

Revolutionary
Electric Servo Actuators
for Process Control



EXLAR

Controlling Costs

Excess variability in a typical process plant creates thousands of dollars of lost profit due to excessive material use, reprocessing costs, or wasted product. Underperforming control valves and dampers are one of the main causes of this excess variability. The performance of these key devices is crucial to plant efficiency, but unless your control valves have the ability to consistently control the process in perfect response to the closed loop controller demand, you're losing money.

In order to get that optimum response, dead time and other non-linearities need to be eliminated or reduced. Proper selection and sizing of your valve is critical, but even more so is the right selection of actuator for your valve system.

Valve actuators are a major source of control loop dead time which includes friction and backlash. Dead time is extremely destabilizing for a control loop, causing limit cycles, overshoot and slow response. Once a limit cycle occurs, effective control is lost and unwanted process variability is created.

The Exlar electric servo actuator is a revolutionary design that virtually eliminates dead time and promises valve manufacturers, OEM's and end users stable control response in all conditions for all final control element applications.

Exlar Replacements for Pneumatic or Hydraulic Actuators


Actuator non-linearities and dead time are a function of many variables including valve friction, load and control loop activity. If friction is present with a pneumatic actuator, the valve will move too much to overcome it and the process variable will go too far. Then, the controller output will reverse direction and the same thing will happen again. This presents a problem especially for small signal changes (under 1%) which is typical for most process loops.

The valve actuator also needs to be stiff enough to resist movement when the flowing load changes. Pneumatics can have problems maintaining stiffness, especially with load changes like negative gradients.

Exlar actuators continuously hold the position of the valve stem or shaft allowing extremely fast response to the smallest command signal changes without overshoot even when friction is present. This results in improved loop performance and reduced process variability.

Hydraulic actuators leak, and introduce significant maintenance problems. Exlar actuators are a direct drop-in replacement for many hydraulic actuators, especially in the turbine control market.





Conventional Electric Actuators vs Exlar

Traditional electric actuators use an electric motor and some form of gear reduction to move the valve. Typically for on-off control, some of these mechanical systems have been modified for use in full modulating control, with varying degrees of success. Many of these electric actuators can only modulate from 1200 to 3600 starts/hour and have a minimum position change of 1%.

In addition, these electric actuators operate slowly, meaning they are not suitable for rapidly changing process parameters such as pressure control or loads that change quickly.

Exlar actuators incorporate a high performance brushless servo motor with a novel mechanism for converting the motor's rotary power and speed to a highly accurate and reliable linear or rotary motion. A high performance closed loop controller yields both the speed and precise control unachievable by other electric actuators. These electric servo actuators were designed for use on full modulating valves and dampers.

Exlar Actuator Advantages

Actuator Technology	Response Time	Resolution	Load Change Stiffness	Maintenance Cost	Initial Cost
Exlar	Very Fast	Very High	Very High	Low	Moderate
Pneumatic	Slow	Low	Low	Moderate	Low to Moderate
Hydraulic	Fast	High	High	High	High
Conventional Electric	Very Slow	High	Very High	Moderate	Moderate to High

The Ultimate Electric Actuator Design

Exlar actuators have been used in the most strenuous military and industrial applications for years, but have been prohibitively expensive for process applications until now. Our patented linear actuator is based on a unique design for integrating a robust and efficient threaded roller mechanism into the

interior of a high power density, high performance brushless servo motor. Combined with a precise position feedback mechanism, the result is an all-electric actuator which is extremely compact, yet delivers superior, consistent performance for your final control element needs.

Built-in Positioner (Tritex)

The Tritex actuators from Exlar include a built in positioner with a 4-20 mA signal to tell you the exact stroke position.

Extreme Accuracy

The Exlar actuators stroke the valve based on exact position, not air pressure. Accuracy and repeatability are easily better than 0.25% of span.

100% Torque Available All the Time

Full torque means almost zero deadband; and friction (stiction) in the valve stem is no problem for the Exlar actuator. Current is always available to the actuator – so it will hold its position no matter what! This provides excellent process loop control.

High Stiffness

Similar to hydraulic actuators without the cost or maintenance issues. Exlar actuators are extremely stiff, so dynamic flow problems like negative gradients aren't a problem.

Built-in Feedback

Exlar actuators know their exact position at all times due to the built in feedback position sensors.

Custom Valve Seat

Exlar actuators stroke the valve based on position – but can switch to torque mode when seating the valve. This allows a tight cut off. It also helps with retrofitting valves that may have some wear. For new valves, it makes sure damage isn't done due to over-forcing the stroke.

Fast Stroke Speeds

Most other electric actuators are known for being slow – a major disadvantage. Exlar actuators can close a valve in milliseconds if needed.



Proven Solutions

Exlar has delivered thousands of electric servo actuator solutions around the world. Process applications range from windbox dampers to controlling fuel or steam valves on turbine generators.



Steam Flow Control

In this GE turbine application, steam flow is controlled by seven control valves mounted in the turbine's steam chest and operated via cams. The Exlar actuator replaced a 10 inch single acting hydraulic cylinder and featured a handwheel for manual operation.



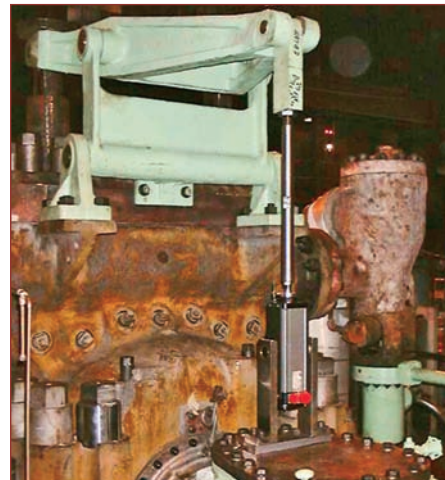
Valve Control

Exlar provides an excellent solution for standard control valve applications, including linear globe valves, rotary ball valves, plug valves and butterfly valves. Exlar actuators can be mounted to any valve from any valve manufacturer.



Windbox Damper Control

In order to get the best possible damper control, utility engineers replace existing windbox dampers with Exlar electric servo actuators. Each actuator, when supplied with Exlar's all-digital SV positioner, will respond to command signal changes in less than 5 mSec. The speed of the response combined with the dynamic capability of the all-electric actuator delivers accuracy and repeatability much greater than pneumatic or induction motor actuators.



Steam Turbine Control

Many shell mounted control valves are modulated by a rack and cam arrangement. This valve operating method utilizes a common hydraulic cylinder to lift a rack of four to nine poppet valves in sequence. A fulcrum lever is used to multiply actuator force. Exlar provided a direct replacement of the hydraulic cylinder with an electric servo actuator and positioner.

Tritex Linear Actuators

Our premier process control solution, the Tritex™ Series linear actuators, integrate a motor, actuator and digital positioner into one complete compact package. Rugged and reliable, the Tritex is a high speed, high accuracy, actuator that is suited for a wide range of demanding process control applications.

Fully programmable to follow an analog signal representing either position or force, the Tritex series is perfectly designed for sliding stem valve applications with thrust needs up to 1250 lbs. Highly accurate position feedback allows the Tritex to achieve combined repeatability and hysteresis as low as 0.25%.

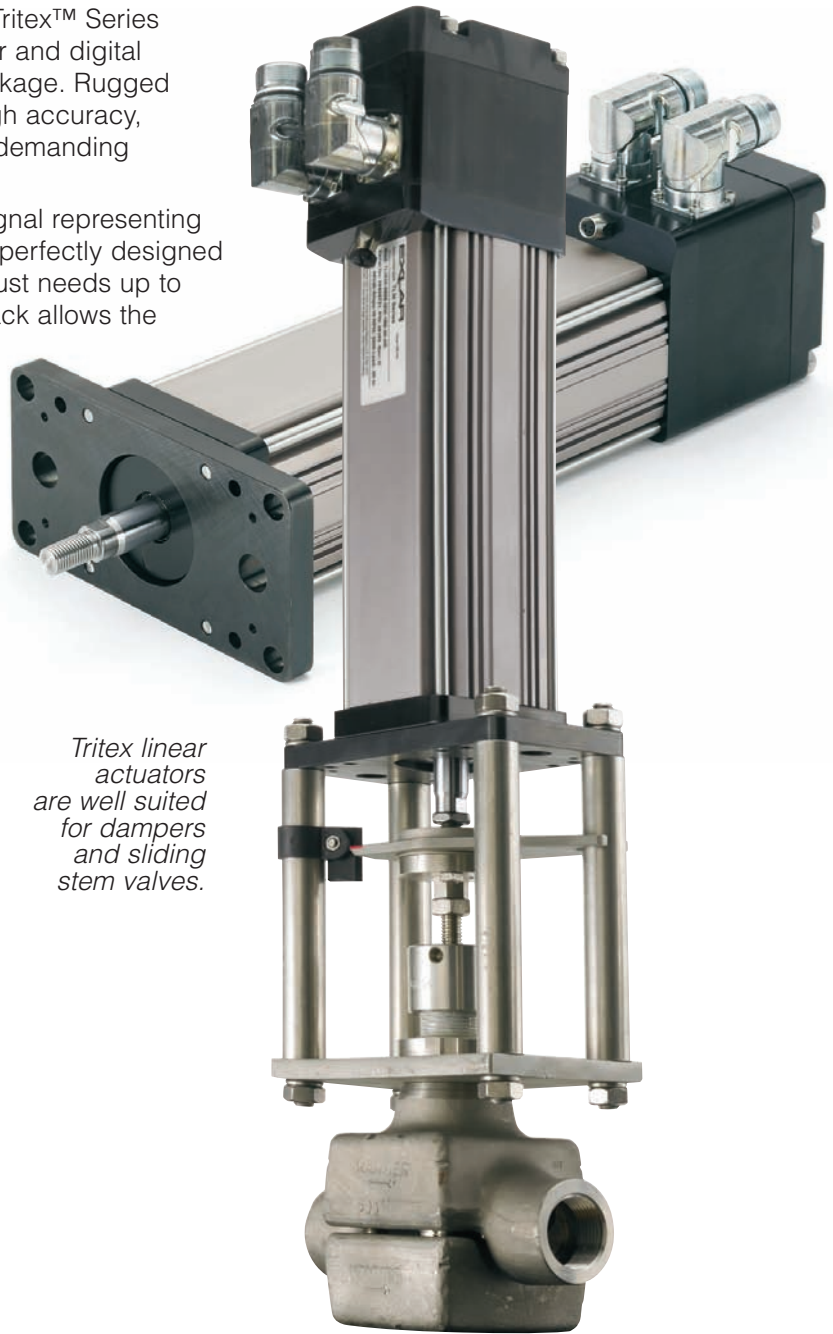
The Tritex Series linear actuators offer extreme mechanical stiffness, making the actuator's position output resistant to non-linear or changing load conditions such as negative gradients. Exlar's Tritex actuator is a superior solution for all of your critical valve control applications.

Product Features

- Integrated servo motor, actuator and positioner
- 24 to 48 VDC and 115 to 230 VAC power
- Up to 3,699 lbf thrust
- Strokes up to 18 inches

Optional Features

- Custom valve mounts
- Bellows
- Manual operation
- Class I Div 2 certification



Tritex linear actuators are well suited for dampers and sliding stem valves.

Size	Frame Size in (mm)	Stroke in (mm)	Max. Output Force lbf (N)	Max Speed in/sec (mm/sec)
TLM20	2.25 (57)	3 to 18 (51 to 457)	578 (2,571)	33 (.8k)
TLM30	3.125 (79)	3 to 18 (51 to 457)	1,250 (5,560)	16 (.6k)
TLM/X90	3.54 (90)	3 to 18 (51 to 457)	1,347 (5,992)	25 (.7k)
TLM/X115	4.52 (115)	3 to 12 (51 to 304)	3,966 (17,642)	25 (.7k)

Tritex Rotary Actuators

The Tritex™ Series rotary actuators are ideal for operating quarter-turn, full-turn or multi-turn valves or shaft driven dampers. Its unique design integrates a high power density, electrically operated brushless motor with a feedback mechanism, planetary gear reducer and controller into one compact package. Tritex can be set up to follow an analog signal representing torque, velocity, or position.

In shaft driven applications, Exlar's Tritex rotary actuators are directly coupled shaft-to-shaft. This eliminates the ungainly mechanisms usually necessary to convert the linear motion of pneumatic and hydraulic cylinders to rotational motion. Gear ratios of 4:1 to 100:1 allow the power of Tritex to be applied to a broad range of applications.

Product Features

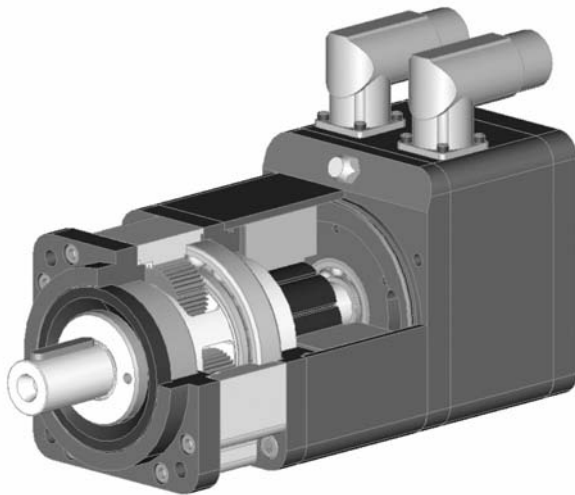
- Integrated servo motor, planetary gearing and positioner
- 24 to 48 VDC power
- 115 to 230 VAC power
- Up to 4,000 lbf-in output torque

Optional Features

- Custom valve mounts
- Manual operation
- Class I Div 2 certification



Direct shaft-to-shaft couplings make the Tritex rotary actuators perfect for rotary valve applications.



Size	Frame Size in (mm)	Max Output Torque lbf-in (Nm)	Max Speed (RPM)
RTM060	2.36 (60)	603 (68.1)	5,000
RTM090	3.54 (90)	2,078 (234.8)	3,000
RTM115	4.52 (115)	4,696 (531.0)	3,000

GS Series Linear Actuators

For applications that need higher forces or faster stroke times than available with the Tritex actuator, the GS Series of actuators combined with the external SV Series Positioner is the perfect solution.

Product Features

- Stroke times to 40 in/sec (1018 mm/sec)
- Force rating range to 12,000 pounds/force (55,000 N)
- Stroke length range up to 18 inches (450 mm)

Options

- Manual operation
- UPS fail-safe
- Custom valve mount
- Class I Div 2 certification



Exlar Model	Nominal Frame Size	Max. Stroke in (mm)	Max. Output Force lbf (N)	Max Speed in/sec (mm/sec)
GS20	2 (50)	12 (300)	578 (2,571)	33 (847)
GS30	3 (75)	18 (450)	1,347 (5,992)	25 (633)
GS40	4 (100)	18 (450)	3,966 (17,642)	37.5 (953)
GS50	5 (130)	14 (450)	8,544 (38,006)	40 (1,016)
GS60	7 (180)	10 (250)	12,389 (55,109)	40 (1,016)

SLG Series Rotary Actuators

For applications that need higher torque than available with the Tritex actuator, the SLG Series of actuators combined with the external SV Series Positioner is the perfect solution.

Product Features

- Integrated servo motor and planetary gear reducer
- Higher stiffness than bolt-on gearhead and motor
- 60, 90 and 115 mm frame size
- Up to 4696 lbf-in output torque
- 4:1, 5:1, 10:1, 16:1, 20:1, 25:1, 40:1, 50:1 and 100:1 reduction ratios
- IP65 sealing

Options

- Manual operation
- UPS fail-safe
- Valve mount



Exlar Model	Nominal Frame Size	Max Output Torque lb-in (Nm)	Max Speed (RPM)
SLG60	60mm	603 (68.1)	5,000
SLG90	90mm	2,078 (234.8)	4,000
SLG115	115mm	4,696 (530.4)	3,000

EL Series Explosion Proof Linear Actuator

EL Series linear actuators offer users all of the advantages of Exlar's patented inverted roller actuator GS design in a Class I div 1, Groups B,C or D package.

Product Features

- Explosion proof Class 1 div 1 Groups B,C and D
- Stroke length range up to 6 inches
- Resolver feedback
- 24 VDC to 460 VAC

Options

- UPS fail-safe
- Custom valve mounts



Exlar Model	Nominal Frame Size	Max. Stroke in (mm)	Max. Output Force lbf (N)	Max Speed in/sec (mm/sec)
EL30	3 (75)	6 (150.0)	885 (39,362)	25 (635.0)

ER Series Explosion-Proof Motors and Planetary Gearmotors

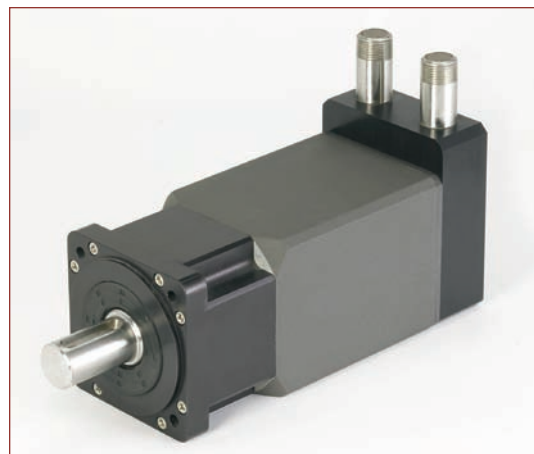
For hazardous duty environments, Exlar's ER series servo motor rotary actuators provide an excellent solution. The gearmotor comprises a brushless permanent magnet motor optimized for use with an integral planetary gear set. Through the uniform load sharing of several gears acting in concert, planetary gearheads provide a very compact, reliable solution providing high torque, low backlash and low maintenance for your rotary valve needs.

Product Features

- Integrated servo motor and planetary gear reducer
- Higher stiffness than bolt-on gearhead and motor
- Explosion proof Class 1 div 1 Groups B,C and D
- ATEX Zone 2 Category 3
- 115 mm frame size
- Up to 4696 lbf-in output torque
- 4:1, 5:1, 10:1, 16:1, 20:1, 25:1, 40:1, 50:1 and 100:1 reduction ratios
- 24 VDC to 460 VAC

Options

- UPS fail-safe
- High temperature
- Custom valve mount



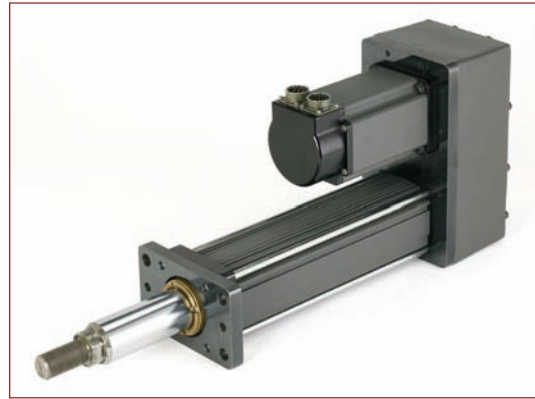
Exlar Model	Nominal Frame Size	Max Output Torque lb-in (Nm)	Max Speed (RPM)
ER115	115mm	4,696 (530.4)	3000

FT Series Linear Actuators

The FT Series actuators are suited to operate large valves, dampers and gates which require longer strokes and higher thrusts. They are an excellent hydraulic actuator replacement. The FT Series product offering consists of a roller screw thrust unit and a conventional NEMA or metric frame motor sized to deliver the force and speed needed to accomplish the application.

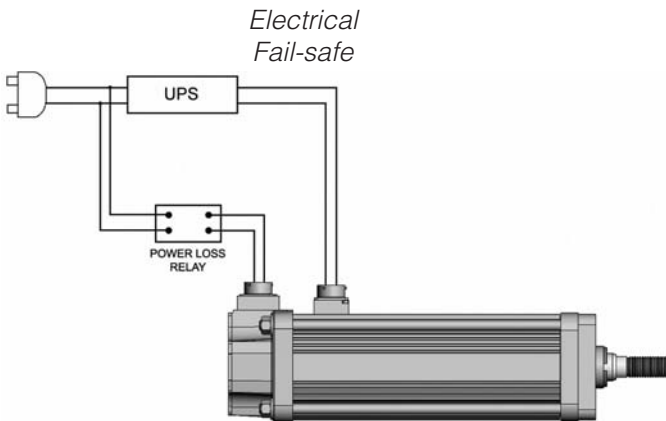
Product Features

- Stroke lengths from 6 inches to 8 feet (150 mm to 2.5 m)
- Force rating up to 40,000 lbs (177,929 N)
- Speed range up to 60 in/sec (1,524 mm/sec)
- Multiple motor mounting options
- Long life and high load capacity
- Shock resistance
- IP65 ratings optional



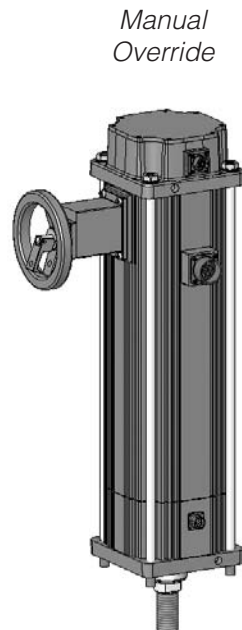
Exlar Model	Frame Size in (mm)	Gear Motor	Max Stroke in (mm)	Max. output Force lbf (N)	Max Speed in/sec (mm/sec)
FT35	3.5 (89)	SLG60	48 (1,219)	2,000 (8,896)	60 (1,524)
FT60	6.0 (152)	SLG90	96 (2,438)	10,000 (44,482)	39 (991)
FT80	8.0 (203)	SLG115	96 (2,438)	20,000 (88,964)	35 (889)

Actuator Accessories and Options



Additional Options

- Bellows rod cover
- Rod scrapers/seals
- Adjustable position switches
- Absolute feedback
- Adjustable stroke limiter





Exlar Corporation - Headquartered in suburban Minneapolis, Minnesota, serves a global customer base with an extensive standard product line and complete engineering support for custom actuator applications.

Exlar supports a large network of sales representatives in North America. To find your local dealer, visit our website at www.exlar.com or call our headquarters at 952-368-3434.

For assistance outside North America, please contact Exlar direct or one of our worldwide partners listed below.

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