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# SM SERIES STEPPER MOTORS

## Hybrid, Permanent Magnet Motors



- Industry-standard NEMA 23, 34, and 42 frame sizes for ease of installation
- Torque of 0.27 to 7.42 N-m (38 to 1050 oz-in) covers virtually any application requirement
- Standard 200 full step (1.8 degree/step) design is ideal for microstepping to 50,000 steps/revolution
- High quality materials used throughout, including stainless-steel shaft and double-shielded ball bearings
- Excellent non-cumulative step accuracy of  $\pm 3\%$

Aerotech offers seven standard models of hybrid, permanent magnet stepper motors. Covering the torque range of 0.27 to 7.42 N-m (38 to 1050 oz-in), these motors are well-suited for virtually all applications that employ stepping and/or microstepping drives.

Aerotech's stepper motors meet NEMA frame size standards for flange-mounted size 23, size 34, and size 42 motors. High quality materials and construction ensure a long service life, even in harsh environments.

### Standard Models

Standard models have flying leads (enclosed terminals on the 1010SM), rear shaft extensions, and load-end shaft flats for secure load coupling. The motors have a standard black textured finish.

Optional rear housings are available that provide either a bulkhead connector or integral cable

termination. Rear housing models include versions with a high-accuracy home marker encoder, standard optical encoder, and manual adjustment knob.



SM stepper motors on Aerotech's high-performance positioning stages




### Home Marker Models

An optional home marker encoder can be added to the standard models. The home marker provides an inexpensive means of establishing a highly accurate (0.1 micron in most Aerotech positioning systems) home reference.

The home marker encoder is protected in a rugged rear motor housing that also provides either a connector ("B" versions) or integral cable/connector ("C" versions) termination of the encoder's leads, as well as the motor and limit switch leads.

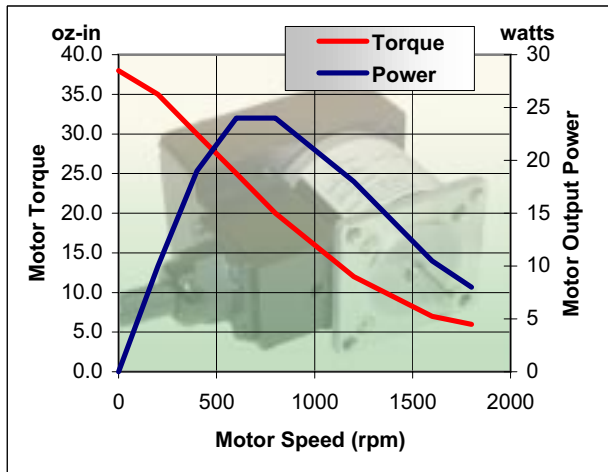
### Optical Encoder Models

An optical encoder with 500 or 1000 ppr is available for the SM series. The three-channel (A, B, marker), amplified-sine or line-driver encoder is housed in a rugged rear motor housing. All leads, including the motor and limit switch leads, are terminated in a connector ("B" versions) or integral cable/connector ("C" versions). 

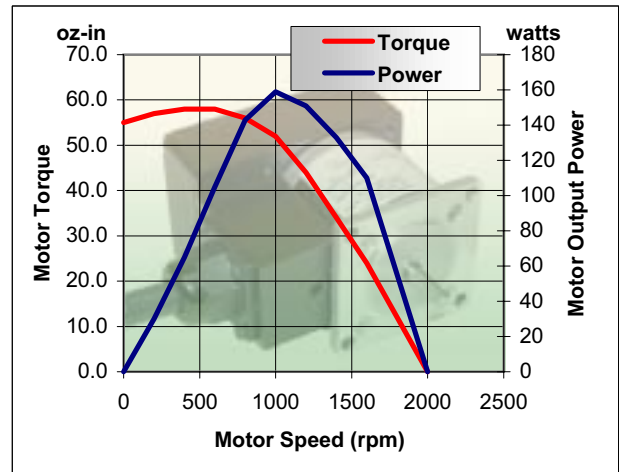
# SM Series Stepper Motor Specifications / Performance

MOTOR MODEL	UNITS	50SM	55SM	101SM	140SM
NEMA Motor Frame Size		23			
Stall Torque	N-m (oz-in)	0.3 (38)	0.4 (55)	0.6 (90)	1.0 (140)
Rated Phase Current	Amps	1	0.8	5	1.4
Recommended Driver Bus Voltage	Volts	40	160	40	160
Rotor Inertia	kg-m <sup>2</sup> (oz-in-s <sup>2</sup> )	12 x 10 <sup>-6</sup> (1.66 x 10 <sup>-3</sup> )	10 x 10 <sup>-6</sup> (1.42 x 10 <sup>-3</sup> )	35 x 10 <sup>-6</sup> (5 x 10 <sup>-3</sup> )	
Full Step Angle	Degrees	1.8			
Accuracy	Degrees	±0.054 (non-cumulative)			
Maximum Radial Load	N (lb)	67 (15)			
Maximum Thrust Load	N (lb)	111 (25)			
Weight	kg (lb)	0.6 (1.4)	0.7 (1.5)	1.3 (2.8)	1.4 (3.1)

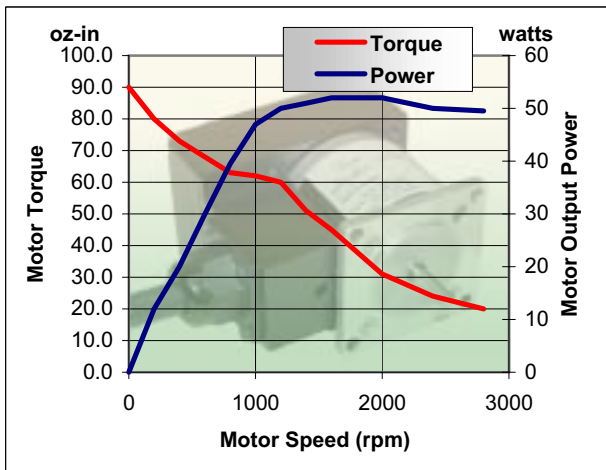
50SM



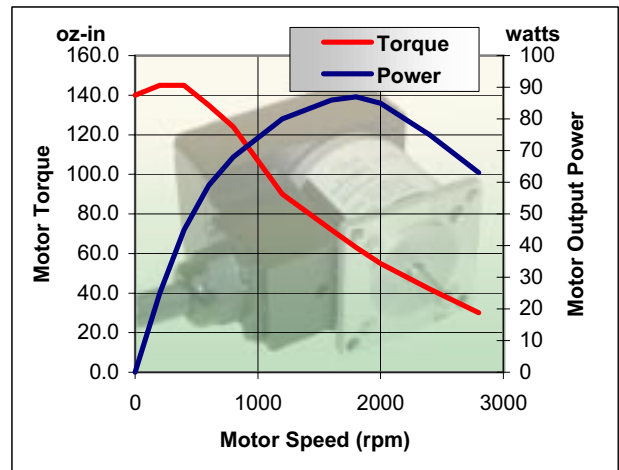
55SM



101SM



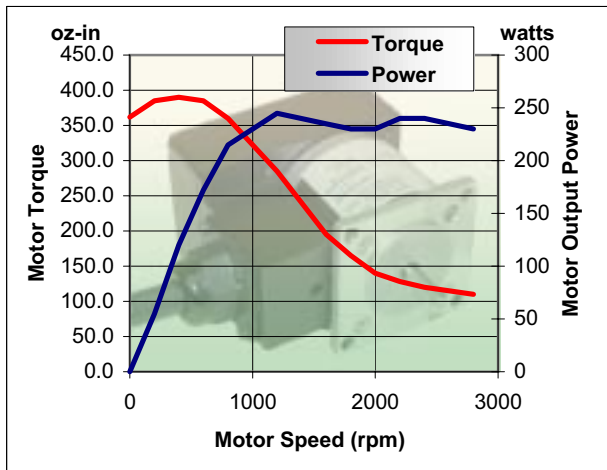
140SM



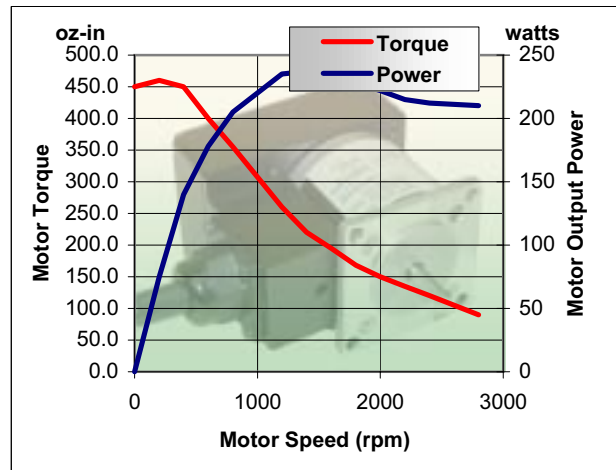
# SM Series Stepper Motor Specifications / Performance

MOTOR MODEL	UNITS	310SM	450SM	1010SM
NEMA Motor Frame Size		34		42
Stall Torque	N-m (oz-in)	2.6 (370)	3.2 (450)	7.4 (1050)
Rated Phase Current	Amps	6	3.5	8.6
Recommended Driver Bus Voltage	Volts	80	160	
Rotor Inertia	kg-m <sup>2</sup> (oz-in-s <sup>2</sup> )	187 x 10 <sup>-6</sup> (27 x 10 <sup>-3</sup> )		805 x 10 <sup>-6</sup> (114 x 10 <sup>-3</sup> )
Full Step Angle	Degrees	1.8		
Accuracy	Degrees	±0.054 (non-cumulative)		
Maximum Radial Load	N (lb)	156 (35)	111 (25)	178 (40)
Maximum Thrust Load	N (lb)	267 (60)	222 (50)	556 (125)
Weight	kg (lb)	3.5 (7.8)	3.6 (8.0)	9.1 (20)

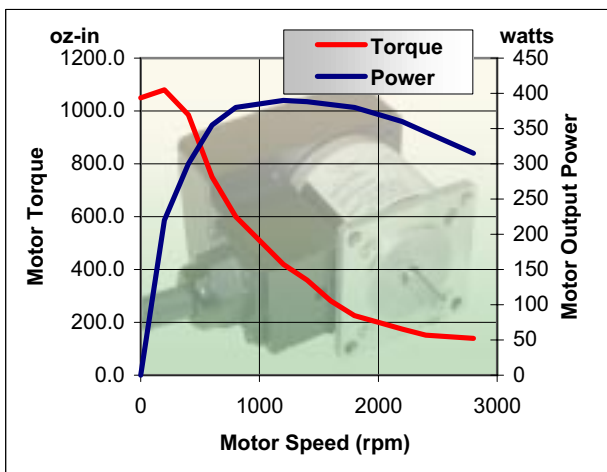
### 310SM



### 450SM

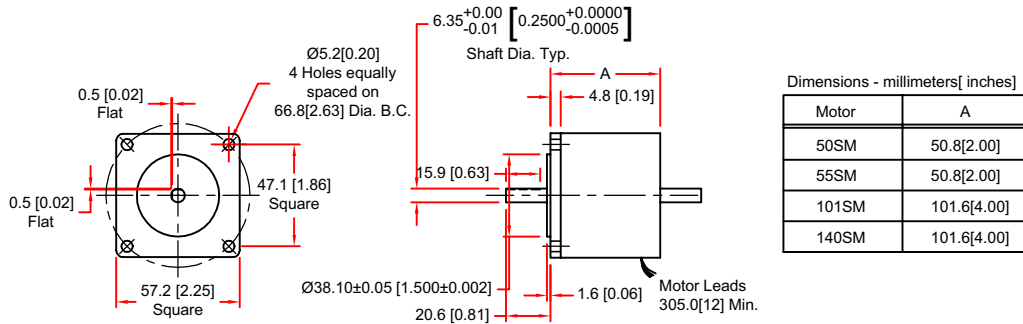


### 1010SM

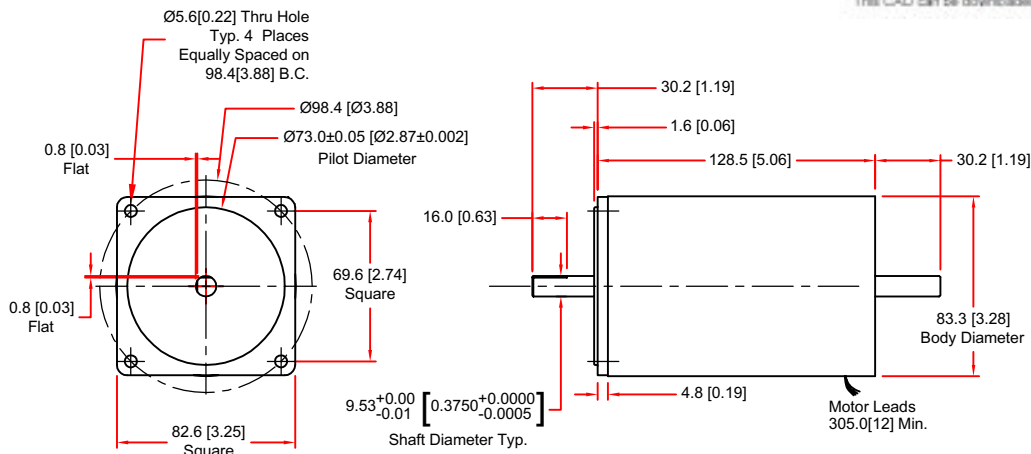


# SM Series Stepper Motor Dimensions

NEMA 23 Frame Stepper Motors: 50SM, 55SM, 101SM, 140SM

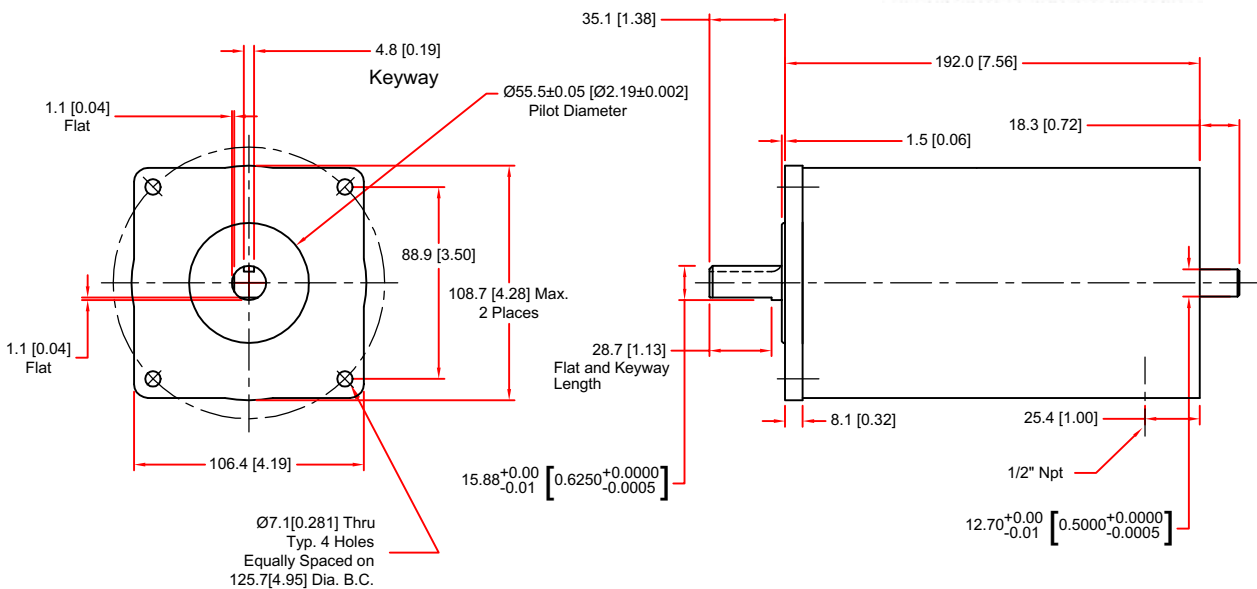


NEMA 34 Frame Stepper Motors: 310SM and 450SM



This CAD can be downloaded from our web site.

NEMA 42 Frame Size Stepper Motor: 1010SM

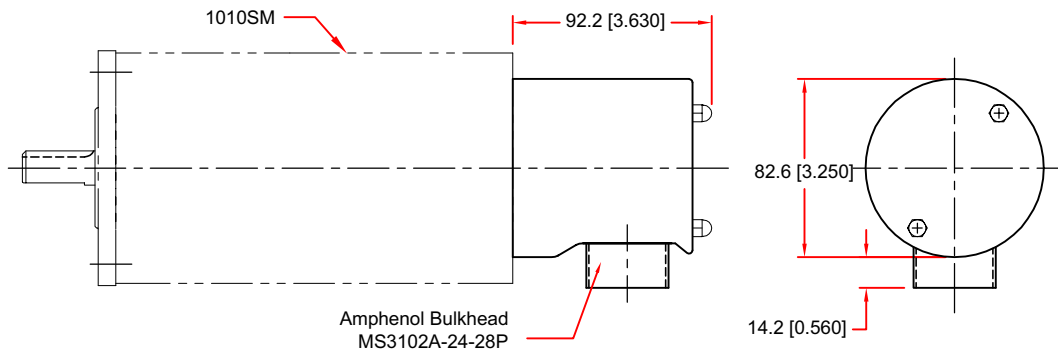


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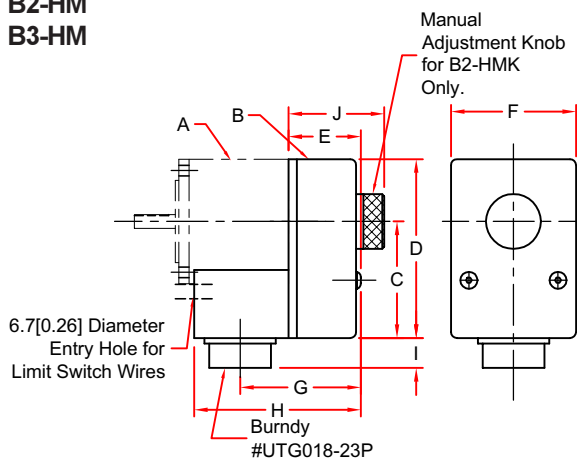


# SM Series Stepper Motor Dimensions

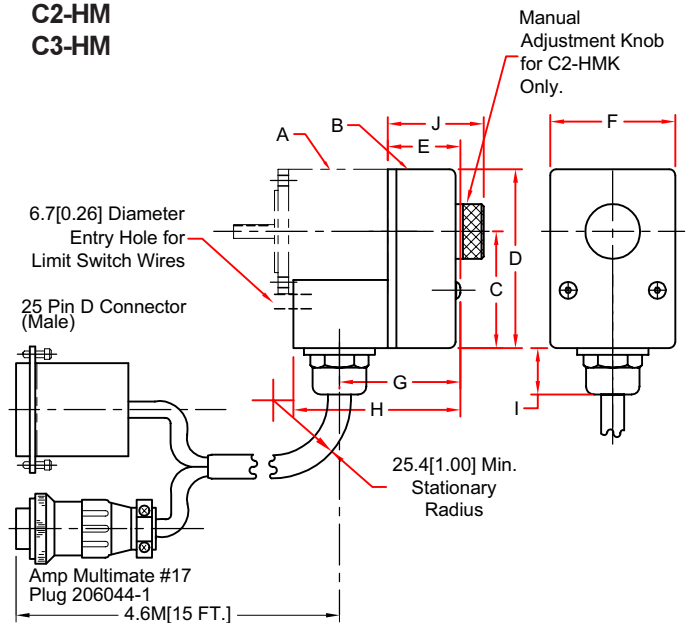
## B4-HM



## B2-HM B3-HM



## C2-HM C3-HM



ROTARY MOTORS



This CAD can be downloaded from our web site.

Dimensions - millimeters[ inches]

	A	B	C	D	E	F	G	H	I	J
50SM 55SM 101SM 140SM		C2-HM B2-HM	54.1[2.13]	83.3[3.28]	33.5[1.32]	57.9[2.28]	55.9[2.20]	77.2[3.04]	21.6[0.86]	—
310SM 450SM		C3-HM B3-HM	61.5[2.42]	104.7[4.12]	36.8[1.45]	86.4[3.40]	66.0[2.60]	87.6[3.45]	21.6[0.86]	—
50SM 55SM 101SM 140SM		C2-HMK B2-HMK	54.1[2.13]	83.3[3.28]	33.5[1.32]	57.9[2.28]	55.9[2.20]	77.2[3.04]	21.6[0.86]	44.5[1.75]
			54.1[2.13]	83.3[3.28]	33.5[1.32]	57.9[2.28]	55.9[2.20]	77.2[3.04]	13.7[0.54]	44.5[1.75]



# SM Series Motor Ordering Information

## PART NUMBER AND ORDERING EXAMPLE: 50SMB2-E500AS

50SM	B2	-E500AS
Stepping Motor Model	Rear Housing	Marker/Encoder/Knob
50SM, 55SM, 101SM, 140SM, 310SM, 450SM, 1010SM	B2, B3, B4 = Housing with connector C2, C3, C4, C2N, C2EN, C3N, C3EN = Housings with integral cable/connector	HM = Home marker encoder HMK = Home marker encoder plus manual adjustment knob (B2, C2 models only) ExxxxA = Optical encoder, amplified sine-wave output (specify resolution "xxxx") ExxxxLD = Optical encoder, line driver output (specify resolution "xxxx")

## Stepper Motors: Permanent Magnet, SM Series

50SM	NEMA 23 - 0.3 N-m (38 oz-in) 1.8 degree stepping motor
55SM	NEMA 23 - 0.4 N-m (55 oz-in) 1.8 degree stepping motor
101SM	NEMA 23 - 0.6 N-m (90 oz-in) 1.8 degree stepping motor
140SM	NEMA 23 - 1.0 N-m (140 oz-in) 1.8 degree stepping motor
310SM	NEMA 34 - 2.6 N-m (370 oz-in) 1.8 degree stepping motor
450SM	NEMA 34 - 3.2 N-m (450 oz-in) 1.8 degree stepping motor
1010SM	NEMA 42 - 7.4 N-m (1050 oz-in) 1.8 degree stepping motor

## Rear Housing Options

B2	Rear housing, connector for NEMA 23 motor, with limit switch wiring
C2	Rear housing, integral cable/connector for NEMA 23 motor, no limit switch wiring
C2N	Rear housing, integral cable/connector for NEMA 23 motor, with limit switch wiring
C2EN	Rear housing, integral end-exit cable/connector for NEMA 23 motor, with limit switch wiring
B3	Rear housing, connector for NEMA 34 motor (Requires HM), with limit switch wiring
B3E	Rear housing, end-exit connector for NEMA 34 motor, with limit switch wiring (Requires HM)
C3	Rear housing, integral cable/connector for NEMA 34 motor (Requires HM)
C3N	Rear housing, integral cable/connector for NEMA 34 motor, with limit switch wiring
C3EN	Rear housing, integral end-exit cable/connector for NEMA 34 motor, with limit switch wiring
B4	Rear housing, connector for NEMA 42 motor, with limit switch wiring (Requires HM)
-K	Adjust knob for NEMA 23 stepper motors
-K	NEMA 34, 42 Adjust knob for NEMA 34, 42 stepper motors
-HM	Home marker encoder
-HMK	Home marker encoder and manual adjust knob (NEMA 23 motor only)
-ExxxxAS **	Rotary encoder with amplified sine output
-ExxxxLD **	Rotary encoder with line driver output

\* Marker/encoder/knob options not available on C4 and P

\*\* Specify encoder resolution ("xxxx") in steps per rev when ordering

## Mating Connectors

MCB2B3	Mate for B2 and B3 stepper cans
MCMS	Mate for MS connector on B4 stepper can (MS3102A-24)
MCKU10	Two connector mates for the two connectors on the C2 and C3 integral cables
W100	Option to make integral cable wiring compatible with the U100
P *	UNIDEX 100 mating connector for 55SM, 140SM, 450SM motors

