

# IG Industrial Rated Servomotors

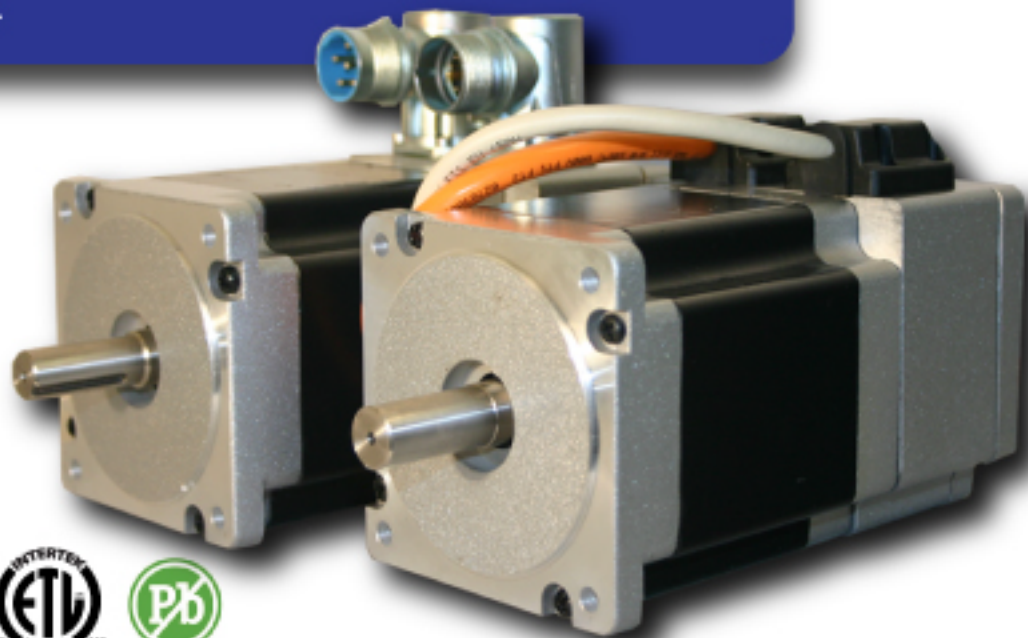
The IG industrial rated series DC brushless three-phase servomotor delivers high continuous torque in a cost reduced package.

The increased torque is the result of eight magnetic poles on the rotor compared to the traditional four magnetic poles. This design uses neodymium magnets for maximum performance. The IG industrial rated series has an open-lamination design reducing cost.

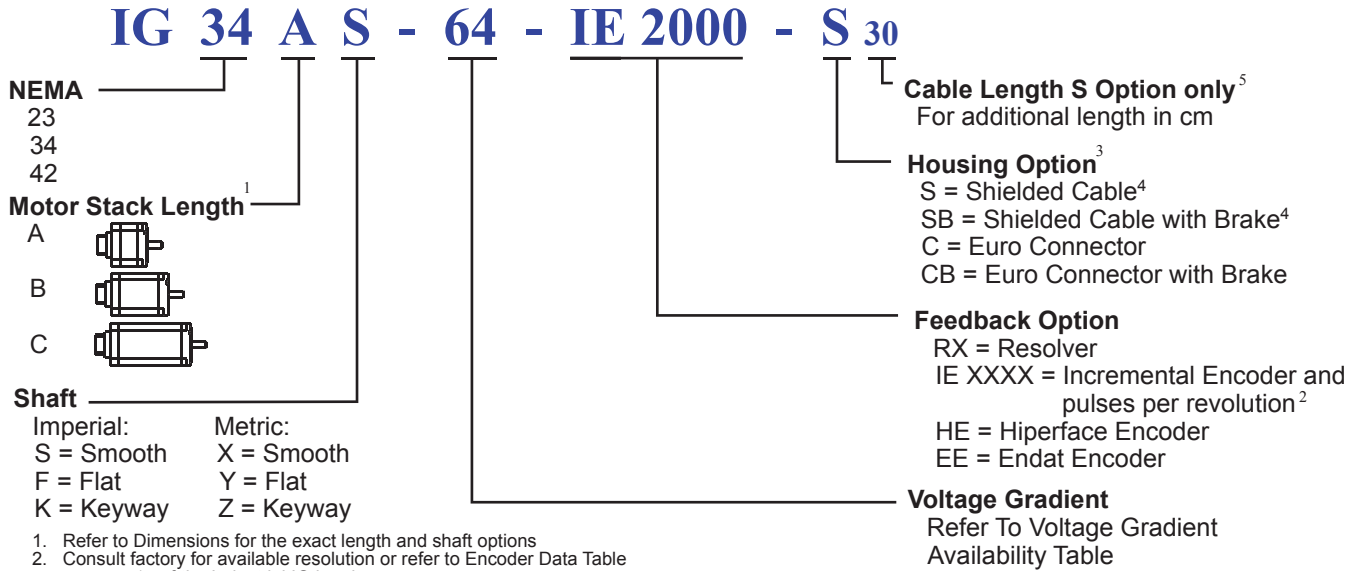
This series come with NEMA standard flanges size 23, 34, and 42 with continuous torque rating from 2.12 to 51.33 lb-in (0.24 to 5.80 Nm).

The motor has embedded thermo sensors for temperature feedback.

For cost and space savings applications the IG's come with 18 inches of shielded cables out of the servomotor, both power and feedback. For applications requiring a connection at the servomotor Euro connectors are provided with the ability to rotate 180°. This series comes standard with an environmental rating of IP64. Adding a front shaft seal increase the rating to an IP65. This series of IG's come with a resolver, incremental encoder, Endat encoder, or Hiperface encoder for feedback. As an option an integrated 24 vdc fail-safe brake is available.



### Model Numbering System:



1. Refer to Dimensions for the exact length and shaft options
2. Consult factory for available resolution or refer to Encoder Data Table on page 14 of the Industrial IG brochure
3. All the motors are rated IP64 and by adding front shaft seal it's rating becomes IP65
4. The **S** and **SB** housing options come with 18 inches (46 cm) shielded cable
5. Blank For Standard length (18 inches = 46 cm)

### Voltage Gradient Availability Table:

Voltage Constant $K_E$ (V/krpm)		8	11	16	22	32	44	64	88	130	180	260	360
Frame Size	IG 23												
	IG 34												
	IG 42												

### Motor Performance Curves:

There are two cases to select a motor:

**Case I:** The bus voltage ( $V_{bus}$ ) and torque ( $T$ ) are known.

The speed is related to the torque and bus voltage according to the following formula:

$$(1) \quad n = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

where

$$a = K_E^2 + \left(\frac{1000\pi PL}{60}\right)^2 \left(\frac{T}{K_T}\right)^2$$

$$b = \frac{2TRK_E}{K_T}$$

$$c = \left(\frac{T}{K_T}\right)^2 R^2 - V_{bus}^2$$

**Case II:** The bus voltage ( $V_{bus}$ ) and speed ( $n$ ) are known.

The torque is related to the speed and bus voltage according to the following formula:

$$(2) \quad T = \frac{-f + \sqrt{f^2 - 4eg}}{2e}$$

where

$$e = \left[ R^2 + \left(\frac{1000n\pi PL}{60}\right)^2 \right] \left(\frac{1}{K_T}\right)^2$$

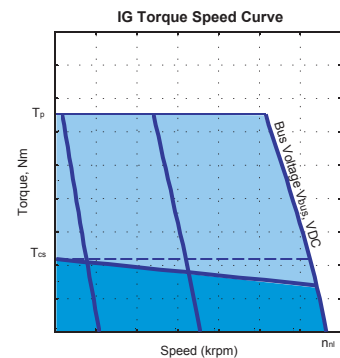
$$f = \frac{2RK_E n}{K_T}$$

$$g = K_E^2 n^2 - V_{bus}^2$$

#### Definitions of Symbols

$n$  is the motor speed, krpm.  
 $V_{bus}$  is the bus voltage, VDC.  
 $K_E$  is the voltage constant, V/krpm.  
 $K_T$  is the torque constant, Nm/Amp (peak).  
 $T$  is the torque, Nm.

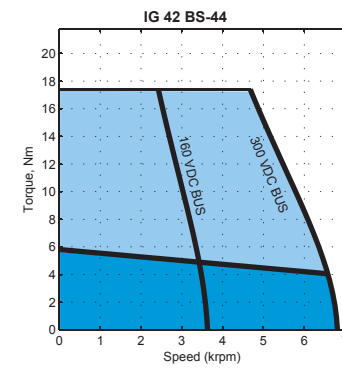
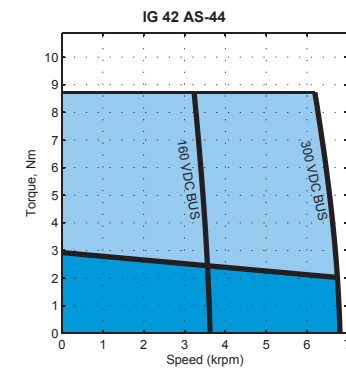
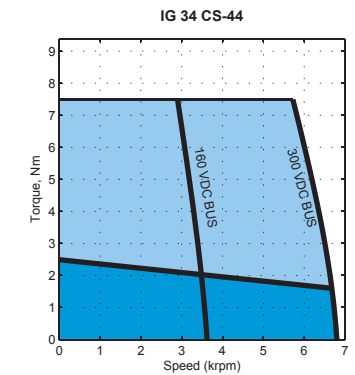
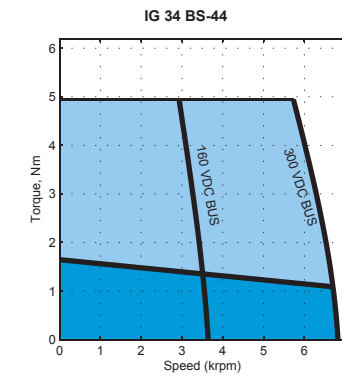
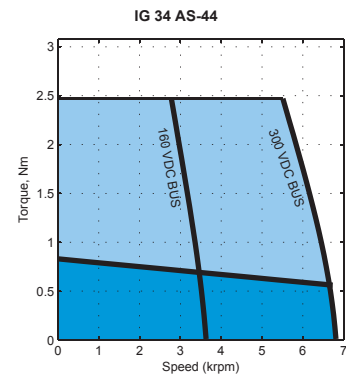
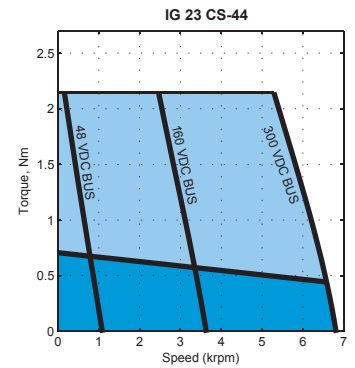
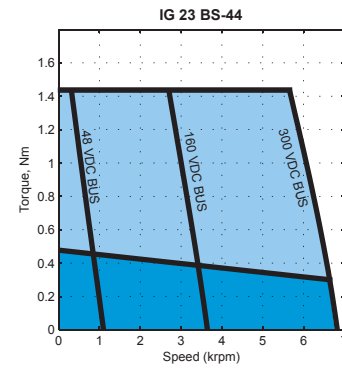
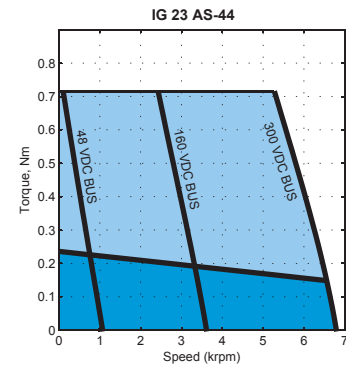
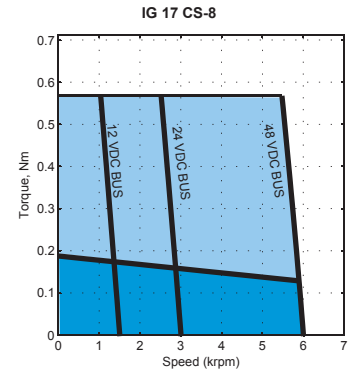
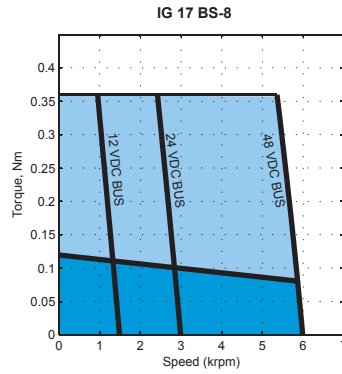
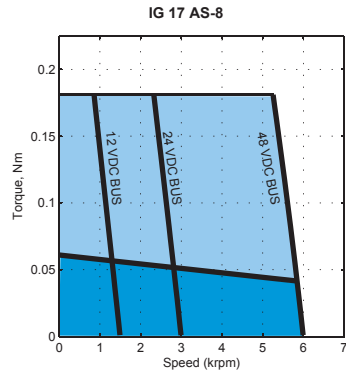
$P$  is the number of poles. For IG motors,  $P=8$ .  
 $R$  is the motor resistance, Ohm  
 $L$  is the motor inductance, Henry.  
 $\pi$  is equal to 3.14



■ Intermittent duty zone  
 ■ Continuous duty zone  
 $T_p$ : Peak stall torque  
 $T_{cs}$ : Continuous stall torque  
 $n_0$ : No load speed at the bus voltage,  $V_{bus}$

Note: While using Eq. (1) and Eq. (2) you must use values with the above specified units.

# Selected Torque-Speed Curves



**Note:**  
Contact factory for torque-speed curves of other motors.

NEMA 23																		
Index	Model Number	Weight		Torque Constant (Peak) (L2L)		Voltage Constant	Cont. Stall Torque		Cont. stall current	Peak Stall Torque		Peak Stall Current	Max BEMF (Peak) (L2L)	Max Speed	L-to-L Resistance	L-to-L Inductance	Rotor Inertia	
		W		K <sub>T</sub>		K <sub>E</sub>	T <sub>es</sub>		I <sub>es</sub>	T <sub>P</sub>		I <sub>P</sub>	U <sub>max</sub>	n <sub>max</sub>	R	L	J	
		kg	lb	Nm/A	lb-in/A	V/krpm	Nm	lb-in	A	Nm	lb-in	A	V	rpm	Ohms	mH	kg-cm <sup>2</sup>	lb-in-sec <sup>2</sup>
13	IG 23 AS - 8	0.62	1.37	0.09	0.78	8.00	0.24	2.12	2.72	0.72	6.37	8.16	64.00	8000	0.60	0.72	0.30	0.00027
14	IG 23 BS - 8	0.96	2.12	0.09	0.78	8.00	0.48	4.25	5.44	1.44	12.75	16.32	64.00	8000	0.28	0.35	0.60	0.00053
15	IG 23 CS - 8	1.20	2.65	0.09	0.78	8.00	0.72	6.37	8.16	2.16	19.12	24.48	64.00	8000	0.21	0.24	0.90	0.00080
16	IG 23 AS - 11	0.62	1.37	0.12	1.07	11.00	0.24	2.12	1.98	0.72	6.37	5.94	88.00	8000	1.40	1.90	0.30	0.00027
17	IG 23 BS - 11	0.96	2.12	0.12	1.07	11.00	0.48	4.25	3.96	1.44	12.75	11.87	88.00	8000	0.55	0.75	0.60	0.00053
18	IG 23 CS - 11	1.20	2.65	0.12	1.07	11.00	0.72	6.37	5.94	2.16	19.12	17.81	88.00	8000	0.45	0.60	0.90	0.00080
19	IG 23 AS - 16	0.62	1.37	0.18	1.56	16.00	0.24	2.12	1.36	0.72	6.37	4.08	128.00	8000	2.65	3.20	0.30	0.00027
20	IG 23 BS - 16	0.96	2.12	0.18	1.56	16.00	0.48	4.25	2.72	1.44	12.75	8.16	128.00	8000	1.00	1.35	0.60	0.00053
21	IG 23 CS - 16	1.20	2.65	0.18	1.56	16.00	0.72	6.37	4.08	2.16	19.12	12.24	128.00	8000	0.78	1.10	0.90	0.00080
22	IG 23 AS - 22	0.62	1.37	0.24	2.15	22.00	0.24	2.12	0.99	0.72	6.37	2.97	176.00	8000	5.90	9.30	0.30	0.00027
23	IG 23 BS - 22	0.96	2.12	0.24	2.15	22.00	0.48	4.25	1.98	1.44	12.75	5.94	176.00	8000	2.20	2.90	0.60	0.00053
24	IG 23 CS - 22	1.20	2.65	0.24	2.15	22.00	0.72	6.37	2.97	2.16	19.12	8.90	176.00	8000	1.80	2.40	0.90	0.00080
25	IG 23 AS - 32	0.62	1.37	0.35	3.12	32.00	0.24	2.12	0.68	0.72	6.37	2.04	256.00	8000	15.20	18.20	0.30	0.00027
26	IG 23 BS - 32	0.96	2.12	0.35	3.12	32.00	0.48	4.25	1.36	1.44	12.75	4.08	256.00	8000	6.20	7.10	0.60	0.00053
27	IG 23 CS - 32	1.20	2.65	0.35	3.12	32.00	0.72	6.37	2.04	2.16	19.12	6.12	256.00	8000	4.60	5.70	0.90	0.00080
28	IG 23 AS - 44	0.62	1.37	0.49	4.29	44.00	0.24	2.12	0.49	0.72	6.37	1.48	352.00	8000	28.50	35.60	0.30	0.00027
29	IG 23 BS - 44	0.96	2.12	0.49	4.29	44.00	0.48	4.25	0.99	1.44	12.75	2.97	352.00	8000	11.50	14.10	0.60	0.00053
30	IG 23 CS - 44	1.20	2.65	0.49	4.29	44.00	0.72	6.37	1.48	2.16	19.12	4.45	352.00	8000	9.10	12.30	0.90	0.00080
31	IG 23 AS - 64	0.62	1.37	0.71	6.25	64.00	0.24	2.12	0.34	0.72	6.37	1.02	512.00	8000	67.20	80.90	0.30	0.00027
32	IG 23 BS - 64	0.96	2.12	0.71	6.25	64.00	0.48	4.25	0.68	1.44	12.75	2.04	512.00	8000	26.90	33.10	0.60	0.00053
33	IG 23 CS - 64	1.20	2.65	0.71	6.25	64.00	0.72	6.37	1.02	2.16	19.12	3.06	512.00	8000	21.30	27.60	0.90	0.00080
34	IG 23 AS - 88	0.62	1.37	0.97	8.59	88.00	0.24	2.12	0.25	0.72	6.37	0.74	704.00	8000	107.00	134.50	0.30	0.00027
35	IG 23 BS - 88	0.96	2.12	0.97	8.59	88.00	0.48	4.25	0.49	1.44	12.75	1.48	704.00	8000	43.30	54.50	0.60	0.00053
36	IG 23 CS - 88	1.20	2.65	0.97	8.59	88.00	0.72	6.37	0.74	2.16	19.12	2.23	704.00	8000	35.80	45.20	0.90	0.00080
37	IG 23 AS - 130	0.62	1.37	1.43	12.69	130.00	0.24	2.12	0.17	0.72	6.37	0.50	1,040.00	8000	170.20	212.50	0.30	0.00027
38	IG 23 BS - 130	0.96	2.12	1.43	12.69	130.00	0.48	4.25	0.33	1.44	12.75	1.00	1,040.00	8000	68.50	86.84	0.60	0.00053
39	IG 23 CS - 130	1.20	2.65	1.43	12.69	130.00	0.72	6.37	0.50	2.16	19.12	1.51	1,040.00	8000	56.70	71.80	0.90	0.00080
40	IG 23 AS - 180	0.62	1.37	1.98	17.57	180.00	0.24	2.12	0.12	0.72	6.37	0.36	1,440.00	8000	307.40	406.50	0.30	0.00027
41	IG 23 BS - 180	0.96	2.12	1.98	17.57	180.00	0.48	4.25	0.24	1.44	12.75	0.73	1,440.00	8000	131.00	166.10	0.60	0.00053
42	IG 23 CS - 180	1.20	2.65	1.98	17.57	180.00	0.72	6.37	0.36	2.16	19.12	1.09	1,440.00	8000	101.00	136.70	0.90	0.00080

L2L: Line-to-Line

# IG Motor Specifications

(Version 3.05)



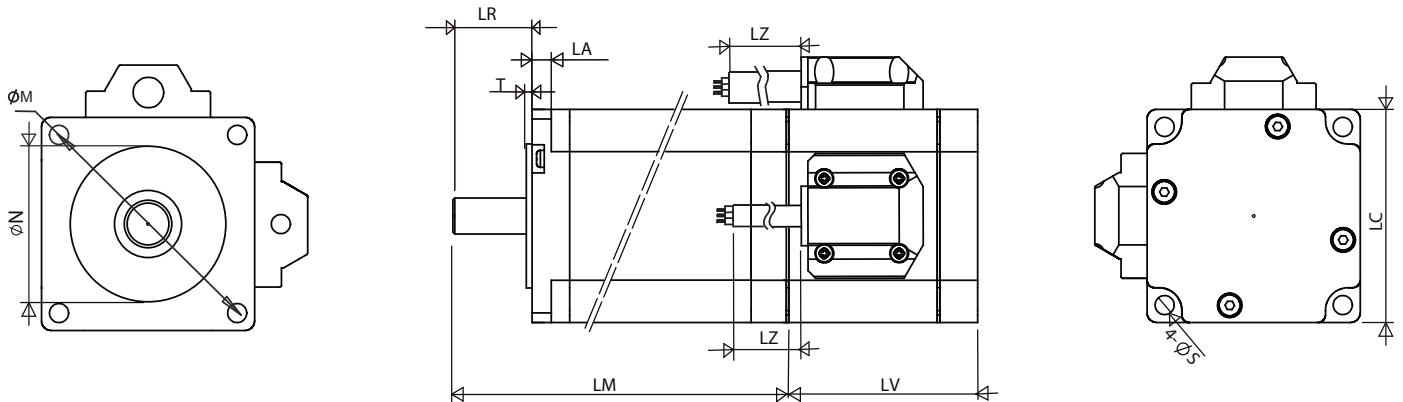
NEMA 34																		
Index	Model Number	Weight		Torque Constant (Peak) (L2L)		Voltage Constant	Cont. Stall Torque		Cont. Stall Current	Peak Stall Torque		Peak Stall Current	Max BEMF (Peak) (L2L)	Max Speed	L-to-L Resistance	L-to-L Inductance	Rotor Inertia	
		W		K <sub>T</sub>		K <sub>E</sub>	T <sub>cs</sub>		I <sub>cs</sub>	T <sub>p</sub>		I <sub>p</sub>	U <sub>max</sub>	n <sub>max</sub>	R	L	J	
		kg	lb	Nm/A	lb-in/A	V/krpm	Nm	lb-in	A	Nm	lb-in	A	V	rpm	Ohms	mH	kg-cm <sup>2</sup>	lb-in-sec <sup>2</sup>
43	IG 34 AS - 16	1.90	4.19	0.18	1.56	16.00	0.82	7.26	4.65	2.46	21.77	13.94	128.00	8000	0.34	1.10	0.80	0.00071
44	IG 34 BS - 16	2.90	6.39	0.18	1.56	16.00	1.65	14.60	9.35	4.95	43.81	28.06	128.00	8000	0.14	0.45	1.60	0.00142
45	IG 34 CS - 16	3.90	8.60	0.18	1.56	16.00	2.50	22.13	14.17	7.50	66.38	42.51	128.00	8000	0.10	0.39	2.40	0.00212
46	IG 34 AS - 22	1.90	4.19	0.24	2.15	22.00	0.82	7.26	3.38	2.46	21.77	10.14	176.00	8000	0.81	2.50	0.80	0.00071
47	IG 34 BS - 22	2.90	6.39	0.24	2.15	22.00	1.65	14.60	6.80	4.95	43.81	20.40	176.00	8000	0.56	0.95	1.60	0.00142
48	IG 34 CS - 22	3.90	8.60	0.24	2.15	22.00	2.50	22.13	10.30	7.50	66.38	30.91	176.00	8000	0.20	0.70	2.40	0.00212
49	IG 34 AS - 32	1.90	4.19	0.35	3.12	32.00	0.82	7.26	2.32	2.46	21.77	6.97	256.00	8000	2.10	6.30	0.80	0.00071
50	IG 34 BS - 32	2.90	6.39	0.35	3.12	32.00	1.65	14.60	4.68	4.95	43.81	14.03	256.00	8000	0.74	2.70	1.60	0.00142
51	IG 34 CS - 32	3.90	8.60	0.35	3.12	32.00	2.50	22.13	7.08	7.50	66.38	21.25	256.00	8000	0.40	1.47	2.40	0.00212
52	IG 34 AS - 44	1.90	4.19	0.49	4.29	44.00	0.82	7.26	1.69	2.46	21.77	5.07	352.00	8000	3.80	12.30	0.80	0.00071
53	IG 34 BS - 44	2.90	6.39	0.49	4.29	44.00	1.65	14.60	3.40	4.95	43.81	10.20	352.00	8000	1.50	5.50	1.60	0.00142
54	IG 34 CS - 44	3.90	8.60	0.49	4.29	44.00	2.50	22.13	5.15	7.50	66.38	15.46	352.00	8000	1.10	3.50	2.40	0.00212
55	IG 34 AS - 64	1.90	4.19	0.71	6.25	64.00	0.82	7.26	1.16	2.46	21.77	3.49	512.00	8000	8.60	27.70	0.80	0.00071
56	IG 34 BS - 64	2.90	6.39	0.71	6.25	64.00	1.65	14.60	2.34	4.95	43.81	7.01	512.00	8000	3.45	12.30	1.60	0.00142
57	IG 34 CS - 64	3.90	8.60	0.71	6.25	64.00	2.50	22.13	3.54	7.50	66.38	10.63	512.00	8000	2.10	7.80	2.40	0.00212
58	IG 34 AS - 88	1.90	4.19	0.97	8.59	88.00	0.82	7.26	0.85	2.46	21.77	2.54	704.00	8000	13.50	45.20	0.80	0.00071
59	IG 34 BS - 88	2.90	6.39	0.97	8.59	88.00	1.65	14.60	1.70	4.95	43.81	5.10	704.00	8000	5.50	19.00	1.60	0.00142
60	IG 34 CS - 88	3.90	8.60	0.97	8.59	88.00	2.50	22.13	2.58	7.50	66.38	7.73	704.00	8000	3.50	12.50	2.40	0.00212
61	IG 34 AS - 130	1.90	4.19	1.43	12.69	130.00	0.82	7.26	0.57	2.46	21.77	1.72	1,040.00	8000	22.50	72.80	0.80	0.00071
62	IG 34 BS - 130	2.90	6.39	1.43	12.69	130.00	1.65	14.60	1.15	4.95	43.81	3.45	1,040.00	8000	8.30	30.00	1.60	0.00142
63	IG 34 CS - 130	3.90	8.60	1.43	12.69	130.00	2.50	22.13	1.74	7.50	66.38	5.23	1,040.00	8000	5.10	20.00	2.40	0.00212
64	IG 34 AS - 180	1.90	4.19	1.98	17.57	180.00	0.82	7.26	0.41	2.46	21.77	1.24	1,440.00	8000	46.00	141.30	0.80	0.00071
65	IG 34 BS - 180	2.90	6.39	1.98	17.57	180.00	1.65	14.60	0.83	4.95	43.81	2.49	1,440.00	8000	17.60	56.70	1.60	0.00142
66	IG 34 CS - 180	3.90	8.60	1.98	17.57	180.00	2.50	22.13	1.26	7.50	66.38	3.78	1,440.00	8000	10.20	38.00	2.40	0.00212
67	IG 34 AS - 260	1.90	4.19	2.87	25.38	260.00	0.82	7.26	0.29	2.46	21.77	0.86	2,080.00	8000	97.20	295.30	0.80	0.00071
68	IG 34 BS - 260	2.90	6.39	2.87	25.38	260.00	1.65	14.60	0.58	4.95	43.81	1.73	2,080.00	8000	33.50	118.50	1.60	0.00142
69	IG 34 CS - 260	3.90	8.60	2.87	25.38	260.00	2.50	22.13	0.87	7.50	66.38	2.62	2,080.00	8000	20.50	79.00	2.40	0.00212
70	IG 34 AS - 360	1.90	4.19	3.97	35.14	360.00	0.82	7.26	0.21	2.46	21.77	0.62	2,880.00	8000	173.00	568.00	0.80	0.00071
71	IG 34 BS - 360	2.90	6.39	3.97	35.14	360.00	1.65	14.60	0.42	4.95	43.81	1.25	2,880.00	8000	67.30	227.00	1.60	0.00142
72	IG 34 CS - 360	3.90	8.60	3.97	35.14	360.00	2.50	22.13	0.63	7.50	66.38	1.89	2,880.00	8000	18.70	153.00	2.40	0.00212

NEMA 42																		
Index	Model Number	Weight		Torque Constant (Peak) (L2L)		Voltage Constant	Cont. Stall Torque		Cont. Stall Current	Peak Stall Torque		Peak Stall Current	Max BEMF (Peak) (L2L)	Max Speed	L-to-L Resistance	L-to-L Inductance	Rotor Inertia	
		W		K <sub>T</sub>		K <sub>E</sub>	T <sub>cs</sub>		I <sub>cs</sub>	T <sub>p</sub>		I <sub>p</sub>	U <sub>max</sub>	n <sub>max</sub>	R	L	J	
		kg	lb	Nm/A	lb-in/amp	V/krpm	Nm	lb-in	A	Nm	lb-in	A	V	rpm	Ohms	mH	kg-cm <sup>2</sup>	lb-in-sec <sup>2</sup>
73	IG 42 AS - 32	5.50	12.13	0.35	3.12	32.00	2.90	25.67	8.22	8.70	77.00	24.65	192.00	6000	0.20	1.10	3.00	0.00266
74	IG 42 BS - 32	9.20	20.28	0.35	3.12	32.00	5.80	51.33	16.44	17.40	154.00	49.31	192.00	6000	0.16	1.40	6.00	0.00531
75	IG 42 AS - 44	5.50	12.13	0.49	4.29	44.00	2.90	25.67	5.98	8.70	77.00	17.93	264.00	6000	0.38	2.30	3.00	0.00266
76	IG 42 BS - 44	9.20	20.28	0.49	4.29	44.00	5.80	51.33	11.95	17.40	154.00	35.86	264.00	6000	0.33	2.90	6.00	0.00531
77	IG 42 AS - 64	5.50	12.13	0.71	6.25	64.00	2.90	25.67	4.11	8.70	77.00	12.33	384.00	6000	1.10	5.00	3.00	0.00266
78	IG 42 BS - 64	9.20	20.28	0.71	6.25	64.00	5.80	51.33	8.22	17.40	154.00	24.65	384.00	6000	0.69	6.40	6.00	0.00531
79	IG 42 AS - 88	5.50	12.13	0.97	8.59	88.00	2.90	25.67	2.99	8.70	77.00	8.97	528.00	6000	1.70	8.00	3.00	0.00266
80	IG 42 BS - 88	9.20	20.28	0.97	8.59	88.00	5.80	51.33	5.98	17.40	154.00	17.93	528.00	6000	1.15	10.50	6.00	0.00531
81	IG 42 AS - 130	5.50	12.13	1.43	12.69	130.00	2.90	25.67	2.02	8.70	77.00	6.07	780.00	6000	2.35	12.70	3.00	0.00266
82	IG 42 BS - 130	9.20	20.28	1.43	12.69	130.00	5.80	51.33	4.05	17.40	154.00	12.14	780.00	6000	1.80	16.70	6.00	0.00531
83	IG 42 AS - 180	5.50	12.13	1.98	17.57	180.00	2.90	25.67	1.46	7.50	66.38	3.78	1,080.00	6000	5.80	25.00	3.00	0.00266
84	IG 42 BS - 180	9.20	20.28	1.98	17.57	180.00	5.80	51.33	2.92	15.00	132.76	7.56	1,080.00	6000	3.50	32.00	6.00	0.00531
85	IG 42 AS - 260	5.50	12.13	2.87	25.38	260.00	2.90	25.67	1.01	7.50	66.38	2.62	1,560.00	6000	11.80	50.70	3.00	0.00266
86	IG 42 BS - 260	9.20	20.28	2.87	25.38	260.00	5.80	51.33	2.02	15.00	132.76	5.23	1,560.00	6000	7.50	67.00	6.00	0.00531
87	IG 42 AS - 360	5.50	12.13	3.97	35.14	360.00	2.90	25.67	0.73	7.50	66.38	1.89	2,160.00	6000	20.30	97.80	3.00	0.00266
88	IG 42 BS - 360	9.20	20.28	3.97	35.14	360.00	5.80	51.33	1.46	15.00	132.76	3.78	2,160.00	6000	14.20	128.00	6.00	0.00531

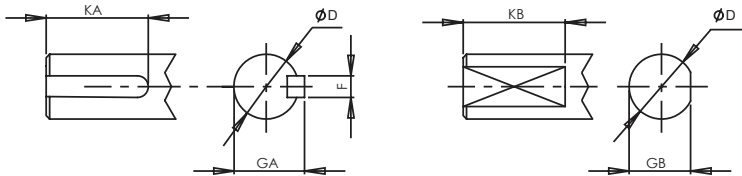
L2L: Line-to-Line



# IG 23 with S Housing



FRONT SHAFT OPTIONS  
 (1) SMOOTH SHAFT, AS SHOWN IN THE VIEWS  
 (2) KEYWAY SHAFT  
 (3) FLAT SHAFT

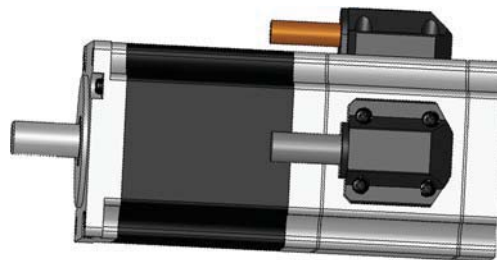


NOTE:  
 THE MOTOR IS RATED IP64 AND BY ADDING FRONT  
 SHAFT SEAL IT'S RATING BECOMES IP65

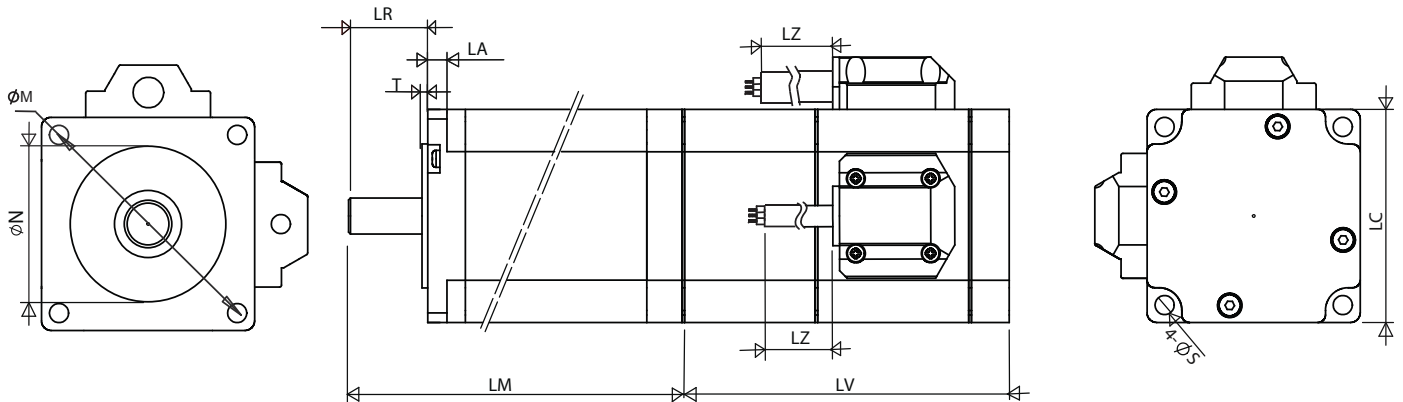
Units: inches (mm)

IG		LM	LV	LA	T	LR	LC	LZ	N	S	M
23	A	2.795 (71)	2.00 (50.7)	0.20 (5.1)	0.060 (1.5)	0.825 (21)	2.220 (56.4)	18 (457.2)	1.500 <sup>0</sup> <sub>-0.002</sub> (38.10 <sup>0</sup> <sub>-0.05</sub> )	0.200 (5.1)	2.625 (66.68)
	B	3.858 (98)									
	C	4.921 (125)									

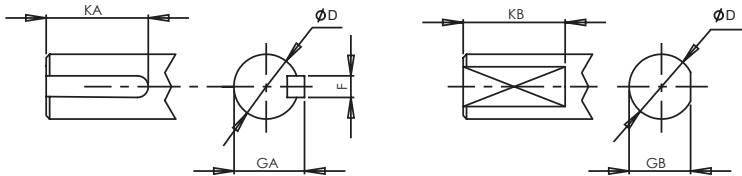
IG	Imperial Shaft Option (S/F/K), Units: Inches						Metric Shaft Option (X/Y/Z), Units: mm					
	D	F	GA	KA	GB	KB	D	F	GA	KA	GB	KB
23	0.3750 <sup>0</sup> <sub>-0.0005</sub>	0.0938 <sup>0</sup> <sub>-0.001</sub>	0.416 <sup>0</sup> <sub>-0.002</sub>	0.50	0.340 <sup>0</sup> <sub>-0.004</sub>	0.50	10 <sup>0</sup> <sub>-0.013</sub>	3 <sup>0</sup> <sub>-0.025</sub>	11.2 <sup>0</sup> <sub>-0.051</sub>	15	9.0 <sup>0</sup> <sub>-0.1</sub>	15.0



# IG 23 with SB Housing



FRONT SHAFT OPTIONS  
 (1) SMOOTH SHAFT, AS SHOWN IN THE VIEWS  
 (2) KEYWAY SHAFT  
 (3) FLAT SHAFT

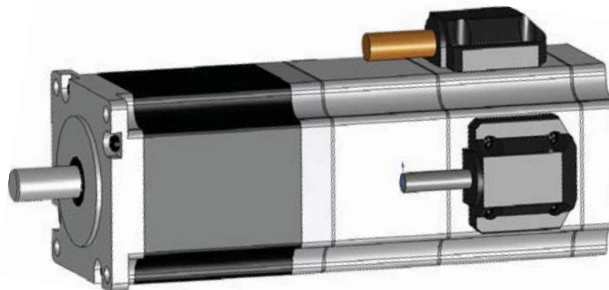


NOTE:  
 ALL THE MOTORS ARE RATED IP64 AND BY ADDING FRONT  
 SHAFT SEAL, IT'S RATING BECOMES IP65

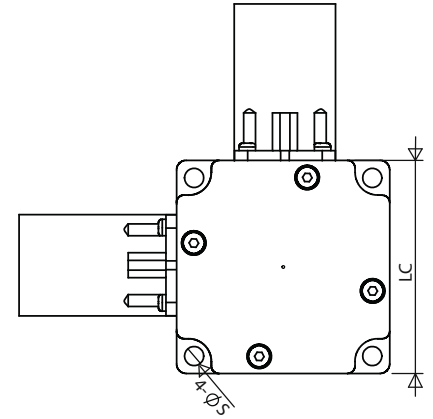
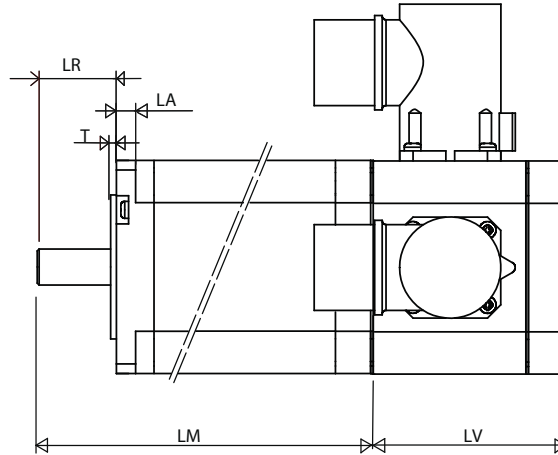
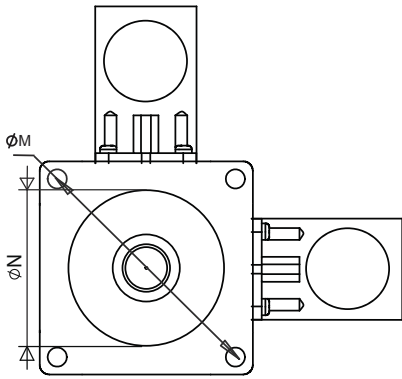
Units: inches (mm)

IG		LM	LV	LA	T	LR	LC	LZ	N	S	M
23	A	2.795 (71)	3.38 (85.9)	0.20 (5.1)	0.060 (1.5)	0.825 (21)	2.220 (56.4)	18 (457.2)	1.500 <sup>0</sup> <sub>-0.002</sub> (38.10 <sup>0</sup> <sub>-0.05</sub> )	0.200 (5.1)	2.625 (66.68)
	B	3.858 (98)									
	C	4.921 (125)									

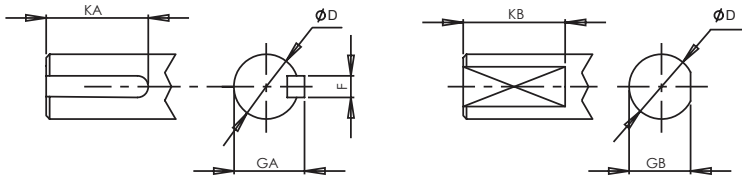
IG	Imperial Shaft Option (S/F/K), Units: Inches						Metric Shaft Option (X/Y/Z), Units: mm					
	D	F	GA	KA	GB	KB	D	F	GA	KA	GB	KB
23	0.3750 <sup>0</sup> <sub>-0.0005</sub>	0.0938 <sup>0</sup> <sub>-0.001</sub>	0.416 <sup>0</sup> <sub>-0.002</sub>	0.50	0.340 <sup>0</sup> <sub>-0.004</sub>	0.50	10 <sup>0</sup> <sub>-0.013</sub>	3 <sup>0</sup> <sub>-0.025</sub>	11.2 <sup>0</sup> <sub>-0.051</sub>	15	9.0 <sup>0</sup> <sub>-0.1</sub>	15.0



# IG 23 with C Housing



FRONT SHAFT OPTIONS  
 (1) SMOOTH SHAFT, AS SHOWN IN THE VIEWS  
 (2) KEYWAY SHAFT  
 (3) FLAT SHAFT

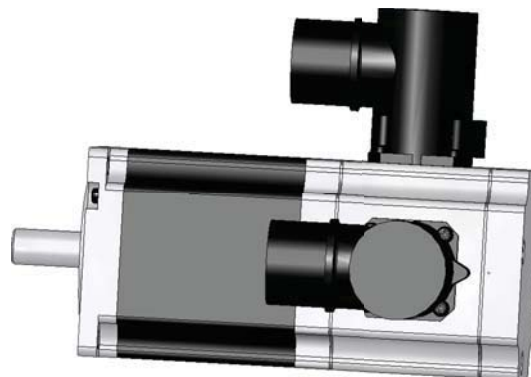


NOTE:  
 ALL THE MOTORS ARE RATED IP64 AND BY ADDING FRONT  
 SHAFT SEAL, IT'S RATING BECOMES IP65

Units: inches (mm)

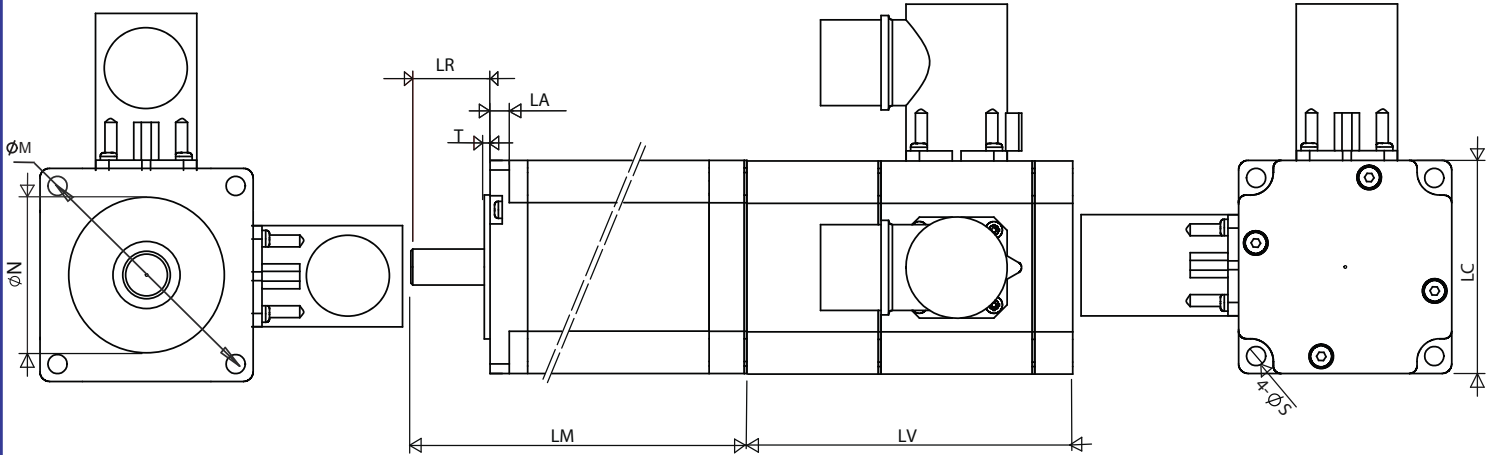
IG		LM	LV	LA	T	LR	LC	N	S	M
23	A	2.795 (71)	2.00 (50.7)	0.20 (5.1)	0.060 (1.5)	0.825 (21)	2.220 (56.4)	1.500 <sup>0</sup> <sub>-0.002</sub> (38.10 <sup>0</sup> <sub>-0.05</sub> )	0.200 (5.1)	2.625 (66.68)
	B	3.858 (98)								
	C	4.921 (125)								

IG	Imperial Shaft Option (S/F/K), Units: Inches						Metric Shaft Option (X/Y/Z), Units: mm					
	D	F	GA	KA	GB	KB	D	F	GA	KA	GB	KB
23	0.3750 <sup>0</sup> <sub>-0.0005</sub>	0.0938 <sup>0</sup> <sub>-0.001</sub>	0.416 <sup>0</sup> <sub>-0.002</sub>	0.50	0.340 <sup>0</sup> <sub>-0.004</sub>	0.50	10 <sup>0</sup> <sub>-0.013</sub>	3 <sup>0</sup> <sub>-0.025</sub>	11.2 <sup>0</sup> <sub>-0.051</sub>	15	9.0 <sup>0</sup> <sub>-0.1</sub>	15.0

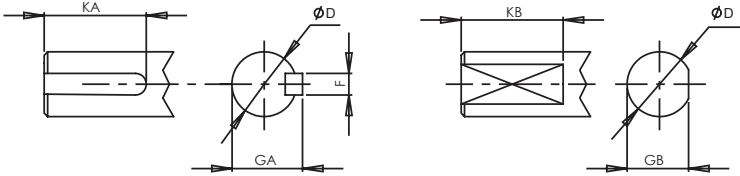




# IG 23 with CB Housing



FRONT SHAFT OPTIONS  
 (1) SMOOTH SHAFT, AS SHOWN IN THE VIEWS  
 (2) KEYWAY SHAFT  
 (3) FLAT SHAFT



NOTE:  
 ALL THE MOTORS ARE RATED IP64 AND BY ADDING FRONT  
 SHAFT SEAL, IT'S RATING BECOMES IP65

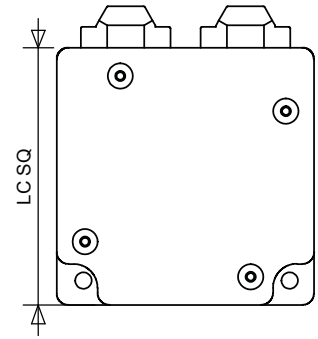
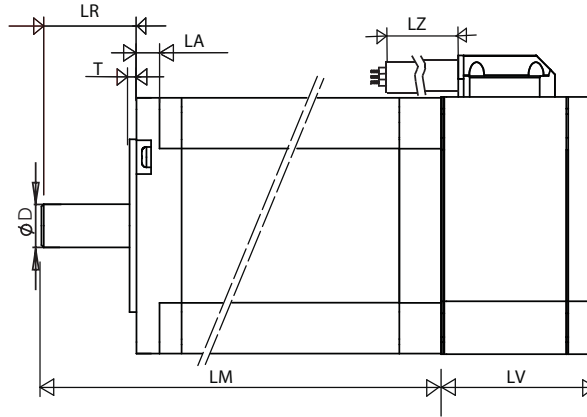
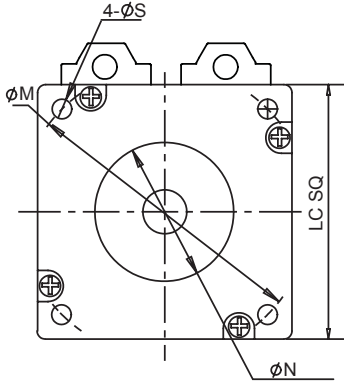
Units: inches (mm)

IG		LM	LV	LA	T	LR	LC	N	S	M
23	A	2.795 (71)	3.38 (85.9)	0.20 (5.1)	0.060 (1.5)	0.825 (21)	2.220 (56.4)	1.500 <sup>0</sup> <sub>-0.002</sub> (38.10 <sup>0</sup> <sub>-0.05</sub> )	0.200 (5.1)	2.625 (66.68)
	B	3.858 (98)								
	C	4.921 (125)								

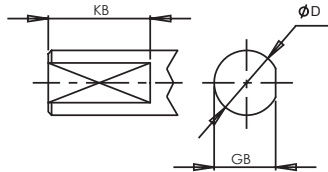
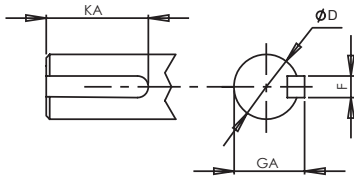
Imperial Shaft Option (S/F/K), Units: Inches							Metric Shaft Option (X/Y/Z), Units: mm					
IG	D	F	GA	KA	GB	KB	D	F	GA	KA	GB	KB
23	0.3750 <sup>0</sup> <sub>-0.0005</sub>	0.0938 <sup>0</sup> <sub>-0.001</sub>	0.416 <sup>0</sup> <sub>-0.002</sub>	0.50	0.340 <sup>0</sup> <sub>-0.004</sub>	0.50	10 <sup>0</sup> <sub>-0.013</sub>	3 <sup>0</sup> <sub>-0.025</sub>	11.2 <sup>0</sup> <sub>-0.051</sub>	15	9.0 <sup>0</sup> <sub>-0.1</sub>	15.0



# IG 34/42 with S Housing



FRONT SHAFT OPTIONS  
 (1) SMOOTH SHAFT, AS SHOWN IN THE VIEWS  
 (2) KEYWAY SHAFT  
 (3) FLAT SHAFT

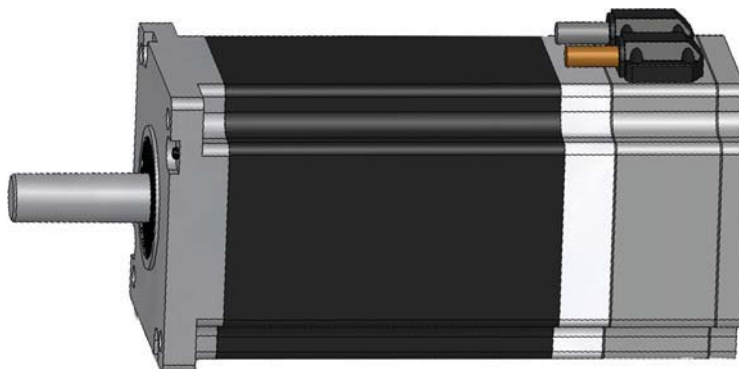


NOTE:  
 ALL THE MOTORS ARE RATED IP64 AND BY ADDING FRONT SHAFT SEAL, IT'S RATING BECOMES IP65

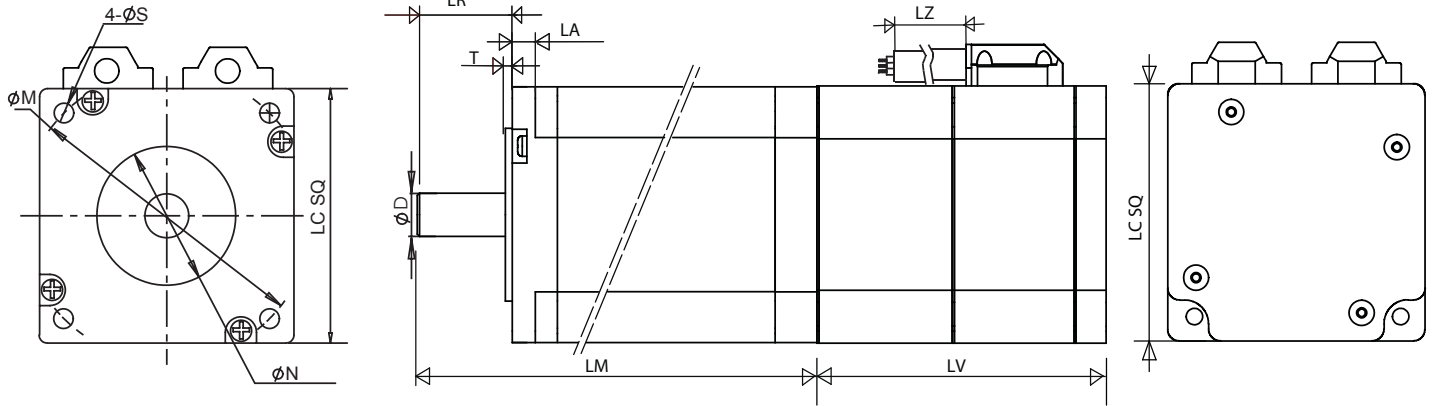
Units: inches (mm)

IG		LM	LV	LA	T	LR	LC	LZ	N	S	M
34	A	2.795 (71)	2.0 (50.7)	0.33 (8.4)	0.059 (1.5)	1.260 (32)	3.386 (86.0)	18 (457.2)	2.875 <sup>0</sup> <sub>-0.0012</sub> (73.03 <sup>0</sup> <sub>-0.031</sub> )	0.217 (5.5)	3.875 (98.43)
	B	3.858 (98)									
	C	4.921 (125)									
42	A	4.449 (113)	2.0 (50.7)	0.49 (12.5)	0.059 (1.5)	2.126 (54)	4.332 (110.0)	2.186 <sup>0</sup> <sub>-0.0018</sub> (55.52 <sup>0</sup> <sub>-0.046</sub> )	0.335 (8.5)	4.950 (125.73)	
	B	6.811 (173)									
	C	-									

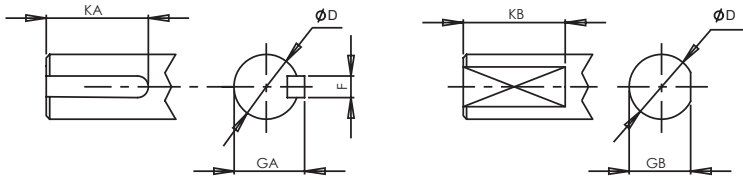
IG	Imperial Shaft Option (S/F/K), Units: inches						Metric Shaft Option (X/Y/Z), Units: mm					
	D	F	GA	KA	GB	KB	D	F	GA	KA	GB	KB
34	0.50 <sup>0</sup> <sub>-0.0005</sub>	0.1250 <sup>0</sup> <sub>-0.001</sub>	0.555 <sup>0</sup> <sub>-0.004</sub>	1.0	0.473 <sup>0</sup> <sub>-0.004</sub>	1.0	14 <sup>0</sup> <sub>-0.013</sub>	5 <sup>0</sup> <sub>-0.03</sub>	16.0 <sup>0</sup> <sub>-0.1</sub>	45	13 <sup>0</sup> <sub>-0.1</sub>	45
42	0.75 <sup>0</sup> <sub>-0.0005</sub>	0.1875 <sup>0</sup> <sub>-0.0012</sub>	0.830 <sup>0</sup> <sub>-0.004</sub>	1.5	0.709 <sup>0</sup> <sub>-0.004</sub>	1.5	19 <sup>0</sup> <sub>-0.013</sub>	6 <sup>0</sup> <sub>-0.030</sub>	21.5 <sup>0</sup> <sub>-0.1</sub>	45	18 <sup>0</sup> <sub>-0.10</sub>	45



# IG 34/42 with SB Housing



FRONT SHAFT OPTIONS  
 (1) SMOOTH SHAFT, AS SHOWN IN THE VIEWS  
 (2) KEYWAY SHAFT  
 (3) FLAT SHAFT

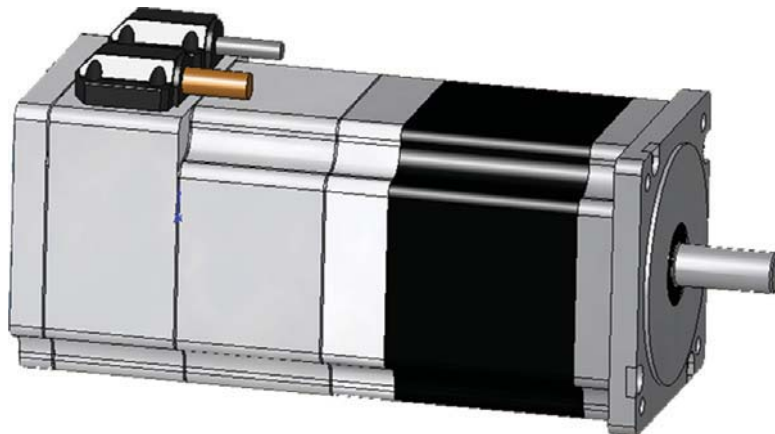


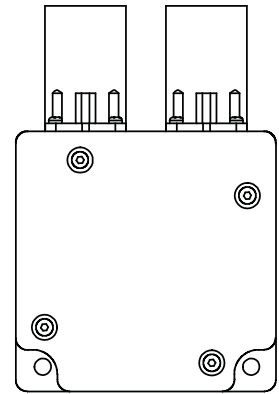
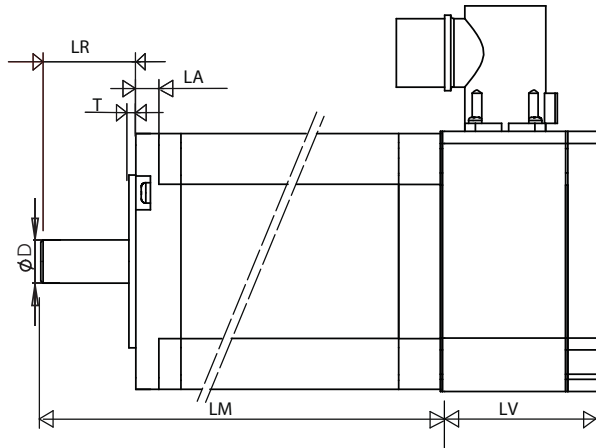
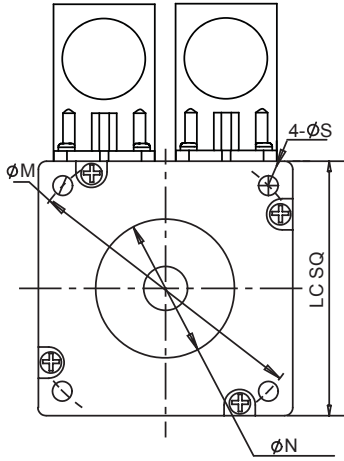
NOTE:  
 ALL THE MOTORS ARE RATED IP64 AND BY ADDING FRONT SHAFT SEAL, IT'S RATING BECOMES IP65

Units: inches (mm)

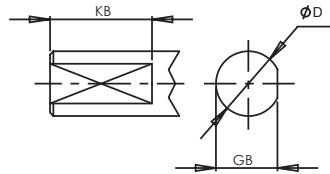
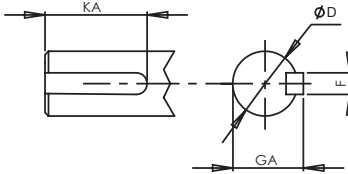
IG		LM	LV	LA	T	LR	LC	LZ	N	S	M
34	A	2.795 (71)	3.8 (96.6)	0.33 (8.4)	0.059 (1.5)	1.260 (32)	3.386 (86.0)	18 (457.2)	2.875 <sup>0</sup> <sub>-0.0012</sub> (73.03 <sup>0</sup> <sub>-0.031</sub> )	0.217 (5.5)	3.875 (98.43)
	B	3.858 (98)									
	C	4.921 (125)									
42	A	4.449 (113)	3.8 (96.6)	0.49 (12.5)	0.059 (1.5)	2.126 (54)	4.332 (110.0)	2.186 <sup>0</sup> <sub>-0.0018</sub> (55.52 <sup>0</sup> <sub>-0.046</sub> )	0.335 (8.5)	4.950 (125.73)	
	B	6.811 (173)									
	C	-									

IG	Imperial Shaft Option (S/F/K), Units: inches						Metric Shaft Option (X/Y/Z), Units: mm					
	D	F	GA	KA	GB	KB	D	F	GA	KA	GB	KB
34	0.50 <sup>0</sup> <sub>-0.0005</sub>	0.1250 <sup>0</sup> <sub>-0.001</sub>	0.555 <sup>0</sup> <sub>-0.004</sub>	1.0	0.473 <sup>0</sup> <sub>-0.004</sub>	1.0	14 <sup>0</sup> <sub>-0.013</sub>	5 <sup>0</sup> <sub>-0.03</sub>	16.0 <sup>0</sup> <sub>-0.1</sub>	45	13 <sup>0</sup> <sub>-0.1</sub>	45
42	0.75 <sup>0</sup> <sub>-0.0005</sub>	0.1875 <sup>0</sup> <sub>-0.0012</sub>	0.830 <sup>0</sup> <sub>-0.004</sub>	1.5	0.709 <sup>0</sup> <sub>-0.004</sub>	1.5	19 <sup>0</sup> <sub>-0.013</sub>	6 <sup>0</sup> <sub>-0.030</sub>	21.5 <sup>0</sup> <sub>-0.1</sub>	45	18 <sup>0</sup> <sub>-0.10</sub>	45





FRONT SHAFT OPTIONS  
 (1) SMOOTH SHAFT, AS SHOWN IN THE VIEWS  
 (2) KEYWAY SHAFT  
 (3) FLAT SHAFT



NOTE:  
 ALL THE MOTORS ARE RATED IP64 AND BY ADDING FRONT SHAFT SEAL, IT'S RATING BECOMES IP65

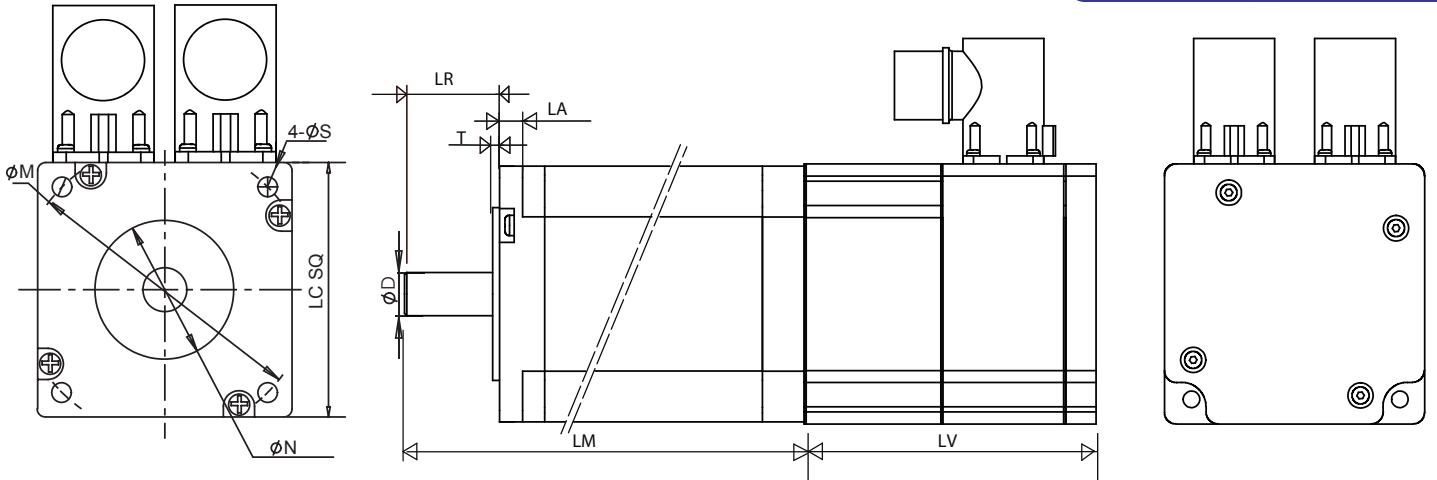
Units: inches (mm)

IG	LM	LV	LA	T	LR	LC	N	S	M
34	A	2.795 (71)	0.33 (8.4)	0.059 (1.5)	1.260 (32)	3.386 (86.0)	2.875 <sup>0</sup> <sub>-0.0012</sub> (73.03 <sup>0</sup> <sub>-0.031</sub> )	0.217 (5.5)	3.875 (98.43)
	B	3.858 (98)							
	C	4.921 (125)							
42	A	4.449 (113)	0.49 (12.5)	0.059 (1.5)	2.126 (54)	4.332 (110.0)	2.186 <sup>0</sup> <sub>-0.0018</sub> (55.52 <sup>0</sup> <sub>-0.046</sub> )	0.335 (8.5)	4.950 (125.73)
	B	6.811 (173)							
	C	-							

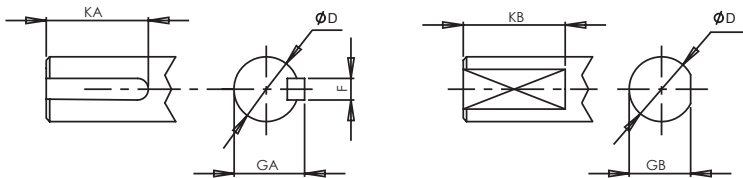
IG	Imperial Shaft Option (S/F/K), Units: inches						Metric Shaft Option (X/Y/Z), Units: mm					
	D	F	GA	KA	GB	KB	D	F	GA	KA	GB	KB
34	0.50 <sup>0</sup> <sub>-0.0005</sub>	0.1250 <sup>0</sup> <sub>-0.001</sub>	0.555 <sup>0</sup> <sub>-0.004</sub>	1.0	0.473 <sup>0</sup> <sub>-0.004</sub>	1.0	14 <sup>0</sup> <sub>-0.013</sub>	5 <sup>0</sup> <sub>-0.03</sub>	16.0 <sup>0</sup> <sub>-0.1</sub>	45	13 <sup>0</sup> <sub>-0.1</sub>	45
42	0.75 <sup>0</sup> <sub>-0.0005</sub>	0.1875 <sup>0</sup> <sub>-0.0012</sub>	0.830 <sup>0</sup> <sub>-0.004</sub>	1.5	0.709 <sup>0</sup> <sub>-0.004</sub>	1.5	19 <sup>0</sup> <sub>-0.013</sub>	6 <sup>0</sup> <sub>-0.030</sub>	21.5 <sup>0</sup> <sub>-0.1</sub>	45	18 <sup>0</sup> <sub>-0.10</sub>	45



# IG 34/42 with CB Housing



FRONT SHAFT OPTIONS  
 (1) SMOOTH SHAFT, AS SHOWN IN THE VIEWS  
 (2) KEYWAY SHAFT  
 (3) FLAT SHAFT

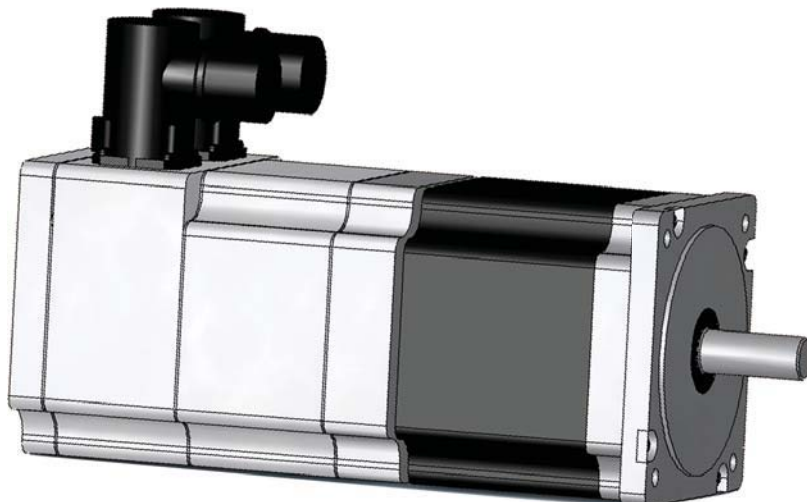


NOTE:  
 ALL THE MOTORS ARE RATED IP64 AND BY ADDING FRONT SHAFT SEAL, IT'S RATING BECOMES IP65

Units: inches (mm)

IG	LM	LV	LA	T	LR	LC	N	S	M
34	A	2.795 (71)	0.33 (8.4)	0.059 (1.5)	1.260 (32)	3.386 (86.0)	2.875 <sup>0</sup> <sub>-0.0012</sub> (73.03 <sup>0</sup> <sub>-0.031</sub> )	0.217 (5.5)	3.875 (98.43)
	B	3.858 (98)							
	C	4.921 (125)							
42	A	4.449 (113)	0.49 (12.5)	0.059 (1.5)	2.126 (54)	4.332 (110.0)	2.186 <sup>0</sup> <sub>-0.0018</sub> (55.52 <sup>0</sup> <sub>-0.046</sub> )	0.335 (8.5)	4.950 (125.73)
	B	6.811 (173)							
	C	-							

IG	Imperial Shaft Option (S/F/K), Units: inches						Metric Shaft Option (X/Y/Z), Units: mm					
	D	F	GA	KA	GB	KB	D	F	GA	KA	GB	KB
34	0.50 <sup>0</sup> <sub>-0.0005</sub>	0.1250 <sup>0</sup> <sub>-0.001</sub>	0.555 <sup>0</sup> <sub>-0.004</sub>	1.0	0.473 <sup>0</sup> <sub>-0.004</sub>	1.0	14 <sup>0</sup> <sub>-0.013</sub>	5 <sup>0</sup> <sub>-0.03</sub>	16.0 <sup>0</sup> <sub>-0.1</sub>	45	13 <sup>0</sup> <sub>-0.1</sub>	45
42	0.75 <sup>0</sup> <sub>-0.0005</sub>	0.1875 <sup>0</sup> <sub>-0.0012</sub>	0.830 <sup>0</sup> <sub>-0.004</sub>	1.5	0.709 <sup>0</sup> <sub>-0.004</sub>	1.5	19 <sup>0</sup> <sub>-0.013</sub>	6 <sup>0</sup> <sub>-0.030</sub>	21.5 <sup>0</sup> <sub>-0.1</sub>	45	18 <sup>0</sup> <sub>-0.10</sub>	45



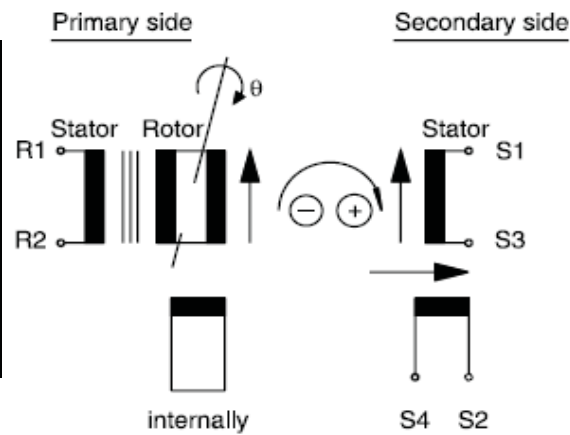




## Resolver Cable

Cable Code	Description
BLK	SIN-(S4)
BRN	SIN+(S2)
GRN	EXCT-(R2)
RED	Thermistor 1
ORN	Thermistor 2
YEL	EXCT+(R1)
VIO	COS+(S1)
BLU	COS-(S3)
N.C.	-

Olflex 027715, AWG24, 4 Pairs  
30V, 80C, UL, CE, CSA

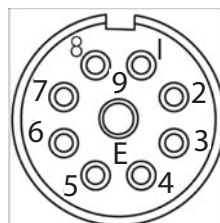


## Resolver Electrical Data

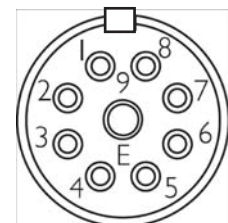
Basic Model	RE-15-1-A14	
Pole Pairs	1	
Input Voltage	7V <sub>rms</sub>	7V <sub>rms</sub>
Input Current	58 mA	36 mA
Input Frequency	5 kHz	10 kHz
Phase Shift (± 3°)	8°	- 6°
Accuracy	±10', ±6' on request	
Accuracy Ripple	1' max.	
Operating Temperature	-55°C ... +155°C	
Max. Permissible Speed	20,000 rpm	
Rotor	Completely impregnated	
Stator	Completely impregnated	

## Resolver Connector

SFMB 09E PIN	Definition
1	SIN - (S4)
2	SIN + (S2)
3	EXCT - (R2)
4	THERMISTOR 1
5	THERMISTOR 2
6	EXCT + (R1)
7	COS + (S1)
8	COS - (S3)
9	-



Motor Side: SFMB09EMRSR000  
PIN Arrangement



Cable Side: SPNA09FFROR169  
PIN Arrangement

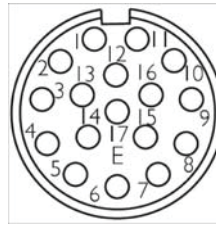
## EnDat Encoder Data ECI 1116 (for all the motors)

Parameter	Values
Power Supply	5 VDC $\pm$ 5% max. 260 mA
Electrical Connection	PCB connector, 12-pin
Absolute position values	65536 positions per revolution
Interface	EnDat 21 (purley serial data transmission)
Code	Pure Binary
Electrically permissible speed	$\leq$ 12000 rpm
Incremental signals	2 sinusoidal signals A and B, typically 0.5 Vpp to 1.1 Vpp (0.77 V at PWT 18)
Signal period/System accuracy	16/ $\pm$ 480 <sup>0</sup> (typ. $\pm$ 310 <sup>0</sup> )
Maximum cable length	150 m (492 ft)
Moment of inertia for rotor	0.76 x 10 <sup>-6</sup> kgm <sup>2</sup>
Permissible axial motion of measured shaft	$\pm$ 0.2 mm
Vibration 55 to 2000 Hz	$\leq$ 300 m/s <sup>2</sup> (IEC 60 068-2-6)
Shock 6 ms	$\leq$ 1000 m/s <sup>2</sup> (IEC 60 068-2-27)
Operating Temperature	-20°C to 115°C

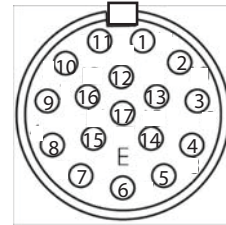
## EnDat Encoder Cable

Wire Code	Function
BRN/BLK	A+
BLK/BRN	A-
BLU/BLK	B+
BLK/BLU	B-
ORN/BLK	DAT-
BLK/ORN	DATA-
YEL/BLK	CLK
BLK/YEL	CLK-
GRN/BLK	+5V Sensor
BLK/GRN	GND Sensor
WHT/BLK	+5V Power
BLK/WHT	GND Power
RED/WHT	Thermistor 1
WHT/RED	Thermistor 2
Shield	Shield

## Encoder Connector, Customer View



Motor Side: SFMB17GMRSN000  
PIN Arrangement



Cable Side: SPNA17HFRON169  
PIN Arrangement

## Endat Encoder Wiring Diagram

SFMB 17G PIN	Definition
1	+5V SENSOR
2	-
3	-
4	GND SENSOR
5	THERMISTOR 1
6	THERMISTOR2
7	+5V POWER
8	CLK +
9	CLK -
10	GND POWER
11	-
12	B+
13	B-
14	DATA +
15	A+
16	A-
17	DATA -

## Endat Encoder Data ECI 1116

Parameter	Values
Power Supply	5 VDC $\pm$ 5% max. 260 mA
Electrical Connection	PCB connector, 12-pin
Absolute position values	65536 positions per revolution
Interface	EnDat 21 (purley serial data transmission)
Code	Pure Binary
Electrically permissible speed	$\leq$ 12000 rpm
Incremental signals	2 sinusoidal signals A and B, typically 0.5 Vpp to 1.1 Vpp (0.77 V at PWT 18)
Signal period/System accuracy	16/ $\pm$ 480 <sup>0</sup> (typ. $\pm$ 310 <sup>0</sup> )
Maximum cable length	150 m (492 ft)
Moment of inertia for rotor	0.76 x 10 <sup>-6</sup> kgm <sup>2</sup>
Permissible axial motion of measured shaft	$\pm$ 0.2 mm
Vibration 55 to 2000 Hz	$\leq$ 300 m/s <sup>2</sup> (IEC 60 068-2-6)
Shock 6 ms	$\leq$ 1000 m/s <sup>2</sup> (IEC 60 068-2-27)
Operating Temperature	-20°C to 115°C

# Incremental Encoder Specifications



## Incremental Encoder Data

Parameter	Values
Input Voltage	5 VDC $\pm$ 10% Single Supply
Input Current Requirement	175 mA
Output Data	Line driver
Output Format	Square wave two channel quadrature with index and commutation signals
Frequency Response	500 kHz
Minimum Edge Separation	45° electrical angle
Commutation Format	Three commutation channels, 4 cycles/360 electrical angle for eight poles
Termination	15 pins JAE P/N F1.W15P.HF interface
Operating Temperature	-30°C to 115°C
Storage Temperature	-40°C to 125°C
Available line counts	250, 256, 500, 512, 1000, 1024, 2000, 2048, 4000, 4096, 8000, 8192 ppr

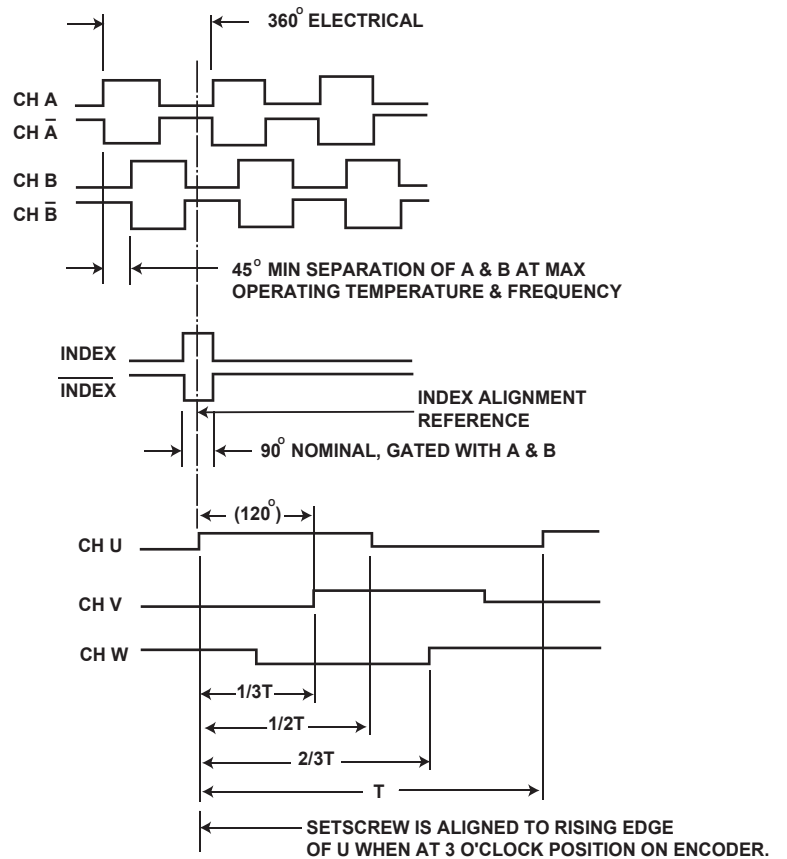
## Encoder Wiring Diagram

Function	Color
CH A	BRN with BLK
CH A-	BLK with BRN
CH B	BLU with BLK
CH B-	BLK with BLU
INDEX	ORN with BLK
INDEX-	BLK with ORN
CH U	YEL with BLK
CH U-	BLK with YEL
CH V	GRN with BLK
CH V-	BLK with GRN
CH W	RED with BLK
CH W-	BLK with RED
+5VDC	WHT with BLK
GND	BLK with WHT
Thermistor 1	RED with WHT
Thermistor 2	WHT with RED
SHIELD	SHIELD

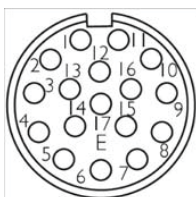
## Incremental Encoder Wiring Diagram with Connector

SFMB 17G PIN	Wire Code	Definition
1	WHT/BLK	+5VDC
2	BLK/WHT	GND
3	BRN/BLK	A+
4	BLK/BRN	A-
5	BLU/BLK	B+
6	BLK/BLU	B-
7	ORN/BLK	Z+
8	RED/WHT	THERMISTOR 1
9	WHT/RED	THERMISTOR 2
10	BLK/ORN	Z-
11	YEL/BLK	HALL U+
12	BLK/YEL	HALL U-
13	GRN/BLK	HALL V+-
14	BLK/GRN	HALL V--
15	RED/BLK	HALL W+
16	BLK/RED	HALL W--
17	N.C.	-

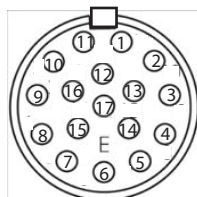
## Incremental Encoder Output Waveforms



## Encoder Connector, Customer View



Motor Side: SFMB17GMRSN000  
PIN Arrangement



Cable Side: SPNA17HFRON169  
PIN Arrangement

## Hiperface Encoder Data SKS 36, SKM 36 (IG 23)

Parameter	Values
# of sine/cosine periods per revolution	128
Code type for the absolute value	Binary
Total number of steps (single SKS)	4,096
Output frequency for sine/cosine signals	0 .. 65 kHz
Operating speed (SKS)	12,000 min <sup>-1</sup>
Working temperature range	+ 5 ... + 110°C
Operating voltage range	7 ... 12 v
Recommended supply voltage	8 v
Max. operating current, no load	60 mA
Interface signals	
Process data channel=SIN, REFSIN, COS, REFCOS	Analogue, differential
Parameter channel = RS 485	Digital

## Hiperface Encoder Data SRS 50, SRM 50 (IG 34,42)

Parameter	Values
# of sine/cosine periods per revolution	1,024
Code type for the absolute value	Binary
Total number of steps (single SRS)	32,768
Output frequency for sine/cosine signals	0 .. 200 kHz
Operating speed (SKS)	12,000 min <sup>-1</sup>
Working temperature range	+ 5 ... + 115°C
Operating voltage range	7 ... 12 v
Recommended supply voltage	8 v
Max. operating current, no load	80 mA
Interface signals	
Process data channel=SIN, REFSIN, COS, REFCOS	Analogue, differential
Parameter channel = RS 485	Digital

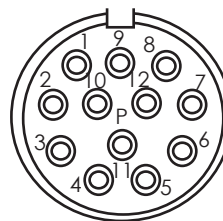
## Hiperface Encoder Cable

Wire Code	Function
BRN/BLK	REFSIN
BLK/BRN	REFCOS
BLU/BLK	DATA+
BLK/BLU	DATA-
ORN/BLK	+SIN
BLK/ORN	+COS
WHT/BLK	+7~12VDC
BLK/WHT	GND
RED/WHT	Thermistor 1
WHT/RED	Thermistor 2
Shield	Shield

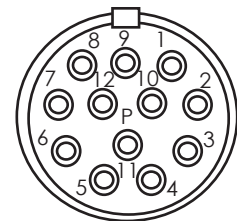
## Hiperface Encoder Wiring Diagram

SFMB 12T PIN	Wire Code	Definition
1	ORN/BLK	SIN +
2	BLK/ORN	SIN -
3	BLU/BLK	DATA +
4	BLK/BLU	DATA -
5	BLK/WHT	GND
6	RED/WHT	THERMISTOR 1
7	WHT/RED	THERMISTOR 2
8	WHT/BLK	+VDC
9	N.C.	-
10	BRN/BLK	COS +
11	N.C.	-
12	BLK/BRN	COS -

## Encoder Connector, Customer View



Motor Side: SFMB12TMRSN000  
PIN Arrangement



Cable Side: SPNA12SFRON169  
PIN Arrangement