

LO-COG® DC Servo Motors



Pittman brand LO-COG® brush-commutated DC motors offer smooth, quiet operation and long life. Armatures are skewed to minimize magnetic cogging, even at low speeds, and windings are resin impregnated for greater reliability in incremental motion applications. An innovative cartridge brush assembly reduces audible and electrical noise and significantly improves brush life by maintaining optimum brush force throughout the life of the motor. For precision motor control, Hewlett-Packard® optical encoders are available in 2 or 3 channel versions with several CPR ranges to meet your position, velocity and direction feedback needs.

Construction

- 2 pole permanent magnet stators are constructed of ceramic magnets enclosed in heavy-gauge steel return rings
- Diamond turned commutators ensure maximum brush life
- Standard copper graphite brushes
- Precision ground hardened stainless steel shafts
- Silicon-steel laminations
- Self-aligning, sintered bronze bearings

Options

- Custom cables
- Multiple shaft configurations
- Shaft-mounted pulleys and gears
- Ball bearings
- Multiple windings
- Electromechanical brakes
- Integrated Hewlett-Packard® optical encoders
- Adaptors available for other encoders
- RFI suppression
- Dynamic armature balancing
- Customized versions available in production quantities
- Other brush materials available

Series 8000

- Available in 3 lengths
- 7 slot armature
- Speeds from 7,700 to 10,650 RPM
- Peak Torques from 5.05 to 16.8 oz-in
- Encoder resolutions from 96 to 1024

Series 9000

- Available in 6 lengths
- 7 slot armature
- Speeds from 4,900 to 8,250 RPM
- Peak Torques from 8.35 to 77 oz-in
- Encoder resolutions from 96 to 2048

Series 14000

- Available in 7 lengths
- 11 slot armature
- Speeds from 3,050 to 4,230 RPM
- Peak Torques from 62.8 to 410 oz-in
- Encoder resolutions from 96 to 2048

SERIES 8000

Motor Data

Line No.	Parameter	Symbol	Units	8X22	8X23	8X24
1	Continuous Torque (Max.) ¹	T _C	oz-in (N·m)	1.6 (11.2 X 10 ⁻³)	2.0 (14.1 X 10 ⁻³)	2.6 (18.5 X 10 ⁻³)
2	Peak Torque (Stall) ²	T _{PK}	oz-in (N·m)	7.4 (52.0 X 10 ⁻³)	10.5 (74.2 X 10 ⁻³)	16.8 (118.6 X 10 ⁻³)
3	Motor Constant	K _M	oz-in/√W (N·m/√W)	1.12 (7.9 X 10 ⁻³)	1.30 (9.2 X 10 ⁻³)	1.49 (10.5 X 10 ⁻³)
4	No-Load Speed	S _{NL}	rpm (rad/s)	7847 (822)	8298 (869)	10158 (1064)
5	Friction Torque	T _F	oz-in (N·m)	0.35 (2.5 X 10 ⁻³)	0.35 (2.5 X 10 ⁻³)	0.35 (2.5 X 10 ⁻³)
6	Rotor Inertia	J _M	oz-in-s ² (kg·m ²)	1.4 X 10 ⁻⁴ (9.89 X 10 ⁻⁷)	1.7 X 10 ⁻⁴ (1.20 X 10 ⁻⁶)	2.3 X 10 ⁻⁴ (1.62 X 10 ⁻⁶)
7	Electrical Time Constant	τ _E	ms	0.52	0.55	0.54
8	Mechanical Time Constant	τ _M	ms	15.6	14.1	14.7
9	Viscous Damping— Infinite Source Impedance	D	oz-in/krpm (N·m/(rad/s))	0.0153 (1.03 X 10 ⁻⁶)	0.0176 (1.19 X 10 ⁻⁶)	0.0202 (1.36 X 10 ⁻⁶)
10	Viscous Damping— Zero Source Impedance	K _D	oz-in/krpm (N·m/(rad/s))	0.92 (6.20 X 10 ⁻⁵)	1.25 (8.42 X 10 ⁻⁵)	1.63 (1.10 X 10 ⁻⁴)
11	Maximum Winding Temperature	θ _{MAX}	°F (°C)	311 (155)	311 (155)	311 (155)
12	Thermal Impedance	R _{TH}	°F/watt °C/watt	75.9 (24.4)	72.9 (22.7)	70.52 (21.4)
13	Thermal Time Constant	τ _{TH}	min	7.75	9.00	10.70
14	Motor Weight (Mass)	W _M	oz (g)	4.69 (133.0)	5.05 (143.2)	5.81 (164.7)
15	Motor Length, 81XX/82XX	L ₁	in max (mm max)	2.070 (52.6)	2.195 (54.61)	2.445 (62.1)
16	Motor Length, 83XX/84XX	L ₁	in max (mm max)	2.007 (51)	2.132 (54.2)	2.382 (60.5)

¹Continuous torque specified at 25°C ambient temperature and without additional heat sink.

²Theoretical values supplied for reference only.

Model 8XX2 Winding Data (Other windings available upon request)

Line No.	Parameter	Symbol	Units	8X22			
17	Reference Voltage	E	V	12.0	19.1	24.0	30.3
18	Torque Constant	K _T	oz-in/A (N-m/A)	1.94 (13.7 X 10 ⁻³)	3.07 (21.7 X 10 ⁻³)	3.88 (27.4 X 10 ⁻³)	4.88 (34.5 X 10 ⁻³)
19	Back-EMF Constant	K _E	V/krpm (V/rad/s)	1.43 (13.7 X 10 ⁻³)	2.27 (21.7 X 10 ⁻³)	2.87 (27.4 X 10 ⁻³)	3.61 (34.5 X 10 ⁻³)
20	Resistance	R _T	Ω	3.10	7.61	12.1	19.1
21	Inductance	L	mH	1.57	3.93	6.27	9.92
22	No-Load Current	I _{NL}	A	0.25	0.16	0.12	0.10
23	Peak Current (Stall)	I _P	A	3.88	2.51	1.99	1.59

Model 8XX3 Winding Data (Other windings available upon request)

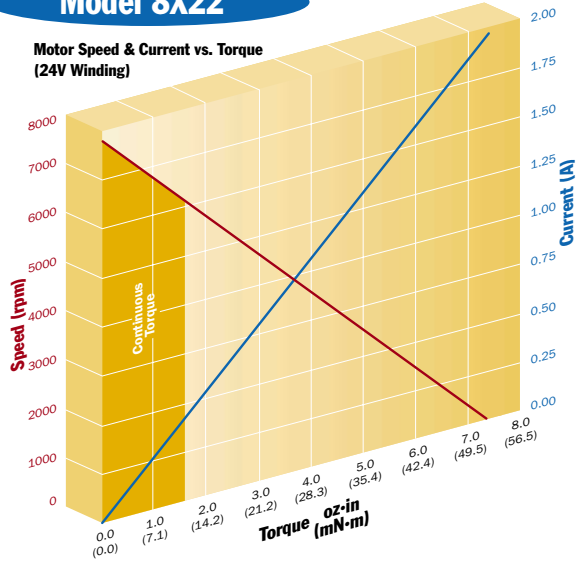
Line No.	Parameter	Symbol	Units	8X23			
24	Reference Voltage	E	V	12.0	19.1	24.0	30.3
25	Torque Constant	K _T	oz-in/A (N-m/A)	1.88 (13.3 X 10 ⁻³)	2.94 (20.8 X 10 ⁻³)	3.73 (26.4 X 10 ⁻³)	4.71 (33.3 X 10 ⁻³)
26	Back-EMF Constant	K _E	V/krpm (V/rad/s)	1.39 (13.3 X 10 ⁻³)	2.18 (20.8 X 10 ⁻³)	2.76 (26.4 X 10 ⁻³)	3.48 (33.3 X 10 ⁻³)
27	Resistance	R _T	Ω	2.17	5.20	8.24	13.1
28	Inductance	L	mH	1.17	2.85	4.57	7.29
29	No-Load Current	I _{NL}	A	0.27	0.17	0.13	0.11
30	Peak Current (Stall)	I _P	A	5.54	3.67	2.91	2.32

Model 8XX4 Winding Data (Other windings available upon request)

Line No.	Parameter	Symbol	Units	8X24			
31	Reference Voltage	E	V	12.0	19.1	24.0	30.3
32	Torque Constant	K _T	oz-in/A (N-m/A)	1.54 (10.9 X 10 ⁻³)	2.47 (17.5 X 10 ⁻³)	3.09 (21.9 X 10 ⁻³)	3.86 (27.3 X 10 ⁻³)
33	Back-EMF Constant	K _E	V/krpm (V/rad/s)	1.14 (10.9 X 10 ⁻³)	1.83 (17.5 X 10 ⁻³)	2.29 (21.9 X 10 ⁻³)	2.86 (27.3 X 10 ⁻³)
34	Resistance	R _T	Ω	1.17	2.79	4.33	6.75
35	Inductance	L	mH	0.58	1.50	2.34	3.65
36	No-Load Current	I _{NL}	A	0.36	0.23	0.18	0.15
37	Peak Current (Stall)	I _P	A	10.3	6.85	5.54	4.49

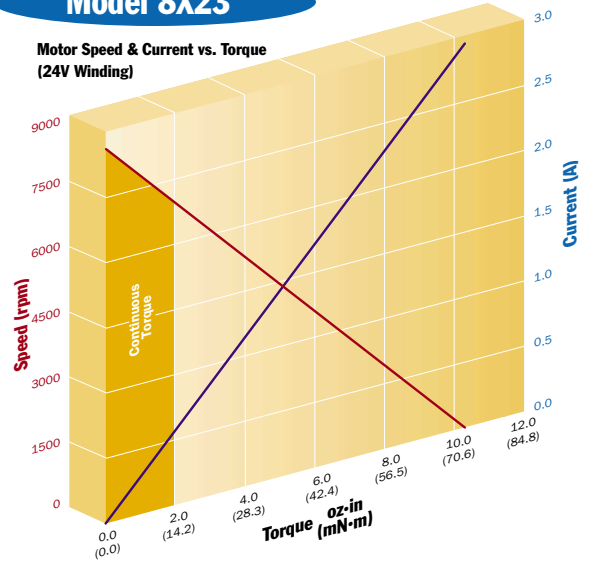
Model 8X22

Motor Speed & Current vs. Torque
(24V Winding)



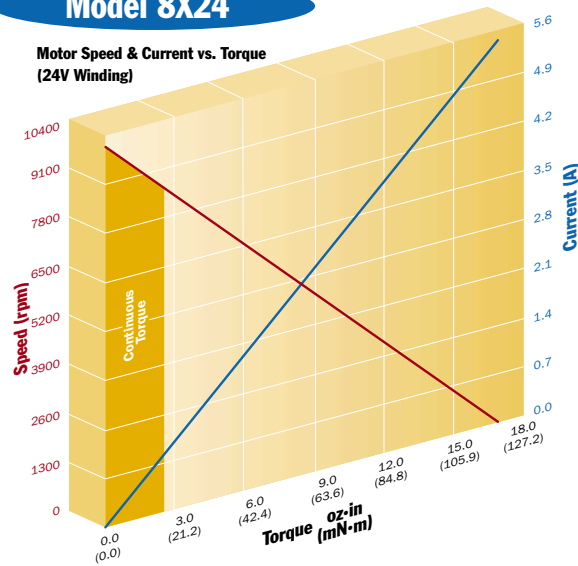
Model 8X23

Motor Speed & Current vs. Torque
(24V Winding)

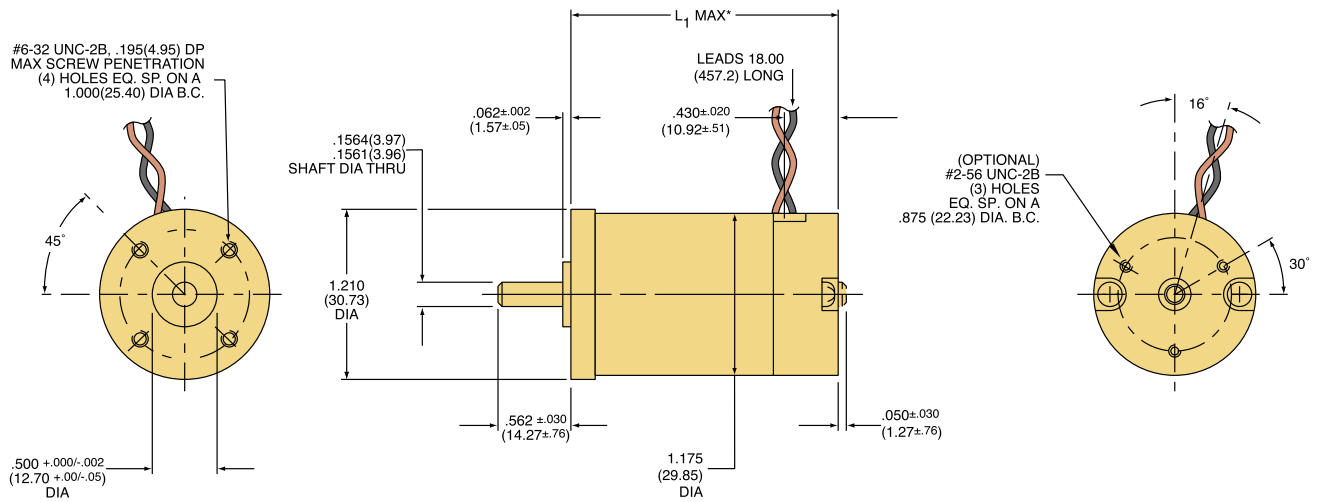


Model 8X24

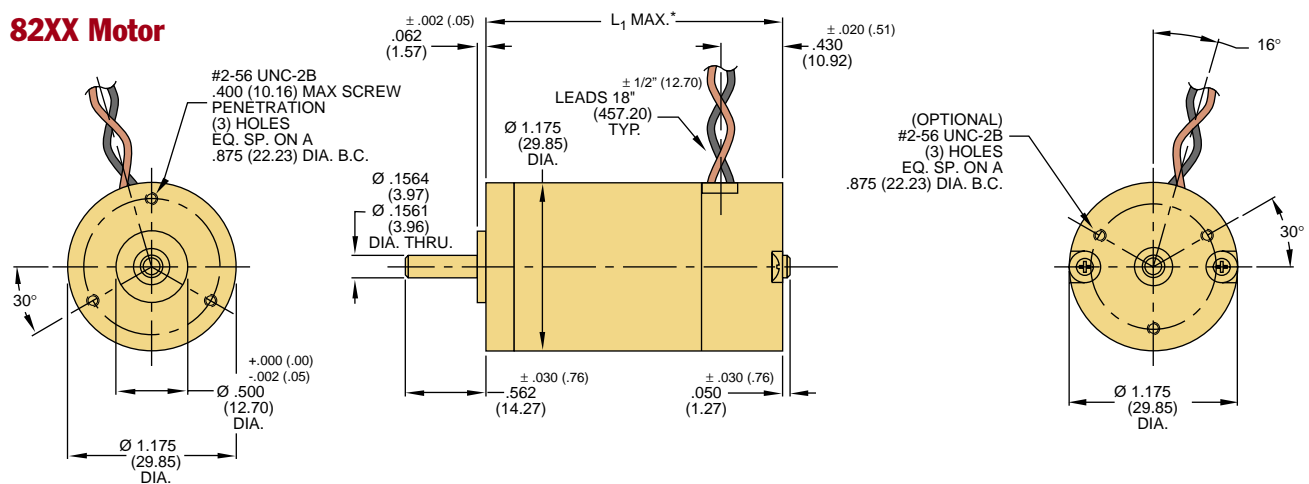
Motor Speed & Current vs. Torque
(24V Winding)



81XX Motor



82XX Motor

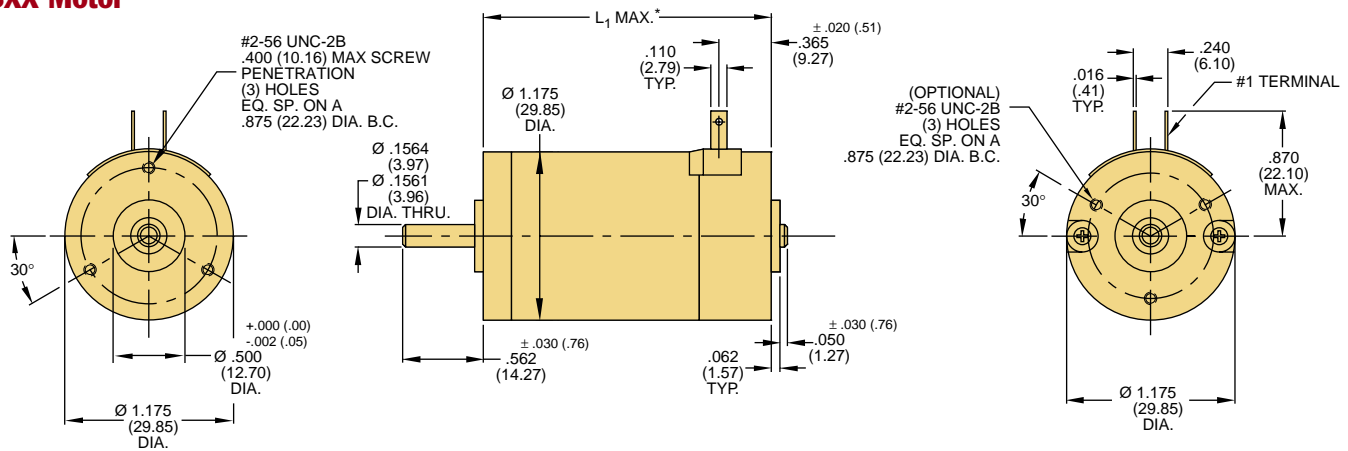


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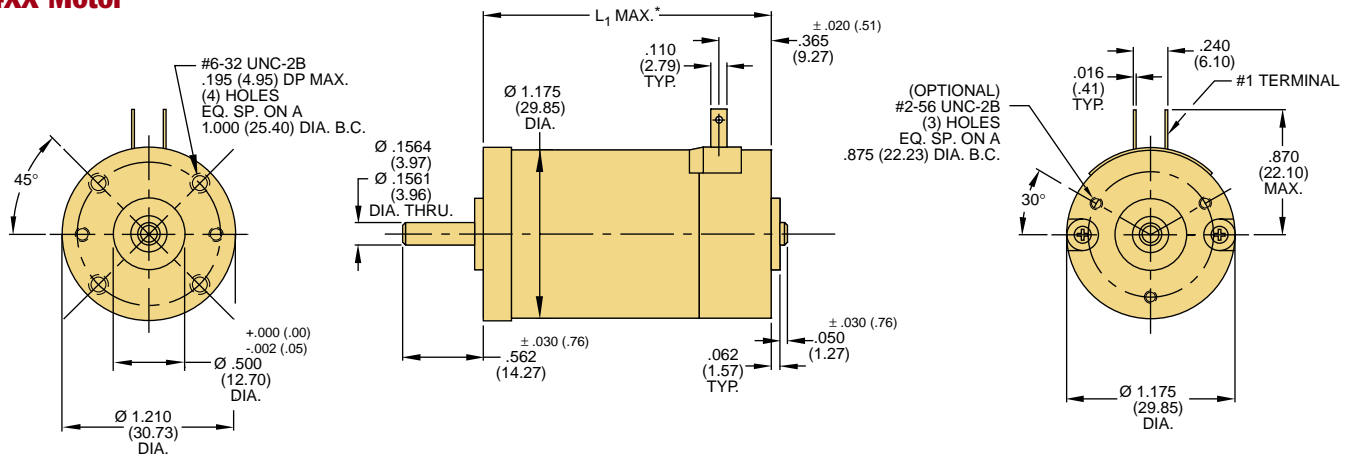
- Unless otherwise specified, all tolerances are to be $\pm .005$ (.01)
- All measurements are in inches (mm)
- *See line number 15 and 16 in the motor data chart

SERIES 8000

83XX Motor



84XX Motor



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

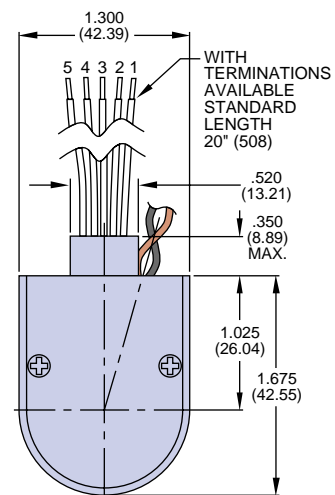
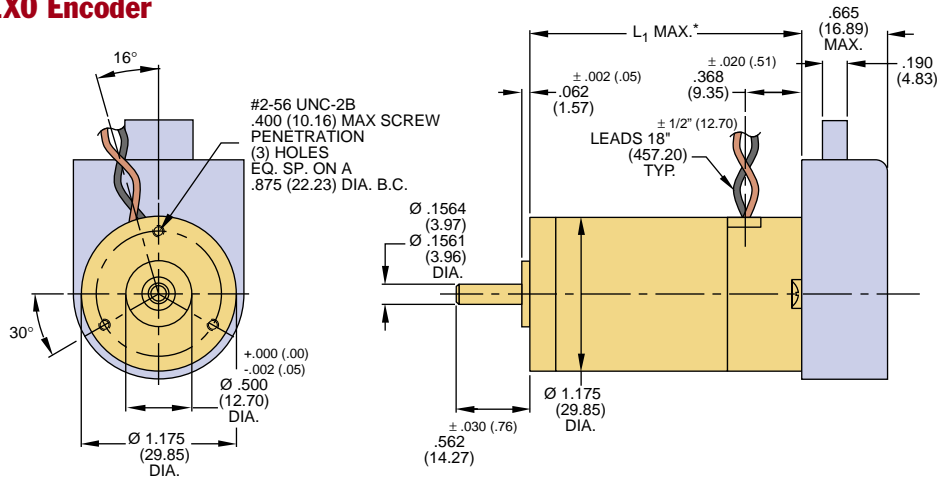
Notes:

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

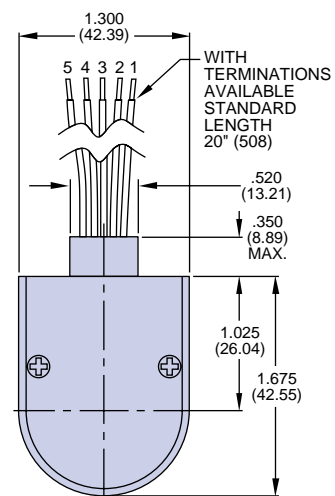
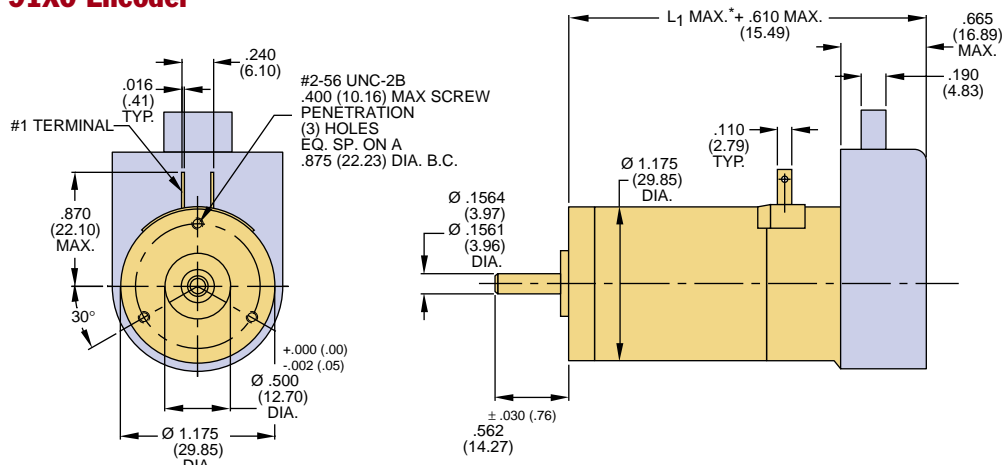
*See line number 15 and 16 in the motor data chart

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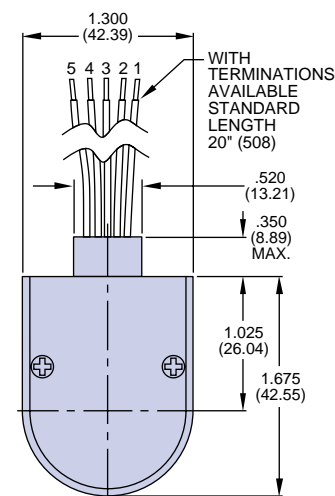
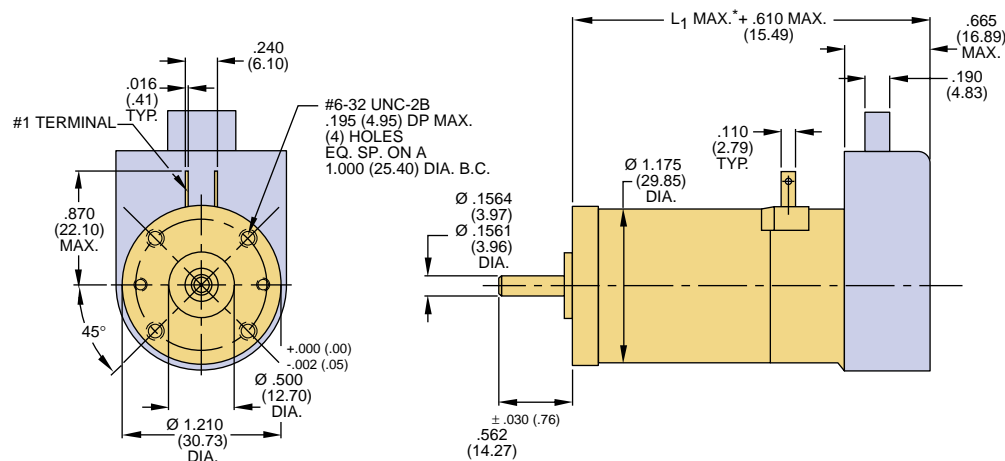
82XX Motor with 91X0 Encoder



83XX Motor with 91X0 Encoder



84XX Motor with 91X0 Encoder



Motor Data

Line No.	Parameter	Symbol	Units	9X32	9X33	9X34	9X35	9X36	9X37
1	Continuous Torque (Max.) ¹	T_C	oz-in (N-m)	2.3 (16.2 X 10 ⁻³)	4.7 (33.2 X 10 ⁻³)	6.1 (43.1 X 10 ⁻³)	6.9 (48.7 X 10 ⁻³)	9.5 (67.1 X 10 ⁻³)	11.5 (81.2 X 10 ⁻³)
2	Peak Torque (Stall) ²	T_{PK}	oz-in (N-m)	13.8 (97.5 X 10 ⁻³)	31.6 (223.2 X 10 ⁻³)	41.3 (291.7 X 10 ⁻³)	49.4 (348.9 X 10 ⁻³)	61.8 (436.4 X 10 ⁻³)	77.0 (543.8 X 10 ⁻³)
3	Motor Constant	K_M	oz-in/√W (N-m/√W)	1.62 (11.4 X 10 ⁻³)	2.66 (18.8 X 10 ⁻³)	3.01 (21.3 X 10 ⁻³)	3.21 (22.7 X 10 ⁻³)	4.11 (29.0 X 10 ⁻³)	4.41 (31.1 X 10 ⁻³)
4	No-Load Speed	S_{NL}	rpm (rad/s)	7015 (734.6)	5993 (627.6)	6151 (644.2)	6348 (664.7)	4916 (514.8)	5331 (558.3)
5	Friction Torque	T_F	oz-in (N-m)	0.5 (3.5 X 10 ⁻³)	0.6 (4.2 X 10 ⁻³)	0.6 (4.2 X 10 ⁻³)	0.65 (4.6 X 10 ⁻³)	0.8 (5.6 X 10 ⁻³)	0.80 (5.6 X 10 ⁻³)
6	Rotor Inertia	J_M	oz-in-s ² (kg-m ²)	2.7 X 10 ⁻⁴ (1.91 X 10 ⁻⁶)	4.6 X 10 ⁻⁴ (3.25 X 10 ⁻⁶)	5.9 X 10 ⁻⁴ (4.17 X 10 ⁻⁶)	7.9 X 10 ⁻⁴ (5.58 X 10 ⁻⁶)	1.0 X 10 ⁻³ (7.06 X 10 ⁻⁶)	1.2 X 10 ⁻³ (8.47 X 10 ⁻⁶)
7	Electrical Time Constant	τ_E	ms	0.63	0.84	0.85	0.88	1.06	1.06
8	Mechanical Time Constant	τ_M	ms	14.4	9.29	9.25	10.9	8.5	8.88
9	Viscous Damping— Infinite Source Impedance	D	oz-in/krpm (N-m/rad/s)	0.0272 (1.83 X 10 ⁻⁶)	0.0335 (2.25 X 10 ⁻⁶)	0.0387 (2.61 X 10 ⁻⁶)	0.0450 (3.03 X 10 ⁻⁶)	0.0525 (3.54 X 10 ⁻⁶)	0.0550 (3.71 X 10 ⁻⁶)
10	Viscous Damping— Zero Source Impedance	K_D	oz-in/krpm (N-m/rad/s)	1.94 (1.31 X 10 ⁻⁴)	5.23 (3.53 X 10 ⁻⁴)	6.68 (4.50 X 10 ⁻⁴)	7.6 (5.12 X 10 ⁻⁴)	12.5 (8.42 X 10 ⁻⁴)	14.4 (9.71 X 10 ⁻⁴)
11	Maximum Winding Temp.	θ_{MAX}	°F (°C)	311 (155)	311 (155)	311 (155)	311 (155)	311 (155)	311 (155)
12	Thermal Impedance	R_{TH}	°F/watt °C/watt	72.9 (22.7)	66.4 (19.1)	62.8 (17.1)	58.5 (14.7)	56.3 (13.5)	52.16 (11.2)
13	Thermal Time Constant	τ_{TH}	min	7.21	11.1	12.0	12.9	13.5	13.8
14	Motor Weight (Mass)	W_M	oz (g)	6.98 (197.9)	8.90 (252.3)	10.1 (286.3)	0.0 (TBD)	13.8 (391.2)	15.5 (439.4)
15	Motor Length, 92XX, 94XX	L_1	in max (mm max)	1.828 (46.4)	2.203 (56.0)	2.403 (61.0)	2.703 (69.0)	3.053 (78.0)	3.353 (85.17)

Model 9X32 Winding Data (Other windings available upon request)

Line No.	Parameter	Symbol	Units	9X32			
16	Reference Voltage	E	V	12.0	19.1	24.0	30.3
17	Torque Constant	K_T	oz-in/A (N-m/A)	2.20 (15.6 X 10 ⁻³)	3.50 (24.7 X 10 ⁻³)	4.40 (31.1 X 10 ⁻³)	5.53 (39.1 X 10 ⁻³)
18	Back-EMF Constant	K_E	V/krpm (V/rad/s)	1.63 (15.6 X 10 ⁻³)	2.59 (24.7 X 10 ⁻³)	3.25 (31.1 X 10 ⁻³)	4.09 (39.1 X 10 ⁻³)
19	Resistance	R_T	Ω	1.93	4.70	7.38	11.6
20	Inductance	L	mH	1.16	2.94	4.64	7.34
21	No-Load Current	I_{NL}	A	0.32	0.20	0.16	0.13
22	Peak Current (Stall)	I_P	A	6.22	4.06	3.25	2.60

¹Continuous torque specified at 25°C ambient temperature and without additional heat sink.

²Theoretical values supplied for reference only.

Model 9X33 Winding Data (Other windings available upon request)

Line No.	Parameter	Symbol	Units	9X33			
23	Reference Voltage	E	V	12.0	19.1	24.0	30.3
24	Torque Constant	K_T	oz-in/A (N-m/A)	2.67 (18.9×10^{-3})	4.20 (29.7×10^{-3})	5.28 (37.3×10^{-3})	6.68 (47.2×10^{-3})
25	Back-EMF Constant	K_E	V/krpm (V/rad/s)	1.98 (18.9×10^{-3})	3.10 (29.7×10^{-3})	3.90 (37.3×10^{-3})	4.94 (47.2×10^{-3})
26	Resistance	R_T	Ω	1.08	2.53	3.94	6.21
27	Inductance	L	mH	0.84	2.08	3.29	5.27
28	No-Load Current	I_{NL}	A	0.30	0.19	0.15	0.12
29	Peak Current (Stall)	I_P	A	11.1	7.55	6.09	4.88

Model 9X34 Winding Data (Other windings available upon request)

Line No.	Parameter	Symbol	Units	9X34			
30	Reference Voltage	E	V	12.0	19.1	24.0	30.3
31	Torque Constant	K_T	oz-in/A (N-m/A)	2.58 (18.2×10^{-3})	4.07 (28.7×10^{-3})	5.17 (36.5×10^{-3})	6.50 (45.9×10^{-3})
32	Back-EMF Constant	K_E	V/krpm (V/rad/s)	1.91 (18.2×10^{-3})	3.01 (28.7×10^{-3})	3.82 (36.5×10^{-3})	4.81 (45.9×10^{-3})
33	Resistance	R_T	Ω	0.83	1.89	2.96	4.62
34	Inductance	L	mH	0.63	1.56	2.51	3.97
35	No-Load Current	I_{NL}	A	0.33	0.21	0.16	0.13
36	Peak Current (Stall)	I_P	A	14.5	10.1	8.11	6.55

Model 9X35 Winding Data (Other windings available upon request)

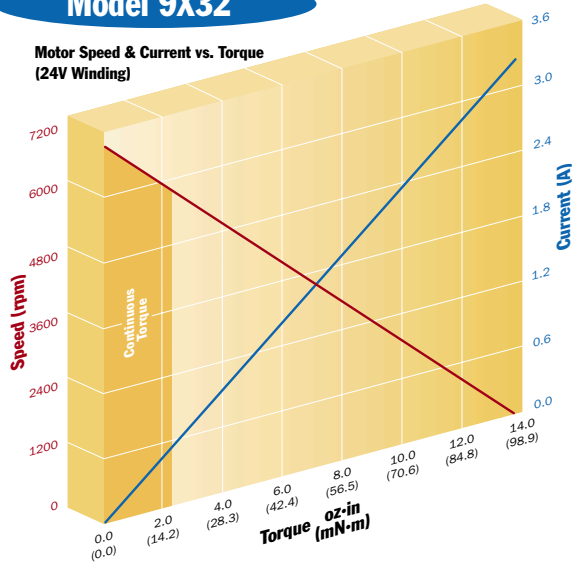
Line No.	Parameter	Symbol	Units	9X35			
37	Reference Voltage	E	V	12.0	19.1	24.0	30.3
38	Torque Constant	K_T	oz-in/A (N-m/A)	2.47 (17.4×10^{-3})	3.99 (28.2×10^{-3})	4.94 (34.9×10^{-3})	6.27 (44.3×10^{-3})
39	Back-EMF Constant	K_E	V/krpm (V/rad/s)	1.83 (17.4×10^{-3})	2.95 (28.2×10^{-3})	3.65 (34.9×10^{-3})	4.64 (44.3×10^{-3})
40	Resistance	R_T	Ω	.68	1.56	2.37	3.72
41	Inductance	L	mH	0.51	1.34	2.04	3.30
42	No-Load Current	I_{NL}	A	0.38	0.24	0.19	0.16
43	Peak Current (Stall)	I_P	A	17.6	12.2	10.1	8.14

Model 9X36/9X37 Winding Data (Other windings available upon request)

Line No.	Parameter	Symbol	Units	9X36				9X37			
37	Reference Voltage	E	V	12.0	19.1	24.0	30.3	12.0	19.1	24.0	30.3
38	Torque Constant	K_T	oz-in/A (N-m/A)	3.25 (23.0×10^{-3})	5.24 (37.0×10^{-3})	6.49 (45.8×10^{-3})	8.24 (58.2×10^{-3})	3.00 (21.2×10^{-3})	4.72 (33.3×10^{-3})	6.00 (42.4×10^{-3})	7.43 (52.5×10^{-3})
39	Back-EMF Constant	K_E	V/krpm (V/rad/s)	2.4 (23.0×10^{-3})	3.88 (37.0×10^{-3})	4.8 (45.8×10^{-3})	6.09 (58.2×10^{-3})	2.22 (21.2×10^{-3})	3.49 (33.3×10^{-3})	4.44 (42.4×10^{-3})	5.50 (52.5×10^{-3})
40	Resistance	R_T	Ω	0.71	1.64	2.49	0.55	1.20	1.85	2.82	3.91
41	Inductance	L	mH	0.66	1.72	2.63	4.24	0.49	1.21	1.97	3.01
42	No-Load Current	I_{NL}	A	0.33	0.20	0.16	0.13	0.37	0.23	0.18	0.15
43	Peak Current (Stall)	I_P	A	16.9	11.7	9.64	7.74	21.7	15.9	12.96	10.73

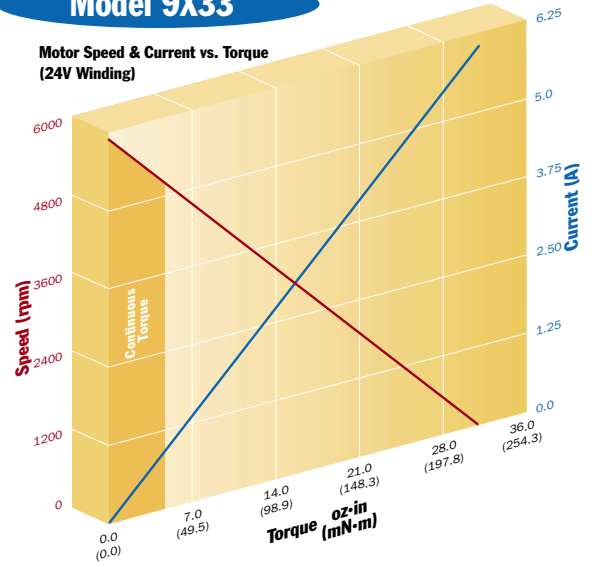
Model 9X32

Motor Speed & Current vs. Torque
(24V Winding)



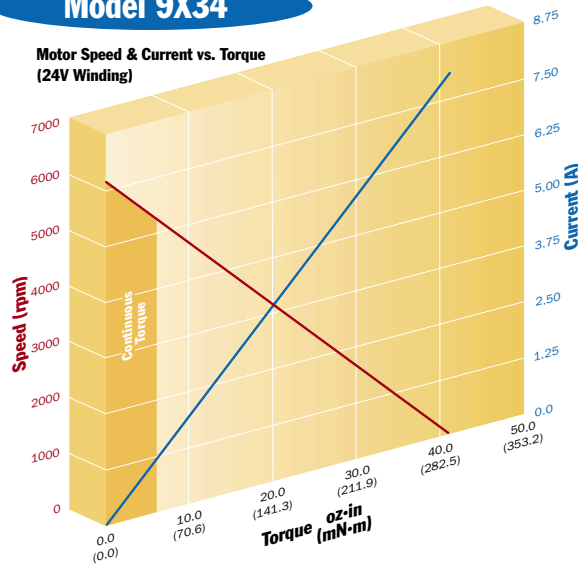
Model 9X33

Motor Speed & Current vs. Torque
(24V Winding)



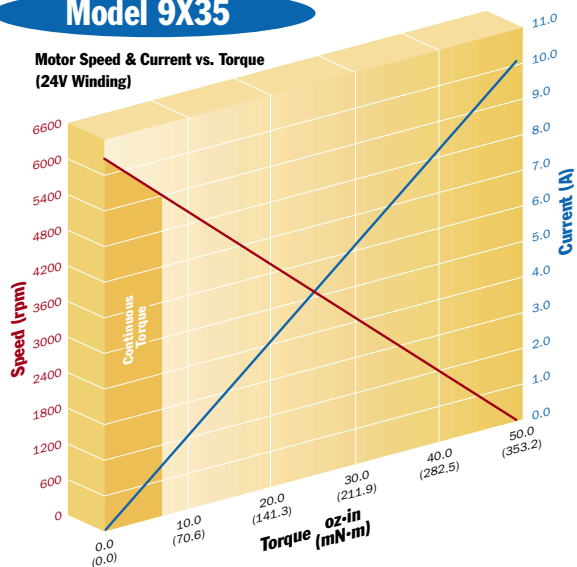
Model 9X34

Motor Speed & Current vs. Torque
(24V Winding)



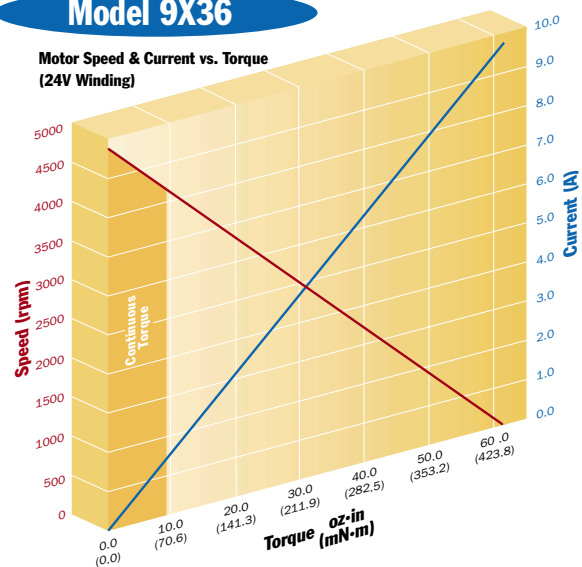
Model 9X35

Motor Speed & Current vs. Torque
(24V Winding)



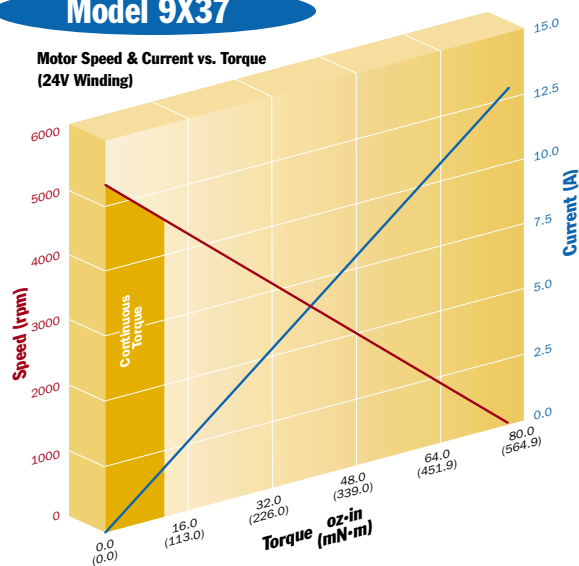
Model 9X36

Motor Speed & Current vs. Torque
(24V Winding)



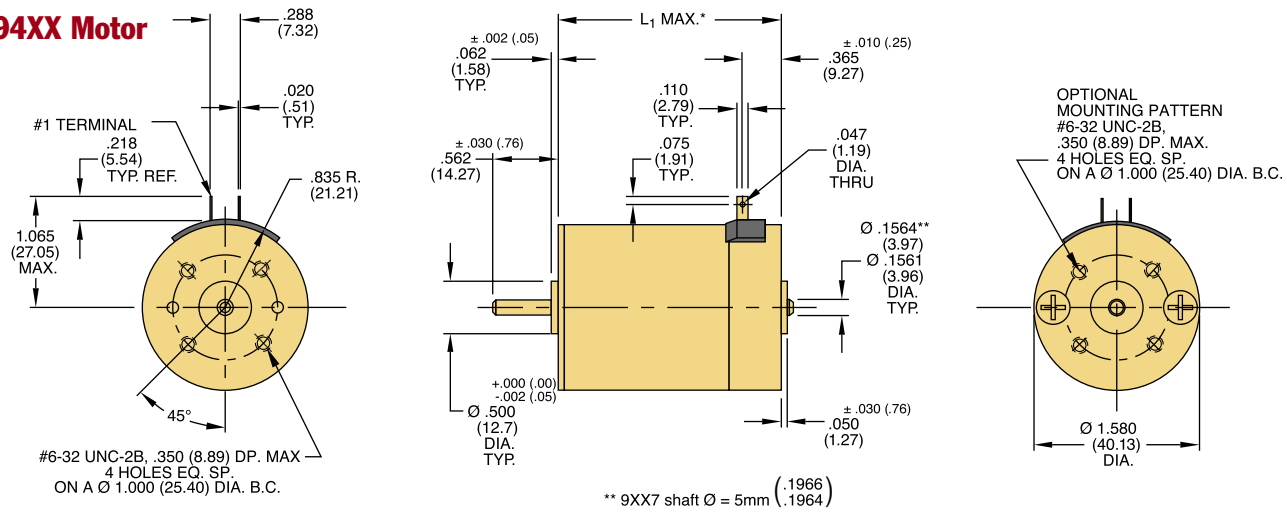
Model 9X37

Motor Speed & Current vs. Torque
(24V Winding)

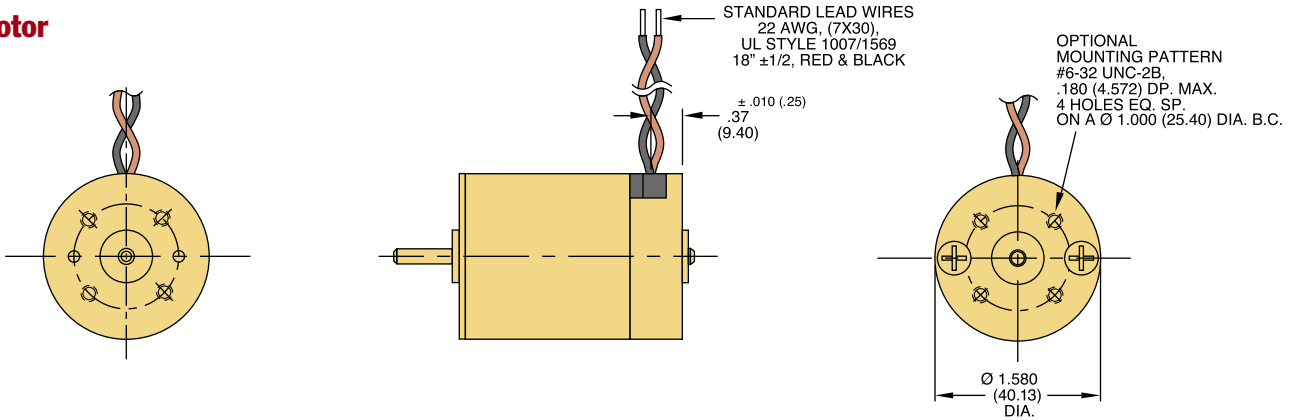


SERIES 9000

94XX Motor



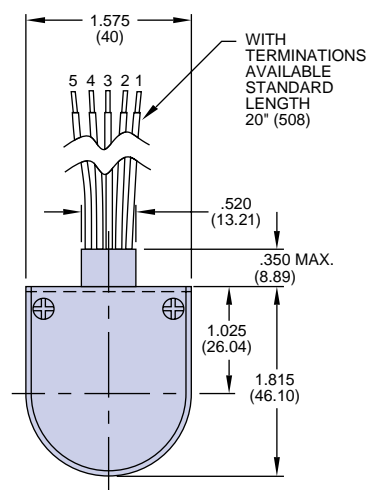
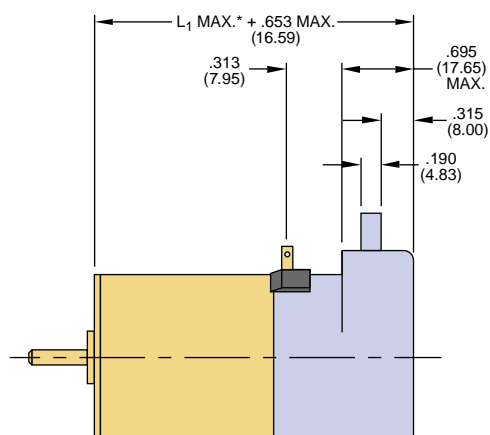
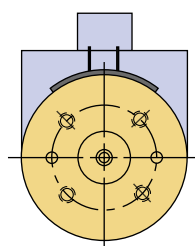
92XX Motor



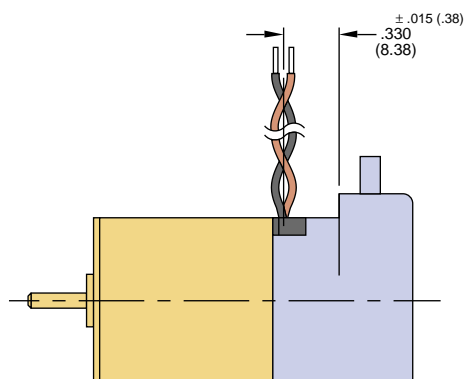
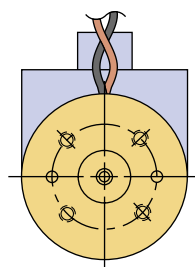
Notes:

- Unless otherwise specified, all tolerances are to be ±.005 (.01)
- All measurements are in inches (mm)
- *See line number 15 in motor data chart

94XX Motor with 91X0 Encoder



92XX Motor with 91X0 Encoder



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 ± 0.005 (.01)
- All measurements are in inches (mm)
- *See line number 15 in motor data chart

SERIES 14000

Motor Data

Line No.	Parameter	Symbol	Units	14XX1	14XX2	14XX3	14XX4	14XX5	14XX6	14XX7
1	Continuous Torque(Max.) ¹	T _C	oz-in (N·m)	10.0 (70.6 X 10 ⁻³)	14.0 (98.9 X 10 ⁻³)	21.0 (148.3 X 10 ⁻³)	26.0 (183.6 X 10 ⁻³)	31.0 (218.9 X 10 ⁻³)	36.5 (257.8 X 10 ⁻³)	50.0 (353.1 X 10 ⁻³)
2	Peak Torque (Stall) ²	T _{PK}	oz-in (N·m)	62.8 (.44)	107 (.76)	159 (1.12)	204 (1.44)	225 (1.59)	284 (2.01)	410 (2.90)
3	Motor Constant	K _M	oz-in/√W (N·m/√W)	4.45 (31.4 X 10 ⁻³)	5.93 (41.9 X 10 ⁻³)	7.88 (55.6 X 10 ⁻³)	8.63 (60.9 X 10 ⁻³)	9.97 (70.4 X 10 ⁻³)	10.9 (77.0 X 10 ⁻³)	13.1 (92.5 X 10 ⁻³)
4	No-Load Speed	S _{NL}	rpm (rad/s)	4230 (443)	4087 (428)	3456 (362)	3702 (388)	3056 (320)	3216 (337)	3211 (336)
5	Friction Torque	T _F	oz-in (N·m)	1.20 (8.5 X 10 ⁻³)	1.20 (8.5 X 10 ⁻³)	1.60 (11.3 X 10 ⁻³)	1.60 (11.3 X 10 ⁻³)	2.00 (14.1 X 10 ⁻³)	2.00 (14.1 X 10 ⁻³)	2.20 (15.5 X 10 ⁻³)
6	Rotor Inertia	J _M	oz-in-s ² (kg·m ²)	1.6 X 10 ⁻³ (1.13 X 10 ⁻⁵)	2.3 X 10 ⁻³ (1.62 X 10 ⁻⁵)	3.0 X 10 ⁻³ (2.12 X 10 ⁻⁵)	3.7 X 10 ⁻³ (2.61 X 10 ⁻⁵)	4.4 X 10 ⁻³ (3.11 X 10 ⁻⁵)	5.2 X 10 ⁻³ (3.67 X 10 ⁻⁵)	6.7 X 10 ⁻³ (4.73 X 10 ⁻⁵)
7	Electrical Time Constant	τ _E	ms	0.91	1.47	1.64	1.58	1.63	1.62	1.50
8	Mechanical Time Constant	τ _M	ms	11.4	9.26	6.84	7.04	6.27	6.19	5.50
9	Viscous Damping— Infinite Source Impedance	D	oz-in/krpm (N·m/(rad/s))	0.17 (1.14 X 10 ⁻⁵)	0.17 (1.14 X 10 ⁻⁵)	0.18 (1.21 X 10 ⁻⁵)	0.18 (1.21 X 10 ⁻⁵)	0.19 (1.28 X 10 ⁻⁵)	0.19 (1.28 X 10 ⁻⁵)	0.25 (1.69 X 10 ⁻⁵)
10	Viscous Damping— Zero Source Impedance	K _D	oz-in/krpm (N·m/(rad/s))	14.7 (9.91 X 10 ⁻⁴)	26.0 (1.75 X 10 ⁻³)	45.9 (3.09 X 10 ⁻³)	55.0 (3.71 X 10 ⁻³)	73.5 (4.96 X 10 ⁻³)	88.0 (5.93 X 10 ⁻³)	127.0 (8.56 X 10 ⁻³)
11	Maximum Winding Temperature	θ _{MAX}	°F (°C)	311 (155)	311 (155)	311 (155)	311 (155)	311 (155)	311 (155)	311 (155)
12	Thermal Impedance	R _{TH}	°F/watt °C/watt	49.8 (9.90)	48.2 (9.00)	46.6 (8.10)	41.3 (7.19)	45.1 (7.30)	44.2 (6.80)	41.0 (4.98)
13	Thermal Time Constant	τ _{TH}	min	22.0	24.0	26.0	26.82	29.4	33.6	32.3
14	Motor Weight (Mass)	W _M	oz (g)	20.8 (589.7)	26.0 (737.1)	31.2 (884.5)	35.2 (997.9)	39.5 (1119.8)	45.4 (1287.1)	54.5 (1545.1)
15	Motor Length, 1410X, 1420X	L ₁	in max (mm max)	2.953 (75.0)	3.203 (81.4)	3.703 (94.1)	4.078 (103.6)	4.453 (113.1)	4.953 (125.8)	5.703 (144.9)

Model 14XX1/14XX2 Winding Data (Other windings available upon request)

Line No.	Parameter	Symbol	Units	14XX1				14XX2			
16	Reference Voltage	E	V	12.0	19.1	24.0	30.3	12.0	19.1	24.0	30.3
17	Torque Constant	K _T	oz-in/A (N·m/A)	3.72 (26.3 X 10 ⁻³)	5.89 (41.6 X 10 ⁻³)	7.44 (52.5 X 10 ⁻³)	9.46 (66.8 X 10 ⁻³)	3.90 (27.5 X 10 ⁻³)	6.16 (43.5 X 10 ⁻³)	7.80 (55.1 X 10 ⁻³)	9.85 (69.6 X 10 ⁻³)
18	Back-EMF Constant	K _E	V/krpm (V/rad/s)	2.75 (26.3 X 10 ⁻³)	4.36 (41.6 X 10 ⁻³)	5.50 (52.5 X 10 ⁻³)	6.99 (66.8 X 10 ⁻³)	2.88 (27.5 X 10 ⁻³)	4.55 (43.5 X 10 ⁻³)	5.77 (55.1 X 10 ⁻³)	7.29 (69.6 X 10 ⁻³)
19	Resistance	R _T	Ω	0.72	1.76	2.79	4.45	0.45	1.09	1.73	2.74
20	Inductance	L	mH	0.63	1.59	2.54	4.10	0.63	1.58	2.54	4.05
21	No-Load Current	I _{NL}	A	0.52	0.33	0.26	0.20	0.49	0.31	0.24	0.19
22	Peak Current (Stall)	I _P	A	16.7	10.8	8.60	6.80	26.4	17.5	13.9	11.1

¹Continuous torque specified at 25°C ambient temperature and without additional heat sink.

²Theoretical values supplied for reference only.

Model 14XX3/14XX4 Winding Data (Other windings available upon request)

Line No.	Parameter	Symbol	Units	14XX3				14XX4			
23	Reference Voltage	E	V	12.0	19.1	24.0	30.3	12.0	19.1	24.0	30.3
24	Torque Constant	K _T	oz-in/A (N-m/A)	4.63 (32.7 X 10 ⁻³)	7.41 (52.3 X 10 ⁻³)	9.26 (65.4 X 10 ⁻³)	11.7 (82.6 X 10 ⁻³)	4.33 (30.7 X 10 ⁻³)	6.86 (48.5 X 10 ⁻³)	8.67 (61.2 X 10 ⁻³)	10.8 (76.5 X 10 ⁻³)
25	Back-EMF Constant	K _E	V/krpm (V/rad/s)	3.42 (32.7 X 10 ⁻³)	5.48 (52.3 X 10 ⁻³)	6.85 (65.4 X 10 ⁻³)	8.67 (82.6 X 10 ⁻³)	3.21 (30.7 X 10 ⁻³)	5.08 (48.5 X 10 ⁻³)	6.41 (61.2 X 10 ⁻³)	8.01 (76.5 X 10 ⁻³)
26	Resistance	R _T	Ω	0.37	0.89	1.38	2.19	0.27	0.65	1.01	1.57
27	Inductance	L	mH	0.56	1.45	2.26	3.63	0.40	1.00	1.60	2.50
28	No-Load Current	I _{NL}	A	0.48	0.30	0.24	0.19	0.52	0.33	0.26	0.21
29	Peak Current (Stall)	I _P	A	32.7	21.5	17.4	13.9	43.7	29.6	23.8	19.2

Model 14XX5/14XX6 Winding Data (Other windings available upon request)

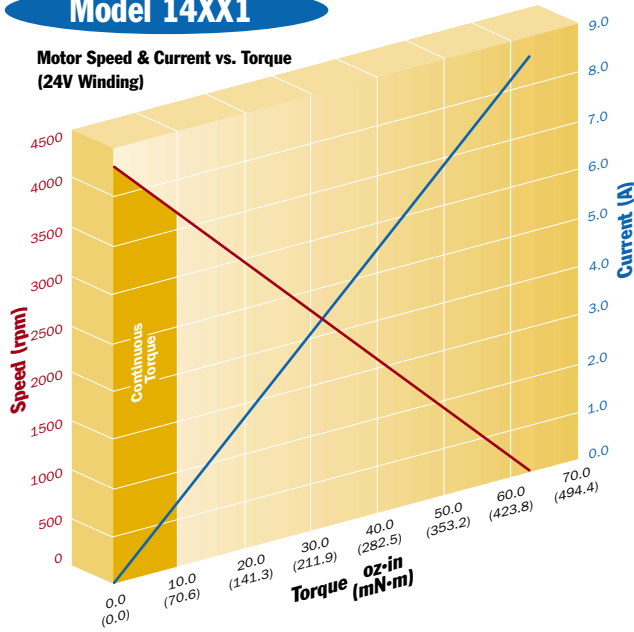
Line No.	Parameter	Symbol	Units	14XX5				14XX6			
30	Reference Voltage	E	V	12.0	19.1	24.0	30.3	12.0	19.1	24.0	30.3
31	Torque Constant	K _T	oz-in/A (N-m/A)	5.25 (37.1 X 10 ⁻³)	8.31 (58.7 X 10 ⁻³)	10.5 (74.2 X 10 ⁻³)	13.1 (92.7 X 10 ⁻³)	4.74 (33.5 X 10 ⁻³)	7.89 (55.8 X 10 ⁻³)	10.0 (70.6 X 10 ⁻³)	12.6 (89.2 X 10 ⁻³)
32	Back-EMF Constant	K _E	V/krpm (V/rad/s)	3.88 (37.1 X 10 ⁻³)	6.15 (58.7 X 10 ⁻³)	7.76 (74.2 X 10 ⁻³)	9.71 (92.7 X 10 ⁻³)	3.50 (33.5 X 10 ⁻³)	5.84 (55.8 X 10 ⁻³)	7.39 (70.6 X 10 ⁻³)	9.34 (89.2 X 10 ⁻³)
33	Resistance	R _T	Ω	0.30	0.71	1.11	1.73	0.22	0.54	0.84	1.32
34	Inductance	L	mH	0.45	1.13	1.81	2.83	0.31	0.85	1.36	2.17
35	No-Load Current	I _{NL}	A	0.49	0.31	0.25	0.20	0.56	0.33	0.26	0.21
36	Peak Current (Stall)	I _P	A	40.1	27.0	21.6	17.5	54.2	35.6	28.6	23.0

Model 14XX7 Winding Data (Other windings available upon request)

Line No.	Parameter	Symbol	Units	14XX7			
37	Reference Voltage	E	V	15.1	19.1	24.0	30.3
38	Torque Constant	K _T	oz-in/A (N-m/A)	6.0 (42.4 X 10 ⁻³)	8.0 (56.5 X 10 ⁻³)	10.0 (70.6 X 10 ⁻³)	12.7 (89.7 X 10 ⁻³)
39	Back-EMF Constant	K _E	V/krpm (V/rad/s)	4.44 (42.4 X 10 ⁻³)	5.92 (56.5 X 10 ⁻³)	7.39 (70.6 X 10 ⁻³)	9.37 (89.7 X 10 ⁻³)
40	Resistance	R _T	Ω	0.24	0.39	0.59	0.93
41	Inductance	L	mH	0.31	0.56	0.87	1.40
42	No-Load Current	I _{NL}	A	0.51	0.38	0.30	0.24
43	Peak Current (Stall)	I _P	A	62.4	49.3	40.4	32.6

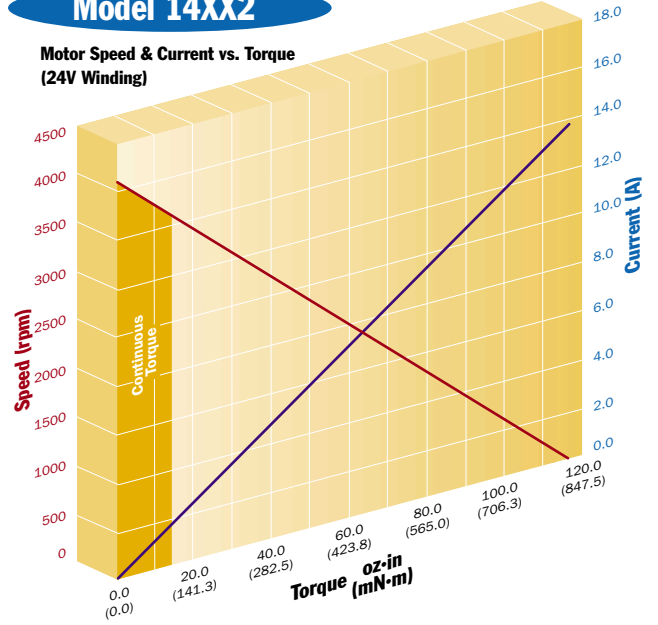
Model 14XX1

Motor Speed & Current vs. Torque
(24V Winding)



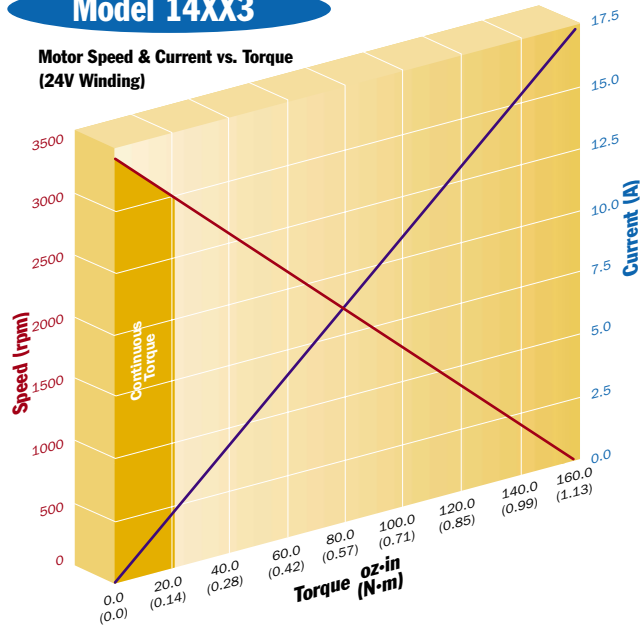
Model 14XX2

Motor Speed & Current vs. Torque
(24V Winding)



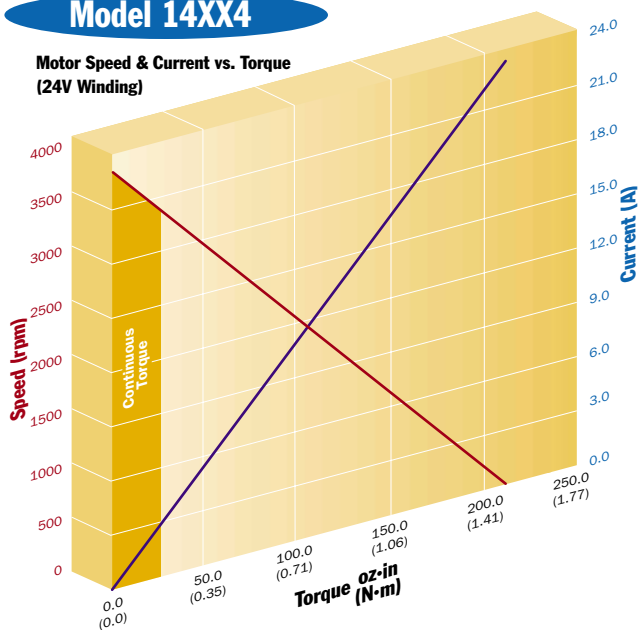
Model 14XX3

Motor Speed & Current vs. Torque
(24V Winding)



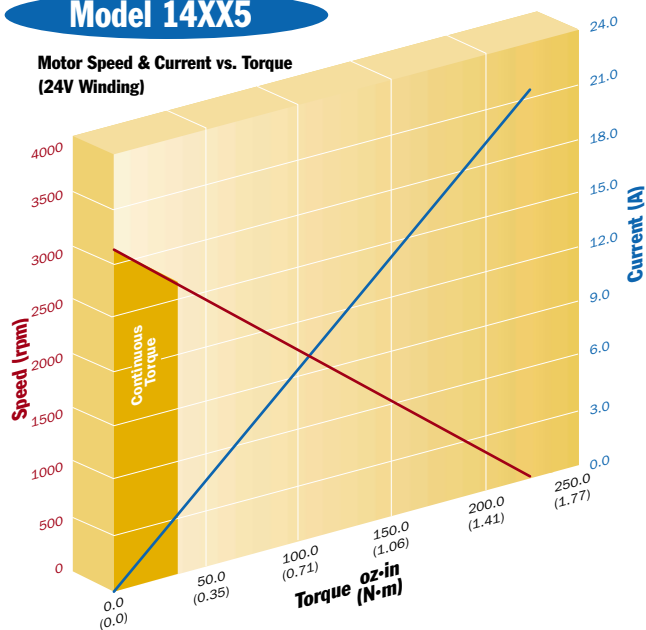
Model 14XX4

Motor Speed & Current vs. Torque
(24V Winding)



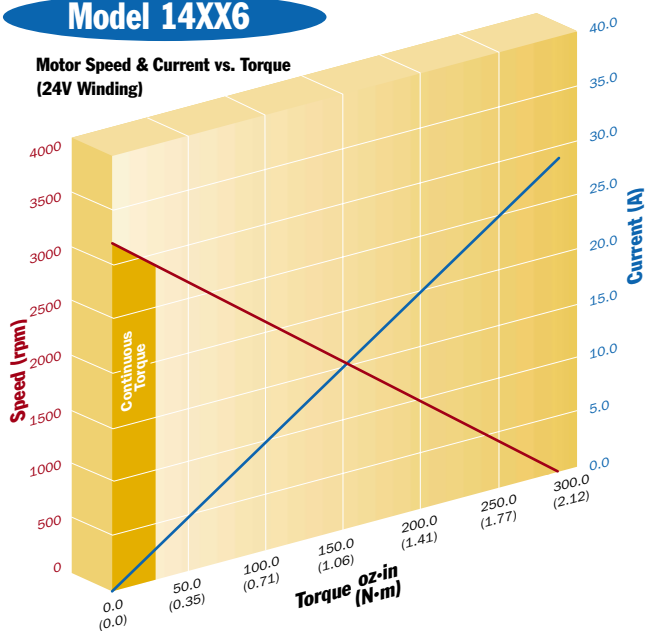
Model 14XX5

Motor Speed & Current vs. Torque
(24V Winding)



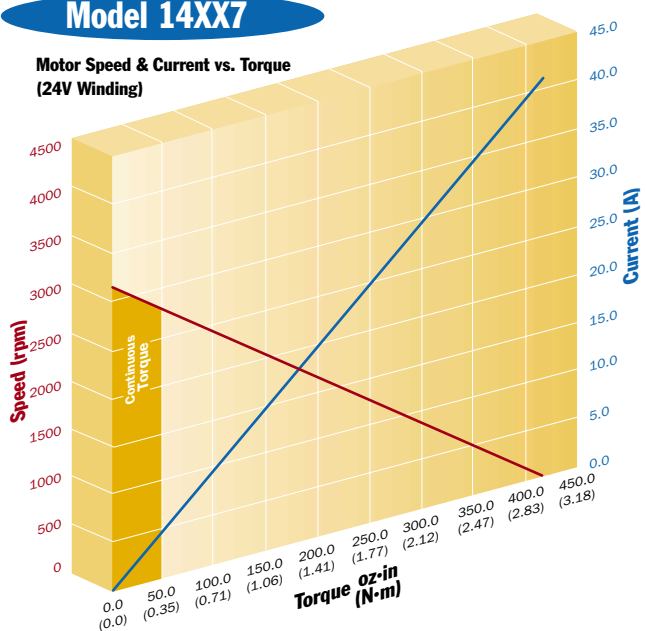
Model 14XX6

Motor Speed & Current vs. Torque
(24V Winding)

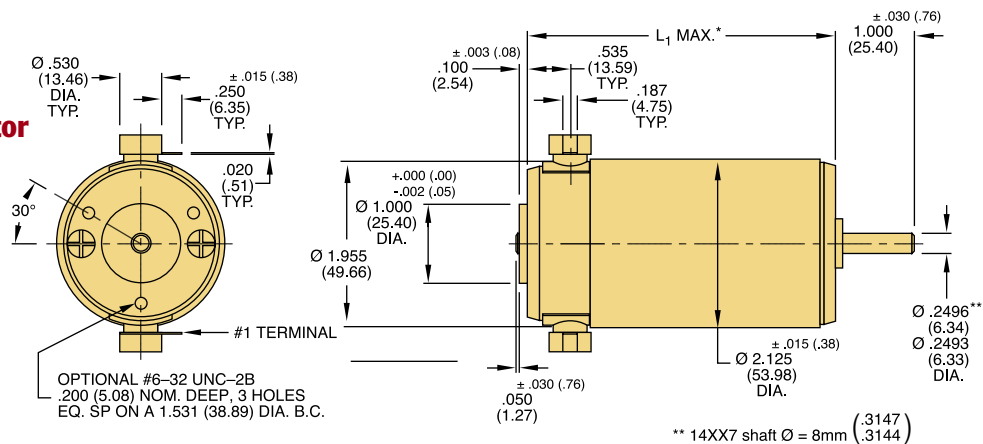


Model 14XX7

Motor Speed & Current vs. Torque
(24V Winding)

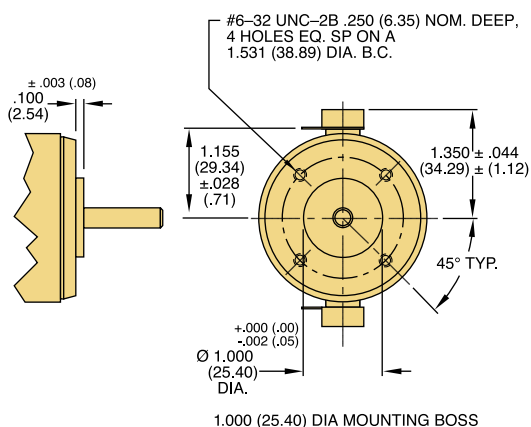


141XX/142XX Motor

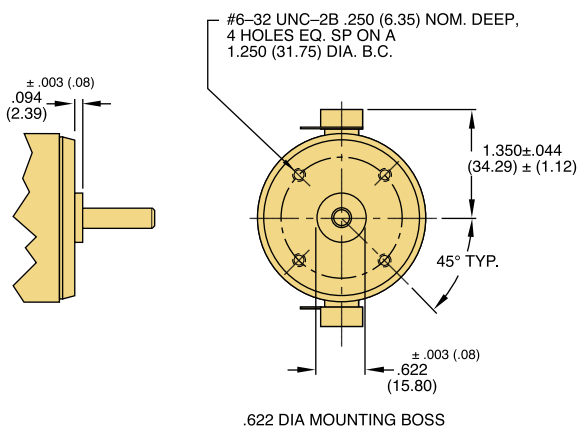


Front Mounting Options

142XX



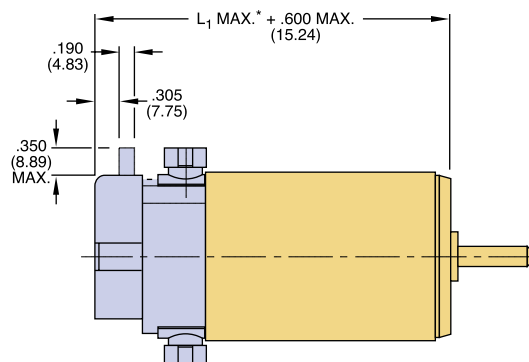
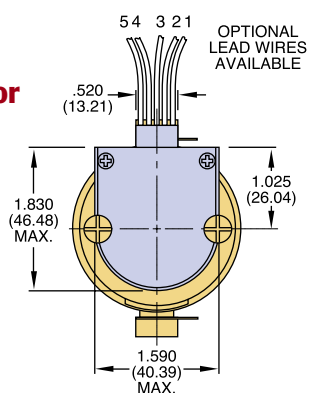
141XX



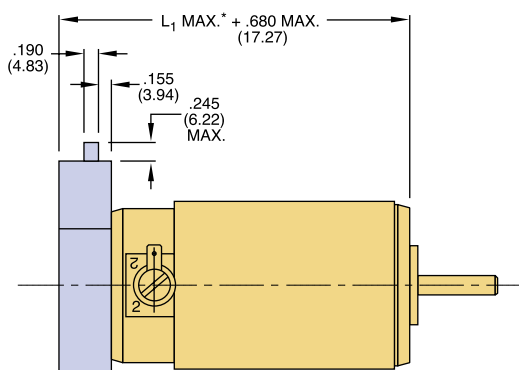
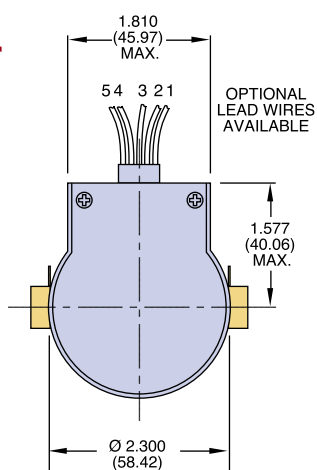
Notes:

- Unless otherwise specified, all tolerances are to be $\pm .005$ (.01)
 - All measurements are in inches (mm)
- *See line number 15 in motor data chart

**141XX/142XX Motor
with 91X0 Encoder**



**141XX/142XX Motor
with 90X0 Encoder**



Encoder Connection Chart

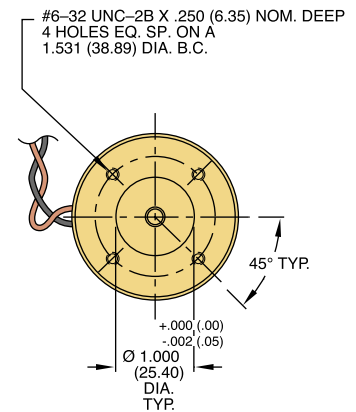
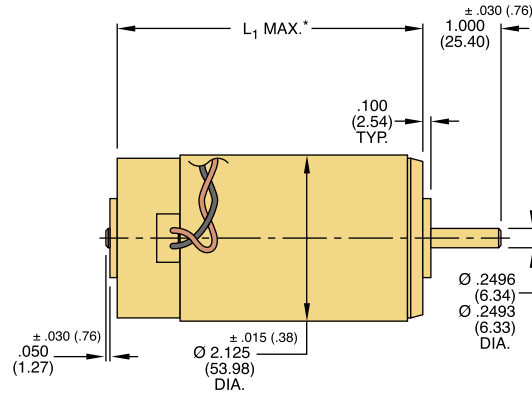
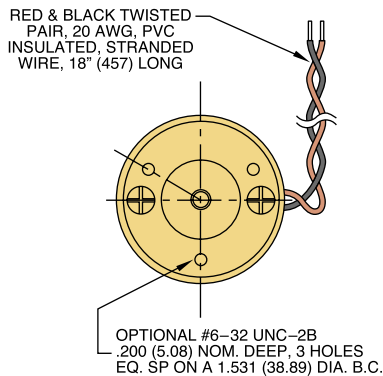
Pin No.	Color	Connection
1	Black	Ground
2	Green	Index/NC
3	Yellow	Channel A
4	Red	Vcc
5	Blue	Channel B

Notes:

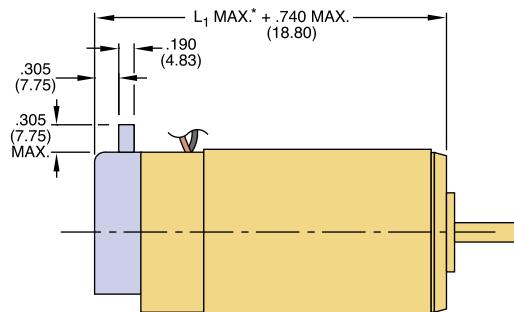
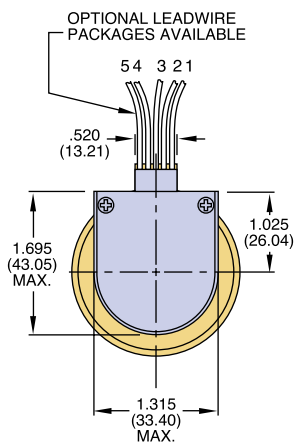
- Unless otherwise specified, all tolerances are to be $\pm .005$ (.01)
- All measurements are in inches (mm)
- *See line number 15 in motor data chart

SERIES 14000

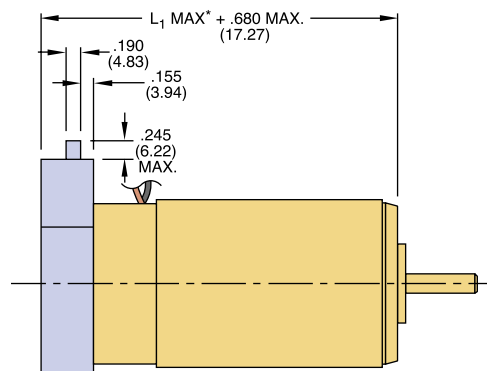
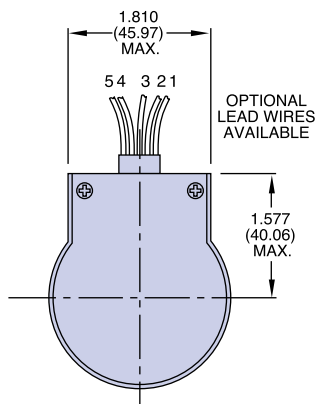
14X3X Motor



14X3X Motor with 91X0 Encoder



14X3X Motor with 90X0 Encoder



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 $\pm .005$ (.01)
- All measurements are in inches (mm)
- *See line number 15 in motor data chart

Specifications subject to change without notice.



LCM-20

PITTMAN®

343 GODSHALL DRIVE
HARLEYSVILLE, PENNSYLVANIA 19438 U.S.A.
PHONE: 215-256-6601 • FAX: 215-256-1338
TOLL FREE: 877-PITTMAN (USA Only)
E-MAIL: info@pittmannet.com
WEB SITE: www.pittmannet.com