2005
Product Catalog

EXLAR

At Exlar, we are very proud of our innovation and development of quality products. With our unique product offering, we have pushed the limits of conventional motion control to provide more speed and more force with less space and less maintenance. Our core competency is our patented roller screw technology which differentiates us from every other actuator supplier. Now, we have expanded that core competency to include leading-edge technology for rotary motors and gearmotors. This product breadth, combined with solid engineering and product quality testing have allowed us to succeed and grow our business. We've assembled an extensive support network of highly trained professional representatives and earned the confidence of customers whose products are used throughout the world.

As you review the designs in this catalog we think you will see how Exlar's unique products could be incorporated into your design for more efficient motion control. We would welcome the opportunity to discuss your motion requirements with you and make a recommendation.

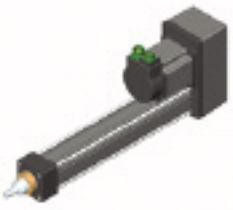
LINEAR MOTION

page

GSX Series

SR Series

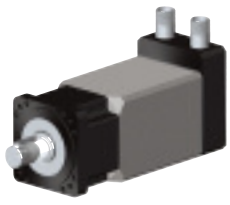
EL Series



FT Series

ROTARY MOTION

SLM/SLG Series



ER Series

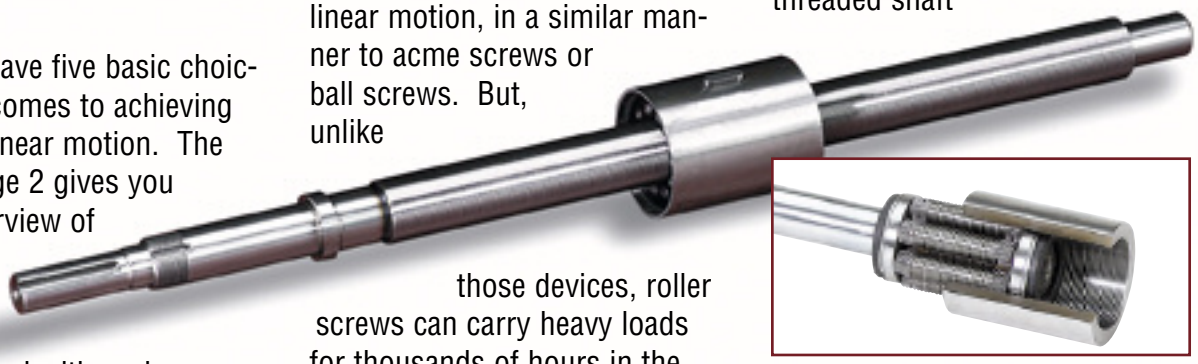
ENGINEERING REFERENCE

Why Consider Roller Screw Technology

Designers have five basic choices when it comes to achieving controlled linear motion. The table on page 2 gives you a quick overview of what general advantages are associated with each. Because the roller screw technology common to all Exlar linear actuators might not be familiar to everyone using this catalog, allow us to present a general overview.

Roller Screw Basics

A roller screw is a mechanism for converting rotary torque into linear motion, in a similar manner to acme screws or ball screws. But, unlike those devices, roller screws can carry heavy loads for thousands of hours in the most arduous conditions. This makes roller screws the ideal choice for demanding, continuous-duty applications.

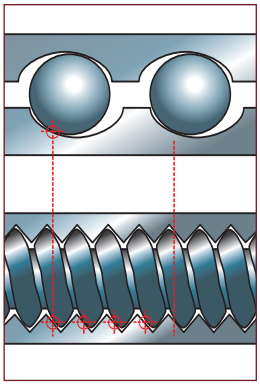


The difference is in the roller screw's design for transmitting forces. Multiple threaded helical rollers are assembled in a planetary arrangement around a threaded shaft

(shown below), which converts a motor's rotary motion into linear movement of the shaft or nut.

Roller Screw vs Hydraulic & Pneumatic – Comparisons:

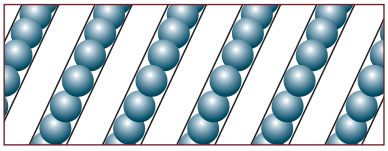
In applications where high loads are anticipated or faster cycling is desired, Exlar's roller screw actuators provide an attractive alternative to the hydraulic or pneumatic options. With their vastly simplified controls, electro-mechanical units using roller screws have major advantages. They do not require a complex support system of valves, pumps, filters and sensors. Thus, Exlar units take up much less space and deliver extremely long working lives with virtually no maintenance. Hydraulic fluid leaks are non-existent. Noise levels are reduced significantly. Additionally, the flexibility of computer programmed positioning can be very desirable in many applications.



Roller vs Ball Screw Performance – Comparisons:

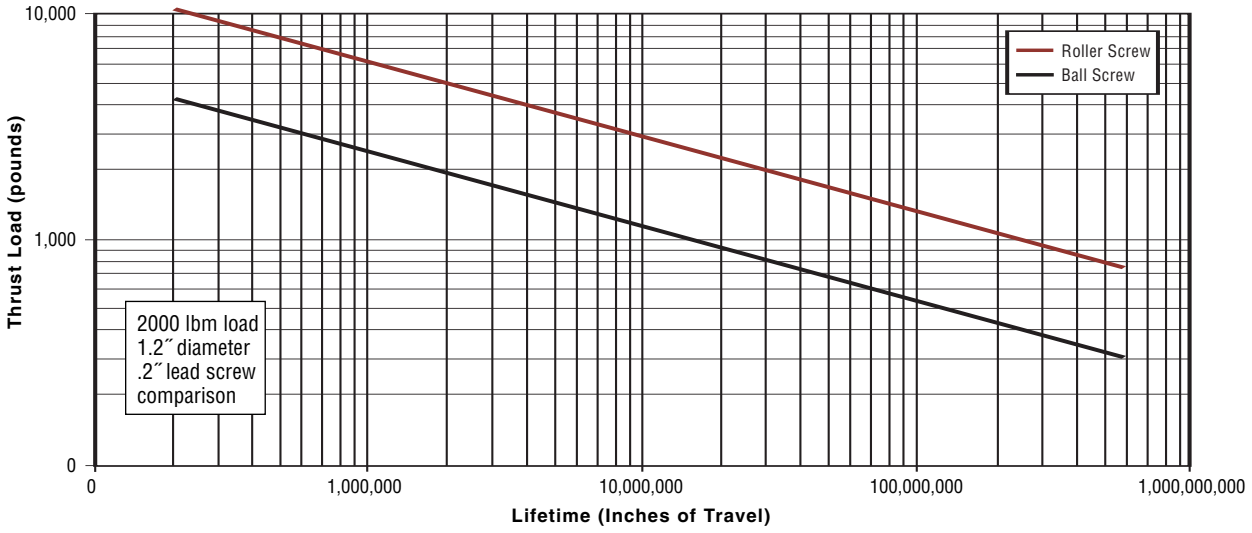
Loads and Stiffness: *Due to design factors, the number of contact points in a ball screw is limited by the ball size. Exlar's planetary roller screw designs provide many more contact points than possible on comparably sized ball screws. Because this number of contact points is greater, roller screws have higher load carrying capacities, plus improved stiffness. In practical terms, this means that typically an Exlar roller screw actuator takes up much less space to meet the designer's specified load rating.*

Travel Life: *As you would expect, with their higher load capacities, roller screws deliver major advantages in working life. Usually measured in "Inches of Travel," the relative travel lives for roller and ball screws are displayed on the graph on page 2. As you can see there, in a 2,000 lb. average load application applied to a 1.2 inch (approximate) screw diameter with a 0.2 inch (approximate) lead, you can predict that the roller screw will have an expected service life that is* ***15 Times Greater.***



Speeds: *Typical ball screw speeds are limited to 2000 rpm and less, due to the interaction of the balls colliding with each other as the race rotates. In contrast, the rollers in a roller screw are fixed in planetary fashion by journals at the ends of the nut and therefore do not have this limitation. Hence, roller screws can work at 5000 rpm and higher – producing comparably higher linear travel rates.*

Lifetime Comparison (Roller vs Ball Screws)



Roller Screw vs. Other Linear Motion Technologies

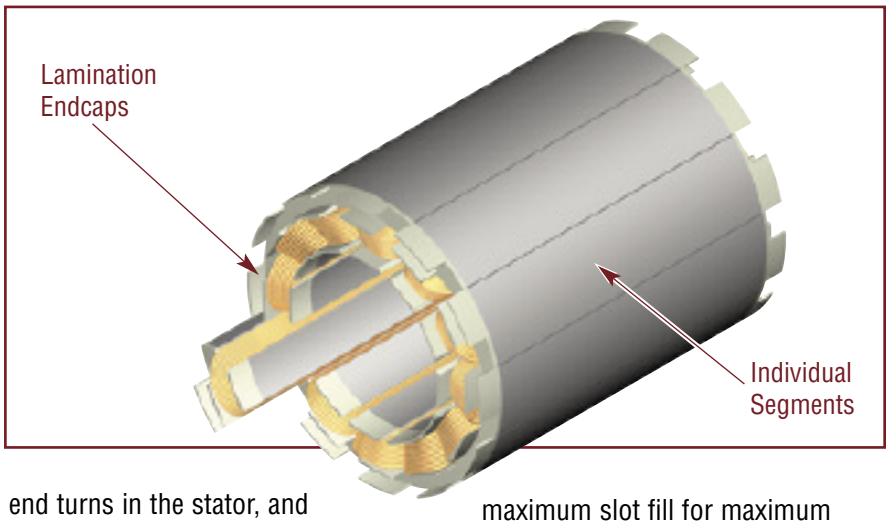
(Used in electronic positioning applications)

	EXLAR ROLLER SCREWS	ACME SCREWS	BALL SCREWS	HYDRAULIC CYLINDERS	PNEUMATIC CYLINDERS
Load ratings	Very High	High	High	Very High	High
Lifetime	Very long, many times greater than ball screw	Very low, due to high friction & wear	Moderate	Can be long with proper maintenance	Can be long with proper maintenance
Speed	Very high	Low	Moderate	Moderate	Very high
Acceleration	Very high	Low	Moderate	Very high	Very high
Electronic Positioning	Easy	Moderate	Easy	Difficult	Very Difficult
Stiffness	Very high	Very high	Moderate	Very high	Very low
Shock Loads	Very high	Very high	Moderate	Very high	High
Relative Space Requirements	Minimum	Moderate	Moderate	High	High
Friction	Low	High	Low	High	Moderate
Efficiency	>90%	approx 40%	>90%	<50%	<50%
Installation	Compatible with standard servo electronic controls	User may have to engineer a motion/actuator interface	Compatible with standard servo electronic controls	Complex, requires servo-valves, high pressure plumbing, filtering, pumps linear positioning & sensing	Very complex requires servo-valves, plumbing, filtering, compressors linear positioning & sensing
Maintenance	Very low	High due to poor wear characteristics	Moderate	Very high	High
Environmental	Minimal	Minimal	Minimal	Hydraulic fluid leaks & disposal	High noise levels

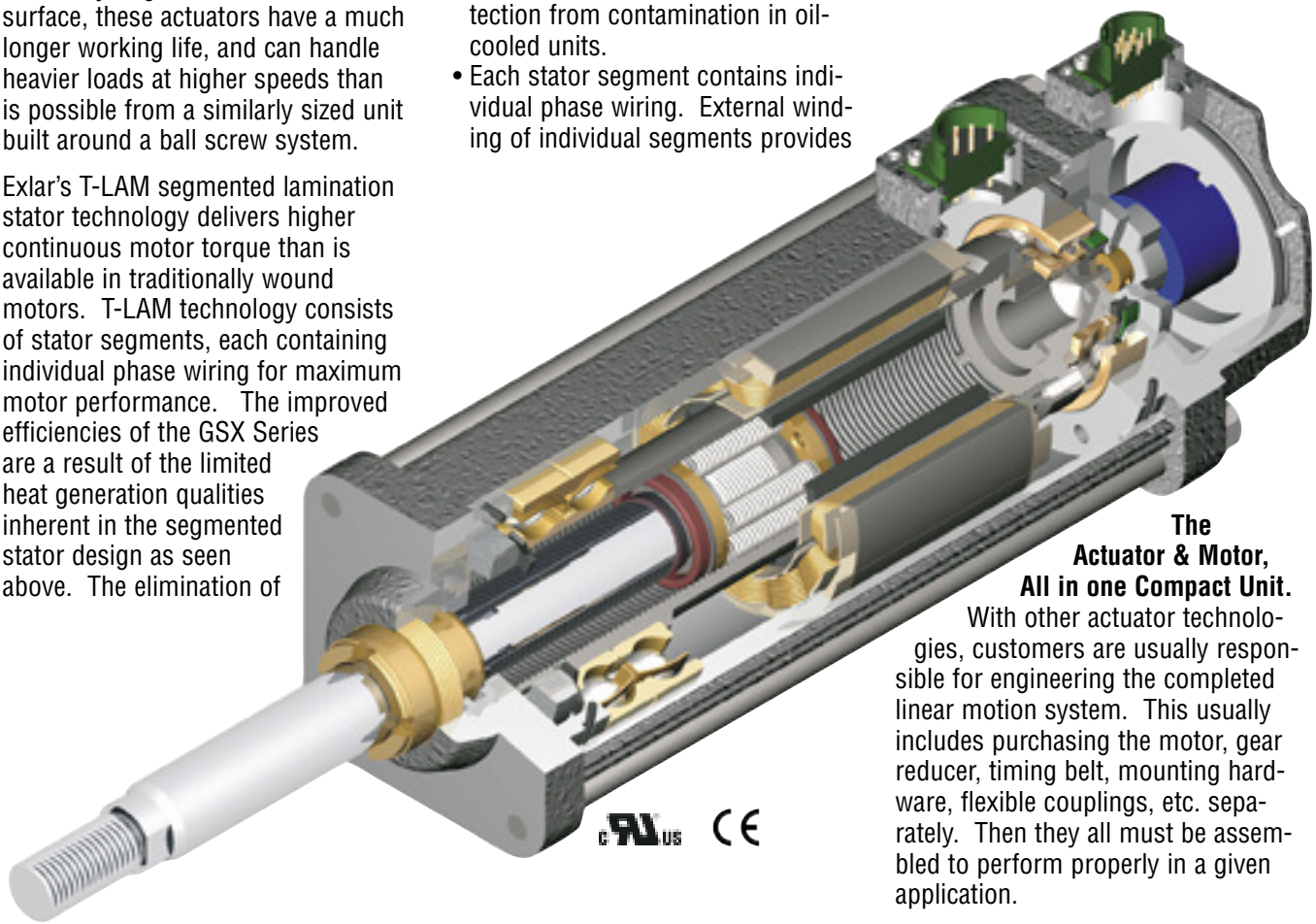
GSX Series – The Highest Performance, Longest Life and Most Compact Linear Actuators!

GSX Series linear actuators combine the advantages of Exlar's roller screw technology and T-LAM™ technology to create the next generation of linear actuators. Exlar uses 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.

GSX 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 GSX 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.

Sealed for Long Life with Minimum Maintenance

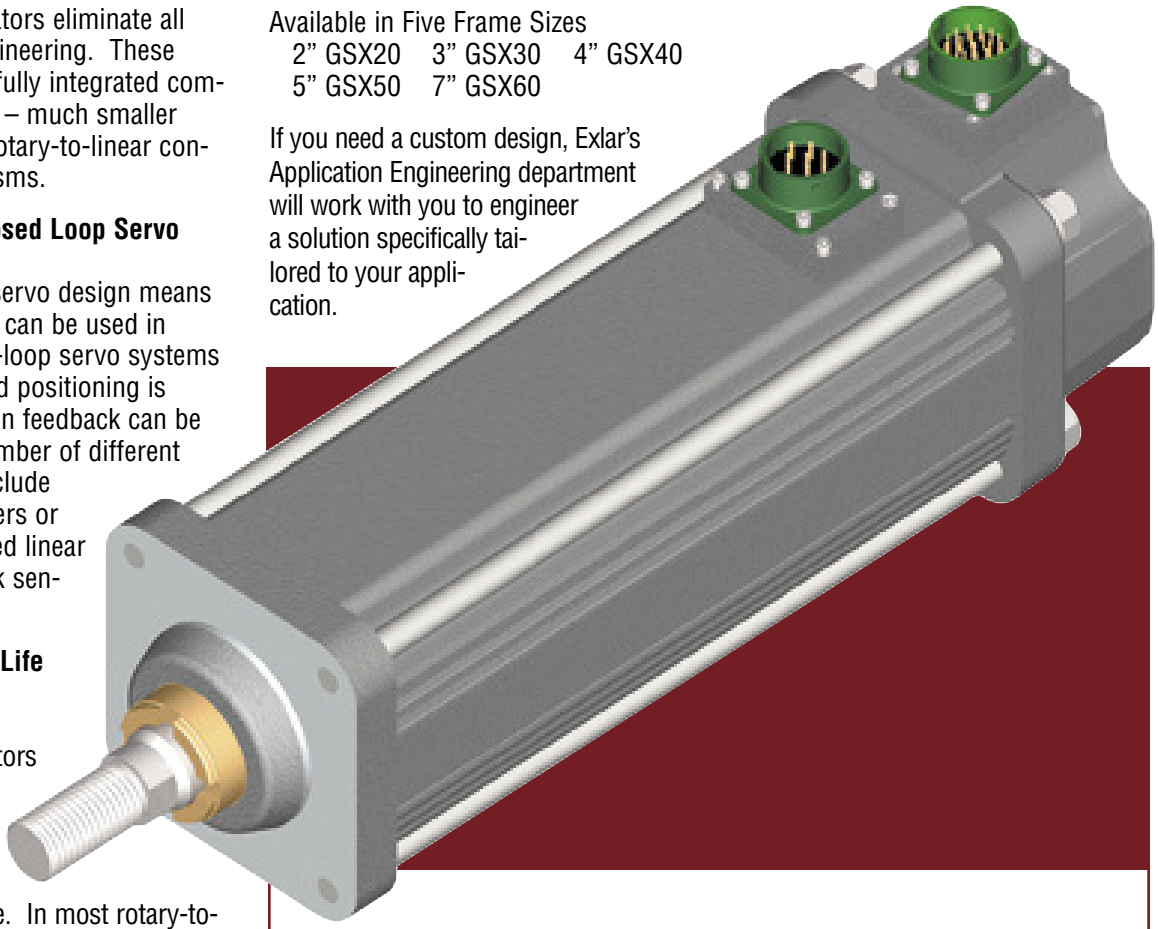
GSX Series actuators have strong advantages whenever outside contaminants are an issue. In most rotary-to-linear devices, critical mechanisms are exposed to the environment. Thus, they must be frequently inspected, cleaned and lubricated.

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 re-greasing. 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

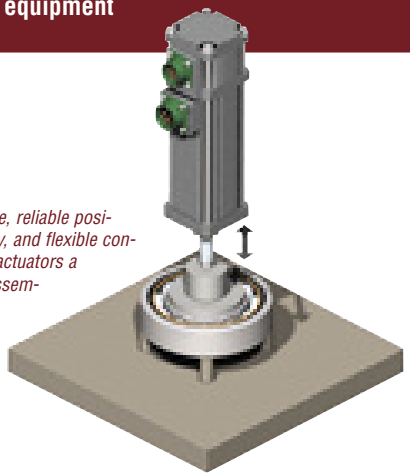
If you need a custom design, Exlar's Application Engineering department will work with you to engineer a solution specifically tailored to your application.



Feature	Standard	Optional
External anti-rotate mechanism	No	Yes
Pre-loaded follower	No	Yes
Electric brake	No	Yes
Internal End switches	No	Yes
Connectors	Two MS Style Connectors (3 if brake and/or Switches are Ordered)	Electroless Nickel Connectors/Male NPT with Potted Leads/ Manufacturers Connectors
Mounting Style	Extended Tie Rods, Side Tapped Mounting Holes, Trunnion, Rear Clevis, or Front 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	VRVT, including signal conditioner

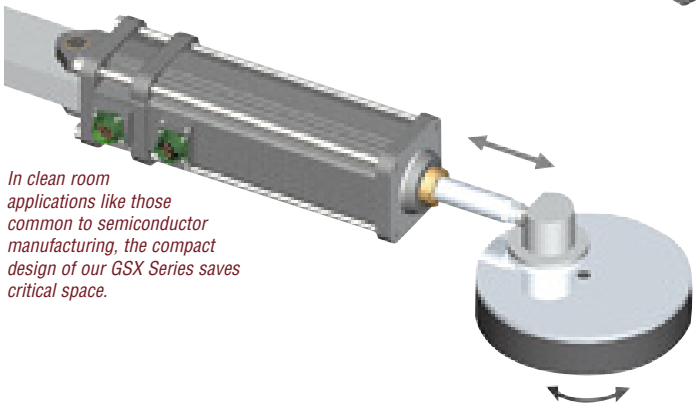
EXLAR GSX SERIES ACTUATORS APPLICATIONS INCLUDE:

- 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



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.



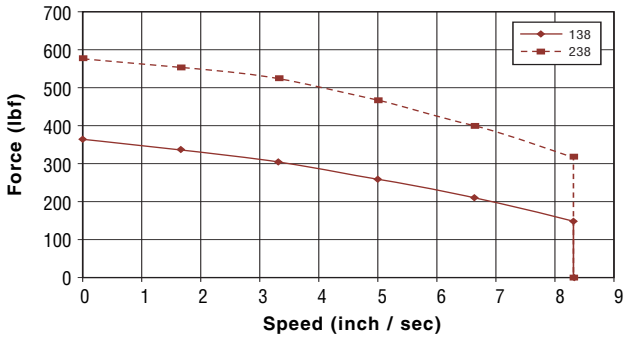
In clean room applications like those common to semiconductor manufacturing, the compact design of our GSX Series saves critical space.

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

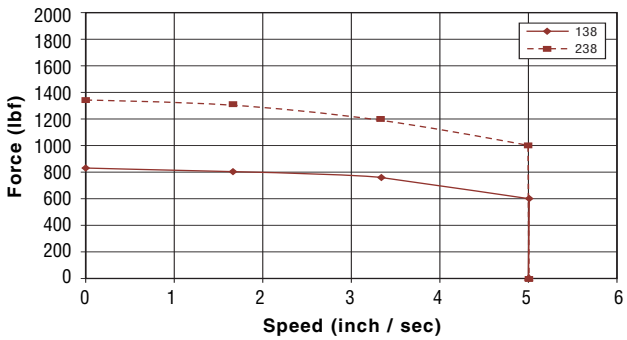
GSX Series Speed vs. Force Curves

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 Exlar Application Engineering.)

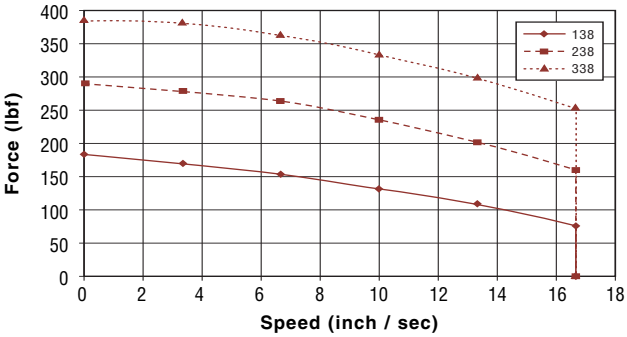
GSX20-.1 Inch Lead



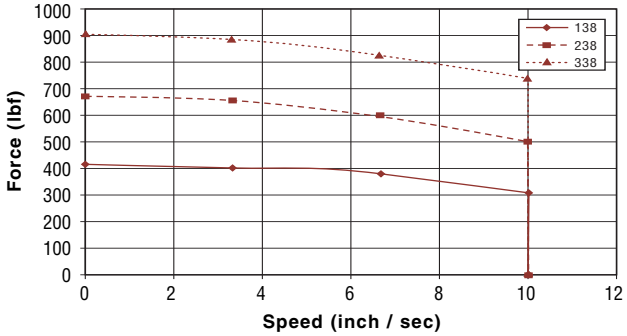
GSX30-.1 Inch Lead



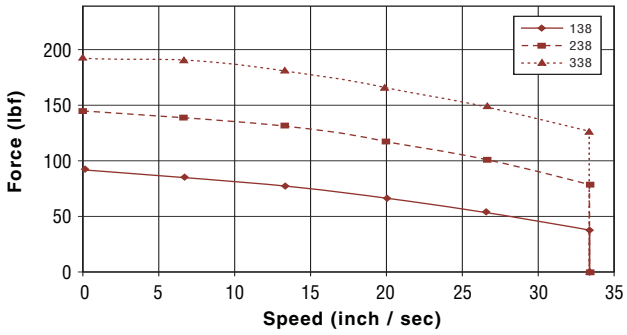
GSX20-.2 Inch Lead



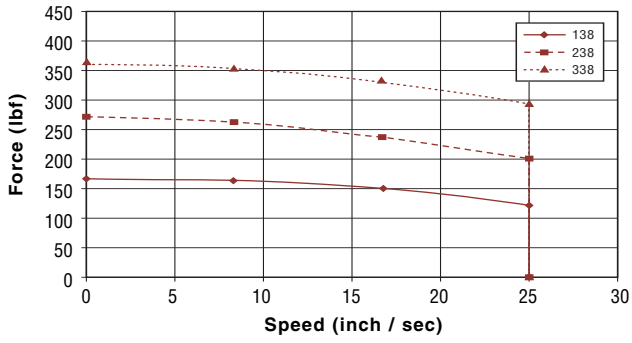
GSX30-.2 Inch Lead



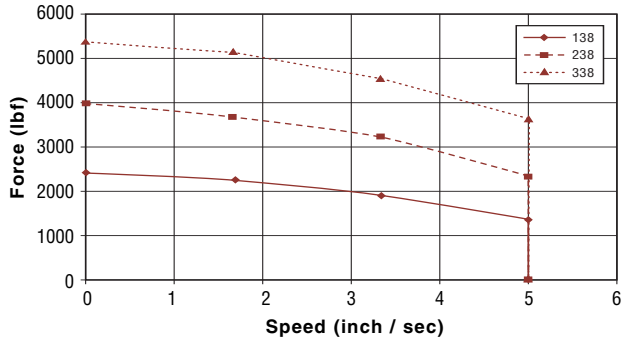
GSX20-.4 Inch Lead



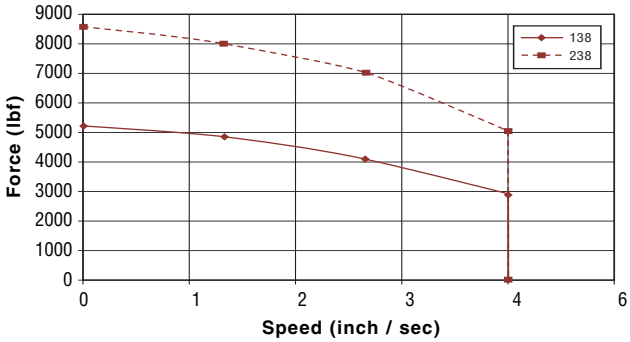
GSX30-.5 Inch Lead



GSX.40-.1 Inch Lead



GSX50-.1 Inch Lead



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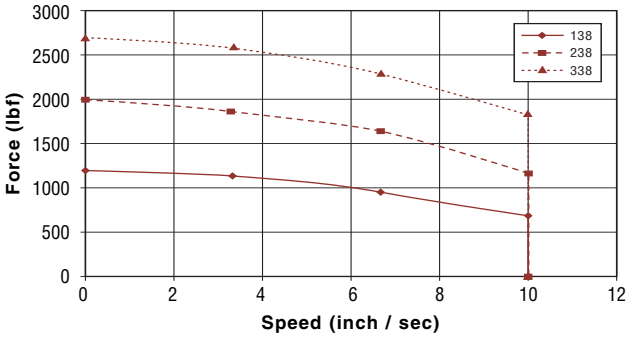

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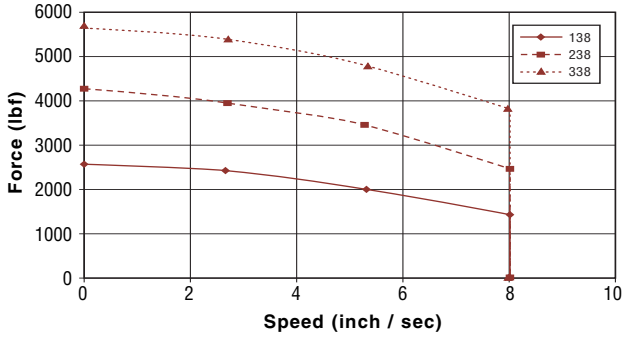
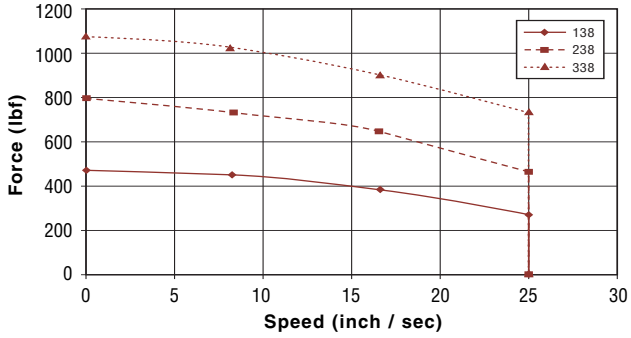


GSX40-.5 Inch Lead



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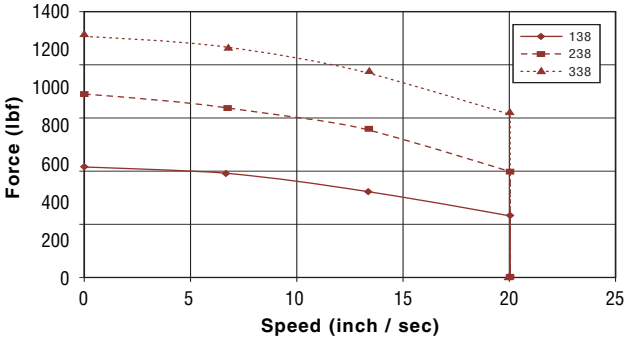
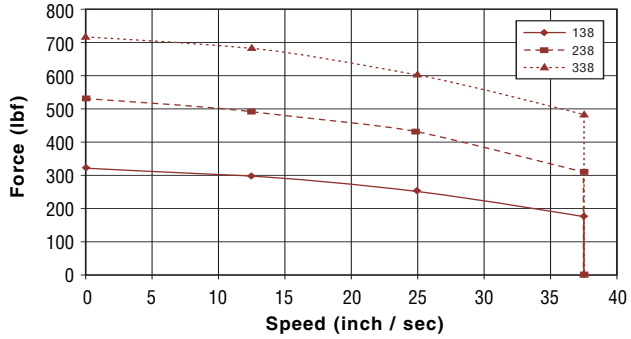
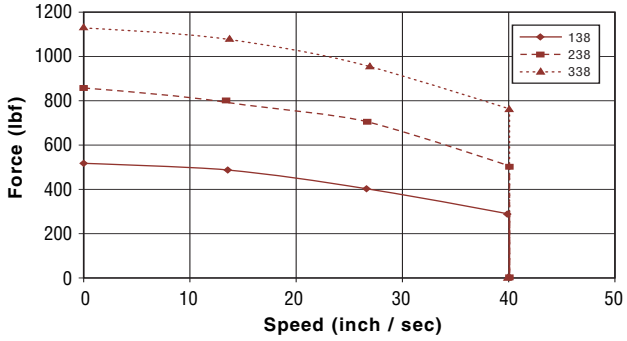


GSX40-.75 Inch Lead



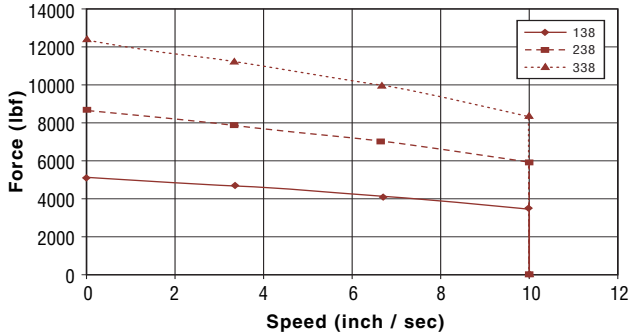
GSX50-1.0 Inch Lead



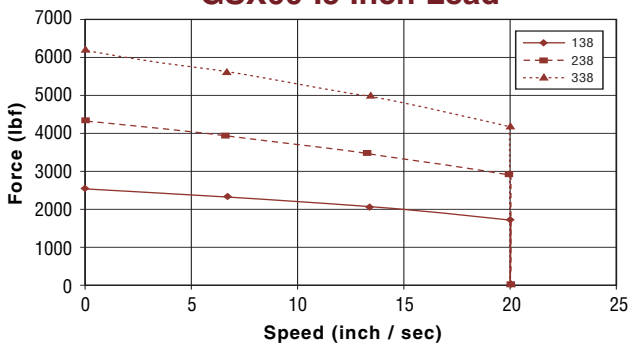
GSX Series Speed vs. Force Curves

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 Exlar Application Engineering.)

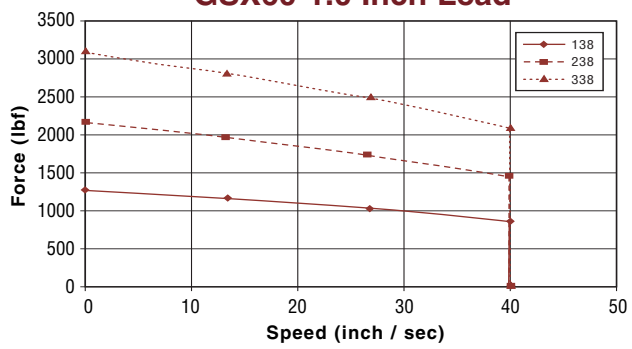
GSX60-.25 Inch Lead



GSX60-.5 Inch Lead



GSX60-1.0 Inch Lead



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. This is not a guarantee and these charts should be used for estimation purposes only.

The underlying formula that defines this value is:

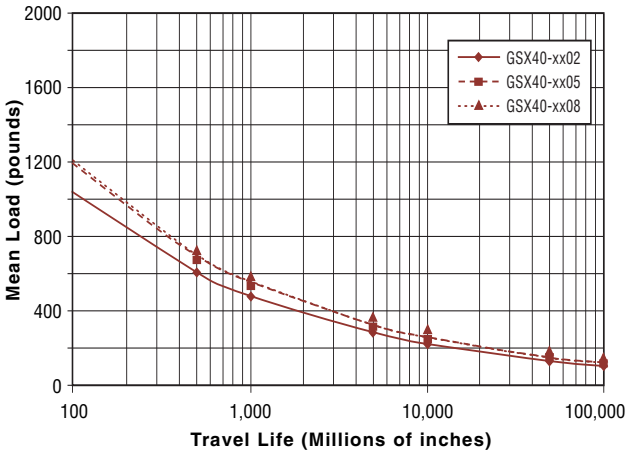
Travel life in millions of inches, where:

C = Dynamic load rating (lbf)
F = Cubic mean applied load (lbf)
S = Roller screws lead (inches)

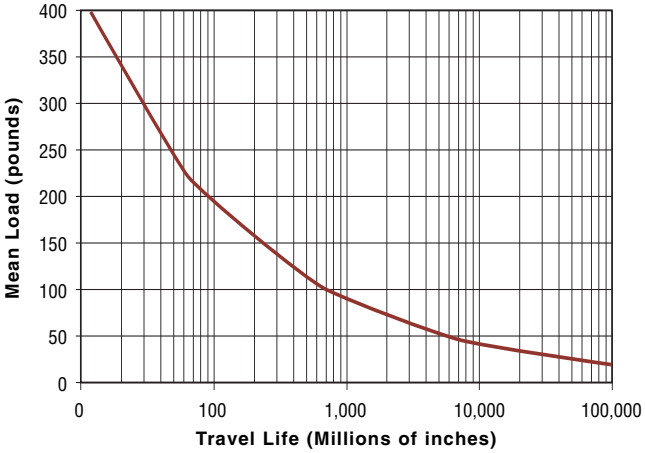
$$L_{10} = \left(\frac{C}{F}\right)^3 \times S \equiv$$

All curves represent properly lubricated and maintained actuators.

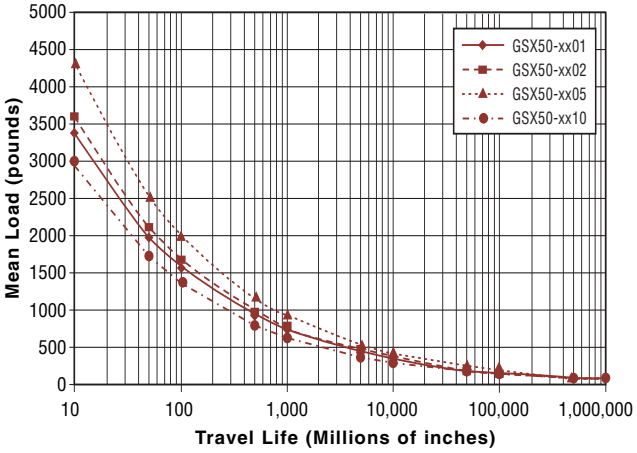
GSX40



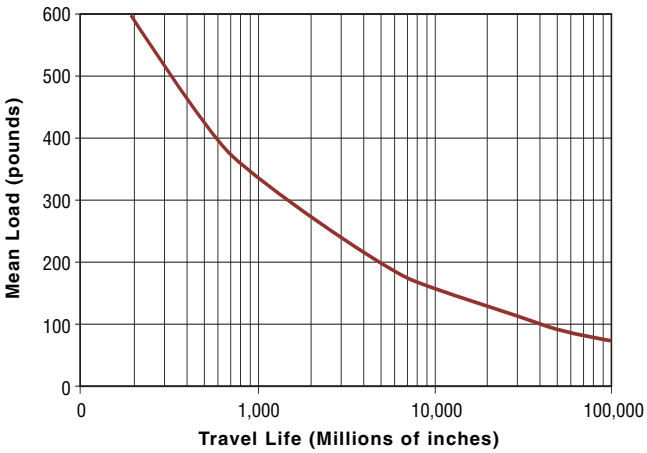
GSX20



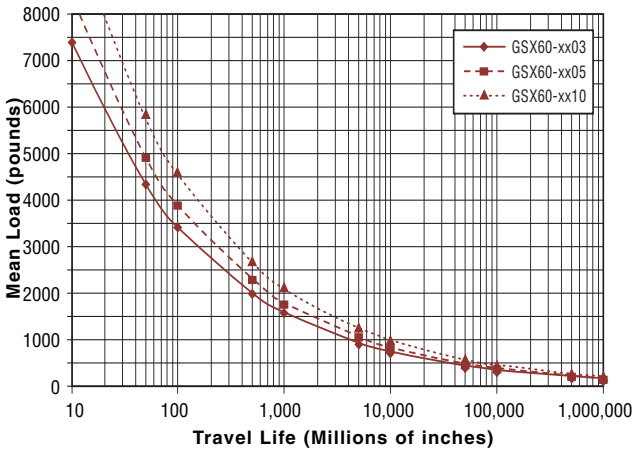
GSX50



GSX30



GSX60



GSX20 & GSX30 Performance Specifications

Model	Frame Size in (mm)	Stroke (nominal)* in (mm)*	Screw Lead in (mm)	Force* Rating lb (N) 1/2/3 stack	Max Velocity in/sec (mm/sec)	Continuous Motor Torque lb-in (N-m)	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 (75)	0.1 (2.54)	367/578/NA (1632/2571/NA)	8.33 (211.67)	7.3/11.5/NA (0.82/1.30/NA)	1250 (5560)	0.00101 (0.000114)	2075 (9230)	6.5 (2.9)
GSX20-0302	2.25 (57)	3 (75)	0.2 (5.08)	183/289/NA (814/1286/NA)	16.77 (423.33)	7.3/11.5/NA (0.82/1.30/NA)	1250 (5560)	0.00101 (0.000114)	1540 (6850)	6.5 (2.9)
GSX20-0304	2.25 (57)	3 (75)	0.4 (10.16)	92/145/NA (409/645/NA)	33.33 (846.67)	7.3/11.5/NA (0.82/1.30/NA)	1250 (5560)	0.00101 (0.000114)	1230 (5471)	6.5 (2.9)
GSX20-0601	2.25 (57)	6 (150)	0.1 (2.54)	367/578/NA (1632/2571/NA)	8.33 (211.67)	7.3/11.5/NA (0.82/1.30/NA)	1250 (5560)	0.00114 (0.000129)	2075 (9230)	7.0 (3.2)
GSX20-0602	2.25 (57)	6 (150)	0.2 (5.08)	183/289/385 (814/1286/1713)	16.67 (423.33)	7.3/11.5/15.3 (0.82/1.30/1.73)	1250 (5560)	0.00114 (0.000129)	1540 (6850)	7.0 (3.2)
GSX20-0604	2.25 (57)	6 (150)	0.4 (10.16)	92/145/192 (409/645/854)	33.33 (846.67)	7.3/11.5/15.3 (0.82/1.30/1.73)	1250 (5560)	0.00114 (0.000129)	1230 (5471)	7.0 (3.2)
GSX20-1001	2.25 (57)	10 (250)	0.1 (2.54)	367/578/NA (1632/2571/NA)	8.33 (211.67)	7.3/11.5/NA (0.82/1.30/NA)	1250 (5560)	0.00133 (0.000150)	2075 (9230)	7.5 (3.4)
GSX20-1002	2.25 (57)	10 (250)	0.2 (5.08)	183/289/385 (814/1286/1713)	16.67 (423.33)	7.3/11.5/15.3 (0.82/1.30/1.73)	1250 (5560)	0.00133 (0.000150)	1540 (6850)	7.5 (3.4)
GSX20-1004	2.25 (57)	10 (250)	0.4 (10.16)	92/145/192 (409/645/854)	33.33 (846.67)	7.3/11.5/15.3 (0.82/1.30/1.73)	1250 (5560)	0.00133 (0.000150)	1230 (5471)	7.5 (3.4)
GSX20-1201	2.25 (57)	12 (300)	0.1 (2.54)	367/578/NA (1632/2571/NA)	8.33 (211.67)	7.3/11.5/NA (0.82/1.30/NA)	1250 (5560)	0.00143 (0.000162)	2075 (9230)	8.0 (3.6)
GSX20-1202	2.25 (57)	12 (300)	0.2 (5.08)	183/289/385 (814/1286/1713)	16.67 (423.33)	7.3/11.5/15.3 (0.82/1.30/1.73)	1250 (5560)	0.00143 (0.000162)	1540 (6850)	8.0 (3.6)
GSX20-1204	2.25 (57)	12 (300)	0.4 (10.16)	92/145/192 (409/645/854)	33.33 (846.67)	7.3/11.5/15.3 (0.82/1.30/1.73)	1250 (5560)	0.00143 (0.000162)	1230 (5471)	8.0 (3.6)
GSX30-0301	3.125 (79)	3 (75)	0.1 (2.54)	829/1347/NA (3688/5992/NA)	5 (127)	16.5/26.8/NA (1.86/3.03/NA)	2700 (12010)	0.00319 (0.000360)	5516 (24536)	9.5 (4.3)
GSX30-0302	3.125 (79)	3 (75)	0.2 (5.08)	415/674/NA (1846/2998/NA)	10 (254)	16.5/26.8/NA (1.86/3.03/NA)	2700 (12010)	0.00319 (0.000360)	5800 (25798)	9.5 (4.3)
GSX30-0305	3.125 (79)	3 (75)	0.5 (12.7)	166/269/NA (738/1197/NA)	25 (635)	16.5/26.8/NA (1.86/3.03/NA)	2700 (12010)	0.00319 (0.000360)	4900 (21795)	9.5 (4.3)
GSX30-0601	3.125 (79)	5.9 (150)	0.1 (2.54)	829/1347/NA (3688/5992/NA)	5 (127)	16.5/26.8/NA (1.86/3.03/NA	2700 (12010)	0.00361 (0.000408)	5516 (24536)	11.5 (5.2)
GSX30-0602	3.125 (79)	5.9 (150)	0.2 (5.08)	415/674/905 (1846/2998/4026)	10 (254)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00361 (0.000408)	5800 (25798)	11.5 (5.2)
GSX30-0605	3.125 (79)	5.9 (150)	0.5 (12.7)	166/269/362 (738/1197/1610)	25 (635)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00361 (0.000408)	4900 (21795)	11.5 (5.2)
GSX30-1001	3.125 (79)	10 (250)	0.1 (2.54)	829/1347/NA (3688/5992/NA)	5 (127)	16.5/26.8/NA (1.86/3.03/NA)	2700 (12010)	0.00416 (0.00047)	5516 (24536)	19 (8.6)
GSX30-1002	3.125 (79)	10 (250)	0.2 (5.08)	415/674/905 (1846/2998/4026)	10 (254)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00416 (0.00047)	5800 (25798)	19 (8.6)
GSX30-1005	3.125 (79)	10 (250)	0.5 (12.7)	166/269/362 (738/1197/1610)	25 (635)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00416 (0.00047)	4900 (21795)	19 (8.6)
GSX30-1201	3.125 (79)	12 (305)	0.1 (2.54)	829/1347/NA (3688/5992/NA)	5 (127)	16.5/26.8/NA (1.86/3.03/NA)	2700 (12010)	0.00443 (0.000501)	5516 (24536)	22 (10)
GSX30-1202	3.125 (79)	12 (305)	0.2 (5.08)	415/674/905 (1846/2998/4026)	10 (254)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00443 (0.000501)	5800 (25798)	22 (10)
GSX30-1205	3.125 (79)	12 (305)	0.5 (12.7)	166/269/362 (738/1197/1610)	25 (635)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00443 (0.000501)	4900 (21795)	22 (10)
GSX30-1402	3.125 (79)	14 (355)	0.2 (5.08)	415/674/905 (1846/2998/4026)	10 (254)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00473 (0.000534)	5800 (25798)	22 (10)
GSX30-1405	3.125 (79)	14 (355)	0.5 (12.7)	166/269/362 (738/1197/1610)	25 (635)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00473 (0.000534)	4900 (21795)	22 (10)
GSX30-1802	3.125 (79)	18 (455)	0.2 (5.08)	415/674/905 (1846/2998/4026)	10 (254)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00533 (0.000602)	5800 (25798)	25 (11.3)
GSX30-1805	3.125 (79)	18 (455)	0.5 (12.7)	166/269/362 (738/1197/1610)	25 (635)	16.5/26.8/36 (1.86/3.03/4.07)	2700 (12010)	0.00533 (0.000602)	4900 (21795)	25 (11.3)

*Please note that stroke mm are nominal dimensions. **Inertia +/– 5%

Specifications subject to change without notice.

GSX40 Performance Specifications

Model	Frame Size in (mm)	Stroke (nominal)* in (mm)*	Screw Lead in (mm)	Force* Rating lb (N) 1/2/3 stack	Max Velocity in/sec (mm/sec)	Continuous Motor Torque lb-in (N-m)	Maximum Static Load lb (N)	Armature Inertia** lb-in-s^2 (Kg-m^2)	Dynamic Load Rating lb (N)	Weight (approx.) lb (Kg)
GSX40-0601	3.9 (99)	6 (150)	0.1 (2.54)	2393/3966/NA (10645/17642/NA)	5 (127)	47.6/78.9/NA (5.38/8.91/NA)	5400 (24020)	0.0152 (0.001717)	7900 (35141)	20 (9.1)
GSX40-0602	3.9 (99)	6 (150)	0.2 (5.08)	1196/1983/NA (5320/8821/NA)	10 (254)	47.6/78.9/NA (5.38/8.91/NA)	5400 (24020)	0.0152 (0.001717)	8300 (36920)	20 (9.1)
GSX40-0605	3.9 (99)	6 (150)	0.5 (12.7)	479/793/NA (2131/3527/NA)	25 (635)	47.6/78.9/NA (5.38/8.91/NA)	5400 (24020)	0.0152 (0.001717)	7030 (31271)	20 (9.1)
GSX40-0608	3.9 (99)	6 (150)	0.75 (19.05)	319/529/NA (1419/2353/NA)	37.5 (953)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0152 (0.001717)	6335 (28179)	20 (9.1)
GSX40-0801	3.9 (99)	8 (200)	0.1 (2.54)	2393/3966/NA (10645/17642/NA)	5 (127)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0163 (0.001842)	7900 (35141)	24 (10.9)
GSX40-0802	3.9 (99)	8 (200)	0.2 (5.08)	1196/1983/2692 (5320/8821/11975)	10 (254)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0163 (0.001842)	8300 (36920)	24 (10.9)
GSX40-0805	3.9 (99)	8 (200)	0.5 (12.7)	479/793/1077 (2131/3527/4791)	25 (635)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0163 (0.001842)	7030 (31271)	24 (10.9)
GSX40-0808	3.9 (99)	8 (200)	0.75 (19.05)	319/529/718 (1419/2353/3194)	37.5 (953)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0163 (0.001842)	6335 (28179)	24 (10.9)
GSX40-1001	3.9 (99)	10 (250)	0.1 (2.54)	2393/3966/NA (10645/17642/NA)	5 (127)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0175 (0.001977)	7900 (35141)	28 (12.7)
GSX40-1002	3.9 (99)	10 (250)	0.2 (5.08)	1196/1983/2692 (5320/8821/11975)	10 (254)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0175 (0.001977)	8300 (36920)	28 (12.7)
GSX40-1005	3.9 (99)	10 (250)	0.5 (12.7)	479/793/1077 (2131/3527/4791)	25 (635)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0175 (0.001977)	7030 (31271)	28 (12.7)
GSX40-1008	3.9 (99)	10 (250)	0.75 (19.05)	319/529/718 (1419/2353/3194)	37.5 (953)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0175 (0.001977)	6335 (28179)	28 (12.7)
GSX40-1201	3.9 (99)	12 (305)	0.1 (2.54)	2393/3966/NA (10645/17642/NA)	5 (127)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0186 (0.002102)	7900 (35141)	32 (14.5)
GSX40-1202	3.9 (99)	12 (305)	0.2 (5.08)	1196/1983/2692 (5320/8821/11975)	10 (254)	47.6/8.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0186 (0.002102)	8300 (36920)	32 (14.5)
GSX40-1205	3.9 (99)	12 (305)	0.5 (12.7)	479/793/1077 (2131/3527/4791)	25 (635)	47.6/8.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0186 (0.002102)	7030 (31271)	32 (14.5)
GSX40-1208	3.9 (99)	12 (305)	0.75 (19.05)	319/529/718 (1419/2353/3194)	37.5 (953)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0186 (0.002102)	6335 (28179)	32 (14.5)
GSX40-1802	3.9 (99)	18 (455)	0.2 (5.08)	1196/1983/2692 (5320/8821/11975)	10 (254)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0220 (0.002486)	8300 (36920)	44 (20)
GSX40-1805	3.9 (99)	18 (455)	0.5 (12.7)	479/793/1077 (2131/3527/4791)	25 (635)	47.6/78.9/107.1 (5.38/8.91/12.1)	5400 (24020)	0.0220 (0.002486)	7030 (31271)	44 (20)

*Please note that stroke mm are nominal dimensions. **Inertia +/– 5%

Specifications subject to change without notice.

GSX50 & GSX60 Performance Specifications

Model	Frame Size in (mm)	Stroke (nominal)* in (mm)*	Screw Lead in (mm)	Continuous Force* Rating lb 1/2/3 stack	Max Velocity in/sec (mm/sec)	Continuous Motor Torque lb-in (N-m)	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	5.0 (127)	6 (150)	0.1 (2.54)	5127/8544/NA (22806/38006/NA)	4 (101.6)	102/170/NA (11.5/19.2/NA)	13200 (58717)	0.03241 (0.003662)	15693 (69806)	54 (24)
GSX50-0602	5.0 (127)	6 (150)	0.2 (5.08)	2564/4272/NA (11405/19003/NA)	8 (203)	102/170/NA (11.5/19.2/NA)	13200 (58717)	0.03241 (0.003662)	13197 (58703)	54 (24)
GSX50-0605	5.0 (127)	6 (150)	0.5 (12.7)	1026/1709/NA (4564/7602/NA)	20 (508)	102/170/NA (11.5/19.2/NA)	13200 (58717)	0.03241 (0.003662)	11656 (51848)	54 (24)
GSX50-0610	5.0 (127)	6 (150)	1.0 (25.4)	513/855/NA (2282/3803/NA)	40 (1016)	102/170/NA (11.5/19.2/NA	13200 (58717)	0.03241 (0.003662)	6363 (28304)	54 (24)
GSX50-1001	5.0 (127)	10 (250)	0.1 (2.54)	5127/8544/NA (22806/38006/NA)	4 (101.6)	102/170/NA (11.5/19.2/NA)	13200 (58717)	0.03725 (0.004209)	15693 (69806)	62 (28)
GSX50-1002	5.0 (127)	10 (250)	0.2 (5.08)	2564/4272/NA (11405/19003/NA)	8 (203)	102/170/NA (11.5/19.2/NA)	13200 (58717)	0.03725 (0.004209)	13197 (58703)	62 (28)
GSX50-1005	5.0 (127)	10 (250)	0.5 (12.7)	1026/1709/2261 (4564/7602/10057)	20 (508)	102/170/226 (11.5/19.2/25.5)	13200 (58717)	0.03725 (0.004209)	11656 (51848)	62 (28)
GSX50-1010	5.0 (127)	10 (250)	1.0 (25.4)	513/855/1131 (2349/3803/5031)	40 (1016)	102/170/226 (11.5/19.2/25.5)	13200 (58717)	0.03725 (0.004209)	6363 (28304)	62 (28)
GSX50-1402	5.0 (127)	14 (355)	0.2 (5.08)	2564/4272/5655 (11405/19003/25155)	8 (203)	102/170/226 (11.5/19.2/25.5)	13200 (58717)	0.04208 (0.004756)	13197 (58703)	70 (32)
GSX50-1405	5.0 (127)	14 (355)	0.5 (12.7)	1026/1709/2261 (4564/7602/10057)	20 (508)	102/170/226 (11.5/19.2/25.5)	13200 (58717)	0.04208 (0.004756)	11656 (51848)	70 (32)
GSX60-0603	7.0 (178)	6 (150)	0.25 (6.35)	5098/NA/NA (22677/NA/NA)	10 (254)	241/NA/NA (27/NA/NA)	25000 (111200)	0.1736 (0.019614)	25300 (112540)	69 (31)
GSX60-0605	7.0 (178)	6 (150)	0.5 (12.7)	2549/NA/NA (11339/NA/NA)	20 (508)	241/NA/NA (27/NA/NA)	25000 (111200)	0.1736 (0.019614)	22800 (101420)	69 (31)
GSX60-0610	7.0 (178)	6 (150)	1.0 (25.4)	1275/NA/NA (5671/NA/NA)	40 (1018)	241/NA/NA (27/NA/NA)	25000 (111200)	0.1736 (0.019614)	21200 (94302)	69 (31)
GSX60-1003	7.0 (178)	10 (250)	0.25 (6.35)	5098/8656/12389 (22677/38504/55109)	10 (254)	241/409/585 (27/46/66)	25000 (111200)	0.1943 (0.021953)	25300 (112540)	101 (46)
GSX60-1005	7.0 (178)	10 (250)	0.5 (12.7)	2549/4328/6195 (11339/19252/27557)	20 (508)	241/409/585 (27/46/66)	25000 (111200)	0.1943 (0.021953)	22800 (101420)	101 (46)
GSX60-1010	7.0 (178)	10 (250)	1.0 (25.4)	1275/2164/3097 (5671/9626/13776)	40 (1018)	241/409/585 (27/46/66)	25000 (111200)	0.1943 (0.021953)	21200 (94302)	101 (46)

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.
Continuous Motor Torque: Torque produced by the motor at rated continuous current.

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.

*Please note that stroke mm are nominal dimensions. **Inertia +/– 5%

Specifications subject to change without notice.

GSX20 Mechanical and Electrical Specifications

		GSX20											
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 / Optional		IP65/67											
Motor Stator		**118**	**138**	**158**	**168**	**218**	**238**	**258**	**268**	**318***	**338***	**358***	**368***
RMS Sinusoidal Commutation													
Continuous Motor Torque	lbf-in	7.6	7.3	7.0	7.0	11.9	11.5	11.2	11.3	15.3	15.3	14.8	15.0
	(Nm)	(0.86)	(0.83)	(0.79)	(0.79)	(1.35)	(1.30)	(1.27)	(1.28)	(1.73)	(1.73)	(1.67)	(1.69)
Torque Constant (Kt)	lbf-in/A	2.5	5.2	8.3	9.5	2.5	5.2	8.9	10.2	2.3	5.3	8.8	10.2
(+/– 10% @ 25˚C)	(Nm/A)	(0.28)	(0.59)	(0.94)	(1.07)	(0.28)	(0.59)	(1.00)	(1.15)	(0.26)	(0.60)	(0.99)	(1.15)
Continuous Current Rating: Greased	(IG) A	3.4	1.6	0.9	0.8	5.4	2.5	1.4	1.2	7.3	3.2	1.9	1.6
Oiled	(IL) A	6.9	3.1	1.9	1.6	10.8	4.9	2.8	2.5	14.6	6.5	3.8	3.3
Peak Current Rating	Amps	6.9	3.1	1.9	1.6	10.8	4.9	2.8	2.5	14.6	6.5	3.8	3.3
Trapezoidal Commutation													
Continuous Motor Torque	lbf-in	7.3	7.0	6.7	6.7	11.4	11.0	10.7	10.8	14.7	14.6	14.1	14.3
	(Nm)	(0.82)	(0.79)	(0.76)	(0.76)	(1.29)	(1.24)	(1.21)	(1.22)	(1.66)	(1.65)	(1.60)	(1.61)
Torque Constant (Kt)	lbf-in/A	1.9	4.1	7.4	7.4	1.9	4.1	6.9	7.9	1.8	4.1	6.9	7.9
(+/– 10% @ 25˚C)	(Nm/A)	(0.22)	(0.46)	(0.73)	(0.84)	(0.22)	(0.46)	(0.78)	(0.89)	(0.21)	(0.46)	(0.77)	(0.89)
Continuous Current Rating: Greased	(IG) A	4.2	1.9	1.1	1.0	6.6	3.0	1.7	1.5	9.0	4.0	2.3	2.0
Oiled	(IL) A	8.4	3.9	2.3	2.0	13.2	6.0	3.5	3.0	17.9	8.0	4.6	4.0
Peak Current Rating	Amps	8.4	3.9	2.3	2.0	13.2	6.0	3.5	3.0	17.9	8.0	4.6	4.0
Motor Stator Data													
Voltage Constant (Ke)	Vrms/krpm	16.9	35.6	56.9	64.9	16.9	35.6	60.5	69.4	16.0	36.0	60.0	69.4
(+/– 10% @ 25˚C)	Vpk/kprm	23.9	50.3	80.9	91.8	23.9	50.3	85.5	98.1	22.6	50.9	84.9	98.1
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	35.2	45.8	1.1	5.3	16.0	20.7	0.62	3.1	9.4	12.2
Inductance (L-L)(+/– 15%)	mH	5.1	22.8	58.3	75.8	2.5	11.0	31.7	41.7	1.5	7.4	20.5	27.4
Brake Inertia	lbf-in-sec^2	.000025	.000025	.000025	.000025	.000025	.000025	.000025	.000025	.000025	.000025	.000025	.000025
	(Kg-cm^2)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
Brake Current @ 24 Vdc	A	.21	.21	.21	.21	.21	.21	.21	.21	.21	.21	.21	.21
Brake Holding Torque - Dry	lbf-in (Nm)	24 (2.71)	24 (2.71)	24 (2.71)	24 (2.71)	24 (2.71)	24 (2.71)	24 (2.71)	24 (2.71)	24 (2.71)	24 (2.71)	24 (2.71)	24 (2.71)
Brake Holding Torque - Oil Lubricated	lbf-in (Nm)	8 (0.90)	8 (0.90)	8 (0.90)	8 (0.90)	8 (0.90)	8 (0.90)	8 (0.90)	8 (0.90)	8 (0.90)	8 (0.90)	8 (0.90)	8 (0.90)
Brake Engage/Disengage Time	ms	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50
Mechanical Time Constant (tm),ms	min	6.0	6.5	7.1	7.1	2.5	2.7	2.9	2.8	1.6	1.6	1.7	1.7
	max	8.5	9.2	10.1	10.1	3.6	3.9	4.0	4.0	2.2	2.2	2.4	2.4
Electrical Time Constant (te)	ms	2.0	1.8	1.7	1.7	2.2	2.1	2.0	2.0	2.4	2.4	2.2	2.2
Damping Constant	lbf-in/krpm	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
	(Nm/krpm)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Friction Torque	lbf-in	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	(Nm)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Motor Wire Insulation		Class 180 H											
Motor Stator Rating		Class 180 H											
Thermal Switch Case Temperature	˚C	100											
Standard Connectors (O-option)	Motor	MS-3112-E16-8P											
	Feedback	MS-3112-E14-18P											
	Brake/Limit Sw.	MS-3112-E12-8P											

All ratings at 25 degrees Celsius
For amplifiers with peak sinusoidal commutation Kt = Ktrms(0.707), Ic = Icrms/(0.707), Ipk = Ipkrms/(0.707)
*The 3 stack motor is not available with the .1 inch lead GSX20. The 3 stack lamination fits only the 6 inch and longer GSX20. The GSX20-03 can only accommodate the 1 or 2 stack.

Specifications subject to change without notice.

GSX30 Mechanical and Electrical Specifications

		GSX30											
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 / Optional		IP65/67											
Motor Stator		**118**	**138**	**158**	**168**	**218**	**238**	**258**	**268**	**318***	**338***	**358****	**368***
RMS Sinusoidal Commutation													
Continuous Motor Torque	lbf-in	16.6	16.5	15.7	15.7	26.8	26.8	26.7	26.7	38.7	38.3	36.3	36.3
	(Nm)	(1.88)	(1.87)	(1.77)	(1.78)	(3.03)	(3.03)	(3.02)	(3.01)	(4.38)	(4.33)	(4.10)	(4.10)
Torque Constant (Kt)	lbf-in/A	4.4	8.7	15.5	17.5	4.4	8.7	15.5	17.5	4.4	8.7	15.7	17.6
(+/– 10% @ 25˚C)	(Nm/A)	(0.49)	(0.99)	(1.75)	(1.98)	(0.49)	(0.99)	(1.75)	(1.98)	(0.50)	(0.98)	(1.77)	(1.98)
Continuous Current Rating: Greased	(IG) A	4.2	2.1	1.1	1.0	6.9	3.4	1.9	1. 7	9.7	4.9	2.6	2.3
Oiled	(IL) A	8.5	4.2	2.3	2.0	13.7	6.8	3.8	3.4	19.5	9.9	5.2	4.6
Peak Current Rating	Amps	8.5	4.2	2.3	2.0	13.7	6.8	3.8	3.4	19.5	9.9	5.2	4.6
Trapezoidal Commutation													
Continuous Motor Torque	lbf-in	15.9	15.8	14.9	15.0	25.6	25.6	25.5	25.5	37.0	36.6	34.8	34.7
	(Nm)	(1.79)	(1.78)	(1.69)	(1.70)	(2.89)	(2.89)	(2.88)	(2.88)	(4.18)	(4.13)	(3.91)	(3.92)
Torque Constant (Kt)	lbf-in/A	3.4	6.8	12.1	13.6	3.4	6.8	12.1	13.6	3.5	6.8	12.2	13.7
(+/– 10% @ 25˚C)	(Nm/A)	(0.39)	(0.77)	(1.37)	(1.54)	(0.39)	(0.77)	(1.37)	(1.54)	(0.39)	(0.76)	1.38	(1.55)
Continuous Current Rating: Greased	(IG) A	5.2	2.6	1.4	1.2	8.4	4.2	2.4	2.1	11.9	6.0	3.2	2.8
Oiled	(IL) A	10.4	5.2	2.8	2.5	16.8	8.4	4.7	4.2	23.9	12.1	6.3	5.7
Peak Current Rating	Amps	10.4	5.2	2.8	2.5	16.8	8.4	4.7	4.2	23.9	12.1	6.3	5.7
Motor Stator Data													
Voltage Constant (Ke)	Vrms/krpm	29.9	59.7	106.0	119.5	29.9	59.7	106.7	119.5	30.3	59.2	106.9	119.9
(+/– 10% @ 25˚C)	Vpk/kprm	42.2	84.5	149.9	169.0	42.2	84.5	149.9	168.9	42.9	83.8	151.2	169.6
Pole Configuration	8	8	8	8	8	8	8	8	8	8	8	8	
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	2.8	11.2	39.5	49.6	1.1	4.5	14.1	18.0	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	.00012	.00012	.00012	.00012	.00012	.00012	.00012	.00012	.00012	.00012	.00012	.00012
	(Kg-cm^2)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)
Brake Current @ 24 Vdc	A	.72	.72	.72	.72	.72	.72	.72	.72	.72	.72	.72	.72
Brake Holding Torque - Dry	lbf-in (Nm)	78 (8.81)	78 (8.81)	78 (8.81)	78 (8.81)	78 (8.81)	78 (8.81)	78 (8.81)	78 (8.81)	78 (8.81)	78 (8.81)	78 (8.81)	78 (8.81)
Brake Holding Torque - Oil Lubricated	lbf-in (Nm)	26 (2.94)	26 (2.94)	26 (2.94)	26 (2.94)	26 (2.94)	26 (2.94)	26 (2.94)	26 (2.94)	26 (2.94)	26 (2.94)	26 (2.94)	26 (2.94)
Brake Engage/Disengage Time	ms	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50
Mechanical Time Constant (tm),ms	min	6.5	6.5	7.3	7.2	2.6	2.6	2.6	2.6	1.5	1.5	1.7	1.7
	max	10.8	10.9	12.2	12.0	4.3	4.3	4.4	4.4	2.5	2.5	2.8	2.8
Electrical Time Constant (te)	ms	2.8	2.7	2.5	2.5	3.3	3.3	3.3	3.3	3.8	3.7	3.3	3.3
Damping Constant	lbf-in/krpm	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
	(Nm/krpm)	(.14)	(.14)	(.14)	(.14)	(.14)	(.14)	(.14)	(.14)	(.14)	(.14)	(.14)	(.14)
Friction Torque	lbf-in	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	(Nm)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Motor Wire Insulation		Class 180 H											
Motor Stator Rating		Class 180 H											
Thermal Switch Case Temperature	C	100											
Standard Connectors (O-option)	Motor	MS-3112-E16-8P											
	Feedback	MS-3112-E14-18P											
	Brake/Limit Sw.	MS-3112-E12-8P											

All ratings at 25 degrees Celsius
For amplifiers with peak sinusoidal commutation Kt = Ktrms(0.707), Ic = Icrms/(0.707), Ipk = Ipkrms/(0.707)
*The 3 stack lamination fits only the 6 inch and longer GSX30. The GSX30-03 can only accommodate the 1 or 2 stack.
**The 3X8 option is not available in the 3˝ stroke GSX30 actuator.

Specifications subject to change without notice.

GSX40 Mechanical and Electrical Specifications

		GSX40									
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 / Optional		IP65/67									
Motor Stator		**118**	**138**	**158**	**168**	**238**	**258**	**268**	**338***	**358***	**368***
RMS Sinusoidal Commutation											
Continuous Motor Torque	lbf-in	47.6	47.6	44.7	45.5	78.9	78.8	79.7	107.1	105.5	107.1
	(Nm)	(5.38)	(5.37)	(5.05)	(5.14)	(8.91)	(8.91)	(9.00)	(12.10)	(11.92)	(12.10)
Torque Constant (Kt)	lbf-in/A	4.1	8.2	14.6	16.8	8.2	14.6	16.8	8.4	14.8	16.8
(+/– 10% @ 25˚C)	(Nm/A)	(0.46)	(0.93)	1.65	(1.90)	(0.93)	(1.65)	(1.90)	(0.95)	(1.65)	(1.90)
Continuous Current Rating: Greased	(IG) A	12.9	6.5	3.4	3.0	10.7	6.0	5.3	14.2	8.1	7.1
Oiled	(IL) A	25.9	12.9	6.9	6.0	21.4	12.1	10.6	28.5	16.2	14.2
Peak Current Rating	Amps	25.9	12.9	6.9	6.0	21.4	12.1	10.6	28.5	16.2	14.2
Trapezoidal Commutation											
Continuous Motor Torque	lbf-in	45.5	45.4	42.7	43.5	75.3	75.3	76.1	102.3	100.7	102.3
	(Nm)	(5.14)	(5.13)	(4.83)	(4.91)	(8.51)	(8.50)	(8.60)	(11.56)	(11.38)	(11.56)
Torque Constant (Kt)	lbf-in/A	3.2	6.4	11.4	13.1	6.4	11.4	13.1	6.6	11.4	13.1
(+/– 10% @ 25˚C)	(Nm/A)	(0.36)	(0.72)	(1.28)	(1.48)	(0.72)	(1.28)	(1.48)	(0.74)	(1.28)	(1.48)
Continuous Current Rating: Greased	(IG) A	15.9	7.9	4.2	3.7	13.1	7.4	6.5	17.4	9.9	8.7
Oiled	(IL) A	31.7	15.8	8.4	7.4	26.3	14.8	13.0	34.9	19.8	17.4
Peak Current Rating	Amps	31.7	15.8	8.4	7.4	26.3	14.8	13.0	34.9	19.8	17.4
Motor Stator Data											
Voltage Constant (Ke)	Vrms/krpm	28.1	56.1	96.5	114.8	56.1	99.5	114.8	57.4	99.5	114.8
(+/– 10% @ 25˚C)	Vpk/kprm	39.7	79.4	140.7	162.4	79.4	140.7	162.4	81.2	140.7	162.4
Pole Configuration	8	8	8	8	8	8	8	8	8	8	
Resistance (L-L) (+/– 5% @ 25˚C)	Ohms	0.4	1.7	6.0	7.8	0.7	2.26	3.0	0.5	1.52	1.9
Inductance (L-L) (+/– 15%)	mH	3.0	11.9	37.5	49.9	5.8	18.2	24.2	4.0	12.0	16.0
Brake Inertia	lbf-in-sec^2	.00186	.00186	.00186	.00186	.00186	.00186	.00186	.00186	.00186	.00186
	(Kg-cm^2)	(2.102)	(2.102)	(2.102)	(2.102)	(2.102)	(2.102)	(2.102)	(2.102)	(2.102)	(2.102)
Brake Current @ 24 Vdc	A	.88	.88	.88	.88	.88	.88	.88	.88	.88	.88
Brake Holding Torque - Dry	lbf-in (Nm)	120 (13.56)	120 (13.56)	120 (13.56)	120 (13.56)	120 (13.56)	120 (13.56)	120 (13.56)	120 (13.56)	120 (13.56)	120 (13.56)
Brake Holding Torque - Oil Lubricated	lbf-in (Nm)	40 (4.52)	40 (4.52)	40 (4.52)	40 (4.52)	40 (4.52)	40 (4.52)	40 (4.52)	40 (4.52)	40 (4.52)	40 (4.52)
Brake Engage/Disengage Time	ms	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50
Mechanical Time Constant (tm),ms	min	5.3	5.3	6.0	5.8	2.3	2.3	2.2	1.5	1.5	1.5
	max	7.7	7.7	8.7	8.4	3.3	3.3	3.2	2.1	2.2	2.1
Electrical Time Constant (te)	ms	7.0	7.0	8.2	6.4	8.0	8.0	8.2	8.2	7.9	8.2
Damping Constant	lbf-in/krpm	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
	(Nm/krpm)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)
Friction Torque	lbf-in	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
	(Nm)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)
Bus Voltage	Vrms	115	230	400	460	230	400	460	230	400	460
Speed @ Bus Voltage	rpm	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Motor Wire Insulation		Class 180 H									
Motor Stator Rating		Class 180 H									
Thermal Switch Case Temperature	˚C	100									
Standard Connectors (O-option)	Motor	MS-3102-E20-15P									
	Feedback	MS-3112-E14-18P									
	Brake/Limit Sw.	MS-3112-E12-8P									

All ratings at 25 degrees Celsius
For amplifiers with peak sinusoidal commutation Kt = Ktrms(0.707), Ic = Icrms/(0.707), Ipk = Ipkrms/(0.707)
*The 3 stack lamination fits only the 8 inch and longer GSX40.
The shortest length of each actuator can only accommodate the 1 or 2 stack.

Specifications subject to change without notice.

GSX50 Mechanical and Electrical Specifications

		GSX50							
Nominal Backlash	in (mm)	0.004 (.10)							
Maximum Backlash (preloaded)	in mm	0.0							
Lead Accuracy	in/ft (m/300 mm)	0.001 (.025)							
Maximum Radial Load	lb (N)	100 (445)							
Environmental Rating: Standard		IP65							
Motor Stator		**138**	**158**	**168**	**238**	**258**	**268**	**358***	**368***
RMS Sinusoidal Commutation									
Continuous Motor Torque	lbf-in	106.9	104.4	106.2	179.2	178.2	177.2	236.4	237.5
	(Nm)	(12.07)	(11.80)	(12.00)	(20.25)	(20.13)	(20.02)	(26.71)	(26.83)
Torque Constant (Kt)	lbf-in/A	11.8	20.1	23.5	11.8	20.1	23.5	20.1	23.9
(+/– 10% @ 25˚C)	(Nm/A)	(1.33)	(2.28)	(2.66)	(1.33)	(2.28)	(2.66)	(2.28)	(2.70)
Continuous Current Rating: Greased	(IG) A	10.2	5.8	5.0	17.0	9.9	8.4	13.1	11.1
Oiled	(IL) A	20.3	11.6	10.1	34.1	19.8	16.8	26.2	22.2
Peak Current Rating	Amps	20.3	11.6	10.1	34.1	19.8	16.8	26.2	22.2
Trapeziodal Commutation									
Continuous Motor Torque	lbf-in	102.0	99.7	101.5	171.1	170.1	169.2	225.8	226.8
	(Nm)	(11.53)	(11.26)	(11.46)	(19.34)	(19.22)	(19.12)	(25.51)	(25.62)
Torque Constant (Kt)	lbf-in/A	9.2	15.7	18.3	9.2	15.7	18.3	15.7	18.7
(+/– 10% @ 25˚C)	(Nm/A)	(1.04)	(1.77)	(2.07)	(1.04)	(1.77)	(2.07)	(1.77)	(2.11)
Continuous Current Rating: Greased	(IG) A	12.4	7.1	6.2	20.9	12.1	10.3	16.1	13.6
Oiled	(IL) A	24.9	14.2	12.4	41.7	24.2	20.6	32.1	27.2
Peak Current Rating	Amps	24.9	14.2	12.4	41.7	24.2	20.6	32.1	27.2
Motor Stator Data									
Voltage Constant (Ke)	Vrms/krpm	80.3	137.6	160.6	80.3	137.6	160.6	137.6	163.4
(+/– 10% @ 25˚C)	Vpk/krpm	113.5	194.6	227.1	113.5	194.6	227.1	194.6	231.1
Pole Configuration	8	8	8	8	8	8	8	8	
Resistance (L-L) (+/– 5% @ 25˚C)	Ohm	1.00	3.09	4.06	0.37	1.11	1.52	0.66	0.92
Inductance (L-L) (+/– 15%)	mH	23.7	69.6	94.8	10.7	31.6	43.0	20.3	28.7
Brake Inertia	lbf-in-sec^2	.008408	.008408	.008408	.008408	.008408	.008408	.008408	.008408
	(Kg-cm^2)	(9.5)	(9.5)	(9.5)	(9.5)	(9.5)	(9.5)	(9.5)	(9.5)
Brake Current at 24 VDC	A	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Brake Holding Torque - Dry	lbf-in	354	354	354	354	354	354	354	354
	(Nm)	(39.99)	(39.99)	(39.99)	(39.99)	(39.99)	(39.99)	(39.99)	(39.99)
Brake Engage/Disengage Time	ms	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
Mechanical Time Constant (tm)	ms min	3.3	3.4	3.3	1.2	1.2	1.2	0.7	0.7
	Max	4.7	5.0	4.8	1.8	1.8	1.8	1.1	1.0
Electrical Time Constant (te)	ms	23.6	22.6	23.4	28.9	28.5	28.2	31.0	31.2
Damping Constant	lbf-in/krpm	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
	(Nm/krpm)	(0.79)	(0.79)	(0.79)	(0.79)	(0.79)	(0.79)	(0.79)	(0.79)
Friction Torque	lbf-in	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	(Nm)	(0.90)	(0.90)	(0.90)	(0.90)	(0.90)	(0.90)	(0.90)	(0.90)
Bus Voltage	Vrms	230	400	460	230	400	460	400	460
Speed @ Bus Voltage	rpm	2400	2400	2400	2400	2400	2400	2400	2400
Motor Wire Insulation		Class 180 H							
Motor Stator Rating		Class 180 H							
Thermal Switch Case Temperature	˚C	100							
Standard Connectors (O-option)	Motor	MS-3102-E20-8P							
	Feedback	MS-3112_E14-18P							
	Brake/Limit Sw	MS-3112-E12-8P							

For amplifiers with peak sinusoidal commutation Kt = Ktrms(0.707), Ic = Icrms/(0.707), Ipk = Ipkrms/(0.707)

*The 3 stack lamination fits only the 10 inch or longer GSX50

Specifications subject to change without notice.

GSX60 Mechanical and Electrical Specifications

		GSX60							
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 / Optional		IP65							
Motor Stator		**138**	**158**	**168**	**238**	**258**	**268**	**358**	**368**
RMS Sinusoidal Commutation									
Continuous Motor Torque	lbf-in	252.6	249.9	252.6	424.8	423.0	427.5	604.2	615.0
	(Nm)	(28.53)	(28.23)	(28.53)	(47.99)	(47.79)	(48.30)	(68.26)	(69.49)
Torque Constant (Kt)	lbf-in/A	12.6	21.8	25.2	12.6	21.8	25.2	21.4	25.2
(+/– 10% @ 25˚C)	(Nm/A)	(1.42)	(2.46)	(2.84)	(1.42)	(2.46)	(2.84)	(2.42)	(2.84)
Continuous Current Rating: Greased	(IG) A	22.4	12.8	11.2	37.7	21.7	19.0	31.6	27.3
Oiled	(IL) A	44.9	25.6	22.4	75.5	43.4	38.0	63.1	54.6
Peak Current Rating	Amps	44.9	25.6	22.4	75.5	43.4	38.0	63.1	54.6
Trapezoidal Commutation									
Continuous Motor Torque	lbf-in	241.2	238.6	241.2	405.7	404.0	408.3	577.0	587.3
	(Nm)	(27.25)	(26.96)	(27.25)	(45.83)	(45.69)	(46.13)	(65.19)	(66.35)
Torque Constant (Kt)	lbf-in/A	9. 8	17	19.6	9.8	17.0	19.6	16.7	19.6
(+/– 10% @ 25˚C)	(Nm/A)	(1.11)	(1.92)	(2.22)	(1.11)	(1.92)	(2.22)	(1.88)	(2.22)
Continuous Current Rating:Greased	(IG) A	27.5	15.7	13.7	46.2	26.5	23.3	38.7	33.4
Oiled	(IL) A	54.9	31.4	27.5	92.4	53.0	46.5	77.3	66.9
Peak Current Rating	Amps	54.9	31.4	27.5	92.4	53.0	46.5	77.3	66.9
Motor Stator									
Voltage Constant (Ke)	Vrms/kprm	85.9	148.9	171.8	85.9	149.9	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	0.33	1.0	1.3	0.13	0.41	0.53	0.23	0.30
Inductance (L-L) (+/– 15%)	mH	8.3	24.8	33.0	3.9	11.8	15.8	7.5	10.3
Brake Inertia	lbf-in-sec^2	.0167	.0167	.0167	.0167	.0167	.0167	.0167	.0167
	(Kg-cm^2)	(18.86)	(18.86)	(18.86)	(18.86)	(18.86)	(18.86)	(18.86)	(18.86)
Brake Current at 24 VDC	Amps	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Brake Holding Torque - Dry	lbf-in (Nm)	600 (67.8)	600 (67.8)	600 (67.8)	600 (67.8)	600 (67.8)	600 (67.8)	600 (67.8)	600 (67.8)
Brake Holding Torque - Oil Lubricated	lbf-in (Nm)	375 (42.38)	375 (42.38)	375 (42.38)	375 (42.38)	375 (42.38)	375 (42.38)	375 (42.38)	375 (42.38)
Brake Engage/Disengage Time	ms	250/50	250/50	250/50	250/50	250/50	250/50	250/50	250/50
Mechanical Time Constant (tm), ms	min	5.0	5.1	5.0	2.0	2.1	2.0	1.2	1.2
	max	5.6	5.7	5.6	2.3	2.3	2.3	1.3	1.3
Electrical Time Constant (te),	ms	25.4	24.6	25.1	29.4	29.1	29.8	33.0	34.2
Damping Constant	lbf-in/krpm	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
	(Nm/krpm)	(3.16)	(3.16)	(3.16)	(3.16)	(3.16)	(3.16)	(3.16)	(3.16)
Friction Torque	lbf-in/krpm	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	(Nm/krpm)	(4.52)	(4.52)	(4.52)	(4.52)	(4.52)	(4.52)	(4.52)	(4.52)
Bus Voltage	Vrms	230	400	460	230	400	460	400	460
Speed @ Bus Voltage	rpm	2400	2400	2400	2400	2400	2400	2400	2400
Motor Wire Insulation		Class 180 H							
Motor Stator Rating		Class 180 H							
Thermal Switch Case Temperature	˚C	100							
Standard Connectors (O-option)	Motor	MS-3102-E24-10P							
	Feedback	MS-3112_E14-18P							
	Brake/Limit Sw	MS-3112-E12-8P							

For amplifiers with peak sinusoidal commutation Kt = Ktrms(0.707), Ic = Icrms/(0.707), Ipk = Ipkrms/(0.707)

Specifications subject to change without notice.

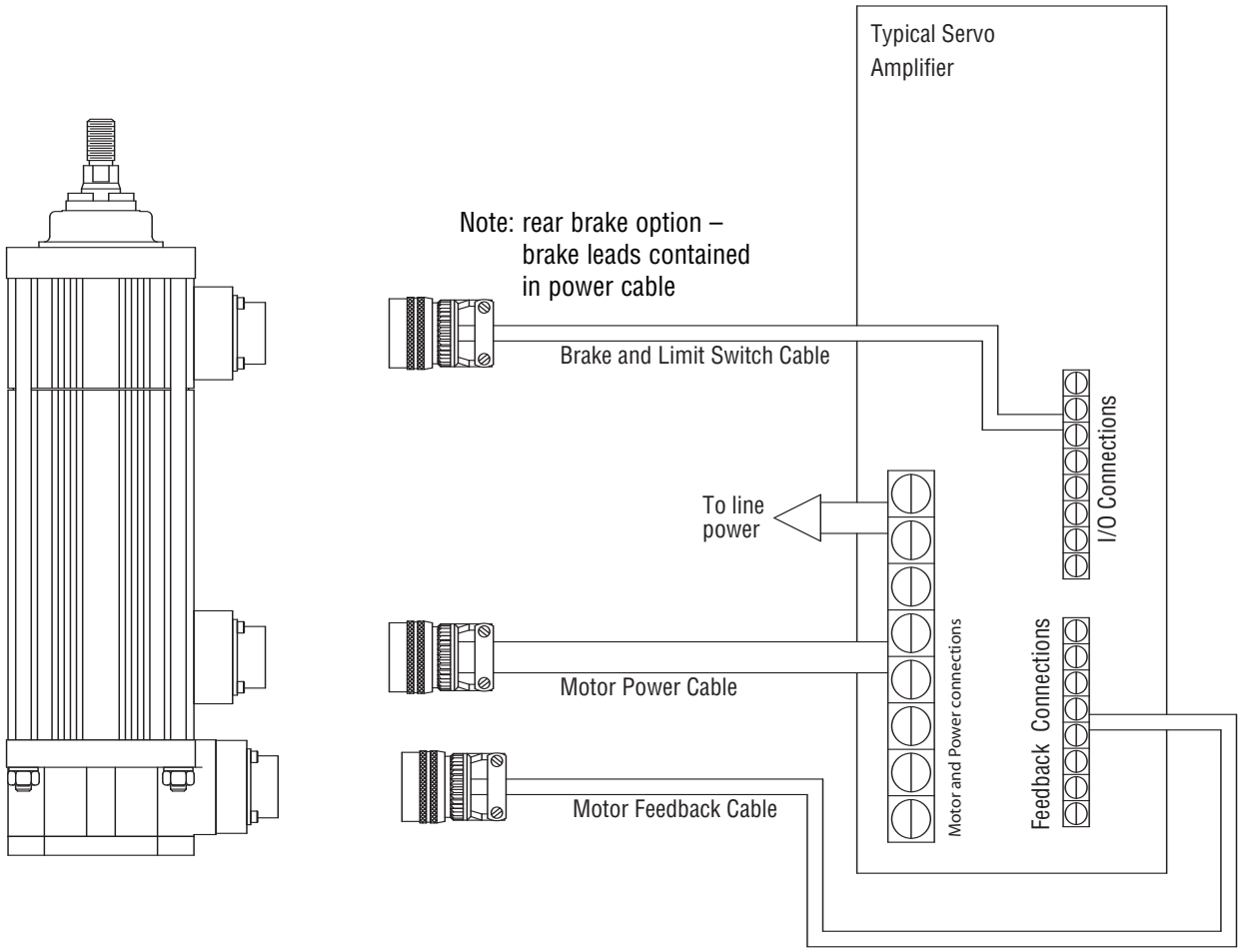
GSX Series – System Configuration

GSX Series actuators include an integrated brushless servo motor. Exlar's unique design gives users a variety of the feedback configuration options so GSX units can be powered by almost any brushless motor amplifier on the market.

This flexibility means GSX actuators can be incorporated into today's highest performance single and multi-axis motion control systems. In anything from food and beverage packaging, to multi-axis turning centers, to aircraft assembly, GSX Series units show incredible performance and durability.

The schematic below shows the typical connections for a single axis system with actuator and servo amplifier.

The Brake and Limit Switch Options for the GSX actuators are mutually exclusive. Only one of the two options is available on a GSX series actuator. They utilize the same cable, so connections need be made only for the option being used.



Drawings subject to change. Consult Exlar for certified drawings.

GSX Series Cable and Connector Selection

This section provides you with cable part numbers for operation of your GSX Series actuators with both Exlar's and other manufacturers' servo drives.

The "O" connector option on the GSX Series of actuators provides for an actuator with Exlar's standard MS style connectors, compatible with Exlar's standard cables.

The "M" connector option on the GSX series of actuators provides for an actuator configured with connectors that allow the end user to purchase the feedback cable or power and feedback cables from the manufacturer of their servo amplifier, thus eliminating the headaches and confusion that can arise from power and feedback wiring.

Depending on actuator size, voltage, and cable availability from the amplifier manufacturer, some cables must be obtained from Exlar.

For amplifier manufacturers who use standard style military connectors, with molded and shielded cables, the feedback cable can be purchased from the amplifier manufacturer, and the power cable purchased from Exlar. The Exlar power cables with the PCx-MC-xxx model numbers are molded and shielded and provide a good match with the cables provided by the amplifier manufacturer.

For some amplifier manufacturers who utilize a different style of connector, when the "M" option is available from Exlar, both the connectors will be configured to allow the feedback and power cables to be purchased from the amplifier manufacturer. Consult Exlar for details on all connector configurations.

Cables For Actuators With Exlar Standard "O" Connections

Power Cables	Connector-ization	Description	Standard Exlar Power Cable
GSX20	O	Standard Power, Molded, Shielded	PC6-MC-xxx
GSX30	O	Standard Power, Anodized	PC1-AC-xxx
	E	Standard Power, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	PC1-EC-xxx
GSX40	O	Standard Power, Molded, Shielded	PC7-MC-xxx
GSX50	O	Standard Power, Anodized	PC7-AC-xxx
	E	Standard Power, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	PC7-EC-xxx
GSX60	O	Standard Power, Anodized	PC3-AC-xxx
	E	Standard Power, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	PC3-EC-xxx
Feedback Cables			**Standard Exlar Feedback Cable**
GSX20	O	Standard Resolver Feedback, Anodized	RC1-AC-xxx
GSX30	O	Standard Encoder Feedback, Anodized	EC1-AC-xxx
	E	Standard Resolver Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	RC1-EC-xxx
	E	Standard Encoder Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC1-EC-xxx
GSX40	O	Standard Resolver Feedback, Anodized	RC1-AC-xxx
GSX50	O	Standard Encoder Feedback, Anodized	EC1-AC-xxx
	E	Standard Resolver Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	RC1-EC-xxx
	E	Standard Encoder Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC1-EC-xxx
GSX60	O	Standard Resolver Feedback, Anodized	RC1-AC-xxx
	O	Standard Encoder Feedback, Anodized	EC1-AC-xxx
	E	Standard Resolver Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	RC1-EC-xxx
	E	Standard Encoder Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC1-EC-xxx
Brake Cables			**Standard Exlar Brake Cable**
GSX20	O	Standard Brake Cable, Anodized	BC1-AC-xxx
GSX30	E	Standard Brake Cable, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	BC1-EC-xxx
GSX40	O	Standard Brake Cable, Anodized	BC1-AC-xxx
GSX50	E	Standard Brake Cable, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	BC1-EC-xxx
GSX60	O	Standard Brake Cable, Anodized	BC1-AC-xxx
	E	Standard Brake Cable, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	BC1-EC-xxx

Cables For Actuators With "M" Connectors (standard lengths of 15´, 25´ and 50´)

Exlar Actuator	Amplifier Manufacturer and Type	Exlar Feedback Callout	Power Cable Manufacturer	Power Cable Part Number	Feedback Cable Manufacturer	Feedback Cable Part Number
GSX20 GSX30	Allen Bradley Ultra 100/200	AB1	Exlar	PC6-MC-xxx	Allen Bradley	9101-1366-xxx
	Allen Bradley Ultra 3000/5000	AB7*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx
	Allen Bradley Ultra 3000/5000	AB4/AB5*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx**
	Control Techniques En, Epsilon and MDS Series	EM2	Control Techniques	CMDS-xxx	Control Techniques	CFCS-xxx
	Kollmorgen Servo Star & Servo Star CD	KM1	Kollmorgen	CSSSRHA1H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHA1H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM5/KM2	Kollmorgen	CSSSRHG1H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHG1H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM3/KM4	Kollmorgen	CSSSS3HG2H-xxx set includes feedback cable)	Kollmorgen	CSSSS3HG2H-xxx (set includes power cable)
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN1	Bosch/Rexroth Indramat	IKG4077, IKG4017, IKG4009, IKG4008 depending on Indramat amplifier	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN2	Bosch/Rexroth Indramat	IKG4077, IKG4017, IKG4009, IKG4008 depending on Indramat amplifier	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN4/IN3	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4374
	Bosch/Rexroth Indramat DIAX Series	IN1	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN2	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN3	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4374
	Parker Compumotor Gemini Series	PC3	Exlar	PC6-MC-xxx	Parker Compumotor	71-018308-XX
	Yaskawa Sigma II Series (3 inch and smaller motors 100/200VAC)	YS3	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (3 inch and smaller motors 400VAC)	YS3	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 100/200VAC)	YS2	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 400VAC)	YS2	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
GSX40 GSX50	Allen Bradley Ultra 100/200	AB1	Exlar	2090-UXNPAMP-14Sxx – GSX40 only 2090-UXNPAMP-10Sxx – GSX50 only	Allen Bradley	9101-1366-xxx
	Allen Bradley Ultra 3000/5000	AB7*	Allen Bradley	2090-UXNPAMP-14Sxx – GSX40 only 2090-UXNPAMP-10Sxx – GSX50 only	Allen Bradley	2090-UXNFBMP-Sxx
	Allen Bradley Ultra 3000/5000	AB4/AB5*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx**
	Control Techniques En, Epsilon and MDS Series	EM2	Control Techniques	CMMS-xxx	Control Techniques	CFCS-XXX
	Kollmorgen Servo Star & Servo Star CD	KM1	Kollmorgen	CSSSRHA2H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHA2H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM5/KM2	Kollmorgen	CSSSRHG2H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHG2H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM4/KM3	Kollmorgen	CSSSS3HG2H-xxx (set includes feedback cable)	Kollmorgen	CSSSS3HG2H-xxx (set includes power cable)
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN1	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN2	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN3/IN4	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4374
	Bosch/Rexroth Indramat DIAX Series	IN1	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN2	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN3	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4374
	Parker Compumotor Gemini Series	PC3	Exlar	PC7-MC-xxx	Parker Compumotor	71-018308-XX
	Yaskawa Sigma II Series (3 inch and smaller motors 100/200VAC)	YS3	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (3 inch and smaller motors 400VAC)	YS3	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 100/200VAC)	YS2	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 400VAC)	YS2	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
GSX60	As in tables above for GSX40/GSX50	As in tables above for GSX40/GSX50	Exlar	PC3-AC-xxx	As in tables above for GSX40/GSX50	As in tables above for GSX40/GSX50
	Allen Bradley Ultra 3000/5000	AB4/AB5/AB7*	Allen Bradley	2090-UXNPAMP-10Sxx	Allen Bradley	2090-UXNFBMP-Sxx

* Brake Cable AB4/AB5 and AB7, 2090-UXNPAMP-18Sxx

** Exlar Corporation uses absolute encoders for AB4 and AB5 configurations that are powered by 5 VDC. A customer not using Allen-Bradley's universal feedback cable referenced here, must make provisions such that the wiring scheme provides connectivity according to Allen-Bradley's wiring requirments for 5 VDC encoder power from the amplifier to the encoder.

High Power/Minimal Maintenance Operation Guidelines

Exlar GSX series actuators can be lubricated with either grease or oil. All are shipped from the factory fully greased and are capable of functioning for many thousands of hours between re-greasings. Typically, greased lubrication is preferred for lower speed or intermittent duty applications. In these situations, you simply mount the actuator, connect the servo amplifier, and run.

However, many GSX Series actuators are deployed into applications involving high speed, high force, or both. To provide the cooling required when operating at these high power levels and/or to eliminate periodic re-greasing, all GSX units have another built-in feature. They are designed with an internal circulation path and the portings necessary for customers to convert from grease by connecting a recirculation oil system. This feature makes GSX units the only all-electric actuators on the market capable of true continuous-duty performance in moderate and high power applications when heat is an issue.

The conversion to externally supplied oil is simple. Identify which port will be lowest when the actuator is mounted. That will become the oil supply side. *(For optimum cooling it is important that GSX actuators are mounted so the high-side port is at least above the unit's centerline, preferably in the top quarter region. This assures that the stator windings receive the oil's cooling benefits.)* Just connect your oil lines and you're done. Residual grease will be flushed out and filtered during initial operation.

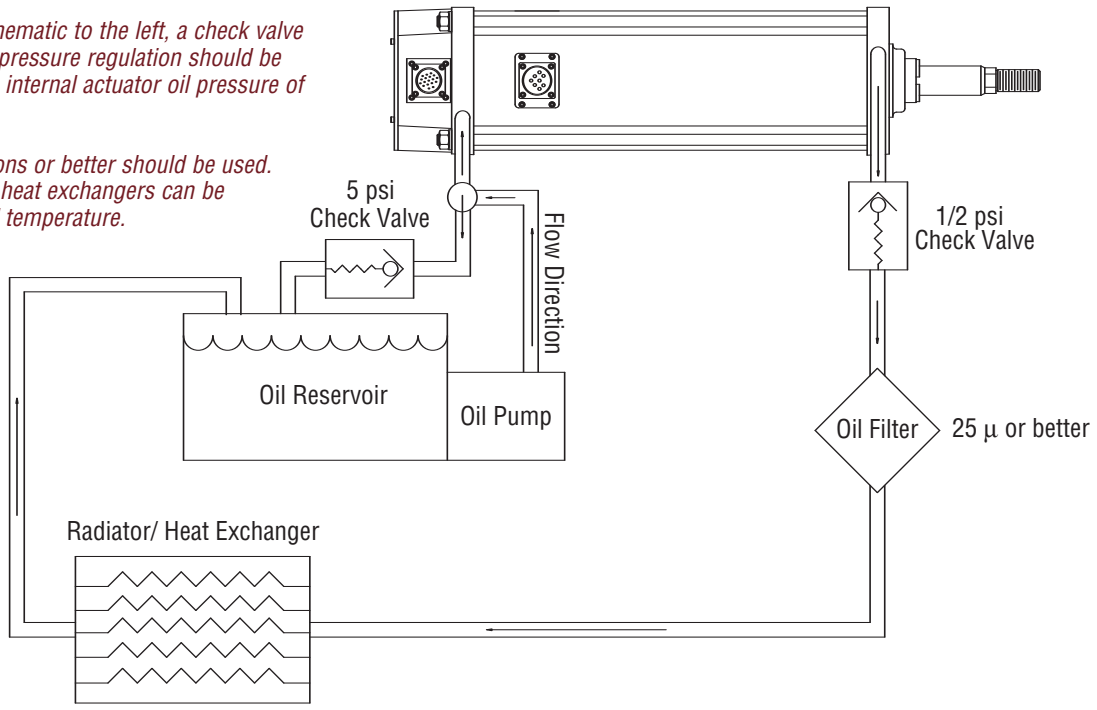
A typical oil cooling system is shown below. Whenever application requirements are such that the RMS current requirement exceeds the continuous current rating of the GSX motor, oil cooling should be used to keep case temperatures below their 85˚C maximum specification. For very high speed applications, consult Exlar for oil routing recommendations.

Simple Oil System Schematic

As shown in the schematic to the left, a check valve or other method of pressure regulation should be used to maintain an internal actuator oil pressure of 5 psi.

Filtering of 25 microns or better should be used. Simple radiators or heat exchangers can be used to maintain oil temperature.

Locate oil system as close to actuator as possible. Use as large as possible oil line to minimize any possibility of flow restriction.



Exlar recommends the use of petroleum based gear oils with EP additive. An ISO 100 grade is suitable for most applications. Examples of this type of oil are: Mobil Mobilgear, Exxon Spartan EP, Shell Omala and Texaco Meropa. Oils meeting the FDA's food grade specifications are also available such as Mobil DTE FM 32.

Oil Cooling and Lubrication

Oil lubrication will extend the life of the actuator and improve its efficiency. More importantly, oil is required in high power applications for cooling. In applications where the RMS current exceeds I_G (see electrical specs on pages 13-17), oil lubrication is required in order to maintain the case temperature below its maximum of 85°C[1]. When such oil lubrication is required, you can determine oil flow rates and case temperatures from this information:

Actuator Load Constants: $K_L = \left(\frac{°C \times Gal}{Hour}\right)$

$K_{L\ GSX20}$	=	40
$K_{L\ GSX30}$	=	70
$K_{L\ GSX40}$	=	95
$K_{L\ GSX50}$	=	125
$K_{L\ GSX60}$	=	260

Application Load Factor: F_L

$$F_L = \left(\frac{I_{rms}}{I_G}\right)^2$$

Where:

I_{rms} = actual application current

I_G = actuator current rating from specifications (see pages 13-17)

Use this relationship to determine oil flow requirements: W

$$W = K_L \frac{F_L}{\Delta T} \qquad \text{Where} \qquad \Delta_T = T_{CASE} - T_{OIL}$$

Consider The Following Examples:

CASE 1:

A GSX30-238 requires 4 amps of RMS current to perform the required application. The incoming oil temperature is 45°C, and we desire to maintain the actuator at it's maximum case temperature of 85°C.

$F_L = (4/3.4)^2 = 1.38$ $\qquad$ $W = [(1.38 \times 70)/(85 - 45)] = 2.415$ GAL / HOUR

CASE 2:

A GS45 requires 12 amps of RMS current to perform the required application. The incoming oil temperature is 45°C, and we desire to maintain the actuator at it's maximum case temperature of 85°C.

$F_L = (\ 12/8\ )^2 = 2.25$ $\qquad$ $W = [(\ 2.25*125\ ) / (85 - 45)] = 7.0$ GAL / HOUR

1. *GSX Series actuators can be ordered with features that allow them to achieve case temperatures of 150°C. Inquire with Exlar's application engineers or local representative for details.*

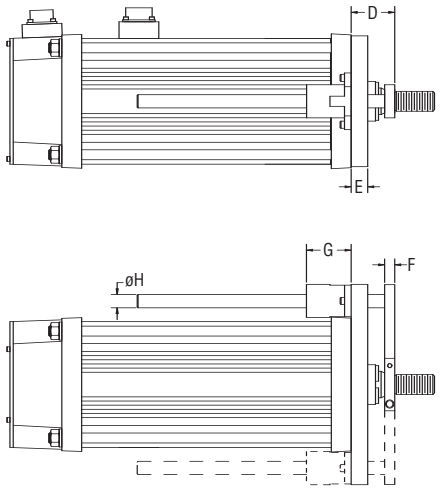
GSX Series Linear Actuator Anti-rotation Option

The unique design of the GSX Series of linear actuators permits the extending rod to rotate. This simplifies actuator setup by allowing the user to rotate the rod and thread it in and out of the actuator for mechanical attachment or system testing.

However, this feature also requires that once setup and testing are completed, the rod be kept from rotating so proper linear motion will be maintained. In most applications the actuator's load is coupled to linear bearings, or some other support device. In these cases the load cannot rotate, and a separate anti-rotation system is not needed.

For applications in which the load is free to rotate, Exlar offers the anti-rotation systems shown below. Shorter GSX units use an anti-rotation arm on one side of the actuator. Longer strokes (defined above right) use rods on both sides.

Anti-rotation Option GSX20, GSX30, GSX40 and GSX60

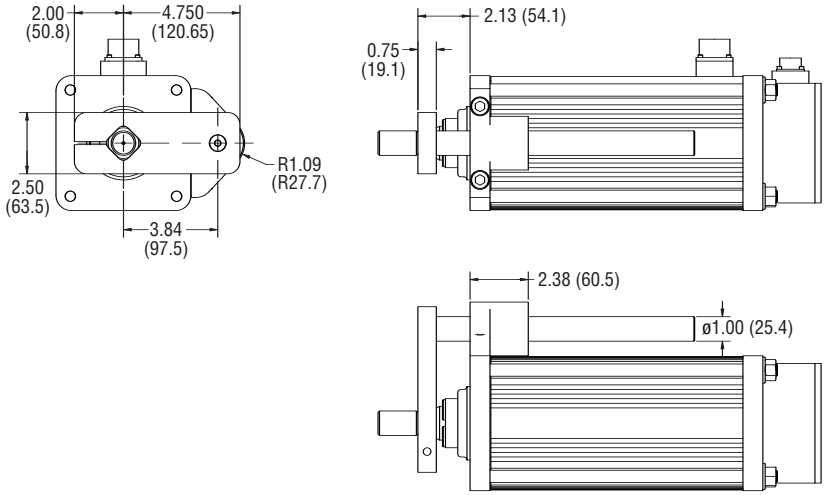


For longer strokes a second Anti-Rotate arm is used.
Longer strokes are:

- GSX20, 12 inch
- GSX30, 10 inch and longer.
- GSX40, 12 inch and longer
- GSX60, 10 inch only and uses a single sided Anti-Rotate.

Dims in inches (mm)	GSX20	GSX30	GSX40	GSX60
A	0.60 (15.2)	0.79 (20.1)	1.25 (31.8)	1.75 (44.5)
B	1.81 (46.0)	2.54 (64.5)	3.78 (96.0)	5.79 (147)
C	0.54 (13.7)	0.71 (18.0)	0.98 (24.9)	1.55 (39.4)
D	1.00 (25.4)	1.30 (33.0)	1.64 (41.7)	1.94 (49.3)
E	0.44 (11.2)	0.44 (11.2)	0.63 (16.0)	0.75 (19.1)
F	0.28 (7.11)	0.32 (8.13)	0.38 (9.65)	0.50 (12.7)
G	0.31 (7.87)	1.69 (42.9)	1.69 (42.9)	2.81 (71.4)
øH	0.37 (9.40)	0.50 (12.7)	0.50 (12.7)	1.00 (25.4)

Anti-rotation Option GSX50



Drawings subject to change. Consult Exlar for certified drawings.

GSX Series Travel Options

PF = Preloaded Follower

This option offers a true zero backlash follower for the GSX 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 absolute internal feedback option.

EB = Electric Brake

This option provides an internal holding brake for the GSX20, 30, 40 & 60 actuators. The brake is spring activated and electrically released.

RB = Rear Electric Brake

This option provides an internal holding brake for the GSX50 actuator. The brake is spring activated and electrically released.

ES = Internal End of Travel Switches

This option allows for two internal end of travel switches to be included with the GSX Series actuator. These switches provide end of travel indication to the controller and are not adjustable. See page 31 for details.

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.

XT = Special Travel Option Selections

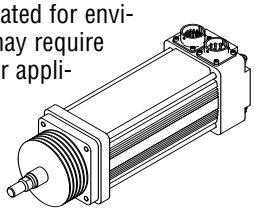
The XT Option can be used to specify various special travel options on the GSX Series of Linear Actuators. Because this option can be used to specify many things, it is important that an order including the -XT option spell out in detail, the exact options being selected by the including of the -XT in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

Descriptions:

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 neoprene coated nylon. This standard bellows is rated for environmental temperatures of -54 degrees to 121 degrees Celsius. Longer strokes may require the main rod of the actuator to be extended beyond standard length. Consult Exlar applications engineers for details.

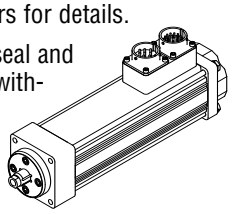


High Temp Protective Bellows

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 high temperature material of this bellows is silicone coated fiberglass. This standard bellows is rated for environmental temperatures of -73 degrees to 288 degrees Celsius. Longer strokes may require the main rod of the actuator to be extended beyond standard length. Consult Exlar applications engineers for details.

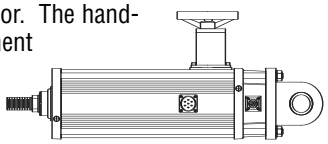
Splined Main Rod

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.



Manual Drive Handwheel

This option provides for a manual drive handwheel on the side of the actuator. The handwheel has a engagement/disengagement lever which allows for disengagement of the handwheel during operation. This engagement/disengagement lever is not tied to the operation of the motor and requires that the user guarantee its disengagement before operating the motor. Not available on GSX20.



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 anti-rotate for this option). See page 32 for details.

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.

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.

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	

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 GSX-30-03-01-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 Exlar applications engineers. Also, it is not possible to produce every possible speed from -01 to -99 for each motor at each voltage so please contact Exlar applications engineers for confirmation of the speed that is desired for the application.

Absolute Linear Feedback Options

LT = LVDT (VRVT) including conditioner
This option provides for an actuator containing an internally mounted LVDT (VRVT) transducer spanning the full stroke of the actuator. Inquire with Exlar engineering for details and conditioner output preference.

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 = 1 stack, 230 Vrms, 8 Pole, Class 180 H
158 = 1 stack, 400 Vrms, 8 Pole, Class 180 H
168 = 1 stack, 460 Vrms, 8 Pole, Class 180 H
218 = 2 stack, 115 Vrms, 8 Pole, Class 180 H
238 = 2 stack, 230 Vrms, 8 Pole, Class 180 H
258 = 2 stack, 400 Vrms, 8 Pole, Class 180 H
268 = 2 stack, 460 Vrms, 8 Pole, Class 180 H
318 = 3 stack, 115 Vrms, 8 Pole, Class 180 H
338 = 3 stack, 230 Vrms, 8 Pole, Class 180 H
358 = 3 stack, 400 Vrms, 8 Pole, Class 180 H
368 = 3 stack, 460 Vrms, 8 Pole, Class 180 H

Rod End Attachments

Rear Clevis Pin
Spherical Rod Eye
Rod Eye
Rod Clevis

See drawings on pages 33-36.

Attachments ordered separate from actuator.

Housing Options

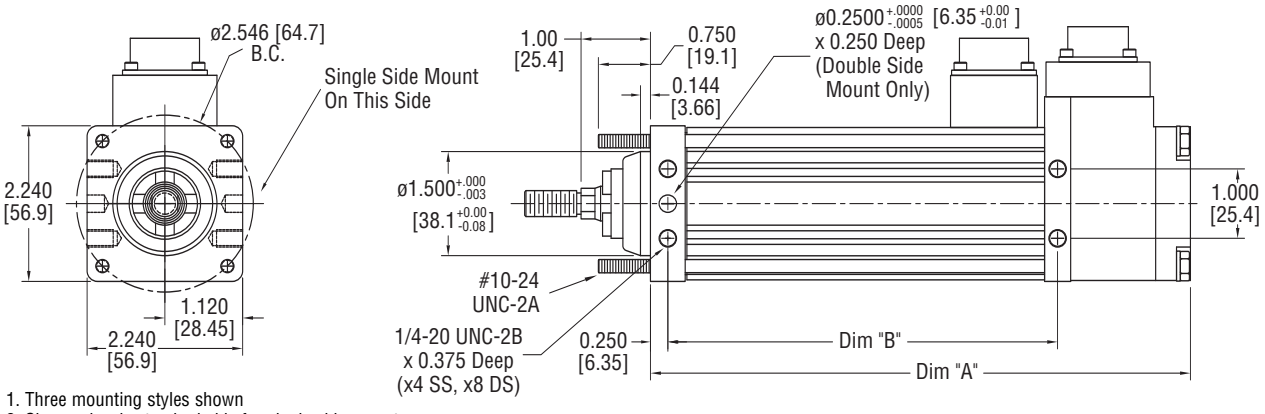
FG = Food Grade Epoxy
This option provides for an actuator coated with FDA approved white epoxy.

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. Please inquire with Exlar for dimensions.

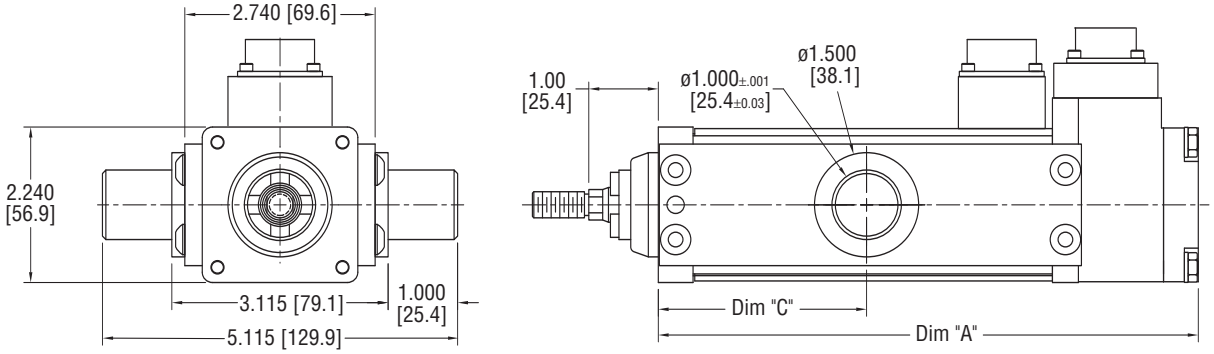
XH = Special Housing Option
Any housing option that is not designated by the above codes should be listed as XH and described at time of order. All special options must be discussed with Exlar engineering.

GSX20 Single, Double Side Mounts or Extended Tie Rod Mount

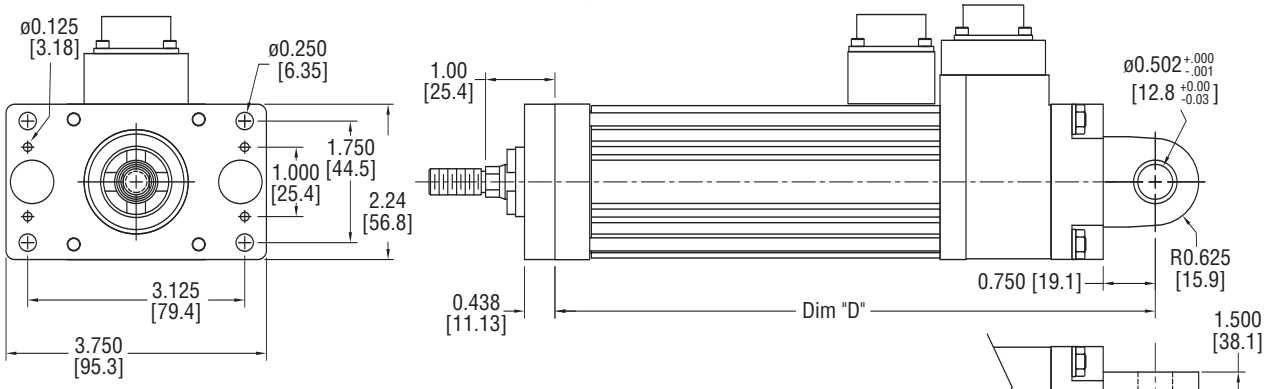


1. Three mounting styles shown
2. Shown view is standard side for single side mount

GSX20 Side Trunnion Mount



GSX20 Rear Clevis Mount or Front Flange Mount



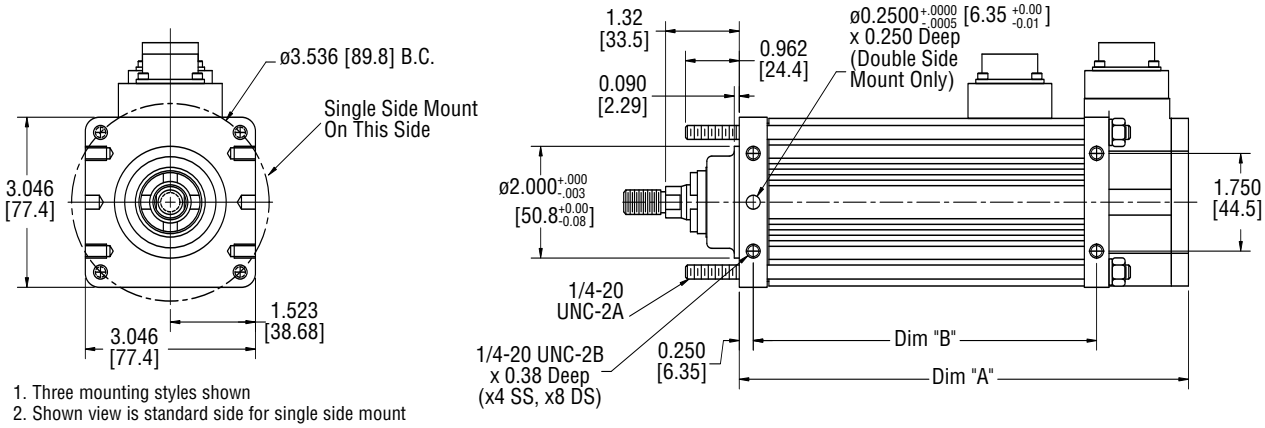
Dim	3 inch (mm) stroke	6 inch (mm) stroke	10 inch (mm) stroke	12 inch (mm) stroke
A	7.775 (197.5)	10.775 (273.7)	14.775 (375.3)	16.775 (426.1)
B	5.613 (142.6)	8.613 (218.8)	12.613 (320.4)	14.613 (371.2)
C	3.000 (76.2)	6.000 (152.4)	10.000 (254.4)	12.000 (304.8)
D	8.775 (222.9)	11.775 (299.1)	15.775 (400.7)	17.775 (451.5)

Note: Add 1.784 Inches to Dims "A,B,& D" if ordering an Electric Brake or Internal End of Travel Switches.

1. Two mounting styles shown
2. With flange mount, dimension A is equivalent to top two drawings

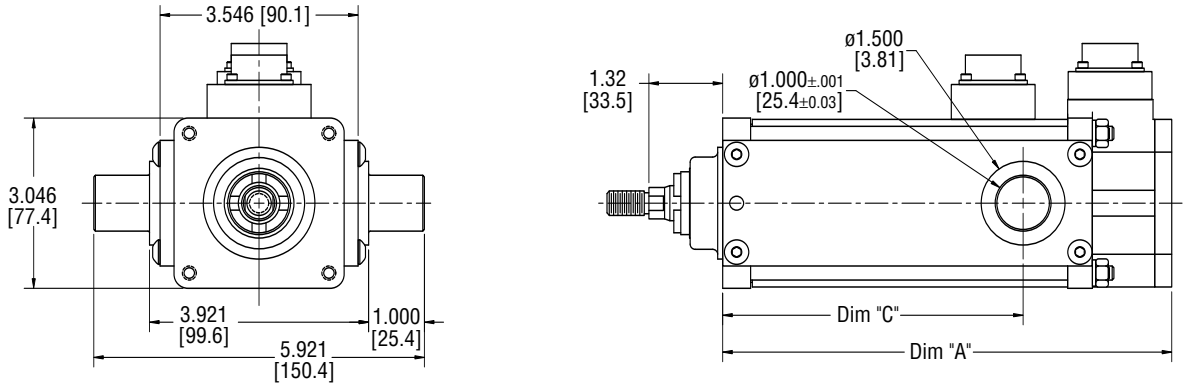
Drawings subject to change. Consult Exlar for certified drawings.

GSX30 Single, Double Side Mounts or Extended Tie Rod Mount

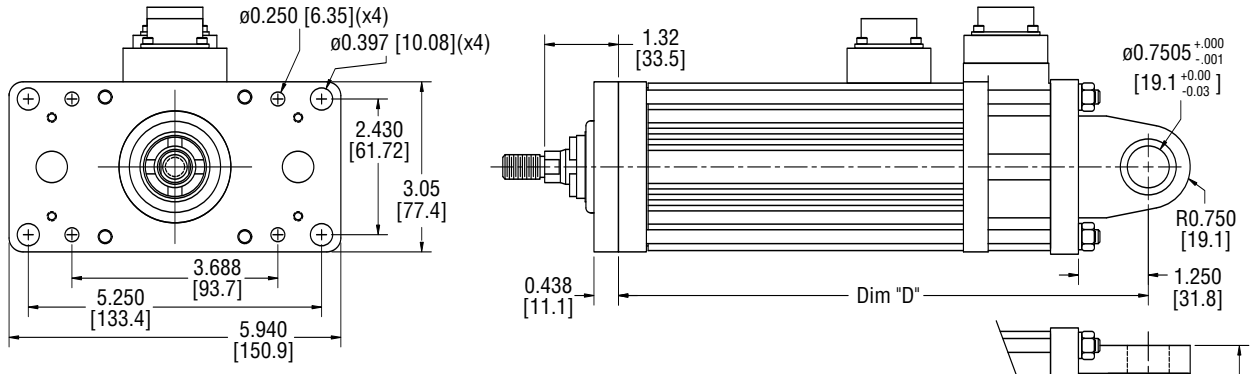


1. Three mounting styles shown
2. Shown view is standard side for single side mount

GSX30 Side Trunnion Mount



GSX30 Rear Clevis Mount or Front Flange Mount



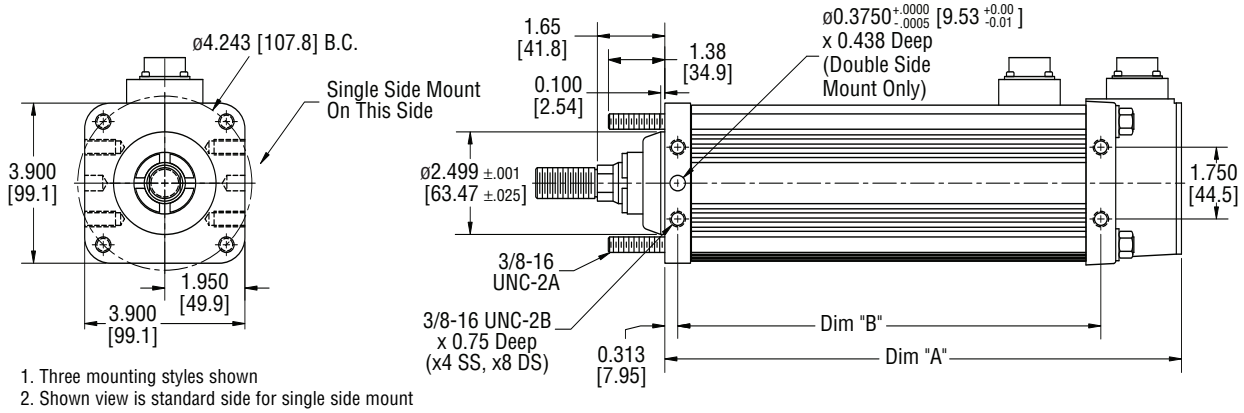
Dim	3 inch (mm) stroke	6 inch (mm) stroke	10 inch (mm) stroke	14 inch (mm) stroke	18 inch (mm) stroke
A	8.041 (204.2)	10.514 (267.1)	15.013 (381.3)	19.013 (482.9)	23.013 (584.5)
B	6.147 (156.1)	8.620 (218.9)	13.119 (333.3)	17.119 (434.8)	21.119 (536.4)
C	5.380 (136.7)	8.006 (203.4)	10.000 (254.0)	14.000 (355.6)	18.000 (457.2)
D	9.486 (240.9)	11.959 (303.8)	16.458 (418.0)	20.458 (519.6)	24.458 (621.2)

Note: Add 1.773 Inches to Dims "A,B,&D" if ordering an Electric Brake or Internal End of Travel Switches.

1. Two mounting styles shown
2. With flange mount, dimension A is equivalent to top two drawings

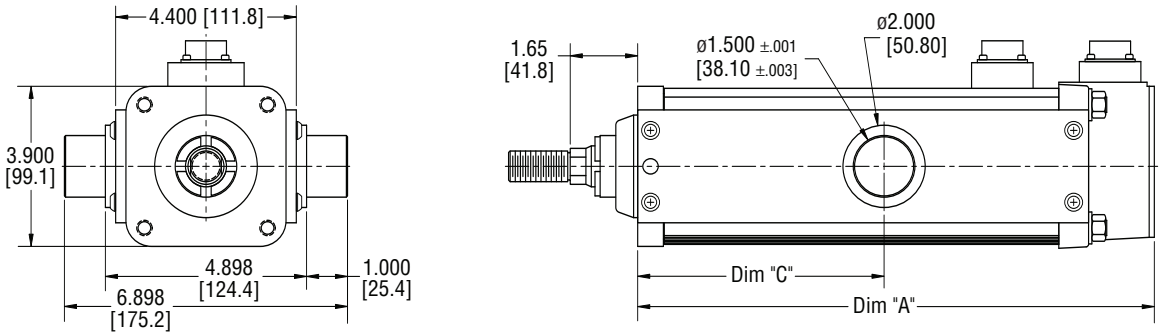
Drawings subject to change. Consult Exlar for certified drawings.

GSX40 Single, Double Side Mounts or Extended Tie Rod Mount

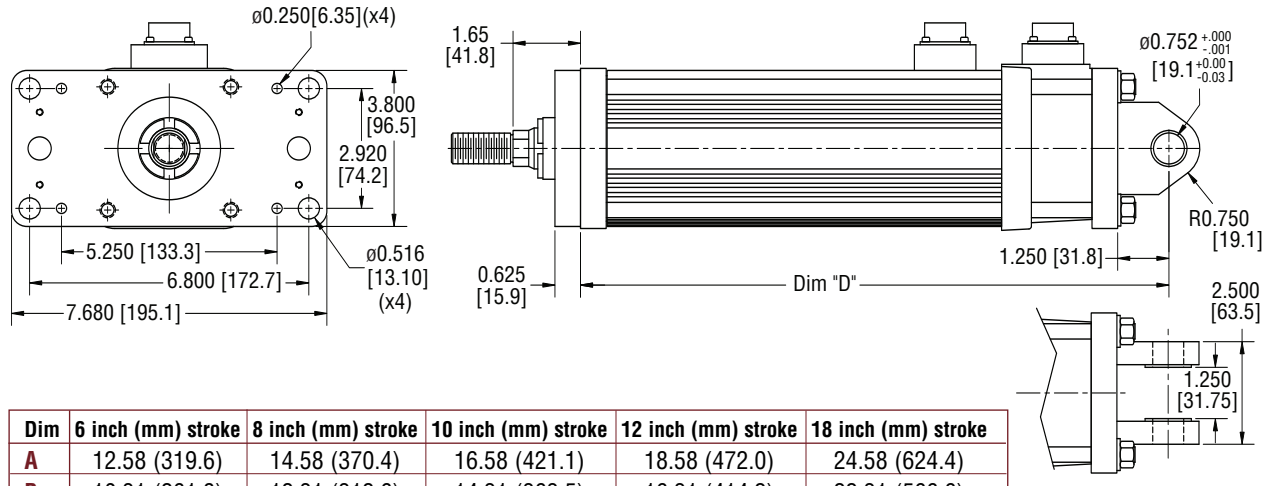


1. Three mounting styles shown
2. Shown view is standard side for single side mount

GSX40 Side Trunnion Mount



GSX40 Rear Clevis Mount or Front Flange Mount



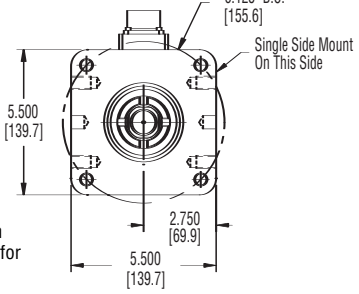
Dim	6 inch (mm) stroke	8 inch (mm) stroke	10 inch (mm) stroke	12 inch (mm) stroke	18 inch (mm) stroke
A	12.58 (319.6)	14.58 (370.4)	16.58 (421.1)	18.58 (472.0)	24.58 (624.4)
B	10.31 (261.8)	12.31 (312.6)	14.31 (363.5)	16.31 (414.2)	22.31 (566.6)
C	6.00 (152.4)	8.00 (203.2)	10.00 (254)	12.00 (304.8)	18.00 (457.2)
D	14.33 (364.0)	16.33 (414.8)	18.33 (465.6)	20.33 (516.4)	26.33 (668.8)

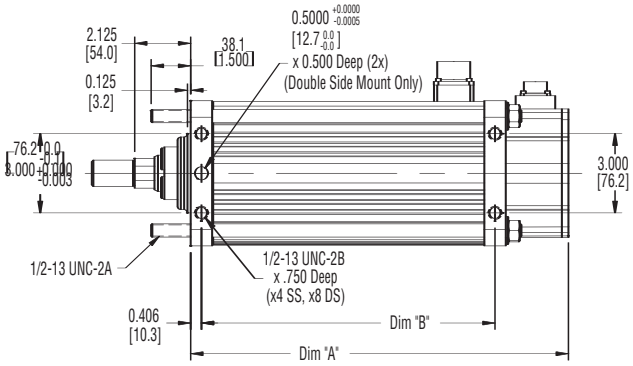
Note: Add 2.330 Inches to Dims "A,B,&D" if ordering an Electric Brake or Internal End of Travel Switches.

1. Two mounting styles shown
2. With flange mount, dimension A is equivalent to top two drawings

Drawings subject to change. Consult Exlar for certified drawings.

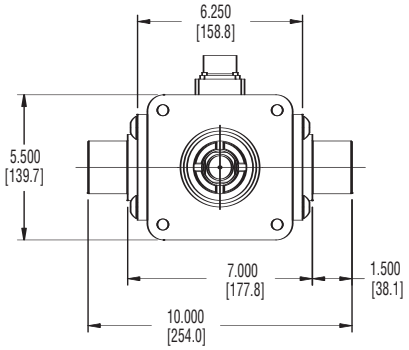
GSX50 Single, Double Side Mounts or Extended Tie Rod Mount

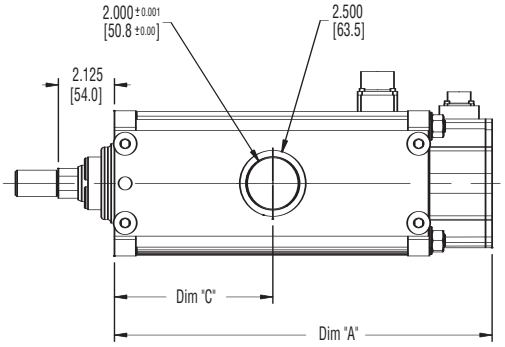




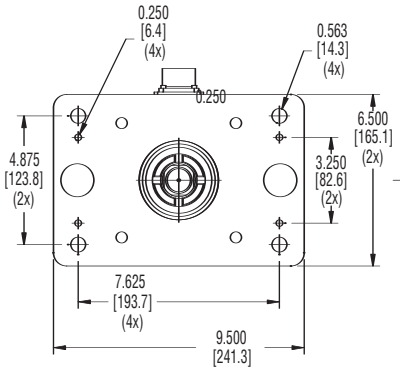
1. Three mounting styles shown
2. Shown view is standard side for single side mount

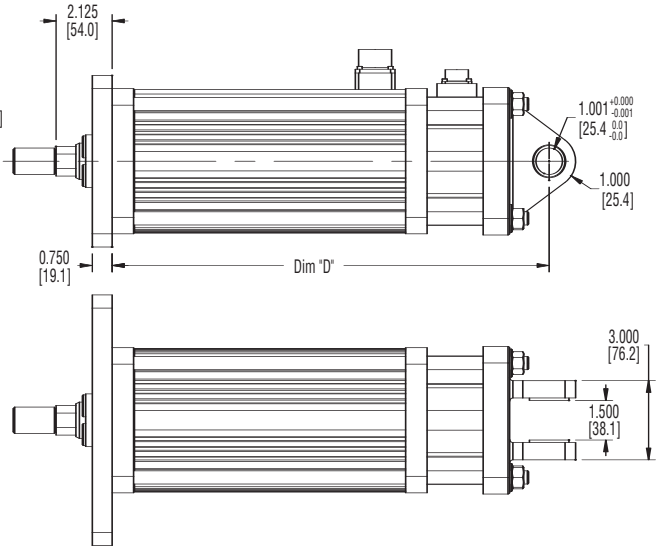
GSX50 Side Trunnion Mount





GSX50 Rear Clevis Mount or Front Flange Mount



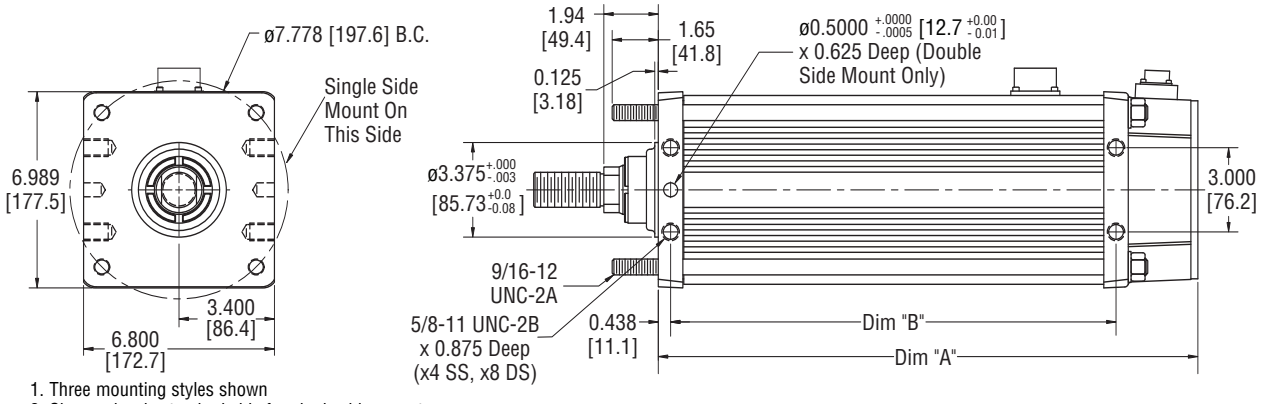


1. Two mounting styles shown
2. With flange mount, dimension A is equilavent to top two drawings

Dim	6 inch (mm) stroke	10 inch (mm) stroke	14 inch (mm) stroke
A	14.31 (363.5)	18.31 (465.1)	22.31 (566.7)
B	11.12 (282.4)	15.12 (384.0)	19.12 (485.6)
C	6.00 (152.4)	10.00 (254.0)	14.00 (355.6)
D	16.56 (420.6)	20.56 (522.2)	24.56 (623.8)
Note: Add 2.498 Inches to Dims "A,B,&D" if ordering an Electric Brake or Internal End of Travel Switches.			

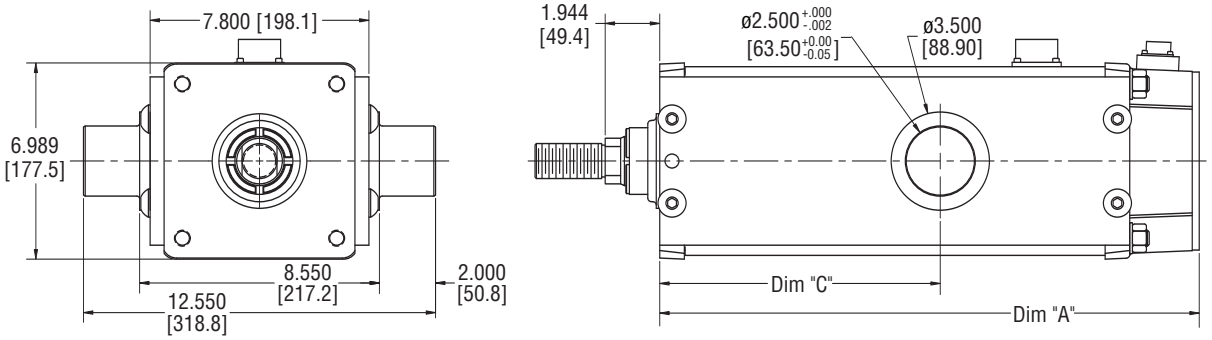
Drawings subject to change. Consult Exlar for certified drawings

GSX60 Single, Double Side Mounts or Extended Tie Rod Mount

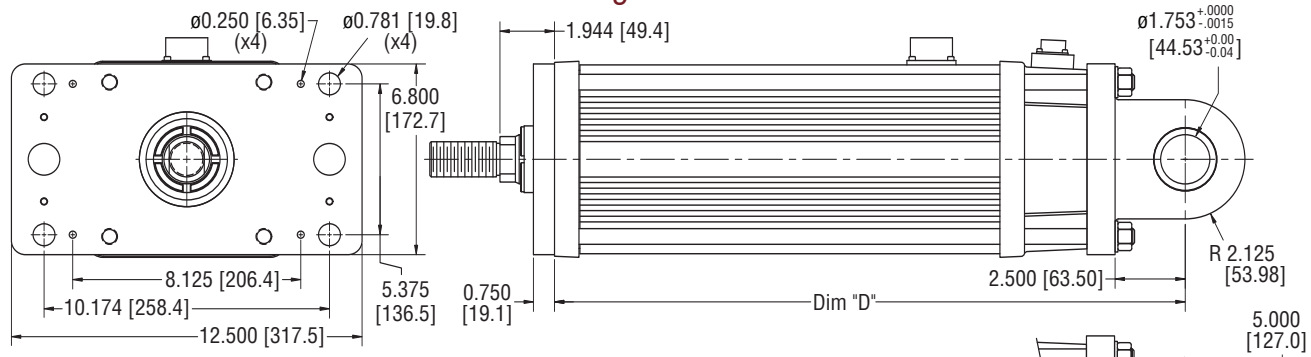


1. Three mounting styles shown
2. Shown view is standard side for single side mount

GSX60 Side Trunnion Mount



GSX60 Rear Clevis Mount or Front Flange Mount



Dim	6 inch (mm) stroke	10 inch (mm) stroke
A	15.23 (386.8)	19.23 (488.4)
B	11.88 (301.8)	15.88 (403.3)
C	6.00 (152.4)	10.00 (254.0)
D	18.48 (469.4)	22.48 (571.0)

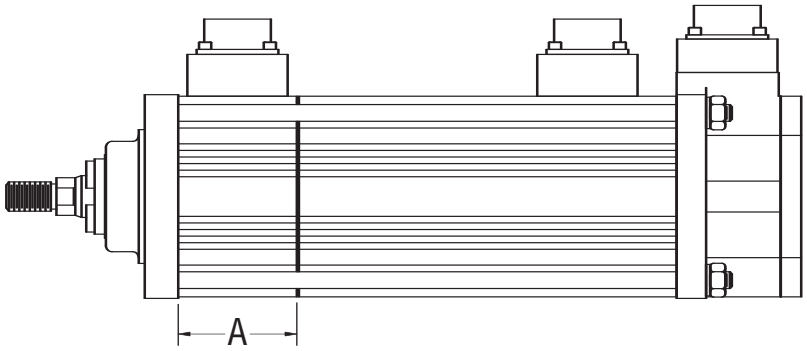
Note: Add 3.575 Inches to Dimensions "A,B,&D" if ordering an Electric Brake or Internal End of Travel Switches.

1. Two mounting styles shown
2. With flange mount, dimension A is equivalent to top two drawings

Drawings subject to change. Consult Exlar for certified drawings.

GSX20, GSX30, GSX40 & GSX60 Brake and Internal Limit Switch Extension Options

Note: The stroke limitation from the limit switch option IS NOT MECHANICAL. It represents the position at which the switches will activate. The stroke limitation for the brake is a mechanical limitation. The brake and limit switch options are mutually exclusive and thus are not available in the same unit. Drawing and specifications subject to change without notice.

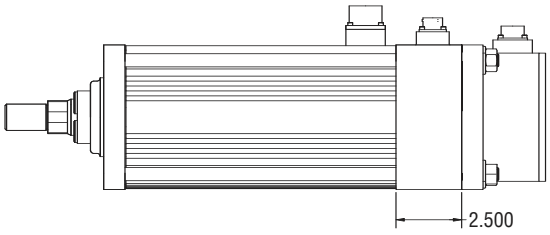


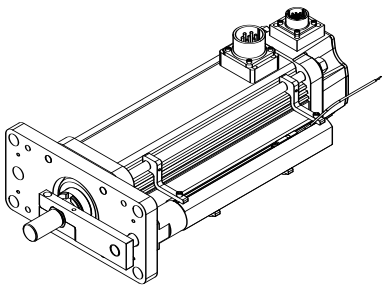
Actuator	A - Limit Switch Extension Length	Stroke Length Reduction
GSX20	1.784” (45.21 mm)	0.4” (10.1 mm)
GSX30	1.773” (44.96 mm)	0.4” (10.1 mm)
GSX40	No internal limit switch	
GSX60	3.575” (90.81 mm)	0.4” (10.1) mm
Actuator	**A - Brake Extension Length**	**Stroke Length Reduction**
GSX20	1.784” (45.21 mm)	NA
GSX30	1.773” (44.96 mm)	NA
GSX40	2.330” (59.18 mm)	NA
GSX60	3.575” (90.81 mm)	NA

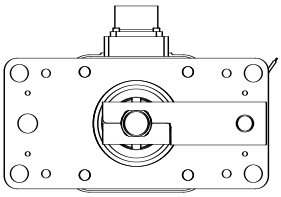
GSX20, GSX30, GSX40, GSX50 & GSX60 External Limit Switch Extension Options

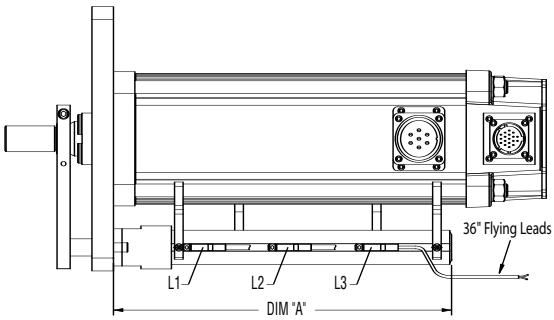
Dim A	3 inch (mm) stroke	6 inch (mm) stroke	10 inch (mm) stroke	12 inch (mm) stroke	14 inch (mm) stroke	18 inch (mm) stroke
GSX20	5.515 (140.1)	8.515 (216.3)	NA NA	14.515 (368.7)	NA NA	NA NA
GSX30	6.932 (176.1)	9.832 (249.7)	13.832 (351.3)	15.832 (402.1)	17.832 (452.9)	21.832 (554.5)
GSX40	NA NA	9.832 (249.7)	13.832 (351.3)	15.832 (402.1)	17.832 (452.9)	21.832 (554.5)
GSX50	NA NA	11.667 (296.3)	NA NA	NA NA	19.667 (499.5)	23.667 (601.1)
GSX60	NA NA	NA NA	14.461 (367.3)	NA NA	NA NA	NA NA

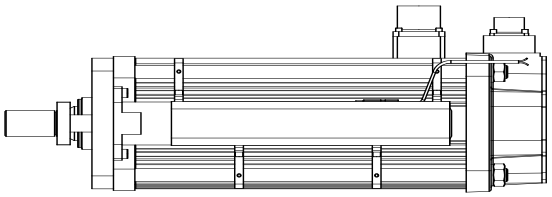
GSX50 Brake Extension Option











The external limit switch 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.

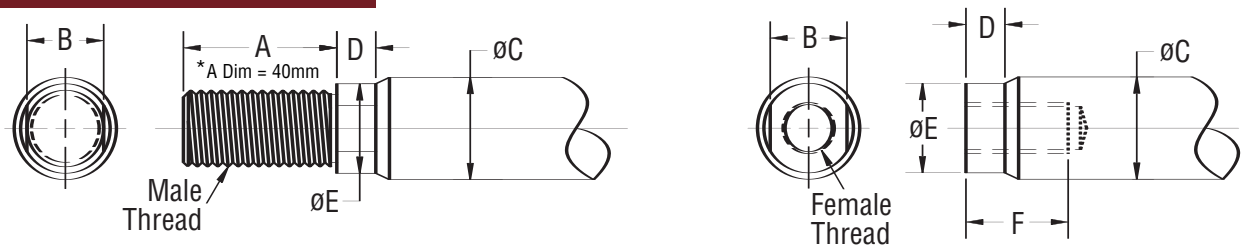
The number of switches desired is selected by ordering the L1, L2 or L3 option, in which 1, 2 or 3 switches will be provided, respectively.

The switches are 9-30 VDC powered, PNP output, with either normally open or normally closed logic operation depending on the switch configuration ordered. 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

Switch Type	Exlar Part Number	Turck Part Number
Normally Closed Switch	24631	BIM-INT-RP6X
Normally Open Switch	22303	BIM-INT-AP6X

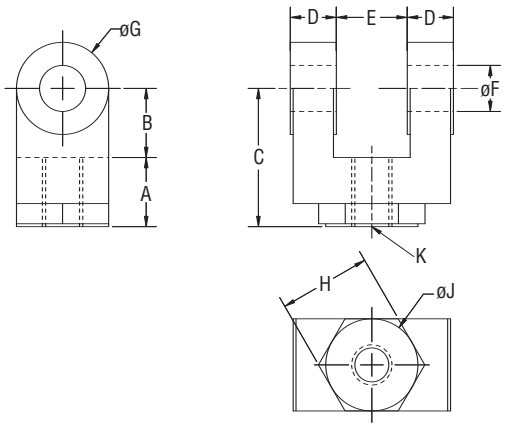
Actuator Rod End Options



	A	B	øC	D	øE	F	Male U.S.	Male Metric	Female U.S.	Female Metric
GSX20	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	M8X1	5/16 – 24 UNF – 2B	M8X1
GSX30	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 UN F– 2A	M12X1.75*	7/16 – 20 UNF – 2B	M10X1.5
GSX40	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	M16X1.5	5/8 – 18 UNF – 2B	M16X1.5
GSX50	1.500 (38.1)	0.750 (19.05)	1.000 (25.4)	0.381 (9.7)	0.875 (22.2)	1.000 (25.4)	1 – 14 UNS – 2A	M27X2	1 – 14 UNS – 2B	M24X2
GSX60	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	M30X2	7/8 – 14 UNF – 2B	M25X1.5

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.

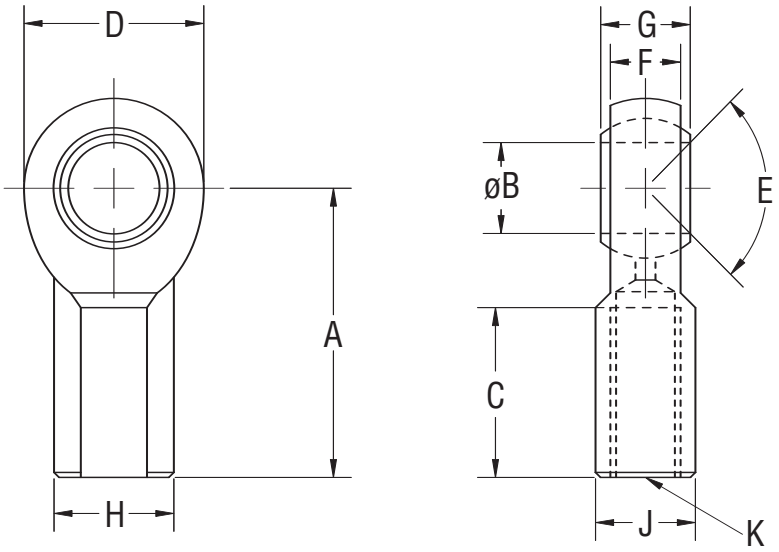
Rod Clevis Dimensions



	GSX20	GSX30	GSX40	GSX50	GSX60
	RC038	**RC050**	**RC075**	**RC100**	**RC138**
A	0.787” (20 mm)	0.75” (19.1 mm)	1.125” (28.58 mm)	1.625” (41.2mm)	2.00” (50.8 mm)
B	0.787” (20 mm)	0.75” (19.1 mm)	1.25” (31.75 mm)	1.500” (38.1 mm)	2.125” (53.98 mm)
C	1.574” (40 mm)	1.50” (38.1 mm)	2.375” (60.3 mm)	3.125” (79.4 mm)	4.125” (104.78 mm)
D	.575” (14.6 mm)	0.50” (12.7 mm)	0.625” (15.88 mm)	.750” (19.1 mm)	1.00”(25.4 mm)
E	0.375” (9.5 mm)	0.765” (19.43 mm)	1.265” (32.13 mm)	1.515” (38.5 mm)	2.032” (51.6 mm)
øF	0.375” (9.5 mm)	0.50” (12.7 mm)	0.75” (19.1 mm)	1.000” (25.4 mm)	1.375” (34.93 mm)
øG	0.75” (19.1 mm)	1.00” (25.4 mm)	1.50” (38.1 mm)	2.000” (50.8 mm)	2.75” (69.85 mm)
H	NA	1.00” (25.4 mm)	1.25” (31.75 mm)	1.500” (38.1 mm)	2.00” (50.8 mm)
øJ	NA	1.00” (25.4 mm)	1.25” (31.75 mm)	1.500” (38.1 mm)	2.00” (50.8 mm)
K	3/8-24	7/16-20	3/4-16	1-14	1-1/4 - 12

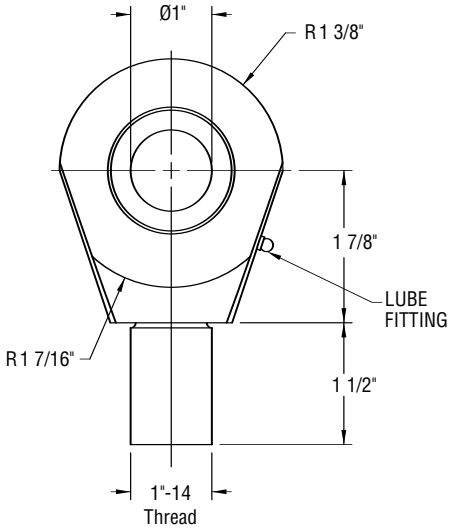
Drawings subject to change. Consult Exlar for certified drawings.

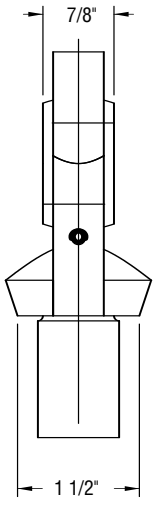
Spherical Rod Eye Dimensions



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

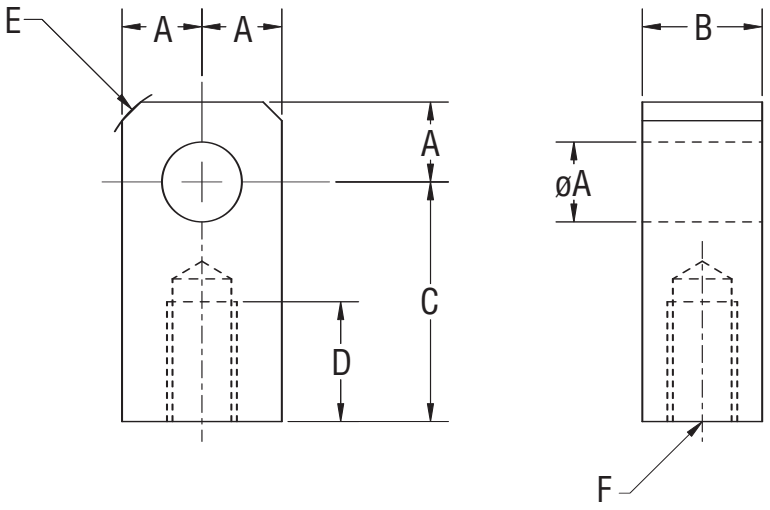
See GSX50 Sperical Rod Eye drawing below. Requires female rod end.





Drawings subject to change. Consult Exlar for certified drawings.

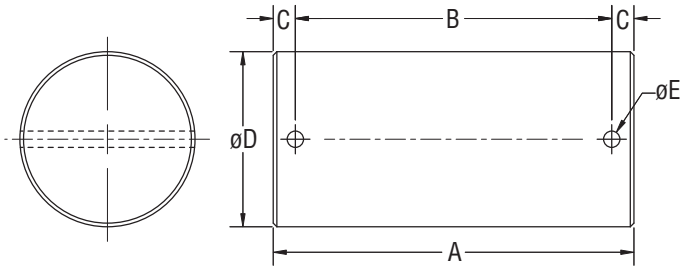
Rod Eye Dimensions



	GSX30	GSX40	GSX50	GSX60
	RE050	**RE075**	**RE100**	**RE138**
øA	0.50” (12.7 mm)	0.75” (19.1 mm)	1.00” (25.4 mm)	1.375” (34.93 mm)
B	0.75” (19.1 mm)	1.25” (31.8 mm)	1.50” (38.1 mm)	2.0” (50.8 mm)
C	1.50” (38.1 mm)	2.06” (52.3 mm)	2.81” (71.4 mm)	3.44” (87.3 mm)
D	0.75” (19.1 mm)	1.13” (28.7 mm)	1.63” (41.4 mm)	2.0” (50.8 mm)
E	0.63” (15.9 mm)	0.88” (22.3 mm)	1.19” (30.2 mm)	1.837” (46.67 mm)
F	7/16-20	3/4-16	1 - 14	1-1/4 - 12

Drawings subject to change. Consult Exlar for certified drawings.

Clevis Pin Dimensions



	A	B	C	øD	øE
GSX20 CP050-Rear Clevis	2.28” (57.9 mm)	1.94” (49.28 mm)	0.17” (4.32 mm)	0.50” (12.7 mm)	0.095” (2.41 mm)
GSX30 CP050-Rod eye, Rod Clevis	2.28” (57.9 mm)	1.94” (49.28 mm)	0.17” (4.32 mm)	0.50” (12.7 mm)	0.095” (2.41 mm)
CP075-Rear Clevis	3.09” (78.5 mm)	2.72” (69.1 mm)	0.19” (4.82 mm)	0.75” (19.1 mm)	0.14” (3.56 mm)
GSX40 CP075-Rod eye, Rod Clevis Spherical Eye, Rear Clevis	3.09” (78.5 mm)	2.72” (69.1 mm)	0.19” (4.82 mm)	0.75” (19.1 mm)	0.14” (3.56 mm)
GSX50 CP100-Rod eye, Rod Clevis Spherical Eye, Rear Clevis	3.59” (91.2 mm)	3.22” (81.8 mm)	0.19” (4.82 mm)	1.00” (25.4 mm)	0.14” (3.56 mm)
GSX60 CP138-Rod eye, Rod Clevis	4.66” (118.3 mm)	4.25” (108 mm)	0.20” (5.08 mm)	1.375” (34.93 mm)	0.173” (4.39 mm)
CP175-Rear Clevis	5.656” (143.6 mm)	5.25” (133.3 mm)	0.203” (5.15 mm)	1.750” (4.44 mm)	0.173” (4.39 mm)

Drawings subject to change. Consult Exlar for certified drawings.

GSX | AA | - | BB | CC | - | D | E | F | - | GGG | - | HHH | - | II | - | {XX..XX}

GSX Series Ordering Information

AA = GSX Actuator Size
20 = 2 inch frame
30 = 3 inch frame
40 = 4 inch frame
50 = 5 inch frame
60 = 7 inch frame

BB = Stroke Length
03 = 3 inches (GSX20, GSX30)
06 = 5.9 inches (GSX30)
6 inches (GSX20, GSX40, GSX50, GSX60)
08 = 8 inches (GSX40)
10 = 10 inches (all models)
12 = 12 inches (GSX20, GSX30, GSX40)
14 = 14 inches (GSX30, GSX50)
18 = 18 inches (GSX30, GSX40)

CC = Lead
01 = 0.1 inch (GSX20, GSX30, GSX40, GSX50)[9]
02 = 0.2 inch (GSX20, GSX30, GSX40, GSX50)
03 = 0.25 inch (GSX60)
04 = 0.4 inch (GSX20 only)
05 = 0.5 inch (GSX30, GSX40, GSX50, GSX60)
08 = 0.75 inch (GSX40)[10]
10 = 1.0 inch (GSX50, GSX60)[11]

D = Connections
O = MS style (anodized)
E = MS style (electroless nickel)
M = Manufacturer's Connector[7]
I = Intercontec style (Exlar standard style connector)
X = Special (please specify)

E = Mounting
S = Side tapped mounting holes
D = Double side tapped mounting
E = Extended tie rods
F = Front flange
T = Trunnion
C = Rear clevis
X = Special (please specify)

F = Rod End
M = Male, US std. Thread
A = Male, Metric std. Thread
F = Female, US std. Thread
B = Female, Metric Thread
X = Special (please specify)

GGG = Brushless Amplifier (Please indicate the amplifier to be used to power the actuator)
XX1 = Custom Feedback - purchaser must supply drawing of feedback device and desired wiring drawings
OO1 = Standard Feedback Mount - actuator is supplied ready for size 15 resolver or encoder, includes .375 mm shaft
OO2 = Same as above with 8mm shaft

If the Rockwell Allen-Bradley system that you are using is the Kinetix platform or SERCOS based, additional software and data files are required from Allen-Bradley. Please contact your Rockwell Allen-Bradley representative for support.

AB1 = Allen-Bradley Ultra 100/200[4] (std encoder, 2048 line, with commutation, 5 VDC)
AB4 = Allen Bradley Ultra 3000 or 5000[4] with single-turn (absolute encoder)
AB5 = Allen Bradley Ultra 3000 or 5000[4] with multi-turn (absolute encoder)
AB6 = Allen Bradley 1394[8] (resolver, type 2)(replaces AB2)
AB7 = Allen Bradley Ultra 3000 or 5000[4] (std encoder, 2048 line, with commutation, 5 VDC)
AD1 = Advanced Digital "Simple Servo" (std encoder, 2048 line, with commutation, 5 VDC)
AP1 = API resolver based (resolver, type 2)
AP2 = API encoder based (std encoder, 2048 line, with commutation, 5 VDC)
AM1 = Advanced Motion Controls (std encoder, 2048 line, with commutation, 5 VDC)
AM2 = Advanced Motion Controls (std encoder, 1000 line, with commutation, 5 VDC)
AM3 = Advanced Motion Controls (resolver, type 1)
AM4 = Advanced Motion Controls BX Series default settings (std encoder, 2048 line, with commutation, 5 VDC)
BD2 = Baldor Flex Series (resolver, type 1)(replaces BD1)
BD3 = Baldor Flex Series (std encoder, 2048 line, with commutation, 5 VDC)
BO1 = Bosch (resolver, type 2)
CC1 = Cleveland Machine Controls (resolver, type 1)
CM1 = Comau (resolver, type 1)
CO1 = Copley Controls (std encoder, 2048 line, with commutation, 5 VDC)
CS1 = Parker (Custom Servo Motors) MPA, MPSL (resolver, type 1)
CS2 = Parker (Custom Servo Motors) Servo Flex (std encoder, 2048 line, with commutation, 5 VDC)
EL1 = Elmo Motion Control (resolver, type 1)
EL2 = Elmo CLA, SBA, FLU Series, (std encoder, 2048 line, with commutation, 5 VDC)
EM2 = Emerson En, Epsilon, MDS Series and Uni-Drive[4] (std encoder, 2048 line, with commutation, 5 VDC)
EM3 = Emerson MX Series (resolver, type 2)
EM4 = Emerson UniDrive SP (resolver, type 1)
EU1 = Elau (absolute encoder, multi-turn, type 2)
EX4 = Exlar SV Series (resolver, type 1) (replaces EX3)
GL1 = Sheffield Automation (G&L) Smart Drive (standard encoder, 2048 line, with commutation, 5 VDC) If selecting the "M" connector option with GL1, the motor power and encoder connector configuration will be equivalent to that used on the Sheffield Automation HSM Series motors.
GL2 = Sheffield Automation (G&L) Smart Drive (standard encoder, 2048 line, with commutation, 5 VDC) If selecting the "M" connector option with GL2, the motor power and encoder connector configuration will be equivalent to that used on the Sheffield Automation LSM/MSM Series motors.
IN1 = Bosch-Rexroth (Indramat) ECO Drive (absolute, multi-turn Heidenhain encoder, type 2)
IN2 = Bosch-Rexroth (Indramat) ECO Drive (absolute, single-turn Heidenhain encoder)
IN4 = Bosch-Rexroth (Indramat) ECO Drive, Standard resolver (resolver, type 1)(replaces IN3)
KM1 = Kollmorgen ServoStar Series[4] 230V (resolver, type 2)
KM3 = Kollmorgen ServoStar600 Series[4] (Absolute encoder, single turn, type 1)
KM4 = Kollmorgen ServoStar600 Series[4] (Absolute encoder, multi-turn, type 2)
KM5 = Kollmorgen ServoStar600 Series[4] and ServoStar CD (resolver, type 2)(replaces KM2)
KM6 = Kollmorgen ServoStar300 Series[4] (std encoder, 2048 line, with commutation, 5 VDC)
LZ1 = Lenze 9300 Series (Multi-turn Absolute Encoder, type 2)
LZ2 = Lenze 9300 Series (resolver, type 2)
MD1 = Modicon (resolver, type 1)
MX1 = Metronix ARS Series, Resolver type 1
OR1 = Ormec (resolver, type 2)
PC1 = Parker Compumotor Apex & Z Series (resolver, type 1)
PC2 = Parker Compumotor TQ Series (std encoder, 2048 line, with commutation, 5 VDC)
PC3 = Parker Compumotor Gemini Series (std encoder, 2048 line, with commutation, 5 VDC)
PS2 = Pacific Scientific (std encoder, 2048 line, with commutation, 5 VDC)
PS3 = Pacific Scientific SC900, 700 Series (resolver, type 1)(replaces PS1)
SM2 = Siemens (resolver, type 1)
SP2 = In Motion, PAM Series (resolver, type 1)
WD1 = Whedco (GE-Fanuc)(resolver, type 1)
YS2 = Yaskawa Sigma II Series for 4 inch and larger Exlar motors (multi-turn absolute encoder, type 1)
YS3 = Yaskawa Sigma II Series for 3 inch and smaller Exlar actuators (multi-turn absolute encoder, type 1)

GSX Series Ordering Information

HHH = Motor Stator[2] – All 8 Pole
118 = 1 stack, 115 Vrms
218 = 2 stack, 115 Vrms
318 = 3 stack, 115 Vrms

138 = 1 stack, 230 Vrms
238 = 2 stack, 230 Vrms
338 = 3 stack, 230 Vrms

158 = 1 stack, 400 Vrms
258 = 2 stack, 400 Vrms
358 = 3 stack, 400 Vrms

168 = 1 stack, 460 Vrms
268 = 2 stack, 460 Vrms
368 = 3 stack, 460 Vrms

II = Motor Speed
24 = 2400 rpm, GSX50, GSX60
30 = 3000 rpm, GSX30, GSX40
50 = 5000 rpm, GSX20
01-99 = Customer specified base speed

XX .. XX = Options

Travel Options
PF = Preloaded follower[1]
ES = Internal end of travel switches[5]
AR = External Anti-rotate assembly
EB = Electric Brake[5]
RB = Rear Electric Brake[5] (GSX50)
XT = Special Travel Option (see pg. 24)
L1/L2/L3 = External Limit Switches

Motor Options
XM = Special motor option
XL = Special lubrication

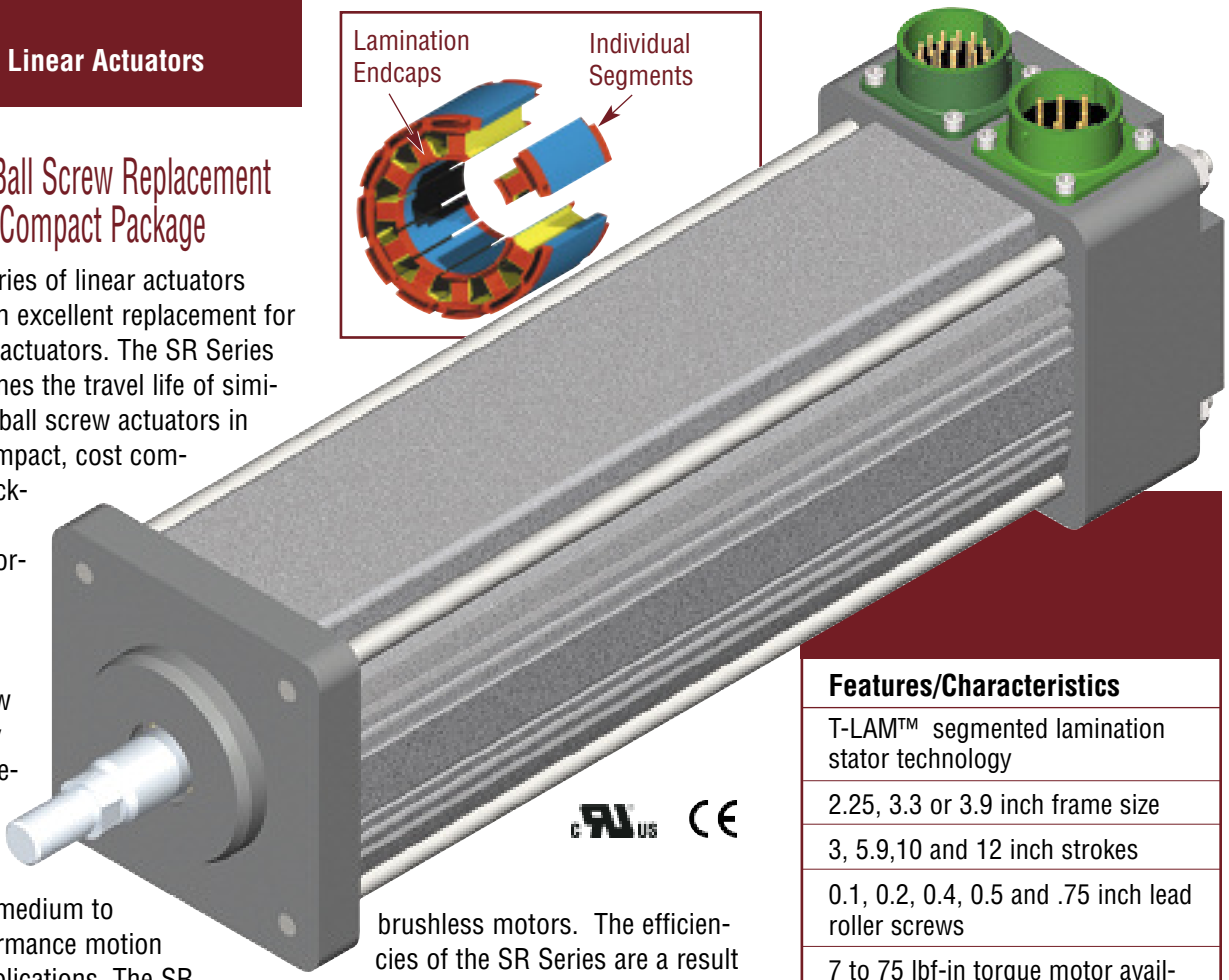
Housing Options
FG = Food grade paint[6]
EN = Electroless nickel plating[6]
SS = Stainless steel housing[6]
XH = Special housing option

Absolute Linear Feedback
LT = VRVT, including signal conditioner[3]

1. 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 internal feedback option.
2. Stator voltage and pole options allow for catalog rated performance at varying amplifier bus voltages and pole configuration requirements.
3. Linear feedback is not available in the GSX20.
4. Emerson EN and Epsilon Series, AB Ultra Series, Kollmorgen ServoStar and other amps require motor data files for operation with GSX Series actuators. These files can be downloaded from our website at www.exlar.com. Contact Exlar for details.
5. The internal limit switch or brake options require a third cable. Internal limit switches and brake together are not available.
6. These housing options 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 flanges.
7. Available with AB1, AB4/5, AB7, EM2, KM1, KM3, KM4, KM5, KM6, IN1, IN2, IN4, LZ1, LZ2, PC3, PS3, YS2 and YS3 feedback. This option allows the customer to use the standard cables supplied by their amplifier manufacturers.
8. Use of the A-B 1394 requires assistance from Allen-Bradley to configure the axis for a custom motor.
9. .1 lead not available above 12˝ stroke in GSX40.
10. .75 lead not available above 12˝.
11. 1.0 lead not available above 10˝ stroke.

Excellent Ball Screw Replacement in a More Compact Package

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



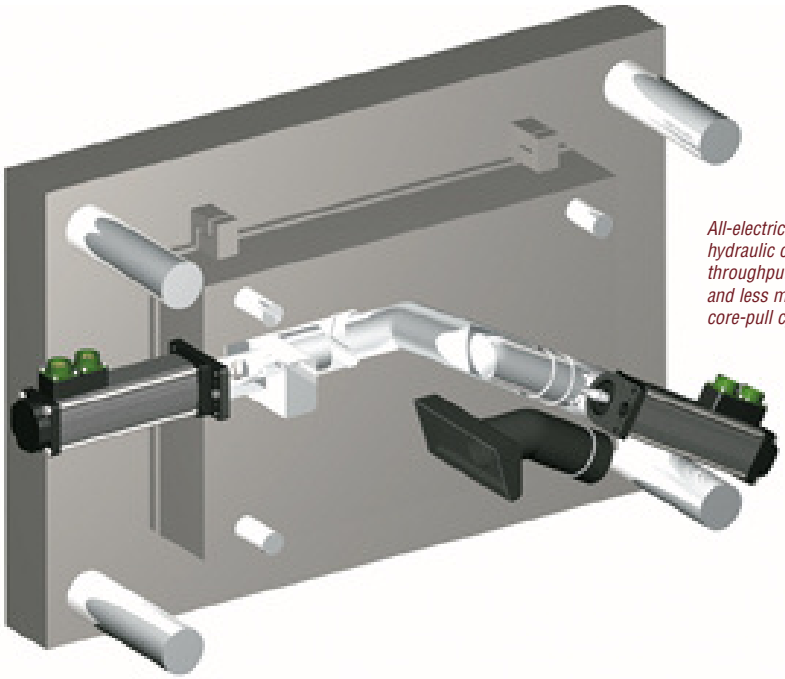
Selection of the proper feedback configuration allows SR Series actuators to be powered by nearly every brand of brushless motor amplifier on the market. This flexibility allows SR Series actuators to be incorporated into the highest performance single and multi-axis motion control systems in use today.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

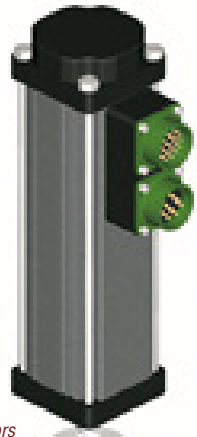
Features/Characteristics
T-LAM™ segmented lamination stator technology
2.25, 3.3 or 3.9 inch frame size
3, 5.9,10 and 12 inch strokes
0.1, 0.2, 0.4, 0.5 and .75 inch lead roller screws
7 to 75 lbf-in torque motor availability
Up to 33 inch per second linear speeds
92 to 1983 lbf thrust capacity depending on motor selection
Front flange, rear clevis, trunnion, side, double side or extended tie rods mounting options
Encoder feedback with ms style connectors
Molded and shielded cables available
Black anodized and epoxy-coated aluminum housing
Competitively priced with ball screw actuators
5 times the life of a similar sized ball screw actuator
IP54 or IP65 sealing
Class 180 H insulation
UL recognized component

EXLAR SR SERIES ACTUATORS APPLICATIONS INCLUDE:

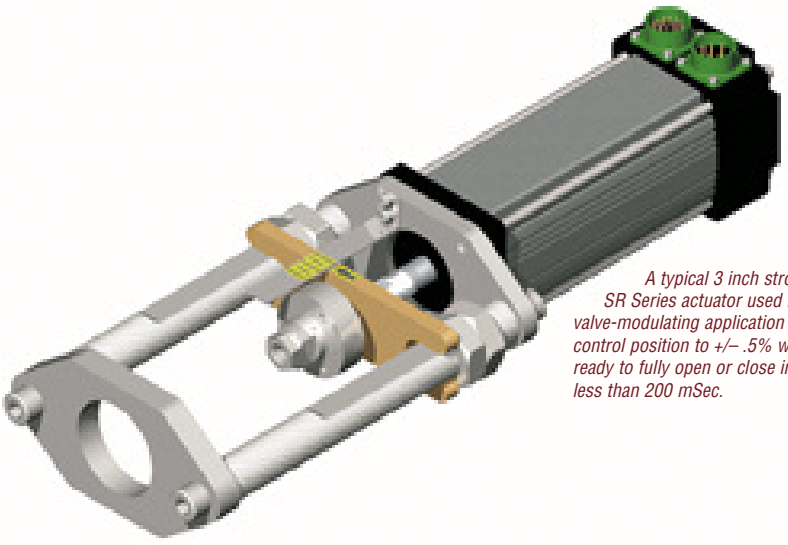
- Hydraulic cylinder replacement
- Ball screw replacement
- Pneumatic cylinder replacement
- Chip and wafer handling
- Automated flexible fixturing
- Dispensers
- Machine tool
- Automated assembly
- Parts clamping
- Automatic tool changers
- Volumetric pumps
- Medical equipment
- Conveyor diverters / 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



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



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

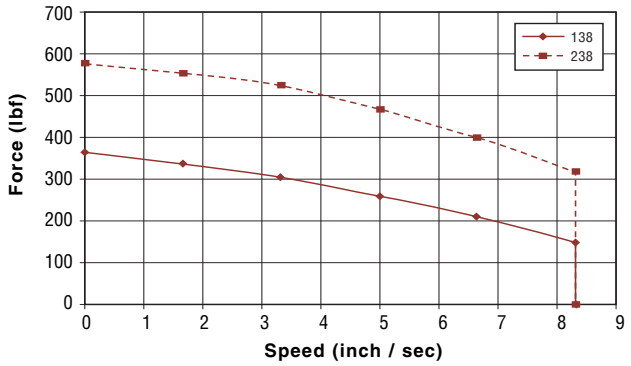


A typical 3 inch stroke SR Series actuator used in a valve-modulating application can control position to +/– .5% while ready to fully open or close in less than 200 mSec.

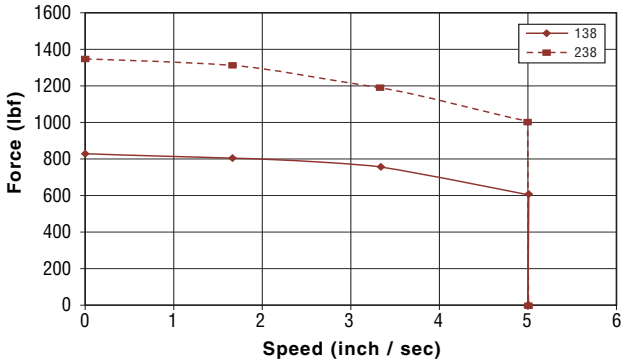
SR Series Performance and Life Curves

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.

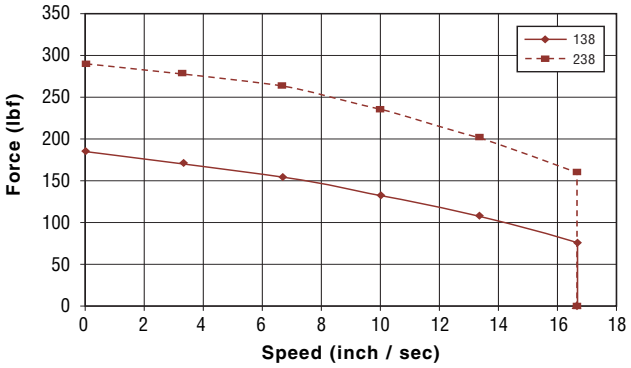
SR21-.1 Inch Lead



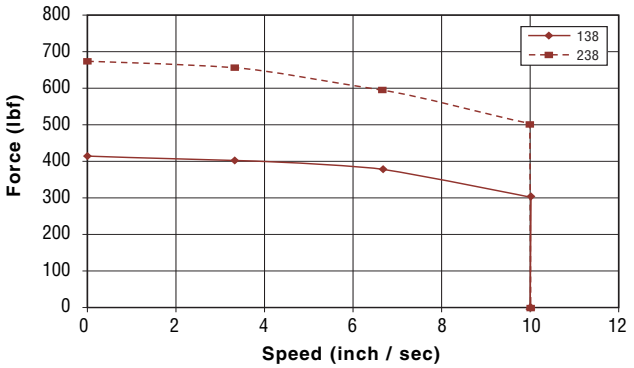
SR31-.1 Inch Lead



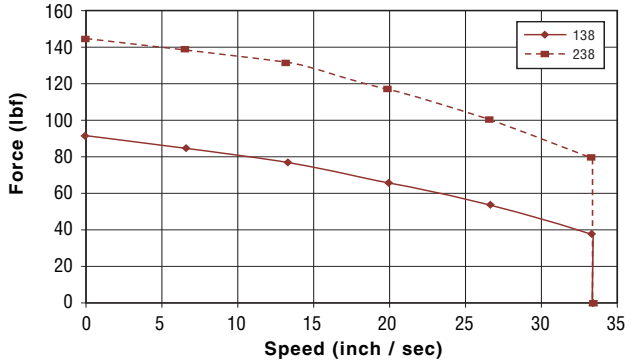
SR21-.2 Inch Lead



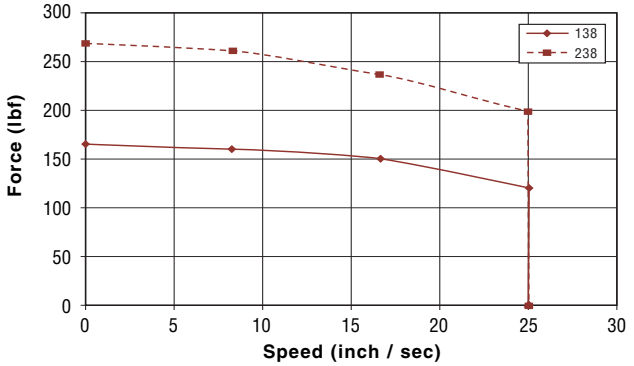
SR31-.2 Inch Lead



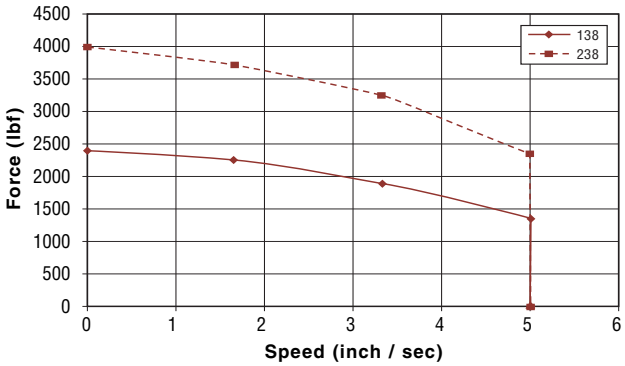
SR21-.4 Inch Lead



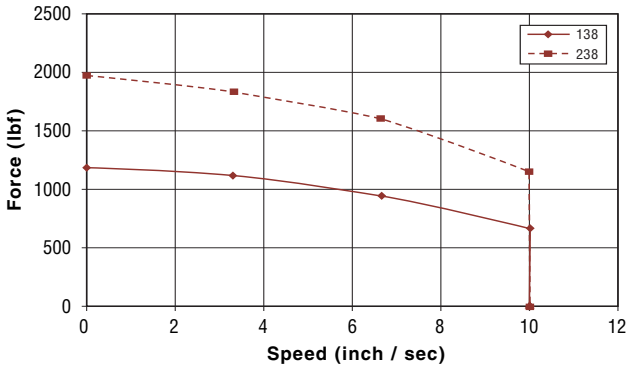
SR31-.5 Inch Lead



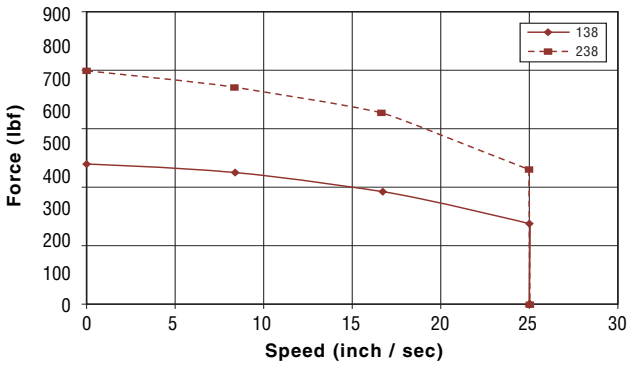
SR41-.1 Inch Lead



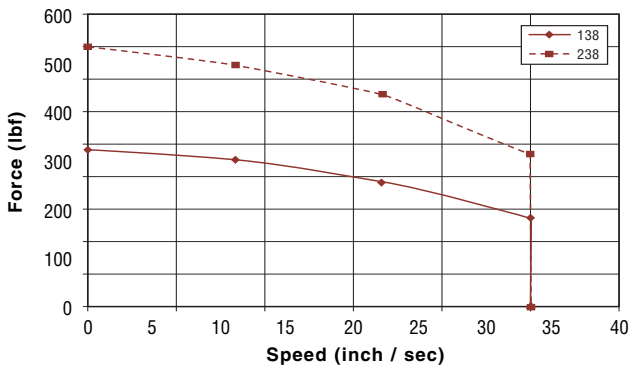
SR41-.2 Inch Lead



SR41-.5 Inch Lead



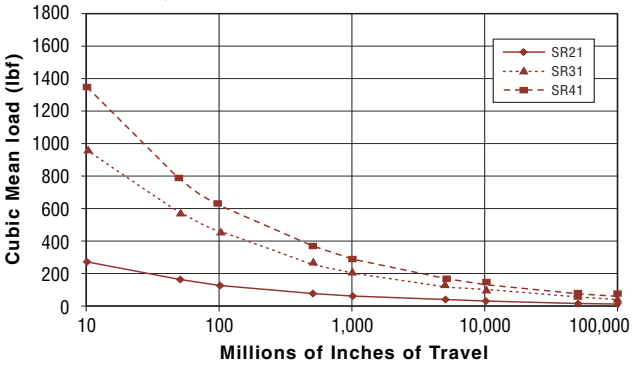
SR41-.75 Inch Lead



Life Curves

The estimated travel life indicates the approximate expected travel life from the roller screw mechanism within the SR31 at indicated cubic mean load. The chart on the right represents L10 travel life estimates. The reliability for these values is 90%. This information assumes that the roller screw is properly maintained and lubricated. The equation used to calculate the L10 life is: Travel (C/F)3 (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 Exlar application engineering for details.

SR21, SR31 & SR41 L10 Travel life



SR21 & SR31 Performance Specifications

Model No.	Frame Size in. (mm)	Stroke (nominal)* in (mm)	Screw Lead in (mm)	Force Rating 1 stack/ 2 stack lb (N)	Max. Velocity in/sec (mm/sec)	Approx.* Cont. Motor Torque 1 stack/ 2 stack lb-in (Nm)	Maximum Static Load lb (N)	Armature Inertia Rating** Lb-in-s^2 (Kg-m^2)	Dynamic Load lb (N)	Weight (approx) lb (Kg)
SR21-0301	2.25 (57)	3 (75)	0.1 (2.54)	367/578 (1632/2571)	8.33 (211.67)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00101 (0.000114)	1568 (6970)	6.5 (2.9)
SR21-0302	2.25 (57)	3 (75)	0.2 (5.08)	183/289 (814/1286)	16.77 (423.33)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00101 (0.000114)	1219 (5422)	6.5 (2.9)
SR21-0304	2.25 (57)	3 (75)	0.4 (10.16)	92/145 (409/645)	33.33 (846.67)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00101 (0.000114)	738 (3283)	6.5 (2.9)
SR21-0601	2.25 (57)	6 (150)	0.1 (2.54)	367/578 (1632/2571)	8.33 (211.67)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00114 (0.000129)	1567 (6970)	7.0 (3.2)
SR21-0602	2.25 (57)	6 (150)	0.2 (5.08)	183/289 (814/1286)	16.67 (423.33)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00114 (0.000129)	1219 (5422)	7.0 (3.2)
SR21-0604	2.25 (57)	6 (150)	0.4 (10.16)	92/145 (409/645)	33.33 (846.67)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00114 (0.000129)	738 (3283)	7.0 (3.2)
SR21-1001	2.25 (57)	10 (254)	0.1 (2.54)	367/578 (1632/2571)	8.33 (211.67)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00133 (0.000150)	1567 (6970)	7.5 (3.4)
SR21-1002	2.25 (57)	10 (254)	0.2 (5.08)	183/289 (814/1286)	16.67 (423.33)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00133 (0.000150)	1219 (5422)	7.5 (3.4)
SR21-1004	2.25 (57)	10 (254)	0.4 (10.16)	92/145 (409/645)	33.33 (846.67)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00133 (0.000150)	738 (3283)	7.5 (3.4)
SR21-1201	2.25 (57)	12 (300)	0.1 (2.54)	367/578 (1632/2571)	8.33 (211.67)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00143 (0.000162)	1567 (6970)	8.0 (3.6)
SR21-1202	2.25 (57)	12 (300)	0.2 (5.08)	183/289 (814/1286)	16.67 (423.33)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00143 (0.000162)	1219 (5422)	8.0 (3.6)
SR21-1204	2.25 (57)	12 (300)	0.4 (10.16)	92/145 (409/645)	33.33 (846.67)	7.3/11.5 (0.82/1.30)	750 (3336)	0.00143 (0.000162)	738 (3283)	8.0 (3.6)
SR31-0301	3.3 (84)	3 (75)	0.1 (2.54)	829/1347 (3688/5992)	5 (127)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00319 (0.000360)	3310 (14724)	9.5 (4.3)
SR31-0302	3.3 (84)	3 (75)	0.2 (5.08)	415/674 (1846/2998)	10 (254)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00319 (0.000360)	3570 (15880)	9.5 (4.3)
SR31-0305	3.3 (84)	3 (75)	0.5 (12.7)	166/269 (738/1197)	25 (635)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00319 (0.000360)	3016 (13416)	9.5 (4.3)
SR31-0601	3.3 (84)	5.9 (150)	0.1 (2.54)	829/1347 (3688/5992)	5 (127)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00361 (0.000408)	3310 (14724)	11.5 (5.2)
SR31-0602	3.3 (84)	5.9 (150)	0.2 (5.08)	415/674 (1846/2998)	10 (254)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00361 (0.000408)	3570 (15880)	11.5 (5.2)
SR31-0605	3.3 (84)	5.9 (150)	0.5 (12.7)	166/269 (738/1197)	25 (635)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00361 (0.000408)	3016 (13416)	11.5 (5.2)
SR31-1001	3.3 (84)	10 (250)	0.1 (2.54)	829/1347 (3688/5992)	5 (127)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00416 (0.00047)	3310 (14724)	19 (8.6)
SR31-1002	3.3 (84)	10 (250)	0.2 (5.08)	415/674 (1846/2998)	10 (254)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00416 (0.00047)	3570 (15880)	19 (8.6)
SR31-1005	3.3 (84)	10 (250)	0.5 (12.7)	166/269 (738/1197)	25 (635)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00416 (0.00047)	3016 (13416)	19 (8.6)
SR31-1201	3.3 (84)	12 (305)	0.1 (2.54)	829/1347 (3688/5992)	5 (127)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00443 (0.000501)	3310 (14724)	22 (10)
SR31-1202	3.3 (84)	12 (305)	0.2 (5.08)	415/674 (1846/2998)	10 (254)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00443 (0.000501)	3570 (15880)	22 (10)
SR31-1205	3.3 (84)	12 (305)	0.5 (12.7)	166/269 (738/1197)	25 (635)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00443 (0.000501)	3016 (13416)	22 (10)
SR31-1802	3.3 (84)	18 (457)	0.2 (5.08)	415/674 (1846/2998)	10 (254)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00533 (0.000602)	3570 (15880)	25 (11.3)
SR31-1805	3.3 (84)	18 (487)	0.5 (12.7)	166/269 (738/1197)	25 (635)	16.5/26.8 (1.86/3.03)	1620 (7206)	0.00533 (0.000602)	3016 (13416)	25 (11.3)

*Please note that stroke mm are nominal dimensions. **Inertia +/– 5%.

For definition of terms see page 12.

SR41 Performance Specifications

Model No.	Frame Size in. (mm)	Stroke (nominal)* in (mm)	Screw Lead in (mm)	Force Rating 1 stack/ 2 stack lb (N)	Max. Velocity in/sec (mm/sec)	Approx.* Cont. Motor Torque 1 stack/ 2 stack lb-in (Nm)	Maximum Static Load lb (N)	Armature Inertia Rating** Lb-in-s^2 (Kg-m^2)	Dynamic Load lb (N)	Weight (approx) lb (Kg)
SR41-0601	3.9 (99)	6 (150)	0.1 (2.54)	2393/3966 (10645/17642)	5 (127)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0152 (0.001717)	4736 (21067)	20 (9.1)
SR41-0602	3.9 (99)	6 (150)	0.2 (5.08)	1196/1983 (5320/8821)	10 (254)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0152 (0.001717)	4890 (21751)	20 (9.1)
SR41-0605	3.9 (99)	6 (150)	0.5 (12.7)	479/793 (2131/3527)	25 (635)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0152 (0.001717)	4218 (18763)	20 (9.1)
SR41-0608	3.9 (99)	6 (150)	0.75 (19.05)	319/529 (1419/2353)	37.5 (953)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0152 (0.001717)	3328 (14804)	20 (9.1)
SR41-1001	3.9 (99)	10 (250)	0.1 (2.54)	2393/3966 (10645/17642)	5 (127)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0175 (0.001977)	4736 (21067)	28 (12.7)
SR41-1002	3.9 (99)	10 (250)	0.2 (5.08)	1196/1983 (5320/8821)	10 (254)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0175 (0.001977)	4890 (21751)	28 (12.7)
SR41-1005	3.9 (99)	10 (250)	0.5 (12.7)	479/793 (2131/3527)	25 (635)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0175 (0.001977)	4218 (18763)	28 (12.7)
SR41-1008	3.9 (99)	10 (250)	0.75 (19.05)	319/529 (1419/2353)	37.5 (953)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0175 (0.001977)	3328 (14804)	28 (12.7)
SR41-1201	3.9 (99)	12 (305)	0.1 (2.54)	2393/3966 (10645/17642)	5 (127)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0186 (0.002102)	4736 (21067)	32 (14.5)
SR41-1202	3.9 (99)	12 (305)	0.2 (5.08)	1196/1983 (5320/8821)	10 (254)	47.6/8.9 (5.38/8.91)	3966 (17642)	0.0186 (0.002102)	4890 (21751)	32 (14.5)
SR41-1205	3.9 (99)	12 (305)	0.5 (12.7)	479/793 (2131/3527)	25 (635)	47.6/8.9 (5.38/8.91)	3966 (17642)	0.0186 (0.002102)	4218 (18763)	32 (14.5)
SR41-1208	3.9 (99)	12 (305)	0.75 (19.05)	319/529 (1419/2353)	37.5 (953)	47.6/78.9 (5.38/8.91)	3966 (17642)	0.0186 (0.002102)	3328 (14804)	32 (14.5)
SR41-1802	3.9 (99)	18 (455)	0.2 (5.08)	1196/1983 (5320/8821)	10 (254)	47.6/8.9 (5.38/8.91)	3966 (17642)	0.0220 (0.002486)	4890 (21751)	44 (19.9)
SR41-1805	3.9 (99)	18 (455)	0.5 (12.7)	479/793 (2131/3527)	25 (635)	47.6/8.9 (5.38/8.91)	3966 (17642)	0.0220 (0.002486)	4218 (18763)	44 (19.9)

*Please note that stroke mm are nominal dimensions. **Inertia +/– 5%.

For definition of terms see page 12.

SR21 Series Mechanical / Electrical Specifications

		SR21							
Nominal Backlash	in (mm)	0.004 (.10)							
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)							
Maximum Radial Load	lb (N)	20 (90)							
Environmental Rating: Standard		IP54							
MOTOR STATOR		**118**	**138**	**158**	**168**	**218**	**238**	**258**	**268**
RMS Sinusoidal Commutation									
Continuous Motor Torque	lbf-in	7.6	7.3	7.0	7.0	11.9	11.5	11.2	11.3
	(N-m)	(0.86)	(0.83)	(0.79)	(0.79)	(1.35)	(1.30)	(1.27)	(1.28)
Torque Constant (Kt)	lbf-in/A	2.5	5.2	8.3	9.5	2.5	5.2	8.9	10.2
(+/– 10% @ 25˚C)	N-m/A	(0.28)	(0.59)	(0.94)	(1.07)	(0.28)	(0.59)	(1.00)	(1.15)
Continuous Current Rating	Amps	3.4	1.6	0.9	0.8	5.4	2.5	1.4	1.2
Peak Current Rating	Amps	6.9	3.1	1.9	1.6	10.8	4.9	2.8	2.5
Trapezoidal Commutation									
Continuous Motor Torque	lbf-in	7.3	7.0	6.7	6.7	11.4	11.0	11.2	10.8
	(N-m)	(0.82)	(0.79)	(0.76)	(0.76)	(1.29)	(1.24)	(1.21)	(1.22)
Torque Constant (Kt)	lbf-in/A	1.9	4.1	6.5	7.4	1.9	4.1	6.9	7.9
(+/– 10% @ 25˚C)	(N-m/A)	(0.22)	(0.46)	(0.73)	(0.84)	(0.22)	(0.46)	(0.78)	(0.89)
Continuous Current Rating	Amps	4.2	1.9	1.1	1.0	6.6	3.0	1.7	1.5
Peak Current Rating	Amps	8.4	3.9	2.3	2.0	13.2	6.0	3.5	3.0
Motor Stator Data									
Voltage Constant (Ke)	Vrms / Krpm	16.9	35.6	56.9	64.9	16.9	35.6	60.5	69.4
(+/– 10% @ 25˚C)	Vpk / Krpm	23.9	50.3	80.5	91.8	23.9	50.3	85.5	98.1
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L) (+/– 5% @ 25˚C)	Ohms	2.6	12.5	35.2	45.8	1.1	5.3	160	20.7
Inductance (L-L)(+/– 5%)	mH	5.1	22.8	58.3	75.8	2.5	11.0	31.7	41.7
Brake Inertia	lbf-in-sec^2	0.000336	0.000336	0.000336	0.000336	0.000336	0.000336	0.000336	0.000336
	(Kg-cm^2)	(0.32)	(0.38)	(0.38)	(0.38)	(0.38)	(0.38)	(0.38)	(0.38)
Brake Current @ 24 Vdc	A	.33	.33	.33	.33	.33	.33	.33	.33
Brake Holding Torque	lbf-in	18	18	18	18	18	18	18	18
	(Nm)	(2.2)	(2.2)	(2.2)	(2.2)	(2.2)	(2.2)	(2.2)	(2.2)
Brake Engage/Disengage Time	ms	14/28	14/28	14/28	14/28	14/28	14/28	14/28	14/28
Mech. Time Constant (tm), ms	min	6.0	6.5	7.1	7.1	2.5	2.7	2.9	2.8
	max	8.5	9.2	10.1	10.1	3.6	3.9	4.0	4.0
Electrical Time Constant (te)	ms	2.0	1.8	1.7	1.7	2.2	2.1	2.0	2.0
Damping Constant	lbf-in/krpm	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
	(N-m/krpm)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Friction Torque	lbf-in	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	(N-m)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
Bus Voltage	Vrms	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	5000	5000	5000	5000	5000	5000	5000	5000
Motor Wire Insulation		Class 180 H							
Motor Stator Rating		Class 180 H							
Thermal Switch, Stator Temp.	C˚	130							
Std. Connectors ("S" Option): Motor & Brake		MS-3112-E16-8P							
	Feedback	MS-3112-E16-23P							

All ratings at 25 degrees Celsius
For amplifiers with peak sinusoidal commutation Kt = Ktrms(0.707), Ic = Icrms/(0.707), Ipk = Ipkrms/(0.707)

Specifications subject to change without notice.

SR31 Series Mechanical / Electrical Specifications

		SR31							
Nominal Backlash	in (mm)	0.004 (.10)							
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)							
Maximum Radial Load	lb (N)	15 (67)							
Environmental Rating: Standard		IP54							
MOTOR STATOR		**118**	**138**	**158**	**168**	**218**	**238**	**258**	**268**
RMS Sinusoidal Commutation									
Continuous Motor Torque	lbf-in	16.6	16.5	15.7	15.7	26.8	26.8	26.7	26.7
	(N-m)	(1.88)	(1.87)	(1.77)	(1.78)	(3.03)	(3.03)	(3.02)	(3.01)
Torque Constant (Kt)	lbf-in/A	4.4	8.7	15.5	17.5	4.4	8.7	15.5	17.5
(+/– 10% @ 25˚C)	N-m/A	(0.49)	(0.99)	(1.75)	(1.98)	(0.49)	(0.99)	(1.75)	(1.98)
Continuous Current Rating	Amps	4.2	2.1	1.1	1.0	6.9	3.4	1.9	1.7
Peak Current Rating	Amps	8.5	4.2	2.3	2.0	13.7	6.8	3.8	3.4
Trapezoidal Commutation									
Continuous Motor Torque	lbf-in	15.9	15.8	14.9	15.0	25.6	25.6	25.5	25.5
	(N-m)	(1.79)	(1.78)	(1.69)	(1.70)	(2.89)	(2.89)	(2.88)	(2.88)
Torque Constant (Kt)	lbf-in/A	3.4	6.8	12.1	13.6	3.4	6.8	12.1	13.6
(+/– 10% @ 25˚C)	(N-m/A)	(0.39)	(0.77)	(1.37)	(1.54)	(0.39)	(0.77)	(1.37)	(1.54)
Continuous Current Rating	Amps	5.2	2.6	1.4	1.2	8.4	4.2	2.4	2.1
Peak Current Rating	Amps	10.4	5.2	2.8	2.5	16.8	8.4	4.7	4.2
Motor Stator Data									
Voltage Constant (Ke)	Vrms / Krpm	29.9	59.7	106.0	119.5	29.9	59.7	106.0	119.5
	Vpk / Krpm	42.2	84.5	149.9	168.9	42.2	84.5	149.9	168.9
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L) (+/– 5% @ 25˚C)	Ohms	2.8	11.2	39.5	49.6	1.1	4.5	14.1	18.0
Inductance (L-L) (+/– 5%)	mH	7.7	30.7	96.8	123.0	3.7	14.7	46.2	58.7
Brake Inertia	lbf-in-sec^2	.000938	.000938	.000938	.000938	.000938	.000938	.000938	.000938
	(Kg-cm^2)	(1.06)	(1.06)	(1.06)	(1.06)	(1.06)	(1.06)	(1.06)	(1.06)
Brake Current @ 24 Vdc	A	.66	.66	.66	.66	.66	.66	.66	.66
Brake Holding Torque	lbf-in	28	28	28	28	28	28	28	28
	(Nm)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)	(3.2)
Brake Engage/Disengage Time	ms	20/29	20/29	20/29	20/29	20/29	20/29	20/29	20/29
Mech. Time Constant (tm), ms	min	6.5	6.5	7.3	7.2	2.6	2.6	2.6	2.6
	max	10.8	10.9	12.2	12.0	4.3	4.3	4.4	4.4
Electrical Time Constant (te)	ms	2.8	2.7	2.5	2.5	3.3	3.3	3.3	3.3
Damping Constant	lbf-in/krpm	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
	(N-m/krpm)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.37)	(0.37)
Friction Torque	lbf-in	2.00	2.00	2.00	2.00	2.00	2.00	4.50	4.50
	(N-m)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.51)	(0.51)
Bus Voltage	Vrms	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	3000	3000	3000	3000	3000	3000	3000	3000
Motor Wire Insulation		Class 180 H							
Motor Stator Rating		Class 180 H							
Thermal Switch, Stator Temp.	C˚	130							
Std. Connectors ("S" Option): Motor & Brake		MS-3112-E16-8P							
	Feedback	MS-3112-E16-23P							

All ratings at 25 degrees Celsius
For amplifiers with peak sinusoidal commutation Kt = Ktrms(0.707), Ic = Icrms/(0.707), Ipk = Ipkrms/(0.707)

Specifications subject to change without notice.

SR41 Series Mechanical / Electrical Specifications

		SR41							
Nominal Backlash	in (mm)	0.004 (.10)							
Lead Accuracy	in/ft (mm/300 mm)	0.001 (.025)							
Maximum Radial Load	lb (N)	15 (67)							
Environmental Rating: Standard		IP54							
MOTOR STATOR		**118**	**138**	**158**	**168**	**218**	**238**	**258**	**268**
RMS Sinusoidal Commutation									
Continuous Motor Torque	lbf-in	47.6	47.6	44.7	45.5	78.9	78.9	78.8	79.7
	(N-m)	(5.38)	(5.37)	(5.05)	(5.14)	(8.91)	(8.91)	(8.91)	(9.00)
Torque Constant (Kt)	lbf-in/A	4.1	8.2	14.6	16.8	4.1	8.2	14.6	16.8
(+/– 10% @ 25˚C)	N-m/A	(0.46)	(0.93)	(1.65)	(1.90)	(0.46)	(0.93)	(1.65)	(1.90)
Continuous Current Rating	Amps	12.9	6.5	3.4	3.0	21.4	10.7	6.0	5.3
Peak Current Rating	Amps	25.9	12.9	6.9	6.0	42.9	21.4	12.1	10.6
Trapezoidal Commutation									
	lbf-in	45.5	45.4	42.7	43.5	75.3	75.3	75.3	76.1
	(N-m)	(5.14)	(5.13)	(4.83)	(4.91)	(8.51)	(8.51)	(8.50)	(8.60)
Torque Constant (Kt)	lbf-in/A	3.2	6.4	11.4	13.1	3.2	6.4	11.4	13.1
(+/– 10% @ 25˚C)	(N-m/A)	(0.36)	(0.72)	(1.28)	(1.48)	(0.36)	(0.72)	(1.28)	(1.48)
Continuous Current Rating	Amps	15.9	7.9	4.2	3.7	26.3	13.1	7.4	6.5
Peak Current Rating	Amps	31.7	15.8	8.4	7.4	52.5	26.3	14.8	13.0
Motor Stator Data									
Voltage Constant (Ke)	Vrms / Krpm	28.1	56.1	99.5	114.8	28.1	56.1	99.5	114.8
(+/– 10% @ 25˚C)	Vpk / Krpm	39.7	79.4	140.7	162.4	39.7	79.4	140.7	162.4
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L) (+/– 5% @ 25˚ C)	Ohms	0.42	1.7	6.0	7.8	0.18	0.72	2.26	3.0
Inductance (L-L) (+/– 15%)	mH	3.0	11.9	37.5	49.8	1.4	5.8	18.2	24.2
Brake Inertia	lbf-in-sec^2	.000938	.000938	.000938	.000938	.000938	.000938	.000938	.000938
	(Kg-cm^2)	(1.06)	(1.06)	(1.06)	(1.06)	(1.06)	(1.06)	(1.06)	(1.06)
Brake Current @ 24 Vdc	A	.66	.66	.66	.66	.66	.66	.66	.66
Brake Holding Torque	lbf-in	97	97	97	97	97	97	97	97
	(Nm)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
Brake Engage/Disengage Time	ms	20/29	20/29	20/29	20/29	20/29	20/29	20/29	20/29
Mech. Time Constant (tm), ms	min	5.3	5.3	6.0	5.8	2.3	2.3	2.3	2.3
	max	7.7	7.7	8.7	8.4	3.3	3.3	3.3	3.2
Electrical Time Constant (te)	ms	7.0	7.0	6.2	6.4	8.0	8.0	8.0	8.2
Damping Constant	lbf-in/krpm	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
	(N-m/krpm)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)
Friction Torque	lbf-in	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
	(N-m)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)	(0.51)
Bus Voltage	Vrms	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	3000	3000	3000	3000	3000	3000	3000	3000
Motor Wire Insulation		Class 180 H							
Motor Stator Rating		Class 180 H							
Thermal Switch, Stator Temp.	C˚	130							
Std. Connectors ("S" Option): Motor & Brake		MS-3102-E20-15P							
	Feedback	MS-3112-E16-23P							

All ratings at 25 degrees Celsius
For amplifiers with peak sinusoidal commutation Kt = Ktrms(0.707), Ic = Icrms/(0.707), Ipk = Ipkrms/(0.707)

Specifications subject to change without notice.

Standard Connectors

The “S” connector option on the SR Series of actuators provides for an actuator with Exlar’s standard MS style connectors, compatible with Exlar’s standard cables.

Cables For SR Series Actuators With Exlar Standard “S” Connections

Power Cables	Connecto-rization	Description	Standard Exlar Power Cable
SR21	S	Standard Power, Molded, Shielded	PC6-MC-xxx
SR31	S	Standard Power, Anodized, Required If Using Brake Option	PC1-AC-xxx
	E	Standard Power, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	PC1-EC-xxx
SR41	S	Standard Power, Molded, Shielded	PC7-MC-xxx
	S	Standard Power, Anodized, Required If Using Brake Option	PC7-AC-xxx
	E	Standard Power, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	PC7-EC-xxx
Feedback Cables			**Standard Exlar Feedback Cable**
SR21	S	Standard Resolver Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
SR31	S	Standard Encoder Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
	E	Standard Resolver Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC4-EC-xxx
	E	Standard Encoder Feedback, Anodized, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC4-EC-xxx
SR41	S	Standard Resolver Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
	S	Standard Encoder Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
	E	Standard Resolver Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC1-EC-xxx
	E	Standard Encoder Feedback, Anodized, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC1-EC-xxx
Brake Cables			**Standard Exlar Brake Cable**
SR21	S	Brake Leads In Power Cable Connector	N/A
SR31	E	Brake Leads In Power Cable Connector	N/A
SR41	S	Brake Leads In Power Cable Connector	N/A
	E	Brake Leads In Power Cable Connector	N/A

* Standard lengths of 15’, 25’ and 50’

Specifications subject to change without notice.

Cables For SR Series Actuators With "M" Connectors

Exlar Actuator	Amplifier Manufacturer and Type	Exlar Feedback Callout	Power Cable Manufacturer	Power Cable Part Number	Feedback Cable Manufacturer	Feedback Cable Part Number
SR21 SR31	Allen Bradley Ultra 100/200	AB1	Exlar	PC6-MC-xxx	Allen Bradley	9101-1366-xxx
	Allen Bradley Ultra 3000/5000	AB7*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx
	Allen Bradley Ultra 3000/5000	AB4/AB5*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx**
	Control Techniques En, Epsilon and MDS Series	EM2	Control Techniques	CMDS-xxx	Control Techniques	CFCS-xxx
	Kollmorgen Servo Star & Servo Star CD	KM1	Kollmorgen	CSSSRHA1H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHA1H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM5/KM2	Kollmorgen	CSSSRHG1H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHG1H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM3/KM4	Kollmorgen	CSSSS3HG2H-xxx set includes feedback cable)	Kollmorgen	CSSSS3HG2H-xxx (set includes power cable)
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN1	Bosch/Rexroth Indramat	IKG4077, IKG4017, IKG4009, IKG4008 depending on Indramat amplifier	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN2	Bosch/Rexroth Indramat	IKG4077, IKG4017, IKG4009, IKG4008 depending on Indramat amplifier	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN4/IN3	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4374
	Bosch/Rexroth Indramat DIAX Series	IN1	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN2	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN3	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4374
	Parker Compumotor Gemini Series	PC3	Exlar	PC6-MC-xxx	Parker Compumotor	71-018308-XX
	Yaskawa Sigma II Series (3 inch and smaller motors 100/200VAC)	YS3	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (3 inch and smaller motors 400VAC)	YS3	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 100/200VAC)	YS2	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 400VAC)	YS2	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
SR41	Allen Bradley Ultra 100/200	AB1	Exlar	PC7-MC-xxx	Allen Bradley	9101-1366-xxx
	Allen Bradley Ultra 3000/5000	AB7*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx
	Allen Bradley Ultra 3000/5000	AB4/AB5*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx**
	Control Techniques En, Epsilon and MDS Series	EM2	Control Techniques	CMMS-xxx	Control Techniques	CFCS-XXX
	Kollmorgen Servo Star & Servo Star CD	KM1	Kollmorgen	CSSSRHA2H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHA2H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM5/KM2	Kollmorgen	CSSSRHG2H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHG2H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM4/KM3	Kollmorgen	CSSSS3HG2H-xxx (set includes feedback cable)	Kollmorgen	CSSSS3HG2H-xxx (set includes power cable)
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN1	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN2	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN3/IN4	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4374
	Bosch/Rexroth Indramat DIAX Series	IN1	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN2	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN3	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4374
	Parker Compumotor Gemini Series	PC3	Exlar	PC7-MC-xxx	Parker Compumotor	71-018308-XX
	Yaskawa Sigma II Series (3 inch and smaller motors 100/200VAC)	YS3	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (3 inch and smaller motors 400VAC)	YS3	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 100/200VAC)	YS2	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 400VAC)	YS2	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)

* Brake Cable AB4/AB5 and AB7, 2090-UXNPAMP-18Sxx

** Exlar Corporation uses absolute encoders for AB4 and AB5 configurations that are powered by 5 VDC. A customer not using Allen-Bradley's universal feedback cable referenced here, must make provisions such that the wiring scheme provides connectivity according to Allen-Bradley's wiring requirments for 5 VDC encoder power from the amplifier to the encoder.

SR Series Travel Options

PF = Preloaded Follower

This option offers a true zero backlash follower for the SR 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 absolute internal feedback option.

RB = Rear Electic Brake

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

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.

XT = Special Travel Option Selections

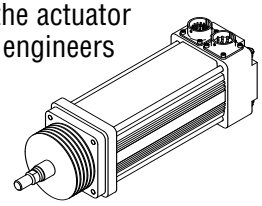
The XT Option can be used to specify various special travel options on the SR Series of Linear Actuators. Because this option can be used to specify many things, it is important that an order including the -XT option spell out in detail, the exact options being selected by the including of the -XT in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

Descriptions:

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 neoprene coated nylon. This standard bellows is rated for environmental temperatures of -54 degrees to 121 degrees Celsius. Longer strokes may require the main rod of the actuator to be extended beyond standard length. Consult Exlar applications engineers for details.

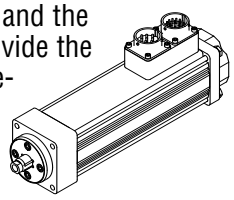


High Temp Protective Bellows

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 high temperature material of this bellows is silicone coated fiberglass. This standard bellows is rated for environmental temperatures of -73 degrees to 288 degrees Celsius. Longer strokes may require the main rod of the actuator to be extended beyond standard length. Consult Exlar applications engineers for details.

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.



L1, L2, L3 = Adjustable External Travel Switches

This option allows up to 3 external switches to be included with the SR Series Actuator. These switch es provide travel indication to the controller and are adjustable. See drawing on page 57. Must purchase 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.

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.

Designator	Base Speed	Actuator/Motor Series
-50	5000 rpm	SR21
-30	3000 rpm	SR31/SR41
01-99	Special Speed, Consult Exlar	

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 SR-31-03-01-BSA-EM3-138-30 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 Exlar applications engineers. Also, it is not possible to produce every possible speed from -01 to -99 for each motor at each voltage so please contact Exlar applications engineers for confirmation of the speed that is desired for the application.

Motor Options

SR 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 = 1 stack,
230 Vrms, 8 Pole, Class 180 H

158 = 1 stack,
400 Vrms, 8 Pole, Class 180 H

168 = 1 stack,
460 Vrms, 8 Pole, Class 180 H

218 = 2 stack,
115 Vrms, 8 Pole, Class 180 H

238 = 2 stack,
230 Vrms, 8 Pole, Class 180 H

258 = 2 stack,
400 Vrms, 8 Pole, Class 180 H

268 = 2 stack,
460 Vrms, 8 Pole, Class 180

Note: 3 stack not available in SR Series

Rod End Attachments

Rear Clevis Pin

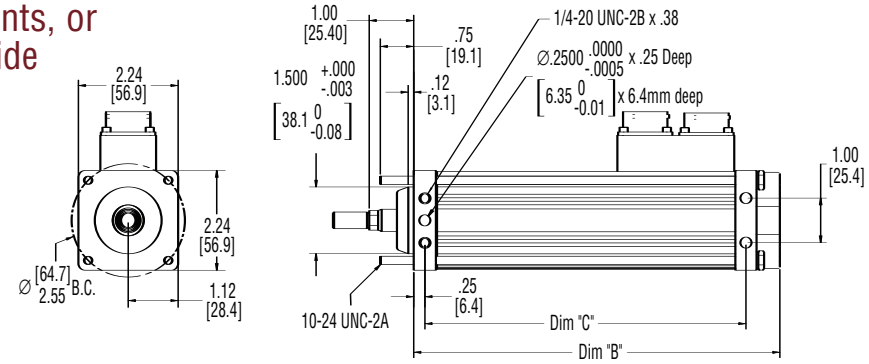
Spherical Rod Eye

Rod Eye

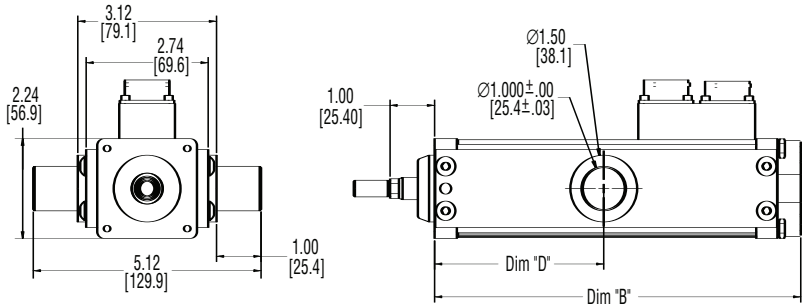
Rod Clevis

See drawings on pages 55-57.
Attachments ordered separate from actuator.

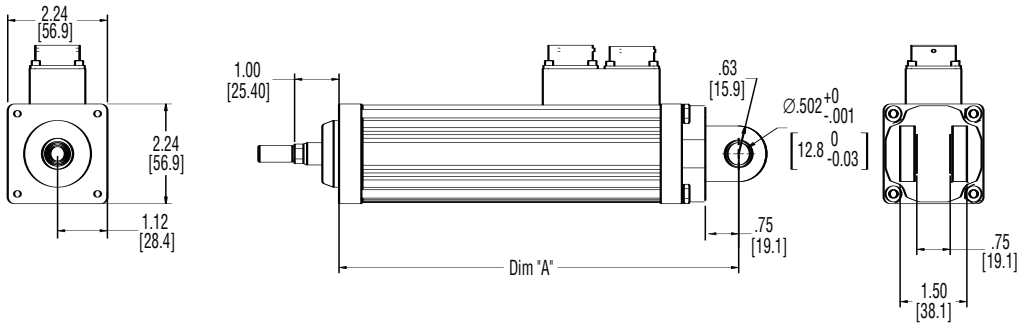
SR21 Extended Tie Rod Mounts, Side Mounts, or Double Side Mounts



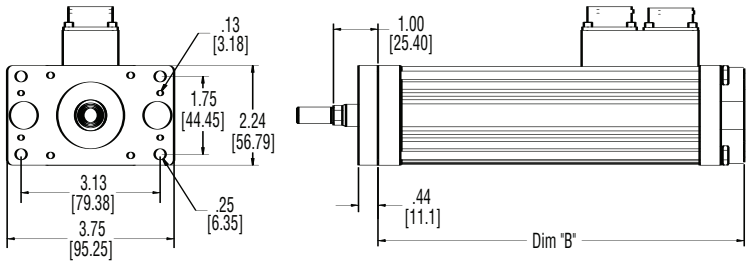
SR21 Trunnion Mount



SR21 Clevis Mount



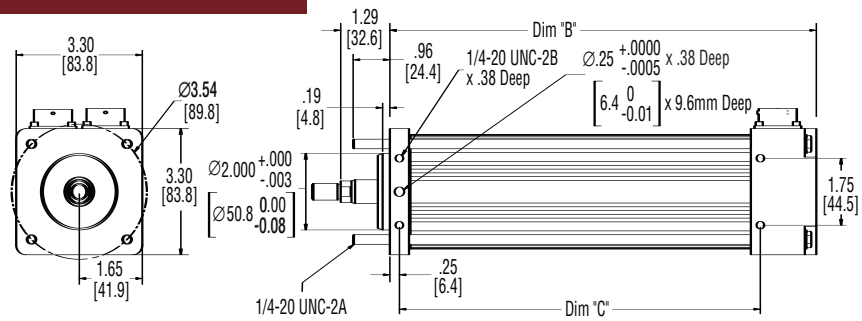
SR21 Front Flange Mount



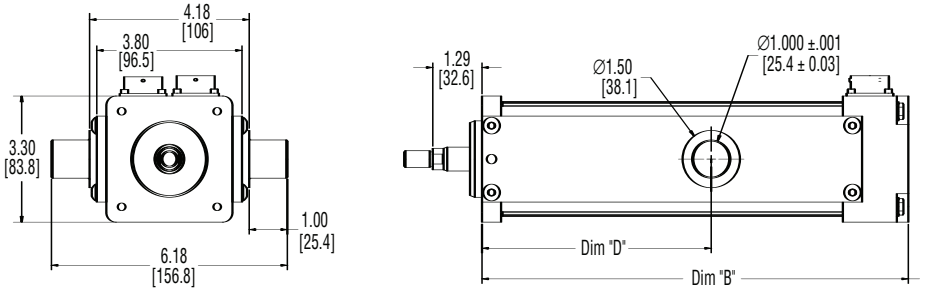
Dim	3 inch stroke (mm)	6 inch stroke (mm)	10 inch stroke (mm)	12 inch stroke (mm)
A	9.0 (225.6)	12 (304.8)	16 (406.4)	18 (457.2)
B	8.2 (208.3)	11.2 (284.5)	15.2 (386.1)	17.2 (436.9)
C	7.21 (183.1)	10.21 (259.3)	14.21 (360.9)	16.21 (411.7)
D	3.0 (76.2)	6.0 (152.4)	10.0 (254.0)	12.0 (304.8)

Note: Add 1.9 inches (48 mm) to Dims A,B,& C if ordering Brake.

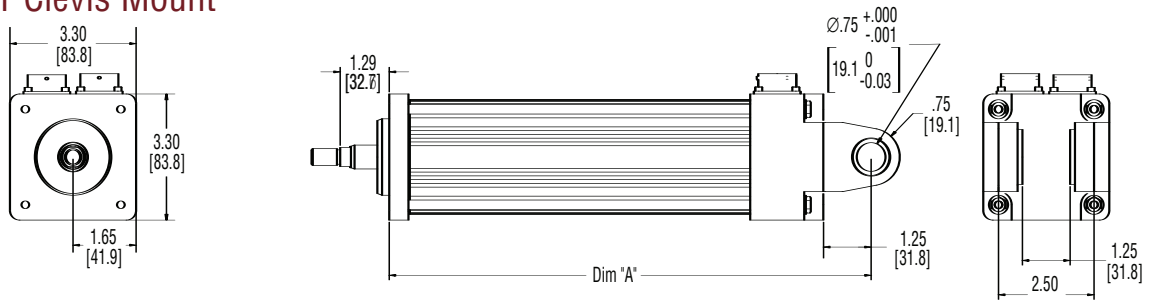
SR31 Extended Tie Rod Mounts, Side Mounts, or Double Side Mounts



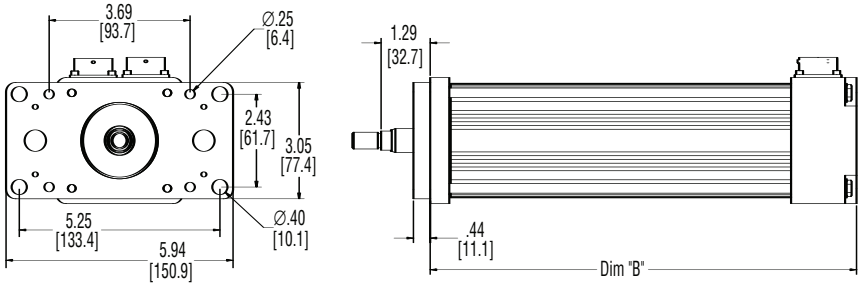
SR31 Trunnion Mount



SR31 Clevis Mount



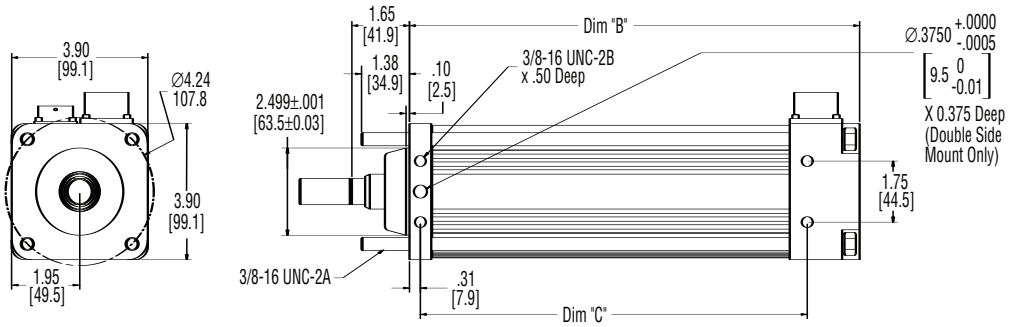
SR31 Front Flange Mount



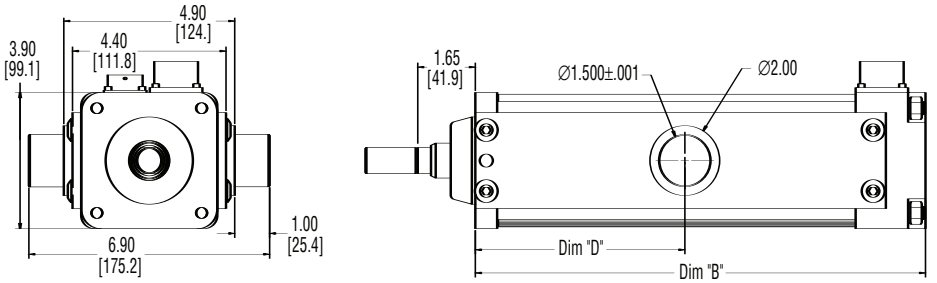
Dim	3 inch stroke (mm)	6 inch stroke (mm)	10 inch stroke (mm)	12 inch stroke (mm)	18 inch stroke (mm)
A	10.1 (256.5)	12.6 (320.0)	17.1 (434.3)	19.1 (485.1)	25.1 (637.5)
B	8.7 (221.0)	11.2 (284.5)	15.7 (398.7)	17.7 (449.6)	23.7 (602.0)
C	6.98 (177.3)	9.45 (240.0)	13.95 (354.3)	15.95 (405.1)	21.95 (557.5)
D	3 (76.2)	6.0 (152.4)	10 (254.0)	12 (304.8)	18 (457.2)

Note: Add 1.6 inches (40.6 mm) to Dims A,B,& C if ordering Brake.

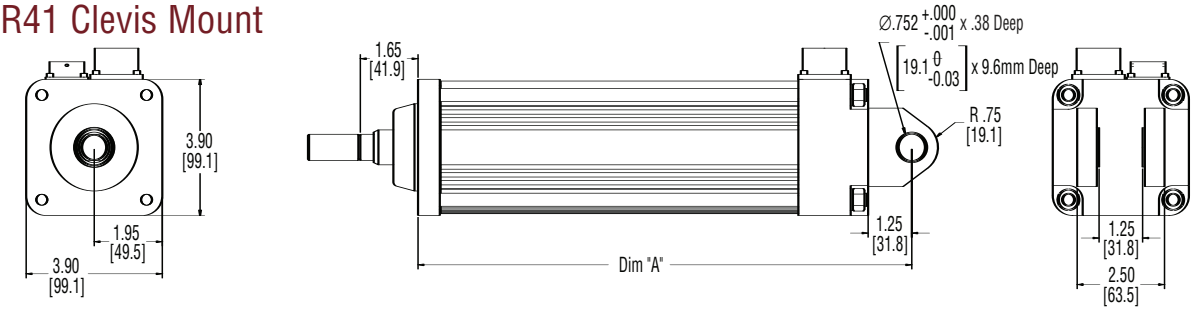
SR41 Extended Tie Rod Mounts, Side Mounts, or Double Side Mounts



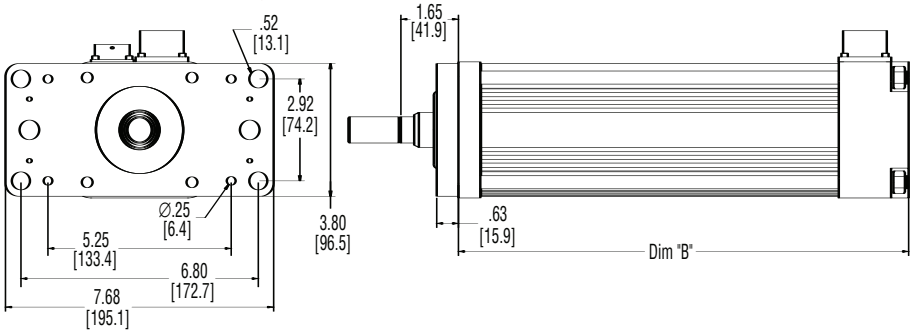
SR41 Trunnion Mount



SR41 Clevis Mount

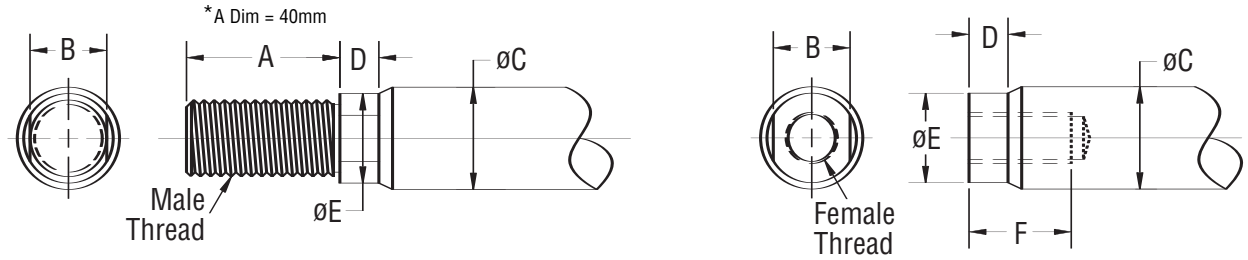


SR41 Front Flange Mount



Dim	6 inch stroke (mm)	12 inch stroke (mm)	18 inch stroke (mm)
A	14.1 (358.1)	20.1 (510.5)	26.1 (663.0)
B	12.9 (327.6)	18.9 (480.1)	24.9 (632.4)
C	11.08 (281.4)	17.08 (433.8)	23.08 (586.2)
D	6.0 (152.4)	12 (304.8)	18 (457.2)
Note: Add 1.52 inches (38.6 mm) to Dims A,B,& C if ordering Brake.			

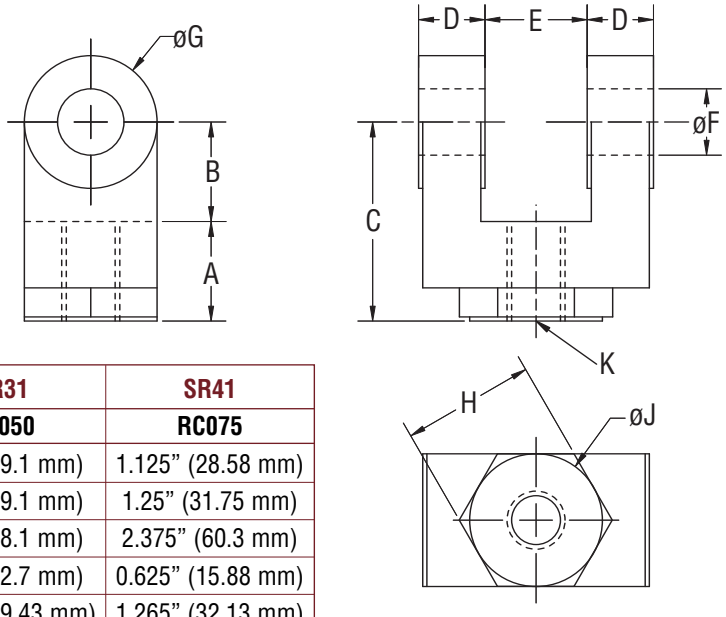
Actuator Rod End Options



	A inch (mm)	B inch (mm)	øC inch (mm)	D inch (mm)	øE inch (mm)	F inch (mm)	Male U.S.	Male Metric	Female U.S.	Female Metric
SR21	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	M8X1	5/16 – 24 UNF – 2B	M8X1
SR31	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 UN F– 2A	M12X1.75*	7/16 – 20 UNF – 2B	M10X1.5
SR41	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	M16X1.5	5/8 – 18 UNF – 2B	M16X1.5

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

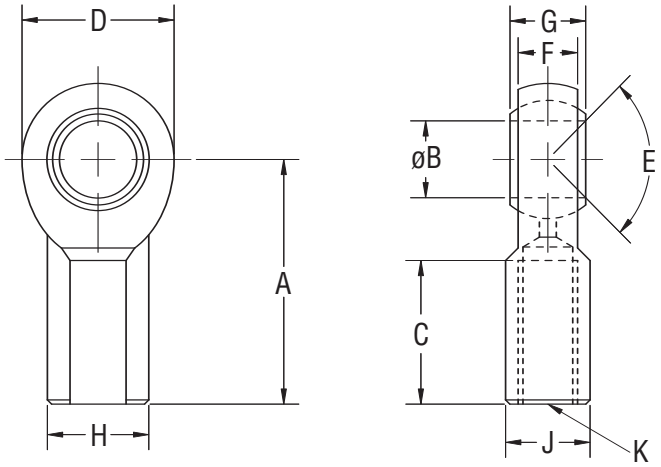
Rod Clevis Dimensions



	SR21	SR31	SR41
	RC038	**RC050**	**RC075**
A	0.787” (20 mm)	0.75” (19.1 mm)	1.125” (28.58 mm)
B	0.787” (20 mm)	0.75” (19.1 mm)	1.25” (31.75 mm)
C	1.574” (40 mm)	1.50” (38.1 mm)	2.375” (60.3 mm)
D	.575” (14.6 mm)	0.50” (12.7 mm)	0.625” (15.88 mm)
E	0.375” (9.5 mm)	0.765” (19.43 mm)	1.265” (32.13 mm)
øF	0.375” (9.5 mm)	0.50” (12.7 mm)	0.75” (19.1 mm)
øG	0.75” (19.1 mm)	1.00” (25.4 mm)	1.50” (38.1 mm)
H	NA	1.00” (25.4 mm)	1.25” (31.75 mm)
øJ	NA	1.00” (25.4 mm)	1.25” (31.75 mm)
K	3/8-24	7/16-20	3/4-16

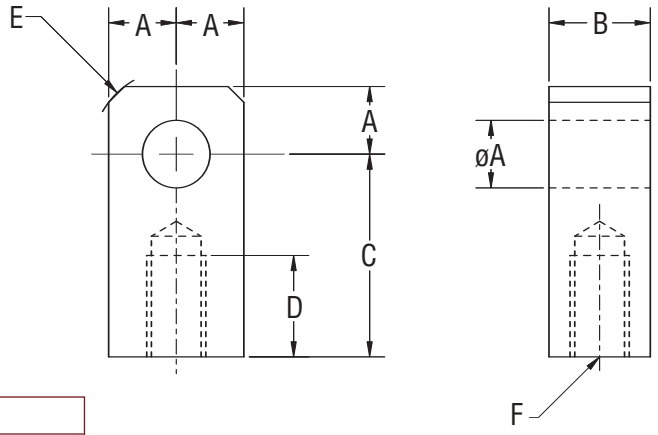
Drawings subject to change. Consult Exlar for certified drawings.

Spherical Rod Eye Dimensions



	SR21	SR31	SR41
	SRM038	**SRM044**	**SRM075**
A	1.625” (41.3 mm)	1.81” (46.0 mm)	2.88” (73.2 mm)
øB	.375” (9.525 mm)	0.438” (11.13 mm)	0.75” (19.1 mm)
C	.906” (23.0 mm)	1.06” (26.9 mm)	1.72” (43.7 mm)
D	1.0” (25.4 mm)	1.13” (28.7 mm)	1.75” (44.5 mm)
E	±6 deg	14 deg	14 deg
F	.406” (10.3 mm)	0.44” (11.1 mm)	0.69” (17.5 mm)
G	.500” (12.7 mm)	0.56” (14.2 mm)	0.88” (22.3 mm)
H	.688” (17.4 mm)	0.75” (19.1 mm)	1.13” (28.7 mm)
J	.562” (14.3 mm)	0.63” (16.0 mm)	1.00” (25.4 mm)
K	3/8-24	7/16-20	3/4-1

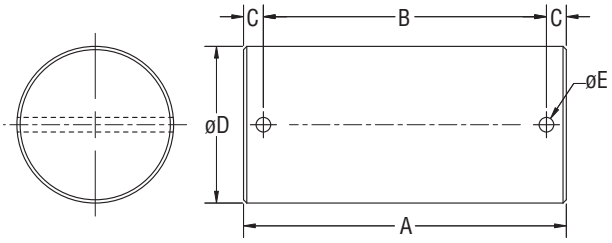
Rod Eye Dimensions



	SR31	SR41
	RE050	**RE075**
øA	0.50” (12.7 mm)	0.75” (19.1 mm)
B	0.75” (19.1 mm)	1.25” (31.8 mm)
C	1.50” (38.1 mm)	2.06” (52.3 mm)
D	0.75” (19.1 mm)	1.13” (28.7 mm)
E	0.63” (16.0 mm)	0.88” (22.3 mm)
F	7/16-20	3/4-16

Drawings subject to change. Consult Exlar for certified drawings.

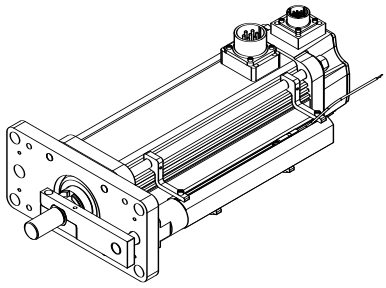
Rear Clevis Pin Dimensions

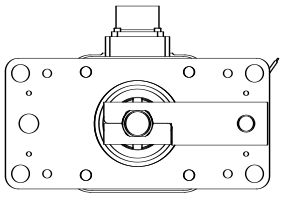


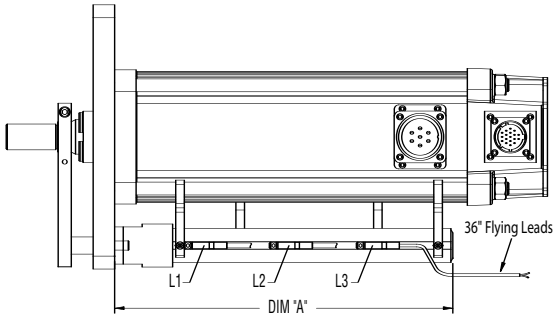
	A	B	C	øD	øE
SR21 **CP050**	2.28” (57.9 mm)	1.94” (49.28 mm)	0.17” (4.32 mm)	0.50” (12.7 mm)	0.095” (2.41 mm)
SR31/SR41 **CP075**	3.09” (78.5 mm)	2.72” (69.1 mm)	0.19” (4.82 mm)	0.75” (19.1 mm)	0.14” (3.56 mm)

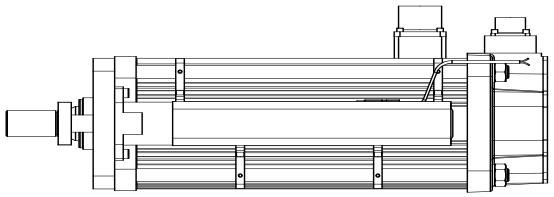
SR21, SR31 and SR41 External Limit Switch Extension Options

Dim A	3 inch (mm) stroke	6 inch (mm) stroke	10 inch (mm) stroke	12 inch (mm) stroke	14 inch (mm) stroke	18 inch (mm) stroke
SR21	5.515 (140.1)	8.515 (216.3)	NA NA	14.515 (368.7)	NA NA	NA NA
SR31	6.932 (176.1)	9.832 (249.7)	13.832 (351.3)	15.832 (402.1)	17.832 (452.9)	21.832 (554.5)
SR41	NA NA	9.832 (249.7)	13.832 (351.3)	15.832 (402.1)	17.832 (452.9)	21.832 (554.5)









The external limit switch option for the SR 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. 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

Switch Type	Exlar Part Number	Turck Part Number
Normally Closed Switch	24631	BIM-INT-RP6X
Normally Open Switch	22303	BIM-INT-AP6X

Drawings subject to change. Consult Exlar for certified drawings.

SR Series Ordering Information

SR AA - BB CC - D E F - GGG - HHH - II - {XX..XX}

AA = SR Actuator Size
21 = 2.25 inch frame actuator
31 = 3.3 inch frame actuator
41 = 3.9 inch frame

BB = Stroke Length
03 = 3 inch stroke (SR21 and SR31)
06 = 6 inch, All (SR31 = 5.9 inch)
10 = 10 inch(SR21, SR31 and SR41)
12 = 12 inch (SR21, SR31 and SR41)
18 = 18 inch (SR31 and SR41)

CC = Lead
01 = 0.1 inch (SR21, SR31 and SR41)
02 = 0.2 inch (All)
04 = 0.4 inch (SR21)
05 = 0.5 inch (SR31 and SR41)
08 = 0.75 inch (SR41)[5]

D = Connections
B = Embedded leads
S = Exlar standard, 23 pin feedback, 8 pin power
I = Intercontec style (Exlar standard European style connector)
M = Manufacturer's Connectors[1]
P = Embedded leads with plug

E = Mounting
S = Side Mount
D = Double Mount
F = Front Flange
C = Rear Clevis
E = Extended Tie Rod
T = Trunnion Mount

F = Rod End
A = Male,Metric
B = Female,Metric
M = Male, US Standard Thread
F = Female, US Standard Thread

Note:
1. Available with AB1, AB4/5, AB7, EM2, KM1, KM3, KM4, KM5, KM6, IN1, IN2, IN4, LZ1, LZ2, PC3, PS3, YS2 and YS3 feedback. This option allows the customer to use the standard cables supplied by their amplifier manufacturers.
2. Use of the Allen-Bradley 1394 requires assistance from Allen-Bradley to configure the axis for a custom motor.
3. Stator voltage and pole options allow for catalog rated performance at varying amplifier bus voltages and pole configuration requirements.
4. Emerson EN and Epsilon Series, A-B Ultra Series, and Kollmorgen ServoStar Series amps require motor data files for operation with SR Series actuators. These files can be downloaded from our website at www.exlar.com. Inquire with Exlar applications engineers for details.
5. 0.75 lead not available in 12˝ stroke

GGG = Brushless Amplifier (Please indicate the amplifier to be used to power the actuator)
XX1 = Custom Feedback - purchaser must supply drawing of feedback device and desired wiring drawings
OO1 = Standard Feedback Mount - actuator is supplied ready for size 15 resolver or encoder, includes .375 mm shaft
OO2 = Same as above with 8mm shaft

If the Rockwell Allen-Bradley system that you are using is the Kinetix platform or SERCOS based, additional software and data files are required from Allen-Bradley. Please contact your Rockwell Allen-Bradley representative for support.

AB1 = Allen-Bradley Ultra 100/200[4] (std encoder, 2048 line, with commutation, 5 VDC)
AB4 = Allen Bradley Ultra 3000 or 5000[4] with single-turn (absolute encoder)
AB5 = Allen Bradley Ultra 3000 or 5000[4] with multi-turn (absolute encoder)
AB6 = Allen Bradley 1394[2] (resolver, type 2)(replaces AB2)
AB7 = Allen Bradley Ultra 3000 or 5000[4] (std encoder, 2048 line, with commutation, 5 VDC)
AD1 = Advanced Digital "Simple Servo" (std encoder, 2048 line, with commutation, 5 VDC)
AP1 = API resolver based (resolver, type 2)
AP2 = API encoder based (std encoder, 2048 line, with commutation, 5 VDC)
AM1 = Advanced Motion Controls (std encoder, 2048 line, with commutation, 5 VDC)
AM2 = Advanced Motion Controls (std encoder, 1000 line, with commutation, 5 VDC)
AM3 = Advanced Motion Controls (resolver, type 1)
AM4 = Advanced Motion Controls BX Series default settings (std encoder, 2048 line, with commutation, 5 VDC)
BD2 = Baldor Flex Series (resolver, type 1)(replaces BD1)
BD3 = Baldor Flex Series (std encoder, 2048 line, with commutation, 5 VDC)
BO1 = Bosch (resolver, type 2)
CC1 = Cleveland Machine Controls (resolver, type 1)
CM1 = Comau (resolver, type 1)
CO1 = Copley Controls (std encoder, 2048 line, with commutation, 5 VDC)
CS1 = Parker (Custom Servo Motors) MPA, MPSL (resolver, type 1)
CS2 = Parker (Custom Servo Motors) Servo Flex (std encoder, 2048 line, with commutation, 5 VDC)
EL1 = Elmo Motion Control (resolver, type 1)
EL2 = Elmo CLA, SBA, FLU Series, (std encoder, 2048 line, with commutation, 5 VDC)
EM2 = Emerson En, Epsilon, MDS Series and UniDrive[4] (std encoder, 2048 line, with commutation, 5 VDC)
EM3 = Emerson MX Series (resolver, type 2)
EM4 = Emerson UniDrive SP (resolver, type 1)
EU1 = Elau (absolute encoder, multi-turn, type 2)
EX4 = Exlar SV Series (resolver, type 1) (replaces EX3)
GL1 = Sheffield Automation (G&L) Smart Drive (standard encoder, 2048 line, with commutation, 5 VDC) If selecting the "M" connector option with GL1, the motor power and encoder connector configuration will be equivalent to that used on the Sheffield Automation HSM Series motors.
GL2 = Sheffield Automation (G&L) Smart Drive (standard encoder, 2048 line, with commutation, 5 VDC) If selecting the "M" connector option with GL2, the motor power and encoder connector configuration will be equivalent to that used on the Sheffield Automation LSM/MSM Series motors.
IN1 = Bosch-Rexroth (Indramat) ECO Drive, (absolute, multi-turn Heidenhain encoder, type 2)
IN2 = Bosch-Rexroth (Indramat) ECO Drive, (absolute, single-turn Heidenhain encoder)
IN4 = Bosch-Rexroth (Indramat) ECO Drive, Standard resolver (resolver, type 1)(replaces IN3)
KM1 = Kollmorgen ServoStar Series[4] 230V (resolver, type 2)
KM3 = Kollmorgen ServoStar600 Series[4] (Absolute encoder, single turn, type 1)
KM4 = Kollmorgen ServoStar600 Series[4] (Absolute encoder, multi-turn, type 2)
KM5 = Kollmorgen ServoStar600 Series[4] and ServoStar CD(resolver, type 2)(replaces KM2)
KM6 = Kollmorgen ServoStar300 Series[4] (std encoder, 2048 line, with commutation, 5 VDC)
LZ1 = Lenze 9300 Series (multi-turn absolute encoder, type 2)
LZ2 = Lenze 9300 Series (resolver, type 2)
MD1 = Modicon (resolver, type 1)
MX1 = Metronix ARS Series, Resolver type 1
OR1 = Ormec (resolver, type 2)
PC1 = Parker Compumotor Apex & Z Series (resolver, type 1)
PC2 = Parker Compumotor TQ Series (std encoder, 2048 line, with commutation, 5 VDC)
PC3 = Parker Compumotor Gemini Series (std encoder, 2048 line, with commutation, 5 VDC)
PS2 = Pacific Scientific (std encoder, 2048 line, with commutation, 5 VDC)
PS3 = Pacific Scientific SC900, 700 Series (resolver, type 1)(replaces PS1)
SM2 = Siemens (resolver, type 1)
SP2 = In Motion, PAM Series (resolver, type 1)
WD1 = Whedco (GE Fanuc) (resolver, type 1)
YS2 = Yaskawa Sigma II Series for 4 inch and larger Exlar motors (multi-turn absolute encoder, type 1)
YS3 = Yaskawa Sigma II Series for 3 inch and smaller Exlar actuators (multi-turn absolute encoder, type 1)

HHH = Motor Stator[3]

118 = 1 stack, 115 Vrms, 8 pole	218 = 2 stack, 115 Vrms, 8 pole
138 = 1 stack, 230 Vrms, 8 pole	238 = 2 stack, 230 Vrms, 8 pole
158 = 1 stack, 400 Vrms, 8 pole	258 = 2 stack, 400 Vrms, 8 pole
168 = 1 stack, 460 Vrms, 8 pole	268 = 2 stack, 460 Vrms, 8 pole

II = Motor Speed
30 = 3000 rpm, SR31, SR41 50 = 5000 rpm, SR21 01-99 = Customer Specified Base Speed

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

Travel Options
AR = External Anti-rotate
RB = Rear Brake
L1/2/3 = External Limit Switch
XT = Special travel options

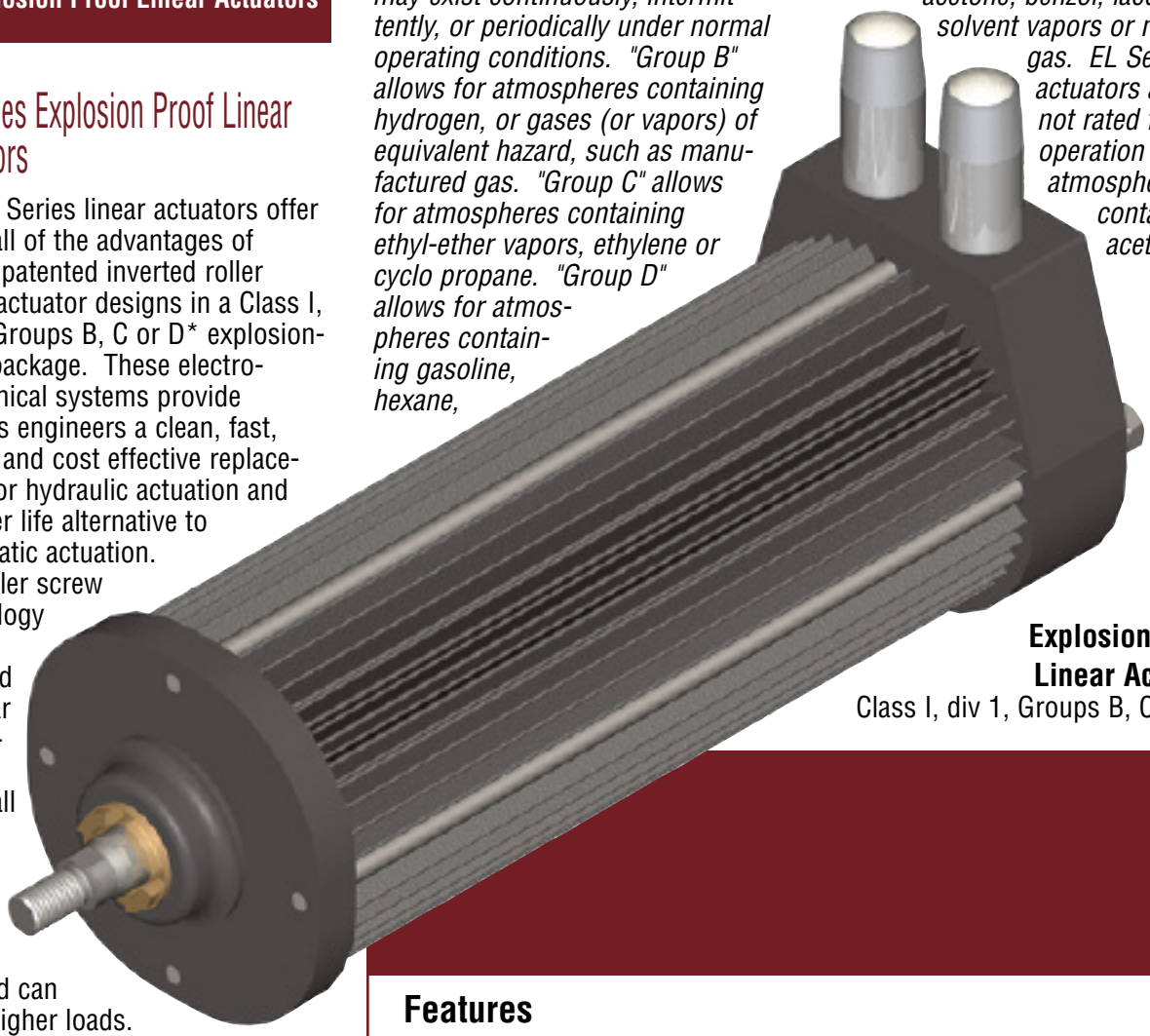
Housing Options
P5 = IP65 Sealing Option
XL = Special Lubrication
XM = Special Motor Options

EL Series Explosion Proof Linear Actuators

The EL Series linear actuators offer users all of the advantages of Exlar's patented inverted roller screw actuator designs in a Class I, div 1, Groups B, C or D* explosion-proof package. These electro-mechanical systems provide process engineers a clean, fast, simple and cost effective replacement for hydraulic actuation and a longer life alternative to pneumatic actuation. The roller screw technology manufactured by Exlar outperforms rival ball screws by 15 times in travel life, and can carry higher loads. The compact design allows users to effectively replace hydraulic or air cylinders with an electromechanical actuator, yet meet all required capabilities of the application.

The EL Series actuator is compatible with nearly any manufacturers' resolver-based amplifier.

** "Class I" means that flammable gases or vapors may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. "Division 1" means that hazardous concentrations in the air may exist continuously, intermittently, or periodically under normal operating conditions. "Group B" allows for atmospheres containing hydrogen, or gases (or vapors) of equivalent hazard, such as manufactured gas. "Group C" allows for atmospheres containing ethyl-ether vapors, ethylene or cyclo propane. "Group D" allows for atmospheres containing gasoline, hexane, naphtha, benzene, butane, alcohol, acetone, benzol, lacquer solvent vapors or natural gas. EL Series actuators are not rated for operation in atmospheres containing acetylene.*



EL30
Explosion-Proof
Linear Actuator
Class I, div 1, Groups B, C and D

Features

T-LAM technology yielding 35%increase in continuous motor torque over traditional windings
Resolver feedback
8 pole motors
Rod end options
1,2,or 3 stack motor compatible with nearly any servo amplifier
Several mounting configurations
Potted NPT connectors
Windings available from 24 VDC to 460 VAC rms
Class 180H insulation system

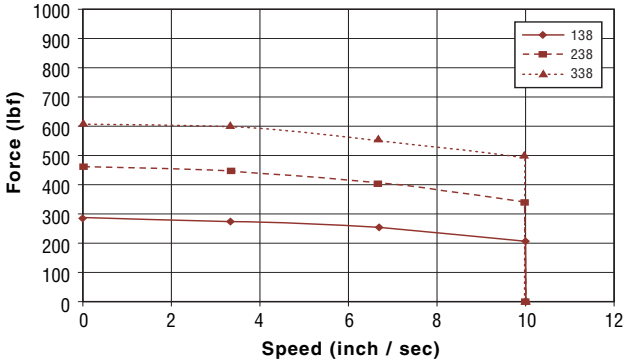
TYPICAL APPLICATIONS FOR EL SERIES EXPLOSION-PROOF MOTORS ARE WELL-SUITED TO MANY APPLICATIONS SUCH AS:

Turbine fuel flow	**Engine test stands**	**Chemical process plants**
Printing presses	**Fuel distribution systems**	**Shipbound fuel management**

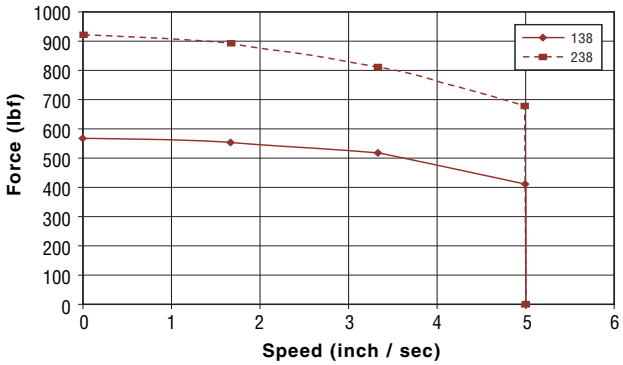
EL Series Performance Curves

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.

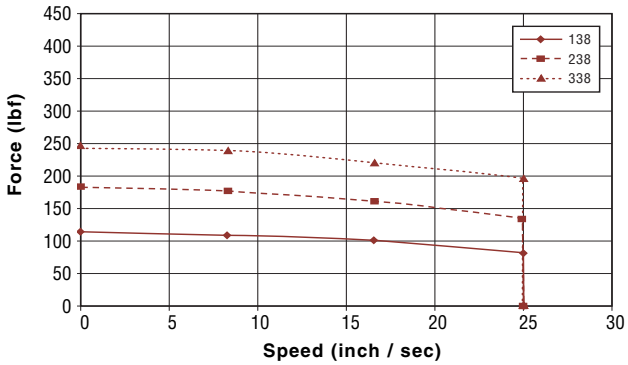
EL30-.2 Inch Lead



EL30-.1 Inch Lead



EL30-.5 Inch Lead



EL30 Performance Specifications

Model No.	Frame Size in. (mm)	Stroke in (mm)*	Screw Lead in (mm)	Force Rating 1 stack/ 2 stack lb (N)	Max. Velocity in/sec (mm/sec)	Approx.* Cont. Motor Torque 1 stack/ 2 stack lb-in (Nm)	Maximum Static Load lb (N)	Armature Inertia Rating** Lb-in-s^2 (Kg-m^2)	Dynamic Load lb (N)	Weight (approx) lb (Kg)
EL30-0301	3.125 (79.0)	3 (75.0)	0.1 (2.54)	543/885/NA (2415/3936/NA)	5 (127.0)	10.8/17.6/NA (1.22/1.99/NA)	2700 (12010)	0.00319 (0.00036)	5516 (24536)	12 (5.4)
EL30-0302	3.125 (79.0)	3 (75.0)	0.2 (5.08)	271/442/NA (1205/1966/NA)	10 (254.0)	10.8/17.6/NA (1.22/1.99/NA)	2700 (12010)	0.00319 (0.00036)	5800 (25798)	12 (5.4)
EL30-0305	3.125 (79.0)	3 (75.0)	0.5 (12.7)	109/177/NA (485/787/NA)	25 (635.0)	10.8/17.6/NA (1.22/1.99/NA)	2700 (12010)	0.00319 (0.00036)	4900 (21795)	12 (5.4)
EL30-0601	3.125 (79.0)	6 (150.0)	0.1 (2.54)	543/885/NA (2415/3936/NA)	5 (127.0)	10.8/17.6/NA (1.22/1.99/NA)	2700 (12010)	0.00361 (0.00041)	5516 (24536)	15 (6.8)
EL30-0602	3.125 (79.0)	6 (150.0)	0.2 (5.08)	271/442/626 (1205/1966/2785)	10 (254.0)	10.8/17.6/24.9 (1.22/1.99/2.81)	2700 (12010)	0.00361 (0.00041)	5800 (25798)	15 (6.8)
EL30-0605	3.125 (79.0)	6 (150.0)	0.5 12.7)	109/177/250 (485/787/1112)	25 (635.0)	10.8/17.6/24.9 (1.22/1.99/2.81)	2700 (12010)	0.00361 (0.00041)	4900 (21795)	15 (6.8)

*Please note that stroke mm are nominal dimensions. **Inertia +/– 5%.

For definition of terms see page 12.

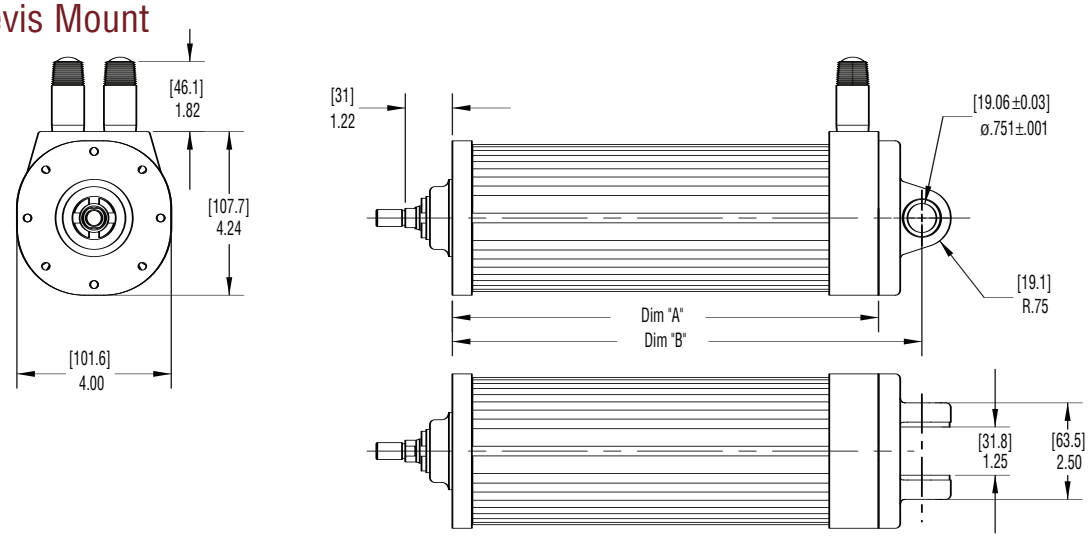
EL30 Series Mechanical / Electrical Specifications

		EL30															
Maximum Backlash (not pre-loaded)	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		IP65															
MOTOR STATOR		1A8	1B8	118	138	158	168	2A8	2B8	218	238	258	268	318	338	358	368
RMS Sinusoidal Commutation																	
Continuous Motor Torque	lbf-in	10.8	10.8	10.9	10.8	10.7	10.3	17.4	17.4	17.6	17.6	17.5	17.5	25.2	24.9	23.6	23.6
	(N-m)	(1.22)	(1.22)	(1.23)	(1.22)	(1.21)	(1.16)	(1.97)	(1.97)	(1.99)	(1.99)	(1.98)	(1.98)	(2.85)	(2.81)	(2.67)	(2.67)
Torque Constant (Kt)	lbf-in/A	1.1	1.1	4.4	8.7	15.5	17.5	1.1	1.1	4.4	8.7	15.5	17.5	4.4	8.7	15.7	17.6
(+/– 10% @ 80˚C)	N-m/A	(0.13)	(0.13)	(0.49)	(0.99)	(1.75)	(1.98)	(0.13)	(0.13)	(0.49)	(0.99)	(1.75)	(1.98)	(0.50)	(0.98)	(1.77)	(1.98)
Continuous Current Rating	Amps	10.7	10.7	2.8	1.4	0.8	0.7	17.3	17.3	4.5	2.2	1.3	1.1	6.3	3.2	1.7	1.5
Peak Current Rating	Amps	21.3	21.3	5.6	2.8	1.5	1.3	34.5	34.5	9.0	4.5	2.5	2.2	12.7	6.4	3.4	3.0
Trapezoidal Commutation																	
Continuous Motor Torque	lbf-in	10.3	10.3	10.4	10.3	10.2	9.8	16.6	16.6	16.8	16.8	16.7	16.7	24.1	23.8	22.5	22.6
	(N-m)	(1.16)	(1.16)	(1.17)	(1.17)	(1.15)	(1.11)	(1.88)	(1.88)	(1.90)	(1.90)	(1.89)	(1.89)	(2.72)	(2.69)	(2.55)	(2.55)
Torque Constant (Kt)	lbf-in/A	0.9	0.9	3.4	6.8	12.1	13.6	0.9	0.9	3.4	6.8	12.1	13.6	3.5	6.8	12.2	13.7
(+/– 10% @ 80˚C)	(N-m/A)	(0.10)	(0.10)	(0.39)	(0.77)	(1.37)	(1.54)	(0.10)	(0.10)	(0.39)	(0.77)	(1.37)	(1.54)	(0.39)	(0.76)	(1.38)	(1.55)
Continuous Current Rating	Amps	13.1	13.1	3.4	1.7	0.9	0.8	21.1	21.1	5.5	2.8	1.5	1.4	7.8	3.9	2.1	1.8
Peak Current Rating	Amps	26.1	26.1	6.8	3.4	1.9	1.6	42.3	42.3	11.0	5.5	3.1	2.7	15.5	7.9	4.1	3.7
Motor Stator Data																	
Voltage Constant (Ke)	Vrms / Krpm	7.7	7.7	29.9	59.7	106.0	119.5	7.7	7.7	29.9	59.7	106.0	119.5	30.3	59.2	106.9	119.9
(+/– 10% @ 80˚C)	Vpk / Krpm	10.9	10.9	42.2	84.5	149.9	168.9	10.9	10.9	42.2	84.5	149.9	168.9	42.9	83.8	151.2	169.6
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L) (+/– 5% @ 80˚C)	Ohms	0.19	0.19	2.8	11.2	36.3	49.6	0.08	0.08	1.1	4.5	14.1	18.0	0.65	2.6	9.3	11.6
Inductance (L-L)(+/– 5%)	mH	0.51	0.51	7.7	30.7	96.8	123.0	0.24	0.24	3.7	14.7	46.2	58.7	2.5	9.5	30.9	38.8
Mech Time Constant tm,	ms min	6.6	6.6	6.5	6.5	6.7	7.2	2.6	2.6	2.6	2.6	2.6	2.6	1.5	1.5	1.7	1.7
	Max	7.4	7.4	7.3	7.4	7.6	8.1	3.0	3.0	2.9	2.9	3.0	3.0	1.7	1.7	1.9	1.9
Electrical Time Contrant (te)	ms	2.7	2.7	2.8	2.7	2.7	2.5	3.2	3.2	3.3	3.3	3.3	3.3	3.8	3.7	3.3	3.3
Damping Constant	lbf-in/krpm	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
	(N-m/krpm)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Friction Torque	lbf-in	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	(N-m)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)	(0.23)
Bus Voltage	Vrms	24VDC	48VDC	115	230	400	460	24VDC	48VDC	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	RPM	1500	3000	3000	3000	3000	3000	1500	3000	3000	3000	3000	3000	3000	3000	3000	3000
Motor Wire Insulation		Class 180H															
Thermal Switch, Stator Temp.	˚C	T4 = 130˚C T3A = 165˚C															
Connectors		Potted NPT Connectors Only															

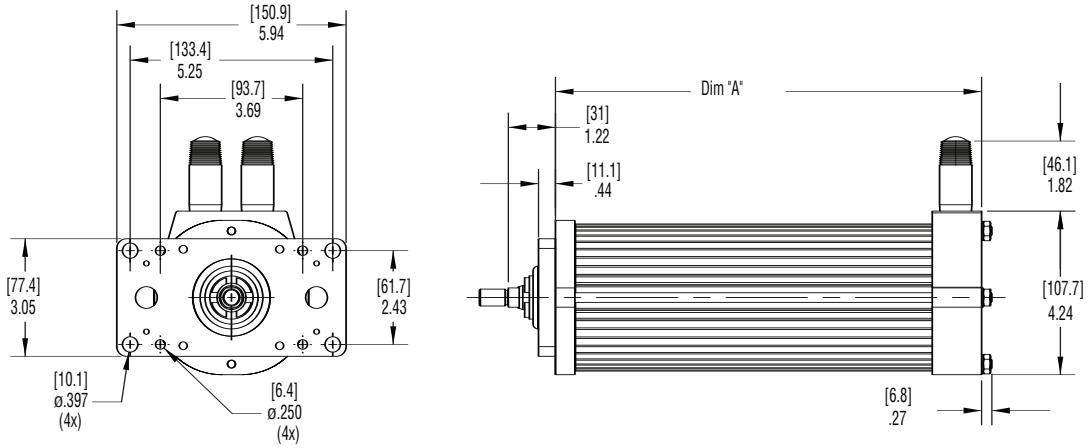
For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by 0.707, and peak current by 1.414.
Specifications reflect 80 °C test environment

Specifications subject to change without notice.

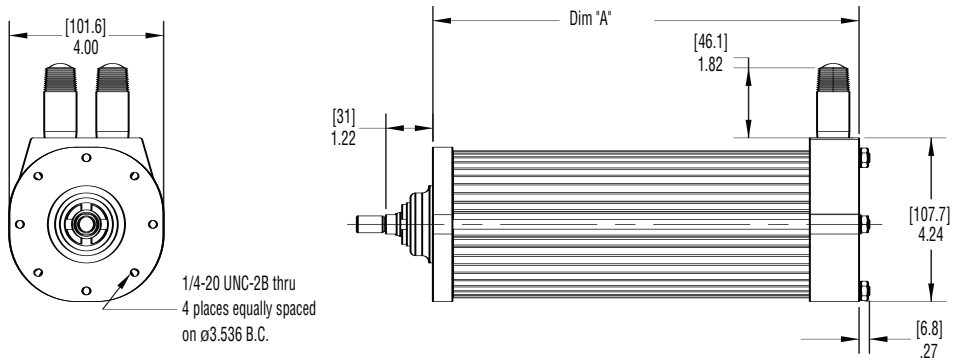
EL30 Clevis Mount



EL30 Front Flange Mount



EL30 Base Unit



Dim	3 inch (76.2 mm) stroke	6 inch (152.4 mm) stroke
A	8.57 (217.7)	11.04 (280.5)
B	9.70 (246.4)	12.17 (309.1)

EL30 Series Ordering Information

EL	AA	BB	CC	DDD	E	F	GGG	HHH	II	JJJ	XX	#####

EL = Model Series
EL = EL Series

AA = Frame Size
30 = 3 inch nominal

BB = Nomimal Stroke Length
03 = 3 inch stroke
06 = 6 inch stroke
XX = Special stroke not to exceed 6 inches

CC = Screw Lead
01 = 0.1 inch lead
02 = 0.2 inch lead
05 = 0.5 inch lead
XX = Special

DDD = Connector Options
N## = Potted NPT with flying leads
X## = length of flying leads in feet

E = Mounting Options
F = Front Flange
C = Rear Clevis
H = Threaded Face
X = Special Mounting

F = Rod Ends
M = Male,US std thread
A = Male,Metric std thread
F = Female,US std thread
B = Female,Metric std thread
X = Special rod end

Notes:
1. Amplifiers require motor data files for operation. See www.exlar.com or contact Exlar Engineering.
2. Use of the Allen-Bradley 1394 requires assistance from Allen-Bradley to configure the axis for a custom motor.
3. 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 pre-loaded 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 internal feedback option.

GGG = Feedback Options (Please indicate the amplifier to be used.)
XX1 = Custom feedback -buyer to supply drawing of desired feedback
001 = Standard feedback mount - actuator is supplied ready for size 15 resolver, includes .375 mm shaft
002 = Same as above with 8 mm shaft
AB6 = Allen-Bradley 1394[2] (resolver type 2)
AP1 = API (resolver based, type 2)
AM3 = Advanced Motion Controls (resolver, type 1)
BD2 = Baldor Flex Series (resolver type 1)
BO1 = Bosch (resolver, type 2)
CC1 = Cleveland Machine Controls (resolver, type 1)
CM1 = Comau (resolver, type 1)
CS1 = Parker (Custom Servo Motors) MPA, MPSL (resolver, type 1)
EL1 = Elmo Motion Control (resolver, type 1)
EM4 = Emerson UniDrive SP (resolver, type 1)
EX4 = Exlar SV Series (resolver, type 1)
IN4 = Bosch-Rexroth (Indramat) ECO Drive (standard resolver, type 1) (replaces IN3)
KM1 = Kollmorgen Servo Star[1] (resolver, type 2)
KM5 = Kollmorgen ServoStar 600 and ServoStar CD[1] (resolver, type 2)
LZ1 = Lenze 9300 (resolver, type 2)
MD1 = Modicon (resolver, type 1)
MX1 = Metronix ARS Series (resolver, type 1)
OR1 = Ormec (resolver, type 2)
PC1 = Parker Compumotor Apex &Z Series (resolver, type 1)
PS3 = Pacific Scientific SC9000, 700 Series (resolver, type 1)
SM2 = Siemens (resolver, type 1)
SP2 = In Motion, PAM Series (resolver, type 1)
WD1 = Whedco (GE-Fanuc) (resolver, type 1)

HHH = Motor Stator

1A8	= 1 stack, 24 Vrms, 8 pole	218	= 2 stack, 115 Vrms, 8 pole
1B8	= 1 stack, 48 Vrms, 8 pole	238	= 2 stack, 230 Vrms, 8 pole
118	= 1 stack, 115 Vrms, 8 pole	258	= 2 stack, 400 Vrms, 8 pole
138	= 1 stack, 230 Vrms, 8 pole	268	= 2 stack, 460 Vrms, 8 pole
158	= 1 stack, 400 Vrms, 8 pole	318	= 3 stack, 115 Vrms, 8 pole
168	= 1 stack, 460 Vrms, 8 pole	338	= 3 stack, 230 Vrms, 8 pole
2A8	= 2 stack, 24 Vrms, 8 pole	358	= 3 stack, 400 Vrms, 8 pole
2B8	= 2 stack, 48 Vrms, 8 pole	368	= 3 stack, 460 Vrms, 8 pole

II = Motor Speed
8 = 8 motor poles
01 - 99 = Two didit number - rated speed in rpm x 100

JJJ = Hazardous Location Temperature Rating
T3A = 180 deg C (Samariam Cobolt magnets)
T4 = 135 deg C (Neodymium-Iron-Boron magnets)

XX = Optional Speed & Mechanical Designations -Multiples possible
XL = Special lubrication
PF = Preloaded follower[3]
XT = Special travel option

= Part Number Designator for Specials
= Optional 5 digit assigned part number to designate unique model number for specials

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.

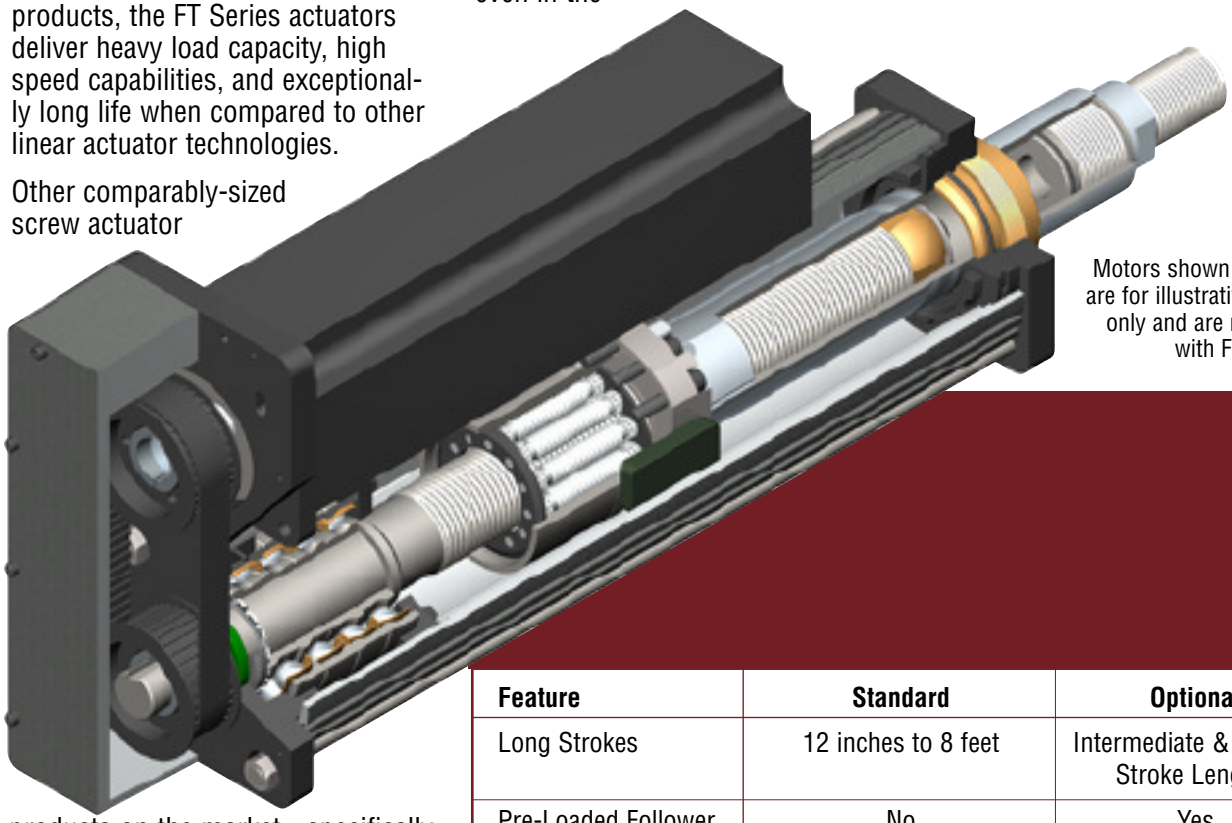
Contamination Protection and Lifetime Lubrication

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.

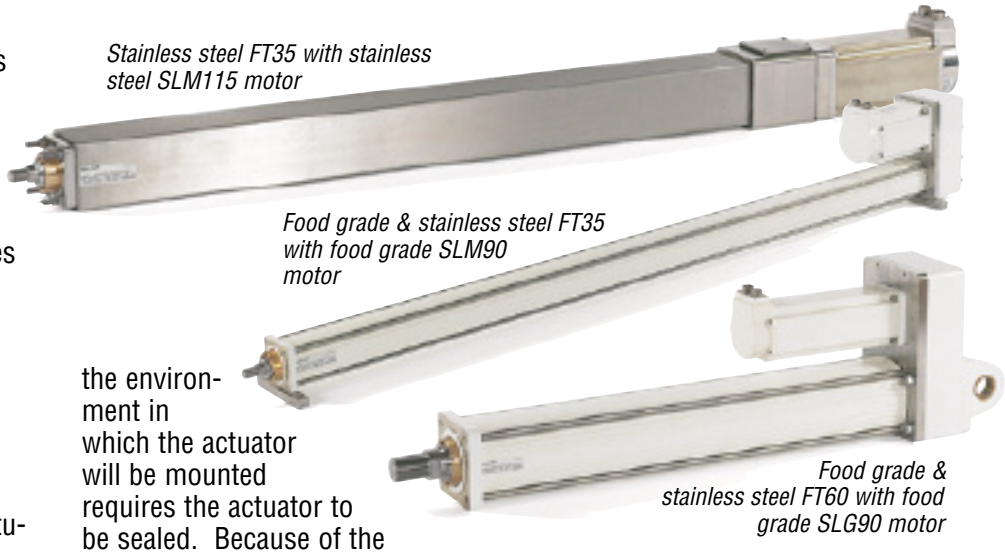
Feature	Standard	Optional
Long Strokes	12 inches to 8 feet	Intermediate & Custom Stroke Lengths
Pre-Loaded Follower	No	Yes
External End Switches	No	One, two or three Adjustable Switches
Multiple Actuator Mountings	Side Mount, Side Lug, Extended Tie Rods, Rear Clevis, Front Flange, Side Trunnion, Rear Flange, Front/Rear Flange	OEM Specials Available
Multiple Motor Mounting Configurations	Inline Direct Drive, Parallel 1:1 Drive, Parallel, 2:1Reduction	OEM 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 drawing on page 71). These rod and shaft seals, and o-ring sealing provides IP65 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. Consult Exlar applications engineering for details and quotations on special sealing of this type.



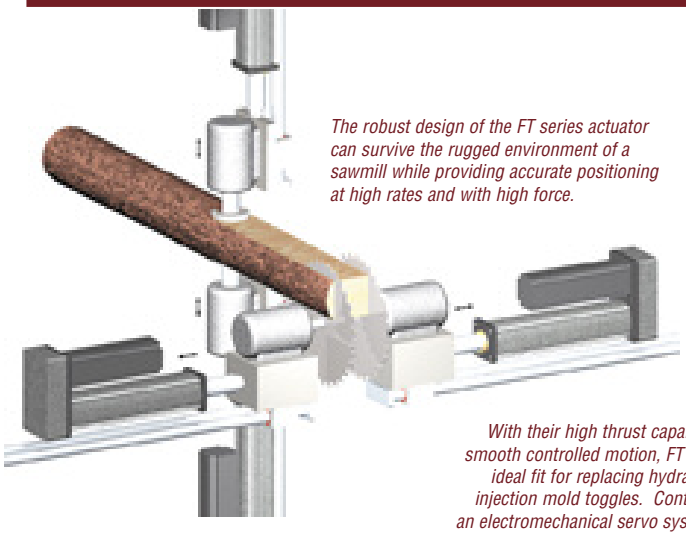
Stainless steel FT35 with stainless steel SLM115 motor

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



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.

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.

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

FT Series Lifetime Curves

The expected life of a force tube actuator is expressed as the travel distance that 90% of the actuators are expected to exceed before experiencing metal fatigue. The formula that defines this value is:

The underlying formula that defines this value is:

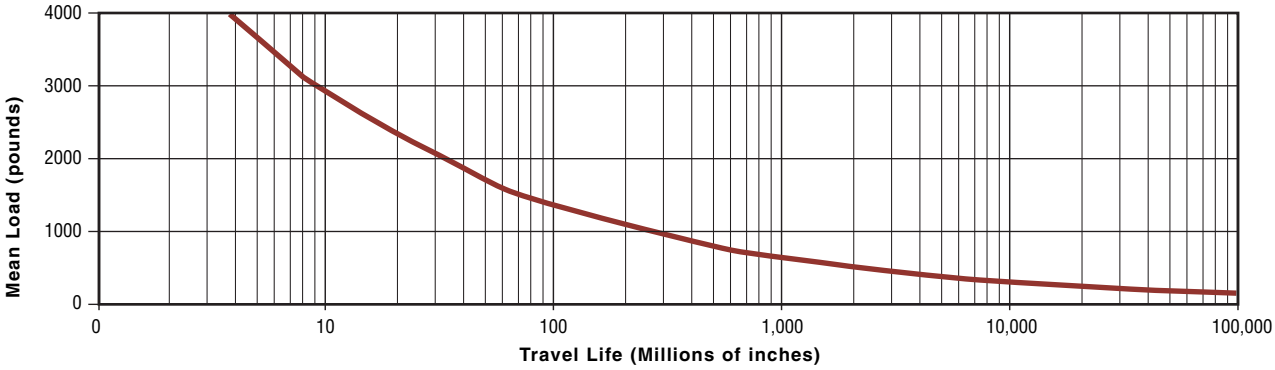
$L_{10} = (C/F)^3 \times S \equiv$ where C = Dynamic load rating (lbs)

F = Cubic mean applied load (lbs.)

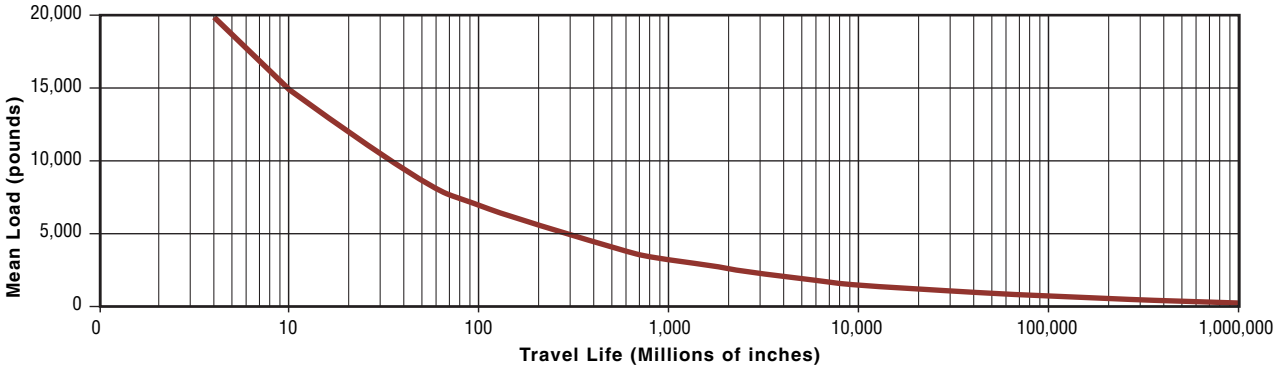
S = Roller screws lead (inches)

Travel life in millions of inches, where:

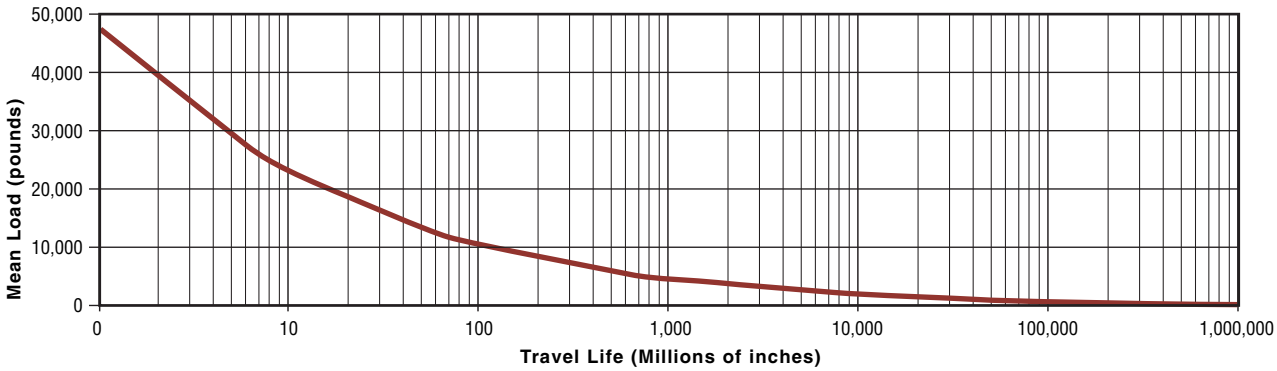
FT35



FT60



FT80



FT Series Performance Specifications

Model No.	Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Max. Linear Speed in/sec (mm/sec)	Rated Force lbf (kN)	Dynamic Load Rating (std. follower) lbf (kN)	Torque @ Rated Force lb-in (N-m)	Screw Inertia lb-in-s^2 (kg-m^2)	Max. Force* lbf (kN)	Max. Rot. Speed rpm	Weight Base Unit lb (kg)
FT35-0605	3.5 (89)	6 (152)	0.2 (5)	14.7 (373)	2000 (8.9)	10700 (47.5)	75 (8.3)	0.0019 (0.00022)	4000 (17.8)	4500	30 (14)
FT35-0610	3.5 (89)	6 (152)	0.39 (10)	29.5 (750)	2000 (8.9)	8700 (38.5)	150 (16.5)	0.0019 0.00022)	4000 (17.8)	4500	30 (14)
FT35-0620	3.5 (89)	6 (152)	0.79 (20)	59.3 (1500)	2000 (8.9)	7100 (31.5)	300 (33.0)	0.0019 (0.00022)	4000 (17.8)	4500	30 (14)
FT35-1205	3.5 (89)	12 (304)	0.2 (5)	14.7 (373)	2000 (8.9)	10700 (47.5)	75 (8.3)	0.0027 (0.00031)	4000 (17.8)	4500	35 (16)
FT35-1210	3.5 (89)	12 (304)	0.39 (10)	29.5 (750)	2000 (8.9)	8700 (38.5)	150 (16.5)	0.0027 (0.00031)	4000 (17.8)	4500	35 (16)
FT35-1220	3.5 (89)	12 (304)	0.79 (20)	59.3 (1500)	2000 (8.9)	7100 (31.5)	300 (33.0)	0.0027 (0.00031)	4000 (17.8)	4500	35 (16)
FT35-1805	3.5 (89)	18 (457)	0.2 (5)	14.7 (373)	2000 (8.9)	10700 (47.5)	75 (8.3)	0.0037 (0.00042)	4000 (17.8)	4500	40 (18)
FT35-1810	3.5 (89)	18 (457)	0.39 (10)	29.5 (750)	2000 (8.9)	8700 (38.5)	150 (16.5)	0.0037) (0.00042)	4000 (17.8)	4500	40 (18)
FT35-1820	3.5 (89)	18 (457)	0.79 (20)	59.3 (1500)	2000 (8.9)	7100 (31.5)	300 (33.0)	0.0037 (0.00042)	4000 (17.8)	4500	40 (18)
FT35-2405	3.5 (89)	24 (610)	0.2 (5)	14.7 (373)	2000 (8.9)	10700 (47.5)	75 (8.3)	0.0045 (0.00051)	4000 (17.8)	4500	45 (21)
FT35-2410	3.5 (89)	24 (610)	0.39 (10)	29.5 (750)	2000 (8.9)	8700 (38.5)	150 (16.5)	0.0045 (0.00051)	4000 (17.8)	4500	45) (21)
FT35-2420	3.5 (89)	24 (610)	0.79 (20)	59.3 (1500)	2000 (8.9)	7100 (31.5)	300 (33.0)	0.0045 (0.00051)	4000 (17.8)	4500	45 (21)
FT35-3605	3.5 (89)	36 (914)	0.2 (5)	8.9 (226)	2000 (8.9)	10700 (47.5)	75 (8.3)	0.0061 (0.00069)	4000 (17.8)	2700	55 (25)
FT35-3610	3.5 (89)	36 (914)	0.39 (10)	17.8 (452)	2000 (8.9)	8700 (38.5)	150 (16.5)	0.0061 (0.00069)	4000 (17.8)	2700	55 (25)
FT35-3620	3.5 (89)	36 (914)	0.79 (20)	35.6 (903)	2000 (8.9)	7100 (31.5)	300 (33.0)	0.0061 (0.00069)	4000 (17.8)	2700	55 (25)
FT35-4805	3.5 (89)	48 (1219)	0.2 (5)	5.7 (145)	2000 (8.9)	10700 (47.5)	75 (8.3)	0.0076 (0.00086)	4000 (17.8)	1700	65 (30)
FT35-4810	3.5 (89)	48 (1219)	0.39 (10)	11.4 (290)	2000 (8.9)	8700 (38.5)	150 (16.5)	0.0076 (0.00086)	4000 (17.8)	1700	65 (30)
FT35-4820	3.5 (89)	48 (1219)	0.79 (20)	22.4 (568)	2000 (8.9)	7100 (31.5)	300 (33.0)	0.0076 (0.00086)	4000 (17.8)	1700	65 (30)

Intermediate and custom stroke lengths are available. Intermediate leads may also be available. Belt and pulley inertia varies with ratio & motor selection. Contact Exlar's Applications Engineering Department for more information. See page 70 for definition 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 sufficient to exceed these forces. Contact Exlar for further details.

FT Standard Inline Coupling Maximum Torque Ratings and Inertia

	Torque Rating	Inertia
FT35	40N-m (354 lbf-in)	0.30 lb-in, 0.000777 lbf-in-sec^2

Pulley inertias lbf X in X sec^2, 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 Exlar's Application Engineering Department if these values are critical to your application.

FT35 3 inch motor 1:1 = 0.004874 FT35 4 inch motor 1:1 = 0.009993
FT35 3 inch motor 2:1 = 0.002087 FT35 3 inch motor 2:1 = 0.005003

FT Series Performance Specifications

Model No.	Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Max. Linear Speed in/sec (mm/sec)	Rated Force lbf (kN)	Dynamic Load Rating (std. follower) lbf (kN)	Torque @ Rated Force lb-in (N-m)	Screw Inertia lb-in-s^2 (kg-m^2)	Max. Force* lbf (kN)	Max. Rot. Speed rpm	Weight Base Unit lb (kg)
FT60-1206	6.0) (152)	12 (305)	0.23 (6)	7.9 (201)	10,000 (45.4)	51900 (231)	460 (50.6)	0.0454 (0.0051)	20,000 (90.8)	2000	100 (45)
FT60-1212	6.0 (152)	12 (305)	0.47 (12)	15.8 (401)	10,000 (45.4)	44600 (199)	860 (94.6)	0.0454 (0.0051)	20,000 (90.8)	2000	100 (45)
FT60-1230	6.0 (152)	12 (305)	1.18 (30)	39.0 (1000)	10,000 (45.4)	41700 (186)	2200 (242)	0.0454 (0.0051)	20,000 (90.8)	2000	100 (45)
FT60-2406	6.0 (152)	24 (610)	0.23 (6)	7.9 (201)	10,000 (45.4)	51900 (231)	460 (50.6)	0.073 (0.0083)	20,000 (90.8)	2000	130 (59)
FT60-2412	6.0 (152)	24 (610)	0.47 (12)	15.8 (401)	10,000 (45.4)	44600 (199)	860 (94.6)	0.073 (0.0083)	20,000 (90.8)	2000	130 (59)
FT60-2430	6.0) (152)	24 (610)	1.18 (30)	39.0 (1000)	10,000 (45.4)	41700 (186)	2200 (242)	0.073 (0.0083)	20,000 (90.8)	2000	130 (59)
FT60-3606	6.0 (152)	36 (914)	0.23 (6)	7.9 (201)	10,000 (45.4)	51900 (231)	460 (50.6)	0.1 (0.0113)	20,000 (90.8)	2000	160 (72)
FT60-3612	6.0 (152)	36 (914)	0.47 (12)	15.8 (401)	10,000 (45.4)	44600 (199)	860 (94.6)	0.1 (0.0113)	20,000 (90.8)	2000	160 (72)
FT60-3630	6.0 (152)	36 (914)	1.18 (30)	39.0 (1000)	10,000 (45.4)	41700 (186)	2200 (242)	0.1 (0.0113)	20,000 (90.8)	2000	160 (72)
FT60-4806	6.0 (152)	48 (1219)	0.23 (6)	7.9 (201)	10,000 (45.4)	51900 (231)	460 (50.6)	0.126 (0.0142)	20,000 (90.8)	2000	190 (86)
FT60-4812	6.0 (152)	48 (1219)	0.47 (12)	15.8 (401)	10,000 (45.4)	44600 (199)	860 (94.6)	0.126 (0.0142)	20,000 (90.8)	2000	190 (86)
FT60-4830	6.0 (152)	48 (1219)	1.18 (30)	39.0 (1000)	10,000 (45.4)	41700 (186)	2200 (242)	0.126 (0.0142)	20,000 (90.8)	2000	190 (86)

Intermediate and custom stroke lengths are also available. Intermediate leads may also be available. Belt and pulley inertia varies with ratio and motor selection. See page 70 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 sufficient to exceed these forces. Contact Exlar for further details.

Ft Standard Inline Coupling Maximum Torque Ratings and Inertia

	Torque Rating	Inertia
FT60	100N-m (885 lbf-in)	0.90 lb-in, 0.002331 lbf-in-sec^2

Pulley inertias lbf X in X sec^2, 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 Exlar's Application Engineering Department if these values are critical to your application.

FT60 1:1 = 0.030000 FT60 2:1 = 0.035000

FT Series Performance Specifications

Model No.	Frame Size in (mm)	Stroke in (mm)	Screw Lead in (mm)	Max. Linear Speed in/sec (mm/sec)	Rated Force lbf (kN)	Dynamic Load Rating (std. follower) lbf (kN)	Torque @ Rated Force lb-in (N-m)	Screw Inertia lb-in-s^2 (kg-m^2)	Max. Force* lbf (kN)	Max. Rot. Speed rpm	Weight Base Unit lb (kg)
FT80-1206	8.0 (203)	12 (305)	0.23 (6)	6.9 (175)	20,000 (90.8)	80700 (358)	975 (107)	0.1630 (0.0184)	40,000 (178)	1750	190 (86)
FT80-1212	8.0 (203)	12 (305)	0.47 (12)	13.8 (351)	20,000 (90.8)	70200 (312)	1775 (195)	0.1630 (0.0184)	40,000 (178)	1750	190 (86)
FT80-1230	8.0 (203)	12 (305)	1.18 (30)	34.4 (875)	20,000 (90.8)	64700 (288)	4420 (485)	0.1630 (0.0184)	40,000 (178)	1750	190 (86)
FT80-2406	8.0 203)	24 (610)	0.23 (6)	6.9 (175)	20,000 (90.8)	80700 (358)	975 (107)	0.247 (0.0279)	40,000 (178)	1750	265 (120)
FT80-2412	8.0 (203)	24 (610)	0.47 (12)	13.8 (351)	20,000 (90.8)	70200 (312)	1775 (195)	0.247 (0.0279)	40,000 (178)	1750	265 (120)
FT80-2430	8.0 (203)	24 (610)	1.18 (30)	34.4 (875)	20,000 (90.8)	64700 (288)	4420 (485)	0.247 (0.0279)	40,000 (178)	1750	265 (120)
FT80-3606	8.0 203)	36 (914)	0.23 (6)	6.9 (175)	20,000 (90.8)	80700 (358)	975 (107)	0.331 (0.0374)	40,000 (178)	1750	340 (153)
FT80-3612	8.0 (203)	36 (914)	0.47 (12)	13.8 (351)	20,000 (90.8)	70200 (312)	1775 (195)	0.331 (0.0374)	40,000 (178)	1750	340 (153)
FT80-3630	8.0 (203)	36 (914)	1.18 (30)	34.4 (875)	20,000 (90.8)	64700 (288)	4420 (485)	0.331 (0.0374)	40,000 (178)	1750	340 (153)
FT80-4806	8.0 (203)	48 (1219)	0.23 (6)	6.9 (175)	20,000 (90.8)	80700 (358)	975 (107)	0.415 (0.0468)	40,000 (178)	1750	415 (187)
FT80-4812	8.0 (203)	48 (1219)	0.47 (12)	13.8 (351)	20,000 (90.8)	70200 (312)	1775 (195)	0.415 (0.0468)	40,000 (178)	1750	415 (187)
FT80-4830	8.0 (203)	48 (1219)	1.18 (30)	34.4 (875)	20,000 (90.8)	64700 (288)	4420 (485)	0.415 (0.0468)	40,000 (178)	1750	415 (187)

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 Exlar's Applications Engineering Department for more information.

* 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 Exlar for further details.

FT Standard Inline Coupling Maximum Torque Ratings and Inertia

	Torque Rating	Inertia
FT80	200N-m (1770 lbf-in)	3.89 lb-in, 0.010075 lbf-in-sec^2

Pulley inertias lbf X in X sec^2, 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 Exlar's Application Engineering Department if these values are critical to your application.

FT80 1:1 = 0.235000 FT80 2:1 = 0.157000

Definitions:

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

Rated Force: The linear force produced by the actuator at the torque at the rated force value.

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.

FT Series Mechanical Specifications

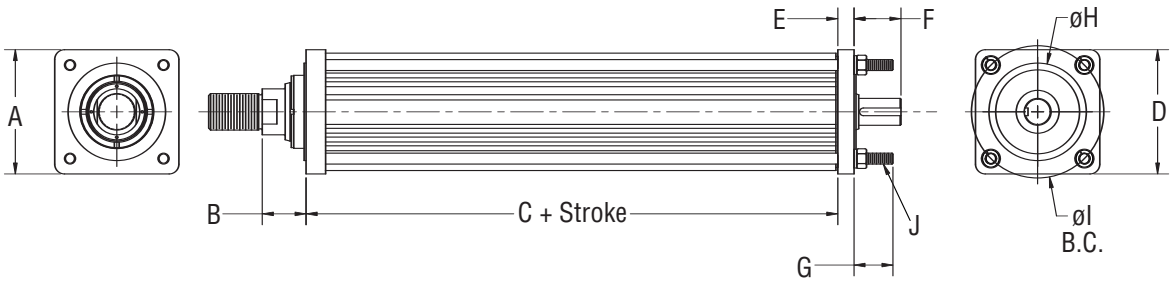
	FT35	FT60	FT80
Roller Screw Backlash in (mm)	0.0004 - 0.001 (0.01 - 0.03)	0.0004 - 0.001 (0.01 - 0.03)	0.0004 - 0.001 (0.01 - 0.03)
Preloaded Loader Screw Backlash	0	0	0
System Backlash:* in (mm)	0.002 (0.006)	0.002 (0.006)	0.002 (0.006)
Standard Lead Accuracy:** in/ft (mm/mm)	0.001 (.025/300)	0.001 (.025/300)	0.001 (.025/300)
Maximum Radial Load	0	0	0
Environmental Rating: (Base Unit Only)*** Standard	IP65	IP65	IP65
Case: Standard Optional	Epoxy-coated aluminum Food Grade Coating	Epoxy-coated aluminum Food Grade Coating	Epoxy-coated aluminum Food Grade Coating

* System backlash will be different with various types of motor mounting arrangements and couplings. Please discuss your particular configuration with Exlar application engineers.

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

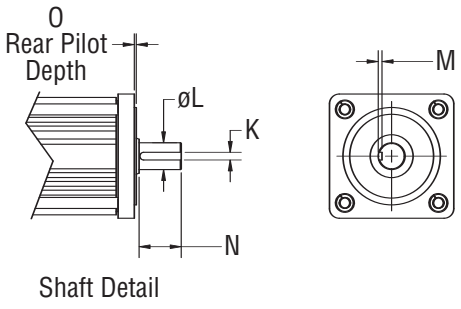
*** For IP65 scaling of unit with motor mounted, please contact Exlar's Applications Engineering Department for more information and ordering information.

FT Linear Actuator Base Unit



	A	B	C	D	E	F	G	øH	øI
FT35	3.625 (92.1)	1.690 (42.9)	9.125 (231.8)	3.625 (92.1)	0.570 (14.5)	2.126 (54.0)	1.500 (38.1)	3.00 (76.2)	3.860 (98.0)
FT60	6.375 (161.9)	2.249 (57.1)	15.287 (388.3)	6.375 (161.9)	0.830 (21.1)	2.409 (61.2)	2.000 (50.8)	5.000 (127.0)	6.788 (172.4)
FT80	8.500 (215.9)	3.033 (77.0)	19.812 (503.2)	8.500 (215.9)	0.900 (22.9)	3.355 (85.2)	3.00 (76.2)	6.750 (171.5)	9.330 (237.0)

	J	K	øL	M	N	O
FT35	3/8-16 UNC-2A	0.236 $^{-.0005}_{-.0017}$ 6.00mm (p9)	0.750 $^{+.0000}_{-.0005}$ 19.05mm $^{+.000}_{-.013}$	0.138 $^{+.004}_{-.000}$ 3.50mm $^{+.10}_{-.00}$	1.890 (48mm)	0.100
FT60	9/16-12 UNC-2A	0.394 $^{-.0006}_{-.0020}$ 10.00mm (p9)	1.379 $^{+.0000}_{-.0005}$ 35.00mm $^{+.000}_{-.013}$	0.197 $^{-.008}_{-.000}$ 5.00mm $^{+.20}_{-.00}$	2.126 (54mm)	0.100
FT80	3/4-10 UNC-2A	0.709 $^{-.0007}_{-.0024}$ 18.00mm (p9)	2.362 $^{+.0000}_{-.0005}$ 60mm $^{-.000}_{-.013}$	0.295 $^{+.005}_{-.000}$ 7.5mm $^{+.13}_{-.00}$	2.559 (65mm)	0.150

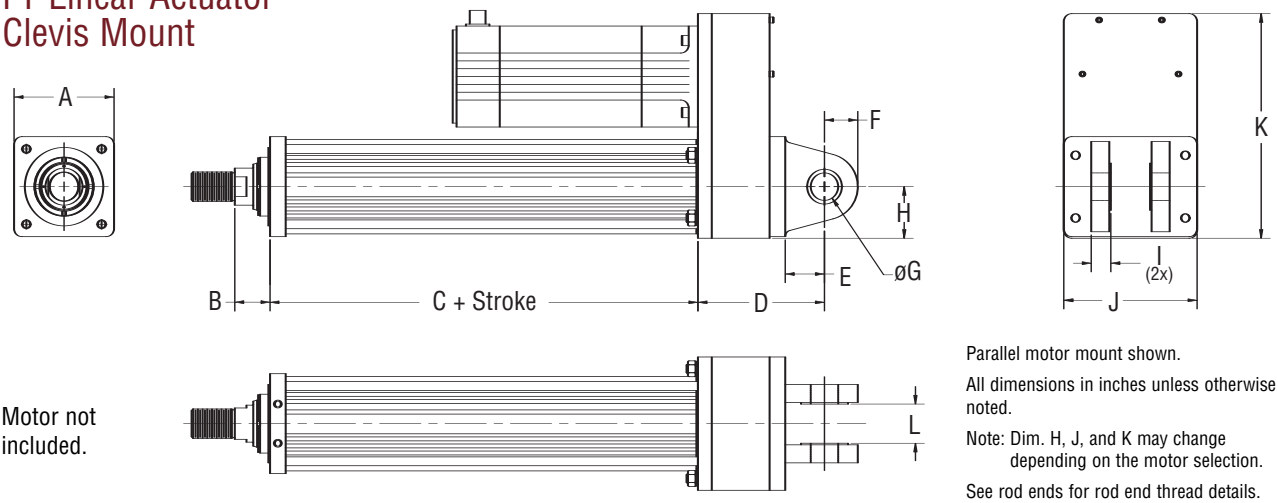


Shaft Detail

All dimensions in inches unless otherwise noted.
See rod ends drawing for rod end details.

Drawings subject to change. Consult Exlar for certified drawings.

FT Linear Actuator Clevis Mount



Motor not included.

Parallel motor mount shown.

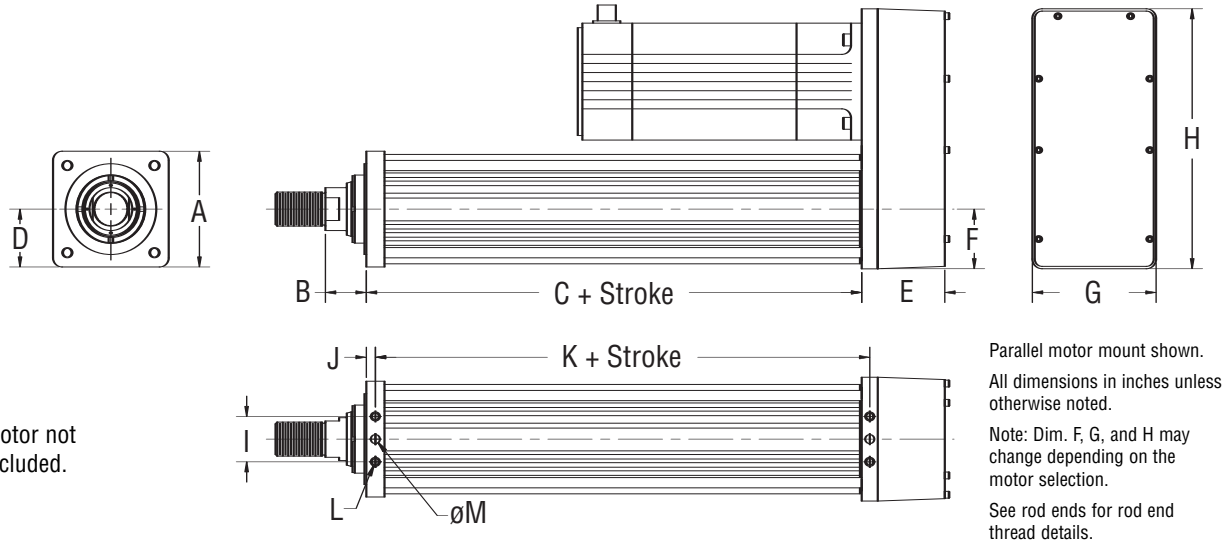
All dimensions in inches unless otherwise noted.

Note: Dim. H, J, and K may change depending on the motor selection.

See rod ends for rod end thread details.

	A	B	C	D	E	F	øG	H	I	J	K	L
FT35	3.625 (92.1)	1.690 (42.9)	9.125 (231.8)	6.250 (158.8)	1.500 (38.1)	1.000 (25.4)	1.001 $^{+.000}_{-.001}$ (25.43 $^{+.000}_{-.025}$)	1.960 (49.8)	0.747 (19.0)	5.250 (133.4)	9.600 (243.8)	1.507 (38.3)
FT60	6.375 (161.9)	2.249 (57.1)	15.287 (388.3)	8.070 (205.1)	2.500 (63.5)	2.125 (54.0)	1.753 $^{+.000}_{-.001}$ (44.53 $^{+.000}_{-.025}$)	3.290 (83.6)	1.250 (31.8)	8.500 (215.9)	14.320 (363.7)	2.500 (63.5)
FT80	8.500 (215.9)	3.033 (77.0)	19.812 (503.2)	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A

FT Linear Actuator Side Mount



Motor not included.

Parallel motor mount shown.

All dimensions in inches unless otherwise noted.

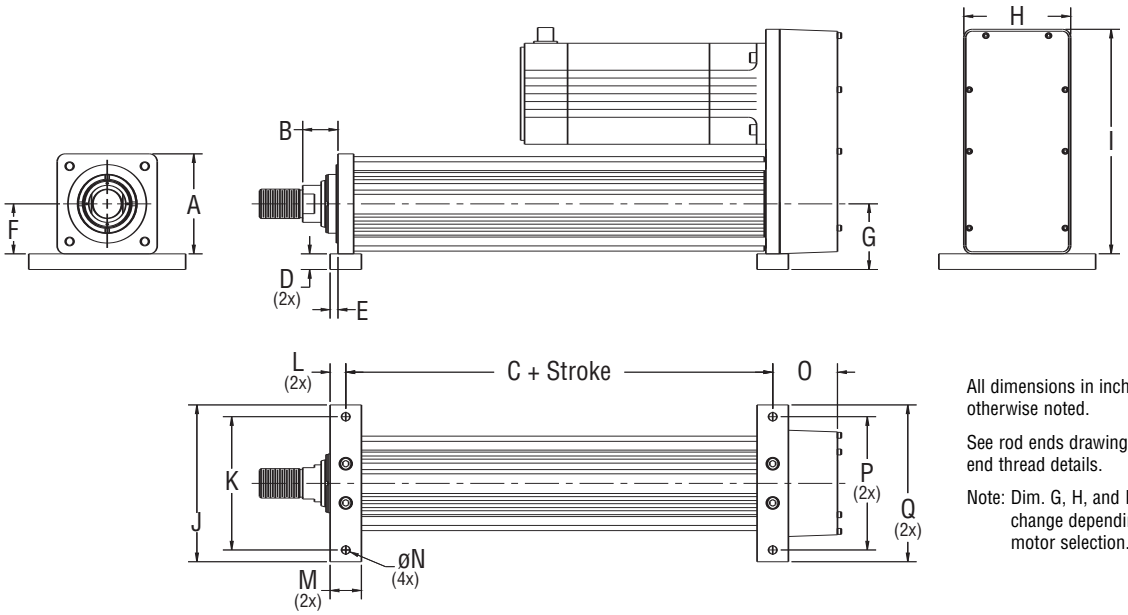
Note: Dim. F, G, and H may change depending on the motor selection.

See rod ends for rod end thread details.

	A	B	C	D	E	F	G	H	I	J	K	L	øM
FT35	3.625 (92.1)	1.690 (42.9)	9.125 (231.8)	1.813 (46.1)	4.185 (106.3)	1.813 (46.1)	5.250 (133.4)	9.600 (243.8)	1.625 (41.3)	0.312 (7.9)	9.123 (231.7)	1/4-20 UNC-2B x 0.625	N/A
FT60	6.375 (161.9)	2.249 (57.1)	15.287 (388.3)	3.188 (81.0)	4.570 (116.1)	3.188 (81.0)	6.875 (174.6)	14.320 (363.7)	2.500 (63.5)	0.500 (12.7)	15.227 (386.8)	1/2-13 UNC-2B x 1.125	N/A
FT80	8.500 (215.9)	3.033 (77.0)	19.812 (503.2)	4.250 (108.0)	6.440 (163.6)	4.250 (108.0)	8.780 (223.0)	17.340 (440.4)	4.000 (101.6)	0.750 (19.1)	19.563 (496.9)	5/8-11 UNC-2B x 1.250	0.625 x 1.375

Drawings subject to change. Consult Exlar for certified drawings.

FT Linear Actuator Side Lug Mount



All dimensions in inches unless otherwise noted.

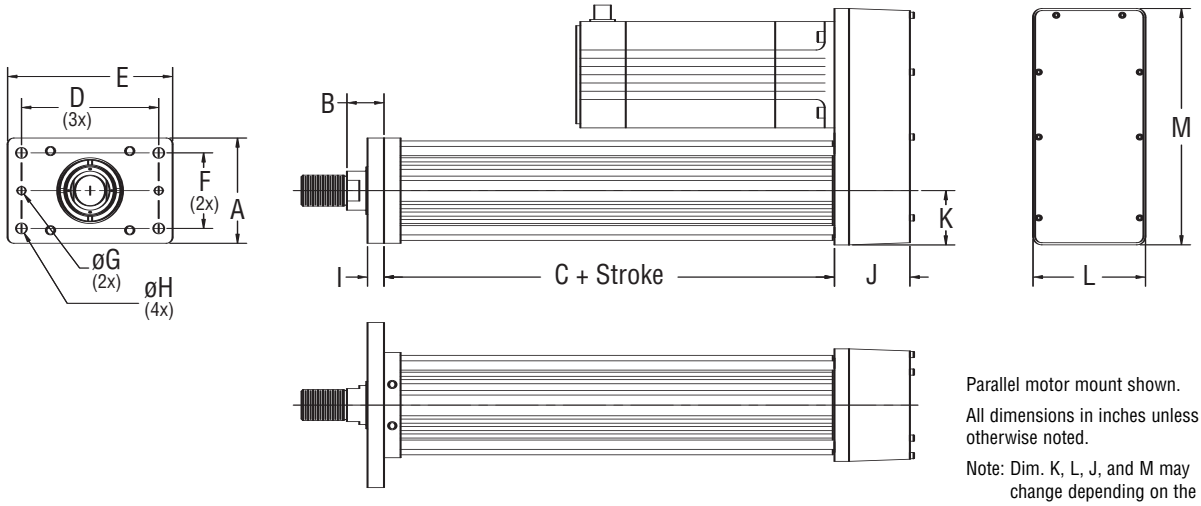
See rod ends drawing for rod end thread details.

Note: Dim. G, H, and I may change depending on the motor selection.

	A	B	C	D	E	F	G	H	I	J	K	L	M	øN	O	P	Q
FT35	3.625 (92.1)	1.690 (42.9)	9.123 231.7)	0.750 (19.1)	0.188 (4.8)	1.813 (46.1)	2.563 (65.1)	5.250 (133.4)	9.453 (240.1)	6.250 (158.8)	5.250 (133.4)	0.500 (12.7)	1.000 (25.4)	0.406 (10.3)	3.875 (98.4)	6.500 (165.1)	7.500 (190.5)
FT60	6.375 (161.9)	2.249 (57.1)	15.227 (386.8)	1.000 (25.4)	0.500 (12.7)	3.188 (81.0)	4.188 (106.4)	6.875 (174.6)	14.218 (361.1)	10.000 (254.0)	8.500 (215.9)	1.000 (25.4)	2.000 (50.8)	0.531 (13.5)	4.130 (104.9)	8.500 (215.9)	10.000 (254.0)
FT80	8.500 (215.9)	3.033 (77.0)	19.563 (496.9)	2.000 (50.8)	0.500 (12.7)	4.250 (108.0)	6.250 (158.8)	8.780 (223.0)	17.170 (436.1)	12.750 (323.9)	10.750 (273.1)	1.250 (31.8)	2.500 (63.5)	0.781 (19.8)	5.940 (150.9)	10.750 (273.1)	12.750 (323.9)

Drawings subject to change. Consult Exlar for certified drawings.

FT Linear Actuator Front Flange Mount



Parallel motor mount shown.

All dimensions in inches unless otherwise noted.

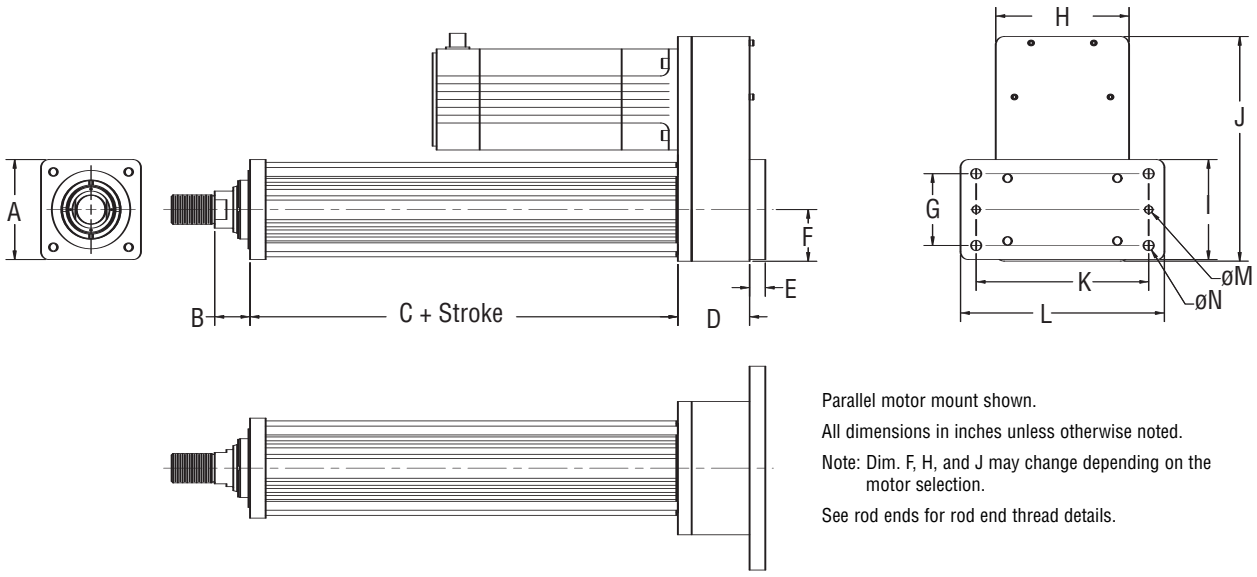
Note: Dim. K, L, J, and M may change depending on the motor selection.

See rod ends for rod end thread details.

	A	B	C	D	E	F	øG	øH	I	J	K	L	M
FT35	3.625	1.690	9.125	4.750	5.750	2.500	$0.375^{+.000}_{-.001}$	0.530	0.625	4.185	1.960	5.250	9.600
	(92.1)	(42.9)	(231.8)	(120.7)	(146.1)	(63.5)	$(9.53^{+.000}_{-.025})$	(13.5)	(15.9)	(106.3)	(49.8)	(133.4)	(243.8)
FT60	6.375	2.249	15.287	8.315	10.000	4.575	$0.501^{+.000}_{-.001}$	0.656	1.000	4.570	3.290	6.875	14.320
	(161.9)	(57.1)	(388.3)	(211.2)	(254.0)	(116.2)	$(12.73^{+.000}_{-.025})$	(16.7)	(25.4)	(116.1)	(83.6)	(174.6)	(363.7)
FT80	8.500	3.033	19.812	10.750	12.750	6.000	$0.625^{+.000}_{-.001}$	0.781	1.250	6.440	4.420	8.780	17.340
	(215.9)	(77.0)	(503.2)	(273.1)	(323.9)	(152.4)	$(15.88^{+.000}_{-.025})$	(19.8)	(31.8)	(163.6)	(112.3)	(223.0)	(440.4)

Drawings subject to change. Consult Exlar for certified drawings.

FT Linear Actuator Rear Flange Mount



Parallel motor mount shown.

All dimensions in inches unless otherwise noted.

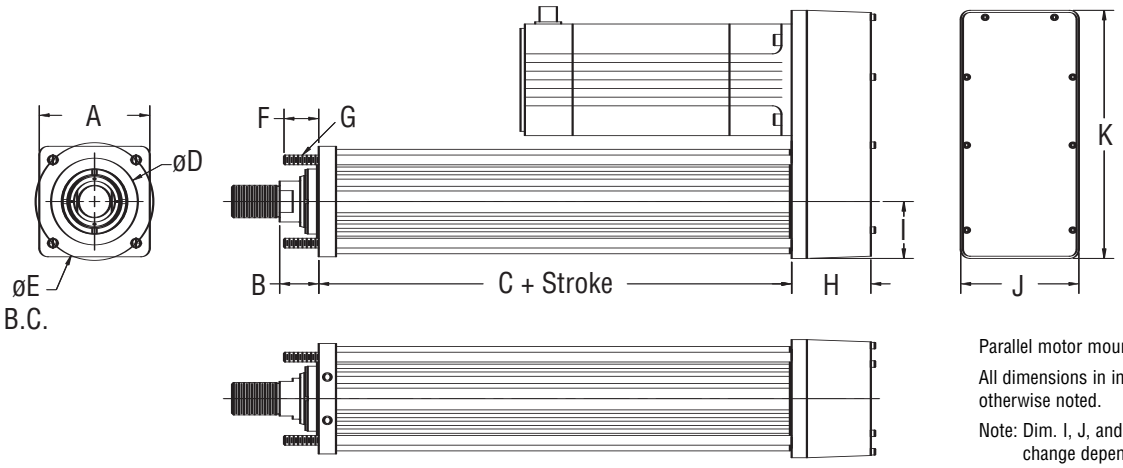
Note: Dim. F, H, and J may change depending on the motor selection.

See rod ends for rod end thread details.

	A	B	C	D	E	F	G	H	I	J	K	L	øM	øN
FT35	3.625 (92.1)	1.690 (42.9)	9.125 (231.8)	4.125 (104.8)	0.625 (15.9)	1.960 (49.8)	2.500 (63.5)	5.250 (133.4)	3.500 (88.9)	9.600 (243.8)	6.500 (165.1)	7.500 (190.5)	N/A (N/A)	0.530 (13.5)
FT60	6.375 (161.9)	2.249 (57.1)	15.287 (388.3)	4.570 (116.1)	1.000 (25.4)	3.290 (83.6)	4.575 (116.2)	8.500 (215.9)	6.375 (161.9)	14.320 (363.2)	11.000 (279.4)	13.000 (330.2)	0.501 (12.7)	0.656 (16.7)
FT80	8.500 (215.9)	3.033 (77.0)	19.812 (503.2)	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A

Drawings subject to change. Consult Exlar for certified drawings.

FT Linear Actuator Extended Tie Rod Mount



Parallel motor mount shown.

All dimensions in inches unless otherwise noted.

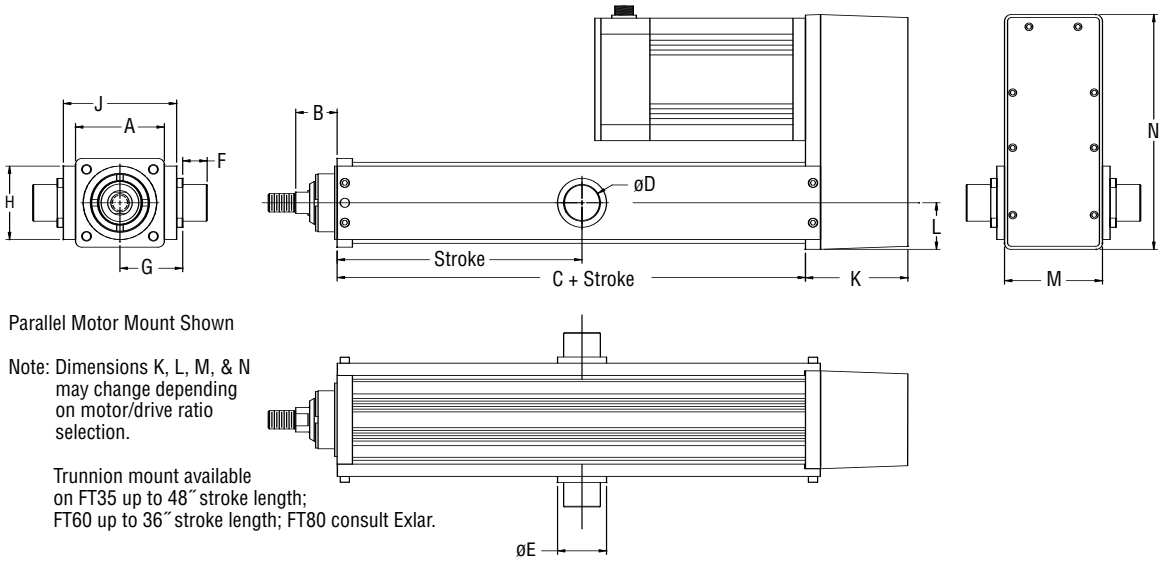
Note: Dim. I, J, and K may change depending on the motor selection.

See rod ends for rod end thread details.

	A	B	C	øD	øE	F	G	H	I	J	K
FT35	3.625	1.690	9.125	$3.000^{+.000}_{-.002}$	3.859	1.250	3/8-16 UNC-2A	4.185	1.960	5.250	9.600
	(92.1)	(42.9)	(231.8)	$(76.2^{+.000}_{-.051})$	(98.0)	(31.8)		(106.3)	(49.8)	(133.4)	(243.8)
FT60	6.375	2.249	15.287	$5.000^{+.000}_{-.002}$	6.788	2.000	9/16-12 UNC-2A	4.570	3.290	6.875	14.320
	(161.9)	(57.1)	(388.3)	$(127.0^{+.000}_{-.051})$	(172.4)	(50.8)		(116.1)	(83.6)	(174.6)	(363.7)
FT80	8.500	3.033	19.812	$6.750^{+.000}_{-.002}$	9.330	3.500	3/4-10 UNC-2A	6.440	4.420	8.780	17.340
	(215.9)	(77.0)	(503.2)	$(171.5^{+.000}_{-.051})$	(237.0)	(88.9)		(163.6)	(112.3)	(223.0)	(440.4)

Drawings subject to change. Consult Exlar for certified drawings.

FT Linear Actuator Standard Trunnion Mount



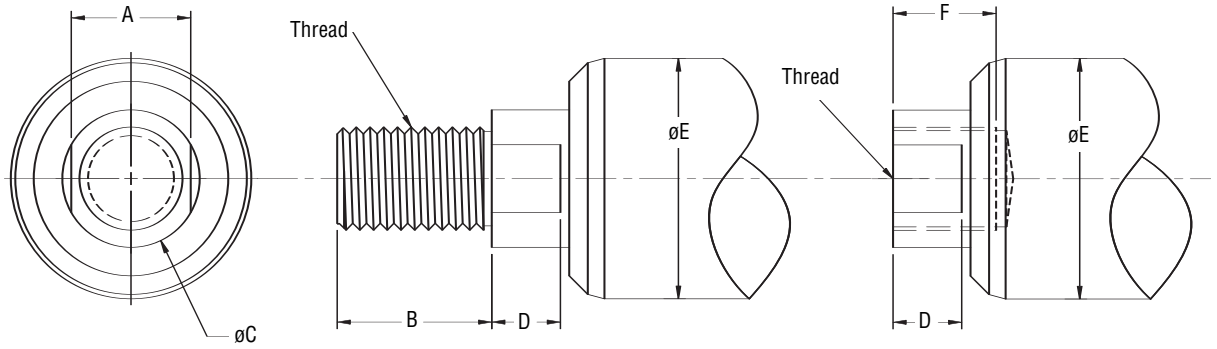
Parallel Motor Mount Shown

Note: Dimensions K, L, M, & N may change depending on motor/drive ratio selection.

Trunnion mount available on FT35 up to 48˝ stroke length; FT60 up to 36˝ stroke length; FT80 consult Exlar.

	A	B	C	D	E	F	G	H	J	K	L	M	N
FT35	3.63 (92.1)	1.09 (42.9)	9.12 (231.7)	1.500 (38.1)	2.00 (50.8)	1.00 (25.4)	2.66 (85.1)	3.00 (76.2)	4.63 (117.5)	4.19 (108.3)	1.96 (49.8)	6.25 (133.4)	9.60 (243.8)
FT60	6.38 (161.9)	2.25 (57.1)	15.23 (386.8)	2.500 (63.5)	3.50 (88.9)	2.00 (50.8)	4.06 (103.2)	5.00 (127.0)	7.88 (200.0)	4.57 (116.1)	3.29 (83.6)	6.88 (174.6)	14.32 (363.7)
FT80	Contact Exlar												

FT Linear Actuator Rod End



	A	B	øC	D	øE	F	Male U.S.	Male Metric	Female U.S.	Female Metric
FT35	0.87 (22.1)	1.125 (28.6)	1.000 (25.4)	0.500 (12.7)	1.750 (44.5)	0.750 (19.1)	3/4-16 UNF-2A	M16X1.5	3/4-16 UNF-2B	M16X1.5
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	1 7/8-12 UN-2B	M42X4.5
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	2 1/2-12 UN-2B	M56X5.5

Drawings subject to change. Consult Exlar for certified drawings.

FT Series Ordering Information

FTAA - BB - CC - D - E - F - GGG - XX XX

AA = FT Frame Size
35 = 3.5 inch frame actuator
60 = 6.0 inch frame actuator
80 = 8.0 inch frame actuator

BB = Stroke Length
06 = 6 inch (FT35)
12 = 12 inch (FT35, 60, 80)
18 = 18 inch (FT35)
24 = 24 inch (FT35, 60, 80)
36 = 36 inch (FT35, 60, 80)
48 = 48 inch (FT35, 60, 80)

CC = 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 Style
S = Side mount
L = Side lugs
E = Extended tie rods
C = Rear clevis (NA w/inline)
F = Front flange
T = Side trunnion mount (not available on all sizes and lengths)
R = Rear flange (not available with inline motor mount)
B = Front / rear flange (not available with inline motor mount)
X = Special

E = Motor Mounting Configurations
N = None
I = Inline direct drive (includes Exlar standard coupling)
P = Parallel, 1:1 drive
Q = Parallel, 2:1 reduction
X = Special

F = Rod End
M = Male, U.S. standard
F = Female, U.S. standard
A = Male, metric
B = Female, metric
X = Special
Consult Factory for female ends.

GGG = Motor Mount Provisions*

(Please indicate the motor that will be used with the FT Actuator by it's 3 digit code.)
NMT = No motor mount – keyed shaft on base unit only
N34 = NEMA 34 motor mount
N42 = NEMA 42 motor mount
N56 = NEMA 56 motor mount
AB3,4,6,8 = Allen Bradley Ultra 3, 4, 6, & 8 inch motors
BD3,4,6,8 = Baldor 3, 4, 6, & 8 inch motors
CE3,4,6,8 = Parker(Custom Servo Motors) Imperial 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 English motors
EM3,4,6,8 = Emerson EMC Metric 3, 4, 6, & 8 inch Metric motors
EC3,4,6,8 = ElectroCraft F&H 3000, 4000, 6000 series, 8000 Series
FA 4,6,8 = Fanuc 4, 6 & 8 inch motors
IN3,4,6,8 = Bosch- Rexroth (Indramat) 3, 4, 6, & 8 inch motors
KM2,4,6,8 = Kollmorgen B & M 20, 40, 60, & 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, & 5.6 inch
YS3,4,6,8 = Yaskawa 3, 4, 6, & 8 inch motors
MXX = Unlisted or special motor mounting provisions

XX .. XX = Options

Housing Options
XH = Special housing options
XT = Special travel
SS = Stainless steel
FG = Food grade white epoxy
(IP65 sealing of unit with motor mounted require "XH" option.

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)

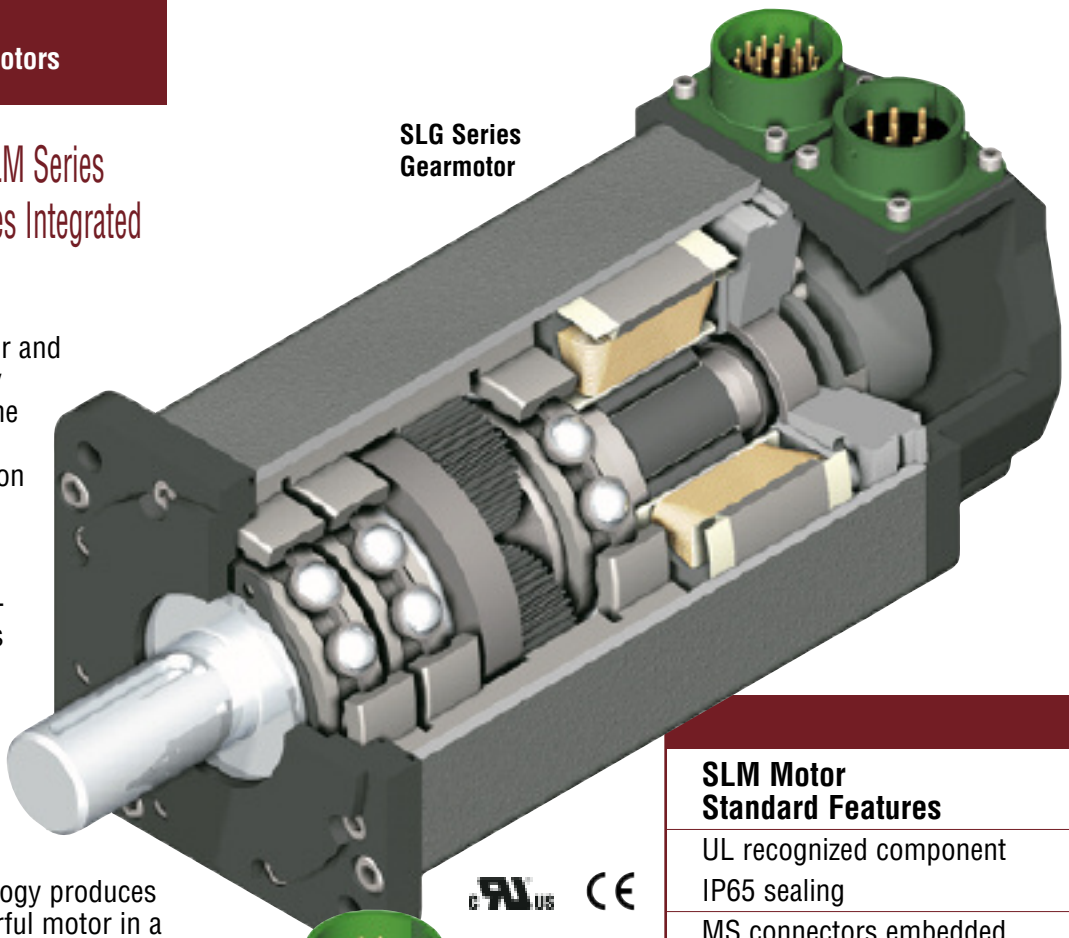
Please provide a drawing of motor dimensions with all orders to insure proper mounting compatibility.

*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 Exlar engineering.

Consult Exlar's Application Engineering Department regarding all special actuator components.

Introducing Exlar's 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.

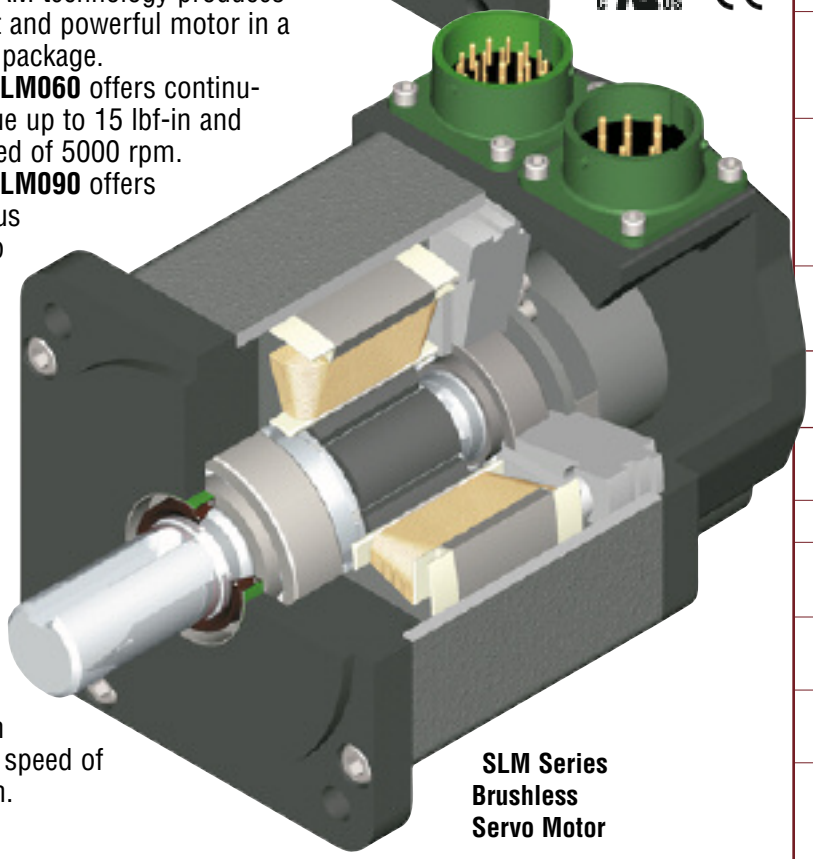


SLG Series Gearmotor

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.

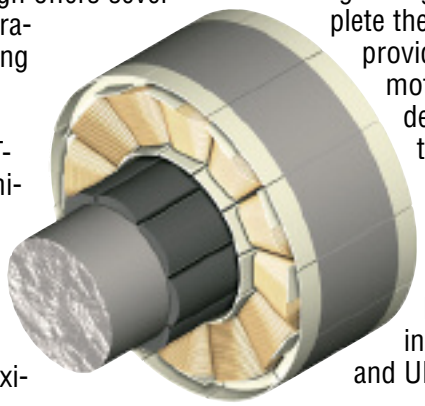


SLM Series Brushless Servo Motor

SLM Motor Standard Features
UL recognized component
IP65 sealing
MS connectors embedded leads, or embedded leads with cable plugs
Feedback configurations for nearly all servo amplifiers
115, 230 or 460 Vrms motor voltages
Epoxy-coated housings
Class 180H insulation system
SLG Gearmotor Standard Features
All features of SLM motor shown above plus . . .
High side load bearing design
Integrated armature and sungear
Higher stiffness then bolt-on gearhead and motor
10 arc minute standard backlash
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

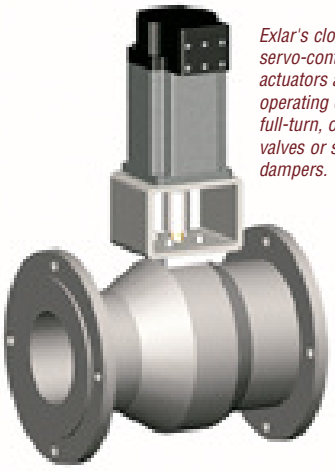
Exlar Corporation has capabilities allowing custom motors to be manufactured to meet your OEM requirements. Whatever your special requirements are . . . custom shafts, custom mountings, custom stators, custom housing materials . . . please contact Exlar or your local sales representative to discuss your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

Typical Applications

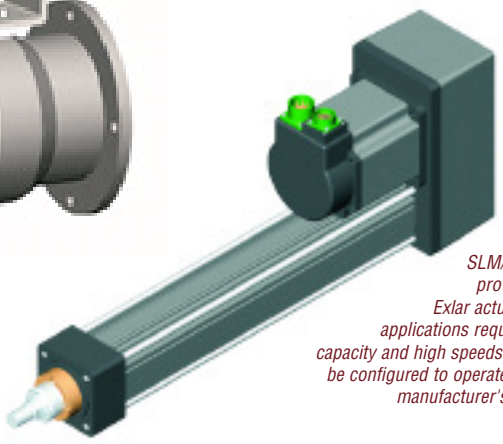
SLM Series Motors and SLG Series Gearmotors are perfectly suited for applications in any industry.

EXLAR SLM & SLG SERIES MOTORS APPLICATIONS INCLUDE:

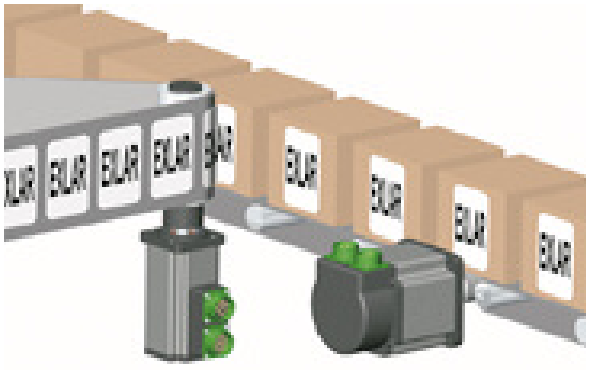
- Semiconductor
- Labeling
- Automotive Assembly
- Winding Machines
- Web Feed
- Packaging
- Stage Positioning
- Plastics Machinery
- Machine Tools
- Parts Handling
- Glass Manufacturing
- Fluid Handling
- Conveyor Drives
- Medical Applications
- Tensioning
- Simulation Robotics
- Screw Drives



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.

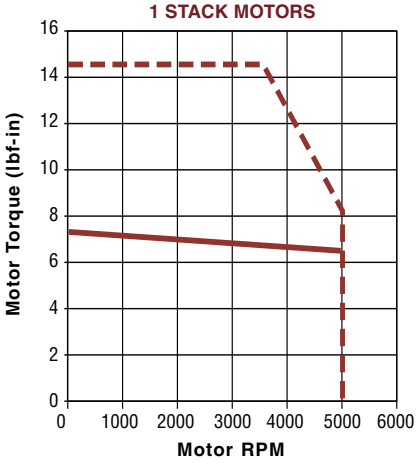


Exlar's brushless motors are the highest performance with very compact size. This makes them perfect for high-speed labeling and demanding conveyor drive applications.

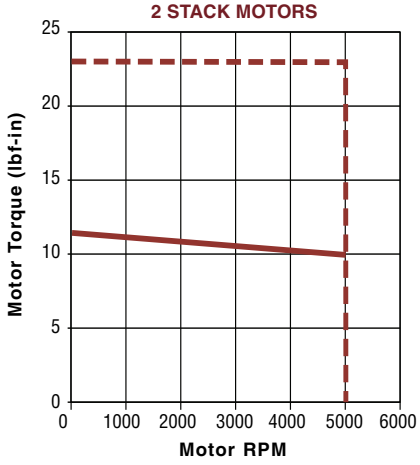
SLM/SLG Speed/Torque Curves

Peak Torque
Continuous Torque

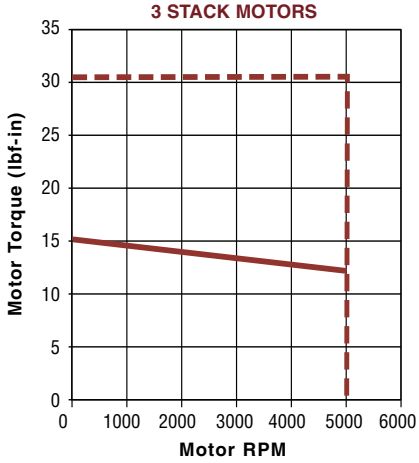
SLM/SLG-060
1 STACK MOTORS



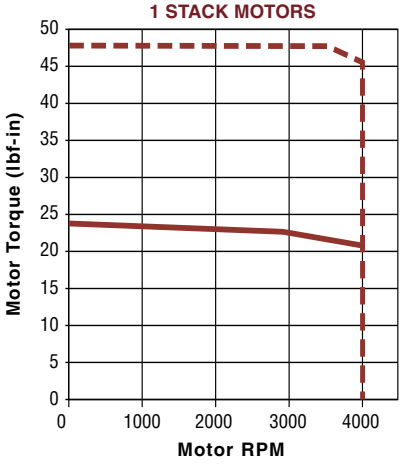
SLM/SLG-060
2 STACK MOTORS



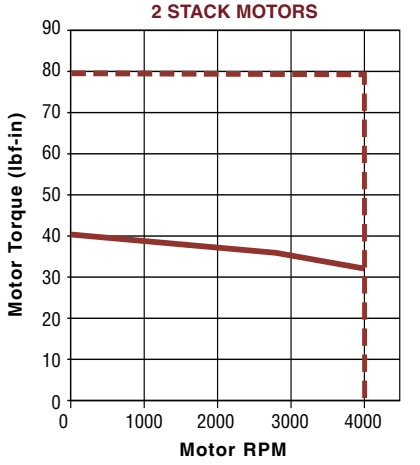
SLM/SLG-060
3 STACK MOTORS



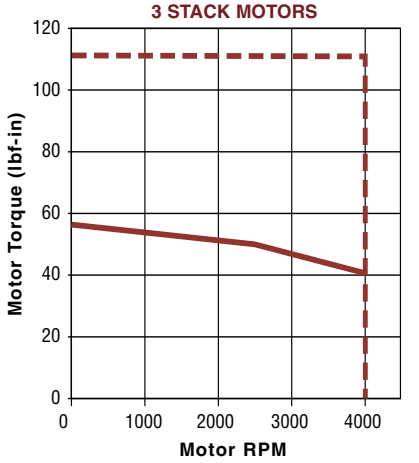
SLM/SLG-090
1 STACK MOTORS



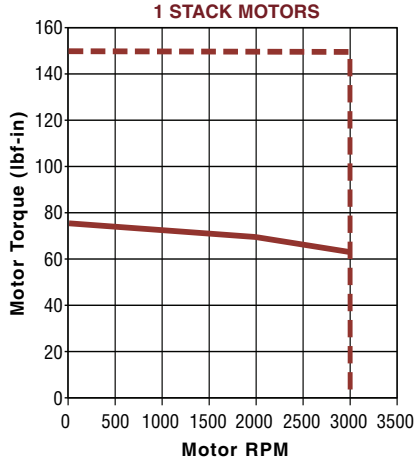
SLM/SLG-090
2 STACK MOTORS



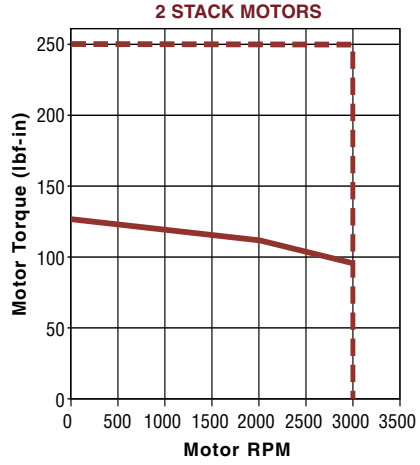
SLM/SLG-090
3 STACK MOTORS



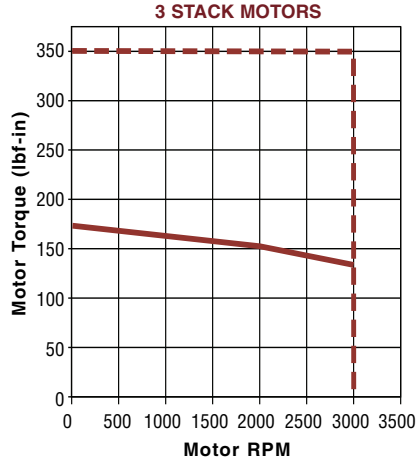
SLM/SLG-115
1 STACK MOTORS



SLM/SLG-115
2 STACK MOTORS



SLM/SLG-115
3 STACK MOTORS



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	7.6	7.3	7.0	7.0	11.9	11.5	11.2	11.3	15.3	15.3	14.8	15.0
	(Nm)	(0.86)	(0.83)	(0.79)	(0.79)	(1.35)	(1.30)	(1.27)	(1.28)	(1.73)	(1.73)	(1.67)	(1.69)
Peak Motor Torque	lbf-in	15.3	14.7	14.0	14.0	23.8	23.0	22.5	22.6	30.7	30.7	29.6	29.9
	(Nm)	(1.72)	(1.66)	(1.58)	(1.58)	(2.69)	(2.60)	(2.54)	(2.56)	(3.47)	(3.46)	(3.34)	(3.38)
Torque Constant (Kt)	lbf-in/A	2.5	5.2	8.3	9.5	2.5	5.2	8.9	10.2	2.3	5.3	8.8	10.2
(+/– 10% @ 25˚C)	(Nm/A)	(0.28)	(0.6)	(0.9)	(1.1)	(0.3)	(0.6)	(1.0)	(1.1)	(0.3)	(0.6)	(1.0)	(1.1)
Continuous Current Rating	A	3.4	1.6	1.9	0.8	5.4	2.5	1.4	1.2	7.3	3.2	1.9	1.6
Peak Current Rating	A	6.9	3.1	3.8	1.6	10.8	4.9	2.8	2.5	14.6	6.5	3.8	3.3
Trapezoidal Commutation Data													
Continuous Motor Torque	lbf-in	7.3	7.0	6.7	6.7	11.4	11.0	10.7	10.8	14.7	14.6	14.1	14.3
	(Nm)	(0.82)	(0.79)	(0.76)	(0.76)	(1.29)	(1.24)	(1.21)	(1.22)	(1.66)	(1.65)	(1.6)	(1.61)
Peak Motor Torque	lbf-in	14.6	14.0	13.4	13.4	22.8	22.0	21.5	21.6	29.3	29.3	28.3	28.6
	(Nm)	(1.65)	(1.6)	(1.5)	(1.5)	(2.6)	(2.5)	(2.4)	(2.4)	(3.3)	(3.3)	(3.2)	(3.2)
Torque Constant (Kt)	lbf-in/A	1.93	4.06	6.5	7.41	1.93	4.06	6.90	7.92	1.83	4.11	6.85	7.92
(+/– 10% @ 25˚C)	(Nm/A)	(0.22)	(0.46)	(0.73)	(0.84)	(0.22)	(0.46)	(0.78)	(0.89)	(0.21)	(0.46)	(0.77)	(0.89)
Continuous Current Rating	A	4.22	1.93	1.15	1.01	6.59	3.02	1.74	1.52	8.96	3.98	2.30	2.02
Peak Current Rating	A	8.44	3.86	2.3	2.02	13.18	6.04	3.47	3.04	17.92	7.96	4.61	4.04
Motor Data													
Voltage Constant (Ke)	Vpk/Krpm	23.9	50.3	80.5	91.8	23.9	50.3	85.5	98.1	22.6	50.9	84.9	98.1
(+/– 10% @ 25˚C)	Vrms/Krpm	16.9	35.6	56.9	64.9	16.9	35.6	60.5	69.4	16.0	36.0	60.0	69.4
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	2.62	12.52	35.22	45.79	1.11	5.26	15.95	20.69	0.62	3.14	9.36	12.22
Inductance (L-L)(+/– 15%)	mH	3.1	13.7	35.0	45.5	1.5	6.6	19.0	25.0	0.9	4.4	12.3	16.5
SLM Armature Inertia	lb-in-sec^2	0.000237				0.000413				0.000589			
(+/– 5%)	(kg-cm^2)	(0.268)				(0.466)				(0.665)			
Brake Inertia	lb-in-sec^2	0.000120				0.000120				0.000120			
	(kg-cm^2)	(0.135)				(0.135)				(0.135)			
Brake Current @ 24 VDC	A	.33				.33				.33			
Brake Holding Torque	lbf-in (Nm)	18 (2.2)				18 (2.2)				18 (2.2)			
Brake Engage/Disengage Time	ms	14/28				14/28				14/28			
Mechanical Time Constant (tm)	ms	1.41	1.52	1.67	1.67	0.60	0.64	0.67	0.66	0.37	0.37	0.40	0.39
Electrical Time Constant (te)	ms	1.18	1.09	0.99	0.99	1.34	1.25	1.19	1.21	1.42	1.41	1.32	1.35
Damping Constant	lbf-in/krpm	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05
	(N-m/krpm)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)	(0.006)
Friction Torque	lbf-in	0.07	0.07	0.07	0.07	0.10	0.10	0.10	0.10	0.14	0.14	0.14	0.14
	(Nm)	(0.008)	(0.008)	(0.008)	(0.008)	(0.011)	(0.011)	(0.011)	(0.011)	(0.016)	(0.016)	(0.016)	(0.016)
Voltage Rating	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	5000											
Stator Insulation System (Class)	C	180 (H)											
Insulation System Volt Rating	Vrms	460											
Thermal Switch, Case Temp.	C	100											
Environmental Rating		IP65											
Standard Connecters	Motor & Brake	MS-3112-E16-8P											
	Feedback	MS-3112-E16-23P											

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

SLG060 Gearmotor Data

		1 Stack Stator	2 Stack Stator	3 Stack Stator
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%			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/G090 Electrical/Mechanical Specifications

SLM/SLG090 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	23.8	24.0	23.7	24.0	39.6	40.0	39.6	40.0	55.8	55.5	55.8
	(Nm)	(2.69)	(2.71)	(2.68)	(2.71)	(4.48)	(4.52)	(4.47)	(4.52)	(6.31)	(6.27)	(6.30)
Peak Motor Torque	lbf-in	47.6	48.0	47.4	48.0	79.2	80.1	79.1	80.0	111.6	111.0	111.6
	(Nm)	(5.38)	(5.43)	(5.35)	(5.42)	(8.95)	(9.05)	(8.94)	(9.04)	(12.61)	(12.54)	(12.61)
Torque Constant (Kt)	lbf-in/A	3.2	6.6	11.6	13.3	3.2	6.6	11.6	13.3	6.6	11.6	13.1
(+/– 10% @ 25˚C)	(Nm/A)	(0.37)	(0.7)	(1.3)	(1.5)	(0.4)	(0.7)	(1.3)	(1.5)	(0.7)	(1.3)	(1.5)
Continuous Current Rating	A	8.2	4.0	2.3	2.0	13.6	6.8	3.8	3.4	9.5	5.3	4.8
Peak Current Rating	A	16.4	8.1	4.6	4.0	27.3	13.5	7.6	6.7	19.0	10.7	9.5
Trapezoidal Commutation Data												
Continuous Motor Torque	lbf-in	22.7	22.9	22.6	22.9	37.8	38.2	37.8	38.2	53.3	53.0	53.3
	(Nm)	(2.57)	(2.59)	(2.56)	(2.59)	(4.27)	(4.32)	(4.27)	(4.31)	(6.02)	(5.99)	(6.02)
Peak Motor Torque	lbf-in	45.4	45.9	45.3	45.8	75.7	76.5	75.6	76.4	106.6	106.0	106.6
	(Nm)	(5.13)	(5.2)	(5.1)	(5.2)	(8.5)	(8.6)	(8.5)	(8.6)	(12.0)	(12.0)	(12.0)
Torque Constant (Kt)	lbf-in/A	2.53	5.17	9.02	10.34	2.53	5.17	9.02	10.34	5.11	9.07	10.23
(+/– 10% @ 25˚C)	(Nm/A)	(0.29)	(0.58)	(1.02)	(1.17)	(0.29)	(0.58)	(1.02)	(1.17)	(0.58)	(1.03)	(1.16)
Continuous Current Rating	A	10.04	4.96	2.80	2.48	16.71	8.27	4.68	4.13	11.65	6.53	5.82
Peak Current Rating	A	20.08	9.92	5.61	4.96	33.42	16.54	9.36	8.26	23.30	13.05	11.64
Motor Data												
Voltage Constant (Ke)	Vpk/Krpm	31.3	64.0	7.90	128.1	31.3	64.0	79.0	128.1	63.4	79.5	126.7
(+/– 10% @ 25˚C)	Vrms/Krpm	22.2	45.3	111.7	90.6	22.2	45.3	111.7	90.6	44.8	112.4	89.6
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	12.28	0.30	1.21	3.78	4.86	0.69	2.19	2.75
Inductance (L-L) (+/– 15%)	mH	3.7	15.4	78.0	61.5	1.8	7.3	37.2	29.3	4.7	24.7	18.8
SLM Armature Inertia	lb-in-sec^2	0.00054				0.00097				0.00140		
(+/– 5%)	(kg-cm^2)	(0.609)				(1.09)				(1.58)		
Brake Inertia	lb-in-sec^2	0.00096				0.00096				0.00096		
	(kg-cm^2)	(1.08)				(1.08)				(1.08)		
Brake Current @ 24 VDC	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	0.51	0.52	0.76	0.52	0.38	0.37	0.54	0.37	0.31	0.44	0.31
Electrical Time Constant (te)	ms	5.14	5.02	8.14	5.01	5.93	6.06	9.85	6.04	6.86	11.30	6.86
Damping Constant	lbf-in/krpm	0.07	0.07	0.07	0.07	0.12	0.12	0.12	0.12	0.18	0.18	0.18
	(N-m/krpm)	(0.008)	(0.008)	(0.008)	(0.008)	(0.014)	(0.014)	(0.014)	(0.014)	(0.020)	(0.020)	(0.020)
Friction Torque	lbf-in	0.20	0.20	0.20	0.20	0.35	0.35	0.35	0.35	0.50	0.50	0.50
	(Nm)	(0.023)	(0.023)	(0.023	(0.023)	(0.040)	(0.040)	(0.040)	(0.040)	(0.056)	(0.056)	(0.056)
Voltage Rating	Vrms	115	230	400	460	115	230	400	460	230	400	460
Speed @ Bus Voltage	rpm	4000										
Stator Insulation System (Class)	˚C	180 (H)										
Insulation System Volt Rating	Vrms	460										
Thermal Switch, Case Temp.	˚C	100										
Environmental Rating		IP65										
Standard Connecters	Motor & Brake	MS-3112-E16-8P										
	Feedback	MS-3112-E16-23P										

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

SLG090 Gearmotor Data

		1 Stack Stator	2 Stack Stator	3 Stack Stator
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% 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 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	75.8	74.2	74.4	74.2	123.8	121.6	123.8	174.2	173.1	177.1
	(Nm)	(8.57)	(8.39)	(8.41)	(8.38)	(13.99)	(13.74)	(13.99)	(19.68)	(19.56)	20.01)
Peak Motor Torque	lbf-in	151.7	148.5	148.9	148.4	247.6	243.2	247.6	348.4	346.2	354.2
	(Nm)	(17.14)	(16.77)	(16.82)	(16.77)	(27.98)	(27.48)	(27.98)	(39.36)	(39.11)	40.02)
Torque Constant (Kt)	lbf-in/A	4.5	8.7	15.7	17.4	8.7	15.9	17.4	8.5	15.9	17.6
(+/– 10% @ 25˚C)	(Nm/A)	(0.51)	(1.0)	(1.8)	(2.0)	(1.0)	(1.8)	(2.0)	(1.0)	(1.8)	(2.0)
Continuous Current Rating	A	18.7	9.5	5.3	4.8	15.9	8.6	8.0	22.9	12.2	11.3
Peak Current Rating	A	37.4	19.1	10.6	9.5	31.8	17.1	15.9	45.8	24.4	22.5
Trapezoidal Commutation Data											
Continuous Motor Torque	lbf-in	72.4	70.9	71.1	70.9	118.2	116.1	118.2	166.4	165.3	169.1
	(Nm)	(8.18)	(8.01)	(8.03)	(8.01)	(13.36)	(13.12)	(13.36)	(18.8)	(18.67)	(19.11)
Peak Motor Torque	lbf-in	144.8	141.8	142.1	141.7	236.5	232.3	236.5	332.7	330.6	338.2
	(Nm)	(16.36)	(16.0)	(16.1)	(16.0)	(26.7)	(26.2)	(26.7)	(37.6)	(37.3)	(38.2)
Torque Constant (Kt)	lbf-in/A	3.53	6.78	12.22	13.55	6.78	12.37	13.55	6.63	12.37	13.7
(+/– 10% @ 25˚C)	(Nm/A)	(0.40)	(0.77)	(1.38)	(1.53)	(0.77)	(1.40)	(1.53)	(0.75)	(1.40)	(1.55)
Continuous Current Rating	A	22.89	11.69	6.50	5.84	19.5	10.49	9.75	28.04	14.93	13.79
Peak Current Rating	A	45.78	23.38	12.99	11.68	39.0	20.98	19.18	55.24	29.85	27.18
Motor Data											
Voltage Constant (Ke)	Vpk/Krpm	43.8	83.9	151.4	167.9	83.9	153.3	167.9	82.1	153.3	169.7
(+/– 10% @ 25˚C)	Vrms/Krpm	31.0	59.4	107.1	118.7	59.4	108.4	118.7	58.1	108.4	120
Pole Configuration		8	8	8	8	8	8	8	8	8	8
Resistance (L-L) (+/– 5% @ 25˚C)	Ohms	0.21	0.80	2.60	3.21	0.34	1.17	1.35	0.20	0.69	0.81
Inductance (L-L) (+/– 15%)	mH	2.1	7.8	25.5	31.3	3.8	12.7	15.2	2.4	8.4	10.2
SLM Armature Inertia	lb-in-sec^2	0.00344				0.00623			0.00901		
(+/– 5%)	(kg-cm^2)	(3.89)				(7.036)			(10.181)		
Brake Inertia	lb-in-sec^2	0.00327				0.00327			0.00327		
	(kg-cm^2)	(3.70)				(3.70)			(3.70)		
Brake Current @ 24 VDC	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	0.49	0.51	0.51	0.51	0.39	0.40	0.39	0.34	0.34	0.33
Electrical Time Constant (te)	ms	10.18	9.76	9.81	9.75	11.23	10.84	11.23	12.11	12.11	12.69
Damping Constant	lbf-in/krpm	0.21	0.21	0.21	0.21	0.35	0.35	0.35	0.40	0.40	0.40
	(N-m/krpm)	(0.024)	(0.024)	(0.024)	(0.024)	(0.040)	(0.040)	(0.040)	(0.045)	(0.045)	(0.045)
Friction Torque	lbf-in	0.56	0.56	0.56	0.56	1.00	1.00	1.00	1.20	1.20	1.20
	(Nm)	(0.06)	(0.06)	(0.06)	(0.06)	(0.113)	(0.113)	(0.113)	(0.136)	(0.136)	(0.136)
Voltage Rating	Vrms	115	230	400	460	230	400	460	230	400	460
Speed @ Bus Voltage	rpm	3000									
Stator Insulation System (Class)	˚C	180 (H)									
Insulation System Volt Rating	Vrms	460									
Thermal Switch, Case Temp.	˚C	100									
Environmental Rating		IP65									
Standard Connecters	Motor & Brake	MS-3102-E20-15P									
	Feedback	MS-3102-E20-23P									

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

SLG115 Gearmotor Data

	1 Stack Stator	2 Stack Stator	3 Stack Stator
SLG Armature Inertia* lbf-in-sec^2 (kg-cm^2)	0.00538 (6.08)	0.00816 (9.22)	0.0109 (12.37)

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% 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˝

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

		Maximum Allowable Output Torque - Set by User		Output Torque @ Speed for 10,000 Hour Life					
				1000 RPM		3000 RPM		5000 RPM	
Model	Ratio	lbf-in	(Nm)	lbf-in	(Nm)	lbf-in	(Nm)	lbf-in	(Nm)
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)
				1000 RPM		2500 RPM		4000 RPM	
SLG090	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)
				1000 RPM		2000 RPM		3000 RPM	
SLG115	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)

Radial Load and Bearing Life

Side load ratings shown below are for 10,000 hour bearing life at 25mm from motor face at given rpm.
Visit www.exlar.com for full details on radial load and bearing life.

	RPM	50	100	250	500	1000
SLG060	lbf (N)	195 (867)	155 (690)	114 (507)	90 (400)	72 (320)
SLG090	lbf (N)	389 (1730)	309 (1375)	227 (1010)	180 (801)	143 (636)
SLG115	lbf (N)	939 (4177)	745 (3314)	549 (2442)	435 (1935)	346 (1539)

Motor and Gearmotor Weight (lbs)

SLM/G060	Motor	1 Stage	2 Stage
1 Stack	3.0	7.5	9.3
2 Stack	4.1	8.6	10.4
3 Stack	5.2	9.7	11.5
SLM/G060 Brake 1.8			

SLM/G090	Motor	1 Stage	2 Stage
1 Stack	5.4	12.8	14.8
2 Stack	7.8	15.2	17.2
3 Stack	10.2	17.6	19.6
SLM/G090 Brake 2.7			

SLM/G115	Motor	1 Stage	2 Stage
1 Stack	14.2	28	34
2 Stack	22.0	35.8	41.8
3 Stack	29.8	43.6	49.6
SLM/G115 Brake 4.1			

Cables For Motors With Exlar Standard "C/P" Connections

Power Cables	Connector-ization	Description	Standard Exlar Power Cable
SLM060	C	Standard Power, Molded, Shielded	PC6-MC-xxx
SLG060	C	Standard Power, Anodized, Required If Using Brake Option	PC1-AC-xxx
	E	Standard Power, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	PC1-EC-xxx
SLM090	C	Standard Power, Molded, Shielded	PC6-MC-xxx
SLG090	C	Standard Power, Anodized, Required If Using Brake Option	PC1-AC-xxx
	E	Standard Power, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	PC1-EC-xxx
SLM115	C	Standard Power, Molded, Shielded	PC7-MC-xxx
SLG115	C	Standard Power, Anodized, Required If Using Brake Option	PC7-AC-xxx
	E	Standard Power, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	PC7-EC-xxx
Feedback Cables			**Standard Exlar Power Cable**
SLM060	C	Standard Resolver Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
SLG060	C	Standard Encoder Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
	E	Standard Resolver Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC4-EC-xxx
	E	Standard Encoder Feedback, Anodized, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC4-EC-xxx
SLM090	C	Standard Resolver Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
SLG090	C	Standard Encoder Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
	E	Standard Resolver Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC4-EC-xxx
	E	Standard Encoder Feedback, Anodized, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC4-EC-xxx
SLM115	C	Standard Resolver Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
SLG115	C	Standard Encoder Feedback, Anodized, Molded, Shielded	EC4-MC-xxx
	E	Standard Resolver Feedback, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC4-EC-xxx
	E	Standard Encoder Feedback, Anodized, Electroless Nickel, Environmentally Sealed, EMI/RFI Shielded	EC4-EC-xxx
Brake Cables	All	Brake leads in power connector	NA

Standard cable lengths of 15', 25' and 50'

Specifications subject to change without notice.

Cables For SLM/SLG Series Actuators With "M" Connectors

Exlar Actuator	Amplifier Manufacturer and Type	Exlar Feedback Callout	Power Cable Manufacturer	Power Cable Part Number	Feedback Cable Manufacturer	Feedback Cable Part Number
SLM060 SLG060	Allen Bradley Ultra 100/200	AB1	Exlar	PC6-MC-xxx	Allen Bradley	9101-1366-xxx
SLM090 SLG090	Allen Bradley Ultra 3000/5000	AB7*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx
	Allen Bradley Ultra 3000/5000	AB4/AB5*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx**
	Control Techniques En, Epsilon and MDS Series	EM2	Control Techniques	CMDS-xxx	Control Techniques	CFCS-xxx
	Kollmorgen Servo Star & Servo Star CD	KM1	Kollmorgen	CSSSRHA1H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHA1H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM5/KM2	Kollmorgen	CSSSRHG1H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHG1H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM3/KM4	Kollmorgen	CSSSS3HG2H-xxx set includes feedback cable)	Kollmorgen	CSSSS3HG2H-xxx (set includes power cable)
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN1	Bosch/Rexroth Indramat	IKG4077, IKG4017, IKG4009, IKG4008 depending on Indramat amplifier	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN2	Bosch/Rexroth Indramat	IKG4077, IKG4017, IKG4009, IKG4008 depending on Indramat amplifier	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN4/IN3	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4374
	Bosch/Rexroth Indramat DIAX Series	IN1	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN2	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN3	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4374
	Parker Compumotor Gemini Series	PC3	Exlar	PC6-MC-xxx	Parker Compumotor	71-018308-XX
	Yaskawa Sigma II Series (3 inch and smaller motors 100/200VAC)	YS3	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (3 inch and smaller motors 400VAC)	YS3	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 100/200VAC)	YS2	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 400VAC)	YS2	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
SLM115 SLG115	Allen Bradley Ultra 100/200	AB1	Exlar	PC7-MC-xxx	Allen Bradley	9101-1366-xxx
	Allen Bradley Ultra 3000/5000	AB7*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx
	Allen Bradley Ultra 3000/5000	AB4/AB5*	Allen Bradley	2090-UXNPAMP-14Sxx	Allen Bradley	2090-UXNFBMP-Sxx**
	Control Techniques En, Epsilon and MDS Series	EM2	Control Techniques	CMMS-xxx	Control Techniques	CFCS-XXX
	Kollmorgen Servo Star & Servo Star CD	KM1	Kollmorgen	CSSSRHA2H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHA2H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM5/KM2	Kollmorgen	CSSSRHG2H-xxx (set includes feedback cable)	Kollmorgen	CSSSRHG2H-xxx (set includes power cable)
	Kollmorgen Servo Star 600	KM4/KM3	Kollmorgen	CSSSS3HG2H-xxx (set includes feedback cable)	Kollmorgen	CSSSS3HG2H-xxx (set includes power cable)
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN1	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN2	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DKC Series, ECO Drive	IN3/IN4	Bosch/Rexroth Indramat	IKG4009	Bosch/Rexroth Indramat	IKS4374
	Bosch/Rexroth Indramat DIAX Series	IN1	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN2	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4001
	Bosch/Rexroth Indramat DIAX Series	IN3	Bosch/Rexroth Indramat	IKG4077	Bosch/Rexroth Indramat	IKS4374
	Parker Compumotor Gemini Series	PC3	Exlar	PC7-MC-xxx	Parker Compumotor	71-018308-XX
	Yaskawa Sigma II Series (3 inch and smaller motors 100/200VAC)	YS3	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (3 inch and smaller motors 400VAC)	YS3	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 100/200VAC)	YS2	Yaskawa	B1E-xxA	Yaskawa	JZSP-CMP02-XX(B)
	Yaskawa Sigma II Series (4 inch and larger motors 400VAC)	YS2	Yaskawa	BAE-xxA	Yaskawa	JZSP-CMP02-XX(B)

* Brake Cable AB4/AB5 and AB7, 2090-UXNPAMP-18Sxx

** Exlar Corporation uses absolute encoders for AB4 and AB5 configurations that are powered by 5 VDC. A customer not using Allen-Bradley's universal feedback cable referenced here, must make provisions such that the wiring scheme provides connectivity according to Allen-Bradley's wiring requirments for 5 VDC encoder power from the amplifier to the encoder.

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.

Designator	Base Speed	Motor Series
-50	5000 rpm	SLM/SLG060
-40	4000 rpm	SLM/SLG090
-30	3000 rpm	SLM/SLG115
01-99	Special Speed, Consult Exlar	

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 SLG-090-010-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 Exlar applications engineers. Also, it is not possible to produce every possible speed from -01 to -99 for each motor at each voltage so please contact Exlar applications engineers for confirmation of the speed that is desired for the application.

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.

118 = 1 stack,
115 Vrms, 8 Pole, Class 180 H

138 = 1 stack,
230 Vrms, 8 Pole, Class 180 H

158 = 1 stack,
400 Vrms, 8 Pole, Class 180 H

168 = 1 stack,
460 Vrms, 8 Pole, Class 180 H

218 = 2 stack,
115 Vrms, 8 Pole, Class 180 H

238 = 2 stack,
230 Vrms, 8 Pole, Class 180 H

258 = 2 stack,
400 Vrms, 8 Pole, Class 180 H

268 = 2 stack,
460 Vrms, 8 Pole, Class 180 H

318 = 3 stack,
115 Vrms, 8 Pole, Class 180 H

338 = 3 stack,
230 Vrms, 8 Pole, Class 180 H

358 = 3 stack,
400 Vrms, 8 Pole, Class 180 H

368 = 3 stack,
460 Vrms, 8 Pole, Class 180 H

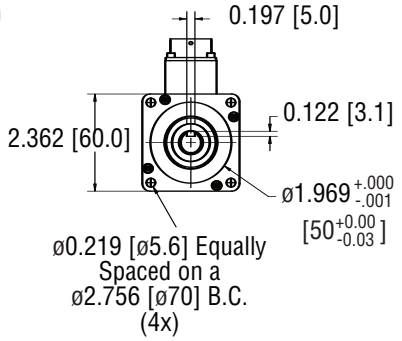
Housing Options

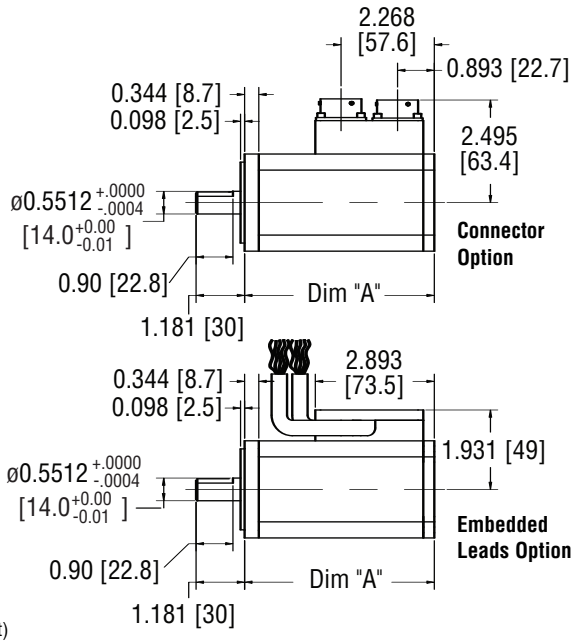
FG = Food Grade Epoxy
This option provides for a motor coated with FDA approved white epoxy.

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. Please inquire with Exlar for dimensions.

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 Exlar engineering.

SLM060

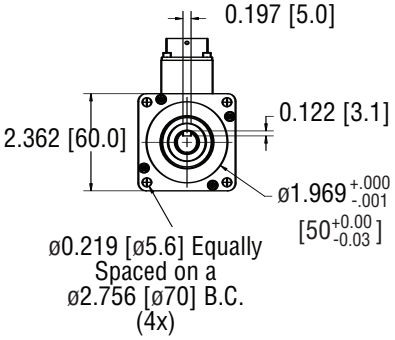


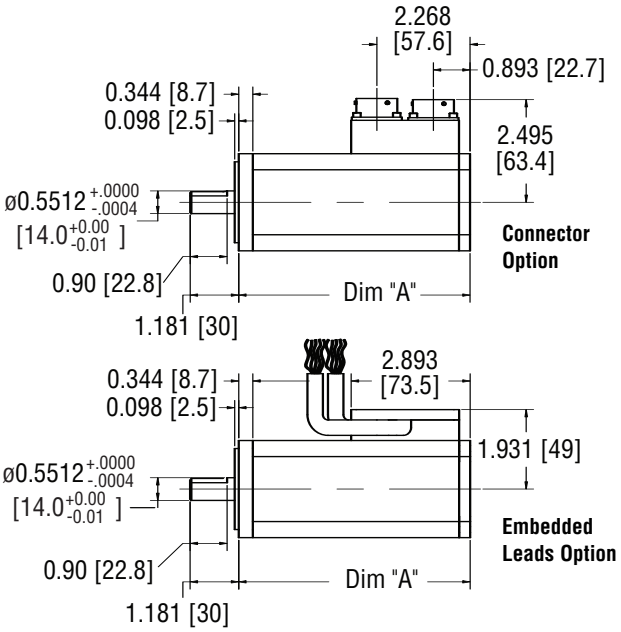


Note: Dimension format = in. [mm]
Face plate edge is not intended for alignment of shaft (use pilot)

Connector Option				Embedded Leads Option			
Dim	**1 Stack Motor**	**2 Stack Motor**	**3 Stack Motor**	**Dim**	**1 Stack Motor**	**2 Stack Motor**	**3 Stack Motor**
A	4.612 [117]	5.862 [149]	7.112 [181]	**A**	4.612 [117]	5.862 [149]	7.112 [181]

SLM060 With Brake Option

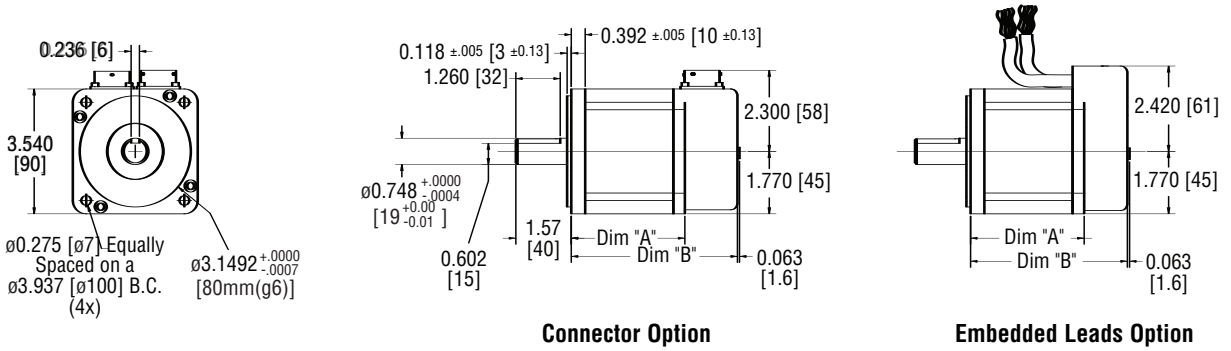




Connector Option				Embedded Leads Option			
Dim	**1 Stack Motor**	**2 Stack Motor**	**3 Stack Motor**	**Dim**	**1 Stack Motor**	**2 Stack Motor**	**3 Stack Motor**
A	5.627 [143]	6.877 [175]	8.127 [206]	**A**	5.627 [143]	6.877 [175]	8.127 [206]

Drawings subject to change. Consult Exlar for certified drawings.

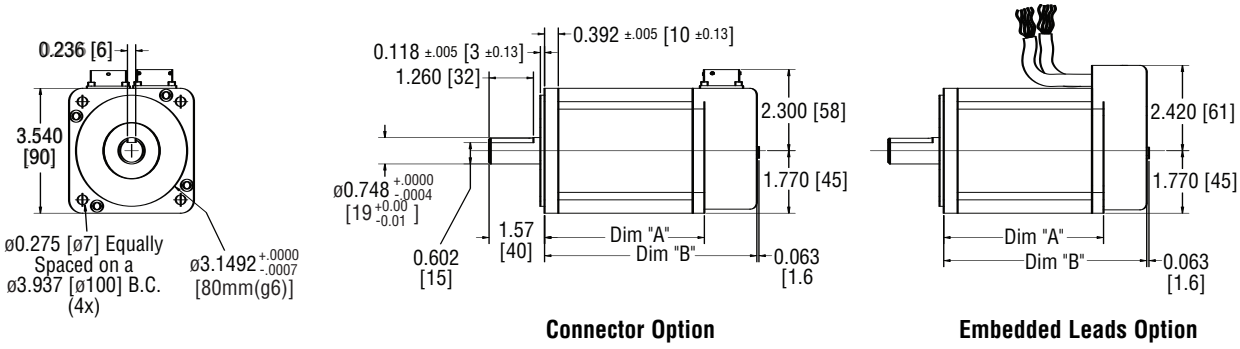
SLM090



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

Connector Option				Embedded Leads Option			
Dim	**1 Stack Stator**	**2 Stack Stator**	**3 Stack Stator**	**Dim**	**1 Stack Stator**	**2 Stack Stator**	**3 Stack Stator**
A	3.225 [82]	4.225 [107]	5.225 [133]	**A**	3.225 [82]	4.225 [107]	5.225 [133]
B	4.650 [118]	5.650 [144]	6.650 [169]	**B**	4.450 [113]	5.450 [138]	6.450 [164]

SLM090 With Brake Option

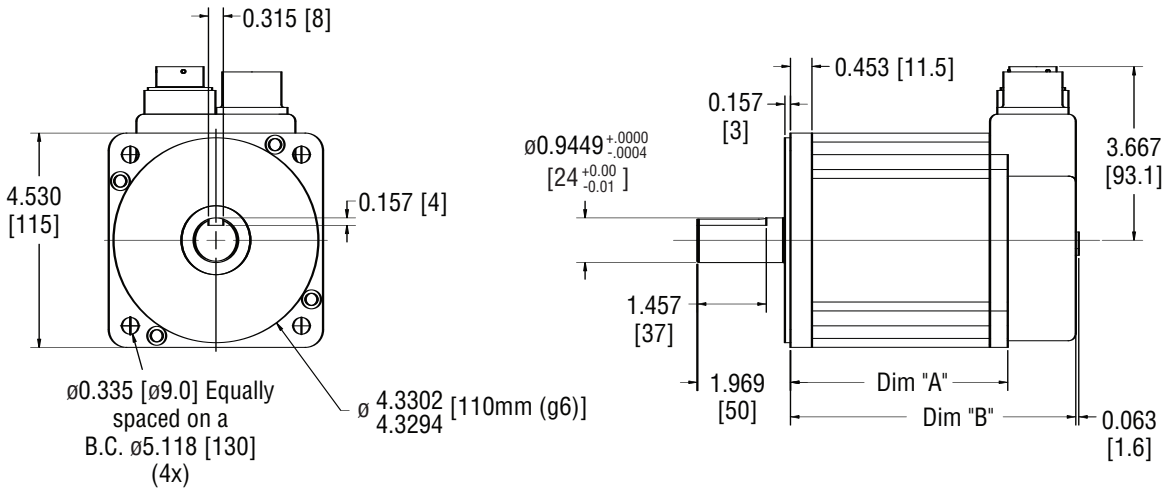


Note: Dimension format = in. [mm]
Face plate edge is not intended for alignment of shaft (use pilot)

Connector Option				Embedded Leads Option			
Dim	**1 Stack Stator**	**2 Stack Stator**	**3 Stack Stator**	**Dim**	**1 Stack Stator**	**2 Stack Stator**	**3 Stack Stator**
A	4.535 [115]	5.535 [141]	6.535 [166]	**A**	4.535 [115]	5.535 [141]	6.535 [166]
B	5.960 [151]	6.960 [177]	7.960 [202]	**B**	5.760 [144]	6.976 [169]	7.760 [195]

Drawings subject to change. Consult Exlar for certified drawings.

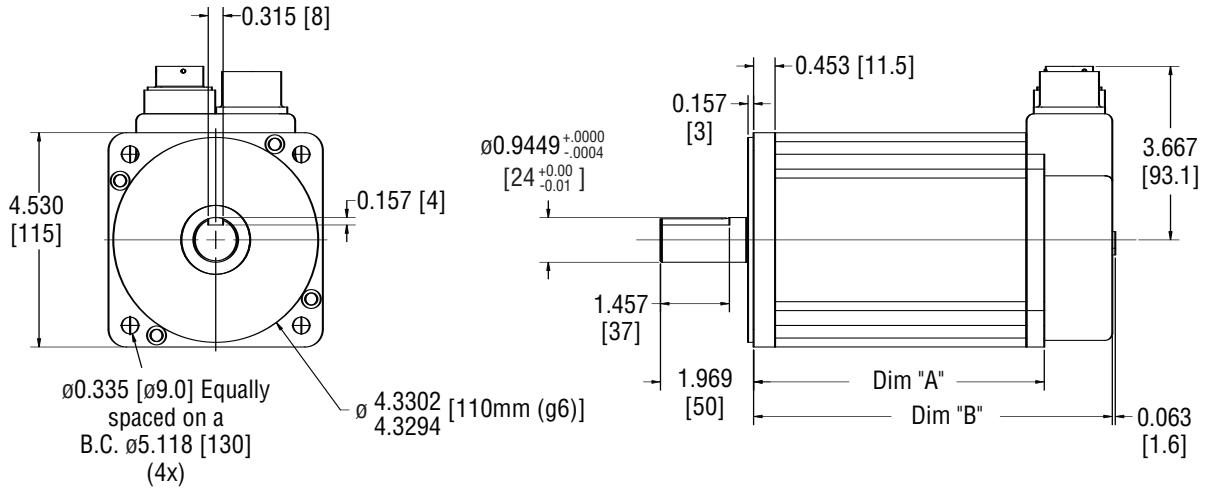
SLM115



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

Dim	1 Stack Stator	2 Stack Stator	3 Stack Stator
A	4.593 [117]	6.593 [168]	8.593 [218]
B	6.031 [153]	8.031 [204]	10.031 [255]

SLM115 With Brake Option

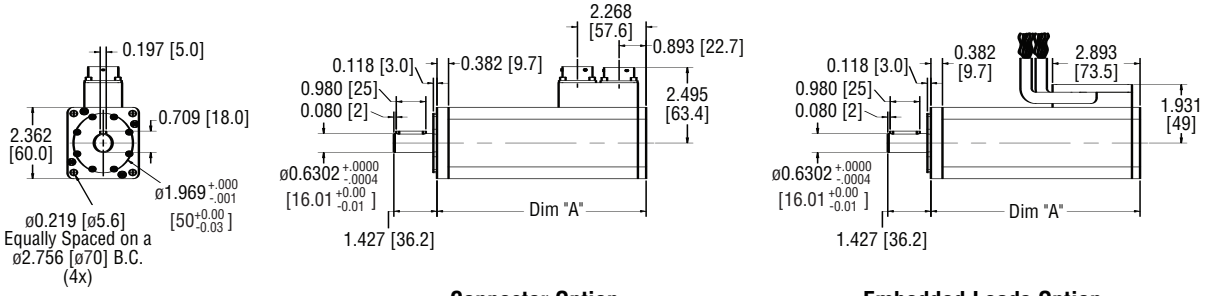


Note: Dimension format = in. [mm]
Face plate edge is not intended for alignment of shaft (use pilot)

Dim	1 Stack Stator	2 Stack Stator	3 Stack Stator
A	6.143 [156]	8.143 [207]	10.143 [258]
B	7.581 [193]	9.581 [243]	11.581 [255]

Drawings subject to change. Consult Exlar for certified drawings.

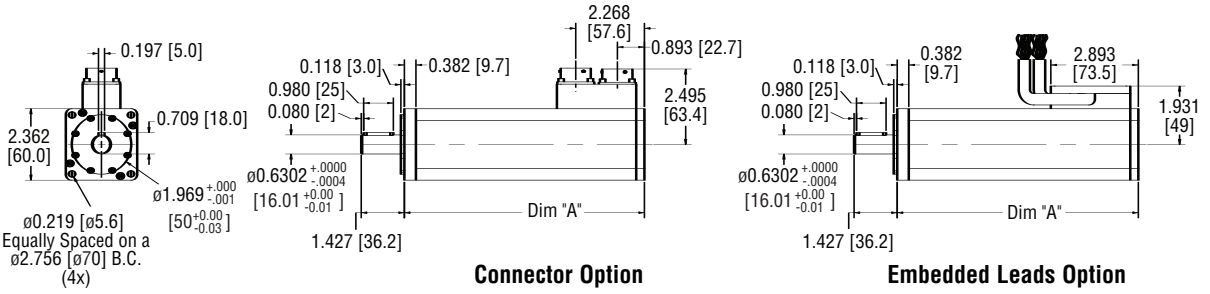
SLG060



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

Connector Option				Embedded Leads Option			
Dim	**1 Stack Stator** 1 Stage Gearhead	**2 Stack Stator** 1 Stage Gearhead	**3 Stack Stator** 1 Stage Gearhead	**Dim**	**1 Stack Stator** 1 Stage Gearhead	**2 Stack Stator** 1 Stage Gearhead	**3 Stack Stator** 1 Stage Gearhead
A	6.915 [176]	8.165 [207]	9.415 [239]	**A**	6.915 [176]	8.165 [207]	9.415 [239]
Dim	**1 Stack Stator** 2 Stage Gearhead	**2 Stack Stator** 2 Stage Gearhead	**3 Stack Stator** 2 Stage Gearhead	**Dim**	**1 Stack Stator** 2 Stage Gearhead	**2 Stack Stator** 2 Stage Gearhead	**3 Stack Stator** 2 Stage Gearhead
A	7.960 [202]	9.210 [234]	10.460 [266]	**A**	7.960 [202]	9.210 [234]	10.460 [266]

SLG060 With Brake Option

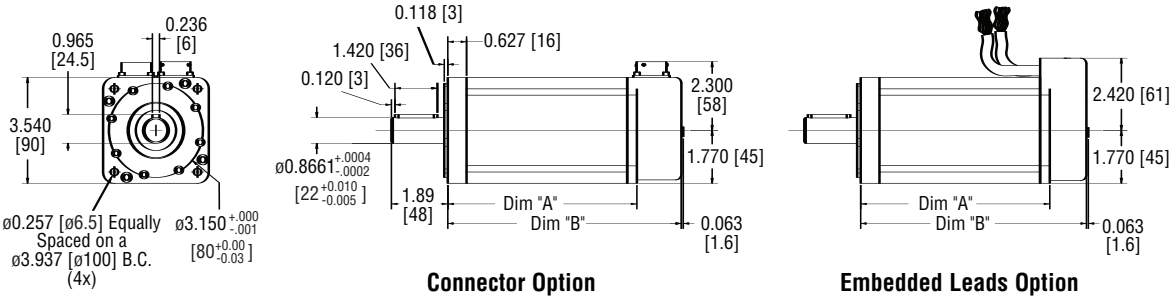


Note: Dimension format = in. [mm]
Face plate edge is not intended for alignment of shaft (use pilot)

Connector Option				Embedded Leads Option			
Dim	**1 Stack Stator** 1 Stage Gearhead	**2 Stack Stator** 1 Stage Gearhead	**3 Stack Stator** 1 Stage Gearhead	**Dim**	**1 Stack Stator** 1 Stage Gearhead	**2 Stack Stator** 1 Stage Gearhead	**3 Stack Stator** 1 Stage Gearhead
A	7.930 [201]	9.180 [233]	10.430 [265]	**A**	7.930 [201]	9.180 [233]	10.430 [265]
Dim	**1 Stack Stator** 2 Stage Gearhead	**2 Stack Stator** 2 Stage Gearhead	**3 Stack Stator** 2 Stage Gearhead	**Dim**	**1 Stack Stator** 2 Stage Gearhead	**2 Stack Stator** 2 Stage Gearhead	**3 Stack Stator** 2 Stage Gearhead
A	8.975 [228]	10.225 [260]	11.475 [291]	**A**	8.975 [228]	10.225 [260]	11.475 [291]

Drawings subject to change. Consult Exlar for certified drawings.

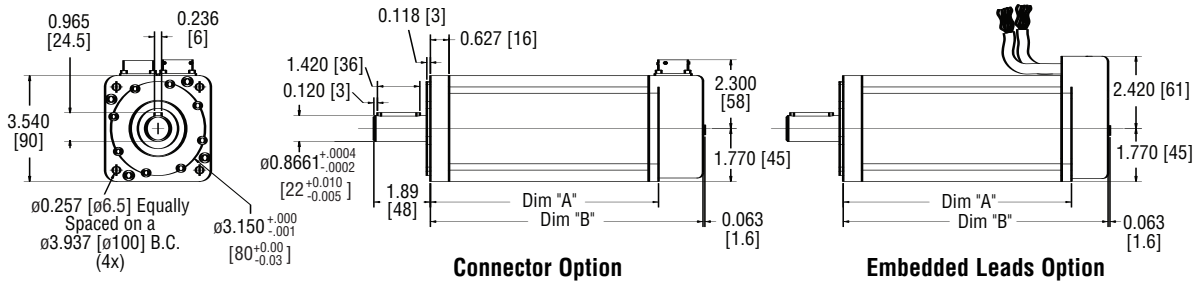
SLG090



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

Connector Option				Embedded Leads Option			
Dim	**1 Stack Stator** 1 Stage Gearhead	**2 Stack Stator** 1 Stage Gearhead	**3 Stack Stator** 1 Stage Gearhead	**Dim**	**1 Stack Stator** 1 Stage Gearhead	**2 Stack Stator** 1 Stage Gearhead	**3 Stack Stator** 1 Stage Gearhead
A	6.335 [161]	7.335 [186]	8.355 [212]	**A**	6.335 [161]	7.335 [186]	8.355 [212]
B	7.760 [197]	8.760 [223]	9.760 [248]	**B**	7.560 [192]	8.560 [217]	9.560 [243]
Dim	**1 Stack Stator** 2 Stage Gearhead	**2 Stack Stator** 2 Stage Gearhead	**3 Stack Stator** 2 Stage Gearhead	**Dim**	**1 Stack Stator** 2 Stage Gearhead	**2 Stack Stator** 2 Stage Gearhead	**3 Stack Stator** 2 Stage Gearhead
A	7.600 [193]	8.600 [218]	9.600 [244]	**A**	7.600 [193]	8.600 [218]	9.600 [244]
B	9.025 [229]	10.025 [255]	11.025 [280]	**B**	8.825 [224]	9.825 [250]	10.825 [275]

SLG090 With Brake Option

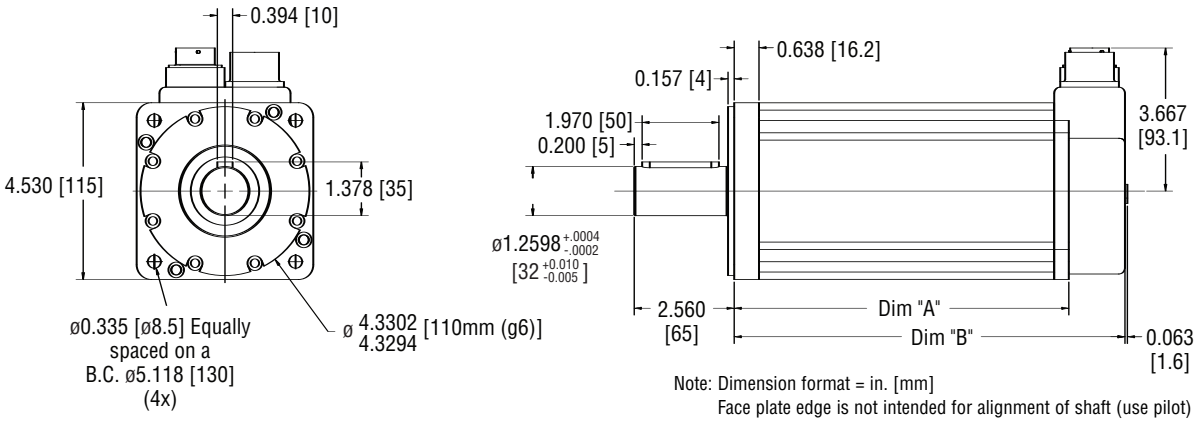


Note: Dimension format = in. [mm]
Face plate edge is not intended for alignment of shaft (use pilot)

Connector Option				Embedded Leads Option			
Dim	**1 Stack Stator** 1 Stage Gearhead	**2 Stack Stator** 1 Stage Gearhead	**3 Stack Stator** 1 Stage Gearhead	**Dim**	**1 Stack Stator** 1 Stage Gearhead	**2 Stack Stator** 1 Stage Gearhead	**3 Stack Stator** 1 Stage Gearhead
A	7.645 [194]	8.645 [220]	9.645 [245]	**A**	7.645 [194]	8.645 [220]	9.645 [245]
B	9.070 [230]	10.070 [256]	11.070 [281]	**B**	8.870 [225]	9.870 [251]	10.870 [276]
Dim	**1 Stack Stator** 2 Stage Gearhead	**2 Stack Stator** 2 Stage Gearhead	**3 Stack Stator** 2 Stage Gearhead	**Dim**	**1 Stack Stator** 2 Stage Gearhead	**2 Stack Stator** 2 Stage Gearhead	**3 Stack Stator** 2 Stage Gearhead
A	8.910 [226]	9.910 [252]	10.910 [277]	**A**	8.910 [226]	9.910 [252]	10.910 [277]
B	10.335 [263]	11.335 [288]	12.335 [313]	**B**	10.135 [257]	11.135 [283]	12.135 [308]

Drawings subject to change. Consult Exlar for certified drawings.

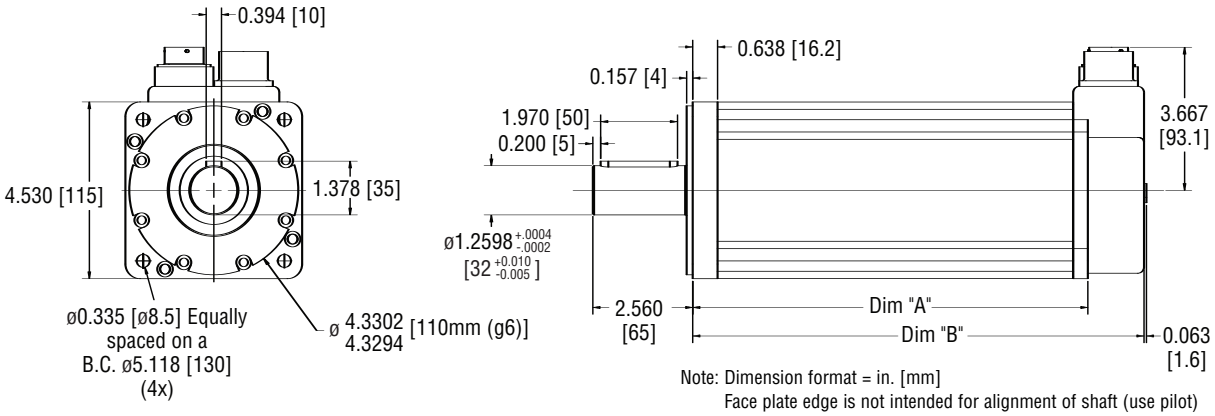
SLG115



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

Dim	1 Stack Stator 1 Stage Gearhead	2 Stack Stator 1 Stage Gearhead	3 Stack Stator 1 Stage Gearhead	Dim	1 Stack Stator 2 Stage Gearhead	2 Stack Stator 2 Stage Gearhead	3 Stack Stator 2 Stage Gearhead
A	8.578 [218]	10.578 [269]	12.578 [319]	A	10.188 [259]	12.188 [310]	14.188 [360]
B	10.016 [254]	12.016 [305]	14.016 [356]	B	11.626 [295]	13.626 [346]	15.626 [397]

SLG115 With Brake Option



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

Dim	1 Stack Stator 1 Stage Gearhead	2 Stack Stator 1 Stage Gearhead	3 Stack Stator 1 Stage Gearhead	Dim	1 Stack Stator 2 Stage Gearhead	2 Stack Stator 2 Stage Gearhead	3 Stack Stator 2 Stage Gearhead
A	10.128 [257]	12.128 [308]	14.128 [359]	A	11.738 [298]	13.738 [349]	15.738 [400]
B	11.566 [294]	13.566 [345]	15.566 [395]	B	13.176 [335]	15.176 [385]	17.176 [436]

Drawings subject to change. Consult Exlar for certified drawings.

SLM/G - AAA - BBB - C - D - E - F - GGG - HHH - II - XX - #####

SLM/SLG Series Motor Ordering Information

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 = 115mm

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

C = Shaft Type
K = Keyed
R = Smooth/Round
X = Special Shaft

D = Connector Options
B = Embedded Leads
C = Standard MS Connectors
I = Intercontec style (Exlar standard style connector)
M = Manufacturer's Connectors[3]
P = Embedded Leads with Standard MS Connector Cable Plugs
X = Special Connectors

E = Coating Options[2]
G = Standard Gray E-Coat, Black Anodized[7] Front/Rear Covers
E = Electroless Nickel Plated
F = Food Grade White
X = Special Coating

F = Brake Options
B = Brake
S = Standard No Brake

GGG = Brushless Amplifier (Please indicate the amplifier to be used to power the actuator)
XX1 = Custom Feedback - purchaser must supply drawing of feedback device and desired wiring drawings
OO1 = Standard Feedback Mount - actuator is supplied ready for size 15 resolver or encoder, includes .375 mm shaft
OO2 = Same as above with 8mm shaft
If the Rockwell Allen-Bradley system that you are using is the Kinetix platform or SERCOS based, additional software and data files are required from Allen-Bradley. Please contact your Rockwell Allen-Bradley representative for support.
AB1 = Allen-Bradley Ultra 100/200[5] (std encoder, 2048 line, with commutation, 5 VDC)
AB4 = Allen Bradley Ultra 3000 or 5000[5] with single-turn (absolute encoder)
AB5 = Allen Bradley Ultra 3000 or 5000[5] with multi-turn (absolute encoder)
AB6 = Allen Bradley 1394[4] (resolver, type 2)(replaces AB2)
AB7 = Allen Bradley Ultra 3000 or 5000[5] (std encoder, 2048 line, with commutation, 5 VDC)
AD1 = Advanced Digital "Simple Servo" (std encoder, 2048 line, with commutation, 5 VDC)
AP1 = API resolver based (resolver, type 2)
AP2 = API encoder based (std encoder, 2048 line, with commutation, 5 VDC)
AM1 = Advanced Motion Controls (std encoder, 2048 line, with commutation, 5 VDC)
AM2 = Advanced Motion Controls (std encoder, 1000 line, with commutation, 5 VDC)
AM3 = Advanced Motion Controls (resolver, type 1)
AM4 = Advanced Motion Controls BX Series default settings (std encoder, 2048 line, with commutation, 5 VDC)
BD2 = Baldor Flex Series (resolver, type 1)(replaces BD1)
BD3 = Baldor Flex Series (std encoder, 2048 line, with commutation, 5 VDC)
BO1 = Bosch (resolver, type 2)
CC1 = Cleveland Machine Controls (resolver, type 1)
CM1 = Comau (resolver, type 1)
CO1 = Copley Controls (std encoder, 2048 line, with commutation, 5 VDC)
CS1 = Parker (Custom Servo Motors) MPA, MPSL (resolver, type 1)
CS2 = Parker (Custom Servo Motors) Servo Flex (std encoder, 2048 line, with commutation, 5 VDC)
EL1 = Elmo Motion Control (resolver, type 1)
EL2 = Elmo CLA, SBA, FLU Series, (std encoder, 2048 line, with commutation, 5 VDC)
EM2 = Emerson En, Epsilon, MDS Series and Uni-Drive[5] (std encoder, 2048 line, with commutation, 5 VDC)
EM3 = Emerson MX Series (resolver, type 2)
EM4 = Emerson UniDrive SP (resolver, type 1)
EU1 = Elau (absolute encoder, multi-turn, type 2)
EX4 = Exlar SV Series (resolver, type 1) (replaces EX3)
GL1 = Sheffield Automation (G&L) Smart Drive (standard encoder, 2048 line, with commutation, 5 VDC) If selecting the "M" connector option with GL1, the motor power and encoder connector configuration will be equivalent to that used on the Sheffield Automation HSM Series motors.
GL2 = Sheffield Automation (G&L) Smart Drive (standard encoder, 2048 line, with commutation, 5 VDC) If selecting the "M" connector option with GL2, the motor power and encoder connector configuration will be equivalent to that used on the Sheffield Automation LSM/MSM Series motors.
IN1 = Bosch-rexroth (Indramat) ECO Drive, (absolute, multi-turn Heidenhain encoder, type 2)
IN2 = Bosch-rexroth (Indramat) ECO Drive, (absolute, single-turn Heidenhain encoder)
IN4 = Bosch-rexroth (Indramat) ECO Drive, Standard resolver (resolver, type 1)(replaces IN3)
KM1 = Kollmorgen ServoStar Series[5] 230V (resolver, type 2)
KM3 = Kollmorgen ServoStar600 Series[5] (Absolute encoder, single turn, type 1)
KM4 = Kollmorgen ServoStar600 Series[5] (Absolute encoder, multi-turn, type 2)
KM5 = Kollmorgen ServoStar600 Series[5] and ServoStar CD (resolver, type 2)(replaces KM2)
KM6 = Kollmorgen ServoStar300 Series[5] (std encoder, 2048 line, with commutation, 5 VDC)
LZ1 = Lenze 9300 Series (Multi-turn Absolute Encoder, type 2)
LZ2 = Lenze 9300 Series (resolver, type 2)
MD1 = Modicon (resolver, type 1)
MX1 = Metronix ARS Series, Resolver type 1
OR1 = Ormec (resolver, type 2)
PC1 = Parker Compumotor Apex & Z Series (resolver, type 1)
PC2 = Parker Compumotor TQ Series (std encoder, 2048 line, with commutation, 5 VDC)
PC3 = Parker Compumotor Gemini Series (std encoder, 2048 line, with commutation, 5 VDC)
PS2 = Pacific Scientific (std encoder, 2048 line, with commutation, 5 VDC)
PS3 = Pacific Scientific SC900, 700 Series (resolver, type 1)(replaces PS1)
SM2 = Siemens (resolver, type 1)
SP2 = In Motion, PAM Series (resolver, type 1)
WD1 = Whedco (GE-Fanuc)(resolver, type 1)
YS2 = Yaskawa Sigma II Series for 4 inch and larger Exlar motors (multi-turn absolute encoder, type 1)
YS3 = Yaskawa Sigma II Series for 3 inch and smaller Exlar actuators (multi-turn absolute encoder, type 1)

Consult Exlar's application engineering department regarding all special actuator components.

SLM/SLG Series Motor Ordering Information

HHH = Motor Stator, All 8 Pole[1,6]

118 = 1 Stack, 115 Vrms
138 = 1 Stack, 230 Vrms
158 = 1 Stack, 400 Vrms
168 = 1 Stack, 460 Vrms

218 = 2 Stack, 115 Vrms
238 = 2 Stack, 230 Vrms
258 = 2 Stack, 400 Vrms
268 = 2 Stack, 460 Vrms

318 = 3 Stack, 115 Vrms
338 = 3 Stack, 230 Vrms
358 = 3 Stack, 400 Vrms
368 = 3 Stack, 460 Vrms

II = Optional Speed & Mechanical Designations

30 = 3000 rpm, SLM/G115
40 = 4000 rpm, SLM/G090
50 = 5000 rpm, SLM/G060
01-99 = Special Speed, Consult Exlar

XX = Part Number Designator for specials

SS = Stainless steel housing
XH = Special housing or mounting option
XM = Special motor options
XF = Special feedback option
XL = Special lubrication
FG = Food grade

= Part Number Designator for Specials

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

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

1. Stator voltage and pole options allow for catalog rated performance at varying amplifier bus voltages and pole configuration requirements.
2. These housing options would typically be accompanied by the choice of the electroless nickel connectors if a connectorized unit were selected. This choice may also indicate a need for special material main rods or flanges. Please inquire with Exlar Eng.
3. Available with AB1, AB4/5, AB7, EM2, KM1, KM3, KM4, KM5, KM6, IN1, IN2, IN4, LZ1, LZ2, PC3, PS3, YS2 and YS3 feedback currently. This option allows the customer to use the standard cables supplied by their amplifier manufacturer.
4. Use of the Allen-Bradley 1394 requires assistance from Allen-Bradley to configure the axis for a custom motor.
5. Amps require motor data files for operation. See www.exlar.com or contact Exlar Engineering.
6. See page 88 for explanation of voltage, speed and stack options.
7. When selecting special housing options, use “G” in this model mask location.

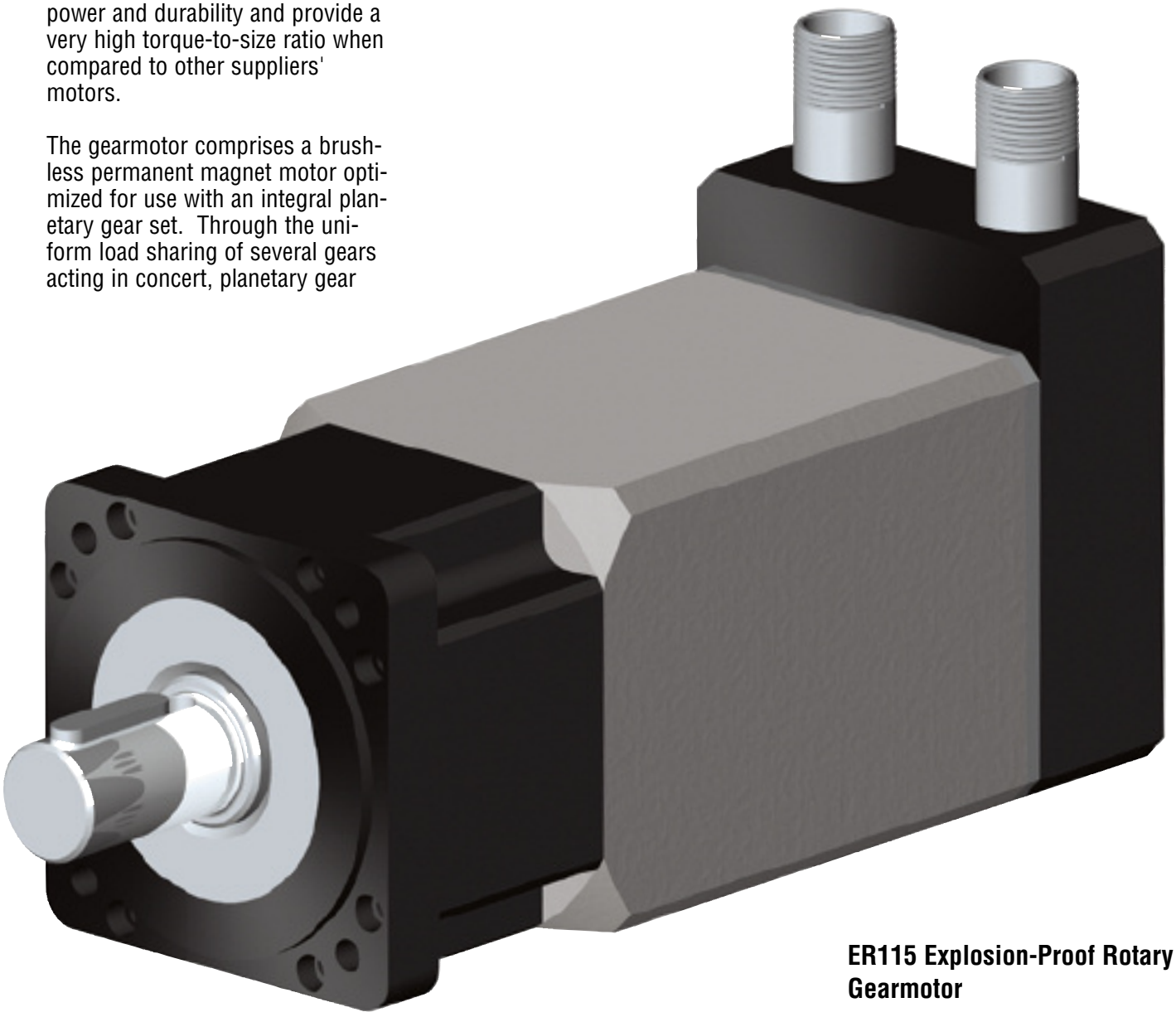
ER Series Rotary Motor and Gearmotor

For hazardous duty environments with constant exposure to flammable gasses or vapors* Exlar's ER Series rotary explosion-proof motors and gearmotors provide an excellent solution. Exlar's motors utilizing T-LAM™ technology, an innovative segmented winding, have been designed for efficiency, power and durability and provide a very high torque-to-size ratio when compared to other suppliers' motors.

The gearmotor comprises a brushless permanent magnet motor optimized for use with an integral planetary gear set. Through the uniform load sharing of several gears acting in concert, planetary gear heads are a very compact, reliable solution providing high torque, low backlash and low maintenance.

The ER Series motors are compatible with nearly any manufacturers' resolver-based amplifier.

**ER Series motors are rated for Class I, div 1, Groups B, C and D. "Class I" means that flammable gasses or vapors may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. "Division1" means that hazardous concentrations in the air may exist continuously, intermittently, or periodically under normal operating conditions. "Group B" allows for atmospheres containing hydrogen, or gasses (or vapors) of equivalent hazard, such as manufactured gas. "Group C" allows for atmospheres containing ethyl-ether vapors, ethylene or cyclo propane. "Group D" allows for atmospheres containing gasoline, hexane, naphtha, benzene, butane, alcohol, acetone, benzol, lacquer solvent vapors or natural gas. ER Series motors are not rated for operation in atmospheres containing acetylene.*



ER115 Explosion-Proof Rotary Gearmotor

Class I, div 1, Groups B, C and D

Features

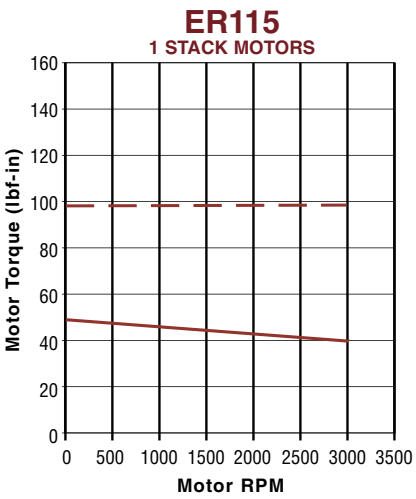
- T-LAM technology yielding 35% increase in continuous motor torque over traditional windings
- Resolver feedback
- 8 pole motors
- Rod end options
- 1, 2, or 3 stack motor availability compatible with nearly any resolver based servo amplifier
- Several mounting configurations
- Potted NPT connectors
- Windings from 24 VDC to 460 VAC rms
- Class 180H insulation system

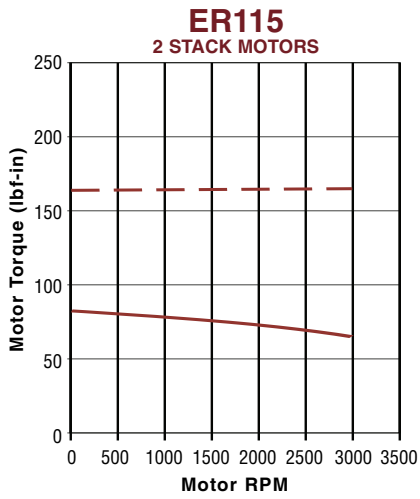
TYPICAL APPLICATIONS FOR EL SERIES EXPLOSION-PROOF MOTORS ARE WELL-SUITED TO MANY APPLICATIONS SUCH AS:

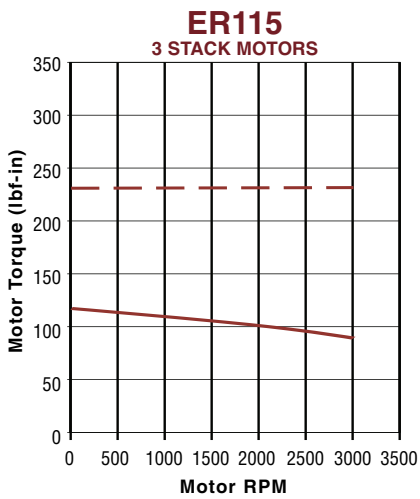
- Turbine fuel flow
- Printing presses
- Engine test stands
- Fuel distribution systems
- Chemical process plants
- Shipbound fuel management

ER Speed/Torque Curves

Peak Torque
Continuous Torque
Torque Rated at 80˚C







ER115 Electrical/Mechanical Specifications

ER115 Motor Stator Data		1A8	1B8	118	138	158	168	2A8	2B8	238	258	268	338	358	368
Sinusoidal Commutation Data															
Continuous Motor Torque*	lbf-in	49.7	49.7	50.5	50.5	50.6	50.5	83.3	83.3	84.0	82.5	84.0	117.3	117.6	120.4
	(N-m)	(5.61v	(5.61v	(5.70)	(5.70v	(5.72)	(5.70)	(9.41)	(9.41)	(9.49)	(9.32)	(9.49)	(13.25)	(13.29)	(13.60)
Peak Motor Torque	lbf-in	99.3	99.3	101.0	101.0	101.2	100.9	166.6	166.6	168.0	165.0	168.0	234.6	235.3	240.8
	(N-m)	(11.22)	(11.22)	(11.41)	(11.41)	(11.44)	(11.40)	(18.82)	(18.82)	(18.98)	(18.64)	(18.98)	(26.50)	(26.58)	(27.21)
Torque Constant (Kt)	lbf-in/A	5.3	5.3	4.3	8.7	15.7	17.4	5.3	5.3	8.7	15.9	17.4	8.5	15.9	17.6
(+/– 10% @ 80˚C)	N-m/A	0.60	0.6	0.5	1.0	1.8	2.0	0.6	0.6	1.0	1.8	2.0	1.0	1.8	2.0
Cont. Current Rating	A	10.5	10.5	13.0	6.5	3.6	3.2	17.6	17.6	10.8	5.8	5.4	15.4	8.3	7.7
Peak Current Rating	A	21.0	21.0	26.0	13.0	7.2	6.5	35.2	35.2	2.16	11.6	10.8	30.8	16.6	15.3
Trapezoidal Commutation Data															
Continuous Motor Torque	lbf-in	47.4	47.4	48.2	48.2	48.3	48.2	79.5	79.5	80.2	78.8	80.2	112.0	112.3	115.0
	(N-m)	(5.36)	(5.36)	(5.45)	(5.45)	(5.46)	(5.45)	(8.99)	(8.99)	(9.06)	(8.90)	(9.06)	(12.66)	(12.69)	(12.99)
Peak Motor Torque	lbf-in	94.8	94.8	96.4	96.4	96.7	96.4	159.1	159.1	160.4	157.6	160.4	224.0	224.7	230.0
	(N-m)	(10.71)	(10.7)	(10.9)	(10.9)	(10.9)	(10.9)	(18.0)	(18.0)	(18.1)	(17.8)	(18.1)	(25.3)	(25.4)	(26.0)
Torque Constant (Kt)	lbf-in/A	4.12	4.12	3.39	6.78	12.22	13.55	4.12	4.12	6.78	12.37	13.55	6.63	12.37	13.70
(+/– 10% @ 80˚C)	(N-m/A)	(0.47)	(0.47)	(0.38)	(0.77)	(1.38)	(1.53)	(0.47)	(0.47)	(0.77)	(1.40)	(1.53)	(0.75)	(1.40)	(1.55)
Cont. Current Rating	A	12.85	12.85	15.90	7.95	4.42	3.97	21.55	21.55	13.23	7.12	6.61	18.88	10.14	9.38
Peak Current Rating	A	25.69	25.69	31.81	15.90	8.84	7.95	43.10	43.10	26.46	14.23	13.23	37.76	20.29	18.76
Motor Data															
Voltage Constant (Ke)	Vrms/Krpm	51.1	51.1	42.0	83.9	151.4	167.9	53.1	51.1	83.9	153.3	167.9	82.1	153.3	169.7
(+/– 10% @ 80˚C)	Vpk /Krpm	36.1	36.1	29.7	59.4	107.1	118.7	36.1	36.1	59.4	108.4	118.7	58.1	108.4	120.0
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L) (+/– 5% @ 25˚C)	Ohms	0.31	0.31	0.20	0.80	2.60	3.21	0.13	0.13	0.34	1.17	1.35	0.20	0.69	0.81
Inductance (L-L) (+/– 15%)	mH	4.8	4.8	3.3	13.0	42.4	52.1	2.3	2.3	6.3	21.1	25.3	4.0	13.9	17.1
Armature Inertia	lb-in-sec^2	0.00555						0.00833					0.01112		
	(kg-cm^2)	(6.27)						(9.42)					(12.56)		
Mech.Time Constant (tm),	ms	0.85	0.85	0.82	0.82	0.82	0.82	0.53	0.53	0.52	0.54	0.52	0.43	0.42	0.40
Electrical Time Constant (te)	ms	15.73	15.73	16.26	16.26	16.34	16.25	18.41	18.41	18.72	18.06	18.72	20.08	20.19	21.16
Damping Constant	lbf-in/krpm	0.21	0.21	0.21	0.21	0.21	0.21	0.35	0.35	0.35	0.35	0.35	0.40	0.40	0.40
	(N-m/krpm)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.045)	(0.045)	(0.045)
Friction Torque	lbf-in	0.56	0.56	0.56	0.56	0.56	0.56	1.00	1.00	1.00	1.00	1.00	1.20	1.20	1.20
	(N-m)	(0.063)	(0.063)	(0.063)	(0.063)	(0.063)	(0.063)	(0.113)	(0.113)	(0.113)	(0.113)	(0.113)	(0.136)	(0.136)	(0.136)
Bus Voltage	Vrms	24VDC	48VDC	115	230	400	460	24VDC	48VDC	230	400	460	230	400	460
Speed @Bus Voltage	RPM	300	750	3000	3000	3000	3000	300	750	3000	3000	3000	3000	3000	3000
Motor Wire Insulation	˚C (class)	180(H)													
Insulation System Voltage Rating		460													
Thermal Switch, Stator Temp.	˚C	T4 = 130˚ T3A = 165˚													
Environmental Rating		IP65													

ER115 Gearmotor Data

ER 115 Armature Inertia*	lbf-in-sec^2 (kg-cm^2)	0.00344 (3.89)	0.00441 (4.99)	0.00538 (6.08)

For amplifiers using peak sinusoidal ratings,multiply RMS sinusoidal Kt by 0.707,and peak current by 1.414.

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% Double Reduction: 86%

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

ER Series Gearmotor General Performance Specifications

Two torque ratings for the ER 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 ER 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

		Maximum	Output Torque @ Speed for 10,000 Hour Life		
		Output Torque	1000 RPM	3000 RPM	5000 RPM
ER115	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)

Radial Load and Bearing Life

Side load ratings shown below are for 10,000 hour bearing life at 25mm from motor face at given rpm.
Visit www.exlar.com for full details on radial load and bearing life.

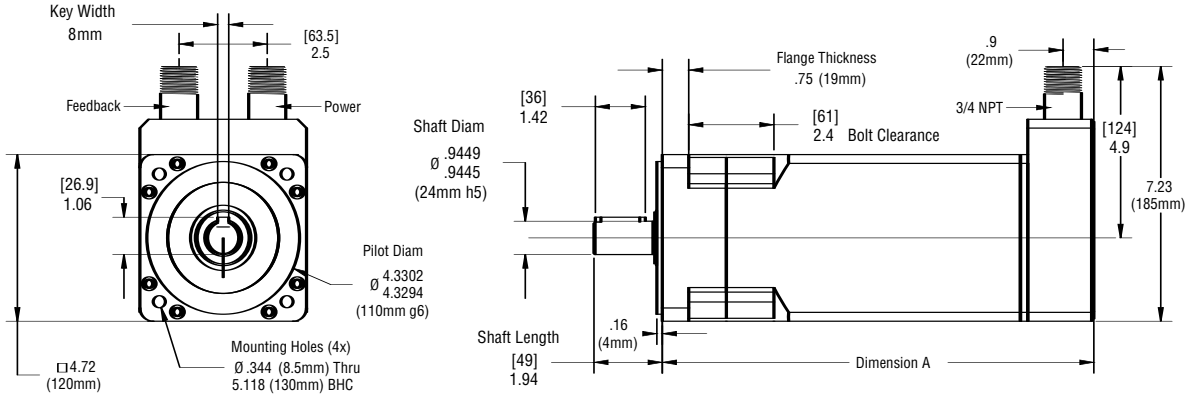
	RPM	50	100	250	500	1000
ER115	lbf (N)	939 (4177)	745 (3314)	549 (2442)	435 (1935)	346 (1539)

Motor and Gearmotor Weight (lbs)

ER115	Motor	1 Stage	2 Stage
1 Stack	14.2	28	34
2 Stack	22.0	35.8	41.8
3 Stack	29.8	43.6	49.6

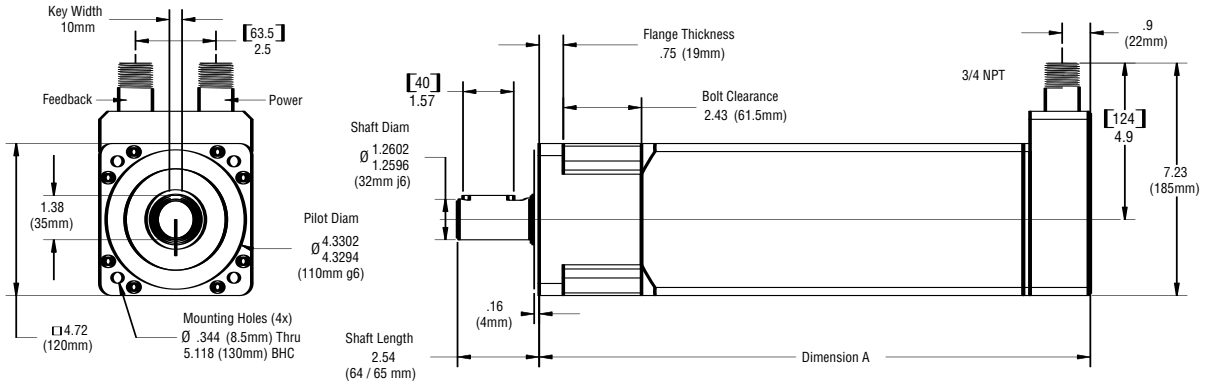
ER115 Brake Add 4.1 lbs.

ER115



Gear Reduction		Dinension "A"
Stages	**Stacks**	**Length**
0	1	8.3" (210 mm)
0	2	10.3" (261 mm)
0	3	12.3" (311 mm)

ER115 With Gear Reduction Option



Gear Reduction		Dinension "A"
Stages	**Stacks**	**Length**
1	1	11.6" (293 mm)
1	2	13.6" (344 mm)
1	3	15.6" (395 mm)
2	1	13.2" (334 mm)
2	2	15.2" (385 mm)
2	3	17.2" (436 mm)

Drawings subject to change. Consult Exlar for certified drawings.

ER115 Series Motor Ordering Information

ER - AAA - BBB - C - D - F - GGG - HHH - II - JJJ - XX - #####

ER = Model Series
ER = ER Series

AAA = Frame Size
115 = 115 mm frame

BBB = Gear Reduction Ratio
(Optional - blank for motor)
004 = 4:1 Single stage reduction
005 = 5:1 Single stage reduction
010 =1 0:1 Single stage reduction
016 = 16:1 Two stage reduction
020 = 20:1 Two stage reduction
025 = 25:1 Two stage reduction
040 = 40:1 Two stage reduction
050 = 50:1 Two stage reduction
100 = 100:1 Two stage reduction
X = Special Gear Reduction Ratio

C = Shaft Type
K = Keyed
R = Smooth /Round
X = Special shaft

D = Connector Options
N## = Potted NPT with flying leads
= length of flying leads in feet

F = Brake Options
S = Standard no brake

1. Use of the Allen-Bradley 1394 requires assistance from Allen-Bradley to configure the axis for a custom motor.
2. Amplifiers require motor data files for operation. See www.exlar .com or contact Exlar engineering.

GGG = Brushless Amplifier (Please indicate the amplifier to be used to power the actuator)

XX1 = Custom Feedback - purchaser must supply drawing of feedback device and desired wiring drawings
OO1 = Standard Feedback Mount - actuator is supplied ready for size 15 resolver or encoder, includes .375 mm shaft
OO2 = Same as above with 8mm shaft
AB6 = Allen Bradley 1394[1] (resolver, type 2)(replaces AB2)
AP1 = API resolver based (resolver, type 2)
AM3 = Advanced Motion Controls (resolver, type 1)
BO1 = Bosch (resolver, type 2)
CC1 = Cleveland Machine Controls (resolver, type 1)
CM1 = Comau (resolver, type 1)
CS1 = Parker (Custom Servo Motors) MPA, MPSL (resolver, type 1)
EL1 = Elmo Motion Control (resolver, type 1)
EX4 = Exlar SV2000 Series (resolver, type 1) (replaces EX3)
IN4 = Bosch-Rexroth (Indramat) ECO Drive, Standard resolver (resolver, type 1)(replaces IN3)
KM1 = Kollmorgen ServoStar Series[2] 230V (resolver, type 2)
KM5 = Kollmorgen ServoStar600 Series[2] and ServoStar CD(resolver, type 2)(replaces KM2)
LZ2 = Lenze 9300 Series (resolver, type 2)
MD1 = Modicon (resolver, type 1)
MX1 = Metronix ARS Series, Resolver type 1
OR1 = Ormec (resolver, type 2)
PC1 = Parker Compumotor Apex & Z Series (resolver, type 1)
PS3 = Pacific Scientific SC900, 700 Series (resolver, type 1)(replaces PS1)
SM2 = Siemens (resolver, type 1)
SP2 = In Motion, PAM Series (resolver, type 1)
WD1 = Whedco (GE-Fanuc) (resolver, type 1)

HHH = Motor Stator, All 8 Pole

1A8 = 1 stack, 24 Vrms, 8 pole	2A8 = 2 stack, 24 Vrms, 8 pole	338 = 3 stack, 230 Vrms, 8 pole
1B8 = 1 stack, 48 Vrms, 8 pole	2B8 = 2 stack, 48 Vrms, 8 pole	358 = 3 stack, 400 Vrms, 8 pole
118 = 1 stack, 115 Vrms, 8 pole	238 = 2 stack, 230 Vrms, 8 pole	368 = 3 stack, 460 Vrms, 8 pole
138 = 1 stack, 230 Vrms, 8 pole	258 = 2 stack, 400 Vrms, 8 pole	
158 = 1 stack, 400 Vrms, 8 pole	268 = 2 stack, 460 Vrms, 8 pole	
168 = 1 stack, 460 Vrms, 8 pole		

II = Speed Designations
01-99 Two digit number. Rated speed in rpm X 100

JJJ = Hazardous Location Temperature Rating
T3A = 180˚C (Samariam Cobolt magnets)
T4 = 135˚C (Neodymium-Iron-Boron magnets)

XX = Optional Speed &Mechanical Designations
XL = Special lubrication

= Part Number Designator for Specials
= Optional 5 digit assigned part number to designate unique model number for specials

Consult Exlar's application engineering department regarding all special actuator components.

Engineering Reference

Sizing and Selection of Exlar Linear and Rotary Actuators

Move Profiles

The first step in analyzing a motion control application and selecting an actuator is to determine the required move profile. This move profile is based on the distance to be traveled and the amount of time available in which to make that move. The calculations below can help you determine your move profile.

Each motion device will have a maximum speed that it can achieve for each specific load capacity. This maximum speed will determine which type of motion profile can be used to complete the move. Two common types of move profiles are trapezoidal and triangular.

If the average velocity of the profile, is less than half the max. velocity of the actuator, then triangular profiles can be used. Triangular Profiles result in the lowest possible acceleration and deceleration. Otherwise a trapezoidal profile can be used. The trapezoidal profile below with 3 equal divisions will result in 25% lower maximum speed and 12.5% higher acceleration and deceleration. This is commonly called a 1/3 trapezoidal profile.

Linear Move Profile Calculations

V_{max} = max.velocity-in/sec (m/sec)
V_{avg} = avg. velocity-in/sec (m/sec)
t_{acc} = acceleration time (sec)
t_{dec} = deceleration time (sec)
t_{cv} = constant velocity (sec)
t_{total} = total move time (sec)
acc = accel-in/sec^2 (m/sec^2)
dec = decel-in/sec^2 (m/sec^2)
cv = constant vel.-in/sec (m/sec)
D = total move distance-in (m) or revolutions (rotary)

Standard Equations

$V_{avg} = D / t_{total}$

If $t_{acc} = t_{dec}$ **Then:**

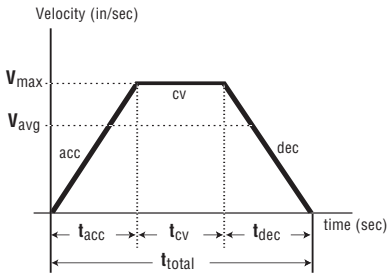
$V_{max} = (t_{total}/(t_{total}-t_{acc}))(V_{avg})$

and

D = Area under profile curve

$D = (\frac{1}{2}(t_{acc}+t_{dec})+t_{cv})(V_{max})$

Trapezoidal Move Profile



Trapezoidal Equations

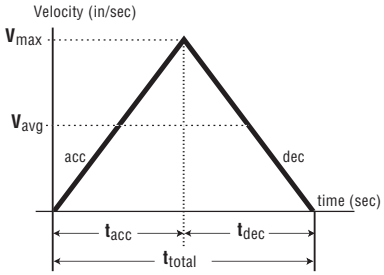
If $t_{acc} = t_{cv} = t_{dec}$ **Then:**

$V_{max} = 1.5(V_{avg})$

$D = (\frac{2}{3})(t_{total})(V_{max})$

$$acc = dec = \frac{V_{max}}{t_{acc}}$$

Triangular Move Profile



Triangular Equations

If $t_{acc} = t_{dec} = t_{total}/2$ **Then:**

$V_{max} = 2.0(V_{avg})$

$D = (\frac{1}{2})(t_{total})(V_{max})$

$$acc = dec = \frac{V_{max}}{t_{acc}}$$

The following pages give the required formulas that allow you to select the proper Exlar linear or rotary actuator for your application.

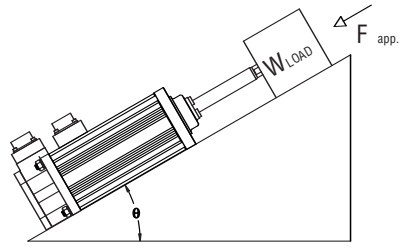
The first calculation explanation is for determining the required thrust in a linear application. The second provides the necessary equations for determining the torque required from a linear or rotary application. For rotary applications this includes the use of reductions through belts or gears, and for linear applications, through screws.

Pages are included to allow you to enter your data and easily perform the required calculations. You can also describe your application graphically and fax it to Exlar for sizing. Reference tables for common unit conversions and motion system constants are included at the end of the section.

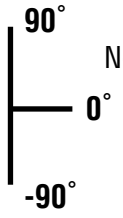
Sizing and Selection of Exlar Linear Actuators

Thrust Calculations

Definition of thrust:
The thrust necessary to perform a specific move profile is equal to the sum of four components of force. These are the force due to acceleration of the mass, gravity, friction and applied forces such as cutting and pressing forces and overcoming spring forces.



Angle of Inclination



Note: at θ = 0˚
cosθ = 1; sinθ = 0
at θ = 90˚
cosθ = 0; sinθ = 1

It is necessary to calculate the required thrust for an application during each portion of the move profile, and determine the worst case criteria. The linear actuator should then be selected based on those values. The calculations at the right show calculations during acceleration which is often the most demanding segment of a profile.

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)
W_L = Weight of Load-lbm (kg)
θ = Angle of inclination (deg)
t_{acc} = Acceleration time (sec)
v = Change in velocity-in/sec (m/s)
μ = Coefficient of sliding friction
(refer to table on page 95 for different materials)
g = 386.4:Acceleration of gravity - in / sec^2 (9.8 m/ sec^2)

Thrust Calculation Equations

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

THRUST = $W_L \mu \cos\theta$ + [(W_L /386.4) (**v**/t_{acc})] + $W_L \sin\theta$ + $F_{applied}$

Sample Calculations: Calculate the thrust required to accelerate a 200 pound mass to 8 inches per second in an acceleration time of 0.2 seconds. Calculate this thrust at inclination angles(θ) of 0˚, 90˚ and 30˚. Assume that there is a 25 pound spring force that is applied against the acceleration.

W_L = 200 lbm, v = 8.0 in/sec., t_a = 0.2 sec., $F_{app.}$ = 25 lbf, μ = 0.15

θ = 0˚
THRUST = $W_L \mu \cos\theta$ + [(W_L /386.4) (**v**/t_{acc})] + $W_L \sin\theta$ + $F_{applied}$
= (200)(0.15)(1) + [(200/386.4)(8.0/0.2)] + (200)(0) + 25

= 30 lbs + 20.73 lbs + 0 lbs + 25 lbs = **75.73 lbs force**

θ = 90˚
THRUST = $W_L \mu \cos\theta$ + [(W_L /386.4) (**v**/t_{acc})] + $W_L \sin\theta$ + $F_{applied}$
= (200)(0.15)(0) + [(200/386.4)(8.0/0.2)] + (200)(1) + 25

= 0 lbs + 20.73 lbs + 200 lbs + 25 lbs = **245.73 lbs force**

θ = 30˚
THRUST = $W_L \mu \cos\theta$ + [(W_L /386.4) (**v**/t_{acc})] + $W_L \sin\theta$ + $F_{applied}$
= (200)(0.15)(0.866) + [(200/386.4)(8.0/0.2)] + (200)(0.5) + 25

= 26 lbs + 20.73 lbs + 100 + 25 = **171.73 lbs force**

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.

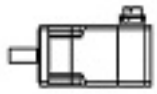
When the system uses a separate motor and screw, like the FT actuator, the ratings for that motor and amplifier are consulted. In the case of the GSX Series actuators with their integral brushless motors, the required torque divided by the torque constant of the motor (Kt) must be less than the current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

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

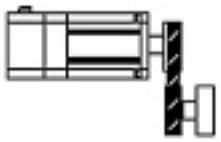
For the GSX Series the screw and motor inertia are combined.

Motor with screw (GSX,GS, SR &FT)

Motor & motor with reducer (SLM/SLG)



Motor with belt and pulley



Terms and (units)

λ = Required motor torque, lbf-in (N-m)
λa = Required motor acceleration torque, lbf-in (N-m)
F = Applied force load, non inertial, lbf (N)
S = Screw lead, in (m)
R = Belt or reducer ratio
$\mathbf{T}_L$ = Torque at driven load lbf-in (N-m)
$\mathbf{v}_L$ = 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 ($\cong$ 85% for roller screws)
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)
$\mathbf{J}_L$ = Reflected Inertia due to load, lbf-in-s^2 (N-m-s^2)
$\mathbf{J}_r$ = Reflected Inertia due to ratio, lbf-in-s^2 (N-m-s^2)
$\mathbf{J}_s$ = Reflected Inertia due to external screw, lbf-in-s^2 (N-m-s^2)
$\mathbf{J}_m$ = 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)

Velocity Equations

Screw drive: $\mathbf{v}_L = \omega_m * S/2\pi$ in/sec (m/sec)
Belt or gear drive: $\omega_m = \omega_L * R$ rad/sec

Torque Equations

Torque Under Load

Screw drive (GSX, FT or separate screw): $\lambda = \dfrac{S \bullet F}{2 \bullet \pi \bullet \eta}$ lbf-in (N-**m**)

Belt and Pulley drive: $\lambda = \mathbf{T}_L / R\ \eta$ lbf-in (N-**m**)

Gear or gear reducer drive: $\lambda = \mathbf{T}_L / R\ \eta$ lbf - in (N-**m**)

Torque Under Acceleration

$\lambda a = (\mathbf{J}_m + \mathbf{J}_R + (\mathbf{J}_S + \mathbf{J}_L)/R^2)\alpha$ lbf-in

α = angular acceleration = ((RPM / 60) x 2π) / $\mathbf{t}_{acc}$, rad/sec^2.

$$\mathbf{J}_S = \frac{\pi \bullet \mathbf{L} \bullet \rho \times r^4}{2 \bullet g} \text{ lb - in - s}^2 \text{ (N - } \mathbf{m} \text{ - s}^2 \text{)}$$

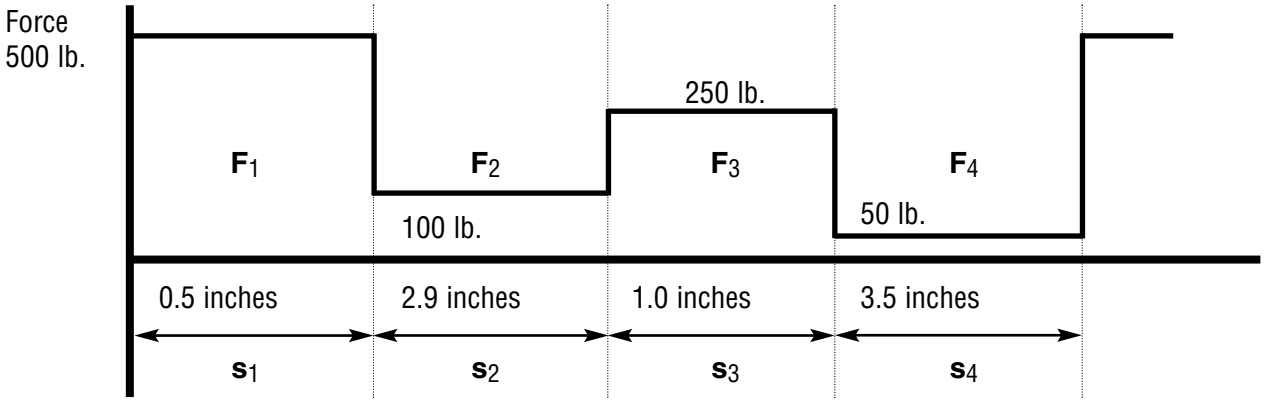
Total Torque per move segment

$\lambda T = \lambda a + \lambda$ 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.



s = Distance traveled during each move segment

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 225.8 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:

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

Preloaded (split) nut:

$$L_{10} = \left(L_{10(1)}{}^{-10/9} + L_{10(2)}{}^{-10/9} \right)^{-9/10}$$

where:

L_{10} = Travel life in millions of inches (mm)
$L_{10(1)}$ = Expected life in the extend direction, as determined by the single nut lifetime equation
$L_{10(2)}$ = Expected life in the retract direction, as determined by the single nut lifetime equation

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.

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/sec^2 ($9.8\ m/sec^2$)

Variables

θ = 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 = [$W_L \times \mu \times \cos\theta$] + [(W_L /386.4) x (**v** / t_{acc})] + $W_L \sin\theta$ + $F_{applied}$

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

THRUST = [ ] + [( ) x ( )] + [ ]+( )

= _____ 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

$$\sqrt[3]{\frac{F_1^3 s_1 + F_2^3 s_2 + F_3^3 s_3 + F_4^3 s_4}{s_1 + s_2 + s_3 + s_4}}$$

F_1= _____ s_1= _____ $F_1^3 t_1$= _____

F_2= _____ s_2= _____ $F_2^3 t_2$= _____

F_3= _____ s_3= _____ $F_3^3 t_3$= _____

F_4= _____ s_4= _____ $F_4^3 t_4$= _____

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 . . . . . = _____

$\mathbf{T}_L$ = Torque at driven load, lbf-in (N-m) . . . . . = _____

$\mathbf{v}_L$ = 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) . . . . . = _____

$\mathbf{J}_R$ = Reflected Inertia due to ratio, lb-in-s^2 (N-m-s^2) . . . . . = _____

$\mathbf{J}_S$ = Reflected Inertia due to screw, lb-in-s^2 (N-m-s^2) . . . . . = _____

$\mathbf{J}_L$ = Reflected Inertia due to load, lb-in-s^2(N-m-s^2) . . . . . = _____

$\mathbf{J}_M$ = Motor armature inertia, lb-in-s^2 (N-m-s^2) . . . . . = _____

π = pi (3.14159) . . . . . = 3.14159

$\mathbf{K}_t$ = Motor Torque constant, lb-in/amp (N-m/amp) . . . . . = _____

* For the GS Series $\mathbf{J}_S$ and $\mathbf{J}_M$ are one value from the GS Specifications.

Torque Equations

Torque From Calculated Thrust.

$\lambda = \dfrac{SF}{2 \bullet \pi \bullet \eta}$ lb - in (N - **m**) = ( ) x ( )/2π(0.85) = ( ) x ( )/5.34 = _____

Torque Due To Load, Rotary.

Belt and pulley drive: λ = $\mathbf{T}_L$ / R η lbf-in (N-**m**)

Gear or gear reducer drive: λ = $\mathbf{T}_L$ / Rη lbf-in (N-**m**)

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

$\lambda = (\mathbf{J}_m + (\mathbf{J}_S + \mathbf{J}_L) / R^2)\ \alpha$ lb-in (N-**m**) = [( ) + (+)/( )]( ) = _____

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

( ) +( ) +( ) = _____

Motor Current = λ / $\mathbf{K}_t$ = ( ) / ( ) = _____

Exlar Application Worksheet

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

Date: _____

Company Name: _____

Address: _____

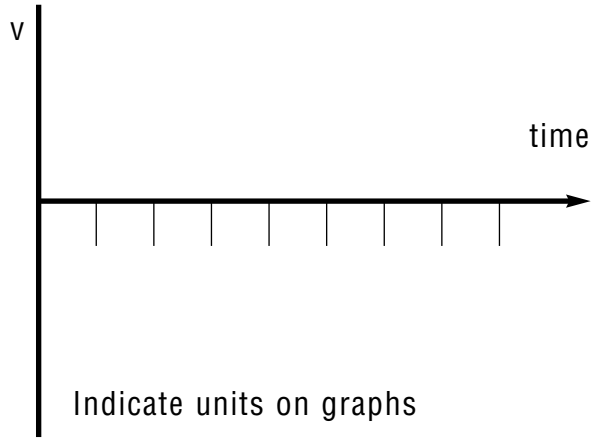
City: _____ State: ____ Zip Code: _____

Phone: _____ Fax: _____

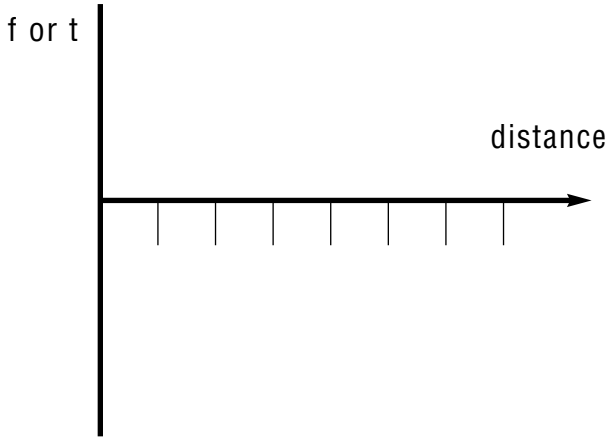
Contact: _____ Title: _____

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-sec^2 (kg-m^2)

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 Req'd

Holding Brake Req'd: ___ Yes ___ No

Cable Length _____ ft (m)

ROTARY INERTIA

To obtain a conversion from A to B, multiply by the value in the table.

B	kg-m^2	kg-cm^2	g-cm^2	kgf-m-s^2	kgf-cm-s^2	gf-cm-s^2	oz-in^2	ozf-in-s^2	lb-in^2	lbf-in-s^2	lb-ft^2	lbf-ft-s^2
A												
kg-m^2	1	10^4	10^7	0.10192	10.1972	1.01972x10^4	5.46745x10^4	1.41612x10^2	3.41716x10^3	8.850732	23.73025	0.73756
kg-cm^2	10^{-4}	1	10^3	1.01972x10^5	1.01972x10^3	1.01972	5.46745	1.41612x10^{-2}	0.341716	8.85073x10^{-4}	2.37303x10^{-3}	7.37561x10^{-5}
g-cm^2	10^{-7}	10^{-3}	1	1.01972x10^{-8}	1.01972x10^{-6}	1.01972x10^{-3}	5.46745x10^{-3}	1.41612x10^{-5}	3.41716x10^{-4}	8.85073x10^{-7}	2.37303x10^{-6}	7.37561x10^{-8}
kgf-m-s^2	9.80665	9.80665x10^4	9.80665x10^7	1	10^2	10^5	5.36174x10^5	1.388674x10^3	3.35109x10^4	86.79606	2.32714x10^2	7.23300
kgf-cm-s^2	9.80665x10^{-2}	9.80665x10^2	9.80665x10^5	10^{-2}	1	10^5	5.36174 x10^3	13.8874	3.35109x10^{-2}	0.86796	2.32714	7.23300x10^{-2}
gf-cm-s^2	9.80665x10^{-5}	0.980665	9.80665x10^2	10^{-5}	10^{-3}	1	5.36174	1.38874 x10^{-2}	0.335109	8.67961x10^{-4}	2.32714x10^{-3}	7.23300x10^{-5}
oz-in^2	1.82901x10^{-5}	0.182901	1.82901x10^2	1.86505x10^{-6}	1.86505x10^{-4}	0.186506	1	2.59008 x10^{-3}	6.25 x10^{-2}	1.61880x10^{-4}	4.34028x10^{-4}	1.34900x10^{-3}
oz-in-s^2	7.06154x10^{-3}	70.6154	7.06154x10^4	7.20077x10^4	7.20077x10^{-2}	72.0077	3.86089x10^2	1	24.13045	6.25 x10^{-2}	0.167573	5.20833x10^{-4}
lb-in^2	2.92641x10^{-4}	2.92641	2.92641x10^3	2.98411x10^5	2.98411x10^3	2.98411	16	4.14414 x10^2	1	2.59008x10^{-3}	6.94444x10^{-3}	2.15840x10^{-4}
lbf-in-s^2	0.112985	1.129x10^3	1.12985x10^6	1.15213x10^2	1.15213	1.51213 x10^3	6.1774 x10^3	16	3.86088x10^2	1	2681175	8.3333x10^{-2}
lbf-ft^2	4.21403x10^{-2}	4.21403x10^2	4.21403x10^5	4.29711x10^3	0.429711	4.297114	2.304 x10^3	5.96755	144	0.372971	1	3.10809x10^{-2}
lbf-ft-s^2	1.35583	1.35582x10^4	1.35582x10^7	0.138255	13.82551	1.38255x10^4	7.41289x10^4	192	4.63306x10^3	12	32.17400	1

TORQUE

To obtain a conversion from A to B, multiply A by the value in the table.

B	N-m	N-cm	dyn-cm	kg-m	kg-cm	g-cm	oz-in	ft-lb	in-lb
A									
N-m	1	10^2	10^7	0.109716	10.19716	1.019716 x10^4	141.6199	0.737562	8.85074
N-cm	10^2	1	10^5	1.019716 x10^3	0.1019716	1.019716 x10^2	1.41612	7.37562 x10^{-3}	8.85074 x10^{-2}
dyn-cm	10^{-7}	10^{-5}	1	1.019716 x10^{-8}	1.019716 x10^{-6}	1.019716 x10^{-3}	1.41612 x10^{-5}	7.2562 x10^{-8}	8.85074 x10^{-7}
kg-m	9.80665	980665x10^2	9.80665 x10^7	1	10^2	10^5	1.38874 x10^3	7.23301	86.79624
kg-cm	9.80665x10^{-2}	9.80665	9.80665 x10^5	10^{-2}	1	10^3	13.8874	7.23301 x10^{-2}	0.86792
g-cm	9.80665x10^{-5}	9.80665x10^{-3}	9.80665 x10^2	10^{-5}	10^{-3}	1	1.38874 x10^{-2}	7.23301 x10^{-5}	8.679624 x10^{-4}
oz-in	7.06155x10^{-3}	0.706155	7.06155 x10^4	7.20077 x10^{-4}	7.20077 x10^{-2}	72,077	1	5.20833 x10^{-3}	6.250 x10^{-2}
ft-lb	1.35582	1.35582x10^2	1.35582 x10^7	0.1382548	13.82548	1.382548 x10^4	192	1	12
in-lb	0.113	11.2985	1.12985 x10^6	1.15212 x10^{-2}	1.15212	1.15212 x10^3	16	8.33333 x10^{-2}	1

COMMON MATERIAL DENSITIES

Material	oz/in^3	gm/cm^3
Aluminum (cast or hard drawn)	1.54	2.66
Brass (cast or rolled)	4.80	8.30
Bronze (cast)	4.72	8.17
Copper (cast or hard drawn)	5.15	8.91
Plastic	0.64	1.11
Steel (hot or cold rolled)	4.48	7.75
Wood (hard)	0.46	0.80
Wood (soft)	0.28	0.58

COEFFICIENTS OF SLIDING FRICTION

Materials in contact	μ
Steel on Steel (dry)	0.58
Steel on Steel (lubricated)	0.15
Aluminum on Steel	0.45
Copper on Steel	0.36
Brass on Steel	0.44
Plastic on Steel	0.20
Linear Bearings	0.001

Headquartered at our manufacturing and motion control research center in suburban Minneapolis, MN, Exlar serves a global customer base with an extensive standard product line and complete engineering support for custom applications.

EXLAR

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Chanhassen, MN 55317

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