

Industry's Most Compact All-In-One Linear & Rotary Motion Actuators

By combining the latest electronic power technology with advanced thermal management modeling technology, Exlar has set a new benchmark for electric actuator performance versus size. The new Tritex II actuators integrate an **AC powered** servo drive, digital position controller, brushless motor and linear or rotary actuator in one elegant, compact, sealed package.



Now you can distribute motion control and solve your application with one integrated device. Simply connect AC power, I/O, communications and go!

Dramatically Reduce Space Requirements

Tritex II actuators are the highest power density, smallest footprint servo drive devices on the market. Finally, you can incorporate a fully electronic solution in the space of your existing hydraulic or pneumatic cylinder. You can also eliminate troublesome ball screw actuators or bulky servo gear reducers. And the space previously consumed by panel mount servo drives and motion controllers is no longer needed. Tritex II actuators may also reduce the size of your machine design while offering significant reliability improvement.

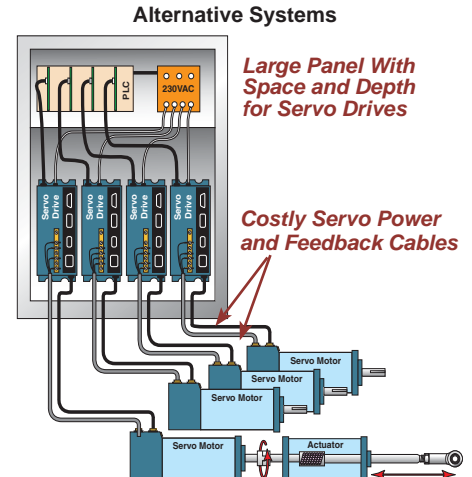
Reduce Costs

Because the new AC powered Tritex II houses the servo drive, digital positioner, and actuator all in one convenient package, you eliminate the labor costs for mounting and wiring the panels. Cable costs are also significantly reduced by eliminating the need for expensive, high-maintenance specialty servo cables. All that is required is an economical standard AC power cord, and standard communication cable for digital and analog I/O.

Also eliminated are the issues associated with power signals and feedback signals traveling long distances from servo drive to servo motor. With the Tritex II, the servo drive and motor are always integrated in the same housing.

No Compromises on Power, Performance or Reliability

With forces to approximately 4000 pounds (18 kN) continuous and 10,000 pounds peak (44 kN), and speeds to 33 in/sec (800 mm/sec), the AC Tritex II linear actuators also offer a benefit that no other integrated product

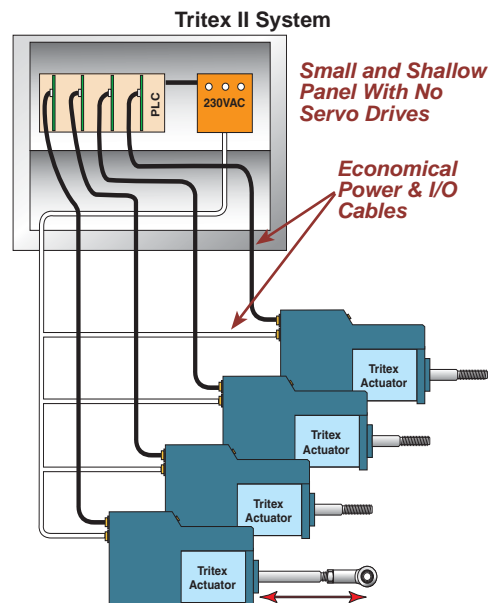


offers - POWER! No longer are you limited to trivial amounts of force, or speeds so slow that many motion applications are not possible. And the new Tritex II with AC power electronics operates with maximum reliability over a broad range of ambient temperatures; -40°C to +65°C.

The AC powered Tritex II actuators contain a 1.5 kW servo amplifier and a very capable motion controller. With standard features such as analog following for position, compound moves, move chaining and individual force/torque control for each move, the Tritex II Series is the ideal solution for most motion applications.

Flexible Communications

Multiple feedback types, including absolute feedback, allow you to select the system that is best suited for your application. Digital and analog I/O plus popular communication networks such as Modbus, Ethernet IP, HART, Modbus TCP/IP, CAN Open and CAN J1939 allow the Tritex II to become an integral part of your control architecture or machine control processes.



Linear Applications

Tritex II linear actuators employ Exlar's patented, inverted roller screw mechanism for converting rotary motion to highly robust and long-life linear motion. These characteristics enable the Tritex actuator to solve applications that previously required pneumatic or hydraulic cylinders. No additional mechanisms (such as acme or ball screws) are necessary to convert the actuator's rotary power into linear motion in order to move the load. In addition, the Tritex II software allows you to create a sequence which causes the actuator, when commanded, to move forward while pressing an object into position. You can establish a preprogrammed force which triggers an event (such as stopping or retracting to another position) or it can maintain that force level until commanded otherwise. The sequence is ideal for assembly, test, fastening and pressing applications.



The Tritex II linear actuator can be programmed to follow an analog command signal, making it ideal for controlling valves and dampers in process control applications.

Rotary Applications

Tritex II rotary motors and gear-motors provide high response and precise control of a rotatable shaft similar to that found in any electric motor. The difference is that with Tritex II you can program (via your PC) the rotational speed and position of the output shaft in response to external commands. For example, the motor can be commanded to rotate at a controlled velocity and precisely stop at a preprogrammed position. You can also program the unit to run at a preset velocity until a switch input is



received or a preprogrammed torque level is produced against a load. Alternatively, the rotary Tritex II actuators can be set up to follow an analog signal, either voltage or current, representing your choice of torque, velocity, or position.

Signals for initiating the preprogrammed velocity and position commands come from optically isolated inputs or directly via the Modbus serial communication channel provided on each Tritex II unit. Likewise, isolated output commands of the status and events allow precise coordination with your system controls or machine operator.

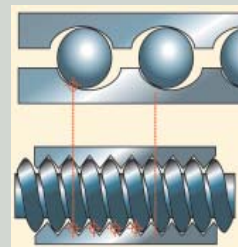
Optional Internal Gear Reducer

If the application requires greater torque and less speed than available with the base unit, the Tritex II is available with an integral servo grade planetary gear reducer. Gear ratios of 4:1 to 100:1 allow the power of Tritex II to be applied over a broad range of torque requirements.

Roller Screw Basics

Exlar's patented, inverted 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 linear motion 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 as seen below, which converts a motor's rotary motion into linear movement of the shaft or nut.



Compare a similar size ball screw to Exlar's planetary roller screw design and see many more contact points on the roller screw. This results in up to 15 times the load-carrying capacity of ball screws and improved stiffness.

The Exlar Advantage

Exlar has delivered thousands of roller screw linear actuator solutions around the world in applications ranging from demanding automatic welding to controlling fuel or steam valves on turbine generators. Exlar's linear actuators provide trouble-free, precise linear motion control for millions of cycles of operation.

Tritex II Models

- T2M standard mechanical capacity actuator, 90 and 115 mm
- T2X high mechanical capacity actuator, 90 and 115 mm
- R2M rotary motor, 90 and 115 mm
- R2G rotary gearmotor, 90 and 115 mm

Power Requirements

- AC Power 100V - 240V, +/- 10%, single phase
- Built-in AC line filter
- Connections for external braking resistor

Feedback Types

- Analog Hall
- Incremental encoder with 8192 count resolution
- Absolute Feedback (Q4,2009)

Communications & I/O

Digital I/O:

- 8 digital inputs
 - 10 to 30 VDC opto-isolated
- 4 digital outputs
 - 30 VDC maximum, 100 mA, opto-isolated

Analog I/O:

- 1 analog input
 - +/- 10V mode
 - 12 bit resolution
 - Force/torque, velocity, position
- 1 analog output
 - 0-10V or +10V/-10V, 12 bit resolution
 - Force/torque, velocity, position
- Optional isolated 4-20mA board
 - 1 4-20 mA isolated analog input
 - 1 4-20 mA isolated analog output
 - 16 bit resolution

Standard Communications:

- 1 RS 485 port, Modbus RTU, opto-isolated for programming, controlling and monitoring

LED Display

An LED display on the Tritex II actuators indicates power, status, status and two customer programmable indicators.



Typical Applications

- Process Control
- Test
- Simulation
- Food Processing
- Industrial Automation
- Forestry
- Semi-conductor
- Remote Vehicles
- Medical Equipment
- Automotive Assembly
- Molding
- Die Casting
- Welding



Tritex II rotary motor with cable glands shown left and Tritex II linear actuator with threaded ports shown above.

Tritex II Series Operation

The Tritex II Series actuators can operate in one of five different motion-producing modes. These modes solve an endless variety of applications in industrial automation, medical equipment, fastening and joining, blow molding, injection molding, testing, food processing, and more.

Programmed functions are stored in the Tritex II non-volatile memory. An RS/485 serial interface allows control, programming and monitoring of all aspects of the motor or actuator as it performs your application.

Operating Modes

1) Move To A Position (Or Switch)

The Tritex II Series actuators allow you to execute your programmed positions or distances. You may also use a limit switch or other input device as the end condition of a move. This combination of index flexibility provides a simple solution for point-to-point indexing.

2) Move To A Preset Force Or Torque

The Tritex II Series allows you to terminate your move upon the achievement of a programmed torque or force. This is an ideal mode for pressing and clamping applications.

3) Position Proportional To An Analog Signal

Ideal for process control solutions, the Tritex II Series provides the functionality to position a valve's damper by following an analog input signal. This allows the Tritex II Series to be a drop-in replacement for inconvenient and inefficient hydraulic and pneumatic solutions already positioning to analog signals.

4) Velocity Proportional to An Analog Signal

Tritex II actuators offer you the capability to control velocity with an analog signal. This is particularly useful with Tritex II rotary motors offering precise control of the speed of any process or operation.

5) Force/Torque Proportional to Analog Signal

Perfect for pressing and torquing applications, you can control torque from an analog input while in torque mode.

Selectable Input Functions

Enable • Move (0-15) • Dedicated Position • Jog+ • Jog- select move (0-15) • Jog Fast • Home • Extend Switch • Retract Switch • Home Switch • Teach Enable • Teach Move (0-15) • Stop • Hold • Alternate Mode; allows you to switch between 2 operating modes.

Selectable Output Functions

Enabled • Homed • Ready (Enabled and Homed) • Fault • Warning • Fault or Warning Active • Move (0-15) in Progress • Homing • Jogging • Jogging+ • Jogging- • Motion • In Position • At Home Position • At Move (0-15) • Position • Stopped • Holding • In Current Limit • In Current Fold back • Above Rated Current • Home

Tritex Option Boards

- Option boards offer additional functionality to the base Tritex II actuators
 - Terminal board for customer I/O
 - Terminal board for customer I/O plus encoder output and pulse direction input
 - Isolated 4-20mA analog input and output
 - I/O expansion
 - Load cell input
 - Customer specific
- Communication buses
 - Ethernet IP
 - Modbus TCP/IP
 - CAN Open and CAN J1939
 - HART

Connectivity

- Internal terminals accessible through removable cover
- Threaded ports for cable sealing glands
- Optional connectors
 - M23 Power
 - M16 I/O
- M8 connector for RS485
- Custom connection options

Expert User Interface

Expert, the Tritex II user interface software, provides you with a simple way to select all aspects of configuration and control required to set up and operate a Tritex II actuator. Easy-to-use tabbed pages provide access to input all of the parameters necessary to successfully configure your motion application. 'Application' files give you a convenient way to store and redistribute configurations amongst multiple computers, and 'Drive' files allow the same configuration to be distributed to multiple Tritex II actuators. Motion setup, homing, teach mode, tuning parameters, jogging, I/O configuration, and local control are all accomplished with ease using Expert software.

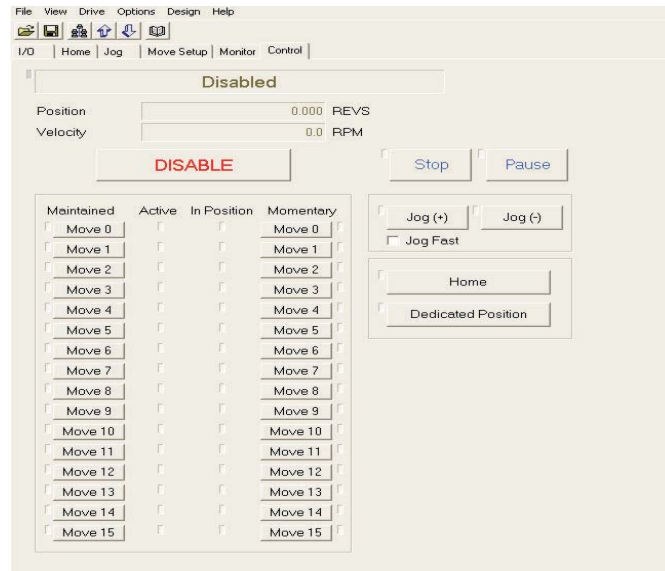
Motion Setup

Within the Expert software, Exlar provides several system configurations for various applications.

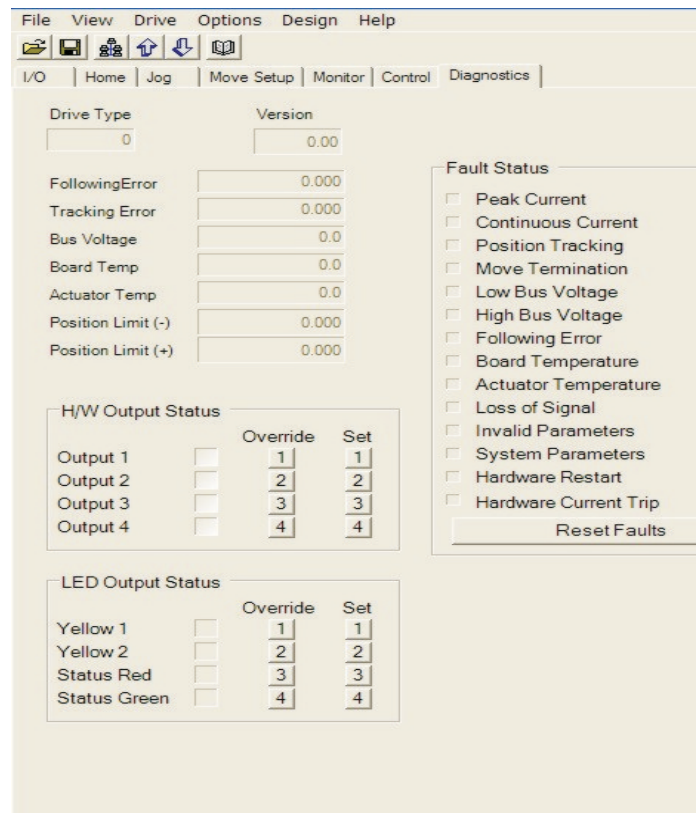
These can serve as your configuration, or as a starting point for your configuration. Alternatively, you can begin from scratch selecting configuration details specific to your application.

Easy selection of move conditions, distance, speed and acceleration are shown in the setup screen lower left.

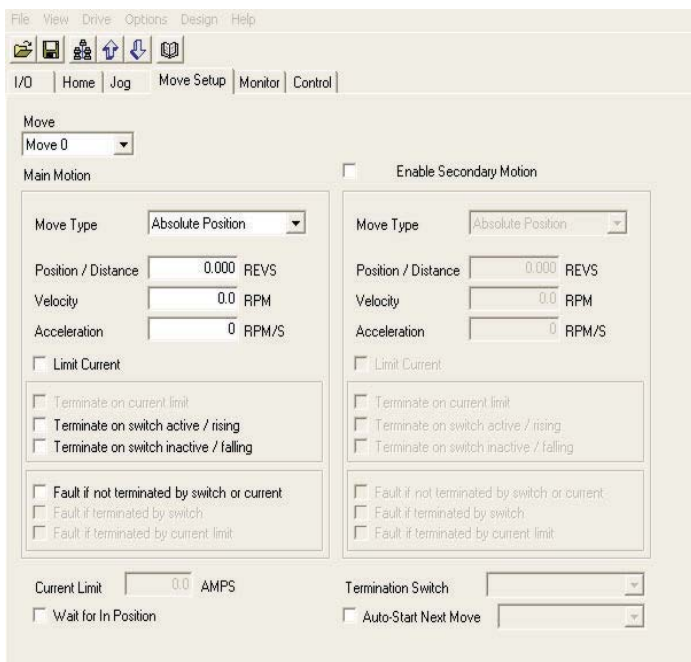
You can configure a move to position, move to switch, or move to force motion at the click of a button. The Tritex II products offer absolute and incremental motion, as well as moves ending on a condition such as a specific force or torque being reached, or an input being triggered by a proximity switch.



Control Screen



Diagnostics Screen

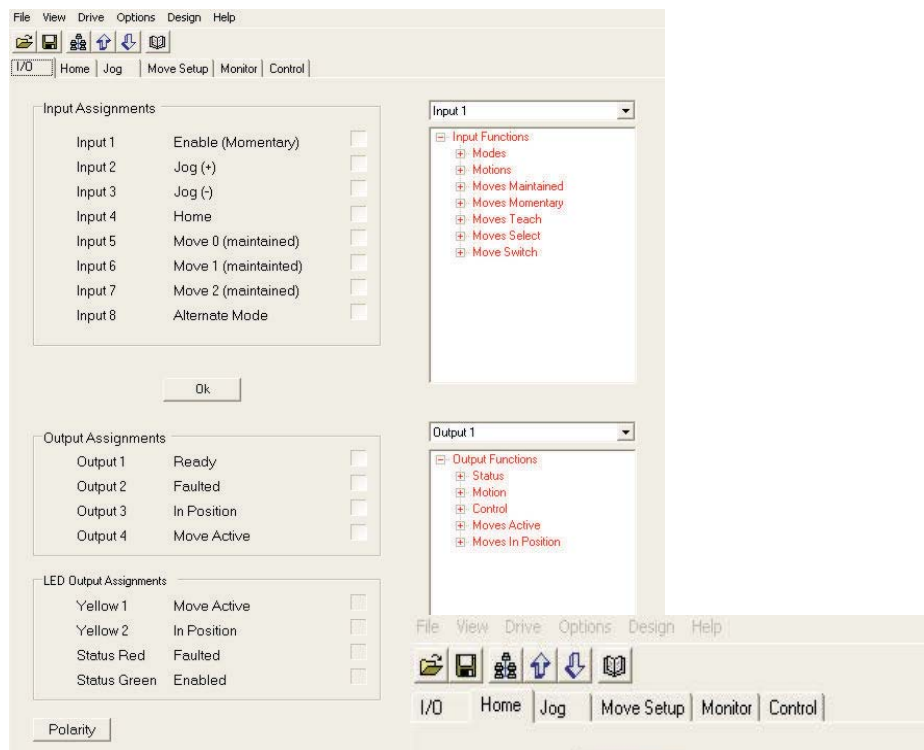


Motion Setup Screen

Control Page

The Expert control page gives you the ability to operate or initiate all motion functions from one single, simple screen. This screen provides you very easy system start-up and testing without all the inconvenience of machine wiring.

The control page offers the capability to enable and disable the drive and perform fast and slow jogs. This gives you the ability to verify motion before needing any I/O wiring.



Configuring I/O Screen

Monitor Page

All input functions can be monitored and activated from the Expert monitor page, and all output functions can be monitored. These functions can be monitored and controlled, even if they are not programmed as the function of any particular hardware input or output. Information on critical fault and status data is available as a separate page, or as a fixed window on the bottom of each page of the software.

Configuring I/O

Configuring I/O points to one of over 40 available input or output functions couldn't be easier. A pull down menu adjacent to each I/O point allows all I/O to be set up in minutes.

Inputs can be configured to be maintained, or momentary, depending on the application requirements.

Input and output logic can also be inverted with a simple click.

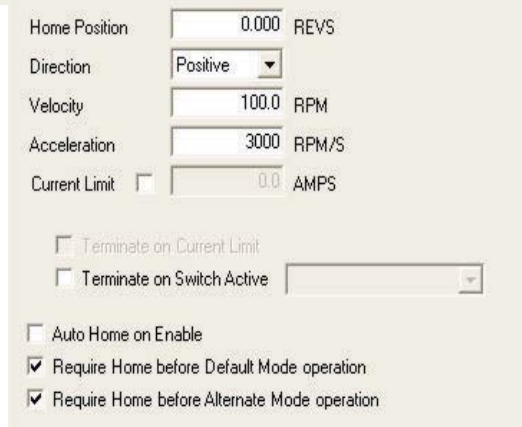
Homing

The Tritex II homing setup is simple to use. It allows you to home to an input, by using a proximity or limit switch, or allows homing to a specific force or torque.

Homing to a force or torque is ideal for setting up applications that require motion referenced to a hard stop, like the closed position of a valve, or the final position of a press.

Teach Mode

To provide the easiest motion set up possible, Tritex II products offer 'Teach mode.' In this mode, you can jog the actuator to the desired position, and activate an input, or click a button in the Expert software and the current position of the actuator becomes the defined distance or absolute position associated with a particular move command.



Homing Screen



Teach Mode Screen

Process Control Functionality

Tritex II actuators, available in both rotary and linear versions, provide a perfect solution for your valve actuation needs. Small hysteresis and dead band, quick response to small signal changes and stable dynamic responses delivered by Tritex II actuators are all key parameters for process control.

Fully programmable to follow an analog signal representing either position or force, the Tritex II linear actuator is perfectly designed for sliding stem valve applications with thrust requirements up to 3685 lbs. Highly accurate position feedback allows the Tritex II to achieve combined repeatability and hysteresis as low as 0.25%.

The Tritex II Rotary actuators are ideal for operating quarter-turn, full-turn, or multi-turn valves or shaft driven dampers. In shaft driven applications, the rotary Tritex II 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 II to be applied to a broad range of applications.

Tritex II actuators can be mounted on any valve from any manufacturer.

Benefits for Process Control Applications

100% Torque Availability

Full Torque means almost zero deadband, and stiction in the valve stem is no problem. Current is always available so it will hold its position. This provides excellent process loop control.

Speed of Response

Tritex II response rate is measured in milliseconds. This provides excellent modulating control of both ball valves and butterfly valves.

High Accuracy

Tritex II actuators have a built-in position feedback sensor, providing much higher accuracy over potentiometer-based actuators.

Custom Valve Seat

Exlar linear 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.

High Stiffness

Similar to hydraulic actuators, but without the cost or maintenance issues, Tritex II actuators

are extremely stiff. This allows control down to the smallest operating range (<1%) and also eliminates dynamic flow problems such as negative gradients.

Fast Stroke Speeds

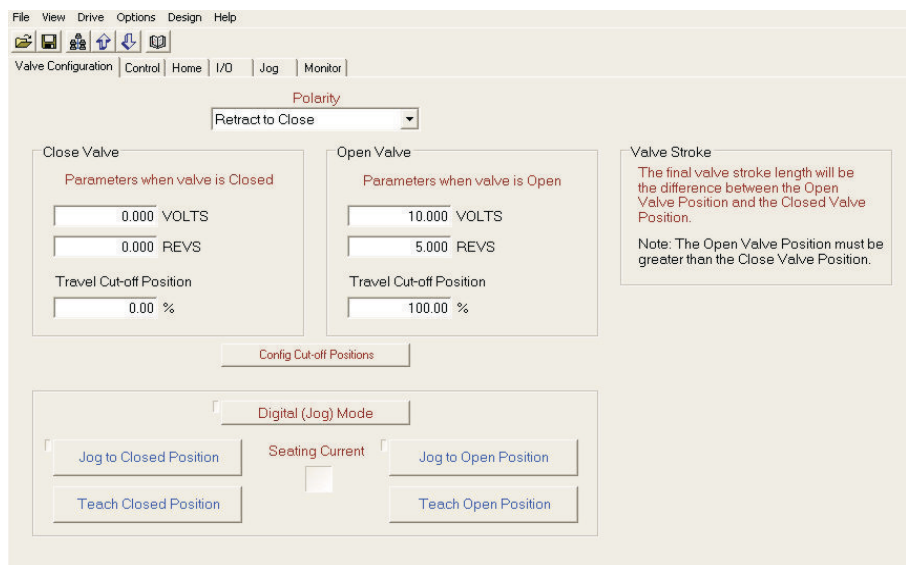
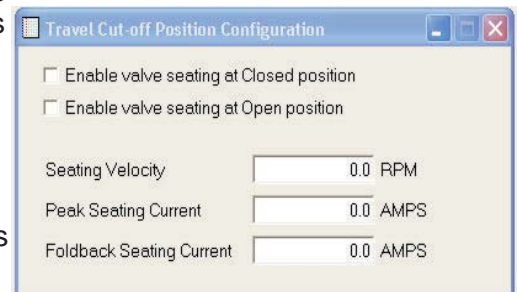
Most other electric actuators are known for being slow - a major disadvantage. Tritex actuators can close a valve in milliseconds if needed.

Improved Control

Under modulating conditions, Tritex II actuators provide precise closed loop tracking by effectively eliminating non-linearities and deadtime.

Valve Software

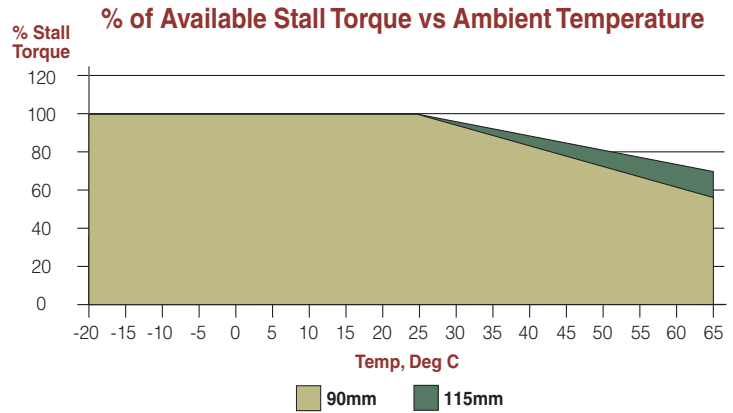
Our valve software is simple to use, featuring a teach mode for foolproof configuration. Included is a programmable valve cut off position feature that enables a firm valve seat on both new valves, or retrofitted valves.



Performance Curves

Extended Temperature De-Rating Curve

The speed/torque curves are based on 25°C ambient conditions. The actuators may be operated at ambient temperatures up to 65° C. Use the curve shown right for continuous torque/force deratings above 25° C.



T2M/T2X Lifetime Curves

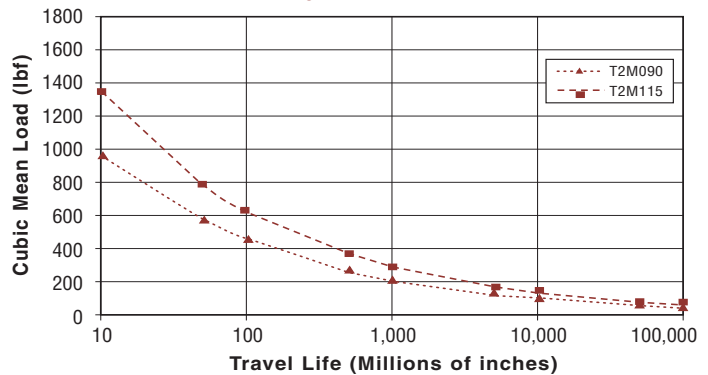
The L_{10} expected life of a roller screw linear actuator is expressed as the linear travel distance that 90% of properly maintained roller screws manufactured are expected to meet or exceed. This is not a guarantee and these charts should be used for estimation purposes only. The underlying formula 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)

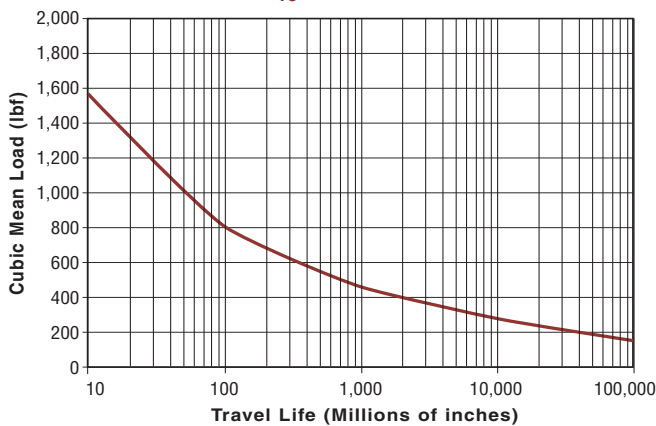
$$L_{10} = \left(\frac{C}{F}\right)^3 \times S =$$

All curves represent properly lubricated and maintained actuators.

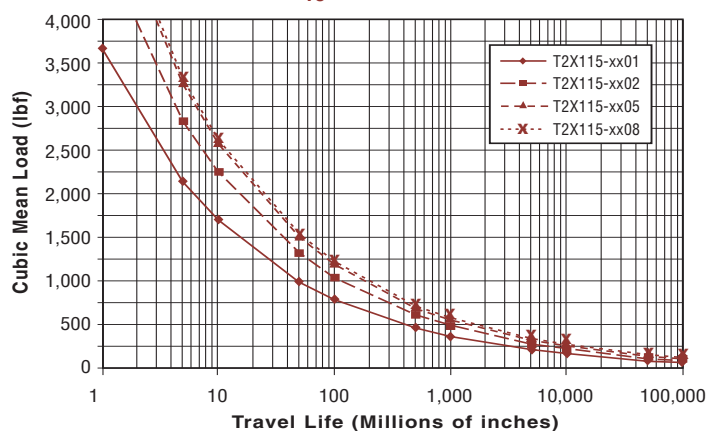
T2M090 and T2M115 L_{10} Travel Life



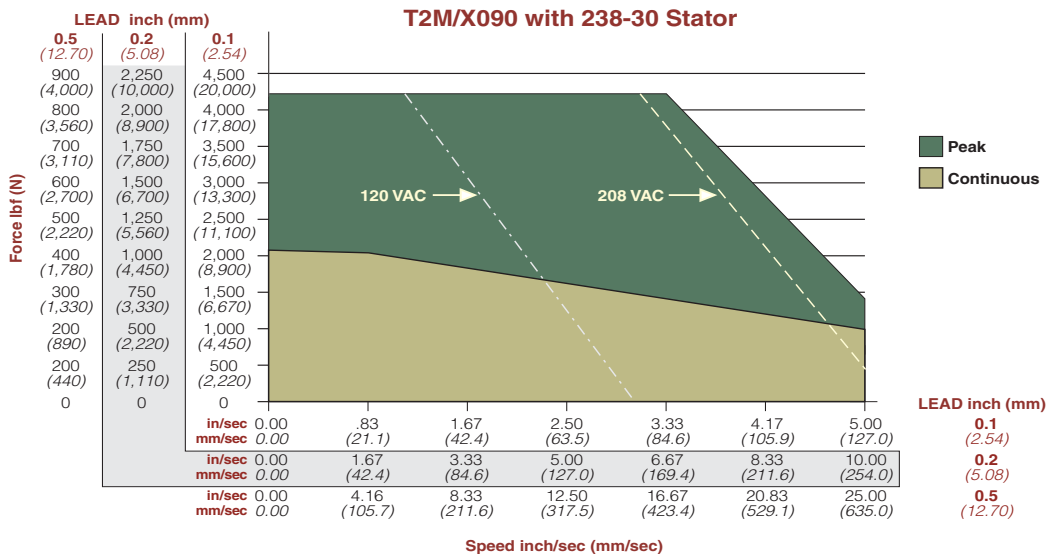
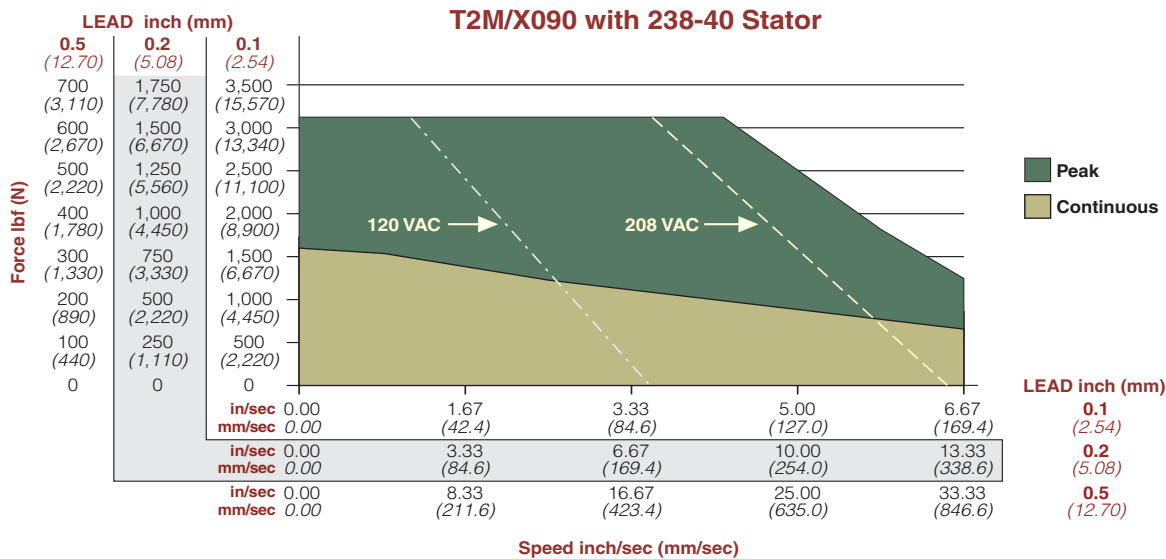
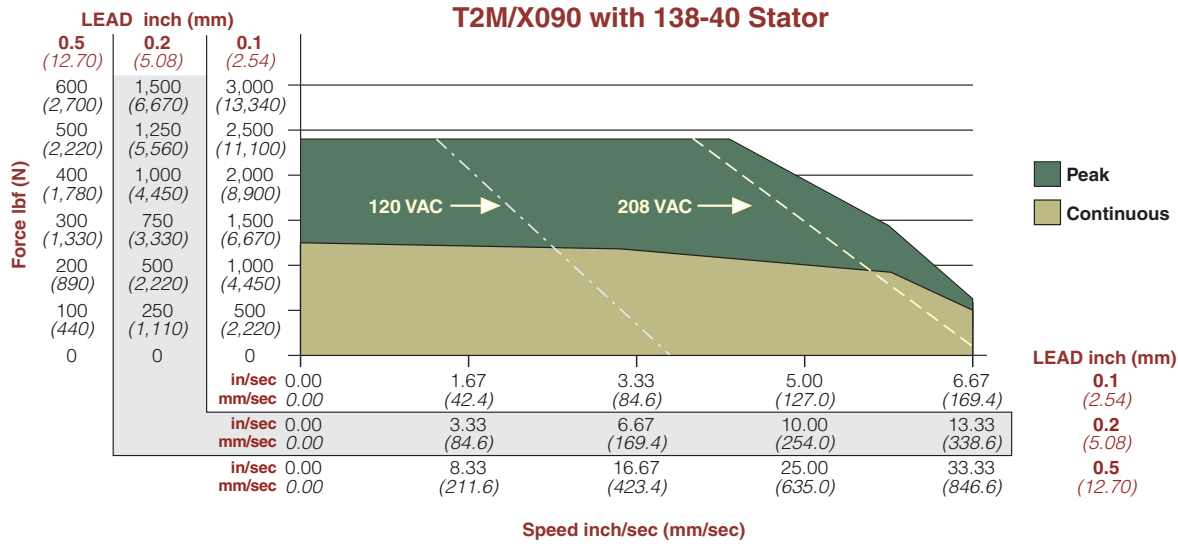
T2X090 L_{10} Travel Life



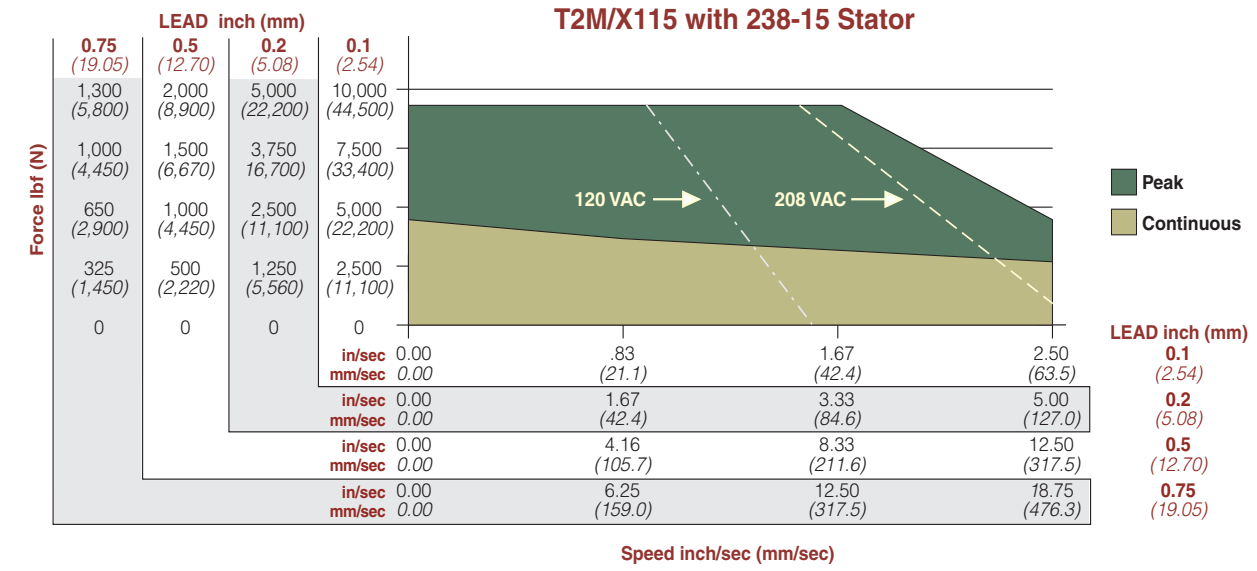
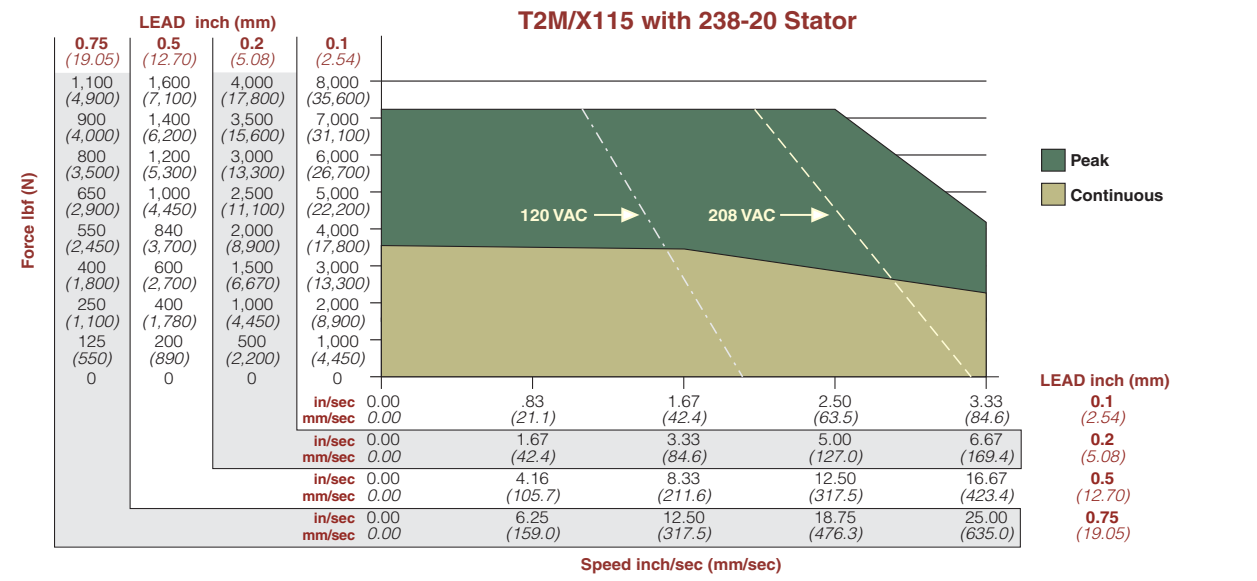
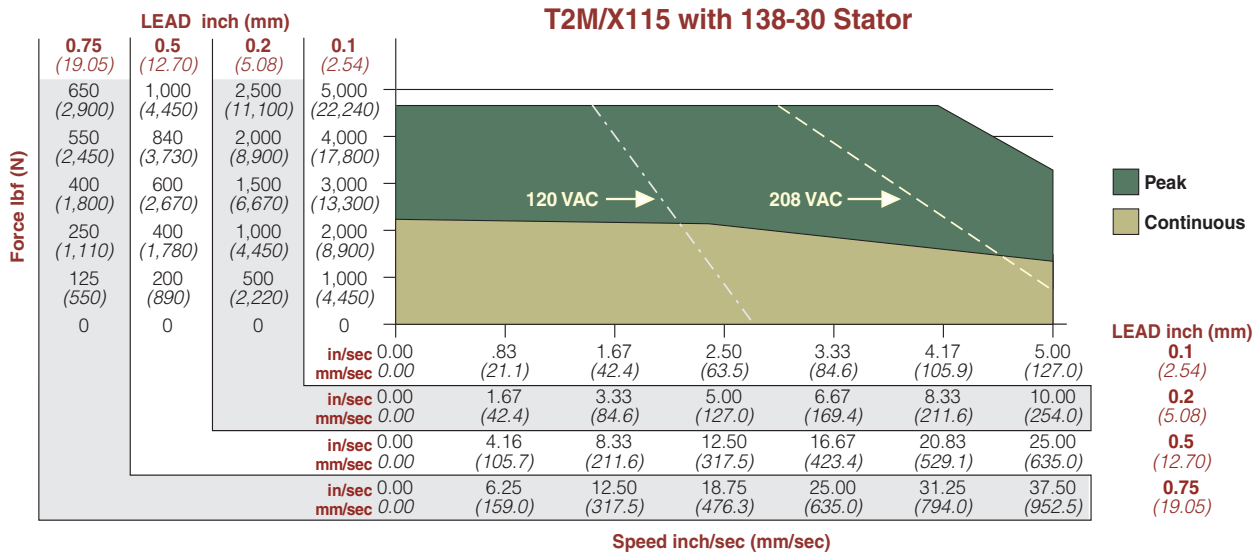
T2X115 L_{10} Travel Life



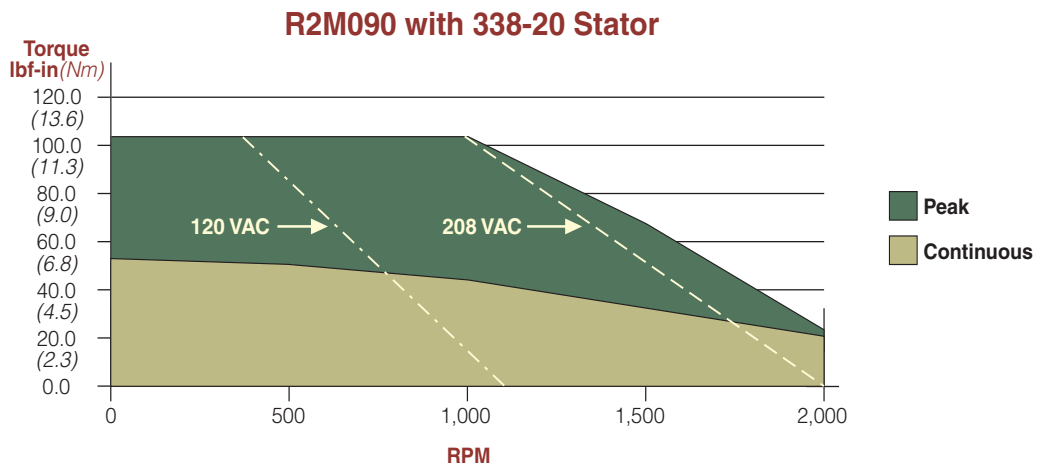
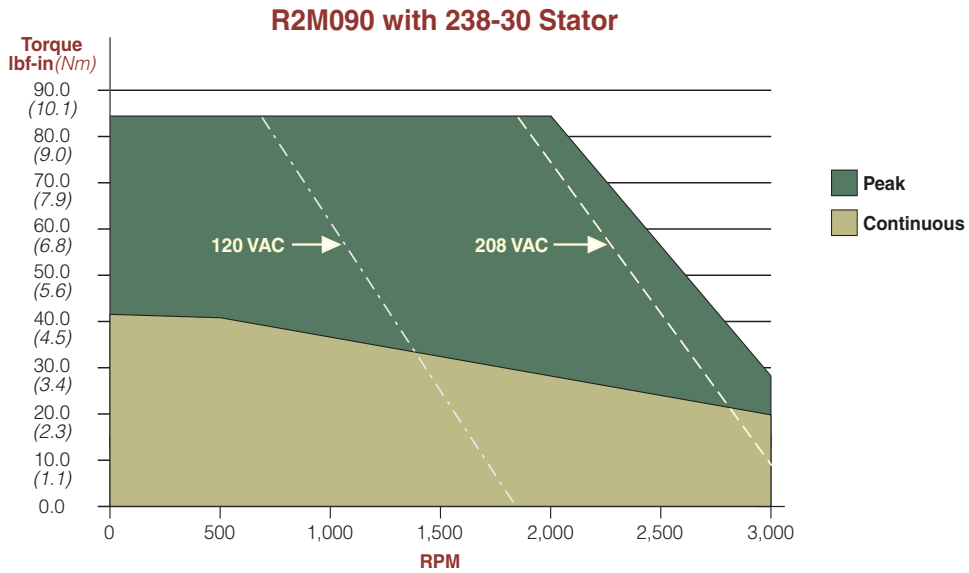
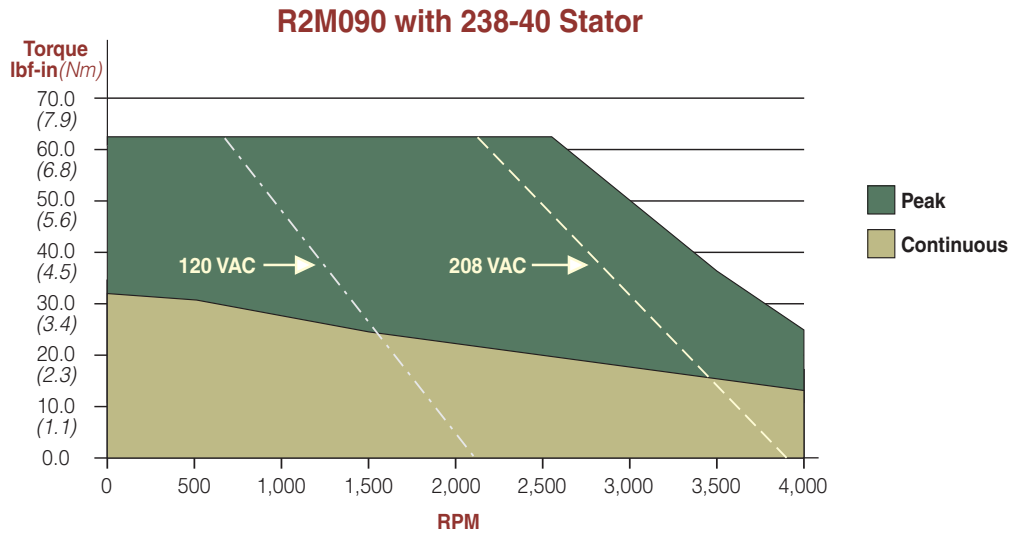
T2M/X090 Linear Actuator Speed vs. Force Curves



T2M/X115 Linear Actuator Speed vs. Force Curves

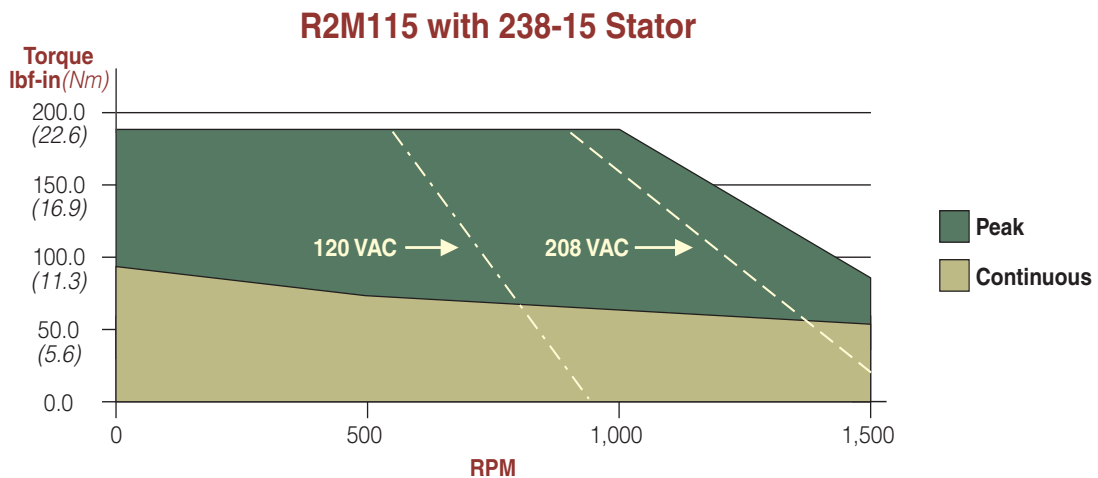
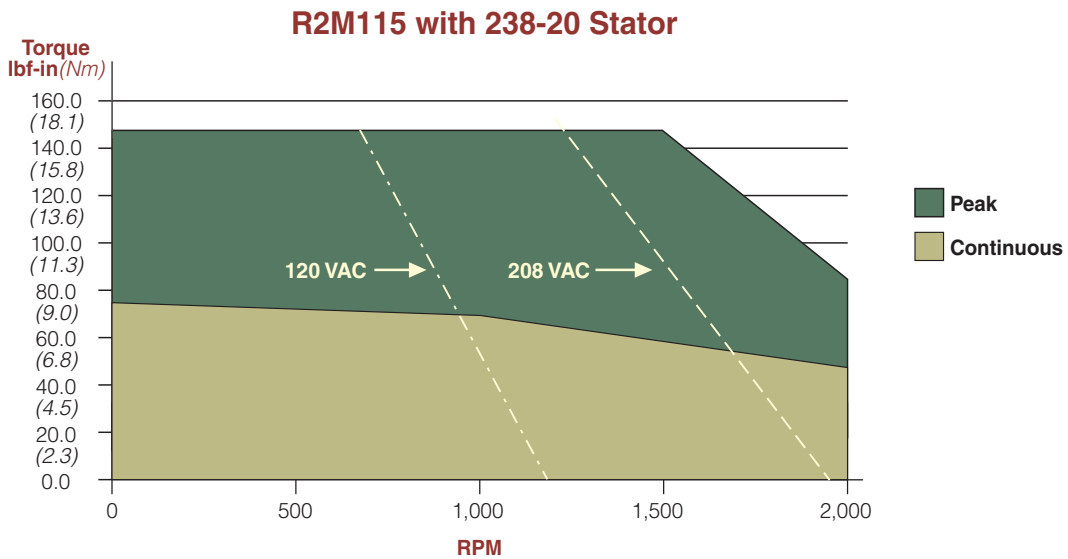
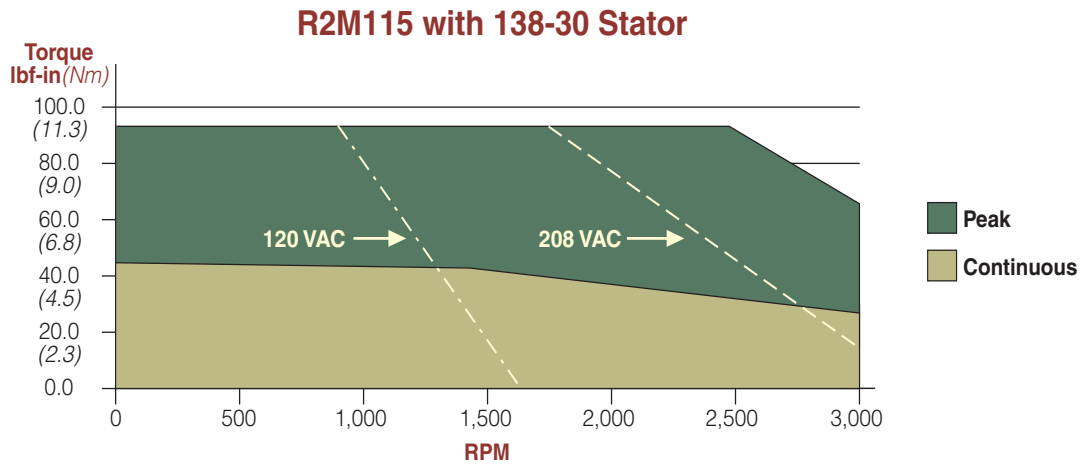


R2M090 Rotary Motor Speed vs. Torque Curves



*For R2G gearmotors, multiply torque by your ratio and efficiency. Divide speed by gear ratio.

R2M115 Rotary Motor Speed vs. Torque Curves



*For R2G gearmotors, multiply torque by your ratio and efficiency. Divide speed by gear ratio.

T2M/X Linear Actuator Performance Specifications

T2M/X090 LINEAR ACTUATOR PERFORMANCE SPECIFICATIONS					
Backlash		in (mm)	.008 (.20)		
Lead Accuracy		in/ft (mm/300 mm)	.001 (.025)		
Maximum Radial Load		lb (N)	15 (67)		
Environmental Rating: Std		IP54 Std / IP65 Optional on T2M			
		Stator	1 Stack 138-40	2 Stack 238-40	2 Stack 238-30
		RPM @ 230 VAC	4000	4000	3000
Lead					
0.1	Stall Force	lbf (N)	1205 (5360)	1587 (7059)	NA
	Max Speed	in/sec (mm/sec)	6.67 (169)	6.67 (169)	NA
0.2	Stall Force	lbf (N)	603 (2682)	794 (3532)	1047 (4657)
	Max Speed	in/sec (mm/sec)	13.33 (338)	13.33 (338)	10.00 (254)
0.5	Stall Force	lbf (N)	241 (912)	317 (1410)	419 (1864)
	Max Speed	in/sec (mm/sec)	33.33 (846)	33.33 (846)	25.00 (635)
Full Load Amps, AC		7			
Available Stroke Lengths in (mm)		3 (75), 6 (150), 10 (254), 12 (300), 18 (450)			
Approximate Weight lb (kg)		14 (6.35) 3" stroke, 1 stack	1 (0.5) Added weight per inch of stroke	3 (1.4) Added weight per motor stack	3 (1.4) Added weight for brake

T2M/X115 LINEAR ACTUATOR PERFORMANCE SPECIFICATIONS					
Backlash			.008 (.20)		
Lead Accuracy			.001 (.025)		
Maximum Radial Load			15 (67)		
Environmental Rating: Std		IP54 Std / IP65 Optional on T2M			
		Stator	1 Stack 138-30	2 Stack 238-20	2 Stack 238-15
		RPM @ 230 VAC	3000	2000	1500
Lead					
0.1	Stall Force	lbf (N)	2354 (10470)	3685 (16391)	NA
	Max Speed	in/sec (mm/sec)	5.00 (127)	3.33 (84)	NA
0.2	Stall Force	lbf (N)	1177 (5235)	1843 (8198)	2380 (10586)
	Max Speed	in/sec (mm/sec)	10.00 (254)	6.67 (169)	5.00 (127)
0.5	Stall Force	lbf (N)	471 (2095)	737 (3278)	952 (4234)
	Max Speed	in/sec (mm/sec)	25.00 (635)	16.67 (423)	12.50 (317)
0.75	Stall Force	lbf (N)	314 (1397)	491 (2184)	635 (2825)
	Max Speed	in/sec (mm/sec)	37.5 (953)	25 (635)	18.75 (476)
Full Load Amps, AC		9			
Available Stroke Lengths in (mm)		6 (150), 10 (254), 12 (300), 18 (450)			
Approximate Weight lb (kg)		34 (15.5) 6 " stroke, 1 stack	2 (1) Added weight per inch of stroke	8 (4) Added weight per motor stack	4 (2) Added weight for brake

R2M/R2G090 Rotary Motor/Gearmotor Performance Specifications

R2M090 ROTARY MOTOR TORQUE AND SPEED RATINGS

For output torque of R2G gearmotors, multiply by ratio and efficiency. Please note maximum allowable output torques found at bottom of page.

	Stator	2 Stack 238-40	2 Stack 238-30	3 Stack 338-20
	RPM at 230 VAC	4000	3000	2000
Continuous Stall Torque	lbf-in (Nm)	30 (3.4)	40 (4.5)	52 (5.9)
Peak Torque	lbf-in (Nm)	60 (6.8)	80 (9.0)	105 (11.9)
Full Load Amps, AC	7			

R2M/R2G090 INERTIA

	Stator	2 Stack	3 Stack
R2M Motor Armature Inertia (+/-5%)	lb-in-sec ² (kg-cm ²)	0.00097 (1.09)	0.00140 (1.58)
R2G Gearmotor Armature Inertia*	lbf-in-sec ² (kg-cm ²)	0.00157 (1.77)	0.00200 (2.26)

*Add armature inertia to gearing inertia for total inertia.

R2M/R2G090 RADIAL LOAD AND BEARING LIFE

RPM	50	100	250	500	1000
lbf (N)	389 (1730)	309 (1375)	227 (1010)	180 (801)	143 (636)

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

R2G090 GEARMOTOR MECHANICAL RATINGS

		Output Torque at Motor Speed for 10,000 Hour Life							
		Maximum Allowable Output Torque - Set by User		1000 RPM		1500 RPM		2000 RPM	
Model	Ratio	lbf-in	(Nm)	lbf-in	(Nm)	lbf-in	(Nm)	lbf-in	(Nm)
R2G090-004	4:1	2078	(234.8)	600	(67.8)	552	(62.4)	504	(56.9)
R2G090-005	5:1	1798	(203.1)	775	(87.6)	714	(80.7)	652	(73.7)
R2G090-010	10:1	1126	(127.2)	890	(100.6)	820	(92.7)	750	(84.7)
R2G090-016	16:1	2078	(234.8)	912	(103.4)	830	(94.7)	763	(86.2)
R2G090-020	20:1	2078	(234.8)	980	(110.7)	900	(101.7)	820	(92.6)
R2G090-025	25:1	1798	(203.1)	1250	(141.2)	1150	(130)	1050	(118.6)
R2G090-040	40:1	2078	(234.8)	1200	(135.6)	1107	(125)	1013	(114.4)
R2G090-050	50:1	1798	(203.1)	1550	(169.4)	1434	(162)	1317	(148.8)
R2G090-100	100:1	1126	(127.2)	1100	(124.3)	1100	(124.3)	1100	(124.3)

Two torque ratings for the R2G gearmotors are given in the table above. The left hand columns give the maximum (peak) allowable output torque for the indicated ratios of each size R2G 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 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 life (L10). The setup of the system will determine the actual output torque and speed.

R2G090 Rotary Gearmotor Performance Specifications

R2G090 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)

R2G090 BACKLASH AND EFFICIENCY

	Single Reduction	Double Reduction
Backlash at 1% Rated Torque	10 Arc min	13 Arc min
Efficiency	91%	86%

R2M090 MOTOR AND RTG090 GEARMOTOR WEIGHTS

		R2M090 Without Gears	R2G090 with 1 Stage Gearing	R2G090 with 2 Stage Gearing	Added Weight for Brake
1 Stack Stator	lb (kg)	11 (4.9)	19 (8.6)	22 (10)	3 (1.4)
2 Stack Stator	lb (kg)	14 (6.4)	22 (10)	25 (11.3)	
3 Stack Stator	lb (kg)	17 (7.7)	25 (11.3)	28 (12.7)	

R2M/R2G115 Rotary Motor/Gearmotor Performance Specifications

R2M115 ROTARY MOTOR TORQUE AND SPEED RATINGS

For output torque of R2G gearmotors, multiply by ratio and efficiency. Please note maximum allowable output torques found at bottom of page.

	Stator	1 Stack 138-30	2 Stack 238-20	2 Stack 238-15
	RPM at 230 VAC	3000	2000	1500
Continuous Torque	lbf-in (Nm)	47 (5.3)	73 (8.3)	95 (10.7)
Peak Torque	lbf-in (Nm)	94 (10.6)	146 (16.5)	190 (21.5)
Full Load Amps, AC	9			

R2M/R2G115 INERTIA

	Stator	1 Stack	2 Stack
R2M Motor Armature Inertia (+/-5%)	lb-in-sec ² (kg-cm ²)	0.00344 (3.89)	0.00623 (7.036)
R2G Gearmotor Armature Inertia*	lb-in-sec ² (kg-cm ²)	0.00538 (6.08)	0.00816 (9.22)

*Add armature inertia to gearing inertia for total R2M system inertia.

R2M/R2G115 RADIAL LOAD AND BEARING LIFE

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

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

R2G115 GEARMOTOR MECHANICAL RATINGS

		Output Torque at Motor Speed for 10,000 Hour Life							
		Maximum Allowable Output Torque - Set by User		1000 RPM		2000 RPM		3000 RPM	
Model	Ratio	lbf-in	(Nm)	lbf-in	(Nm)	lbf-in	(Nm)	lbf-in	(Nm)
R2G115-004	4:1	4696	(530.4)	1392	(157.3)	1132	(127.9)	1000	(112.9)
R2G115-005	5:1	4066	(459.4)	1455	(163.3)	1175	(132.8)	1040	(117.5)
R2G115-010	10:1	2545	(287.5)	1660	(187.6)	1350	(152.6)	1200	(135.6)
R2G115-016	16:1	4696	(530.4)	2112	(238.6)	1714	(193.0)	1518	(171.0)
R2G115-020	20:1	4696	(530.4)	2240	(253.1)	1840	(207.9)	1620	(183.0)
R2G115-025	25:1	4066	(459.4)	2350	(265.5)	1900	(214.7)	1675	(189.2)
R2G115-040	40:1	4696	(530.4)	2800	(316.4)	2240	(253.1)	2000	(225.9)
R2G115-050	50:1	4066	(459.4)	2900	(327.7)	2350	(265.5)	2100	(237.3)
R2G115-100	100:1	2545	(287.5)	2500	(282.5)	2500	(282.5)	2400	(271.2)

Two torque ratings for the R2G gearmotors are given in the table above. The left hand columns give the maximum (peak) allowable output torque for the indicated ratios of each size R2G 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 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 life (L10). The setup of the system will determine the actual output torque and speed.

R2G115 Rotary Gearmotor Performance Specifications

R2G115 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)

R2G115 BACKLASH AND EFFICIENCY

	Single Reduction	Double Reduction
Backlash at 1% Rated Torque	10 Arc min	13 Arc min
Efficiency	91%	86%

R2M115 MOTOR AND RTG115 GEARMOTOR WEIGHTS

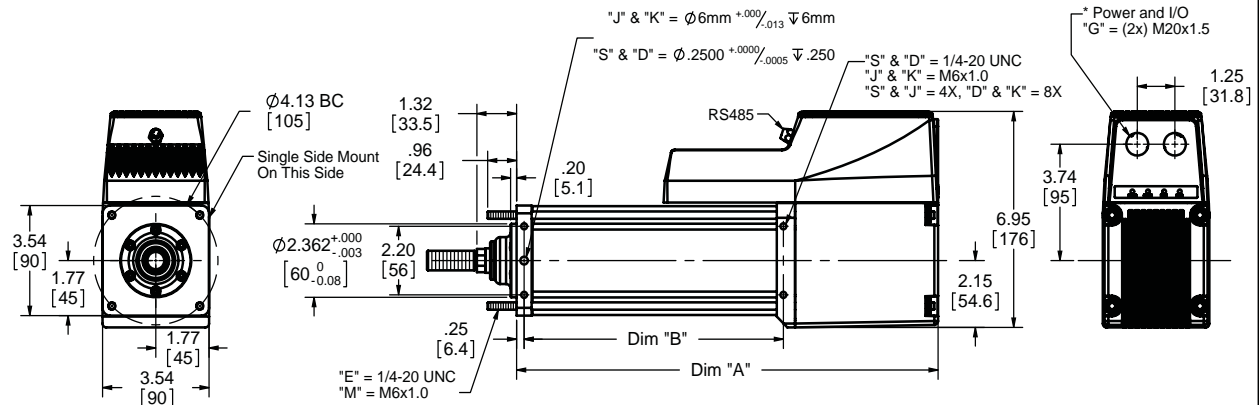
		R2M115 Without Gears	R2G115 with 1 Stage Gearing	R2G115 with 2 Stage Gearing	Added Weight for Brake
1 Stack Stator	lb (kg)	19 (8.6)	34 (15.4)	40 (18.1)	4 (2)
2 Stack Stator	lb (kg)	27 (12.2)	42 (19.1)	48 (21.8)	
3 Stack Stator	lb (kg)	35 (15.9)	50 (22.7)	56 (25.4)	

TRITEX II AGENCY APPROVALS (ALL PENDING)

Safety	UL, EN61800-5-1
EMC	EN61800-3
Hazardous Location	Class 1, Div 2

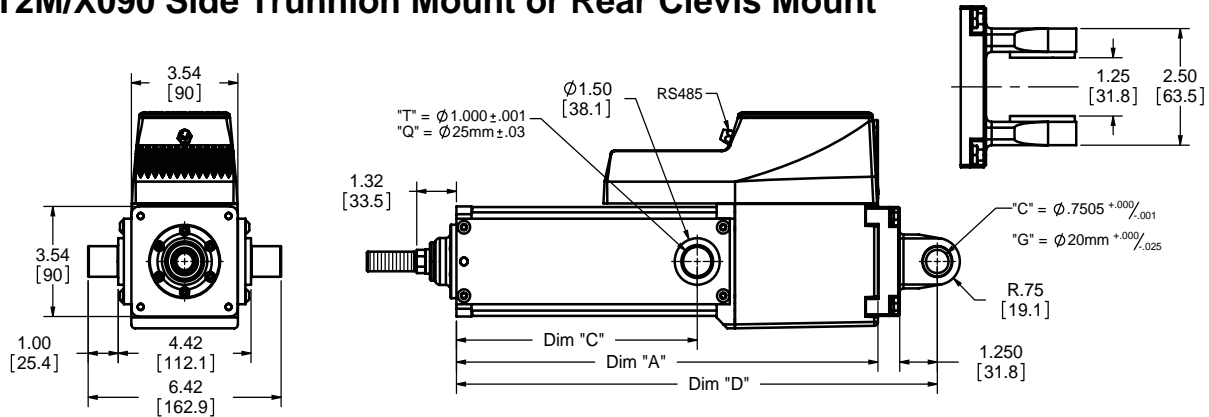
T2M/X090 Linear Actuator Dimensions

T2M/X090 Double Side Mount or Extended Tie Rod Mount



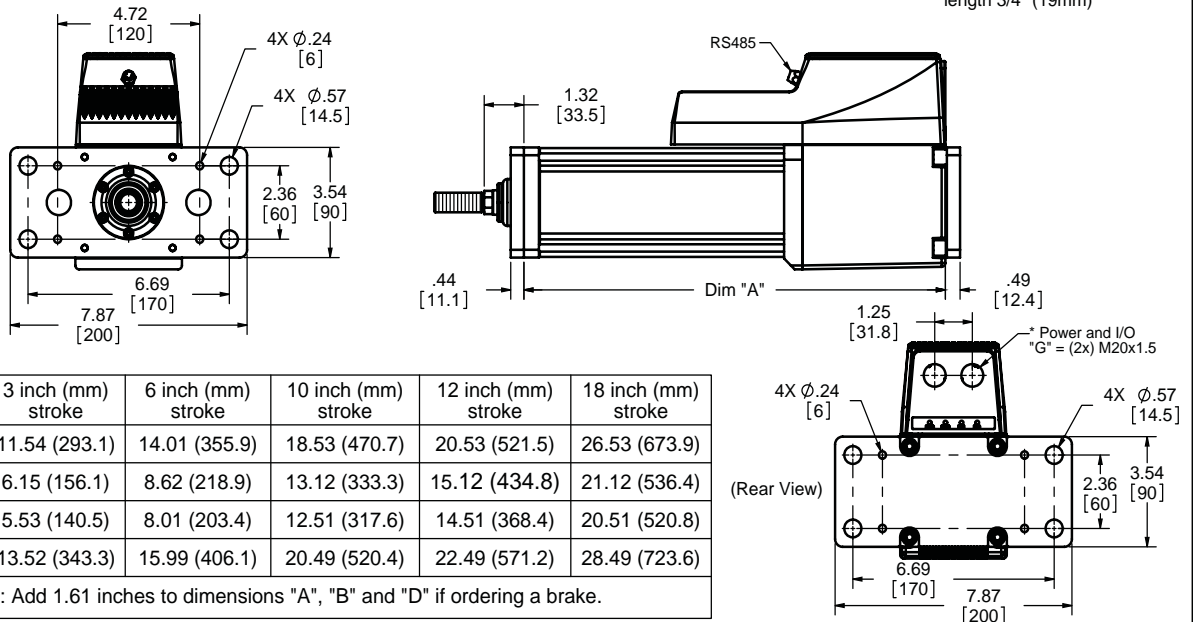
* "N" option utilizes adapter from M20x1.5 to 1/2" NPT thread. Dia 1-5/16 (24mm), length 3/4" (19mm)

T2M/X090 Side Trunnion Mount or Rear Clevis Mount



* "N" option utilizes adapter from M20x1.5 to 1/2" NPT thread. Dia 1-5/16 (24mm), length 3/4" (19mm)

T2M/X090 Front, Rear, or Front and Rear Flange Mount

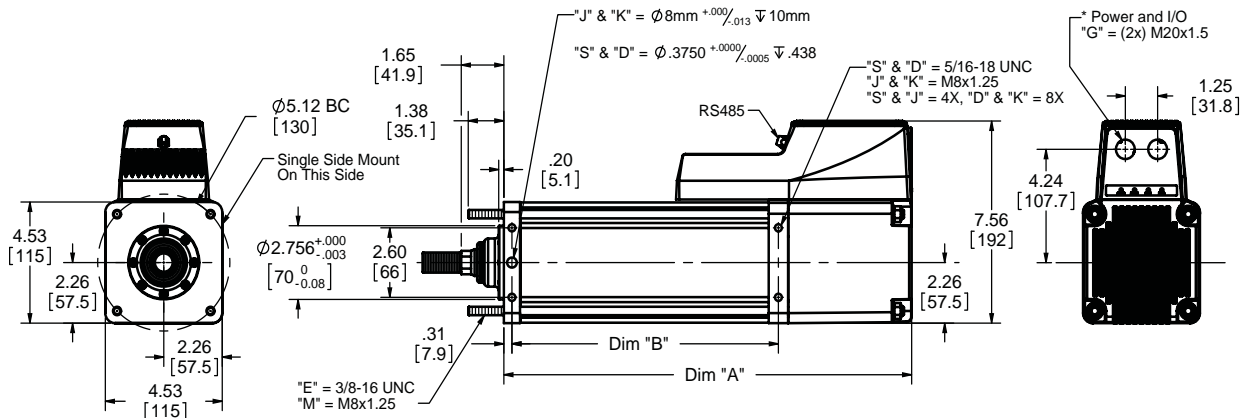


Dim	3 inch (mm) stroke	6 inch (mm) stroke	10 inch (mm) stroke	12 inch (mm) stroke	18 inch (mm) stroke
A	11.54 (293.1)	14.01 (355.9)	18.53 (470.7)	20.53 (521.5)	26.53 (673.9)
B	6.15 (156.1)	8.62 (218.9)	13.12 (333.3)	15.12 (434.8)	21.12 (536.4)
C	5.53 (140.5)	8.01 (203.4)	12.51 (317.6)	14.51 (368.4)	20.51 (520.8)
D	13.52 (343.3)	15.99 (406.1)	20.49 (520.4)	22.49 (571.2)	28.49 (723.6)

Note: Add 1.61 inches to dimensions "A", "B" and "D" if ordering a brake.

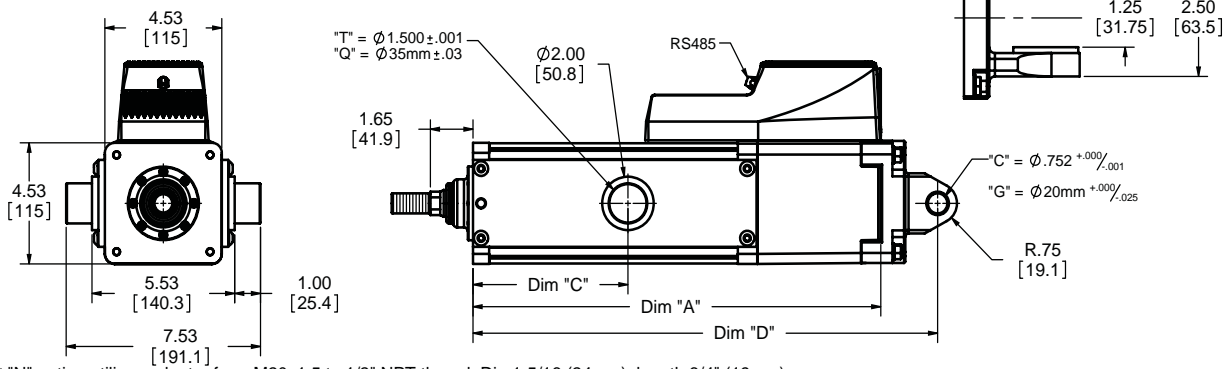
T2M/X115 Linear Actuator Dimensions

T2M/X115 Double Side Mount or Extended Tie Rod Mount



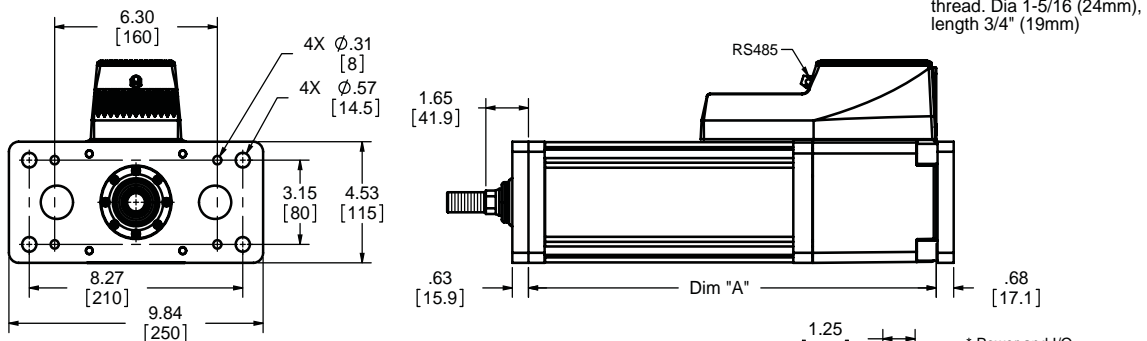
* "N" option utilizes adapter from M20x1.5 to 1/2" NPT thread. Dia 1-5/16 (24mm), length 3/4" (19mm)

T2M/X115 Side Trunnion Mount or Rear Clevis Mount



* "N" option utilizes adapter from M20x1.5 to 1/2" NPT thread. Dia 1-5/16 (24mm), length 3/4" (19mm)

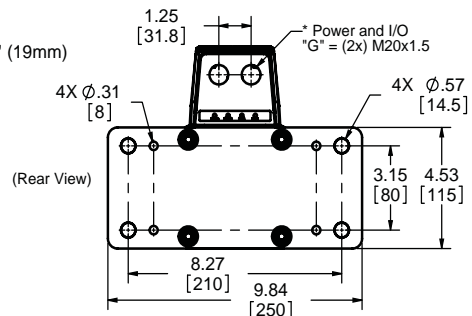
T2M/X115 Front, Rear, or Front and Rear Flange Mount



* "N" option utilizes adapter from M20x1.5 to 1/2" NPT thread. Dia 1-5/16 (24mm), length 3/4" (19mm)

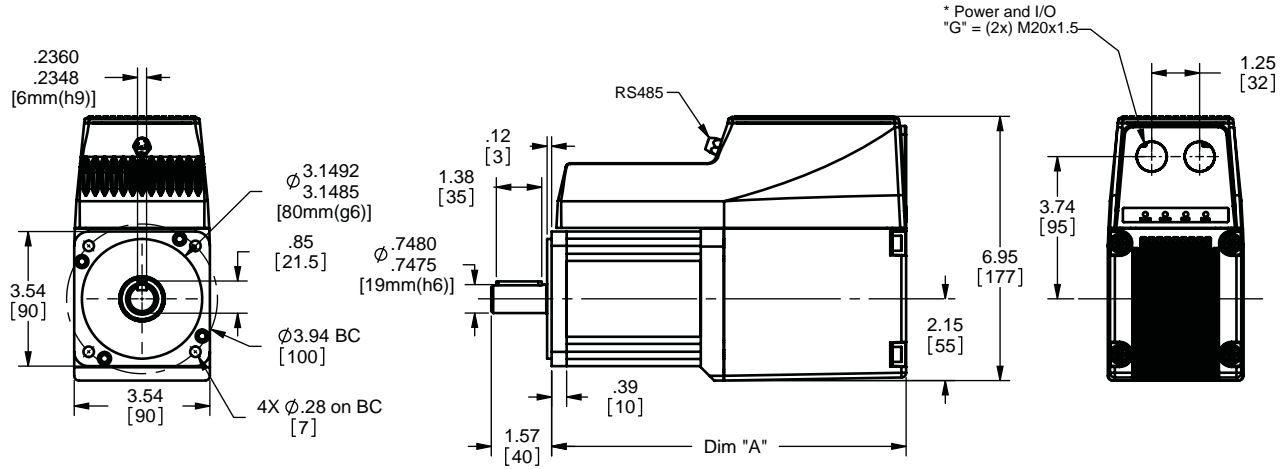
Dim	6 inch (mm) stroke	10 inch (mm) stroke	12 inch (mm) stroke	18 inch (mm) stroke
A	15.79 (401.1)	19.79 (502.7)	21.79 (553.5)	27.79 (705.9)
B	10.31 (261.8)	14.31 (363.5)	16.31 (414.3)	22.31 (566.7)
C	6.00 (152.4)	10.00 (254.0)	12.00 (304.8)	18.00 (457.2)
D	17.99 (456.9)	21.99 (558.5)	23.99 (609.3)	29.99 (761.7)

Note: Add 2.33 inches to dimensions "A", "B" and "D" if ordering a brake.



R2M090 and R2G090 Rotary Motor/Gearmotor Dimensions

R2M090 Dimensions

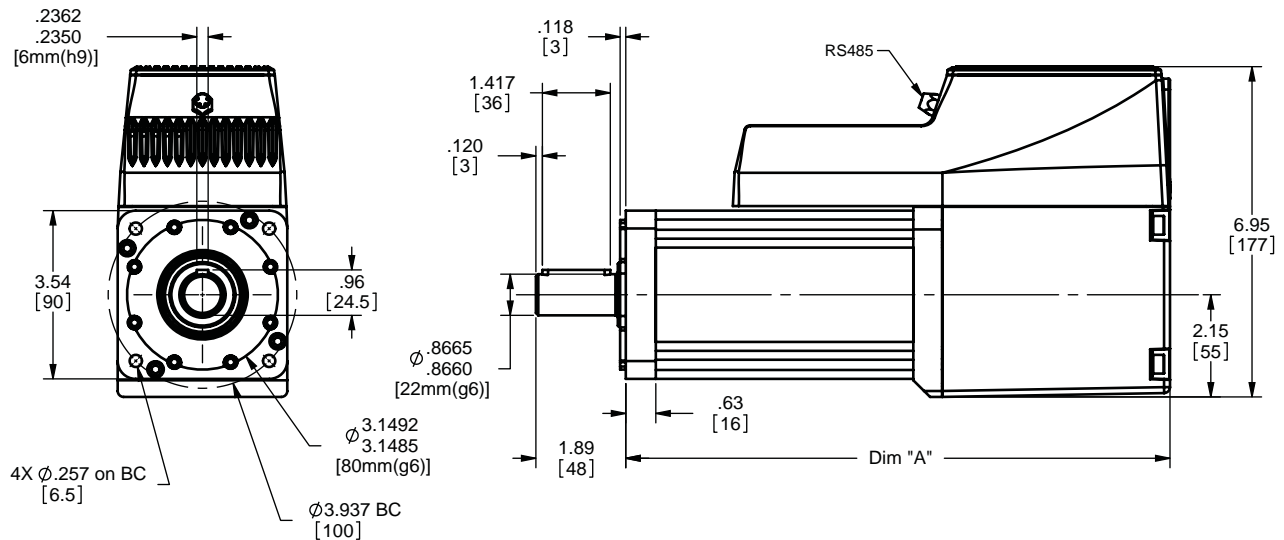


Without Brake Option		
Dim	2 Stack Stator	3 Stack Stator
A	10.25 (256.3)	11.25 (285.8)

With Brake Option		
Dim	2 Stack Stator	3 Stack Stator
A	11.6 (294.6)	12.6 (320.0)

* "N" option utilizes adapter from M20x1.5 to 1/2" NPT thread. Dia 1-5/16 (24mm), length 3/4" (19mm)

R2G090 Dimensions



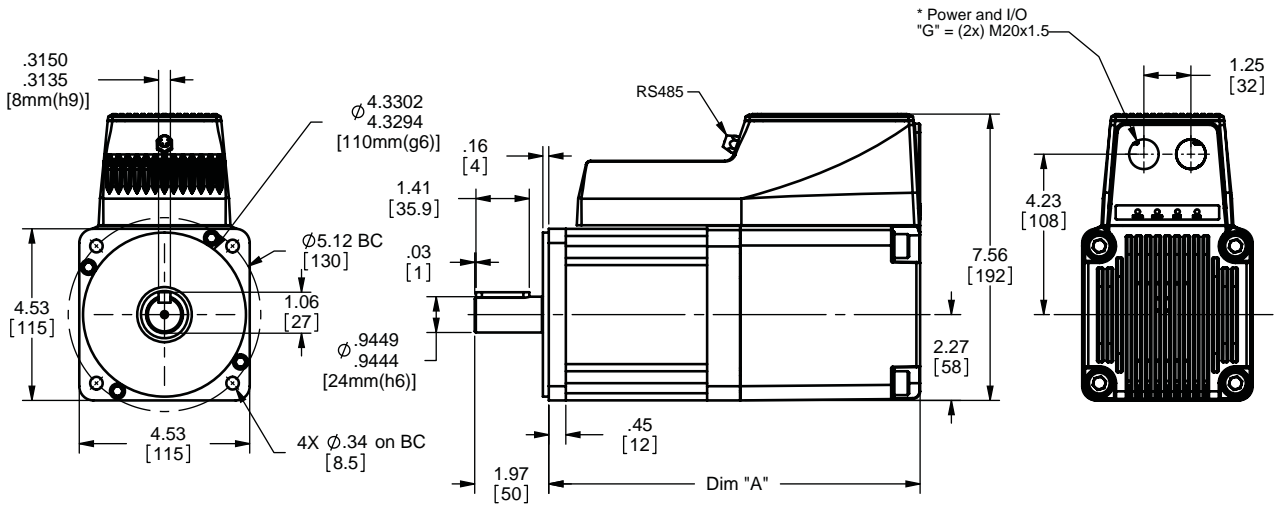
Without Brake Option		
Dim	2 Stack Stator 1 Stage Gearhead	3 Stack Stator 1 Stage Gearhead
A	12.36 (313.9)	13.36 (339.3)
Dim	2 Stack Stator 2 Stage Gearhead	3 Stack Stator 2 Stage Gearhead
A	13.63 (346.2)	14.63 (371.6)

With Brake Option		
Dim	2 Stack Stator 1 Stage Gearhead	3 Stack Stator 1 Stage Gearhead
A	13.67 (347.2)	14.67 (372.6)
Dim	2 Stack Stator 2 Stage Gearhead	3 Stack Stator 2 Stage Gearhead
A	14.94 (379.5)	15.94 (404.9)

* "N" option utilizes adapter from M20x1.5 to 1/2" NPT thread. Dia 1-5/16 (24mm), length 3/4" (19mm)

R2M115 and R2G115 Rotary Motor/Gearmotor Dimensions

R2M115 Dimensions

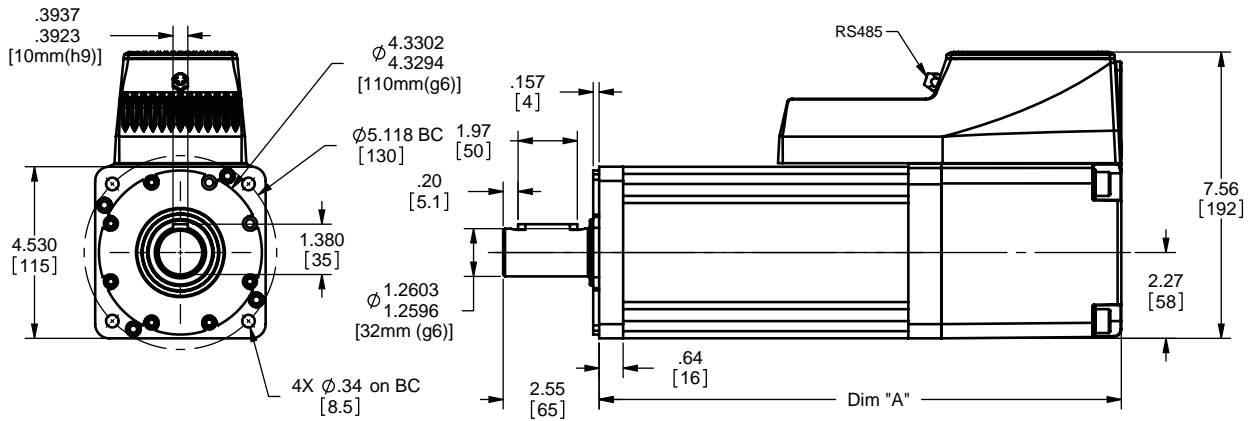


Without Brake Option		
Dim	1 Stack Stator	2 Stack Stator
A	9.87 (250.7)	11.87 (301.5)

With Brake Option		
Dim	1 Stack Stator	2 Stack Stator
A	11.60 (294.6)	13.60 (345.4)

* "N" option utilizes adapter from M20x1.5 to 1/2" NPT thread. Dia 1-5/16 (24mm), length 3/4" (19mm)

R2G115 Dimensions



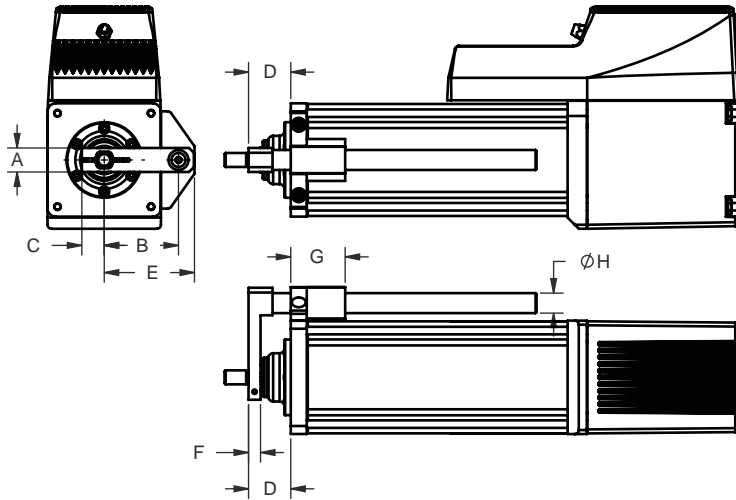
Without Brake Option		
Dim	1 Stack Stator 1 Stage Gearhead	2 Stack Stator 1 Stage Gearhead
A	13.88 (352.6)	15.88 (403.4)
Dim	1 Stack Stator 2 Stage Gearhead	2 Stack Stator 2 Stage Gearhead
A	15.49 (393.4)	17.49 (444.2)

With Brake Option		
Dim	1 Stack Stator 1 Stage Gearhead	2 Stack Stator 1 Stage Gearhead
A	15.43 (391.9)	17.43 (442.7)
Dim	1 Stack Stator 2 Stage Gearhead	2 Stack Stator 2 Stage Gearhead
A	17.04 (432.8)	19.04 (483.6)

* "N" option utilizes adapter from M20x1.5 to 1/2" NPT thread. Dia 1-5/16 (24mm), length 3/4" (19mm)

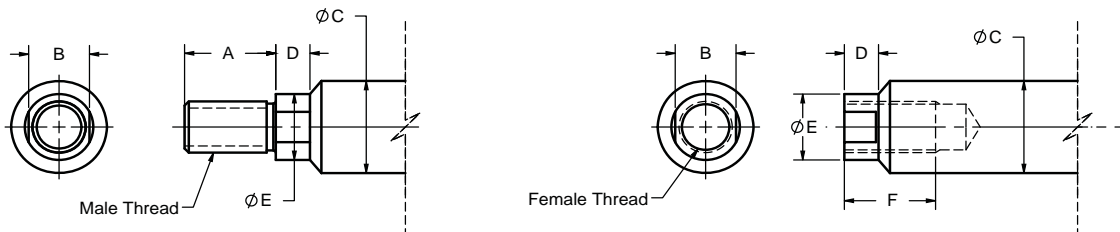
Options and Rod End Attachment Dimensions

Anti-Rotate Option



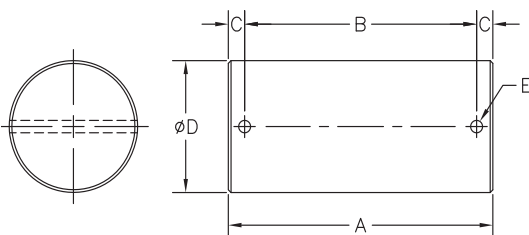
Dims in inches (mm)	T2M/X090	T2M/X115
A	0.75 (19.1)	1.13 (28.7)
B	2.32 (58.9)	3.06 (77.7)
C	0.70 (17.8)	1.00 (25.4)
D	1.32 (33.5)	1.65 (41.9)
E	2.82 (71.6)	3.63 (92.2)
F	0.38 (9.7)	0.50 (12.7)
G	1.70 (43.2)	1.97 (50.0)
ØH	0.63 (16.0)	0.75 (19.1)

Actuator Rod End Options



	A	B (Inch)	B (Metric)	ØC	D	ØE	F	Male "M" (Inch)	Male "A" (Metric)	Female "F" (Inch)	Female "B" (Metric)
T2M/X090	1.250 (31.8)	0.625	17.0	0.787 (20.0)	0.281 (7.1)	0.725 (18.4)	1.000 (25.4)	1/2-20 UNF-2A	M16x1.5 6g	1/2-20 UNF-2B	M16x1.5 6h
T2M/X115	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 6g	5/8-18 UNF-2B	M16x1.5 6h

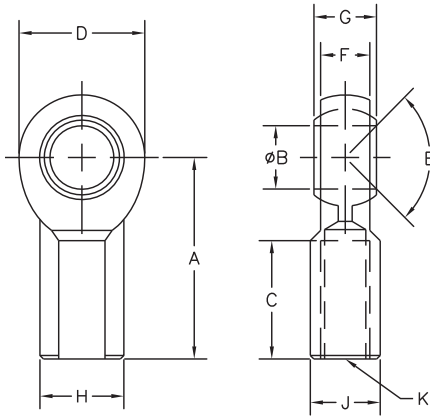
Clevis Pin



		A	B	C	ØD	ØE
T2M/X090	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)
T2M/X115	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)

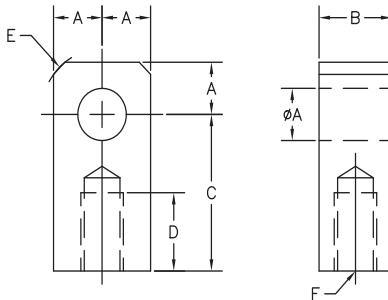
Rod End Attachment Dimensions (continued)

Spherical Rod Eye



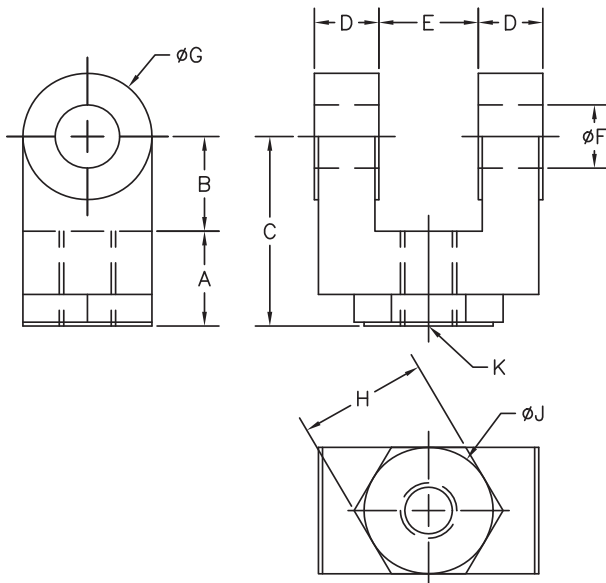
	T2M/X090	T2M/X115
	SRM050	SRM075
A	2.125" (54.0 mm)	2.88" (73.2 mm)
ϕB	0.500" (12.7 mm)	0.75" (19.1 mm)
C	1.156" (29.4 mm)	1.72" (43.7 mm)
D	1.312" (33.3 mm)	1.75" (44.5 mm)
E	6 Deg	14 Deg
F	0.500" (12.7 mm)	0.69" (17.5 mm)
G	0.625" (15.9 mm)	0.88" (22.3 mm)
H	0.875" (22.2 mm)	1.13" (28.7 mm)
J	0.750" (19.1 mm)	1.00" (25.4 mm)
K	1/2-20	3/4-16

Rod Eye



	T2M/X090	T2M/X115
	REI050	RE075
ϕA	0.50" (12.7 mm)	0.75" (19.05 mm)
B	0.75" (19.05 mm)	1.25" (31.8 mm)
C	1.50" (38.1 mm)	2.06" (52.3 mm)
D	0.75" (19.05 mm)	1.13" (28.7 mm)
E	0.375" (9.53 mm)	0.88" (22.2 mm)
F	1/2-20	3/4-16

Rod Clevis



	T2M/X090	T2M/X115
	RCI050	RC075
A	0.750" (19.05 mm)	1.125" (28.58 mm)
B	0.750" (19.05 mm)	1.25" (31.75 mm)
C	1.500" (38.1 mm)	2.375" (60.3 mm)
D	0.500" (12.7 mm)	0.625" (15.88 mm)
E	0.765" (19.43 mm)	1.265" (32.12 mm)
ϕF	0.500" (12.7 mm)	0.75" (19.1 mm)
ϕG	1.000" (25.4 mm)	1.50" (38.1 mm)
H	1.000" (25.4 mm)	1.25" (31.75 mm)
ϕJ	N/A	1.25" (31.75 mm)
K	1/2-20	3/4-16

Linear Actuator Ordering Guide

TRITEX II T2M/X LINEAR ACTUATOR ORDERING GUIDE	
AAABBB-CCDD-EFG-HH-III-II-JJJ-KKK- (XX..XX - #####)	
AAA = Actuator Type	III-II = Motor Stator, All 8 Pole
T2M = Tritex II Linear Actuator, standard mechanical capacity	T2M/X090 Stator Specifications
T2X = Tritex II Linear Actuator, high mechanical capacity	138-40 = 1 Stack, 230 VAC, 4000 rpm
BBB = Actuator Frame Size	238-40 = 2 Stack, 230 VAC, 4000 rpm
090 = 90 mm	238-30 = 2 Stack, 230 VAC. 3000 rpm (N/A with 0.1" lead)
115 = 115 mm	T2M/X115 Stator Specifications
CC = Stroke Length	138-30 = 1 Stack, 230 VAC, 3000 rpm
03 = 3 inch (75 mm) (T2M/X090 only)	238-20 = 2 Stack, 230 VAC, 2000 rpm
06 = 6 inch (150 mm)	238-15 = 2 Stack, 230 VAC, 1500 rpm (N/A with 0.1" lead)
10 = 10 inch (250 mm)	JJJ = Voltage
12 = 12 inch (305 mm)	230 = 115-230 VAC, single phase
18 = 18 inch (455 mm)	KKK = Option Board
DD = Lead (linear travel per screw revolution)	SIO = Standard I/O Interconnect
01 = 0.1 inch (2.54 mm)	IA4 = SIO plus Isolated 4 - 20 mA Analog I/O
02 = 0.2 inch (5.08 mm)	EIP = SIO plus Ethernet IP
05 = 0.5 inch (12.7 mm)	ABZ = SIO plus encoder output signal, requires IE Feedback option. Includes M12 connector for encoder output signals. (3)
08 = 0.75 inch (19.05 mm) (T2M/X115 only) (6)	X..XX = Travel and Housing Options (Multiples Possible)
E = Connections	Travel Options
G = Standard Straight Threaded Port with Internal terminals, M20x1.5	AR = External Anti-rotate
N = NPT Threaded Port via Adapter with Internal Terminals, 1/2" NPT	PF = Preloaded Follower (4)
I = Intercontec Style - Exlar std, M16/M23 Style Connector	L1/2/3 = External Llimit Switches
X = Custom Connectivity	RB = Rear Brake
F = Mounting	XT = Special Travel Options
B = Front & Rear Flange	Housing Options
F = Front Flange	P5 = IP65 Sealed Housing (T2M only)
C = Rear Clevis	HC = Type III Hard Coat Anodized (5)
R = Rear Flange	FG = Smooth White Epoxy Coating
G = Metric Rear Clevis	Special Motor Options
S = Side Mount	XL = Special Lubrication (7)
D = Double Side Mount	J = Metric Side Mount
T = Side Trunnion	XM = Special Motor Option
K = Metric Double Side Mount	XH = Special Housing Option
T = Side Trunnion	XT = Manual Drive Hand Wheel (T2X only)
E = Extended Tie Rod	XT = Protective Bellows
Q = Metric Side Trunnion	XT = Splined Main Rod
M = Metric Extended Tie Rod	##### = Part Number Designator for Specials
X = Special	Optional 5 digit assigned PN to designate unique model numbers
G = Rod End	Notes:
M = Male US Standard Thread (1)	(1) Chrome-plated carbon steel. Threads not chrome-plated.
A = Male Metric Thread (1)	(2) Available Q4, 2009
F = Female US Standard Thread(1)	(3) Will require external cable for encoder output signals
B = Female Metric Thread (1)	(4) The dynamic load rating of zero backlash, preloaded screws is 63% of the dynamic load rating of the std 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-pre loaded screw.
W = Male, US Standard Thread 440C SS	(5) This housing option may indicate the need for special material main rods or mounting.
R = Male Metric Thread 440C SS	(6) 0.75 lead not available above 12" stroke.
V = Female US Standard Thread 440C SS	(7) To achieve -40 operating temperature, specify -XL in the actuator model mask and define Mobilgrease 28 in order notes. Other special lubricants are also available.
L = Female Metric Thread 440C SS	
X = Special (please specify)	
HH = Feedback Type	
HD = Analog Hall Device	
IE = Incremental Encoder, 8192 count resolution	
AF = Absolute Feedback (2)	

Rotary Motor and Gearmotor Ordering Guide

TRITEX II R2M MOTOR OR R2G GEARMOTOR ORDERING GUIDE		
R2M/GAAA-BBB-CDEF-GG-HHH-HH-III-JJJ (XX...XX) - #####		
R2M/G = Motor Type		F = Brake Option
R2M = Tritex II AC Rotary Motor		S = No brake, standard
R2G = Tritex II AC Rotary Gearmotor		B = Electric brake, 24 VDC
AAA = Frame Size		GG = Feedback Type
090 = 90 mm		HD = Analog Hall Device
115 = 115 mm		IE = Incremental Encoder, 8192 count resolution
BBB = Gear Ratio		AF = Absolute Feedback (2)
Blank = R2M		HHH-HH = Motor Stators
Single Reduction Ratios	Double Reduction Ratios	R2M/G090 Stator Specifications
004 = 4:1	016 = 16:1 020 = 20:1	238-40 = 2 Stack, 230 VAC, 4000 rpm
005 = 5:1	025 = 25:1 040 = 40:1	238-30 = 2 Stack, 230 VAC, 3000 rpm
010 = 10:1	050 = 50:1 100 = 100:1	338-20 = 3 Stack, 230 VAC, 2000 rpm
C = Shaft Type		R2M/G115 Stator Specifications
K = Keyed		138-30 = 1 Stack, 230 VAC, 3000 rpm
R = Smooth/Round		238-20 = 2 Stack, 230 VAC, 2000 rpm
X = Special Shaft		238-15 = 2 Stack, 230 VAC, 1500 rpm
D = Connections		III = Voltage
G = Standard Straight Threaded Port with Internal terminals, M20x1.5		230 = 115-230 VAC, single phase
N = NPT Threaded Port via Adapter with Internal Terminals, 1/2" NPT		JJJ = Option Board
I = Intercontec style - Exlar std, M16/M23 Style Connector		SIO = Standard I/O Interconnect
X = Custom Connectivity		IA4 = SIO plus Isolated 4-20 mA Analog I/O
E = Housing Options		EIP = SIO plus Ethernet IP
G = Anodized Gray, Exlar Standard		ABZ = SIO plus encoder output signal, requires IE Feedback option. Includes M12 connector for encoder output signals (3)
H = Type III Hard Coat Anodized (1)		XX = Special Options (multiples possible)
F = Smooth White Epoxy Coating		XH = Special Housing Options
E = Electroless Nickel Plating		XM = Special Motor Options
X = Special or Custom		XL = Special Lubrication (4)
		##### = Part Number Designator for Specials
		Optional 5 digit assigned PN to designate unique model number
		Notes:
		(1) May require special material main rods or mounting
		(2) Available Q4, 2009
		(3) Will require external cable for encoder output signals
		(4) To achieve -40 operating temperature, specify -XL in the actuator model mask and define Mobilgrease 28 in order notes. Other special lubricants are also available.

Options/Accessories



Model TTUSB485

The model TTUSB485 is a USB (Universal Serial Bus) port to 2 or 4 wire isolated RS-485/422 converter. The serial port side can be set up for an RS-422 or RS-485 network. USB bus supplies power so no separate power supply is needed.



Model TT232485

The Model TT232485 is a feature-packed RS232 to RS-422/485 9-pin converter. The driver uses automatic SD (send data) or TS (handshake) control, or can be configured as always enabled for use in RS-422 systems.



Model TT485SP

RS485 communications splitter. Use to daisy-chain multiple Tritex actuators.

Cables/Accessories Ordering Guide

TRITEX II SERIES CABLES & ACCESSORIES		Part Number
Cables		
Raw Power Cable, prepared on one end for use with cable gland GLD-T2M16x1.5		CBL-T2IPC-RAW-xxx
Raw I/O Cable, prepared on end end for use with cable gland GLD-T2M16x1.5		CBL-T2IOC-RAW-xxx
Cable Gland - Nickel-plated brass, CE shielding provisions, M20x1.5, for use with above cables		GLD-T2M16x1.5
M20 x 1.5 to 1/2" NPT threaded hole adapter		ADAPT-M20-NPT1/2
Communication Cable, PICO type connector, 4 pin, xxx = Length in feet. Std lengths 15, 25, 50 feet		CBL-TTCOM-xxx
Power Cables, molded M23 style connector, 6 pin, xxx = Length in feet. Std lengths 15, 25, 50 feet		CBL-T2IPC-SMI-xxx
I/O Cables, molded M16 style connector, 19 pin, xxx = Length in feet. Std lengths 15, 25, 50 feet		CBL-T2IOC-SMI-xxx
Cable for encoder output of ABZ option board		CBL-T2ENC-xxx
Accessories		
Communication Cable for use with TT485SP, 6 ft.		CBL-TTDAS-006
Communication Cable for use with TT485SP, 15 ft.		CBL-TTDAS-015
Port to RS-485/422 Converter		TTUSB485
RS-232 to RS-422/485 Converter		TT232485
RS-485 Splitter		TT485SP
Braking Resistor, ESTOP Duty		T2BR1
Rod Ends and Accessories		
Clevis Pin for T2M/X090 male "M" rod end 1/2-20 thread		CP050
Clevis Pin for T2M/X115 male "M" rod end 3/4-16 thread		CP075
Spherical Rod Eye for T2M/X090 male "M" rod end 1/2-20 thread		SRM050
Spherical Rod Eye for T2M/X115 male "M" rod end 3/4-16 thread		SRM075
Rod Eye for T2M/X090 male "M" rod end 1/2-20 thread		REI050
Rod Eye for T2M/X115 male "M" rod end 3/4-16 thread		RE075
Rod Clevis for T2M/X090 male "M" rod end 1/2-20 thread		RCI050
Rod Clevis for T2M/X115 male "M" rod end 3/4-16 thread		RC075
Jam Nut for T2M/X090 male rod end, 1/2 - 20		JAM1/2-20-SS
Jam Nut for T2M/X115 male rod end, 3/4-16		JAM3/4-16-SS



The Company - Headquartered in suburban Minneapolis, Minnesota, Exlar 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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