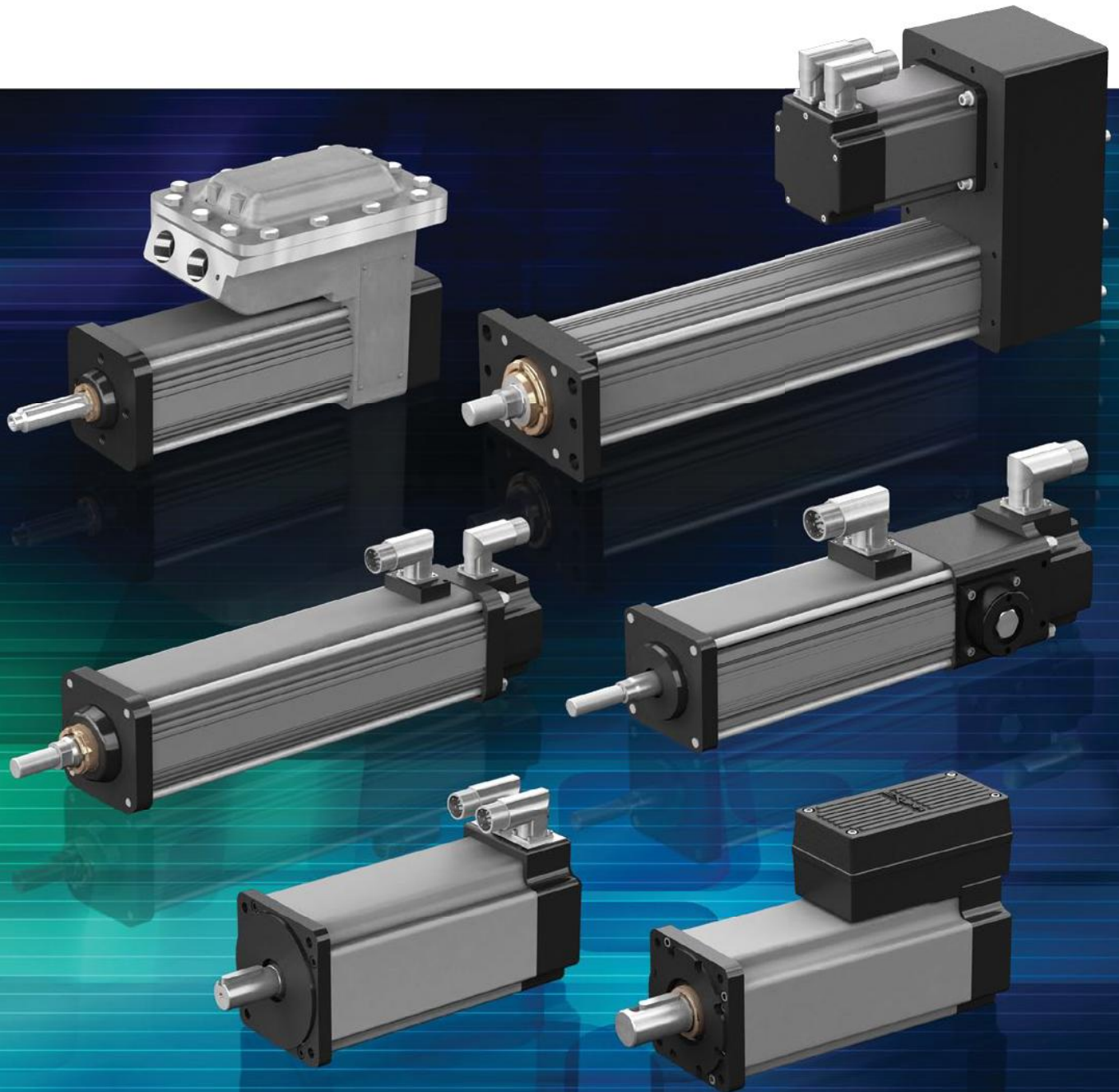


Electric Actuator

PRODUCT CATALOG



EXLAR
a Curtiss-Wright Company

GS Series Linear Actuators with Integrated Motor

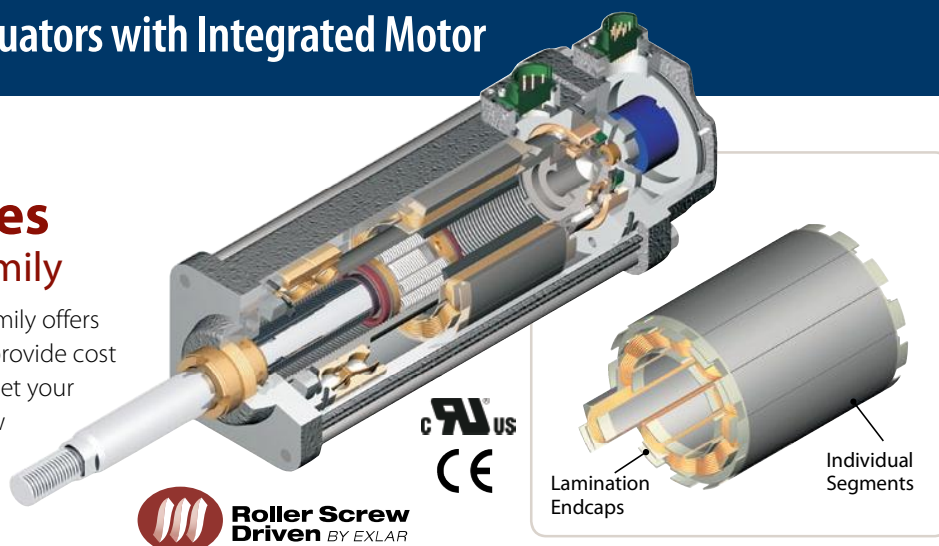
Exlar GS Series Linear Actuator Family

The GS Series linear actuator family offers you two grades of actuator to provide cost effective options in order to meet your application's requirements. View the chart below to compare the GSX and GSM models.

All GS Series actuators use a specially designed roller screw mechanism for converting electric motor power into linear motion within the actuator. Planetary rollers assembled around the actuator's extending rod follow threads which are precisely machined on the inside surface of the actuator's hollow armature. Linear motion is produced in precise synchronization with the armature rotation. Because this roller screw mechanism has an inherently larger cumulative contact surface, these actuators have a much longer working life, and can handle heavier loads at higher speeds than is possible from a similarly sized unit built around a ball screw system.

Exlar's T-LAM™ segmented lamination stator technology delivers higher continuous motor torque than is available in traditionally wound motors. T-LAM technology consists of stator segments, each containing individual phase wiring for maximum motor performance. The improved efficiencies of the GSX Series are a result of the limited heat generation qualities inherent in the segmented stator design as seen above. The elimination of end turns in the stator, and use of thermally conductive potting removes the parts most susceptible to failure in a traditional stator. Other design advantages include:

- Neodymium-iron-boron magnets provide high flux density and maximum motor torque.
- Thermally conductive potting of the entire stator provides increased heat dissipation and provides protection from contamination in oil-cooled units.
- Each stator segment contains individual phase wiring. External winding of individual segments provides maximum slot fill for maximum motor performance.
- Motors with T-LAM technology have Class 180 H insulation systems compliant with UL requirements.
- UL recognized component.
- Motors with T-LAM technology are CE compliant



The Actuator & Motor, All in one Compact Unit

With other actuator technologies, customers are usually responsible for engineering the completed linear motion system. This usually includes purchasing the motor, gear reducer, timing belt, mounting hardware, flexible couplings, etc. separately. Then they all must be assembled to perform properly in a given application.

GS Series actuators eliminate all this systems engineering. These units are single, fully integrated component packages – much smaller than traditional rotary-to-linear conversion mechanisms.

Designed for Closed Loop Servo Systems

Their brushless servo design means GS Series units can be used in advanced closed-loop servo systems when velocity and positioning is required. Position feedback can be delivered in a number of different forms. These include resolvers, encoders or internally mounted linear position feedback sensors.

GSX and GSM Differences	GSX (pg 4)	GSM (pg 42)
Roller Screw Option	High Capacity	Standard Capacity
Ingress Protection	IP65S	IP54S (IP65S optional)
No. of Stacks	1, 2, 3	1, 2
Life BSY (Ball Screw Years)	15X	2 to 5X
Oil Cooling	Yes	No
Food Grade Paint	Yes	No
Electroless Nickel Housing	Yes	Yes
Stainless Steel Case	Yes	No
Hard Coat Anodized	Yes	Yes
LVDT FB	Yes (except 2" frame)	Yes (except 2" frame)
5.5 in. Frame	Yes	No
7 in. Frame	Yes	No
Force (lbf)	92 - 15,000	92 - 3,966
1.0 Lead	50 & 60 only	No
Rear Brake	all	all
Speeds (ips)	5 - 40	5 - 37.5
Electroless Nickel Connectors	Yes	Yes
Backlash (in)	.004	.008

GSX Series Linear Actuators with Integrated Motor

GSX Series—High Capacity Roller Screw Option

For applications that require long life and continuous duty, even in harsh environments the GSX Series actuator offers a robust solution. The life of the GSX Series can exceed that of a ball screw actuator by 15X while delivering high speeds and high forces. This compact package has all the advantages that our GS Series offers.

Sealed for Long Life with Minimum Maintenance

GSX Series actuators have strong advantages whenever outside contaminants are an issue. In most rotary-to-linear devices, critical mechanisms are exposed to the environment. Thus, they must be frequently inspected, cleaned and lubricated.

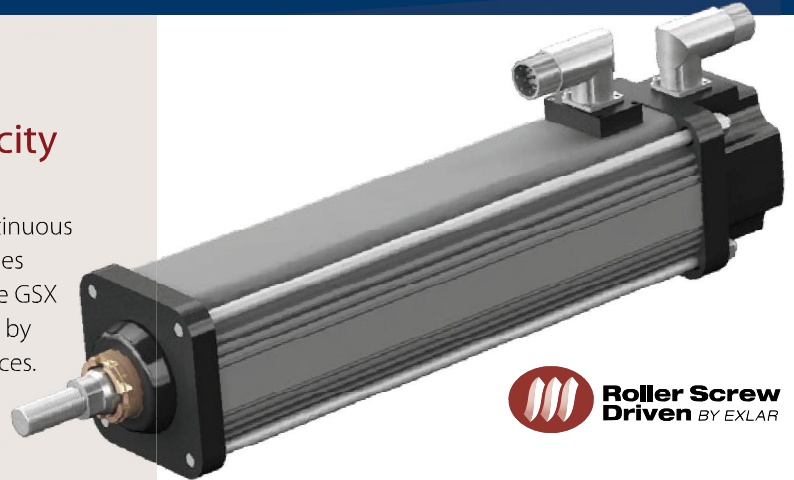
In contrast, the converting components in all Exlar GSX units are mounted within the sealed motor housing. With a simple bushing and seal arrangement on the smooth extending rod, abrasive particles or other contaminants are prevented from reaching the actuator's critical mechanisms. This assures trouble-free operation even in the most harsh environments.

Lubrication requirements are minimal. GSX actuators can be lubricated with either grease or recirculated oil. Grease lubricated units will run up to 10,000 hours without regreasing. Recirculated oil systems eliminate this type of maintenance altogether. A GSX Series actuator with a properly operating recirculating oil system will operate indefinitely without any other lubrication requirements.

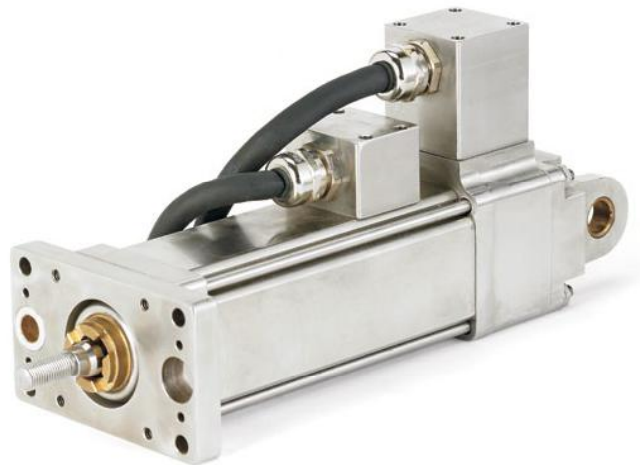
Available in Five Frame Sizes

2" GSX20 3" GSX30 4" GSX40
5" GSX50 7" GSX60

If you need a custom design, your local sales representative will work with you to engineer a solution specifically tailored to your application.



GSX Series



Feature	Standard	Optional
External anti-rotate mechanism	No	Yes
Internal Anti-rotate	No	Yes
Pre-loaded follower	No	Yes
Electric brake	No	Yes
External End switches	No	Yes
Connectors	MS or Threaded Circular Style Connectors	Electroless Nickel Connectors/ Male NPT with Potted Leads/ Manufacturers Connectors
Mounting Style	Extended Tie Rods, Side Tapped Mounting Holes, Trunnion, Rear Clevis, Front or Rear Flange	Custom Mountings
Rod End	Male or Female: U.S. Standard or Metric	Specials Available To Meet OEM Requirements
Lubrication	Greased, Oil Connection Ports are Built-in for Customer Supplied Recirculated Oil Lubrication	Specials Available To Meet OEM Requirements
Primary Feedback	Standard Encoders or Resolvers to Meet Most Amplifier Requirements	Custom Feedback
Absolute Linear Feedback	No	ICT, including signal conditioner

GSX Series Linear Actuators with Integrated Motor

Exlar GSX Series Linear Actuators Applications Include:

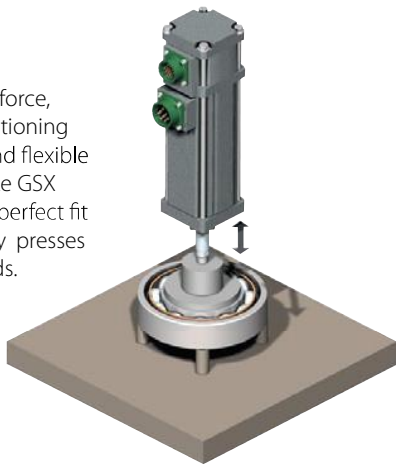
Hydraulic cylinder replacement
Ball screw replacement
Pneumatic cylinder replacement
Chip and wafer handling
Automated flexible fixturing
Dispensers
Machine tool
Automated assembly
Parts clamping
Automatic tool changers
Volumetric pumps

Medical equipment
Conveyor diverters / gates
Plastics equipment
Cut-offs
Die cutters
Packaging machinery
Entertainment
Sawmill equipment
Open / close doors
Fillers
Formers
Precision grinders
Indexing stages

Lifts
Product sorting
Material cutting
Material handling
Riveting / fastening / joining
Molding
Volumetric pumps
Semiconductor
Pick and place systems
Robot manipulator arms
Simulators
Precision valve control

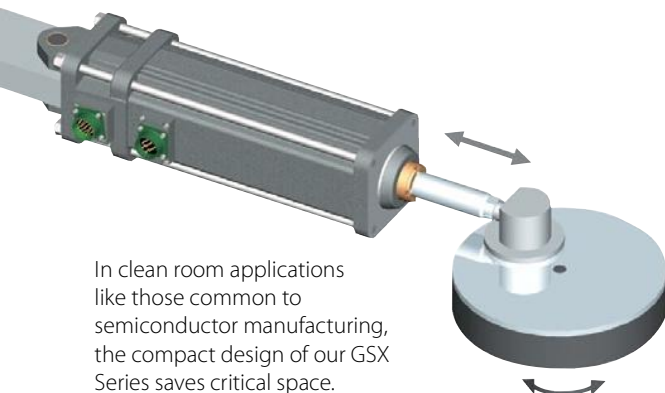
Ventilation control systems
Pressing
Process control
Tube bending
Welding
Stamping
Test stands
Tension control
Web guidance
Wire winding
Food Processing

Repeatable force, reliable positioning accuracy, and flexible control make GSX actuators a perfect fit for assembly presses or test stands.



Because they cycle quickly and can be synchronized to line speeds, Exlar actuators produce dramatic improvements in web control applications.

In clean room applications like those common to semiconductor manufacturing, the compact design of our GSX Series saves critical space.



Repeatable force control plus positioning accuracy extends the life of costly tools when Exlar linear actuators are used in precision clamping applications.

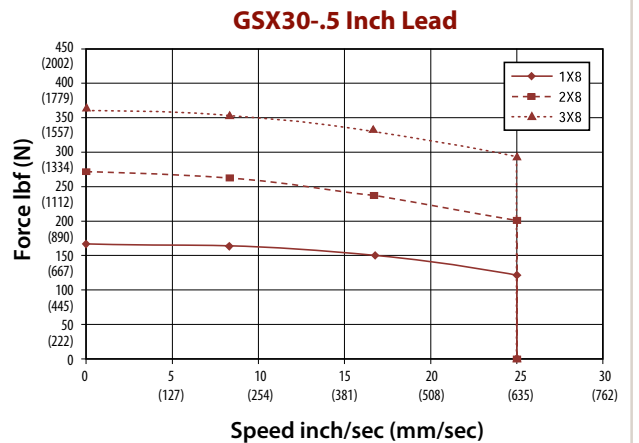
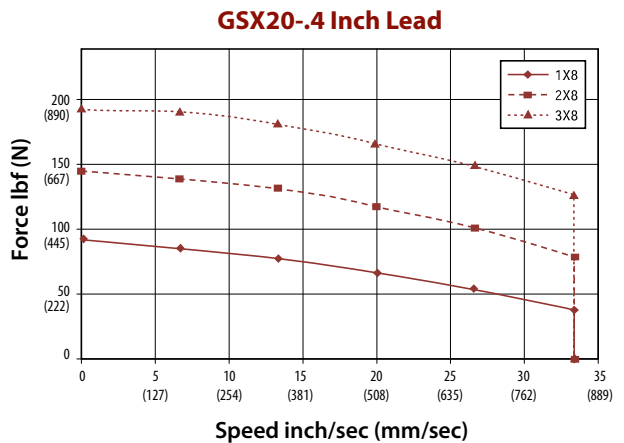
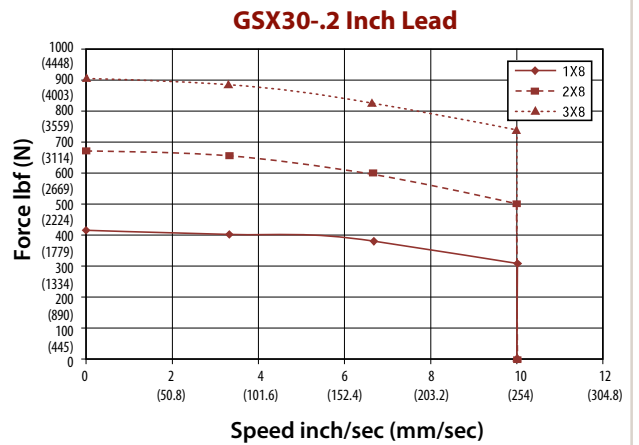
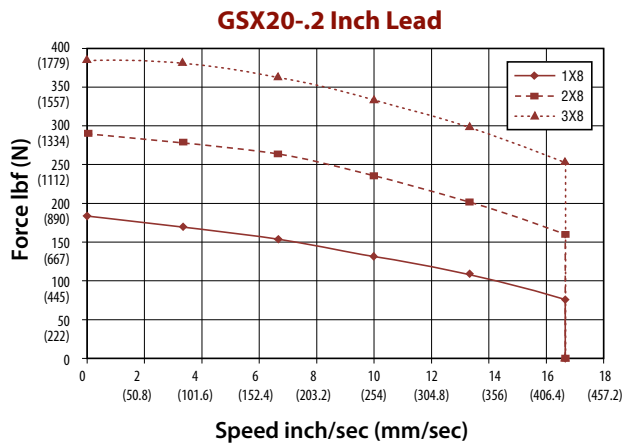
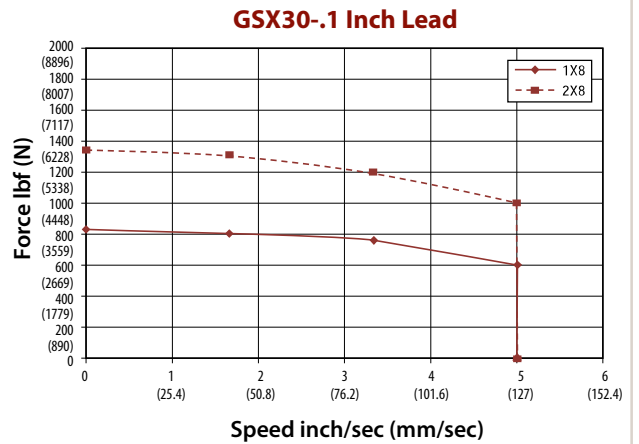
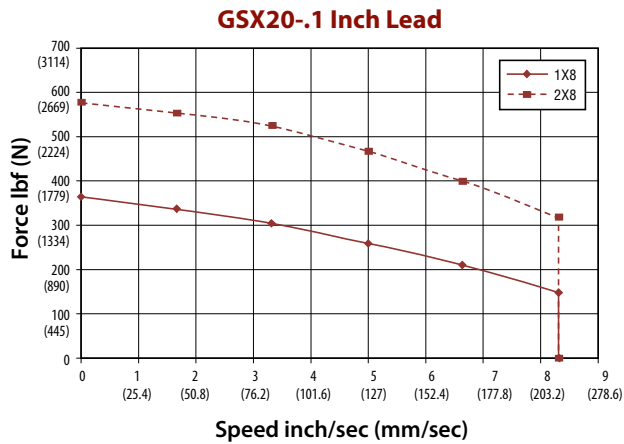


GSX Series Linear Actuators with Integrated Motor

GSX Series Speed vs. Force Curves

These charts represent typical linear speed versus linear force curves for the GSX actuators using common brushless motor amplifiers. The GSX Series are compatible with many different brushless motor amplifiers, and differences in the

performance ratings of these amplifiers can alter the actuator's performance. Thus, the curves below should be used for estimation only. (Further information is available by contacting your local sales representative.)

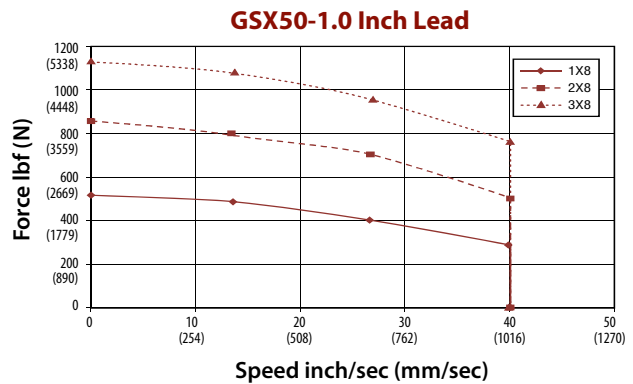
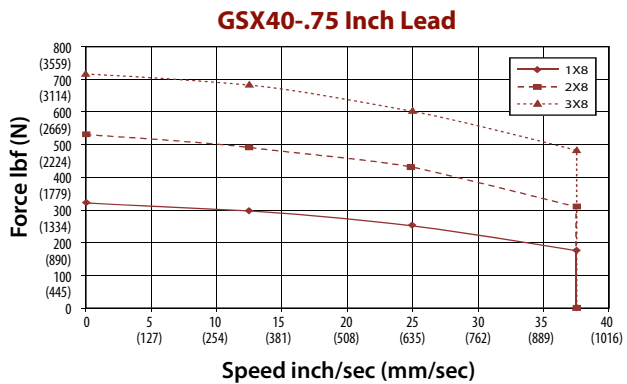
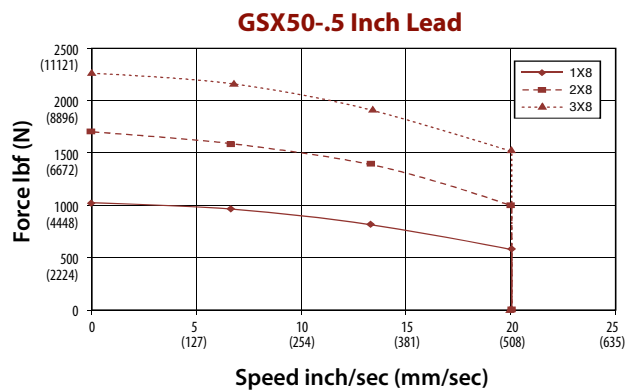
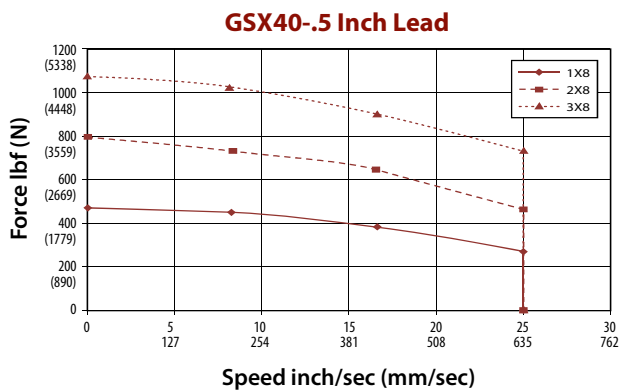
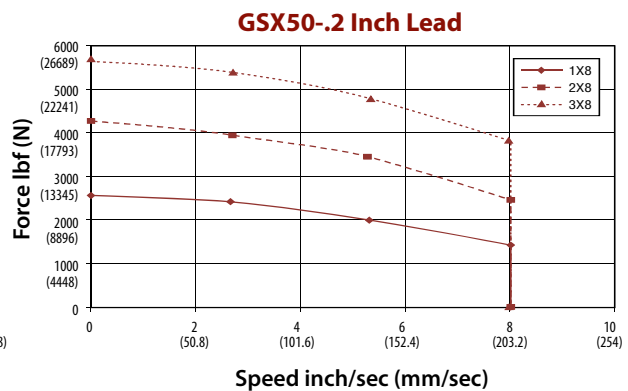
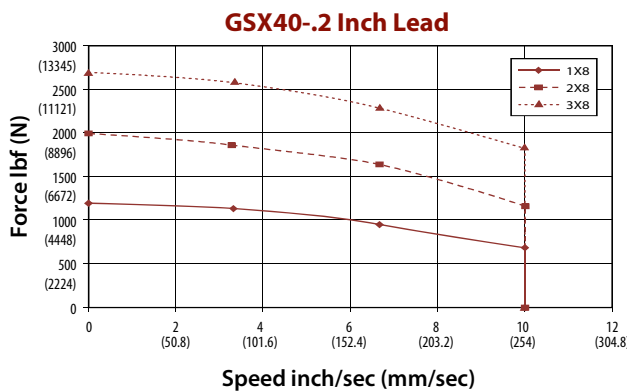
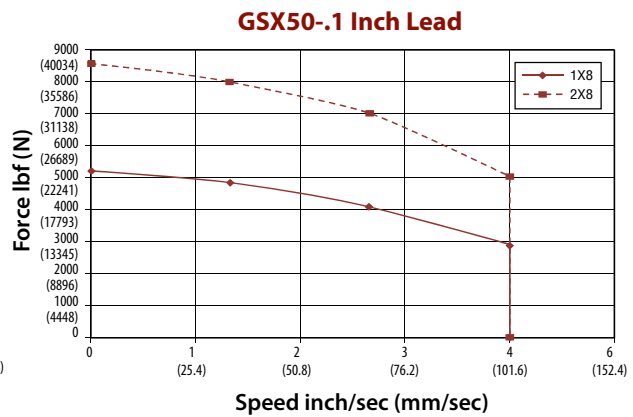
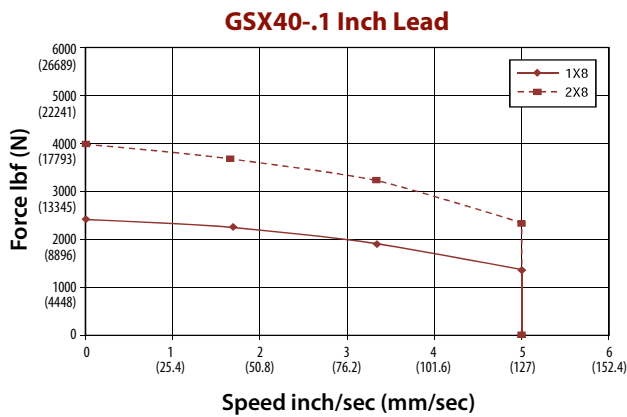


See page 28 for explanation of motor stator options (1x8, 2x8, 3x8)

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4" for GSX20 and 10" x 10" x 3/8" for GSX30

GSX Series Linear Actuators with Integrated Motor

GSX Series Speed vs. Force Curves



See page 28 for explanation of motor stator options (1x8, 2x8, 3x8)

Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" for GSX40 and 12" x 12" x 1/2" for GSX50

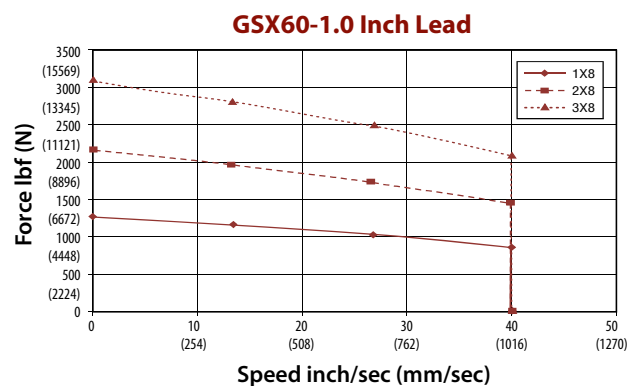
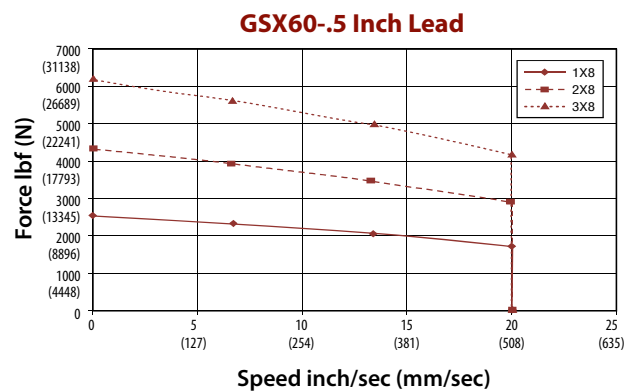
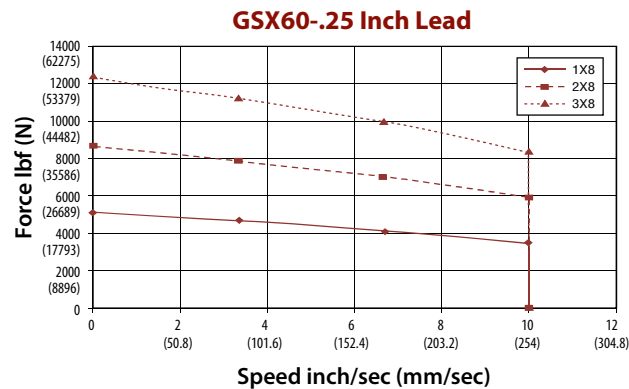
GSX Series Linear Actuators with Integrated Motor

GSX Series Speed vs. Force Curves

These charts represent typical linear speed versus linear force curves for GSX actuators using common brushless motor amplifiers. The GSX Series are compatible with many different brushless motor amplifiers, and differences in the

performance ratings of these amplifiers can alter the actuator's performance. Thus, the curves below should be used for estimation only. (Further information is available by contacting your local sales representative.)

GSX Series



See page 28 for explanation of motor stator options (1x8, 2x8, 3x8)

GSX Series Linear Actuators with Integrated Motor

GSX Series Lifetime Curves

The L_{10} expected life of a roller screw linear actuator is expressed as the linear travel distance that 90% of properly maintained roller screws manufactured are expected to meet or exceed. For higher than 90% reliability, the result should be multiplied by the following factors: 95% x 0.62; 96% x 0.53; 97% x 0.44; 98% x 0.33; 99% x 0.21. This is not a guarantee and these charts should be used for estimation purposes only.

The underlying formula that defines this value is:

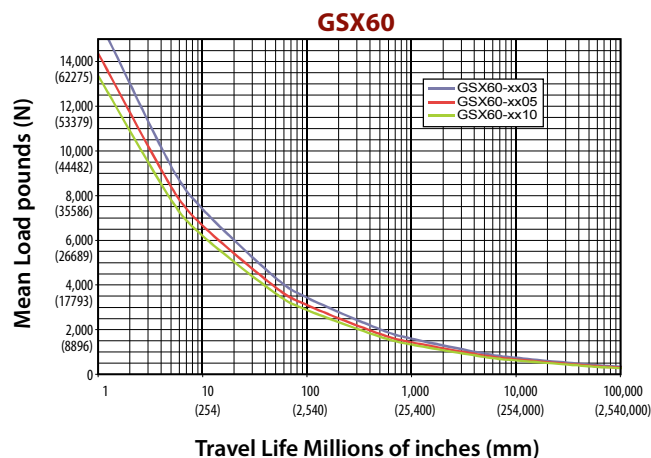
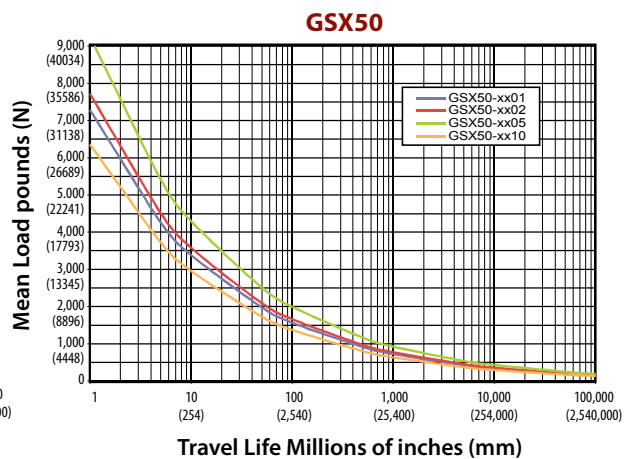
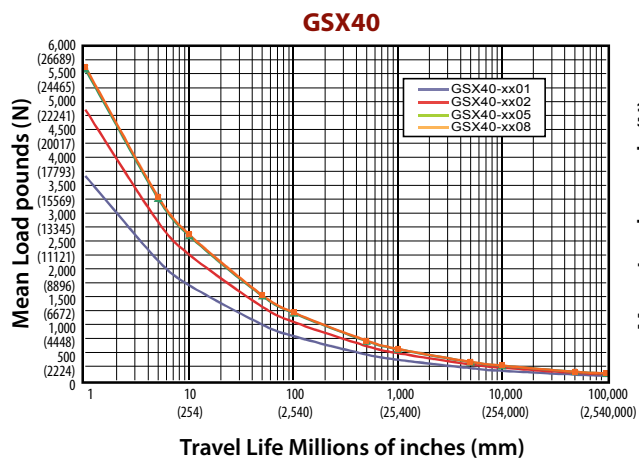
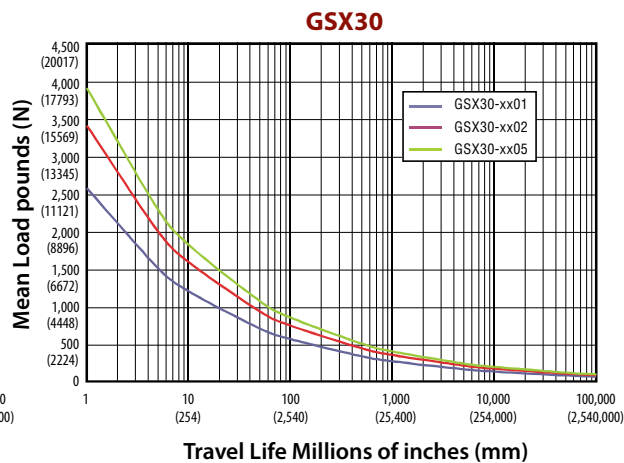
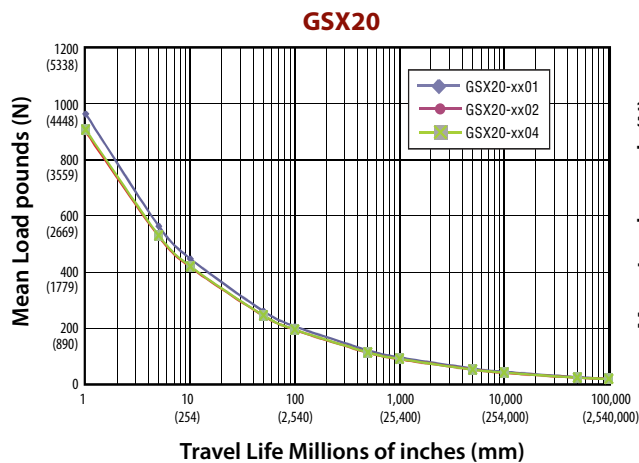
Travel life in millions of inches, where:

C = Dynamic load rating (lbf)

F = Cubic mean applied load (lbf) $L_{10} = \left(\frac{C}{F}\right)^3 \times S$

S = Roller screws lead (inches)

All curves represent properly lubricated and maintained actuators.



GSX Series Linear Actuators with Integrated Motor

GSX20 & GSX30 Performance Specifications

Model No.	Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Continuous Force Rating lb (N) 1/2/3 stack	Max Velocity in/sec (mm/sec)	Maximum Static Load lb (N)	Armature Inertia** lb-in-s ² (Kg-m ²)	Dynamic Load Rating lb (N)	Weight (approx.) lb (kg)
GSX20-0301	2.25 (57)	3 (76)	0.1 (2.54)	367/578/NA (1,632/2,571/NA)	8.33 (211.67)	1250 (5560)	0.00101 (0.000114)	2075 (9230)	6.5 (2.9)
GSX20-0302			0.2 (5.08)	195/307/NA (867/1,366/NA)	16.77 (423.33)			1540 (6850)	
GSX20-0304			0.4 (10.16)	103/163/NA (459/723/NA)	33.33 (846.67)			1230 (5471)	
GSX20-0601	2.25 (57)	6 (152)	0.1 (2.54)	367/578/NA (1,632/2,571/NA)	8.33 (211.67)	1250 (5560)	0.00114 (0.000129)	2075 (9230)	8.0 (3.6)
GSX20-0602			0.2 (5.08)	195/307/409 (867/1,366/1,817)	16.67 (423.33)			1540 (6850)	
GSX20-0604			0.4 (10.16)	103/163/216 (459/723/962)	33.33 (846.67)			1230 (5471)	
GSX20-1001	2.25 (57)	10 (254)	0.1 (2.54)	367/578/NA (1,632/2,571/NA)	8.33 (211.67)	1250 (5560)	0.00133 (0.000150)	2075 (9230)	9.5 (4.3)
GSX20-1002			0.2 (5.08)	195/307/409 (867/1,366/1,817)	16.67 (423.33)			1540 (6850)	
GSX20-1004			0.4 (10.16)	103/163/216 (459/723/962)	33.33 (846.67)			1230 (5471)	
GSX20-1201	2.25 (57)	12 (305)	0.1 (2.54)	367/578/NA (1,632/2,571/NA)	8.33 (211.67)	1250 (5560)	0.00143 (0.000162)	2075 (9230)	11.0 (4.9)
GSX20-1202			0.2 (5.08)	195/307/409 (867/1,366/1,817)	16.67 (423.33)			1540 (6850)	
GSX20-1204			0.4 (10.16)	103/163/216 (459/723/962)	33.33 (846.67)			1230 (5471)	
GSX30-0301	3.125 (79)	3 (76)	0.1 (2.54)	792/1,277/NA (3,521/5,680/NA)	5 (127)	2700 (12010)	0.00319 (0.000360)	5516 (24536)	9.5 (4.3)
GSX30-0302			0.2 (5.08)	449/724/NA (1,995/3,219/NA)	10 (254)			5800 (25798)	
GSX30-0305			0.5 (12.7)	190/306/NA (845/1,363/NA)	25 (635)			4900 (21795)	
GSX30-0601	3.125 (79)	5.9 (152)	0.1 (2.54)	792/1,277/NA (3,521/5,680/NA)	5 (127)	2700 (12010)	0.00361 (0.000408)	5516 (24536)	11.5 (5.2)
GSX30-0602			0.2 (5.08)	449/724/1,020 (1,995/3,219/4,537)	10 (254)			5800 (25798)	
GSX30-0605			0.5 (12.7)	190/306/432 (845/1,363/1,922)	25 (635)			4900 (21795)	
GSX30-1001	3.125 (79)	10 (254)	0.1 (2.54)	792/1,277/NA (3,521/5,680/NA)	5 (127)	2700 (12010)	0.00416 (0.00047)	5516 (24536)	19 (8.6)
GSX30-1002			0.2 (5.08)	449/724/1,020 (1,995/3,219/4,537)	10 (254)			5800 (25798)	
GSX30-1005			0.5 (12.7)	190/306/432 (845/1,363/1,922)	25 (635)			4900 (21795)	
GSX30-1201	3.125 (79)	12 (305)	0.1 (2.54)	792/1,277/NA (3,521/5,680/NA)	5 (127)	2700 (12010)	0.00443 (0.000501)	5516 (24536)	20.5 (9.3)
GSX30-1202			0.2 (5.08)	449/724/1,020 (1,995/3,219/4,537)	10 (254)			5800 (25798)	
GSX30-1205			0.5 (12.7)	190/306/432 (845/1,363/1,922)	25 (635)			4900 (21795)	
GSX30-1401	3.125 (79)	14 (356)	0.1 (2.54)	792/1,277/NA (3,521/5,680/NA)	5 (127)	2700 (12010)	0.00473 (0.000534)	5516 (24536)	20.5 (9.3)
GSX30-1402			0.2 (5.08)	449/724/1,020 (1,995/3,219/4,537)	10 (254)			5800 (25798)	
GSX30-1405			0.5 (12.7)	190/306/432 (845/1,363/1,922)	25 (635)			4900 (21795)	
GSX30-1801	3.125 (79)	18 (457)	0.1 (2.54)	792/1,277/NA (3,521/5,680/NA)	5 (127)	2700 (12010)	0.00533 (0.000602)	5516 (24536)	25 (11.3)
GSX30-1802			0.2 (5.08)	449/724/1,020 (1,995/3,219/4,537)	10 (254)			5800 (25798)	
GSX30-1805			0.5 (12.7)	190/306/432 (845/1,363/1,922)	25 (635)			4900 (21795)	
GSX30-2401	3.125 (79)	24 (610)	0.1 (2.54)	792/1,277/NA (3,521/5,680/NA)	5 (127)	2700 (12010)	0.00615 (0.000695)	5516 (24536)	30 (13.6)
GSX30-2402			0.2 (5.08)	449/724/1,020 (1,995/3,219/4,537)	10 (254)			5800 (25798)	
GSX30-2405			0.5 (12.7)	190/306/432 (845/1,363/1,922)	25 (635)			4900 (21795)	

**Inertia +/- 5%
See page 13 for definition of terms.

Specifications subject to change without notice.

GSX Series Linear Actuators with Integrated Motor

GSX40 Performance Specifications

Model No.	Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Continuous Force Rating lb (N) 1/2/3 stack	Max Velocity in/sec (mm/sec)	Maximum Static Load lb (N)	Armature Inertia** lb-in-s ² (Kg-m ²)	Dynamic Load Rating lb (N)	Weight (approx.) lb (kg)
GSX40-0401	3.9 (99)	4 (102)	0.1 (2.54)	2,089/NA/NA (9,293/NA/NA)	5 (127)	5400 (24020)	0.0140 (0.001582)	7900 (35141)	16 (7.3)
GSX40-0402			0.2 (5.08)	1,194/NA/NA (5,310/NA/NA)	10 (254)			8300 (36920)	
GSX40-0405			0.5 (12.7)	537/NA/NA (2,390/NA/NA)	25 (635)			7030 (31271)	
GSX40-0408			0.75 (19.05)	358/NA/NA (1,593/NA/NA)	37.5 (953)			6335 (28179)	
GSX40-0601	3.9 (99)	6 (152)	0.1 (2.54)	2,089/3,457/NA (9,293/15,377/NA)	5 (127)	5400 (24020)	0.0152 (0.001717)	7900 (35141)	20 (9.1)
GSX40-0602			0.2 (5.08)	1,194/1,975/NA (5,310/8,787/NA)	10 (254)			8300 (36920)	
GSX40-0605			0.5 (12.7)	537/889/NA (2,390/3,954/NA)	25 (635)			7030 (31271)	
GSX40-0608			0.75 (19.05)	358/593/NA (1,593/2,636/NA)	37.5 (953)			6335 (28179)	
GSX40-0801	3.9 (99)	8 (203)	0.1 (2.54)	2,089/3,457/NA (9,293/15,377/NA)	5 (127)	5400 (24020)	0.0163 (0.001842)	7900 (35141)	24 (10.9)
GSX40-0802			0.2 (5.08)	1,194/1,975/2,687 (5,310/8,787/11,950)	10 (254)			8300 (36920)	
GSX40-0805			0.5 (12.7)	537/889/1,209 (2,390/3,954/5,378)	25 (635)			7030 (31271)	
GSX40-0808			0.75 (19.05)	358/593/806 (1,593/2,636/3,585)	37.5 (953)			6335 (28179)	
GSX40-1001	3.9 (99)	10 (254)	0.1 (2.54)	2,089/3,457/NA (9,293/15,377/NA)	5 (127)	5400 (24020)	0.0175 (0.001977)	7900 (35141)	28 (12.7)
GSX40-1002			0.2 (5.08)	1,194/1,975/2,687 (5,310/8,787/11,950)	10 (254)			8300 (36920)	
GSX40-1005			0.5 (12.7)	537/889/1,209 (2,390/3,954/5,378)	25 (635)			7030 (31271)	
GSX40-1008			0.75 (19.05)	358/593/806 (1,593/2,636/3,585)	37.5 (953)			6335 (28179)	
GSX40-1201	3.9 (99)	12 (305)	0.1 (2.54)	2,089/3,457/NA (9,293/15,377/NA)	5 (127)	5400 (24020)	0.0186 (0.002102)	7900 (35141)	32 (14.5)
GSX40-1202			0.2 (5.08)	1,194/1,975/2,687 (5,310/8,787/11,950)	10 (254)			8300 (36920)	
GSX40-1205			0.5 (12.7)	537/889/1,209 (2,390/3,954/5,378)	25 (635)			7030 (31271)	
GSX40-1208			0.75 (19.05)	358/593/806 (1,593/2,636/3,585)	37.5 (953)			6335 (28179)	
GSX40-1801	3.9 (99)	18 (457)	0.1 (2.54)	2,089/3,457/NA (9,293/15,377/NA)	5 (127)	5400 (24020)	0.022 (0.002486)	7900 (35141)	44 (20)
GSX40-1802			0.2 (5.08)	1,194/1,975/2,687 (5,310/8,787/11,950)	10 (254)			8300 (36920)	
GSX40-1805			0.5 (12.7)	537/889/1,209 (2,390/3,954/5,378)	25 (635)			7030 (31271)	

**Inertia +/- 5%
See page 13 for definition of terms.

Specifications subject to change without notice.

GSX Series Linear Actuators with Integrated Motor

GSX50 & GSX60 Performance Specifications

Model No.	Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Continuous Force Rating lb (N) 1/2/3 stack	Max Velocity in/sec (mm/sec)	Maximum Static Load lb (N)	Armature Inertia** lb-in-s ² (Kg-m ²)	Dynamic Load Rating lb (N)	Weight (approx.) lb (kg)
GSX50-0601	5.5 (140)	6 (152)	0.1 (2.54)	4,399/7,150/NA (19,568/31,802/NA)	4 (101.6)	13200 (58717)	0.03241 (0.003662)	15693 (69806)	54 (24)
GSX50-0602			0.2 (5.08)	2,578/4,189/NA (11,466/18,634/NA)	8 (203)			13197 (58703)	
GSX50-0605			0.5 (12.7)	1,237/2,011/NA (5,503/8,944/NA)	20 (508)			11656 (51848)	
GSX50-0610			1.0 (25.4)	619/1,005/NA (2,752/4,472/NA)	40 (1016)			6363 (28304)	
GSX50-1001	5.5 (140)	10 (254)	0.1 (2.54)	4,399/7,150/NA (19,568/31,802/NA)	4 (101.6)	13200 (58717)	0.03725 (0.004209)	15693 (69806)	62 (28)
GSX50-1002			0.2 (5.08)	2,578/4,189/5,598 (11,466/18,634/24,901)	8 (203)			13197 (58703)	
GSX50-1005			0.5 (12.7)	1,237/2,011/2,687 (5,503/8,944/11,953)	20 (508)			11656 (51848)	
GSX50-1010			1.0 (25.4)	619/1,005/1,344 (2,752/4,472/5,976)	40 (1016)			6363 (28304)	
GSX50-1402	5.5 (140)	14 (356)	0.2 (5.08)	2,578/4,189/5,598 (11,466/18,634/24,901)	8 (203)	13200 (58717)	0.04208 (0.004756)	13197 (58703)	70 (32)
GSX50-1405			0.5 (12.7)	1,237/2,011/2,687 (5,503/8,944/11,953)	20 (508)			11656 (51848)	
GSX60-0603	7.0 (178)	6 (152)	0.25 (6.35)	4,937/8,058/11,528 (21,958/35,843/51,278)	10 (254)	25000 (111200)	0.1736 (0.019614)	25300 (112540)	69 (31)
GSX60-0605			0.5 (12.7)	2,797/4,566/6,533 (12,443/20,311/29,058)	20 (508)			22800 (101420)	
GSX60-0610			1.0 (25.4)	1,481/2,417/3,459 (6,588/10,753/15,383)	40 (1018)			21200 (94302)	
GSX60-1003	7.0 (178)	10 (254)	0.25 (6.35)	4,937/8,058/11,528 (21,958/35,843/51,278)	10 (254)	25000 (111200)	0.1943 (0.021953)	25300 (112540)	101 (46)
GSX60-1005			0.5 (12.7)	2,797/4,566/6,533 (12,443/20,311/29,058)	20 (508)			22800 (101420)	
GSX60-1010			1.0 (25.4)	1,481/2,417/3,459 (6,588/10,753/15,383)	40 (1018)			21200 (94302)	

**Inertia +/- 5%

Specifications subject to change without notice.

DEFINITION OF TERMS:

Continuous Force Rating: The linear force produced by the actuator at continuous motor torque.

Max Velocity: The linear velocity that the actuator will achieve at rated motor rpm.

Maximum Static Load: The mechanical load limit of the actuator if re-circulated oil or other cooling method is used to allow higher than rated torque from the motor.

Armature Inertia: The rotary inertia of the armature of the GSX Series actuators. For calculation purposes, this value includes the screw inertia in a GSX actuator.

Dynamic Load Rating: A design constant used in calculating the estimated travel life of the roller screw. The cubic mean load is the load at which the device will perform one million revolutions.

GSX offers 1, 2, or 3 stack stators providing 3 torque force levels.

GSX Series Linear Actuators with Integrated Motor

GSX20 Mechanical and Electrical Specifications

Nominal Backlash	in (mm)	0.004 (.10)											
Maximum Backlash (pre-loaded)	in (mm)	0.0											
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)											
Maximum Radial Load	lb (N)	20 (90)											
Environmental Rating: Standard		IP65S											
Motor Stator		118	138	158	168	218	238	258	268	318*	338*	358*	368*
RMS SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in (Nm)	7.6 (0.86)	7.3 (0.83)	7.0 (0.79)	7.0 (0.79)	11.9 (1.34)	11.5 (1.30)	11.0 (1.25)	11.3 (1.28)	15.0 (1.70)	15.3 (1.73)	14.6 (1.65)	14.9 (1.69)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	2.5 (0.28)	5.2 (0.59)	7.5 (0.85)	9.5 (1.07)	2.5 (0.28)	5.2 (0.59)	8.6 (0.97)	10.1 (1.15)	2.5 (0.29)	5.3 (0.59)	8.8 (0.99)	10.1 (1.15)
Continuous Current Rating:	Greased (IG) A	3.4	1.6	1.0	0.8	5.4	2.5	1.4	1.2	6.6	3.2	1.9	1.6
	Oiled (IL) A	6.9	3.1	2.1	1.6	10.8	4.9	2.9	2.5	13.2	6.5	3.7	3.3
Peak Current Rating	A	6.9	3.1	2.1	1.6	10.8	4.9	2.9	2.5	13.2	6.5	3.7	3.3
0-PK SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in (Nm)	7.6 (0.86)	7.3 (0.83)	7.0 (0.79)	7.0 (0.79)	11.9 (1.34)	11.5 (1.30)	11.0 (1.25)	11.3 (1.28)	15.0 (1.70)	15.3 (1.73)	14.6 (1.65)	14.9 (1.69)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	1.7 (0.20)	3.7 (0.42)	5.3 (0.60)	6.7 (0.76)	1.7 (0.20)	3.7 (0.42)	6.1 (0.69)	7.2 (0.81)	1.8 (0.20)	3.7 (0.42)	6.2 (0.70)	7.2 (0.81)
Continuous Current Rating	Greased (IG) A	4.9	2.2	1.5	1.2	7.6	3.5	2.0	1.8	9.4	4.6	2.6	2.3
	Oiled (IL) A	9.7	4.5	2.9	2.3	15.2	7.0	4.1	3.5	18.7	9.2	5.3	4.7
Peak Current Rating	A	9.7	4.5	2.9	2.3	15.2	7.0	4.1	3.5	18.7	9.2	5.3	4.7
MOTOR STATOR DATA													
Voltage Constant (Ke) (+/- 10% @ 25 °C)	Vrms/Krpm	16.9	35.5	51.5	64.8	16.9	35.5	58.6	69.3	17.3	36.0	59.9	69.3
	Vpk/Krpm	23.9	50.2	72.8	91.7	23.9	50.2	82.9	98.0	24.5	50.9	84.8	98.0
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25 °C)	Ohms	2.6	12.5	28.8	45.8	1.1	5.3	15.5	20.7	0.76	3.1	9.6	12.2
Inductance (L-L)(+/- 15%)	mH	4.6	21.4	47.9	68.3	2.5	10.2	28.3	39.5	1.7	7.4	18.5	27.4
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.00012 (0.135)											
Brake Current @ 24 VDC	A	0.33											
Brake Holding Torque	lbf-in (Nm)	19 (2.2)											
Brake Engage/Disengage Time	ms	14/28											
Mechanical Time Constant (tm), ms	min	4.7	5.1	5.5	5.6	2.0	2.1	2.3	2.2	1.3	1.2	1.4	1.3
	max	6.6	7.2	7.9	7.9	2.8	3.0	3.3	3.1	1.8	1.8	1.9	1.8
Electrical Time Constant (te)	ms	1.8	1.7	1.7	1.5	2.2	1.9	1.8	1.9	2.3	2.4	1.9	2.2
Friction Torque	lbf-in (Nm)	1.0 (0.11)				1.1 (0.12)				1.1 (0.12)			
Additional Friction Torque for Preloaded Screw	lbf-in (Nm)	1.25 (0.14)				1.25 (0.14)				1.25 (0.14)			
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	5000											
Insulation Class		180 (H)											

All ratings at 25 degrees Celsius

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

*Refer to performance specifications on page 11 for availability of 3 stack stator by stroke/lead combination.

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4"

Specifications subject to change without notice.

GSX Series Linear Actuators with Integrated Motor

GSX30 Mechanical and Electrical Specifications

Nominal Backlash	in (mm)	0.004 (.10)											
Maximum Backlash (pre-loaded)	in (mm)	0.0											
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)											
Maximum Radial Load	lb (N)	30 (134)											
Environmental Rating: Standard		IP65S											
Motor Stator		118	138	158	168	218	238	258	268	318*	338*	358*	368*
RMS SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in (Nm)	16.9 (1.91)	16.8 (1.90)	16.3 (1.84)	16.0 (1.81)	26.9 (3.04)	27.1 (3.06)	26.7 (3.01)	27.0 (3.05)	38.7 (4.37)	38.2 (4.32)	36.2 (4.09)	36.3 (4.10)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	4.4 (0.49)	8.7 (0.99)	15.5 (1.75)	17.5 (1.97)	4.4 (0.49)	8.7 (0.99)	15.5 (1.75)	17.5 (1.97)	4.4 (0.50)	8.7 (0.98)	15.6 (1.77)	17.5 (1.98)
Continuous Current Rating:	Greased (IG) A	4.3	2.2	1.2	1.0	6.9	3.5	1.9	1.7	9.7	4.9	2.6	2.3
	Oiled (IL) A	8.6	4.3	2.4	2.0	13.8	6.9	3.8	3.4	19.5	9.9	5.2	4.6
Peak Current Rating	A	8.6	4.3	2.4	2.0	13.8	6.9	3.8	3.4	19.5	9.9	5.2	4.6
O-PK SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in (Nm)	16.9 (1.91)	16.8 (1.90)	16.3 (1.84)	16.0 (1.81)	26.9 (3.04)	27.1 (3.06)	26.7 (3.01)	27.0 (3.05)	38.7 (4.37)	38.2 (4.32)	36.2 (4.09)	36.3 (4.10)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	3.1 (0.35)	6.2 (0.70)	11.0 (1.24)	12.4 (1.40)	3.1 (0.35)	6.2 (0.70)	11.0 (1.24)	12.4 (1.40)	3.1 (0.35)	6.1 (0.69)	11.1 (1.25)	12.4 (1.40)
Continuous Current Rating:	Greased (IG) A	6.1	3.0	1.7	1.4	9.7	4.9	2.7	2.4	13.8	7.0	3.7	3.3
	Oiled (IL) A	12.2	6.1	3.3	2.9	19.5	9.8	5.4	4.9	27.6	13.9	7.3	6.5
Peak Current Rating	A	12.2	6.1	3.3	2.9	19.5	9.8	5.4	4.9	27.6	13.9	7.3	6.5
MOTOR STATOR DATA													
Voltage Constant (Ke)	Vrms/Krpm	29.8	59.7	105.8	119.3	29.8	59.7	105.8	119.3	30.3	59.2	106.8	119.8
(+/- 10% @ 25 °C)	Vpk/Krpm	42.2	84.4	149.7	168.7	42.2	84.4	149.7	168.7	42.9	83.7	151.0	169.4
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L) (+/- 5% @ 25 °C)	Ohms	2.7	10.8	36.3	47.9	1.1	4.4	14.1	17.6	0.65	2.6	9.3	11.6
Inductance (L-L) (+/- 15%)	mH	7.7	30.7	96.8	123.0	3.7	14.7	46.2	58.7	2.5	9.5	30.9	38.8
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.00033 (0.38)											
Brake Current @ 24VDC	A	0.5											
Brake Holding Torque	lbf-in (Nm)	70 (8)											
Brake Engage/Disengage Time	ms	19/29											
Mechanical Time Constant (tm), ms	min	4.9	4.9	5.2	5.4	2.0	2.0	2.0	2.0	1.1	1.2	1.3	1.3
	max	9.4	9.5	10.1	10.5	3.9	3.8	3.9	3.8	2.2	2.3	2.5	2.5
Electrical Time Constant (te)	ms	2.9	2.8	2.7	2.6	3.3	3.4	3.3	3.3	3.8	3.7	3.3	3.3
Friction Torque	lbf-in (Nm)	1.5 (0.17)				1.7 (0.19)				1.9 (0.21)			
Additional Friction Torque for Preloaded Screw	lbf-in (Nm)	1.75 (0.20)				1.75 (0.20)				1.75 (0.20)			
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	3000											
Insulation Class		180 (H)											

All ratings at 25 degrees Celsius

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

*Refer to performance specifications on page 11 for availability of 3 stack stator by stroke/lead combination.

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 3/8"

Specifications subject to change without notice.

GSX Series Linear Actuators with Integrated Motor

GSX40 Mechanical and Electrical Specifications

Nominal Backlash	in (mm)	0.004 (.10)										
Maximum Backlash (pre-loaded)	in (mm)	0.0										
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)										
Maximum Radial Load	lb (N)	40 (179)										
Environmental Rating: Standard		IP65S										
Motor Stator		118	138	158	168	218	238	258	268	338*	358*	368*
RMS SINUSOIDAL COMMUTATION												
Continuous Motor Torque	lbf-in (Nm)	47.5 (5.37)	47.5 (5.36)	45.9 (5.19)	45.4 (5.13)	75.1 (8.49)	78.6 (8.89)	78.7 (8.89)	79.5 (8.99)	106.9 (12.08)	105.3 (11.90)	106.9 (12.08)
Torque Constant (Kt) (+/- 10% @ 25°C)	lbf-in/A (Nm/A)	4.1 (0.46)	8.2 (0.93)	14.5 (1.64)	16.8 (1.90)	4.1 (0.46)	8.2 (0.93)	14.5 (1.64)	16.8 (1.90)	8.4 (0.95)	14.5 (1.64)	16.8 (1.90)
Continuous Current Rating:	Greased (IG) A	12.9	6.5	3.5	3.0	20.5	10.7	6.0	5.3	14.2	8.1	7.1
	Oiled (IL) A	25.9	12.9	7.1	6.0	40.9	21.4	12.1	10.6	28.5	16.2	14.2
Peak Current Rating	A	25.9	12.9	7.1	6.0	40.9	21.4	12.1	10.6	28.5	16.2	14.2
O-PK SINUSOIDAL COMMUTATION												
Continuous Motor Torque	lbf-in (Nm)	47.5 (5.37)	47.5 (5.36)	45.9 (5.19)	45.4 (5.13)	75.1 (8.49)	78.6 (8.89)	78.7 (8.89)	79.5 (8.99)	106.9 (12.08)	105.3 (11.90)	106.9 (12.08)
Torque Constant (Kt) (+/- 10% @ 25°C)	lbf-in/A (Nm/A)	2.9 (0.33)	5.8 (0.66)	10.3 (1.16)	11.9 (1.34)	2.9 (0.33)	5.8 (0.66)	10.3 (1.16)	11.9 (1.34)	5.9 (0.67)	10.3 (1.16)	11.9 (1.34)
Continuous Current Rating:	Greased (IG) A	18.3	9.1	5.0	4.3	28.9	15.1	8.5	7.5	20.1	11.4	10.1
	Oiled (IL) A	36.6	18.3	10.0	8.6	57.9	30.3	17.1	15.0	40.3	22.9	20.1
Peak Current Rating	A	36.6	18.3	10.0	8.6	57.9	30.3	17.1	15.0	40.3	22.9	20.1
MOTOR STATOR DATA												
Voltage Constant (Ke)	Vrms/Krpm	28.0	56.0	99.3	114.6	28.0	56.0	99.3	114.6	57.3	99.3	114.6
(+/- 10% @ 25°C)	Vpk/Krpm	39.6	79.2	140.5	162.1	39.6	79.2	140.5	162.1	81.0	140.5	162.1
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25°C)	Ohms	0.42	1.7	5.7	7.8	0.2	0.72	2.26	3.0	0.5	1.52	2.0
Inductance (L-L)(+/- 15%)	mH	3.0	11.9	37.5	49.9	1.2	5.4	18.2	23.1	4.0	12.0	16.0
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.00096 (1.08)										
Brake Current @ 24 VDC	A	0.67										
Brake Holding Torque	lbf-in (Nm)	97 (11)										
Brake Engage/Disengage Time	ms	20/29										
Mechanical Time Constant (tm), ms	min	4.5	4.5	4.8	4.9	2.1	1.9	1.9	1.9	1.2	1.3	1.2
	max	6.0	6.0	6.4	6.6	2.8	2.6	2.6	2.5	1.7	1.7	1.7
Electrical Time Constant (te)	ms	7.0	7.0	6.6	6.4	5.9	7.5	8.0	7.8	8.2	7.9	8.2
Friction Torque	lbf-in (Nm)	2.7 (0.31)				3.0 (0.34)				3.5 (0.40)		
Additional Friction Torque for Preloaded Screw	lbf-in (Nm)	4.5 (0.51)				4.5 (0.51)				4.5 (0.51)		
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	230	400	460
Speed @ Bus Voltage	rpm	3000										
Insulation Class		180 (H)										

All ratings at 25 degrees Celsius

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

*Refer to performance specifications on page 12 for availability of 3 stack stator by stroke/lead combination.

Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2"

Specifications subject to change without notice.

GSX Series Linear Actuators with Integrated Motor

GSX50 Mechanical and Electrical Specifications

Nominal Backlash	in (mm)	0.004 (.10)							
Maximum Backlash (pre-loaded)	in (mm)	0.0							
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)							
Maximum Radial Load	lb (N)	75 (337)							
Environmental Rating: Standard		IP65S							
Motor Stator		138	158	168	238	258	268	358*	368*
RMS SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in (Nm)	107.2 (12.12)	104.8 (11.84)	109.4 (12.36)	179.9 (20.32)	178.8 (20.20)	177.8 (20.09)	237.2 (26.80)	237.6 (26.85)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	11.8 (1.33)	20.2 (2.28)	23.6 (2.67)	11.8 (1.33)	20.2 (2.28)	23.6 (2.67)	20.2 (2.28)	15.2 (1.71)
Continuous Current Rating:	Greased (IG) A	10.2	5.8	5.2	17.0	9.9	8.4	13.1	17.5
	Oiled (IL) A	20.3	11.6	10.4	34.1	19.8	16.8	26.2	35.0
Peak Current Rating	A	20.3	11.6	10.4	34.1	19.8	16.8	26.2	35.0
O-PK SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in (Nm)	107.2 (12.12)	104.8 (11.84)	109.4 (12.36)	179.9 (20.32)	178.8 (20.20)	177.8 (20.09)	237.2 (26.80)	237.6 (26.85)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	8.3 (.94)	14.3 (1.62)	16.7 (1.88)	8.3 (0.94)	14.3 (1.62)	16.7 (1.88)	14.3 (1.62)	10.7 (1.21)
Continuous Current Rating:	Greased (IG) A	14.4	8.2	7.3	24.1	14.0	11.9	18.5	24.8
	Oiled (IL) A	28.7	16.4	14.7	48.2	27.9	23.8	37.1	49.5
Peak Current Rating	A	28.7	16.4	14.7	48.2	27.9	23.8	37.1	49.5
MOTOR STATOR DATA									
Voltage Constant (Ke)	Vrms/Krpm	80.6	138.1	161.1	80.6	138.1	161.1	138.1	103.6
(+/- 10% @ 25 °C)	Vpk/Krpm	113.9	195.3	227.9	113.9	195.3	227.9	195.3	146.5
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25 °C)	Ohms	0.87	2.68	3.34	0.34	1.01	1.39	0.61	0.34
Inductance (L-L)(+/- 15%)	mH	21.7	63.9	78.3	10.4	27.6	41.5	20.0	11.3
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.0084 (9.5)							
Brake Current @ 24 VDC	A	1							
Brake Holding Torque	lbf-in (Nm)	354 (40)							
Brake Engage/Disengage Time	ms	25/73							
Mechanical Time Constant (tm), ms	min	2.2	2.3	2.1	0.9	0.9	0.9	0.5	0.5
	max	2.8	3.0	2.7	1.1	1.1	1.1	0.7	0.7
Electrical Time Constant (te)	ms	25.0	23.9	23.4	30.6	27.3	29.9	32.6	32.7
Friction Torque	lbf-in (Nm)	4.1 (0.46)			4.6 (0.53)			5.3 (0.60)	
Additional Friction Torque for Preloaded Screw	lbf-in (Nm)	6.00 (0.68)			6.00 (0.68)			6.00 (0.68)	
Bus Voltage	Vrms	230	400	460	230	400	460	400	460
Speed @ Bus Voltage	rpm	2400							
Insulation Class		180 (H)							

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.
Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2"

Specifications subject to change without notice.

GSX Series Linear Actuators with Integrated Motor

GSX60 Mechanical and Electrical Specifications

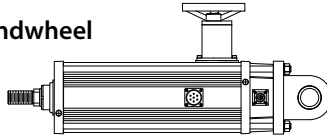
Nominal Backlash	in (mm)	0.004 (.10)							
Maximum Backlash (pre-loaded)	in (mm)	0.0							
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)							
Maximum Radial Load	lb (N)	100 (445)							
Environmental Rating: Standard		IP65S							
Motor Stator		138	158	168	238	258	268	358	368
RMS SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in (Nm)	254.2 (28.72)	249.9 (28.23)	261.9 (29.59)	424.8 (47.99)	423.0 (47.79)	427.5 (48.30)	595.6 (67.29)	611.6 (69.10)
Torque Constant (Kt) (+/- 10% @ 25°C)	lbf-in/A (Nm/A)	12.6 (1.42)	21.8 (2.46)	25.2 (2.84)	12.6 (1.42)	21.8 (2.46)	25.2 (2.84)	21.4 (2.42)	25.2 (2.84)
Continuous Current Rating:	Greased (IG) A	22.6	12.8	11.6	37.7	21.7	19.0	31.1	27.2
	Oiled (IL) A	45.2	25.6	23.3	75.5	43.4	38.0	62.2	54.3
Peak Current Rating	A	45.2	25.6	23.3	75.5	43.4	38.0	62.2	54.3
O-PK SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in (Nm)	254.2 (28.72)	249.9 (28.23)	261.9 (29.59)	424.8 (47.99)	423.0 (47.79)	427.5 (48.30)	595.6 (67.29)	611.6 (69.10)
Torque Constant (Kt) (+/- 10% @ 25°C)	lbf-in/A (Nm/A)	8.9 (1.01)	15.4 (1.74)	17.8 (2.01)	8.9 (1.01)	15.4 (1.74)	17.8 (2.01)	15.1 (1.71)	17.8 (2.01)
Continuous Current Rating:	Greased (IG) A	31.9	18.1	16.4	53.4	30.7	26.8	44.0	38.4
	Oiled (IL) A	63.9	36.2	32.9	106.7	61.3	53.7	88.0	76.8
Peak Current Rating	A	63.9	36.2	32.9	106.7	61.3	53.7	88.0	76.8
MOTOR STATOR DATA									
Voltage Constant (Ke)	Vrms/Krpm	85.9	148.9	171.8	85.9	148.9	171.8	146.1	171.8
(+/- 10% @ 25°C)	Vpk/Krpm	121.5	210.6	243.0	121.5	210.6	243.0	206.6	243.0
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25°C)	Ohms	0.3	1.0	1.2	0.13	0.41	0.5	0.23	0.3
Inductance (L-L)(+/- 15%)	mH	8.3	24.8	29.4	3.9	11.8	15.8	7.5	10.3
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.02815 (31.8)							
Brake Current @ 24 VDC	A	1.45							
Brake Holding Torque	lbf-in (Nm)	708 (80)							
Brake Engage/Disengage Time	ms	53/97							
Mechanical Time Constant (tm), ms	min	3.9	4.0	3.6	1.6	1.6	1.6	1.0	0.9
	max	4.3	4.5	4.1	1.8	1.8	1.8	1.1	1.0
Electrical Time Constant (te)	ms	25.4	24.6	24.0	29.4	29.1	29.8	32.1	33.8
Friction Torque	lbf-in (Nm)	8.1 (0.91)			10.8 (1.22)			14.5 (1.64)	
Additional Friction Torque for Preloaded Screw	lbf-in (Nm)	6.00 (0.68)			6.00 (0.68)			6.00 (0.68)	
Bus Voltage	Vrms	230	400	460	230	400	460	400	460
Speed @ Bus Voltage	rpm	2400							
Insulation Class		180 (H)							

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.
 Test data derived using NEMA recommended aluminum heatsink 16" x 16" x 1"
 The GSX60-06 can only accommodate a single stack stator.

Specifications subject to change without notice.

HW = Manual Drive, Handwheel

This option provides a manual drive handwheel on the side of the actuator. The handwheel has an engage/disengage lever that is tied to an interrupt switch. Not available on GSX20. Also not available with holding brake unless application details have been discussed with your local sales representative.



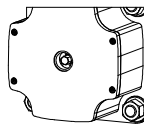
Construction. This standard bellows is rated for environmental temperatures of -67 to 500 degrees F. Longer strokes may require the main rod of the actuator to be extended beyond standard length. Not available with extended tie rod mounting option. Please contact your local sales representative for details.

L1, L2, L3 = Adjustable External Travel Switches

This option allows up to 3 external switches to be included with the GSX Series Actuator. These switches provide travel indication to the controller and are adjustable (must purchase external anti-rotate for this option). See page 35 for details.

RD = Manual Drive, Rear Hex

This option provides a hex shaft at the rear of the actuator for manual operation. The hex shaft is directly coupled to the motor and can be turned by hand with a compatible wrench. The hex shaft is enclosed by a sealed cap during operation. This option is not available w/absolute feedback. If the application requires a brake, discuss manual drive use with your local sales representative.



XL = Non-Standard Lubrication

This option provides for indication in the model number that the customer has specified a lubrication other than the standard provided by Exlar, Mobilith SHC220. Specials include other greases including JAX FG-2 food grade, Mobilgrease 28, or other non-standard grease.

SD = Manual Drive, Side Hex

This option provides a hex shaft on the side of the actuator. The hex can be turned by hand with a wrench. Not available on GSX20. Also not available with holding brake unless application details have been discussed with your local sales representative.



XT = Special Travel Option Selections

The XT Option can be used to specify various special travel options on the GSX Series of Linear Actuators. Because this option can be used to specify many things, it is important that an order including the -XT option spell out in detail, the exact options being selected by the including of the -XT in the model number.

It is recommended that prior to ordering an actuator including the -XT specifier that a quote be obtained through Exlar's special products application engineers for the desired options, and that quote be referenced on, or included with any order placed.

High Temp Protective Bellows, an XT option, provides an accordion style protective bellows to protect the main actuator rod from damage due to abrasives or other contaminants in the environment in which the actuator must survive. The high temperature material of this bellows is D1 Teflon Coated Fiberglass, Sewn

GSX Series Linear Actuators with Integrated Motor

Motor Speed Designators

All Exlar T-LAM™ motors and actuators carry a standard motor speed designator as defined below. This is representative of the standard base speed of the motor, for the selected bus voltage.

If the model number is created and the location for the motor speed designator is left blank, this is the base speed to which each motor will be manufactured. The model number can also be created including this standard speed designator.

Designator	Base Speed	Actuator/Motor Series
-50	5000 rpm	GSX20
-30	3000 rpm	GSX30, GSX40
-24	2400 rpm	GSX50, GSX60
01-99	Special Speed, Consult Exlar	

Exlar also provides the flexibility to manufacture all of its T-LAM products with special base speeds to match the customer's exact application requirements. This may be a higher than standard speed motor, or lower base speed than standard which will allow the customer to get the required torque at a speed optimized to their application and use the minimum amount of current from their amplifier.

The call-out for a special speed is configured in the model number by using a two digit code from 01-99. These numbers represent the number, in hundreds, of RPM that will be the base speed for the particular motor.

For example, a GSX30-0301-OSM-AD1-118-30 motor that normally has a 3000 RPM standard winding can be changed to a 3300 RPM winding by changing the -30 to a -33. It can be changed to a 5000 RPM winding by changing the -30 to a -50.

Changing this speed designator will change the ratings of the motor, and these must be obtained from your local sales representative. Also, it is not possible to produce every possible speed from -01 to -99 for each motor at each voltage so please contact your local sales representative for confirmation of the speed that is desired for the application.

Feedback Options

LT = ICT including signal conditioner

This option provides for an actuator containing an internally mounted ICT transducer spanning the full stroke of the actuator. Inquire with Exlar engineering for details and signal conditioner output preference. LT not available with absolute feedback. Not available in GSX20 actuator.

Absolute Feedback

Due to the variability in size of some feedback devices, especially absolute feedback devices which are often very large relative to the size of the actuator motor, the actual size of the actuator may differ in length and width from these drawings for feedback types other than standard resolvers and standard encoders. Please consult Exlar for details. In the event that you order an actuator that differs from these standard dimensions, you will be sent a drawing of the final configuration of your actuator for approval.

Motor Options

GSX motor options are described with a 3 digit code. The first digit calls out the stack length, the second the rated bus voltage, and the third the number of poles of the motor. Refer to the mechanical/electrical specifications for motor torque and actuator rated force.

118	1 stack	115 Vrms	8 Pole	Class 180 H
138		230 Vrms		
158		400 Vrms		
168		460 Vrms		
1A8*		24 VDC		
1B8*		48 VDC		
1C8*		120 VDC		
218	2 stack	115 Vrms	8 Pole	Class 180 H
238		230 Vrms		
258		400 Vrms		
268		460 Vrms		
2A8*		24 VDC		
2B8*		48 VDC		
2C8*		120 VDC		
318	3 stack	115 Vrms	8 Pole	Class 180 H
338		230 Vrms		
358		400 Vrms		
368		460 Vrms		
3A8*		24 VDC		
3B8*		48 VDC		
3C8*		120 VDC		

* Low voltage stators may be limited to less than catalog rated torque and/or speed. Please contact your local sales representative when ordering this option.

Rod End Attachments

Rear Clevis Pin Rod Eye **Spherical Rod Eye Rod Clevis**

See drawings on pages 36-38.

Attachments ordered separate from actuator.

Housing Options

FG = Smooth White Epoxy

This option provides for an actuator coated with FDA approved white epoxy.

EN = Electroless Nickel Plating

This option provides for an actuator with electroless nickel plating.

SS = Stainless Steel Housing

This option provides an actuator with all stainless steel construction. Housing dimensions for this option are not equal to the standard housing. Force, torque and current

ratings are reduced 25% with this option. Please inquire with Exlar for dimensions and ratings.

HC = Type III Hard Coat Anodized, Class I

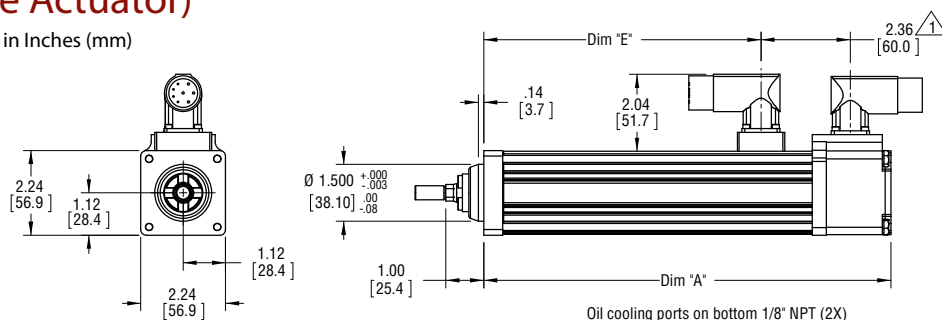
This option provides an actuator with type III hard coat anodized coating. Class I, no dye.

XH = Special Housing Option

Any housing option that is not designated by the above codes should be listed as XH and described at time of order. All special options must be discussed with your local sales representative.

GSX Series

All Dimensions Shown in Inches (mm)



Ø 2.546 [64.66] BC

Single Side Mount On This Side

"E" = 10-24 UNC
"M" = M5 x 0.8

.75 [19.1]

"S" & "D" = Ø .2500+0/- .0005 ▽.25
"J" & "K" = Ø 6mm M7 ▽9.0

1.00 [25.4]

".25 [6.4]"

2

"S" & "D" = 1/4-20 UNC
"J" & "K" = M6 x 1.0
"S" & "K" = 4X, "D" & "K" = 8X

Dim "B"

Trunnion Mount or Rear Clevis Mount

Technical drawing showing the Trunnion Mount or Rear Clevis Mount. The drawing includes three views: a front view, a side view, and a detail view of the mounting bracket.

Dimensions:

- Front View:
 - Overall width: 5.12 [129.9]
 - Distance from center to mounting bracket: 3.12 [79.1]
 - Distance from center to mounting bracket (alternative): 1.00 [25.4]
- Side View:
 - Overall length: Dim "D"
 - Distance from center to mounting bracket: Dim "C"
 - Mounting bracket width: 1.50 [38.1]
 - Mounting bracket height: 0.50 [12.7]
 - Mounting bracket thickness: 0.12 [3.0]
 - Mounting bracket radius: R.63 [15.9]
- Detail View:
 - Mounting bracket width: 1.50 [38.1]
 - Mounting bracket height: 0.75 [19.1]

Notes:

- "T" = $\varnothing 1.000 \pm .001$
- "Q" = $\varnothing 25\text{mm h7}$
- "C" = $\varnothing .500 +.002/-.001$
- "G" = $\varnothing 12\text{mm } +.01/-.06$

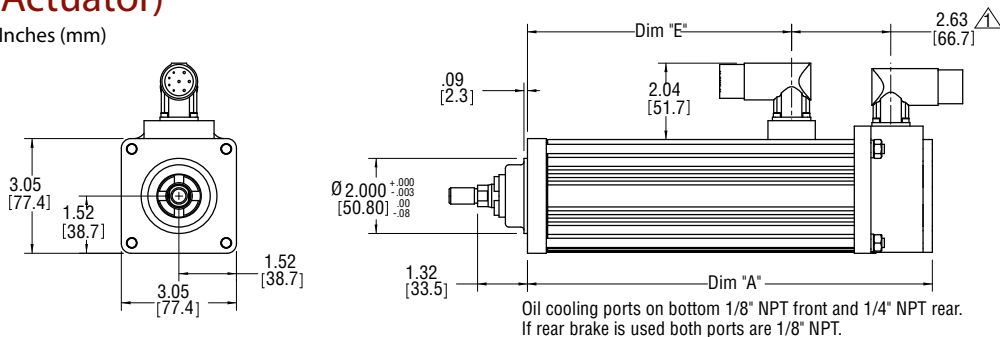
Dim	3" (76 mm) Stroke in (mm)	6" (152 mm) Stroke in (mm)	10" (254 mm) Stroke in (mm)	12" (305 mm) Stroke in (mm)
A	7.8 (198)	10.8 (274)	14.8 (375)	16.8 (426)
B	5.6 (143)	8.6 (219)	12.6 (320)	14.6 (371)
C	3.0 (76)	6.0 (152)	10.0 (254)	12.0 (305)
D	8.8 (223)	11.8 (299)	15.8 (401)	17.8 (452)
E	4.3 (110)	7.3 (186)	11.3 (288)	14.3 (364)

- Notes:
1. Add 1.78 inches to Dims "A" & "D" and to Dim Δ if ordering a brake.
 2. Models are shown with Exlar standard M23 style connectors (option "I"). See ordering guide for other connector options.
 3. Depending on connector and feedback options selected, dimensions may vary. Consult Exlar for details, or refer to the drawings provided after receipt of order.
 4. Drawings subject to change.
 5. Add .50 inches to Dims "A, C, D, E" and to Dim Δ if ordering splined main rod.

GSX Series Linear Actuators with Integrated Motor

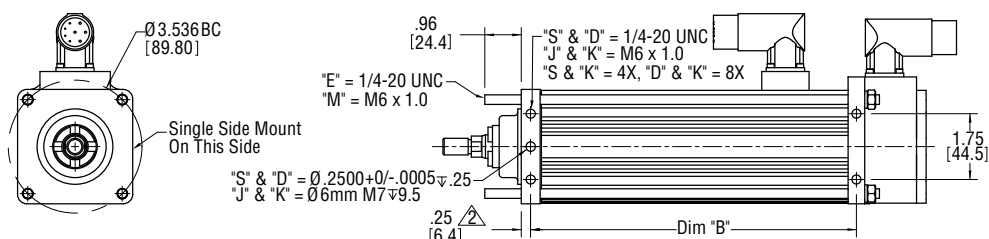
GSX30 (Base Actuator)

All Dimensions Shown in Inches (mm)

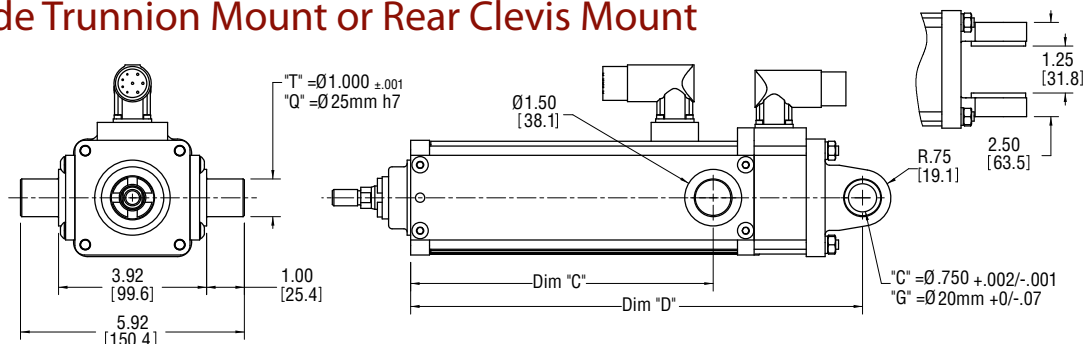


Oil cooling ports on bottom 1/8" NPT front and 1/4" NPT rear.
If rear brake is used both ports are 1/8" NPT.

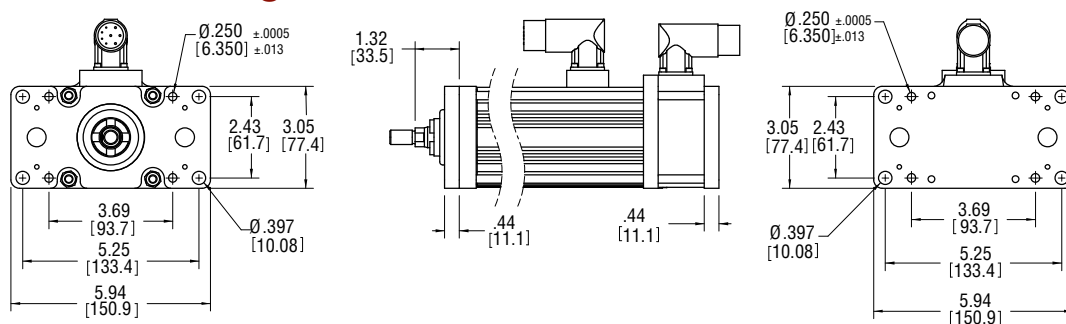
GSX30 Side Mounts or Extended Tie Rod Mount



GSX30 Side Trunnion Mount or Rear Clevis Mount



GSX30 Front or Rear Flange Mount



Dim	3" (76 mm) Stroke in (mm)	6" (152 mm) Stroke in (mm)	10" (254 mm) Stroke in (mm)	12" (305 mm) Stroke in (mm)	14" (355 mm) Stroke in (mm)	18" (457 mm) Stroke in (mm)
A	8.2 (209)	10.7 (272)	15.2 (387)	17.2 (437)	19.2 (488)	23.2 (590)
B	6.1 (156)	8.6 (219)	13.1 (333)	15.1 (384)	17.1 (435)	21.1 (536)
C	5.4 (137)	8.0 (203)	10.0 (254)	12.0 (305)	14.0 (356)	18.0 (457)
D	9.5 (241)	12.0 (304)	16.5 (418)	18.5 (469)	20.5 (520)	24.5 (621)
E	4.5 (114)	7.0 (178)	11.5 (292)	13.5 (343)	15.5 (394)	19.5 (495)

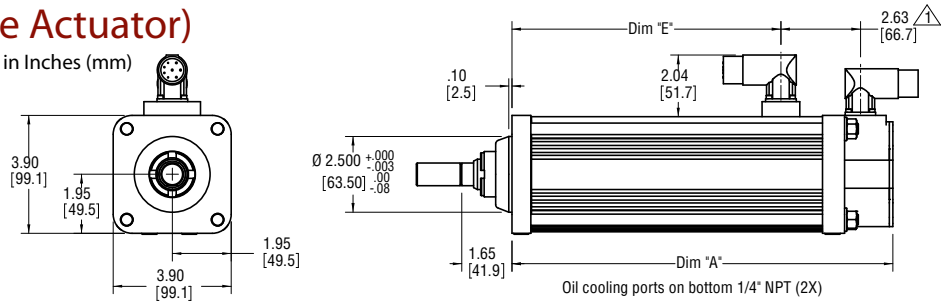
Notes:

1. Add 1.6 inches to Dims A & D and to Dim Δ if ordering a brake.
2. Add 1.20 inches to Dims A, C, D, E and to Dim Δ if ordering a splined main rod.
3. Models are shown with Exlar standard M23 style connectors (option "I"). See ordering guide for other connector options.
4. Depending on connector and feedback options selected, dimensions may vary. Consult Exlar for details, or refer to the drawings provided after receipt of order.
5. Drawings subject to change.

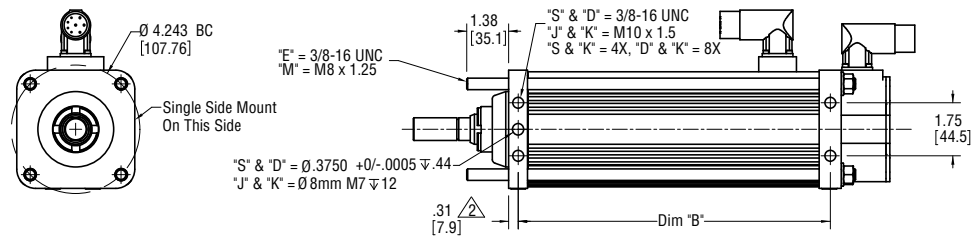
GSX Series Linear Actuators with Integrated Motor

GSX40 (Base Actuator)

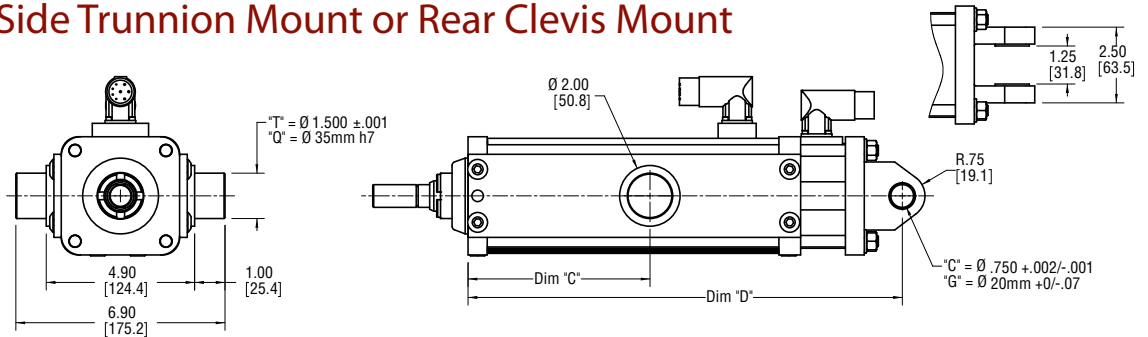
All Dimensions Shown in Inches (mm)



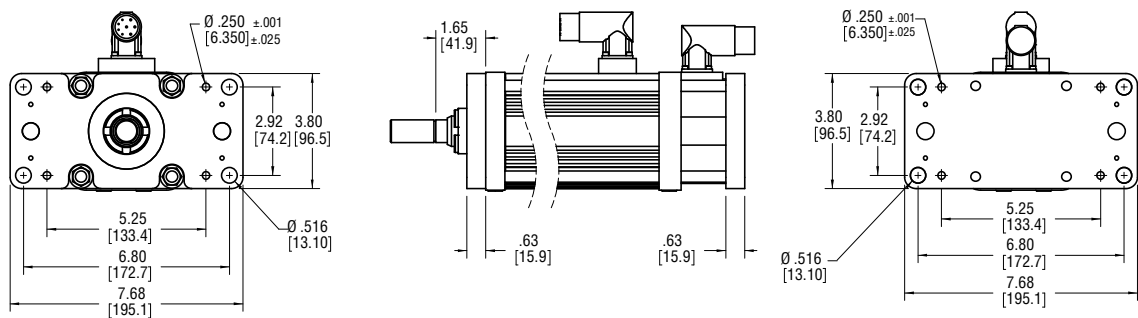
GSX40 Side Mounts or Extended Tie Rod Mount



GSX40 Side Trunnion Mount or Rear Clevis Mount



GSX40 Front or Rear Flange Mount



Dim	4" (102 mm) Stroke in (mm)	6" (152 mm) Stroke in (mm)	8" (203 mm) Stroke in (mm)	10" (254 mm) Stroke in (mm)	12" (305 mm) Stroke in (mm)	18" (457 mm) Stroke in (mm)
A	10.6 (269)	12.6 (320)	14.6 (370)	16.6 (421)	18.6 (472)	24.6 (624)
B	8.3 (211)	10.3 (262)	12.3 (313)	14.3 (364)	16.3 (414)	22.3 (567)
C	4.0 (102)	6.0 (152)	8.0 (203)	10.0 (254)	12.0 (305)	18.0 (457)
D	12.3 (312)	14.3 (363)	16.3 (415)	18.3 (466)	20.3 (516)	26.3 (669)
E	6.9 (175)	8.9 (226)	10.9 (277)	12.9 (328)	14.9 (378)	20.9 (531)

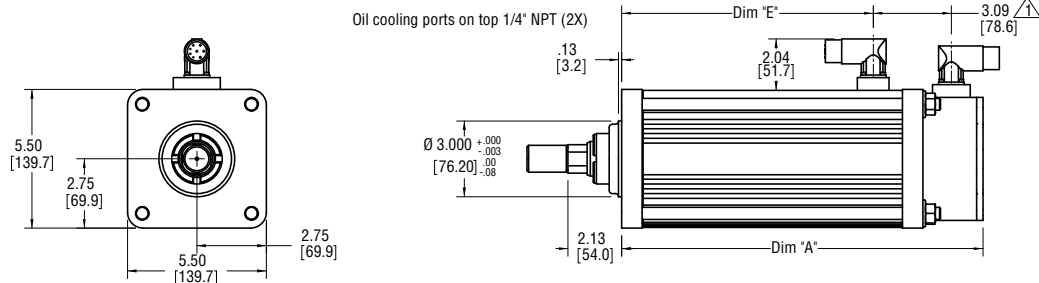
Notes:

1. Add 2.33 inches to Dims A & D and to Dim Δ if ordering a brake.
2. Add 1.77 inches to Dims A, C, D, E and to Dim Δ if ordering a splined main rod.
3. Models are shown with Exlar standard M23 style connectors (option "I"). See ordering guide for other connector options.
4. Depending on connector and feedback options selected, dimensions may vary. Consult Exlar for details, or refer to the drawings provided after receipt of order.
5. Drawings subject to change.

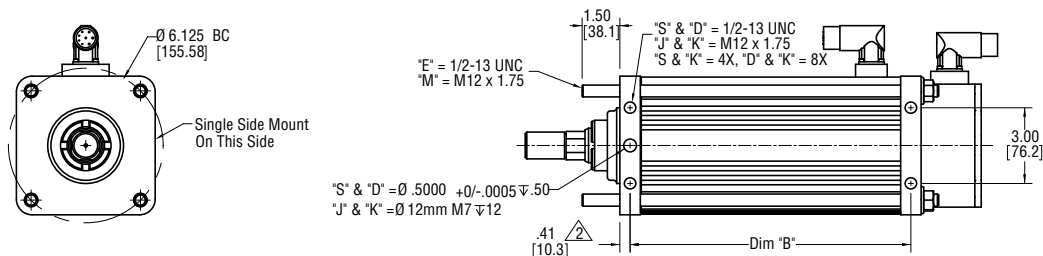
GSX Series Linear Actuators with Integrated Motor

GSX50 (Base Actuator)

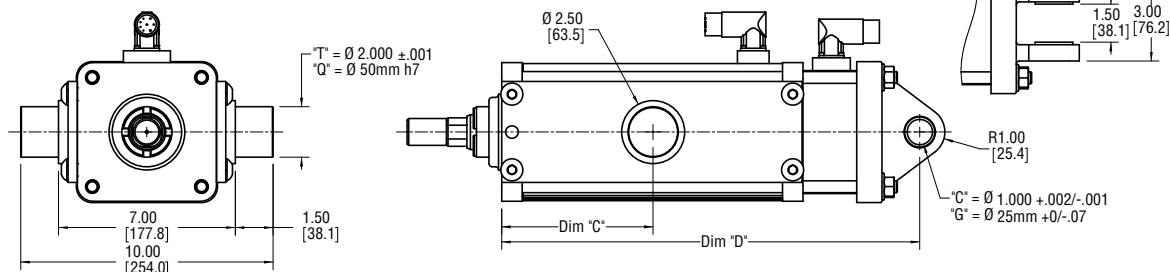
All Dimensions Shown in Inches (mm)



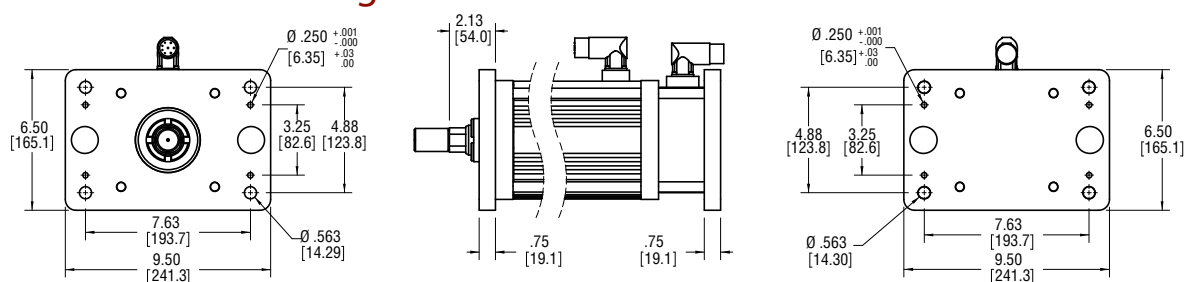
GSX50 Side Mounts or Extended Tie Rod Mount



GSX50 Side Trunnion Mount or Rear Clevis Mount



GSX50 Front or Rear Flange Mount



Dim	6" (152 mm) Stroke in (mm)	10" (254 mm) Stroke in (mm)	14" (356 mm) Stroke in (mm)
A	14.3 (364)	18.3 (465)	22.3 (567)
B	11.1 (282)	15.1 (384)	19.1 (486)
C	6.0 (152)	10.0 (254)	14.0 (356)
D	16.6 (421)	20.6 (522)	24.6 (624)
E	10.0 (254)	14.0 (356)	18.0 (457)

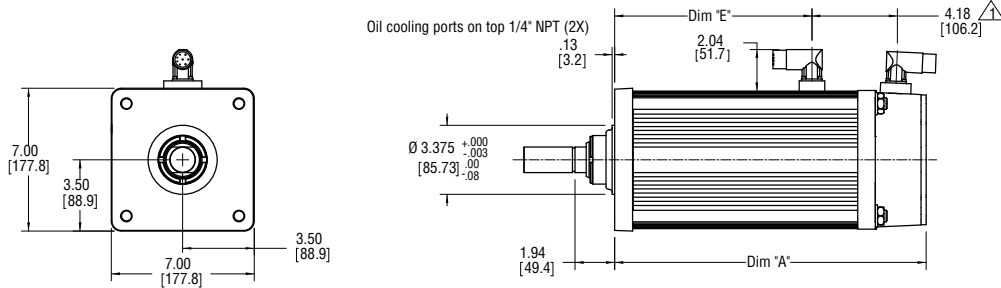
Notes:

1. Add 2.50 inches to Dims A & D and to Dim Δ if ordering a brake.
2. Add 2.06 inches to Dims A, C, D, E and to Dim Δ if ordering a splined main rod.
3. Models are shown with Exlar standard M23 style connectors (option "I"). See ordering guide for other connector options.
4. Depending on connector and feedback options selected, dimensions may vary. Consult Exlar for details, or refer to the drawings provided after receipt of order.
5. Drawings subject to change.

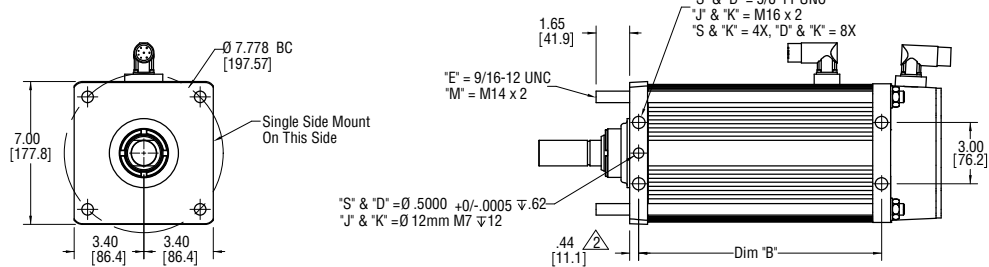
GSX Series Linear Actuators with Integrated Motor

GSX60 (Base Actuator)

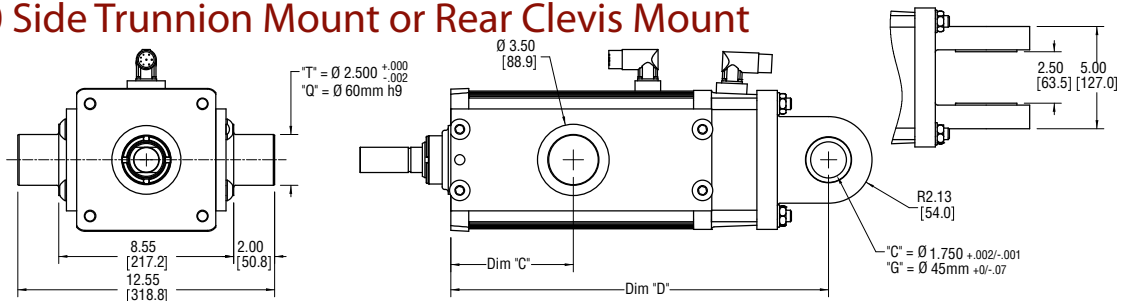
All Dimensions Shown in Inches (mm)



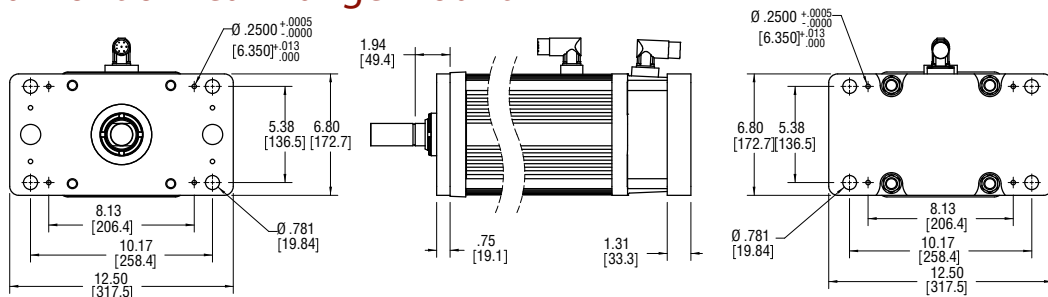
GSX60 Side Mounts or Extended Tie Rod Mount



GSX60 Side Trunnion Mount or Rear Clevis Mount



GSX60 Front or Rear Flange Mount



Dim	6" (152 mm) Stroke in (mm)	10" (254 mm) Stroke in (mm)
A	15.2 (387)	19.2 (488)
B	11.9 (302)	15.9 (403)
C	6.0 (152)	10.0 (254)
D	18.5 (469)	22.5 (571)
E	9.60 (245)	13.6 (346)

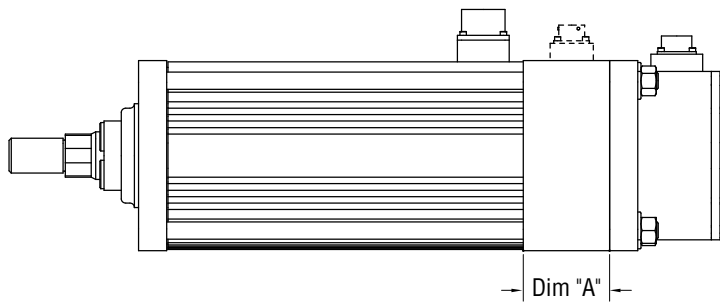
Notes:

1. Add 3.58 inches to Dims A & D and to Dim Δ if ordering a brake.
2. Add 2.73 inches to Dims A, C, D, E and to Dim Δ if ordering a splined main rod.
3. Models are shown with Exlar standard M23 style connectors (option "I"). See ordering guide for other connector options.
4. Depending on connector and feedback options selected, dimensions may vary. Consult Exlar for details, or refer to the drawings provided after receipt of order.
5. Drawings subject to change.

GSX Series Linear Actuators with Integrated Motor

Rear Brake Extension Option

*Brake connector if needed.

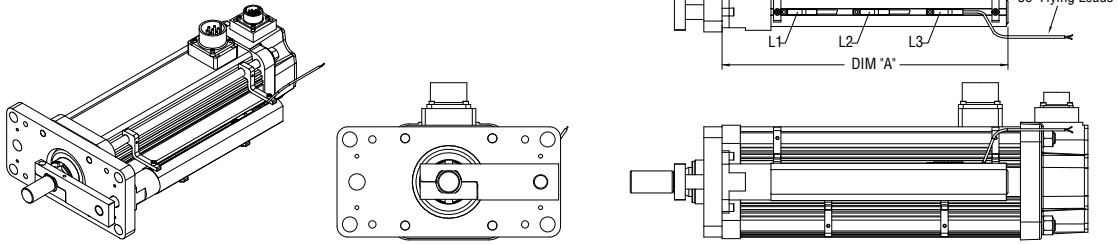


	GSX20	GSX30	GSX40	GSX50	GSX60
A in (mm)	1.78 (45.21)	1.61 (40.9)	2.33 (59.18)	2.5 (63.5)	3.575 (90.8)

*Consult Exlar for connector and wiring information if ordering brake option.

GSX Series Linear Actuators with Integrated Motor

GSX20, GSX30, GSX40, GSX50 & GSX60 External Limit Switch Extension Options



Dim A	3" (76 mm) stroke in (mm)	6" (152 mm) stroke in (mm)	8" (203 mm) stroke in (mm)	10" (254 mm) stroke in (mm)	12" (305 mm) stroke in (mm)	14" (355 mm) stroke in (mm)	18" (457 mm) stroke in (mm)
GSX20	5.515 (140.1)	8.515 (216.3)	NA	12.500 (317.5)	14.515 (368.7)	NA	NA
GSX30	6.932 (176.1)	9.832 (249.7)	NA	13.832 (351.3)	15.832 (402.1)	17.832 (452.9)	21.832 (554.5)
GSX40	NA	9.832 (249.7)	11.83 (300.5)	13.832 (351.3)	15.832 (402.1)	NA	21.832 (554.5)
GSX50	NA	11.667 (296.3)	NA	15.667 (397.9)	NA	19.667 (499.5)	NA
GSX60	NA	10.461 (265.7)	NA	14.461 (367.3)	NA	NA	NA

The external limit switch option (requires anti-rotate option) for the GSX Series of linear actuators provides the user with 1, 2 or 3 externally mounted adjustable switches for use as the end of travel limit switches or home position sensors.

The number of switches desired is selected by ordering the L1, L2 or L3 option, in which 1, 2 or 3 switches will be provided, respectively.

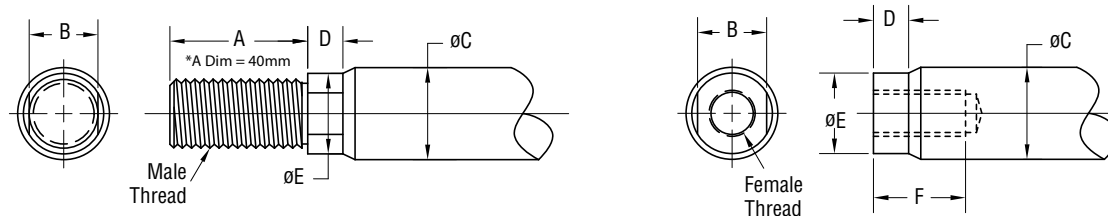
The switches are 9-30 VDC powered, PNP output, with either normally open or normally closed logic operation depending on the switch configuration ordered. Switches are supplied with 1 meter, 3 wire embedded cable. Below is a diagram indicating which logic operation will be provided for each switch, based on the option ordered.

Option	SW1	SW2	SW3
L1	Not Supplied	Normally Open	Not Supplied
L2	Normally Closed	Not Supplied	Normally Closed
L3	Normally Closed	Normally Open	Normally Closed

Switch Type	Exlar Part Number	Turck Part Number
Normally Closed Switch	43404	BIM-UNT-RP6X
Normally Open Switch	43403	BIM-UNT-AP6X

GSX Series Linear Actuators with Integrated Motor

Actuator Rod End Options



Standard Rod End

	A	B	øC	D	øE	F	Male U.S.	Male Metric	Female U.S.	Female Metric
GSX20 in (mm)	0.813 (20.7)	0.375 (9.5)	0.500 (12.7)	0.200 (5.1)	0.440 (11.2)	0.750 (19.1)	3/8 – 24 UNF – 2A	M8 x 1 6g	5/16 – 24 UNF – 2B	M8 x 1 6h
GSX30 in (mm)	0.750 (19.1)	0.500 (12.7)	0.625 (15.9)	0.281 (7.1)	0.562 (14.3)	0.750 (19.1)	7/16 – 20 UNF – 2A	M12 x 1.75* 6g	7/16 – 20 UNF – 2B	M10 x 1.5 6h
GSX40 in (mm)	1.500 (38.1)	0.750 (19.1)	1.000 (25.4)	0.381 (9.7)	0.875 (22.2)	1.000 (25.4)	3/4 – 16 UNF – 2A	M16 x 1.5 6g	5/8 – 18 UNF – 2B	M16 x 1.5 6h
GSX50 in (mm)	1.625 (41.3)	1.125 (28.6)	1.375 (34.9)	0.750 (19.1)	1.250 (31.8)	1.750 (44.5)	1 – 14 UNS – 2A	M27 x 2 6g	1 – 14 UNS – 2B	M24 x 2 6h
GSX60 in (mm)	2.500 (63.5)	1.250 (31.8)	1.750 (44.5)	0.550 (14.0)	1.625 (41.3)	1.750 (44.5)	1 1/4 – 12 UNF – 2A	M30 x 2 6g	7/8 – 14 UNF – 2B	M25 x 1.5 6h

Rod End With Splined Main Rod

	A	B	C	D	E	F	Male U.S.	Male Metric	Female U.S.	Female Metric
GSX20 in (mm)	0.813 (20.7)	0.375 (9.5)	0.512 (13.0)	0.200 (5.1)	0.440 (11.2)	0.750 (19.1)	3/8 – 24 UNF – 2A	M8 x 1 6g	5/16 – 24 UNF – 2B	M8 x 1 6h
GSX30 in (mm)	0.750 (19.1)	0.500 (12.7)	0.630 (16.0)	0.281 (7.1)	0.562 (14.3)	0.750 (19.1)	7/16 – 20 UNF – 2A	M12 x 1.75 6g	7/16 – 20 UNF – 2B	M10 x 1.5 6h
GSX40 in (mm)	1.500 (38.1)	0.750 (19.1)	0.906 (23.0)	0.381 (9.7)	0.875 (22.2)	1.000 (25.4)	3/4 – 16 UNF – 2A	M16 x 1.5 6g	5/8 – 18 UNF – 2B	M16 x 1.5 6h
GSX50 in (mm)	1.625 (41.3)	1.000* (25.4)	1.102 (28.0)	0.750** (19.1)	1.102 (28.0)	1.500 (38.1)	1 – 14 UNS – 2A	M24 x 2 6g	3/4 – 16 UNF – 2B	M20 x 1.5 6h
GSX60 in (mm)	2.500 (63.5)	1.250 (31.8)	1.850 (47.0)	0.550 (14.0)	1.625 (41.3)	1.750 (44.5)	1 1/4 – 12 UNF – 2A	M30 x 2 6g	7/8 – 14 UNF – 2B	M25 x 1.5 6h

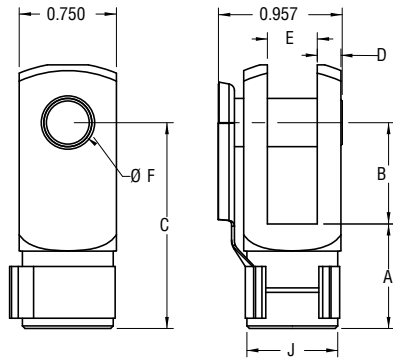
*When Male, Metric (A) = .945 (24 mm)

**When Male (M or A) = .500 (12.7 mm)

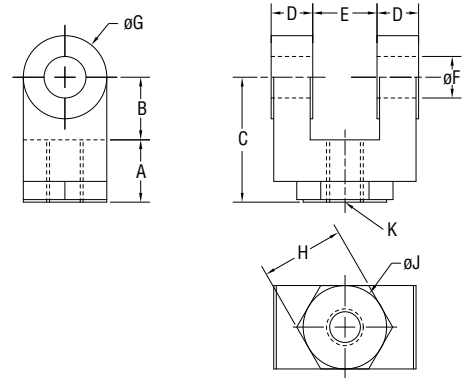
Part numbers for rod attachment options indicate the through hole size or pin diameter. Before selecting a spherical rod eye for use with a GSX series actuator, please consult the information on the anti-rotation option for the GSX actuators. Spherical rod eyes will allow the rod to rotate if the load is not held.

Drawings subject to change. Consult Exlar for certified drawings.

Rod Clevis Dimensions



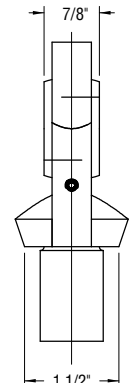
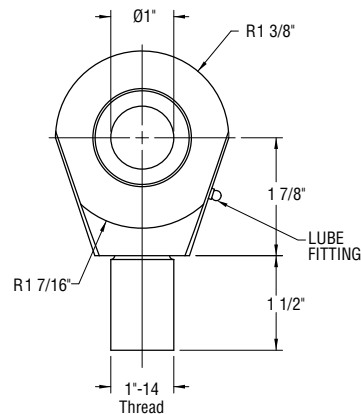
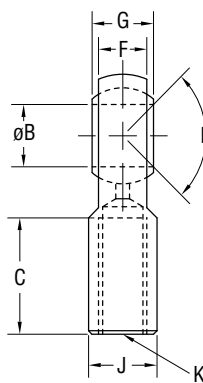
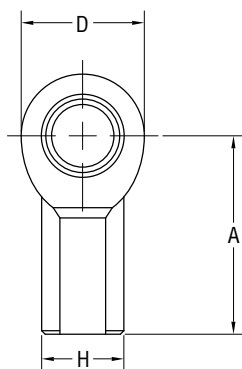
Dimensions for RC038



Dimensions for RE050, RC075, RC100, RC138

	A	B	C	D	E	øF	øG	H	øJ	K
GSX20 RC038 in (mm)	0.810 (20.6)	0.785 (19.9)	1.595 (40.5)	0.182 (4.6)	0.386 (9.8)	0.373 (9.5)	0.951 (24.2)	NA	NA	3/8-24
GSX30 RC050 in (mm)	0.75 (19.1)	0.75 (19.1)	1.50 (38.1)	0.50 (12.7)	0.765 (19.43)	0.50 (12.7)	1.00 (25.4)	1.00 (25.4)	1.00 (25.4)	7/16-20
GSX40 RC075 in (mm)	1.125 (28.58)	1.25 (31.75)	2.375 (60.3)	0.625 (15.88)	1.265 (32.13)	0.75 (19.1)	1.50 (38.1)	1.25 (31.75)	1.25 (31.75)	3/4-16
GSX50 RC100 in (mm)	1.625 (41.2)	1.500 (38.1)	3.125 (79.4)	0.750 (19.1)	1.515 (38.5)	1.000 (25.4)	2.000 (50.8)	1.500 (38.1)	1.500 (38.1)	1-14
GSX60 RC138 in (mm)	2.00 (50.8)	2.125 (53.98)	4.125 (104.78)	1.00 (25.4)	2.032 (51.6)	1.375 (34.93)	2.75 (69.85)	2.00 (50.8)	2.00 (50.8)	1-1/4 - 12

Spherical Rod Eye Dimensions

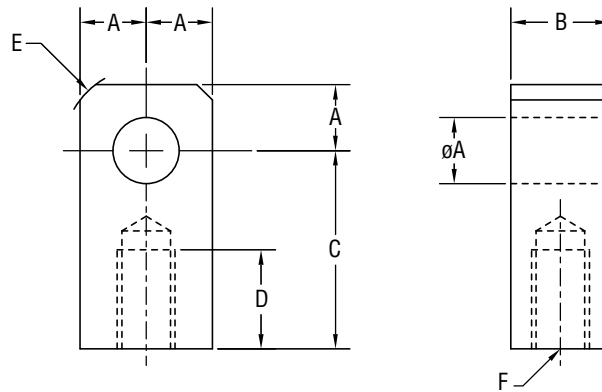


	A	øB	C	D	E	F	G	H	J	K
GSX20 SRM038 in (mm)	1.625 (41.3)	.375 (9.525)	.906 (23.0)	1.0 (25.6)	12 deg	.406 (10.3)	.500 (12.7)	.688 (17.7)	.562 (14.3)	3/8-24
GSX30 SRM044 in (mm)	1.81 (46.0)	0.438 (11.13)	1.06 (26.9)	1.13 (28.7)	14 deg	0.44 (11.1)	0.56 (14.2)	0.75 (19.1)	0.63 (16.0)	7/16-20
GSX40 SRM075 in (mm)	2.88 (73.2)	0.75 (19.1)	1.72 (43.7)	1.75 (44.5)	14 deg	0.69 (17.5)	0.88 (22.3)	1.13 (28.7)	1.00 (25.4)	3/4-16
GSX50 SRF100 in (mm)	See GSX50 Special Rod Eye drawing below. Requires female rod end.									

Drawings subject to change. Consult Exlar for certified drawings.

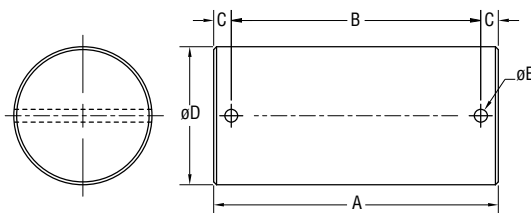
GSX Series Linear Actuators with Integrated Motor

Rod Eye Dimensions



	øA	B	C	D	E	F
GSX20 RE038 in (mm)	0.50 (12.7)	0.560 (14.2)	1.000 (25.4)	0.500 (12.7)	0.25 x 45°	3/8 - 24
GSX30 RE050 in (mm)	0.50 (12.7)	0.75 (19.1)	1.50 (38.1)	0.75 (19.1)	0.63 (15.9)	7/16 - 20
GSX40 RE075 in (mm)	0.75 (19.1)	1.25 (31.8)	2.06 (52.3)	1.13 (28.7)	0.88 (22.3)	3/4 - 16
GSX50 RE100 in (mm)	1.00 (25.4)	1.50 (38.1)	2.81 (71.4)	1.63 (41.4)	1.19 (30.2)	1 - 14
GSX60 RE138 in (mm)	1.375 (34.93)	2.0 (50.8)	3.44 (87.3)	2.0 (50.8)	1.837 (46.67)	1 1/4 - 12

Clevis Pin Dimensions



	A	B	C	øD	øE
CP050 ¹ in (mm)	2.28 (57.9)	1.94 (49.28)	0.17 (4.32)	0.50" +0.000/-0.002 (12.7 mm +0.00/-0.05)	0.106 (2.69)
CP075 ² in (mm)	3.09 (78.5)	2.72 (69.1)	0.19 (4.82)	0.75" +0.000/-0.002 (19.1 mm +0.00/-0.05)	0.14 (3.56)
CP100 ³ in (mm)	3.59 (91.2)	3.22 (81.8)	0.19 (4.82)	1.00" +0.000/-0.002 (25.4 mm +0.00/-0.05)	0.14 (3.56)
CP138 ⁴ in (mm)	4.66 (118.3)	4.25 (108)	0.20 (5.08)	1.375" +0.000/-0.002 (34.93 mm +0.00/-0.05)	0.173 (4.39)
CP175 ⁵ in (mm)	5.656 (143.6)	5.25 (133.3)	0.203 (5.15)	1.750" +0.000/-0.002 (44.4 mm +0.00/-0.05)	0.173 (4.39)

¹ Fits GSX20 and GSX30 rear clevis, RC050 and RE050

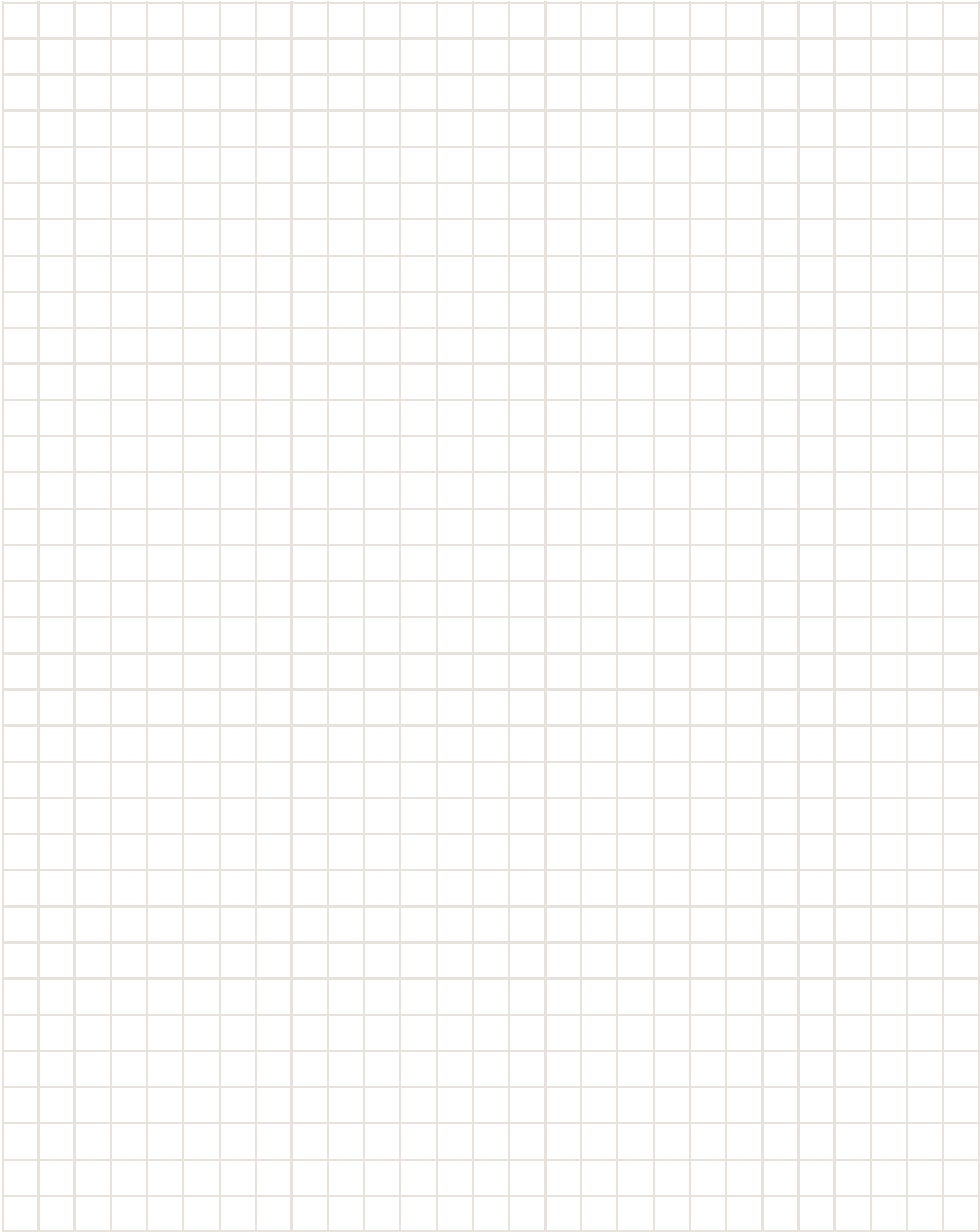
² Fits GSX30, 40 and RC075, RE075 and SMR075

³ Fits GSX50 rear clevis, RC100, RE100

⁴ Fits RC138, RE138

⁵ Fits GSX60 rear clevis

Drawings subject to change. Consult Exlar for certified drawings.



AA = GSX Actuator Frame Size (Nominal)

- 20 = 2 in (60 mm)
- 30 = 3 in (80 mm)
- 40 = 4 in (100 mm)
- 50 = 5.5 in (140 mm)
- 60 = 7 in (180 mm)

BB = Stroke Length

- 03 = 3 in (76 mm) GSX20, GSX30
- 04 = 4 in (102 mm) GSX40
- 06 = 5.9 in (150 mm) GSX30
- 6 in (152 mm) GSX20, GSX40, GSX50, GSX60
- 08 = 8 in (203 mm) GSX40
- 10 = 10 in (254 mm) all models
- 12 = 12 in (305 mm) GSX20, GSX30, GSX40
- 14 = 14 in (356 mm) GSX30, GSX50
- 18 = 18 in (457 mm) GSX30, GSX40
- 24 = 24 in (610 mm) GSX30

CC = Lead

- 01 = 0.1 in (2.54 mm) (GSX20, GSX30, GSX40, GSX50)¹²
- 02 = 0.2 in (5.08 mm) (GSX20, GSX30, GSX40, GSX50)
- 03 = 0.25 in (6.35 mm) (GSX60)
- 04 = 0.4 in (10.16 mm) (GSX20 only)
- 05 = 0.5 in (12.7 mm) (GSX30, GSX40, GSX50, GSX60)
- 08 = 0.75 in (19.05 mm) (GSX40)⁸
- 10 = 1.0 in (25.4 mm) (GSX50, GSX60)⁹

D = Connections

- I = Exlar standard M23 style¹⁰
- M = Manufacturer's connector⁶
- A = MS style (anodized)
- D = MS style (electroless nickel)
- B = Embedded leads 3 ft. std.
- P = Embedded leads w/ "A" plug 3 ft. standard
- J = Embedded leads w/ "I" plug, 3 ft. standard
- X = Special (please specify)

E = Mounting

- B = Front and rear flange
- C = Rear clevis
- F = Front flange
- R = Rear flange
- S = Side mount
- D = Double side mount
- T = Side trunnion
- E = Extended tie rods
- J = Metric side mount
- K = Metric double side mount
- Q = Metric side trunnion
- M = Metric extended tie rods
- G = Metric rear clevis
- X = Special (please specify)

F = Rod End Thread/Rod Material

- M = Male, US std. thread
- A = Male, metric thread
- F = Female, US std. thread
- B = Female, metric thread
- W = Male, US std. thread SS²²
- R = Male, metric thread SS²²
- V = Female, US std. thread SS²²
- L = Female, metric thread SS²²
- X = Special (please specify)

GGG = Feedback Type (Also specify the Amplifier/Drive Model being used when ordering)

- Standard Incremental Encoder – 2048 line (8192 cts) per rev. index pulse, Hall commutation, 5vdc
- Standard Resolver – Size 15, 1024 line (2048 cts) per rev. two pole resolver
- Motor files for use with select Emerson/CT, Rockwell /AB and Danaher/Kollmorgen Drives are available at www.exlar.com

Custom Feedback - contact your local sales representative:

- XX1 = Wiring and feedback device information must be provided and new feedback callout will be created

Allen-Bradley/Rockwell: (Actuators used with Kinetix and/or Sercos based control systems require a .cmf file from AB/Rockwell. Please contact your AB/Rockwell representative for support.)

- AB8 = Standard Incremental Encoder – MPL Circular (Speedtec) DIN connectors for 'M' option
- AB9 = Hiperface Stegmann SRM050 absolute encoder – 40-50-60 Frame Size. MPL Circular (Speedtec) DIN connectors for 'M' option – Plug & Play feedback option¹⁶
- ABB = Hiperface Stegmann SKM036 multi-turn absolute encoder. 20-30 Frame Size. MPL Circular (Speedtec) DIN connectors for 'M' option – Plug & Play feedback option¹⁶

AMKASYN:

- AK1 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – 40-50-60 Frame Size. DS motor wiring w/M23 euro connectors for 'M' option
- AK2 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – 20-30 Frame Size. DS motor wiring w/M23 euro connectors for 'M' option

Advanced Motion Control:

- AM1 = Standard Incremental Encoder
- AM2 = Encoder 1000 line, w/commutation, 5 VDC
- AM3 = Standard Resolver
- AM5 = Encoder 5000 line, w/commutation, 5 VDC

API Controls:

- AP1 = Standard Resolver
- AP2 = Standard Incremental Encoder

Aerotech:

- AR1 = Encoder 5000 line, w/commutation, 5 VDC
- AR2 = Standard Incremental Encoder

ABB Robot:

- BB1 = LTN Resolver

Baldor:

- BD2 = Std Resolver – BSM motor wiring w/M23 connectors for 'M' option
- BD3 = Std Incremental Encoder – BSM motor wiring w/M23 connectors for 'M' option

Beckhoff:

- BE2 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – AM5XX motor wiring w/M23 euro connectors for 'M' option

Baumüller:

- BM2 = Standard Resolver

B&R Automation:

- BR1 = Standard Resolver

- BR2 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – 8LS/8LM motor wiring w/M23 euro connectors for 'M' option

Comau Robot:

- CM1 = Standard Resolver

Copley Controls:

- CO1 = Standard Incremental Encoder
- CO2 = Standard Resolver

Control Techniques/Emerson:

- CT1 = Hiperface Stegmann SRM050 multi-turn absolute encoder – 40-50-60 Frame Size. FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option
- CT3 = Hiperface Stegmann SKM036 multi-turn absolute encoder – 20-30 Frame Size. FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option
- CT4 = Standard Incremental Encoder – FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option
- CT5 = Std Resolver – FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option
- CT7 = Encoder 5000 line, with commutation, 5 VDC – FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option

Delta Tau Data Systems:

- DT1 = Encoder 1000 line, with commutation, 5 VDC
- DT2 = Standard Resolver

Elmo Motion Control:

- EL1 = Standard Resolver
- EL2 = Standard Incremental Encoder
- EL3 = EnDat Heidenhain EQN1125 multi-turn absolute encoder

Emerson/Control Techniques:

- EM2 = Std Incremental Encoder – NT motor wiring w/MS connectors for 'M' option
- EM5 = Encoder 5000 line, with commutation, 5 VDC – NT motor wiring w/MS connectors for 'M' option

Elau:

- EU1 = Hiperface Stegmann SRM050 multi-turn absolute encoder – 40-50-60 Frame Size. SH motor wiring w/MS connectors for 'M' option
- EU4 = Hiperface Stegmann SKM036 multi-turn absolute encoder – 20-30 Frame Size. SH motor wiring w/MS connectors for 'M' option

Exlar:

- EX4 = Standard Resolver

Fanuc Pulsecoder:^{20, 23} Consult Exlar

G&L Motion Control/Danaher Motion:

- GL1 = Std Incremental Encoder – HSM motor wiring w/ MS connectors for 'M' option
- GL2 = Std Incremental Encoder – LSM-MSM motor wiring w/M23 euro connectors for 'M' option
- GL3 = Std Incremental Encoder – NSM motor wiring w/MS connectors for 'M' option
- GL4 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – AKM motor wiring w/M23 euro connectors for 'M' option

Infranor:

- IF1 = Standard Resolver

Indramat/Bosch-Rexroth:

- IN6 = Std Resolver – MKD/MHD motor wiring w/M23 euro connectors for 'M' option

GSM Series Linear Actuators with Integrated Motor

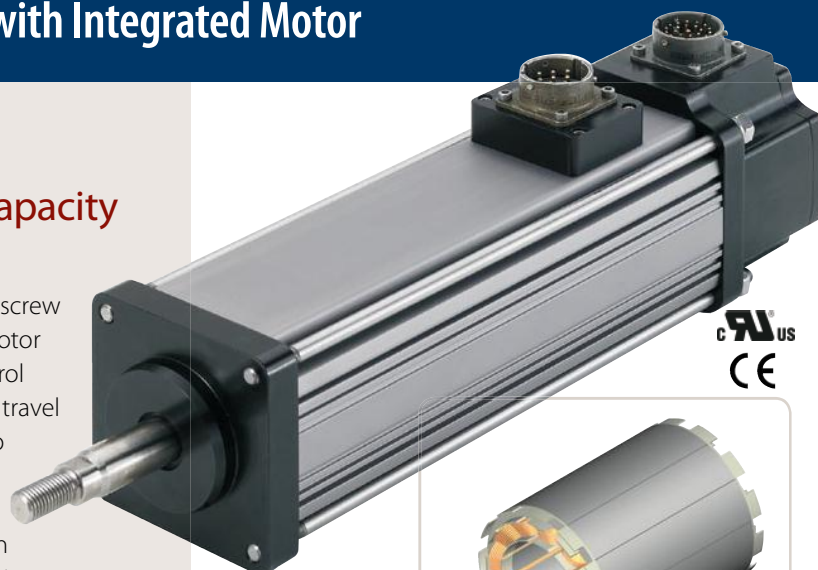
GSM Series—Standard Capacity Roller Screw Option

This design incorporates Exlar's patented roller screw technology with an integral brushless servo motor for medium to high performance motion control applications. The GSM Series offers 5 times the travel life of similarly sized ball screw actuators. It also provides a smaller package with higher speed and higher load capacity than ball screws and other traditional rotary to linear conversion mechanisms. These features make the GSM Series an excellent replacement for ball screw actuators.

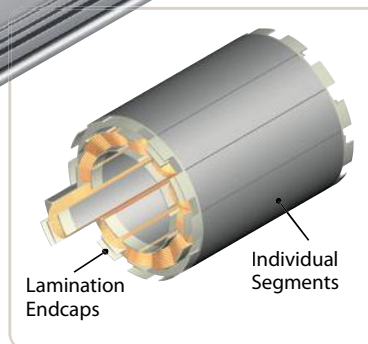
Selection of the proper feedback configuration allows GSM Series actuators to be powered by nearly every brand of brushless motor amplifier on the market. This flexibility allows GSM Series actuators to be incorporated into the highest performance single and multi-axis motion control systems in use today. In applications varying from food and beverage packaging, to multi-axis turning centers, to aircraft assembly, the GSM Series of actuators show incredible performance and durability.

Exlar's T-LAM technology incorporated into the motor design provides a solution with 35% more torque in the same package size as traditional brushless motors. The efficiencies of the GSM Series are a result of the limited heat generation qualities inherent in the segmented stator design. The elimination of end turns in the stator, and the use of thermally conductive potting removes the parts most susceptible to failure in a traditional stator. Other benefits include:

- Neodymium iron boron magnets provide high flux density and maximum motor torque.
- Thermally conductive potting of the entire stator provides increased heat dissipation and provides protection from contamination in oil-cooled units.
- Each stator segment contains individual phase wiring. External winding of individual segments provides maximum slot fill for maximum motor performance.
- Motors with T-LAM technology have Class H insulation systems compliant with UL requirements.



**Roller Screw
Driven BY EXLAR**



Features/Characteristics

T-LAM™ segmented lamination stator technology

2.25, 3.3 or 3.9 inch frame size

3, 4, 5.9, 6, 10, 12, 14, 18 and 24 inch strokes

0.1, 0.2, 0.4, 0.5 and .75 inch lead roller screws

7 to 75 lbf-in torque motor availability

Up to 33 inch per second linear speeds

92 to 1983 lbf thrust capacity depending on motor selection

Front flange, rear flange, rear clevis, trunnion, side, double side or extended tie rods mounting options

Encoder feedback with MS style connectors

Molded and shielded cables available

Anodized aluminum housing

Competitively priced with ball screw actuators

5 times the life of a similar sized ball screw actuator

IP54S or IP65S sealing

Class 180 H insulation

UL recognized component

GSM Series Linear Actuators with Integrated Motor

Exlar GSM Series Linear Actuators Applications Include:

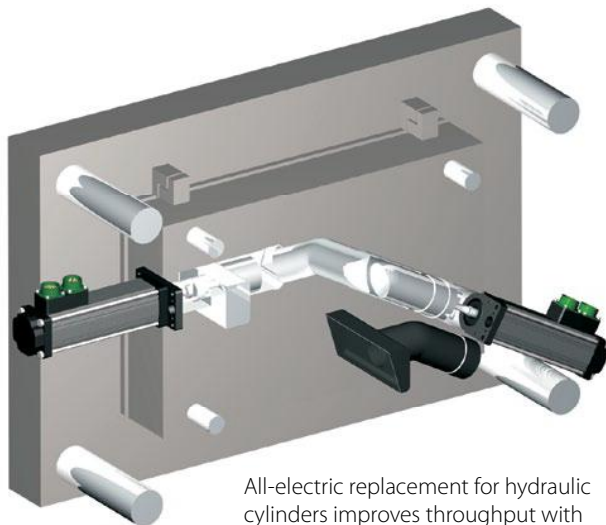
Hydraulic cylinder replacement
Ball screw replacement
Pneumatic cylinder replacement
Chip and wafer handling
Automated flexible fixturing
Dispensers
Machine tool
Automated assembly
Parts clamping
Automatic tool changers
Volumetric pumps

Medical equipment
Conveyor diverters / gates
Plastics equipment
Cut-offs
Die cutters
Packaging machinery
Entertainment
Sawmill equipment
Open / close doors
Fillers
Formers
Precision grinders
Indexing stages

Lifts
Product sorting
Material cutting
Material handling
Riveting / fastening / joining
Molding
Volumetric pumps
Semiconductor
Pick and place systems
Robot manipulator arms
Simulators
Precision valve control

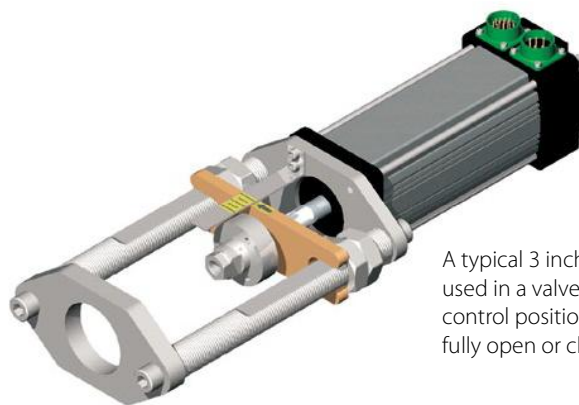
Ventilation control systems
Pressing
Process control
Tube bending
Welding
Stamping
Test stands
Tension control
Web guidance
Wire winding
Food Processing

GSM Series



All-electric replacement for hydraulic cylinders improves throughput with servo control and less maintenance for core-pull cylinders.

GSM-Series actuators can provide the precision at high force loads for fluid dispensing in a medical environment.



A typical 3 inch stroke GSM Series actuator used in a valve-modulating application can control position to $\pm .5\%$ while ready to fully open or close in less than 200 mSec.

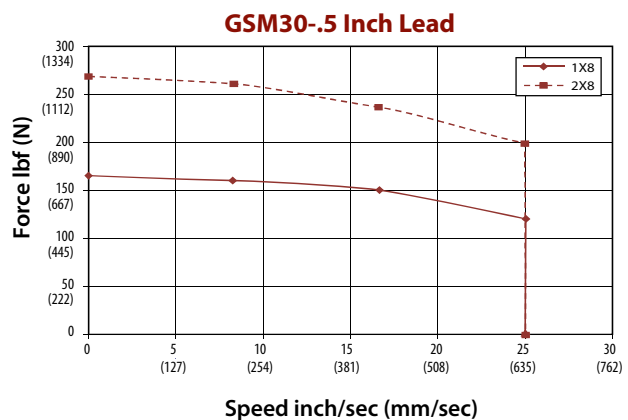
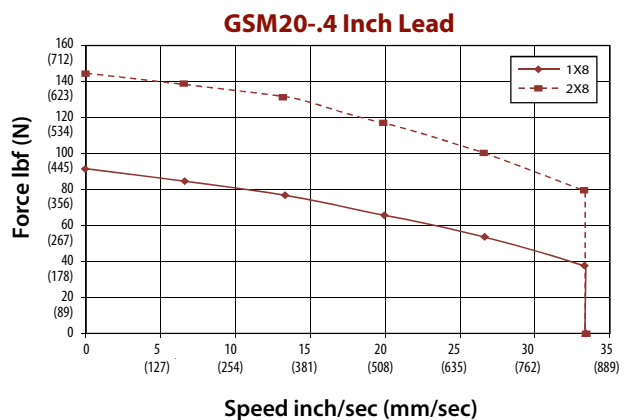
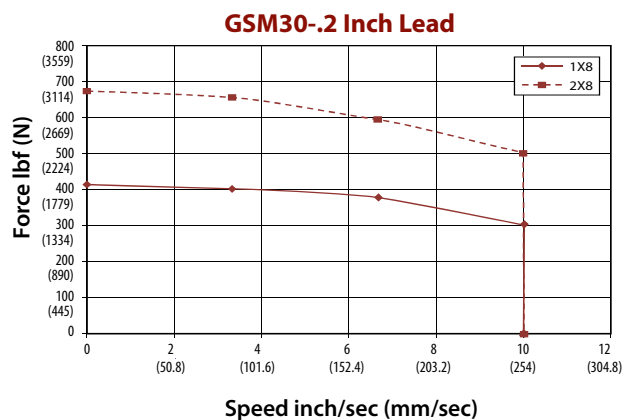
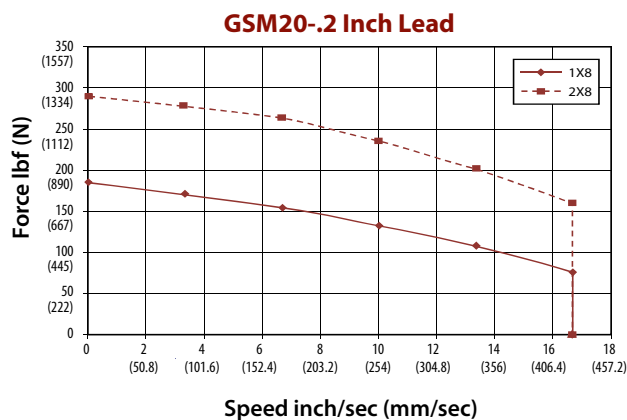
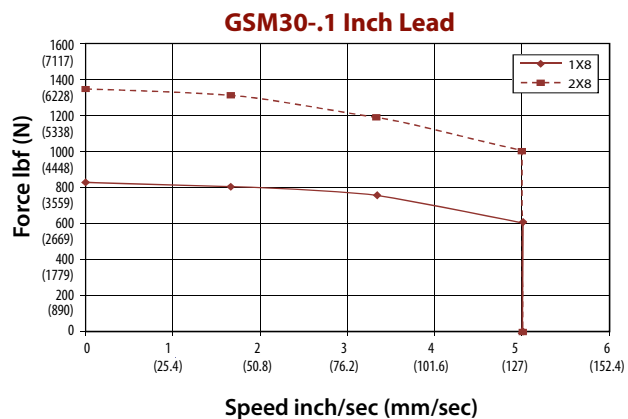
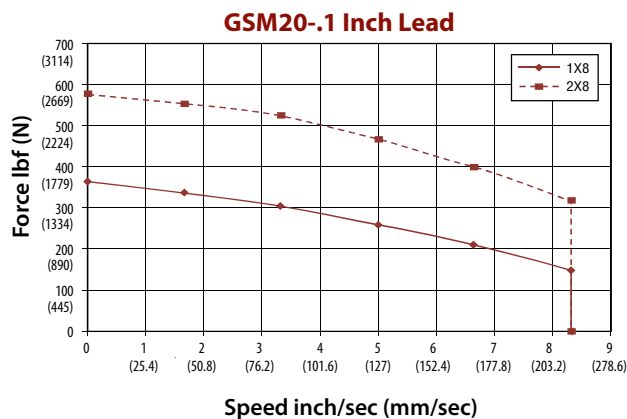


GSM Series Linear Actuators with Integrated Motor

GSM Series Performance

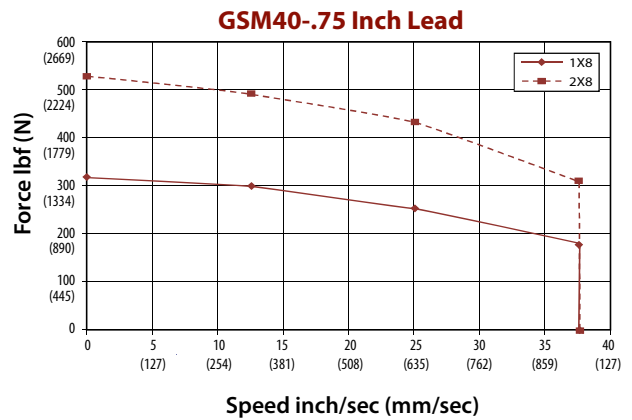
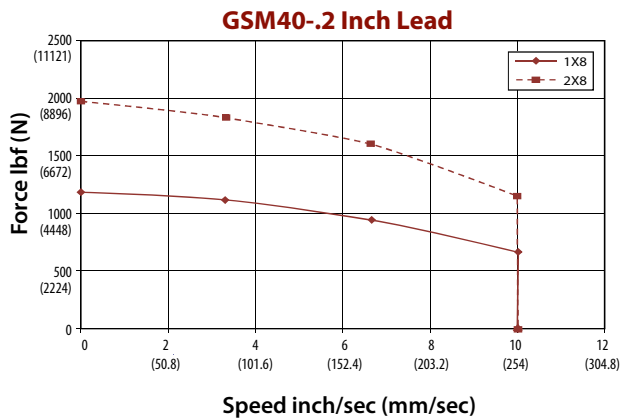
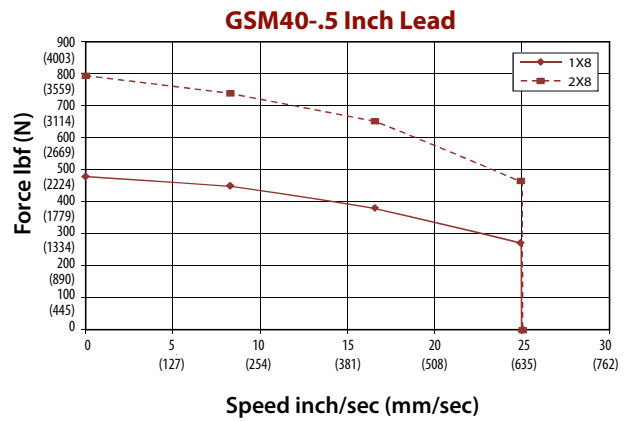
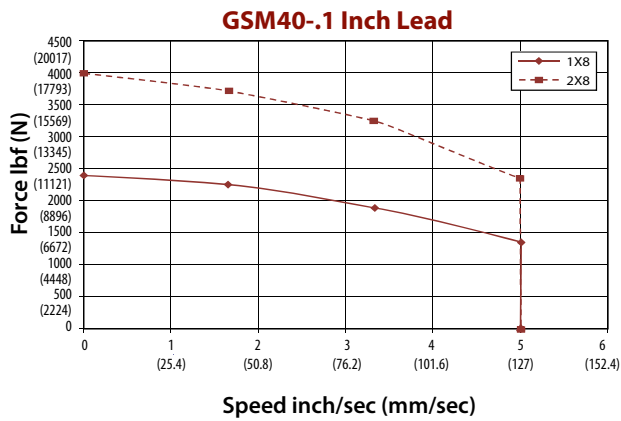
The below speed vs. force curves represent approximate continuous thrust ratings at indicated linear speed. Different types of servo amplifiers will offer varying motor

torque and thus actuator thrust. These values are at constant velocity and do not account for motor torque required for acceleration.



Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4" on GSM20 and 10" x 10" x 3/8" on GSM30

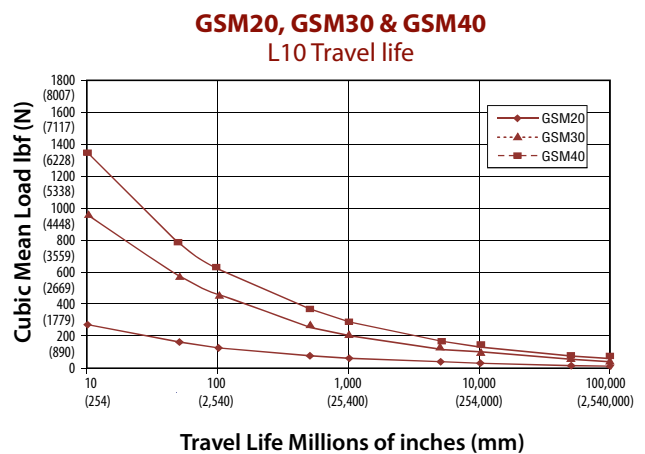
GSM Series Linear Actuators with Integrated Motor



Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" on GSM40

Life Curves

The estimated travel life indicates the approximate expected travel life from the roller screw mechanism within the GSM30 at indicated cubic mean load. The chart below represents L_{10} travel life estimates. The reliability for these values is 90%. For higher than 90% reliability, the result should be multiplied by the following factors: 95% x 0.62; 96% x 0.53; 97% x 0.44; 98% x 0.33; 99% x 0.21. This information assumes that the roller screw is properly maintained and lubricated. The equation used to calculate the L_{10} life is: Travel $(\text{in})^3 \times S$, where S = lead in millions of inches/mm. Where C = the dynamic load rating of the screw and F is the cubic mean load rating of the application. For higher than 90% reliability, derating of this value is implemented. Contact your local sales representative for details.



GSM Series Linear Actuators with Integrated Motor

GSM20 & GSM30 Performance Specifications

Model No.	Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Continuous Force Rating lb (N) 1 stack/2 stack	Max Velocity in/sec (mm/sec)	Maximum Static Load lb (N)	Armature Inertia** lb-in-s ² (Kg-m ²)	Dynamic Load Rating lb (N)	Weight (approx.) lb (kg)
GSM20-0301	2.25 (57)	3 (76)	0.1 (2.54)	367/578 (1,632/2,571)	8.33 (211.67)	750 (3336)	0.00101 (0.000114)	1568 (6970)	6.5 (2.9)
GSM20-0302			0.2 (5.08)	195/307 (867/1,366)	16.77 (423.33)			1219 (5422)	
GSM20-0304			0.4 (10.16)	103/163 (459/723)	33.33 (846.67)			738 (3283)	
GSM20-0601	2.25 (57)	6 (152)	0.1 (2.54)	367/578 (1,632/2,571)	8.33 (211.67)	750 (3336)	0.00114 (0.000129)	1567 (6970)	7.0 (3.2)
GSM20-0602			0.2 (5.08)	195/307 (867/1,366)	16.67 (423.33)			1219 (5422)	
GSM20-0604			0.4 (10.16)	103/163 (459/723)	33.33 (846.67)			738 (3283)	
GSM20-1001	2.25 (57)	10 (254)	0.1 (2.54)	367/578 (1,632/2,571)	8.33 (211.67)	750 (3336)	0.00133 (0.000150)	1567 (6970)	7.5 (3.4)
GSM20-1002			0.2 (5.08)	195/307 (867/1,366)	16.67 (423.33)			1219 (5422)	
GSM20-1004			0.4 (10.16)	103/163 (459/723)	33.33 (846.67)			738 (3283)	
GSM20-1201	2.25 (57)	12 (305)	0.1 (2.54)	367/578 (1,632/2,571)	8.33 (211.67)	750 (3336)	0.00143 (0.000162)	1567 (6970)	8.0 (3.6)
GSM20-1202			0.2 (5.08)	195/307 (867/1,366)	16.67 (423.33)			1219 (5422)	
GSM20-1204			0.4 (10.16)	103/163 (459/723)	33.33 (846.67)			738 (3283)	
GSM30-0301	3.3 (84)	3 (76)	0.1 (2.54)	792/1,277 (3,521/5,680)	5 (127)	1620 (7206)	0.00319 (0.000360)	3310 (14724)	9.5 (4.3)
GSM30-0302			0.2 (5.08)	449/724 (1,995/3,219)	10 (254)			3570 (15880)	
GSM30-0305			0.5 (12.7)	190/306 (845/1,363)	25 (635)			3016 (13416)	
GSM30-0601	3.3 (84)	5.9 (150)	0.1 (2.54)	792/1,277 (3,521/5,680)	5 (127)	1620 (7206)	0.00361 (0.000408)	3310 (14724)	11.5 (5.2)
GSM30-0602			0.2 (5.08)	449/724 (1,995/3,219)	10 (254)			3570 (15880)	
GSM30-0605			0.5 (12.7)	190/306 (845/1,363)	25 (635)			3016 (13416)	
GSM30-1001	3.3 (84)	10 (254)	0.1 (2.54)	792/1,277 (3,521/5,680)	5 (127)	1620 (7206)	0.00416 (0.00047)	3310 (14724)	19 (8.6)
GSM30-1002			0.2 (5.08)	449/724 (1,995/3,219)	10 (254)			3570 (15880)	
GSM30-1005			0.5 (12.7)	190/306 (845/1,363)	25 (635)			3016 (13416)	
GSM30-1201	3.3 (84)	12 (305)	0.1 (2.54)	792/1,277 (3,521/5,680)	5 (127)	1620 (7206)	0.00443 (0.000501)	3310 (14724)	20.5 (9.3)
GSM30-1202			0.2 (5.08)	449/724 (1,995/3,219)	10 (254)			3570 (15880)	
GSM30-1205			0.5 (12.7)	190/306 (845/1,363)	25 (635)			3016 (13416)	
GSM30-1401	3.3 (84)	14 (356)	0.1 (2.54)	792/1,277 (3,521/5,680)	5 (127)	1620 (7206)	0.00473 (0.000534)	3310 (14724)	22 (10)
GSM30-1402			0.2 (5.08)	449/724 (1,995/3,219)	10 (254)			3570 (15880)	
GSM30-1405			0.5 (12.7)	190/306 (845/1,363)	25 (635)			3016 (13416)	
GSM30-1801	3.3 (84)	18 (457)	0.1 (2.54)	792/1,277 (3,521/5,680)	5 (127)	1620 (7206)	0.00533 (0.000602)	3310 (14724)	25 (11.3)
GSM30-1802			0.2 (5.08)	449/724 (1,995/3,219)	10 (254)			3570 (15880)	
GSM30-1805			0.5 (12.7)	190/306 (845/1,363)	25 (635)			3016 (13416)	
GSM30-2401	3.3 (84)	24 (610)	0.1 (2.54)	792/1,277 (3,521/5,680)	5 (127)	1620 (7206)	0.00615 (0.000695)	3310 (14724)	30 (13.6)
GSM30-2402			0.2 (5.08)	449/724 (1,995/3,219)	10 (254)			3570 (15880)	
GSM30-2405			0.5 (12.7)	190/306 (845/1,363)	25 (635)			3016 (13416)	

**Inertia +/- 5%

See page 47 for definition of terms.

GSM Series Linear Actuators with Integrated Motor

GSM40 Performance Specifications

Model No.	Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Continuous Force Rating lb (N) 1 stack/2 stack	Max Velocity in/sec (mm/sec)	Maximum Static Load lb (N)	Armature Inertia** lb-in-s ² (Kg-m ²)	Dynamic Load Rating lb (N)	Weight (approx.) lb (kg)
GSM40-0401	3.9 (99)	4 (102)	0.1 (2.54)	2,089/NA (9,293/NA)	5 (127)	3966 (17642)	0.0140 (0.001582)	4736 (21067)	16 (7.3)
GSM40-0402			0.2 (5.08)	1,194/NA (5,310/NA)	10 (254)			4890 (21751)	
GSM40-0405			0.5 (12.7)	537/NA (2,390/NA)	25 (635)			4218 (18763)	
GSM40-0408			0.75 (19.05)	358/NA (1,593/NA)	37.5 (953)			3328 (14804)	
GSM40-0601	3.9 (99)	6 (152)	0.1 (2.54)	2,089/3,457 (9,293/15,377)	5 (127)	3966 (17642)	0.0152 (0.001717)	4736 (21067)	20 (9.1)
GSM40-0602			0.2 (5.08)	1,194/1,975 (5,310/8,787)	10 (254)			4890 (21751)	
GSM40-0605			0.5 (12.7)	537/889 (2,390/3,954)	25 (635)			4218 (18763)	
GSM40-0608			0.75 (19.05)	358/593 (1,593/2,636)	37.5 (953)			3328 (14804)	
GSM40-0801	3.9 (99)	8 (203)	0.1 (2.54)	2,089/3,457 (9,293/15,377)	5 (127)	3966 (17642)	0.0163 (0.001842)	4736 (21067)	24 (10.9)
GSM40-0802			0.2 (5.08)	1,194/1,975 (5,310/8,787)	10 (254)			4890 (21751)	
GSM40-0805			0.5 (12.7)	537/889 (2,390/3,954)	25 (635)			4218 (18763)	
GSM40-0808			0.75 (19.05)	358/593 (1,593/2,636)	37.5 (953)			3328 (14804)	
GSM40-1001	3.9 (99)	10 (254)	0.1 (2.54)	2,089/3,457 (9,293/15,377)	5 (127)	3966 (17642)	0.0175 (0.001977)	4736 (21067)	28 (12.7)
GSM40-1002			0.2 (5.08)	1,194/1,975 (5,310/8,787)	10 (254)			4890 (21751)	
GSM40-1005			0.5 (12.7)	537/889 (2,390/3,954)	25 (635)			4218 (18763)	
GSM40-1008			0.75 (19.05)	358/593 (1,593/2,636)	37.5 (953)			3328 (14804)	
GSM40-1201	3.9 (99)	12 (305)	0.1 (2.54)	2,089/3,457 (9,293/15,377)	5 (127)	3966 (17642)	0.0186 (0.002102)	4736 (21067)	32 (14.5)
GSM40-1202			0.2 (5.08)	1,194/1,975 (5,310/8,787)	10 (254)			4890 (21751)	
GSM40-1205			0.5 (12.7)	537/889 (2,390/3,954)	25 (635)			4218 (18763)	
GSM40-1208			0.75 (19.05)	358/593 (1,593/2,636)	37.5 (953)			3328 (14804)	
GSM40-1801	3.9 (99)	18 (457)	0.1 (2.54)	2,089/3,457 (9,293/15,377)	5 (127)	3966 (17642)	0.0220 (0.002486)	4736 (21067)	44 (19.9)
GSM40-1802			0.2 (5.08)	1,194/1,975 (5,310/8,787)	10 (254)			4890 (21751)	
GSM40-1805			0.5 (12.7)	537/889 (2,390/3,954)	25 (635)			4218 (18763)	

**Inertia +/- 5%

See below for definition of terms.

DEFINITION OF TERMS:

Continuous Force Rating: The linear force produced by the actuator at continuous motor torque.

Max Velocity: The linear velocity that the actuator will achieve at rated motor rpm.

Maximum Static Load: The mechanical load limit of the actuator if re-circulated oil or other cooling method is used to allow higher than rated torque from the motor.

Armature Inertia: The rotary inertia of the armature of the GSM Series actuators. For calculation purposes, this value includes the screw inertia in a GSM actuator.

Dynamic Load Rating: A design constant used in calculating the estimated travel life of the roller screw. The cubic mean load is the load at which the device will perform one million revolutions.

GSM Series Linear Actuators with Integrated Motor

GSM20 Mechanical and Electrical Specifications

Nominal Backlash	in (mm)	0.008 (.20)											
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)											
Maximum Radial Load	lb (N)	15 (67)											
Environmental Rating: Standard/Optional		IP54S/IP65S											
Motor Stator		118	138	158	168	218	238	258	268	318	338	358	368
RMS SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in (Nm)	7.6 (0.86)	7.3 (0.83)	7.0 (0.79)	7.0 (0.79)	11.9 (1.34)	11.5 (1.30)	11.0 (1.25)	11.3 (1.28)	15.0 (1.70)	15.3 (1.73)	14.6 (1.65)	14.9 (1.69)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	2.5 (0.28)	5.2 (0.59)	7.5 (0.85)	9.5 (1.07)	2.5 (0.28)	5.2 (0.59)	8.6 (0.97)	10.1 (1.15)	2.5 (0.29)	5.3 (0.59)	8.8 (0.99)	10.1 (1.15)
Continuous Current Rating	A	3.4	1.6	1.0	0.8	5.4	2.5	1.4	1.2	6.6	3.2	1.9	1.6
Peak Current Rating	A	6.9	3.1	2.1	1.6	10.8	4.9	2.9	2.5	13.2	6.5	3.7	3.3
O-PK SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in (Nm)	7.6 (0.86)	7.3 (0.83)	7.0 (0.79)	7.0 (0.79)	11.9 (1.34)	11.5 (1.30)	11.0 (1.25)	11.3 (1.28)	15.0 (1.70)	15.3 (1.73)	14.6 (1.65)	14.9 (1.69)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	1.7 (0.20)	3.7 (0.42)	5.3 (0.60)	6.7 (0.76)	1.7 (0.20)	3.7 (0.42)	6.1 (0.69)	7.2 (0.81)	1.8 (0.20)	3.7 (0.42)	6.2 (0.70)	7.2 (0.81)
Continuous Current Rating	A	4.9	2.2	1.5	1.2	7.6	3.5	2.0	1.8	9.4	4.6	2.6	2.3
Peak Current Rating	A	9.7	4.5	2.9	2.3	15.2	7.0	4.1	3.5	18.7	9.2	5.3	4.7
MOTOR STATOR DATA													
Voltage Constant (Ke)	Vrms/Krpm	16.9	35.5	51.5	64.8	16.9	35.5	58.6	69.3	17.3	36.0	59.9	69.3
(+/- 10% @ 25 °C)	Vpk/Krpm	23.9	50.2	72.8	91.7	23.9	50.2	82.9	98.0	24.5	50.9	84.8	98.0
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25 °C)	Ohms	2.6	12.5	28.8	45.8	1.1	5.3	15.5	20.7	0.76	3.1	9.6	12.2
Inductance (L-L)(+/- 15%)	mH	4.6	21.4	47.9	68.3	2.5	10.2	28.3	39.5	1.7	7.4	18.5	27.4
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.00012 (0.135)											
Brake Current @ 24VDC	A	0.33											
Brake Holding Torque	lbf-in (Nm)	19 (2.2)											
Brake Engage/Disengage Time	ms	14/28											
Mechanical Time Constant (tm), ms	min	4.7	5.1	5.5	5.6	2.0	2.1	2.3	2.2	1.3	1.2	1.4	1.3
	max	6.6	7.2	7.9	7.9	2.8	3.0	3.3	3.1	1.8	1.8	1.9	1.8
Electrical Time Constant (te)	ms	1.8	1.7	1.7	1.5	2.2	1.9	1.8	1.9	2.3	2.4	1.9	2.2
Friction Torque	lbf-in (Nm)	1.0 (0.12)				1.1 (0.12)				1.1 (0.13)			
Additional Friction Torque for Preloaded Screw	lbf-in (Nm)	1.25 (0.14)				1.25 (0.14)				1.25 (0.14)			
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	5000											
Insulation Class		180 (H)											

All ratings at 25 degrees Celsius

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4"

Specifications subject to change without notice.

GSM Series Linear Actuators with Integrated Motor

GSM30 Mechanical and Electrical Specifications

Nominal Backlash	in (mm)	0.008 (.20)											
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)											
Maximum Radial Load	lb (N)	20 (90)											
Environmental Rating: Standard/Optional		IP54S/IP65S											
Motor Stator		118	138	158	168	218	238	258	268	318	338	358	368
RMS SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in (Nm)	16.9 (1.91)	16.8 (1.90)	16.3 (1.84)	16.0 (1.81)	26.9 (3.04)	27.1 (3.06)	26.7 (3.01)	27.0 (3.05)	38.7 (4.37)	38.2 (4.32)	36.2 (4.09)	36.3 (4.10)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	4.4 (0.49)	8.7 (0.99)	15.5 (1.75)	17.5 (1.97)	4.4 (0.49)	8.7 (0.99)	15.5 (1.75)	17.5 (1.97)	4.4 (0.50)	8.7 (0.98)	15.6 (1.77)	17.5 (1.98)
Continuous Current Rating	A	4.3	2.2	1.2	1.0	6.9	3.5	1.9	1.7	9.7	4.9	2.6	2.3
Peak Current Rating	A	8.6	4.3	2.4	2.0	13.8	6.9	3.8	3.4	19.5	9.9	5.2	4.6
O-PK SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in (Nm)	16.9 (1.91)	16.8 (1.90)	16.3 (1.84)	16.0 (1.81)	26.9 (3.04)	27.1 (3.06)	26.7 (3.01)	27.0 (3.05)	38.7 (4.37)	38.2 (4.32)	36.2 (4.09)	36.3 (4.10)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	3.1 (0.35)	6.2 (0.70)	11.0 (1.24)	12.4 (1.40)	3.1 (0.35)	6.2 (0.70)	11.0 (1.24)	12.4 (1.40)	3.1 (0.35)	6.1 (0.69)	11.1 (1.25)	12.4 (1.40)
Continuous Current Rating	A	6.1	3.0	1.7	1.4	9.7	4.9	2.7	2.4	13.8	7.0	3.7	3.3
Peak Current Rating	A	12.2	6.1	3.3	2.9	19.5	9.8	5.4	4.9	27.6	13.9	7.3	6.5
MOTOR STATOR DATA													
Voltage Constant (Ke)	Vrms/Krpm	29.8	59.7	105.8	119.3	29.8	59.7	105.8	119.3	30.3	59.2	106.8	119.8
(+/- 10% @ 25 °C)	Vpk/Krpm	42.2	84.4	149.7	168.7	42.2	84.4	149.7	168.7	42.9	83.7	151.0	169.4
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25 °C)	Ohms	2.7	10.8	36.3	47.9	1.1	4.4	14.1	17.6	0.65	2.6	9.3	11.6
Inductance (L-L)(+/- 15%)	mH	7.7	30.7	96.8	123.0	3.7	14.7	46.2	58.7	2.5	9.5	30.9	38.8
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.00033 (0.38)											
Brake Current @ 24 VDC	A	0.5											
Brake Holding Torque	lbf-in (Nm)	70 (8)											
Brake Engage/Disengage Time	ms	19/29											
Mechanical Time Constant (tm), ms	min	4.9	4.9	5.2	5.4	2.0	2.0	2.0	2.0	1.1	1.2	1.3	1.3
	max	9.4	9.5	10.1	10.5	3.9	3.8	3.9	3.8	2.2	2.3	2.5	2.5
Electrical Time Constant (te)	ms	2.9	2.8	2.7	2.6	3.3	3.4	3.3	3.3	3.8	3.7	3.3	3.3
Friction Torque	lbf-in (Nm)	1.5 (0.17)				1.7 (0.19)				1.9 (0.21)			
Additional Friction Torque for Preloaded Screw	lbf-in (Nm)	1.75 (0.20)				1.75 (0.20)				1.75 (0.20)			
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	3000											
Insulation Class		180 (H)											

All ratings at 25 degrees Celsius

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 3/8"

Specifications subject to change without notice.

GSM Series Linear Actuators with Integrated Motor

GSM40 Mechanical and Electrical Specifications

Nominal Backlash	in (mm)	0.008 (.20)										
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)										
Maximum Radial Load	lb (N)	30 (135)										
Environmental Rating: Standard/Optional		IP54S/IP65S										
Motor Stator		118	138	158	168	218	238	258	268	338	358	368
RMS SINUSOIDAL COMMUTATION												
Continuous Motor Torque	lbf-in (Nm)	47.5 (5.37)	47.5 (5.36)	45.9 (5.19)	45.4 (5.13)	75.1 (8.49)	78.6 (8.89)	78.7 (8.89)	79.5 (8.99)	106.9 (12.08)	105.3 (11.90)	106.9 (12.08)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/ (Nm/A)	4.1 (0.46)	8.2 (0.93)	14.5 (1.64)	16.8 (1.90)	4.1 (0.46)	8.2 (0.93)	14.5 (1.64)	16.8 (1.90)	8.4 (0.95)	14.5 (1.64)	16.8 (1.90)
Continuous Current Rating	A	12.9	6.5	3.5	3.0	20.5	10.7	6.0	5.3	14.2	8.1	7.1
Peak Current Rating	A	25.9	12.9	7.1	6.0	40.9	21.4	12.1	10.6	28.5	16.2	14.2
O-PK SINUSOIDAL COMMUTATION												
Continuous Motor Torque	lbf-in (Nm)	47.5 (5.37)	47.5 (5.36)	45.9 (5.19)	45.4 (5.13)	75.1 (8.49)	78.6 (8.89)	78.7 (8.89)	79.5 (8.99)	106.9 (12.08)	105.3 (11.90)	106.9 (12.08)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	2.9 (0.33)	5.8 (0.66)	10.3 (1.16)	11.9 (1.34)	2.9 (0.33)	5.8 (0.66)	10.3 (1.16)	11.9 (1.34)	5.9 (0.67)	10.3 (1.16)	11.9 (1.34)
Continuous Current Rating	A	18.3	9.1	5.0	4.3	28.9	15.1	8.5	7.5	20.1	11.4	10.01
Peak Current Rating	A	36.6	18.3	10.0	8.6	57.9	30.3	17.1	15.0	40.3	22.9	20.01
MOTOR STATOR DATA												
Voltage Constant (Ke)	Vrms/ Krpm	28.0	56.0	99.3	114.6	28.0	56.0	99.3	114.6	57.3	99.3	114.6
(+/- 10% @ 25 °C)	Vpk/Krpm	39.6	79.2	140.5	162.1	39.6	79.2	140.5	162.1	81.0	140.5	162.1
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25 °C)	Ohms	0.42	1.7	5.7	7.8	0.2	0.72	2.26	3.0	0.5	1.52	2.0
Inductance (L-L)(+/- 15%)	mH	3.0	11.9	37.5	49.9	1.2	5.4	18.2	23.1	4.0	12.0	16.0
Brake Inertia	lb-in-sec ² (Kg-cm ²)	0.00096 (1.08)										
Brake Current @ 24 VDC	A	0.67										
Brake Holding Torque	lbf-in (Nm)	97 (11)										
Brake Engage/Disengage Time	ms	20/29										
Mechanical Time Constant (tm), ms	min	4.5	4.5	4.8	4.9	2.1	1.9	1.9	1.9	1.2	1.3	1.2
	max	6.0	6.0	6.4	6.6	2.8	2.6	2.6	2.5	1.7	1.7	1.7
Electrical Time Constant (te)	ms	7.0	7.0	6.6	6.4	5.9	7.5	8.0	7.8	8.2	7.9	8.2
Friction Torque	lbf-in (Nm)	2.7 (0.31)				3.0 (0.34)				3.5 (0.40)		
Additional Friction Torque for Preloaded Screw	lbf-in (Nm)	3.00 (0.34)				3.00 (0.34)				3.00 (0.34)		
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	230	400	460
Speed @ Bus Voltage	rpm	3000										
Insulation Class		180 (H)										

All ratings at 25 degrees Celsius
 For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.
 Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2"

Specifications subject to change without notice.

GSM Series Travel Options

PF = Preloaded Follower

This option offers a true zero backlash follower for the GSM Series actuator. The dynamic load rating of zero backlash, preloaded screws is 63% of the dynamic load rating of the standard non-preloaded screws. The calculated travel life of a preloaded screw will be 25% of the calculated travel life of the same size and lead of a non-preloaded screw for the same application. Preloaded follower is not available with LT Linear feedback option.

AR = External Anti-rotate Assembly

This option provides a rod and bushing to restrict the actuator rod from rotating when the load is not held by another method. Shorter actuators have single sided anti-rotation attachments. Longer lengths require attachments on both sides for proper operation. For AR dimensions, see page 26.

RB = Rear Electric Brake

This option provides an internal holding brake for the GSM Series actuators. The brake is spring activated and electrically released.

SR = Splined Main Rod

This option provides a main rod manufactured of ball spline shafting, and the front seal and bushing assembly replaced with a ball spline nut to provide the anti-rotate function without using an external mechanism. Rod diameters are the closest metric equivalents to standard Exlar rod sizes. This option is **NOT** sealed in any way. This option is not suitable for any environment in which contaminants come in contact with the actuator, and may enter the actuator.

Note: This option affects overall length and mounting dimensions for GSM actuators. Consult your local sales representative.

PB = Protective Bellows

This option provides an accordion style protective bellows to protect the main actuator rod from damage due to abrasives or other contaminants in the environment in which the actuator must survive. The standard material of this bellows is S2 Neoprene Coated Nylon, Sewn Construction. This standard bellows is rated for environmental temperatures of -40 to 250 degrees F. Longer strokes may require the main rod of the actuator to be extended beyond standard length. Not available with extended tie rod mounting option. Please contact your local sales representative.

HW = Manual Drive, Handwheel

This option provides a manual drive handwheel on the side of the actuator. The handwheel has an engage/disengage lever that is tied to an interrupt switch. Not available on GSM20. Also not available with holding brake unless application details have been discussed with your local sales representative.

RD = Manual Drive, Rear Hex

This option provides a hex shaft at the rear of the actuator for manual operation. The hex shaft is directly coupled to the motor and can be turned by hand with a compatible wrench. The hex shaft is enclosed by a sealed cap during operation. N/A with holding brake unless application details have been discussed with your local sales representative.

SD = Manual Drive, Side Hex

This option provides a hex manual drive on the side of the actuator. The hex can be turned by hand with a wrench. Not available on GSM20. Also not available with holding brake unless application details have been discussed with your local sales representative.

XT = Special Travel Option Selections

The XT Option can be used to specify various special travel options on the GSM Series of Linear Actuators. Because this option can be used to specify many things, it is important that an order including the -XT option spell out in detail, the exact options being selected by the including of the -XT in the model number.

It is recommended that prior to ordering an actuator including the -XT specifier that a quote be obtained through Exlar's special products application engineers for the desired options, and that quote be referenced on, or included with any order placed.

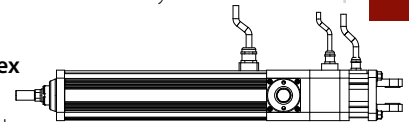
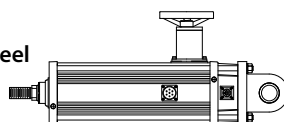
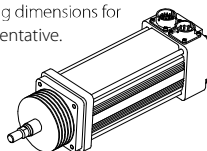
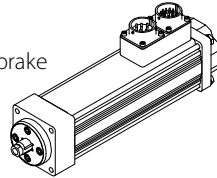
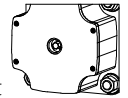
High Temp Protective Bellows, an XT option, provides an accordion style protective bellows to protect the main actuator rod from damage due to abrasives or other contaminants in the environment in which the actuator must survive. The high temperature material of this bellows is D1 Teflon Coated Fiberglass, Sewn Construction. This standard bellows is rated for environmental temperatures of -67 to 500 degrees F. Longer strokes may require the main rod of the actuator to be extended beyond standard length. Not available with extended tie rod mounting option. Please contact your local sales representative for details.

L1, L2, L3 = Adjustable External Travel Switches

This option allows up to 3 external switches to be included with the GSM Series Actuator. These switches provide travel indication to the controller and are adjustable. See drawing on page 57. Must purchase external anti-rotate with this option.

XL = Non-Standard Lubrication

This option provides for indication in the model number that the customer has specified a lubrication other than the standard provided by Exlar, Mobilith SHC220. Specials include other greases including JAX FG-2 food grade, Mobilgrease 28, or other non-standard grease.



GSM Series Linear Actuators with Integrated Motor

Motor Speed Designators

All Exlar T-LAM™ motors and actuators carry a standard motor speed designator as defined below. This is representative of the standard base speed of the motor for the selected bus voltage.

If the model number is created and the location for the motor speed designator is left blank, this is the base speed to which each motor will be

manufactured. The model number can also be created including this standard speed designator.

Exlar also provides the flexibility to manufacture all of its T-LAM products with special base speeds to match the customer's exact application requirements. This may be a higher than standard speed motor, or lower base speed than standard which will allow the customer to get the required torque at a speed optimized to their application and use the minimum amount of current from their amplifier.

The call out for a special speed is configured in the model number by using a two digit code from 01-99. These numbers represent the number, in hundreds, of RPM that will be the base speed for the particular motor.

For example, a GSM30-0301-MFM-EM2-138-30 motor that normally has a 3000 RPM standard winding can be changed to a 3300 RPM winding by changing the -30 to a -33. It can be changed to a 5000 RPM winding by changing the -30 to a -50.

Changing this speed designator will change the ratings of the motor, and these must be obtained from your local sales representative. Also, it is not possible to produce every possible speed from -01 to -99 for each motor at each voltage so please contact your local sales representative for confirmation of the speed that is desired for the application.

Feedback Options

LT = ICT including signal conditioner

This option provides for an actuator containing an internally mounted ICT transducer spanning the full stroke of the actuator. Inquire with your local sales representative for details and signal conditioner output preference. LT is not available with absolute feedback.

Due to the variability in size of some feedback devices, especially absolute feedback devices which are often very large relative to the size of the actuator motor, the actual size of the actuator may differ in length and width from these drawings for feedback types other than standard resolvers and standard encoders. Please consult your local sales representative. In the event that you order an actuator that differs from these standard dimensions, you will be sent a drawing of the final configuration of your actuator for approval.

Motor Options

GSM motor options are described with a 3 digit code. The first digit calls out the stack length, the second the rated bus voltage, and the third the number of poles of the motor. Refer to the mechanical/electrical specifications for motor torque and actuator rated force.

118	1 stack	115 Vrms	8 Pole	Class 180 H
138		230 Vrms		
158		400 Vrms		
168		460 Vrms		
1A8*		24 VDC		
1B8*		48 VDC		
1C8*		120 VDC		
218	2 stack	115 Vrms	8 Pole	Class 180 H
238		230 Vrms		
258		400 Vrms		
268		460 Vrms		
2A8*		24 VDC		
2B8*		48 VDC		
2C8*		120 VDC		

Note: 3 stack not available in GSM Series

* Low voltage stators may be limited to less than catalog rated torque and/or speed. Please contact your local sales representative when ordering this option.

Rod End Attachments

Rear Clevis Pin Spherical Rod Eye
Rod Eye Rod Clevis

See drawings on pages 56-57.

Attachments ordered separate from actuator.

Housing Options

P5 = IP65S Sealing Option

Please read full description of IP Ratings on page 26.

HC = Type III Hard Coat Anodized, Class I

This option provides an actuator with type III hard coat anodized coating. Class I, no dye.

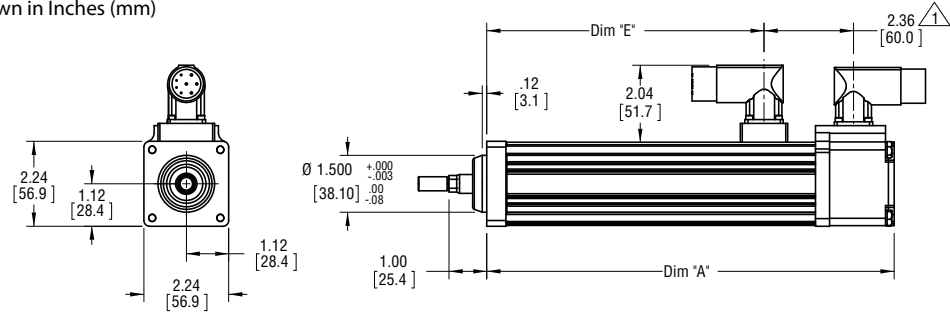
XH = Special Housing Option

Any housing option that is not designated by the above codes should be listed as XH and described at time of order. All special options must be discussed with your local sales representative.

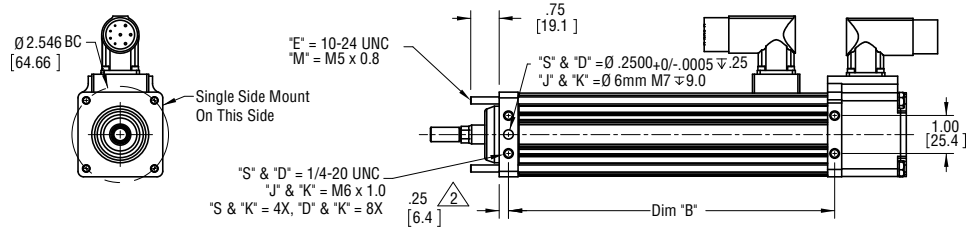
GSM Series Linear Actuators with Integrated Motor

GSM20 (Base Actuator)

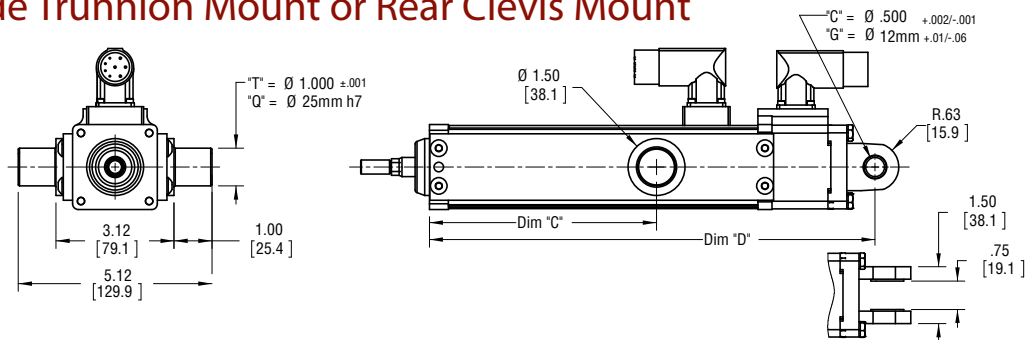
All Dimensions Shown in Inches (mm)



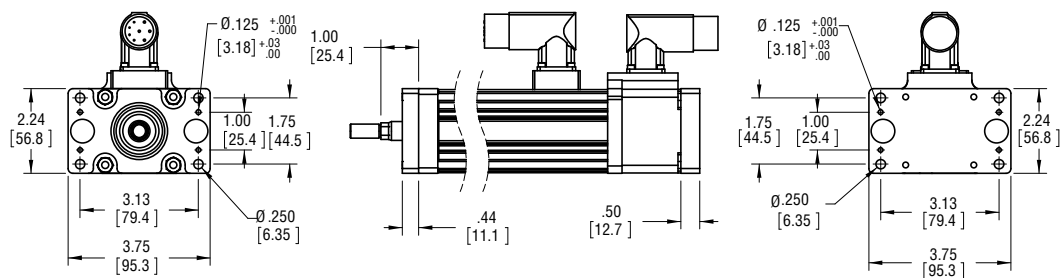
GSM20 Side Mounts or Extended Tie Rod Mount



GSM20 Side Trunnion Mount or Rear Clevis Mount



GSM20 Front or Rear Flange Mount



Dim	3" (76 mm) Stroke in (mm)	6" (152 mm) Stroke in (mm)	10" (254 mm) Stroke in (mm)	12" (305 mm) Stroke in (mm)
A	7.8 (198)	10.8 (274)	14.8 (375)	16.8 (426)
B	5.6 (143)	8.6 (219)	12.6 (320)	14.6 (371)
C	3.0 (76)	6.0 (152)	10.0 (254)	12.0 (305)
D	8.8 (223)	11.8 (299)	15.8 (401)	17.8 (452)
E	4.3 (110)	7.3 (186)	11.3 (288)	14.3 (364)

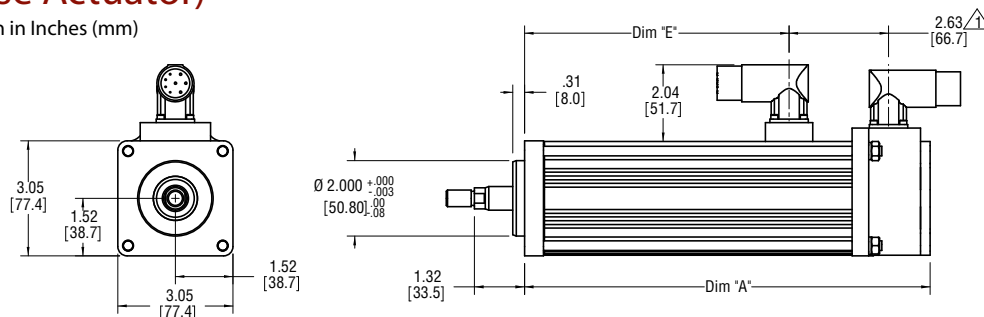
Notes:

1. Add 1.78 Inches to Dims A & D and to Dim Δ if ordering a brake.
2. Add .50 Inches to Dims A, C, D, E and to Dim Δ if ordering a splined main rod.
3. Models are shown with Exlar standard M23 style connectors (option "I"). See ordering guide for other connector options.
4. Depending on connector and feedback options selected, dimensions may vary. Consult Exlar for details, or refer to the drawings provided after receipt of order.
5. Drawings subject to change.

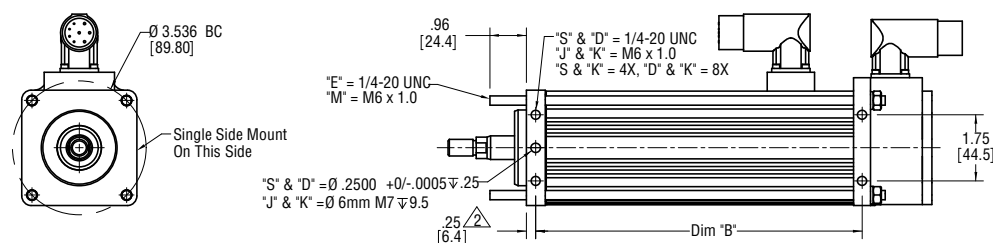
GSM Series Linear Actuators with Integrated Motor

GSM30 (Base Actuator)

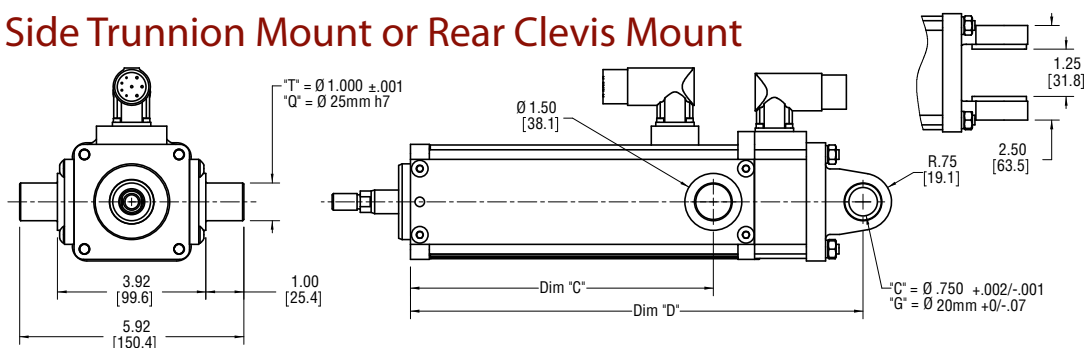
All Dimensions Shown in Inches (mm)



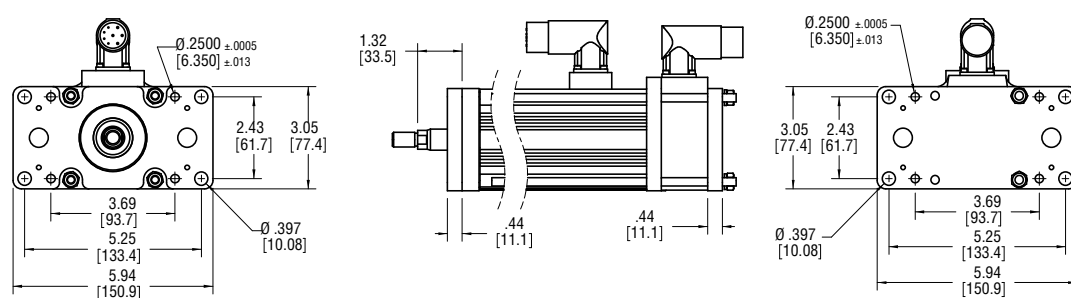
GSM30 Side Mounts or Extended Tie Rod Mount



GSM30 Side Trunnion Mount or Rear Clevis Mount



GSM30 Front or Rear Flange Mount



Dim	3" (76 mm) Stroke in (mm)	6" (152 mm) Stroke in (mm)	10" (254 mm) Stroke in (mm)	12" (305 mm) Stroke in (mm)	14" (356 mm) Stroke in (mm)	18" (457 mm) Stroke in (mm)
A	8.2 (209)	10.7 (272)	15.2 (387)	17.2 (437)	19.2 (539)	23.2 (590)
B	6.1 (156)	8.6 (219)	13.1 (333)	15.1 (384)	17.1 (485)	21.1 (536)
C	5.4 (137)	8.0 (203)	10.0 (254)	12.0 (305)	14.0 (406)	18.0 (457)
D	9.5 (241)	12.0 (304)	16.5 (418)	18.5 (469)	20.5 (570)	24.5 (621)
E	4.5 (114)	7.0 (178)	11.5 (292)	13.5 (343)	15.5 (394)	19.5 (495)

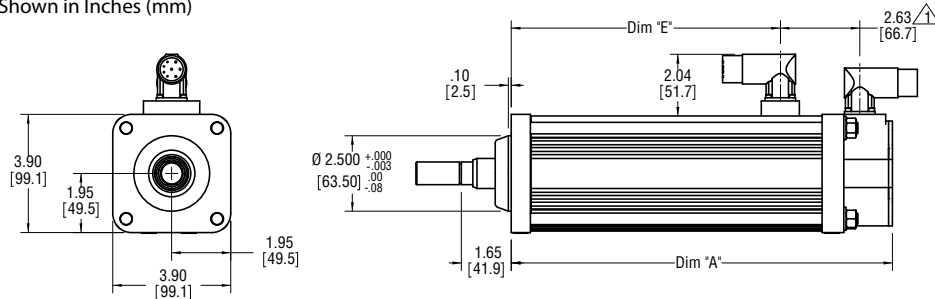
Notes:

1. Add 1.6 Inches to Dims A & D and to Dim Δ if ordering a brake.
2. Add 1.20 Inches to Dims A, C, D, E and to Dim Δ if ordering a splined main rod.
3. Models are shown with Exlar standard M23 style connectors (option "I"). See ordering guide for other connector options.
4. Depending on connector and feedback options selected, dimensions may vary. Consult Exlar for details, or refer to the drawings provided after receipt of order.
5. Drawings subject to change.

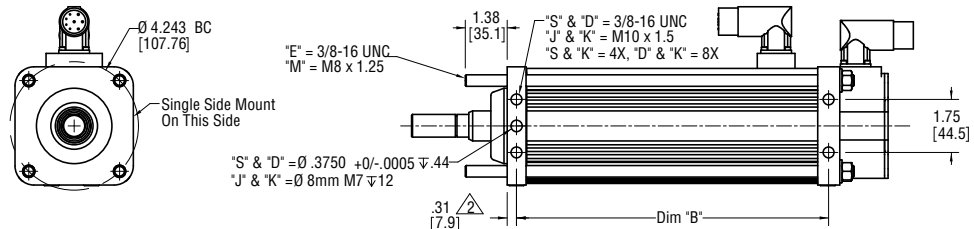
GSM Series Linear Actuators with Integrated Motor

GSM40 (Base Actuator)

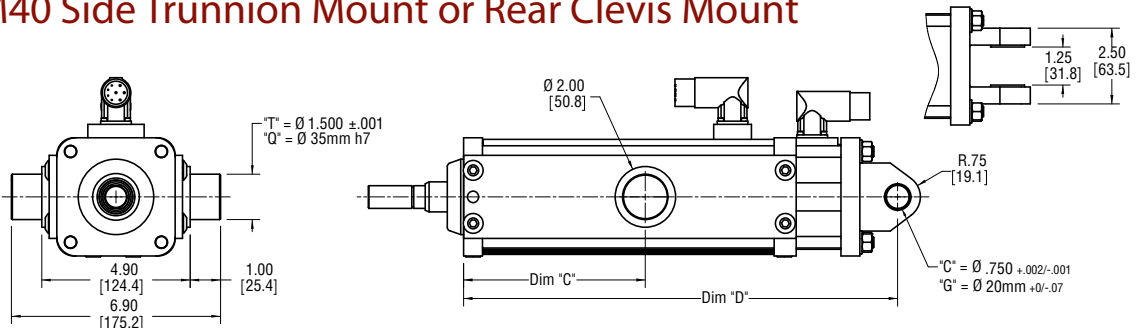
All Dimensions Shown in Inches (mm)



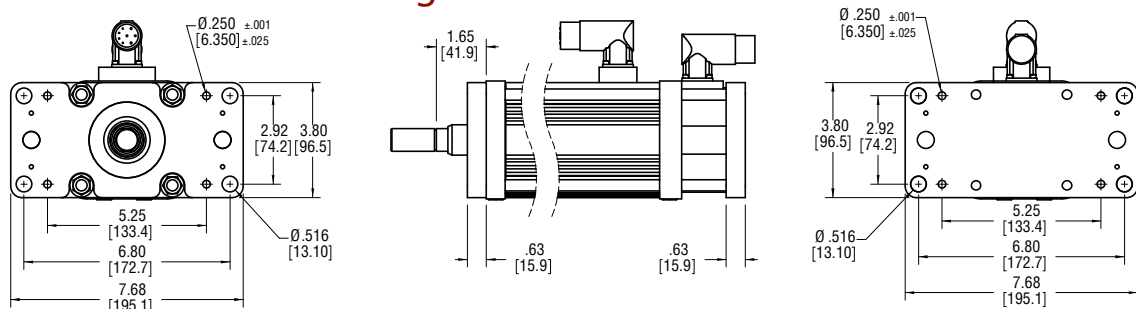
GSM40 Side Mounts or Extended Tie Rod Mount



GSM40 Side Trunnion Mount or Rear Clevis Mount



GSM40 Front or Rear Flange Mount



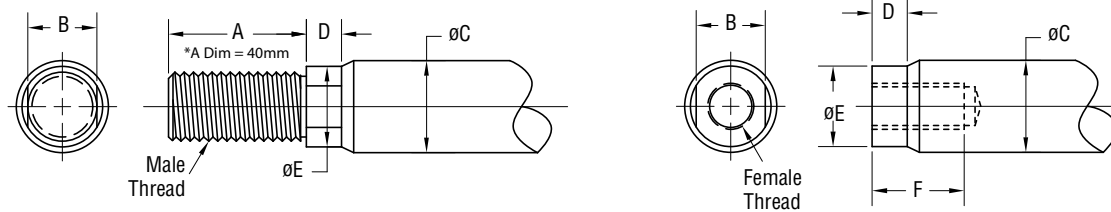
Dim	4" (102 mm) Stroke in (mm)	6" (152 mm) Stroke in (mm)	8" (203 mm) Stroke in (mm)	10" (254 mm) Stroke in (mm)	12" (305 mm) Stroke in (mm)	18" (457 mm) Stroke in (mm)
A	10.6 (269)	12.6 (320)	14.6 (370)	16.6 (421)	18.6 (472)	24.6 (624)
B	8.3 (211)	10.3 (262)	12.3 (313)	14.3 (364)	16.3 (414)	22.3 (567)
C	4.0 (102)	6.0 (152)	8.0 (203)	10.0 (254)	12.0 (305)	18.0 (457)
D	12.3 (312)	14.3 (363)	16.3 (415)	18.3 (466)	20.3 (516)	26.3 (669)
E	6.9 (175)	8.9 (226)	10.9 (277)	12.9 (328)	14.9 (378)	20.9 (531)

Notes:

1. Add 2.33 Inches to Dims A & D and to Dim Δ if ordering a brake.
2. Add 1.77 Inches to Dims A, C, D, E and to Dim Δ if ordering a splined main rod.
3. Models are shown with Exlar standard M23 style connectors (option "I"). See ordering guide for other connector options.
4. Depending on connector and feedback options selected, dimensions may vary. Consult Exlar for details, or refer to the drawings provided after receipt of order.
5. Drawings subject to change.

GSM Series Linear Actuators with Integrated Motor

Actuator Rod End Options



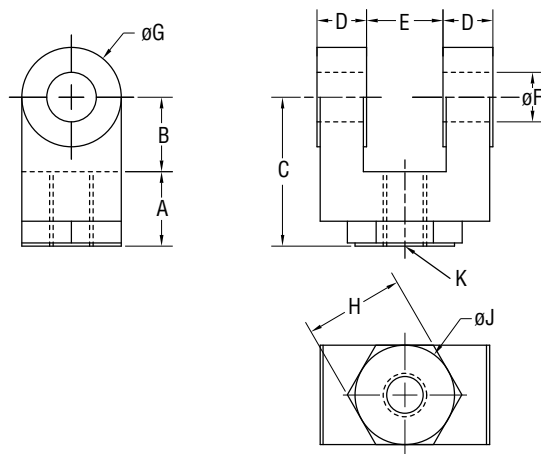
Standard Rod Ends

	A	B	ØC	D	ØE	F	Male U.S.	Male Metric	Female U.S.	Female Metric
GSM20 in (mm)	0.813 (20.7)	0.375 (9.5)	0.500 (12.7)	0.200 (5.1)	0.440 (11.2)	0.750 (19.1)	3/8 – 24 UNF – 2A	M8 x 1.6g	5/16 – 24 UNF – 2B	M8 x 1.6h
GSM30 in (mm)	0.750 (19.1)	0.500 (12.7)	0.625 (15.9)	0.281 (7.1)	0.562 (14.3)	0.750 (19.1)	7/16 – 20 UNF – 2A	M12 x 1.75* 6g	7/16 – 20 UNF – 2B	M10 x 1.5 6h
GSM40 in (mm)	1.500 (38.1)	0.750 (19.1)	1.000 (25.4)	0.381 (9.7)	0.875 (22.2)	1.000 (25.4)	3/4 – 16 UNF – 2A	M16 x 1.5 6g	5/8 – 18 UNF – 2B	M16 x 1.5 6h

Part numbers for rod attachment options indicate the through hole size or pin diameter. Before selecting a spherical rod eye for use with a GSM series actuator, please consult the information on the anti-rotation option for the GSM actuators. Spherical rod eyes will allow the rod to rotate if the load is not held.

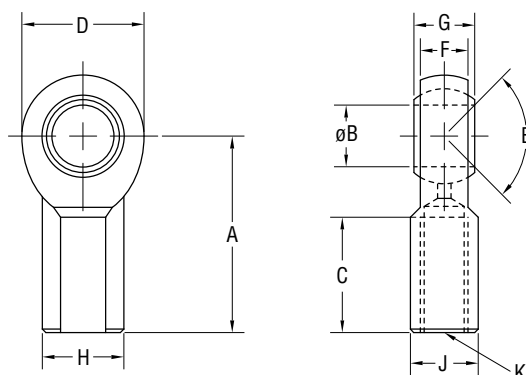
For Rod End with Splined Main Rod, see pg 36

Rod Clevis Dimensions



in (mm)	GSM20 RC038	GSM30 RC050	GSM40 RC075
A	0.810 (20.6)	0.75 (19.1)	1.125 (28.58)
B	0.785 (19.9)	0.75 (19.1)	1.25 (31.75)
C	1.595 (40.5)	1.50 (38.1)	2.375 (60.3)
D	0.182 (4.6)	0.50 (12.7)	0.625 (15.88)
E	0.386 (9.8)	0.765 (19.43)	1.265 (32.13)
ØF	0.373 (9.5)	0.50 (12.7)	0.75 (19.1)
ØG	0.951 (24.2)	1.00 (25.4)	1.50 (38.1)
H	NA	1.00 (25.4)	1.25 (31.75)
ØJ	NA	1.00 (25.4)	1.25 (31.75)
K	3/8-24	7/16-20	3/4-16

Spherical Rod Eye Dimensions

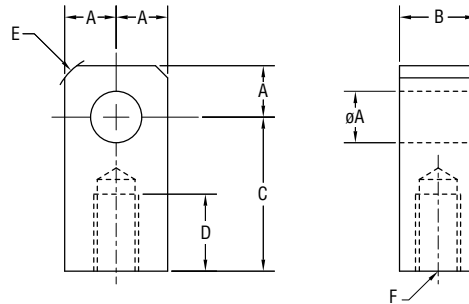


in (mm)	GSM20 SRM038	GSM30 SRM044	GSM40 SRM075
A	1.625 (41.3)	1.81 (46.0)	2.88 (73.2)
ØB	.375 (9.525)	0.438 (11.13)	0.75 (19.1)
C	.906 (23.0)	1.06 (26.9)	1.72 (43.7)
D	1.0 (25.4)	1.13 (28.7)	1.75 (44.5)
E	6 deg	14 deg	14 deg
F	.406 (10.3)	0.44 (11.1)	0.69 (17.5)
G	.500 (12.7)	0.56 (14.2)	0.88 (22.3)
H	.688 (17.4)	0.75 (19.1)	1.13 (28.7)
J	.562 (14.3)	0.63 (16.0)	1.00 (25.4)
K	3/8-24	7/16-20	3/4-1

Drawings subject to change. Consult Exlar for certified drawings.

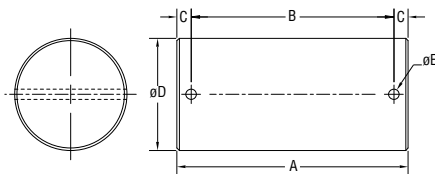
GSM Series Linear Actuators with Integrated Motor

Rod Eye Dimensions



in (mm)	GSM20 RE038	GSM30 RE050	GSM40 RE075
ØA	0.50 (12.7)	0.50 (12.7)	0.75 (19.1)
B	0.560 (14.2)	0.75 (19.1)	1.25 (31.8)
C	1.00 (25.4)	1.50 (38.1)	2.06 (52.3)
D	0.50 (12.7)	0.75 (19.1)	1.13 (28.7)
E	0.25 x 45°	0.63 (16.0)	0.88 (22.3)
F	3/8 - 24	7/16 - 20	3/4 - 16

Rod Clevis Pin Dimensions



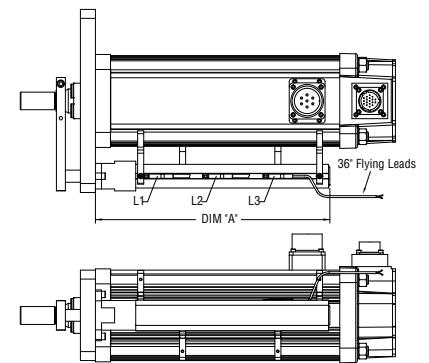
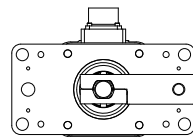
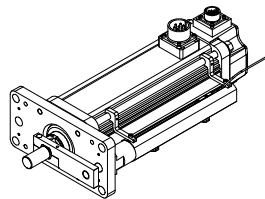
in (mm)	A	B	C	ØD	ØE
CP050 ¹	2.28 (57.9)	1.94 (49.28)	0.17 (4.32)	0.50" +0.000/-0.002 (12.7 mm +0.00/-0.05)	0.106 (2.69)
CP075 ²	3.09 (78.5)	2.72 (69.1)	0.19 (4.82)	0.75" +0.000/-0.002 (19.1 mm +0.00/-0.05)	0.14 (3.56)

¹ Fits GSM30 rear clevis, RC050 and RE050

² Fits GSM30, 40 and RC075, RE075 and SRM075

GSM20, GSM30 and GSM40 External Limit Switch Extension Options

Dim A	3" (76 mm) stroke in (mm)	6" (152 mm) stroke in (mm)	8" (203 mm) stroke in (mm)	10" (254 mm) stroke in (mm)	12" (305 mm) stroke in (mm)	18" (457 mm) stroke in (mm)
GSM20	5.515 (140.1)	8.515 (216.3)	NA	12.5 (317.5)	14.515 (368.7)	NA
GSM30	6.932 (176.1)	9.832 (249.7)	NA	13.832 (351.3)	15.832 (402.1)	21.832 (554.5)
GSM40	NA	9.832 (249.7)	11.83 (300.5)	13.832 (351.3)	15.832 (402.1)	21.832 (554.5)



* Dimensions for Anti rotate option can be seen on page 26.

The external limit switch option (requires anti-rotate option) for the GSM Series of linear actuators provides the user with 1, 2 or 3 externally mounted adjustable switches for use as the end of travel limit switches or home position sensors.

The number of switches desired is selected by ordering the L1, L2 or L3 option, in which 1, 2 or 3 switches will be provided, respectively.

The switches are 9-30 VDC powered, PNP output, with either normally open or normally closed logic operation depending on the switch configuration ordered. Switches are supplied with 1 meter, 3 wire embedded cable. Below is a diagram which logic operation will be provided for each switch, based on the option ordered.

Option	SW1	SW2	SW3
L1	Not Supplied	Normally Open	Not Supplied
L2	Normally Closed	Not Supplied	Normally Closed
L3	Normally Closed	Normally Open	Normally Closed

Drawings subject to change. Consult Exlar for certified drawings.

Switch Type	Exlar Part Number	Turck Part Number
Normally Closed Switch	43404	BIM-UNT-RP6X
Normally Open Switch	43403	BIM-UNT-AP6X

AA = GSM Actuator Size (nominal)

- 20 = 2 in (60 mm) frame
- 30 = 3 in (80 mm) frame
- 40 = 4 in (100 mm) frame

BB = Stroke Length

- 03 = 3 in (76 mm) GSM20 and GSM30
- 04 = 4 in (102 mm) GSM40
- 06 = 6 in (152 mm) all models
- 5.9 in (150 mm) GSM30
- 08 = 8 in (203 mm) GSM40
- 10 = 10 in (254 mm) GSM20, GSM30 and GSM40
- 12 = 12 in (305 mm) GSM20, GSM30 and GSM40
- 14 = 14 in (356 mm) GSM30
- 18 = 18 in (457 mm) GSM30 and GSM40
- 24 = 24 in (610 mm) GSM30

CC = Lead

- 01 = 0.1 in (2.54 mm) (all models)
- 02 = 0.2 in (5.08 mm) (all models)
- 04 = 0.4 in (10.16 mm) (GSM20)
- 05 = 0.5 in (12.7 mm) (GSM30 and GSM40)
- 08 = 0.75 in (19.05 mm) (GSM40)³

D = Connections

- I = Exlar standard M23 style
- M = Manufacturer's connector¹
- A = MS style (anodized)
- D = MS style (electroless nickel)
- B = Embedded leads 3 ft. std.
- P = Embedded leads w/plug 3 ft. standard w/"A" plug
- J = Embedded leads w/"I" plug, 3 ft. std
- X = Special (please specify)

E = Mounting

- B = Front and rear flange
- C = Rear clevis
- F = Front flange
- R = Rear flange
- S = Side mount
- D = Double side mount
- T = Side trunnion
- E = Extended tie rods
- J = Metric side mount
- K = Metric double side mount
- Q = Metric side trunnion
- M = Metric extended tie rods
- G = Metric rear clevis
- Z = Clevis mount with same pin to pin as SR Series
- X = Special (please specify)

F = Rod End Thread/Rod Material

- M = Male, US std. thread
- A = Male, metric thread
- F = Female, US std. thread
- B = Female, metric thread
- W = Male, US std. thread SS¹⁶
- R = Male metric thread SS¹⁶
- V = Female, US std. thread SS¹⁶
- L = Female, metric thread SS¹⁶
- X = Special (please specify)

GGG = Feedback Type (Also specify the Amplifier/Drive Model being used when ordering)

- Standard Incremental Encoder – 2048 line (8192 cts) per rev. index pulse, Hall commutation, 5vdc
- Standard Resolver – Size 15, 1024 line (2048 cts) per rev. two pole resolver
- Motor files for use with select Emerson/CT, Rockwell /AB and Danaher/Kollmorgen Drives are available at www.exlar.com

Custom Feedback: contact your local sales representative:

- XX1 = Wiring and feedback device information must be provided and new feedback callout will be created

Allen-Bradley/Rockwell: (Actuators used with Kinetix and/or Sercos based control systems require a .cmf file from AB/Rockwell. Please contact your AB/Rockwell representative for support.)

- AB8 = Standard Incremental Encoder – MPL Circular (Speedtec) DIN connectors for 'M' option
- AB9 = Hiperface Stegmann SRM050 absolute encoder – 40 Frame Size. MPL Circular (Speedtec) DIN connectors for 'M' option – Plug & Play feedback option¹²
- ABB = Hiperface Stegmann SKM036 multi-turn absolute encoder. 20-30 Frame Size. MPL Circular (Speedtec) DIN connectors for 'M' option – Plug & Play feedback option¹²

AMKASYN:

- AK1 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – 40 Frame Size. DS motor wiring w/M23 euro connectors for 'M' option
- AK2 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – 20-30 Frame Size. DS motor wiring w/M23 euro connectors for 'M' option

Advanced Motion Control:

- AM1 = Standard Incremental Encoder
- AM2 = Encoder 1000 line, w/commutation, 5 VDC
- AM3 = Standard Resolver
- AM5 = Encoder 5000 line, w/commutation, 5 VDC

API Controls:

- AP1 = Standard Resolver
- AP2 = Standard Incremental Encoder

Aerotech:

- AR1 = Encoder 5000 line, w/commutation, 5 VDC
- AR2 = Standard Incremental Encoder

ABB Robot:

- BB1 = LTN Resolver

Baldor:

- BD2 = Std Resolver – BSM motor wiring w/M23 connectors for 'M' option
- BD3 = Std Incremental Encoder – BSM motor wiring w/M23 connectors for 'M' option

Beckhoff:

- BE2 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – AM5XX motor wiring w/M23 euro connectors for 'M' option

Baumüller:

- BM2 = Standard Resolver

B&R Automation:

- BR1 = Standard Resolver
- BR2 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – 8LS/8LM motor wiring w/M23 euro connectors for 'M' option

Comau Robot:

- CM1 = Standard Resolver

Copley Controls:

- CO1 = Standard Incremental Encoder
- CO2 = Standard Resolver

Control Techniques/Emerson:

- CT1 = Hiperface Stegmann SRM050 multi-turn absolute encoder – 40 Frame Size. FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option
- CT3 = Hiperface Stegmann SKM036 multi-turn absolute encoder – 20-30 Frame Size. FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option
- CT4 = Standard Incremental Encoder – FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option
- CT5 = Standard Resolver – FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option
- CT7 = Encoder 5000 line, w/commutation, 5 VDC – FM/UM/EZ motor wiring w/M23 euro connectors for 'M' option

Delta Tau Data Systems:

- DT1 = Encoder 1000 line, w/commutation, 5 VDC
- DT2 = Standard Resolver

Elmo Motion Control:

- EL1 = Standard Resolver
- EL2 = Standard Incremental Encoder
- EL3 = EnDat Heidenhain EQN1125 multi-turn absolute encoder

Emerson/Control Techniques:

- EM2 = Std Incremental Encoder – NT motor wiring w/MS connectors for 'M' option
- EM5 = Encoder 5000 line, with commutation, 5 VDC – NT motor wiring w/MS connectors for 'M' option

Elau:

- EU1 = Hiperface Stegmann SRM050 multi-turn absolute encoder – 40 Frame Size. SH motor wiring w/MS connectors for 'M' option
- EU4 = Hiperface Stegmann SKM036 multi-turn absolute encoder – 20-30 Frame Size. SH motor wiring w/MS connectors for 'M' option

Exlar:

- EX4 = Standard Resolver

Fanuc Pulsecoder: Consult Exlar¹⁷

G&L Motion Control/Danaher Motion:

- GL1 = Std Incremental Encoder – HSM motor wiring w/ MS connectors for 'M' option
- GL2 = Std Incremental Encoder – LSM-MSM motor wiring w/M23 euro connectors for 'M' option
- GL3 = Std Incremental Encoder – NSM motor wiring w/MS connectors for 'M' option
- GL4 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – AKM motor wiring w/M23 euro connectors for 'M' option

Infranor:

IF1 = Standard Resolver

Indramat/Bosch-Rexroth:

IN6 = Std Resolver – MKD/MHD motor wiring w/M23 euro connectors for 'M' option

IN7 = Hiperface Stegmann SKM036 multi-turn absolute encoder – MSK motor wiring w/M23 euro connectors for 'M' option – plug & play option

Jetter Technologies:

JT1 = Standard Resolver – JH/JL motor wiring w/M23 euro connectors for 'M' option

Kollmorgen/Danaher::06

KM4 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – AKM motor wiring w/M23 euro connectors for 'M' option

KM5 = Standard Resolver – AKM motor wiring w/M23 euro connectors for 'M' option

KM6 = Standard Incremental Encoder – AKM motor wiring w/M23 euro connectors for 'M' option

Kuka Robot:

KU1 = Tyco Size 21 Resolver¹⁷

Kawasaki Robot:

KW1 = Kawasaki Special Encoder¹⁷

Lenze/AC Tech:

LZ1 = Hiperface Stegmann SRM050 multi-turn absolute encoder – MCS motor wiring w/M23 euro connectors for 'M' option

LZ5 = Std Resolver – MCS motor wiring w/ M23 euro connectors for 'M' option

LZ6 = Std Incremental Encoder – MCS motor wiring w/ M23 euro connectors for 'M' option

Matuschek:

MC1 = LTN Resolver

Metronix:

MX1 = Standard Resolver

MX2 = Hiperface Stegmann SKM036 multi-turn absolute encoder

MX3 = EnDat Heidenhain EQN1125 multi-turn absolute encoder

Mitsubishi:

MT1 = Mitsubishi Absolute Encoder – HF-SP motor wiring with 'M' option

Modicon:

MD1 = Standard Resolver

Momentum:

MN1 = Hiperface Stegmann SRM050 multi-turn absolute encoder – MN motor wiring w/M23 connectors for 'M' option

MN2 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – MN motor wiring connectors for 'M' option

MN3 = Std incremental encoder – MN motor wiring w/M23 connectors for 'M' option

MN4 = Std resolver – MN motor wiring w/M23 connectors for 'M' option

Moog:

MG1 = Standard Resolver

Motoman Robot:

MM1 = Yaskawa Serial Encoder¹⁷

Nachi Robot:

NC1 = Tamagawa Serial Encoder¹⁷

Ormec:

OR1 = Standard Resolver

OR2 = Std Incremental Encoder – G series motor wiring w/MS connectors for 'M' option

Parker Compumotor:

PC6 = Std Incremental Encoder – SMH motor wiring w/M23 connectors for 'M' option – European only

PC7 = Std Resolver – SMH motor wiring w/M23 connectors for 'M' option – European only

PC8 = Std Incremental Encoder – MPP series motor wiring w/PS connectors for 'M' option – US Only

PC9 = Hiperface Stegmann SRM050 multi-turn absolute encoder – MPP motor wiring w/PS connectors for 'M' option – US Only

PC0 = Std Resolver – MPP motor wiring w/PS connectors for 'M' option – US Only

Pacific Scientific:

PS2 = Standard Incremental Encoder

PS3 = Standard Resolver – PMA motor wiring w/M23 connectors for 'M' option

Stober Drives:

SB3 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – ED/EK motor wiring w/M23 euro connectors for 'M' option

SB4 = Standard Resolver ED/EK motor wiring w/M23 connector for 'M' option

Siemens:

SM2 = Standard Resolver – 1FK7 motor wiring w/M23 connectors for 'M' option

SM3 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – 40 Frame Size. 1FK7 motor wiring w/M23 euro connectors for 'M' option

SM4 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – 20-30 Frame Size. 1FK7 motor wiring w/M23 euro connectors for 'M' option

SEW/Eurodrive:

SW1 = Standard Resolver – CM motor wiring w/ M23 euro connectors for 'M' option

SW2 = Standard Incremental Encoder

SW3 = Hiperface Stegmann SRM050 multi-turn absolute encoder – CM motor wiring w/ M23 euro connectors for 'M' option

Whedco:

WD1 = Standard Resolver

Yaskawa:

YS2 = Yaskawa Absolute Encoder – SGMGH motor wiring 40 Exlar Frame Size

YS3 = Yaskawa Absolute Encoder – SGMGH motor wiring 20/30 Exlar Frame Sizes

HHH = Motor Stator² – All 8 Pole¹⁴

118 = 1 stack	115	158 = 1 stack	400
218 = 2 stack	Vrms	258 = 2 stack	Vrms
138 = 1 stack	230	168 = 1 stack	460
238 = 2 stack	Vrms	268 = 2 stack	Vrms

II = Motor Speed

30 = 3000 rpm, GSM30, GSM40

50 = 5000 rpm, GSM20

01- 99 = Customer specified base speed

XX .. XX = Travel and Housing Options (please list desired options)

Travel Options

AR = External anti-rotate¹³

HW = Manual drive, Handwheel with interlock switch^{10, 15}

PB = Protective bellows¹¹

SR = Splined main rod

RB = Rear brake

RD = Manual drive, Simple Rear^{9, 15}

SD = Manual drive, Side Hex¹⁵

PF = Preloaded follower⁴

L1/L2/L3 = External limit switch⁸

XT = Special travel options, high temperature bellows¹¹ or angular contact bearings

Housing Options

EN = Electroless nickel plating

XH = Special housing

P5 = IP65S sealing option⁵

HC = Type III hard coat anodized⁶

XL = Special lubrication, food grade or Mobilgrease 28, specify

XM = Special motor options

Absolute Linear Feedback

LT = ICT, including signal conditioner^{4, 7, 9}

= Part No. Designator for Specials

Optional 5 digit assigned part number to designate unique model numbers for specials.

Note:

- Available as described in Feedback Types.
- Stator voltage and pole options allow for catalog rated performance at varying amplifier bus voltages and pole configuration requirements.
- 0.75 lead not available over 12" stroke
- The dynamic load rating of zero backlash, preloaded screws is 63% of the dynamic load rating of the standard non-preloaded screws. The calculated travel life of a preloaded screw will be 25% of the calculated travel life of the same size and lead of a non-preloaded screw. Preloaded follower is not available with absolute linear (LT) internal feedback option.
- Not available with splined main rod option.
- This housing option would typically be accompanied by the choice of the electroless nickel connectors if a connectorized unit were selected. This choice may also indicate the need for special material main rods or mounting.
- Linear feedback is not available in the GSM20 and not available in the GSM30, 14" and 18".
- Requires AR option
- Not available with absolute feedback.
- Not available on GSM20.
- Not available with extended tie rod mounting option.
- Not compatible with Kinetix 300 drives.
- A second anti-rotate arm is used on GSM 20, 30 & 40 for 10 inch and longer stroke.
- See page 52 for optimized stators.
- N/A with holding brake unless application details are discussed with your local sales representative.
- Consult with your local sales representative when ordering splined stainless steel main rod.
- Requires Robot Vendor Approval and Support.

FT Series Linear Actuators

FT Series Linear Actuators

Exlar FT Series force tube actuators use a planetary roller screw mounted inside a telescoping tube mechanism. The follower is attached to the moveable force tube, which then extends and retracts as the screw rotates. An external motor (supplied by Exlar or the customer) provides the rotational force.

High Performance

As with all of Exlar's roller screw products, the FT Series actuators deliver heavy load capacity, high speed capabilities, and exceptionally long life when compared to other linear actuator technologies.

Other comparably-sized screw actuator products on the market - specifically ball screw and acme screw actuators - have relatively low load capacities, short working lives and limited speed capabilities. At equivalent sizes, under moderate to heavy loads, it is reasonable to project that FT units will deliver up to 15 times the working life of those other designs. For OEM designers, this often means much more power and durability can be achieved from a much smaller footprint when Exlar FT units are used.

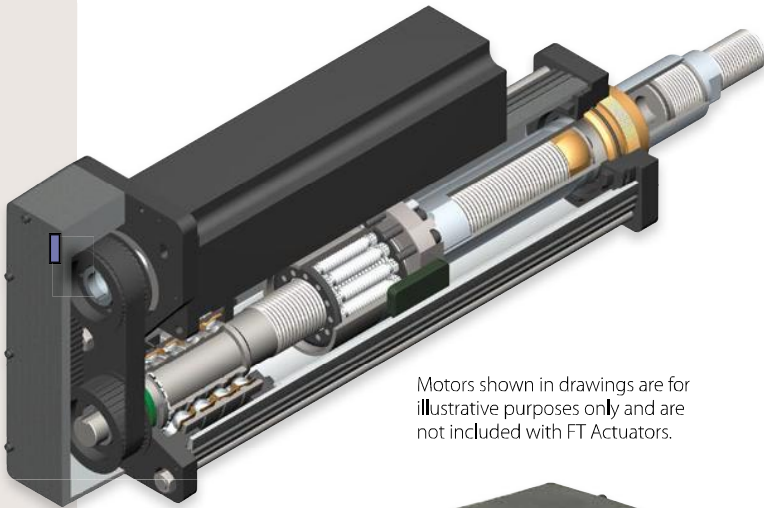
Contamination Protection

The FT Series design has all the contamination-isolation advantages of hydraulic cylinders without the limited load, life, and speed of designs built around ball or acme screws. The bearing and roller screw components in the Exlar FT Series force tubes are mounted within the sealed housing. This prevents abrasive particles and other contaminants from entering the actuator's critical mechanisms, and assures trouble-free operation even in the most severe environments.

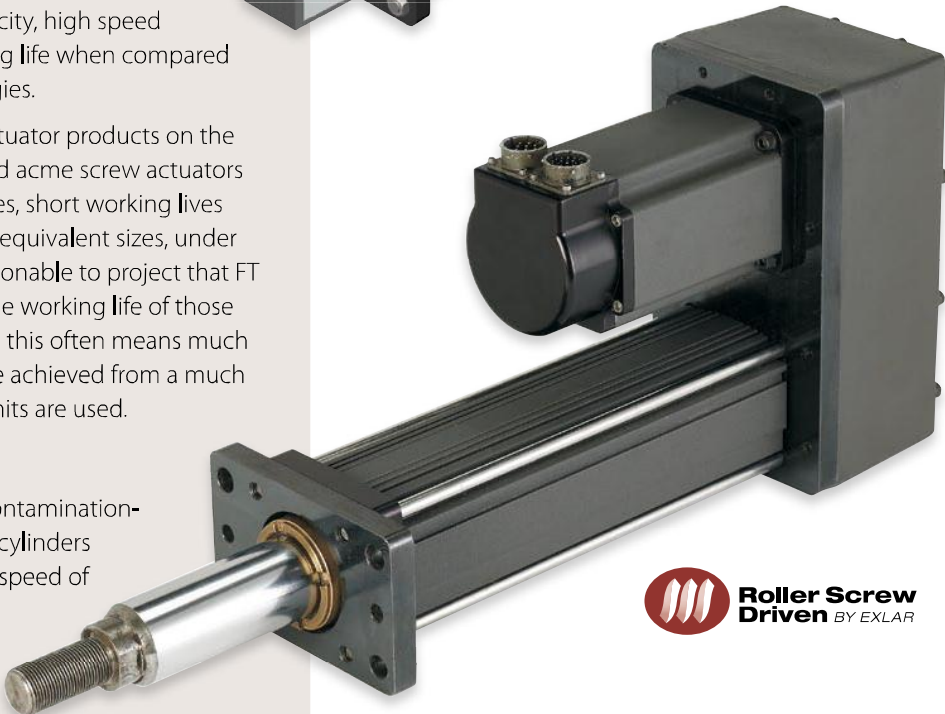
FT Series actuators are provided with standard grease lubrication. Custom provisions can be made for oil filled lubrication.

Engineered Compatibility

Exlar has removed much of the end-user-engineering burden by designing the FT series to be compatible with a wide variety of standard motors. Motor mounting, actuator mounting, and gearing configurations are available to meet nearly any application's requirements.



Motors shown in drawings are for illustrative purposes only and are not included with FT Actuators.



Feature	Standard	Optional
Long Strokes	6", 12", 18", 24", 36", and 48"	Intermediate Lengths up to 96"
Pre-Loaded Follower	No	Yes
External Limit Switches	No	One, two or three Adjustable Switches
Multiple Actuator Mountings	Side Mount, Side Lug, Extended Tie Rods, Rear Clevis, Front Flange, Side Trunnion, Rear Flange, Front/Rear Flange	Specials Available
Multiple Motor Mounting Configurations	Inline Direct Drive, Parallel 1:1 Drive, Parallel, 2:1 Reduction	Specials Available

Special Sealing Options

The base unit of the FT actuators are sealed at the extending rod end by a rod seal, and on the drive end by a shaft seal (see base unit drawings on pages 66, 68 and 70). These rod and shaft seals, and o-ring sealing provides IP65S sealing for the FT actuator base units.

In standard units with inline or parallel motor mounting, the mounting surface between the actuator and the motor, and between the end cover, or inline cover of the actuator and the actuator housing are not sealed as a standard feature.

These areas of the FT actuators can be sealed as a special option if the environment in which the actuator will be mounted requires the actuator to be sealed. Because of the vast differences in the design of various brands of motors that are mounted to the FT Series actuators, sealing of these two areas may alter the design of the actuator. Please contact your local sales representative for details and quotations on special sealing of this type.



Stainless steel FT35 with stainless steel SLM115 motor



Food grade & stainless steel FT35 with food grade SLM90 motor



Food grade & stainless steel FT60 with food grade SLG90 motor

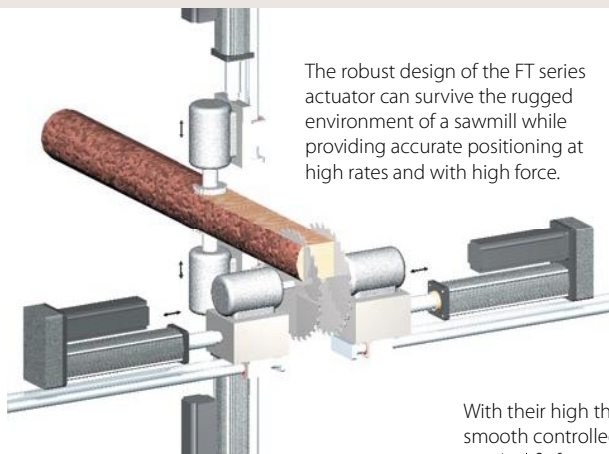
Exlar FT Series Actuators Applications Include:

Hydraulic cylinder replacement
Ball screw replacement
Pneumatic cylinder replacement
Chip and wafer handling
Automated flexible fixturing
Dispensers
Machine tool
Automated assembly
Parts clamping
Automatic tool changers

Volumetric pumps
Medical equipment
Conveyor diverters / gates
Plastics equipment
Cut-offs
Die cutters
Packaging machinery
Entertainment
Sawmill equipment
Open / close doors
Fillers
Formers
Precision grinders

Indexing stages
Lifts
Product sorting
Material cutting
Material handling
Riveting / fastening / joining
Molding
Volumetric pumps
Semiconductor
Pick and place systems
Robot manipulator arms
Simulators

Precision valve control
Ventilation control systems
Pressing
Process control
Tube bending
Welding
Stamping
Test stands
Tension control
Web guidance
Wire winding
Food Processing



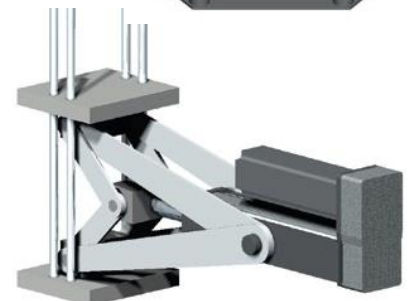
The robust design of the FT series actuator can survive the rugged environment of a sawmill while providing accurate positioning at high rates and with high force.

Motors shown in drawings are for illustrative purposes only and are not included with FT Actuators.

The smooth and accurate motion of Exlar's actuators combined with today's servo technology make multiple degree of freedom motion simulation applications easier to implement, cleaner and more efficient than hydraulic solutions.



With their high thrust capability, compact size and smooth controlled motion, FT Series actuators are an ideal fit for replacing hydraulics or pneumatics on injection mold toggles. Control improvements from an electromechanical servo system offer less abuse of valuable molds and more consistent performance.



FT Series Linear Actuators

FT Series Lifetime Curves

The L_{10} expected life of a roller screw linear actuator is expressed as the linear travel distance that 90% of properly maintained roller screws manufactured are expected to meet or exceed. For higher than 90% reliability, the result should be multiplied by the following factors: 95% x 0.62; 96% x 0.53; 97% x 0.44; 98% x 0.33; 99% x 0.21. This is not a guarantee and these charts should be used for estimation purposes only.

The underlying formula that defines this value is:

Travel life in millions of inches, where:

C = Dynamic load rating (lbf)

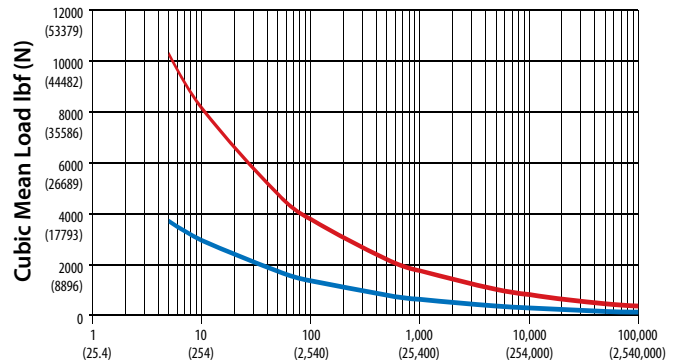
F = Cubic mean applied load (lbf) $L_{10} = \left(\frac{C}{F}\right)^3 \times S$

S = Roller screw's lead (inches)

All curves represent properly lubricated and maintained actuators.

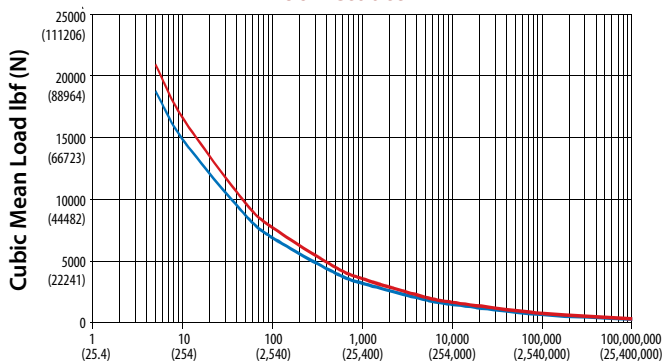
— FT35, 60 & 80 High Capacity
— FT35, 60 & 80 Standard Capacity

FT35 Actuator



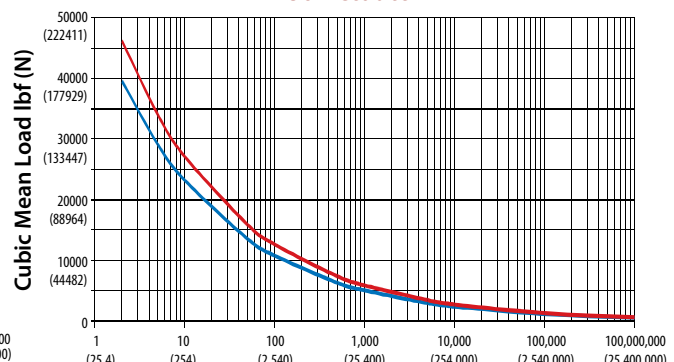
Travel Life Millions of inches (mm)

FT60 Actuator



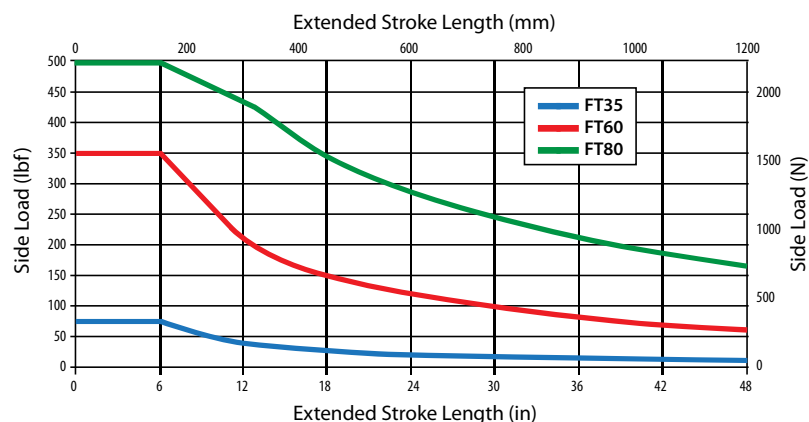
Travel Life Millions of inches (mm)

FT80 Actuator



Travel Life Millions of inches (mm)

FT Series Maximum Allowable Side Load



FT35 Series Performance Specifications

Model No.	Nominal Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Max Force lbf (kN)	Linear Speed at Max Rated RPM in/sec (mm/sec)	Dynamic Load Rating (Std capacity screw) lbf (kN)	Dynamic Load Rating (High capacity screw) lbf (kN)	Life at Max Force (Std capacity screw) 10 ⁶ in (Km)	Life at Max Force (High capacity screw) 10 ⁶ in (Km)	Max Input Torque lbf-in (Nm)	Max Rated Input rpm	Weight Base lb (kg)
FT35-0605	3.5 (89)	6 (152)	0.197 (5)	5,000 (22.2)	14.7 (373)	17,800 (79.2)	21,400 (95.2)	8.88 (225.6)	15.4 (392)	196 (22.1)	4,500	30 (14)
FT35-0610			0.394 (10)		29.5 (750)	16,500 (73.4)	19,850 (88.3)	14.15 (359.4)	24.6 (626)	392 (44.3)		
FT35-0620			0.787 (20)		59.3 (1500)	17,200 (76.5)	20,800 (92.5)	32.05 (814.2)	56.7 (1,440)	783 (88.5)		
FT35-1205	3.5 (89)	12 (305)	0.197 (5)	5,000 (22.2)	14.7 (373)	17,800 (79.2)	21,400 (95.2)	8.88 (225.6)	15.4 (392)	196 (22.1)	4,500	35 (16)
FT35-1210			0.394 (10)		29.5 (750)	16,500 (73.4)	19,850 (88.3)	14.15 (359.4)	24.6 (626)	392 (44.3)		
FT35-1220			0.787 (20)		59.3 (1500)	17,200 (76.5)	20,800 (92.5)	32.05 (814.2)	56.7 (1,440)	783 (88.5)		
FT35-1805	3.5 (89)	18 (457)	0.197 (5)	5,000 (22.2)	14.7 (373)	17,800 (79.2)	21,400 (95.2)	8.88 (225.6)	15.4 (392)	196 (22.1)	4,500	40 (18)
FT35-1810			0.394 (10)		29.5 (750)	16,500 (73.4)	19,850 (88.3)	14.15 (359.4)	24.6 (626)	392 (44.3)		
FT35-1820			0.787 (20)		59.3 (1500)	17,200 (76.5)	20,800 (92.5)	32.05 (814.2)	56.7 (1,440)	783 (88.5)		
FT35-2405	3.5 (89)	24 (610)	0.197 (5)	5,000 (22.2)	14.7 (373)	17,800 (79.2)	21,400 (95.2)	8.88 (225.6)	15.4 (392)	196 (22.1)	4,500	45 (21)
FT35-2410			0.394 (10)		29.5 (750)	16,500 (73.4)	19,850 (88.3)	14.15 (359.4)	24.6 (626)	392 (44.3)		
FT35-2420			0.787 (20)		59.3 (1500)	17,200 (76.5)	20,800 (92.5)	32.05 (814.2)	56.7 (1,440)	783 (88.5)		
FT35-3605	3.5 (89)	36 (914)	0.197 (5)	5,000 (22.2)	8.9 (226)	17,800 (79.2)	21,400 (95.2)	8.88 (225.6)	15.4 (392)	196 (22.1)	2,700	55 (25)
FT35-3610			0.394 (10)		17.8 (452)	16,500 (73.4)	19,850 (88.3)	14.15 (359.4)	24.6 (626)	392 (44.3)		
FT35-3620			0.787 (20)		35.6 (903)	17,200 (76.5)	20,800 (92.5)	32.05 (814.2)	56.7 (1,440)	783 (88.5)		
FT35-4805	3.5 (89)	48 (1219)	0.197 (5)	5,000 (22.2)	5.7 (145)	17,800 (79.2)	21,400 (95.2)	8.88 (225.6)	15.4 (392)	196 (22.1)	1,700	65 (30)
FT35-4810			0.394 (10)		11.4 (290)	16,500 (73.4)	19,850 (88.3)	14.15 (359.4)	24.6 (626)	392 (44.3)		
FT35-4820			0.787 (20)		22.4 (568)	17,200 (76.5)	20,800 (92.5)	32.05 (814.2)	56.7 (1,440)	783 (88.5)		

Intermediate and custom stroke lengths are available. Intermediate leads may also be available. Belt and pulley inertia varies with ratio & motor selection. Please contact your local sales representative. See page 64 for definition of terms.

¹ FT35 actuators with high capacity screw option are 20 mm longer. See dimensions page 66.

² The rated and max force on the FT series actuators are those forces derived from using typical servo motors of similar frame size to the actuator, at their rated continuous and peak torques. In many cases FT actuators can be configured with input torque sufficient to exceed these forces. Contact your local sales representative for further details.

Standard Inline Coupling Maximum Torque Ratings and Inertia

FT35	Torque Rating	Inertia
	354 lbf-in (40 N-m)	0.000104 kg-m ² (0.000920 lbf-in s ²)

Shown below are pulley inertias reflected at motor including typical pulleys, belt and standard bushings. Because of differences in belt and pulley selection due to particular motor choices, please contact your local sales representative if these values are critical to your application.

FT35 Reflective Inertias

	5 mm Lead	10 mm Lead	20 mm Lead	
NMT Unit - J (0)	0.0004087	0.0004121	0.0004259	kg-m ² (at input shaft) kg-m ² /inch of stroke
NMT Unit - J (Stroke)	0.0000159	0.0000162	0.0000171	
Inline w/ Coupler - J (0)	0.0005127	0.0005161	0.0005299	kg-m ² (at motor shaft) kg-m ² /inch of stroke
Inline w/ Coupler - J (Stroke)	0.0000159	0.0000162	0.0000171	
Parallel 1:1 - J (0)	0.0011042	0.0011855	0.0014480	
Parallel 1:1 - J (Stroke)	0.0000159	0.0000162	0.0000171	
Parallel 2:1 - J (0)	0.0014029	0.0014038	0.0015345	
Parallel 2:1 - J (Stroke)	0.0000040	0.0000040	0.0000043	

*Pulleys for parallel mount match actuator max performance ratings

FT60 Series Linear Actuators

FT60 Series Performance Specifications

Model No.	Nominal Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Max Force lbf (kN)	Linear Speed at Max Rated RPM in/sec (mm/sec)	Dynamic Load Rating (Std capacity screw) lbf (kN)	Dynamic Load Rating (High capacity screw) lbf (kN)	Life at Max Force (Std capacity screw) 10 ⁶ in (Km)	Life at Max Force (High capacity screw) 10 ⁶ in (Km)	Max Input Torque lbf-in (Nm)	Max Rated Input rpm	Weight Base lb (kg)
FT60-1206			0.236 (6)		7.9 (201)	51,900 (230.9)	57,933 (257.7)	4.1 (104.8)	5.7 (145.8)	940 (106)		
FT60-1212	6.0 (152)	12 (305)	0.472 (12)	20,000 (89.0)	15.8 (401)	44,600 (198.4)	49,750 (221.3)	5.2 (133.1)	7.3 (184.7)	1880 (212)	2000	100 (45)
FT60-1230			1.181 (30)		39.0 (1000)	41,700 (185.5)	63,958 (284.5)	10.7 (271.9)	38.6 (981.1)	4699 (531)		
FT60-2406			0.236 (6)		7.9 (201)	51,900 (230.9)	57,933 (257.7)	4.1 (104.8)	5.7 (145.8)	940 (106)		
FT60-2412	6.0 (152)	24 (610)	0.472 (12)	20,000 (89.0)	15.8 (401)	44,600 (198.4)	49,750 (221.3)	5.2 (133.1)	7.3 (184.7)	1880 (212)	2000	130 (59)
FT60-2430			1.181 (30)		39.0 (1000)	41,700 (185.5)	63,958 (284.5)	10.7 (271.9)	38.6 (981.1)	4699 (531)		
FT60-3606			0.236 (6)		7.9 (201)	51,900 (230.9)	57,933 (257.7)	4.1 (104.8)	5.7 (145.8)	940 (106)		
FT60-3612	6.0 (152)	36 (914)	0.472 (12)	20,000 (89.0)	15.8 (401)	44,600 (198.4)	49,750 (221.3)	5.2 (133.1)	7.3 (184.7)	1880 (212)	2000	160 (72)
FT60-3630			1.181 (30)		39.0 (1000)	41,700 (185.5)	63,958 (284.5)	10.7 (271.9)	38.6 (981.1)	4699 (531)		
FT60-4806			0.236 (6)		7.9 (201)	51,900 (230.9)	57,933 (257.7)	4.1 (104.8)	5.7 (145.8)	940 (106)		
FT60-4812	6.0 (152)	48 (1219)	0.472 (12)	20,000 (89.0)	15.8 (401)	44,600 (198.4)	49,750 (221.3)	5.2 (133.1)	7.3 (184.7)	1880 (212)	2000	190 (86)
FT60-4830			1.181 (30)		39.0 (1000)	41,700 (185.5)	63,958 (284.5)	10.7 (271.9)	38.6 (981.1)	4699 (531)		

Intermediate and custom stroke lengths are also available. Intermediate leads may also be available. Belt and pulley inertia varies with ratio and motor selection.

* The rated and max force on the FT series actuators are those forces derived from using typical servo motors of similar frame size to the actuator, at their rated continuous and peak torques. In many cases FT actuators can be configured with input sufficient to exceed these forces. Contact your local sales representative for further details.

Standard Inline Coupling Maximum Torque Ratings and Inertia

FT60	Torque Rating	Inertia
	885 lbf-in (100 N-m)	0.000330 kg-m ² (0.002921 lbf-in s ²)

Shown below are pulley inertias reflected at motor including typical pulleys, belt and standard bushings. Because of differences in belt and pulley selection due to particular motor choices, please contact your local sales representative if these values are critical to your application.

FT60 Reflective Inertias

	6 mm Lead	12 mm Lead	30 mm Lead	
NMT Unit - J (0)	0.0078464	0.0078709	0.0080424	kg-m ² (at input shaft)
NMT Unit - J (Stroke)	0.0002539	0.0002547	0.0002600	kg-m ² /inch of stroke
Inline w/ Coupler - J (0)	0.0081764	0.0082009	0.0083724	
Inline w/ Coupler - J (Stroke)	0.0002539	0.0002547	0.0002600	
Parallel 1:1 - J (0)	0.0129357	0.0146113	0.0312682	kg-m ² (at motor shaft)
Parallel 1:1 - J (Stroke)	0.0002539	0.0002547	0.0002600	kg-m ² /inch of stroke
Parallel 2:1 - J (0)	0.0049158	0.0057202	0.0214777	
Parallel 2:1 - J (Stroke)	0.0000635	0.0000637	0.0000650	

* Pulleys for parallel mount match actuator max performance ratings

DEFINITIONS:

Max Linear Speed: The linear speed achieved by the actuator at a screw speed equal to the max rotational speed value.

Max Force: Values are derived from the design capacity of the FT actuator and should not be exceeded or relied upon for continuous operation.

Dynamic Load Rating: A design constant used in calculating the estimated travel life of the roller screw. The dynamic mean load is the mean load at which the device will perform one million revolutions.

Torque at Rated Force: The torque required at the screw to produce the force rating.

Screw Inertia: The rotary inertia of the planetary roller screw in the actuator.

Max. Rot. Speed: The maximum allowable rotational screw speed determined by the screw length or the rotational speed limit of the roller screw nut.

FT80 Series Performance Specifications

Model No.	Nominal Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Max Force lbf (kN)	Linear Speed at Max Rated RPM in/sec (mm/sec)	Dynamic Load Rating (Std capacity screw) lbf (kN)	Dynamic Load Rating (High capacity screw) lbf (kN)	Life at Max Force (Std capacity screw) 10 ⁶ in (Km)	Life at Max Force (High capacity screw) 10 ⁶ in (Km)	Max Input Torque lbf-in (Nm)	Max Rated Input rpm	Weight Base lb (kg)
FT80-1206	8.0 (203)	12 (305)	0.236 (6)	40,000 (177.9)	6.9 (175)	80,700 (359)	94,330 (419.6)	1.94 (49.3)	3.1 (78.7)	1,880 (212)	1750	190 (86)
FT80-1212			0.472 (12)		13.8 (351)	70,200 (312.2)	84,079 (374)	2.55 (64.9)	4.4 (111.4)	3,760 (425)		
FT80-1230			1.181 (30)		34.4 (875)	64,700 (287.8)	95,971 (426.9)	5.00 (127)	16.3 (414.3)	9,399 (1,062)		
FT80-2406	8.0 (203)	24 (610)	0.236 (6)	40,000 (177.9)	6.9 (175)	80,700 (359)	94,330 (419.6)	1.94 (49.3)	3.1 (78.7)	1,880 (212)	1750	265 (120)
FT80-2412			0.472 (12)		13.8 (351)	70,200 (312.2)	84,079 (374)	2.55 (64.9)	4.4 (111.4)	3,760 (425)		
FT80-2430			1.181 (30)		34.4 (875)	64,700 (287.8)	95,971 (426.9)	5.00 (127)	16.3 (414.3)	9,399 (1,062)		
FT80-3606	8.0 (203)	36 (914)	0.236 (6)	40,000 (177.9)	6.9 (175)	80,700 (359)	94,330 (419.6)	1.94 (49.3)	3.1 (78.7)	1,880 (212)	1750	340 (153)
FT80-3612			0.472 (12)		13.8 (351)	70,200 (312.2)	84,079 (374)	2.55 (64.9)	4.4 (111.4)	3,760 (425)		
FT80-3630			1.181 (30)		34.4 (875)	64,700 (287.8)	95,971 (426.9)	5.00 (127)	16.3 (414.3)	9,399 (1,062)		
FT80-4806	8.0 (203)	48 (1219)	0.236 (6)	40,000 (177.9)	6.9 (175)	80,700 (359)	94,330 (419.6)	1.94 (49.3)	3.1 (78.7)	1,880 (212)	1750	415 (187)
FT80-4812			0.472 (12)		13.8 (351)	70,200 (312.2)	84,079 (374)	2.55 (64.9)	4.4 (111.4)	3,760 (425)		
FT80-4830			1.181 (30)		34.4 (875)	64,700 (287.8)	95,971 (426.9)	5.00 (127)	16.3 (414.3)	9,399 (1,062)		

Intermediate and custom stroke lengths are also available. Intermediate leads may also be available. Belt and pulley inertia varies with ratio and motor selection. Please contact your local sales representative. See page 64 for definitions of terms.

* The rated and max force on the FT series actuators are those forces derived from using typical servo motors of similar frame size to the actuator, at their rated continuous and peak torques. In many cases FT actuators can be configured with input torque sufficient to exceed these forces. Contact your local sales representative for further details.

Standard Inline Coupling Maximum Torque Ratings and Inertia

FT80	Torque Rating	Inertia
	1770 lbf-in (200 N-m)	0.0001210 kg-m ² (0.010709 lbf-in s ²)

Shown below are pulley inertias reflected at motor including typical pulleys, belt and standard bushings. Because of differences in belt and pulley selection due to particular motor choices, please contact your local sales representative if these values are critical to your application.

FT80 Reflective Inertias

	6 mm Lead	12 mm Lead	30 mm Lead	
NMT Unit - J (0)	0.0302504	0.0303275	0.0308673	kg-m ² (at input shaft)
NMT Unit - J (Stroke)	0.0008022	0.0008035	0.0008124	kg-m ² /inch of stroke
Inline w/ Coupler - J (0)	0.0314604	0.0315375	0.0320773	kg-m ² (at motor shaft)
Inline w/ Coupler - J (Stroke)	0.0008022	0.0008035	0.0008124	
Parallel 1:1 - J (0)	0.0721056	0.0535533	0.1342578	
Parallel 1:1 - J (Stroke)	0.0008022	0.0008035	0.0008124	
Parallel 2:1 - J (0)	0.0198765	0.0270490	0.0753395	kg-m ² /inch of stroke
Parallel 2:1 - J (Stroke)	0.0002006	0.0002009	0.0002031	

*Pulleys for parallel mount match actuator max performance ratings

FT Series Mechanical Specifications

Model No.	FT35, FT60, FT80
Roller Screw Backlash in (mm)	0.0004 - 0.001 (0.01 - 0.03)
System Backlash* in (mm)	0.002 (0.06)
Standard Lead Accuracy** in/ft (mm/mm)	0.001 (.025/300)
Dynamic Torque Values lbf in/krpm (nm/krpm)	FT35: 6.0 (0.68) FT60: 11.0 (1.24) FT80: 20.0 (2.26)
Friction Torque Values lbf in (nm)	FT35: 7.0 (0.79) FT60: 14.0 (1.58) FT80: 35.0 (3.95)
Maximum Radial Load	See chart p 62
Environmental Rating (Base Unit Only)***	IP65S Standard
Case:	Epoxy-coated aluminum
Standard Optional	Food Grade Coating

* System backlash will be different with various types of motor mounting arrangements and couplings. Please discuss your particular configuration with your local sales representative.

** Optional lead accuracy – from 0.0002 in/ft (6 µm/300 mm) to 0.002 in/ft (200 µm/10000 mm) – are also available.

*** For IP65S scaling of unit with motor mounted, Please contact your local sales representative.

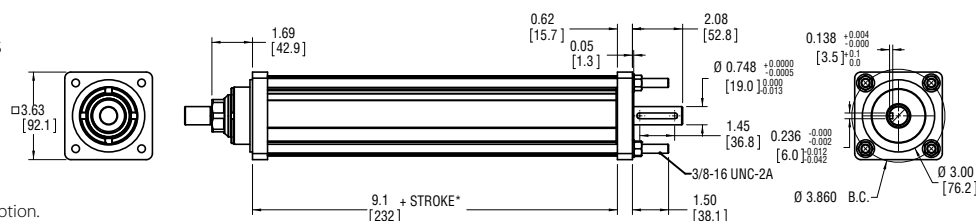
FT35 Series Linear Actuators

Base Unit

All dimensions shown in inches with millimeter equivalent in brackets.

See rod ends for rod end thread details.

*Add 20mm if choosing high capacity option.



Clevis Mount Unit

Parallel motor mount shown.

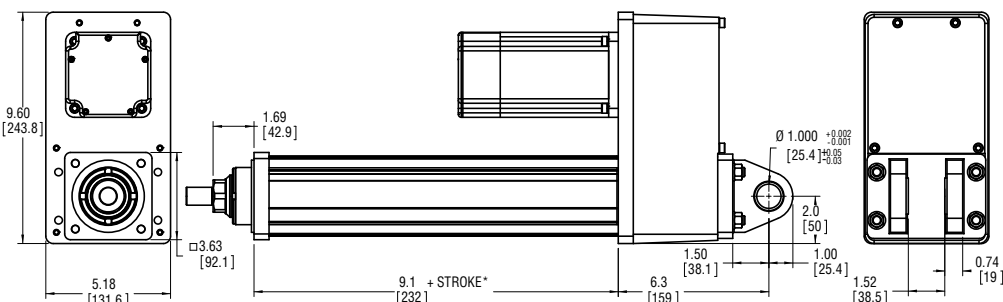
All dimensions shown in inches with millimeter equivalent in brackets.

See rod ends for
thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.

*Add 20mm if choosing high capacity option.

* If "G" metric clevis option, Ø 27 mm + 0.00 / - 0.06



Front Flange Unit

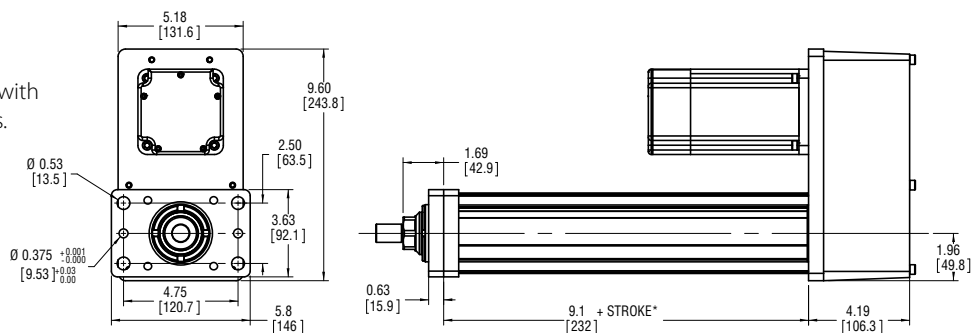
Parallel motor mount shown.

All dimensions shown in inches with millimeter equivalent in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.

*Add 20mm if choosing high capacity option.



Rear Flange Unit

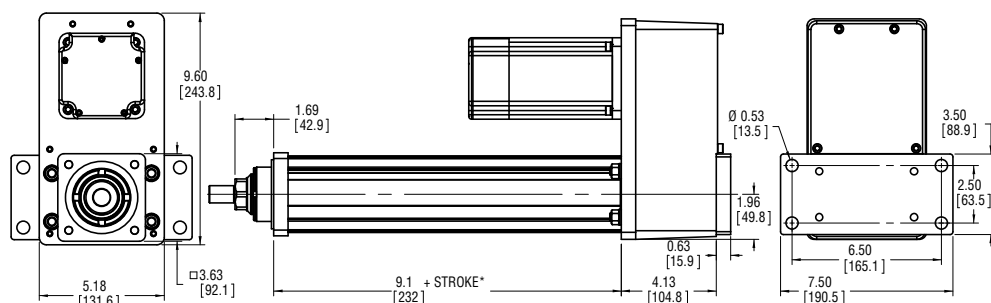
Parallel motor mount shown.

All dimensions shown in inches with millimeter equivalent in brackets.

See rod ends for
thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.

*Add 20mm if choosing high capacity option.



Drawings subject to change. Consult Exlar for certified drawings.

Trunnion Unit

Parallel motor mount shown.

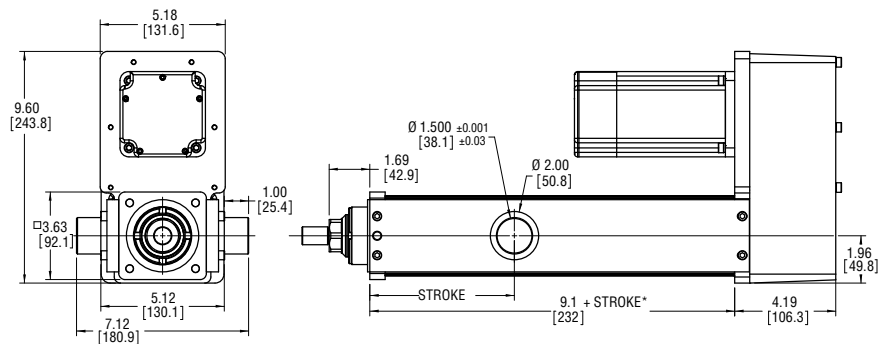
All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.

*Add 20mm if choosing high capacity option.

** If "Q" metric side trunnion option, Ø 35 mm h7



Extended Tie Rod Unit

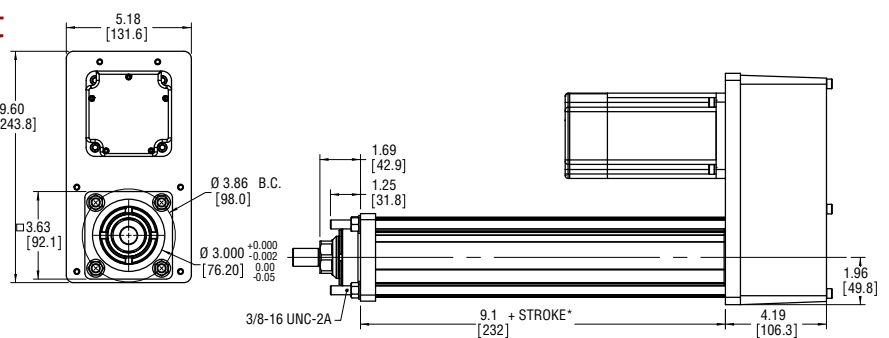
Parallel motor mount shown.

All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.

*Add 20mm if choosing high capacity option.



Side Lug Unit

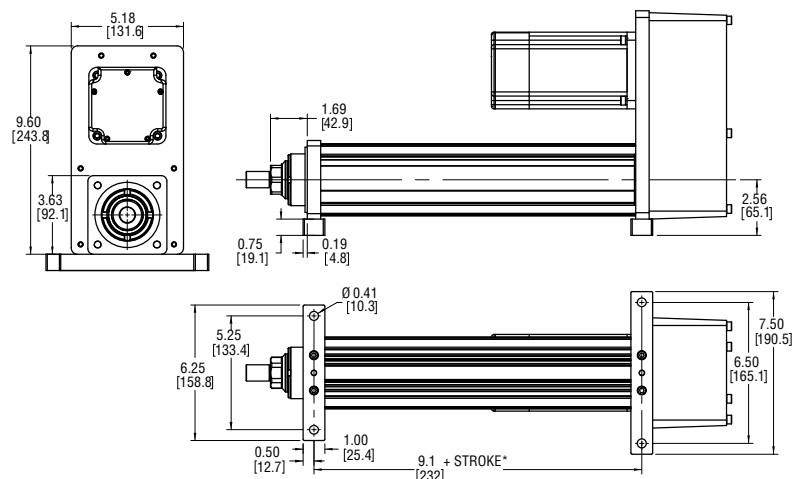
Parallel motor mount shown.

All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.

*Add 20mm if choosing high capacity option.



Side Mount Unit

Parallel motor mount shown.

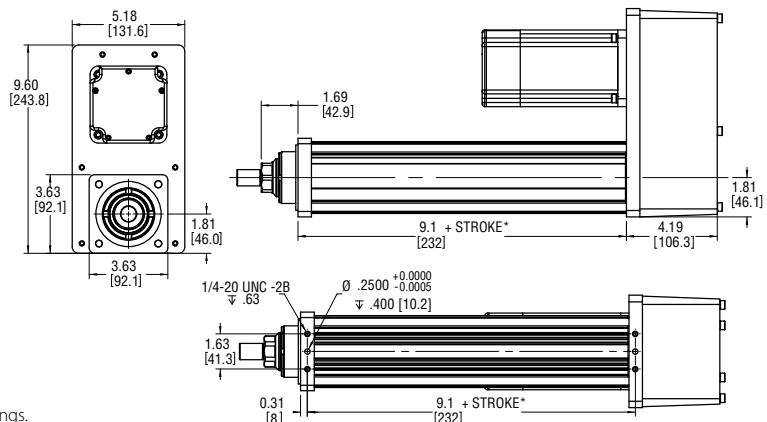
All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.

*Add 20mm if choosing high capacity option.

* If "J" or "K" metric side mount options, M6 x 1.0 ♂ 9 mm with Ø 6 mm M7 ♂ 9 mm Dowel Hole

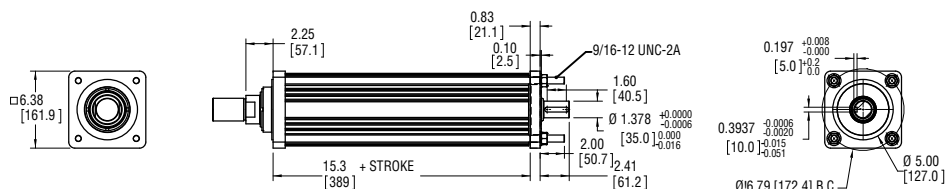


Drawings subject to change. Consult Exlar for certified drawings.

FT60 Series Linear Actuators

Base Unit

All dimensions shown in inches with millimeter equivalent in brackets.
See rod ends for rod end thread details.



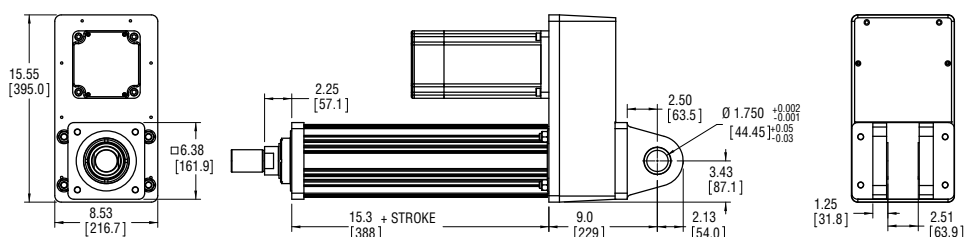
Clevis Mount Unit

Parallel motor mount shown.

All dimensions shown in inches with millimeter equivalent in brackets.
See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.

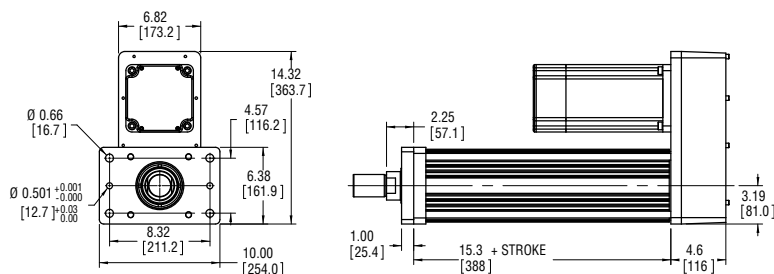
** If "G" metric clevis option, $\varnothing 45 \text{ mm} + 0.00 / - 0.08$



Front Flange Unit

Parallel motor mount shown.

All dimensions shown in inches with millimeter equivalent in brackets.
See rod ends for rod end thread details.
Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.

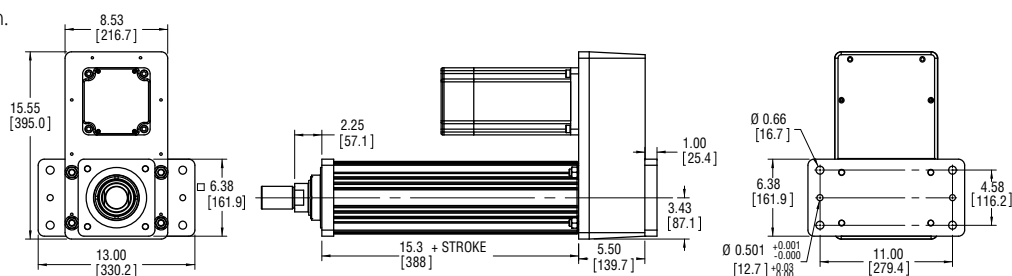


Rear Flange Unit

Parallel motor mount shown.

All dimensions shown in inches with millimeter equivalent in brackets.
See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.



Drawings subject to change. Consult Exlar for certified drawings.

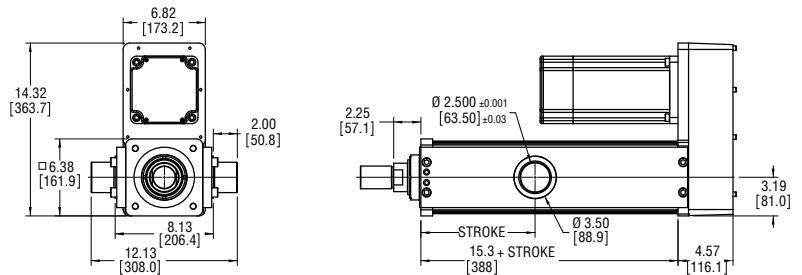
Trunnion Unit

Parallel motor mount shown.

All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.



* If "Q" metric side trunnion option, Ø 60 mm h9

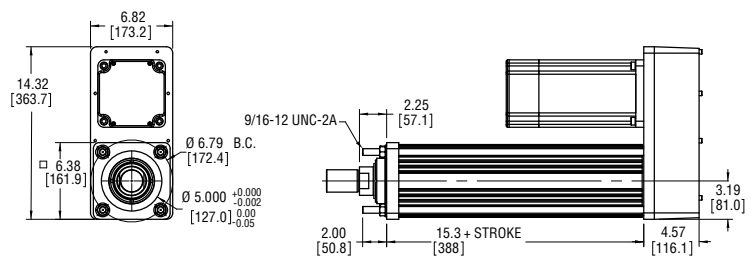
Extended Tie Rod Unit

Parallel motor mount shown.

All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.



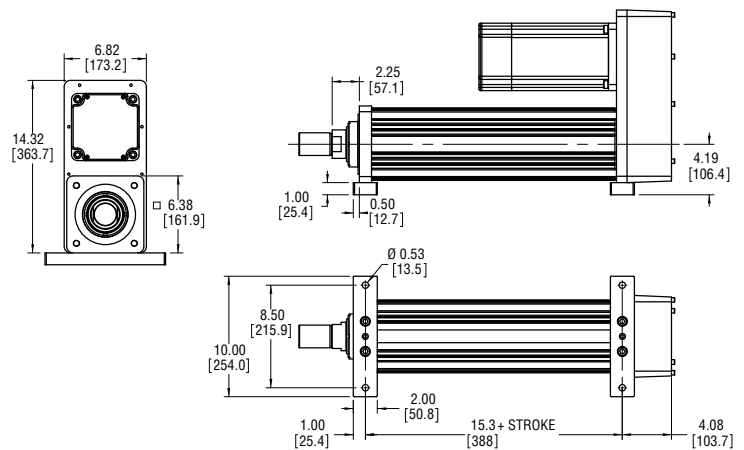
Side Lug Unit

Parallel motor mount shown.

All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.



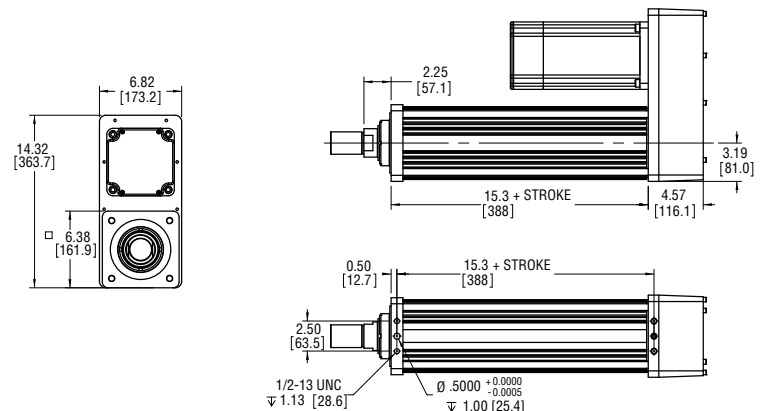
Side Mount Unit

Parallel motor mount shown.

All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.



* If "J" or "K" metric side mount options, M12 x 1.75 ⚓ 19 mm with Ø 12 mm M7 ⚓ 12 mm Dowel Hole

Drawings subject to change. Consult Exlar for certified drawings.

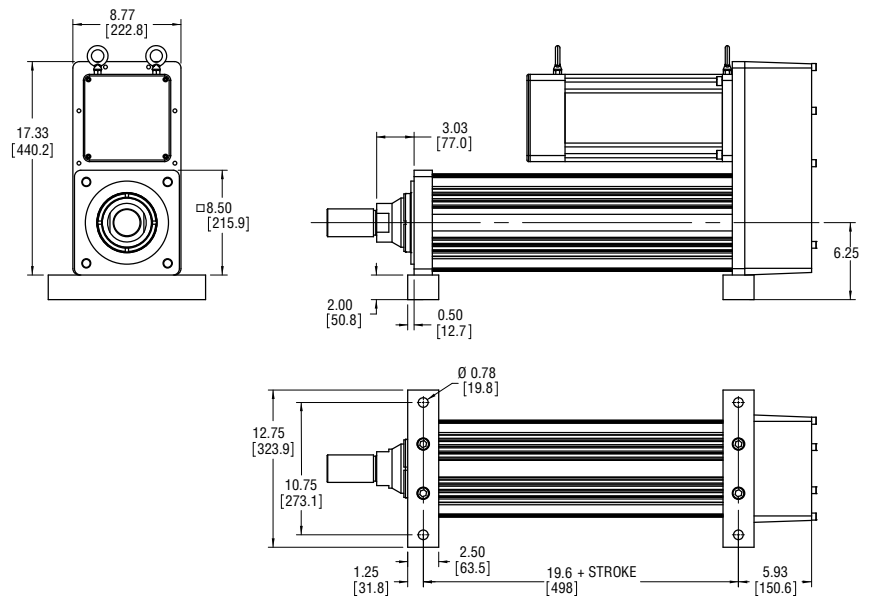
Side Lug Unit

Parallel motor mount shown.

All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.



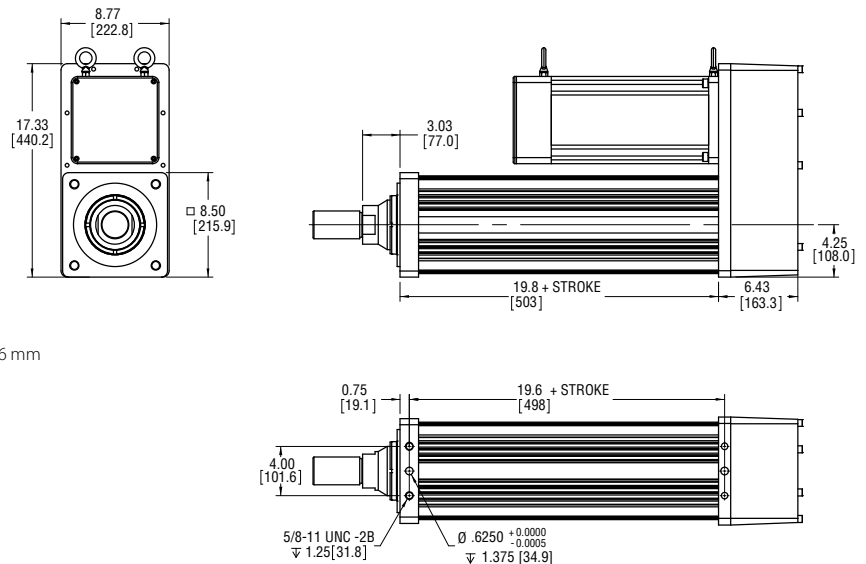
Side Mount Unit

Parallel motor mount shown.

All dimensions shown in inches with millimeters equivalents in brackets.

See rod ends for rod end thread details.

Motor plate and cover dimensions are subject to change depending on the motor and ratio selection.



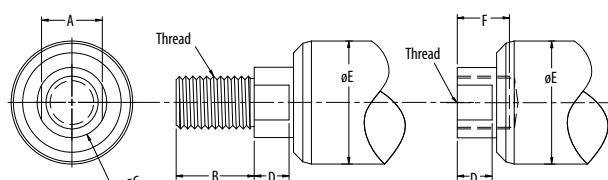
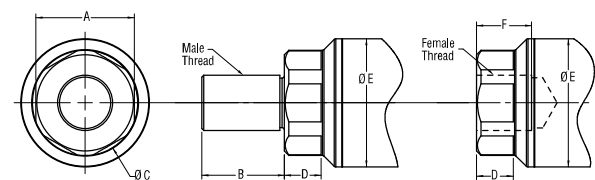
* If "J" or "K" metric side mount options, M16 x 2.0 ∇ 16 mm with \varnothing 12 mm M7 ∇ 12 mm Dowel Hole

NOTE: For Clevis, Trunnion or Rear Flange, Consult Exlar

Drawings subject to change. Consult Exlar for certified drawings.

FT Series Linear Actuators

Rod Ends

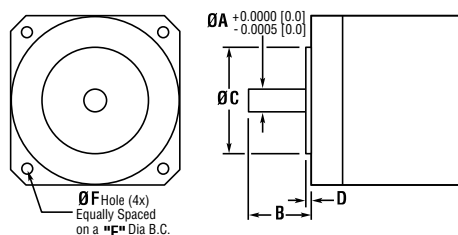


	A	B	ØC	D	OE	F	Male U.S.	Male Metric	Female U.S.	Female Metric
	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)				
FT35	1.34 (34)	1.125 (28.6)	1.434 (36.4)	0.50 (12.7)	1.750 (44.5)	0.750 (19.1)	3/4-16 UNF-2A	M16x1.5 6g	3/4-16 UNF-2B	M16x1.5 6h

	A	B	ØC	D	OE	F	Male U.S.	Male Metric	Female U.S.	Female Metric
	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)				
FT60	2.00 (50.8)	2.750 (69.9)	2.360 (59.9)	0.750 (19.1)	3.000 (76.2)	2.000 (50.8)	1 7/8-12 UN-2A	M42x4.5 6g	1 7/8-12 UN-2B	M42x4.5 6h
FT80	2.75 (69.9)	4.019 (102.1)	3.143 (79.8)	1.000 (25.4)	4.000 (101.6)	2.250 (57.2)	2 1/2-12 UN-2A	M56x5.5 6g	2 1/2-12 UN-2B	M56x5.5 6h

NEMA Standard Motor Dimensions

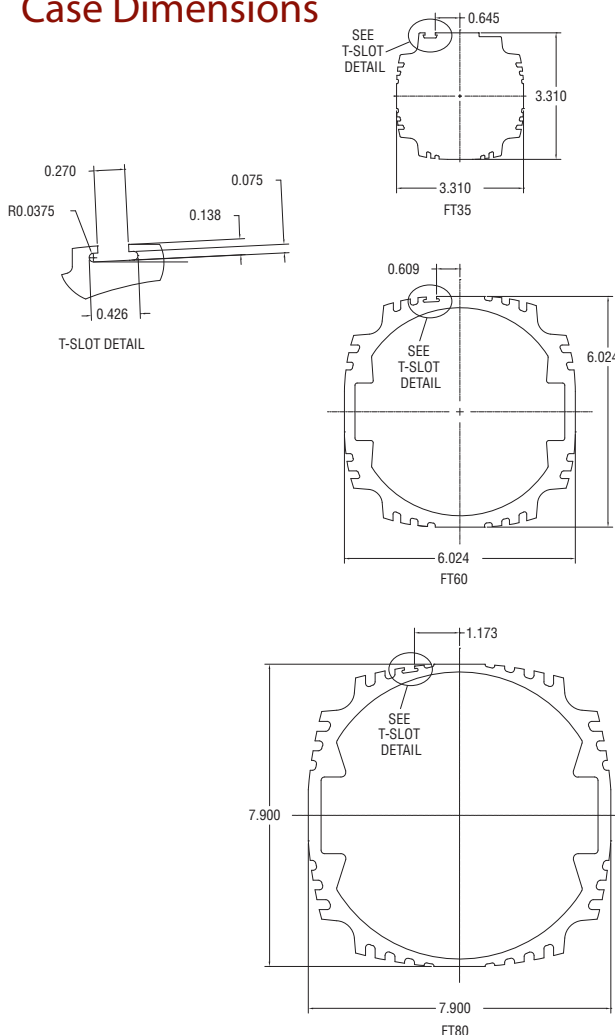
The FT Series actuators offer the selection for motor mounting provisions to be the various NEMA motor sizes. Because there are variations from brand to brand of motor as to what is called NEMA dimensions, we publish this table of NEMA dimensions that we use as the standards for the product line. If the motor that you choose differs from these dimensions, it would not be called out by the N23, N34, N42, N56 call outs but rather by the A## alpha numeric callout for specific motors.



Dimension (in)	NEMA 23	NEMA 34	NEMA 42	NEMA 56
"A" Motor Shaft Diameter	0.25	0.5	0.75	0.625
"B" Motor Shaft Length	0.81	1.19	2.19	2.0625
"C" Motor Pilot Diameter	1.5	2.875	2.186	4.5
"D" Pilot Depth	0.05	0.0625	0.0625	0.1 - 0.16
"E" Mounting Bolt Circle	2.625	3.875	4.95	5.875
"F" Mounting Bolt Hole Dia.	0.205	0.223	0.328	3/8-16 UNC tap

Drawings subject to change. Consult Exlar for certified drawings.

Case Dimensions



GGG = Motor Mount Provisions^{3,4}

A## = Alpha numeric motor call out – Contact your local sales representative. Motor not included.

NMT = No motor mount – keyed shaft on base unit only

N23 = Nema 23 standard dimension

N34 = Nema 34 standard dimension

N42 = Nema 42 standard dimension

N56 = Nema 56 standard dimension

M60 = Exlar 60 mm SLM. Motor not included.

M90 = Exlar 90 mm SLM. Motor not included.

M11 = Exlar 115 mm SLM and ER. Motor not included.

M14 = Exlar 142 mm SLM. Motor not included.

M18 = Exlar 180 mm SLM. Motor not included.

G60 = Exlar 60 mm SLG. Motor not included.

G90 = Exlar 90 mm SLG. Motor not included.

G11 = Exlar 115 mm SLG and ER. Motor not included.

AB3, 4, 6, 8 = Allen Bradley Ultra 3, 4, 6 and 8 inch motors

BD3, 4, 6, 8 = Baldor 3, 4, 6 & 8 inch motors

CM3, 4, 6, 8 = Parker (Custom Servo Motors) Metric 3, 4, 6 & 8 inch motors

EE3, 4 = Emerson EMC Imperial 3 & 4 inch

EM3, 4, 6, 8 = Emerson EMC Metric 3, 4, 6 & 8 inch

FA 4, 6, 8 = Fanuc 4, 6 & 8 inch motors

IN3, 4, 6, 8 = Bosch-Rexroth (Indramat) 3, 4, 6 and 8 inch motors

KM2, 4, 6, 8 = Kollmorgen B & M 20, 40, 60 and 80 Series

MT3, 4, 6, 8 = Mitsubishi 3, 4, 6 & 8 inch motors

PS3, 4, 6, 8 = Pacific Scientific PMA/PMB Series

PC2, 3, 4, 6 = Parker Compumotor Apex 2.7, 3.6, 4.5 and 5.6 inch

SM2 = Siemens 2 inch motor

SM3 = Siemens 3 inch motor

YS3, 4, 6, 8 = Yaskawa 3, 4, 6 and 8 inch motors

MXX = Unlisted or special motor mounting provisions

AA = FT Frame Size

35 = 3.5 inch (90 mm)

60 = 6.0 inch (150 mm)

80 = 8.0 inch (200 mm)

BB = Stroke Length

06 = 6 inch (152 mm) FT35

12 = 12 inch (305 mm) FT35, 60, 80

18 = 18 inch (457 mm) FT35

24 = 24 inch (610 mm) FT35, 60, 80

36 = 36 inch (914 mm) FT35, 60, 80

48 = 48 inch (1219 mm) FT35, 60, 80

CC = Screw Lead

05 = 0.2 inch, FT35

06 = 0.23 inch, FT60, 80

10 = 0.39 inch, FT35

12 = 0.47 inch, FT60, 80

20 = 0.79 inch, FT35

30 = 1.18 inch, FT60, 80

D = Mounting Style¹

L = Side lugs

B = Front/rear flange (5)

C = Rear clevis (5)

F = Front flange

R = Rear flange (5)

S = Side mount

D = Double side mount

T = Side trunnion mount (5)

E = Extended tie rods

J = Metric side mount

K = Metric double side mount

Q = Metric side trunnion

M = Metric extended tie rods

G = Metric rear clevis (5)

X = Special (please specify)

E = Motor Mounting Configurations

N = None

I = Inline direct drive (includes Exlar standard coupling)

P = Parallel, 1:1 belt reduction

Q = Parallel, 2:1 belt reduction

X = Special

F = Rod End

M = Male, US std. thread

A = Male, metric thread

F = Female, US std. thread

B = Female, metric thread

W = Male, US std. thread SS, rod end only

R = Male metric thread SS, rod end only

V = Female, US std. thread SS, rod end only

L = Female, metric thread SS, rod end only

X = Special (please specify)

XX .. XX = Options**Housing Options**

XH = Special housing options

HC = Type III hard coat anodized, class I²

XT = High capacity roller screw

SS = Stainless steel²

FG = Smooth white epoxy²

(IP65SS sealing of unit with motor mounted requires "XH" option.)²

Special Follower

PF = Preloaded follower. The dynamic load rating of zero backlash, preloaded screws is 63% of the dynamic load rating of the standard non-preloaded screws. The calculated travel life of a preloaded screw will be 25% of the calculated travel life of the same size and lead non-preloaded screw for the same application.

FX = Special follower

End Switches (adjustable position throughout stroke)

L1 = One adjustable switch, (10-30 VDC, PNP, N.C., 1m. 3 wire embedded cable)

L2 = Two adjustable switches, (10-30 VDC, PNP, N.C., 1m. 3 wire embedded cable)

L3 = Three adjustable switches, (10-30 VDC, PNP, N.C., 1m. 3 wire embedded cable)

Please provide a drawing of motor dimensions with all orders to insure proper mounting compatibility.

= Part No. Designator for Specials Optional 5 digit assigned part number to designate unique model numbers for specials.

Note:

1. Mounting face size, shaft length and other details of particular motors may require special adapters or provisions for mounting. Always discuss your motor selection with your local sales representative.
2. These housing options may also indicate the need for special material main rods, faceplate and motor mounting provisions. Internal anti-rotate is not available with stainless steel options. Please contact your local sales representative.
3. NEMA callout must meet specifications on page 72 or use alpha-numeric callout.
4. MAX Std. motor size FT35: 4 inch/115 mm, FT60 & 80: 8 inch/200 mm. For oversized motors, contact your local sales representative.
5. Not available with inline motor mount, contact your local sales representative.

Contact your local sales representative regarding all special actuator components.

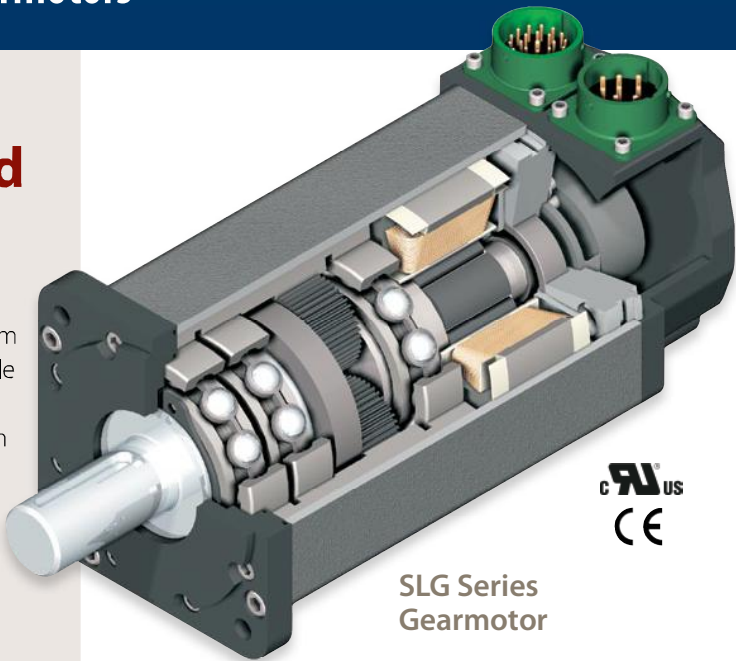
SLM Series Motors and
SLG Series Integrated
Gearmotors

Brushless servo motor and gearmotor technology from Exlar provides the highest torque-to-size ratio available in motion control today. Small size, outstanding performance specifications, quality and customization capabilities offer you the solution you need for your motion control application.

Very High Torque Density

Exlar’s T-LAM technology produces an efficient and powerful motor in a very small package.

- **60 mm SLM060** offers continuous torque up to 15 lbf-in and base speed of 5000 rpm.
- **90 mm SLM090** offers continuous torque up to 56 lbf-in and base speed of 4000 rpm.
- **115 mm SLM115** offers continuous torque up to 176 lbf-in and base speed of 3000 rpm.
- **142 mm SLM142** offers continuous torque up to 237 lbf-in and base speed of 2400 rpm.
- **180 mm SLM180** offers continuous torque up to 612 lbf-in and base speed of 2400 rpm.



SLG Series
Gearmotor



Standard Features	
SLM Motor	SLM Motor Standard Features
	UL recognized component IP65S sealing
	MS connectors embedded leads, or embedded leads with cable plugs
	Feedback configurations for nearly all servo amplifiers
	Anodized housings
SLG Gearmotor	Class 180H insulation system
	All features of SLM motor shown above plus...
	High side load bearing design
	Integrated armature and sungear
	Higher stiffness than bolt-on gearhead and motor
	10 arc minute standard backlash, single stage; 13 arc minute standard backlash, dual stage
	Single and double reduction ratios: 4:1, 5:1, 10:1, 16:1, 20:1, 25:1, 40:1, 50:1, and 100:1

Unique T-LAM™ Stator Design Advantage

This innovative design offers several advantages over traditional motor winding for a more efficient and powerful motor.

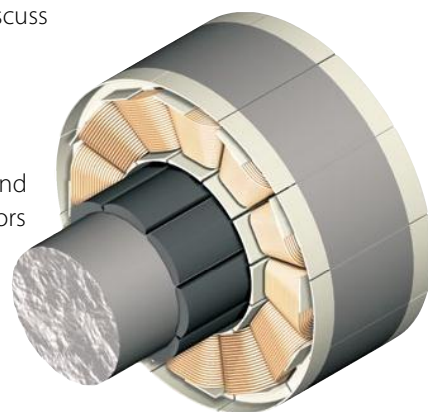
Built for durability, T-LAM segmented lamination stator technology consists of individual segments, each containing individual phase wiring for maximum motor performance. The robust insulation, high coercive strength magnets, and complete thermal potting all provide a more robust motor design – a design yielding a 35 to 70% torque increase in the same package size! T-LAM motor designs have Class 180-H insulation systems and UL recognition.

Customization to Suit Your Requirements

Exlar Corporation has capabilities allowing custom motors to be manufactured to meet your OEM requirements. Whatever your special requirements are... custom shafts, custom mountings, custom stators, custom housing materials... please contact Exlar or your local sales representative to discuss your needs.

Typical Applications

SLM Series Motors and SLG Series Gearmotors are perfectly suited for applications in any industry.



EXLAR SLM & SLG Series Motors applications include:

Semiconductor

Plastics Machinery

Tensioning

Web Feed

Fluid Handling

Stage Positioning

Medical Applications

Winding Machines

Glass Manufacturing

Food Processing

Conveyor Drives

Automotive Assembly

Parts Handling

Screw Drives

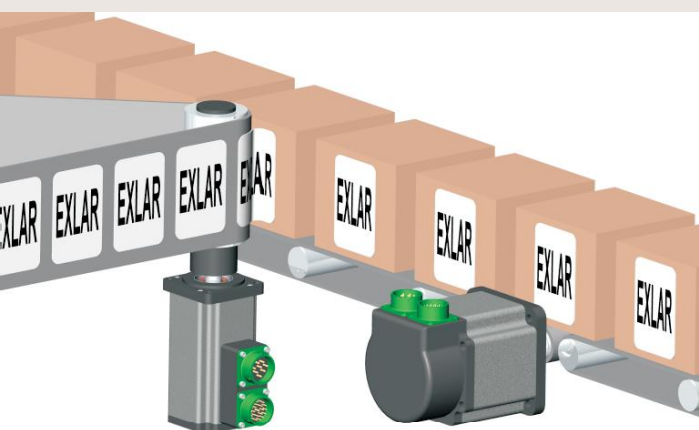
Labeling

Machine Tools

Simulation Robotics

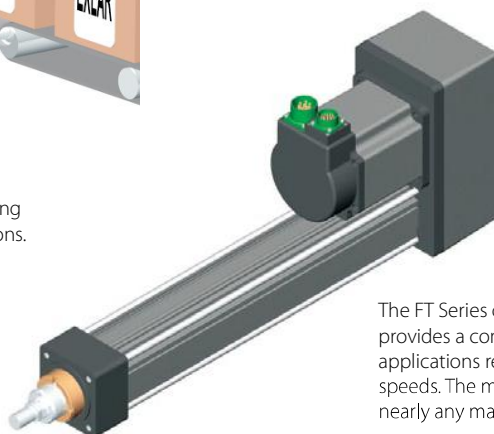
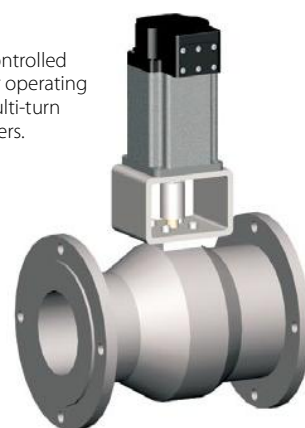
Packaging

SLM/SLG Series



Exlar's brushless motors are the highest performance with very compact size. This makes them perfect for high-speed labeling and demanding conveyor drive applications.

Exlar's closed-loop, servo-controlled rotary actuators are ideal for operating quarter-turn, full-turn, or multi-turn valves or shaft driven dampers.



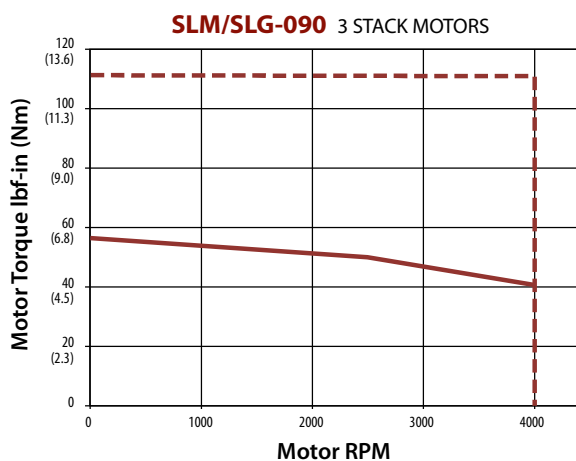
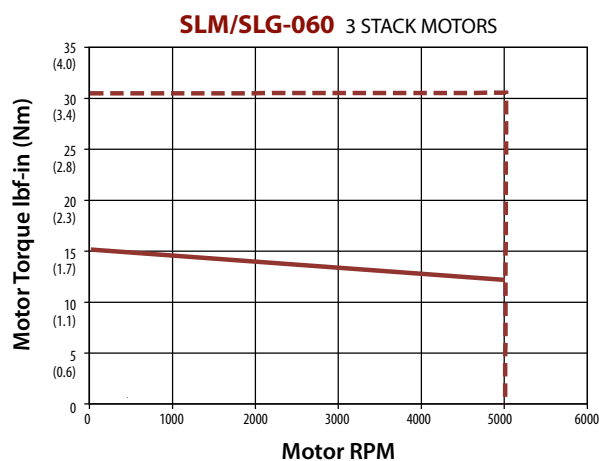
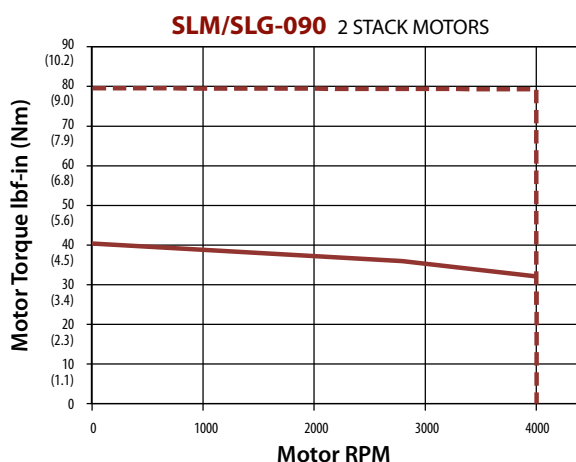
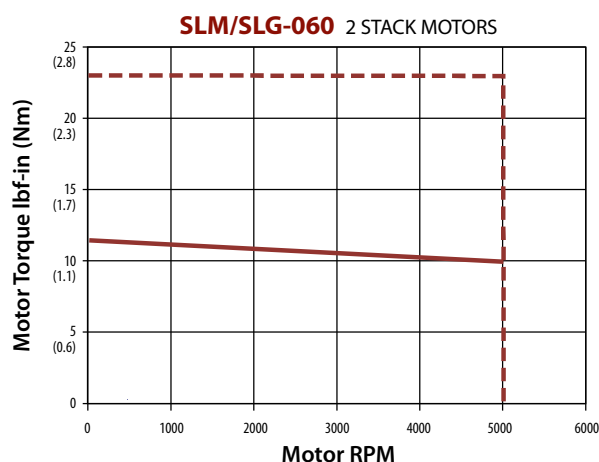
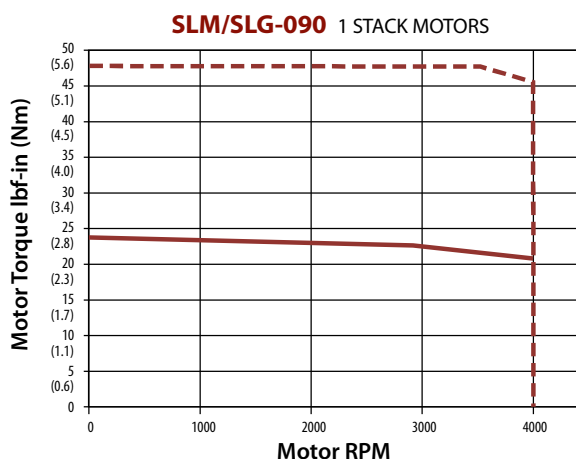
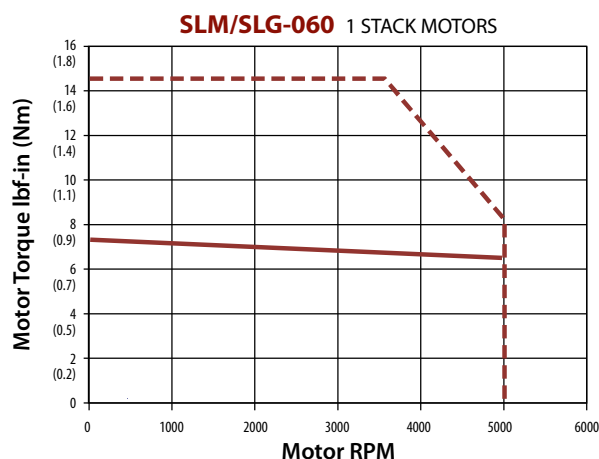
The FT Series combined with SLM/G Series motors provides a complete Exlar actuator solution for applications requiring heavy load capacity and high speeds. The motor can be configured to operate with nearly any manufacturer's servo amplifier.

SLM Series Motors/SLG Series Gearmotors

SLM/SLG Speed/Torque Curves

These speed vs. torque curves represent approximate continuous torque ratings at indicated rpms. Different types of servo amplifiers will offer varying motor torque.

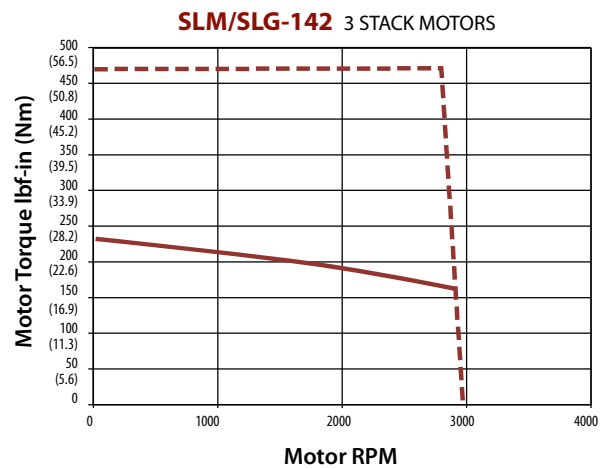
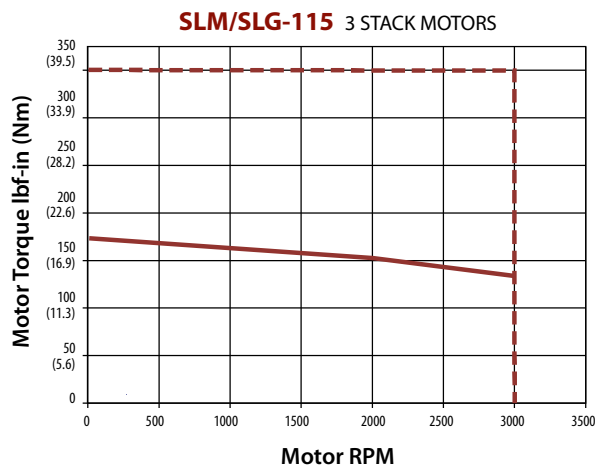
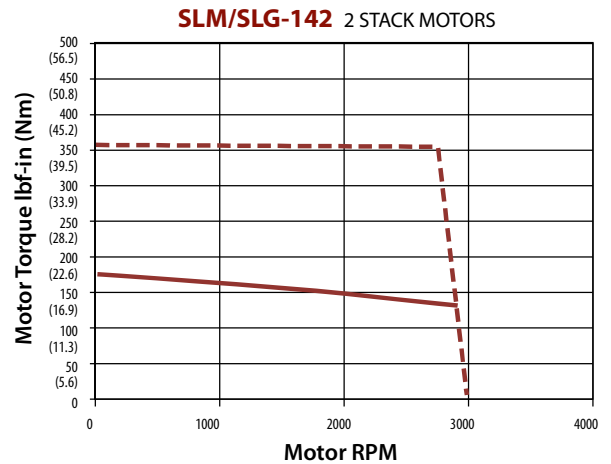
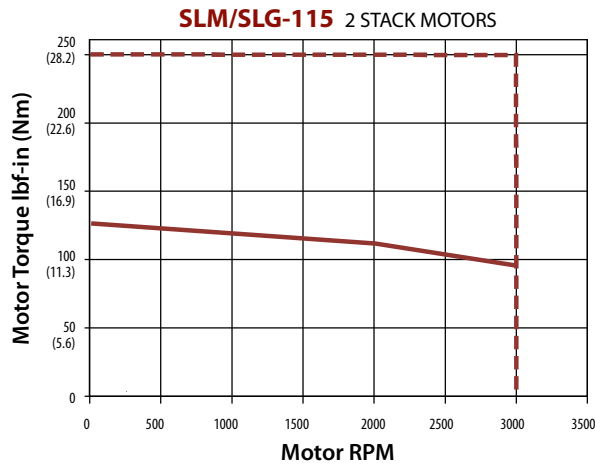
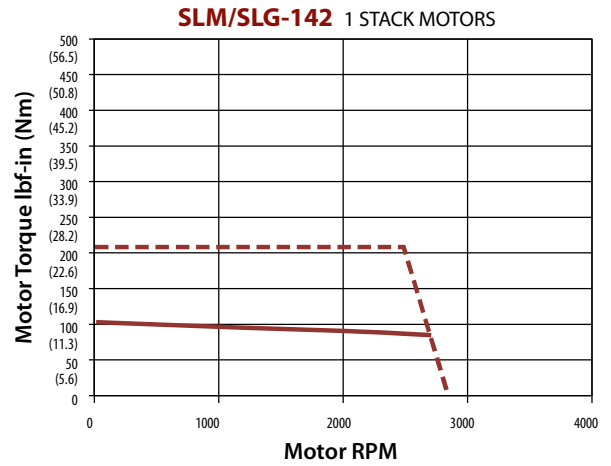
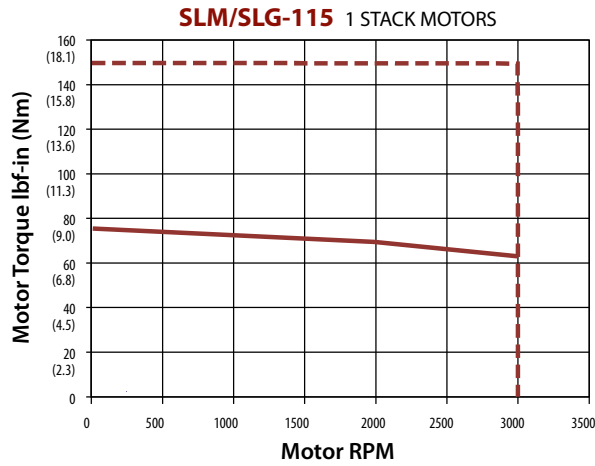
----- Peak Torque
—— Continuous Torque



Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4" on SLM/SLG060 and 10" x 10" x 3/8" on SLM/SLG090

SLM/SLG Speed/Torque Curves

--- Peak Torque
— Continuous Torque



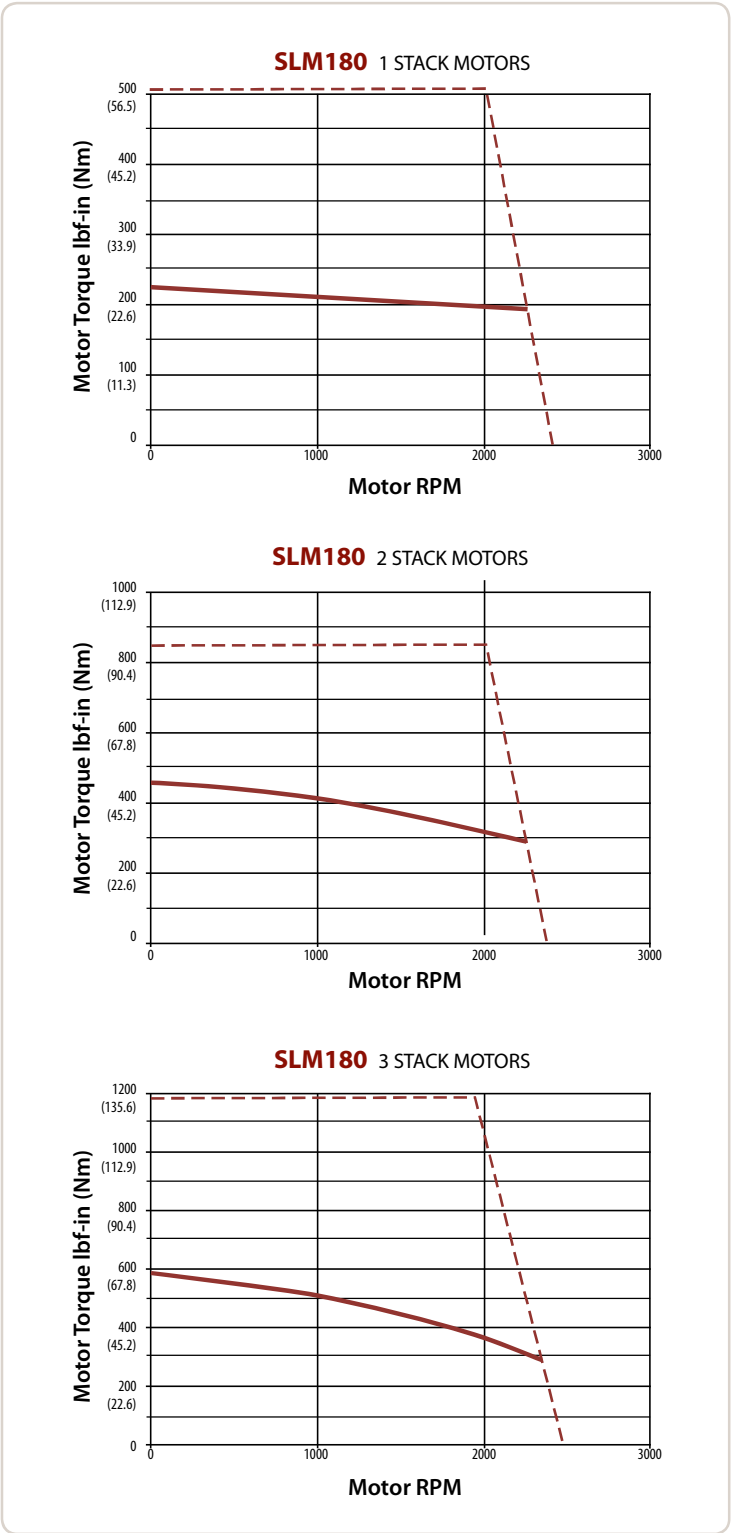
Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" on SLM/SLG115 and 12" x 12" x 1/2" on SLM/SLG142

SLM Series Motors/SLG Series Gearmotors

SLM Speed/Torque Curves

These speed vs. torque curves represent approximate continuous torque ratings at indicated rpms. Different types of servo amplifiers will offer varying motor torque.

- Peak Torque
- Continuous Torque



Test data derived using NEMA recommended aluminum heatsink 16" x 16" x 1"

SLM/SLG060 Electrical/Mechanical Specifications

SLM/G060 Stator Data		1 Stack Motor				2 Stack Motor				3 Stack Motor			
Sinusoidal Commutation Data		118	138	158	168	218	238	258	268	318	338	358	368
Continuous Motor Torque	lbf-in (Nm)	7.6 (0.86)	7.3 (0.83)	7.0 (0.79)	7.0 (0.79)	11.9 (1.34)	11.5 (1.30)	11.0 (1.25)	11.3 (1.28)	15.0 (1.70)	15.3 (1.73)	14.6 (1.65)	14.9 (1.69)
Peak Motor Torque	lbf-in (Nm)	15.2 (1.72)	14.7 (1.66)	14.0 (1.58)	14.0 (1.58)	23.8 (2.69)	23.0 (2.60)	22.1 (2.49)	22.6 (2.55)	30.0 (3.39)	30.6 (3.46)	29.2 (3.30)	29.9 (3.38)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	2.5 (0.28)	5.2 (0.6)	7.5 (0.9)	9.5 (1.1)	2.5 (0.3)	5.2 (0.6)	8.6 (1.0)	10.1 (1.1)	2.5 (0.3)	5.3 (0.6)	8.8 (1.0)	10.1 (1.1)
Continuous Current Rating	A	3.4	1.6	1.0	0.8	5.4	2.5	1.4	1.2	6.6	3.2	1.9	1.6
Peak Current Rating	A	6.9	3.1	2.0	1.6	10.8	4.9	2.9	2.5	13.2	6.5	3.7	3.3
O-PK SINUSOIDAL COMMUTATION DATA													
Continuous Motor Torque	lbf-in (Nm)	7.6 (0.86)	7.3 (0.83)	7.0 (0.79)	7.0 (0.79)	11.9 (1.34)	11.5 (1.30)	11.0 (1.25)	11.3 (1.28)	15.0 (1.70)	15.3 (1.73)	14.6 (1.65)	14.9 (1.69)
Peak Motor Torque	lbf-in (Nm)	15.2 (1.72)	14.7 (1.66)	14.0 (1.58)	14.0 (1.58)	23.8 (2.69)	23.0 (2.60)	22.1 (2.49)	22.6 (2.55)	30.0 (3.39)	30.6 (3.46)	29.2 (3.30)	29.9 (3.38)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	1.7 (0.20)	3.7 (0.4)	5.3 (0.6)	6.7 (0.8)	1.7 (0.2)	3.7 (0.4)	6.1 (0.7)	7.2 (0.8)	1.8 (0.2)	3.7 (0.4)	6.2 (0.7)	7.2 (0.8)
Continuous Current Rating	A	4.9	2.2	1.5	1.2	7.6	3.5	2.0	1.8	9.4	4.6	2.6	2.3
Peak Current Rating	A	9.7	4.5	2.9	2.3	15.2	7.0	4.1	3.5	18.7	9.2	5.3	4.7
MOTOR DATA													
Voltage Constant (Ke) (+/- 10% @ 25 °C)	Vrms/Krpm Vpk/Krpm	16.9 23.9	35.5 50.2	51.5 72.8	64.8 91.7	16.9 23.9	35.5 50.2	58.6 82.9	69.3 98.0	17.3 24.5	36.0 50.9	59.9 84.8	69.3 98.0
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25 °C)	Ohms	2.6	12.52	28.82	45.79	1.11	5.26	15.51	20.69	0.76	3.14	9.57	12.22
Inductance (L-L)(+/- 15%)	mH	4.6	21.4	47.9	68.3	2.5	10.2	28.3	39.5	1.7	7.4	18.5	27.4
SLM Armature Inertia (+/- 5%)	lbf-in-sec ² (Kg-cm ²)	0.000237 (0.268)				0.000413 (0.466)				0.000589 (0.665)			
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.00012 (0.135)				0.000120 (0.135)				0.000120 (0.135)			
Brake Current @ 24 VDC	A	.33				.33				.33			
Brake Holding Torque	lbf-in (Nm)	19 (2.2)				19 (2.2)				19 (2.2)			
Brake Engage/Disengage Time	ms	14/28				14/28				14/28			
Mechanical Time Constant (tm)	ms	2.20	2.38	2.60	2.61	1.62	1.74	1.89	1.80	1.50	1.45	1.59	1.52
Electrical Time Constant (te)	ms	1.76	1.71	1.66	1.49	2.24	1.95	1.82	1.91	2.27	2.36	1.93	2.24
Friction Torque	lbf-in (Nm)	0.27 (0.031)				0.34 (0.038)				0.38 (0.043)			
Voltage Rating	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	5000											
Insulation Class		180 (H)											
Insulation System Volt Rating	Vrms	460											
Environmental Rating		IP65S											

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

SLG060 Gearmotor Data

	1 Stack Motor		2 Stack Motor		3 Stack Motor	
SLG Armature Inertia* lbf-in-sec ² (Kg-cm ²)	0.000226 (0.255)		0.000401 (0.453)		0.000576 (0.651)	
GEARING REFLECTED INERTIA	SINGLE REDUCTION			DOUBLE REDUCTION		
	Gear Stages	lbf-in-sec ²	(Kg-cm ²)	Gear Stages	lbf-in-sec ²	(Kg-cm ²)
	4:1	0.0000132	(0.0149)	16:1	0.0000121	(0.0137)
	5:1	0.0000087	(0.00984)	20:1, 25:1	0.0000080	(0.00906)
	10:1	0.0000023	(0.00261)	40:1, 50:1, 100:1	0.0000021	(0.00242)
Backlash at 1% rated torque:	10 Arc minutes Efficiency: Single reduction 91%			13 Arc minutes Double Reduction: 86%		

* Add armature inertia to gearing inertia for total SLG system inertia

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4"

SLM Series Motors/SLG Series Gearmotors

SLM/SLG090 Electrical/Mechanical Specifications

SLM/G090 Stator Data		1 Stack Motor				2 Stack Motor				3 Stack Motor		
Sinusoidal Commutation Data		118	138	158	168	218	238	258	268	338	358	368
Continuous Motor Torque	lbf-in (Nm)	23.8 (2.68)	24.0 (2.71)	23.7 (2.67)	24.7 (2.79)	39.6 (4.47)	40.0 (4.52)	39.5 (4.46)	39.9 (4.51)	55.7 (6.30)	55.4 (6.26)	55.7 (6.30)
Peak Motor Torque	lbf-in (Nm)	47.5 (5.37)	48.0 (5.42)	47.3 (5.35)	49.4 (5.58)	79.1 (8.94)	80.0 (9.04)	79.0 (8.93)	79.9 (9.02)	111.5 (12.59)	110.9 (12.52)	111.5 (12.59)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	3.2 (0.37)	6.6 (0.7)	11.6 (1.3)	13.2 (1.5)	3.2 (0.4)	6.6 (0.7)	11.6 (1.3)	13.2 (1.5)	6.6 (0.7)	11.6 (1.3)	13.1 (1.5)
Continuous Current Rating	A	8.2	4.0	2.3	2.1	13.6	6.8	3.8	3.4	9.5	5.3	4.8
Peak Current Rating	A	16.4	8.1	4.6	4.2	27.3	13.5	7.6	6.7	19.0	10.7	9.5
0-PK SINUSOIDAL COMMUTATION DATA												
Continuous Motor Torque	lbf-in (Nm)	23.8 (2.68)	24.0 (2.71)	23.7 (2.67)	24.7 (2.79)	39.6 (4.47)	40.0 (4.52)	39.5 (4.46)	39.9 (4.51)	55.7 (6.30)	55.4 (6.26)	55.7 (6.30)
Peak Motor Torque	lbf-in (Nm)	47.5 (5.37)	48.0 (5.42)	47.3 (5.35)	49.4 (5.58)	79.1 (8.94)	80.0 (9.04)	79.0 (8.93)	79.9 (9.02)	111.5 (12.59)	110.9 (12.52)	111.5 (12.59)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	2.3 (0.26)	4.7 (0.5)	8.2 (0.9)	9.4 (1.1)	2.3 (0.3)	4.7 (0.5)	8.2 (0.9)	9.4 (1.1)	4.6 (0.5)	8.2 (0.9)	9.3 (1.0)
Continuous Current Rating	A	11.6	5.7	3.2	2.9	19.3	9.5	5.4	4.8	13.4	7.5	6.7
Peak Current Rating	A	23.2	11.4	6.5	5.9	38.6	19.1	10.8	9.5	26.9	15.1	13.4
MOTOR DATA												
Voltage Constant (Ke)	Vrms/Krpm	22.1	45.2	78.9	90.4	22.1	45.2	78.9	90.4	44.7	79.4	89.5
(+/- 10% @ 25 °C)	Vpk/Krpm	31.3	64.0	111.6	127.9	31.3	64.0	111.6	127.9	63.3	112.3	126.5
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25 °C)	Ohms	0.75	3.06	9.57	11.55	0.30	1.21	3.78	4.86	0.69	2.19	2.75
Inductance (L-L)(+/- 15%)	mH	6.1	25.6	78.0	88.6	2.9	10.5	37.2	43.1	6.6	24.7	31.4
SLM Armature Inertia (+/- 5%)	lbf-in-sec ² (Kg-cm ²)	0.00054 (0.609)				0.00097 (1.09)				0.00140 (1.58)		
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.00096 (1.08)				0.00096 (1.08)				0.00096 (1.08)		
Brake Current @ 24VDC	A	.67				.67				.67		
Brake Holding Torque	lbf-in (Nm)	97 (11)				97 (11)				97 (11)		
Brake Engage/Disengage Time	ms	20/29				20/29				20/29		
Mechanical Time Constant (tm)	ms	0.83	0.82	0.84	0.77	0.59	0.58	0.59	0.58	0.48	0.49	0.48
Electrical Time Constant (te)	ms	8.21	7.31	8.14	7.67	9.88	8.66	9.85	8.88	9.57	11.30	11.43
Friction Torque	lbf-in (Nm)	0.68 (0.077)				0.85 (0.095)				1.06 (0.119)		
Voltage Rating	Vrms	115	230	400	460	115	230	400	460	230	400	460
Speed @ Bus Voltage	rpm	4000										
Insulation Class		180 (H)										
Insulation System Volt Rating	Vrms	460										
Environmental Rating		IP65S										

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

SLG090 Gearmotor Data

	1 Stack Motor		2 Stack Motor		3 Stack Motor	
SLG Armature Inertia* lbf-in-sec ² (Kg-cm ²)	0.00114 (1.29)		0.00157 (1.77)		0.00200 (2.26)	
GEARING REFLECTED INERTIA	SINGLE REDUCTION			DOUBLE REDUCTION		
	Gear Stages	lbf-in-sec ²	(Kg-cm ²)	Gear Stages	lbf-in-sec ²	(Kg-cm ²)
	4:1	0.000154	(0.174)	16:1	0.000115	(0.130)
	5:1	0.000100	(0.113)	20:1, 25:1	0.0000756	(0.0854)
	10:1	0.0000265	(0.0300)	40:1, 50:1, 100:1	0.0000203	(0.0230)
Backlash at 1% rated torque:	10 Arc minutes Efficiency: Single reduction 91%			13 Arc minutes Double Reduction: 86%		

* Add armature inertia to gearing inertia for total SLG system inertia

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 3/8"

SLM/SLG115 Electrical/Mechanical Specifications

SLM/SLG115 Stator Data		1 Stack Motor				2 Stack Motor			3 Stack Motor		
Sinusoidal Commutation Data		118	138	158	168	238	258	268	338	358	368
Continuous Motor Torque	lbf-in (Nm)	74.1 (8.37)	74.1 (8.37)	74.3 (8.39)	74.1 (8.37)	123.6 (13.96)	121.4 (13.72)	123.8 (13.96)	172.3 (19.46)	168.9 (19.09)	176.9 (19.98)
Peak Motor Torque	lbf-in (Nm)	148.2 (16.74)	148.2 (16.74)	148.6 (16.79)	148.1 (16.74)	247.2 (27.93)	242.8 (27.43)	247.2 (27.93)	344.5 (38.93)	337.8 (38.17)	353.7 (39.96)
Torque Constant (Kt) (+/- 10% @ 25°C)	lbf-in/A (Nm/A)	4.3 (0.49)	8.7 (1.0)	15.7 (1.8)	17.3 (2.0)	8.7 (1.0)	15.8 (1.8)	17.3 (2.0)	8.5 (1.0)	15.8 (1.8)	17.5 (2.0)
Continuous Current Rating	A	19.1	9.5	5.3	4.8	15.9	8.6	8.0	22.7	11.9	11.3
Peak Current Rating	A	38.2	19.1	10.6	9.5	31.8	17.1	15.9	45.4	23.8	22.5
O-PK SINUSOIDAL COMMUTATION DATA											
Continuous Motor Torque	lbf-in (Nm)	74.1 (8.37)	74.1 (8.37)	74.3 (8.39)	74.1 (8.37)	123.6 (13.96)	121.4 (13.72)	123.6 (13.96)	172.3 (19.46)	168.9 (19.09)	176.9 (19.98)
Peak Motor Torque	lbf-in (Nm)	148.2 (16.74)	148.2 (16.74)	148.6 (16.79)	148.1 (16.74)	247.2 (27.93)	242.8 (27.43)	247.2 (27.93)	344.5 (38.93)	337.8 (38.17)	353.7 (39.96)
Torque Constant (Kt) (+/- 10% @ 25°C)	lbf-in/A (Nm/A)	3.1 (0.35)	6.1 (0.7)	11.1 (1.3)	12.3 (1.4)	6.1 (0.7)	11.2 (1.3)	12.3 (1.4)	6.0 (0.7)	11.2 (1.3)	12.4 (1.4)
Continuous Current Rating	A	27.0	13.5	7.5	6.7	22.5	12.1	11.3	32.1	16.9	15.9
Peak Current Rating	A	54.0	27.0	15.0	13.5	45.0	24.2	22.5	64.2	33.7	31.9
MOTOR DATA											
Voltage Constant (Ke)	Vrms/Krpm	29.6	59.2	106.9	118.5	59.2	108.2	118.5	58.0	108.2	119.8
(+/- 10% @ 25°C)	Vpk/Krpm	41.9	83.8	151.2	167.6	83.8	153.0	167.6	82.0	153.0	169.4
Pole Configuration		8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25°C)	Ohms	0.20	0.80	2.60	3.21	0.34	1.17	1.35	0.20	0.72	0.81
Inductance (L-L)(+/- 15%)	mH	3.3	13.0	42.4	52.1	6.3	21.1	25.3	4.0	13.1	17.1
SLM Armature Inertia (+/- 5%)	lbf-in-sec ² (Kg-cm ²)	0.00344 (3.89)				0.00623 (7.036)			0.00901 (10.181)		
Brake Inertia	lbf-in-sec ² (Kg-cm ²)	0.00327 (3.70)				0.00327 (3.70)			0.00327 (3.70)		
Brake Current @ 24VDC	A	.75				.75			.75		
Brake Holding Torque	lbf-in (Nm)	195 (22)				195 (22)			195 (22)		
Brake Engage/Disengage Time	ms	25/50				25/50			25/50		
Mechanical Time Constant (tm)	ms	0.80	0.80	0.79	0.80	0.61	0.63	0.61	0.54	0.56	0.51
Electrical Time Constant (te)	ms	16.26	16.26	16.34	16.25	18.72	18.06	18.72	20.08	18.14	21.16
Friction Torque	lbf-in (Nm)	1.43 (0.16)				1.81 (0.204)			2.32 (0.262)		
Voltage Rating	Vrms	115	230	400	460	230	400	460	230	400	460
Speed @ Bus Voltage	rpm	3000									
Insulation Class		180 (H)									
Insulation System Volt Rating	Vrms	460									
Environmental Rating		IP65S									

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

SLG115 Gearmotor Data

	1 Stack Motor		2 Stack Motor		3 Stack Motor	
SLG Armature Inertia* lbf-in-sec ² (Kg-cm ²)	0.00538 (6.08)		0.00816 (9.22)		0.0109 (12.31)	
GEARING REFLECTED INERTIA	SINGLE REDUCTION			DOUBLE REDUCTION		
	Gear Stages	lbf-in-sec ²	(Kg-cm ²)	Gear Stages	lbf-in-sec ²	(Kg-cm ²)
	4:1	0.000635	(0.717)	16:1	0.000513	(0.580)
	5:1	0.000428	(0.484)	20:1, 25:1	0.000350	(0.396)
	10:1	0.000111	(0.125)	40:1, 50:1, 100:1	0.0000911	(0.103)
Backlash at 1% rated torque:	10 Arc minutes Efficiency: Single reduction 91%			13 Arc minutes Double Reduction: 86%		

* Add armature inertia to gearing inertia for total SLG system inertia
Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2"

SLM Series Motors/SLG Series Gearmotors

SLM142 Electrical/Mechanical Specifications

SLM142 Stator Data		1 Stack Motor				2 Stack Motor			3 Stack Motor	
Sinusoidal Commutation Data		118	138	158	168	238	258	268	358	368
Continuous Motor Torque	lbf-in (Nm)	108.5 (12.25)	107.2 (12.12)	104.8 (11.84)	109.4 (12.36)	179.9 (20.32)	178.8 (20.20)	177.8 (20.09)	237.2 (26.80)	238.3 (26.93)
Peak Motor Torque	lbf-in (Nm)	216.9 (24.51)	214.5 (24.23)	209.5 (23.67)	218.8 (24.72)	359.8 (40.65)	357.6 (40.40)	355.7 (40.19)	474.4 (53.60)	476.7 (53.85)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	5.9 (0.67)	11.8 (1.3)	20.2 (2.3)	23.6 (2.7)	11.8 (1.3)	20.2 (2.3)	23.6 (2.7)	20.2 (2.3)	24.0 (2.7)
Continuous Current Rating	A	20.5	10.2	5.8	5.2	17.0	9.9	8.4	13.1	11.1
Peak Current Rating	A	41.1	20.3	11.6	10.4	34.1	19.8	16.8	26.2	22.2
O-PK SINUSOIDAL COMMUTATION DATA										
Continuous Motor Torque	lbf-in (Nm)	108.5 (12.25)	107.2 (12.12)	104.8 (11.84)	109.4 (12.36)	179.9 (20.32)	178.8 (20.20)	177.8 (20.09)	237.2 (26.80)	238.3 (26.93)
Peak Motor Torque	lbf-in (Nm)	216.9 (24.51)	214.5 (24.23)	209.5 (23.67)	218.8 (24.72)	359.8 (40.65)	357.6 (40.40)	355.7 (40.19)	474.4 (53.60)	476.7 (53.85)
Torque Constant (Kt) (+/- 10% @ 25 °C)	lbf-in/A (Nm/A)	4.2 (0.47)	8.3 (0.9)	14.3 (1.6)	16.7 (1.9)	8.3 (0.9)	14.3 (1.6)	16.7 (1.9)	14.3 (1.6)	17.0 (1.9)
Continuous Current Rating	A	29.1	14.4	8.2	7.3	24.1	14.0	11.9	18.5	15.7
Peak Current Rating	A	58.1	28.7	16.4	14.7	48.2	27.9	23.8	37.1	31.4
MOTOR DATA										
Voltage Constant (Ke)	Vrms/Krpm	40.3	80.6	138.1	161.1	80.6	138.1	161.1	138.1	164.0
(+/- 10% @ 25 °C)	Vpk/Krpm	57.0	113.9	195.3	227.9	113.9	195.3	227.9	195.3	232.0
Pole Configuration		8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25 °C)	Ohms	0.21	0.87	2.68	3.34	0.339	1.01	1.39	0.61	0.858
Inductance (L-L)(+/- 15%)	mH	5.4	21.7	63.9	78.3	10.4	27.6	41.5	20.0	28.2
Armature Inertia (+/- 5%)	lb-in-sec ² (Kg-cm ²)	0.00927 (10.47)				0.01537 (17.363)			0.02146 (24.249)	
Brake Inertia	lb-in-sec ² (Kg-cm ²)	0.008408 (9.5)				0.008408 (9.5)			0.008408 (9.5)	
Brake Current @ 24VDC	A	1.0				1.0			1.0	
Brake Holding Torque	lbf-in (Nm)	354 (39.99)				354 (39.99)			354 (39.99)	
Brake Engage/Disengage Time	ms	25/73				25/73			25/73	
Mechanical Time Constant (tm)	ms	1.23	1.26	1.32	1.21	0.81	0.82	0.83	0.70	0.69
Electrical Time Constant (te)	ms	25.59	25.02	23.88	23.43	30.58	27.30	29.89	32.60	32.90
Friction Torque	lbf-in (Nm)	2.07 (0.234)				2.65 (0.299)			3.32 (0.375)	
Bus Voltage	Vrms	115	230	400	460	230	400	460	400	460
Speed @ Bus Voltage	RPM	2400								
Insulation Class		180 (H)								
Insulation System Volt Rating	Vrms	460								
Environmental Rating		IP65S								

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

Gearmotor not available on 142 frame motor.

Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2"

SLM180 Electrical/Mechanical Specifications

SLM180 Motor Stator		1 Stack Motor			2 Stack Motor			3 Stack Motor	
RMS Sinusoidal Commutation Data		138	158	168	238	258	268	358	368
Continuous Motor Torque	lbf-in (Nm)	254.2 (28.72)	249.9 (28.23)	261.9 (29.59)	424.8 (47.99)	423.0 (47.79)	427.5 (48.30)	595.6 (67.29)	611.6 (69.10)
Peak Motor Torque	lbf-in (Nm)	508.4 (57.44)	499.8 (56.47)	523.8 (59.18)	849.6 (95.99)	846.0 (95.59)	855.1 (96.61)	1,191.2 (134.58)	1223.2 (138.19)
Torque Constant (Kt) (+/- 10% @ 25° C)	lbf-in/A (Nm/A)	12.6 (1.4)	21.8 (2.5)	25.2 (2.8)	12.6 (1.4)	21.8 (2.5)	25.2 (2.8)	21.4 (2.4)	25.2 (2.8)
Continuous Current Rating (IG)	A	22.6	12.8	11.6	37.7	21.7	19.0	31.1	27.2
Peak Current Rating	A	45.2	25.6	23.3	75.5	43.4	38.0	62.2	54.3
O-PK SINUSOIDAL COMMUTATION DATA									
Continuous Motor Torque	lbf-in (Nm)	254.2 (28.72)	249.9 (28.23)	261.9 (29.59)	424.8 (47.99)	423.0 (47.79)	427.5 (48.30)	595.6 (67.29)	611.6 (69.10)
Peak Motor Torque	lbf-in (Nm)	508.4 (57.44)	499.8 (56.47)	523.8 (59.18)	849.6 (95.99)	846.0 (95.59)	855.1 (96.61)	1,191.2 (134.58)	1,223.2 (138.19)
Torque Constant (Kt) (+/- 10% @ 25° C)	lbf-in/A (Nm/A)	8.9 (1.0)	15.4 (1.7)	17.8 (2.0)	8.9 (1.0)	15.4 (1.7)	17.8 (2.0)	15.1 (1.7)	17.8 (2.0)
Continuous Current Rating	A	31.9	18.1	16.4	53.4	30.7	26.8	44.0	38.4
Peak Current Rating	A	63.9	36.2	32.9	106.7	61.3	53.7	88.0	76.8
MOTOR STATOR DATA									
Voltage Constant (Ke) (+/- 10% @ 25° C)	Vrms/Krpm Vpk/Krpm	85.9 121.5	148.9 210.6	171.8 243.0	85.9 121.5	148.9 210.6	171.8 243.0	146.1 206.6	171.8 243.0
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L)(+/- 5% @ 25° C)	Ohms	0.325	1.010	1.224	0.134	0.407	0.530	0.233	0.306
Inductance (L-L)(+/- 15%)	mH	8.3	24.8	29.4	3.9	11.8	15.8	7.5	10.3
Armature Inertia (+/- 5%)	lb-in-sec² (Kg-cm²)	0.05051 (57.071)			0.08599 (97.159)			0.12147 (137.246)	
Brake Inertia	lb-in-sec² (Kg-cm²)	0.02815 (31.8)							
Brake Current @ 24VDC	A	1.45							
Brake Holding Torque	lbf-in (Nm)	708 (80)							
Brake Engage/Disengage Time	ms	53/97							
Mechanical Time Constant (tm)	ms	2.25	2.33	2.12	1.58	1.59	1.56	1.34	1.27
Electrical Time Constant (te)	ms	25.44	24.58	24.03	29.38	29.14	29.76	32.07	33.81
Friction Torque	lbf-in (Nm)	5.07 (0.573)			7.80 (0.881)			11.52 (1.302)	
Bus Voltage	Vrms	230	400	460	230	400	460	400	460
Speed @ Bus Voltage	RPM	2400							
Insulation Class		180 (H)							
Insulation System Volt Rating	Vrms	460							
Thermal Switch, Case Temp	deg C	100							
Environmental Rating		IP65S							

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by .707 and current by 1.414.

All temperature ratings ambient.

Gearmotor not available on 180 frame.

Test data derived using NEMA recommended aluminum heatsink 16" x 16" x 1"

SLM Series Motors/SLG Series Gearmotors

SLG Series Gearmotor General Performance Specifications

Two torque ratings for the SLG Series Gearmotors are given in the table below. The left hand columns give the maximum (peak) allowable output torque for the indicated ratios of each size SLG Series Gearmotor. This is **NOT** the rated output torque of the motor multiplied by the ratio of the reducer.

It is possible to select a configuration of the motor selection and gear ratio such that the rated motor torque,

multiplied by the gear ratio exceeds these ratings. It is the responsibility of the user to ensure that the settings of the system, including the amplifier, do not allow these values to be exceeded.

The right hand columns give the output torque at the indicated speed which will result in 10,000 hour (L10). The setup of the system, including the amplifier, will determine the actual output torque and speed.

Output Torque Ratings–Mechanical

Model	Ratio	Maximum Allowable Output Torque – Set by User	Output Torque @ Speed for 10,000 Hour Life – lbf-in (Nm)		
			1000 RPM	3000 RPM	5000 RPM
SLG060	4:1	603 (68.1)	144 (16.2)	104 (11.7)	88 (9.9)
	5:1	522 (58.9)	170 (19.2)	125 (14.1)	105 (11.9)
	10:1	327 (36.9)	200 (22.6)	140 (15.8)	120 (13.6)
	16:1	603 (68.1)	224 (25.3)	160 (18.1)	136 (15.4)
	20:1	603 (68.1)	240 (27.1)	170 (19.2)	146 (16.5)
	25:1	522 (58.9)	275 (31.1)	200 (22.6)	180 (20.3)
	40:1	603 (68.1)	288 (32.5)	208 (23.5)	180 (20.3)
	50:1	522 (58.9)	340 (38.4)	245 (27.7)	210 (23.7)
	100:1	327 (36.9)	320 (36.1)	280 (31.6)	240 (27.1)
SLG090			1000 RPM	2500 RPM	4000 RPM
	4:1	2078 (234.8)	600 (67.8)	456 (51.5)	396 (44.7)
	5:1	1798 (203.1)	775 (87.6)	590 (66.7)	510 (57.6)
	10:1	1126 (127.2)	890 (100.6)	680 (76.8)	590 (66.7)
	16:1	2078 (234.8)	912 (103.4)	688 (77.7)	592 (66.9)
	20:1	2078 (234.8)	980 (110.7)	740 (83.6)	640 (72.3)
	25:1	1798 (203.1)	1250 (141.2)	950 (107.3)	825 (93.2)
	40:1	2078 (234.8)	1200 (135.6)	920 (103.9)	800 (90.4)
	50:1	1798 (203.1)	1550 (169.4)	1200 (135.6)	1000 (112.9)
	100:1	1126 (127.2)	1100 (124.3)	1100 (124.3)	1100 (124.3)
SLG115			1000 RPM	2000 RPM	3000 RPM
	4:1	4696(530.4)	1392 (157.3)	1132 (127.9)	1000 (112.9)
	5:1	4066 (459.4)	1445 (163.3)	1175 (132.8)	1040 (117.5)
	10:1	2545 (287.5)	1660 (187.6)	1350 (152.6)	1200 (135.6)
	16:1	4696 (530.4)	2112 (238.6)	1714 (193.0)	1518 (171.0)
	20:1	4696 (530.4)	2240 (253.1)	1840 (207.9)	1620 (183.0)
	25:1	4066 (459.4)	2350 (265.5)	1900 (214.7)	1675 (189.2)
	40:1	4696 (530.4)	2800 (316.4)	2240 (253.1)	2000 (225.9)
	50:1	4066 (459.4)	2900 (327.7)	2350 (265.5)	2100 (237.3)
	100:1	2545 (287.5)	2500 (282.5)	2500 (282.5)	2400 (271.2)

SLM Radial Load

RPM	50	100	250	500	1000
SLM060 lbf (N)	250 (1112)	198 (881)	148 (658)	116 (516)	92 (409)
SLM090 lbf (N)	427 (1899)	340 (1512)	250 (1112)	198 (881)	158 (703)
SLM115 lbf (N)	579 (2576)	460 (2046)	339 (1508)	269 (1197)	214 (952)
SLM142 lbf (N)	1367 (6081)	1085 (4826)	800 (3559)	635 (2825)	504 (2242)
SLM180	2237 (9951)	1776 (7900)	1308 (5818)	1038 (4617)	824 (3665)

SLG Radial Load

RPM	50	100	250	500	1000
SLG060 lbf (N)	189 (841)	150 (667)	110 (489)	88 (391)	70 (311)
SLG090 lbf (N)	350 (1557)	278 (1237)	205 (912)	163 (725)	129 (574)
SLG115 lbf (N)	858 (3817)	681 (3029)	502 (2233)	398 (1770)	316 (1406)

Side load ratings shown above are for 10,000 hour bearing life at 25mm from motor face at given rpm.

Motor and Gearmotor Weight

	SLM/G060			SLM/G090			SLM/G115			SLM142	SLM180
	Motor	1 Stage	2 Stage	Motor	1 Stage	2 Stage	Motor	1 Stage	2 Stage	(gear stages not available on SLM142 and SLM180)	
1 Stack lbs (kg)	3.0 (1.4)	7.5 (3.4)	9.3 (2.4)	5.4 (2.4)	12.8 (5.8)	14.8 (6.7)	14.2 (6.4)	28 (12.7)	34 (15.4)	31 (14.0)	60 (27.2)
2 Stack lbs (kg)	4.1 (1.9)	8.6 (3.9)	10.4 (4.7)	7.8 (3.5)	15.2 (6.9)	17.2 (7.8)	22.0 (9.9)	35.8 (16.2)	41.8 (18.9)	39 (17.7)	82 (37.2)
3 Stack lbs (kg)	5.2 (2.4)	9.7 (4.4)	11.5 (5.2)	10.2 (4.6)	17.6 (7.9)	19.6 (8.9)	29.8 (13.5)	43.6 (19.8)	49.6 (22.5)	47 (21.3)	104 (47.2)
Brake		1.8 (0.8)			2.7 (1.2)			4.1 (1.9)		6.0 (2.7)	12 (5.4)

Motor Speed Designators

All Exlar T-LAM motors and actuators carry a standard motor speed designator as defined below. This is representative of the standard base speed of the motor, for the selected bus voltage.

If the model number is created and the location for the motor speed designator is left blank, this is the base speed to which each motor will be manufactured. The model number can also be created including this standard speed designator.

Exlar also provides the flexibility to manufacture all of its "T-LAM" products with special base speeds to match the customer's exact application requirements. This may be a higher than standard speed motor, or lower base speed than standard which will allow the customer to get the required torque at a speed optimized to their application and use the minimum amount of current from their amplifier.

The call-out for a special speed is configured in the model number by using a two digit code from 01-99. These numbers represent the number, in hundreds, of RPM that will be the base speed for the particular motor.

For example, an SLG090-010-KCGS-AB1-138-40 motor that normally has a 4000 rpm standard winding can be changed to a 3300 rpm winding by changing the -40, to a -33. It can be changed to a 5000 rpm winding by changing the -40 to a -50.

Changing this speed designator will change the ratings of the motor, and these must be obtained from your local sales representative. Also, it is not possible to produce every possible speed from -01 to -99 for each motor at each voltage so please contact your local sales representative for confirmation of the speed that is desired for the application.

Designator	Base Speed	Motor Series
-50	5000 rpm	SLM/SLG060
-40	4000 rpm	SLM/SLG090
-30	3000 rpm	SLM/SLG115
-24	2400 rpm	SLM142, SLM180
01-99	Special Speed, consult your local sales representative	

Motor Options

SLM/SLG motor options are described with a 3 digit code. The first digit calls out the stack length, the second the rated bus voltage, and the third the number of poles of the motor. Refer to the mechanical/electrical specifications for motor torque and actuator rated force.

IP Ratings

Please see page 26 for full description of IP Ratings.

8 Pole, Class 180 H

1 Stack		2 Stack		3 Stack	
118	115 Vrms	218	115 Vrms	318	115 Vrms
138	230 Vrms	238	230 Vrms	338	230 Vrms
158	400 Vrms	258	400 Vrms	358	400 Vrms
168	460 Vrms	268	460 Vrms	368	460 Vrms
1A8*	24 VDC	2A8*	24 VDC	3A8*	24 VDC
1B8*	48 VDC	2B8*	48 VDC	3B8*	48 VDC
1C8*	120 VDC	2C8*	120 VDC	3C8*	120 VDC

Refer to specification pages 79-83 for availability of 115V stators by configuration.

* Low voltage stators may be limited to less than catalog rated torque and/or speed. Please contact your local sales representative when ordering this option.

Housing/Special Options

G = Anodized Aluminum

F = Smooth White Epoxy

This option provides for an actuator coated with FDA approved white epoxy.

E = Electroless Nickel Plating

This option provides for a motor with electroless nickel plating.

SS = Stainless Steel Housing

This option provides a motor with all stainless steel construction. Housing dimensions for this option are not equal to the standard housing. Force, torque and current ratings are reduced 25% with this option. Please inquire with your local sales representative for dimensions and ratings.

HC = Type III Hard Coat Anodized, Class I

This option provides an actuator with type III hard coat anodized coating. Class I, no dye.

XH = Special Housing Option

Any housing option that is not designated by the above codes should be listed as XH and described at time of order. All special options must be discussed with your local sales rep.

HW = Manual Drive, Handwheel

This option provides a manual drive handwheel on the side of the motor. The handwheel has an engage/disengage lever that is tied to an interrupt switch. Not available on SLM/G060. Also not available with holding brake unless application details have been discussed with your local sales representative.

RD = Manual Drive, Rear Hex

This option provides a hex shaft at the rear of the motor for manual operation. The hex shaft is directly coupled to the motor and can be turned by hand with a compatible wrench. The hex shaft is enclosed by a sealed cap

during operation. This option is not available w/absolute feedback. If the application requires a brake, discuss manual drive use with your local sales representative.

SD = Manual Drive, Side Hex

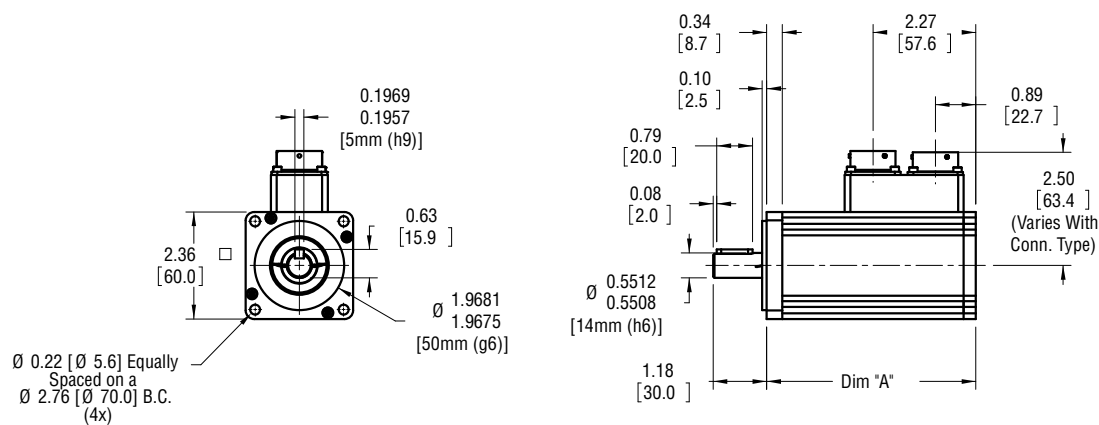
This option provides a hex manual drive on the side of the motor. The hex can be turned by hand with a wrench. Not available on SLM/G060. Also not available with holding brake unless application details have been discussed with your local sales representative.

XL = Non-Standard Lubrication

This option provides for indication in the model number that the customer has specified a lubrication other than the standard provided by Exlar, Mobilith SHC220. Specials include other greases including JAX FG-2 food grade, Mobilgrease 28, or other non-standard grease.

SLM Series Motors/SLG Series Gearmotors

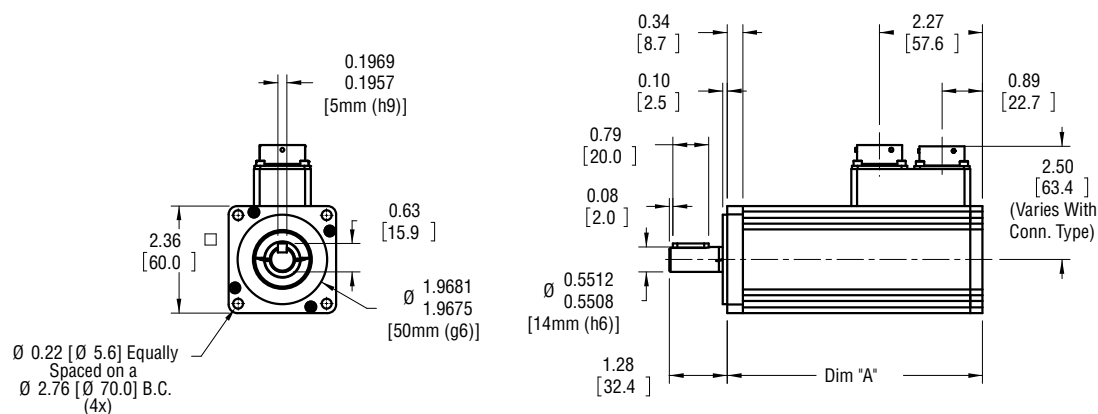
SLM060



DIM	1 Stack Motor in (mm)	2 Stack Motor in (mm)	3 Stack Motor in (mm)
A	4.61 (117.1)	5.86 (149.9)	7.11 (180.6)

Face plate edge is not intended for alignment of shaft (use pilot)

SLM060 With Brake Option

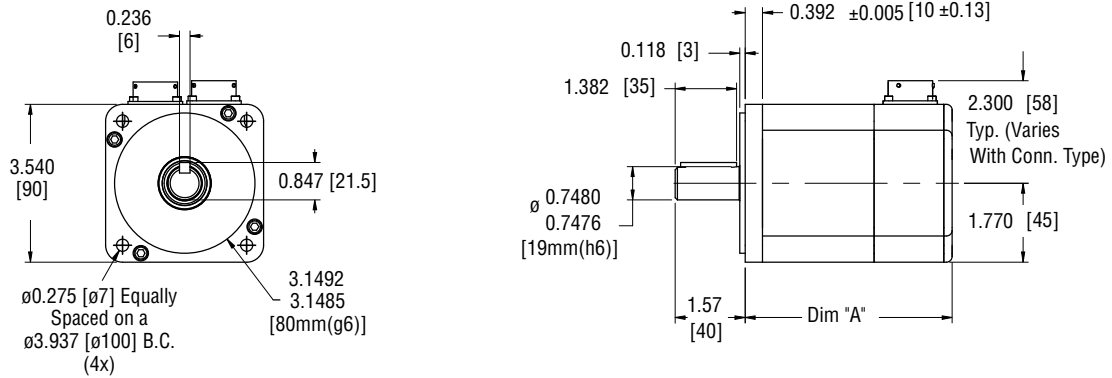


DIM	1 Stack Motor in (mm)	2 Stack Motor in (mm)	3 Stack Motor in (mm)
A	5.63 (143.0)	6.88 (174.7)	8.13 (206.4)

Face plate edge is not intended for alignment of shaft (use pilot)

Drawings subject to change. Consult Exlar for certified drawings.

SLM090

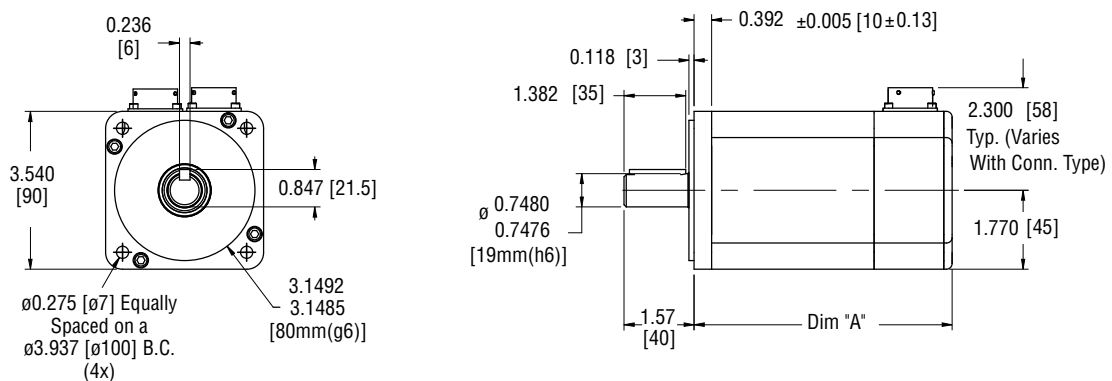


DIM	1 Stack Motor in (mm)	2 Stack Motor in (mm)	3 Stack Motor in (mm)
A	4.650 (118)	5.650 (144)	6.650 (169)

Face plate edge is not intended for alignment of shaft (use pilot)

SLM/SLG
Series

SLM090 With Brake Option

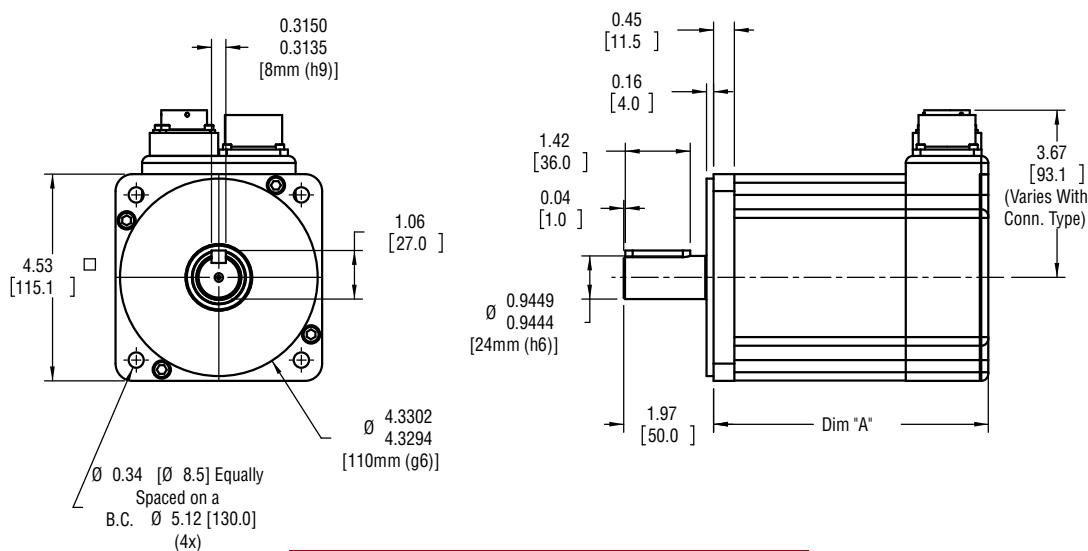


DIM	1 Stack Motor in (mm)	2 Stack Motor in (mm)	3 Stack Motor in (mm)
A	5.960 (151)	6.960 (177)	7.960 (202)

Face plate edge is not intended for alignment of shaft (use pilot)

Drawings subject to change. Consult Exlar for certified drawings.

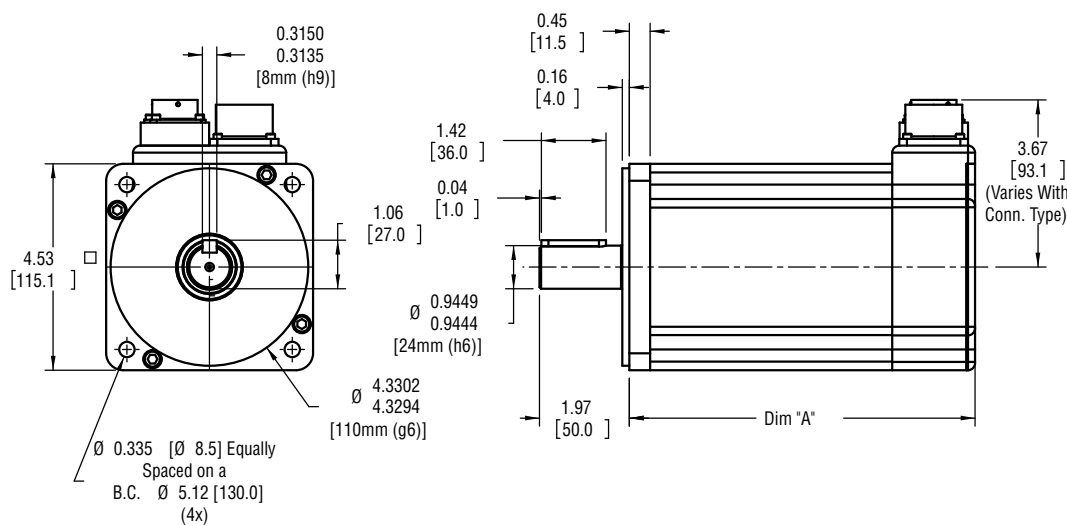
SLM115



DIM	1 Stack—no brake in (mm)	2 Stack—no brake in (mm)	3 Stack—no brake in (mm)
A	6.02 (153.0)	8.02 (203.7)	10.02 (254.5)

Face plate edge is not intended for alignment of shaft (use pilot)

SLM115 With Brake Option

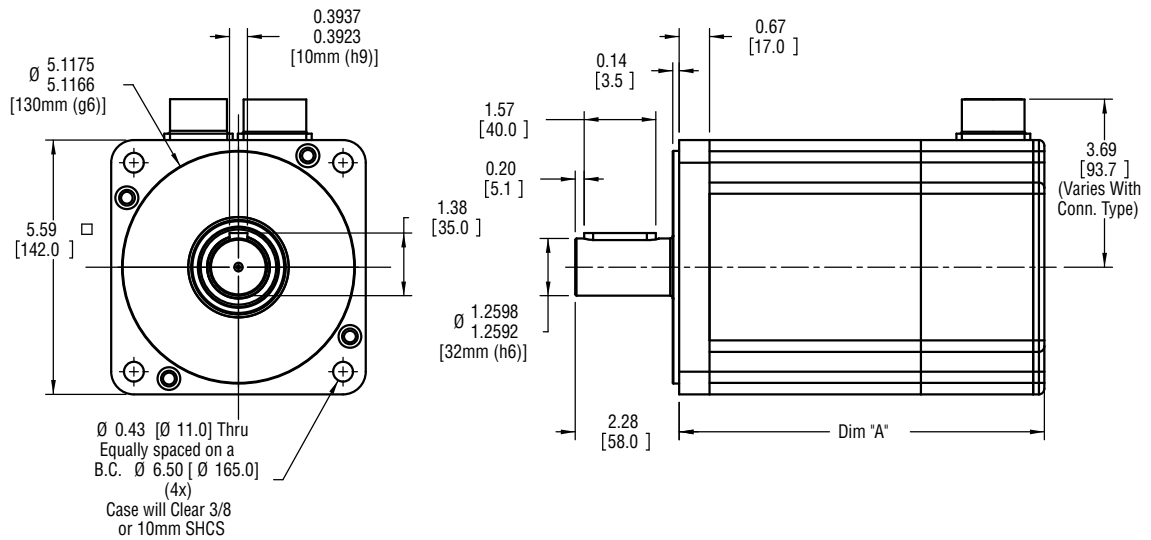


DIM	1 Stack—with brake in (mm)	2 Stack—with brake in (mm)	3 Stack—with brake in (mm)
A	7.75 (196.9)	9.75 (247.7)	11.75 (298.5)

Face plate edge is not intended for alignment of shaft (use pilot)

Drawings subject to change. Consult Exlar for certified drawings.

SLM142

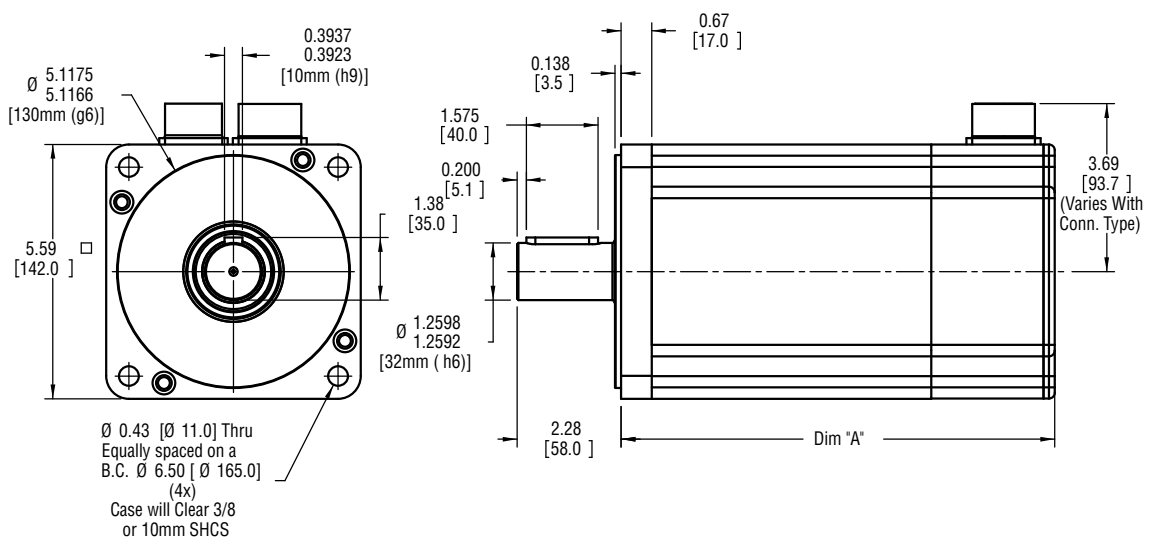


DIM	1 Stack—no brake in (mm)	2 Stack—no brake in (mm)	3 Stack—no brake in (mm)
A	7.87 (199.8)	9.62 (244.2)	11.37 (288.7)

Face plate edge is not intended for alignment of shaft (use pilot)

SLM/SLG
Series

SLM142 With Brake Option

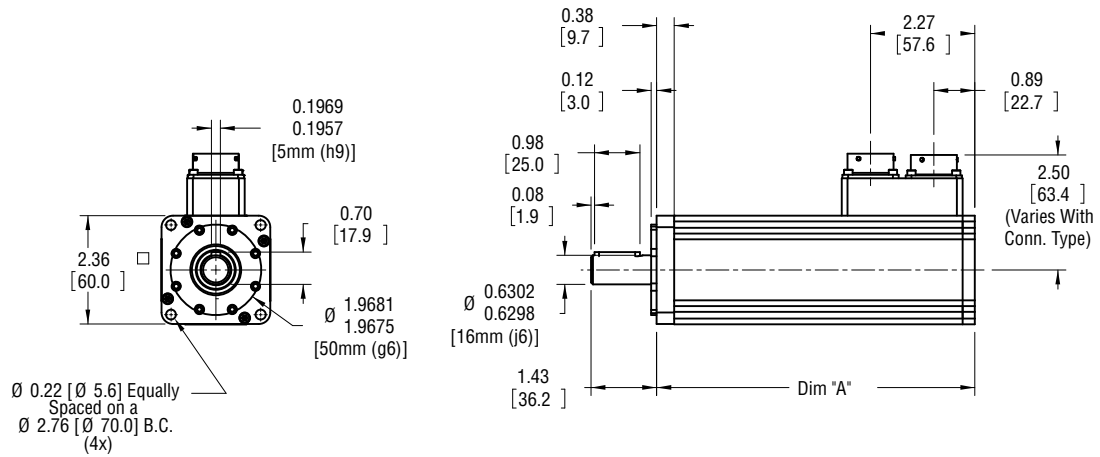


DIM	1 Stack—with brake in (mm)	2 Stack—with brake in (mm)	3 Stack—with brake in (mm)
A	9.53 (241.9)	11.28 (286.4)	13.03 (330.8)

Face plate edge is not intended for alignment of shaft (use pilot)

Drawings subject to change. Consult Exlar for certified drawings.

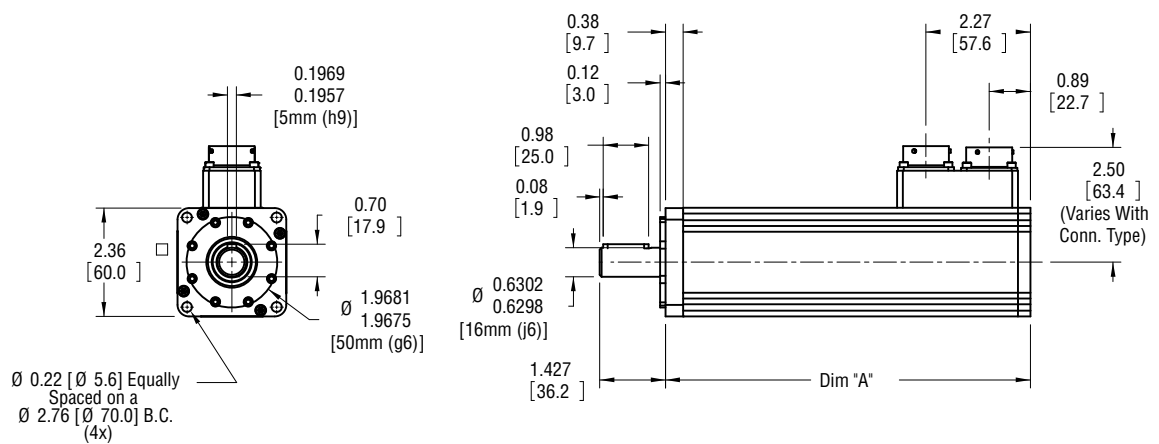
SLG060



DIM	1 Stack Stator in (mm) 1 Stage Gearhead	2 Stack Stator in (mm) 1 Stage Gearhead	3 Stack Stator in (mm) 1 Stage Gearhead
A	6.915 (176)	8.165 (207)	9.415 (239)
	2 Stage Gearhead	2 Stage Gearhead	2 Stage Gearhead
	7.960 (202)	9.210 (234)	10.460 (266)

Face plate edge is not intended for alignment of shaft (use pilot)

SLG060 With Brake Option



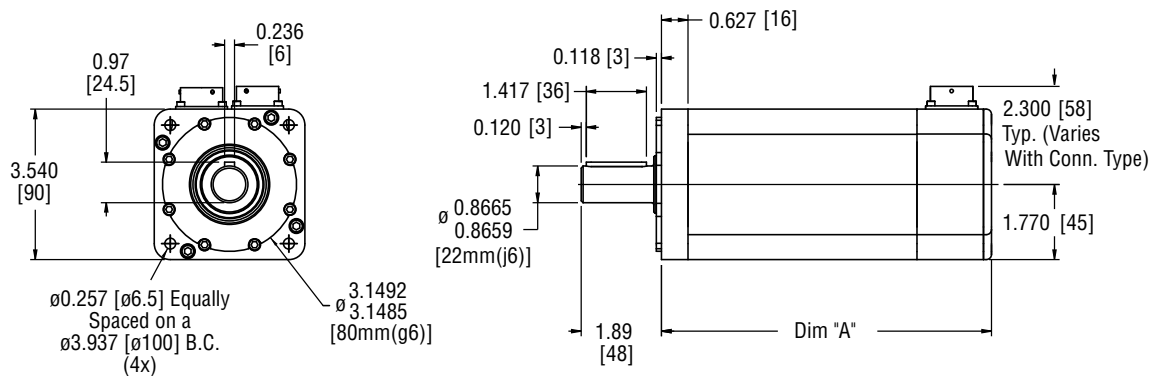
DIM	1 Stack Stator in (mm) 1 Stage Gearhead	2 Stack Stator in (mm) 1 Stage Gearhead	3 Stack Stator in (mm) 1 Stage Gearhead
A	7.930 (201)	9.180 (233)	10.430 (265)
	2 Stage Gearhead	2 Stage Gearhead	2 Stage Gearhead
	8.975 (228)	10.225 (260)	11.475 (291)

Face plate edge is not intended for alignment of shaft (use pilot)

Drawings subject to change. Consult Exlar for certified drawings.

SLM Series Motors/SLG Series Gearmotors

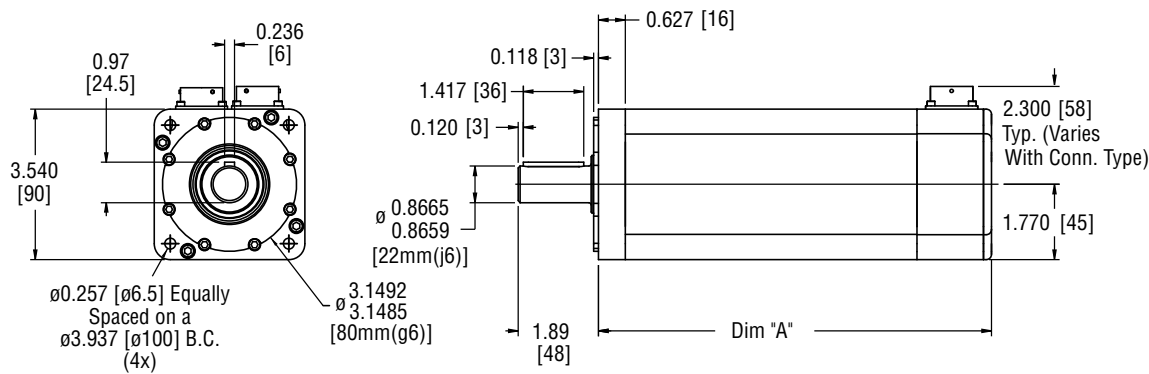
SLG090



DIM	1 Stack Stator in (mm) 1 Stage Gearhead	2 Stack Stator in (mm) 1 Stage Gearhead	3 Stack Stator in (mm) 1 Stage Gearhead
A	7.760 (197)	8.760 (223)	9.760 (248)
	2 Stage Gearhead	2 Stage Gearhead	2 Stage Gearhead
	9.025 (229)	10.025 (255)	11.025 (280)

Face plate edge is not intended for alignment of shaft (use pilot)

SLG090 With Brake Option

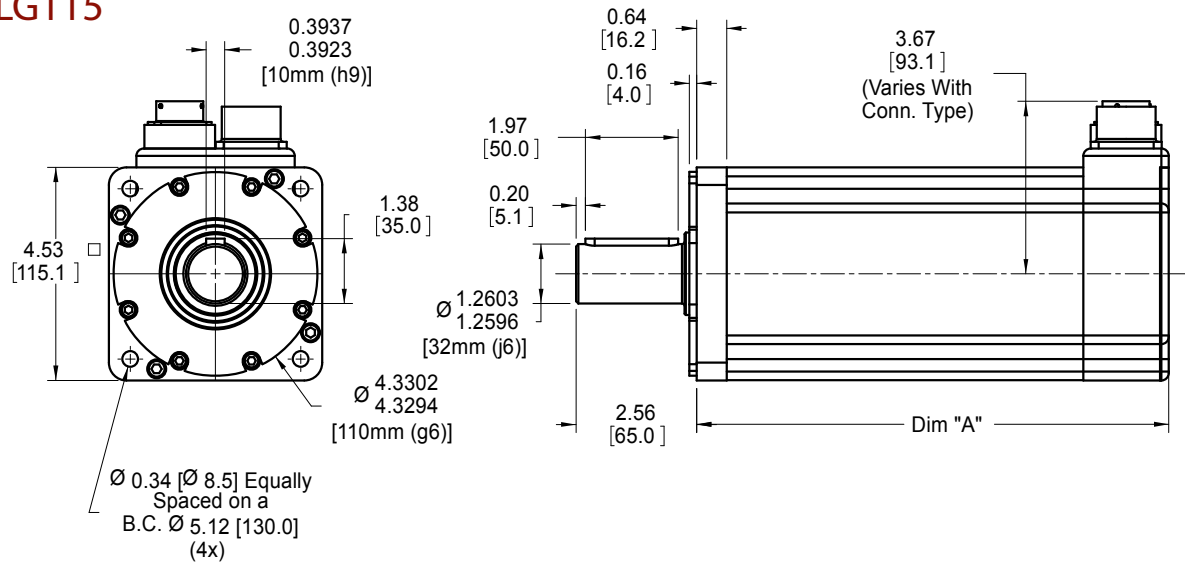


DIM	1 Stack Stator in (mm) 1 Stage Gearhead	2 Stack Stator in (mm) 1 Stage Gearhead	3 Stack Stator in (mm) 1 Stage Gearhead
A	9.070 (230)	10.070 (256)	11.070 (281)
	2 Stage Gearhead	2 Stage Gearhead	2 Stage Gearhead
	10.335 (263)	11.335 (288)	12.335 (313)

Face plate edge is not intended for alignment of shaft (use pilot)

Drawings subject to change. Consult Exlar for certified drawings.

SLG115

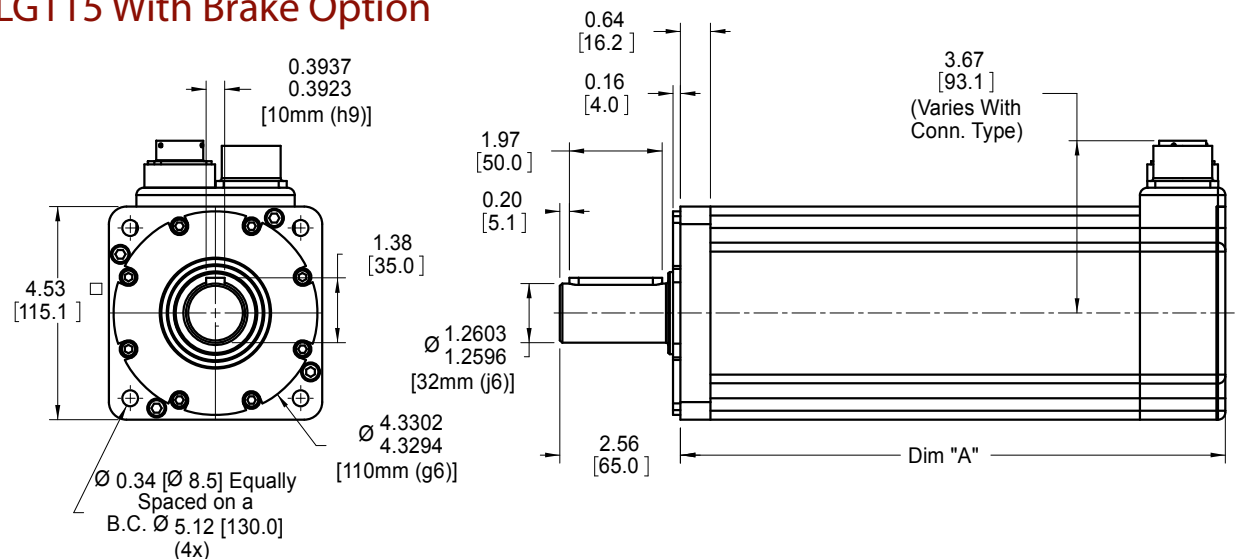


DIM	1 Stack Stator in (mm) 1 Stage Gearhead	2 Stack Stator in (mm) 1 Stage Gearhead	3 Stack Stator in (mm) 1 Stage Gearhead
A	10.03 (254.8)	12.03 (305.6)	14.03 (356.4)
	2 Stage Gearhead	2 Stage Gearhead	2 Stage Gearhead
	11.64 (295.7)	13.64 (346.5)	15.64 (397.3)

NOTE: Dimension format = in. (mm)
Face plate edge is not intended for alignment of shaft (use pilot)

SLM/SLG
Series

SLG115 With Brake Option



DIM	1 Stack Stator in (mm) 1 Stage Gearhead	2 Stack Stator in (mm) 1 Stage Gearhead	3 Stack Stator in (mm) 1 Stage Gearhead
A	11.58 (294.2)	13.58 (345.0)	15.58 (395.8)
	2 Stage Gearhead	2 Stage Gearhead	2 Stage Gearhead
	13.19 (335.1)	15.19 (385.9)	17.19 (436.7)

NOTE: Dimension format = in. (mm)
Face plate edge is not intended for alignment of shaft (use pilot)

Drawings subject to change. Consult Exlar for certified drawings.

SLM/SLG Motor Ordering Info.

SLM/GAAA - BBB - CDEF - GGG - HHH - II - XX - #####

SLM/G = Model Series

SLG = SLG Series Servo Gear Motor
SLM = SLM Series Servo Motor
(No Gear Reduction)

AAA = Frame Size

060 = 60 mm
090 = 90 mm
115 = 115 mm
142 = 142 mm
180 = 180 mm

BBB = Gear Reduction Ratio

Blank = SLM

Single reduction ratios

004 = 4:1
005 = 5:1
010 = 10:1

Double reduction ratios

016 = 16:1
020 = 20:1
025 = 25:1
040 = 40:1
050 = 50:1
100 = 100:1

CC = Shaft Type

K = Keyed
R = Smooth/round
X = Special shaft

D = Connections

I = Exlar standard M23 style
M = Manufacturer's connector²
A = MS style (anodized)
D = MS style (electroless nickel)
B = Embedded leads 3 ft. std.
P = Embedded leads w/plug
3 ft. std.w/ "A" plug
J = Embedded leads w/ "I" plug
3 ft. standard
X = Special (please specify)

E = Coating Options¹

G = Anodized Aluminum
E = Electroless nickel plated
F = Smooth white epoxy
X = Special coating

F = Brake Options

B = Brake
S = Standard no brake

GGG = Feedback Type (Also specify the Amplifier/Drive Model being used when ordering)

- Standard Incremental Encoder – 2048 line
(8192 cts) per rev. index pulse, Hall
commutation, 5vdc
- Standard Resolver – Size 15, 1024 line
(2048 cts) per rev. two pole resolver
- Motor files for use with select Emerson/CT,
Rockwell /AB and Danaher/Kollmorgen
Drives are available at www.exlar.com

Custom Feedback - contact your local sales representative:

XX1 = Wiring and feedback device information
must be provided and new feedback
callout will be created

Allen-Bradley/Rockwell: (Actuators used with
Kinetix and/or Sercos based control systems
require a .cmf file from from AB/Rockwell.

Please contact your AB/Rockwell
representative for support.)

AB8 = Standard Incremental Encoder – MPL
Circular (Speedtec) DIN connectors for
'M' option

AB9 = Hiperface Stegmann SRM050 absolute
encoder – 115, 142, 180 Frame Size – MPL
Circular (Speedtec) DIN connectors for 'M'
option – Plug & Play feedback option⁷

ABB = Hiperface Stegmann SKM036 multi-turn
absolute encoder. 60-90 Frame Size. MPL
Circular (Speedtec) DIN connectors for
'M' option – Plug & Play feedback option⁷

AMKASYN:

AK1 = EnDat Heidenhain EQN1325 multi-turn
absolute encoder – 115, 142, 180 Frame
Size. DS motor wiring w/M23 euro
connectors for 'M' option

AK2 = EnDat Heidenhain EQN1125 multi-turn
absolute encoder – 60-90 Frame Size.
DS motor wiring w/M23 euro connectors
for 'M' option

Advanced Motion Control:

AM1 = Standard Incremental Encoder
AM2 = Encoder 1000 line, w/commutation,
5 VDC
AM3 = Standard Resolver
AM5 = Encoder 5000 line, w/commutation,
5 VDC

API Controls:

AP1 = Standard Resolver
AP2 = Standard Incremental Encoder

Aerotech:

AR1 = Encoder 5000 line, w/commutation, 5 VDC
AR2 = Standard Incremental Encoder

ABB Robot:

BB1 = LTN Resolver

Baldor:

BD2 = Std Resolver – BSM motor wiring
w/M23 connectors for 'M' option
BD3 = Std Incremental Encoder – BSM motor
wiring w/M23 connectors for 'M' option

Beckhoff:

BE2 = EnDat Heidenhain EQN1125 multi-turn
absolute encoder – AM5XX motor
wiring w/M23 euro connectors for 'M'
option

Baumuller:

BM2 = Standard Resolver

B&R Automation:

BR1 = Standard Resolver
BR2 = EnDat Heidenhain EQN1325 multi-turn
absolute encoder – 8LS/8LM motor wiring
w/M23 euro connectors for 'M' option

Comau Robot:

CM1 = Standard Resolver

Copley Controls:

CO1 = Standard Incremental Encoder
CO2 = Standard Resolver

Control Techniques/Emerson:

CT1 = Hiperface Stegmann SRM050 multi-turn
absolute encoder – 115, 142, 180 Frame
Size. FM/UM/EZ motor wiring w/M23
euro connectors for 'M' option

CT3 = Hiperface Stegmann SKM036 multi-turn
absolute encoder – 60-90 Frame Size.
FM/UM/EZ motor wiring w/M23 euro
connectors for 'M' option

CT4 = Standard Incremental Encoder –
FM/UM/EZ motor wiring w/M23 euro
connectors for 'M' option

CT5 = Std Resolver – FM/UM/EZ motor wiring
w/M23 euro connectors for 'M' option

CT7 = Encoder 5000 line, with commutation,
5 VDC – FM/UM/EZ motor wiring w/M23
euro connectors for 'M' option

Delta Tau Data Systems:

DT1 = Encoder 1000 line, w/commutation, 5 VDC
DT2 = Standard Resolver

Elmo Motion Control:

EL1 = Standard Resolver
EL2 = Standard Incremental Encoder
EL3 = EnDat Heidenhain EQN1125 multi-turn
absolute encoder

Emerson/Control Techniques:

EM2 = Std Incremental Encoder – NT motor
wiring w/MS connectors for 'M' option
EM5 = Encoder 5000 line, with commutation,
5 VDC – NT motor wiring w/MS
connectors for 'M' option

Elau:

EU1 = Hiperface Stegmann SRM050 multi-turn
absolute encoder – 115, 142, 180 Frame
Size. SH motor wiring w/MS connectors
for 'M' option

EU4 = Hiperface Stegmann SKM036 multi-turn
absolute encoder – 60-90 Frame Size.
SH motor wiring w/MS connectors for
'M' option

Exlar:

EX4 = Standard Resolver

Fanuc Pulsecode: Consult Exlar⁹

G&L Motion Control/Danaher Motion:

GL1 = Std Incremental Encoder – HSM motor
wiring w/ MS connectors for 'M' option

GL2 = Std Incremental Encoder – LSM-MSM
motor wiring w/M23 euro connectors
for 'M' option

GL3 = Std Incremental Encoder – NSM motor
wiring w/MS connectors for 'M' option

GL4 = EnDat Heidenhain EQN1125 multi-turn
absolute encoder – AKM motor wiring
w/M23 euro connectors for 'M' option

SLM/SLG Motor Ordering Information

Infranor:

IF1 = Standard Resolver

Indramat/Bosch-Rexroth:

IN6 = Std Resolver – MKD/MHD motor wiring w/M23 euro connectors for 'M' option

IN7 = Hiperface Stegmann SKM036 multi-turn absolute encoder – MSK motor wiring w/M23 euro connectors for 'M' option – plug & play option

Jetter Technologies:

JT1 = Standard Resolver – JH/JL motor wiring w/M23 euro connectors for 'M' option

Kollmorgen/Danaher:

KM4 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – AKM motor wiring w/M23 euro connectors for 'M' option

KM5 = Standard Resolver – AKM motor wiring w/M23 euro connectors for 'M' option

KM6 = Standard Incremental Encoder – AKM motor wiring w/ M23 euro connectors for 'M' option

Kuka Robot:

KU1 = Tyco Size 21 Resolver⁹

Kawasaki Robot:

KW1 = Kawasaki Special Encoder⁹

Lenze/AC Tech:

LZ1 = Hiperface Stegmann SRM050 multi-turn absolute encoder – MCS motor wiring w/M23 euro connectors for 'M' option

LZ5 = Standard Resolver – MCS motor wiring w/ M23 euro connectors for 'M' option

LZ6 = Standard Incremental Encoder – MCS motor wiring w/ M23 euro connectors for 'M' option

Matuschek:

MC1 = LTN Resolver

Metronix:

MX1 = Standard Resolver

MX2 = Hiperface Stegmann SKM036 multi-turn absolute encoder

MX3 = EnDat Heidenhain EQN1125 multi-turn absolute encoder

Mitsubishi:

MT1 = Mitsubishi Absolute Encoder – HF-SP motor wiring with 'M' option

Modicon:

MD1 = Standard Resolver

Momentum:

MN1 = Hiperface Stegmann SRM050 multi-turn absolute encoder – MN motor wiring w/M23 connectors for 'M' option

MN2 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – MN motor wiring connectors for 'M' option

MN3 = Std incremental encoder – MN motor wiring w/M23 connectors for 'M' option

MN4 = Std resolver – MN motor wiring w/M23 connectors for 'M' option

Moog:

MG1 = Standard Resolver

Motoman Robot:

MM1 = Yaskawa Serial Encoder⁹

Nachi Robot:

NC1 = Tamagawa Serial Encoder⁹

Ormec:

OR1 = Standard Resolver

OR2 = Std Incremental Encoder – G series motor wiring w/MS connectors for 'M' option

Parker Compumotor:

PC6 = Std Incremental Encoder – SMH motor wiring w/M23 connectors for 'M' option – European only

PC7 = Std Resolver – SMH motor wiring w/M23 connectors for 'M' option – European only

PC8 = Std Incremental Encoder – MPP series motor wiring w/PS connectors for 'M' option – US Only

PC9 = Hiperface Stegmann SRM050 multi-turn absolute encoder – MPP motor wiring w/PS connectors for 'M' option – US Only

PC0 = Std Resolver – MPP motor wiring w/PS connectors for 'M' option – US Only

Pacific Scientific:

PS2 = Standard Incremental Encoder

PS3 = Standard Resolver – PMA motor wiring w/M23 connectors for 'M' option

Stober Drives:

SB3 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – ED/EK motor wiring w/M23 euro connectors for 'M' option

SB4 = Standard Resolver ED/EK motor wiring w/M23 connector for 'M' option

Siemens:

SM2 = Standard Resolver – 1FK7 motor wiring w/M23 connectors for 'M' option

SM3 = EnDat Heidenhain EQN1325 multi-turn absolute encoder – 115, 142, 180 Frame Size. 1FK7 motor wiring w/M23 euro connectors for 'M' option

SM4 = EnDat Heidenhain EQN1125 multi-turn absolute encoder – 60-90 Frame Size. 1FK7 motor wiring w/M23 euro connectors for 'M' option

SEW/Eurodrive:

SW1 = Standard Resolver – CM motor wiring w/ M23 euro connectors for 'M' option

SW2 = Standard Incremental Encoder

SW3 = Hiperface Stegmann SRM050 multi-turn absolute encoder – CM motor wiring w/ M23 euro connectors for 'M' option

Whedco:

WD1 = Standard Resolver

HHH = Motor Stator – All 8 Pole³

118 = 1 stack	115 Vrms	158 = 1 stack	400 Vrms
218 = 2 stack		258 = 2 stack	
318 = 3 stack		358 = 3 stack	
138 = 1 stack	230 Vrms	168 = 1 stack	460 Vrms
238 = 2 stack		268 = 2 stack	
338 = 3 stack		368 = 3 stack	

II = Optional Speed and Mechanical Designations

24 = 2400 rpm, SLM142 & 180

30 = 3000 rpm, SLM/G115

40 = 4000 rpm, SLM/G090

50 = 5000 rpm, SLM/G060

01-99 = Special speed, consult your local sales representative

XX = Part Number Designator for specials

HC = Type III hard coat anodized, class I¹

HW = Manual drive, handwheel with Interlock switch⁵

RD = Manual drive, Simple Rear⁵

SD = Manual drive, Side Hex

SS = Stainless steel housing^{1,8}

XH = Special housing or mounting option^{1,4}

XM = Special motor options

XF = Special feedback option

XL = Special lubrication, food grade or Mobilgrease 28, specify

XT = Special option

= Part No. Designator for Specials

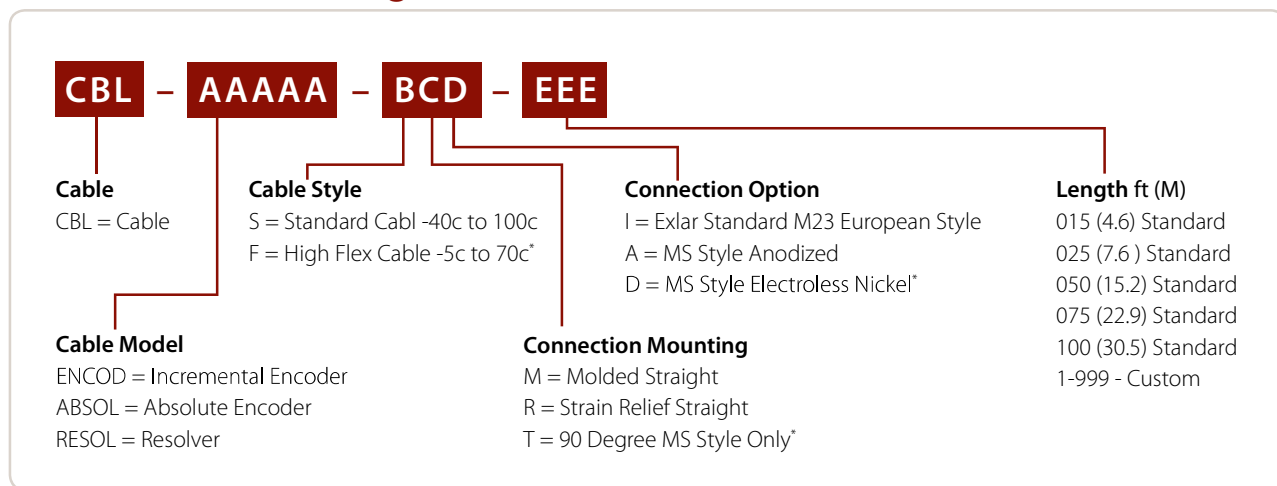
Optional 5 digit assigned part number to designate unique model numbers for specials.

Note:

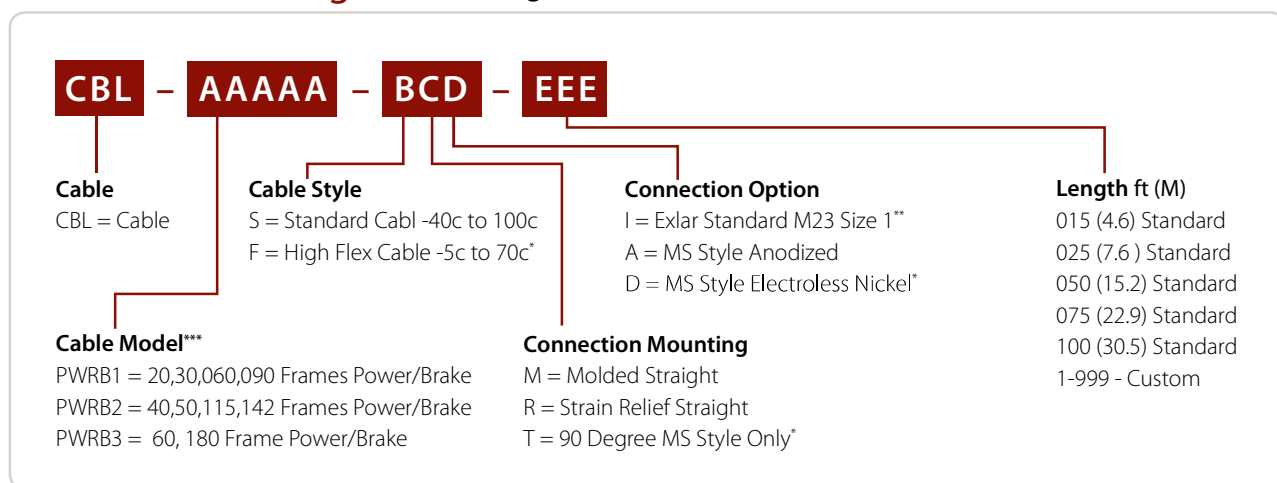
Any specials denoted by an X in the part number require definition and quotation from the factory.

- These housing options would typically be accompanied by the choice of the electroless nickel connectors if a connectorized unit were selected. Please inquire with your local sales representative.
- Available as described in Feedback Types.
- See page 85 for explanation of voltage, speed, stack and optimized stator options.
- When selecting special housing options, use "G" in this model mask location.
- Not available with absolute feedback.
- Not available on SLM/G060
- Not compatible with Kinetix 300 drives.
- Force, torque and current ratings are reduced 25% with this option.
- Requires Robot Vendor Approval and Support.

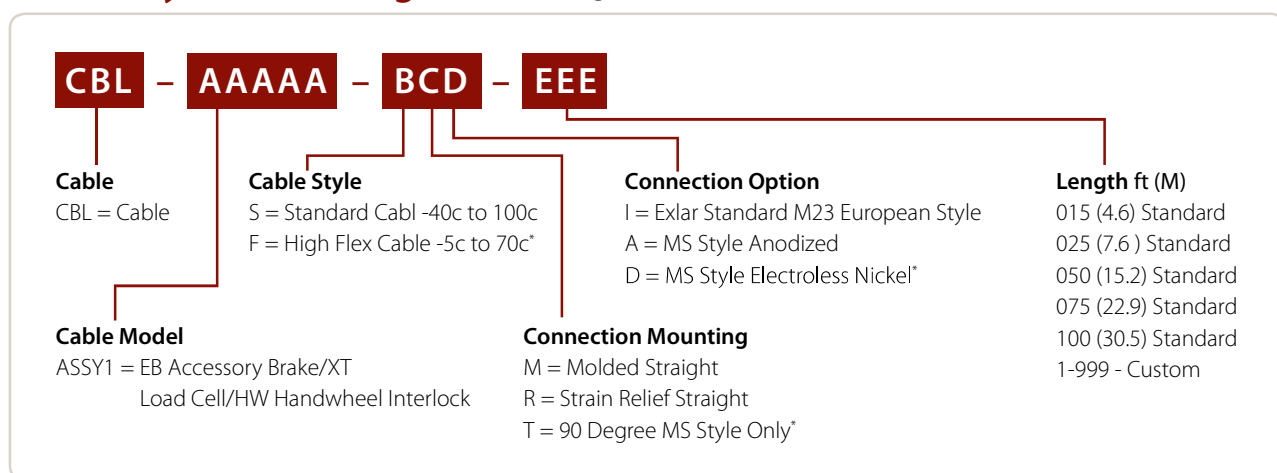
Feedback Cable Configuration - e.g. CBL-ENCOD-SMI-015



Power Cable Configuration - e.g. CBL-PWRB1-SMI-015



Accessory Cable Configuration - e.g. CBL-ASSY1-SMI-015



All Exlar cables rated IP65 when mated to actuator.

* Non-standard options – require longer lead times.

** PWRB3 uses M40 size 1.5.

*** Special stator winding may require a special power cable

Manufacturers Feedback Cable Selection Guide

Amplifier/Drive Selected	Feedback Selected	Manufacturers Part Number
Allen-Bradley/Rockwell: Ultra 3000/5000/Kinetix 6000	AB8/AB9/ABB	2090-CFBM7DF-CDAXyy
AMKASYN: All Drives	AK1/AK2	DS Series Absolute Encoder Cable
Beckhoff: All Drives	BE1	ZK4000-26yy-2zzz
B&R Automation: All Drives	BR1 BR2	8CRxxx.12-1 8CExxx.12-1
Emerson/Control Techniques: Unidrive SP/Epsilon EP	CT1/CT3 CT2/EM2/EM5 CT4/CT7 CT5	SSBAP/SSBAHC UFCS SIBAA/SIBAAA SRBAC/SRBABB
En/Epsilon/MDS	CT4/CT7 EM2/EM5	SIBAH/SIBAFA CFCS
Elau: All Drives	EU1/EU4	SH Series Absolute Encoder Cable
G&L Motion Control/Danaher Motion: MMC Smart Drive/ Digital MMC Control	GL1 GL2 GL3 GL4	ENC-H&F ENC-L&M ENC-NSM ENDAT-AKM
Indramat/Bosch-Rexroth: DKC Series/DIAX	IN1 IN5 IN6 IN7	IKS4001 IKS4001 IKS4374 RKG4200
Jetter Technologies: JetMove 2xx JetMove 6xx	JT1 JT1	JH/JL Series Resolver Cable Nr. 23 JH/JL Series Resolver Cable Nr. 423
Kollmorgen/Danaher: All Drives	KM4 KM5 KM6	AKM Series Absolute Encoder Cable AKM Series Resolver Cable AKM Series Incremental Encoder Cable
Lenze/AC Tech: All Drives	LZ1 LZ5 LZ6	MCS Series Absolute Encoder Cable MCS Series Resolver Cable MCS Series Incremental Encoder Cable
Mitsubishi: MR-J3	MT1	MR-J3ENSCBLxxM-H
Momentum: All Drives	MN1 MN2 MN3 MN4	SC-AE1-xxx SC-AE2-xxx SC-IE1-xxx SC-RS1-xxx
Ormec: All Drives	OR2	Consult Exlar
Parker Compumotor: All Drives	PC6 PC7 PC8 PC9/ PCØ	SMH Series Incremental Encoder Cable SMH Series Resolver Cable COMPAX3 F-2C1-xx or Aries F-1A1-xx F-2B1-xx
Pacific Scientific: All Drives	PS3	CEF-RO-XXX-900X
Stober Drives: FDS/MDS 5000	SB3	Stober Absolute Encoder Cable
Siemens: 611U/Masterdrives/SMC20	SM2 SM3/SM4 SM5	6FX5002-2CF02-.... 6FX5002-2EQ10-.... 6FX5002-2CA31-....
SEW/Eurodrive: All Drives	SW1 SW3	CMP Series Resolver Cable CMP Series Absolute Encoder Cable
Yaskawa: Sigma II Series	YS2/YS3	JZSP-CMP02-XX(B)

Motor Torque

Motor Torque Calculations

When selecting an actuator system it is necessary to determine the required motor torque to perform the given application. These calculations can then be compared to the torque ratings of the given amplifier and motor combination that will be used to control the actuator's velocity and position.

When the system uses a separate motor and screw, like the FT actuator, the ratings for that motor and amplifier are consulted. In the case of the GSX Series actuators with their integral brushless motors, the required torque divided by the torque constant of the motor (K_t) must be less than the current rating of the GSX or SLM motor.

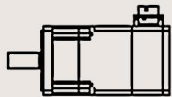
Inertia values and torque ratings can be found in the GSX, FT, I and SLM/SLG Series product specifications.

For the GSX Series the screw and motor inertia are combined.

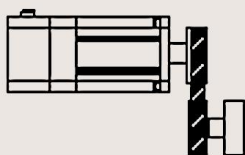
Motor with screw (GSX, GSM, FT, I & EL)



Motor & motor with reducer (SLM/SLG & ER)



Motor with belt and pulley



Terms and (units)

λ	= Required motor torque, lbf-in (N-m)
λ_a	= Required motor acceleration torque, lbf-in (N-m)
F	= Applied force load, non inertial, lbf (N)
S	= Screw lead, in (mm)
R	= Belt or reducer ratio
T_L	= Torque at driven load lbf-in (N-m)
v_L	= Linear velocity of load in/sec (m/sec)
ω_L	= Angular velocity of load rad/sec
ω_m	= Angular velocity of motor rad/sec
η	= Screw or ratio efficiency
g	= Gravitational constant, 386.4 in/s ² (9.75 m/s ²)
α	= Angular acceleration of motor, rad/s ²
m	= Mass of the applied load, lb (N)
J_L	= Reflected Inertia due to load, lbf-in-s ² (N-m-s ²)
J_r	= Reflected Inertia due to ratio, lbf-in-s ² (N-m-s ²)
J_s	= Reflected Inertia due to external screw, lbf-in-s ² (N-m-s ²)
J_m	= Motor armature inertia, lbf-in-s ² (N-m-s ²)
L	= Length of screw, in (m)
ρ	= Density of screw material, lb/in ³ (kg/m ³)
r	= Radius of screw, in (m)
π	= pi (3.14159)
C	= Dynamic load rating, lbf (N)

Velocity Equations

Screw drive: $V_L = \omega_m \cdot S / 2\pi$ in/sec (m/sec)

Belt or gear drive: $\omega_m = \omega_L \cdot R$ rad/sec

Torque Equations

Torque Under Load

Screw drive (GS, FT or separate screw): $\lambda = \frac{S \cdot F}{2 \cdot \pi \cdot \eta}$ lbf-in (N-m)

Belt and Pulley drive: $\lambda = T_L / R \eta$ lbf-in (N-m)

Gear or gear reducer drive: $\lambda = T_L / R \eta$ lbf-in (N-m)

Torque Under Acceleration

$\lambda_a = (J_m + J_R + (J_s + J_L)/R^2) \alpha$ lbf-in

α = angular acceleration = ((RPM / 60) x 2 π) / t_{acc} , rad/sec².

$J_s = \frac{\pi \cdot L \cdot \rho \cdot r^4}{2 \cdot g}$ lb-in-s² (N-m-s²)

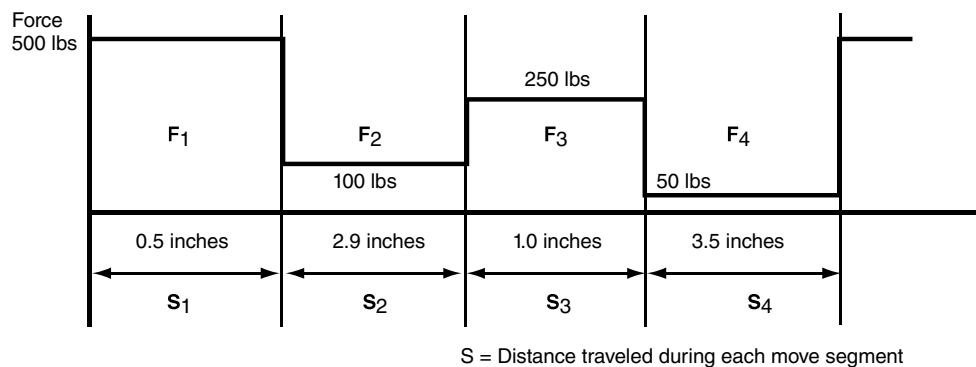
Total Torque per move segment

$\lambda_T = \lambda_a + \lambda$ lbf-in (N-m)

Calculating Estimated Travel Life of Exlar Linear Actuators

Mean Load Calculations

For accurate lifetime calculations of a roller screw in a linear application, the cubic mean load should be used. Following is a graph showing the values for force and distance as well as the calculation for cubic mean load. Forces are shown for example purposes. Negative forces are shown as positive for calculation.



Cubic Mean Load Equation

$$\sqrt[3]{\frac{F_1^3 S_1 + F_2^3 S_2 + F_3^3 S_3 + F_4^3 S_4}{S_1 + S_2 + S_3 + S_4}}$$

Value from example numbers is 217 lbs.

Lifetime Calculations

The expected L_{10} life of a roller screw is expressed as the linear travel distance that 90% of the screws are expected to meet or exceed before experiencing metal fatigue. The mathematical formula that defines this value is below. *The life is in millions of inches (mm).* This standard L_{10} life calculation is what is expected of 90% of roller screws manufactured and is not a guarantee. Travel life estimate is based on a properly maintained screw that is free of contaminants and properly lubricated. Higher than 90% requires de-rating according to the following factors:

95% x 0.62	96% x 0.53
97% x 0.44	98% x 0.33
99% x 0.21	

Single (non-preloaded) nut:

$$L_{10} = \left(\frac{C}{F} \right)^3 \times S$$

Note: The dynamic load rating of zero backlash, preloaded screws is 63% of the dynamic load rating of the standard non-preloaded screws. The calculated travel life of a preloaded screw will be 25% of the calculated travel life of the same size and lead of a non-preloaded screw for the same application.

Thrust Calculations

Total Thrust Calculations

Terms and (units)

THRUST = Total linear force-lbf (N)

F_{friction} = Force from friction-lbf (N)

F_{acc} = Acceleration force-lbf (N)

F_{gravity} = Force due to gravity-lbf (N)

F_{applied} = Applied forces-lbf (N)

386.4 = Acceleration of gravity - in/sec² (9.8 m/sec²)

Variables

Ø = Angle of inclination - deg = _____

t_{acc} = Acceleration time - sec = _____

v = Change in velocity - in/sec (m/s) = _____

μ = Coefficient of sliding friction = _____

W_L = Weight of Load-lbm (kg) = _____

F_{applied} = Applied forces-lbf (N) = _____

Thrust Calculation Equations

THRUST = [**F_{friction}**] + [**F_{acceleration}**] + **F_{gravity}** + **F_{applied}**

THRUST = [**W_L × μ × cos Ø**] + [(**W_L / 386.4**) × (**v / t_{acc}**)] + **W_L sin Ø** + **F_{applied}**

THRUST = [() × () × ()] + [(/ 386.4) × (/)] + [() ()] + ()

THRUST = [()] + [() × ()] + [()] + ()

= _____ lbf.

Calculate the thrust for each segment of the move profile. Use those values in calculations below.
Use the units from the above definitions.

Cubic Mean Load Calculations

$$\sqrt[3]{\frac{F_1^3 S_1 + F_2^3 S_2 + F_3^3 S_3 + F_4^3 S_4}{S_1 + S_2 + S_3 + S_4}}$$

F₁= _____

S₁= _____

F₁³ S₁ = _____

F₂= _____

S₂= _____

F₂³ S₂ = _____

F₃= _____

S₃= _____

F₃³ S₃ = _____

F₄= _____

S₄= _____

F₄³ S₄ = _____

Move Profiles may have more or less than four components. Adjust your calculations accordingly.

Torque Calculations

Terms and (units)

λ	= Torque, lb-in (N-m).....	= -----
F	= Applied Load, non inertial, lbf (N).....	= -----
S	= Screw lead, in (m).....	= -----
η	= Screw or ratio efficiency (~85% for roller screws)	= -----
g	= Gravitational constant, 386 in/s ² (9.8 m/s ²).....	= -----
α	= Acceleration of motor, rad/s ²	= -----
R	= Belt or reducer ratio	= -----
T_L	= Torque at driven load, lbf-in (N-m).....	= -----
V_L	= Linear velocity of load, in/sec (m/sec).....	= -----
ω_L	= Angular velocity of load, rad/sec	= -----
ω_m	= Angular velocity of motor, rad/sec	= -----
m	= Mass of the applied load, lbm (kg)	= -----
J_R	= Reflected Inertia due to ratio, lb-in-s ² (N-m-s ²).....	= -----
J_S	= Reflected Inertia due to screw, lb-in-s ² (N-m-s ²).....	= -----
J_L	= Reflected Inertia due to load, lb-in-s ² (N-m-s ²)	= -----
J_M	= Motor armature inertia, lb-in-s ² (N-m-s ²).....	= -----
π	= pi	= 3.14159
K_t	= Motor Torque constant, lb-in/amp (N-m/amp)	= -----

* For the GS Series **J_S** and **J_M** are one value from the GS Specifications.

Torque Equations

Torque From Calculated Thrust.

$$\lambda = \frac{SF}{2 \cdot \pi \cdot \eta} \text{ lb-in (N-m)} = (\quad) \times (\quad) / 2\pi (0.85) = (\quad) \times (\quad) / 5.34 = \text{-----}$$

Torque Due To Load, Rotary.

Belt and pulley drive: $\lambda = T_L / R \eta$ lbf-in (N-m)

Gear or gear reducer drive: $\lambda = T_L / R\eta$ lbf-in (N-m)

Torque During Acceleration due to screw, motor, load and reduction, linear or rotary.

$$I = (J_m + (J_s + J_L) / R^2) \alpha \text{ lb-in (N-m)} = [(\quad) + (\quad + \quad) / (\quad)] (\quad) = \text{-----}$$

Total Torque = Torque from calculated Thrust + Torque due to motor, screw and load

$$(\quad) + (\quad) + (\quad) = \text{-----}$$

$$\text{Motor Current} = \lambda / K_t = (\quad) / (\quad) = \text{-----}$$

Exlar Application Worksheet

Exlar Application Worksheet

FAX to:
Exlar Corporation
(952) 368-4877
Attn: Applications Engineering

Date: _____ Company Name: _____

Address: _____

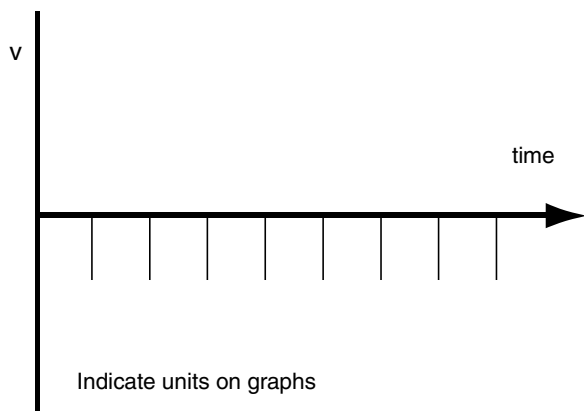
City: _____ State: _____ Zip Code: _____

Phone: _____ Fax: _____

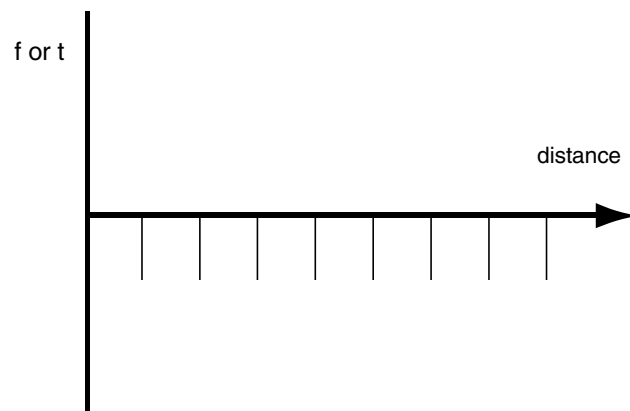
Contact: _____ Title: _____

Sketch/Describe Application

Velocity vs. Time



Force or Torque vs. Distance



Exlar Application Worksheet

Date: _____ Contact: _____ Company: _____

Stroke & Speed Requirements

Maximum Stroke Needed inches (mm), revs
 Index Stroke Length..... inches (mm), revs
 Index Time sec
 Max Speed Requirements..... in/sec (mm/sec), revs/sec
 Min Speed Requirements..... in/sec (mm/sec), revs/sec
 Required Positional Accuracy inches (mm), arc min

Load & Life Requirements

Gravitational Load lb (N)
 External Applied Load lbf (N)
 Inertial Load lbf (N)
 Friction Load..... lbf (N)
 Rotary Inertial Load lbf-in-sec² (Kg-m²)
 or rotary mass, radius of gyr..... lb (kg) in (mm)
 Side Load (rot. or lin. actuator) lb (N)

Force Direction _____ Extend _____ Retract _____ Both
Actuator Orientation _____ Vertical Up _____ Vertical Down _____ Horizontal
 _____ Fixed Angle _____ Degrees from Horizontal
 _____ Changing Angle _____ to _____

Cycling Rate Cycles/min/hr/day
 Operating Hours per Day Hours
 Life Requirement Cycles/hr/inches/mm

Configuration

Mounting: _____ Side _____ Flange _____ Ext Tie Rod _____ Clevis _____ Trunnion
Rod End: _____ Male _____ Female _____ Sph Rod Eye _____ Rod Eye _____ Clevis
Rod Rotation Limiting: _____ Appl Inherent _____ External Required
Holding Brake Required: _____ Yes _____ No
Cable Length: _____ ft (m)