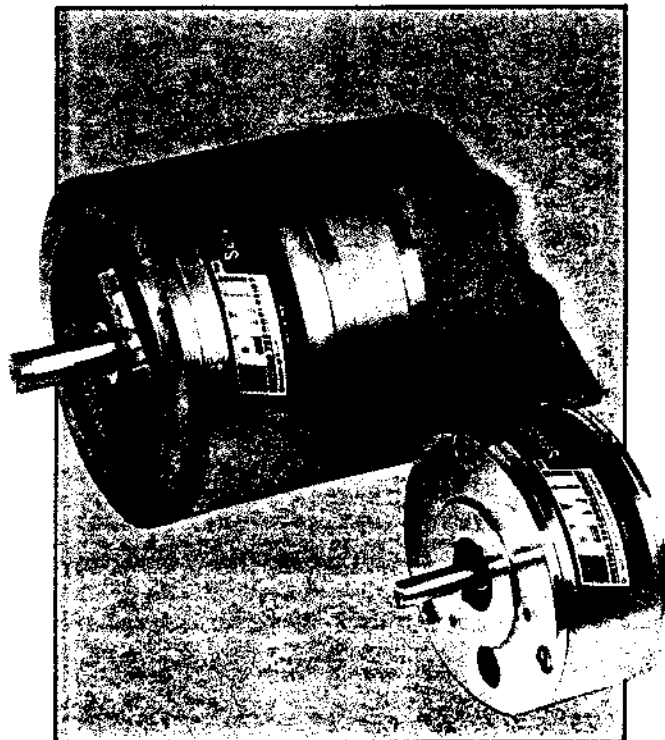


# DC Servo Motors

## S-Series ServoDisc™

### FEATURES

- **UNIQUE SERVO-DISC ARMATURE FOR HIGH PERFORMANCE**
- **FAST ACCELERATION FOR HIGHER THRUPUT**
- **WIDE SPEED RANGE FOR MAXIMUM FLEXIBILITY**
- **ZERO COGGING FOR SMOOTH OPERATION**
- **COMPACT SIZE FOR EASY DESIGN INTEGRATION**
- **OPTIONAL RUGGED HOUSING PROTECTS AGAINST HARSH ENVIRONMENTS**



High performance and industrial packaging are now available in S-Series motors from PMI. S-Series motors incorporate the unique ServoDisc™ technology. The armature of the ServoDisc motor is a low inertia, flat, ironless disc. Incorporating an axial air gap in a permanent-magnet field, it delivers unsurpassed servomotor performance.

This design has distinct advantages over conventional iron core armature motors:

The low inertia of the armature delivers high acceleration and deceleration, dramatically increasing thruput. This is especially useful in incremental motion applications and when exact positioning is necessary.

Full torque is delivered over the entire speed range of zero to 4000 rpm. Therefore, "over-sizing" a motor is unnecessary, saving weight and space.

Zero cogging results in smooth operation at even the lowest speeds. This is particularly valuable when torque ripple cannot be tolerated.

ServoDisc motors are easily integrated into tight mechanical designs because of their very compact shape.

Rugged housings and mil-type connectors added to S-Series motors protect the motors and optional integral components such as encoders, tachometers and fail-safe brakes. They have been designed for harsh industrial environments where protection from damaging elements is essential.



ServoDisc® is a registered trademark of PMI Motion Technologies  
ServoDisc® Products are made in the USA.

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# SPECIFICATIONS

25°C Ambient unless specified

## MAXIMUM PERFORMANCE

		S6M4H S6M4HI	S9M4H S9M4HI	
Peak Torque	TP	217 153	935 660	oz-in N-cm
Continuous Stall Torque	TS	20 14	85 60	oz-in N-cm
Peak Current	IP	51	79	amps
Continuous Stall Current	IS	4.8	7.5	amps
Peak Acceleration (No Load)	AP	256	167	krad/sec <sup>2</sup>
Cogging Torque	TC	0 0	0 0	oz-in N-cm

## RATED PERFORMANCE

Torque	T	21 15	86 61	oz-in N-cm
Speed	N	3000	3000	rpm
Power Output	P	46.5	190	watts
Terminal Voltage	E	17.8	35	volts
Current	I	5.2	7.8	amps

## INTRINSIC MOTOR CONSTANTS

Torque Constant	KT	4.26 3.01	11.91 8.41	oz-in/amp N-cm/amp
Back EMF Constant	KE	3.15	8.80	volts/krpm
Terminal Resistance	RT	1.207	0.85	ohms
Armature Resistance	RA	0.940	0.66	ohms
Average Friction Torque	TF	0.9 0.6	4.0 2.8	oz-in N-cm
Viscous Damping Constant	KD	0.16 0.11	1.32 .93	oz-in/krpm N-cm/krpm
Moment of Inertia	JM	0.00085 .060	.0056 .396	oz-in sec <sup>2</sup> kg-cm <sup>2</sup>
Armature Inductance	L	<100	<100	micro H

## DERIVED MOTOR CONSTANTS

Mechanical Time Constant	TM	6.16	3.7	millisec
Electrical Time Constant	TE	0.11	0.15	millisec
Speed Regulation at Constant Voltage	RM	69.23	6.24	rpm/oz-in

## THERMAL RESISTANCE

Armature to Ambient at Stall	RAA	3.32	2.00	deg C/watt
Armature to Ambient at 3000 rpm	RAA	2.70	1.50	deg C/watt

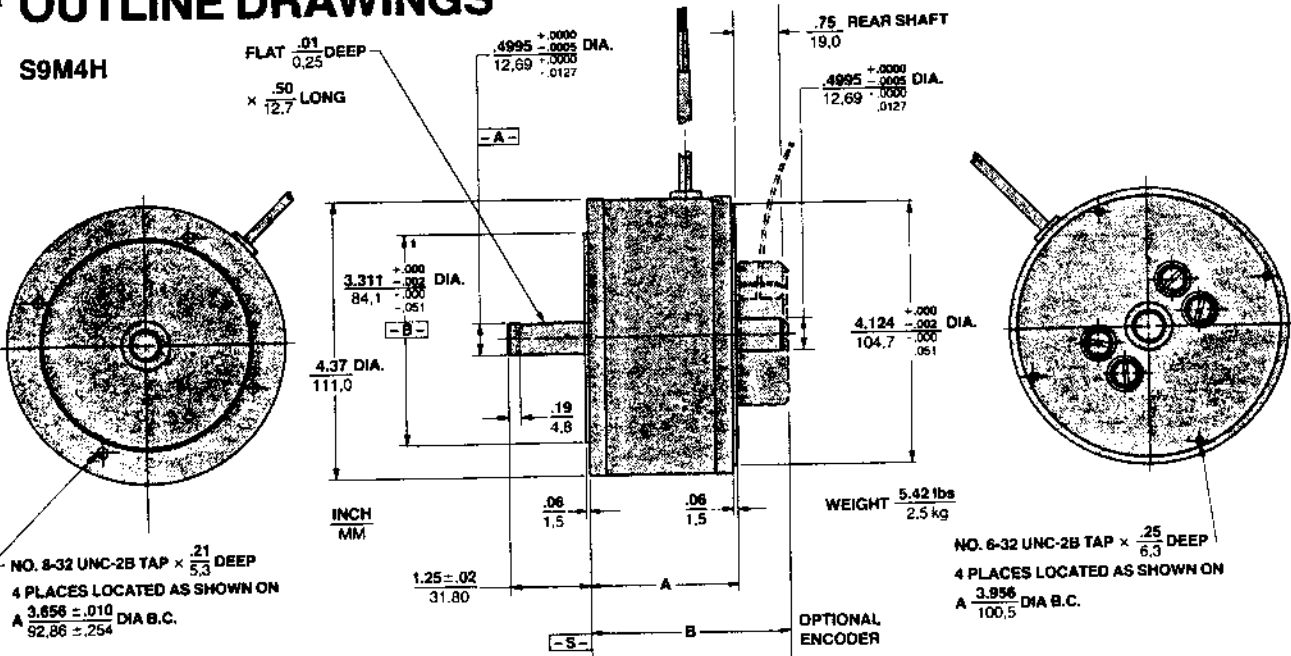
S6M4H (Mounted on 8" x 8" x 3/4" AL heat sink)  
S6M4HI

S9M4H (Mounted 8" x 16" x 3/4" AL heat sink)  
S9M4HI



# OUTLINE DRAWINGS

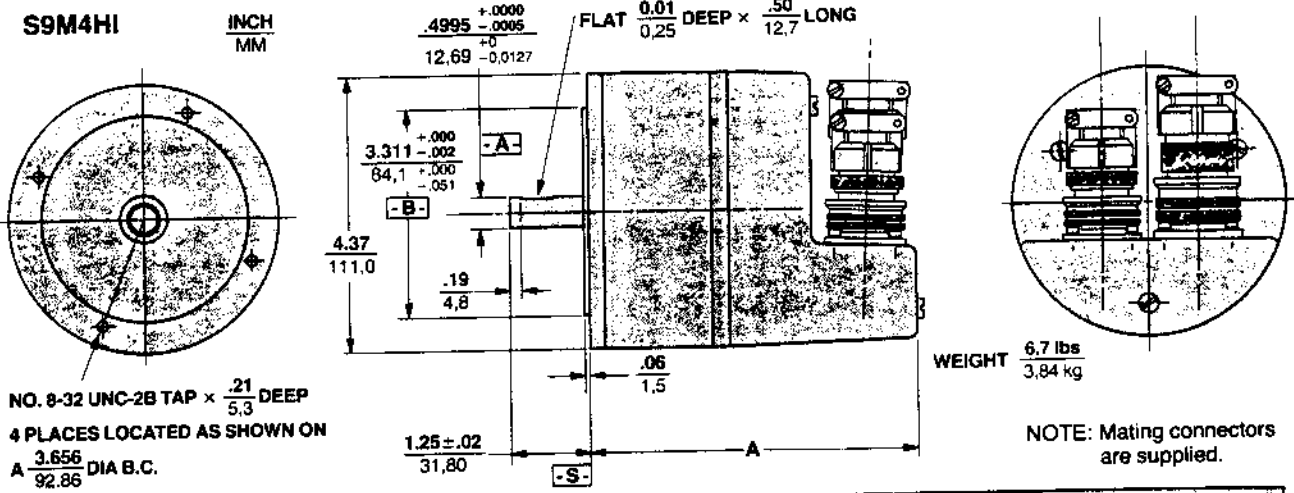
**S9M4H**



			MOTOR	MOTOR/TACHOMETER	MOTOR/BRAKE	MOTOR/BRAKE TACHOMETER
A	WITHOUT ENCODER	INCH	2.28	3.25	3.7	4.7
		MM	57.9	82.6	94.0	119.0
B	WITH ENCODER	INCH	3.09	4.06	4.5	5.5
		MM	78.5	103.0	114.0	140.0

Shaft Loading - S9M4H & S9M4HI - Radial  $\frac{25}{11.4}$  lbs kg @  $\frac{1}{25.4}$  from **-S-** - Axial 25 lbs any direction 11.4 kg

**S9M4HI**



			MOTOR	MOTOR/TACHOMETER	MOTOR/BRAKE	MOTOR/BRAKE TACHOMETER
A	WITHOUT ENCODER	INCH	5.19	6.17	6.6	7.6
		MM	131.8	157.0	167.6	193.0
B	WITH ENCODER	INCH	5.19	6.17	6.6	7.6
		MM	131.8	157.0	167.6	193.0

Motor Connector - MS3102A16S-IP Encoder Connector - MS3102A18-IP

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## OPTIONS

### TACHOMETER

S6M4H S9M4H  
S6M4HI S9M4HI

SPECIFICATIONS	S6T	S9A4T	
Output Voltage	0.75	3.00	volts/krpm
Max Ripple Peak to Peak	1.5	1.5	% (Note 1)
Linearity Referred to 3600 rpm	0.06	0.06	%
Bi-Directional Tolerance	1.5	1.5	%
Output Impedance	<5	<5	ohms
Moment of Inertia	0.00025 0.018	0.0024 0.169	oz-in sec <sup>2</sup> kg-cm <sup>2</sup>
Temperature Coefficient	-0.02	-0.02	%/°C rise
Recommended Load Resistance	1000	1000	ohms
Additional Weight	1.13 0.51	2.0 0.91	lbs kg

Note 1: with 500 Hz low pass filter

### ENCODER M23

SPECIFICATIONS	FOR ALL MOTORS
Resolution	Up to 2540 cycles per revolution (500 for sinewave)
Frequency Response	100 khz
Output Format	Quadrature Channels & Index
Phasing	90° ± 30° maximum
Output Levels— 5, 12, and 15 volts	TTL & CMOS compatible
Input Power	5, 12 and 15 volts 150 ma maximum
Moment of Inertia	0.00025 oz-in sec <sup>2</sup> / 0.018 kg-cm <sup>2</sup>
Additional Weight	0.23 lbs / 0.1 kg

### ELECTRICALLY RELEASED BRAKE

SPECIFICATIONS	S6M4H S6M4HI	S9M4H S9M4HI
DC Voltage	24 volts	24 volts
Input Power @ 20°C Nominal	8 watts	9 watts
Holding Torque	3 lb minimum	8 lb minimum
Inertia	0.0028 oz-in-sec <sup>2</sup>	0.0085 oz-in-sec <sup>2</sup>
Additional Weight	0.65 lbs 0.3 kg	1 lb 0.45 kg

Brakes are intended for power loss situations or to hold motor when motor is at a standstill.  
Additional options available include IP55 environmental sealing and prep for resolver.  
Contact PMI for further details.

All specifications subject to change without notice.

## CONNECTIONS

### MOTOR/TACH MOTOR/TACH/ BRAKE

(for clockwise rotation)

S6M4HI/S9M4HI

LEAD	PIN
(+) Motor Lead	A
(-) Motor Lead	B
(+) Tach. Lead	C
(-) Tach. Lead	D
(+) Brake Lead	E
(-) Brake Lead	F
Case Ground	G

### ENCODER

S6M4HI/S9M4HI

FUNCTION	PIN
Output A	A
Output B	B
Index	C
V+	D
Common	F
Case Ground	G
* Output A	H
* Output B	I/K (1)
* Index	J
** +15V	H
** -15V	I/K (1)

\* Additional outputs for complimentary models

\*\* Split supply for amplified sinewave

NOTES:

(1) S6M4HI uses Pin K  
S9M4HI uses Pin I

5075