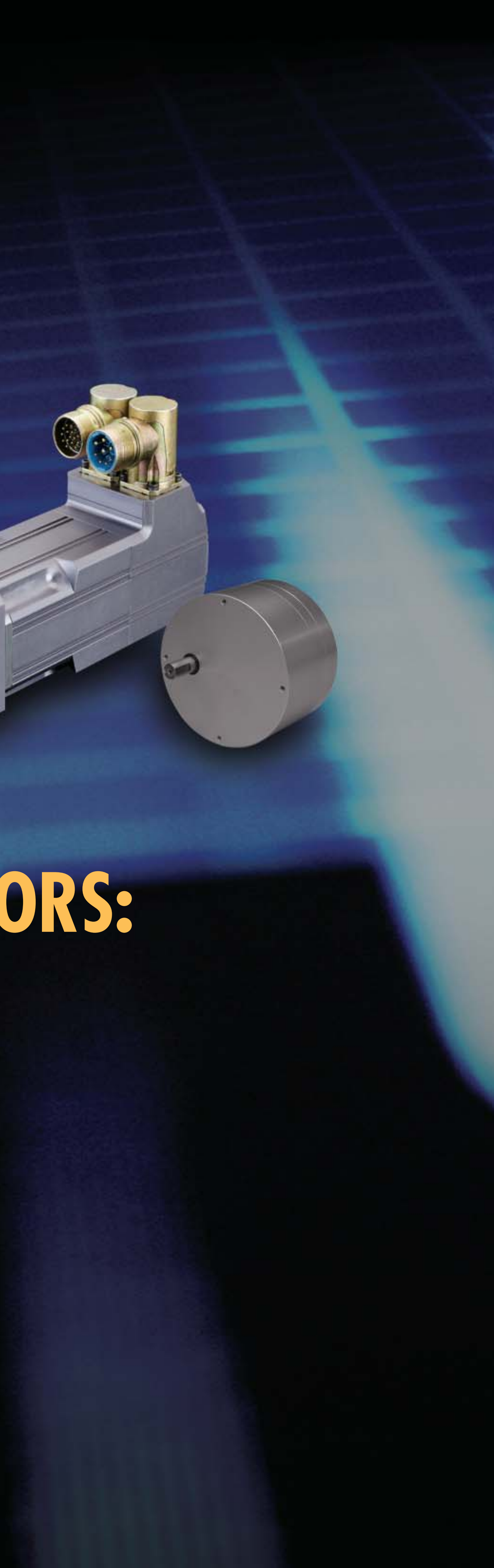
FRAMELESS MOTORS AND GEARMOTO

COMBINING SERVO AND GEARING TECHNOLOGIES



Frameless Motor & Gearmotors

Frameless

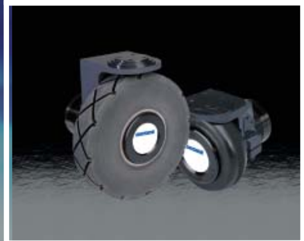
142 Frameless Kit Motor

Gearmotors

156 GM Servo Gearmotors

170 DX Servo Wheel

180 Pancake Gearmotor



Stealth Gearmotors for Office Automation

APPLICATION CHALLENGE

A manufacturer of pressure form-folder/sealers, Bri-Lin, had a desire to develop a new product to replace their current table top model. The current model is typically used in the production of W2, wage, and wducation wrade report forms. The success of their new model was dependent on a number of design criteria required for an office setting inclusive of size, quiet operation with little to no maintenance. On the mechanical side, the requirements for speed control and constant torque was a must, but the critical objective of the new model would be a major productivity improvement over the 5,000 to 7,000 forms per hour offered by their present model.

Design Change Criteria:

- Existing machine frame width must be maintained as these models are designed for desktop use utilizing 8½ x 11 inch sheets. To maintain registration and speed control a DC servo is required. A brushless motor would be preferred for low maintenance and a "no dust" environment. This frame size does not accommodate an in-line or right-angle gearbox even if the cost could allow it.
- A gearmotors option would meet the speed/torque and size requirements, but the cable cost and connector size would be an issue.
- Cut the one-month delivery cycle of complete machine in half by utilizing a JIT component supplier with less than two-week lead times.

APPLICATION CHALLENGE

The customer manufactures an auger-filler machine that uses a fluted screw to volumetrically fill a container. The standard framed servomotor was mounted to the screw using a mechanical coupling device, gearbox and timing belt, but this proved unable to provide the performance required in a space-efficient package. When engineers were looking to improve their machine design, the issues they faced were:

Large package size
The motor, together with all the mechanical coupling and reduction devices, took up a lot of space on the machine.

Overtorque and Runout
The timing belts used in this application created a condition of overtorque and runout, which caused the auger screw to rub the side of the funnel.

Reduced System Reliability
These mechanical devices created reliability issues, causing down time and tolerance problems.

APPLICATION CHALLENGE

A major US manufacturer of vehicles was developing a new car powered by electric motors. Since the car had no gas-powered engine to drive the power-assist steering, alternate methods were required. Mechanical gearing was ruled out due to space requirements and standard electric motors would drain the batteries of the vehicle to quickly. The company had a problem and needed a unique, cost-effective solution. The opportunity was as follows:

Reduced Package Size
The unit needed to provide the torque with an effective weight-to-space ratio

Rugged Design
The motor had to operate in stringent "under the hood" conditions

Parker Bayside SOLUTION

GM90-D1A2F Brushless Servo Gearmotors with 10:1 ratio, with flying leads option.

- The Parker Bayside solution provided a cost-effective package of less than 8 inch overall length with a speed/torque capability that offered a 4 X productivity improvement, raising rates of production to 20,000 forms/hour. The incremental cost was nearly zero with reduced noise and need for routine maintenance. The one-piece gearmotors design with the rotor, sun gear and motor magnets attached reduces the need for multiple seals and bearings. The resulting package of the helical planetary brushless DC gearmotors was a small, quiet, powerful machine that runs clean and cool. The IP65 and stainless steel output shaft also lends itself to wet applications.
- Plans are now underway for the next generation; a 30,000 forms/hour unit on the drawing board utilizing Parker Bayside's next step up in gearmotors frame size, based on the success of the tested 20,000/hour Forms Folder/Sealer.
- This solution can be used in a variety of applications including:
  1. Packaging Industry 2. Printing/Graphics Industry 3. Medical/Pharmaceutical 4. Office Automation

Parker Bayside SOLUTION

(1) Frameless Brushless Motor

- The design problems were solved using a frameless kit motor integrated into the auger drive assembly. This allowed the manufacturer to build a single-shaft system eliminating the problems that existed before. Fewer parts were needed in the design, eliminating the couplings and bearings in the auger assembly. This increased reliability, allowing for higher speeds, accuracy and stiffness.
- Without couplings, timing belts and gearboxes, the customer was able to create a much more compact design.
- Due to increased reliability, down-time no longer becomes a critical issue for users.
- This solution can be used in packaging applications in the following industries:
  1. Consumer products 2.Food Processing 3. Medical/Pharmaceutical

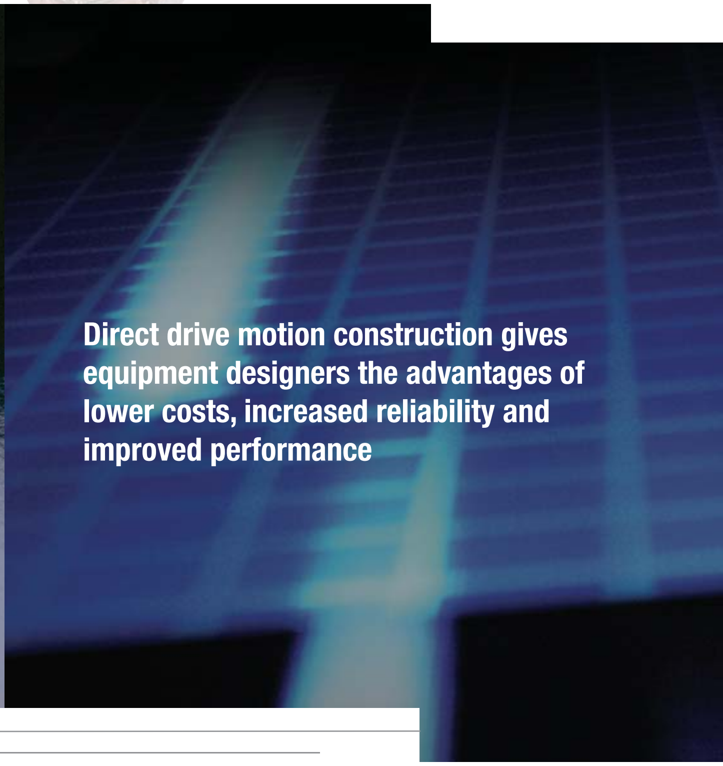
Parker Bayside SOLUTION

(1) Custom-designed brushless steering pump motor.

- Parker Bayside engineering collaborated with the auto maker and its pump manufacturer and presented various options. The final solution was a custom-designed, high-efficiency motor directly driving the pump. The front mounting flange mated to the pump surface and formed the back end housing of the pump. A zer-porousity surface was therefore required for proper sealing. The housing was designed from an extrusion to minimize cost and maximize yield and was formed to plug into a unique low-profile drive/controller design. The stator was custom designed to operate at its highest efficiency point on a 48 volt DC bus.
- The solution was designed using (FEMA) "Failure effect mode analysis" methodology and put into manufacturing in record time.
- The efficiency of the motor assisted in providing maximum battery life for the vehicle.
- The motor was brushless and therefore required no maintenance.
- The motor was designed to configurable for standard gas vehicles.

Frameless Kit Motors:

Build your own high-performance motor

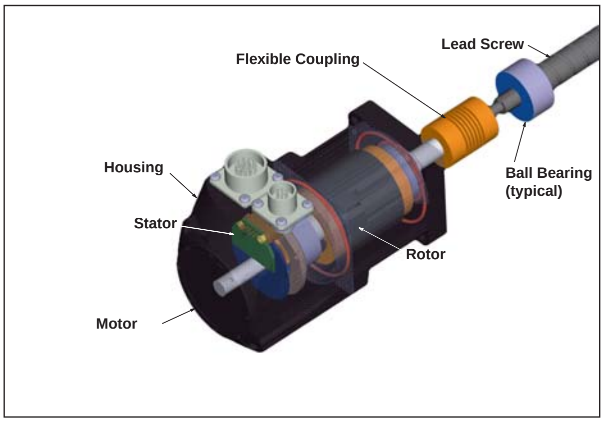


Direct drive motion construction gives equipment designers the advantages of lower costs, increased reliability and improved performance

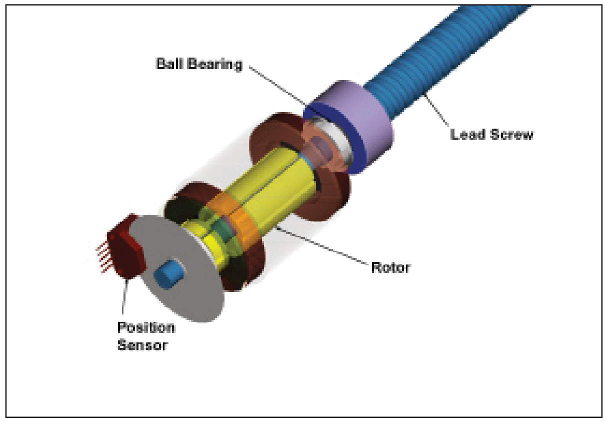
Frameless Kit Motor overview

- The frameless motor allows for direct integration with a mechanical transmission device, eliminating parts that add size, complexity, response and settling time.
- The design engineer is not constrained to the mounting interface and shaft dimensions of a typical framed motor.
- The frameless motor offering comes in a wide range of sizes ranging from 32mm to 254mm in diameter providing a continuous torque from 0.04 Nm to 58 Nm (see below).
- Custom frame sizes are available for OEM applications.

Traditional Coupled Motor



Integrated Frameless Kit Motor



Frameless Kit Motor Torque Range

Frame Size	Stack Range (mm)	(in)	Continuous Torque (Nm)	(oz-in)	Peak Torque (Nm)	(oz-in)
K032	6.35 to 50.8	0.25 to 2.00	0.044 to 0.22	6.3 to 31.1	0.095 to 0.654	13.5 to 93.4
K044	6.35 to 50.8	0.25 to 2.00	0.119 to 0.607	17 to 86	0.357 to 1.820	50 to 258
K064	6.35 to 50.8	0.25 to 2.00	0.31 to 2.16	44.3 to 308	0.93 to 6.47	133 to 924
K089	6.35 to 50.8	0.25 to 2.00	1.307 to 4.291	186.7 to 613	3.92 to 12.87	560 to 1,839
K375	6.35 to 50.8	0.25 to 2.00	1.715 to 4.935	245 to 705	5.14 to 14.82	734 to 2,117
K127	12.7 to 50.8	0.50 to 2.00	3.94 to 11.75	563 to 1,678	11.83 to 35.24	1,690 to 5,034
K500	12.7 to 50.8	0.50 to 2.00	3.05 to 9.44	435 to 1,349	9.14 to 28.32	1,306 to 4,046
K178	12.7 to 50.8	0.50 to 2.00	10.12 to 30.7	1,445 to 4,386	16.18 to 49.12	2,312 to 7,017
K700	12.7 to 50.8	0.50 to 2.00	5.05 to 17.52	722 to 2,503	8.09 to 28.03	1,155 to 4,004
K254	12.7 to 50.8	0.50 to 2.00	18.78 to 58.35	2,683 to 8,336	30.04 to 93.37	4,292 to 13,338

Build Your Own High-Performance Motor

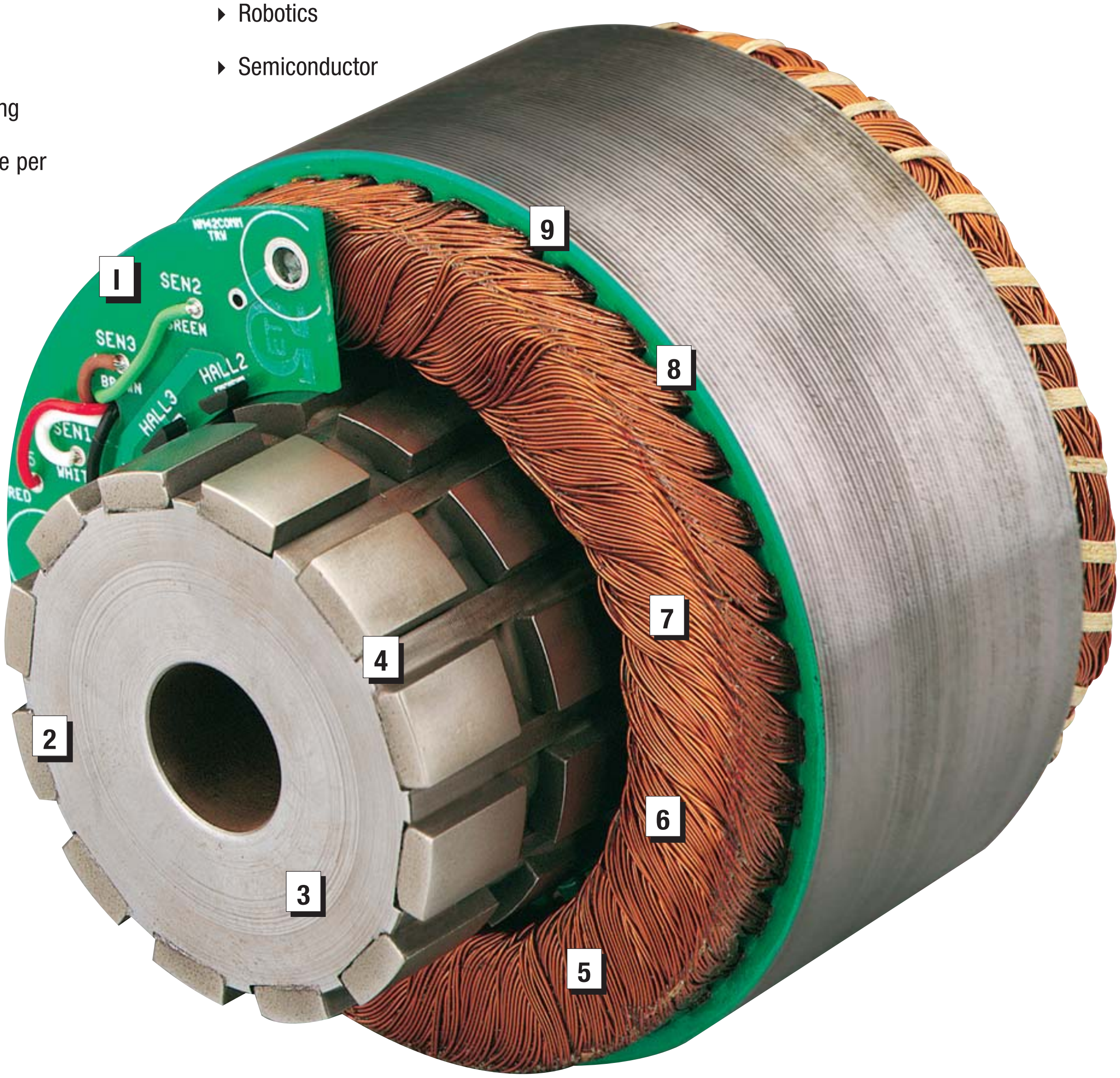
The frameless kit motors are ideal solutions for machine designs that require high performance in small spaces. The kit motors approach allows for direct integration with a mechanical-transmission device, eliminating parts that add size and complexity. The use of frameless kit motors results in a smaller, more reliable motor package.

When to Use:

- A significant cost savings
- Reduced mechanical complexity
- Greater design flexibility
- High performance in a compact package
- Improved dynamic response and settling
- Minimum motor size per application space
- Low cogging for smooth operation
- Low inertia for high acceleration

Applications:

- Automotive
- Machine tool
- Material handling
- Packaging
- Robotics
- Semiconductor



What goes into our Frameless Kit Motors...

Our direct drive brushless kit motors consist of three components:

- The stator and winding
- The rotor with high energy product neodymium magnets
- Hall sensor device for motor commutation

What comes out of our Frameless Kit Motors...

- High Torque - from 0.06 Nm (0.5 in lb) to 9.7 Nm (85.6 in lb)
- High Speeds - up to 50,000 RPM
- Superior Performance - high stiffness and better response
- High Reliability - no mechanical transmission devices (couplings, flanges)
- Compact Design - minimizes product size
- Low Cogging - unique magnetic circuit design decreases cogging

1 Pre-installed Integral Commutation Board
with Hall effects is prealigned for easy assembly. Motor and feedback as integrated unit.

2 Rare Earth Magnets
provide high-flux in a small volume, high resistance to thermal demagnetizing.

3 Rotor Assembly
for easy mounting directly on the drive shaft with or without keyway.

4 Machined Grooves
to securely lock magnets to rotor and ensures optimized radial location.

5 Class H Insulation
for high-temperature operation (up to 155ºC) meeting UL approved requirements.

6 High-Density Copper Winding
for low thermal resistance and consistent performance across all motors.

7 Minimized End Turns
to maximize performance. Formed to minimize motor size.

8 Skewed Laminations
with odd slot counts reduce cogging for precise rotary motion with drastically reduced torque ripple even at low speeds.

9 Optimized Slot Fill
for maximum torque-to-size ratio; hand inserted to obtain highest slot fill possible maximizing ampere-turns.

Performance Specifications (six step/trapezoidal commutation)

Frame Size	Stack Length		Continuous Torque (1) T_c		Peak Torque T_p		Motor Constant K_m		Core Loss P_c	Rotor Inertia J_m		Electrical Time Constant T_c	Thermal Resistance	Weight Wm	
	(mm)	(in)	**(Nm)**	(oz in)	**(Nm)**	(oz in)	**(Nm / $\sqrt{W}$)**	(oz in / $\sqrt{W}$)	W @1kRPM	**(gm cm sec^2)**	(oz in sec^2)	(msec)	(^{0}C / W)	**(kg)**	(oz)
K032025	**6.35**	0.25	**0.044**	6.3	**0.095**	13.5	**0.009**	1.25	0.03	**0.0016**	0.000022	0.21	3.44	**0.042**	1.5
K032050	**12.7**	0.5	**0.08**	11.4	**0.188**	27	**0.016**	2	0.06	**0.0032**	0.000045	0.35	3.44	**0.068**	2.4
K032075	**19.05**	0.75	**0.11**	15.7	**0.281**	40	**0.022**	3	0.09	**0.0048**	0.000067	0.44	3.44	**0.096**	3.4
K032100	**25.4**	1	**0.136**	19.4	**0.375**	54	**0.027**	4	0.12	**0.0064**	0.000089	0.5	3.44	**0.122**	4.3
K032150	**38.1**	1.5	**0.181**	25.8	**0.544**	77.7	**0.036**	5.15	0.18	**0.0096**	0.000134	0.6	3.44	**0.173**	6.1
K032200	**50.8**	2	**0.22**	31.1	**0.654**	93.4	**0.044**	6.25	0.24	**0.013**	0.000178	0.66	3.44	**0.26**	9.2
K032300	**76.2**	3	**0.33**	46.5	**0.99**	139.5	**0.054**	7.56	0.36	**0.0192**	0.000268	0.7	3.44	**0.36**	12.8
K044025	**6.35**	0.25	**0.119**	17	**0.357**	50	**0.02**	3	0.11	**0.0072**	0.0001	0.39	2.36	**0.085**	3
K044050	**12.7**	0.5	**0.214**	30.6	**0.642**	90	**0.035**	5	0.24	**0.014**	0.0002	0.62	2.36	**0.133**	5
K044075	**19.05**	0.75	**0.297**	42.4	**0.891**	127	**0.049**	7	0.37	**0.022**	0.0003	0.76	2.36	**0.200**	7
K044100	**25.4**	1	**0.364**	52	**1.092**	156	**0.06**	9	0.49	**0.03**	0.00041	0.89	2.36	**0.224**	8
K044150	**38.1**	1.5	**0.501**	71	**1.510**	213	**0.08**	11.4	0.74	**0.044**	0.00061	1.05	2.36	**0.311**	11
K044200	**50.8**	2	**0.607**	86	**1.820**	258	**0.097**	13.8	1.11	**0.06**	0.00082	1.12	2.36	**0.399**	14.1
K044300	**76.2**	3	**0.96**	136.0	**2.88**	408	**0.13**	18.3	1.48	**0.088**	0.00122	1.3	2.36	**0.549**	19.4
K064025	**6.35**	0.25	**0.31**	44.3	**0.93**	133	**0.048**	6.88	0.37	**0.046**	0.00064	0.59	1.68	**0.142**	5
K064050	**12.7**	0.5	**0.62**	89	**1.87**	267	**0.087**	12.48	0.78	**0.092**	0.00128	0.98	1.68	**0.286**	10.1
K064075	**19.05**	0.75	**0.85**	121.7	**2.56**	365	**0.122**	17.44	1.19	**0.138**	0.00192	1.26	1.68	**0.427**	15.1
K064100	**25.4**	1	**1.08**	154	**3.23**	462	**0.15**	21.44	1.6	**0.184**	0.00256	1.47	1.68	**0.572**	20.2
K064150	**38.1**	1.5	**1.46**	209	**4.39**	627	**0.204**	29.12	2.37	**0.276**	0.00384	1.77	1.68	**0.846**	30.2
K064200	**50.8**	2	**2.16**	308	**6.47**	924	**0.244**	34.88	3.23	**0.369**	0.00512	1.97	1.68	**1.129**	40.3
K064300	**76.2**	3	**2.91**	410	**8.73**	1,230	**0.33**	46.6	4.74	**0.552**	0.00768	2.6	1.68	**1.701**	60.5
K089050	**12.7**	0.5	**1.307**	186.7	**3.92**	560	**0.164**	23.36	2.14	**0.38**	0.00528	1.26	1.02	**0.498**	17.6
K089075	**19.05**	0.75	**1.96**	280	**5.88**	840	**0.235**	33.6	3.35	**0.576**	0.008	1.64	1.02	**0.747**	26.4
K089100	**25.4**	1	**2.618**	374	**7.84**	1,120	**0.283**	40.64	4.42	**0.792**	0.0011	1.92	1.02	**0.996**	35.2
K089150	**38.1**	1.5	**3.92**	560	**11.76**	1,680	**0.381**	54.4	6.7	**1.15**	0.016	2.33	1.02	**1.494**	52.8
K089200	**50.8**	2	**4.291**	613	**12.87**	1,839	**0.466**	66.56	8.95	**1.51**	0.021	2.6	1.02	**1.992**	70.4
K089300	**76.2**	3	**7.13**	1,004	**21.4**	3,012	**0.631**	88.9	13.4	**2.30**	0.032	2.9	1.02	**3.00**	105.6

(1) = Housed in a motor frame.
Typically an aluminum cylinder with 6.35mm (0.250in) thick walls,
K032, K044 and K064 mounted to a 152mm x 152mm x 12.5 mm (6in x 6in x 0.5in) aluminum plate
K089 mounted to a 203mm x 203mm x 12.5mm (8in x 8in x 0.5in) aluminum plate

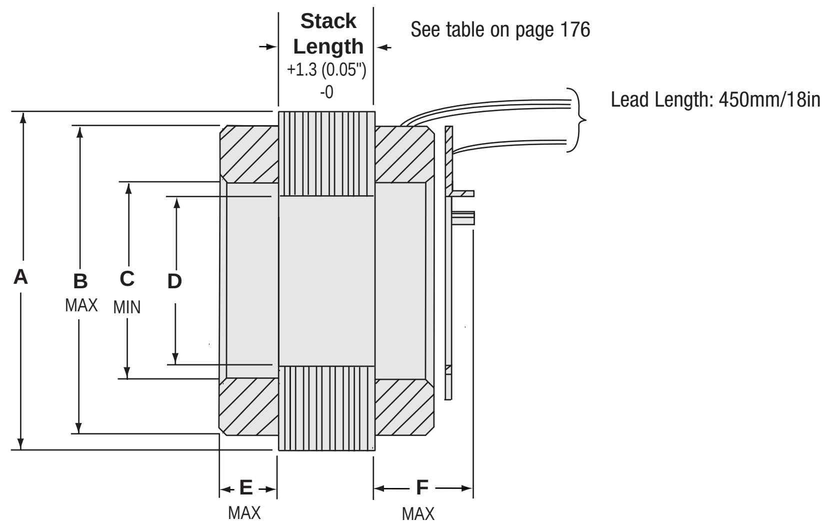
Pole Count
K032 is 4
K044 is 6
K064 is 8
K089 is 12

Frame Size	Stack Length		Continuous Torque (1) T_c		Peak Torque T_p		Motor Constant K_m		Core Loss P_c	Rotor Inertia J_m		Electrical Time Constant T_c	Thermal Resistance	Weight Wm	
	(mm)	(in)	(Nm)	(oz in)	(Nm)	(oz in)	(Nm / $\sqrt{W}$)	(oz in / $\sqrt{W}$)	W@1kRPM	(gm cm sec^2)	(oz in sec^2)	(msec)	(^{o}C / W)	(kg)	(oz)
K375050	12.7	0.5	1.715	245	5.14	734	0.153	21.8	1.2	0.324	0.0045	1.45	1.02	0.611	21.6
K375075	19.05	0.75	2.401	343	7.19	1,027	0.213	30.4	1.8	0.497	0.0069	1.9	1.02	0.917	32.4
K375100	25.4	1	3.003	429	9	1,286	0.267	38.1	2.4	0.655	0.0091	2.24	1.02	1.095	38.7
K375150	38.1	1.5	4.025	575	12.6	1,723	0.357	51	3.6	1.01	0.014	2.68	1.02	1.554	54.9
K375200	50.8	2	4.935	705	14.82	2,117	0.438	62.6	4.8	1.30	0.018	3.03	1.02	2.02	71.1
K375300	76.2	3	6.69	942	20.1	2,826	0.592	83.4	7.2	2.02	0.028	3.5	1.02	2.94	103.5
K127050	12.7	0.5	3.94	563	11.83	1,690	0.29	41.4	4.7	1.15	0.016	2.38	0.7	1.087	38.4
K127100	25.4	1	6.98	997	21.04	3,006	0.513	73.3	9.6	2.38	0.033	3.7	0.7	1.766	62.4
K127150	38.1	1.5	9.56	1,365	28.66	4,094	0.702	100.3	14.5	3.53	0.049	4.6	0.7	2.355	83.2
K127200	50.8	2	11.75	1,678	35.24	5,034	0.864	123.4	19.4	4.75	0.066	5.23	0.7	2.99	105.6
K127300	76.2	3	16.1	2,263	48.3	6,789	1.18	166.1	29.0	7.06	0.098	6.1	0.7	3.65	147.2
K500050	12.7	0.5	3.05	435	9.14	1,306	0.224	32	1.6	1.15	0.016	2.6	0.7	1.087	38.4
K500100	25.4	1	5.49	784	16.46	2,352	0.403	57.6	3	2.30	0.032	4.5	0.7	1.766	62.4
K500150	38.1	1.5	7.92	1,131	23.76	3,394	0.582	83.2	4.8	3.46	0.048	6	0.7	2.355	83.2
K500200	50.8	2	9.44	1,349	28.32	4,046	0.694	99.2	6.4	4.61	0.064	6.4	0.7	2.988	105.6
K500300	76.2	3	15.4	2,170	46.2	6,510	1.13	159.3	8.6	6.92	0.096	8.0	0.7	4.18	147.2
K178050	12.7	0.5	10.12	1,445	16.18	2,312	0.627	89.6	9.1	4.75	0.066	4.16	0.5	2.4	84.8
K178100	25.4	1	18.06	2,580	28.89	4,127	1.12	160	18.7	9.36	0.13	6.54	0.5	3.71	131.2
K178150	38.1	1.5	24.75	3,535	39.59	5,655	1.534	219	14.4	14.4	0.2	8.15	0.5	4.98	176
K178200	50.8	2	30.7	4,386	49.12	7,017	1.904	272	18.7	18.7	0.26	9.31	0.5	6.34	224
K178300	76.2	3	43.1	6,078	69.0	9,724	2.68	377	28.8	28.8	0.4	12.2	0.5	8.90	313.6
K700050	12.7	0.5	5.05	722	8.09	1,155	0.314	44.8	7.70	7.7	0.107	2.9	0.4	2.4	84.8
K700100	25.4	1	9.57	1,367	15.32	2,188	0.594	84.8	15.4	15.4	0.214	5	0.4	3.71	131.2
K700150	38.1	1.5	13.55	1,935	21.67	3,096	0.84	120	23.2	23.2	0.322	6.8	0.4	4.98	176
K700200	50.8	2	17.52	2,503	28.03	4,004	1.086	155.2	30.9	31	0.429	8.5	0.4	6.34	224
K700300	76.2	3	27.5	3,876	44.0	6,200	1.53	215	46.4	46.4	0.644	10.7	0.4	8.91	313.6
K254050	12.7	0.5	18.78	2,683	30.04	4,292	1.043	149	17.9	17.9	0.248	6.05	0.4	4.48	158.4
K254100	25.4	1	33.92	4,846	54.27	7,753	1.883	269	35.5	35.5	0.493	9.63	0.4	6.79	240
K254150	38.1	1.5	46.84	6,692	74.95	10,707	2.597	371	53.1	53.1	0.738	12.5	0.4	9.056	320
K254200	50.8	2	58.35	8,336	93.37	13,338	3.234	462	71.0	71	0.986	14.7	0.4	11.32	400
K254300	76.2	3	80.9	11,400	129.4	18,240	4.49	632	106.2	106	1.478	18.0	0.4	15.9	560

(1) = Housed in a motor frame. Typically an aluminum cylinder with 6.35mm (0.250in) thick walls,
K375, K127 and K500 mounted to a 305mm x 305mm x 12.5mm (12in x 12in x 0.5in) aluminum plate.
K178, K700 and K254 mounted to a 406mm x 406mm x 12.5mm (16in x 16in x 0.5in) aluminum plate.

Pole Count:
K127 & K375 are 12
K700 & K500 are 8
K178 & K254 are 18

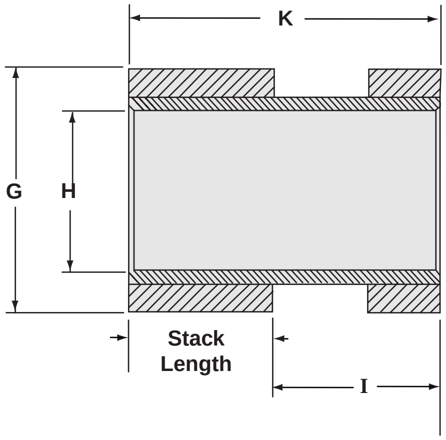
Dimensions



Stator Outline

Frame	A		B		C		D		E		F	
	O.D.		End Turns O.D.		End Turns I.D.		I.D.		End Turns Length		Commutation Length	
Size	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)
K032	**31.78** **31.75**	1.251 1.25	**27.94**	1.1	**16.51**	0.65	**15.06** **14.8**	0.593 0.583	**6.4**	0.25	**14.5**	0.57
K044	**44.48** **44.42**	1.751 1.749	**40.64**	1.6	**26.16**	1.03	**22.35** **22.09**	0.88 0.87	**7.9**	0.31	**16.5**	0.65
K064	**63.52** **63.47**	2.501 2.499	**60.7**	2.39	**38.1**	1.5	**35.18** **34.92**	1.385 1.375	**9.65**	0.38	**17.5**	0.69
K089	**88.92** **88.87**	3.501 3.499	**85.8**	3.38	**54.6**	2.15	**53.47** **53.21**	2.105 2.095	**9.91**	0.39	**17.5**	0.69
K375	**95.28** **95.22**	3.751 3.749	**88.9**	3.5	**53.32**	2.06	**50.93** **50.67**	2.005 1.995	**12.7**	0.5	**19.5**	0.77
K127	**127.02** **126.97**	5.001 4.999	**122.17**	4.81	**74.17**	2.92	**72.49** **72.23**	2.854 2.844	**12.7**	0.5	**19.5**	0.77
K500	**127.05** **126.95**	5.002 4.998	**115.32**	4.54	**70.6**	2.78	**68.2** **67.94**	2.685 2.675	**20.5**	0.81	**30.5**	1.2
K178	**177.88** **177.72**	7.003 6.997	**172.72**	6.8	**111.51**	4.39	**110.64** **110.38**	4.355 4.345	**20.3**	0.8	*	
K700	**177.88** **177.72**	7.003 6.997	**158.24**	6.23	**117.6**	4.63	**115.19** **114.93**	4.535 4.525	**18.8**	0.74	*	
K254	**254.07** **253.92**	10.003 9.997	**253.26**	9.971	**165.1**	6.5	**157.61** **157.35**	6.205 6.195	**19.6**	0.77	*	

*integral commutation not available



Rotor Outline

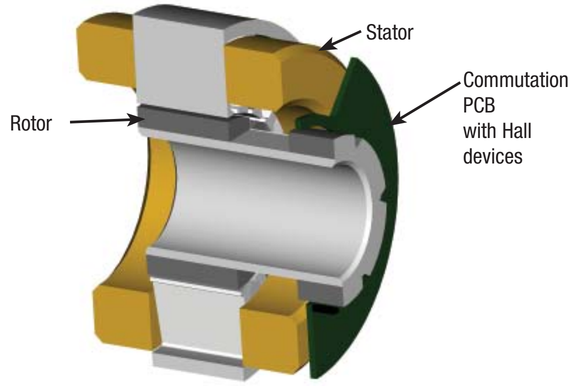


Figure 1.3
Kit Main Components

Frame Size	G Rotor O.D. (mm)	G Rotor O.D. (in)	H Rotor I.D. (mm)	H Rotor I.D. (in)	I Commutation Magnet Length (mm)	I Commutation Magnet Length (in)	K Rotor Length
K032	**13.94**	0.549	**7.62**	0.3	**13.21**	0.52	without Commutation:
	13.89	0.547	**7.59**	0.299			K = Stack Length + **0.76mm** (0.030in)
K044	**21.23**	0.836	**13.97**	0.55	**14.73**	0.58	
	21.18	0.834	**13.94**	0.549			with Commutation:
K064	**34.04**	1.34	**23.52**	0.926	**16.51**	0.65	K = Stack Length + **I + 0.76mm** (0.030in)
	33.98	1.338	**23.49**	0.925			
K089	**51.84**	2.041	**40.64**	1.6	**16.71**	0.66	
	51.79	2.039	**40.61**	1.599			
K375	**49.28**	1.94	**38.1**	1.5	**19.56**	0.77	
	49.15	1.935	**38.07**	1.499			
K127	**71.15**	2.801	**58.42**	2.3	**19.56**	0.77	
	71.09	2.799	**58.39**	2.299			
K500	**66.54**	2.62	**50.83**	2.001	**28.52**	1.12	
	66.5	2.618	**50.8**	2			
K178	**109.2**	4.292	**95.76**	3.77	*		
	108.9	4.29	**95.73**	3.769			
K700	**113.54**	4.47	**95.25**	3.75	*		
	113.49	4.468	**95**	3.74			
K254	**156.16**	6.148	**140.46**	5.53	*		
	156.11	6.146	**140.44**	5.529			

*integral commutation not available

Winding Selection

The selection of a particular frame size and winding for an application is dependent on:

Volume (diameter and length) requirement
Power (torque and speed) requirement
Voltage and current available or required

The first two items are dependent on the load and performance specifications of the application. They result in the selection of a particular frame size (032 through 254) and stack length.

The winding to be used will then be determined by voltage and current available or required.

Voltage: The bus voltage and maximum speed will approximately determine the required voltage constant (K_E).

Current: The maximum load and acceleration will determine the amount of current required, determined by the torque constant (K_T) associated with the selected voltage constant.

Example: Assume a requirement of 1,000 RPM at 50 oz in

If a motor with a particular winding having K_E = 18.24 V/1,000 RPM and K_T = 24.62 oz in/amp is chosen, it will now require a voltage (BEMF) of 18 volts and current of 2 amp.

NOTE: K_E and K_T are directly proportional to each other. Increasing K_E will also increase K_T; Decreasing K_E will also decrease K_T.

The result is that as the voltage requirement changes, the current requirement changes inversely.

Parker Bayside has a range of **27** windings available for each frame size and stack length, providing for virtually any practical combination of voltage and current required for your application.

The following pages show just a small representative sample of speed/torque curves for each of the 10 frame sizes available.

For the 044, 064, 089 and 127 frame sizes, the speed/torque curves are for stators that are used in the standard BM / GM motor products.

They make a good starting point for determining your specific application requirements and working with Parker Bayside application engineers to choose the proper motor size and power.

The following table lists the range of K_E and K_T available for each of the 10 frame sizes.

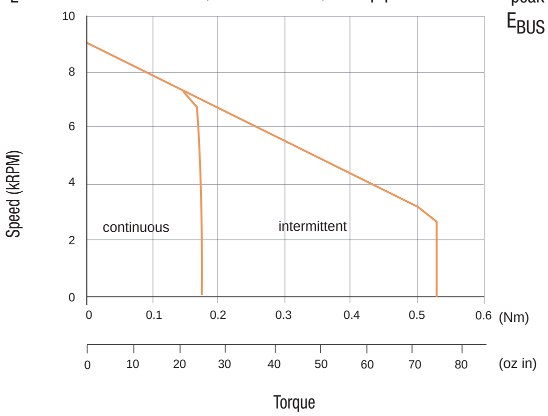
Detailed information for all these windings can be found on the web site:
www.baysidemotion.com or www.parkermotion.com

Frame Size	**Stack Range (mm)**	Stack Range (in)	**K_E Range (V/1,000 RPM)**	K_E Range (V/rad/sec)	**K_T Range (Nm/amp)**	K_T Range (oz in/amp)
K032	**6.35 to 50.8**	0.25 to 2.00	**0.14 to 65.52**	0.0013 to 0.625	**0.0013 to 0.625**	0.18 to 88.45
K044	**6.35 to 50.8**	0.25 to 2.00	**0.28 to 126.3**	0.0027 to 1.2	**0.0027 to 1.2**	0.38 to 170.6
K064	**6.35 to 50.8**	0.25 to 2.00	**0.66 to 291.8**	0.0063 to 2.78	**0.0063 to 2.78**	0.89 to 394
K089	**6.35 to 50.8**	0.25 to 2.00	**1.35 to 605**	0.013 to 5.77	**0.013 to 5.77**	1.83 to 817
K375	**6.35 to 50.8**	0.25 to 2.00	**1.27 to 566**	0.012 to 5.40	**0.012 to 5.40**	1.71 to 765
K127	**12.7 to 50.8**	0.50 to 2.00	**3.73 to 827**	0.036 to 7.88	**0.036 to 7.88**	5.04 to 1116
K500	**12.7 to 50.8**	0.50 to 2.00	**3.38 to 714**	0.032 to 6.81	**0.032 to 6.81**	4.56 to 964
K178	**12.7 to 50.8**	0.50 to 2.00	**8.26 to 1716**	0.079 to 16.4	**0.079 to 16.4**	11.18 to 2,323
K700	**12.7 to 50.8**	0.50 to 2.00	**4.14 to 872**	0.039 to 8.31	**0.039 to 8.31**	5.59 to 1,177
K254	**12.7 to 50.8**	0.50 to 2.00	**11.44 to 2,537**	0.109 to 24.2	**0.109 to 24.2**	15.5 to 3,425

NOTE: Longer stacks and special windings are available. Call **1-800-305-4555**

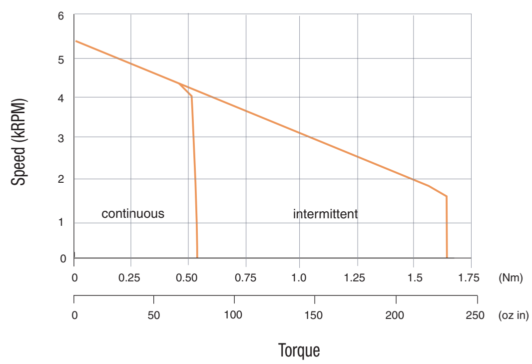
K032150-7Y

K_T = **0.051 Nm / amp** (7.19 oz-in / amp) $R_{T\text{-}T}$ = 2.05 Ω I_{cont} = 3.6 amp
K_E = **0.051 v / rad / sec** (5.32 V / kRPM) $L_{T\text{-}T}$ = 1.16 mH I_{peak} = 10.8 amp
E_{BUS} = 48 Vdc



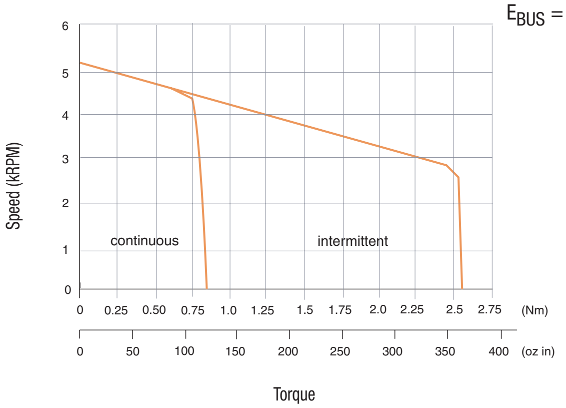
K044150-FY

K_T = **0.28 Nm / amp** (39.6 oz-in / amp) $R_{T\text{-}T}$ = 11.8 Ω I_{cont} = 2 amp
K_E = **0.28 v / rad / sec** (29.3 V / kRPM) $L_{T\text{-}T}$ = 12.5 mH I_{peak} = 6 amp
E_{BUS} = 160 Vdc



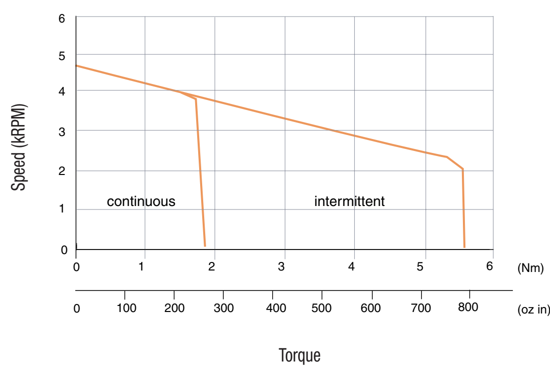
K044300-8Y

K_T = **0.28 Nm / amp** (39.6 oz-in / amp) $R_{T\text{-}T}$ = 4.8 Ω I_{cont} = 3 amp
K_E = **0.28 v / rad / sec** (29.3 V / kRPM) $L_{T\text{-}T}$ = 6.2 mH I_{peak} = 9 amp
E_{BUS} = 160 Vdc



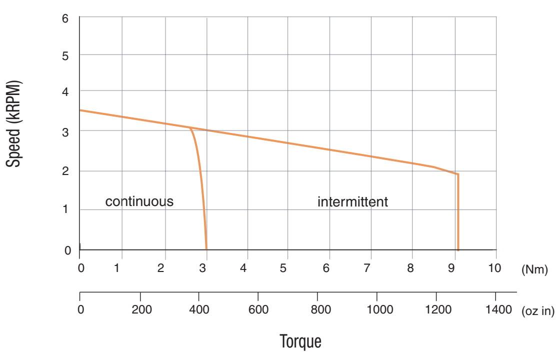
K064150-8Y

K_T = **0.33 Nm / amp** (46.1 oz-in / amp) $R_{T\text{-}T}$ = 2.5 Ω I_{cont} = 6 amp
K_E = **0.33 v / rad / sec** (34.1 V / kRPM) $L_{T\text{-}T}$ = 4.5 mH I_{peak} = 18 amp
E_{BUS} = 160 Vdc



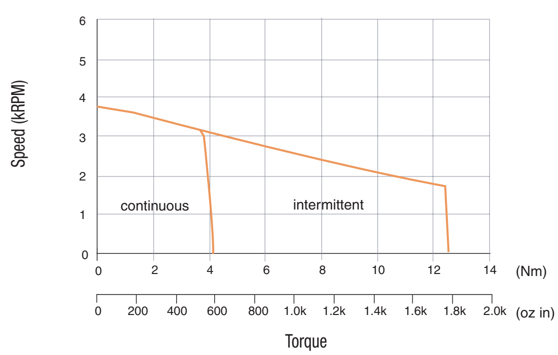
K064300-6Y

K_T = **0.42 Nm / amp** (59.9 oz-in / amp) $R_{T\text{-}T}$ = 1.6 Ω I_{cont} = 7 amp
K_E = **0.42 v / rad / sec** (44.3 V / kRPM) $L_{T\text{-}T}$ = 3.8 mH I_{peak} = 21 amp
E_{BUS} = 160 Vdc



K375150-6Y

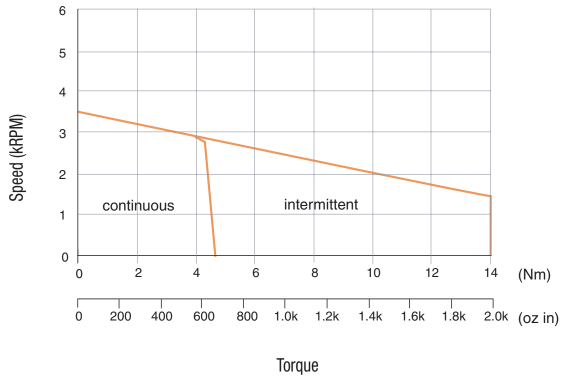
K_T = **0.41 Nm / amp** (57.92 oz-in / amp) $R_{T\text{-}T}$ = 1.21 Ω I_{cont} = 10 amp
K_E = **0.41 v / rad / sec** (47.82 V / kRPM) $L_{T\text{-}T}$ = 3.45 mH I_{peak} = 30 amp
E_{BUS} = 160 Vdc



Speed/Torque Curves

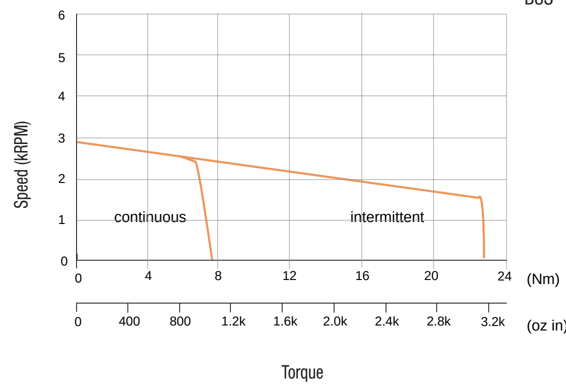
K089150-6Y

K_T = **0.43 Nm / amp** (61.6 oz-in / amp) $R_{T\text{-}T}$ = 1.2 Ω I_{cont} = 11 amp
K_E = **0.43 v / rad / sec** (45.6 V / kRPM) $L_{T\text{-}T}$ = 2.9 mH I_{peak} = 33 amp
E_{BUS} = 160 Vdc



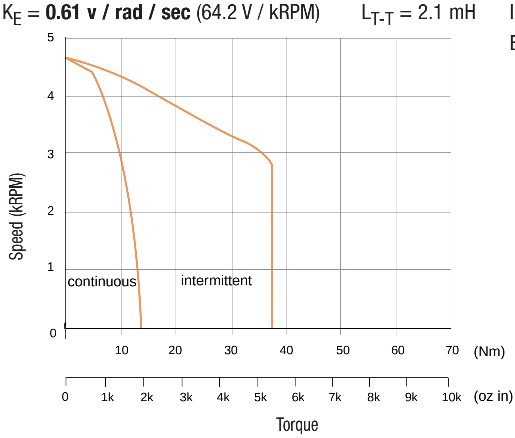
K089300-4Y

K_T = **0.54 Nm / amp** (75.8 oz-in / amp) $R_{T\text{-}T}$ = 0.73 Ω I_{cont} = 15 amp
K_E = **0.54 v / rad / sec** (56.1 V / kRPM) $L_{T\text{-}T}$ = 2.2 mH I_{peak} = 45 amp
E_{BUS} = 160 Vdc



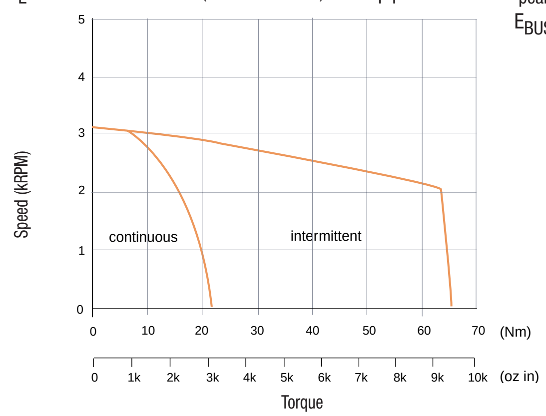
K127250-4Y

K_T = **0.61 Nm / amp** (86.9 oz-in / amp) $R_{T\text{-}T}$ = 0.35 Ω I_{cont} = 20 amp
K_E = **0.61 v / rad / sec** (64.2 V / kRPM) $L_{T\text{-}T}$ = 2.1 mH I_{peak} = 60 amp
E_{BUS} = 300 Vdc



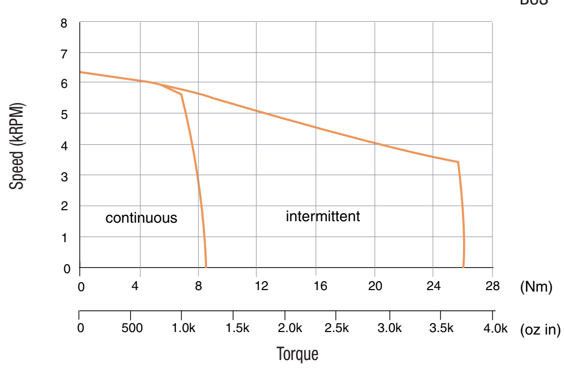
K127500-3Y

K_T = **0.92 Nm / amp** (130.4 oz-in / amp) $R_{T\text{-}T}$ = 0.34 Ω I_{cont} = 24 amp
K_E = **0.92 v / rad / sec** (96.4 V / kRPM) $L_{T\text{-}T}$ = 2.3 mH I_{peak} = 72 amp
E_{BUS} = 300 Vdc



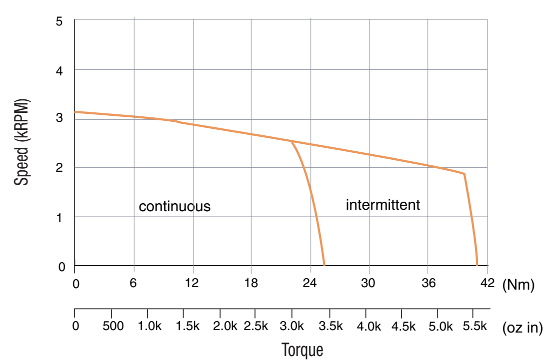
K500150-5Y

K_T = **0.45 Nm / amp** (63.78 oz-in / amp) $R_{T\text{-}T}$ = 0.49 Ω I_{cont} = 18 amp
K_E = **0.45 v / rad / sec** (47.19 V / kRPM) $L_{T\text{-}T}$ = 2.72 mH I_{peak} = 53 amp
E_{BUS} = 300 Vdc



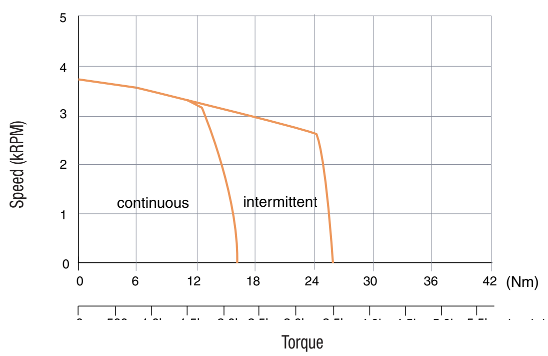
K178150-5Y

K_T = **0.93 Nm / amp** (130.5 oz-in / amp) $R_{T\text{-}T}$ = 0.37 Ω I_{cont} = 27 amp
K_E = **0.93 v / rad / sec** (96.2 V / kRPM) $L_{T\text{-}T}$ = 2.95 mH I_{peak} = 43 amp
E_{BUS} = 300 Vdc



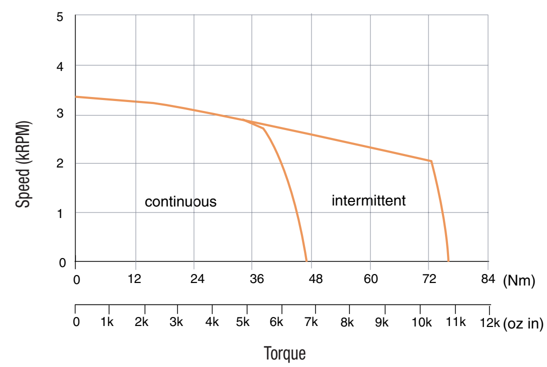
K700150-7Y

K_T = **0.78 Nm / amp** (110.35 oz-in / amp) $R_{T\text{-}T}$ = 0.84 Ω I_{cont} = 18 amp
K_E = **0.78 v / rad / sec** (81.71 V / kRPM) $L_{T\text{-}T}$ = 5.79 mH I_{peak} = 28 amp
E_{BUS} = 300 Vdc



K254150-5Y

K_T = **1.42 Nm / amp** (199.7 oz-in / amp) $R_{T\text{-}T}$ = 0.78 Ω I_{cont} = 34 amp
K_E = **1.42 v / rad / sec** (147.6 V / kRPM) $L_{T\text{-}T}$ = 3.6 mH I_{peak} = 54 amp
E_{BUS} = 300 Vdc



MOUNTING FRAMELESS MOTOR INTO ASSEMBLY

This section outlines a number of methods that can be used to mount the stator and rotor assemblies in the product.

Which method to be used will largely depend on the product design, performance requirements (torque, velocity, temperature, etc.) and the manufacturing capabilities of the user.

Dimensioned drawings for all the kits are shown in the catalog pages.

STATOR

The stator will be typically be mounted into a cylindrically shaped hole in the product (see Figure 9). It is recommended that a banking step be incorporated at the bottom of the hole to assure accurate and repeatable location of the stator.

Alternately, a non-ferrous "plug" could be used to provide a banking surface, which can be removed once the stator is fixed in place.

Figure 9 shows two methods for holding the stator in position; either with adhesive for a permanent assembly or with set screws for a removable assembly.

In designing the housing, be sure to provide a means for the stator lead wires (three) and the commutation Hall sensor PCB wires (five) to extend outside of the housing without interfering with the rotor / shaft assembly.

For volume production, a jig should be fabricated that will assure that the stator is located in the same position for each assembly. The yellow dot on the stator provides an index point for accomplishing this. This will eliminate the need to perform mechanical commutation alignment at final assembly.

Rotor

Except for the smaller motors (K032 and K044), the ID of the rotor will usually be larger than the shaft diameter.

An adapter sleeve will be required to allow mounting of the rotor to the shaft (see Figure 9).

The rotor / sleeve assembly must be positioned on the shaft such that the magnets are located in line with the stator assembly laminations. If the version in which the commutation PCB assembly is bonded to the end turns is being used, the commutation magnets must be located in proper proximity to the Hall sensors on the PCB. Figure 9 shows two methods for holding the rotor / sleeve on the shaft, either with adhesive or by using a spring pin and retaining ring.

When using the adhesive method, a shoulder should be provided on the shaft to properly locate the rotor/sleeve assembly.
When using the spring pin/retaining ring method, a slot must be provided in the sleeve that will engage the spring pin in the shaft, thus properly locating the rotor / sleeve assembly. During assembly, be sure that the pin and slot are fully engaged.

Note: The following adhesives are recommended for rotor and stator assembly (see Figure 9)

Loctite #325
Activator $7074
Loctite #609

Assembly

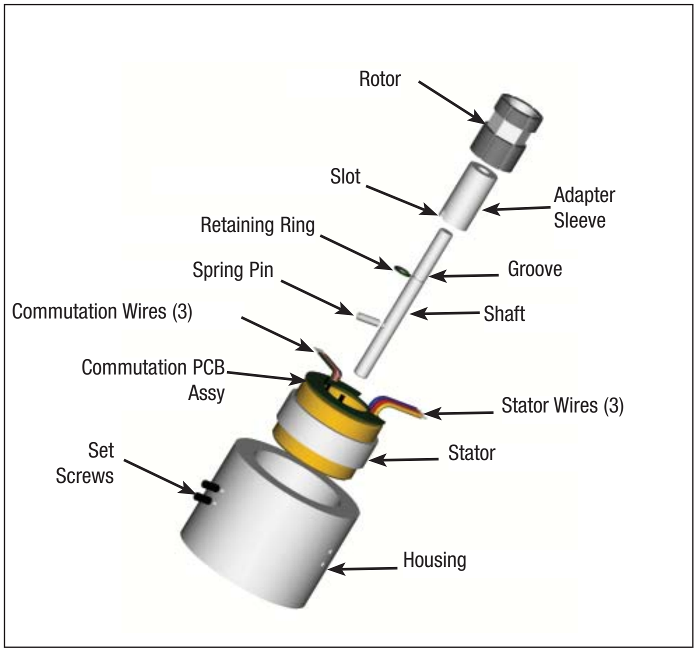
Stator Assembly:
Assemble stator in housing or sleeve (aluminum recommended) with the following locational clearances:

- Diameter to 127mm (5in) 0.025mm (0.001in) to 0.127mm (0.005in) diametrical clearance.
- Diameter over 127mm (5in) 0.05mm (0.002in) to 0.254mm (0.010in) diametrical clearance.

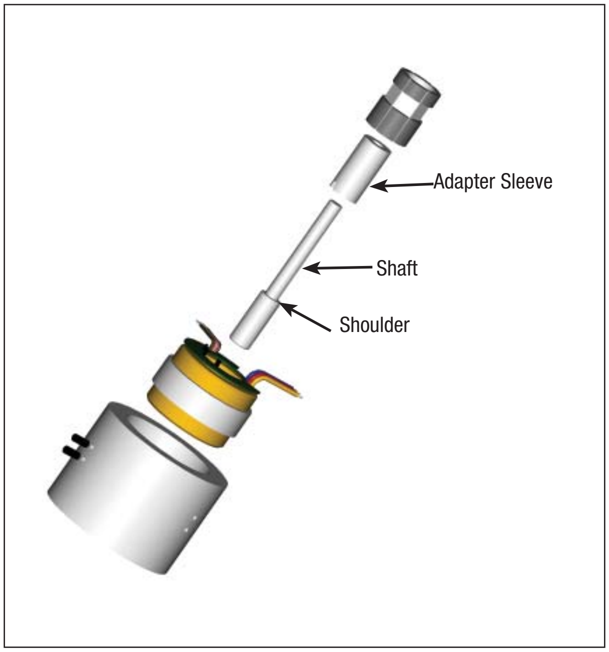
Do not force stator in position. This may damage or deform stator.

Permanent Assembly:
Secure stator with adhesive, Loctite #325 with activator #7074 or equivalent

Removable Assembly:
Secure with cup point screws or setscrews thru housing into stator steel laminations only. Use a minimum of three (3) screws equally spaced about stator O.D. Tighten evenly. Do not over torque screws. This may damage or deform stator.



Spring Pin / Retaining Ring Method



Shoulder / Adhesive Method

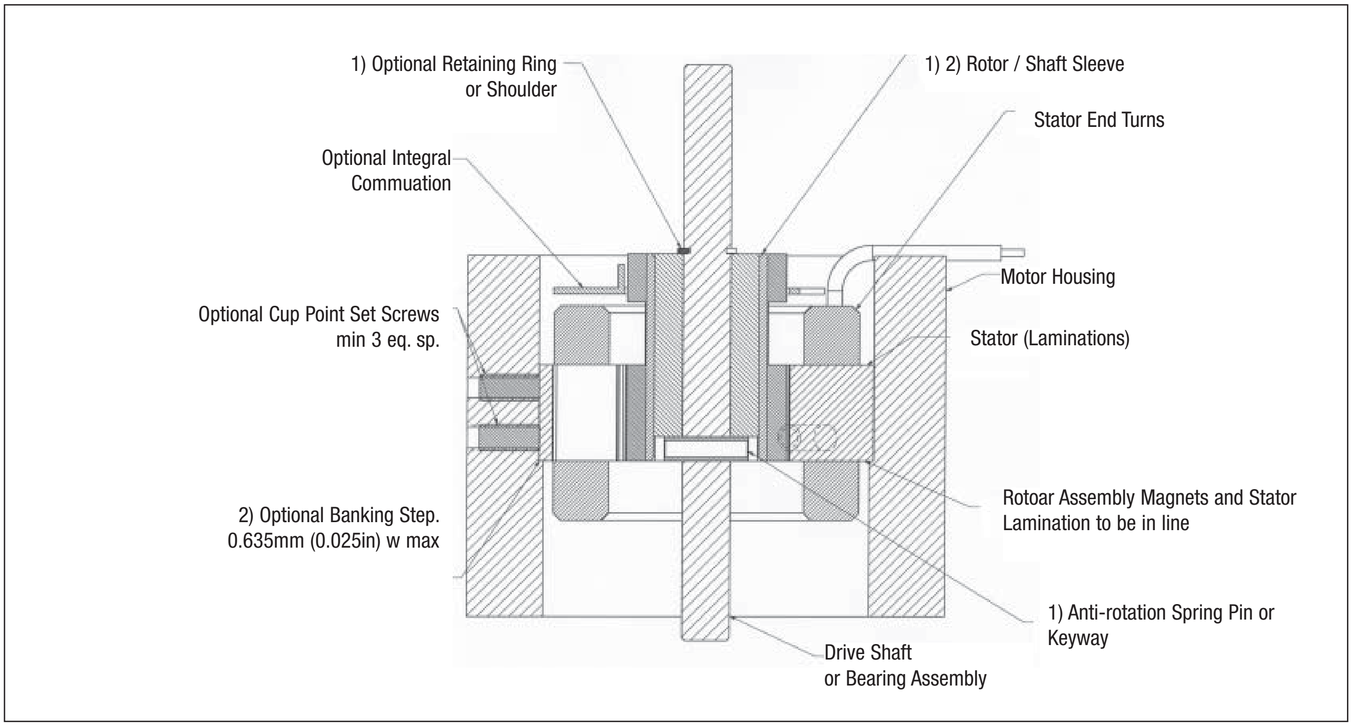


Figure 9

Rotor Assembly:
Assemble rotor to shaft with a locational clearance fit of 0.013mm (0.0005in) to 0.038mm (0.0015in) diametrical clearance.

Shoulder / Adhesive Method:
Fabricate shaft with shoulder. Secure rotor assembly and sleeve with adhesive. Loctite#609 or equivalent.

Spring Pin / Retaining Ring Method:
Fabricate a sleeve (steel or aluminum) with anti rotation spring pin groove. Fabricate shaft to accept retaining ring and spring pin. Permanently bond to rotor assembly.

Final Assembly:
Rotor magnets to be in line with stator laminations and concentric to stator lamination I.D. within 0.127mm (0.005in) MAX.

Caution:
Rotor assembly magnets are powerful and fragile!
Do not place near magnetically sensitive material
Do not place near other ferromagnetic materials such as iron, steel and nickel alloys. Strong uncontrolled attraction may damage magnets on contact.

Improper assembly of rotor into stator can cause serious injury and or damage to equipment.

When assembling the rotor into the stator, high radial forces will be experienced, which can cause the magnets to "crash" into the stator and be damaged and / or cause bodily injury!

The following precautions should be taken:

- Wrap the rotor with a thin (0.005in thick) Mylar sleeve which will fill the air gap between the rotor and stator during assembly and can be easily removed when assembly is complete.

- Support the rotor and stator assemblies in a fixturing arrangement which will prevent radial motion while the two assemblies are being mated.

Example:
1. Hold the rotor / shaft / product assembly in a machine tool vise on the base of an arbor press.
2. Fasten the stator assembly to the vertical moving member of the arbor press, away from the stator.
3. Slowly lower the stator assembly around the rotor / shaft / product assembly.
4. Tighten all fasteners to complete assembly.
5. Remove Mylar shim and check for rotational clearance.

How to Order

Order Numbering Example: K 0 4 4 1 0 0 – E Y 2 XXX

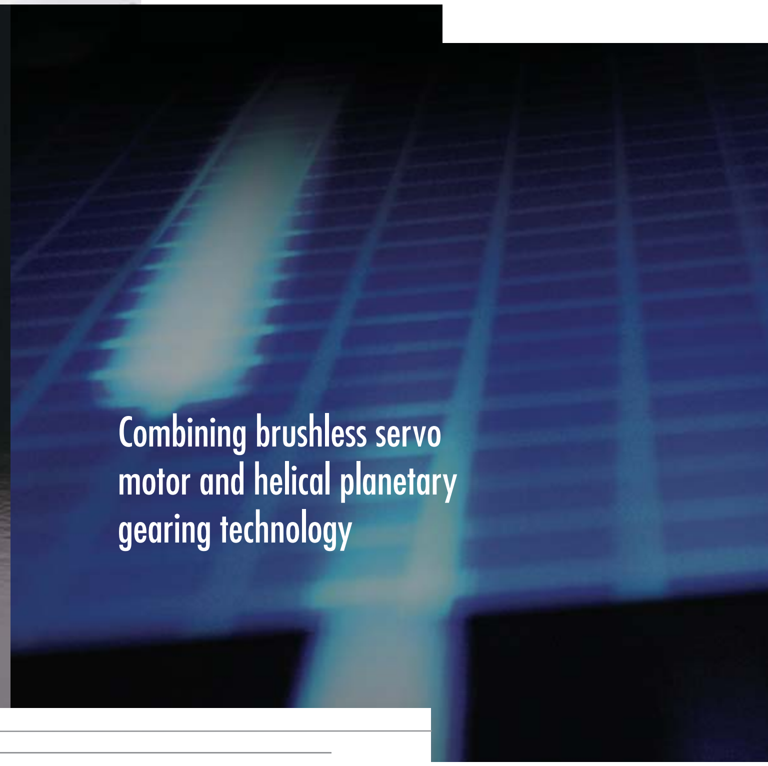
MODEL	STACK LENGTH	WINDING(1)	CONNECTION (2)	COMMUTATION
032	025 (0.25")	1	Y=Wye	1 = Without
044	050 (0.50")	2	D=Delta	2 = With Integral
064	075 (0.75")	3		
089	100 (1.00")	4		
375	150 (1.50")	5		
127	200 (2.00")	6		
500		7		
178		8		
700		9		
254		E		
		F		
		G		
		H		
		J		
		K		
		L		

(1) Consult Parker Bayside (1-800-305-4555 or www.baysidemotion.com or www.parkermotion.com) for specific winding designations.
(2) Consult factory for special options

Parker Bayside Kit Motors are supported by a worldwide network of offices and local distributors.
Call 1-800-305-4555 for application engineering assistance or for the name of your local distributor.
Information can also be obtained at **www.baysidemotion.com or www.parkermotion.com.**

Specifications are subject to change without notice.

Stealth® GM Gearmotor Series:
An Integrated Solution



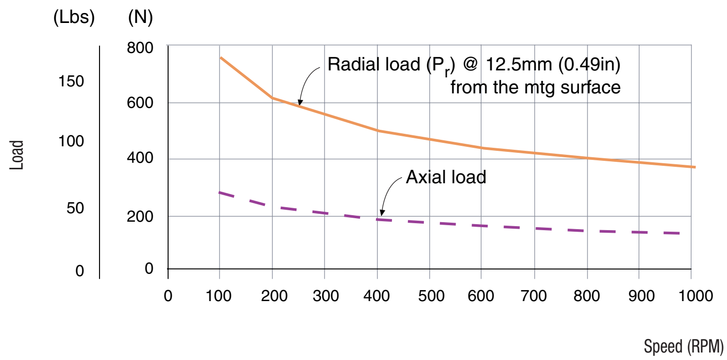
4 Frame Sizes	
GM60	GM23
GM90	GM34
GM115	GM42
GM142	GM56

Ratios	
5:1	25:1
7:1	30:1
10:1	50.1
20:1	100:1

Stealth® GM Gearmotors Series:

Output Shaft Load Rating

GM60/GM23

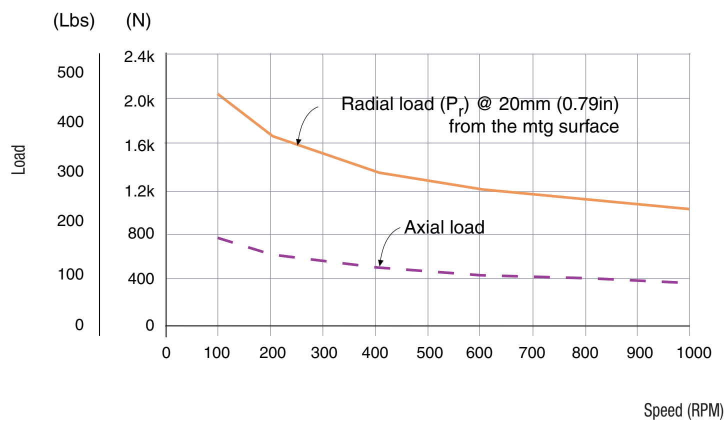


Formulas to calculate radial load (P_{rx}) at any distance "X" from the gearhead mounting surface.

$P_{rx} = (P_r)(\mathbf{54mm}) / (\mathbf{41mm} + X)$

$P_{rx} = (P_r)(2.13in) / (1.61in + X)$

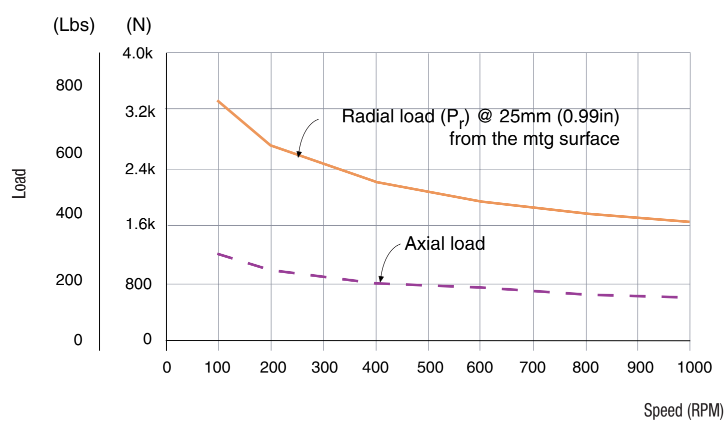
GM90/GM34



$P_{rx} = (P_r)(\mathbf{73mm}) / (\mathbf{52mm} + X)$

$P_{rx} = (P_r)(2.87in) / (2.05in + X)$

GM115/GM42



$P_{rx} = (P_r)(\mathbf{89mm}) / (\mathbf{63mm} + X)$

$P_{rx} = (P_r)(3.5in) / (2.48in + X)$

An Integrated Step Forward

Parker Bayside's Stealth® Gearmotors represent the first time a brushless servo motor and a helical planetary gearhead have been integrated into a single product. Previously, engineers needing a gear drive with servo motor were forced to purchase the gearhead and motor separately. Parker Bayside manufactures precision gearheads and gearmotors under one roof.

Stealth® Gearmotors combine both mechanical and electronic parts into a compact, powerful package. The motor magnets are attached directly to the input gearshaft, eliminating the extra couplings, shafts and bearings required when the two components are separate. Eliminating these extra parts means that Stealth gearmotors are more reliable, have higher performance and cost less than traditional motor/gearhead assemblies.

When to Use:

- High torque in compact package
- Reduce mechanical complexity
- Cost reduction

Applications:

- Automotive
- Machine tool
- Material handling
- Medical
- Packaging
- Paper converting
- Robotics
- Semiconductor

1 **Large Output Bearings**
for high radial loads

2 **IP65 Protection**
with Viton seals, DIN-type connectors, O-rings and an anodized aluminum alloy housing for use in harsh environments

3 **High-Density Copper Windings and Rare-Earth Magnets**
provides maximum torque and efficiency

4 **Skewed Laminations with Odd Slot Counts**
reduce cogging

5 **Duplex Angular Contact Bearing**
for optimum motor assembly stiffness

6 **Modular Encoders, Resolvers and Brakes**
offered standard without increasing package size

7 **Two Winding Options, Single or Double Stack Motors and Multiple Gear Ratios**
for a wide range of torques and speeds

8 **Single-Piece Construction**
of rotor and sun gear guarantees alignment for smooth operation

9 **Motor, Gearhead and Encoder**
in one compact package eliminates extra parts, improving reliability and performance

10 **Stealth® Helical Planetary Output**
provides high torques, low backlash and quiet, reliable performance

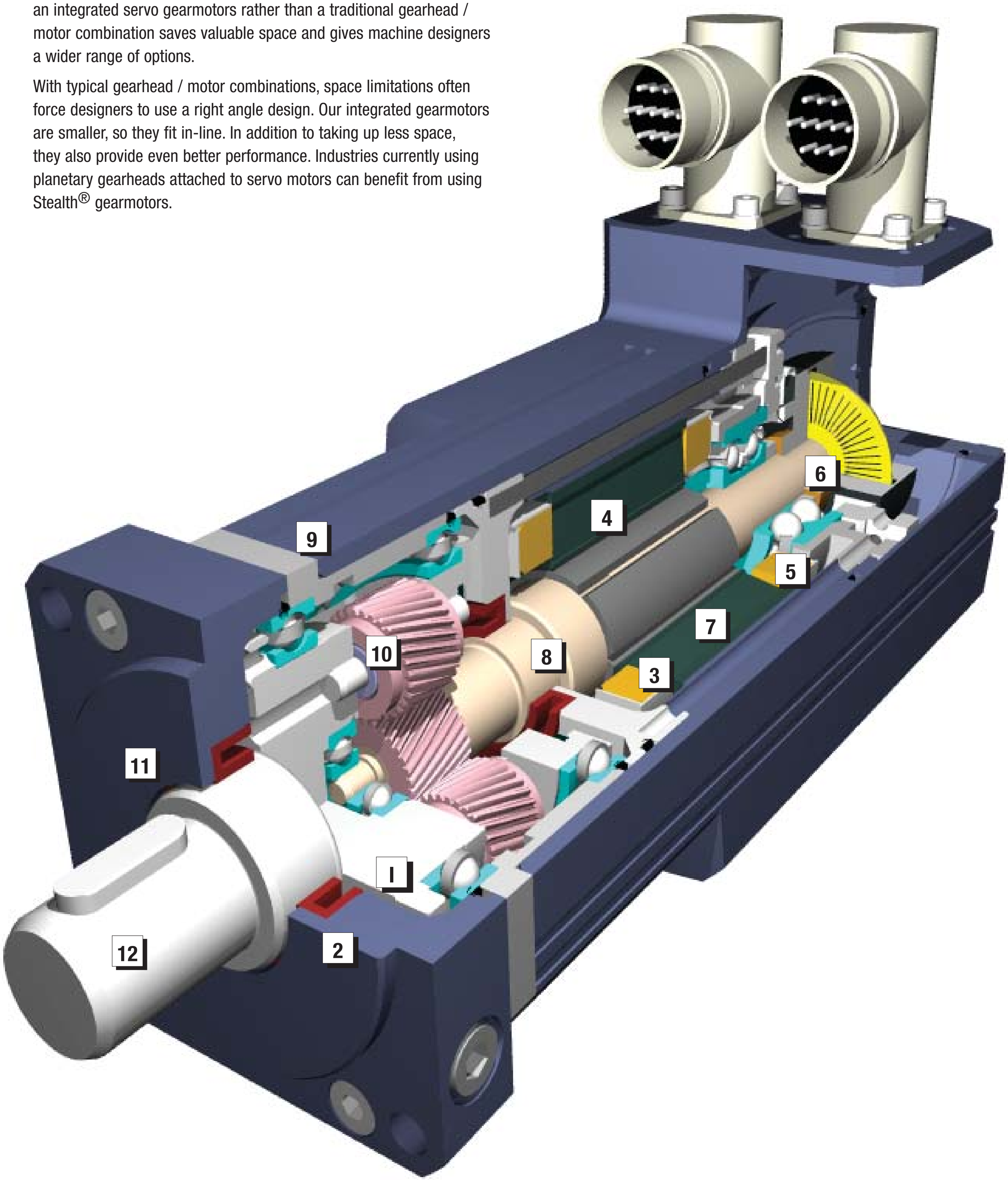
11 **Innovative Thermal Design**
runs 20% cooler than a separate motor/gearhead assembly

12 **Stainless Steel Output Shaft**
won't rust in corrosive environments

Motor and Gearhead All In One

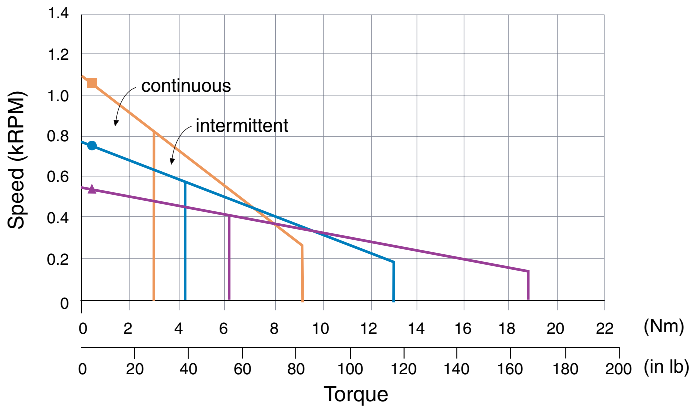
Stealth® gearmotors fit in-line for maximum design flexibility. Using an integrated servo gearmotors rather than a traditional gearhead / motor combination saves valuable space and gives machine designers a wider range of options.

With typical gearhead / motor combinations, space limitations often force designers to use a right angle design. Our integrated gearmotors are smaller, so they fit in-line. In addition to taking up less space, they also provide even better performance. Industries currently using planetary gearheads attached to servo motors can benefit from using Stealth® gearmotors.

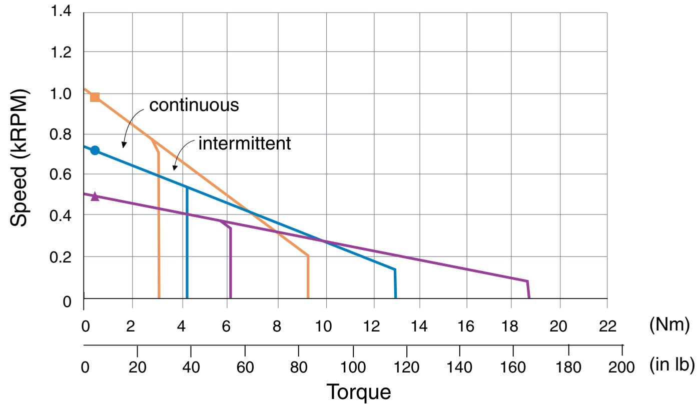


GM60/GM23 Speed / Torque Curves

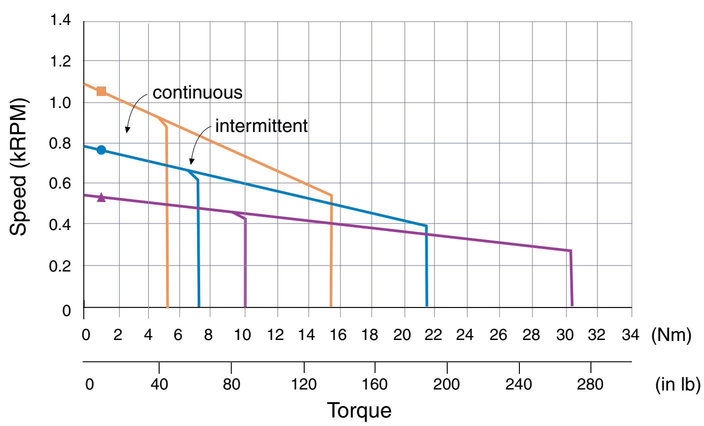
Single Stack - 160 volt



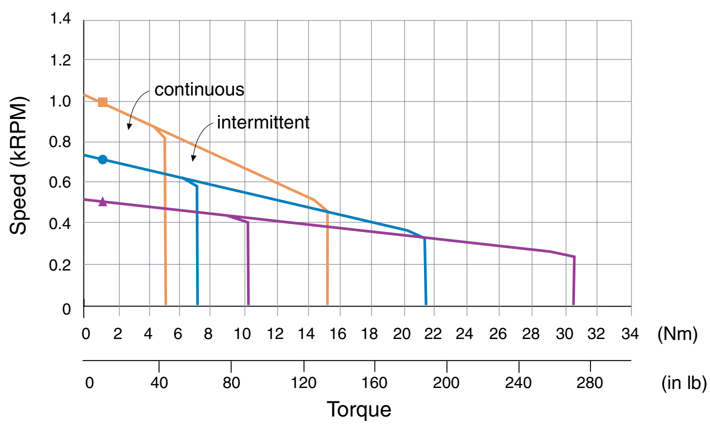
Single Stack - 300 volt



Double Stack - 160 volt



Double Stack - 300 volt



Performance Specifications (six step/trapezoidal commutation)

Mechanical Specifications

Frame Size	Stack Length	Weight without Brake		Maximum Radial Load		Torsional Stiffness		Standard Backlash	Low Backlash
		(kg)	(lb)	**(N)**	(lb)	**(Nm/arc min)**	(in lb/arc min)	(arc min)	(arc min)
GM060	Single	**2.1**	4.7	**1,300**	292	**6**	53	15	10
GM060	Double	**2.8**	6.2	**1,300**	292	**6**	53	15	10

* Measured at 2% of rated torque

Single Stack Specifications

Frame Size	Ratio	Max. Speed(1) T_C	Cont. Stall Torque (1) T_P		Peak Torque(1) D:300 Vdc		Winding C:160 Vdc K_{EL-L}	Voltage Constant(1)(3) K_{TL-L}	Torque Constant(1)(3) L_{L-L}		Induct R_{L-L}	Cold Resistance I_C	Cont. Current I_P	Peak Current	Inertia (2)	
		(RPM)	**(Nm)**	(in lb)	**(Nm)**	(in lb)		(V/kRPM)	**(Nm/amp)**	(in lb/amp)	(mH)	(ohms)	(amps)	(amps)	**(gm cm sec^2)**	(lb in sec^2)
GM060	5:1	1,100	**3.1**	27.5	**9.3**	82.5	C	146.5	**1.40**	12.5	12.5	11.8	2	7	**0.23**	0.00019
GM060	5:1	1,000	**3.1**	27.5	**9.3**	82.5	D	296.5	**2.85**	25.0	51.2	48.3	1	3	**0.23**	0.00019
GM060	7:1	780	**4.3**	38.5	**13.0**	115.5	C	205.1	**1.96**	17.5	12.5	11.8	2	7	**0.19**	0.00016
GM060	7:1	720	**4.3**	38.5	**13.0**	115.5	D	415.1	**3.99**	35.0	51.2	48.3	1	3	**0.19**	0.00016
GM060	10:1	540	**6.2**	55.0	**18.6**	165.0	C	293.0	**2.80**	25.0	12.5	11.8	2	7	**0.19**	0.00016
GM060	10:1	500	**6.2**	55.0	**18.6**	165.0	D	593.0	**5.70**	50.0	51.2	48.3	1	3	**0.19**	0.00016

Double Stack Specifications

Frame Size	Ratio	Max. Speed(1) T_C	Cont. Stall Torque (1) T_P		Peak Torque(1) D:300 Vdc		Winding C:160 Vdc K_{EL-L}	Voltage Constant(1)(3) K_{TL-L}	Torque Constant(1)(3) L_{L-L}		Induct R_{L-L}	Cold Resistance I_C	Cont. Current I_P	Peak Current	Inertia (2)	
		(RPM)	**(Nm)**	(in lb)	**(Nm)**	(in lb)		(V/kRPM)	**(Nm/amp)**	(in lb/amp)	(mH)	(ohms)	(amps)	(amps)	**(gm cm sec^2)**	(lb in sec^2)
GM060	5:1	1,100	**5.1**	45.0	**15.2**	135.0	C	146.5	1.40	12.5	6.2	4.8	4	11	**0.29**	0.00025
GM060	5:1	1,000	**5.1**	45.0	**15.2**	135.0	D	293.0	2.80	25.0	25	19	2	5	**0.29**	0.00025
GM060	7:1	780	**7.1**	63.0	**21.3**	189.0	C	205.6	1.96	17.5	6.2	4.8	4	11	**0.25**	0.00022
GM060	7:1	720	**7.1**	63.0	**21.3**	189.0	D	410.2	3.92	35.0	25	19	2	5	**0.25**	0.00022
GM060	10:1	540	**10.1**	90.0	**30.4**	270.0	C	293.0	2.80	25.0	6.2	4.8	4	11	**0.25**	0.00022
GM060	10:1	500	**10.1**	90.0	**30.4**	270.0	D	586.0	5.60	50.0	25	19	2	5	**0.25**	0.00022

Note: Pole Count for GM060 is 6

Thermal Resistance for GM060 is 1.5 ^{O}C/W

Stator winding thermal resistance (winding to ambient) is for the unit, mounted to a 254mm x 254mm x 12.7mm (10in x 10in x 0.5in) aluminum plate.

(1) These specifications refer to the output of the GM assembly.
When programming a digital amplifier for use with a GM assembly, these specifications must be adjusted by the ratio to create actual motor performance

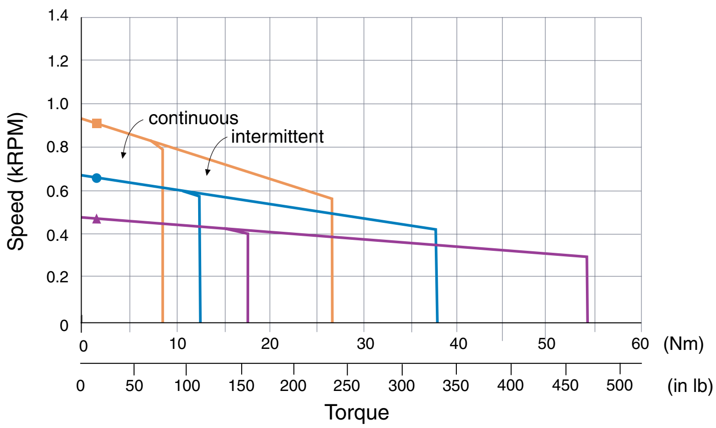
(2) Inertia = Motor Rotor + Gear Selection. External Inertia must be divided by the square of the ratio.

(3) Peak of sine wave

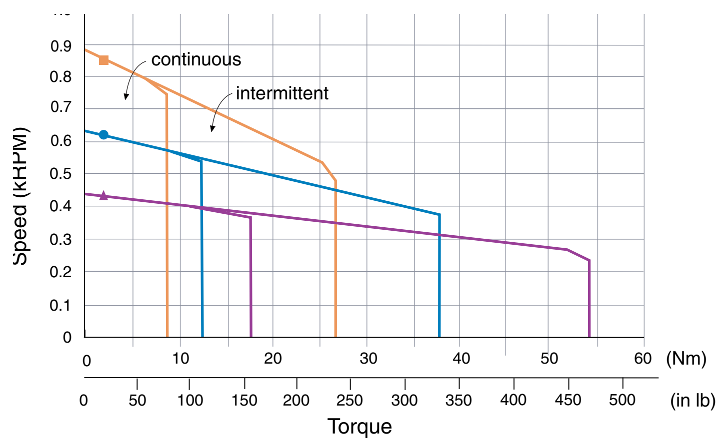
Specification are subject to change without notice

GM90/GM34 Speed / Torque Curves

Single Stack - 160 volt

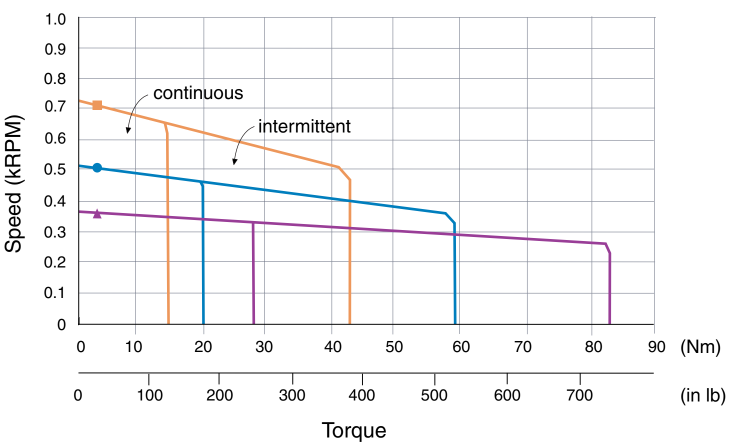


Single Stack - 300 volt

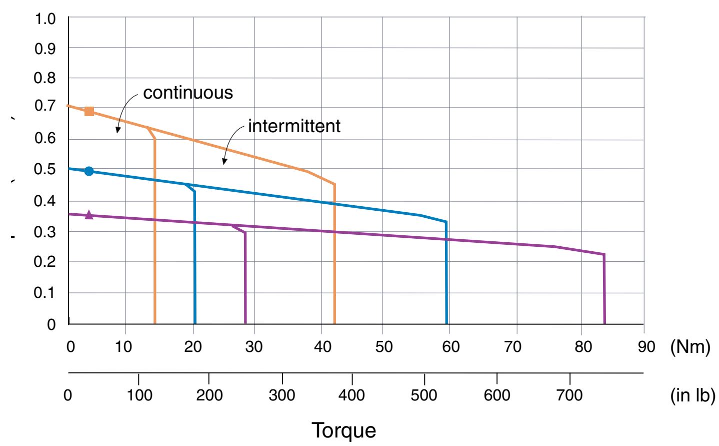


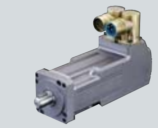
5:1 7:1 10:1

Double Stack - 160 volt



Double Stack - 300 volt





Performance Specifications (six step/trapezoidal commutation)

Mechanical Specifications

Frame Size	Stack Length	Weight without Brake		Maximum Radial Load		Torsional Stiffness		Standard Backlash	Low Backlash
		(kg)	(lb)	**(N)**	(lb)	**(Nm/arc min)**	(in lb/arc min)	(arc min)	(arc min)
GM090	Single	**6.0**	13.2	**2,600**	584	**11**	87	15	10
GM090	Double	**7.4**	16.3	**2,600**	584	**11**	87	15	10

* Measured at 2% of rated torque

Single Stack Specifications

Frame Size	Ratio	Max. Speed(1) T_C	Cont. Stall Torque (1) T_P		Peak Torque(1) D:300 Vdc		Winding C:160 Vdc K_{EL-L}	Voltage Constant(1)(3) K_{TL-L}	Torque Constant(1)(3) L_{L-L}		Induct R_{L-L}	Cold Resistance I_C	Cont. Current I_P	Peak Current	Inertia (2)	
		(RPM)	**(Nm)**	(in lb)	**(Nm)**	(in lb)		(V/kRPM)	**(Nm/amp)**	(in lb/amp)	(mH)	(ohms)	(amps)	(amps)	**(gm cm sec^2)**	(lb in sec^2)
GM090	5:1	900	**8.7**	77.0	**26.0**	231.0	C	170.5	**1.65**	14.5	4.5	2.5	5	16	**1.16**	0.00100
GM090	5:1	870	**8.7**	77.0	**26.0**	231.0	D	341.0	**3.25**	29.0	18.1	10.1	3	8	**1.16**	0.00100
GM090	7:1	670	**12.0**	107.0	**36.1**	321.0	C	238.7	**2.31**	20.3	4.5	2.5	5	16	**0.94**	0.00081
GM090	7:1	620	**12.0**	107.0	**36.1**	321.0	D	477.9	**4.55**	40.6	18.1	10.1	3	8	**0.94**	0.00081
GM090	10:1	450	**17.2**	153.0	**51.7**	459.0	C	341.0	**3.30**	29.0	4.5	2.5	5	16	**0.94**	0.00081
GM090	10:1	430	**17.2**	153.0	**51.7**	459.0	D	682.0	**6.50**	58.0	18.1	10.1	3	8	**0.94**	0.00081

Double Stack Specifications

Frame Size	Ratio	Max. Speed(1) T_C	Cont. Stall Torque (1) T_P		Peak Torque(1) D:300 Vdc		Winding C:160 Vdc K_{EL-L}	Voltage Constant(1)(3) K_{TL-L}	Torque Constant(1)(3) L_{L-L}		Induct R_{L-L}	Cold Resistance I_C	Cont. Current I_P	Peak Current	Inertia (2)	
		(RPM)	**(Nm)**	(in lb)	**(Nm)**	(in lb)		(V/kRPM)	**(Nm/amp)**	(in lb/amp)	(mH)	(ohms)	(amps)	(amps)	**(gm cm sec^2)**	(lb in sec^2)
GM090	5:1	720	**14.0**	124.0	**41.9**	372.0	C	221.5	**2.10**	18.5	3.8	1.6	7	20	**1.31**	0.00113
GM090	5:1	700	**14.0**	124.0	**41.9**	372.0	D	426.0	**4.05**	36.0	14.1	6.3	3	10	**1.31**	0.00113
GM090	7:1	500	**19.5**	173.0	**58.4**	519.0	C	310.1	**2.94**	25.9	3.8	1.6	7	20	**1.10**	0.00094
GM090	7:1	500	**19.5**	173.0	**58.4**	519.0	D	596.4	**5.67**	50.4	14.1	6.3	3	10	**1.10**	0.00094
GM090	10:1	360	**27.8**	247.0	**83.4**	741.0	C	443.0	**4.20**	37.0	3.8	1.6	7	20	**1.10**	0.00094
GM090	10:1	350	**27.8**	247.0	**83.4**	741.0	D	852.0	**8.10**	72.0	14.1	6.3	3	10	**1.10**	0.00094

Note: Pole Count for GM090 is 8

Thermal Resistance for GM090 is 1.2 ^{O}C/W

Stator winding thermal resistance (winding to ambient) is for the unit, mounted to a 254mm x 254mm x 12.7mm (10in x 10in x 0.5in) aluminum plate.

(1) These specifications refer to the output of the GM assembly.
When programming a digital amplifier for use with a GM assembly, these specifications must be adjusted by the ratio to create actual motor performance

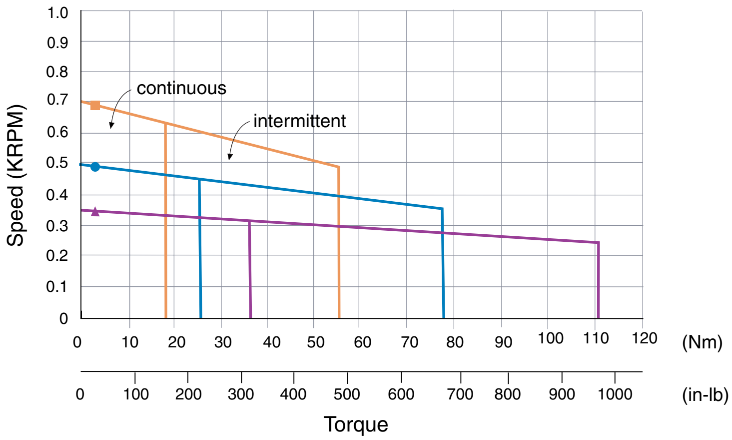
(2) Inertia = Motor Rotor + Gear Selection. External Inertia must be divided by the square of the ratio.

(3) Peak of sine wave

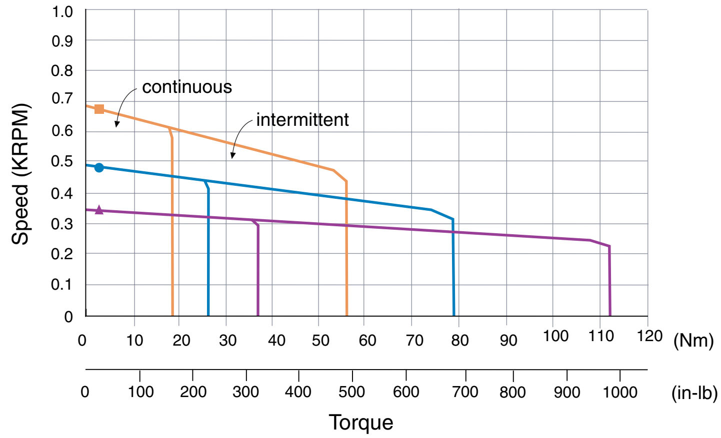
Specification are subject to change without notice

GM115/GM42 Speed / Torque Curves

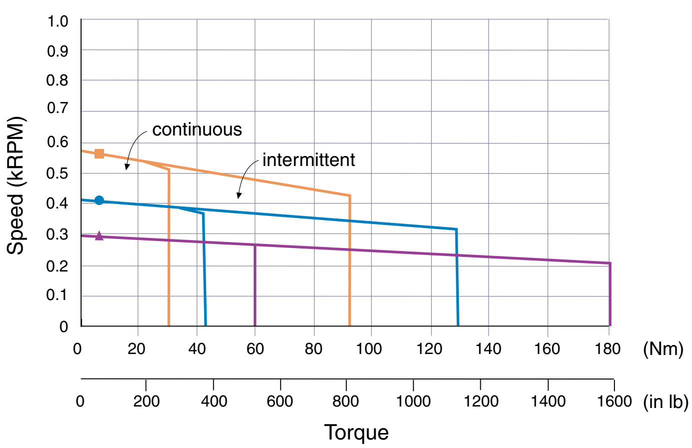
Single Stack - 160 volt



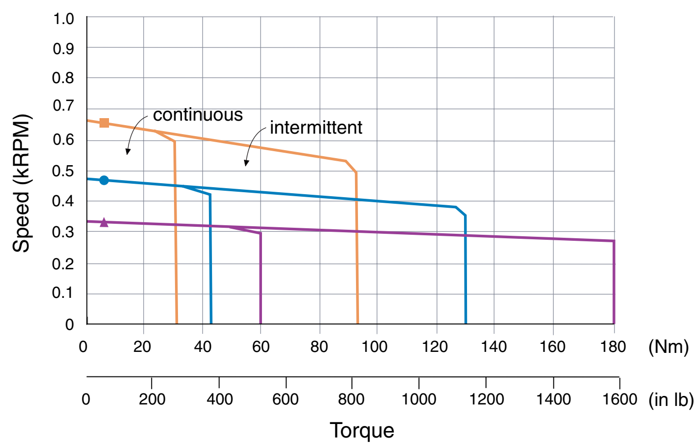
Single Stack - 300 volt



Double Stack - 160 volt



Double Stack - 300 volt



Performance Specifications (six step / trapezoidal commutation)

Mechanical Specifications

Frame Size	Stack Length	Weight without Brake		Maximum Radial Load		Torsional Stiffness		Standard Backlash	Low Backlash
		(kg)	(lb)	(N)	(lb)	(Nm/arc min)	(in lb/arc min)	(arc min)	(arc min)
GM115	Single	**8.4**	18.5	**3,900**	876	**20**	177	15	10
GM115	Double	**10.6**	23.4	**3,900**	876	**20**	177	15	10

* Measured at 2% of rated torque

Single Stack Specifications

Frame Size	Ratio	Max. Speed[(1)] T_C	Cont. Stall Torque [(1)] T_P		Peak Torque[(1)] D:300 Vdc		Winding C:160 Vdc K_{EL-L}	Voltage Constant[(1)(3)] K_{TL-L}	Torque Constant[(1)(3)] L_{L-L}		Induct R_{L-L}	Cold Resistance I_C	Cont. Current I_P	Peak Current	Inertia [(2)]	
		(RPM)	(Nm)	(in lb)	(Nm)	(in lb)		(V/kRPM)	(Nm/amp)	(in lb/amp)	(mH)	(ohms)	(amps)	(amps)	(gm cm sec^2)	(lb in sec^2)
GM115	5:1	700	**18.2**	162	**54.7**	486	C	228.0	**2.15**	19.5	2.9	1.2	8	25	**4.33**	0.00375
GM115	5:1	680	**18.2**	162	**54.7**	486	D	438.0	**4.15**	37.0	10.7	4.7	4	13	**4.33**	0.00375
GM115	7:1	500	**25.4**	227	**76.6**	681	C	319.2	**3.01**	27.3	2.9	1.2	8	25	**3.54**	0.00306
GM115	7:1	480	**25.4**	227	**76.6**	681	D	613.2	**5.81**	51.8	10.7	4.7	4	13	**3.54**	0.00306
GM115	10:1	350	**36.5**	324	**109.4**	972	C	456.0	**4.30**	39.0	2.9	1.2	8	25	**3.54**	0.00306
GM115	10:1	340	**36.5**	324	**109.4**	972	D	876.0	**8.30**	74.0	10.7	4.7	4	13	**3.54**	0.00306

Double Stack Specifications

Frame Size	Ratio	Max. Speed[(1)] T_C	Cont. Stall Torque [(1)] T_P		Peak Torque[(1)] D:300 Vdc		Winding C:160 Vdc K_{EL-L}	Voltage Constant[(1)(3)] K_{TL-L}	Torque Constant[(1)(3)] L_{L-L}		Induct R_{L-L}	Cold Resistance I_C	Cont. Current I_P	Peak Current	Inertia [(2)]	
		(RPM)	(Nm)	(in lb)	(Nm)	(in lb)		(V/kRPM)	(Nm/amp)	(in lb/amp)	(mH)	(ohms)	(amps)	(amps)	(gm cm sec^2)	(lb in sec^2)
GM115	5:1	570	**30.1**	267	**90.2**	801	C	280.5	**2.70**	23.5	2.2	0.73	11	34	**6.28**	0.00544
GM115	5:1	650	**30.1**	267	**90.2**	801	D	455.5	**4.35**	38.5	5.8	1.9	7	21	**6.28**	0.0054
GM115	7:1	400	**42.0**	373	**125.9**	1,119	C	392.7	**3.78**	32.9	2.2	0.73	11	34	**5.50**	0.00475
GM115	7:1	470	**42.0**	373	**125.9**	1,119	D	637.7	**6.09**	53.9	5.8	1.9	7	21	**5.50**	0.00475
GM115	10:1	280	**60.0**	533	**179.9**	1,599	C	561.0	**5.40**	47.0	2.2	0.73	11	34	**5.50**	0.00475
GM115	10:1	320	**60.0**	533	**179.9**	1,599	D	911.0	**8.70**	77.0	5.8	1.9	7	21	**5.50**	0.00475

Note: Pole Count for GM115 is 12

Thermal Resistance for GM115 is 0.95 ^{O}C/W

Stator winding thermal resistance (winding to ambient) is for the unit, mounted to a 254mm x 254mm x 12.7mm (10in x 10in x 0.5in) aluminum plate.

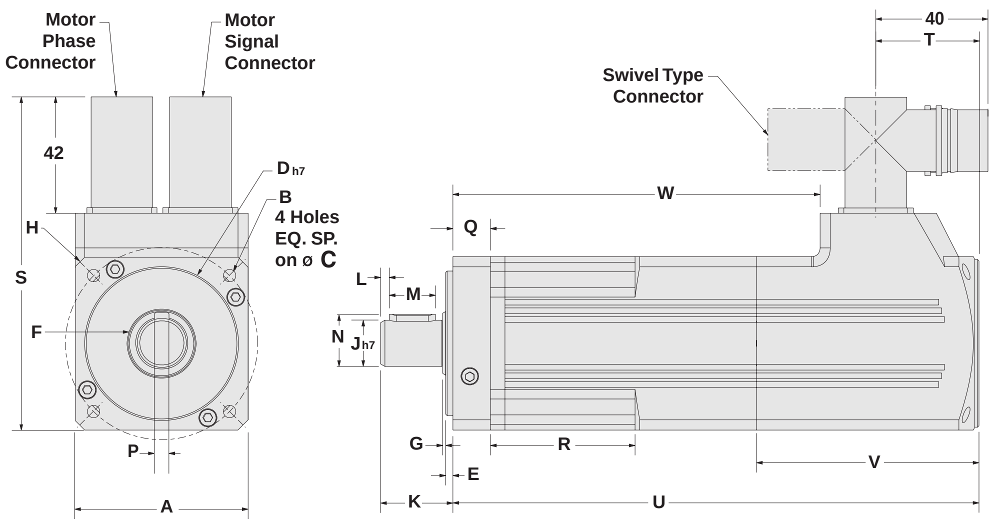
(1) These specifications refer to the output of the GM assembly.
When programming a digital amplifier for use with a GM assembly, these specifications must be adjusted by the ratio to create actual motor performance

(2) Inertia = Motor Rotor + Gear Selection. External Inertia must be divided by the square of the ratio.

(3) Peak of sine wave

Specification are subject to change without notice

Dimensions



METRIC SIZES

Frame Size	A Square Flange (mm)	A (in)	B Bolt Hole (mm)	B (in)	C Bolt Circle Diameter (mm)	C (in)	D Pilot Diameter (mm)	D (in)	E Pilot Thick. (mm)	E (in)	F Shoulder Diameter (mm)	F (in)	G Shoulder Height (mm)	G (in)	H Housing Diameter (mm)	H (in)	J Shaft Diameter (mm)	J (in)
GM060	60	2.36	5.5	0.22	70	2.756	50	1.969	2.5	0.1	23	0.91	1.0	0.04	80	3.15	16	0.63
GM090	90	3.54	6.5	0.26	100	3.94	80	3.15	3.0	0.12	36	1.42	1.0	0.04	116	4.57	20	0.79
GM115	115	4.53	8.5	0.33	130	5.12	110	4.33	3.5	0.14	36	1.42	1.5	0.6	152	5.95	24	0.94

Frame Size	K Shaft Length (mm)	K (in)	L Dist From Shaft End (mm)	L (in)	M Keyway Length (mm)	M (in)	N Keyway Height (mm)	N (in)	P Keyway Width (mm)	P (in)	Q Flange Thick (mm)	Q (in)	R Recess Length (mm)	R (in)	S Height (mm)	S (in)	T Connector Location (mm)	T (in)
GM060	25.0	0.98	3	0.118	16	0.630	18.0	0.709	5	0.20	13	0.51	50.0	1.969	117	4.60	37	1.457
GM090	40.0	1.57	5	0.20	28	1.10	22.5	0.886	6	0.24	17	0.67	54.5	2.15	147	5.79	39	1.535
GM115	50.0	1.97	7	0.28	32	1.26	27.0	1.063	8	0.32	20	0.79	55.5	2.18	175	6.89	46	1.811

NEMA SIZES

Frame Size	B Bolt Hole (in)	B (mm)	C Bolt Circle (in)	C (mm)	D Pilot Diameter (in)	D (mm)	J Output Shaft Diameter (in)	J (mm)	K Output Shaft Length (in)	K (mm)	M Keyway Length (in)	M (mm)	N Keyway Height (in)	N (mm)	P Keyway Width (in)	P (mm)
GM023	0.195	5.0	2.625	66.7	1.500	38.1	0.375	9.5	1.000	25.4	0.750 flat	19.1 flat	0.015 flat	0.4 flat	—	—
GM034	0.218	5.5	3.875	98.4	2.875	73.0	0.500	12.7	1.250	31.8	1.063	27.0	0.072	1.8	0.125	3.2
GM042	0.281	7.1	4.950	125.7	2.187	55.5	0.625	15.9	1.500	38.1	1.130	28.7	0.108	2.7	0.188	4.8

Options	Single Stack U Length		Single Stack V Rear Cover Length		Single Stack W Flange Offset		Double Stack U Length		Double Stack V Rear Cover Length		Double Stack W Flange Offset	
	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)
GM060 Single Stack – Encoder or Resolver	178	7.01	70	2.76	121	4.76	219.2	8.63	70	2.76	162.2	6.39
GM060 Single Stack – Encoder or Resolver and Brake	203	7.99	95	3.74	143	5.63	244.2	9.61	95	3.74	184.2	7.25
GM060 Double Stack – Encoder or Resolver	216	8.5	70	2.76	159	6.26	257.2	10.13	70	2.76	200.2	7.88
GM060 Double Stack – Encoder or Resolver and Brake	241	9.46	95	3.74	181	7.12	282.2	11.11	95	3.74	222.2	8.75
GM090 Single Stack – Encoder or Resolver	202.3	7.96	83	3.27	143.3	5.64	259.3	10.21	83	3.27	200.3	7.89
GM090 Single Stack – Encoder or Resolver and Brake	230.3	9.07	111	4.37	171	6.73	287.3	11.31	111	4.37	228	8.98
GM090 Double Stack – Encoder or Resolver	240.4	9.46	83	3.27	181.4	7.14	297.4	11.71	83	3.27	238.4	9.39
GM090 Double Stack – Encoder or Resolver and Brake	268.4	10.57	111	4.37	209.1	8.23	325.4	12.81	111	4.37	266.1	10.48
GM115 Single Stack – Encoder or Resolver	207.2	8.16	70	2.76	147.3	5.8	276.2	10.87	70	2.76	216.3	8.52
GM115 Single Stack – Encoder or Resolver and Brake	240.2	9.46	103	4.06	170.3	6.7	309.2	12.17	103	4.06	239.3	10.02
GM115 Double Stack – Encoder or Resolver	245.3	9.66	70	2.76	185.4	7.3	314.3	12.37	70	2.76	254.4	2.14
GM115 Double Stack – Encoder or Resolver and Brake	278.3	10.96	103	4.06	208.4	8.2	347.3	13.67	103	4.06	277.4	10.92

Encoder Specifications (All GM Frame Sizes)

Resolution	2,000 LPR (8,000 LPR)
Electrical Input:	5 Vdc, 125 ma maximum (plus interface loads)
Encoder Output:	A, B, I, $\overline{A}$, $\overline{B}$, $\overline{I}$ Differential, TTL compatible Frequency Response 500 Khz

Resolver Specification (All Frame Sizes)

Frequency	Hz	5,000
Input Voltage	Vrms	4.0
Input Current	ma max.	23
Input Power	Watts nom.	0.045
Transformation Ratio	$\pm$ 10%	0.50
Output voltage	Vrms	2.0
Sensitivity	mv / Deg	35

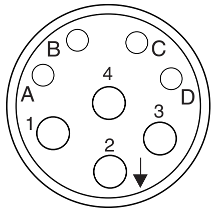
Brake Specification

Frame Size	Static Holding Torque		Voltage	Current	Resistance	Inertia	
	(Nm)	(in lb)	(V)	(amps)	(ohms)	(gm cm sec^2)	(oz in sec^2)
GM060	**0.33**	3.0	24 Vdc	0.19	131	**4.32 x 10^{-8}**	6.0 x 10^{-10}
GM090	**5.64**	50	24 Vdc	0.30	65	**4.32 x 10^{-8}**	6.0 x 10^{-10}
GM115	**5.64**	50	24 Vdc	0.30	65	**2.5 x 10^{-7}**	3.5 x 10^{-9}

Specification are subject to change without notice

DIN Motor Power Connection

Pin Number	Function
1	U
4	V
3	W
2	Chassis Gnd.
A	Thermistor +
B	Thermistor -
C	Brake +
D	Brake -
–	Shield



Power

Motor Power Mating Connector

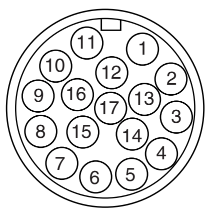
Manufacturer	Part Number	Description
Hypertac	LPNA08BFRKB170	Body
	020.232.2000	4 Pins Female 18-26 AWG
	020.090.1020	4 Pins Female 16-20 AWG

Motor Power Cable

Part Number	Length	Used With
10963093-3000	3 meter	Flying Leads
10963093-8000	8 meter	Flying Leads

DIN Sensor Connector Details

Pin Number	Function: Encoder	Function: Resolver	Mating Cable i-Drive Conn. Pin Number
1	A +	S1 (SIN+)	1
2	B +	S4 (COS+)	2
7	+5V	R2 (Ref+)	7
8	Shield	Shield	8
9	A -	S3 (SIN-)	9
10	B -	S2 (COS-)	10
15	Gnd	R1 (REF-)	15
12	Spare	Spare	—
5	I +	—	5
13	I -	—	13
3	Hall 1 (S1)	—	—
11	Hall 2 (S2)	—	—
4	Hall 3 (S3)	—	—
16	Thermistor +	Thermistor +	—
17	Thermistor -	Thermistor -	—
6 & 14	No Connection		



Sensor

Motor Sensor Mating Connector

Manufacturer	Part Number	Description
Hypertac	SPNA17HFRON	Body
	020.256.1020	17 Pins Female

Mating Sensor Cable

Part Number	Length	Used With
10963123-3000	3 meter	Flying Leads
10963123-8000	8 meter	Flying Leads

Flying Leads from out of the Motor (All GM Frame Sizes)

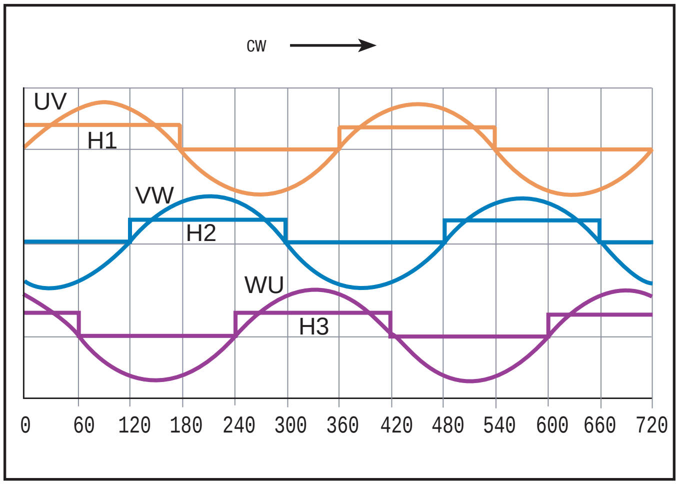
Power

Function	Color Code
U	Red
V	Black
W	White
Ground	Green

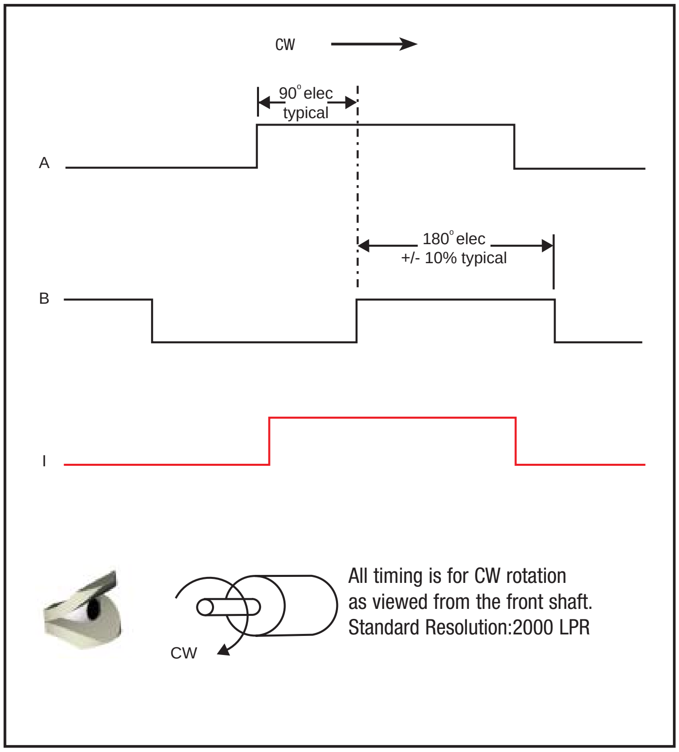
Encoder

Function	Color Code
A-	White
A+	Brown
B-	Green
B+	Blue
I-	Yellow
I+	Orange
S2	Violet
S1	White / Brown
S3	White / Orange
+5V	Red
GND	Black
T1	White / Red
T2	White / Black

Motor Signal Timing (C/D winding)
at motor connector



Encoder Timing



How to Order

Order Numbering Example: G M 0 6 0 – B 1 C 1 D

FRAME SIZE

Metric	**NEMA**
060	023
090	034
115	042

RATIO

B = 5:1
C = 7:1
D = 10:1
E = 15:1
F = 20:1
G = 25:1
H = 30:1
J = 50:1
K = 70:1
L = 100:1

STACK LENGTH

1 = Single
2 = Double

WINDING

C = 160Vdc
D = 300Vdc

OPTIONS

1 = 2000 Line (1) Encoder
2 = 2000 Line (1) Encoder, Brake
3 = Resolver
4 = Resolver, Brake

CONNECTOR

B = MIL Connector
D = DIN Connector
F = Flying Leads (450mm/18in)
P = Parker standard Din Connector

(1) Includes commutation signals

Gearmotors are supported by a worldwide network of offices and local distributors. Call **1-800-305-4555** for application engineering assistance or for the name of your local distributor. Information can also be obtained at **www.baysidemotion.com or www.parkermotiom.com**

Specifications are subject to change without notice.

Servo Wheel Series:

Compact Wheel Drives for Electric Vehicles

Combining servo motor, gearing and
wheel design makes system integration easy.

Servo Wheel Series: Design Features

The Servo Wheel™ combines a brushless DC motor with planetary gears in a lightweight, aluminum housing to provide a compact solution for vehicle control. The Power Wheel's unique design makes system integration easy. You no longer have to purchase the motor, gearhead, wheel, electronics and bracket from different sources. Parker Bayside does all of the work for you. From component sourcing to actual assembly, Parker Bayside engineers designed the Power Wheel with your application in mind.
All you have to do is bolt it up and go!

Single-Piece Construction Motor Shaft

The first stage's planetary section sun gear is integrated into the single-piece construction motor shaft, to provide higher reliability in a compact package.

Planetary Gears

The planetary input stage provides a first pass reduction that is capable of carrying high torques with high input speeds in a small package.

Integrated Output Stage

The second stage planetary's unique design uses two planets for higher efficiency. Built entirely into the wheel, it utilizes an otherwise wasted area to provide a compact, space-saving package. Two large diameter bearings support the weight, protecting the gears from shock loading and dramatically increasing the radial load carrying capacity of the wheels.

Compact Wheel Drives for Electric Vehicles

Parker Baysides NEW Servo Wheel™ Drive System features state-of-the-art technology to provide motion for small, battery-powered, electric vehicles, including:

- Automated Cleaning Equipment
- Robotic/Material Handling Equipment
- Healthcare Equipment
- AGV's

Parker Bayside's Servo Wheel features:

BRUSHLESS DC MOTOR AMPLIFIERS designed for common motion profiles in battery powered vehicles to provide:

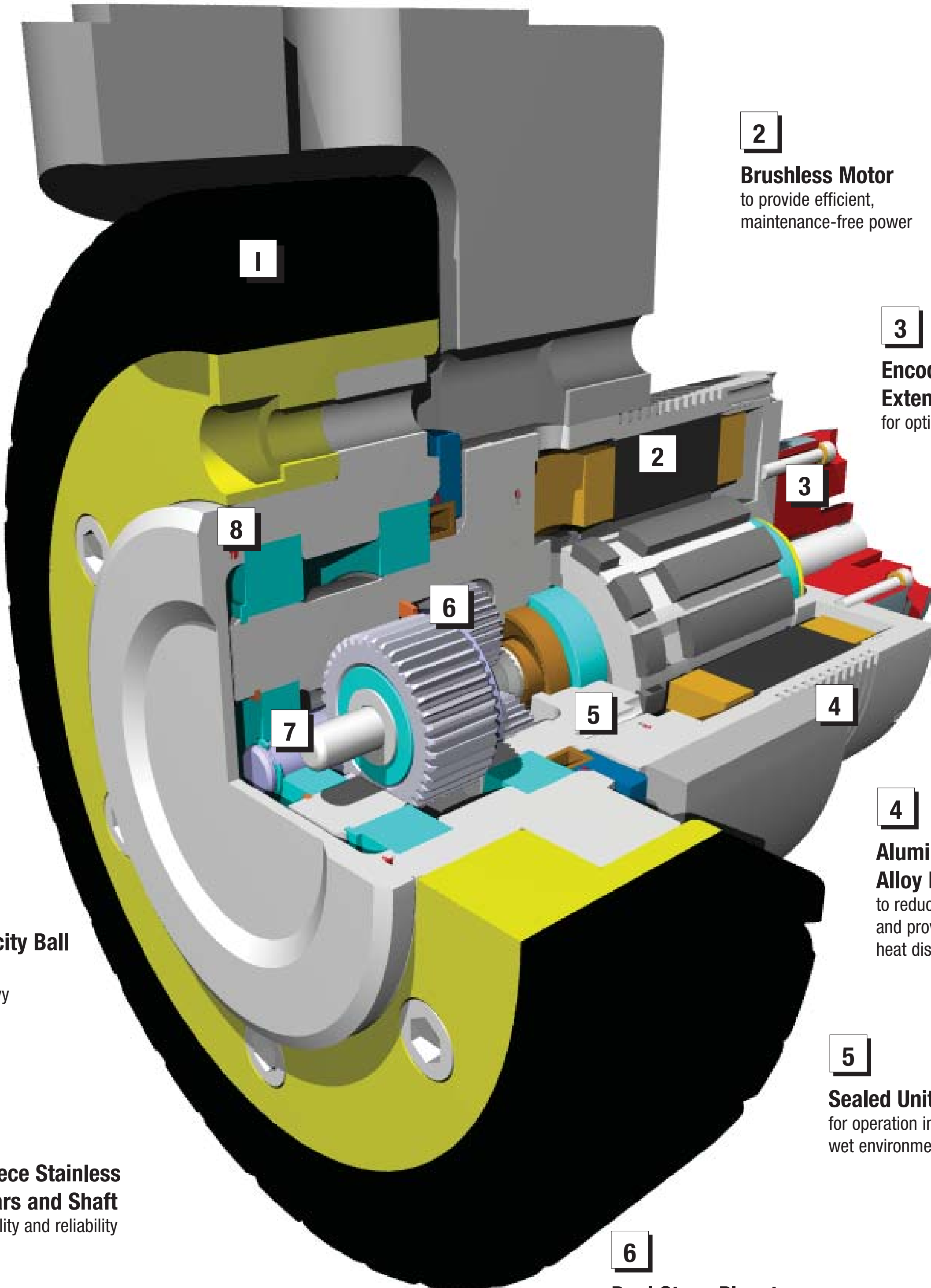
- 12, 24, 36 and 48 volt operation
- Current and temperature feedback control for safe, reliable operation
- Multiple input architectures for easy communication with higher-level controllers and navigation systems

PERMANENT MAGNET BRUSHLESS MOTORS to provide:

- High efficiency for longer run times between battery charges
- Greater power to size ratio for a compact package
- Integral hall sensors for motor TRAP commutation
- Long life and maintenance free-operation
- High input speeds in excess of 10,000 RPM
- No internal sparking – safe in explosive environments
- Low EMI, eliminating the need for heavy shielding

PLANETARY GEARS to provide high torque-carrying capability in a small package. The gears are built into the hub of the wheel, making the package compact and lightweight. This design also increases the radial load-carrying and shock loading capacity of the entire system.

Polyurethane tires are ideal for applications in hospitals, schools, and airports – any place requiring non-marking materials. This material is also ideal for high load carrying applications like material handling.



1

Polyurethane Antistatic Tires

2

Brushless Motor
to provide efficient, maintenance-free power

3

Encoder/Brake Extension
for optional ad-ons

4

Aluminum Alloy Housing
to reduce weight and provide optimum heat dissipation

5

Sealed Unit
for operation in hostile or wet environments

6

Dual Stage Planetary Gear Design
to deliver high torque and high efficiency in a compact package

7

Single Piece Stainless Steel Gears and Shaft
for high quality and reliability

8

High Load Capacity Ball Bearings
to accommodate heavy vehicle loads

Performance Specifications

Tire Diameter				152mm (6in)				203mm (8in)			
Speed Code Gear Ratio				20	25	30	36	20	25	30	36
Motor Code	Power Cont. (W)										
1	400	Max Speed	Km/hr	**5.5**	**4.4**	**3.6**	**3.0**	**7.3**	**5.8**	**4.9**	**4.0**
			MPH	3.4	2.7	2.3	1.9	4.5	3.6	3.0	2.5
		Peak Torque	Nm	**62**	**78**	**93**	**112**	**62**	**78**	**93**	**112**
			in lb	551	689	827	992	551	689	827	992
		Continuous Torque	Nm	**21**	**26**	**31**	**37**	**21**	**26**	**31**	**37**
			in lb	184	230	276	331	184	230	276	331
2	450	Max Speed	Km/hr	**4.61**	**3.69**	**3.08**	**2.56**	**6.16**	**4.93**	**4.11**	**3.42**
			MPH	2.86	2.29	1.91	1.59	3.83	3.06	2.55	2.13
		Peak Torque	Nm	**83**	**104**	**125**	**149**	**83**	**104**	**125**	**149**
			in lb	735	919	1,103	1,323	735	919	1,103	1,323
		Continuous Torque	Nm	**28**	**35**	**42**	**50**	**28**	**35**	**42**	**50**
			in lb	245	306	368	441	245	306	368	441
3	1000	Max Speed	Km/hr	**4.58**	**3.67**	**3.06**	**3.40**	**6.12**	**4.90**	**4.08**	**3.40**
			MPH	2.85	2.28	1.90	2.11	3.80	3.04	2.53	2.11
		Peak Torque	Nm	**197**	**247**	**296**	**355**	**1.97**	**247**	**296**	**355**
			in lb	1,748	2,184	2,621	3,146	1,748	2,184	2,621	3,145
		Continuous Torque	Nm	**66**	**82**	**99**	**118**	**66**	**82**	**99**	**118**
			in lb	583	728	874	1,049	583	728	874	1,049
ALL TIRES		Load Capacity	kg	**454**				**454**			
			lb	1,000				1,000			

Antistatic Tires

Code	R	Polyurethane Black Smooth
	S	Polyurethane Black x Thread

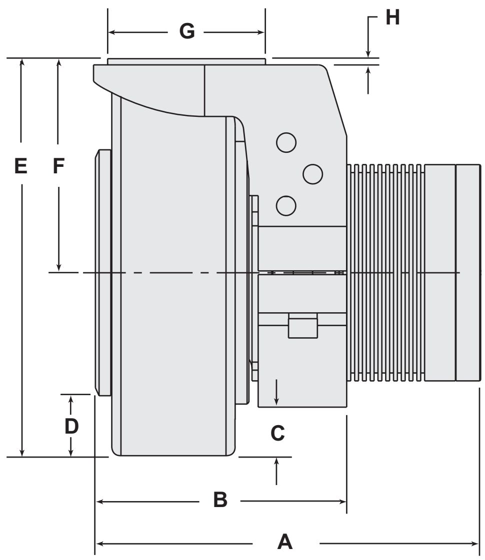
Operating Voltages

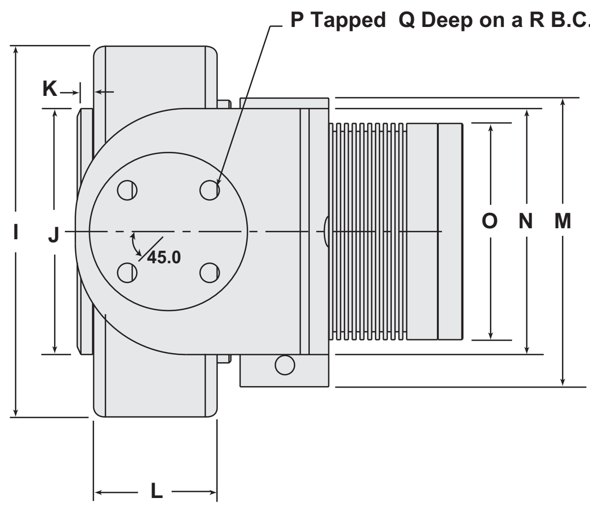
Code	K
Volts	24

Brake

Code	0	None
	3	50 in-lb

Dimensions





Model Number	Motor Power	A* without Brake (mm)	A* (in)	B (mm)	B (in)	C (mm)	C (in)	D (mm)	D (in)	E (mm)	E (in)	F (mm)	F (in)
DX6	150	158.75	6.25	104.1	4.1	20.3	0.8	25.4	1.0	165.1	6.5	87.9	3.46
	300	175.26	6.90	104.1	4.1	20.3	0.8	25.4	1.0	165.1	6.5	87.9	3.46
	746	191.77	7.55	104.1	4.1	20.3	0.8	25.4	1.0	165.1	6.5	87.9	3.46
DX8	150	158.75	6.25	104.1	4.1	45.7	1.8	50.8	2.0	218.4	8.6	116.8	4.60
	300	175.26	6.90	104.1	4.1	45.7	1.8	50.8	2.0	218.4	8.6	116.8	4.60
	746	191.77	7.55	104.1	4.1	45.7	1.8	50.8	2.0	218.4	8.6	116.8	4.60

Model Number	Motor Power	G (mm)	G (in)	H (mm)	H (in)	I (mm)	I (in)	J (mm)	J (in)	K (mm)	K (in)	L (mm)	L (in)
DX6	150	65.0	2.559	2.54	0.1	152.4	6.0	101.1	3.98	6.86	0.27	50.8	2.0
	300	65.0	2.559	2.54	0.1	152.4	6.0	101.1	3.98	6.86	0.27	50.8	2.0
	746	65.0	2.559	2.54	0.1	152.4	6.0	101.1	3.98	6.86	0.27	50.8	2.0
DX8	150	65.0	2.559	2.54	0.1	203.2	8.0	101.1	3.98	6.86	0.27	50.8	2.0
	300	65.0	2.559	2.54	0.1	203.2	8.0	101.1	3.98	6.86	0.27	50.8	2.0
	746	65.0	2.559	2.54	0.1	203.2	8.0	101.1	3.98	6.86	0.27	50.8	2.0

Model Number	Motor Power	M (mm)	M (in)	N (mm)	N (in)	O (mm)	O (in)	P (mm)	P (in)	Q (mm)	Q (in)	R (mm)	R (in)
DX6	150	118.6	4.67	101.1	3.98	88.9	3.5	7.94	5.16	25.4	1.0	47.98	1.889
	300	118.6	4.67	101.1	3.98	88.9	3.5	7.94	5.16	25.4	1.0	47.98	1.889
	746	118.6	4.67	101.1	3.98	100	3.94	7.94	5.16	25.4	1.0	47.98	1.889
DX8	150	118.6	4.67	101.1	3.98	88.9	3.5	7.94	5.16	25.4	1.0	47.98	1.889
	300	118.6	4.67	101.1	3.98	88.9	3.5	7.94	5.16	25.4	1.0	47.98	1.889
	746	118.6	4.67	101.1	3.98	100	3.94	7.94	5.16	25.4	1.0	47.98	1.889

* Consult factory for increased length with encoder and on brake option.

5 Step Procedure

1 Motor Code Selection

Based on the application requirement, select the appropriate motor power from the second column in the "Performance Specifications" table. The number to the left of it in the first column is the motor code.

2 Speed Code Selection

Find the intersection of the column with the selected tire diameter and the row with the motor code to give you the available speed ranges. From the four given speeds (in mph), select the one that meets your application needs. Proceed to the top of that column to find the speed code just under the tire diameter you have selected in step 1.

3 Voltage Code Selection

From the "Operating Voltages" table, select the correct voltage code based on the power supply available for the application.

4 Tire Composition Code Selection

Servo Wheels™ are available for a wide variety of applications. Some require a smooth ride or high load carrying capacity, or a combination of both. From the tire composition table, select the appropriate material for your application. The letter in the first column is the tire composition code.

5 Compose part number based on the codes selected

How to Order

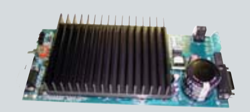
Order Numbering Example: D X A – R M V T B

TIRE DIAMETER	RATIO	MOTOR SIZE	VOLTAGE	TIRE MATERIAL*	BRAKE/ENCODER** SIZE
A = 6 in.	1 = 20	1 = 400V	K = 24V	S = Polyurethane antistatic black x tread	0 = No Brake
B = 8 in.	2 = 24	2 = 450V		R = Polyurethane antistatic black	3 = 50 in-lb
	3 = 30	3 = 1000V			
	4 = 36				

* Other tire compositions availble upon requests.
** Consult factory for encoder options.

Call **1-800-305-4555** for application engineering assistance or for the name of your local distributor.

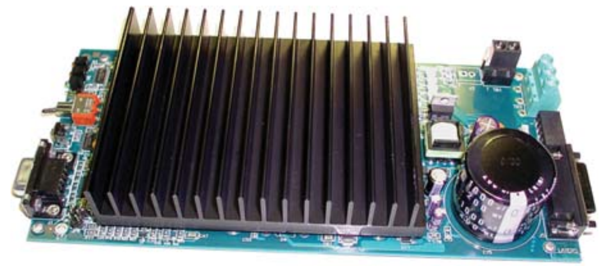
Specifications are subject to change without notice.



WHEEL DRIVE SERIES 55 DIGITAL SERVO AMPLIFIER
High Current Control

FEATURES

- High-performance DSP-based servo controls motor force or torque. Control of velocity or position using the motor's Hall of encoder signals is an option.
- Controls brush-type, brushless-trapezoidal and brushless-sinusoidal motors.
- User inputs motor parameters, voltage, peak and continuous current limit into Windows-based setup software. Setup software automatically downloads the algorithm for a 2kHz current loop bandwidth via RS-232 communications.
- Proprietary PWM software controlled switching scheme yields ultra-low ripple at low current levels, zero crossover distortion, and minimizes EMI in noise sensitive applications
- Differential amplifiers accept a single +/- 10V analog current command for trapezoidal brushless and brush type motors.
- Optional inputs allow digital commands through the RS-232 or Serial Peripheral Interface.
- 3 Output current ranges and scale factors available.
- Optically isolated digital inputs for Enable/Reset, Brake, and +_ Travel Limits.
- Motor current monitor output, and optically isolated digital outputs provide controller fault indication. Configurator program provides drive status and fault history via RS-232 link.
- Fault protection makes this drive virtually indestructible.
- Operates from one low-cost 24 - 48 VDC unregulated power supply or battery.



PRODUCT DESCRIPTION

This digital servo amplifier provides DSP-based digital closed-loop, four-quadrant PWM control of force or torque of permanent magnet, linear or rotary, brush or brushless DC motors. Our PWM current control algorithm, current sensing method, and advanced switching scheme yields performance comparable to a linear servo amplifier.

This digital drive will reduce expensive motor drive stocking requirements because it will control brush-type, brushless-trapezoidal and brushless-sinusoidal motors.

Setup is easy. The operating configuration – motor type, motor parameters, operating voltage, peak and continuous current limits and system parameters for velocity or position control are all input by the user to a PC-based setup program that automatically downloads the information, with the computed algorithm, into the flash memory of the drive via an RS-232 port. The drive can be reconfigured at any time by running the setup-program.

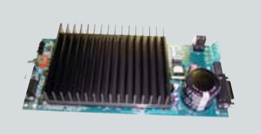
Specifications

BMG	P/N 11564028	11564030
INPUT POWER BUS	24 to 48 VDC	24 to 48 VDC
CONT. OUTPUT POWER (Max.)	450 watts [1]	1350 watts [1]
CONT. OUTPUT CURRENT	10 amps [1]	30 amps [1]
PEAK OUTPUT CURRENT	20 amps [1] (1 sec typ.)	60 amps [1]
SCALE FACTOR (A / V)	2	6
VOLTAGE @ CONT. OUTPUT CURRENT	Input Bus Voltage - [3] Volts Typical	Input Bus Voltage -[3] Volts Typical
Max HEAT SINK TEMPERATURE	Disables if > 70 °C	Disables if > 70 °C
Current LOOP BANDWIDTH	2 kHZ Typical	2 kHZ Typical
SWITCHING FREQUENCY	40kHZ	40kHZ
MINIMUM LOAD INDUCTANCE	100 UH	100 UH
WEIGHT	25 OZ	25 OZ

OPERATING CONTROL SIGNALS and INDICATORS

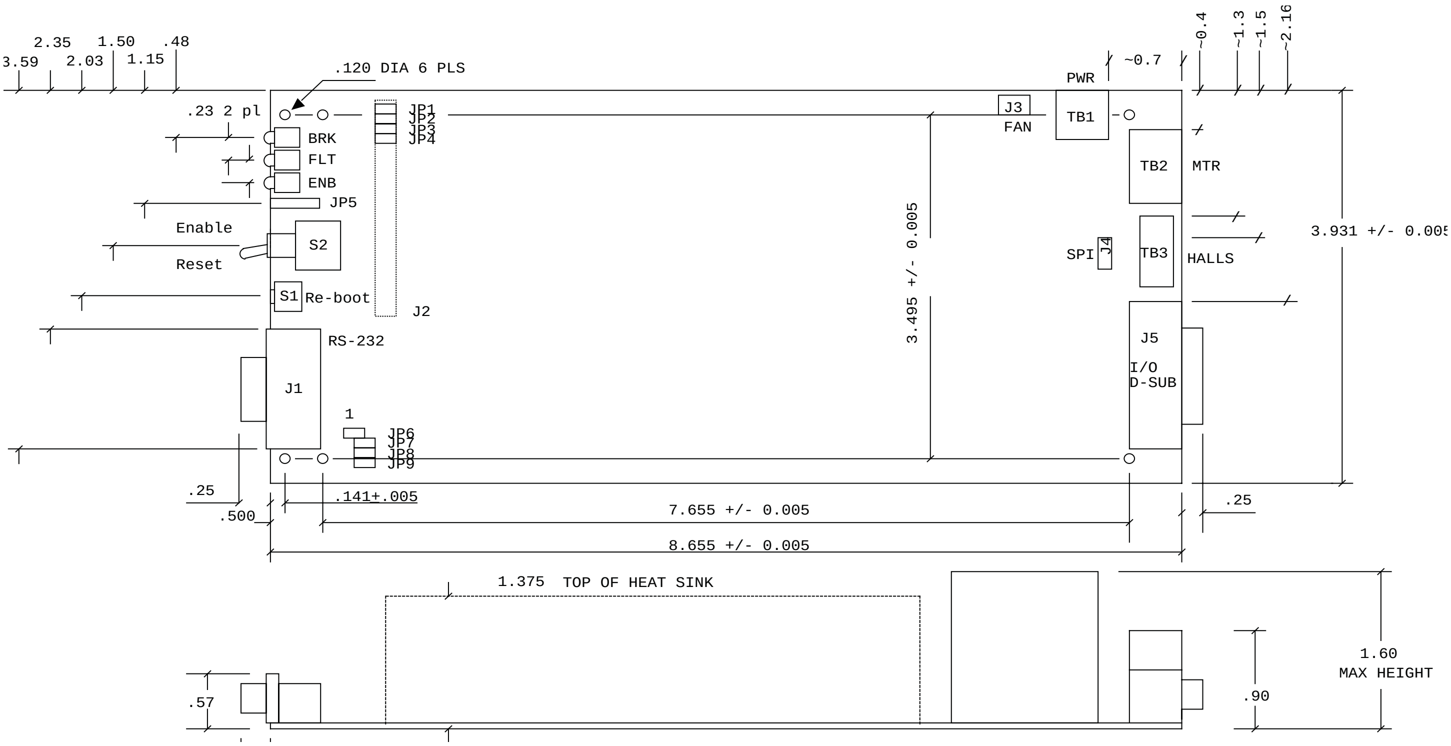
Input analog control signal	+_ 10 Volts
Digital Input Commands	Rs-232, SPI
Peak Current limit	Software adjustable
Continuous Current limit	Software adjustable
Drive Enable/Reset	5V logic, optically isolated
(+) Travel Limit	5V logic, optically isolated
(-) Travel Limit	5V logic, optically isolated
Brake	5V logic, optically isolated
Fault and/or Brake status	5V logic, optically isolated
Drive Enabled indicator	Green LED
Brake indicator	Red LED
Fault indicator	Red LED
Digital Hall Effect Sensors	3 channels,+5 Volts,Gnd

NOTES: 1. Depends on ambient operating temperature and heat sink.
For the >10 amperes continuous output, we recommend forced convection cooling with a minimum airflow of 100 CFM. Consult factory for assistance.



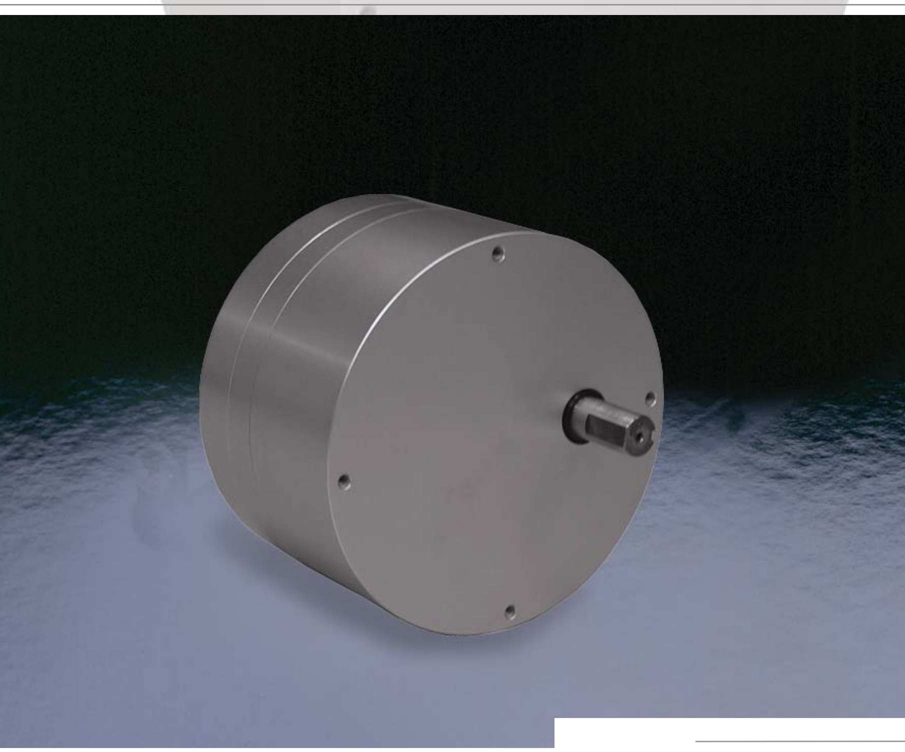
Digital Servo Amplifier

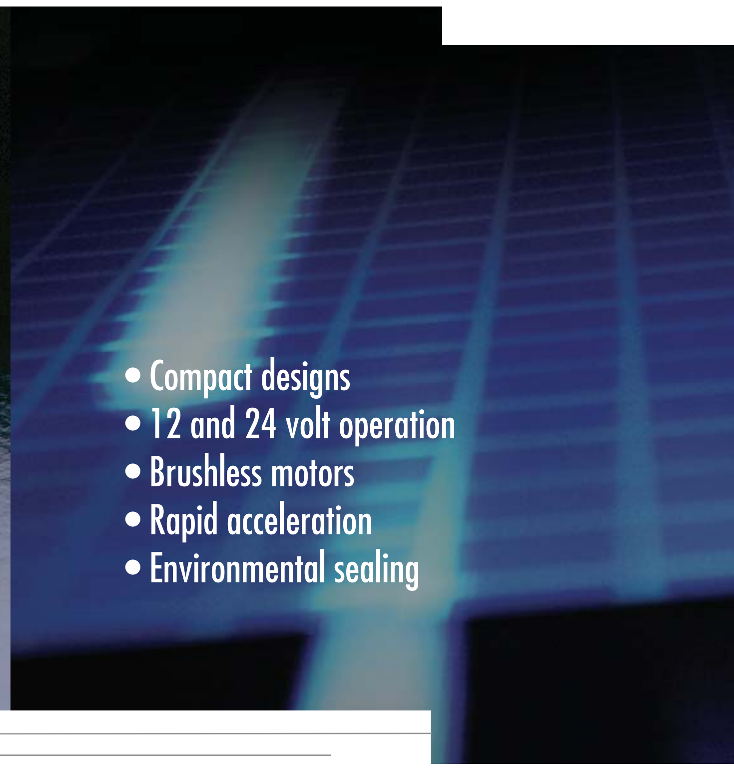
Mounting Dimensions



Pancake Gearmotor:

Compact Brushless DC Gearmotor





Pancake Gearmotor Series: Design Features

The Pancake Gearmotor combines a brushless DC motor with precision gearing in a lightweight, aluminum housing to provide a compact solution. This unique design makes system integration easy. You no longer have to purchase the motor, gearhead, and electronics bracket from different sources.

Parker Bayside does all of the work for you. From component sourcing to actual assembly, Parker Bayside engineers designed the Pancake Gearmotor with your application in mind.

Single Integrated Package

- Environmentally sealed
- Available with brake and encoder add-ons
- Rugged aluminum alloy housing
- Durable anodized finish
- Customized mounting to fit any application

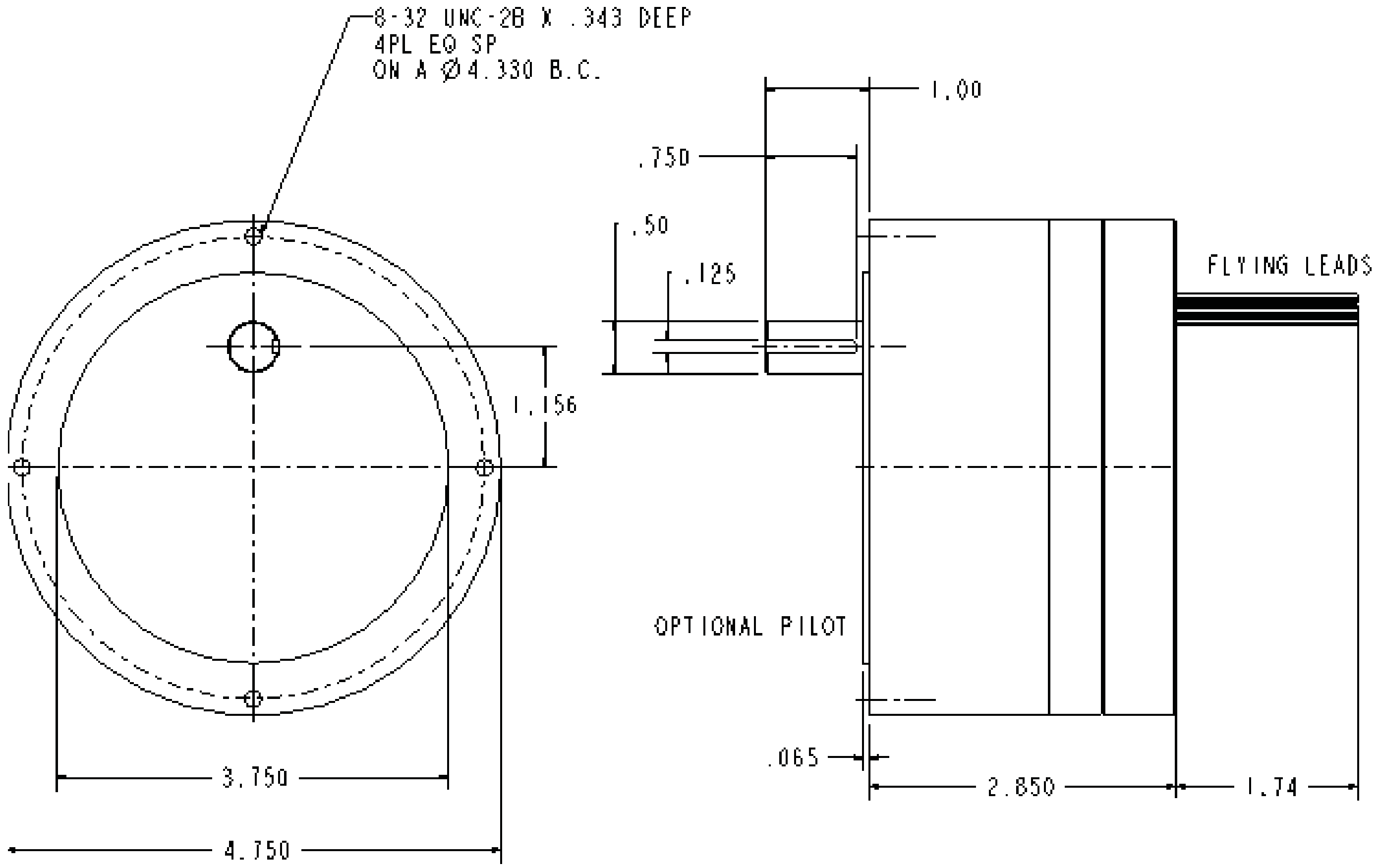
Brushless DC Motor

- Maintenance-free brushless design
- Low EMI
- Greater power-to-size factor than brush DC motors
- Built-in position and velocity sensing

Compact Gear Reduction

- Wide range of gear ratios
- Ideal for low-speed applications
- Precision ball bearings throughout
- Reduces load inertia for maximum performance

Dimensions



Flying leads

Color Coding	
Black	GND
Red	Vref
Green	Sensor C
Blue	Sensor B
Yellow	Sensor A
White	Phase C
Brown	Phase A
Orange	Phase B

Mechanical Specifications

Model	Weight (kg) / (lb)	Radial Load (N) / (lb)	Axial Load (N) / (lb)	Backlash (arc min)
GM50	2.3 / 5	223 / 50	45 / 10	30

Performance Specifications

Model	Ratio	Max Speed) (RPM	Torque (Nm)/(in-lbs)	Voltage (volts DC)	Current (amps)
GM50-152	152.51:1	27	19.8/175	12/24	4.6/2.3
GM50-100	100.65:1	40	18.1/160	12/24	6.4/3.2
GM50-043	42.47:1	93	7.9/70	12/24	6.4/3.2
GM50-011	10.51:1	364	2.0/18	12/24	6.3/3.2

How to Order

Order Numbering Example: G M 5 0 – 0 1 0 XXX

RATIO
010 = 10.51:1
042 = 42.47:1
100 = 100.65:1
152 = 152.51:1

SPECIAL

Factory Issued

Call **1-800-305-4555** for application engineering assistance or for the name of your local distributor.

Specifications are subject to change without notice.