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**Series 6000 LO-COG<sup>®</sup> 22mm Brush Commutated DC Motors**

Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
0.81 (0.0057)	8260 (865)	2.70 (0.0191)	1.85 (0.013)	1.37 (0.013)	7.75	4.05	12	None	PE-4	6312S001-R1
0.81 (0.0057)	8260 (865)	2.70 (0.0191)	3.70 (0.026)	2.74 (0.026)	30.38	16.20	24	None	PE-4	6312S002-R1
1.32 (0.0093)	7780 (815)	5.56 (0.0393)	2.02 (0.014)	1.49 (0.014)	4.19	2.76	12	None	PE-4	6313S003-R1
1.32 (0.0093)	7780 (815)	5.56 (0.0393)	4.04 (0.029)	2.99 (0.029)	16.90	11.04	24	None	PE-4	6313S004-R1



**Series 8000 LO-COG® Brush Commutated DC Motors**

Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
1.58 (.011)	7847 (821.7)	7.4 (.052)	1.94 (0.014)	1.43 (0.014)	3.1	1.57	12	500 CPR	PE-5	8322S001
1.58 (.011)	7847 (821.7)	7.4 (.052)	3.88 (0.027)	2.87 (0.027)	12.1	6.27	24	None	PE-5	8322S002
1.58 (.011)	7847 (821.7)	7.4 (.052)	3.88 (0.027)	2.87 (0.027)	12.1	6.27	24	500 CPR	PE-5	8322S003
1.58 (.011)	7847 (821.7)	7.4 (.052)	1.94 (0.014)	1.43 (0.014)	3.1	1.57	12	None	PE-5	8322S008
2.62 (.019)	10158 (1063.7)	16.8 (.118)	1.54 (0.011)	1.14 (0.011)	1.17	0.58	12	None	PE-5	8324S004
2.62 (.019)	10158 (1063.7)	16.8 (.118)	1.54 (0.011)	1.14 (0.011)	1.17	0.58	12	500 CPR	PE-5	8324S005
2.62 (.019)	10158 (1063.7)	16.8 (.118)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	24	None	PE-5	8324S006
2.62 (.019)	10158 (1063.7)	16.8 (.118)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	24	500 CPR	PE-5	8324S007

**Series 9000 LO-COG® Brush Commutated DC Motors**

Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
2.3 (.016)	7015 (734.6)	13.8 (.097)	2.2 (0.016)	1.63 (0.016)	1.93	1.16	12	500 CPR	PE-6	9232S001
2.3 (.016)	7015 (734.6)	13.8 (.097)	4.4 (0.031)	3.25 (0.031)	7.38	4.64	24	None	PE-6	9232S002
2.3 (.016)	7015 (734.6)	13.8 (.097)	4.4 (0.031)	3.25 (0.031)	7.38	4.64	24	500 CPR	PE-6	9232S003
4.7 (.033)	5993 (627.6)	31.6 (.223)	2.67 (0.019)	1.98 (0.019)	1.08	0.84	12	None	PE-6	9233S012
4.7 (.033)	5993 (627.6)	31.6 (.223)	5.28 (0.037)	3.9 (0.037)	3.94	3.29	24	None	PE-6	9233S013
6.1 (.043)	6151 (644.1)	41.3 (.291)	2.58 (0.018)	1.91 (0.018)	0.83	0.63	12	None	PE-6	9234S004
6.1 (.043)	6151 (644.1)	41.3 (.291)	2.58 (0.018)	1.91 (0.018)	0.83	0.63	12	500 CPR	PE-6	9234S005
6.1 (.043)	6151 (644.1)	41.3 (.291)	5.17 (0.037)	3.82 (0.037)	2.96	2.51	24	None	PE-6	9234S006
6.1 (.043)	6151 (644.1)	41.3 (.291)	5.17 (0.037)	3.82 (0.037)	2.96	2.51	24	500 CPR	PE-6	9234S007
9.5 (.067)	4913 (514.5)	61.8 (.436)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	None	PE-6	9236S008
9.5 (.067)	4913 (514.5)	61.8 (.436)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	500 CPR	PE-6	9236S009
11.5 (.081)	5331 (558.3)	77 (.543)	6 (0.042)	4.44 (0.042)	1.85	1.97	24	None	PE-6	9237S010
11.5 (.081)	5331 (558.3)	77 (.543)	6 (0.042)	4.44 (0.042)	1.85	1.97	24	500 CPR	PE-6	9237S011

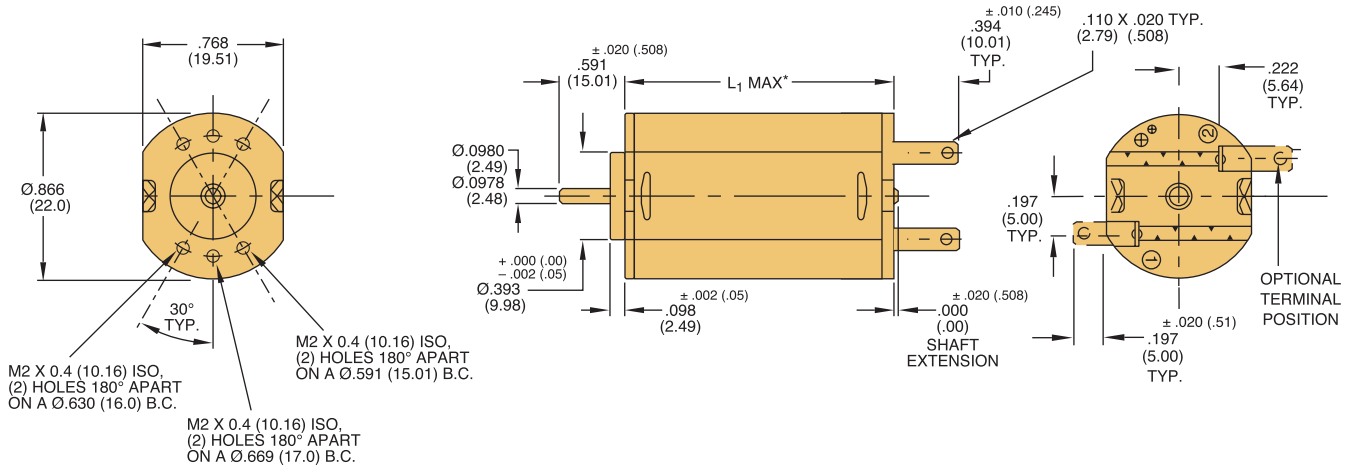
Note: All encoders supplied with 20" lead wires.

**Series 14000 LO-COG® Brush Commutated DC Motors**

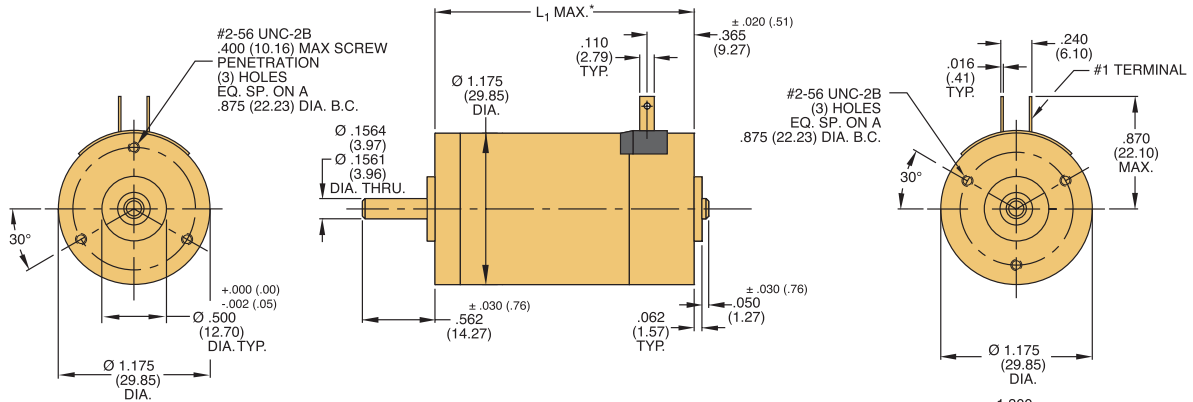
Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
10 (.071)	4230 (443.0)	62.8 (.444)	3.72 (0.026)	2.75 (0.026)	0.72	0.63	12	500 CPR	PE-6	14201S001
10 (.071)	4230 (443.0)	62.8 (.444)	7.44 (0.053)	5.5 (0.053)	2.79	2.54	24	None	PE-6	14201S002
10 (.071)	4230 (443.0)	62.8 (.444)	7.44 (0.053)	5.5 (0.053)	2.79	2.54	24	500 CPR	PE-6	14201S003
21 (.148)	3456 (361.9)	159 (1.12)	9.26 (0.065)	6.85 (0.065)	1.38	2.26	24	None	PE-6	14203S009
21 (.148)	3456 (361.9)	159 (1.12)	4.63 (0.033)	3.42 (0.033)	0.37	0.56	12	None	PE-6	14203S010
26 (.184)	3702 (387.7)	204 (1.44)	4.33 (0.031)	3.21 (0.031)	0.27	0.4	12	500 CPR	PE-6	14204S004
26 (.184)	3702 (387.7)	204 (1.44)	8.67 (0.061)	6.41 (0.061)	1.01	1.6	24	None	PE-6	14204S005
26 (.184)	3702 (387.7)	204 (1.44)	8.67 (0.061)	6.41 (0.061)	1.01	1.6	24	500 CPR	PE-6	14204S006
36.5 (.258)	3216 (336.8)	284 (2.01)	10 (0.071)	7.39 (0.071)	0.84	1.36	24	None	-	14206S011
50 (.35)	3211 (336.3)	410 (2.90)	10 (0.071)	7.39 (0.071)	0.59	0.87	24	None	PE-6	14207S007
50 (.35)	3211 (336.3)	410 (2.90)	10 (0.071)	7.39 (0.071)	0.59	0.87	24	500 CPR	PE-6	14207S008

Note: All encoders supplied with 20" lead wires.

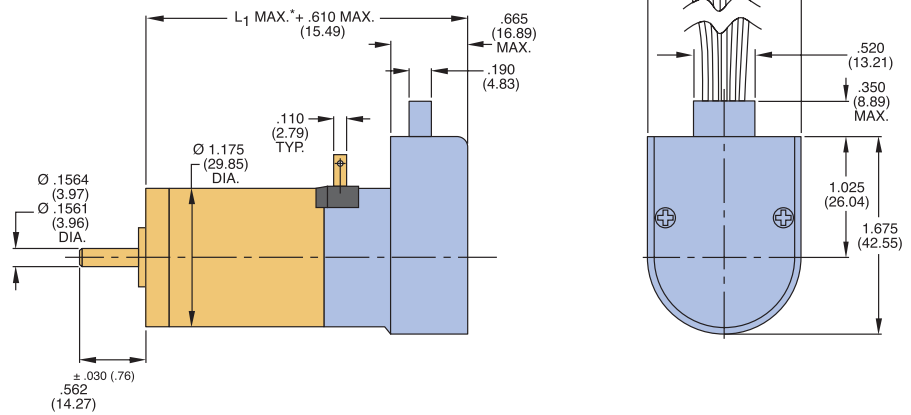
**Series 6000 LO-COG® 22mm Brush Commutated DC Motors**



Series 8000 LO-COG® Brush Commutated DC Motors



With 91X0 Encoder



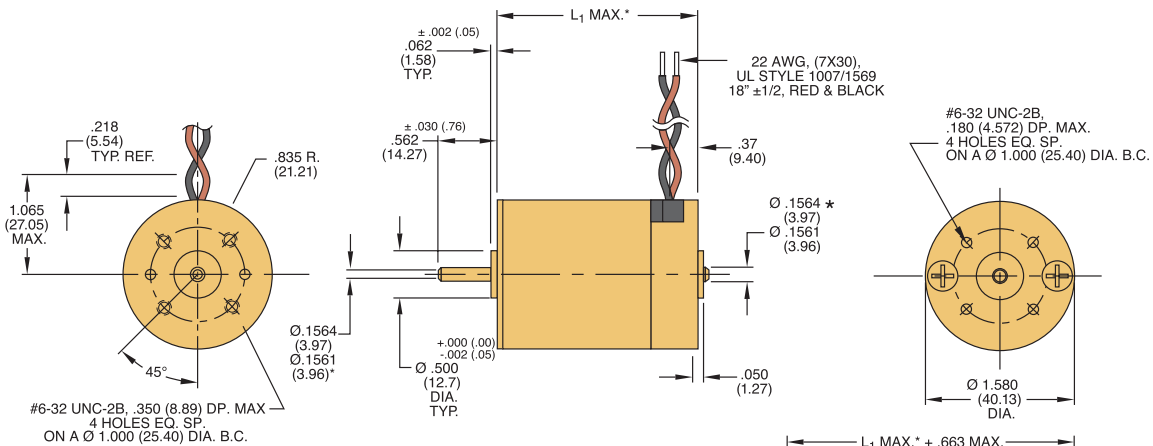
L <sub>1</sub>	Model Number
2.003 (50.9)	8322
2.378 (60.4)	8324

Encoder Connection Chart

Pin No.	Color	Connection
1	Black	Ground
2	Green	Index
3	Yellow	Channel A
4	Red	Vcc
5	Blue	Channel B

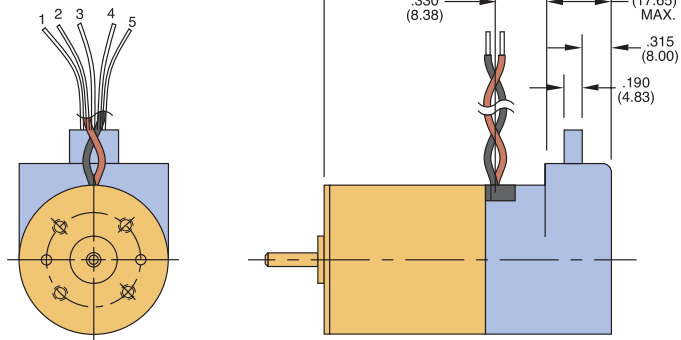
- Notes:
- Unless otherwise specified, all tolerances are to be ±.005 (.01)
  - All measurements are in inches (mm)

**Series 9000 LO-COG® Brush Commutated DC Motors**



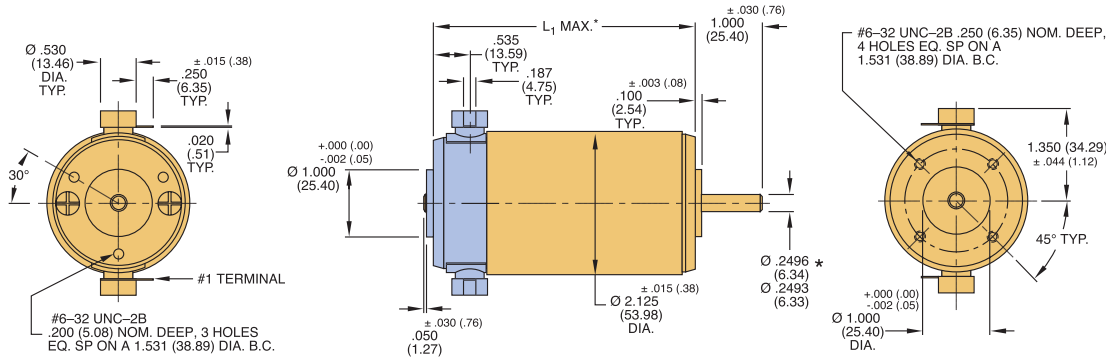
**With 91X Encoder**

L <sub>1</sub>	Model Number
1.828 (46.4)	9232
2.203 (55.9)	9233
2.403 (61.0)	9234
3.053 (77.5)	9236
3.353 (85.2)	9237*



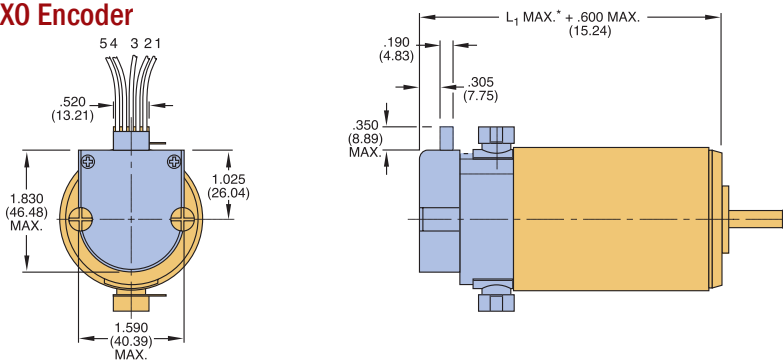
\* The 9237 Motor has a 5mm (.1966) Ø Shaft

**Series 14000 LO-COG® Brush Commutated DC Motors**



L <sub>1</sub>	Model Number
2.953 (75.0)	14201
3.703 (94.1)	14203
4.078 (103.6)	14204
4.953 (125.8)	14206
5.703 (144.9)	14207*

**With 91X Encoder**



**Encoder Connection Chart**

Pin No.	Color	Connection
1	Black	Ground
2	Green	Index
3	Yellow	Channel A
4	Red	Vcc
5	Blue	Channel B

Notes:  
 • Unless otherwise specified, all tolerances are to be ±.005 (.01)  
 • All measurements are in inches (mm)

\* The 14207 Motor has a 8mm (.3147) Ø Shaft



Series GM 8000 LO-COG® Brush Commutated DC Motors

Reduction Ratio	Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
	ozin (N-m)	rpm (rad/s)	ozin (N-m)	ozin/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
6.3:1 6.3:1	6 (.04)	1227 (128.5)	26 <sup>1</sup> (.184)	3.06 (0.022)	2.27 (0.022)	10.8	5.4	19.1	None	PE-10	GM8712-11
19.5:1 19.5:1	15.5 (.109)	396 (41.5)	72 <sup>1</sup> (.51)	3.06 (0.022)	2.27 (0.022)	10.8	5.4	19.1	None	PE-10	GM8712-21
60.5:1 60.5:1	46 (.325)	128 (13.4)	201 <sup>1,2</sup> (1.42)	3.06 (0.022)	2.27 (0.022)	10.8	5.4	19.1	None	PE-10	GM8712-31
187.7:1 187.7:1	100 (.71)	41 (4.3)	557 <sup>1,2</sup> (3.93)	3.06 (0.022)	2.27 (0.022)	10.8	5.4	19.1	None	PE-10	GM8712-41
187.7:1 187.7:1	100 (.71)	41 (4.3)	557 <sup>1,2</sup> (3.93)	3.87 (0.027)	2.86 (0.027)	17.2	8.62	24	None	PE-10	GM8712S030
6.3:1 6.3:1	14.5 (.102)	720 (75.4)	42 <sup>1</sup> (.297)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	12	None	PE-10	GM8724S008 <sup>3</sup>
6.3:1 6.3:1	14.5 (.102)	720 (75.4)	42 <sup>1</sup> (.297)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	12	500 CPR	PE-10	GM8724S009 <sup>3</sup>
6.3:1 6.3:1	14.5 (.102)	720 (75.4)	42 <sup>1</sup> (.297)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	None	PE-10	GM8724S010 <sup>3</sup>
6.3:1 6.3:1	14.5 (.102)	720 (75.4)	42 <sup>1</sup> (.297)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	500 CPR	PE-10	GM8724S011 <sup>3</sup>
9.9:1 9.9:1	21 (.148)	455 (47.7)	60 <sup>1</sup> (.424)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	12	None	PE-10	GM8724S012 <sup>3</sup>
9.9:1 9.9:1	21 (.148)	455 (47.7)	60 <sup>1</sup> (.424)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	None	PE-10	GM8724S013 <sup>3</sup>
19.5:1 19.5:1	41.5 (.293)	230 (24.1)	117 <sup>1</sup> (.826)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	12	None	PE-10	GM8724S014 <sup>3</sup>
19.5:1 19.5:1	41.5 (.293)	230 (24.1)	117 <sup>1</sup> (.826)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	12	500 CPR	PE-10	GM8724S015 <sup>3</sup>
19.5:1 19.5:1	41.5 (.293)	230 (24.1)	117 <sup>1</sup> (.826)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	None	PE-10	GM8724S016 <sup>3</sup>
19.5:1 19.5:1	41.5 (.293)	230 (24.1)	117 <sup>1</sup> (.826)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	500 CPR	PE-10	GM8724S017 <sup>3</sup>
30.9:1 30.9:1	61 (.431)	146 (15.3)	168 <sup>1</sup> (1.187)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	12	None	PE-10	GM8724S018 <sup>3</sup>
30.9:1 30.9:1	61 (.431)	146 (15.3)	168 <sup>1</sup> (1.187)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	None	PE-10	GM8724S019 <sup>3</sup>
60.5:1 60.5:1	113 (.798)	75 (7.9)	328 <sup>1,2</sup> (2.317)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	12	None	PE-10	GM8724S020 <sup>3</sup>
60.5:1 60.5:1	113 (.798)	75 (7.9)	328 <sup>1,2</sup> (2.317)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	12	500 CPR	PE-10	GM8724S021 <sup>3</sup>
60.5:1 60.5:1	113 (.798)	75 (7.9)	328 <sup>1,2</sup> (2.317)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	None	PE-10	GM8724S022 <sup>3</sup>
60.5:1 60.5:1	113 (.798)	75 (7.9)	328 <sup>1,2</sup> (2.317)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	500 CPR	PE-10	GM8724S023 <sup>3</sup>
95.9:1 95.9:1	173 (1.222)	47 (4.9)	466 <sup>1,2</sup> (3.291)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	12	None	PE-10	GM8724S024 <sup>3</sup>
95.9:1 95.9:1	173 (1.222)	47 (4.9)	466 <sup>1,2</sup> (3.291)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	None	PE-10	GM8724S025 <sup>3</sup>
187.7:1	175	24	911 <sup>1,2</sup>	3.09	2.29	4.33	2.34	12	None	PE-10	GM8724S026 <sup>3</sup>

**Series GM 8000 LO-COG® Brush Commutated DC Motors** (continued)

Reduction Ratio	Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
	oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
187.7:1 187.7:1	175 (1.23)	24 (2.5)	911 <sup>1,2</sup> (6.434)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	None	PE-10	GM8724S028 <sup>3</sup>
187.7:1 187.7:1	175 (1.23)	24 (2.5)	911 <sup>1,2</sup> (6.434)	6.18 (0.044)	4.57 (0.044)	17	9.35	24	500 CPR	PE-10	GM8724S029 <sup>3</sup>

**Series GM 9000 LO-COG® Brush Commutated DC Motors**

Reduction Ratio	Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
	oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
11.5:1 11.5:1	61 (.431)	424 (44.4)	304 <sup>1,2</sup> (2.147)	3.29 (0.023)	2.43 (0.023)	1.26	1.02	12	None	PE-11	GM9234S016 <sup>3</sup>
11.5:1 11.5:1	61 (.431)	424 (44.4)	304 <sup>1,2</sup> (2.147)	6.5 (0.046)	4.81 (0.046)	4.62	3.97	24	None	PE-11	GM9234S017 <sup>3</sup>
38.3:1 38.3:1	187 (1.321)	127 (13.3)	911 <sup>1,2</sup> (6.434)	3.29 (0.023)	2.43 (0.023)	1.26	1.02	12	None	PE-11	GM9234S022 <sup>3</sup>
38.3:1 38.3:1	187 (1.321)	127 (13.3)	911 <sup>1,2</sup> (6.434)	6.5 (0.046)	4.81 (0.046)	4.62	3.97	24	None	PE-11	GM9234S023 <sup>3</sup>
127.8:1 127.8:1	500 (3.51)	36 (3.8)	2747 <sup>1,2</sup> (19.401)	3.29 (0.023)	2.43 (0.023)	1.26	1.02	12	None	PE-11	GM9234S028 <sup>3</sup>
127.8:1 127.8:1	500 (3.51)	36 (3.8)	2747 <sup>1,2</sup> (19.401)	6.5 (0.046)	4.81 (0.046)	4.62	3.97	24	None	PE-11	GM9234S029 <sup>3</sup>
218.4:1 218.4:1	500 (3.51)	21 (2.2)	4199 <sup>1,2</sup> (29.655)	3.29 (0.023)	2.43 (0.023)	1.26	1.02	12	None	PE-11	GM9234S030 <sup>3</sup>
218.4:1 218.4:1	500 (3.51)	21 (2.2)	4199 <sup>1,2</sup> (29.655)	3.29 (0.023)	2.43 (0.023)	1.26	1.02	12	500 CPR	PE-11	GM9234S031 <sup>3</sup>
218.4:1 218.4:1	500 (3.51)	21 (2.2)	4199 <sup>1,2</sup> (29.655)	6.5 (0.046)	4.81 (0.046)	4.62	3.97	24	None	PE-11	GM9234S032 <sup>3</sup>
218.4:1 218.4:1	500 (3.51)	21 (2.2)	4199 <sup>1,2</sup> (29.655)	6.5 (0.046)	4.81 (0.046)	4.62	3.97	24	500 CPR	PE-11	GM9234S033 <sup>3</sup>
5.9:1 5.9:1	48 (.339)	790 (82.7)	286 <sup>1</sup> (2.02)	3.25 (0.023)	2.4 (0.023)	0.71	0.66	12	None	PE-11	GM9236S012 <sup>3</sup>
5.9:1 5.9:1	48 (.339)	790 (82.7)	286 <sup>1</sup> (2.02)	3.25 (0.023)	2.4 (0.023)	0.71	0.66	12	500 CPR	PE-11	GM9236S013 <sup>3</sup>
5.9:1 5.9:1	48 (.339)	790 (82.7)	286 <sup>1</sup> (2.02)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	None	PE-11	GM9236S014 <sup>3</sup>
5.9:1 5.9:1	48 (.339)	790 (82.7)	286 <sup>1</sup> (2.02)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	500 CPR	PE-11	GM9236S015 <sup>3</sup>
19.7:1 19.7:1	153 (1.081)	236 (24.7)	860 <sup>1,2</sup> (6.074)	3.25 (0.023)	2.4 (0.023)	0.71	0.66	12	None	PE-11	GM9236S018 <sup>3</sup>

<sup>1</sup>Caution: Peak Torque (Stall) is provided for the purpose of performance calculations only. Operation near, or at, a stalled condition will result in motor and/or gearhead damage.

<sup>2</sup>Caution: The gearhead will be damaged when operating at the Peak Torque.

<sup>3</sup>Unit supplied with ball bearing output shaft.

Note: All speed and torque ratings are specified at the Rated Voltage.

For winding characteristics of a specific Model and Winding Voltage, refer to the appropriate catalog data sheet.

Note: All encoders supplied with 20" lead wires.

Please contact your Pittman sales representative or the factory application engineering group for specific recommendations regarding gearmotor applications.



Series GM 9000 LO-COG® Brush Commutated DC Motors (continued)

Reduction Ratio	Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
	oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
19.7:1 19.7:1	153 (1.081)	236 (24.7)	860 <sup>1,2</sup> (6.074)	3.25 (0.023)	2.4 (0.023)	0.71	0.66	12	500 CPR	PE-11	GM9236S019 <sup>3</sup>
19.7:1 19.7:1	153 (1.081)	236 (24.7)	860 <sup>1,2</sup> (6.074)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	None	PE-11	GM9236S020 <sup>3</sup>
19.7:1 19.7:1	153 (1.081)	236 (24.7)	860 <sup>1,2</sup> (6.074)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	500 CPR	PE-11	GM9236S021 <sup>3</sup>
65.5:1 65.5:1	480 (3.39)	71 (7.4)	2585 <sup>1,2</sup> (18.257)	3.25 (0.023)	2.4 (0.023)	0.71	0.66	12	None	PE-11	GM9236S024 <sup>3</sup>
65.5:1 65.5:1	480 (3.39)	71 (7.4)	2585 <sup>1,2</sup> (18.257)	3.25 (0.023)	2.4 (0.023)	0.71	0.66	12	500 CPR	PE-11	GM9236S025 <sup>3</sup>
65.5:1 65.5:1	480 (3.39)	71 (7.4)	2585 <sup>1,2</sup> (18.257)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	None	PE-11	GM9236S026 <sup>3</sup>
65.5:1 65.5:1	480 (3.39)	71 (7.4)	2585 <sup>1,2</sup> (18.257)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	500 CPR	PE-11	GM9236S027 <sup>3</sup>
5.9:1 5.9:1	15 (.106)	474 (49.6)	36 <sup>1</sup> (.254)	5.6 (0.040)	4.14 (0.040)	8.33	6.17	12	None	PE-11	GM9413-1
19.7:1 19.7:1	45 (.318)	142 (14.9)	109 <sup>1</sup> (.770)	5.6 (0.040)	4.14 (0.040)	8.33	6.17	12	None	PE-11	GM9413-2
65.5:1 65.5:1	136 (.961)	43 (4.5)	326 <sup>1,2</sup> (2.302)	5.6 (0.040)	4.14 (0.040)	8.33	6.17	12	None	PE-11	GM9413-3
218.4:1 218.4:1	175 (1.24)	13 (1.4)	973 <sup>1,2</sup> (6.872)	5.6 (0.040)	4.14 (0.040)	8.33	6.17	12	None	PE-11	GM9413-4
728.1:1 728.1:1	175 (1.24)	4 (0.4)	2913 <sup>1,2</sup> (20.573)	5.6 (0.040)	4.14 (0.040)	8.33	6.17	12	None	PE-11	GM9413-5
75.1:1 75.1:1	265 (1.87)	82 (8.6)	1580 <sup>1</sup> (11.159)	5.17 (0.037)	3.82 (0.037)	2.96	2.51	24	None	*	GM9634S002 <sup>3</sup>
144.0:1 144.0:1	500 (3.51)	43 (4.5)	3033 <sup>1,2</sup> (21.421)	5.17 (0.037)	3.82 (0.037)	2.96	2.51	24	None	*	GM9634S003 <sup>3</sup>

Series GM 14000 LO-COG® Brush Commutated DC Motors

Reduction Ratio	Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
	oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
75.1:1 75.1:1	1125 (7.95)	49 (5.1)	7803 <sup>1,2</sup> (55.1)	8.67 (0.061)	6.41 (0.061)	1.01	1.6	24	None	*	GM14604S002
65.5:1 65.5:1	500 (3.53)	59 (6.2)	4625 <sup>1,2</sup> (32.7)	3.9 (0.030)	2.88 (0.030)	0.45	0.63	12	None	PE-12	GM14902S017
65.5:1 65.5:1	500 (3.53)	59 (6.2)	4625 <sup>1,2</sup> (32.7)	3.9 (0.030)	2.88 (0.030)	0.45	0.63	12	500 CPR	PE-12	GM14902S018
65.5:1 65.5:1	500 (3.53)	59 (6.2)	4625 <sup>1,2</sup> (32.7)	7.8 (0.055)	5.77 (0.055)	1.73	2.54	24	None	PE-12	GM14902S019
65.5:1 65.5:1	500 (3.53)	59 (6.2)	4625 <sup>1,2</sup> (32.7)	7.8 (0.055)	5.77 (0.055)	1.73	2.54	24	500 CPR	PE-12	GM14902S020
5.9:1 5.9:1	124 (.876)	597 (62.5)	975 <sup>1,2</sup> (6.89)	4.33 (0.031)	3.21 (0.031)	0.27	0.4	12	None	PE-12	GM14904S009

\* Planetary gearhead drawings available upon request.

**Series GM 14000 LO-COG® Brush Commutated DC Motors (continued)**

Reduction Ratio	Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
	oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
5.9:1	124	597	975 <sup>1,2</sup>	4.33	3.21	0.27	0.4	12	500 CPR	PE-12	GM14904S010 <sup>3</sup>
5.9:1	(.876)	(62.5)	(6.89)	(0.031)	(0.031)						
5.9:1	124	597	975 <sup>1,2</sup>	8.67	6.41	1.01	1.6	24	None	PE-12	GM14904S011 <sup>3</sup>
5.9:1	(.876)	(62.5)	(6.89)	(0.061)	(0.061)						
5.9:1	124	597	975 <sup>1,2</sup>	8.67	6.41	1.01	1.6	24	500 CPR	PE-12	GM14904S012 <sup>3</sup>
5.9:1	(.876)	(62.5)	(6.89)	(0.061)	(0.061)						
19.7:1	374	179	2934 <sup>1,2</sup>	4.33	3.21	0.27	0.4	12	None	PE-12	GM14904S013 <sup>3</sup>
19.7:1	(2.64)	(18.7)	(20.72)	(0.031)	(0.031)						
19.7:1	374	179	2934 <sup>1,2</sup>	4.33	3.21	0.27	0.4	12	500 CPR	PE-12	GM14904S014 <sup>3</sup>
19.7:1	(2.64)	(18.7)	(20.72)	(0.031)	(0.031)						
19.7:1	374	179	2934 <sup>1,2</sup>	8.67	6.41	1.01	1.6	24	None	PE-12	GM14904S015 <sup>3</sup>
19.7:1	(2.64)	(18.7)	(20.72)	(0.061)	(0.061)						
19.7:1	374	179	2934 <sup>1,2</sup>	8.67	6.41	1.01	1.6	24	500 CPR	PE-12	GM14904S016 <sup>3</sup>
19.7:1	(2.64)	(18.7)	(20.72)	(0.061)	(0.061)						

<sup>1</sup>Caution: Peak Torque (Stall) is provided for the purpose of performance calculations only. Operation near, or at, a stalled condition will result in motor and/or gearhead damage.

<sup>2</sup>Caution: The gearhead will be damaged when operating at the Peak Torque.

<sup>3</sup>Unit supplied with ball bearing output shaft.

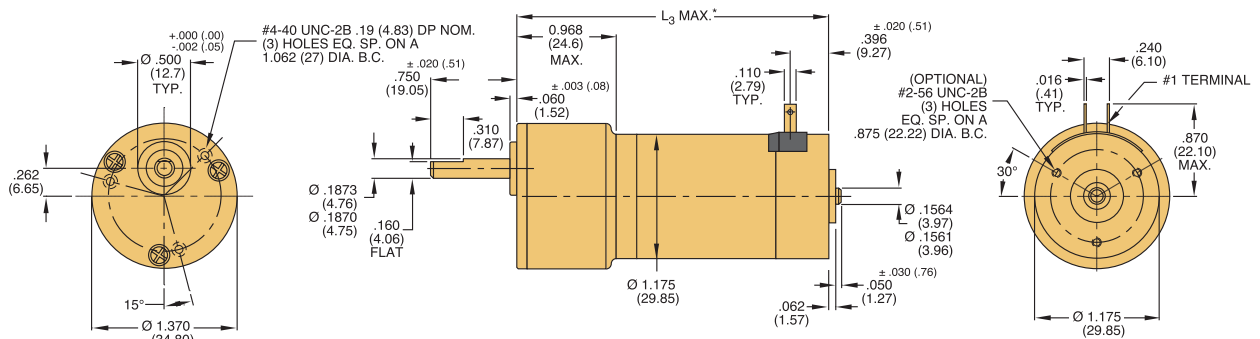
Note: All speed and torque ratings are specified at the Rated Voltage.

For winding characteristics of a specific Model and Winding Voltage, refer to the appropriate catalog data sheet.

Note: All encoders supplied with 20" lead wires.

Please contact your Pittman sales representative or the factory application engineering group for specific recommendations regarding gearmotor applications.

**Series GM 8000 LO-COG® Brush Commutated DC Motors**



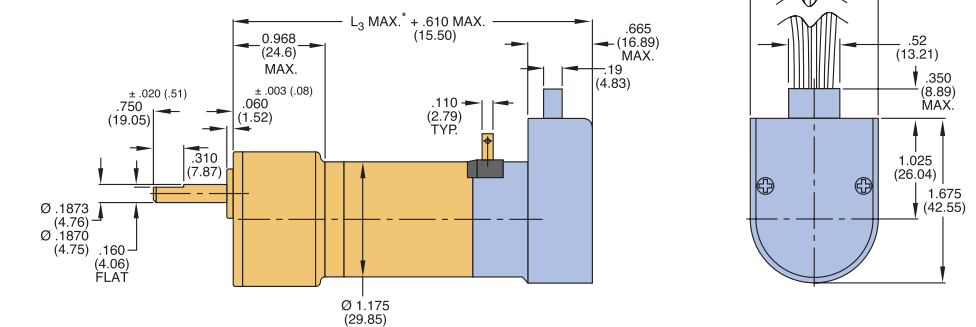
**With 91X0 Encoder**

**Encoder Connection Chart**

Pin No.	Color	Connection
1	Black	Ground
2	Green	Index
3	Yellow	Channel A
4	Red	Vcc
5	Blue	Channel B

Notes:

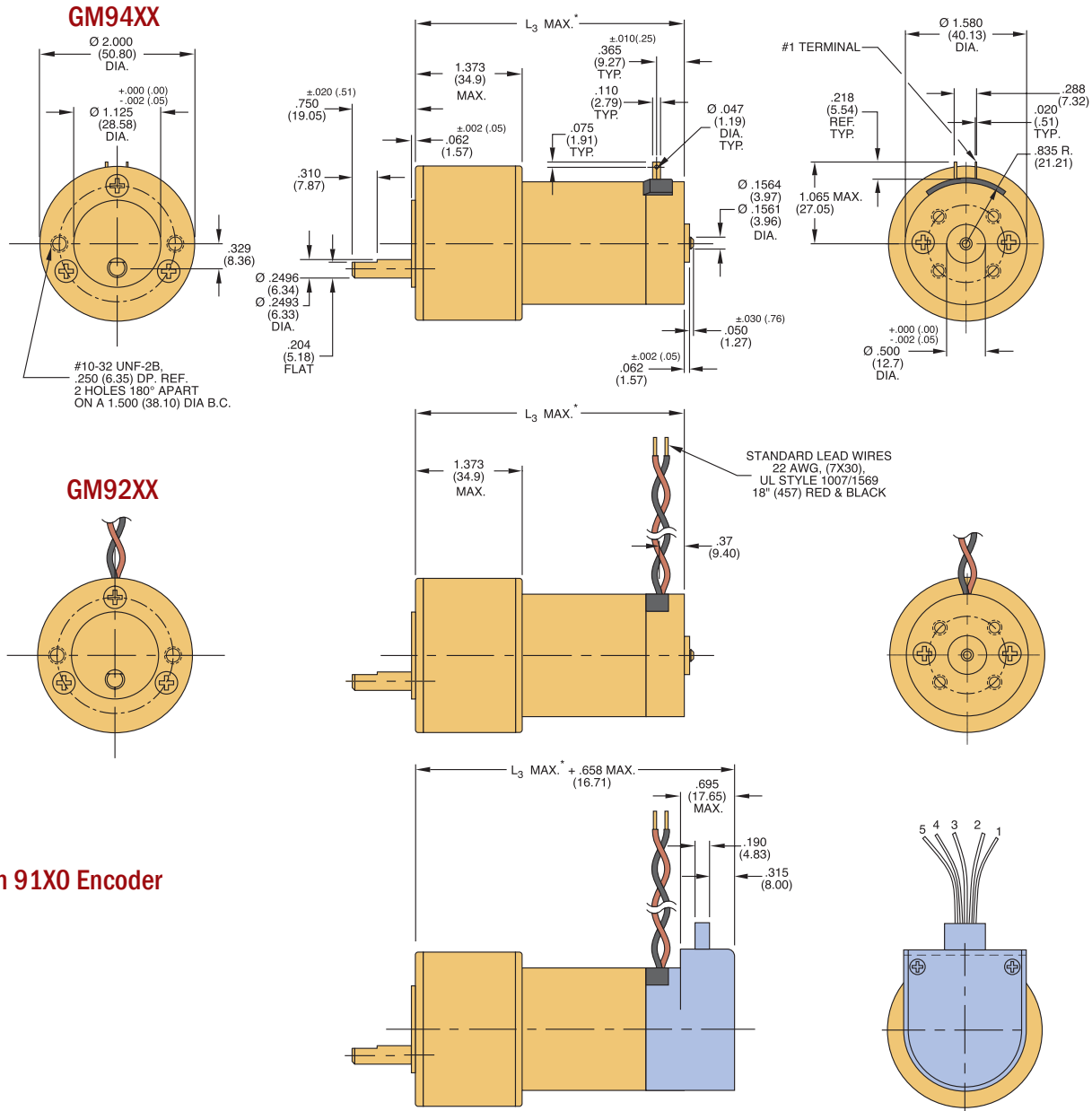
- Unless otherwise specified, all tolerances are to be ±.005 (.01)
- All measurements are in inches (mm)



Gear Ratio	Shaft Rotation
6.3:1, 30.9:1, 60.5:1	CW
9.9:1, 19.5:1, 95.9:1, 187:1	CCW

L <sub>3</sub>	Model Number
2.91 (73.9)	GM8712
3.285 (83.4)	GM8724

Series GM 9000 LO-COG® Brush Commutated DC Motors

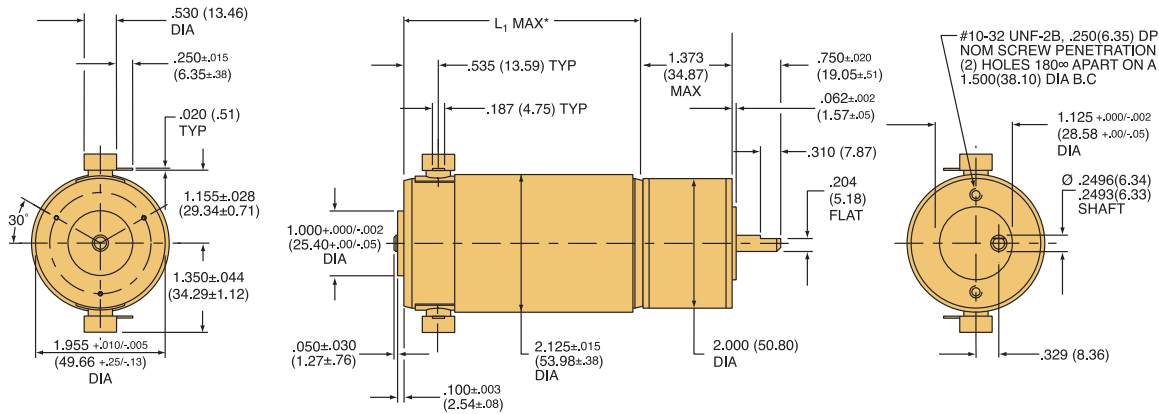


With 91X0 Encoder

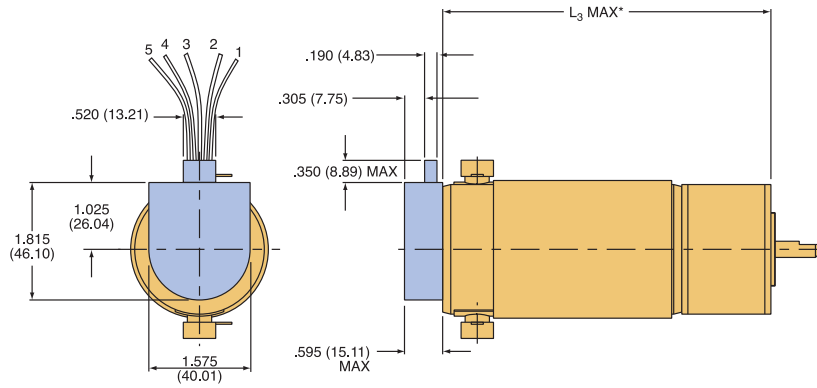
L <sub>3</sub>	Model Number
3.676 (93.4)	GM9234
4.326 (109.9)	GM9236
3.476 (88.3)	GM9413

Gear Ratio	Shaft Rotation
5.9:1, 11.5:1, 65.5:1, 127.8:1	CW
19.7:1, 38.3:1, 218.4:1	CCW

**Series GM 14000 LO-COG® Brush Commutated DC Motors**



**With 91X0 Encoder**



**Gearmotor Only**

L <sub>1</sub>	Model Number
3.203 (81.4)	GM14902
4.078 (103.6)	GM14904

**Gearmotor with Encoder**

L <sub>3</sub>	Model Number
4.572 (116.1)	GM14902
5.447 (138.3)	GM14904

Gear Ratio	Shaft Rotation
5.9:1, 65.1:1	CW
19.7:1	CCW

**Encoder Connection Chart**

Pin No.	Color	Connection
1	Black	Ground
2	Green	Index
3	Yellow	Channel A
4	Red	Vcc
5	Blue	Channel B

**Notes:**

- Unless otherwise specified, all tolerances are to be ±.005 (.01)
- All measurements are in inches (mm)

### ELCOM ST™ Brushless DC Motors

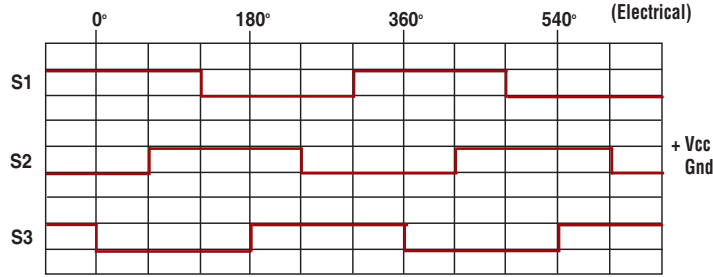
Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
16.3 (0.115)	7197 (754)	32 (0.226)	2.16 (0.015)	1.60 (0.015)	0.26	0.49	12	None	PE-14	N2311A011
16.3 (0.115)	7197 (754)	32 (0.226)	2.16 (0.015)	1.60 (0.015)	0.26	0.49	12	1000 CPR	PE-14	N2341S001
16.3 (0.115)	7353 (770)	32 (0.226)	4.32 (0.030)	3.20 (0.030)	1.05	1.95	24	None	PE-14	N2311A012
16.3 (0.115)	7353 (770)	32 (0.226)	4.32 (0.030)	3.20 (0.030)	1.05	1.95	24	1000 CPR	PE-14	N2341S002
26.5 (0.187)	6431 (673)	70 (0.494)	2.42 (0.017)	1.79 (0.017)	0.15	0.31	12	None	PE-14	N2312A013
26.5 (0.187)	6431 (673)	70 (0.494)	2.42 (0.017)	1.79 (0.017)	0.15	0.31	12	1000 CPR	PE-14	N2342S003
26.5 (0.187)	6571 (688)	70 (0.494)	4.84 (0.034)	3.58 (0.034)	0.60	1.24	24	None	PE-14	N2312A014
26.5 (0.187)	6571 (688)	70 (0.494)	4.84 (0.034)	3.58 (0.034)	0.60	1.24	24	1000 CPR	PE-14	N2342S004

### ELCOM SL™ Brushless DC Motors

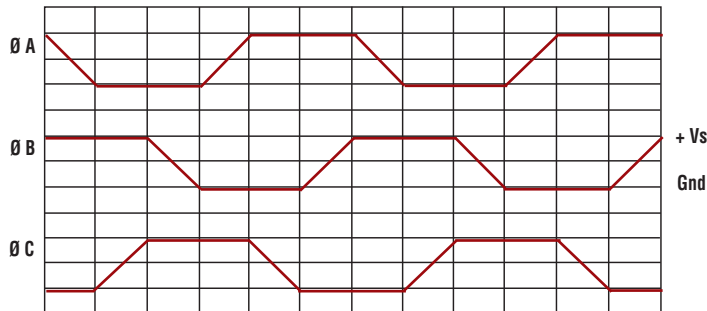
Maximum Continuous Torque	No-Load Speed	Peak Torque (Stall)	Torque Constant	Back EMF Constant	Resistance	Inductance	Rated Voltage	Encoder	Outline Drawing Page Number	Part Number
oz-in (N-m)	rpm (rad/s)	oz-in (N-m)	oz-in/A (N-m/A)	V/krpm (V/rad/s)	Ω	mH	V			
4.11 (.029)	7150 (748.7)	13.3 (.094)	2.24 (0.016)	1.66 (0.016)	1.98	0.18	12	500 CPR	PE-15	3441S001-R3
4.11 (.029)	7150 (748.7)	13.3 (.094)	4.47 (0.032)	3.31 (0.032)	7.9	0.7	24	500 CPR	PE-15	3441S002-R3
5.78 (.041)	7400 (774.9)	26.2 (.185)	3.44 (0.024)	2.54 (0.024)	2.67	0.29	19.1	500 CPR	PE-15	3442S003-R3
5.78 (.041)	7400 (774.9)	26.2 (.185)	6.88 (0.049)	5.09 (0.049)	9.32	1.16	38.2	500 CPR	PE-15	3442S004-R3
11.9 (.084)	5780 (605.3)	71.2 (.503)	3.53 (0.025)	2.61 (0.025)	0.75	0.14	15.1	500 CPR	PE-15	4441S009
11.9 (.084)	5780 (605.3)	71.2 (.503)	7.05 (0.050)	5.21 (0.050)	3	0.54	30.3	500 CPR	PE-15	4441S010
14.3 (.101)	5925 (620.5)	100.2 (.708)	4.33 (0.031)	3.2 (0.031)	0.82	0.16	19.1	500 CPR	PE-15	4442S011
14.3 (.101)	5925 (620.5)	100.2 (.708)	8.67 (0.061)	6.41 (0.061)	3.3	0.64	38.2	500 CPR	PE-15	4442S012
19.1 (.135)	5860 (613.7)	149 (1.05)	5.55 (0.039)	4.1 (0.039)	0.89	0.19	24	500 CPR	PE-15	4443S013
19.1 (.135)	5860 (613.7)	149 (1.05)	11.1 (0.078)	8.21 (0.078)	3.58	0.74	48	500 CPR	PE-15	4443S014
25 (.177)	5025 (526.2)	171 (1.21)	2.96 (0.021)	2.19 (0.021)	0.25	0.06	12	500 CPR	PE-15	5441S005
25 (.177)	5025 (526.2)	171 (1.21)	6.46 (0.046)	4.77 (0.046)	0.88	0.27	24	500 CPR	PE-15	5441S006

Note: All encoders supplied with 20" lead wires.

### Brushless DC Motor Timing Diagram



Code	101	100	110	010	011	001	101	100	110	010	011	001
Step	6	1	2	3	4	5	6	1	2	3	4	5



+B	+B	+C	+C	+A	+A	+B	+B	+C	+C	+A	+A
-C	-A	-A	-B	-B	-C	-C	-A	-A	-B	-B	-C

1 Mechanical Revolution  
3-Phase 4-Pole WYE Connected Motor

### 3-Phase Motor Connection Chart

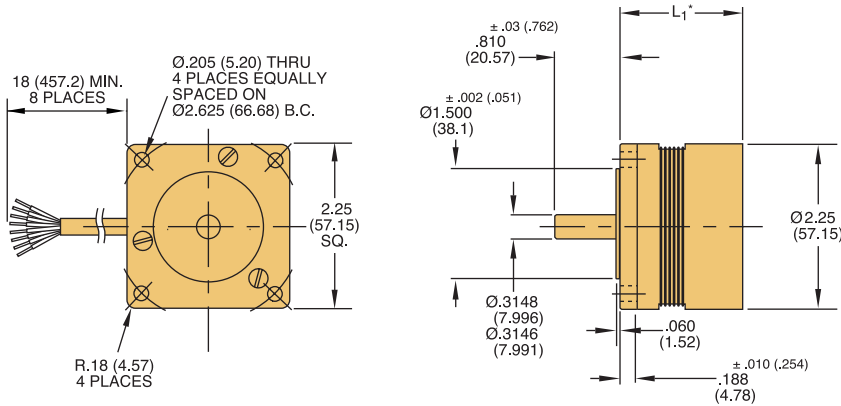
Function	Wire Color
Phase A	Brown
Phase B	Red
Phase C	Orange
Sensor 1	Grey
Sensor 2	Blue
Sensor 3	White
Hall Sensor Power	Violet
Hall Sensor Power Return	Black

### Encoder Connection Chart

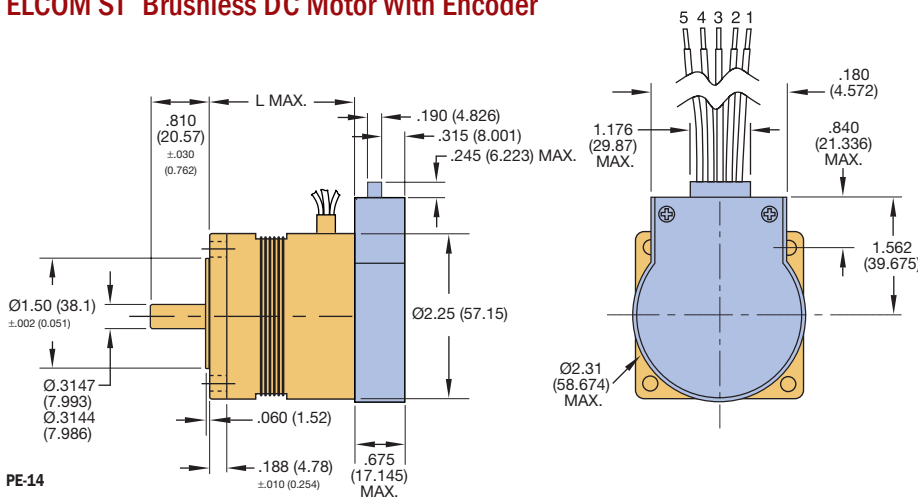
Pin No.	Color	Connection
1	Black	Ground
2	Green	Index/NC
3	Yellow	Channel A
4	Red	Vcc
5	Blue	Channel B

- Notes:
- Unless otherwise specified, all tolerances are to be  $\pm 0.005$  (.01)
  - All measurements are in inches (mm)

### ELCOM ST™ Brushless DC Motor

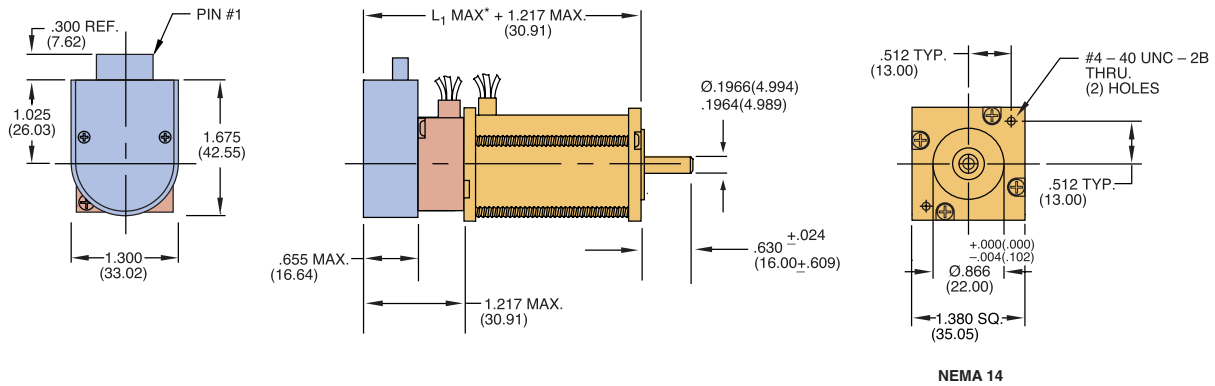


### ELCOM ST™ Brushless DC Motor With Encoder



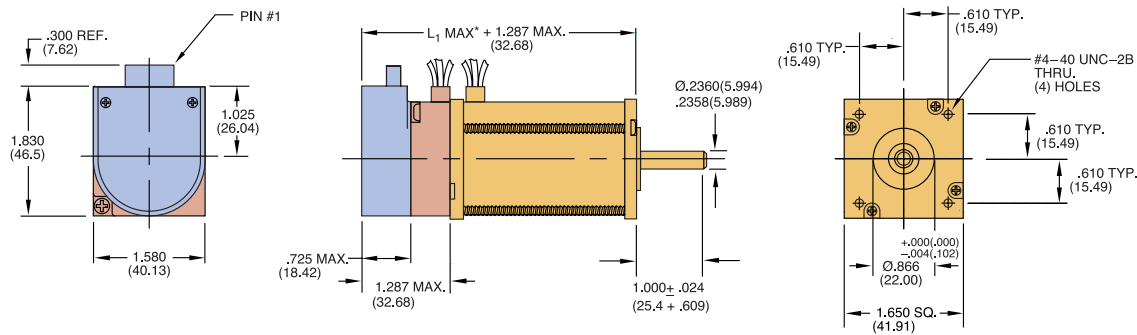


Series 3400 ELCOM SL™ Brushless DC Motor with Encoder



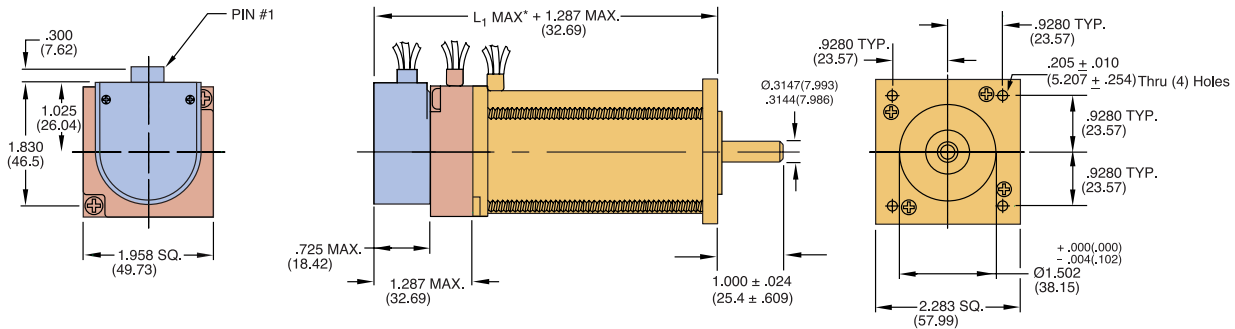
NEMA 14

Series 4400 ELCOM SL™ Brushless DC Motor with Encoder



NEMA 17

Series 5400 ELCOM SL™ Brushless DC Motor with Encoder



NEMA 23

L <sub>1</sub>	Model Number
1.76 (44.7)	3441
2.16 (54.9)	3442
2.093 (53.2)	4441
2.393 (60.8)	4442
2.693 (68.4)	4443
2.603 (66.1)	5441

Specifications subject to change without notice.

## Terms and Conditions of Sale

### 1. Payment:

Net payment is to be made within 30 days from the date of invoice if open terms are extended. Purchaser's credit will be established at time of order and if other than open credit is extended by the Pittman Division, hereinafter called Pittman, purchaser will be so notified.

### 2. Price, Transportation (Insurance) and Taxes:

All prices are F.O.B. Harleysville, PA. The price does not include other charges, such as transportation charges, insurance charges, any present or future sales, use, occupation or other tax which may be imposed on this transaction, all of which shall be paid by the Purchaser. Shipments will not be insured unless specifically requested on the Purchaser's order.

### 3. Cancellation:

Unless Pittman receives notification otherwise within 5 days after receipt hereof by Purchaser, these terms and conditions shall be conclusively presumed to be accepted by Purchaser and thereafter no cancellation of order shall be effective without the consent of Pittman: Except - (a) cancellations of reasonable-size orders of Stock Products may be accepted at the discretion of Pittman before they are shipped to the Purchaser, without any charge to the Purchaser, (b) if the order is for Special Products, i.e., products other than those listed in Pittman's current catalog, the Purchaser will be liable for a cancellation charge equal to the purchase price or, as solely determined by Pittman, to a lesser charge, depending on degree of completion of order and expenses or liabilities incurred by Pittman to the day the cancellation notice is received plus a profit of 15% thereof, and (c) if order is accompanied by a notice that products required are for performance of a contract with the United States, or an agency thereof, containing a standard termination clause, the provisions of such termination clause most favorable to Pittman shall be applicable to this order.

### 4. Delivery:

Pittman will make every effort to maintain a promised shipping date, but because of many factors beyond our reasonable control, the promised shipping date is not guaranteed. Pittman accepts no liability for penalties or damages for delayed shipments, if any. Claims must be received by Pittman within 10 days of receipt of the shipment by Purchaser for consideration.

### 5. Return of Products:

Permission must be obtained from Pittman before any products are returned. If return of products is made necessary through any fault of ours, and permission is granted for its return, we will give full credit, including all transportation charges. If return is due to no fault of ours, and granted, credit less a service charge of 15%, minimum charge \$100.00 on accepted pieces, will be issued when product has been returned, transportation prepaid, counted, inspected and found to be in salable condition by Pittman.

### 6. Warranty:

Pittman makes no warranty, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose, with regard to any of its products except that as to its Catalog Standard Products they shall substantially conform to the specifications thereof listed in Pittman's current catalog at the time the order is accepted by Pittman and as to its Special Products that they shall substantially conform to the specifications agreed upon in writing with Purchaser at the time of acceptance of the order.

Pittman warrants product against defects in material and workmanship for a period of one year from manufactured date.

### 7. Technical or Other Assistance:

Any information or assistance which may be given by Pittman to Purchaser is based on our experience and judgment, but no warranty, expressed or implied, is made as to the information or assistance.

### 8. Title to Merchandise:

Title to products passes to Purchaser upon our delivery thereof to carrier at shipping point, Purchaser thereafter assuming all risks of ownership.

### 9. Patent Infringement:

To extent that products delivered hereunder are not manufactured pursuant to designs or specifications furnished by Purchaser, Pittman agrees that it will defend at its own expense any suit brought against Purchaser in which infringement by products delivered hereunder of any United States Letters Patent is alleged and will indemnify Purchaser, its officers, agents and employees against liability, including costs, for infringement of any such Letters Patent, provided that Purchaser delivers promptly to Pittman all notices of the suit or action alleging such infringement and authorizes Pittman to conduct the defense and/or settlement thereof to a final conclusion. The foregoing indemnification shall not apply to infringement arising from the use or sale of a product delivered hereunder in combination with another product not delivered hereunder where infringement would not have occurred from the use or sale of the product delivered hereunder solely for the purpose for which it was designed. In no event will Pittman be liable for consequential, incidental or special damages even if Pittman has been advised of the possibility of such damages.

### 10. General:

These terms and conditions shall constitute an integral part of the contract for the products covered hereby, which contract shall be governed by the laws of Pennsylvania. No waiver, alteration or modification of any of these provisions shall be valid unless made in writing and signed by an authorized officer of the Pittman Division.



## **AMETEK<sup>®</sup>** TECHNICAL & INDUSTRIAL PRODUCTS

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