

MDrive® Plus

MDM•17 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•17 MDrive Plus Step/direction input products: integrated NEMA17 motor and controls, IP20 & IP65-rated

General features

| | |
|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Cost effective compact integrated microstepping drive and NEMA17 1.8° 2-phase stepper motor | |
| Advanced current control, with automatic current reduction, 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 | |
| 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•17 Step/direction input

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 | 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 | |

(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

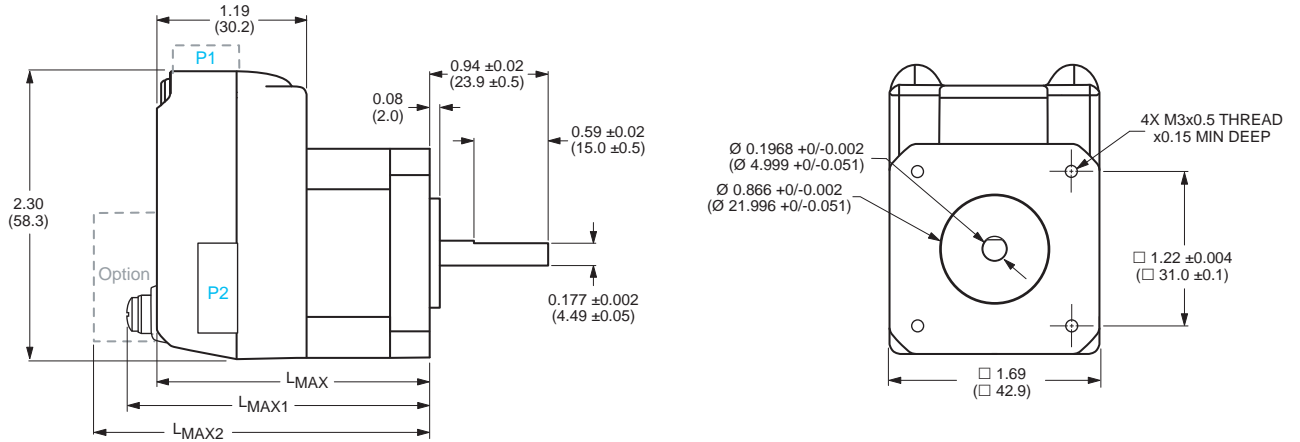
MDrive Plus

MDM•17 Step/direction input

Dimensions

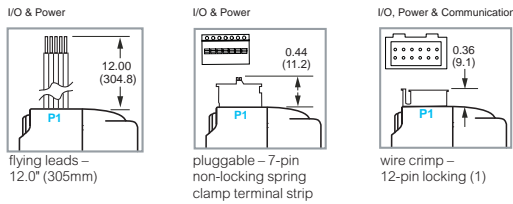
MDM•17 NEMA17 motor, IP20-rated

inches (mm)



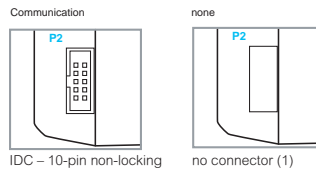
| Motor stack length | Lmax | Lmax1 | Lmax2 |
|--------------------|-------------|--------------|-------------|
| Single | 2.20 (55.9) | 2.45 (62.25) | 2.79 (70.9) |
| Double | 2.43 (61.7) | 2.68 (68.05) | 3.02 (76.7) |
| Triple | 2.77 (70.4) | 3.02 (76.75) | 3.37 (85.6) |

P1 connector options

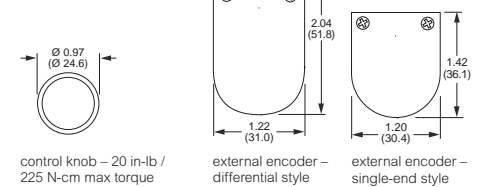


(1) When P1 is a 12-pin connector there is no P2 connector

P2 connector options

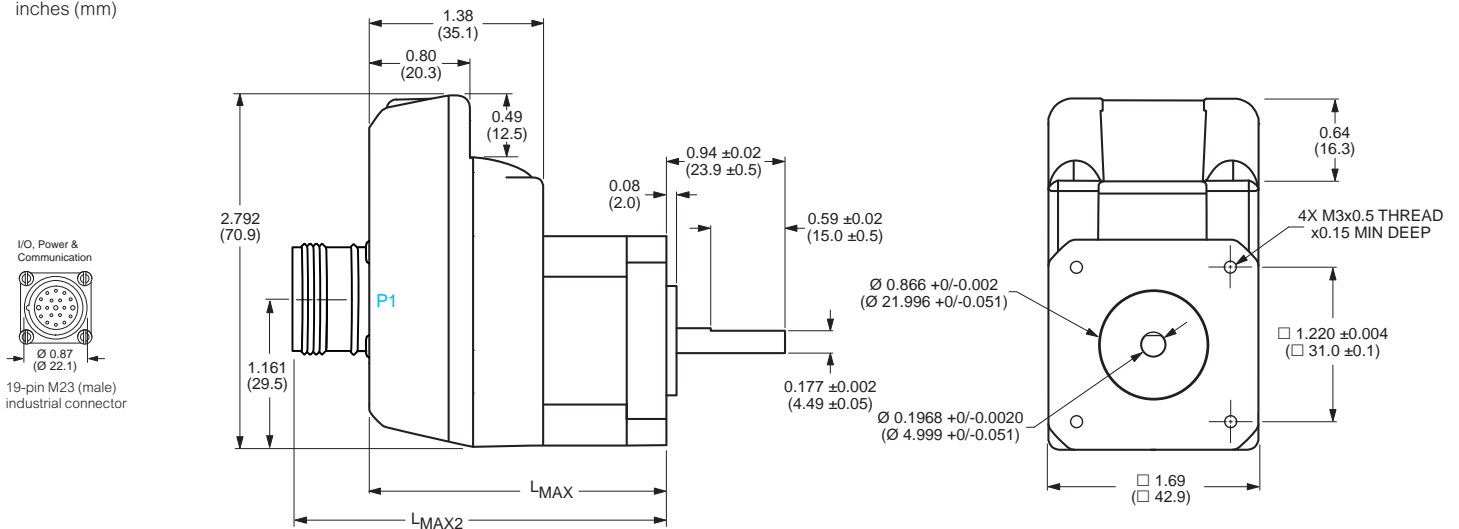


Lmax2 options



MDM•17 NEMA17 motor, IP65-rated

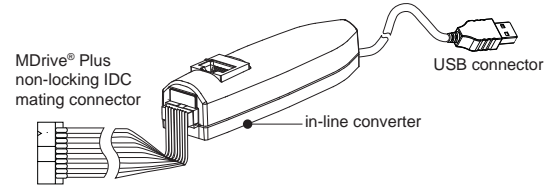
inches (mm)



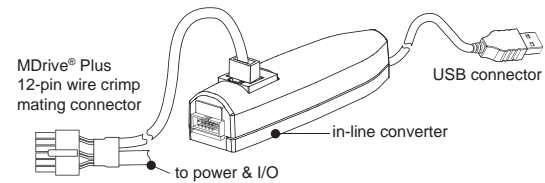
| Motor stack length | Lmax | Lmax2 |
|--------------------|--------------|--------------|
| Single | 2.39 (60.71) | 3.06 (77.72) |
| Double | 2.62 (66.55) | 3.29 (83.57) |
| Triple | 2.96 (75.18) | 3.63 (92.20) |

MDrive Plus

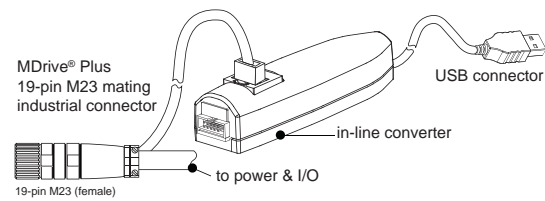
MDM•17 Step/direction input



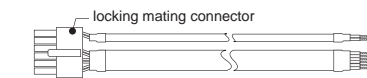
MD-CC300-001



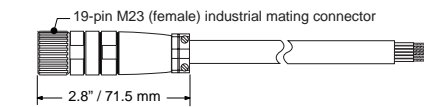
MD-CC303-001



MD-CC301-001



PD12-1434-FL3



MD-CS100-000

Accessories

| description | length feet (m) | part number |
|-------------|-----------------|-------------|
|-------------|-----------------|-------------|

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 MDrive17 step/direction input 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 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

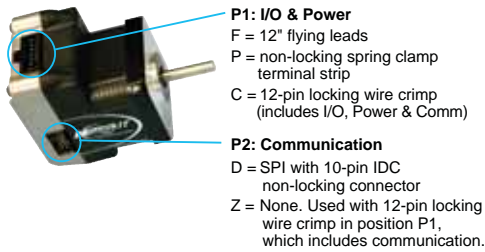
Limits surge current and voltage to a safe level when DC input power is switched on-and-off to an MDrive Plus.

| | | |
|------------------------------------------------|---|-------|
| For all MDrive17 step/direction input products | — | DPM75 |
|------------------------------------------------|---|-------|

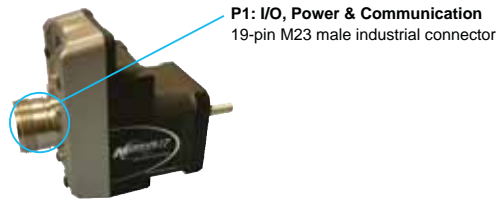
MDrive Plus

MDM•17 Step/direction input

MDrive® 17 Plus IP20



MDrive® 17 Plus IP65 with industrial connector



Part numbers

IP20-rated products

| | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------|---------------------|-----|-----|-----|-----|-----|-----|-----|------|------|---|---|----|
| example part number | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| QuickStart Kit K = kit option, omit from part number if unwanted | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| MDrivePlus version MDM = Step/direction input | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| Input 1 = Plus version with universal input 5 = Plus version with differential CW/CCW input | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| P1 connector F = flying leads P = pluggable C = wire crimp | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| Communication type S = SPI | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| P2 connector D = IDC Z = none (1) | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| Motor size 17 = NEMA 17 1.7" / 42mm | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| Motor length A = single stack B = double stack C = triple stack | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| Drive voltage 4 = +12 to +48 VDC | K | M | D | M | 1 | F | S | D | 1 | 7 | A | 4 | -N |
| Options — omit from part number if unwanted | | | | | | | | | | | | | -N |
| -N = rear control knob for manual positioning | | | | | | | | | | | | | -N |
| -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 | | | |

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

IP65-rated products

| | | | | | | | | | | | | |
|---------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| example part number | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |
| QuickStart Kit K = kit option, omit from part number if unwanted | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |
| MDrivePlus version MDM = Step/direction input | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |
| Input 2 = Plus version with universal input | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |
| P1 connector M = M23 industrial connector | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |
| Communication type S = SPI | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |
| P2 connector Z = none | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |
| Motor size 17 = NEMA 17 1.7" / 42mm | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |
| Motor length A = single stack B = double stack C = triple stack | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |
| Drive voltage 4 = +12 to +48 VDC | K | M | D | M | 2 | M | S | Z | 1 | 7 | A | 4 |

MDrive Plus

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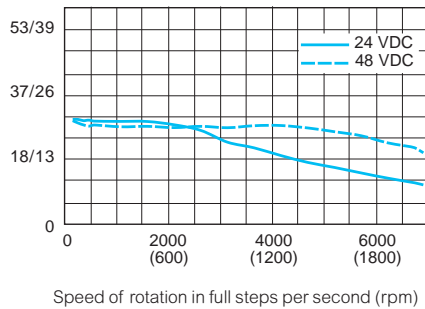
Motor performance

| 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)

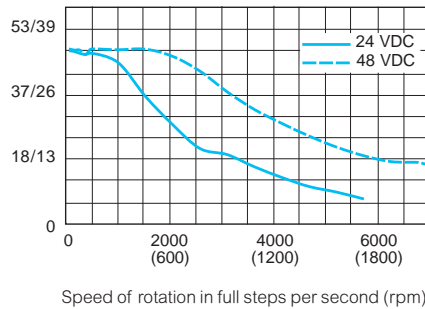
Single stack length

Torque in
Oz-In / N-cm



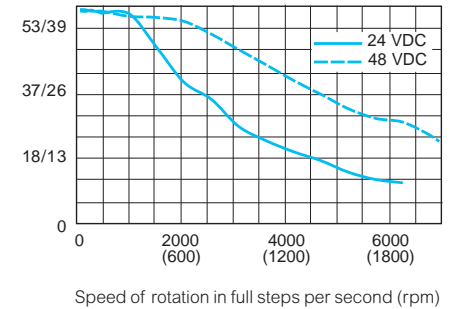
Double stack length

Torque in
Oz-In / N-cm



Triple stack length

Torque in
Oz-In / N-cm



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