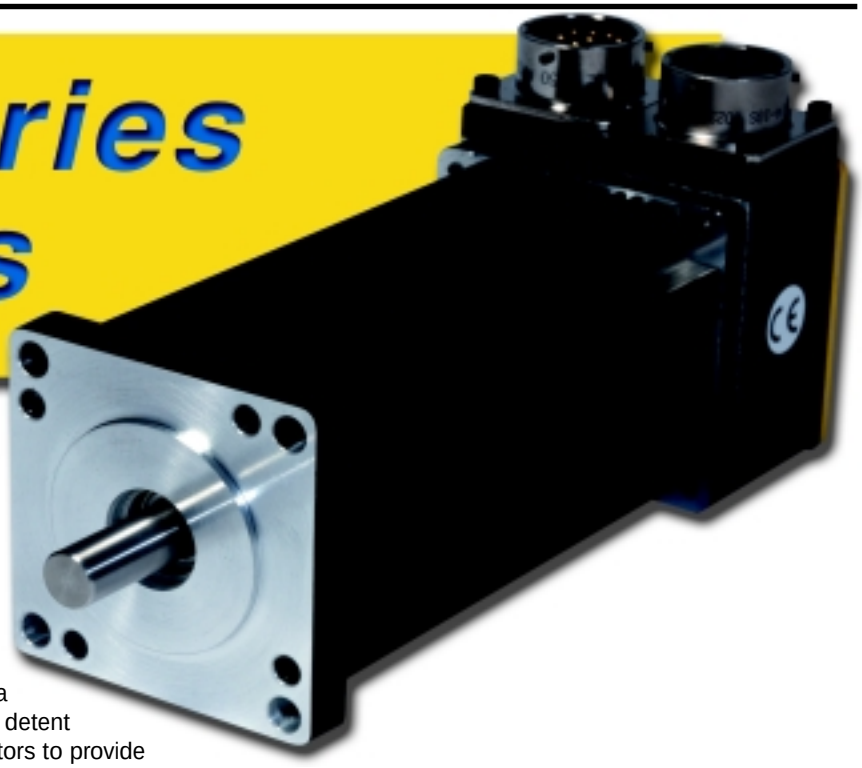
SM Series Motors



High-Performance Slotless Design

The SM Series brushless servo motors feature a slotless stator design. This design eliminates all detent torque in the motor, allowing the SM Series motors to provide extremely smooth motion, especially at low speeds. The slotless design also creates a higher rotor inertia, which is ideal for applications involving high inertial loads (such as lead screws and belt drives).

The SM Series motors also feature a rugged anodized aluminum body and connector housing. An IP65 rating can be obtained on motors with MS connectors and an optional shaft seal. All SM motors are CE (LVD) compliant.

The SM Series servo motors are available with integrated planetary gearheads in ratios up to 100:1. Our unique package integrates the gearhead pinion into the motor shaft, reducing the overall package length by up to 2 inches.

SM Series Features

- Size 16 and 23
- 0.8 to 11.3 lb-in continuous torque
- Brushless construction
- Slotless design
  - Negligible detent torque
  - Reduced torque ripple
  - Medium inertia
- High-performance neodymium magnets
- Thermostat protected
- TENV housing
- IP65 option
- Feedback options
  - Encoder/Hall effect
  - Hall-effect only
  - Resolver
- Connectorization choices
- Special winding availability
- Ten day deliveries
- Two-year warranty
- CAD (.dxf) drawings available
- CE Compliant

Part Numbering System

SM	232	A	E-	N	MS	N
SM Series	*Frame, Magnet Length* 160 230 161 231 162 232 233	*Winding* A B	*Feedback* D - 500 ppr encoder[1] E - 1000 ppr encoder[1] H - Hall-effect only R - resolver[2]	*Shafting* N - normal F - flat K - keyway[2] L - long[2]	*Connection* FL - 18" leads 10 - 10' cable[3] 25 - 25' cable[3,5] MS - military style TQ - TQ amp[6] series GS - Gemini amp[6] series	*Options* N - none V - shaft seal[4] GXX - Gearhead[7]

1 *Includes Hall-effect*
2 *Not available on size 16 or SM230*
3 *Cable is hard-wired*
4 *Sizes 16 and 23 w/ MS, TQ or GS connectors—IP65.*
5 *Size 23 only*
6 *See amplifier sections for specific motor/amplifier compatibility*
7 *Specify "K" shaft option with Gearheads*

Custom Designed Servo Motors For Your Specific Application. Call 1-800-358-9070 Today.

Size 16, Encoder Feedback, Specifications

Parameter	Symbol	Units	SM160A	SM160B	SM161A	SM161B	SM162A	SM162B
Stall Torque Continuous[1]	T_{cs}	lb-in	0.8	0.8	1.6	1.6	2.9	3.1
		oz-in	13	13	26	26	47	49
		Nm	0.09	0.09	0.18	0.18	0.33	0.34
Stall Current Continuous[1,4,8]	I_{cs}(sine)	Amps Peak	2.8	5.6	2.7	5.2	2.6	5.1
Stall Current Continuous[1,7]	I_{cs}(trap)	Amps DC	2.5	4.8	2.3	4.5	2.3	4.4
Peak Torque[6]	T_{pk}	lb-in	2.5	2.5	4.9	4.9	8.8	9.1
		oz-in	40	40	78	78	141	145
		Nm	0.28	0.28	0.55	0.54	0.99	1.02
Peak Current[4,6,8]	I_{pk}(sine)	Amps Peak	8.5	16.7	8.1	15.5	7.8	15.2
Peak Current[6,7]	I_{pk}(trap)	Amps DC	7.4	14.4	7.0	13.4	6.8	13.2
Rated Speed[2]	ω_r	rpm	7,500	7,500	7,500	7,500	7,500	7,500
Current @ Rated Speed	I_r(sine)	Amps	2.5	4.9	2.2	4.2	2.2	4.3
Current @ Rated Speed	I_r(trap)	Amps	2.2	4.2	1.9	3.6	1.9	3.8
Torque @ Rated Speed	T_r	lb-in	0.6	0.6	1.1	1.1	2.3	2.3
		oz-in	10	10	18	18	37	37
		Nm	0.07	0.07	0.13	0.13	0.26	0.26
Shaft Power @ Rated Speed	P_o	watts	57	55	97	100	205	204
Voltage Constant[3,4]	K_b	volts/radian/sec	0.038	0.020	0.079	0.041	0.147	0.078
Voltage Constant[3,4]	K_e	volts/KRPM	4.02	2.08	8.27	4.29	15.39	8.17
Torque Constant[9]	K_t(sine)	oz-in/Amp Peak	4.71	2.43	9.69	5.03	18.03	9.57
		Nm/Amp Peak	0.033	0.017	0.068	0.035	0.126	0.067
Torque Constant[3,4]	K_t(trap)	oz-in/Amp DC	5.43	2.81	11.19	5.81	20.82	11.04
		Nm/Amp DC	0.038	0.02	0.078	0.041	0.146	0.077
Resistance[3]	R	Ohms	3.43	0.90	4.53	1.24	6.50	1.73
Inductance[5]	L	mH	0.53	0.13	0.81	0.21	1.39	0.33
Maximum Bus Voltage	V_m	Volts DC	100	100	170	170	170	170
Thermal Resistance Wind-Amb	R_{th} w-a	°C/watt	3.20	3.20	2.70	2.70	2.00	2.00
Motor Constant	K_m	oz-in/√watt	2.93	2.96	5.26	5.21	8.16	8.40
		Nm/√watt	0.021	0.021	0.037	0.036	0.057	0.059
Viscous Damping	B	oz-in/Krpm	0.162	0.162	0.284	0.284	0.300	0.300
		Nm/Krpm	1.13 E-3	1.13 E-3	1.99 E-3	1.99 E-3	2.10 E-3	2.10 E-3
Static Friction	T_f	oz-in	0.10	0.10	0.15	0.15	0.20	0.20
		Nm	7.0 E-4	7.0 E-4	1.05 E-3	1.05 E-3	1.40 E-3	1.40 E-3
Motor Thermal Time Constant	τ_{th}	minutes	10	10	11.6	11.6	14.2	14.2
Electrical Time Constant	τ_{elec}	millisecs	0.16	0.15	0.18	0.17	0.21	0.19
Mechanical Time Constant	τ_{mch}	millisecs	11.7	11.5	7.7	7.8	5.5	5.2
Intermittent Torque Duration[10]	T_{2x}	seconds	8	8	9	9	14	14
Peak Torque Duration[11]	T_{3x}	seconds	3	3	4	4	5	5
Rotor Inertia	J	lb-in-sec^2	4.4 E-5	4.4 E-5	9.4 E-5	9.4 E-5	1.6 E-4	1.6 E-4
		kg-m^2	5.0 E-6	5.0 E-6	1.1 E-5	1.1 E-5	1.8 E-5	1.8 E-5
Number of Poles	Np		4	4	4	4	4	4
Weight	#	lbs	0.7	0.7	1.1	1.1	1.6	1.6
		kg	0.3	0.3	0.5	0.5	0.7	0.7
Winding Class			H	H	H	H	H	H

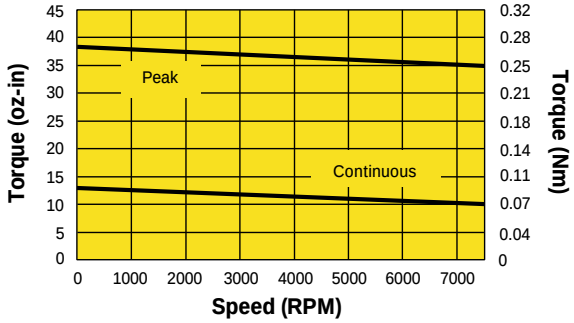
1 *@ 25°C ambient, 125°C winding temperature, motor connected to a 10"x10"x1/4" aluminum mounting plate, @40°C ambient derate phase currents and torques by 12%.*
2 *Maximum speed is 7500RPM with 500 line Encoder. For 1000 line encoders, derate to 6000RPM. For higher speed operation please call the factory.*
3 *Measured Line to Line, ±10% line-to-line*
4 *Value is mesured peak of sine wave.*
5 *±30%, Line-to-Line, inductance bridge measurement @ 1 kHz*
6 *Initial winding temperature must be 60°C or less before peak current is applied.*
7 *DC current through a pair of motor phases of a trapazoidally (six state) commutated motor.*
8 *Peak of the sinusoidal current in any phase for a sinusoidally commutated motor.*
9 *Total motor torque per peak of the sinusoidal amps measured in any phase, +/-10%.*
10 *Maximum Time duration with 2 times rated applied with initial winding temp at 60°C.*
11 *Maximum Time duration with 3 times rated applied with initial winding temp at 60°C.*

Note: These specifications are based on theoretical motor performance and are not specific to any amplifier.

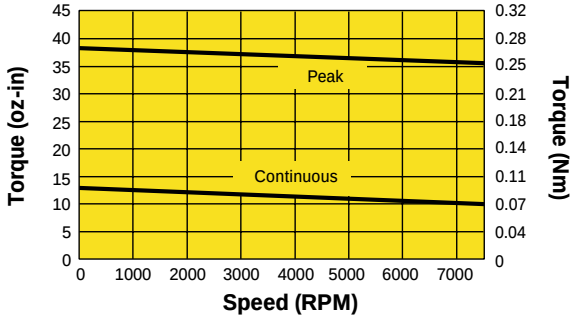
Parker Automation
Parker Hannifin Corporation
Compumotor Division
Rohnert Park, California

Size 16, Encoder Feedback, Performance Curves

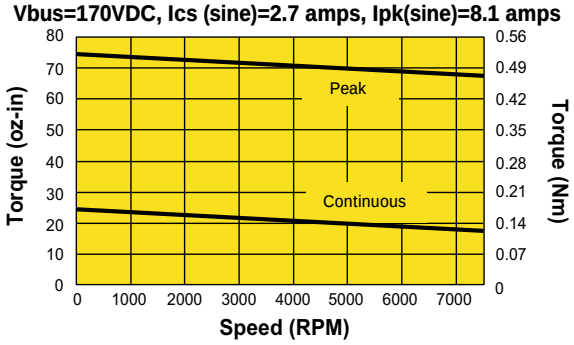
SM160AD
Vbus=75VDC, Ics (sine)=2.8 amps, Ipk(sine)=8.5 amps



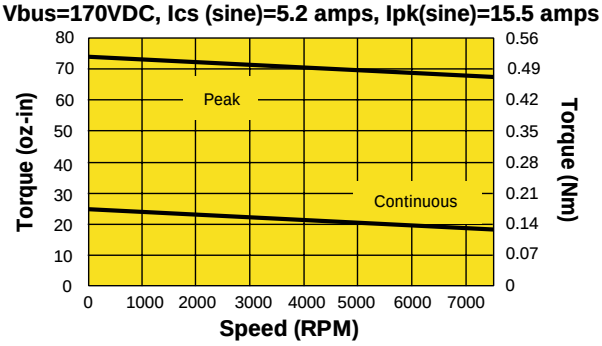
SM160BD
Vbus=75VDC, Ics (sine)=5.6 amps, Ipk(sine)=16.7 amps



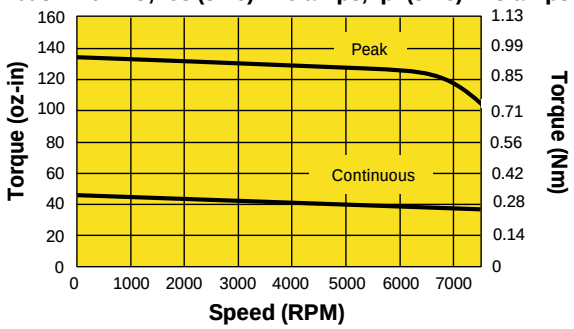
SM161AD
Vbus=170VDC, Ics (sine)=2.7 amps, Ipk(sine)=8.1 amps



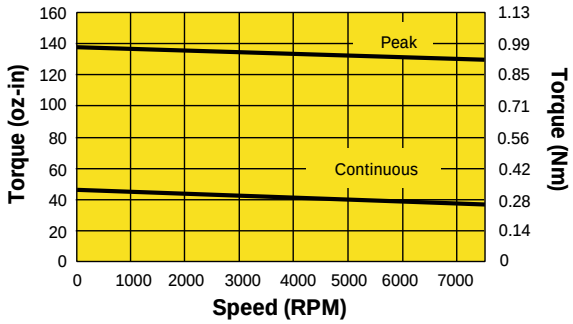
SM161BD
Vbus=170VDC, Ics (sine)=5.2 amps, Ipk(sine)=15.5 amps



SM162AD
Vbus=170VDC, Ics (sine)=2.6 amps, Ipk(sine)=7.8 amps



SM162BD
Vbus=170VDC, Ics (sine)=5.1 amps, Ipk(sine)=15.2 amps



Parker Automation
Parker Hannifin Corporation
Compumotor Division
Rohnert Park, California

Size 23, Encoder Feedback, Specifications

Parameter	Symbol	Units	SM230A	SM230B	SM231A	SM231B	SM232A	SM232B	SM233A	SM233B
Stall Torque Continous[1]	T_{cs}	lb-in	1.7	1.6	3.8	3.4	6.6	7.0	10.1	9.7
		oz-in	27	26	61	54	106	111	161	156
		Nm	0.19	0.18	0.43	0.38	0.74	0.78	1.13	1.09
Stall Current Continuous[1,4,8]	I_{cs}(sine)	Amps Peak	2.7	5.5	2.9	5.5	2.8	5.4	2.7	5.3
Stall Current Continuous[1,7]	I_{cs}(trap)	Amps DC	2.4	4.7	2.5	4.8	2.4	4.7	2.4	4.5
Peak Torque[6]	T_{pk}	lb-in	5.1	4.9	11.3	10.0	19.8	20.9	30.2	29.2
		oz-in	82	78	181	160	316	334	483	467
		Nm	0.57	0.55	1.27	1.12	2.21	2.34	3.38	3.27
Peak Current[4,6,8]	I_{pk}(sine)	Amps Peak	8.2	16.4	8.8	16.6	8.3	16.1	8.1	15.8
Peak Current[6,7]	I_{pk}(trap)	Amps DC	7.1	14.2	7.6	14.3	7.2	14.0	7.1	13.6
Rated Speed[2]	ω_r	rpm	7500	7500	7500	7500	7500	7500	5800	5800
Current@Rated Speed	I_r(sine)	Amps	2.4	4.9	2.5	4.8	2.3	4.5	2.4	4.6
Current@Rated Speed	I_r(trap)	Amps	2.1	4.2	2.2	4.2	2.0	3.9	2.0	4.0
Torque@Rated Speed	T_r	lb-in	1.4	1.3	2.9	2.8	5.1	5.4	8.1	7.6
		oz-in	22	21	47	44	81	86	129	121
		Nm	0.15	0.15	0.33	0.31	0.57	0.60	0.90	0.85
Shaft Power@Rated Speed	P_o	watts	122	116	261	244	449	477	553	519
Voltage Constant[3,4]	K_b	Volts/rad/s	0.081	0.039	0.169	0.079	0.310	0.169	0.484	0.242
Voltage Constant[3,4]	K_e	Volts/KRPM	8.48	4.09	17.70	8.27	32.46	17.70	50.68	25.34
Torque Constant[9]	K_t(sine)	oz-in/Amp Peak	9.93	4.79	20.72	9.69	38.02	20.72	59.35	29.68
		Nm/Amp Peak	0.070	0.034	0.145	0.068	0.266	0.145	0.415	0.208
Torque Constant[3,4]	K_t(trap)	oz-in/Amp DC	11.47	5.54	23.93	11.19	43.90	23.93	68.53	34.27
		Nm/Amp DC	0.080	0.039	0.168	0.078	0.307	0.168	0.480	0.240
Resistance[3]	R	Ohms	4.43	1.12	5.22	1.46	7.50	2.00	9.65	2.58
Inductance[5]	L	mH	1.19	0.28	1.64	0.44	2.90	0.78	4.08	1.06
Maxumum Bus Voltage	V_m	Volts DC	100	100	170	170	340	170	340	170
Therm. Resistance Wind-Amb	R_{th} w-a	°C/watt	2.67	2.67	2.00	2.00	1.54	1.54	1.25	1.25
Motor Constant	K_m	oz-in/√watt	5.45	5.23	10.47	9.26	16.03	16.92	22.06	21.33
		Nm/√watt	0.038	0.037	0.073	0.065	0.112	0.118	0.154	0.149
Viscous Damping	B	oz-in/Krpm	0.160	0.160	0.250	0.250	0.360	0.360	0.540	0.540
		Nm/Krpm	1.12 E-3	1.12 E-3	1.75 E-3	1.75 E-3	2.52 E-3	2.52 E-3	3.78 E-3	3.78 E-3
Static Friction	T_f	oz-in	0.20	0.20	0.30	0.30	0.70	0.70	1.00	1.00
		Nm	1.40 E-3	1.40 E-3	2.10 E-3	2.10 E-3	4.90 E-3	4.90 E-3	7.00 E-3	7.00 E-3
Motor Thermal Time Constant	τ_{th}	minutes	18.3	18.3	20	20	21.6	21.6	23.3	23.3
Electrical Time Constant	τ_{elec}	millisecs	0.27	0.25	0.31	0.30	0.39	0.39	0.42	0.41
Mechanical Time Constant	τ_{mch}	millisecs	18.3	19.9	9.5	12.2	7.2	6.5	5.4	5.8
Intermittent Torque Duration[10]	T_{2x}	seconds	11	11	11	11	18	18	20	20
Peak Torque Duration[11]	T_{3x}	seconds	5	5	4	4	6	6	7	7
Rotor Inertia	J	lb-in-sec^2	2.4 E-4	2.4 E-4	4.6 E-4	4.6 E-4	8.2 E-4	8.2 E-4	1.2 E-3	1.2 E-3
		kg-m^2	2.7 E-5	2.7 E-5	5.2 E-5	5.2 E-5	9.3 E-5	9.3 E-5	1.3 E-4	1.3 E-4
Number of Poles	Np		4	4	4	4	4	4	4	4
Weight	#	lbs	1.2	1.2	2.1	2.1	3.0	3.0	3.9	3.9
		kg	0.5	0.5	1.0	1.0	1.4	1.4	1.8	1.8
Winding Class			H	H	H	H	H	H	H	H

1 *@ 25°C ambient, 125°C winding temperature, motor connected to a 10"x10"x1/4" aluminum mounting plate, @40°C ambient derate phase currents and torques by 12%.*
2 *Maximum speed is 7500RPM with 500 line Encoder. For 1000 line encoders, derate to 6000RPM. For higher speed operation please call the factory.*
3 *Measured Line to Line, ±10% line-to-line*
4 *Value is mesured peak of sine wave.*
5 *±30%, Line-to-Line, inductance bridge measurement @ 1 kHz*
6 *Initial winding temperature must be 60°C or less before peak current is applied.*
7 *DC current through a pair of motor phases of a trapezoidally (six state) commutated motor.*
8 *Peak of the sinusoidal current in any phase for a sinusoidally commutated motor.*
9 *Total motor torque per peak of the sinusoidal amps measured in any phase, +/-10%.*
10 *Maximum Time duration with 2 times rated applied with initial winding temp at 60°C.*
11 *Maximum Time duration with 3 times rated applied with initial winding temp at 60°C..*

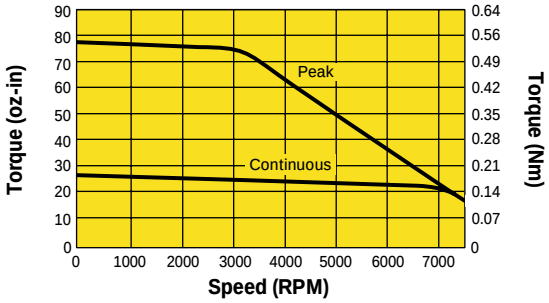
Note: These specifications are based on theoretical motor performance and are not specific to any amplifier.

Parker Automation
Parker Hannifin Corporation
Compumotor Division
Rohnert Park, California

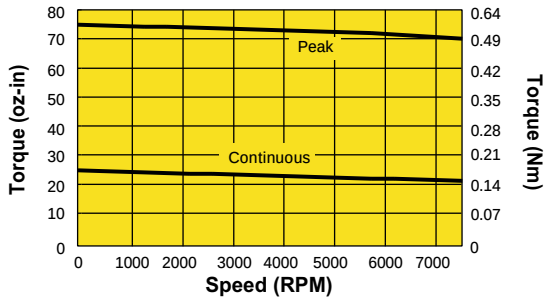
Size 23, Encoder Feedback, Performance Curves

170 VDC
340 VDC

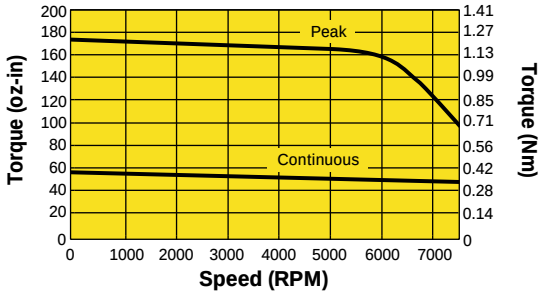
SM230AD
Vbus=75VDC, Ics (sine)=2.7 amps, Ipk(sine)=8.2 amps



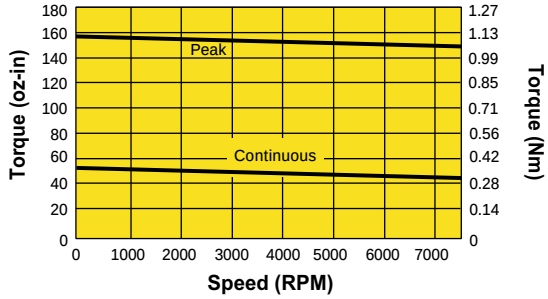
SM230BD
Vbus=75VDC, Ics (sine)=5.5 amps, Ipk(sine)=16.4 amps



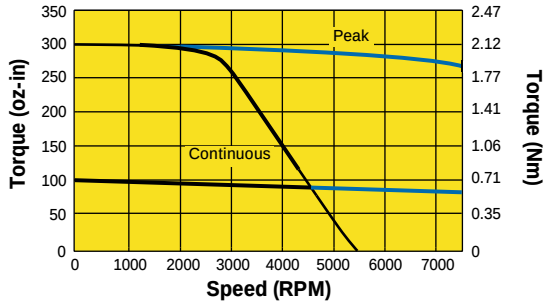
SM231AD
Ics (sine)=2.9 amps, Ipk(sine)=8.8 amps



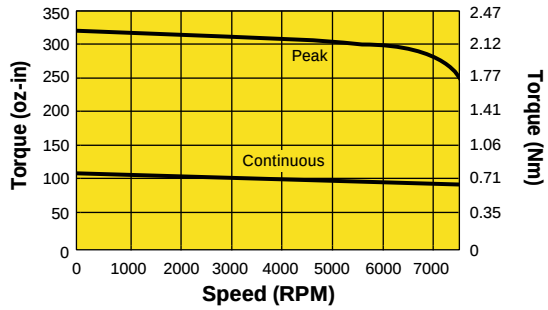
SM231BD
Ics (sine)=5.5 amps, Ipk(sine)=16.6 amps



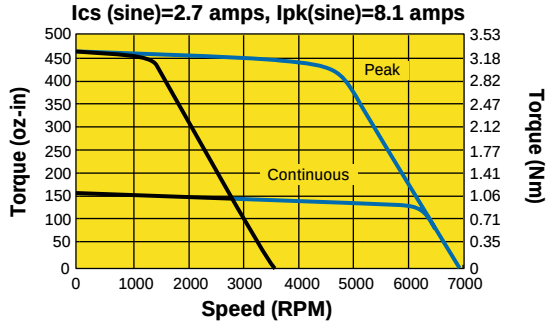
SM232AD
Ics (sine)=2.8 amps, Ipk(sine)=8.3 amps



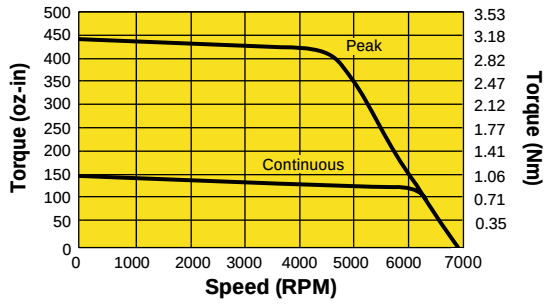
SM232BD
Ics (sine)=5.4 amps, Ipk(sine)=16.1 amps



SM233AD
Ics (sine)=2.7 amps, Ipk(sine)=8.1 amps



SM233BD
Ics (sine)=5.3 amps, Ipk(sine)=15.8 amps



Size 23, Resolver Feedback, Specifications

Parameter	Symbol	Units	SM231A	SM231B	SM232A	SM232B	SM233A	SM233B
Stall Torque Continous[1]	T_{cs}	lb-in	4.3	3.8	7.4	7.8	11.3	10.9
		oz-in	68	60	118	125	180	174
		Nm	0.48	0.42	0.83	0.88	1.26	1.22
Stall Current Continuous[1,4,7]	I_{cs}(sine)	Amps Peak	3.3	6.2	3.1	6.0	3.0	5.9
Peak Torque[6]	T_{pk}	lb-in	12.7	11.2	22.1	23.3	33.8	32.7
		oz-in	203	179	354	373	540	523
		Nm	1.42	1.25	2.48	2.61	3.78	3.66
Peak Current[4,6,7]	I_{pk}(sine)	Amps Peak	9.8	18.5	9.3	18.0	9.1	17.6
Rated Speed[2]	ω_r	rpm	7500	7500	7500	7500	6000	6000
Current@Rated Speed	I_r(sine)	Amps	2.9	5.5	2.7	5.3	2.7	5.3
Current@Rated Speed	I_r(trap)	Amps	2.5	4.8	2.4	4.6	2.4	4.6
Torque@Rated Speed	T_r	lb-in	3.4	3.1	6.0	6.1	9.0	8.8
		oz-in	54	50	96	98	144	140
		Nm	0.38	0.35	0.67	0.69	1.01	0.98
Shaft Power@Rated Speed	P_o	watts	300	277	533	544	639	621
Voltage Constant[3,4]	K_b	Volts/rad/s	0.169	0.079	0.310	0.169	0.484	0.242
Voltage Constant[3,4]	K_e	Volts/KRPM	17.70	8.27	32.46	17.70	50.68	25.34
Torque Constant[8]	K_t(sine)	oz-in/Amp Peak	20.72	9.69	38.02	20.72	59.35	29.68
		Nm/Amp Peak	0.145	0.068	0.266	0.145	0.415	0.208
Resistance[3]	R	Ohms	5.22	1.46	7.50	2.00	9.65	2.58
Inductance[5]	L	mH	1.64	0.44	2.90	0.78	4.08	1.06
Maxumum Bus Voltage	V_m	Volts DC	170	170	340	170	340	170
Therm. Resistance Wind-Amb	R_{th} w-a	°C/watt	2.00	2.00	1.54	1.54	1.25	1.25
Motor Constant	K_m	oz-in/√watt	10.47	9.26	16.03	16.92	22.06	21.33
		Nm/√watt	0.073	0.065	0.112	0.118	0.154	0.149
Viscous Damping	B	oz-in/Krpm	0.25	0.25	0.36	0.36	0.54	0.54
		Nm/Krpm	1.75 E-3	1.75 E-3	2.52 E-3	2.52 E-3	3.78 E-3	3.78 E-3
Static Friction	T_f	oz-in	0.30	0.30	0.70	0.70	1.00	1.00
		Nm	2.10 E-3	2.10 E-3	4.90 E-3	4.90 E-3	7.00 E-3	7.00 E-3
Motor Thermal Time Constant	τ_{th}	minutes	20	20	21.6	21.6	23.3	23.3
Electrical Time Constant	τ_{elec}	millisecs	0.31	0.30	0.39	0.39	0.42	0.41
Mechanical Time Constant	τ_{mch}	millisecs	9.5	12.2	7.2	6.5	5.4	5.8
Intermittent Torque Duration[9]	T_{2x}	seconds	11	11	18	18	20	20
Peak Torque Duration[10]	T_{3x}	seconds	4	4	6	6	7	7
Rotor Inertia	J	lb-in-sec^2	4.8 E-4	4.8 E-4	8.4 E-4	8.4 E-4	1.2 E-3	1.2 E-3
		kg-m^2	5.4 E-5	5.4 E-5	9.5 E-5	9.5 E-5	1.3 E-4	1.3 E-4
Number of Poles	Np		4	4	4	4	4	4
Weight	#	lbs	2.1	2.1	3.0	3.0	3.9	3.9
		kg	1.0	1.0	1.4	1.4	1.8	1.8
Winding Class			H	H	H	H	H	H

1 *@ 25°C ambient, 150°C winding temperature, motor connected to a 10"x10"x1/4" aluminum mounting plate, @40°C ambient derate phase currents and torques by 12%.*
2 *Maximum speed is 7500RPM with 500 line Encoder. For 1000 line encoders, derate to 6000RPM. For higher speed operation please call the factory.*
3 *Measured Line to Line, ±10% line-to-line*
4 *Value is mesured peak of sine wave.*
5 *±30%, Line-to-Line, inductance bridge measurement @ 1 kHz*
6 *Initial winding temperature must be 60°C or less before peak current is applied.*
7 *Peak of the sinusoidal current in any phase for a sinusoidally commutated motor.*
8 *Total motor torque per peak of the sinusoidal amps measured in any phase, +/-10%.*
9 *Maximum Time duration with 2 times rated applied with initial winding temp at 60°C.*
10 *Maximum Time duration with 3 times rated applied with initial winding temp at 60°C.*

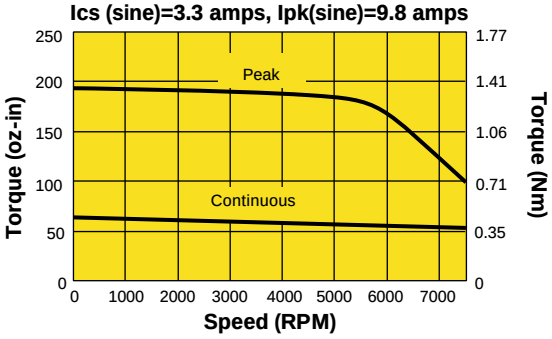
Note: These specifications are based on theoretical motor performance and are not specific to any amplifier.

Parker Automation
Parker Hannifin Corporation
Compumotor Division
Rohnert Park, California

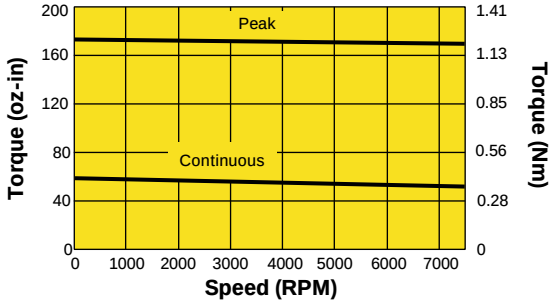
Size 23, Resolver Feedback, Performance Curves

170 VDC
340 VDC

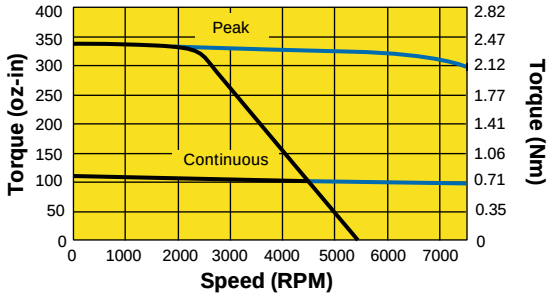
SM231AR
Ics (sine)=3.3 amps, Ipk(sine)=9.8 amps



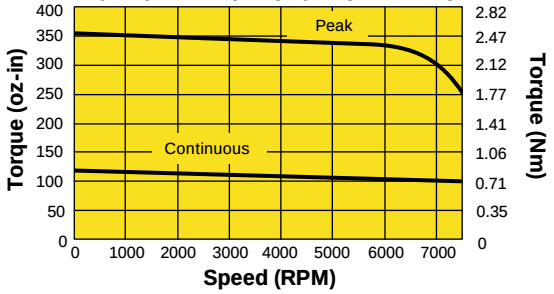
SM231BR
Ics (sine)=6.2 amps, Ipk(sine)=18.5 amps



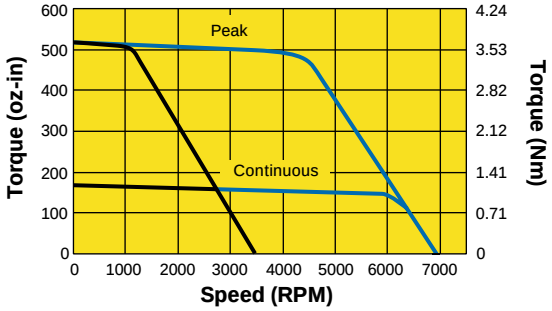
SM232AR
Ics (sine)=3.1 amps, Ipk(sine)=9.3 amps



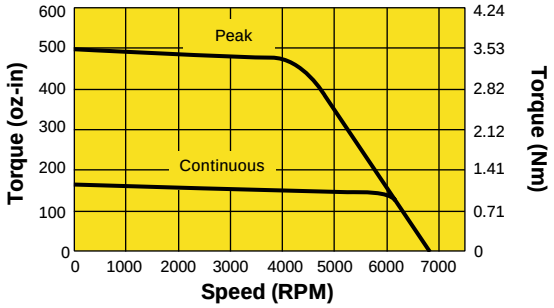
SM232BR
Ics (sine)=6.0 amps, Ipk(sine)=18.0 amps



SM233AR
Ics (sine)=3.0 amps, Ipk(sine)=9.1 amps



SM233BR
Ics (sine)=5.9 amps, Ipk(sine)=17.6 amps

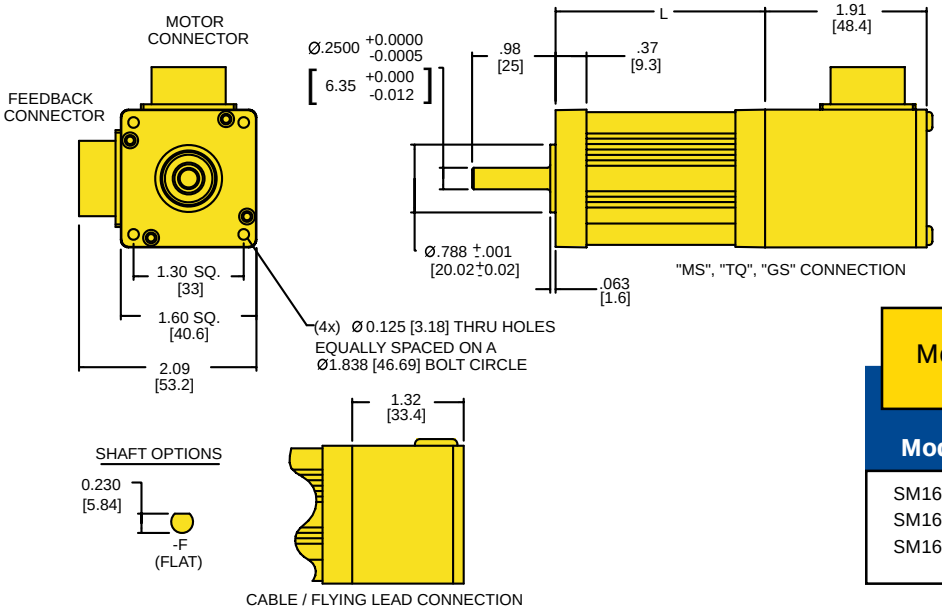


Parker Automation
Parker Hannifin Corporation
Compumotor Division
Rohnert Park, California

SM Series Dimensional Drawings

Size 16, Dimensional Drawing

Dimensions in inches (mm)

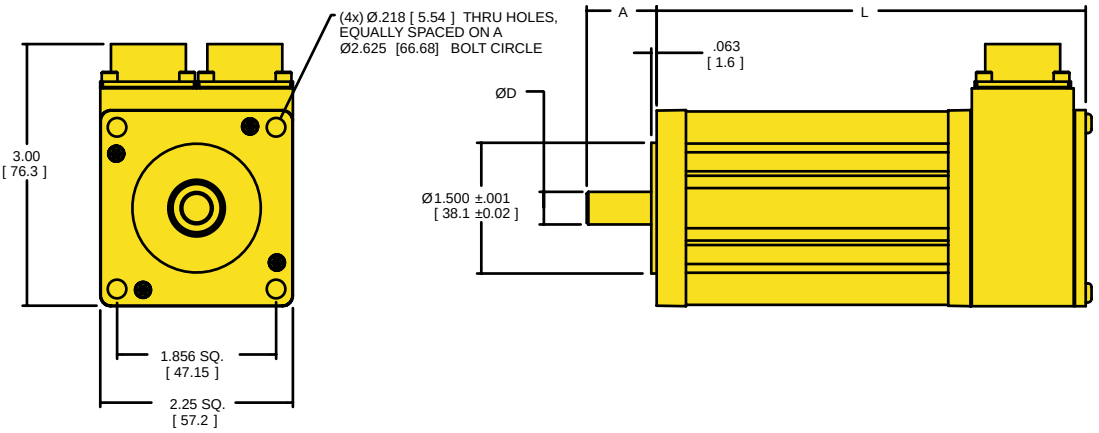


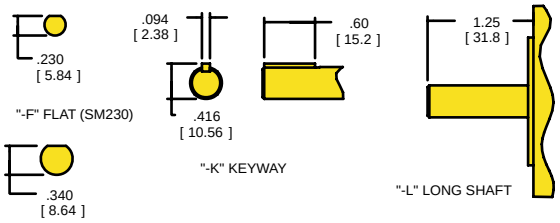
Motor Sizes

Model	Motor Length "L"
SM160	1.97 [50.0]
SM161	2.47 [62.7]
SM162	3.47 [88.1]

Size 23, Dimensional Drawing

Dimensions in inches (mm)





Motor Sizes

Model	Motor Length "L"	Shaft Length "A"	Shaft Diameter "D"
SM230	3.36 [85.3]	.78 [19.8]	.2500 +.0000/-.0005 [6.350 +0.000/-0.013]
SM231	3.98 [101.1]	.82 [20.8]	.3750 +.0000/-.0005 [9.525 +0.000/-0.013]
SM232	4.98 [126.5]	.82 [20.8]	.3750 +.0000/-.0005 [9.525 +0.000/-0.013]
SM233	5.98 [151.9]	.82 [20.8]	.3750 +.0000/-.0005 [9.525 +0.000/-0.013]

Parker Automation
Parker Hannifin Corporation
Compumotor Division
Rohnert Park, California

Feedback Specifications

Encoder Specifications

Mechanical

Electrical

Accuracy	±2 min of arc
Input power	5 VDC ±5%, 135 mA
Operating frequency	100 kHz max
Output device	26LS31
Sink/Source, nominal	20 mA
Suggested user interface	26LS32

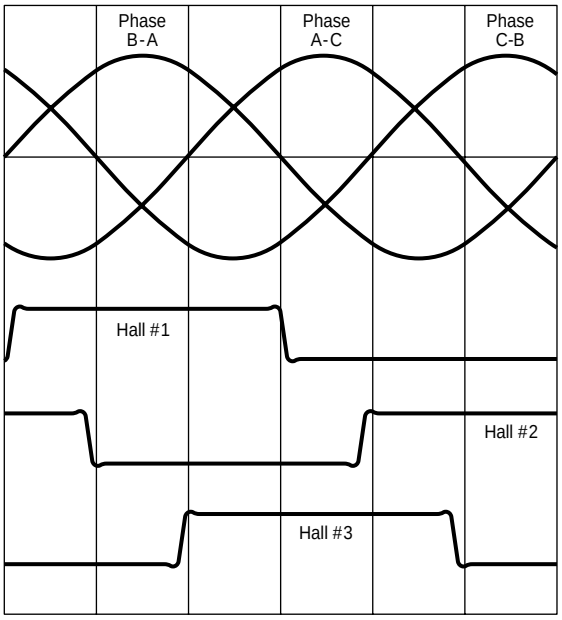
Hall-Effect Specifications

Electrical

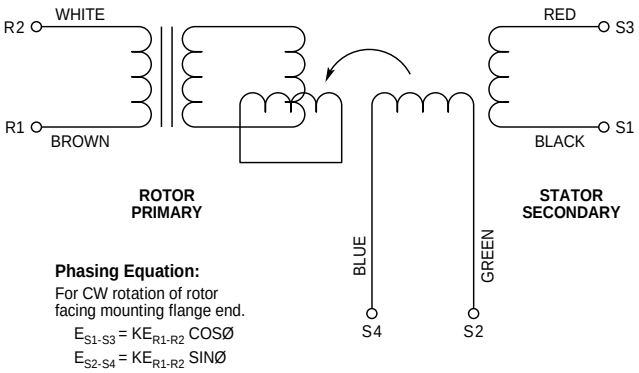
Input power	5 VDC ±5%, 80 mA
Output device (open collector)	LM339
Maximum pull up	12 VDC
Sink	16 mA

Commutation Chart

Clockwise rotation as viewed from front shaft.



Resolver Schematic Diagram



Phasing Equation:
For CW rotation of rotor facing mounting flange end.

$E_{S1-S3} = KE_{R1-R2}$ COSØ
$E_{S2-S4} = KE_{R1-R2}$ SINØ

Resolver Specifications

Parameter	Value
Input voltage @ 7 kHz	4.25 volts
Input current, max	55 mA
Input power, nominal	0.12 watts
Impedance ZSO (@ 90°)	58+j145 ohms
Impedance ZRO	53+j72 ohms
Impedance ZRS	42+j55 ohms
Transformation ratio	0.470 ±5%
Output voltage	2.0 ±5% volts
DC rotor resistance	23 ±10% ohms
DC stator resistance	19 ±10% ohms
Sensitivity	35 mV/degree
Max error from EZ	±10 minutes
Phase shift, open circuit	5° leading, ±3"
Null voltage, total	20 mV rms
Impedance ZSS	50+j128 ohms
Inertia	Incl. with motor spec.

Wiring and Cable Specifications

Flying Leads, Cabled and "MS" Connection

Options

The **"FL" (Flying Lead) connection** option for the SM Series motors features 18" leads extending from the motor body. Wire color codes are the same as listed below for the "MS" connection option.

The **"10" and "25" connection** option for the SM Series motors consist of either 10 feet or 25 feet of hard-wired cable extending from the motor body. These cables terminate in flying leads. Wire color codes are the same as listed below for the "MS" connection option.

The **"MS" connection** option for the SM Series motors provides quick disconnect, bayonet style connectors attached to the motor body. Mating cables are specified and ordered separately. With the "MS" connection option, the motor phase and temperature switch wires are in one cable/conector, and the hall and encoder signals are in the other cable/connector. This option works well when using an amplifier with a built-in controller, or when all cables enter into a cabinet or enclosure and then are wired into a terminal strip. When specifying the "R" (resolver) feedback option, the motor phase wires reside in one connector, the resolver signal and temperature switch wires in the other.

Encoder/Hall Feedback Connection

Designation	Pin Number MS14-18	Wire Color
Encoder +5	H	Red
Encoder Ground	G	Black
CH A +	A	White
CH A -	B	Yellow
CH B +	C	Green
CH B -	D	Blue
Index +	E	Orange
Index -	F	Brown
Hall Ground	K	White/Green
Hall +5	M	White/Blue
Hall 1	T	White/Brown
Hall 2	U	White/Orange
Hall 3	P	White/Violet
Brake[1]	R	Red/Blue
Brake[1]	S	Red/Blue
Shield	N.C.	Clear
N.C.	N.C.	Orange/Yellow
N.C.	N.C.	Orange/Yellow

Motor Connection

Designation	Pin Number MS14-12	Wire Color
Phase A	J	Red/Yellow
Phase B	K	White/Yellow
Phase C	L	Black/Yellow
Ground	M	Green/Yellow
Temp[2]	G	Orange/Yellow or Yellow
Temp[2]	H	Orange/Yellow or Yellow
Shield	N.C.	Clear

1 Brake will operate regardless of polarity connection
2 For motors with the "R" (resolver) feedback option, the temperature switch is connected to leads in the feedback cable/connector

Resolver Feedback Connection

Designation	Pin Number MS14-18	Wire Color
S1, COS +	E	Black
S2, SIN +	L	Green
S3, COS -	J	Red
S4, SIN -	G	Blue
R1, EXC +	C	Brown
R2, EXC -	U	White
Temp[2]	R	Orange/Yellow or Yellow
Temp[2]	N	Orange/Yellow or Yellow
Brake[1]	S	Red/Blue
Brake[1]	T	Red/Blue
Shield	N.C.	Clear

The following cable sets are available for SM Series motors with the "MS" connection option. The cable sets include one motor power cable and one feedback cable. These cables have mating motor connectors at one end, flying leads at the other. Use these cable sets for both size 16 and 23 SM motors.

23MS CABLE-XX - One set of cables for SM motors with encoder feedback and "MS" connection option *"-XX" is cable length "23MS CABLE" sets available in lengths of 10, 25 and 35 feet.*

23RS CABLE-XX - One set of cables for SM motors with resolver feedback and "MS" connection option *"-XX" is cable length "23RS CABLE" sets available in lengths of 10, 25, 35 and 50 feet.*

The following hi-flex cables are available for SM motors with the "MS" connection option. Motor power cable and feedback cable must be ordered separately. These cables have mating motor connectors at one end, flying leads at the other. Wire colors in hi-flex cables do not match the above wiring diagram. Contact Compumotor for wiring diagram.

71-016023-XX - SM "MS" motor cable, hi flex *"-XX" is cable length. Cable available in lengths of 10, 25, 35 and 50 feet.*

71-016022-XX - Encoder feedback cable, hi flex *"-XX" is cable length. Cable available in lengths of 10, 25 and 35 feet.*

71-016374-XX - Resolver feedback cable, hi flex *"-XX" is cable length. Cable available in lengths of 10, 25, 35 and 50 feet.*

Wiring and Cable Specifications (Continued)

"GS" Connection Option

The **"GS"** connection option for the SM Series motors provides quick disconnect, bayonet style connectors attached to the motor body. Mating cables are specified and ordered separately. Wiring for the "GS" connection option for SM motors is similar to the "MS" option, except the temperature switch leads have been moved to the feedback connector. This connection option should be selected when operating the SM motors with the Gemini family of amplifiers.

Motor Connection

Designation	Pin Number MS14-12	Wire Color
Phase A	J	Black 1
Phase B	K	Black 2
Phase C	L	Black 3
Ground	M	Green/Yellow

Encoder/Hall Feedback Connection

Designation	Pin Number MS14-18	Wire Color
Encoder +5	H	Red
Encoder Ground	G	Black
CH A +	A	White
CH A -	B	Yellow
CH B +	C	Green
CH B -	D	Blue
Index +	E	Orange
Index -	F	Brown
Hall Ground	K	White/Green
Hall +5	M	White/Blue
Hall 1	T	White/Brown
Hall 2	U	White/Orange
Hall 3	P	White/Violet
Brake[1]	R	Red/Blue
Brake[1]	S	Red/Blue
Temp	L	Orange/Yellow
Temp	N	Orange/Yellow

1 *Brake will operate regardless of polarity connection*

The following cable sets are available for SM Series motors with encoder feedback for use with the Gemini family of amplifiers. The "GS" connection option should be specified for the SM series motors when using these cable sets. These cable sets consist of one motor power cable and one feedback cable. These cables have mating motor connectors at one end, and molded connectors for wiring to a Gemini amplifier at the other. These cables have a braided metal shield and are CE(EMC) compliant. The "GB" cable sets have leads for wiring SM motors with internal brakes, the "GS" cable sets do not. Use these cable sets for both size 16 and 23 SM motors.

23GS CABLE-XX

One set of cables for SM motors with encoder feedback and "GS" connection option. Cables include molded connectors for wiring to Gemini amplifier. *No connection for internal brake. "-XX" is cable length "23GS CABLE" sets available in lengths of 10, 25 and 35 feet.*

23GB CABLE-XX

One set of cables for SM motors with encoder feedback and "GS" connection option. Cables include molded connectors for wiring to Gemini amplifier. *Includes wiring for internal brake. "-XX" is cable length "23GB CABLE" sets available in lengths of 10, 25 and 35 feet.*

Wiring and Cable Specifications (Continued)

"TQ" Connection Option

The **"TQ"** connection option for the SM Series motors provides quick disconnect, bayonet style connectors attached to the motor body. Mating cables are specified and ordered separately. The "TQ" connection option joins the motor phase, hall effect and temperature switch wires in one connector. The second connector has only encoder signals. This connection option applies well in applications where the hall and motor phase wires connect directly to an amplifier, while the encoder signals connect directly to a controller.

Motor /HallConnection

Designation	Pin Number MS14-12	Wire Color
Phase A	J	Red/Yellow
Phase B	K	White/Yellow
Phase C	L	Black/Yellow
Ground	M	Green/Yellow
Temp	G	Orange/Yellow or Yellow
Temp	H	Orange/Yellow or Yellow
Hall Ground	F	White/Green
Hall +5	B	White/Blue
Hall 1	C	White/Brown
Hall 2	D	White/Orange
Hall 3	E	White/Violet
Shield	N.C.	Clear

Encoder Feedback Connection

Designation	Pin Number MS14-18	Wire Color
Encoder +5	H	Red
Encoder Ground	G	Black
CH A +	A	White
CH A -	B	Yellow
CH B +	C	Green
CH B -	D	Blue
Index +	E	Orange
Index -	F	Brown
Brake[1]	R	Red/Blue
Brake[1]	S	Red/Blue
Shield	N.C.	Clear

1 *Brake will operate regardless of polarity of connection*

The following cable sets are available for SM motors with encoder feedback and the "TQ" connection option. These cable sets consist of one motor power cable and one feedback cable. These cables have mating motor connectors at one end, flying leads at the other. Use these cable sets for both size 16 and 23 SM motors.

23TQ CABLE-XX
One set of cables for the SM motors with encoder feedback and "TQ" connection option. *"-XX" is cable length. "23TQ CABLE" sets available in lengths of 10, 25, and 35 feet.*

The following hi-flex cables are available for SM motors with the "TQ" connection option. Motor power cable and feedback cable must be ordered separately. These cables have mating motor connectors at one end, flying leads at the other. Wire colors in hi-flex cables do not match the above wiring diagram. Contact Compumotor for wiring diagram.

71-017677-XX
TQ motor cable, hi flex. *"-XX" is cable length. Cable available in lengths of 10, 25, and 35 feet.*

71-016022-XX
Encoder feedback cable, hi flex. *"-XX" is cable length. Cable available in lengths of 10, 25, and 35 feet.*

天津昕科佳业科技有限公司

地址：天津市红桥区咸阳北路开源楼32-409

电话：022-86559825

网址：www.xinkejiaye.com