Brushless, Frameless Torque Motors **S Series**

Smooth, Reliable Motion with Outstanding Velocity Control

With an ironless, slotless stator design and high pole-count rotor, S series frameless torque motors have no cogging or torque/velocity ripple effects—so you get exceptionally smooth motion and outstanding velocity stability. A unique coil design maximizes torque density. Choose from a wide variety of standard sizes or work with our motor experts to achieve your ideal customizations.

KEY FEATURES:

- Slotless, ironless design ELIMINATES
 COGGING & TORQUE/VELOCITY RIPPLE
- EASILY INTEGRATES into OEM machines & subsystems
- WIDE VARIETY OF DIAMETERS (50 mm to 240 mm)
- Continuous TORQUE UP TO 34 N*m
- Maximum SPEEDS UP TO 8000 rpm
- Includes HALL EFFECT SENSORS for commutation
- Conforms to EU 2015/863 RoHS 3 directive

S SERIES SPECIFICATIONS

Model	Units	S-50-39		S-50-52		S-50-86		S-76-35		S-76-85		S-76-149	
Winding Designation		-А -В		-A	-B	-A	-B	-A	-В	-A	-В	-A	-B
Performance Specifications ¹²													
Stall Torque, Continuous ³	N∙m	0.21		0.32		0.59		0.48		1.84		3.10	
Peak Torque⁴	N∙m	0.8		1.3		2.4		1.9		7.3		12.4	
Rated Speed	rpm	4000	8000	4000	8000	3000	8000	3000	5000	3000	4000	2000	1500
Rated Power Output, Continuous	W	87.5	174.6	133.6	266.4	185.0	491.2	151.6	252.1	573.6	763.3	645.1	484.4
Electrical Specifications ²													
BEMF Constant (Line-Line)	V/krpm	10.5	3.5	16.8	5.6	34.0	11.3	29.3	14.6	58.4	38.9	76.4	114.6
Continuous Current, Stall ³	А	2.40	7.2	2.3	6.9	2.1	6.3	2.0	4.0	3.8	5.7	4.9	3.27
Peak Current, Stall₄	А	9.6	28.8	9.2	27.6	8.4	25.2	8.0	16.0	15.2	22.8	19.6	13.1
Torque Constant ^{5,6}	N∙m/A	0.09	0.03	0.14	0.05	0.28	0.09	0.24	0.12	0.48	0.32	0.63	0.95
Motor Constant ^{3,5}	N·m/√W	0.034		0.047		0.077		0.075		0.199		0.296	
Resistance, 25°C, (Line-Line)	Ω	6.87	0.76	8.85	0.98	13.60	1.51	10.71	2.68	6.04	2.68	4.7	10.5
Inductance (Line-Line)	mH	1.43	0.16	1.98	0.22	3.4	0.38	1.97	0.49	1.32	0.59	1.06	2.39
Maximum DC Bus Voltage	V	680											
Thermal Resistance	°C/W	1.94			1.64 1.28		1.80		0.88		0.69		
Number of Poles	—	8 14											
Maximum Coil Temperature	°C	100											
Mechanical Specifications													
Motor Weight	kg	0.32		0.48		0.90		0.64		2.20		4.30	
Rotor Inertia	kg∙m²	1.11x10 ⁻⁵		1.70x10 ⁻⁵		3.40x10 ⁻⁵		1.06x10 ⁻⁴		4.20x10-4		8.30x10 ⁻⁴	
Motor Length	mm	39.1		51.8		85.8		35.0		84.8		149.0	
Outside Diameter of Stator	mm	50.8 76.0											
Inner Diameter of Rotor	mm	9.5 30.0											
Standards		EU 2015/863 RoHS 3 Directive											

1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature.

2. All performance and electrical specifications ±10%.

3. Values shown @ 75°C rise above a 25°C ambient temperature, with housed motor mounted to a 250 mm x 250 mm x 6 mm aluminum heat sink.

4. Peak torque assumes correct rms current; consult Aerotech.

5. Torque constant and motor constant specified at stall.

6. All Aerotech motors and amplifiers are rated using vector amplitude values. For sinusoidal signals, use sine wave peak value.



S SERIES SPECIFICATIONS

Model	Units	S-13	0-39	S-13	0-60	S-130-102			
Winding Designation		-A	-В	-A	-В	-A	-В		
Performance Specifications ¹²									
Stall Torque, Continuous ³	N∙m	2.8	31	5.2	20	9.67			
Peak Torque⁴	N∙m	11	.2	20	.8	38.7			
Rated Speed	rpm	2000 4000		1000	2000	500	1000		
Rated Power Output, Continuous	W	582.9 1152.3		540.9 1074.4		503.9	1003.0		
Electrical Specifications ²									
BEMF Constant (Line-Line)	V/krpm	89.3	44.6	184.9	92.4	377.0	188.5		
Continuous Current, Stall ³	A	3.8	7.6	3.4	6.8	3.1	6.2		
Peak Current, Stall⁴	A	15.2	30.4	13.6	27.2	12.4	24.8		
Torque Constant ^{5,6}	N∙m/A	0.74	0.37	1.53	0.76	3.12	1.56		
Motor Constant ^{3,5}	N∙m/√W	0.299		0.527		0.866			
Resistance, 25°C, (Line-Line)	Ω	6.3	1.6	8.6	2.2	13.3	3.32		
Inductance (Line-Line)	mH	1.61 0.40		2.63 0.66		4.59	1.15		
Maximum DC Bus Voltage	V	680							
Thermal Resistance	°C/W	0.8	35	0.7	77	0.60			
Number of Poles	_	18							
Maximum Coil Temperature	°C	100							
Mechanical Specifications									
Motor Weight	kg	1.87		3.60		7.00			
Rotor Inertia	kg∙m²	1.60x10 ⁻³		3.00x10 ⁻³		6.20x10 ⁻³			
Motor Length	mm	38	.7	59	.7	101.7			
Outside Diameter of Stator	mm	128.9							
Inner Diameter of Rotor	mm	50.8							
Standards		EU 2015/863 RoHS 3 Directive							

1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature.

2. All performance and electrical specifications ±10%.

3. Values shown @ 75°C rise above a 25°C ambient temperature, with housed motor mounted to a 330 mm x 300 mm x 13 mm aluminum heat sink.

4. Peak torque assumes correct rms current; consult Aerotech.

5. Torque constant and motor constant specified at stall.

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S SERIES SPECIFICATIONS

Model	Units	S-180-44		S-180-69		S-180-94		S-240-43		S-240-63		S-240-83	
Winding Designation		-А -В		-A	-В	-A	-В	-A	-В	-A	-В	-A	-В
Performance Specifications ¹²													
Stall Torque, Continuous ³	N∙m	6.07		11.82		17.18		11.90		23.32		34.72	
Peak Torque⁴	N∙m	24.3		47.3		68.7		47.6		93.3		138.9	
Rated Speed	rpm	500	1,000	500	1,000	250	500	600	1,200	250	500	200	400
Rated Power Output, Continuous	W	316.1	628.5	614.1	1217.3	447.2	891.1	743.6	1478.5	608.2	1213.2	724.6	1445.8
Electrical Specifications ²													
BEMF Constant (Line-Line)	V/krpm	271.9	135.9	280.2	140.1	424.0	212.0	232.0	116.0	477.8	238.9	723.8	361.9
Continuous Current, Stall ³	А	2.7	5.4	5.1	10.2	4.9	9.8	6.2	12.4	5.9	11.8	5.8	11.6
Peak Current, Stall₄	А	10.8	21.6	20.4	40.8	19.6	39.2	24.8	49.6	23.6	47.2	23.2	46.4
Torque Constant ^{5,6}	N·m/A	2.25	1.12	2.32	1.16	3.51	1.75	1.92	0.96	3.95	1.98	5.99	2.99
Motor Constant ^{3,5}	N∙m/√W	0.628		1.082		1.465		0.901		1.619		2.207	
Resistance, 25°C, (Line-Line)	Ω	13.1	3.3	4.7	1.2	5.9	1.5	4.7	1.2	6.1	1.5	7.6	1.9
Inductance (Line-Line)	mH	6.04	1.51	2.42	0.61	3.85	0.81	1.98	0.50	3.06	0.77	4.11	1.03
Maximum DC Bus Voltage	V	680											
Thermal Resistance	°C/W	0.	0.80 0.63 0.54 0.43				0.36 0.30			30			
Number of Poles		18 26											
Maximum Coil Temperature	°C	100											
Mechanical Specifications													
Motor Weight	kg	4.24		8.10		11.90		5.80		11.00		16.20	
Rotor Inertia	kg∙m²	7.40x10 ⁻³		1.48x10 ⁻²		2.20x10 ⁻²		2.30x10 ⁻²		4.50x10 ⁻²		7.00x10 ⁻²	
Motor Length	mm	43.2		68.2		93.2		42.7		62.7		82.7	
Outside Diameter of Stator	mm	180.4 239.2											
Inner Diameter of Rotor	mm	82.5 120.6											
Standards		EU 2015/863 RoHS 3 Directive											

1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature.

2. All performance and electrical specifications $\pm 10\%$.

3. Values shown @ 75°C rise above a 25°C ambient temperature, with housed motor mounted to a 330 mm x 300 mm x 13 mm aluminum heat sink.

4. Peak torque assumes correct rms current; consult Aerotech.

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S SERIES ORDERING OPTIONS

Motor (Optional)

S-50-39	Slotless motor, rotor, and stator, 50 mm O.D., 39 mm length.
S-50-52	Slotless motor, rotor, and stator, 50 mm O.D., 52 mm length.
S-50-86	Slotless motor, rotor, and stator, 50 mm O.D., 86 mm length.
S-76-35	Slotless motor, rotor, and stator, 76 mm O.D., 35 mm length.
S-76-85	Slotless motor, rotor, and stator, 76 mm O.D., 85 mm length.
S-76-149	Slotless motor, rotor, and stator, 76 mm O.D., 149 mm length.
S-130-39	Slotless motor, rotor, and stator, 130 mm O.D., 39 mm length.
S-130-60	Slotless motor, rotor, and stator, 130 mm O.D., 60 mm length.
S-130-102	Slotless motor, rotor, and stator, 130 mm O.D., 102 mm length.
S-180-44	Slotless motor, rotor, and stator, 180 mm O.D., 44 mm length.
S-180-69	Slotless motor, rotor, and stator, 180 mm O.D., 69 mm length.
S-180-94	Slotless motor, rotor, and stator, 180 mm O.D., 94 mm length.
S-240-43	Slotless motor, rotor, and stator, 240 mm O.D., 43 mm length.
S-240-63	Slotless motor, rotor, and stator, 240 mm O.D., 63 mm length.
S-240-83	Slotless motor, rotor, and stator, 240 mm O.D., 83 mm length.

Note: S-Series torque ring motors include the stator w/flying leads, adjustable-phase Hall bd., and rotor w/magnets.

Winding Designation (Required)

Motor winding

Note: Contact factory to inquire about or check availability of alternate winding options.

Integration (Required)

-A

Aerotech offers both standard and custom integration services to help you get your system fully operational as quickly as possible. The following standard integration options are available for this system. Please consult Aerotech if you are unsure what level of integration is required, or if you desire custom integration support with your system.

-TAS Integration - Test as system

Testing, integration, and documentation of a group of components as a complete system that will be used together (ex: drive, controller, and stage). This includes parameter file generation, system tuning, and documentation of the system configuration.

-TAC Integration - Test as components

Testing and integration of individual items as discrete components that ship together. This is typically used for spare parts, replacement parts, or items that will not be used together. These components may or may not be part of a larger system.



S-50-86-A Torque vs Speed (340 VDC bus)



S-50-52-A Torque vs Speed (340 VDC bus)











2.5

2







S SERIES PERFORMANCE

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350

300

250

Continuous

Peak









Motor Speed [rpm]





S-76-149-B Torque vs Speed (340 VDC bus)











S-76-149-A Torque vs Speed (340 VDC bus)



















Torque [lb-in]

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S-130-102-A Torque vs Speed (340 VDC bus)









S-180-69-A Torque vs Speed (340 VDC bus)



S-180-94-A Torque vs Speed (340 VDC bus)









S-180-69-B Torque vs Speed (340 VDC bus)



S-180-94-B Torque vs Speed (340 VDC bus)

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50











S-240-43-B Torque vs Speed (340 VDC bus)















S-50







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S-76





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S-180







S-240







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