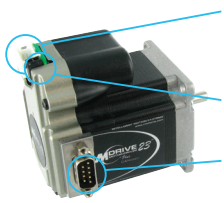
MDrive® 23 Plus IP20



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

P2: Communication
B = CANopen with DB9 male connector

MDrive® 23 Plus² IP20



P1: I/O, and optional remote encoder
C = 14-pin locking wire crimp connector

P3: Power
2-pin locking wire crimp connector

P2: Communication
B = CANopen with DB9 male connector

MDrive® 23 Plus² IP65
with industrial connectors

P2: Communication
Q = CANopen with 5-pin M12 male 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	M	D	I	1	F	C	B	2	3	A	7	–N
MDrivePlus version MDI = Intelligent — CANopen	M	D	I	1	F	C	B	2	3	A	7	–N
Input 1 = Plus version with standard features 3 = Plus² version with expanded features	M	D	I	1	F	C	B	2	3	A	7	–N
P1 connector F = flying leads P = pluggable C = wire crimp (1)	M	D	I	1	F	C	B	2	3	A	7	–N
Communication type C = CANopen	M	D	I	1	F	C	B	2	3	A	7	–N
P2 connector B = DB9	M	D	I	1	F	C	B	2	3	A	7	–N
Motor size 23 = NEMA 23 2.3" / 57mm	M	D	I	1	F	C	B	2	3	A	7	–N
Motor length A = single stack B = double stack C = triple stack D = quad stack	M	D	I	1	F	C	B	2	3	A	7	–N
Drive voltage (2) 7 = +12 to +75 VDC 6 = +12 to +60 VDC	M	D	I	1	F	C	B	2	3	A	7	–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 Plus² products.
(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	M	D	I	4	M	C	Q	2	3	A	7	–EQ
MDrivePlus version MDI = Intelligent — CANopen	M	D	I	4	M	C	Q	2	3	A	7	–EQ
Input 4 = Plus² version with expanded features	M	D	I	4	M	C	Q	2	3	A	7	–EQ
P1 connector M = M23 industrial connectors	M	D	I	4	M	C	Q	2	3	A	7	–EQ
Communication type C = CANopen	M	D	I	4	M	C	Q	2	3	A	7	–EQ
P2 connector Q = M12 industrial connector	M	D	I	4	M	C	Q	2	3	A	7	–EQ
Motor size 23 = NEMA 23 2.3" / 57mm	M	D	I	4	M	C	Q	2	3	A	7	–EQ
Motor length A = single stack B = double stack C = triple stack	M	D	I	4	M	C	Q	2	3	A	7	–EQ
Drive voltage 7 = +12 to +75 VDC	M	D	I	4	M	C	Q	2	3	A	7	–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

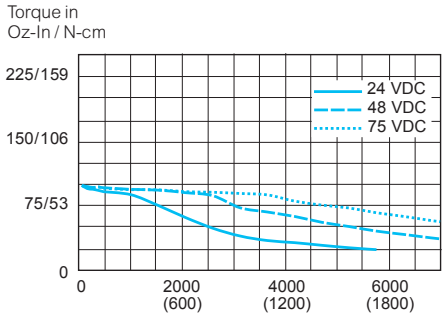
MDI•23 CANopen

Motor performance

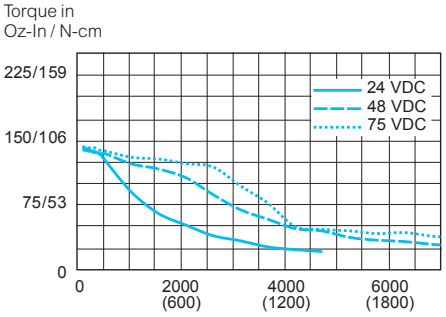
MD•23 NEMA 23 motor specifications	Motor	Stack length	Single	Double	Triple	Quad
	Holding torque	oz-in	90	144	239	283
		N-cm	64	102	169	200
	Detent torque	oz-in	3.9	5.6	9.7	14.2
		N-cm	2.7	3.9	6.9	10.0
	Rotor inertia	oz-in-sec^2	0.0025	0.0037	0.0065	0.0108
		kg-cm^2	0.18	0.26	0.46	0.76
	Weight (motor+driver)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

MD•23 NEMA 23 speed torque (1)

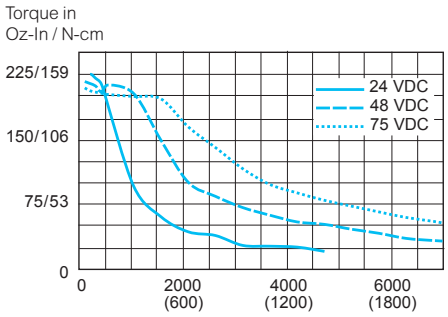
Single stack length



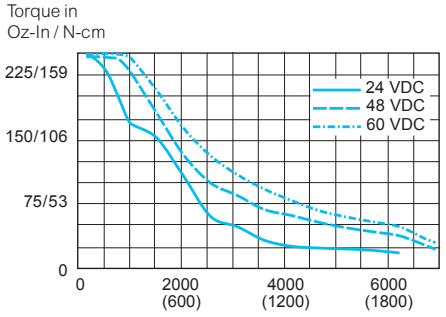
Double stack length



Triple stack length



Quad stack length



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

Schneider Electric Motion USA
370 North Main Street
Marlborough, CT 06447
Phone: (860) 295-6102
Fax: (860) 295-6107
www.motion.schneider-electric.com

Intelligent motion systems | Schneider Electric