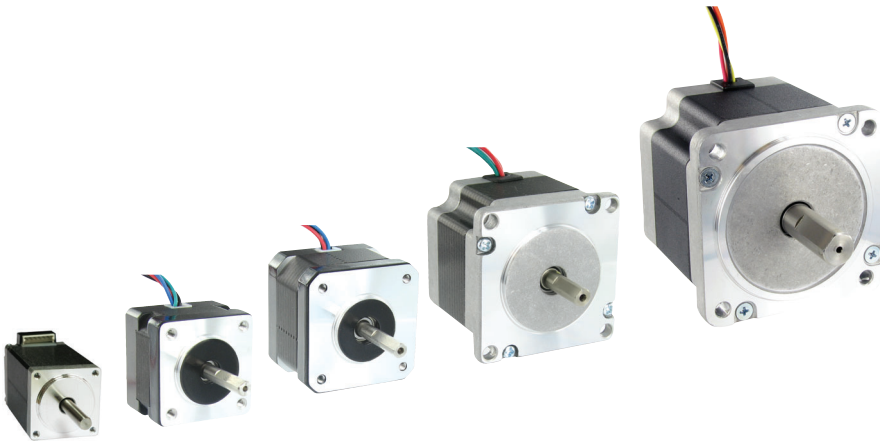


Stepper Motors

1.8° 2-phase stepper motors



NEMA 11, 14, 17, 23 and 34
1.8° 2-phase stepper motors

Product overview

- Presentation page 1
- Description page 1

Specifications

- Product offer page 2
- Motor types page 2

Dimensions

- NEMA11 page 3
- NEMA14 page 4
- NEMA17 page 4
- NEMA23 page 5
- NEMA34 page 5

Performance

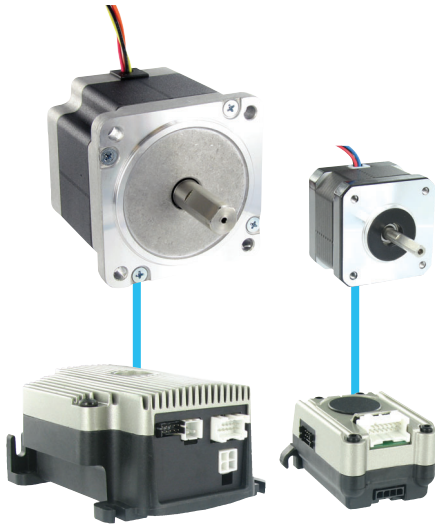
- Ambient conditions page 6
- Electrical and mechanical data page 6
- Speed-torque curves pages 7 & 8

Part numbers & accessories

- References page 9
- Encoders page 9
- Motor interface cable page 9

Stepper motors

1.8° 2-phase



Stepper motors with MForce drives

Presentation

The 2-phase stepper motors from Schneider Electric Motion USA are extremely robust, maintenance-free motors. They carry out precise step-by-step movements that are controlled by a stepper motor drive, such as MForce, to comprise a stepper motor drive system.

The 2-phase stepper motors can be operated at very high resolutions, depending on the stepper motor drive. Maximum power can only be obtained if motor and electronics are perfectly tuned to each other.

Special features

Quiet

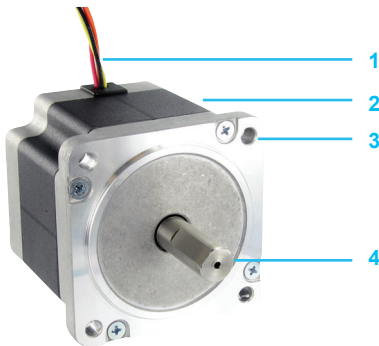
As a result of the special mechanical design of the motors and the sine commutation of Schneider Electric Motion drives such as MForce and Lexium Motion Module, the stepper motors are very quiet and run virtually without resonance.

Strong

The optimized internal geometry of the motor ensures a high power density.

Description


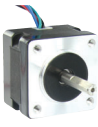

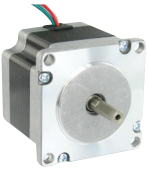
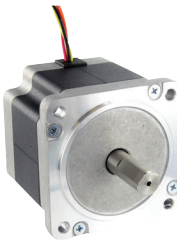
- 1 Motor connection: flying leads all sizes except for the NEMA 11 which is pluggable
- 2 Housing with black protective coating
- 3 Axial flange with four mounting points as per NEMA motor standards
- 4 Smooth shaft end



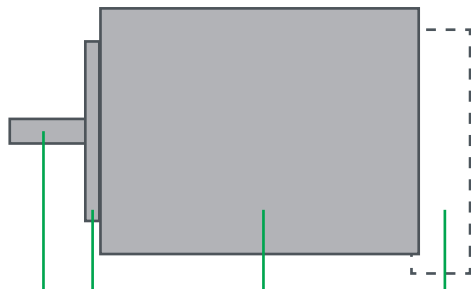
Stepper motors

1.8° 2-phase

Product offer

| 2-phase stepper motors | | M-11• | M-14• | M-17• | M-22• | M-34• |
|-------------------------------------|-------|---|---|--|---|---|
| | |  |  |  |  |  |
| Size | NEMA | 11 | 14 | 17 | 23 | 34 |
| Holding torque | oz-in | 13 ... 24 | 10 | 32 ... 75 | 90 ... 239 | 408 ... 1090 |
| | N-cm | 9 ... 17 | 7 | 23 ... 53 | 64 ... 169 | 288 ... 770 |
| Number of full steps per revolution | | 200 | | | | |
| Step angle α | ° | 1.8 | | | | |
| Motor connection | | pluggable connector | | 4 flying leads | | |

Motor types



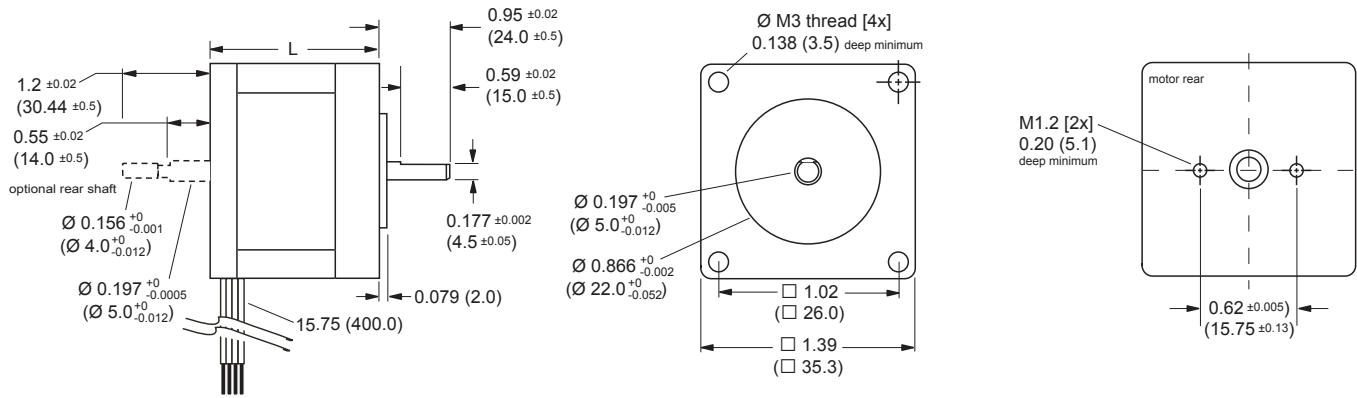
| Shaft version | Centering collar | | Flange size | | Lengths without shaft | | Winding | Motor connection | Optional rear shaft (1) | Optional encoder | | |
|--------------------------------------|------------------|--------|-------------|------|-----------------------|------|----------------------|------------------|--|---------------------|---|----------------------------|
| | inches | mm | inches | mm | inches | mm | | | | | | |
| M-11• | | | | | | | | | | | | |
| Round shaft with single flat feature | Ø 0.197 | Ø 5.0 | Ø 0.866 | Ø 22 | 0.65 | 16.5 | 1.22 1.57 2.01 | 31 40 51 | 2-phase full coil for bi-polar operation | pluggable connector | Round shaft | na |
| M-14• | | | | | | | | | | | | |
| Round shaft with single flat feature | Ø 0.197 | Ø 5.0 | Ø 0.866 | Ø 22 | 1.39 | 35.3 | 1.02 | 26 | 2-phase full coil for bi-polar operation | 4 flying leads | Round shaft | Single-end or differential |
| M-17• | | | | | | | | | | | | |
| Round shaft with single flat feature | Ø 0.197 | Ø 5.0 | Ø 0.866 | Ø 22 | 1.67 | 42.3 | 1.34 1.57 1.89 | 34 40 48 | 2-phase full coil for bi-polar operation | 4 flying leads | Flat feature extending to rear end bell | Single-end or differential |
| M-22• | | | | | | | | | | | | |
| Round shaft with single flat feature | Ø 0.25 | Ø 6.35 | Ø 1.50 | Ø 38 | 2.22 | 56.4 | 1.77 2.13 2.99 | 45 54 76 | 2-phase full coil for bi-polar operation | 4 flying leads | Flat feature extending to rear end bell (2) | Single-end or differential |
| M-34• | | | | | | | | | | | | |
| Round shaft with single flat feature | Ø 0.554 | Ø 14.0 | Ø 2.874 | Ø 73 | 3.386 | 86.0 | 2.48 3.15 4.72 | 63 80 120 | 2-phase full coil for bi-polar operation | 4 flying leads | Flat feature on round shaft | Single-end or differential |

(1) Optional rear shaft available except for NEMA23 2.4amp motors.

(2) Optional rear shaft on NEMA23 6.0amp motors is round without a flat feature.

NEMA14

Dimensions in inches (mm)

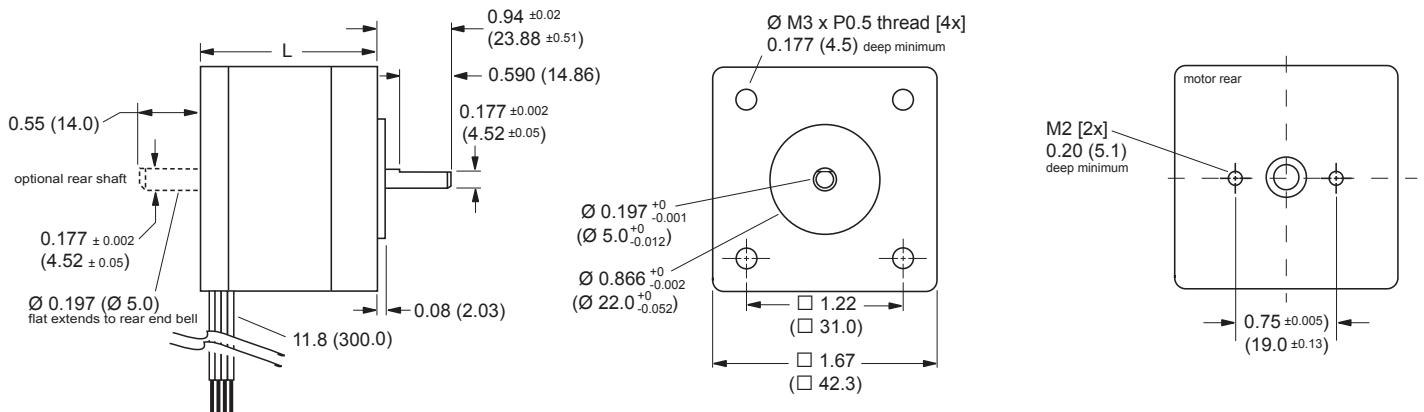


L

| | |
|--------------|-----------|
| M-1410-0.75• | 1.02 (26) |
|--------------|-----------|

NEMA17

Dimensions in inches (mm)



L

| | |
|-------------|-----------|
| M-1713-1.5• | 1.34 (34) |
| M-1715-1.5• | 1.57 (40) |
| M-1719-1.5• | 1.89 (48) |

| Ambient conditions | | |
|-----------------------------------|----|--|
| Ambient temperature | °C | -25 ... +40 |
| Max. installation height | m | < 1000, over m.s.l. without power loss |
| Transport and storage temperature | °C | -25 ... +70 |
| Relative humidity | % | 15 ... 85, no condensation allowed |
| Thermal class | | 130 (B) |

| Electrical and mechanical data | | | | | |
|--------------------------------|------------------------|-------------|-------------|-------------|--|
| NEMA11 | | M-1112-1.0• | M-1116-1.4• | M-1120-1.5• | |
| Stack length | | single | double | triple | |
| Phase current | amps | 1.0 | 1.4 | 1.5 | |
| Holding torque | oz-in (N-cm) | 12.9 (9.1) | 17.8 (12.6) | 24.1 (17.0) | |
| Rotor inertia | oz-in-sec ² | 0.00012745 | 0.00017 | 0.0002549 | |
| | kg-cm ² | 0.00000918 | 0.00001224 | 0.0000184 | |
| Phase inductance | mH | 2.5 | 1.56 | 1.48 | |
| Phase resistance | Ω | 2.7 | 1.77 | 1.65 | |
| Weight | oz (grams) | 3.5 (100) | 5.29 (150) | 7.0 (200) | |

| NEMA14 | | M-1410-0.75• | | |
|------------------|------------------------|--------------|--|--|
| Stack length | | single | | |
| Phase current | amps | 0.75 | | |
| Holding torque | oz-in (N-cm) | 10 (7) | | |
| Rotor inertia | oz-in-sec ² | 0.00017 | | |
| | kg-cm ² | 0.012 | | |
| Phase inductance | mH | 4.0 | | |
| Phase resistance | Ω | 4.3 | | |
| Weight | oz (grams) | 4.2 (120) | | |

| NEMA17 | | M-1713-1.5• | M-1715-1.5• | M-1719-1.5• | |
|------------------|------------------------|-------------|-------------|-------------|--|
| Stack length | | single | double | triple | |
| Phase current | amps | 1.5 | 1.5 | 1.5 | |
| Holding torque | oz-in (N-cm) | 32 (23) | 60 (42) | 75 (53) | |
| Rotor inertia | oz-in-sec ² | 0.000538 | 0.0008037 | 0.0011562 | |
| | kg-cm ² | 0.038 | 0.057 | 0.082 | |
| Phase inductance | mH | 2.1 | 5.0 | 3.85 | |
| Phase resistance | Ω | 1.3 | 2.1 | 2.0 | |
| Weight | oz (grams) | 7.4 (210) | 8.1 (230) | 12.7 (360) | |

| NEMA23 | | M-2218-2.4S | M-2222-2.4S | M-2231-2.4S | M-2218-3.0• | M-2222-3.0• | M-2231-3.0• | M-2218-6.0• | M-2222-6.0• | M-2231-6.0• |
|------------------|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Stack length | | single | double | triple | single | double | triple | single | double | triple |
| Phase current | amps | 2.4 | 2.4 | 2.4 | 3.0 | 3.0 | 3.0 | 6.0 | 6.0 | 6.0 |
| Holding torque | oz-in (N-cm) | 90 (64) | 144 (102) | 239 (169) | 90 (64) | 144 (102) | 239 (169) | 100 (71) | 150 (106) | 257 (181) |
| Rotor inertia | oz-in-sec ² | 0.00255 | 0.00368 | 0.0065 | 0.00255 | 0.00368 | 0.0065 | 0.0017 | 0.00397 | 0.0068 |
| | kg-cm ² | 0.18 | 0.26 | 0.46 | 0.18 | 0.26 | 0.46 | 0.12 | 0.28 | 0.48 |
| Phase inductance | mH | 2.4 | 4.0 | 5.4 | 1.5 | 2.6 | 3.36 | 0.47 | 0.73 | 1.04 |
| Phase resistance | Ω | 0.95 | 1.2 | 1.5 | 0.65 | 0.85 | 0.95 | 0.16 | 0.19 | 0.23 |
| Weight | oz (grams) | 16.9 (480) | 21.2 (600) | 35.3 (1000) | 16.9 (480) | 21.2 (600) | 35.3 (1000) | 16.6 (470) | 24.7 (700) | 35.3 (1000) |

| NEMA34 | | M-3424-6.3• | M-3431-6.3• | M-3447-6.3• | |
|------------------|------------------------|-------------|-------------|--------------|--|
| Stack length | | single | double | triple | |
| Phase current | amps | 6.3 | 6.3 | 6.3 | |
| Holding torque | oz-in (N-cm) | 408 (288) | 574 (405) | 1090 (770) | |
| Rotor inertia | oz-in-sec ² | 0.01275 | 0.01924 | 0.03849 | |
| | kg-cm ² | 0.90 | 1.35 | 2.70 | |
| Phase inductance | mH | 1.9 | 3.3 | 6.2 | |
| Phase resistance | Ω | 0.30 | 0.32 | 0.56 | |
| Weight | oz (grams) | 60.0 (1700) | 84.7 (2400) | 141.1 (4000) | |

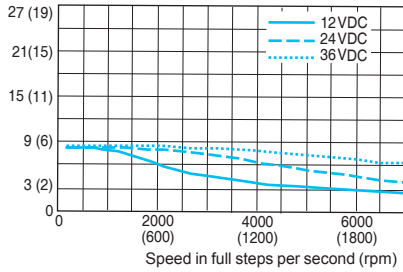
Stepper motors

1.8° 2-phase

Speed-torque curves

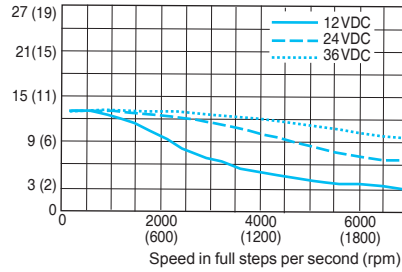
NEMA11: M-1112-1.0•

Torque in Oz-In (N-cm)



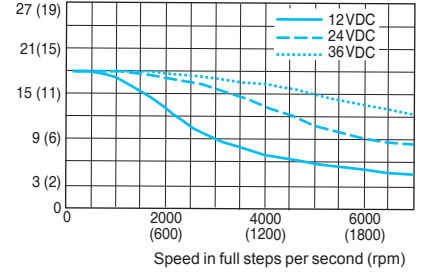
NEMA11: M-1116-1.4•

Torque in Oz-In (N-cm)



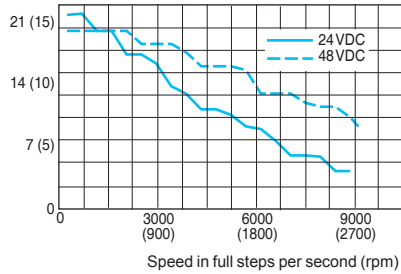
NEMA11: M-1120-1.5•

Torque in Oz-In (N-cm)



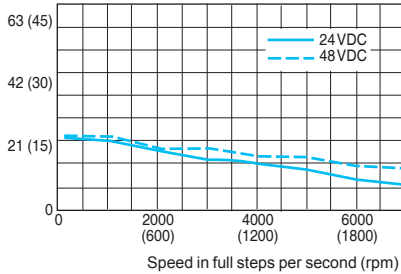
NEMA14: M-1410-0.75•

Torque in Oz-In (N-cm)



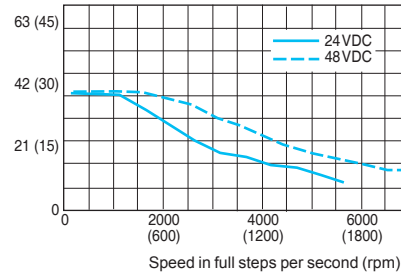
NEMA17: M-1713-1.5•

Torque in Oz-In (N-cm)



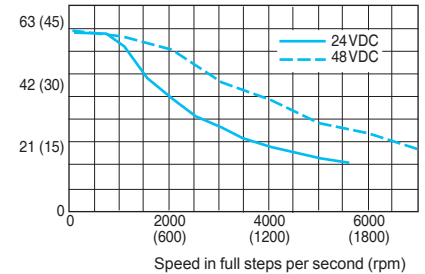
NEMA17: M-1715-1.5•

Torque in Oz-In (N-cm)



NEMA17: M-1719-1.5•

Torque in Oz-In (N-cm)



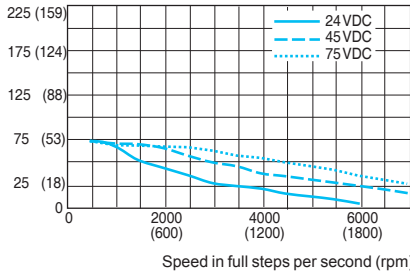
Stepper motors

1.8° 2-phase

Speed-torque curves

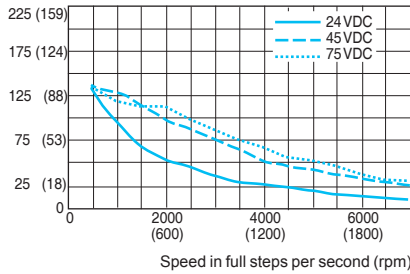
NEMA23: M-2218-2.4S

Torque in Oz-In (N-cm)



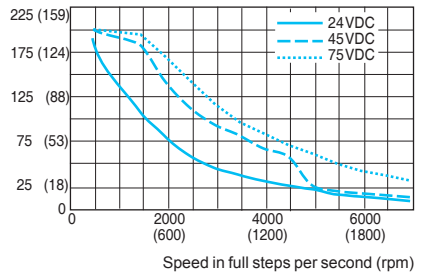
NEMA23: M-2222-2.4S

Torque in Oz-In (N-cm)



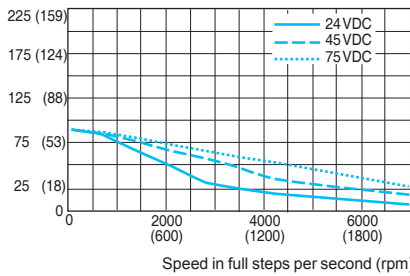
NEMA23: M-2231-2.4S

Torque in Oz-In (N-cm)



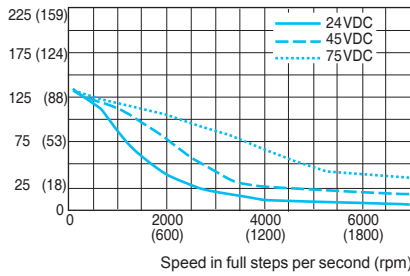
NEMA23: M-2218-3.0•

Torque in Oz-In (N-cm)



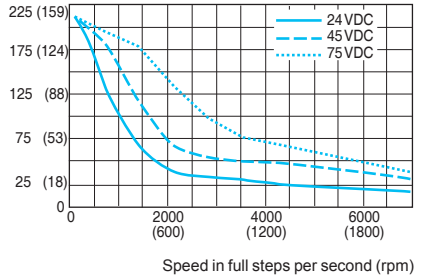
NEMA23: M-2222-3.0•

Torque in Oz-In (N-cm)



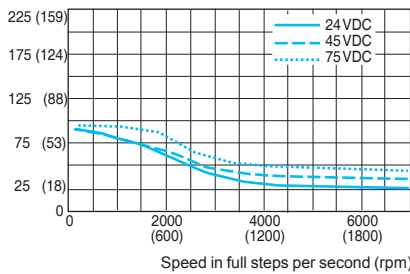
NEMA23: M-2231-3.0•

Torque in Oz-In (N-cm)



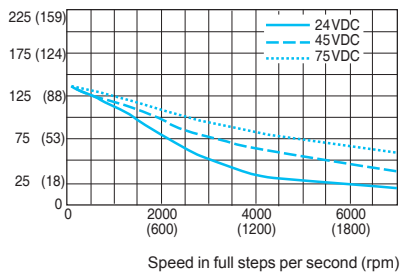
NEMA23: M-2218-6.0•

Torque in Oz-In (N-cm)



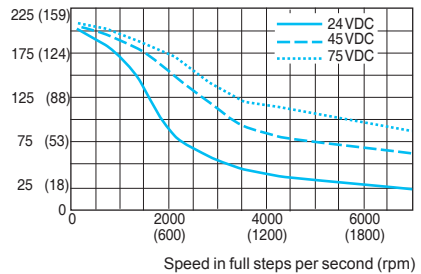
NEMA23: M-2222-6.0•

Torque in Oz-In (N-cm)



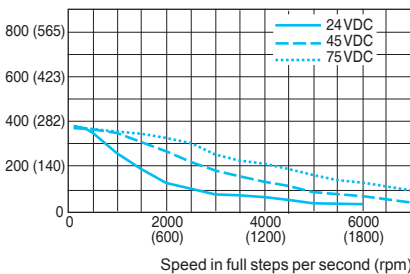
NEMA23: M-2231-6.0•

Torque in Oz-In (N-cm)



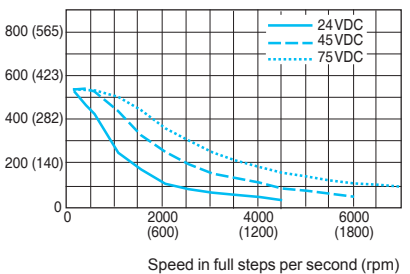
NEMA34: M-3424-6.3•

Torque in Oz-In (N-cm)



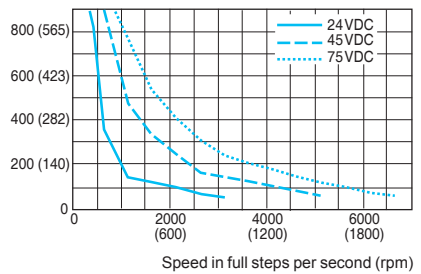
NEMA34: M-3431-6.3•

Torque in Oz-In (N-cm)



NEMA34: M-3447-6.3•

Torque in Oz-In (N-cm)



References

Example: M - 1 7 1 3 - 1.5 S

Motor type
M = 1.8° 2-phase stepper motor

NEMA flange size
11 = NEMA 11 (28 mm)
14 = NEMA 14 (36 mm)
17 = NEMA 17 (42 mm)
23 = NEMA 23 (57 mm)
34 = NEMA 34 (85 mm)

Motor length - Amps phase current

| NEMA size | motor stack length & amps | | |
|-----------|---------------------------|------------|------------|
| | single | double | triple |
| 11 | 12-1.0 | 16-1.4 | 20-1.5 |
| 14 | 10-0.75 | — | — |
| 17 | 13-1.5 | 15-1.5 | 19-1.5 |
| 23 | 18-2.4 (1) | 22-2.4 (1) | 31-2.4 (1) |
| | 18-3.0 | 22-3.0 | 31-3.0 |
| 34 | 18-6.0 | 22-6.0 | 31-6.0 |
| | 24-6.3 | 31-6.3 | 47-6.3 |

Shaft

S = single shaft
D = double shaft (1)

Optional encoder (1) (2)
Selecting an encoder option replaces the shaft designator (S or D) in the part number

encoder style & line count

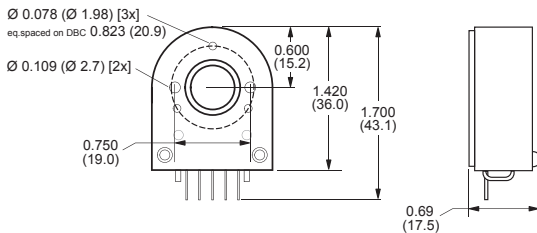
| motor # | single-end | differential |
|----------|------------|--------------|
| M-11• | na (2) | na (2) |
| M-14• | na (2) | na (2) |
| M-17• | ES100 | ED100 |
| M-23•3.0 | ES250 | ED250 |
| M-23•6.0 | ES400 | ED400 |
| | ES500 | ED500 |
| M-34• | ES1000 (3) | ED1000 (3) |

(1) NEMA23 2.4amp motors unavailable with double shaft or encoder option.

(2) No encoder option available for NEMA11 or 14 motors.

(3) All encoders have an index mark, except the ES1000 & ED1000.

Dimensions in inches (mm)



Encoders (1)

| Optical encoder | ES• (single-end) | ED• (differential) |
|-------------------------------|---------------------------------|---------------------------------|
| Number of signals | 3 | 5 |
| Line counts (2) | 100, 200, 250, 400, 500 or 1000 | 100, 200, 250, 400, 500 or 1000 |
| Mating cable part # | ES-CABLE-2 (3) | ED-CABLE-6 |
| Mating cable lengths feet (m) | 1.0 (0.3) | 6.0 (1.8) |

(1) No encoder option available for NEMA11 or 14 motors, or Nema23 2.4amp motors.

(2) All encoders have an index mark, except the 1000 line count version.

(3) Mating cable is not included and must be ordered separately.

Motor interface cable (4)

| Pre-wired motor interface cable with mating connector | Length feet (cm) | Part number |
|---|------------------|--------------|
| NEMA11 interface cable | 1.0 (30.5) | PD04-11-FL.3 |

(4) NEMA 14, 17, 23 & 34 motors have flying leads and do not require an interface cable.

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