

E501

**ENERPAC** 

POWERFUL SOLUTIONS. GLOBAL FORCE.

# UNI-LIFT<sup>®</sup>

## Actuators



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All information in this catalog can be changed due to product improvements without prior notice.

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Enerpac "Yellow Pages" provides in-depth technical information for UNI-LIFT® Actuators.

[www.enerpac.com/unilift](http://www.enerpac.com/unilift)

Visit the Enerpac Web Site to find:

- New product information
- The Enerpac tradeshow schedule
- Product manuals (instruction and repair part sheets)
- Distributors and Service Centers in your area
- Integrated Solutions applications from around the world
- Ordering instructions to request product catalogs



**E**nerpac offers a complete range of high force tools and equipment for all industrial applications, with local availability and after sale service anywhere in the world... this has made Enerpac the undisputed global market leader.

The UNI-LIFT® product line is an engineered solution offering precision control in a mechanical package. Design principals integrate a power screw which converts rotary motion to linear movement. Configurations in either standard or custom designs cover a wide range of applications and use.

UNI-LIFT® Actuators provide force up to 250 tons, travel lengths up to 20 feet and speeds up to 175 in./min. Each Actuator utilizes a high-strength rolled screw and hardened gear nut to provide maximum durability. The housings are constructed with aluminum alloy or ductile iron material coupled with corrosion-resistant plating to withstand the most demanding and rigorous environments.

In addition, Enerpac offers a comprehensive range of accessories to complete your system arrangement for added flexibility.



## Online UNI-LIFT® Configurator



The UNI-LIFT® Configurator guides you through a step-by-step process to properly configure the actuator for your system.

The configurator calculates the torque and horsepower requirements of your system with downloadable and scaled 2D and 3D drawings.

Please visit [www.enerpac.com/unilift](http://www.enerpac.com/unilift) to learn more about UNI-LIFT® Actuators.



## Machine Screw Actuators

UNI-LIFT® M-Series, Machine Screw Actuators, offer positive locking, precise positioning and uniform lifting speeds.

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## Ball Screw Actuators

UNI-LIFT® B-Series, Ball Screw Actuators, provide a high speed, high cycle precision lift system.

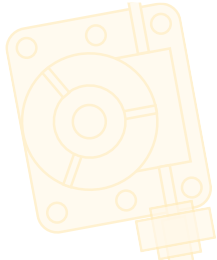
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## UNI-LIFT® System Accessories

UNI-LIFT® provides all power transmission components for your positioning applications.

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*Engineers utilized two (2) UNI-LIFT® 100-ton Actuators with 15' of travel to raise and lower the ramp on each ferry dock along the Mississippi River, USA. The Department of Transportation engineers needed a way of lifting and lowering ramps during high and low tide conditions, while holding up to the harsh environmental conditions of the Gulf Coast.*



*When engineers needed a quick and compact way of opening the large doors of these plating tanks, they selected a UNI-LIFT® solution. The application utilizes two 5-ton double-clevis Actuators, with a motor and a limit switch box mounted on each. The operator just pushes a button to open the doors and pushes another to close them. This method greatly enhances operator safety and helps prevent cross-contamination between tanks.*

*UNI-LIFT® Actuators are used extensively in a variety of material handling applications. Whether used to position conveyer belts, place tension on overhead beams or to move heavy-duty equipment, UNI-LIFT® Actuators are the ideal solution for many jacking, tensioning, and positioning applications. Whether you have one or multiple lifting points, UNI-LIFT® Actuators are the perfect solution for many different OEM material handling and motion-control applications.*



## Model Type

- M-Series Machine Screw
- B-Series Ball Screw

## Mounting Styles

- Inverted
- Upright
- Double Clevis

## Screw Configurations

- Rotating
- Translating
- Keyed
- Anti-Backlash (applicable models)

## Gear Ratios *(Ratios vary with tonnage)*

- Low
- Medium
- High

## End Configurations

- Threaded
- Plain
- Clevis
- Top Plate



## Drive Options

- Couplers
- Motors
- Motor Adaptors
- Worm Gear Reducers
- Mitre Gear Boxes
- Shafting
- Hand Wheels



## Control Options

- Limit Switches
- Control Boxes / Encoders
- Transducers
- Digital Displays



## Protective Options

- Boots
- Stop Nuts



## Key Points to Consider When Properly Sizing an Actuator

- Total system load
- Application loading conditions
- Operating intervals of the actuator
- Linear velocity requirements
- Ambient temperature
- Environmental conditions
- Mounting position requirements
- Load screw configuration
- Screw length requirements
- End mounting requirements
- System components needed

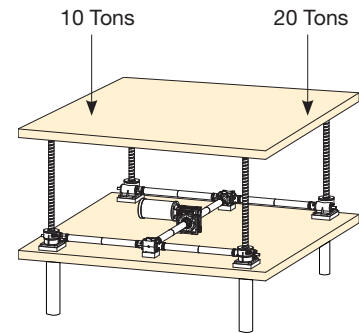
Refer to technical specifications on pages 14 & 36.



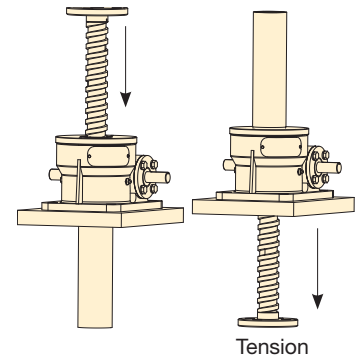
## Total Load Requirements

UNI-LIFT® Actuators can be used individually or in combination with each other to move a load.

- When a single actuator is used, the maximum load is the highest force value the actuator will have to sustain in a particular application.
- When more than one actuator is used, the load can be evenly distributed or unbalanced where one or more actuators in the system are subjected to a higher force in the system.
- The maximum load in an unbalanced system is equal to the highest force applied to a single actuator in the system. In the case of an unbalanced load, size the actuator based on the maximum force applied to a single actuator.



Compression

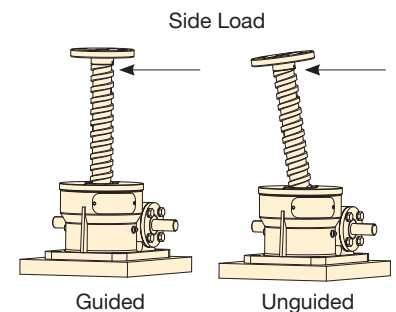


## Application Loading Conditions

Loading conditions are factors that can affect the load screw during the operation. The orientation of the actuator to the load can cause the load screw to be axially loaded in compression or tension. If the load screw will see both compression and tension loads, the use of the anti-backlash design is recommended. Refer to page 72.

- **Guided loads** describe a loading condition where proper alignment between the actuator and the load is maintained by external guiding in the structure. With longer columns guided loads allow you to double your load screw length for a given load.
- **Unguided loads** describe a loading condition where the actuators must rely on the load screw to maintain alignment of the system. Side loads are not recommended in an unguided system.

Refer to the Yellow Pages 71 & 76 for Column Buckle information to properly size your actuator.





## Usage Requirements

- Operating Cycle Requirements**  
 To determine the type and size of the actuator, calculate the required duty and operating cycles.

*Refer to the Yellow Pages 70 & 75 for Duty Cycle information to properly size your actuator.*

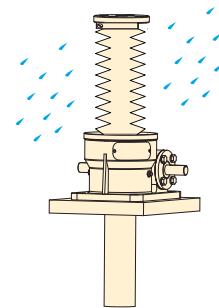
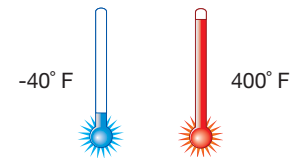
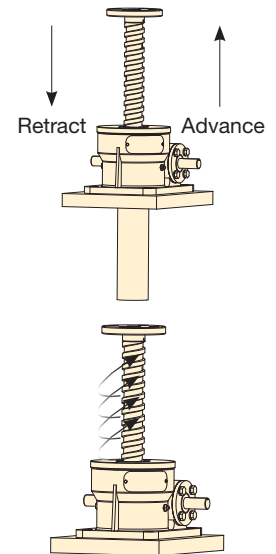
- Linear Velocity Requirements**  
 Linear velocity is the speed that the actuator moves the load based on the output speed of the motor. Turns Per Inch (TPI) is the number of rotations of the actuator's input shaft required for one-inch of travel. Actuators are available in two to three different gear ratios.

- Operating Temperature**  
 To determine the duty cycle limit you will need the maximum temperature the actuator will be exposed to. For severe conditions, Enerpac offers seal and grease options capable of operating in temperatures from -40° F to 400° F.

*For detailed information on Safety, Installation and Maintenance refer to page 80 of the Yellow Pages.*

- Environmental Conditions**  
 The actuator may require a boot to protect the load screw. Boots are used when the load screw may be exposed to contamination, corrosive environments, where an exposed screw is viewed as a hazard or where it is critical to ensure lubrication is retained within the actuator to meet cleanliness requirements.

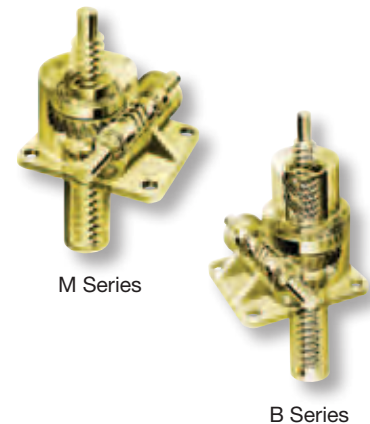
*Refer to Accessory page 62 for detailed information on Boot Sizing.*



## Determine Which Actuator Best Suits the Application

- M-Series Machine Screw Actuator**  
 General applications where the load screw uses a precision rolled acme, self locking screw thread that requires no cribbing to hold load into position.
- B-Series Ball Screw Actuator**  
 Used in high cycle applications, the load screw uses a precision rolled ball screw. A ball screw is 90% efficient, offering a smoother, faster operation. A mechanical break is required to hold position.

*Refer to M- and B-Series Overview pages 12 and 36 for detailed information on actuator models.*

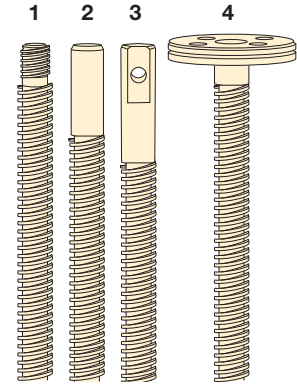


M Series

B Series

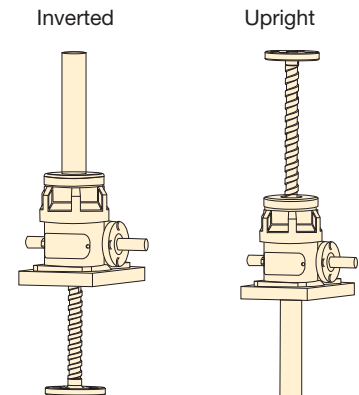
## End Configurations

- Threaded End (1)**  
 The end of the load screw is machined to include a standard unified V-thread form strong enough to sustain the load capacity of the actuator. This option can be used to attach customer supplied mounting configurations.
- Plain End (2)**  
 The end of the load screw is machined to provide a smooth, unthreaded portion suitable for engaging pillow blocks or other bearing supports. Bearing supports are highly recommended when long load screws are used. This option is only available with the Rotating design.
- Clevis End (3)**  
 The end of the load screw features a cross hole for mounting with a pinned connection. This option is used in applications that require a pivoting mount.
- Top Plate (4)**  
 The end of the load screw is adapted with a flange to provide mounting to surfaces perpendicular to the load screw. This option will easily adapt to mounting structures.



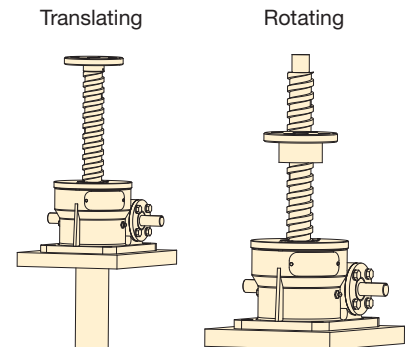
## Determine The Mounting Style

- Inverted Configuration**  
 The load screw protrudes from the same side as the machined mounting face on the housing.
- Upright Configuration**  
 The load screw protrudes from side opposite the machined mounting face on the housing.
- Double Clevis Configuration**  
 The mounting points for the housing and the screw are clevis and pin type. (Illustration not shown.)



## Determine Load Screw Configuration

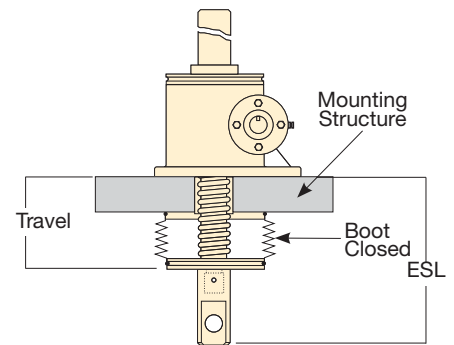
- Translating Design**  
 The load screw is threaded into the driven gear. Rotation of the input shaft turns the driven gear which moves the load screw in and out of housing.
- Rotating Design**  
 The load screw is pinned to the driven gear. Rotation of the input shaft turns the driven gear which rotates the load screw. An auxiliary nut travels the exposed length of the load screw.
- Keyed Screw Design**  
 A key prevents the load screw rotation. Due to the inefficiency of this design, they are down rated to 25% of the load rated capacity. (Illustration not shown.)
- Anti-Backlash Design**  
 An adjustable nut on the load screw eliminates axial endplay. (Illustration not shown.)  
*Refer to page 72 for details.*



## Determine The Extended Screw Length (ESL)

The length of screw that is needed to achieve the required movement, and allow for boot closed heights, traveling nuts, stop nuts and the thickness of the supporting structure between the actuator and the load.

Refer to the Yellow Pages 71 & 76 for more information on ESL.

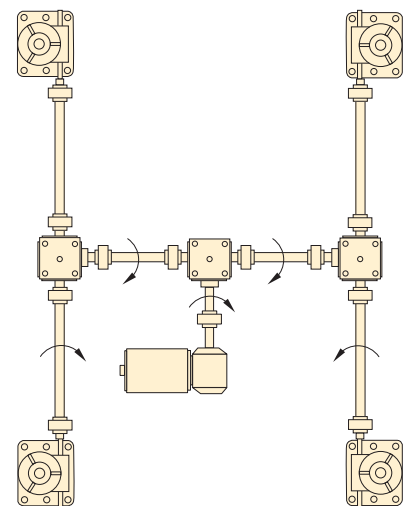


## System Arrangement

Actuators can be configured in multiple system arrangements to allow synchronized lifting. Even when the loads are unequally distributed, the system can lift uniformly. Enerpac offers a complete line of power transmission equipment that can be used to set up your system.

- Determine the system arrangement that best fits the application. Calculate the required torque and horsepower requirements for the system.
- Select a motor with a power rating greater than the horse power requirement and with starting and running torque capability greater than calculated torque requirements.
- Select system torque transmission equipment (reducers, mitre gear boxes, couplings, etc.) with ratings greater than the torque to be transmitted.
- Size shafting for system starting torque to be transmitted.

Refer to the Yellow Pages for more information on Motor Sizing and System Arrangements.



**E**nerpac understands that no two projects are alike; therefore, we offer specialized engineering and design expertise to complete your system integration. Whether you are driving a single actuator or a multiple actuator system, our comprehensive range of control technologies and accessories brings your system together. Enerpac Application Engineers will deliver the precise technical information and support to specify actuator sizing, motor sizing, controls, reducers, mitre boxes, couplings, shafting and pillow blocks to accommodate any system arrangement.

Enerpac's extensive manufacturing capabilities provides a single source for all of your equipment requirements.

Sample system arrangements are shown to help generate ideas. Additional information is included in the Yellow Pages starting on page 64 or contact Enerpac for assistance.

*UNI-LIFT® Actuators were the ideal choice for adjusting complex scaffolding required in aircraft maintenance. Their precision movement allowed safe, efficient control and positioning.*



## Online UNI-LIFT® Configurator



The UNI-LIFT® Configurator guides you through a step-by-step process to properly configure the actuator for your system.

The configurator calculates the torque and horsepower requirements of your system with downloadable and scaled 2D and 3D drawings.

Please visit [www.enerpac.com/unilift](http://www.enerpac.com/unilift) to learn more about UNI-LIFT® Actuators.



## Machine Screw Actuators

UNI-LIFT® M-Series, Machine Screw Actuators offer positive mechanical action and precise positioning.

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## Ball Screw Actuators

UNI-LIFT® B-Series, Ball Screw Actuators, provide a high speed, high cycle precision lift system.

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## UNI-LIFT® System Accessories

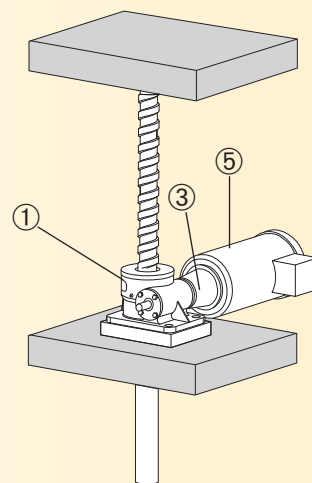
UNI-LIFT® provides all power transmission components for your positioning applications.

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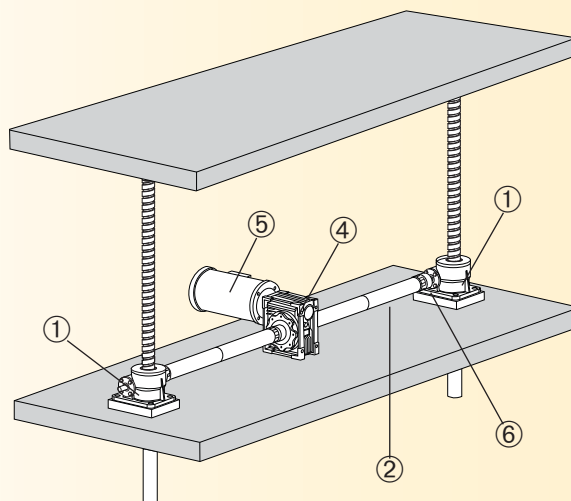
## System Arrangement Reference Numbers

- ① UNI-LIFT® Actuator
- ② Shafting
- ③ Motor Adaptor
- ④ Worm Gear Reducer
- ⑤ Motor
- ⑥ Coupler
- ⑦ Mitre Gear Box

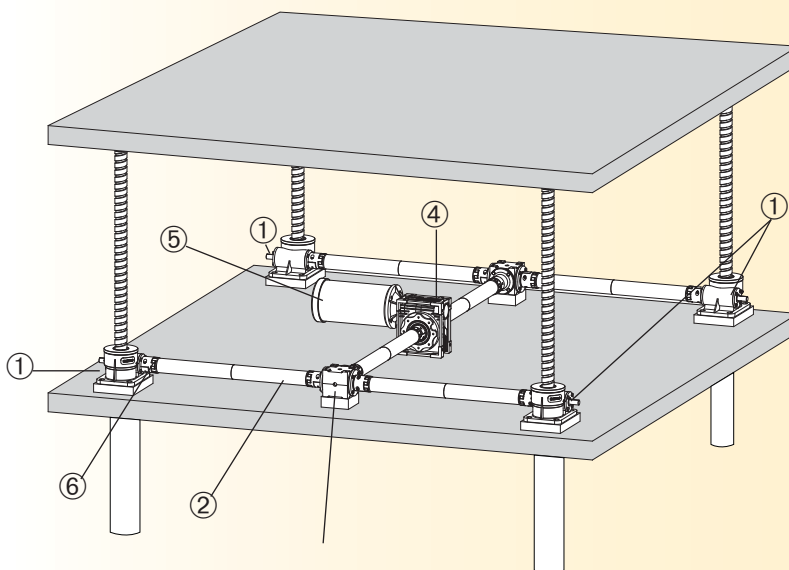
### ▼ Single Point Actuator System



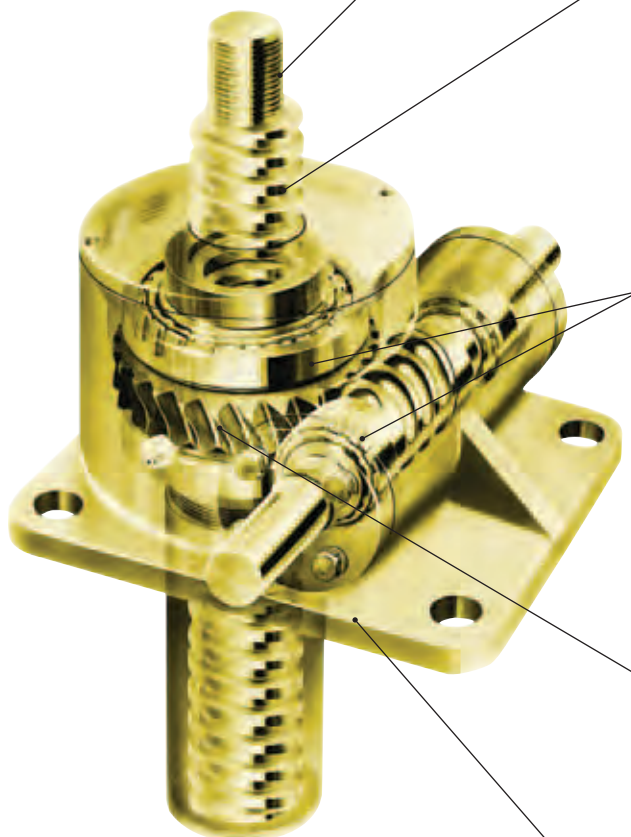
### ▼ Two Point Actuator System



### ▼ Four Point Actuator System



UNI-LIFT® Machine Screw Actuators offer precise positioning, uniform lifting speeds and capacity up to 250 tons. Standard model configurations include upright or inverted units with translating or rotating lifting screws. End configurations are available in top plate, plain, threaded or clevis ends.



## Machine Screw Cutaway

### Screw End Configurations

- Variety of end configurations are available including: threaded, clevis, plain and top plate.

### High Strength Roll-Formed Threaded Load Screw

- Provide minimum friction for smooth operation and longer life
- Self-locking, highly accurate lead design to provide positive positioning
- Minimal axial backlash with Class 3G fit

### Tapered Roller Bearings

- Preloaded for reduced assembly spring rate and high thrust loads
- Provides excellent support for side loading and horizontal applications
- Maintains exact gear alignment under separating and thrust forces
- Bearings sized for endurance and maximum loading conditions

### High Strength Gearing

- Precision gears manufactured to American Gear Standards with close tolerances and minimal backlash
- Heat treated worm gear set provides greater efficiency, higher input speed and extended life

### Rugged Housings

- Robust aluminum alloy or ductile iron construction



## Online UNI-LIFT® Configurator

The UNI-LIFT® Configurator guides you through a step-by-step process to properly configure the actuator for your system.

The configurator calculates the torque and horsepower requirements of your system with downloadable and scaled 2D and 3D drawings.

Please visit [www.enerpac.com/unilift](http://www.enerpac.com/unilift) to learn more about UNI-LIFT® Actuators.



## Contact Enerpac!

Contact the Enerpac office nearest to you for advice and technical assistance in the layout of your ideal UNI-LIFT® System. You can also ask Enerpac for assistance by e-mail at: [unilift@enerpac.com](mailto:unilift@enerpac.com).



## Technical Calculations

For Technical Calculations, such as torque and motor sizing please see our "Yellow Pages".

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## Frequently Asked Questions

To get answers to frequently asked questions please see our "Yellow Pages".

Page: 65

Capacity (tons)	Series	Page
<b>Technical Specs.</b>		<b>14</b> ▶
<b>Ordering Matrix</b>		<b>15</b> ▶
.25	MA5	16 ▶
.75	MA15	17 ▶
1	MA20	18 ▶
1	M1	19 ▶
2	M2	20 ▶
3	M3	21 ▶
4	M4	22 ▶
5	M5	23 ▶
8	M8	24 ▶
10	M10	25 ▶
15	M15	26 ▶
20	M20	27 ▶
25	M25	28 ▶
30	M30	29 ▶
40	M40	30 ▶
50	M50	31 ▶
75	M75	32 ▶
100	M100	33 ▶

▼ Shown: Machine Screw Actuators



- Precision Rolled Acme Thread allows positioning within thousandths of an inch
- Self Locking – No cribbing required when actuator is subjected to minimal vibration
- Hardened Gear Set allows higher efficiency and longer life
- Precision Gears allow synchronized lifting in multi-actuator systems
- Rugged housings made of Cast Aluminum Alloy (MA models) or Ductile Iron to safely mount to a variety of structures



#### Configure Your M-Series Machine Screw Actuator

If you cannot configure your standard M-Series Actuator using the Matrix, please contact Enerpac for further assistance.

Visit our "Online Configurator" to replicate your specific Actuator requirements in 2D / 3D at [www.enerpac.com/unilift](http://www.enerpac.com/unilift).

Capacity:

**.25-250 ton**

Maximum Travel:

**232 inches**

Maximum Speed:

**129 in/min**



#### System Accessories

Enerpac offers a large array of motors, drive components, and boots to meet any demanding project.

Page: **47**



#### CAD Modeling Software

Our experienced sales team and application engineers will deliver the precise support you need to meet the most demanding and unique requirements. State-of-the-Art CAD modeling software offers the needed flexibility to design custom built "special" screw actuators to suit customer needs.

Visit us at [www.enerpac.com/unilift](http://www.enerpac.com/unilift)

#### ▼ SELECTION CHART

Capacity (ton)	Model Number	Load Screw Diameter (in)	Lead of Screw (in)
.25	MA5	0.500	0.250
.75	MA15	0.625	.250/.125
1	MA20	0.750	0.200
1	M1	0.750	0.250
2	M2	1.000	0.250
3	M3	1.000	0.250
4	M4	1.500	0.333
5	M5	1.500	0.375
8	M8	1.750	0.333
10	M10	2.000	0.500
15	M15	2.250	0.500
20	M20	2.500	0.500
25	M25	2.750	0.500
30	M30	3.375	0.667
40	M40	4.250	0.667
50	M50	4.250	0.667
75	M75	5.000	0.667
100	M100	6.000	0.750
150	M150	Contact Enerpac	
250	M250		



# M-Series, Ordering Matrix

▼ This is how a M-Series Machine Screw Actuator is configured:

**M 1 U T 0240 L T - A11 B1 L22 M5 N S2**

1 2 3 4 5 6 7 8 9 10 11 12 13

## 1 Model Type

**M** = Machine Screw Actuator

## 2 Ton Rating

**A5** = .25 Ton (aluminum)  
**A15** = .75 Ton (aluminum)  
**A20** = 1 Ton (aluminum)  
**1** = 1 Ton  
**2** = 2 Ton  
**3** = 3 Ton  
**4** = 4 Ton  
**5** = 5 Ton  
**8** = 8 Ton  
**10** = 10 Ton  
**15** = 15 Ton  
**20** = 20 Ton  
**25** = 25 Ton  
**30** = 30 Ton  
**40** = 40 Ton  
**50** = 50 Ton  
**75** = 75 Ton  
**100** = 100 Ton  
**150** = 150 Ton  
**250** = 250 Ton

## 3 Mounting Style

**U** = Upright  
**I** = Inverted  
**D** = Double Clevis \*

## 4 Screw Configuration

**T** = Translating  
**R** = Rotating  
**A** = Anti-Backlash\*\*  
**K** = Keyed Translating

## 5 Extended Screw Length (ESL)

**xxx.x** = Input Value (in.)  
 (Do not include decimal in part  
 No. - all data will be based on 1  
 decimal place)  
 Example: 12.0" = 0120"

## 6 Gear Ratio

**L** = Low  
**M** = Medium  
**H** = High

## 7 End Configuration

**V** = Threaded End  
**C** = Clevis End  
**P** = Plain End\*\*\*\*  
**T** = Top Plate

## 8 Motor Adaptor

**First Digit**  
**A** = Motor Adaptor  
**Second Digit**  
**1** = Right-Hand Mount  
**2** = Left-Hand Mount

## Third Digit

**1** = 56C  
**2** = 143/145TC  
**3** = 182/184C  
**4** = 182/184TC  
**5** = 213/215C  
**6** = 213/215TC

## 9 Boot Specifications\*\*\*

**First Digit**  
**B** = Boot  
**Second Digit**  
**1** = 1 Boot, No Guides  
**2** = 2 Boots, No Guides  
**3** = 1 Boot, With Guides  
**4** = 2 Boots, With Guides

## 10 Limit Switch Configuration

**First Digit**  
**L** = Limit Switch  
**Second Digit**  
**1** = Right Hand Position, 1  
**2** = Right Hand Position, 2  
**3** = Right Hand Position, 3  
**4** = Right Hand Position, 4  
**5** = Left Hand Position, 1  
**6** = Left Hand Position, 2  
**7** = Left Hand Position, 3  
**8** = Left Hand Position, 4

## Third Digit

**1** = 2 Circuit Series 360  
**2** = 2 Circuit Series 1440  
**3** = 2 Circuit Series 4320

## 11 Motor Specifications

**First Digit**  
**M** = Motor  
**Second & Third Digits**  
**1** = 1/4 hp, 1750 RPM  
**2** = 1/4 hp, 1140 RPM  
**3** = 1/3 hp, 1750 RPM  
**4** = 1/3 hp, 1140 RPM  
**5** = 1/2 hp, 1750 RPM  
**6** = 1/2 hp, 1140 RPM  
**7** = 3/4 hp, 1750 RPM  
**8** = 3/4 hp, 1140 RPM  
**9** = 1 hp, 1750 RPM  
**10** = 1 hp, 1140 RPM  
**11** = 1.5 hp, 1750 RPM  
**12** = 1 hp, 1140 RPM  
**13** = 2 hp, 1750 RPM  
**14** = 2 hp, 1140 RPM  
**15** = 3 hp, 1750 RPM  
**16** = 3 hp, 1140 RPM  
**17** = 5 hp, 1750 RPM  
**18** = 5 hp, 1140 RPM  
**19** = 7.5 hp, 1750 RPM  
**20** = 10 hp, 1750 RPM

## 12 Stop Nut

**N** = Stop Nut

## 13 Single Shaft

**First Digit**  
**S** = Shaft  
**Second Digit**  
**1** = Right Hand  
**2** = Left Hand

\*Double Clevis options are available on models: M2, M3, M4, M5, M8, M10, M15, M20  
 \*\*Anti-Backlash options are available on models: M2, M5, M10, M15, M20, M30, M50  
 \*\*\* Standard Boot material is Neoprene, alternate materials are available, see page 62 -  
 consult factory for boots on rotating jacks  
 \*\*\*\* Plain end for rotating jacks only.

Gear Center (in)	Gear Ratio (in)			Turns of Input Shaft - 1 inch			Torque Required to Lift 1 lbs. (in-lbs)			No Load Torque (in-lbs)	Maximum Input RPM	Estimated Weight (lbs)		Radius of Gyration (in)	Model Number
	Low	Med.	High	Low	Med.	High	Low	Med.	High			0" Travel	Per Inch		
0.938	5:1	-	-	20	-	-	0.022	-	-	2.0	2587	2	0.1	0.094	MA5
0.938	5:1	-	5:1	20	-	40	0.020	-	0.015	2.0	2587	2	0.1	0.125	MA15
1.250	5:1	-	20:1	25	-	100	0.020	-	0.010	4.0	2587	5	0.5	0.154	MA20
1.500	5:1	-	10:1	20	-	40	0.021	-	0.013	3.0	2587	9	0.2	0.156	M1
1.750	6:1	-	24:1	24	-	96	0.020	-	0.009	5.0	1800	17	0.6	0.218	M2
1.831	6:1	8:1	12:1	24	32	48	0.021	0.017	0.013	4.0	1800	13	0.4	0.218	M3
2.256	5½:1	12:1	24:1	16	36	72	0.030	0.018	0.012	5.0	1800	23	0.7	0.334	M4
2.188	6:1	-	24:1	16	-	64	0.028	-	0.011	12.0	1800	30	0.7	0.316	M5
3.010	6:1	-	12:1	18	-	36	0.030	-	0.019	7.0	1800	47	0.9	0.396	M8
2.598	8:1	-	24:1	16	-	48	0.029	-	0.015	18.0	1800	45	1.1	0.423	M10
2.598	8:1	-	24:1	16	-	48	0.031	-	0.015	18.0	1800	55	1.2	0.486	M15
2.875	8:1	-	24:1	16	-	48	0.033	-	0.021	36.0	1800	80	1.7	0.566	M20
4.005	9:1	-	18:1	18	-	36	0.031	-	0.019	10.0	1450	103	2.1	0.628	M25
3.750	10%:1	-	32:1	16	-	48	0.034	-	0.017	48.0	1200	145	2.9	0.743	M30
5.162	-	-	20:1	-	-	30	-	-	0.024	12.0	1200	230	5.0	0.985	M40
5.313	10%:1	-	32:1	16	-	48	0.040	-	0.021	96.0	1200	280	5.0	1.074	M50
6.003	10%:1	-	32:1	16	-	48	0.042	-	0.021	156.0	900	495	6.3	1.149	M75
7.500	12:1	-	36:1	16	-	48	0.045	-	0.024	204.0	900	845	7.4	1.387	M100
Contact Enerpac															M150
Contact Enerpac															M250

# MA5 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
.50" dia. X .25" lead	<b>Low</b>	5:1	20

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

Aluminum housing is standard on MA5, MA15 and MA20 Actuators.

Please see page 15 for ordering Matrix.

## MA5 Series



Capacity:

**.25 ton**

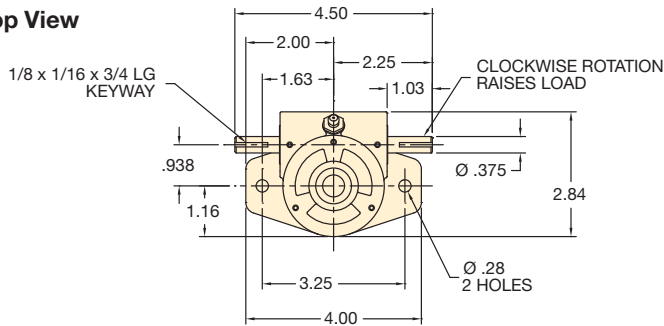
Maximum Travel:

**136 inches**

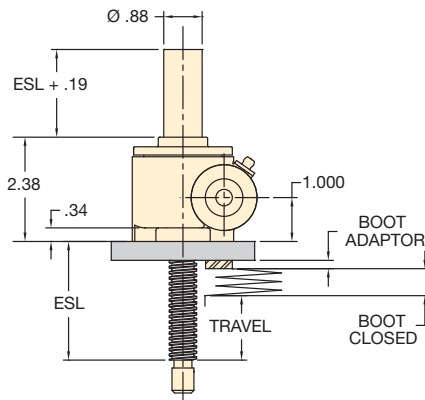
Maximum Speed:

**129 in/min**

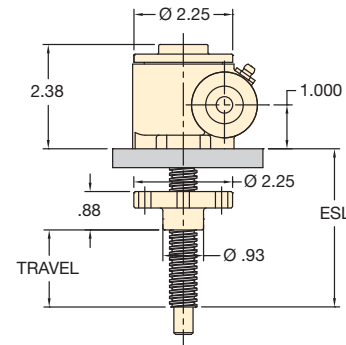
### Top View



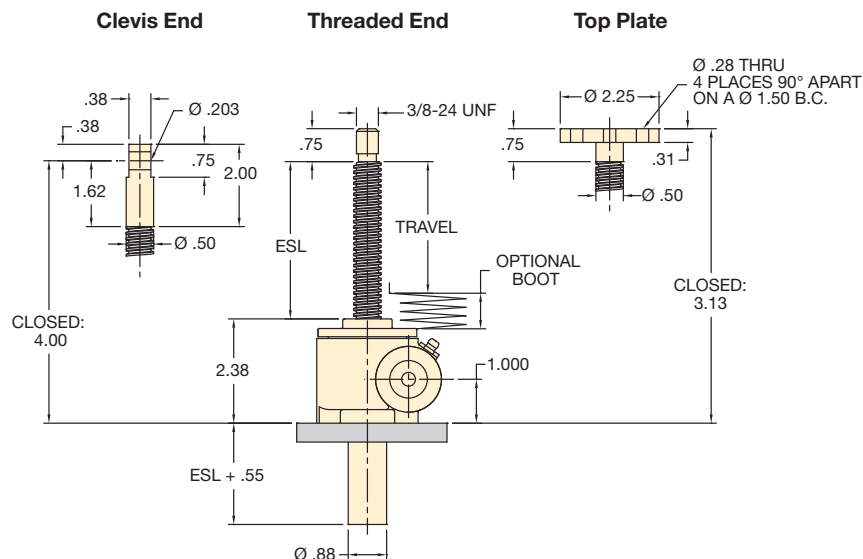
### Inverted Translating



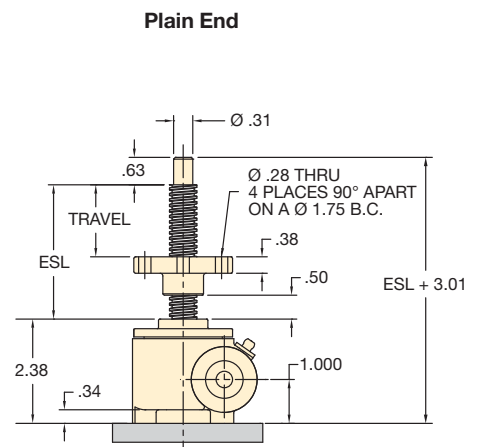
### Inverted Rotating



### Upright Translating



### Upright Rotating



# MA15 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
5/8" dia. X .25" lead	<b>Low</b>	5:1	20
5/8" dia. X .125" lead	<b>High</b>	5:1	40

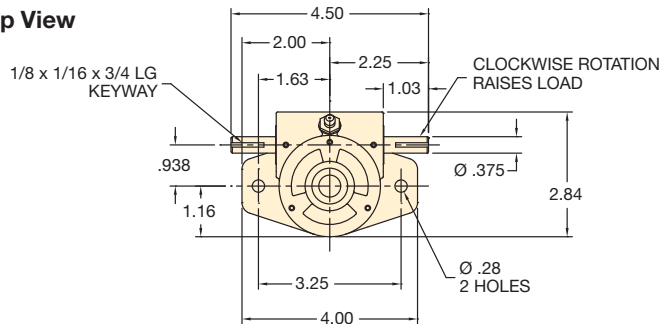
**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\*\*For keyed Actuators, add 0.34" to Actuator housing height.

Aluminum housing is standard on MA5, MA15 and MA20 Actuators.

Please see page 15 for ordering Matrix.

### Top View



## MA15 Series



Capacity:

**.75 ton**

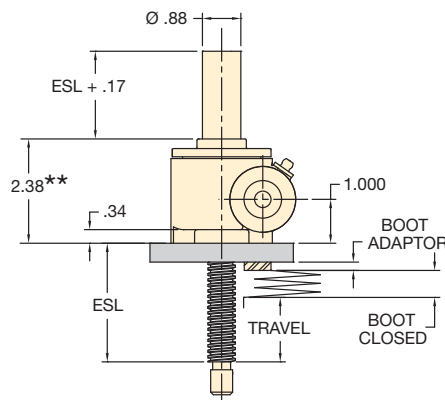
Maximum Travel:

**136 inches**

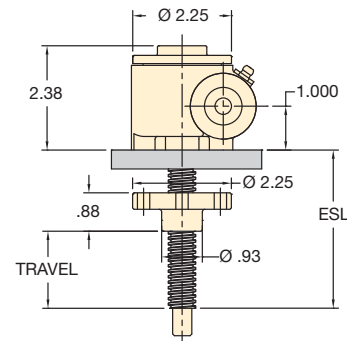
Maximum Speed:

**129 in/min**

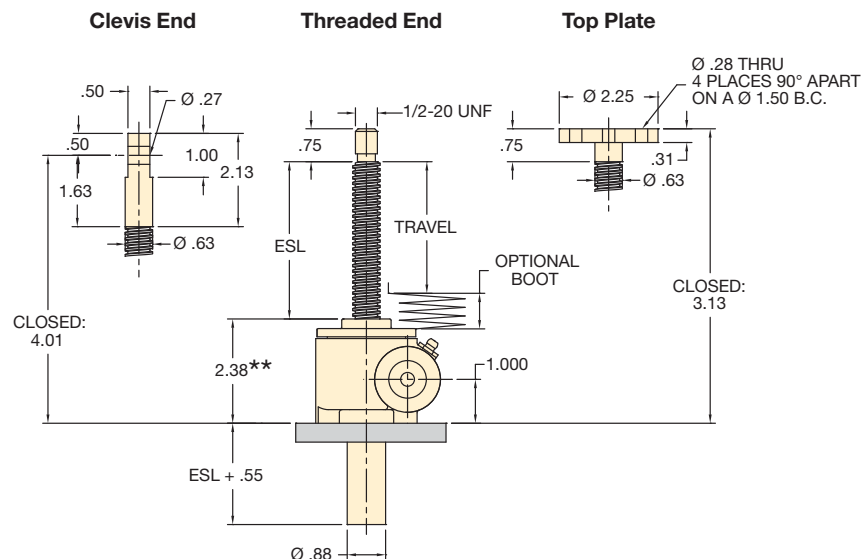
### Inverted Translating



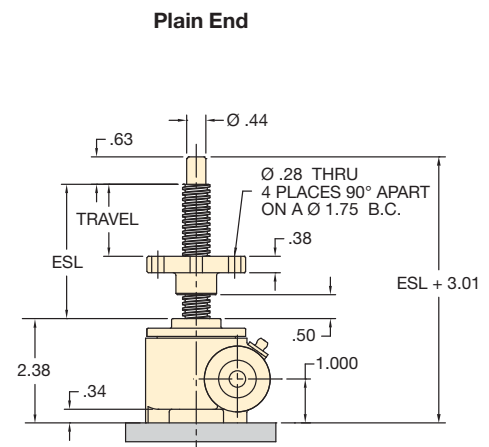
### Inverted Rotating



### Upright Translating



### Upright Rotating



# MA20 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
3/4" dia. X .200" lead	Low	5:1	25
	High	20:1	100

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 1.0" to the pipe length. \*\* For keyed Actuators, add 0.57" to Actuator housing height.

Aluminum housing is standard on MA5, MA15 and MA20 Actuators.

Please see page 15 for ordering Matrix.

## MA20 Series

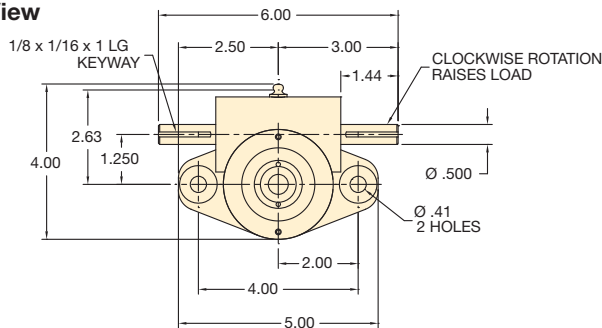


Capacity:  
**1 ton**

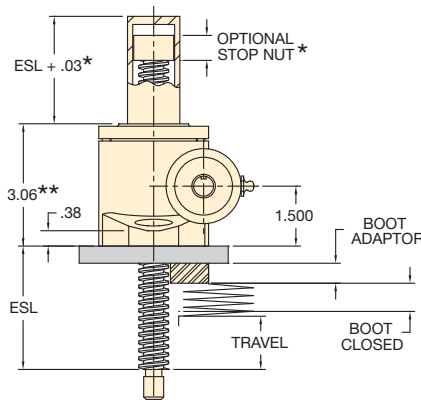
Maximum Travel:  
**230 inches**

Maximum Speed:  
**104 in/min**

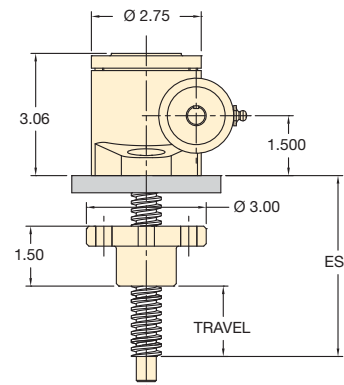
### Top View



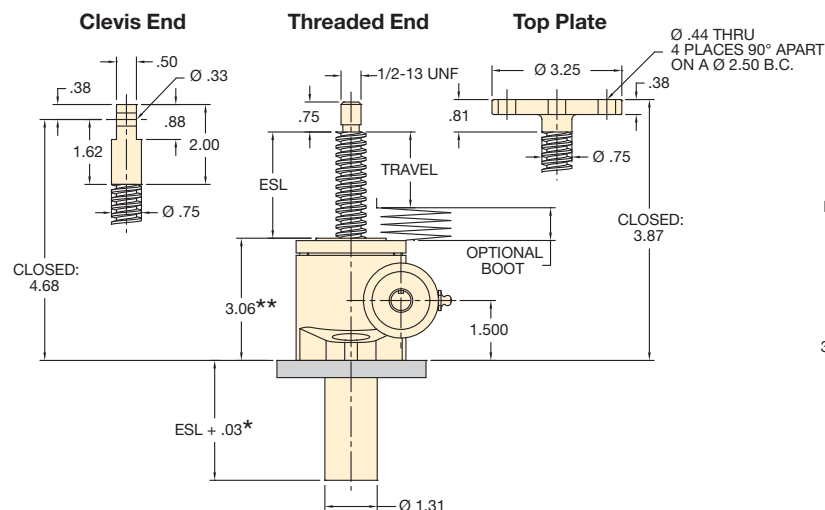
### Inverted Translating



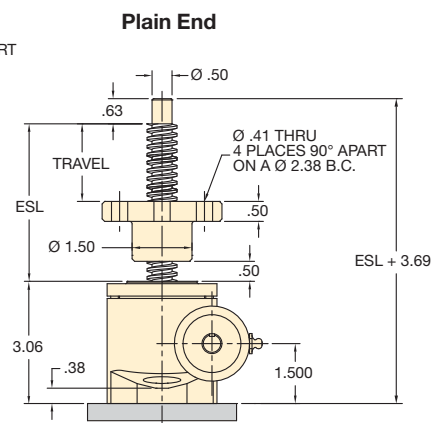
### Inverted Rotating



### Upright Translating



### Upright Rotating



# M1 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
3/4" dia. X .250" lead	Low	5:1	20
	High	10:1	40

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 1.0" to the pipe length. \*\* For keyed Actuators, add 0.16" to Actuator housing height.

Please see page 15 for ordering Matrix.

## M1 Series



Capacity:

**1 ton**

Maximum Travel:

**230 inches**

Maximum Speed:

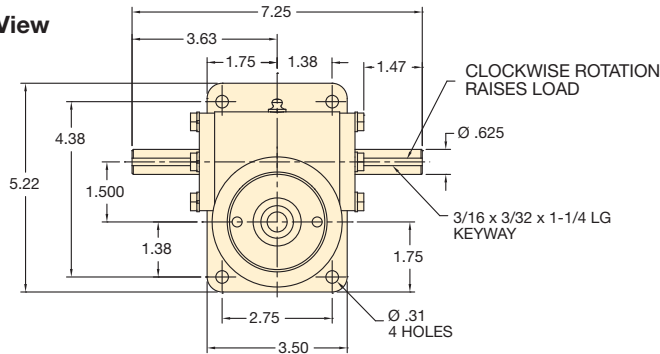
**129 in/min**



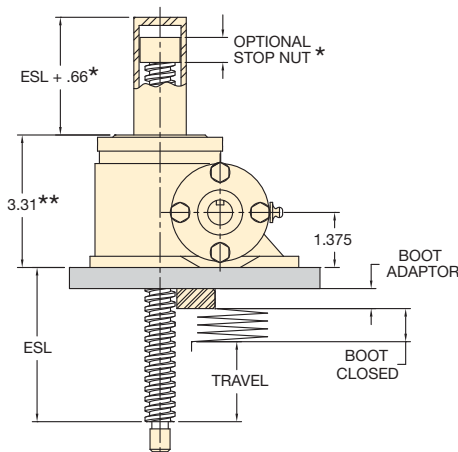
### Mounting Flexibility

The M1 provides added flexibility over the MA20 by allowing for direct mount of motor adaptors and rotary limit switches.

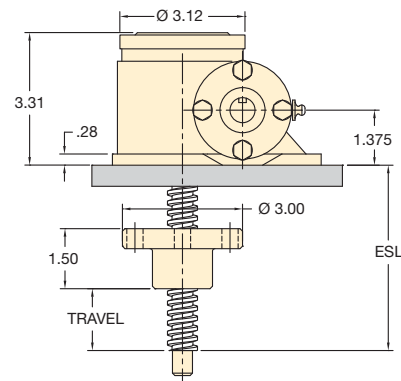
### Top View



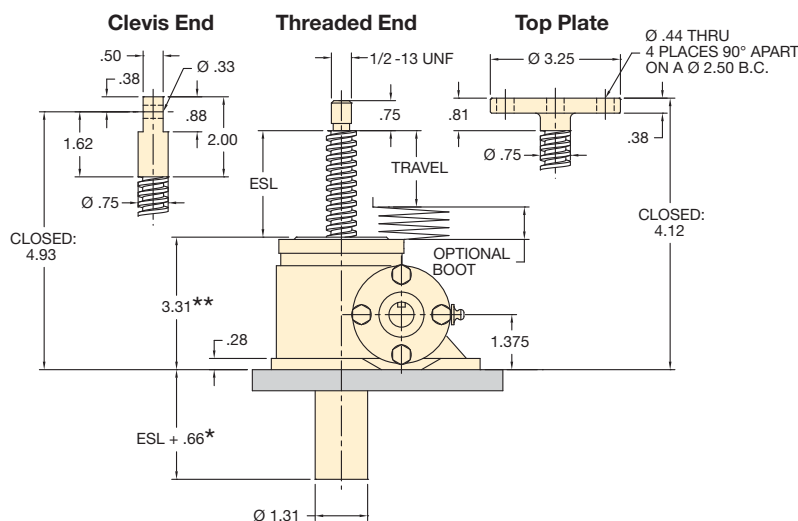
### Inverted Translating



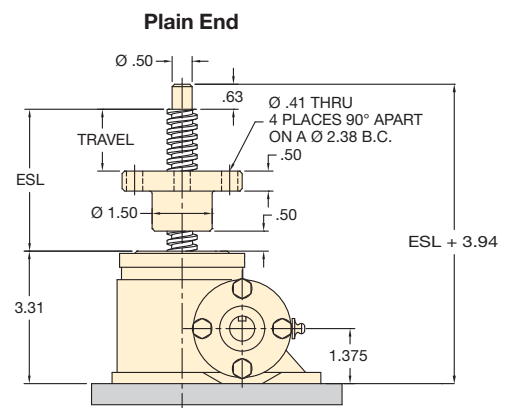
### Inverted Rotating



### Upright Translating



### Upright Rotating



# M2 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
1.00" dia. X .250" lead	Low	6:1	24
	High	24:1	96

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 1.28" to the pipe length. \*\*For keyed Actuators, add 0.06" to Actuator housing height. Optional Double Clevis is available.

Please see page 15 for ordering Matrix.

## M2 Series

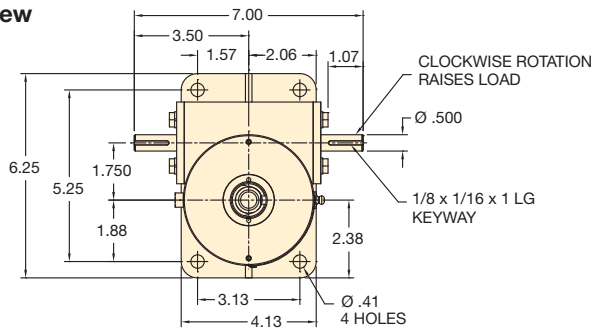


Capacity:  
**2 ton**

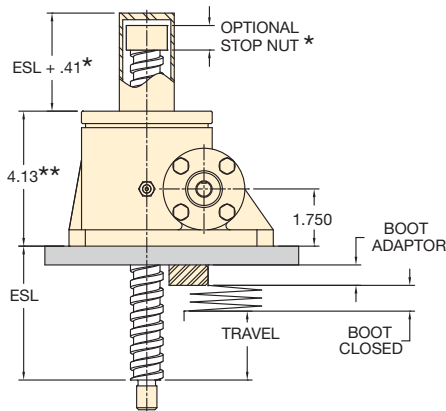
Maximum Travel:  
**232 inches**

Maximum Speed:  
**75 in/min**

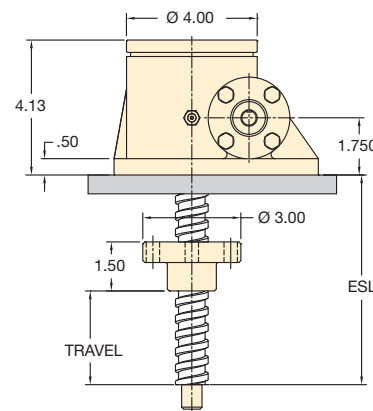
### Top View



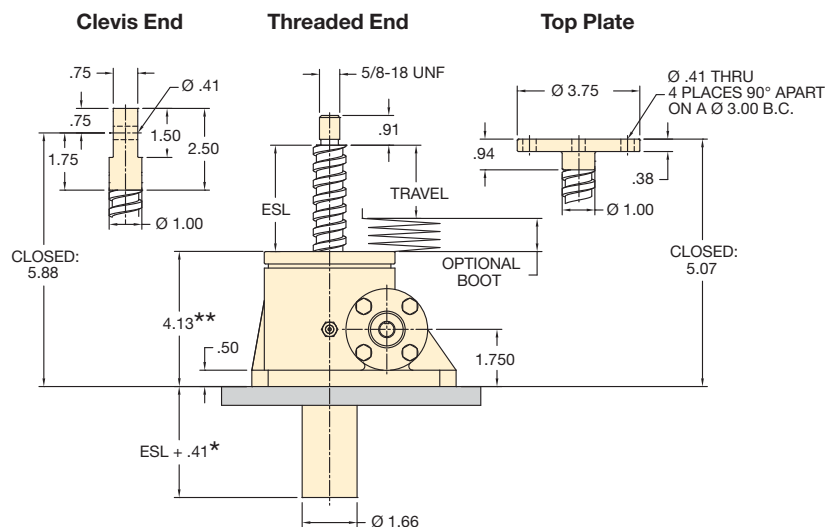
### Inverted Translating



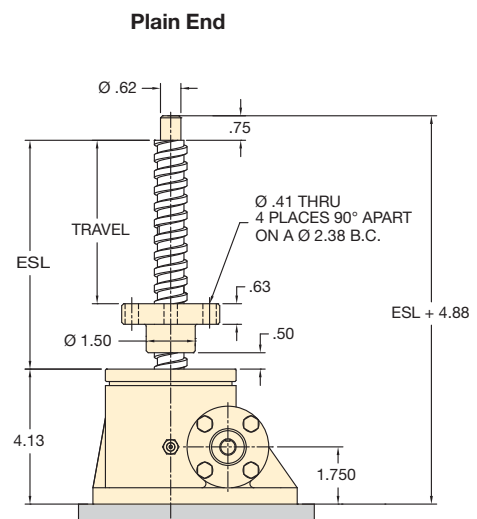
### Inverted Rotating



### Upright Translating



### Upright Rotating





# M4 Series, Machine Screw Actuator

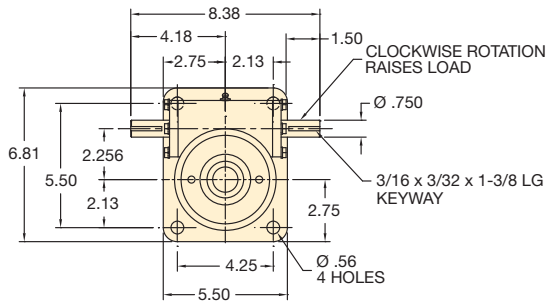
## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
1-1/2" dia. X .333" lead	Low	5 1/3:1	16
	Medium	12:1	36
	High	24:1	72

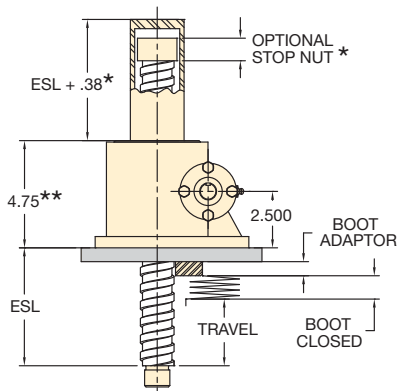
**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 1.45" to the pipe length. \*\* For keyed Actuators, add 0.56" to Actuator housing height. Optional Double Clevis is available. Please see page 15 for ordering Matrix.

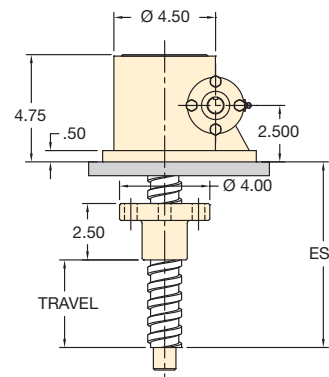
### Top View



### Inverted Translating



### Inverted Rotating

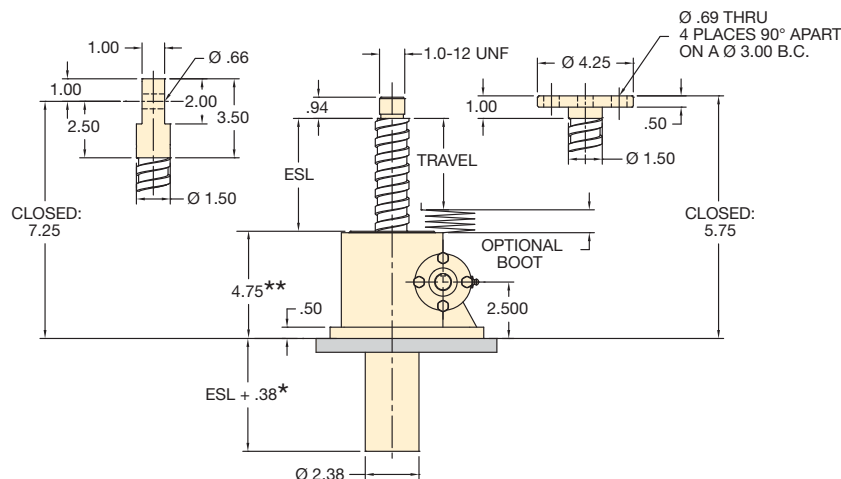


### Upright Translating

#### Clevis End

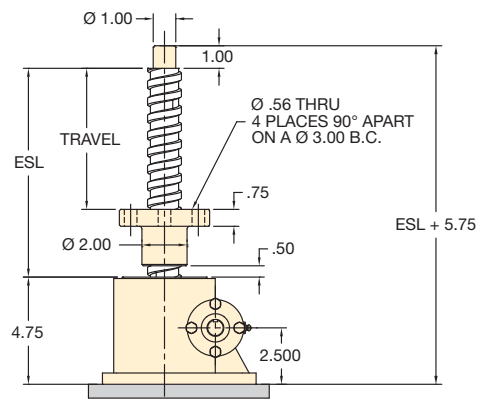
#### Threaded End

#### Top Plate



### Upright Rotating

#### Plain End



## M4 Series



Capacity:  
**4 ton**

Maximum Travel:  
**228 inches**

Maximum Speed:  
**113 in/min**



# M5 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
1-1/2" dia. X .375" lead	Low	6:1	16
	High	24:1	64

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 1.45" to the pipe length. \*\* For keyed Actuators, add 0.33" to Actuator housing height. Optional Double Clevis is available.

Please see page 15 for ordering Matrix.

## M5 Series



Capacity:

**5 ton**

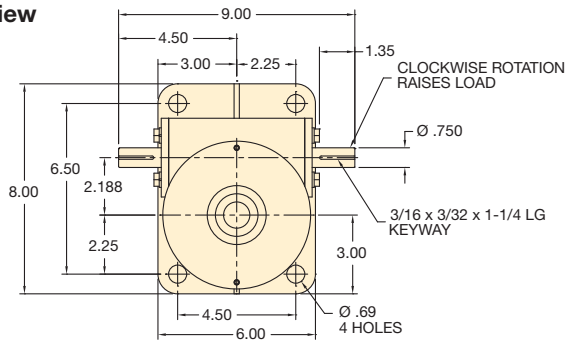
Maximum Travel:

**230 inches**

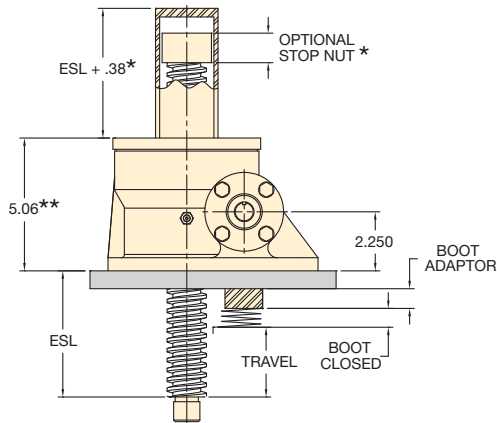
Maximum Speed:

**113 in/min**

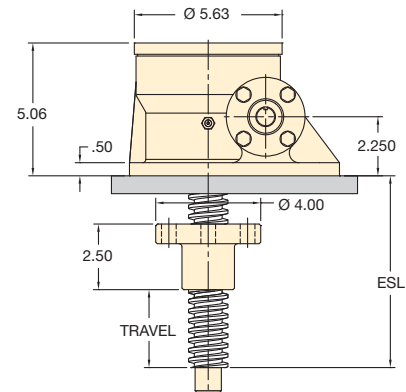
### Top View



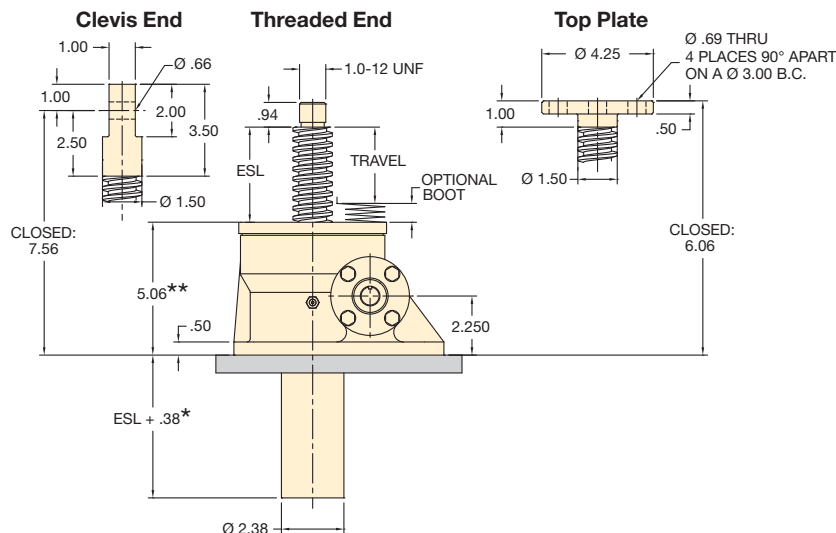
### Inverted Translating



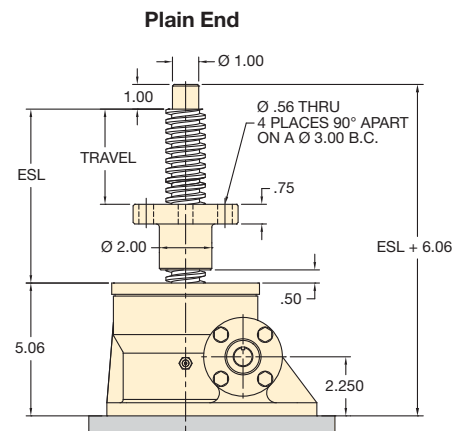
### Inverted Rotating



### Upright Translating



### Upright Rotating



# M8 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
1-3/4" dia. X .333" lead	Low	6:1	18
	High	12:1	36

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 2.06" to the pipe length. \*\* For keyed Actuators, add 0.36" to Actuator housing height. Optional Double Clevis is available.

Please see page 15 for ordering Matrix.

## M8 Series

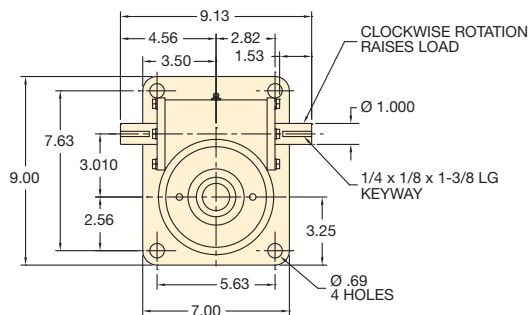


Capacity:  
**8 ton**

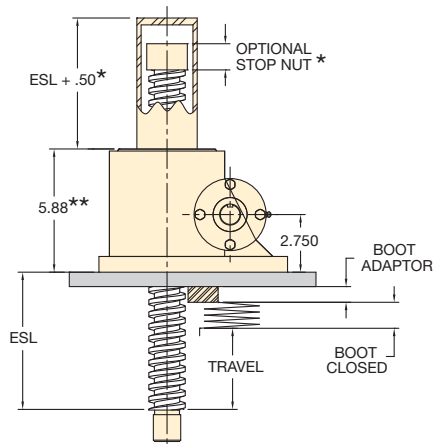
Maximum Travel:  
**226 inches**

Maximum Speed:  
**100 in/min**

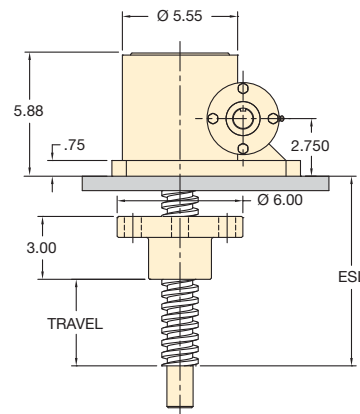
### Top View



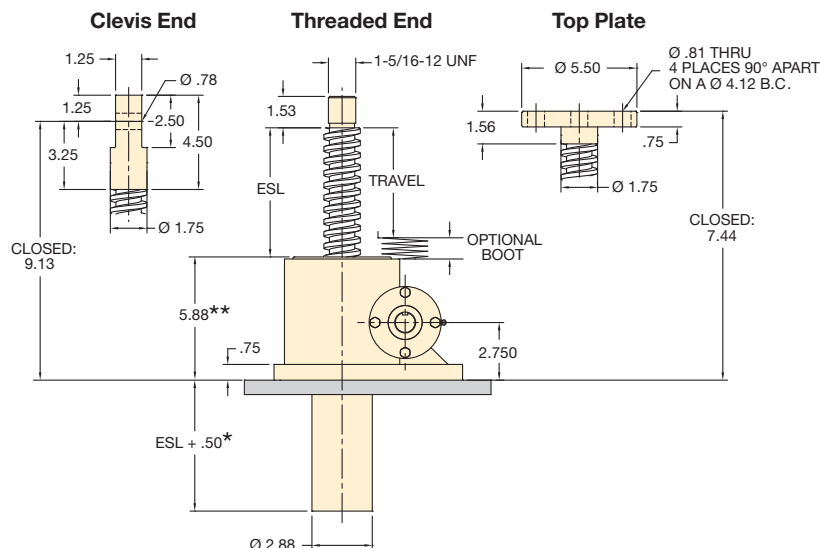
### Inverted Translating



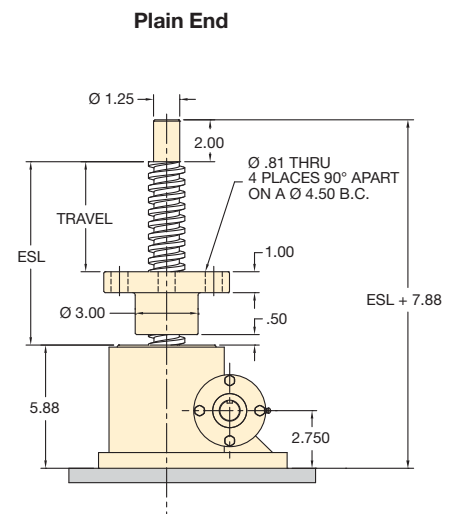
### Inverted Rotating



### Upright Translating



### Upright Rotating



# M10 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
2.00" dia. X .500" lead	Low	8:1	16
	High	24:1	48

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 2.06" to the pipe length. \*\* For keyed Actuators, add 0.75" to Actuator housing height. Optional Double Clevis is available.

Please see page 15 for ordering Matrix.

## M10 Series



Capacity:

**10 ton**

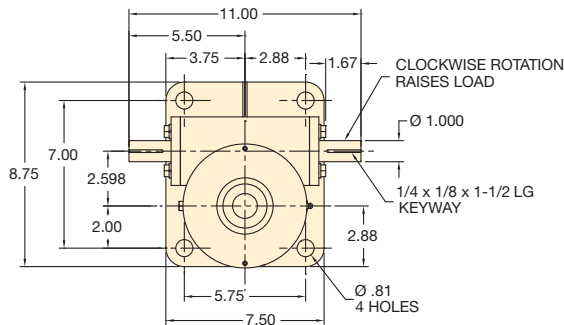
Maximum Travel:

**228 inches**

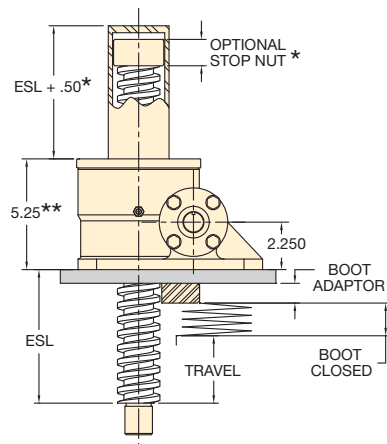
Maximum Speed:

**113 in/min**

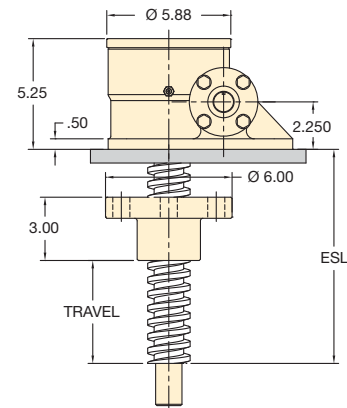
### Top View



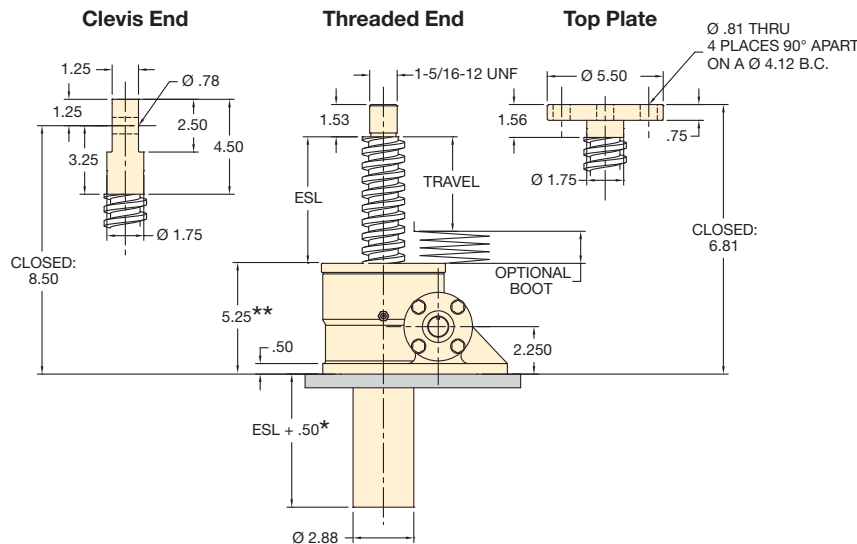
### Inverted Translating



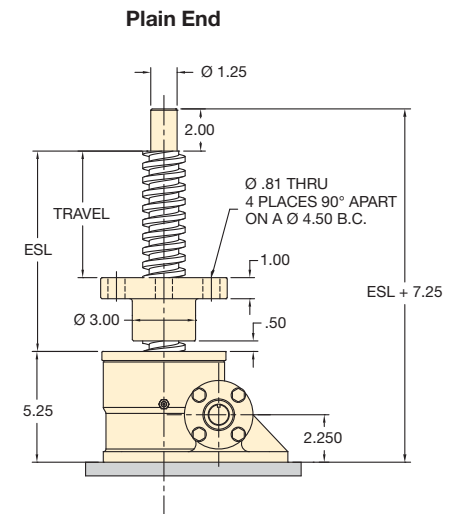
### Inverted Rotating



### Upright Translating



### Upright Rotating



# M15 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
2-1/4" dia. X .500" lead	Low	8:1	16
	High	24:1	48

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 2.06" to the pipe length. \*\* For keyed Actuators, add 0.67" to Actuator housing height. Optional Double Clevis is available.

Please see page 15 for ordering Matrix.

## M15 Series



Capacity:

**15 ton**

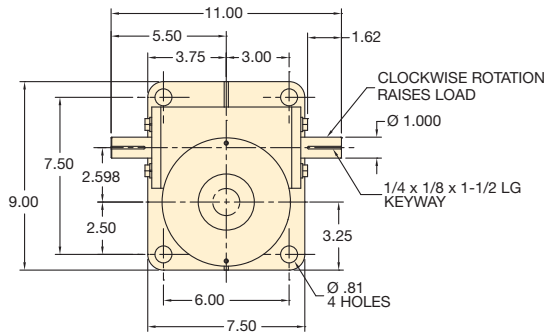
Maximum Travel:

**224 inches**

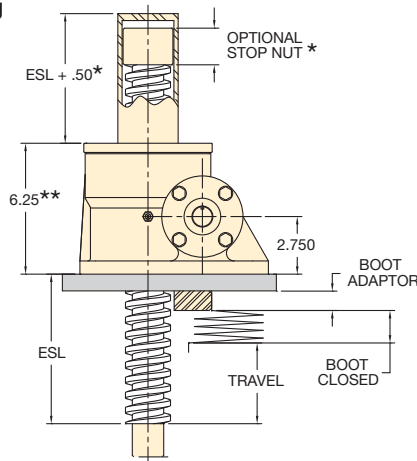
Maximum Speed:

**113 in/min**

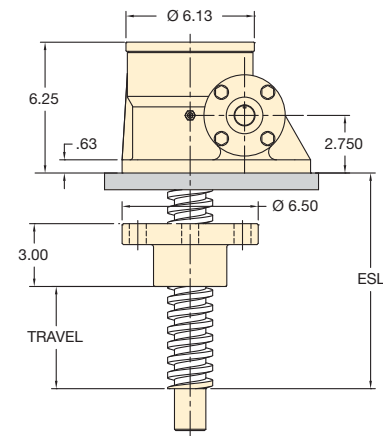
### Top View



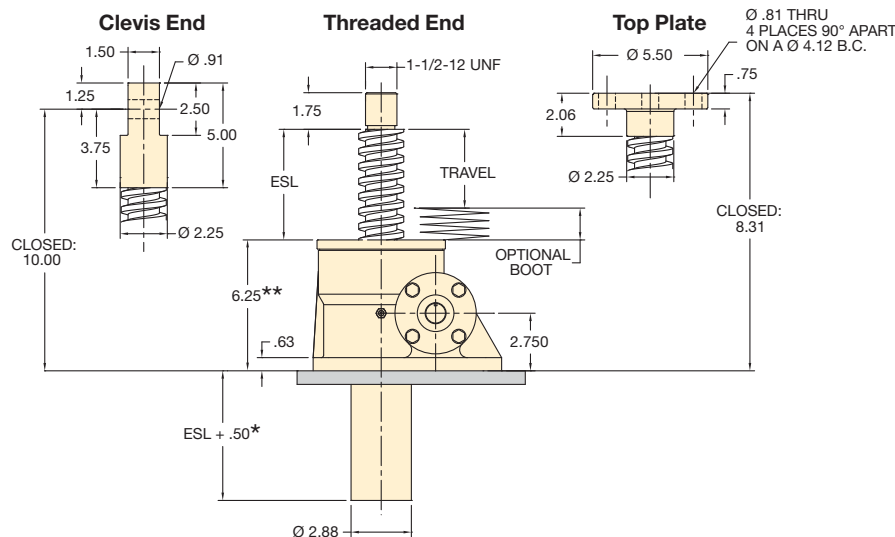
### Inverted Translating



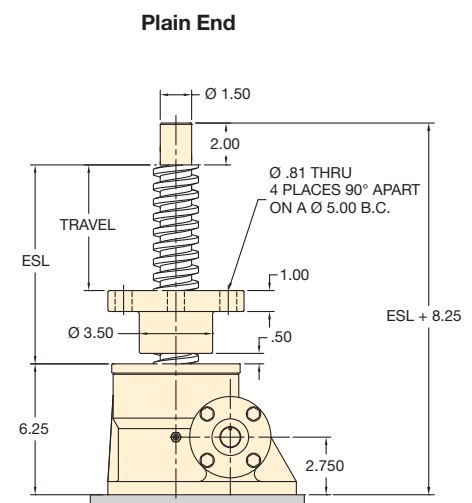
### Inverted Rotating



### Upright Translating



### Upright Rotating



# M20 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
2-1/2" dia. X .500" lead	Low	8:1	16
	High	24:1	48

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 2.05" to the pipe length. \*\* For keyed Actuators, add 1.08" to Actuator housing height. Optional Double Clevis is available.

Please see page 15 for ordering Matrix.

## M20 Series



Capacity:

**20 ton**

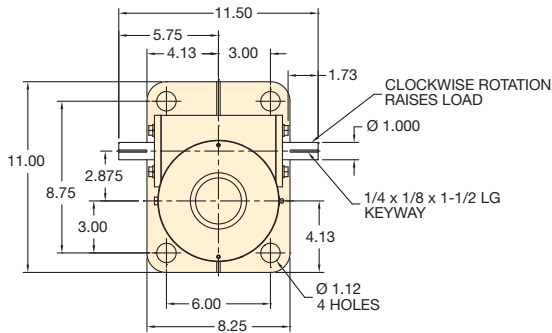
Maximum Travel:

**224 inches**

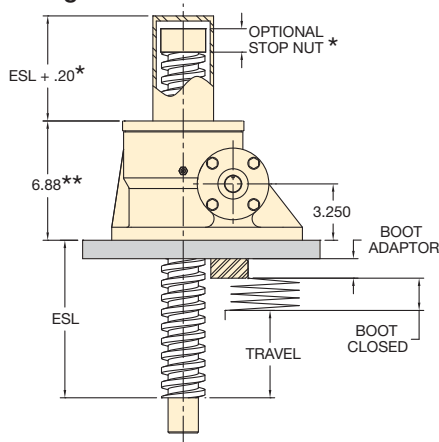
Maximum Speed:

**113 in/min**

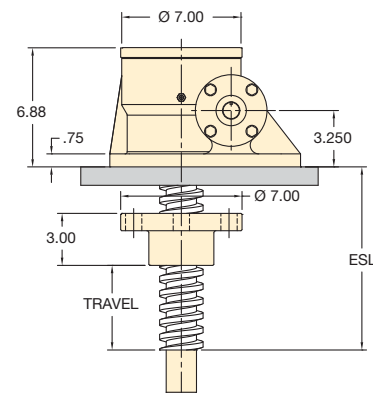
### Top View



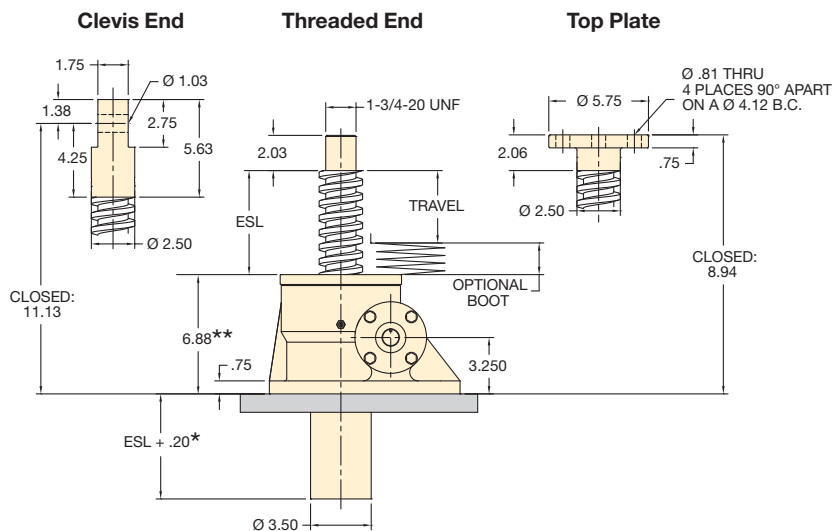
### Inverted Translating



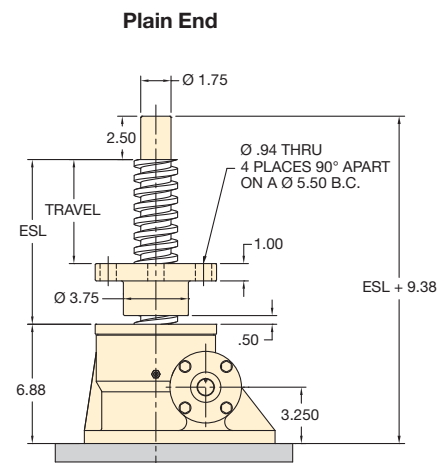
### Inverted Rotating



### Upright Translating



### Upright Rotating





# M30 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
3-3/8" dia. X .667" lead	Low	10 $\frac{2}{3}$ :1	16
	High	32:1	48

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 2.07" to the pipe length. \*\* For keyed Actuators, add 1.43" to Actuator housing height.

Please see page 15 for ordering Matrix.

## M30 Series



Capacity:

**30 ton**

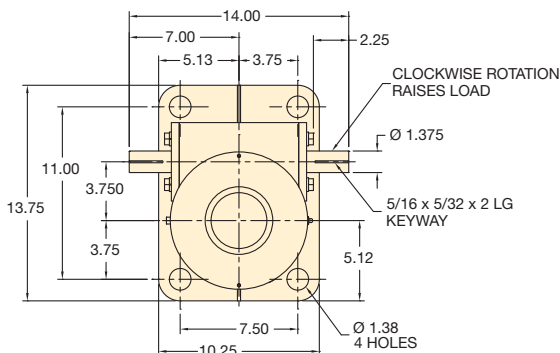
Maximum Travel:

**228 inches**

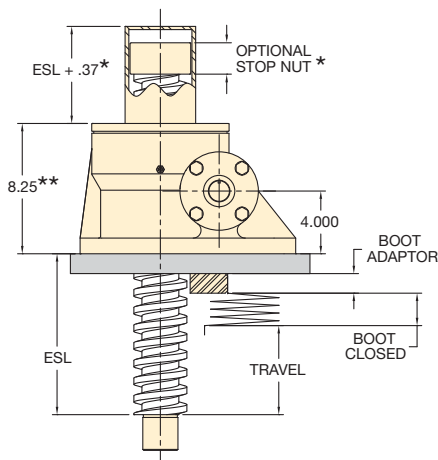
Maximum Speed:

**75 in/min**

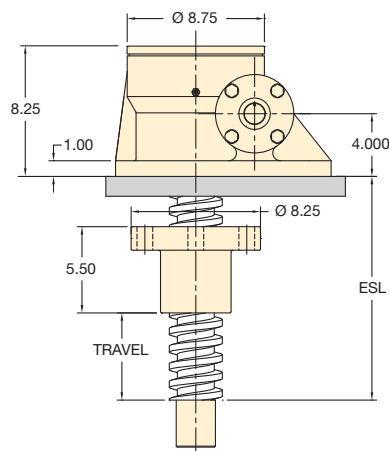
### Top View



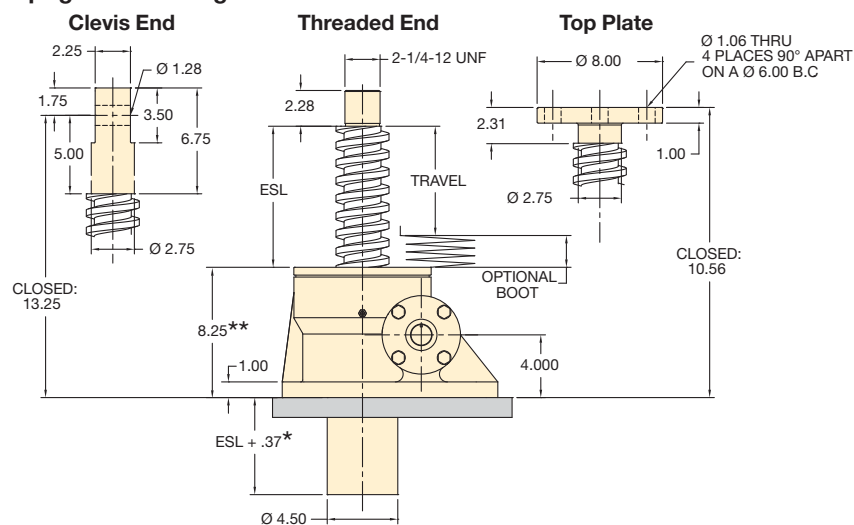
### Inverted Translating



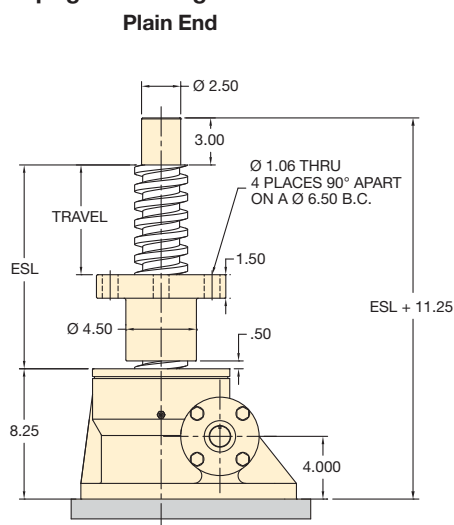
### Inverted Rotating



### Upright Translating



### Upright Rotating



# M40 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
4-1/4" dia. X .667" lead	<b>High</b>	20:1	30

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 1.50" to the pipe length.

Please see page 15 for ordering Matrix.

## M40 Series



Capacity:

**40 ton**

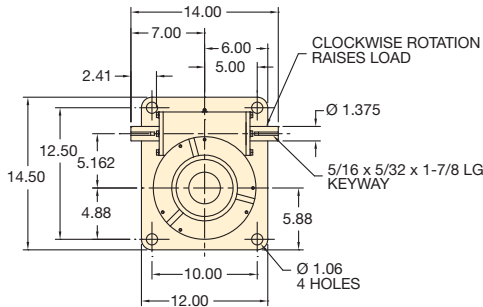
Maximum Travel:

**222 inches**

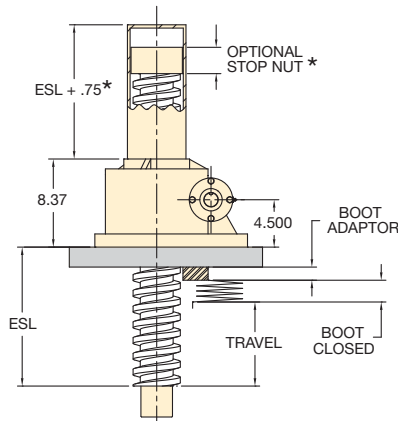
Maximum Speed:

**40 in/min**

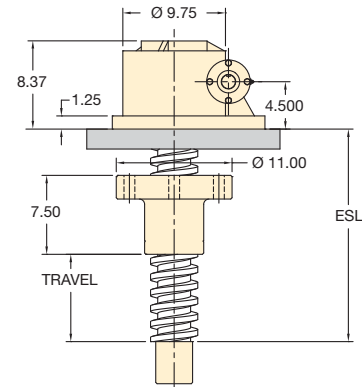
### Top View



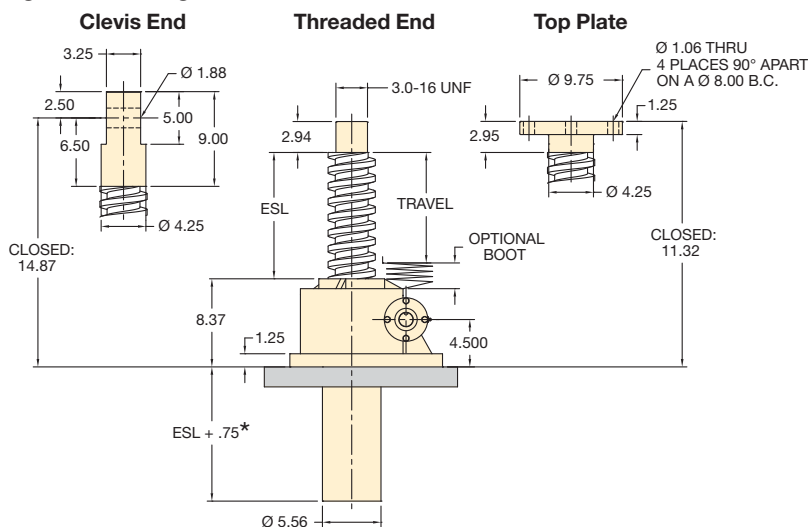
### Inverted Translating



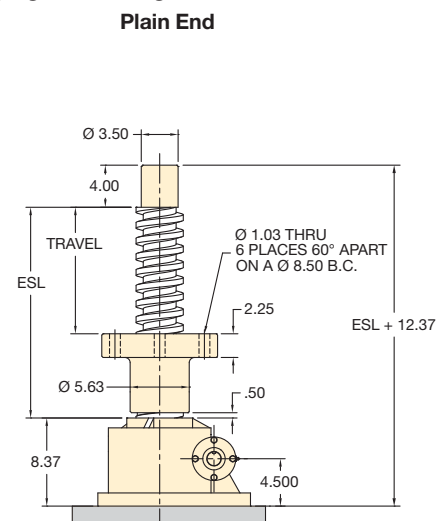
### Inverted Rotating



### Upright Translating



### Upright Rotating





# M50 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
4-1/4" dia. X .667" lead	Low	10 $\frac{2}{3}$ :1	16
	High	32:1	48

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 2.25" to the pipe length. \*\* For keyed Actuators, add 2.50" to Actuator housing height.

Please see page 15 for ordering Matrix.

## M50 Series



Capacity:

**50 ton**

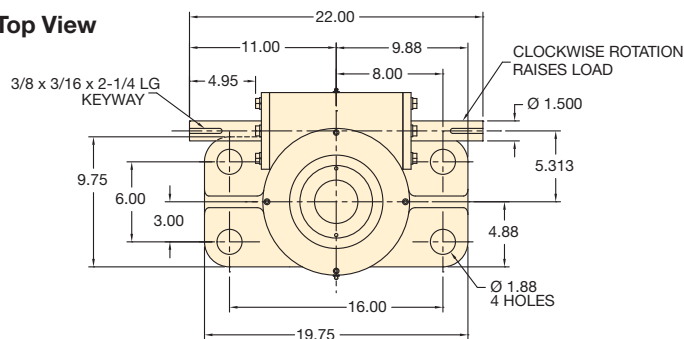
Maximum Travel:

**222 inches**

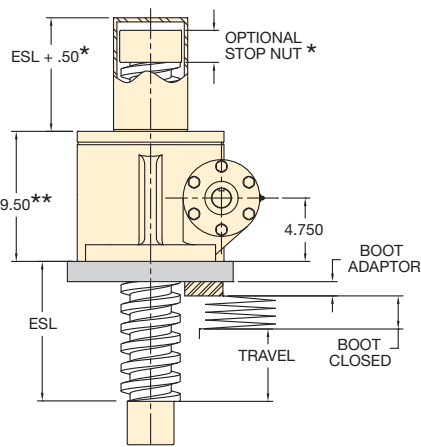
Maximum Speed:

**75 in/min**

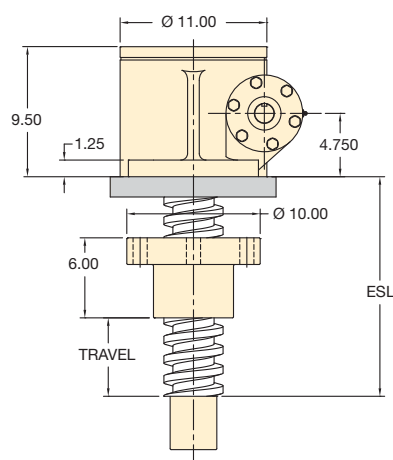
### Top View



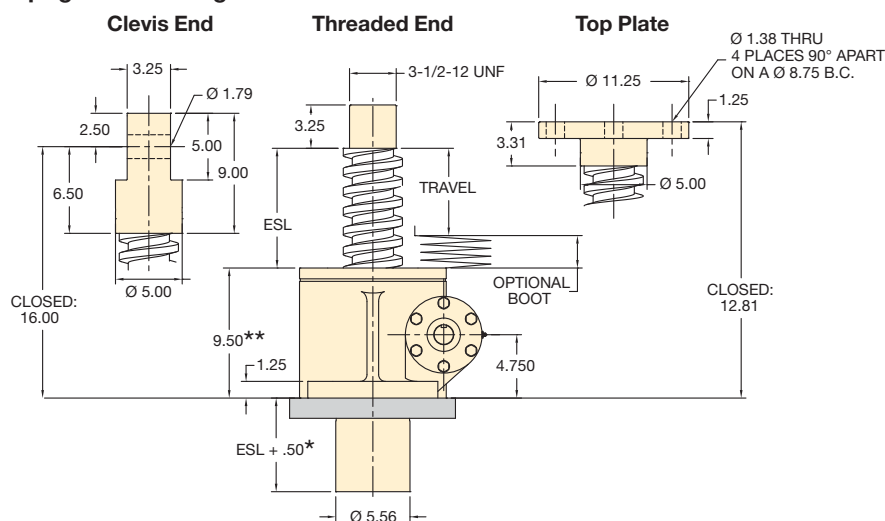
### Inverted Translating



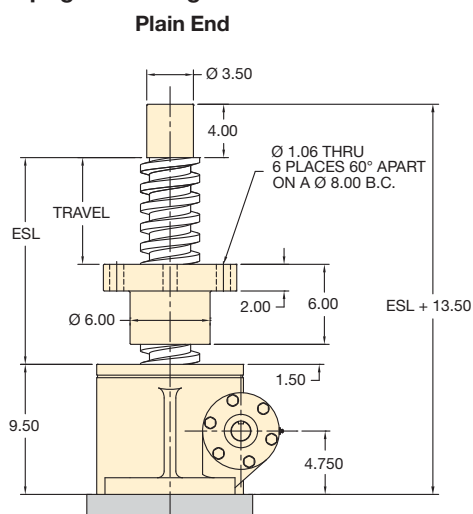
### Inverted Rotating



### Upright Translating



### Upright Rotating



# M75 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
5.0" dia. X .667" lead	Low	10 $\frac{2}{3}$ :1	16
	High	32:1	48

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 2.11" to the pipe length.

Please see page 15 for ordering Matrix.

## M75 Series

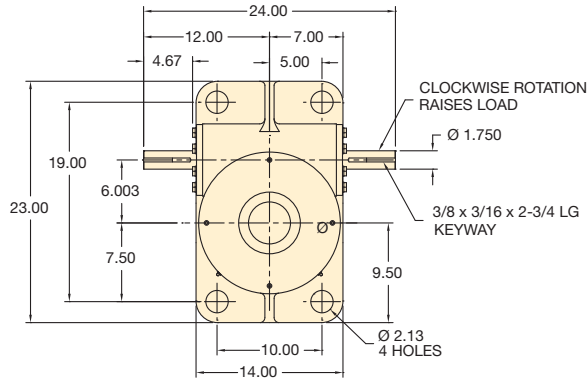


Capacity:  
**75 ton**

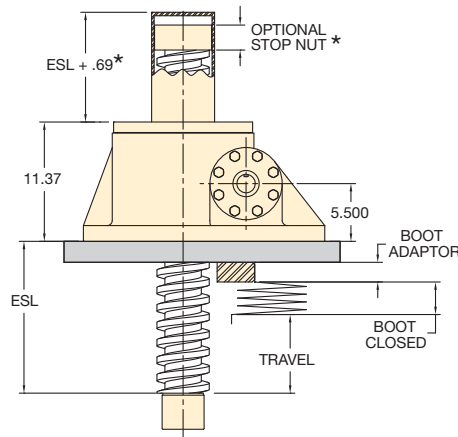
Maximum Travel:  
**225 inches**

Maximum Speed:  
**56 in/min**

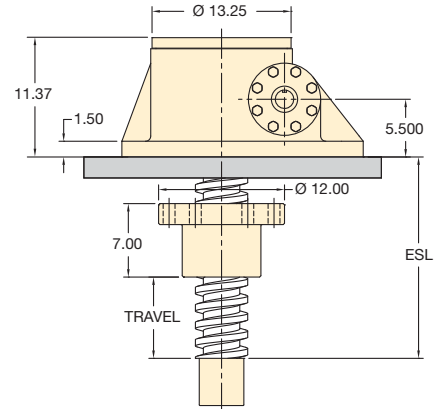
**Top View**



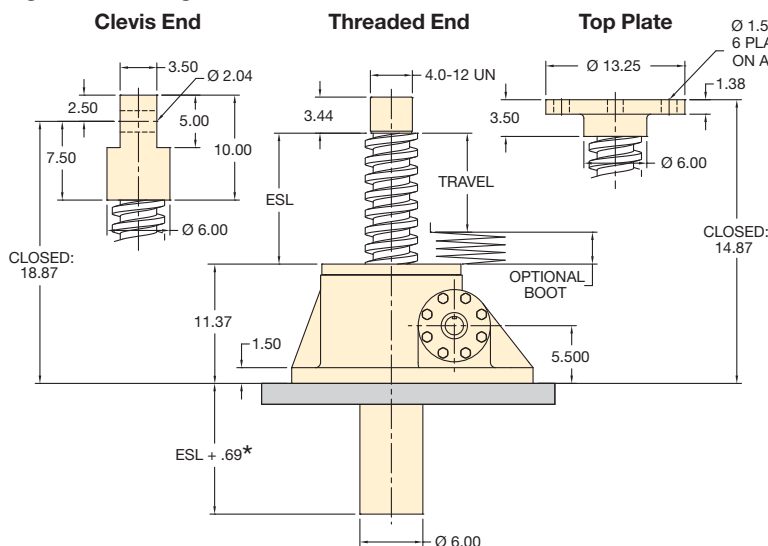
**Inverted Translating**



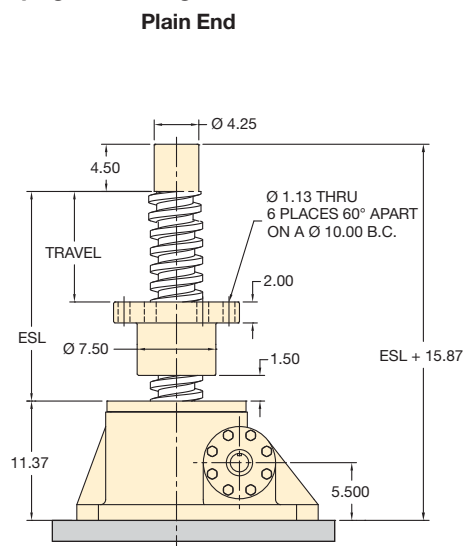
**Inverted Rotating**



**Upright Translating**



**Upright Rotating**



# M100 Series, Machine Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
6.0" dia. X .750" lead	Low	12:1	16
	High	36:1	48

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 4.5" to the pipe length.

Please see page 15 for ordering Matrix.

## M100 Series



Capacity:

**100 ton**

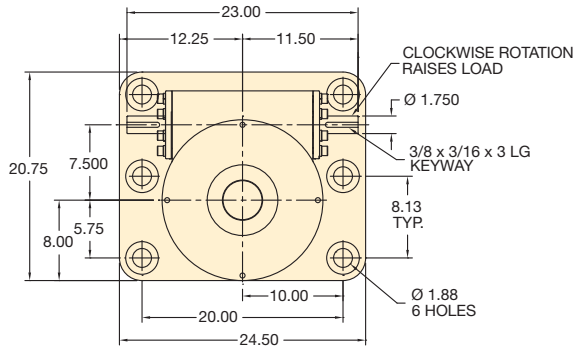
Maximum Travel:

**222 inches**

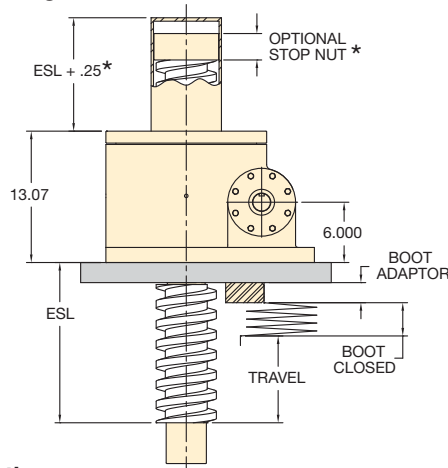
Maximum Speed:

**56 in/min**

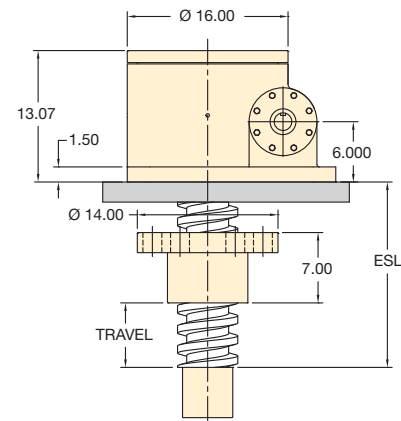
### Top View



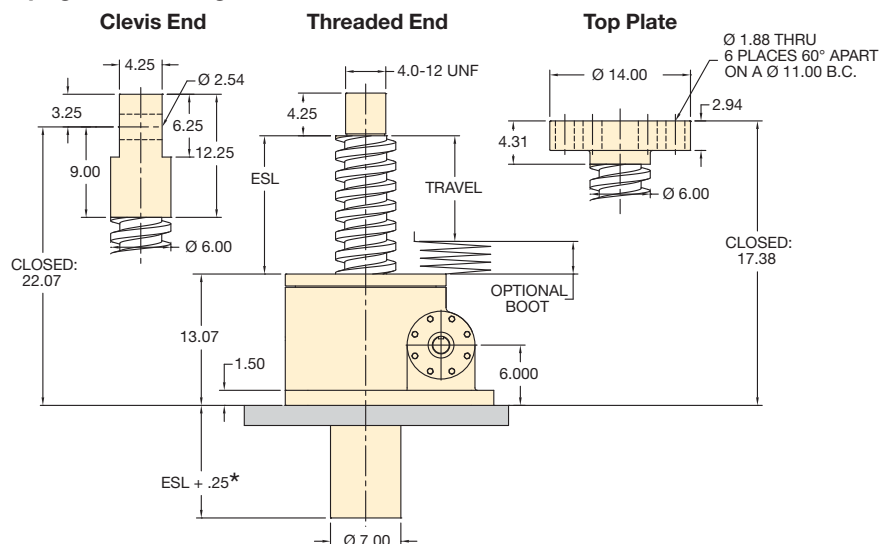
### Inverted Translating



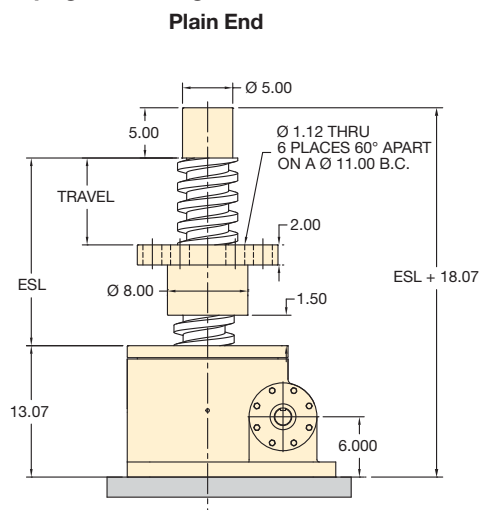
### Inverted Rotating



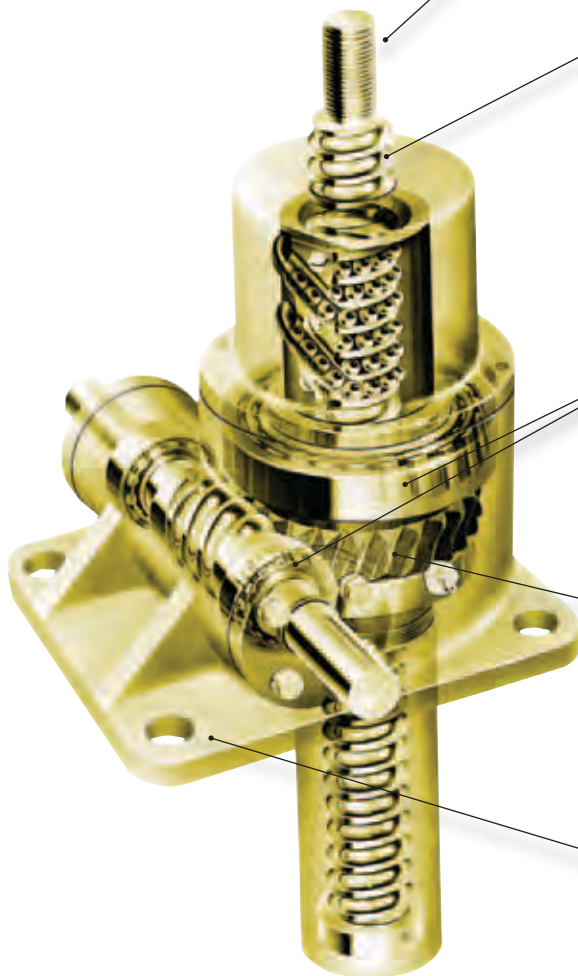
### Upright Translating



### Upright Rotating



UNI-LIFT® Ball Screw Actuators provide high efficiency and high speed in a linear positioning package up to 100 tons. The low friction ball screw and nut design provides longer life at load and requires less power to achieve a specified thrust and movement. Ball Screw Actuators can be used individually, in tandem or as part of a larger mechanical system. With lifts up to 20 feet, UNI-LIFT® Ball Screw Actuators offer the perfect solution to a wide range of linear positioning applications.



## Ball Screw Cutaway

### Screw End Configurations

- Variety of end configurations are available including: threaded, clevis, plain and top plate.
- Bearing journal on end of load screw for rotating jacks provides better column stability

### High Strength Roll-Formed Thread Load Screws

- Provides 95% efficiency for minimum input force to position loads
- Ball Screw is rolled and hardened for strength and wear resistance

### Tapered Roller Bearings

- Preloaded for reduced assembly spring rate and high thrust loads
- Provides excellent support for side loading and horizontal applications
- Maintains exact gear alignment under separating and thrust forces
- Bearings sized for endurance and maximum loading conditions

### High Strength Gearing

- Precision gears manufactured to American Gear Standards with close tolerances and minimal backlash
- Heat treated worm gear set provides greater efficiency, higher input speed, and extended life

### Rugged Housings

- Robust ductile iron construction
- Low closed height design saves space, reduces weight, and allows these Ball Screw Actuators to fit into tight areas



## Online UNI-LIFT® Configurator

The UNI-LIFT® Configurator guides you through a step-by-step process to properly configure the actuator for your system.

The configurator calculates the torque and horsepower requirements of your system with downloadable and scaled 2D and 3D drawings.

Please visit [www.enerpac.com/unilift](http://www.enerpac.com/unilift) to learn more about UNI-LIFT® Actuators.



Capacity (ton)	Series	Page
<b>Technical Specs.</b>		<b>36</b> ▶
<b>Ordering Matrix</b>		<b>37</b> ▶
<b>1</b>	<b>B1</b>	<b>38</b> ▶
<b>2</b>	<b>B2</b>	<b>39</b> ▶
<b>5</b>	<b>B5</b>	<b>40</b> ▶
<b>10</b>	<b>B10</b>	<b>41</b> ▶
<b>20</b>	<b>B20</b>	<b>42</b> ▶
<b>30</b>	<b>B30</b>	<b>43</b> ▶
<b>50</b>	<b>B50</b>	<b>44</b> ▶
<b>75</b>	<b>B75</b>	<b>45</b> ▶
<b>100</b>	<b>B100</b>	<b>46</b> ▶



## Contact Enerpac!

Contact the Enerpac office nearest to you for advice and technical assistance in the layout of your ideal UNI-LIFT® System. You can also ask Enerpac for assistance by e-mail at: [unilift@enerpac.com](mailto:unilift@enerpac.com).



## Technical Calculations

For Technical Calculations, such as torque and motor sizing please see our "Yellow Pages".

Page: 64



## Frequently Asked Questions

To get answers to frequently asked questions please see our "Yellow Pages".

Page: 65

▼ Shown: **Ball Screw Actuators**



Capacity:

**1-100 ton**

Maximum Travel:

**230 inches**

Maximum Speed:

**175 in/min**



### System Accessories

Provides all the additional components you need to complete your system arrangement.

Page: **47**



### CAD Modeling Software

Our experienced sales team and application engineers will deliver the precise support you need to meet the most demanding and unique requirements. State-of-the-art CAD modeling software offers the needed flexibility to design custom built "special" screw actuators to suit customer needs.

Visit us at [www.enerpac.com/unilift](http://www.enerpac.com/unilift).

- Ideal for high speeds and continuous cycle applications
- Ball screw design allows for reduced horsepower requirements
- Reduced friction provides extended service life and lower operating costs
- Integrated ball bearing design reduces operating temperatures
- Precision screw lead offers exact positioning for multiple Actuator systems



### Configure Your B-Series Ball Screw Actuator

If you cannot configure your standard B-Series Actuator using the Matrix, please contact Enerpac for further assistance.

Visit our "Online Configurator" to replicate your specific Actuator requirements in 2D / 3D at [www.enerpac.com/unilift](http://www.enerpac.com/unilift).

### ▼ SELECTION CHART

Capacity (ton)	Model Number	Load Screw Diameter (in)	Lead of Screw (in)
1	<b>B1</b>	0.750	0.500
2	<b>B2</b>	1.000	0.250
5	<b>B5</b>	1.500	0.474
10	<b>B10</b>	1.500	0.474
20	<b>B20</b>	2.250	0.500
30	<b>B30</b>	3.000	0.667
50	<b>B50</b>	4.000	1.000
75	<b>B75</b>	4.000	1.000
100	<b>B100</b>	4.000	1.000

# Ball Screw Actuator Ordering Matrix

▼ This is how a B-Series Ball Screw Actuator is configured:

**B 1 U R 0240 L P - A11 B1 L23 M3 N S2**

1 2 3 4 5 6 7 8 9 10 11 12 13

## 1 Model Type

**B** = Ball Screw Actuator

## 2 Ton Rating

1 = 1 Ton  
2 = 2 Ton  
5 = 5 Ton  
10 = 10 Ton  
20 = 20 Ton  
30 = 30 Ton  
50 = 50 Ton  
75 = 75 Ton  
100 = 100 Ton

## 3 Mounting Style

**U** = Upright  
**I** = Inverted  
**D** = Double Clevis \*

## 4 Screw Configuration

**T** = Translating  
**R** = Rotating

## 5 Extended Screw Length (ESL)

xxx.x = Input Value (in.)  
(Do not include decimal in part No. - all data will be based on 1 decimal place)  
Example: 12.0" = 0120"

## 6 Gear Ratio

**L** = Low  
**H** = High

## 7 End Configuration

**V** = Threaded End  
**C** = Clevis End  
**P** = Plain End  
**T** = Top Plate

## 8 Motor Adaptor

*First Digit*  
**A** = Motor Adaptor

*Second Digit*  
**1** = Right-Hand Mount  
**2** = Left-Hand Mount

## Third Digit

**1** = 56C  
**2** = 143/145TC  
**3** = 182/184C  
**4** = 182/184TC  
**5** = 213/215C  
**6** = 213/215TC

## 9 Boot Specifications\*\*

*First Digit*  
**B** = Boot

*Second Digit*  
**1** = 1 Boot, No Guides  
**2** = 2 Boots, No Guides  
**3** = 1 Boot, With Guides  
**4** = 2 Boots, With Guides

## 10 Limit Switch Configuration

*First Digit*  
**L** = Limit Switch

*Second Digit*  
**1** = Right-Hand Position, 1  
**2** = Right-Hand Position, 2  
**3** = Right-Hand Position, 3  
**4** = Right-Hand Position, 4  
**5** = Left-Hand Position, 1  
**6** = Left-Hand Position, 2  
**7** = Left-Hand Position, 3  
**8** = Left-Hand Position, 4

*Third Digit*  
**1** = 2 Circuit Series 360  
**2** = 2 Circuit Series 1440  
**3** = 2 Circuit Series 4320

## 11 Motor Specifications

*First Digit*  
**M** = Brake Motor\*\*\*

*Second & Third Digits*  
**1** = 1/4 hp, 1750 RPM  
**2** = 1/4 hp, 1140 RPM  
**3** = 1/3 hp, 1750 RPM  
**4** = 1/3 hp, 1140 RPM  
**5** = 1/2 hp, 1750 RPM  
**6** = 1/2 hp, 1140 RPM  
**7** = 3/4 hp, 1750 RPM  
**8** = 3/4 hp, 1140 RPM  
**9** = 1 hp, 1750 RPM  
**10** = 1 hp, 1140 RPM  
**11** = 1.5 hp, 1750 RPM  
**12** = 1 hp, 1140 RPM  
**13** = 2 hp, 1750 RPM  
**14** = 2 hp, 1140 RPM  
**15** = 3 hp, 1750 RPM  
**16** = 3 hp, 1140 RPM  
**17** = 5 hp, 1750 RPM  
**18** = 5 hp, 1140 RPM  
**19** = 7.5 hp, 1750 RPM  
**20** = 10 hp, 1750 RPM

## 12 Stop Nut

**N** = Stop Nut

## 13 Single Shaft

*First Digit*  
**S** = Shaft

*Second Digit*  
**1** = Right Hand  
**2** = Left Hand

\*Double Clevis options are available on models: **B2, B5, B10**

\*\*Standard Boot material is Neoprene, alternate materials are available, see page 62 - consult factory for boot options on rotating jacks

\*\*\* All B-series jacks use brake motors when configured at the factory



### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to maintain position. To determine the required braking torque see page 76.



### Rotation Prevention

Rotation of Load Screw or Traveling Nut must be prevented in order to produce travel (linear motion).



### Stop Nuts

Energpac recommends the use of Stop Nuts to provide a positive stop at the end of travel.

Gear Center (in)	Gear Ratio		Turns of Input Shaft For 1" of Rise		Torque Required to Lift 1 lbs. (in-lb)		Holding Torque (ft-lb)		No Load Torque (in-lbs)	Maximum Input RPM	Estimated Weight (lbs)		Radius of Gyration (in)	Model Number
	Low	High	Low	High	Low	High	Low	High			0" Travel	Per Inch		
1.500	5:1	10:1	10	20	0.024	0.015	1.4	2	4	1800	2.3	0.7	0.154	<b>B1</b>
1.750	6:1	24:1	24	96	0.011	0.005	4	1.5	5	1800	17	0.6	0.205	<b>B2</b>
2.188	6:1	24:1	12.66	50.66	0.018	0.007	14	5	12	1800	35	0.6	0.285	<b>B5</b>
2.598	8:1	24:1	16.88	50.66	0.014	0.007	13	4	18	1800	50	0.8	0.285	<b>B10</b>
2.875	8:1	24:1	16	48	0.015	0.007	27	7	36	1800	85	1.5	0.463	<b>B20</b>
3.750	10%:1	32:1	16	48	0.015	0.008	21	5	48	1200	220	2.4	0.620	<b>B30</b>
5.313	10%:1	32:1	10.66	32	0.022	0.011	40	10	96	1200	340	2.8	0.835	<b>B50</b>
6.000	10%:1	32:1	10.66	32	0.022	0.010	107	24	156	900	590	4.6	0.835	<b>B75</b>
7.500	12:1	36:1	12	36	0.020	0.010	128	50	204	900	960	4.6	0.835	<b>B100</b>

# B1 Series, Ball Screw Actuator

## ▼ Technical Specifications

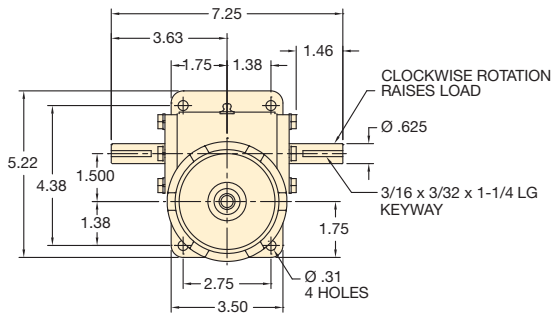
Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
3/4" dia. X .500" lead	Low	5:1	10
	High	10:1	20

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

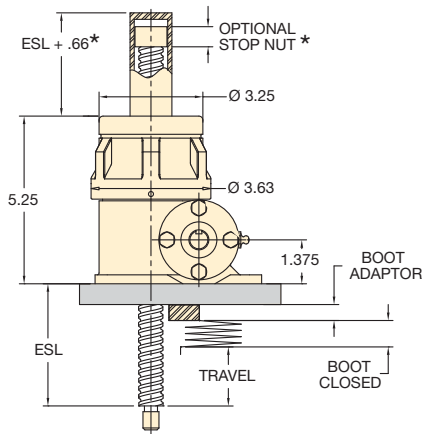
\* If optional stop nut is installed, add 1.0" to pipe length.

Please see page 37 for ordering Matrix.

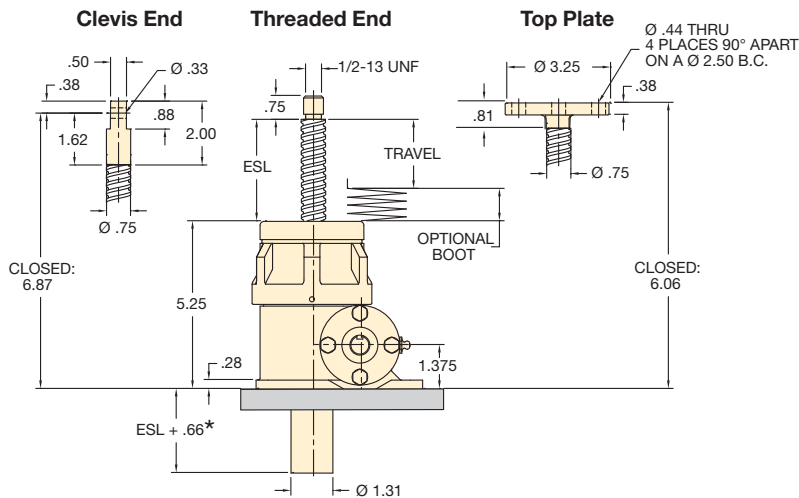
Top View



Inverted Translating



Upright Translating



## B1 Series



Capacity:  
**1 ton**

Maximum Travel:  
**223 inches**

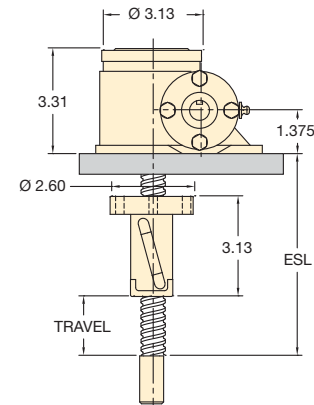
Maximum Speed:  
**180 in/min**



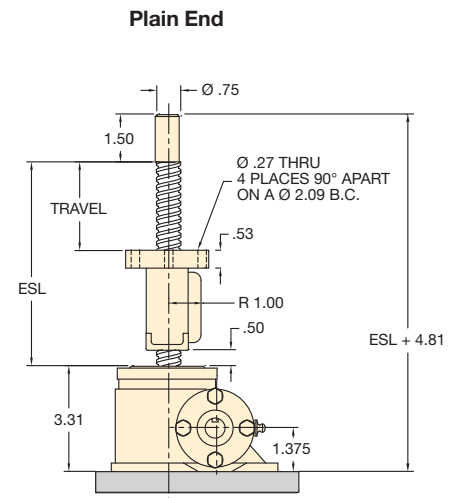
### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to maintain position.

Inverted Rotating



Upright Rotating





# B2 Series, Ball Screw Actuator

## ▼ Technical Specifications

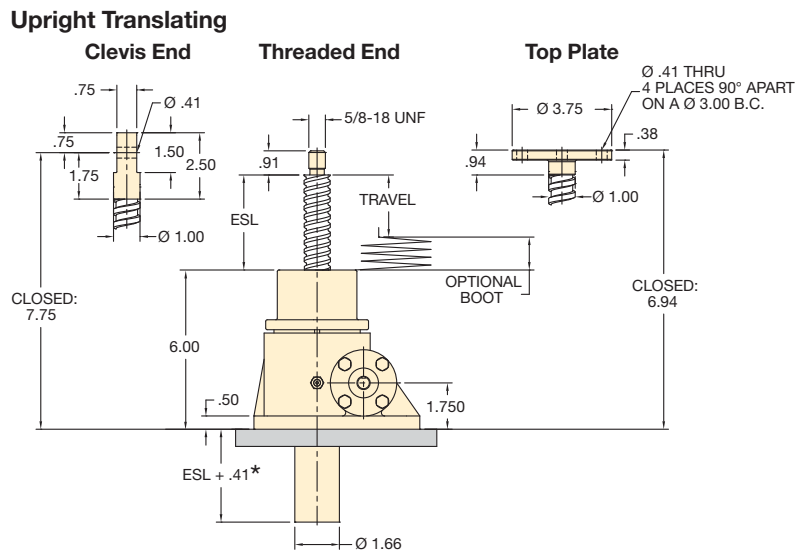
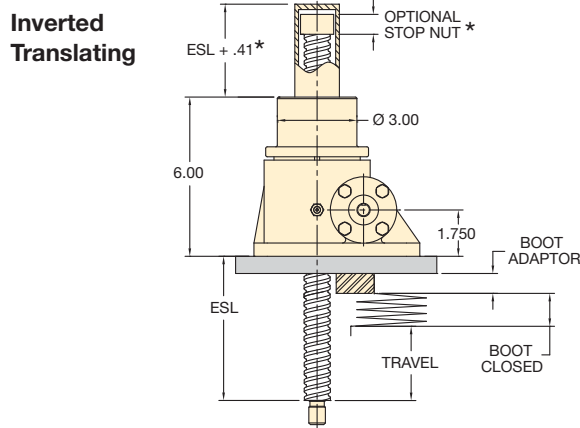
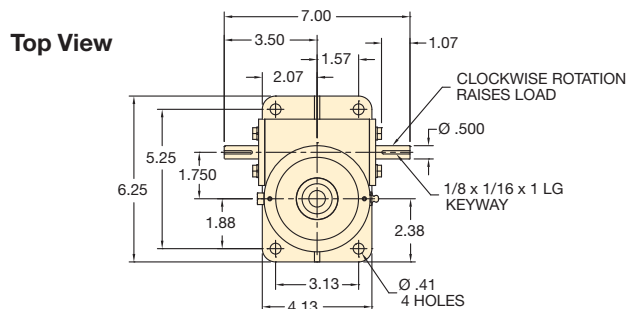
Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
1.00 dia. X .250" lead	Low	6:1	24
	High	24:1	96

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 1.28" to pipe length.

Optional Double Clevis is available.

Please see page 37 for ordering Matrix.



## B2 Series



Capacity:

**2 ton**

Maximum Travel:

**230 inches**

Maximum Speed:

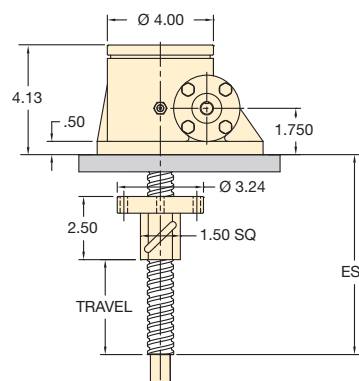
**75 in/min**



### Ball Screw Recommendations

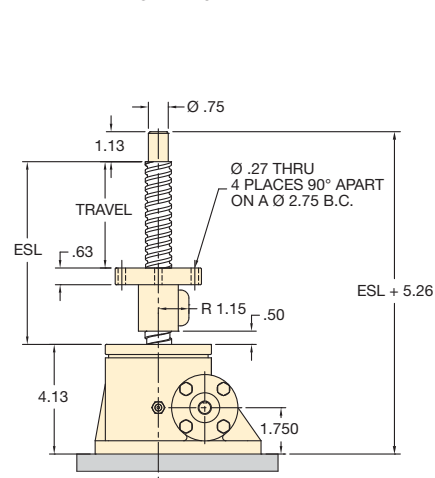
Ball Screw Actuators are non-locking. Brakes must be used to maintain position.

## Inverted Rotating



## Upright Rotating

Plain End



# B5 Series, Ball Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
1-1/2" dia. X .474" lead	Low	6:1	12.66
	High	24:1	50.66

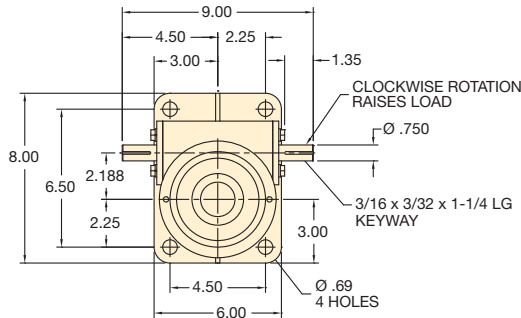
**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 1.45" to pipe length.

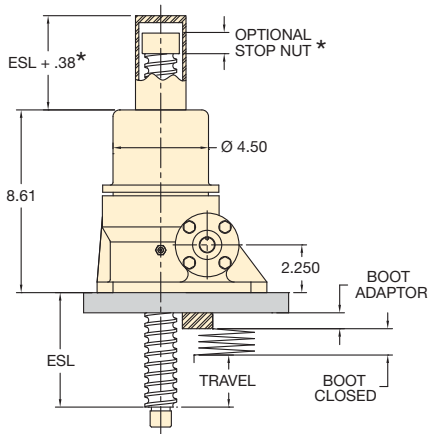
Optional Double Clevis is available.

Please see page 37 for ordering Matrix.

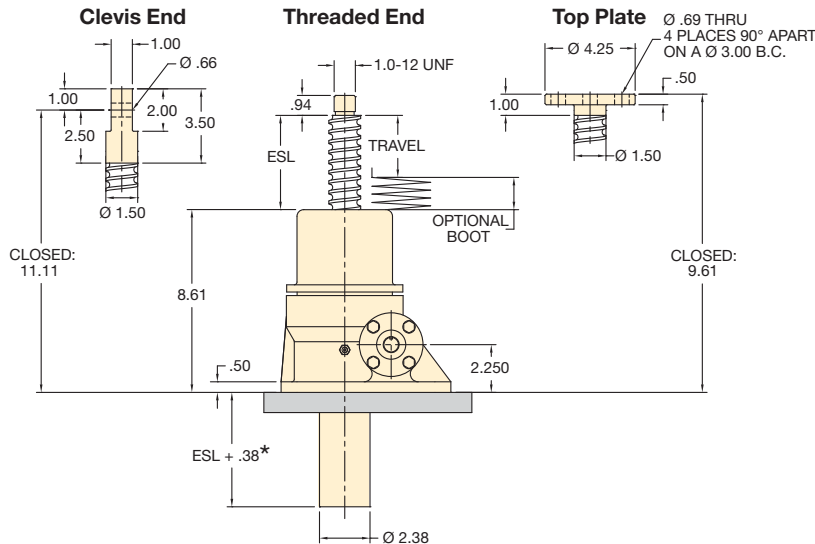
### Top View



### Inverted Translating



### Upright Translating



## B5 Series



Capacity:  
**5 ton**

Maximum Travel:  
**227 inches**

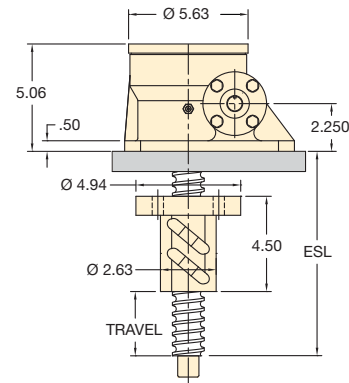
Maximum Speed:  
**142 in/min**



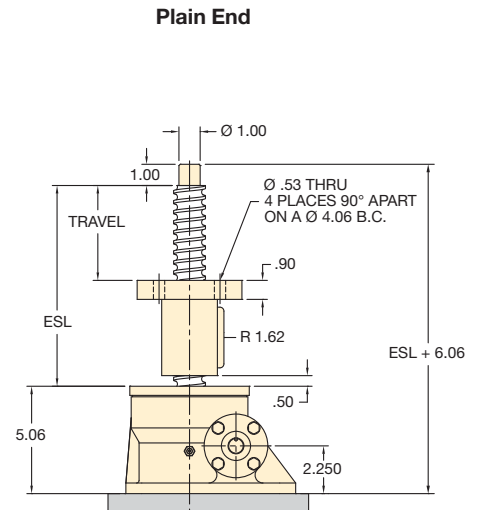
### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to maintain position.

### Inverted Rotating



### Upright Rotating



# B10 Series, Ball Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
1-1/2" dia. X .474" lead	Low	8:1	16.88
	High	24:1	50.66

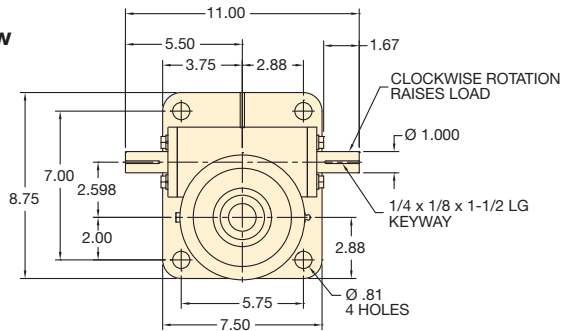
**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 1.37" to pipe length.

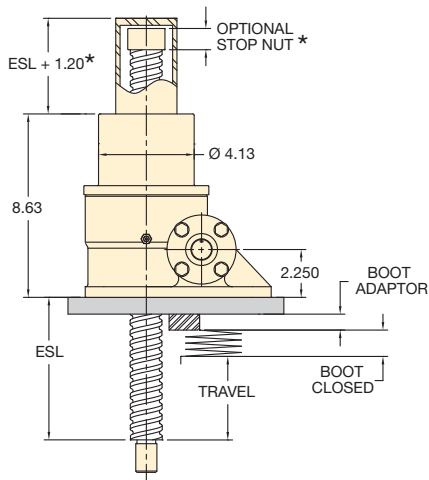
Optional Double Clevis is available.

Please see page 37 for ordering Matrix.

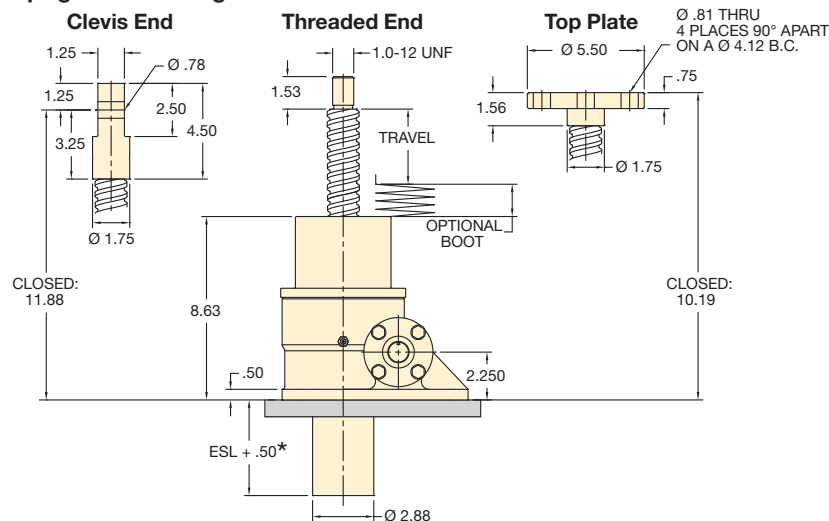
Top View



Inverted Translating



Upright Translating



## B10 Series



Capacity:

**10 ton**

Maximum Travel:

**227 inches**

Maximum Speed:

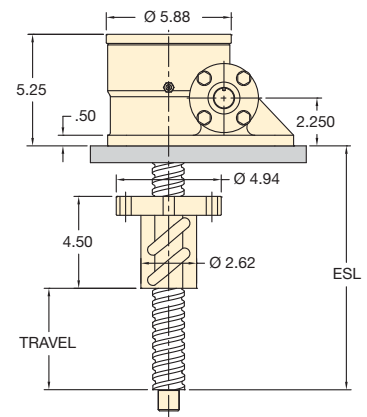
**107 in/min**



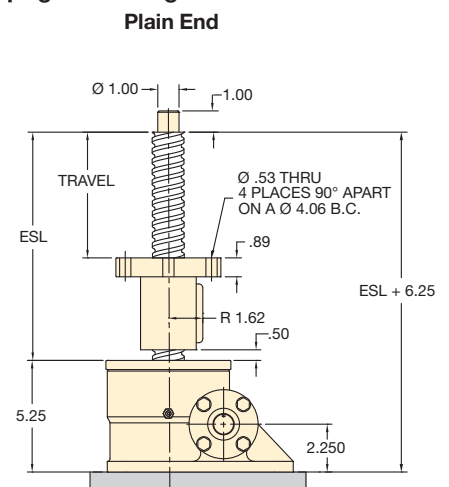
### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to maintain position.

Inverted Rotating



Upright Rotating



# B20 Series, Ball Screw Actuator

## ▼ Technical Specifications

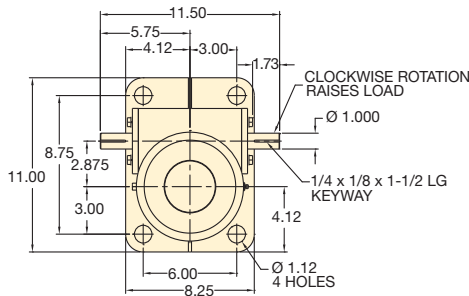
Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
2-1/4" dia. X .500" lead	Low	8:1	16
	High	24:1	48

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

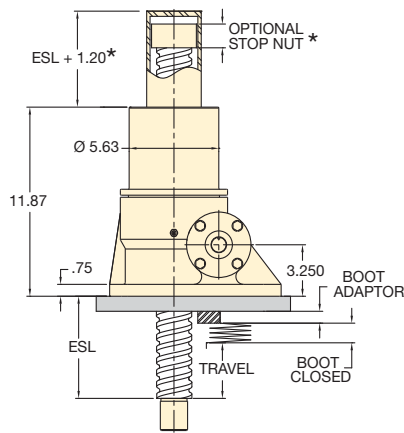
\* If optional stop nut is installed, add 2.52" to pipe length.

Please see page 37 for ordering Matrix.

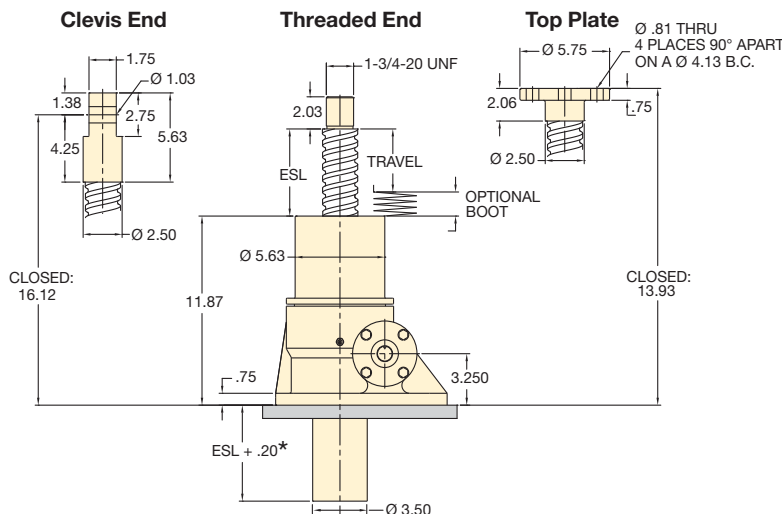
### Top View



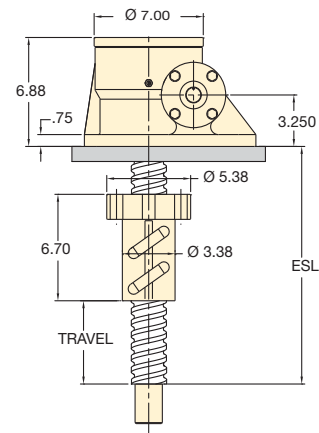
### Inverted Translating



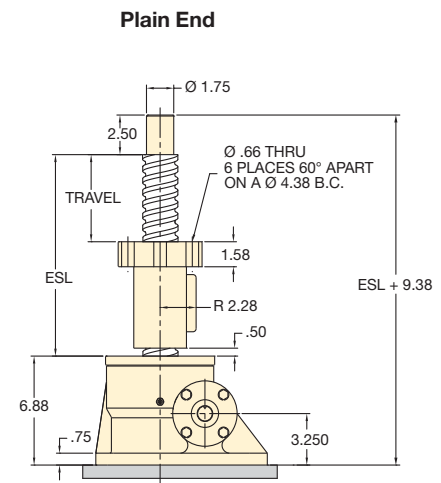
### Upright Translating



### Inverted Rotating



### Upright Rotating



## B20 Series



Capacity:  
**20 ton**

Maximum Travel:  
**223 inches**

Maximum Speed:  
**113 in/min**



### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to maintain position.

# B30 Series, Ball Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
3.00" dia. X .667" lead	Low	10 $\frac{2}{3}$ :1	16
	High	32:1	48

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 3.5" to pipe length.

Please see page 37 for ordering Matrix.

## B30 Series



Capacity:

**30 ton**

Maximum Travel:

**219 inches**

Maximum Speed:

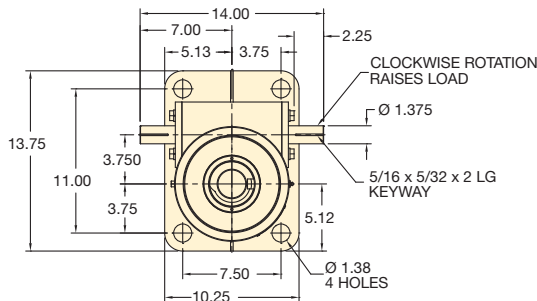
**75 in/min**



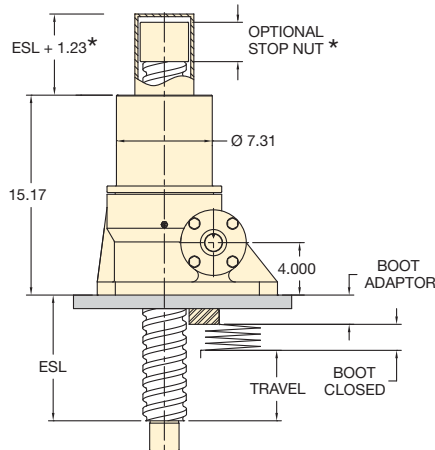
### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to maintain position.

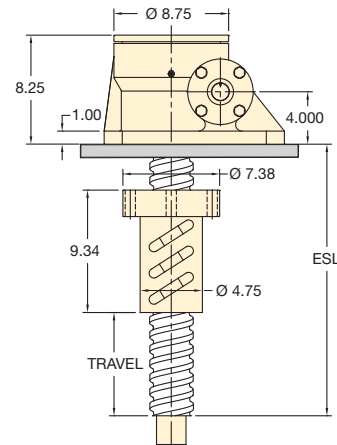
Top View



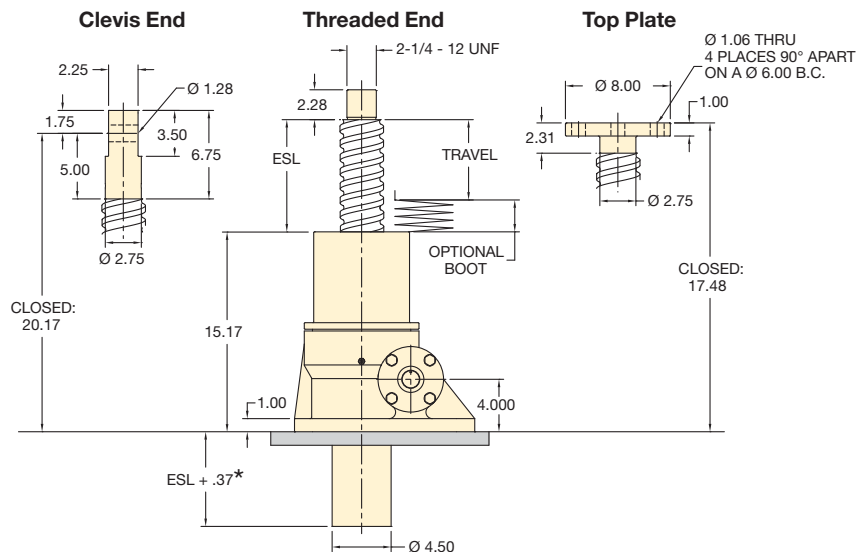
Inverted Translating



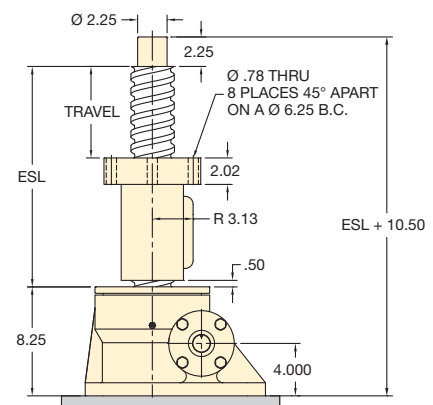
Inverted Rotating



Upright Translating



Upright Rotating Plain End



# B50 Series, Ball Screw Actuator

## ▼ Technical Specifications

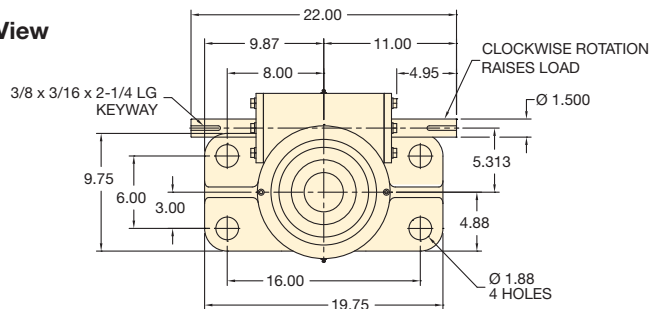
Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
4.00" dia. X 1.0" lead	Low	10 $\frac{2}{3}$ :1	10.66
	High	32:1	32

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

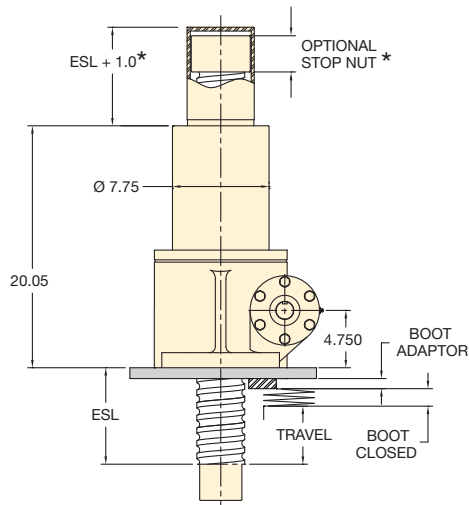
\* If optional stop nut is installed, add 4.0" to pipe length.

Please see page 37 for ordering Matrix.

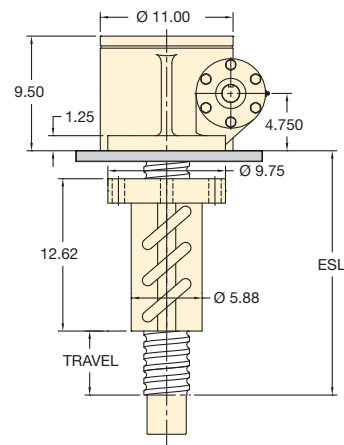
Top View



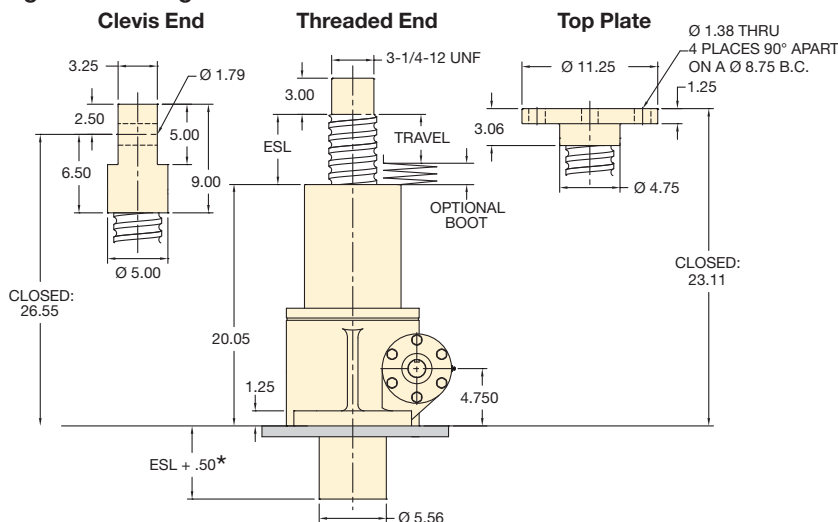
Inverted Translating



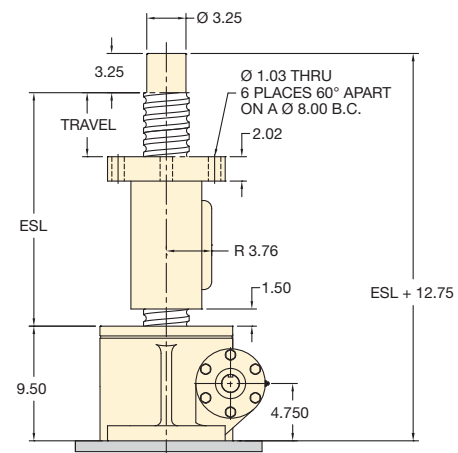
Inverted Rotating



Upright Translating



Upright Rotating Plain End



## B50 Series



Capacity:  
**50 ton**

Maximum Travel:  
**215 inches**

Maximum Speed:  
**113 in/min**



### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to maintain position.

# B75 Series, Ball Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
4.00" dia. X 1.0" lead	Low	10 $\frac{2}{3}$ :1	10.66
	High	32:1	32

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 4.0" to pipe length.

Please see page 37 for ordering Matrix.

## B75 Series



Capacity:

**75 ton**

Maximum Travel:

**213 inches**

Maximum Speed:

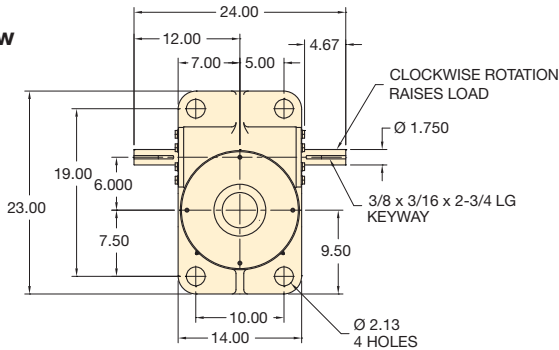
**84 in/min**



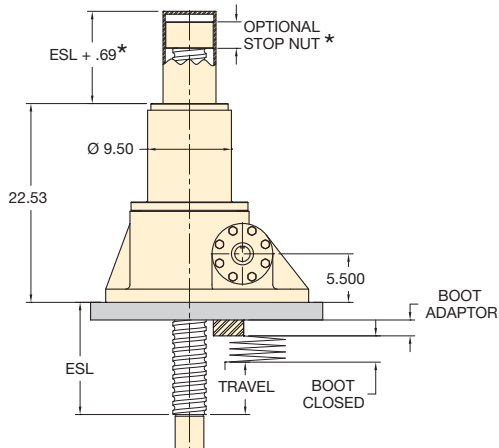
### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to maintain position.

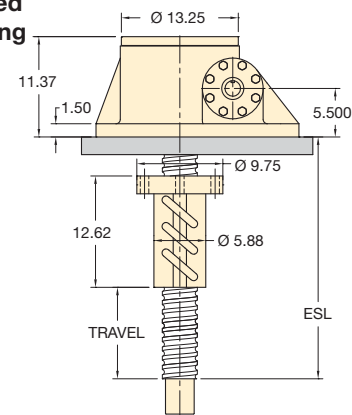
Top View



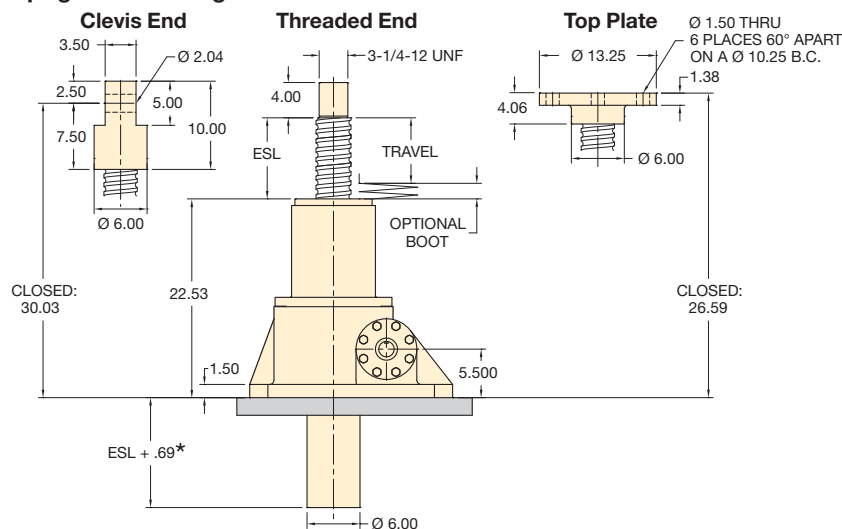
Inverted Translating



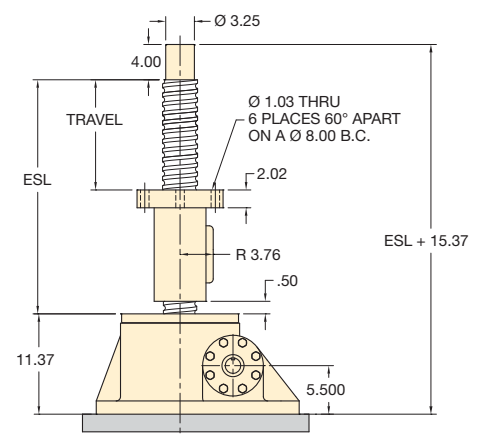
Inverted Rotating



Upright Translating



Upright Rotating Plain End



# B100 Series, Ball Screw Actuator

## ▼ Technical Specifications

Screw Specifications	Gear Specifications		
		Gear Ratio	Turns/Inch
4.00" dia. X 1.00" lead	Low	12:1	12
	High	36:1	36

**NOTES:** For inverted models, add the thickness of the mounting structure to the extended screw length (ESL). All dimensions shown in inches.

\* If optional stop nut is installed, add 4.0" to pipe length.

Please see page 37 for ordering Matrix.

## B100 Series



Capacity:

**100 ton**

Maximum Travel:

**210 inches**

Maximum Speed:

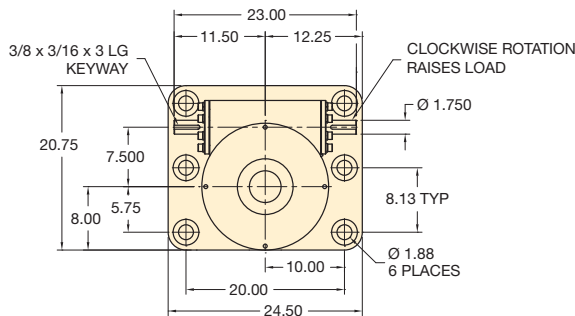
**75 in/min**



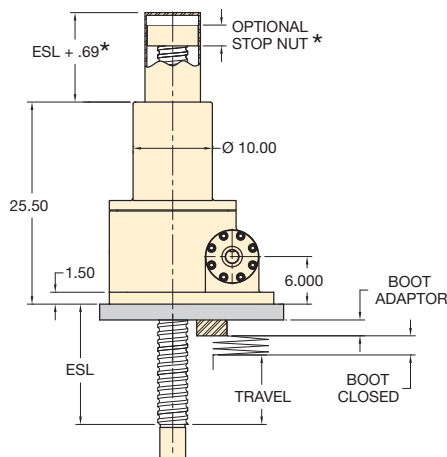
### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to maintain position.

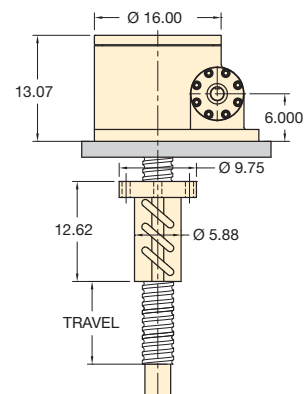
### Top View



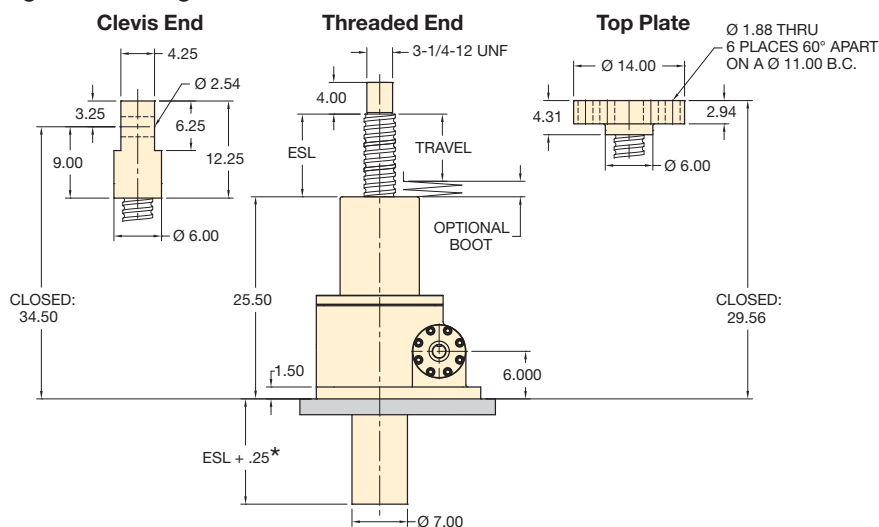
### Inverted Translating



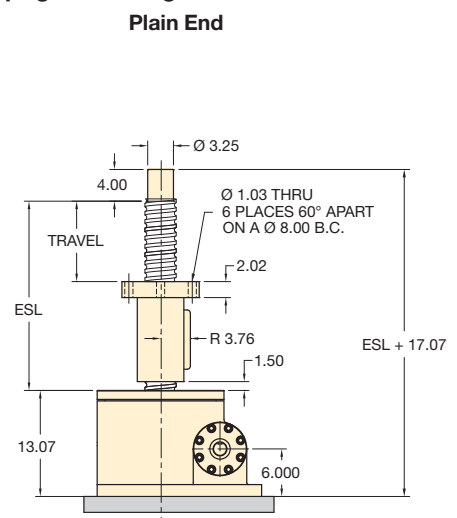
### Inverted Rotating



### Upright Translating














### Upright Rotating





From a single actuator to a multi-actuator system, a comprehensive range of accessories is available to tailor your UNI-LIFT® system to meet your project requirements.

With a complete line of hand wheels, motors, motor adaptors, rotary limit switches, worm gear reducers, mitre gear boxes, couplers, shafting, screw end adapters, pillow blocks, rotary limit switches, electrical controls and boots – Enerpac can provide the accessories you need to compliment your mechanical actuator system and to ensure the efficient operation, extended life and safety of your actuator system.

Components	Series		Page
Hand Wheels	<b>UHW</b>		48 ▶
Motors	<b>UM</b>		49 ▶
Motor Adaptors	<b>UMA</b>		50 ▶
Worm Gear Reducers	<b>UGR</b>		52 ▶
Mitre Gear Boxes	<b>UMG</b>		54 ▶
Couplers	<b>UC</b>		56 ▶
Shafting	<b>US</b>		58 ▶
Screw End Adaptors	<b>UT, UCE</b>		59 ▶
Electrical Controls	<b>UEC</b>		60 ▶
Rotary Limit Switches	<b>UR</b>		61 ▶
Boots	<b>UB</b>		62 ▶



▼ Shown: UHW-34



- Cast iron with chrome plating or aluminum alloy for rigorous applications
- Recessed hub and 3 spoke design provides ample clearance
- Revolving handle design for smooth and easy rotation
- All hand wheels are bored, keyed, and set-screw drilled to provide easy installation

## UHW Series

Shaft Sizes:

**3/8-3/4 inch**

Wheel Diameter:

**4-10 inches**



### Wheel Diameter

As the required input torque increases, a larger wheel diameter reduces the force required from the operator.



### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to hold screw into position.



### Special Requests

Aluminum Alloy or larger hand wheels (diameters up to 20") are available upon request. Please contact Enerpac at: [unilift@enerpac.com](mailto:unilift@enerpac.com).

▼ To tension cables, precise positioning in small increments is required. This Hand-Wheel driven 40-ton M-Series UNI-LIFT's® smooth operation was the perfect choice for this application.



### ▼ HAND WHEEL SELECTION CHART

Actuator	Bore (in)	Hand Wheel Diameter Model Nos.			
		4 (in)	6 (in)	8 (in)	10 (in)
MA5, MA15	3/8	UHW34	—	—	—
MA20, M2	1/2	UHW44	UHW46	—	—
M1, M3	5/8	UHW54	UHW56	UHW58	—
M4, M5	3/4	—	—	—	UHW610

▼ Shown: **UM-5**



- **Wide range of operating voltages; 208-230/460 VAC, 3-phase**
- **TEFC motor for optimal performance**
- **Robust, industrial grade heavy-steel frame**
- **3-phase motors are ideally suited for reversing direction and speed control**

## UM Series

Power:  
**0.25-10 hp**

Voltage:  
**208-230/460 VAC, 3-ph**



### Motor Adaptors

To close-couple your Actuator to the proper motor see our line of Motor Adaptors.

Page: **50**



### Ball Screw Recommendations

Ball Screw Actuators are non-locking. Brakes must be used to hold screw into position.

Horse-power	RPM	Motor Model No.	NEMA Frame	Starting Torque [T <sub>sm</sub> ] (in-lbs)	Running Torque [T <sub>rm</sub> ] (in-lbs)	Brake Motor Model No.	Shaft Diameter (in)	Weight (lbs)
0.25	1750	UM1	56C	30	9	UBM1	0.625	18
0.25	1140	UM2	56C	36	13		0.625	19
0.33	1750	UM3	56C	45	12	UBM3	0.625	20
0.33	1140	UM4	56C	53	18		0.625	21
0.5	1750	UM5	56C	63	18	UBM5	0.625	22
0.5	1140	UM6	56C	74	27		0.625	23
0.75	1750	UM7	56C	105	27	UBM7	0.625	25
0.75	1140	UM8	56C	116	40		0.625	32
1	1750	UM9	56HC	85	36	UBM9	0.625	31
1	1140	UM10	56HC	122	54		0.625	37
1.5	1750	UM11	56HC	150	54	UBM11	0.625	34
1.5	1140	UM12	56HC	134	84		0.625	40
2	1750	UM13	56HC	198	72	UBM13	0.625	41
2	1140	UM14	184TC	252	108		1.125	65
3	1750	UM15	182TC	264	108	UBM15	1.125	61
3	1140	UM16	213TC	409	162		1.375	105
5	1750	UM17	184TC	436	180	UBM17	1.125	75
5	1140	UM18	215TC	783	270		1.375	133
7.5	1750	UM19	213TC	488	270	UBM19	1.375	123
10	1750	UM20	215TC	732	360		1.375	138

▼ Shown: **UMA-1**



- Direct mount capabilities up to 30-tons
- Designed to NEMA C-Face Standards
- Direct couple motor to left or right-hand input shaft
- All hardware provided, including coupling

## Solutions For Direct Mounting



### Larger Capability

For 50-ton and above motor mounting please contact Enerpac at:  
[unilift@enerpac.com](mailto:unilift@enerpac.com).



### Motors

For the correct motor to power your specific Actuator see Enerpac's line of compatible motors.

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### Contact Enerpac!

Contact the Enerpac office nearest to you for advice and technical assistance in the layout of your ideal UNI-LIFT® System. You can also ask Enerpac for assistance by e-mail at:  
[unilift@enerpac.com](mailto:unilift@enerpac.com).

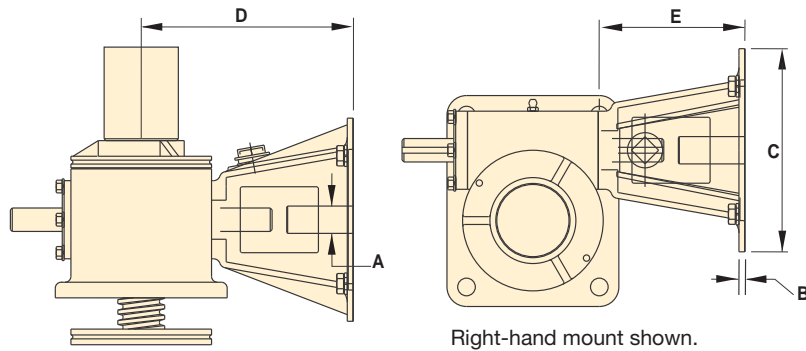


### [www.enerpac.com](http://www.enerpac.com)

Visit our web site for the complete Global Lifetime Warranty or call your Authorized Service Center.

▼ Motor Adaptors are the ideal solution to couple the motor directly to the 5-ton Double-Clevis Actuators, with a Motor and a Limit Switch Box mounted on each Actuator.





**UMA  
Series**



Frame:  
**56C-215TC**

## ▼ MOTOR DIMENSIONAL CHART

Actuator Model No.	Model No.	Motor Frame	A (in)	B (in)	C (in)	D (in)	E (in)	Weight (lbs)
M1/B1/M3	UMA1	56C	0.63	0.19	6.5	6.28	4.72	11
M1/B1/M3	UMA2	143TC, 145TC, 182C, 184C	0.88	0.19	6.5	6.28	4.72	11
M2/B2	UMA3	56C	0.63	0.19	6.5	6.65	4.73	11
M2/B2	UMA4	143TC, 145TC, 182C, 184C	0.88	0.19	6.5	6.65	4.73	11
M4	UMA5	56C	0.63	0.19	6.5	6.78	4.69	11
M4	UMA6	143TC, 145TC, 182C, 184C	0.88	0.19	6.5	6.78	4.69	11
M4	UMA7	182TC, 184TC, 213C, 215C	1.13	0.75	9.00	7.28	5.19	11
M5/B5	UMA8	56C	0.63	0.19	6.50	7.16	4.28	11
M5/B5	UMA9	143TC, 145TC, 182C, 184C	0.88	0.19	6.50	7.16	4.28	11
M5/B5	UMA10	182TC, 184TC, 213C, 215C	1.13	0.75	9.00	8.25	5.37	15
M8	UMA11	56C	0.63	0.19	6.50	7.38	4.94	11
M8	UMA12	143TC, 145TC, 182C, 184C	0.88	0.19	6.50	7.38	4.94	11
M8	UMA13	182TC, 184TC, 213C, 215C	1.13	0.75	9.00	7.94	5.50	15
M10/B10	UMA14	56C	0.63	0.19	6.50	8.31	4.81	11
M10/B10	UMA15	143TC, 145TC, 182C, 184C	0.88	0.19	6.50	8.31	4.81	11
M10/B10	UMA16	182TC, 184TC, 213C, 215C	1.13	0.75	9.00	8.87	5.37	15
M15	UMA17	56C	0.63	0.19	6.50	8.44	4.81	11
M15	UMA18	143TC, 145TC, 182C, 184C	0.88	0.19	6.50	8.44	4.81	11
M15	UMA19	182TC, 184TC, 213C, 215C	1.13	0.75	9.00	9.00	5.37	15
M20/B20	UMA20	56C	0.63	0.19	6.50	8.53	4.81	11
M20/B20	UMA21	143TC, 145TC, 182C, 184C	0.88	0.19	6.50	8.53	4.81	11
M20/B20	UMA22	182TC, 184TC, 213C, 215C	1.13	0.75	9.00	9.15	5.43	15
M20/B20	UMA23	213TC, 215TC	1.38	0.75	9.00	9.15	5.43	15
M25	UMA24	56C	0.63	0.19	6.50	8.41	5.25	11
M25	UMA25	143TC, 145TC, 182C, 184C	0.88	0.19	6.50	8.41	5.25	11
M25	UMA26	182TC, 184TC, 213C, 215C	1.13	0.75	9.00	8.72	5.53	15
M25	UMA27	213TC, 215TC	1.38	0.75	9.00	8.72	5.53	15
M30/B30	UMA28	56C	0.63	0.19	6.50	9.15	4.81	11
M30/B30	UMA29	143TC, 145TC, 182C, 184C	0.88	0.19	6.50	9.15	4.81	11
M30/B30	UMA30	182TC, 184TC, 213C, 215C	1.13	0.75	9.00	9.88	5.55	15
M30/B30	UMA31	213TC, 215TC	1.38	0.75	9.00	9.88	5.55	15

▼ Shown: **UGRB**



## Increases Precision of Movement

- Standard NEMA C-Face mounting flange
- Aluminum alloy housing with heat sink provides maximum cooling efficiencies
- Range from 1/6 – 20 hp @ 1750 RPM
- Coated with epoxy-polyester paint throughout the reducer for high corrosion resistance
- Hardened worm shaft offers increased durability
- Modular construction for easy adaptability
- Maintenance free, pre-filled with synthetic oil for extended life
- Reduction ratios of up to 100:1 are available upon request



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Visit our web site for the complete Global Lifetime Warranty or call your Authorized Service Center.

### ▼ WORM GEAR DIMENSIONAL CHART

NEMA C Flange	Model Number	A (in)	B (in)	C (in)	D (in)	E (in)
56C	<b>UGRA</b>	2.76	3.54	6.50	1.38	2.76
56C	<b>UGRB</b>	3.15	4.09	6.50	1.57	3.15
143TC, 145TC	<b>UGRC</b>	3.74	5.12	6.50	1.97	3.94
182TC, 184TC	<b>UGRD</b>	4.43	6.02	9.00	2.36	4.72
182TC, 184TC	<b>UGRE</b>	5.10	6.77	9.00	2.76	5.51
213TC, 215TC	<b>UGRF</b>	6.30	8.27	9.00	3.35	6.69

# Worm Gear Reducers

## ▼ SELECTION CHART

NEMA C Flange	Model Number	Ratio*	1750 RPM Input		Input (hp)	1140 RPM Input		Input (hp)
			Output			Output		
			RPM	Torque (in-lbs)		RPM	Torque (in-lbs)	
56C	UGRA1	5	350	343	1.78	228	403	1.64
	UGRA2	7.5	233	403	1.43	152	444	1.23
	UGRA3	10	175	403	1.10	114	444	0.94
	UGRA4	15	117	403	0.76	76	454	0.67
56C	UGRB1	5	350	625	3.25	228	757	3.08
	UGRB2	7.5	233	716	2.51	152	847	2.32
	UGRB3	10	175	726	1.95	114	847	1.78
	UGRB4	15	117	746	1.40	76	847	1.25
143TC, 145TC	UGRC2	7.5	233	1291	4.53	152	1523	4.18
	UGRC3	10	175	1311	3.49	114	1543	3.21
	UGRC4	15	117	1412	2.63	76	1563	2.27
182TC, 184TC	UGRD2	7.5	233	1866	6.47	152	2169	5.88
	UGRD3	10	175	1967	5.17	114	2320	4.77
	UGRD4	15	117	2017	3.66	76	2370	3.36
182TC, 184TC	UGRE2	7.5	233	2925	10.03	152	3430	9.19
	UGRE3	10	175	3127	8.13	114	3732	7.59
	UGRE4	15	117	3631	6.51	76	4236	5.94
213TC, 215TC	UGRF2	7.5	233	4842	16.60	152	5699	15.28
	UGRF3	10	175	5245	13.64	114	6254	12.71
	UGRF4	15	117	5749	10.32	76	6657	9.34

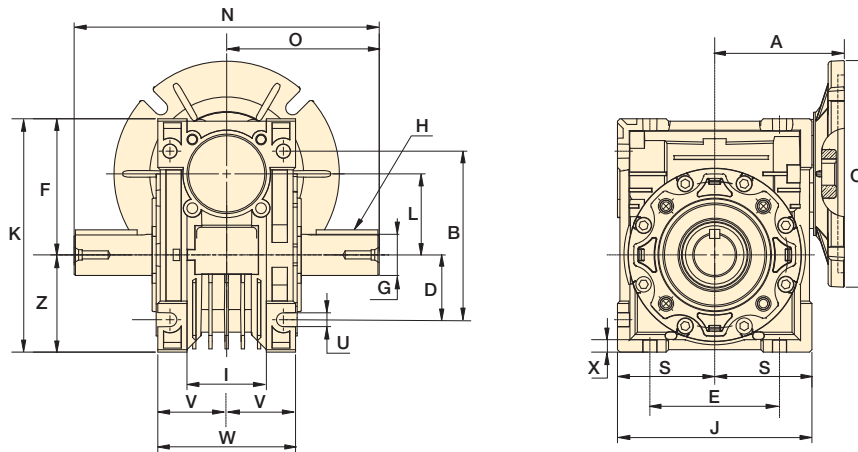
\* Ratios up to 100:1 available upon request.

## UGR Series



NEMA-C Flange Sizes:  
**56C-215TC**

\*Ratios:  
**5:1-15:1**



F	G	H	I	J	K	L	N	O	S	U	V	W	X	Z	Weight	Model Number
(in)	Output Shaft (in)	Key (in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(lbs)	
2.81	0.75	3/16 x 1.5	1.69	3.98	4.78	1.57	7.24	3.62	1.38	0.26	1.18	2.79	0.26	1.97	10	UGRA
3.31	1.00	1/4 x 1.5	1.93	4.76	5.67	1.97	7.83	3.92	1.57	0.33	1.38	3.35	0.283	2.36	12	UGRB
4.02	1.125	1/4 x 1.88	2.64	5.75	6.85	2.48	9.41	4.70	1.97	0.33	1.67	4.06	0.31	2.83	16	UGRC
4.69	1.25	1/4 x 2.25	2.83	6.85	8.07	2.95	10.51	5.26	2.36	0.45	1.77	4.41	0.39	3.39	33	UGRD
5.31	1.375	5/16 x 2.5	2.91	8.19	9.37	3.54	12.17	6.08	2.76	0.51	1.97	5.12	0.43	4.06	41	UGRE
6.59	1.625	3/8 x 2.75	3.28	9.94	11.61	4.33	13.54	6.77	3.34	0.55	2.26	5.67	0.63	5.02	59	UGRF

▼ Shown: UMG5 and UMG3



## Interconnect / Drive Actuator Systems

**i Mitre Gear Boxes**  
Standard units may be inverted to reverse rotation. Input shaft can be rotated in either direction. Other styles and ratios are available on request.

**Standard shaft rotational mitre gear boxes. Invert for reverse rotation.**

**i Iron Mitre Box**  
Iron Mitre Boxes are available with spiral gears if higher speed is required.

### Aluminum Mitre Box

- Lightweight aluminum housing resists corrosion and provides rigid gear and bearing support
- Stainless steel shafts provide resistance to corrosion
- Spiral bevel gearing allows higher operating speeds
- Lubricated for life to assure trouble free service
- Universal mounting (5 surfaces) for maximum design flexibility

### Heavy-Duty Cast Iron Mitre Box

- Rugged iron housing provides rigid gear and bearing support
- Tapered roller bearing for endurance and strength
- Double lip, spring loaded seals keeps lubricant in and dirt out

▼ Mitre Gear Boxes were used extensively throughout this aircraft scaffolding system to interconnect the drive shafts and motors.



### ▼ ALUMINUM MITRE BOX SELECTION CHART

Model No.	Maximum Input RPM	Output Torque @ Maximum RPM (in-lbs)	Input hp @ Maximum RPM	A (in)	B (in)	C (in)
UMG1	3600	32	1.8	3.95	1.98	1.25
UMG2	3600	76	4.3	7.25	3.63	2.00
UMG3	3600	180	10.25	10.00	5.00	3.00

### ▼ IRON MITRE BOX SELECTION CHART

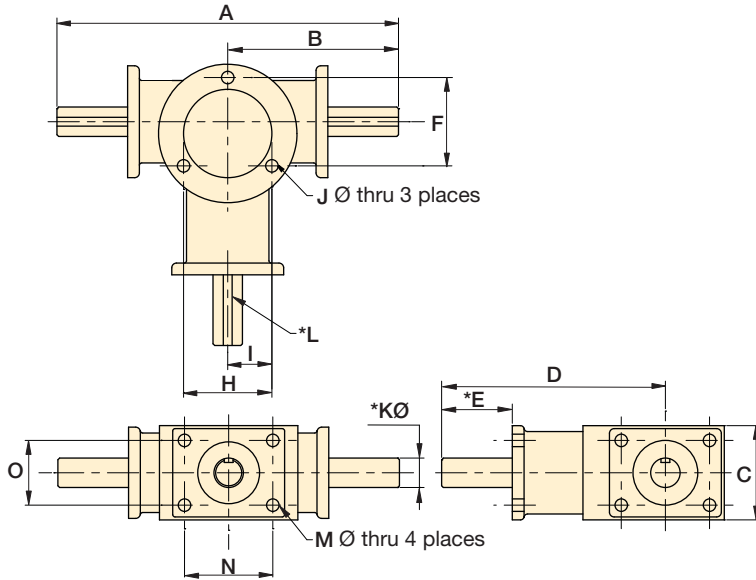
Model No.	Maximum Input RPM	Output Torque @ Maximum RPM (in-lbs)	Input hp @ Maximum RPM	A (in)	B (in)	C (in)
UMG4	2400	79	3	7.50	3.75	3.19
UMG5	1150	660	12	10.19	5.09	4.13
UMG6	1150	1320	24	12.25	6.13	5.63
UMG7	850	3260	44	15.81	7.91	8.19
UMG8	690	5130	56	16.09	8.05	8.09
UMG9	1750	9039	250	21.50	10.75	9.50

**NOTE:** Torque ratings are based upon continuous duty service. Output capacity may be higher for intermittent duty (contact Enerpac).

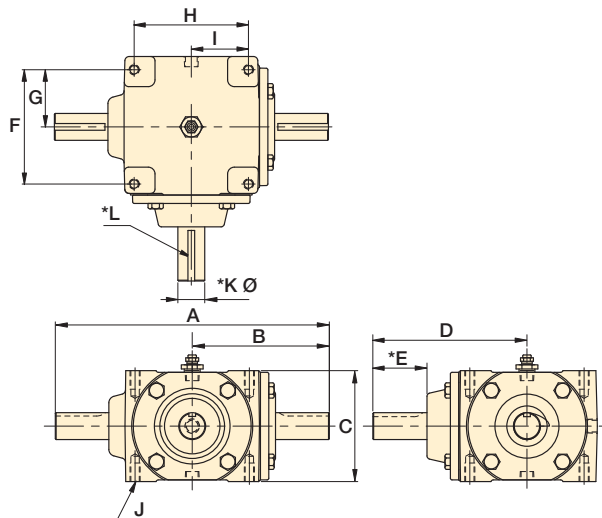


# Mitre Gear Boxes

## Aluminum Mitre Box



## Iron Mitre Box



## UMG Series



Input Power:  
**1.8-250 hp**

Output Torque Rating @ Max. RPM:  
**32-9039 in-lbs**

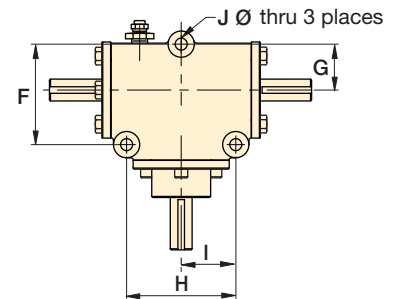


### Shafting / Couplers

Complete your system arrangement by selecting your drive options.

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### UMG4 Mounting Hole Location

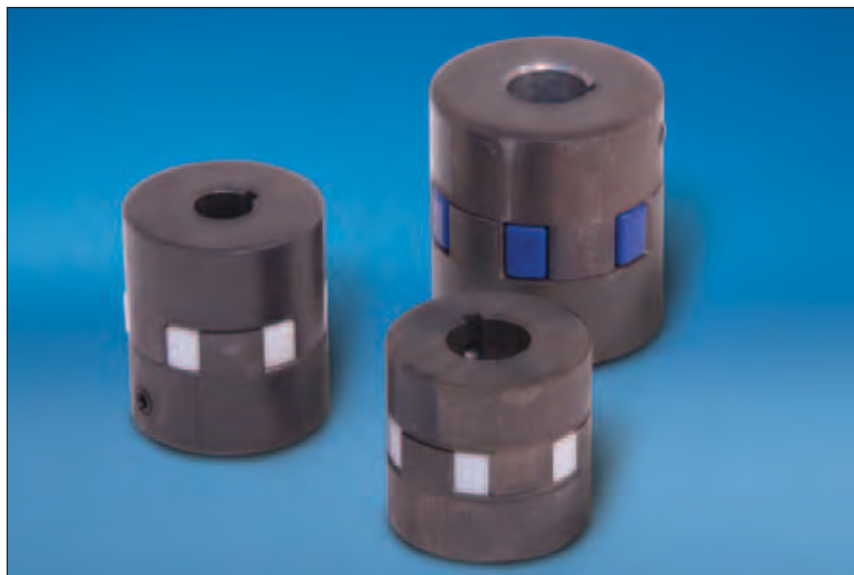


D	E*	F	H	I	J	K*	L* Keyway	M	N	O	Shipping Weight	Model No.
(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(lbs)	
2.75	0.59	1.31	1.31	0.66	0.27	0.375	0.47 Lg Flat X 1/32 DP	0.17	1.19	0.88	0.50	UMG1
4.75	1.50	1.88	1.88	0.94	0.27	0.625	3/16 X 3/32 X 1 7/32	0.27	1.88	1.38	2.00	UMG2
7.00	2.00	3.00	3.00	1.50	0.33	0.750	3/16 X 3/32 X 1 1/16	0.33	3.00	2.25	8.25	UMG3

D	E*	F	G	H	I	J	K*	L* Keyway	Shipping Weight	Model No.
(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(lbs)	
4.56	1.50	2.88	1.31	3.13	1.56	0.34 Thru	0.625	3/16 X 3/32 X 1 5/32	9.00	UMG4
5.72	2.00	4.25	2.13	4.25	2.13	3/8 - NC	1.000	1/4 X 1/8 X 1 25/32	25.00	UMG5
8.47	2.50	4.50	2.25	4.50	2.25	1/2 - NC	1.250	1/4 X 1/8 X 1 25/32	48.00	UMG6
10.88	3.00	6.50	3.25	6.50	3.25	1/2 - NC	1.375	5/16 X 5/32 X 2 5/16	88.00	UMG7
11.48	3.06	6.50	3.25	6.50	3.25	1/2 - NC	1.500	3/8 X 3/16 X 2 1/4	115.00	UMG8
15.00	4.00	8.00	4.00	8.00	4.00	1/2 - NC	2.000	1/2 X 1/4 X 3 3/4	175.00	UMG9

\* Identical for three shafts.

▼ Shown: **Jaw-type couplers**



## Your Actuator Drive Solution

### Couplers

- Couplers offer standard shaft-to-shaft connection for general industrial-duty applications
- Fail-safe – will still perform if elastomer fails
- Sintered iron jaws provide reliable service for heavy-duty applications
- Wide ambient temperature range: -30° to 160° F
- Maximum angle offset of 1° allowing easy installation



#### Contact Enerpac

For complete details and availability, contact Enerpac for assistance by e-mail at: [unilift@enerpac.com](mailto:unilift@enerpac.com).

### ▼ JAW TYPE COUPLER SELECTION CHART

Size	Jaw Type Coupler Half Bore Diameter (in)									Jaw Spider (Material)	
	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	Urethane	Hytrel
1	UC1A	UC1B	UC1C	UC1D	UC1E	—	—	—	—	UCU1	UCH1
2	—	UC2A	UC2B	UC2C	UC2D	UC2E	—	—	—	UCU2	UCH2
3	—	—	UC3A	UC3B	UC3C	UC3D	UC3E	—	—	UCU3	UCH3
4	—	—	—	UC4A	UC4B	UC4C	UC4D	—	—	UCU4	UCH4
5	—	—	—	UC5A	UC5B	UC5C	UC5D	UC5E	UC5F	UCU5	UCH5
6	—	—	—	—	—	UC6A	UC6B	UC6C	UC6D	UCU6	UCH6

### ▼ GEAR TYPE COUPLER SELECTION CHART

Size	Gear Type Coupler Half Bore Diameter (in)								Gear Sleeve
	3/4	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	2	
1	UCG1A	UCG1B	UCG1C	UCG1D	—	—	—	—	UCGC1
2	—	UCG2A	UCG2B	UCG2C	UCG2D	UCG2E	UCG2F	UCG2G	UCGC2
3	—	—	—	—	UCG3A	UCG3B	UCG3C	UCG3D	UCGC3
4	—	—	—	—	UCG4A	UCG4B	UCG4C	UCG4D	UCGC4

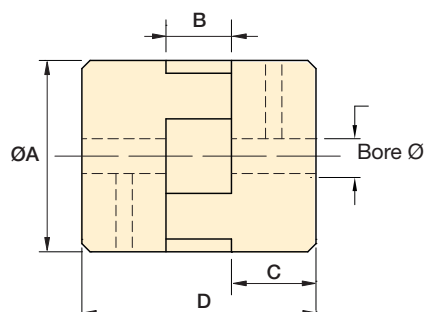
## UC Series

Torque Ratings:

**135-30,200 in-lbs**

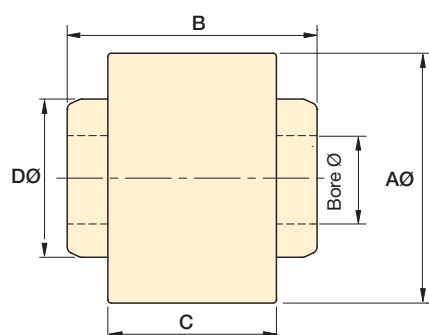
Bore Size:

**1/4-3 1/8 inch**



### ▼ JAW TYPE COUPLER DIMENSIONS

Size	Max. Torque Rating (in-lbs)		Max. Bore (in)	Dimensions (in)			
	Urethane	Hytrel		A	B	C	D
1	135	217	1	1.75	0.50	0.82	2.13
2	216	401	1 1/8	2.11	0.52	0.82	2.15
3	291	561	1 3/16	2.11	0.52	1.00	2.51
4	477	792	1 3/8	2.54	0.71	1.06	2.84
5	626	1134	1 5/8	2.54	0.71	1.38	3.48
6	1188	2268	1 7/8	3.32	0.88	1.68	4.22



### ▼ GEAR TYPE COUPLER DIMENSIONS

Size	Max. Torque Rating (in-lbs)	Max. Bore (in)	Dimensions (in)			
			A	B	C	D
1	2500	1 1/4	3.31	3.13	2.00	2.00
2	7600	1 5/8	3.75	3.75	2.53	2.38
3	20,200	2 1/8	4.75	4.25	2.56	3.25
4	30,200	2 5/8	5.50	4.75	3.06	3.94



### Coupler Ordering

When ordering Couplers, each coupler half and insert/sleeve must be ordered separately.



### Shaft Couplings

Balanced shaft couplings compensate for lateral, axial, and angular misalignment.

By using inserts with different durometers (hardness) it is possible to vary the stiffness and dampening effect of the coupling.

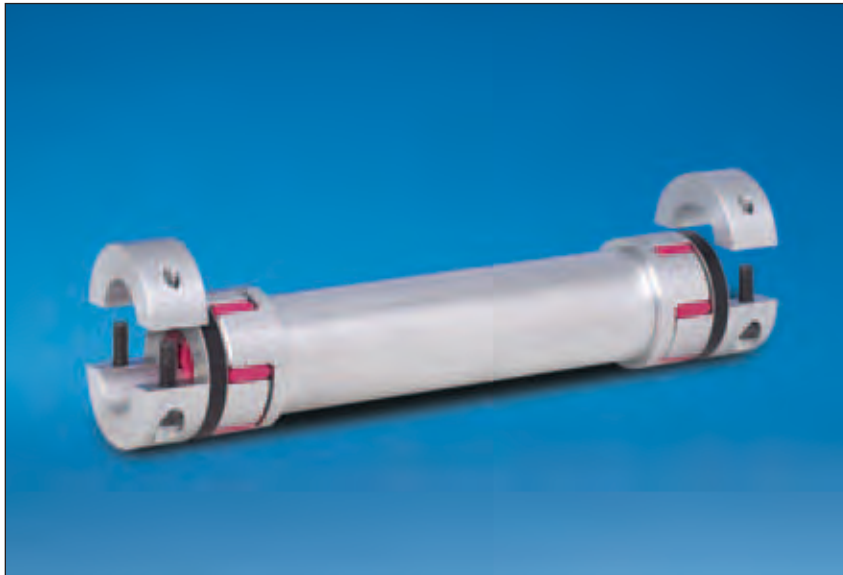


### Shafting Options

Standard shafting options are also available.

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▼ Shown: **Shaft**



- Precision balanced shaft reduces vibration
- No intermediate support bearing required on flexible shaft assemblies
- Spans distances of up to 13 feet

## US Series

Torque Ratings:

**135-30,200 in-lbs**

Bore Size:

**1/4-3 1/8 inch**

▼ This is how a Shaft is configured:

**US 3 B 0125 C C**

1      2      3      4      5      6

**1 = Model Type**  
US = Shaft

**2 = Size**  
1-7 = See table below for options

**3 = Insert**  
B = High Torsional Resistance

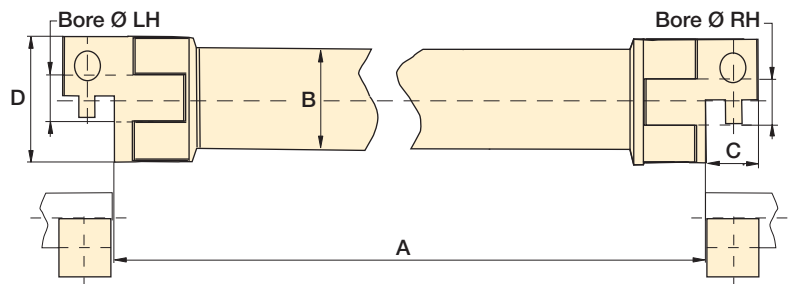
**4 = Shaft to Shaft Length (A)**  
XXX.X = Input Value (in)  
Do not include decimal in part number.  
All data will be based on 1 decimal place.  
Example: 12.5" = 0125

**5 = Bore Size LH**  
A-N = See table below for options

**6 = Bore Size RH**  
A-N = See table below for options

### ▼ DRIVE SHAFTS DIMENSIONS

Size	Shaft to Shaft Length A (in)		Tube Diameter B (in)	Hub Length C (in)	Hub Diameter D (in)
	(min)	(max)			
1		157.0	1.10	0.66	1.26
2		157.0	1.38	0.74	1.65
3		157.0	1.90	1.26	2.20
4		157.0	2.36	1.46	2.62
5		157.0	2.99	1.66	3.23
6		157.0	3.54	2.05	4.02
7		157.0	4.72	2.44	5.37



Size	Max. Torque Rating (in-lbs)	Bore Code Options Diameter (in)													
		0.375	0.500	0.625	0.750	0.875	1.000	1.125	1.250	1.375	1.500	1.625	1.750	1.875	2.000
1	283	A	B	C	—	—	—	—	—	—	—	—	—	—	—
2	372	A	B	C	D	E	F	—	—	—	—	—	—	—	—
3	1328	—	—	C	D	E	F	G	H	—	—	—	—	—	—
4	3540	—	—	—	D	E	F	G	H	I	—	—	—	—	—
5	7169	—	—	—	D	E	F	G	H	I	J	K	L	—	—
6	11,948	—	—	—	—	—	F	G	H	I	J	K	L	M	N
7	19,028	—	—	—	—	—	—	—	—	I	J	K	L	M	N
	<b>Key Size</b>	0.125	0.125	0.188	0.188	0.188	0.250	0.250	0.250	0.313	0.375	0.375	0.375	0.500	0.500

▼ Shown: UCE-005, UT-005



- Clevis design allows for a pinned, pivoting application
- Top Plate design offers a perpendicular mounting surface to easily connect to your structure
- Standard mounting holes assure a secure bolted connection

## UT, UCE Series



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### Screw End Dimensions

Dimensions for Screw End Adaptors can be found in the specific M- and B-Series Actuator pages.

▼ To prevent screw rotation this customer installed a Top Plate Adaptor to mount the 5-ton Actuator into the welding fixture.



### ▼ SELECTION CHART

Actuator Size	Screw End Adaptors Model Nos.	
	Top Plate	Clevis
MA5	UT005	UCE005
MA15	UT008F	UCE008F
MA20, M1, B1	UT008	UCE008
M2, M3, B2	UT010	UCE010
M4, M5, B5	UT010	UCE100
B10	UT101	UCE101
M8, M10	UT105	UCE105
M15	UT108	UCE108
M20, B20	UT112	UCE112
M25	UT202	UCE202
M30, B30	UT204	UCE204
M40	UT300	UCE300
B50	UT304	UCE304
M50	UT308	UCE308

▼ Shown: **Electrical Control Box**



## UEC Series

Voltage:  
**230/460VAC 3 Ph.**

Horsepower:  
**.25-10 hp**

- All systems feature motor short circuit protection, overload protection, phase loss and a lockable disconnect
- Meets NEMA Type 4 Environmental Ratings
- Operates in both a JOG mode and MAINTAINED (Limit Switch) mode
- Extend, Retract, Stop and E-Stop Pushbuttons
- Visible Short Circuit or Overload trip indication, with external reset
- Listed UL508a Control Panel, with a maximum SCCR rating of 100KA
- UL listed and CE marked components
- Full Voltage Reversing Motor Starters are rated for 2.5 million AC-3 Electrical operations



Other voltages and single phase options available upon request.



### Contact Enerpac

Enerpac offers a range of custom controls to meet all of your system requirements.

Contact us at: [unilift@enerpac.com](mailto:unilift@enerpac.com)



◀ Enerpac provided onsite support and control to synchronize M-Series, 100 ton Actuators for this ferry docking system.

# UR-Series, Rotary Limit Switches

▼ Shown: **URS21 Rotary Limit Switch**



- **Geared limit switches monitor the number of revolutions to allow for accurate positioning**
- **2 circuit design allows for a controlled stop in the advance and retract positions**
- **The adjustable cams enable precise positioning of travel limit stops**
- **4 circuit models available for increased position control**



## Rotary Limit Switch Sizing

To calculate the required number of turns, utilize the following formula:

$$TL = TPI \times \text{Rise}$$

TPI - Turns of input shaft for 1 inch of travel

Rise - one way travel (in)

Three standard options are available for each tonnage, after determining your required turns select the next highest option from the table on the right. If the required turns or if your UNI-LIFT's® load capacity exceeds the values in the selection table please contact Enerpac.

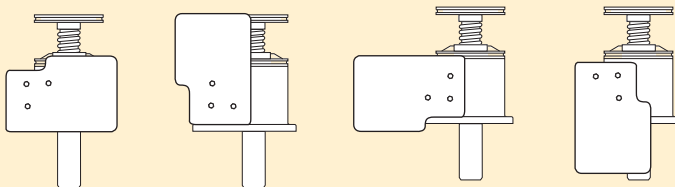
### Example:

20-ton actuator, 8:1 ratio, 72 inches of rise, TPI = 16

$$16 \times 72 = 1152 \text{ turns}$$

1152 turns is less than 1440, therefore, select a No.1440 series Limit Switch

Switch can easily be mounted in any one of these positions. When ordering a Rotary Switch in the Matrix please specify right-hand or left-hand and mounting position number.



Position 1

Position 2

Position 3

Position 4

## UR Series

Switch Series:

**2 Circuit**

Voltage:

**15A 115VAC/10A 230VAC**

Temperature Range:

**-20° F to 150° F**



### Encoders and Linear Transducers

For precise system control Encoders and Linear Transducers can be included

in your UNI-LIFT® System design.

Contact us at: [unilift@enerpac.com](mailto:unilift@enerpac.com)



### Digital Displays

Enerpac can offer precise digital readouts within 0.010". Contact us at:

[unilift@enerpac.com](mailto:unilift@enerpac.com)

Capacity (ton)	Switch Series 2 Circuit**		
	1 (360 max. turns)	2 (1440 max. turns)	3 (4320 max. turns)
1*	URSA11	URSA12	URSA13
2	URSA21	URSA22	URSA23
3	URSA31	URSA32	URSA33
4	URSA41	URSA42	URSA43
5	URSA51	URSA52	URSA53
8	URSA81	URSA82	URSA83
10	URSA101	URSA102	URSA103
15	URSA151	URSA152	URSA153
20	URSA201	URSA202	URSA203
25	URSA251	URSA252	URSA253
30	URSA301	URSA302	URSA303

\* Not available with the MA5, MA15, MA20 actuator.

\*\* 4-Circuit available upon request.

▼ Shown: Assorted Boot Family



## Solutions For Tough Environments

- Protects the lifting screw from dust, dirt and moisture
- Provided with internal or external guides to prevent sagging and with zippers for easy installation or removal
- Flange End Boots are provided with an aluminum back-up plate of the same outer diameter to ensure secure mounting
- Helps maintain proper lubrication
- UNI-LIFT® Boots are constructed of tough, stitched neoprene-coated nylon material to provide maximum protection from abrasive elements and other hostile environmental conditions
- Optional special boots for severe duty applications, such as weld splatter and high temperature, are available



### Travel Guides

Horizontal or angled applications require guides for travel greater than 24". These guides will keep the boot centered on the load screw to avoid untimely deterioration. One guide is supplied for each 24" of travel. Boot guides do not require additional load screw length.



### Determine the Load Screw Length (ESL)

Extra screw must be included for mounting structure, traveling nut, boot closed height, boot retainer and miscellaneous clearances. To calculate the closed height of the boot, reference boot drawing on the adjacent page.



### www.enerpac.com

Visit our web site for the complete Global Lifetime Warranty or call your Authorized Service Center.

Material	Temperature Range	Application Comments
Neoprene Coated Nylon	-40° F to 220° F	Good flexibility, resists oils and greases
Hypalon Coated Polyester	-60° F to 300° F	Good chemical and abrasion resistance
Silicone Coated Fiberglass	-40° F to 550° F	High temperature
Aluminized Fiberglass	-40° F to 550° F	High temperature, weld splatter and good abrasion resistance



▼ This is how a Boot is configured:

**UB M C A20 N G 013**

1 2 3 4 5 6 7

**1 = Boot**

UB = Actuator

**2 = Actuator Series**

M = Machine Screw  
B = Ball Screw

**3 = Mounting Style**

C = Upright Translating  
D = Upright Rotating  
E = Upright Keyed  
F = Inverted Translating  
G = Inverted Rotating  
H = Inverted Keyed

**4 = Ton Rating**

A5 = 500 lbs.  
A15 = 1500 lbs.  
A20 = 2000 lbs.  
1 = 1 Ton  
2 = 2 Ton  
3 = 3 Ton  
4 = 4 Ton  
5 = 5 Ton  
8 = 8 Ton  
10 = 10 Ton  
15 = 15 Ton  
20 = 20 Ton  
30 = 30 Ton  
40 = 40 Ton

**5 = Material**

N = Neoprene Nylon  
H = Hypalon  
S = Silicone  
A = Aluminized

**6 = Application**

**Direction**  
G = Guides  
N = No Guides

**7 = Extended Height**

Input Value  
(length in inches,  
e.g. 12.3" = 013)

## UB Series



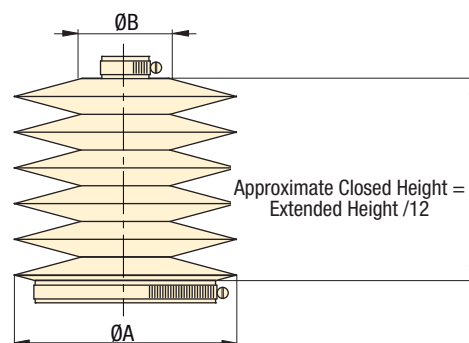
Boot Diameter (outside):

**4-9 inch**

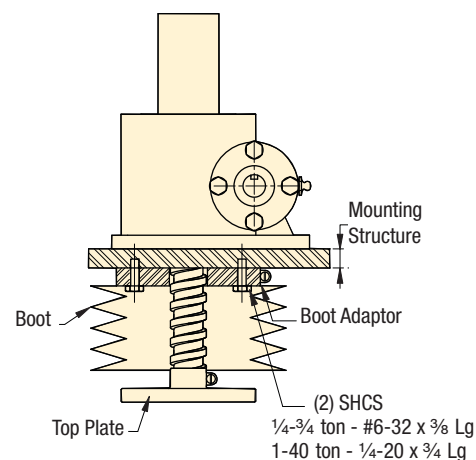
Lengths:

**Up to 20 feet**

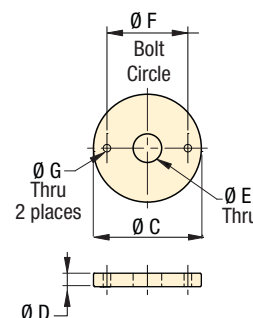
	Actuator Model No.	Boot Diameters (in)		Boot Adaptor Model No.
		A Outside	B Inside	
Machine Screw Actuators	MA5	4.00	1.00	UBPC
	MA15	4.50	1.50	UBPC
	MA20	4.50	1.50	UBPD
	M1	4.50	1.50	UBPD
	M2	5.00	2.00	UBPE
	M3	5.00	2.00	UBPE
	M4	5.50	2.50	UBPF
	M5	5.50	2.50	UBPF
	M8	6.50	3.50	UBPG
	M10	6.50	3.50	UBPG
	M15	6.50	3.50	UBPH
	M20	7.50	4.50	UBPI
	M25	8.00	5.00	UBPJ
	M30	8.00	5.00	UBPJ
Ball Screw Actuators	B1	4.50	1.50	UBPD
	B2	5.00	2.00	UBPE
	B5	5.50	2.50	UBPF
	B10	5.50	2.50	UBPG
	B20	7.50	4.50	UBPI
	B30	8.00	5.00	UBPJ



Boot Configuration Detail



Boot Adaptor Plate Detail



Boot Adaptor Plate (including screw)						
Actuator Model No.	Model No.	C (in)	D (in)	E (in)	F (in)	G (in)
MA5, MA15	UBPC	2.25	0.19	1.03	1.44	0.19
MA20, M1, B1	UBPD	2.75	0.50	0.84	1.75	0.28
M2, M3, B2	UBPE	4.00	0.50	1.06	3.00	0.28
M4, M5, B5	UBPF	4.50	0.50	1.56	3.50	0.28
M8, M10, B10	UBPG	5.88	0.50	2.06	4.25	0.28
M15	UBPH	6.13	0.50	2.32	4.50	0.28
M20, B20	UBPI	7.00	0.50	2.56	5.00	0.28
M25, M30, B30	UBPJ	8.75	0.50	3.44	6.00	0.28
M40	UBPK	9.75	0.50	4.32	8.00	0.36



## Enerpac "Yellow Pages"

provides in-depth technical information for  
UNI-LIFT® Actuators.

The "Yellow Pages" are designed to help you properly specify the right actuator for your project. These pages include detailed engineering information that answers frequently asked questions (FAQs), motor sizing guidelines, duty cycle considerations, column buckle and double clevis design information, keyed actuators, and much more.

Please take the time to review these pages to ensure your awareness of all necessary information to consider when specifying your actuator.

### GLOBAL LIFETIME WARRANTY STATEMENT



[www.enerpac.com](http://www.enerpac.com)

Visit our web site for the complete Global Lifetime Warranty or call your Authorized Service Center.

Enerpac products are warranted to be free of defects in materials and workmanship. Any product that does not conform to specification will be repaired or replaced at Enerpac's expense, anywhere in the world; simple as that!

This warranty does not cover ordinary wear and tear, abuse, misuse, alterations, or the use of improper fluids. Determination of the authenticity of a warranty claim will be made only by Enerpac or its Authorized Service Centers.

Enerpac is certified for several quality standards. These standards require compliance with standards for management, administration, product development and manufacturing.

Enerpac works hard to maintain the ISO 9001 quality rating, in its ongoing pursuit of excellence.



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## TABLE OF VARIABLES

<b>ASL</b> = Adjusted screw length (in)	<b>N</b> = Number of actuators in the system	<b>T<sub>b</sub></b> = Motor brake torque (ft-lbs)
<b>C</b> = Motor brake factor (ft-lbs)	<b>P</b> = Rated capacity of actuator (lbs)	<b>T<sub>e</sub></b> = Estimated system torque (in-lbs)
<b>C<sub>d</sub></b> = Dynamic capacity	<b>P<sub>1</sub></b> = Maximum load (lbs)	<b>Thb</b> = Hold torque (ft-lbs)
<b>C<sub>h</sub></b> = Cycles per hour	<b>P<sub>2</sub></b> = Total system load (lbs)	<b>TL</b> = Turns of limit switch
<b>D</b> = Stopping distance (in)	<b>P<sub>3</sub></b> = Maximum system running load (lbs)	<b>T<sub>m</sub></b> = Mitre gear box running torque (in-lbs)
<b>D<sub>1</sub></b> = Required duty cycle time per hour	<b>P<sub>4</sub></b> = Maximum running load on one actuator (lbs)	<b>To</b> = No load torque (in-lbs)
<b>D<sub>2</sub></b> = Allowable duty cycle time per hour	<b>R</b> = Gear reducer ratio	<b>T<sub>p</sub></b> = Torque required to lift one lb. (in-lbs)
<b>D<sub>s</sub></b> = Shaft diameter (in)	<b>r</b> = Radius of gyration	<b>TPI</b> = Turns of the input shaft for 1 inch of travel
<b>e<sub>1</sub></b> = System arrangement efficiency	<b>Rise</b> = One way travel under load (in)	<b>T<sub>rm</sub></b> = Motor running torque (in-lbs)
<b>e<sub>2</sub></b> = Reducer efficiency	<b>RPM<sub>d</sub></b> = Desired input speed	<b>T<sub>s</sub></b> = Static torque (in-lbs)
<b>ESL</b> = Extended screw length	<b>RPM<sub>m</sub></b> = Motor shaft speed	<b>T<sub>s2</sub></b> = System starting torque (in-lbs)
<b>F</b> = Column factor multiplier	<b>RPM<sub>s</sub></b> = System input speed	<b>T<sub>sm</sub></b> = Motor starting torque (in-lbs)
<b>f</b> = Unit running load proportion factor	<b>T</b> = Running torque (in-lbs)	<b>T[x]</b> = Unit run torque on actuator (in-lbs)
<b>hp</b> = Horsepower	<b>T<sub>1</sub></b> = Unit running torque (in-lbs)	<b>V</b> = Load screw velocity (in/min)
<b>HPe</b> = Estimated horsepower	<b>T<sub>2</sub></b> = System running torque (in-lbs)	<b>V<sub>d</sub></b> = Desired load screw velocity (in/min)
<b>K</b> = Column factor	<b>t<sub>2</sub></b> = Required one way travel time (min)	
<b>L</b> = Extended screw length (in)	<b>T<sub>a</sub></b> = Ambient temperature (deg F)	
<b>L<sub>2</sub></b> = Duty limit service factor		
<b>L<sub>10</sub></b> = Ball screw life (in)		

1. **Q. What is the difference between a Machine Screw Actuator and a Ball Screw Actuator?**

- A. *The machine screw actuator uses an acme threaded screw that is typically self-locking, meaning it will hold its position without a brake. Ball screw actuators use ball screws to convert rotary motion to linear movement, and require 1/3 the horsepower compared to a machine screw actuator. Due to the efficiency of the ball screw, brakes must be used to stop and hold the load screw in position. Brakes are also recommended for use on any actuator if vibration is present.*

2. **Q. Why use a Machine Screw vs. a Ball Screw Actuator?**

- A. *One type of actuator is usually better suited to the operating conditions. Typically, fast operating speeds and frequent cycle times may be more suited to a ball screw actuator, particularly as the load approaches the rated capacity of the actuator. High load at slower speeds, less frequent cycles and the ability to hold the load in position when the system is at rest may be better suited for a machine screw actuator.*

3. **Q. What is the input torque requirement for a given output load?**

- A. *The input torque for a specific load and actuator model is calculated using the technical specifications and formulas in the catalog. The input torque (inch pounds) is listed for each actuator model in the "Selection Chart" titled "Torque Required to Lift One Pound" (see pages 13 and 37).*

4. **Q. How do I operate the actuator?**

- A. *Most actuators are operated by electric motors, but air motors and hydraulic motors can also be used. Occasionally hand wheels are provided for hand operation.*

5. **Q. How do I size motors and calculate required horsepower?**

- A. *The horsepower requirement for UNI-LIFT® is calculated using the following equation:*

$$\frac{(\text{torque to move the load} \times \text{input RPM})}{63025}$$



**6. Q. Can I use a larger motor than required?**

A. Yes, but it is not recommended. The actuator or system components could be damaged if an oversized motor is used. Electronic position switches or travel limit controls must be used for each end of travel to stop the motor. If using solid mechanical stops, actuator components can be subject to shock load conditions and oversize motors can cause catastrophic failure of stops and other components.

**7. Q. What is TPI?**

A. TPI stands for turns per inch and is listed in the Technical Specifications for each actuator model. The value associated with TPI is the number of revolutions required to the input shaft to move the load one inch. This is calculated by dividing the actuator ratio by the lead of the load screw.

**8. Q. How do I stop the actuator at the travel limits?**

A. Limit Switches or other controls must be used to shut off the motor when the Actuator has reached its full extended or retracted position. The use of Limit Switches or Encoders are recommended to control the extended or retracted position of your Actuator travel. Stop Nuts are offered to protect against over extension; however, these are intended for emergency use only. Their continued use can cause severe damage to the actuator. Enerpac offers, as an option, a standard Rotary Limit Switch for this purpose. Other electronic devices include Encoders and Linear Position Transducers.

**9. Q. Can multiple actuators be used in a system?**

A. Yes, but do not exceed 300% of the rated input torque for a given actuator. Use the standard catalog formulas to determine input torque and motor size.

**10. Q. Can different size actuators be used in the same system?**

A. Yes, as long as the input turns for 1-inch of travel are equal. This is sometimes done to accommodate varying load conditions.

**11. Q. What is the system efficiency?**

A. - System Arrangement ( $e_1$ )

2 actuator system: 95%      4-actuator system: 80%  
3 actuator system: 90%      6 actuator system: 75%

Worm Gear Reducers ( $e_2$ )

5 to 1 = 92%                      10 to 1 = 87%  
7.5 to 1 = 90%                    15 to 1 = 83%

Right angle mitre efficiency is 95% ( $e_3$ )

**12. Q. What is the maximum input speed?**

A. Most UNI-LIFT® actuators can be run at 1800 RPM (some run up to 2587 RPM). The catalog sizing procedure correlates the Load vs. Input RPM and Duty Limits and Cycle Times. A gear motor, Helical Gear Reducer or a Worm Gear Reducer is used to reduce the input RPM to the actuator to provide the required

travel speed of the load screw (load screw velocity). Many UNI-LIFT® Actuators can be driven directly by 1800, 1150 and 900 RPM motors. Motors and reducers are available mounted directly to many UNI-LIFT® models.

**13. Q. Can standard UNI-LIFT® Actuators be used for continuous duty?**

A. Yes. The standard catalog sizing procedure includes the formula for determining the duty limits for each actuator model. This unique feature allows you to calculate the duty cycle limits of each UNI-LIFT® model for your application.

**14. Q. What is the duty cycle?**

A. Duty cycle is the time it takes the actuator to heat up under a given set of operating conditions limited to a maximum temperature of 180° F.

**15. Q. What causes heat build up in the actuator?**

A. The actuator is a mechanical gearbox assembly. The friction of the gears, load screw, bearings and seals generate heat while the actuator is operating. The combination of travel, loading, and input speeds all affect the temperature rise of the actuator. UNI-LIFT® sizing calculations take these variables into account to ensure that you select the right actuator model for your application.

**16. Q. What is the load screw capacity and travel?**

A. This is based on the relationship of the screw diameter and the length. Screws in tension are rated for the full capacity of the actuator. For screws in compression, capacity is limited by the load screw's column strength. The column strength of a screw is reduced as the screw gets longer. Use the maximum extended screw length (ESL) when using the Column Buckle Charts (page 71 & 76) to determine load screw capacity.

**17. Q. How do I determine the full-extended screw length?**

A. The Extended Screw Length (ESL) is normally equal to the travel. Allowances must be added for the closed height of a boot and the addition of stop nuts or special closed heights. These allowances increase the length of the screw. For inverted actuators the thickness of the mounting structure must also be included. This total length (ESL) should be used when determining the column load capacity of the actuator.

**18. Q. Should the load being positioned be guided?**

A. It is highly recommended that the load be guided; however, it is not necessary. A guided system will provide more column stability and allow longer load screw travel. Column length is greatly reduced on unguided systems. External load forces, common with unguided systems, are detrimental to the life and operation of the UNI-LIFT®.



**19. Q. Can the actuator withstand side loading or a bending moment?**

A. Yes, but this is not recommended. Consult Enerpac if this condition will be present! These types of loads apply greater forces on the load screw and housing assembly causing premature wear. Guides are highly recommended and should be used to eliminate side and bending loads.

**20. Q. Is there backlash between the load screw and gear nut?**

A. Yes. This is necessary to allow for sliding or rolling action of the screw through the nut. Anti-Backlash Actuators are available when the backlash needs to be minimized. For further information on Anti-Backlash Actuators refer to page 72. Input torque requirements are greater for Anti-Backlash Design Actuators.

**21. Q. Can the actuator withstand shock loading?**

A. This is not recommended. Oversized actuators are required to handle shock loads. Solid thrust bearings are also available in many actuator models when constant vibration and shock are present in an application.

**22. Q. What mounting position can the actuator be mounted?**

A. UNI-LIFT® can be mounted in any position: vertical, horizontal or in-between. A position other than vertical should be noted on inquires and purchase orders since special accommodations may be required.

**23. Q. How is the load screw protected?**

A. Standard translating screw actuators are fitted with a screw protection tube that stores the screw when the actuator is in the closed position. Boots are available and recommended to protect the screw in the extended position. Two (2) boots may be required for rotating actuators with traveling nuts.

**24. Q. How do I attach the load to be positioned to the load screw?**

A. For translating actuators, the load screw has a standard threaded end that can be used to attach the load. Top Plates or Clevis Ends are also available. For traveling nut designs, the traveling nut has a flange with mounting holes. The actuator housing has a mounting base and is also available with a clevis mount for double clevis requirements.

**25. Q. Will the load screw rotate on translating actuators?**

A. Yes. On translating actuators you need to prevent the load screw from rotating to produce linear motion. This is usually accomplished by incorporating it into the application. If rotation of the screw cannot be prevented in the application design, a keyed configuration is available. Input torque will increase for keyed actuators and the capacity is reduced to 25% of rated capacity.

**26. Q. What is the maximum UNI-LIFT® operating temperature limits?**

A. Standard UNI-LIFT® Actuators are designed to operate at a temperature range of -20° F to 180° F. However, special grease and seals are available to extend the operating temperature limits to as low as -100° F and as high as 400° F. See page 82 for further information.

**27. Q. Can actuators be used in food industry applications (USDA)?**

A. Enerpac uses USDA approved lubrication for these applications.

**28. Q. How do I lubricate a screw actuator?**

A. Use the proper grease. Fill the gearbox by pumping grease into the grease fittings supplied in the actuator housing. The screws should have grease applied directly to them with a rag or paintbrush. This must be done as part of a regularly scheduled maintenance program.

**29. Q. How do I select the right actuator?**

A. The "Actuator Overview" section of this catalog contains an easy to follow guide to Actuator selection. Additionally, our on-line Configurator can be used to generate 2D or rendered 3D modes from an easy to follow step-by-step interface ([unilift@enerpac.com](mailto:unilift@enerpac.com)).

**30. Q. What is the position accuracy?**

A. 0.010" between activators.

**31. Q. Who do I call for help?**

A. Enerpac 1.800.433.2766





1. Complete the Uni-Lift® Worksheet located on page 86. See Table 1 for complete details on the technical specifications.

### 2. Determine the maximum load on one actuator (P<sub>1</sub>, lbs)

$$P_1 = \frac{P_2}{N}$$

P<sub>2</sub> = Total system load (lbs)  
N = Number of Actuators in the system

On multi-actuator systems where the load is not equally distributed, P<sub>1</sub> equals the maximum load supported by one actuator.

### 3. Select the Actuator size

- If the screw is in tension, select an actuator with a rated capacity equal to or greater than maximum load (P<sub>1</sub>) on one actuator.
- If the load screw is in compression, use the calculation steps, on page 71, to determine the maximum permissible Extended Screw Length (ESL). Select an actuator that has a load screw length capacity equal to or greater than the length required for the load.

### 4. Determine the Load Screw Velocity (V<sub>d</sub>, in/min)

$$V_d = \frac{\text{Rise}}{t_2}$$

Rise = One way travel under load (in)  
t<sub>2</sub> = Required one way travel time (min)

### 5. Determine Desired Input Speed: (RPM<sub>d</sub>)

RPM<sub>d</sub> = TPI x V<sub>d</sub> TPI = Turns of the input shaft for 1 inch of rise (see table on page 69).

### 6. Determine Load Screw Velocity (V, in/min)

$$V = \frac{\text{RPM}_d}{\text{TPI}}$$

From the catalog data (page 52), select the power transmission equipment with an output speed close to the desired input speed (RPM<sub>d</sub>). Use the output speed to recalculate the actual load screw velocity.

### 7. Required Duty Cycle Time (D<sub>1</sub>, min)

$$D_1 = \frac{(2 * \text{Travel} * C_h)}{V}$$

C<sub>h</sub> = Cycles per hour  
Travel = Distance load will move in one direction (in)

Use the calculation steps on page 70 to determine if D<sub>1</sub> is equal to or greater than D<sub>2</sub>.

If D<sub>2</sub> is less than D<sub>1</sub> you must:

- reduce the input speed to the actuator
- reduce the load by adding additional actuators to the system
- Use a larger actuator

## MOTOR AND POWER TRANSMISSION SIZING

Calculate the torque and horsepower requirements using the 7 steps on page 69.

- Select a motor with a power rating greater than System hp requirement, a starting torque greater than T<sub>sm</sub>, and a motor running torque greater than Trm. See page 49 for horsepower and motor ratings.
- Select system Power Transmission equipment (gear reducer, mitre gear boxes, couplings, etc) with ratings greater than the running torque on power transmission equipment (Te), see Application Example on page 80.
- Size shafting for system starting torque T<sub>sm</sub> to be transmitted, see page 69.



**For a quick estimate for torque and motor requirements use the following calculations**

$$\text{HPe} = \frac{(\text{Te} * \text{RPM}_S)}{63025} \quad \text{Te} = \text{Tp} * P_3$$

HPe = Estimated horsepower

Te = Estimated system torque (in-lbs)

P<sub>3</sub> = Maximum system running load (lbs)

RPM<sub>S</sub> = System RPM

RPM<sub>m</sub> = Motor RPM

Tp = Torque required to lift 1 lbs. [Table 1]

$$\text{RPM}_S = \frac{(\text{RPM}_m)}{\text{Reducer Ratio}}$$

▼ TABLE 1

Capacity [P] (ton)	Model Number	Torque Required to Lift 1 lbs. [Tp] (in-lbs)			No Load Torque [To] (in-lbs)	Radius of Gyration [r] (in-lbs)
		Low	Med.	High		
.25	MA5	0.022	—	—	2.0	0.094
.75	MA15	0.020	—	0.015	2.0	0.125
1	MA20	0.020	—	0.010	4.0	0.154
1	M1	0.021	—	0.013	3.0	0.156
2	M2	0.020	—	0.009	5.0	0.218
3	M3	0.021	0.017	0.013	4.0	0.218
4	M4	0.030	0.018	0.012	5.0	0.334
5	M5	0.028	—	0.011	12.0	0.316
8	M8	0.030	—	0.019	7.0	0.396
10	M10	0.029	—	0.015	18.0	0.423
15	M15	0.031	—	0.015	18.0	0.486
20	M20	0.033	—	0.021	36.0	0.566
25	M25	0.031	—	0.019	10.0	0.628
30	M30	0.034	—	0.017	48.0	0.743
40	M40	—	—	0.024	12.0	0.985
50	M50	0.040	—	0.021	96.0	1.074
75	M75	0.042	—	0.021	156.0	1.149
100	M100	0.045	—	0.024	204.0	1.387
150	M150	Contact Enerpac				
250	M250					

# M-Series, Torque & Motor Sizing



## Calculating the Torque

### 1. Determine unit running load proportion factor (f)

$$f = \frac{P}{P_3 \cdot N}$$

P = Rated capacity of actuator  
 P<sub>3</sub> = Maximum system running load  
 N = Number of Actuators in the system

### 2. Determine unit running torque (T<sub>1</sub>, in-lbs) [Table 2]

$$T_1 = (T \cdot f) + T_o$$

T<sub>o</sub> = No Load Torque (in-lbs)  
 T = Running torque (in-lbs)\*\*

### 3. Find the system running torque (T<sub>2</sub>, in-lbs)

$$T_2 = \frac{(T_1 \cdot N)}{e_1}$$

e<sub>1</sub> = System Arrangement Efficiency - see page 66 (question #11)

### 4. Find system power, (System hp)

$$hp = \frac{(T_2 \cdot RPM_S)}{(63025 \cdot e_2)}$$

RPM<sub>S</sub> = Input shaft speed  
 e<sub>2</sub> = Reducer efficiency - see page 66 (question #11)

### 5. Determine system starting torque (Ts<sub>2</sub>, in-lbs)

$$Ts_2 = \frac{[(Ts \cdot f) + T_o] \cdot N}{e_2}$$

Ts = Static Torque (in-lbs) [Table 2]

### 6. Determine motor starting torque (T<sub>sm</sub>, in-lbs)

$$T_{sm} = \frac{Ts_2}{(R \cdot e_2)}$$

R = Gear Reducer Ratio

### 7. Determine motor running torque (T<sub>rm</sub>, in-lbs)

$$T_{rm} = \frac{T_2}{(R \cdot e_1)}$$

▼ TABLE 2

Rated Capacity [P] (ton)	Model Number	Gear Ratio	Turns Per Inch* [TPI]	Static Torque [Ts]	Unit Input Torque at Rated Capacity								No Load Torque [To] (in-lbs)
					T = Running Torque (in-lbs) @ Various RPM <sub>S</sub> (theoretical)**								
					50 RPM	115 RPM	172 RPM	345 RPM	600 RPM	870 RPM	1140 RPM	1750 RPM	
.25	MA5	5:1	20	11	9	8	8	8	7	7	7	6	2
.75	MA15	5:1	20	36	28	26	25	24	23	22	21	20	2
		5:1	40	29	21	20	19	18	17	16	15	14	1.5
1	MA20	5:1	25	48	35	33	32	29	27	26	25	24	4
		20:1	100	22	15	14	13	12	11	10	9	8	4
1	M1	5:1	20	54	39	37	36	32	31	29	28	27	3
		10:1	40	33	23	22	21	19	18	17	16	15	3
2	M2	6:1	24	104	75	70	67	61	57	54	52	49	5
		24:1	96	51	29	27	26	23	21	20	18	17	5
3	M3	6:1	24	171	120	111	105	95	88	84	81	76	4
		8:1	32	141	97	89	85	76	71	67	64	60	4
		12:1	48	111	73	68	64	58	52	49	47	44	4
4	M4	5.33:1	16	342	237	215	202	186	172	163	156	146	5
		12:1	36	211	135	123	117	102	94	88	84	78	5
		24:1	72	155	92	83	78	68	60	55	52	47	5
5	M5	6:1	16	379	270	249	236	217	202	192	185	174	12
		24:1	64	155	100	92	88	79	71	66	63	58	12
8	M8	6:1	18	732	478	429	400	363	333	313	299	276	7
		12:1	36	472	292	264	247	215	196	184	175	162	7
10	M10	8:1	16	831	569	520	492	448	415	393	377	352	18
		24:1	48	443	274	250	236	209	185	173	164	151	18
15	M15	8:1	16	1,356	912	828	773	708	653	616	589	548	18
		24:1	48	723	442	401	377	332	294	273	259	238	18
20	M20	8:1	16	1,920	1,276	1,150	76	982	902	848	809	750	36
		24:1	48	1,003	811	552	519	454	403	375	356	326	36
25	M25	9:1	18	2,371	1,534	1,371	1,279	1,161	1,062	996	948	—	10
		18:1	36	1,528	941	846	792	689	627	586	557	—	10
30	M30	10 <sup>2</sup> / <sub>3</sub> :1	16	3,067	1,982	1,774	1,656	1,502	1,374	1,289	1,228	—	48
		32:1	48	1,694	988	883	824	713	627	581	549	—	48
40	M40	20:1	30	3,226	1,927	1,706	1,581	1,383	1,248	1,160	1,098	—	12
		10 <sup>2</sup> / <sub>3</sub> :1	16	6,559	3,915	3,382	3,189	2,838	2,556	2,372	2,244	—	96
50	M50	32:1	48	3,721	1,995	1,736	1,595	1,333	1,180	1,084	1,019	—	96
		10 <sup>2</sup> / <sub>3</sub> :1	16	10,171	6,096	5,279	4,975	4,420	3,971	3,676	—	—	156
75	M75	32:1	48	5,243	2,920	2,560	2,361	1,998	1,781	1,642	—	—	156
		12:1	16	15,639	8,767	7,501	7,019	6,165	5,495	5,065	—	—	204
100	M100	36:1	48	9,115	4,568	3,893	3,535	2,928	2,568	2,349	—	—	204

\* Of Input Shaft for 1" of Rise

\*\* When calculating, if actual RPM<sub>S</sub> is between columns, use the column with the lower RPM value.



# M-Series, Duty Cycle Calculations

Duty Limit Service Factor ( $L_2$ ) = Operating time allowed per hour. The numbers greater than 60 are theoretical values and exceed 100% duty, solely to provide base data for adjusting  $L_2$ .

The  $L_2$  values are based on actuators loaded at rated capacity, operating in an ambient temperature of 80° F with a maximum allowable temperature rise of 100° F. For ambient temperatures above 180° F or below -20° F consult Enerpac. For speeds not shown use the next fastest RPM value.

## 1. Determine Allowable Duty Cycle Time ( $D_2$ )

When the unit load is at rated capacity, and the ambient temperature is at 80° F the  $L_2$  value from the table equals  $D_2$ . If not, proceed to step 1A.

### Step 1A

For different temperature service, or a unit load less than rated capacity, use the following equation to determine the Allowable Duty Cycle Time ( $D_2$ ).

$$D_2 = \frac{[(180 - T_a) * P * L_2]}{(100 * P_4)}$$

$T_a$  = Ambient temperature (deg F)

P = Rated capacity (lbs)

$L_2$  - Duty limit service factor (see Table 3)\*\*

$P_4$  = Maximum running load per unit (lbs)

## 2. Determine if Duty Cycle Time is acceptable

If  $D_2 \geq 60$  minutes the application is rated for continuous duty

If  $D_2 \geq D_1$  than the application is acceptable

If  $D_2 < D_1$  than the duty cycle limit has been exceeded for this application. You must do one of the following:

- Reduce the input speed to the actuator
- Reduce load by adding additional actuator to the system
- Use a larger size actuator

If you reduce speed you must recalculate V and  $D_1$  from page 68 numbers 6 and 7.

See page 75 for an "Example" calculation.

▼ TABLE 3

Model Number	Gear Ratio	Turns Per Inch* [TPI] (in)	$L_2$ - Duty Limit Service Factor @ Various RPMs Input Speeds**								
			50 RPM	115 RPM	172 RPM	345 RPM	600 RPM	870 RPM	1140 RPM	1750 RPM	2587 RPM
MA5	5:1	20	971	461	325	184	119	88	71	52	39
MA15	5:1	20	323	153	108	61	39	29	23	17	13
	5:1	40	325	155	110	64	41	30	24	18	13
MA20	5:1	25	229	109	78	45	29	21	17	12	9
	20:1	100	481	250	181	104	68	52	43	32	23
M1	5:1	20	391	188	134	77	49	36	29	21	16
	10:1	40	647	307	217	122	80	59	48	34	26
M2	6:1	24	263	126	90	53	33	25	20	15	
	24:1	96	589	297	213	123	81	62	52	38	
M3	6:1	24	143	69	50	29	18	14	11	8	
	8:1	32	176	85	60	36	23	17	14	10	
	12:1	48	228	110	78	45	30	22	18	13	
M4	5.33:1	16	109	54	40	23	15	11	9	7	
	12:1	36	186	91	66	39	25	19	16	11	
	24:1	72	236	118	90	55	37	29	24	18	
M5	6:1	16	133	65	47	27	17	13	11	8	
	24:1	64	336	163	117	67	44	34	28	20	
M8	6:1	18	84	42	31	18	11	9	7	5	
	12:1	36	135	67	48	29	19	14	11	8	
M10	8:1	16	81	40	29	17	11	8	6	5	
	24:1	48	155	77	56	33	22	17	14	10	
M15	8:1	16	52	26	19	11	7	5	4	3	
	24:1	48	100	50	36	21	14	11	9	6	
M20	8:1	16	47	24	17	10	6	5	4	3	
	24:1	48	93	46	33	20	13	10	8	6	
M25	9:1	18	46	23	17	9	6	5	4		
	18:1	36	74	37	26	16	10	7	6		
M30	10 $\frac{2}{3}$ :1	16	47	23	17	10	6	5	4		
	32:1	48	84	44	32	19	13	10	8		
M40	20:1	30	52	26	19	11	7	5	4		
M50	10 $\frac{2}{3}$ :1	16	30	16	11	6	4	3	2		
	32:1	48	52	28	21	13	9	6	5		
M75	10 $\frac{2}{3}$ :1	16	30	16	11	6	4	3			
	32:1	48	61	31	23	14	9	7			
M100	12:1	16	31	16	12	7	4	3			
	36:1	48	54	30	22	14	9	5			

\* Of Input Shaft for 1" of Rise

\*\* When calculating duty limit service factor, if the actual RPMs value is between columns, use the next higher RPM value.



# M-Series, Column Buckle Chart



The maximum estimated screw length (ESL) values in the chart below are based on a **2:1 factor of safety against column buckle**, and on a standard design with a top plate or a rotating design travel nut. Increased load screw lengths are not shown where the slenderness ratio exceeds 400.



Screw lengths with a column buckle above the dotted line in Chart 1 comply with AISC maximum slenderness ratio specified for design and fabrication of structural steel buildings. This data is for reference only and is not a limiting factor, except as required.

$$\frac{K \cdot L}{r} \leq 200$$

K = Column Factor

L = Extended Screw Length (ESL)

r = Radius of Gyration

See Table on page 68 for r values.

### 1. Determine extended screw length (ESL)

The ESL is the distance in inches the load screw can extend from the housing. Allowances must be made when using boots and for other miscellaneous clearances. See catalog for the model selected to determine ESL.

### 2. Determine the adjusted screw length (ASL)

The chart below is for a standard design top plate or the rotating design travel nut. For other design configurations you must adjust the ESL value using the F factor multiplier to determine the adjusted screw length.

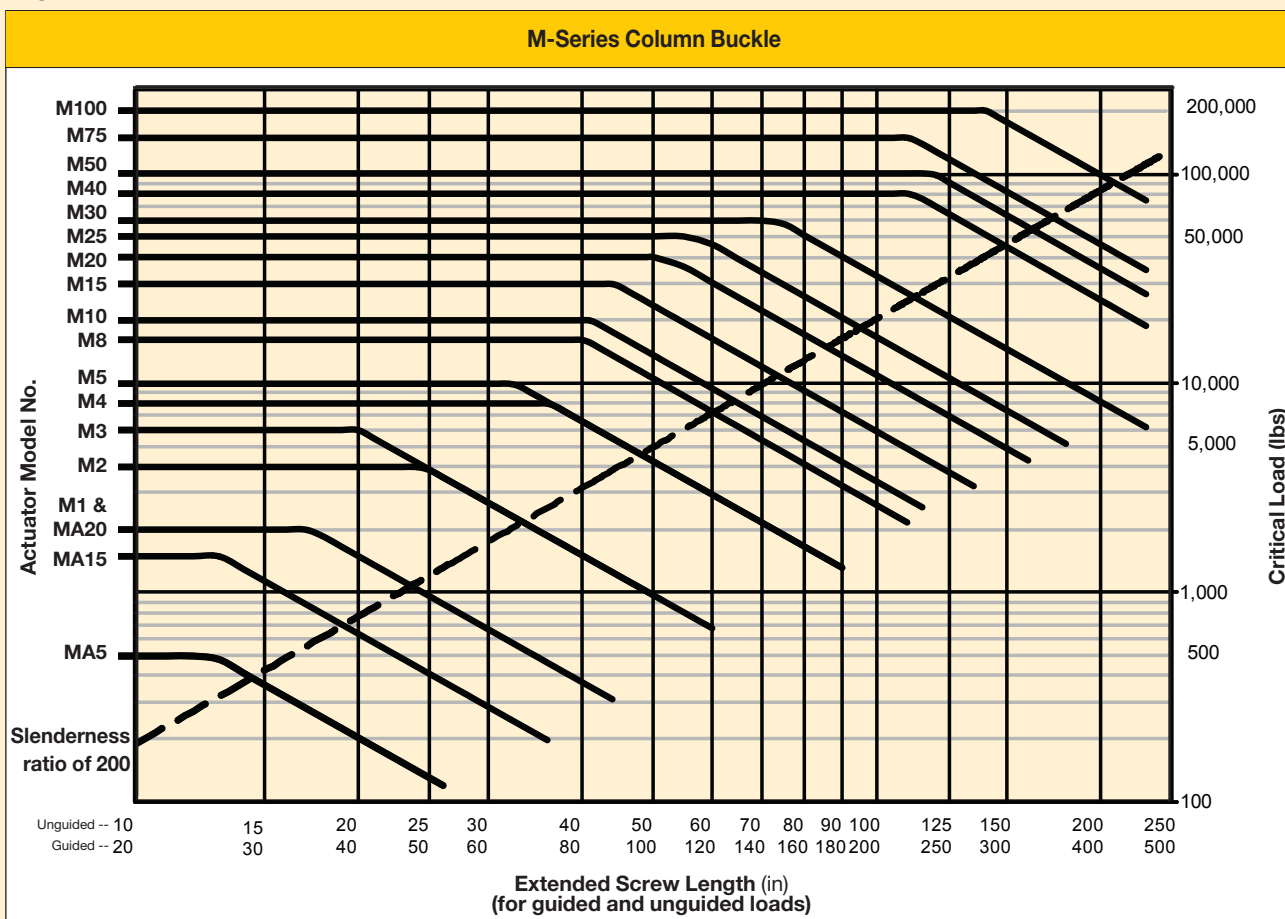
$$ASL = ESL \times F$$

### 3. On the chart below draw a horizontal line to represent the maximum load (P<sub>1</sub>). Using the set of ESL values that apply to your design (guided or unguided), draw a vertical line to represent the ESL or ASL. All of the actuators above the point of intersection will be acceptable.

▼ TABLE 4

Design Configuration	F Factor	K Factor	
		(Guided)	(Unguided)
Standard Design Top Plate	1	0.65	1.3
Rotating Design Traveling Nut	1	0.65	1.3
Standard Design Clevis End	1.25	0.80	1.6
Keyed Design Top Plate	1.25	0.65	1.3
Keyed Design Clevis End	2	0.65	1.6

▼ CHART 1

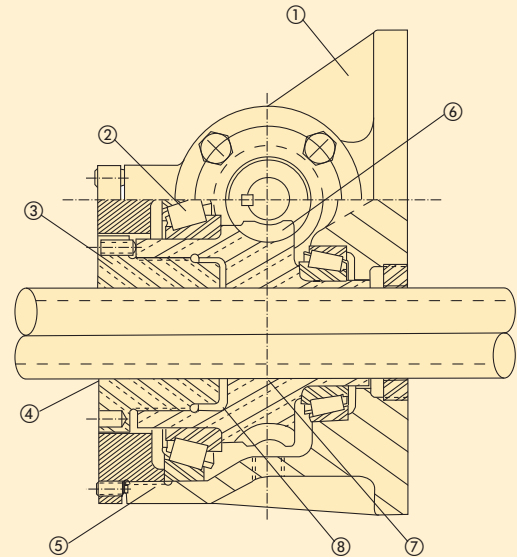




## Anti-Backlash Designed

The Anti-Backlash design allows the backlash in the lifting screw to be minimized to meet the application requirements by simply adjusting the adjustment plug. Features include: One-piece gear nut, independent adjustment of the thrust bearing preload (to bearing manufacturers recommendations), extra long screw thread engagement, reduced unit spring rate, and full gear tooth contact. This design insures proper bearing alignment and worm gear tooth contact for maximum unit efficiency. The Anti-Backlash is a quality product you can depend on to provide a long operating life.

- ① Anti-backlash Actuator components fit in the same Actuator housing with the same mounting footprint as our standard Actuators. Standard units can be field converted.
- ② Full Bearing Guided Drive Sleeve and Correct Gear Alignment provides longer gear life.
- ③ Replaceable Anti-Backlash Adjustment Plug can be replaced without disassembly of the main jack housing assembly.
- ④ True screw backlash can be set without compromising internal housing and bearing backlash tolerances.
- ⑤ Independent Thrust Bearing Adjustment allows the thrust bearings to be independently preloaded, not free to float or allow backlash in the gear nut.
- ⑥ Rigid support of the Worm Gear provides proper alignment for the gear mesh providing full tooth contact and smooth torque transfer.
- ⑦ Long Thread Engagement for both the Drive Sleeve and Adjustment Plug provides long wear life.
- ⑧ Reduce Unit Spring Rate by Design of Independent Backlash Adjustment reduces the expansion and contraction fluctuations of the internal actuator components during reversing load conditions.



# B-Series, Sizing Calculations



**1. Complete the UNI-LIFT® Worksheet located on page 86.** See Table 5 for complete details on the technical specifications.

**2. Determine the maximum load on one actuator (P<sub>1</sub>, lbs)**

$$P_1 = \frac{P_2}{N}$$

P<sub>2</sub> = Total system load (lbs)  
N = Number of Actuators in the system

On multi-actuator systems where the load is not equally distributed, change P<sub>1</sub> to the maximum load supported by one actuator.

**3. Select the Actuator size**

For high-cycle applications, use 80% of rated capacity.

- If the screw is tension, select an actuator with a rated capacity equal to or greater than maximum load (P<sub>1</sub>) on one actuator.
- If the load screw is in compression, use the calculation steps, on page 76, to determine the maximum permissible Extended Screw Length (ESL). Select an actuator that has a load screw length capacity equal to or greater than the length required for the load.

**4. Determine the Load Screw Velocity (V<sub>d</sub>, in/min)**

$$V_d = \frac{\text{Rise}}{t_2}$$

Rise = One way travel under load (in)  
t<sub>2</sub> = Required one way travel time (min)

**5. Determine Desired Input Speed: (RPM<sub>d</sub>)**

$$\text{RPM}_d = \text{TPI} \times V_d$$

TPI = Turns of the input shaft for 1 inch of rise (see table on page 74).

**6. Determine Load Screw Velocity (V, in/min)**

$$V = \frac{\text{RPM}_d}{\text{TPI}}$$

- From the catalog data (page 52), select the power transmission equipment with an output speed close to the desired input speed (RPM<sub>d</sub>). Use the output speed to recalculate the actual load screw velocity.

**7. Check the Required Duty Cycle Time (D<sub>1</sub>, min)**

$$D_1 = \frac{(2 \times \text{Travel} \times C_h)}{V}$$

C<sub>h</sub> = Cycles per hour  
Travel = Distance load will move in one direction (in)

Use the calculation steps on page 75 to determine if D<sub>1</sub> is equal to or greater than D<sub>2</sub>.

If D<sub>2</sub> is less than D<sub>1</sub> you must:

- reduce the input speed to the actuator
- reduce the load by adding additional actuators to the system
- Use a larger actuator

**8. Calculate the Ball Screw life in inches of travel (L<sub>10</sub>, in):**

C<sub>d</sub> = Dynamic capacity based on 1 million inches (lbs)

P<sub>4</sub> = Maximum running load on one actuator (lbs)

If the application requires longer life select a larger actuator or increase the number of actuators in the system.

$$L_{10} = \frac{(C_d^3)}{\frac{P_4^3}{1,000,000}}$$

L<sub>10</sub> life is based on a 10% wear factor on the load screw and ball nut.

## MOTOR AND POWER TRANSMISSION SIZING

**Calculate the torque and horsepower requirements using the 8 steps on page 74.**

- Select a motor with a power rating greater than System hp requirement, a starting torque greater than T<sub>sm</sub>, and a motor running torque greater than T<sub>rm</sub>. See page 49 for horsepower and motor ratings.
- Select system Power Transmission equipment (gear reducer, mitre gear boxes, couplings, etc) with ratings greater than the running torque on power transmission equipment (T<sub>e</sub>), see Application Example on page 80.
- Size shafting for system starting torque T<sub>sm</sub> to be transmitted, see page 74.



**For a quick estimate for torque and motor requirements use the following calculations**

$$\text{HPe} = \frac{(\text{Te} \times \text{RPM}_S)}{63025}$$

HPe = Estimated horsepower

Te = Estimated system torque (in-lbs)

P<sub>3</sub> = Maximum system running load

RPM<sub>S</sub> = System RPM

RPM<sub>m</sub> = Motor RPM

Tp = Torque required to lift 1 lbs. (Table 1)

$$\text{RPM}_s = \frac{(\text{RPM}_m)}{\text{Reducer Ratio}}$$

▼ TABLE 5

Capacity [P] (ton)	Model Number	Turns per Inch* [TPI]		Torque Required to Lift 1 lbs. [Tp] (in-lbs)		Holding Torque [Thb] (ft-lbs)		Radius of Gyration [r] (in)	Dynamic Capacity @ 1 Million Inches [Cd] (lbs)
		Low	High	Low	High	Low	High		
1	B1	10.00	20.00	0.024	0.015	1.4	2	0.154	3400
2	B2	24.00	96.00	0.011	0.005	4	1.5	0.205	1625
5	B5	12.66	50.66	0.018	0.007	14	5	0.285	10,050
10	B10	16.88	50.66	0.014	0.007	13	4	0.285	10,050
20	B20	16.00	48.00	0.015	0.007	27	7	0.463	19,300
30	B30	16.00	48.00	0.015	0.008	21	5	0.620	38,000
50	B50	10.66	48.00	0.022	0.011	40	10	0.835	85,000
75	B75	10.66	32.00	0.022	0.010	107	24	0.835	85,000
100	B100	12.00	36.00	0.020	0.010	128	50	0.835	85,000

\* Of Input Shaft for 1" of Rise



## Calculating the Torque

### 1. Determine unit running load proportion factor (f)

$$f = \frac{P_3}{(P \cdot N)}$$

P = Rated capacity of actuator  
P<sub>3</sub> = Maximum system running load  
N = Number of Actuators in the system

### 2. Determine unit running torque (T<sub>1</sub>, in-lbs) [Table 7]\*\*

$$T_1 = (T \cdot f) + T_0$$

T<sub>0</sub> = No Load Torque (in-lbs)  
T = Running torque (in-lbs)

### 3. Find the system running torque (T<sub>2</sub>, in-lbs)

$$T_2 = \frac{(T_1 \cdot N)}{e_1}$$

e<sub>1</sub> = System Arrangement Efficiency - see page 66 (question #11)

### 4. Find system power, (System hp)

$$hp = \frac{(T_2 \cdot RPM_S)}{(63025 \cdot e_2)}$$

RPM<sub>S</sub> = Input shaft speed  
e<sub>2</sub> = Reducer efficiency - see page 66 (question #11)

### 5. Determine system starting torque (Ts<sub>2</sub>, in-lbs)

T<sub>s</sub> = Static Torque (in-lbs) [Table 7]  
See Table 7.

### 6. Determine motor starting torque (T<sub>sm</sub>, in-lbs)

$$T_{sm} = \frac{T_{s2}}{(R \cdot e_2)}$$

R = Gear Reducer Ratio

### 7. Determine motor running torque (T<sub>rm</sub>, in-lbs)

$$T_{rm} = \frac{T_2}{(R \cdot e_1)}$$

### 8. Determine motor brake torque (T<sub>b</sub>, ft-lbs) (required for all Ball Screw Actuator applications):

$$\left( T_b = \frac{C}{(TPI \cdot D \cdot R)} \right) + \left( \frac{(TPI \cdot D \cdot R)}{R} \right)$$

C = Motor Brake Factor (ft-lbs) (see Table 6)

T<sub>b</sub> = Motor Brake Torque (ft-lbs)

T<sub>hb</sub> = Hold Torque (ft-lbs) (see page 72)

D = Stopping Distance (in)

N = Number of Actuators

R = Gear Reducer Ratio

**TABLE 6**

**C-Factor for Brake Motor (ft-lbs)**

Motor (hp)	1140 RPM	1725 RPM
1/4	3.20	4.1
1/3	4.00	4.9
1/2	5.10	6.1
3/4	7.89	9.2
1	9.18	17.8
1-1/2	11.30	21.6
2	29.50	25.6
3	38	66.5
5	48.3	87.4
7-1/2	69.4	112
10	126	146
15	268	273
20	306	315
25	548	596

**▼ TABLE 7**

Rated Capacity [P] (ton)	Model Number	Gear Ratio	Turns Per Inch* [TPI]	Static Torque [T <sub>s</sub> ] (in-lbs)	Unit Input Torque at Rated Capacity								No Load Torque [T <sub>0</sub> ] (in-lbs)
					T = Running Torque (in-lbs) @ Various RPM <sub>S</sub> (theoretical)**								
					50 RPM	115 RPM	172 RPM	345 RPM	600 RPM	870 RPM	1140 RPM	1750 RPM	
1	B1	5:1	10.00	51	44	43	42	41	40	40	39	38	3
		10:1	20.00	32	26	25	24	23	22	22	21	21	
2	B2	6:1	24.00	43	37	36	35	34	34	33	33	32	5
		24:1	96.00	19	14	13	13	12	11	11	10	10	
5	B5	6:1	12.66	196	171	167	164	160	156	154	152	150	12
		24:1	50.66	80	60	57	55	52	49	47	46	44	
10	B10	8:1	16.88	322	270	261	256	247	240	236	233	228	18
		24:1	50.66	172	125	117	112	105	98	94	91	87	
20	B20	8:1	16.00	667	561	543	534	516	502	493	487	479	36
		24:1	48.00	348	255	239	230	215	202	194	189	181	
30	B30	10 $\frac{3}{4}$ :1	16.00	1054	864	832	815	784	760	745	736	—	48
		32:1	48.00	582	408	379	363	335	312	298	289	—	
50	B50	10 $\frac{3}{4}$ :1	16.00	2700	2150	2058	2011	1929	1870	1836	1814	—	96
		32:1	48.00	1532	1018	932	887	811	755	722	701	—	
75	B75	10 $\frac{3}{4}$ :1	10.66	3842	3134	3015	2954	2848	2770	2724	—	—	156
		32:1	32.00	1981	1384	1284	1232	1141	1074	1035	—	—	
100	B100	12:1	16.00	4977	3846	3660	3568	3414	3307	3248	—	—	204
		36:1	48.00	2901	1837	1663	1575	1429	1327	1271	—	—	

\* Of Input Shaft for 1" of Rise

\*\* When calculating running torque, if actual RPM<sub>S</sub> value is between columns, use column with the lower RPM value.

# B-Series, Duty Cycle Calculations



Duty Limit Service factor ( $L_2$ ) = Operating time allowed per hour. The numbers greater than 60 are theoretical values and exceed 100% duty, solely to provide base data for adjusting  $L_2$ .

The  $L_2$  values are based on actuators loaded at rated capacity, operating in an ambient temperature of 80° F with a maximum allowable temperature rise of 100° F.

For ambient temperatures above 180° F or below -20° F consult Enerpac. For speeds not shown use the next fastest RPM value.

## 1. Determine Allowable Duty Cycle Time ( $D_2$ )

When the unit load is at rated capacity, and the ambient temperature is at 80° F the  $L_2$  value from the table equals  $D_2$ . If not, proceed to Step 1A.

### Step 1A

For different temperature service, or a unit load less than rated capacity, use the following equation to determine the Allowable Duty Cycle Time factor ( $D_2$ ).

$$D_2 = \frac{[(180 - T_a) * P * L_2]}{(100 * P_4)}$$

$T_a$  = Ambient temperature (deg F)

$P$  = Rated capacity (lbs)

$L_2$  - Duty limit service factor (see Table 8)\*\*

$P_4$  = Maximum running load per unit (lbs)

## 2. Determine if Duty Cycle Time is Acceptable

If  $D_2 \geq 60$  minutes the application is rated for continuous duty

If  $D_2 \geq D_1$  than the application is acceptable

If  $D_2 < D_1$  than the duty cycle limit has been exceeded for this application. You must do one of the following:

- Reduce the input speed to the actuator
- Reduce load by adding additional actuator to the system
- Use a larger size actuator

If you reduce speed you must recalculate  $V$  and  $D_1$  from page 73 numbers 4 and 5.

### Example:

Consider for a B-10 low ratio 8:1 operating in 70° F ambient temperature, 10,000 pound load, and 1725 RPM, with a rise of 30 inches and 25 cycles per hour.

$$D_1 = \frac{(2 * \text{Rise} * C_h)}{V}$$

$$D_1 = \frac{(2 * 30 * 25)}{102.2}$$

Duty time per hour = 14.7 minutes per hour

$$D_2 = \frac{[(180 - 70) * 20,000 * 26]}{100 * 10,000}$$

Duty cycle limit = 57.2 minutes per hour

Since  $D_2$  is greater than  $D_1$  the application is ok for the duty cycle limit.

▼ TABLE 8

Model Number	Gear Ratio	Turns Per Inch* [TPI]	L <sub>2</sub> - Duty Limit Service Factor @ Various RPM <sub>s</sub> Input Speeds**								
			50 RPM	115 RPM	172 RPM	345 RPM	600 RPM	870 RPM	1140 RPM	1750 RPM	2587 RPM
B1	5:1	10.00	874	423	302	170	110	82	66	48	34
	10:1	20.00	925	479	363	212	143	111	92	69	52
B2	6:1	24.00	1500	723	514	289	186	138	112	81	
	24:1	96.00	458	424	384	301	236	198	172	138	
B5	6:1	12.66	665	320	227	127	81	60	48	34	
	24:1	50.66	523	328	261	175	127	102	87	68	
B10	8:1	16.88	439	217	156	90	59	44	36	26	
	24:1	50.66	237	171	142	101	76	62	53	41	
B20	8:1	16.00	327	161	116	66	43	32	26	19	
	24:1	48.00	221	145	117	80	59	47	40	31	
B30	10 <sup>2</sup> / <sub>3</sub> :1	16.00	306	154	112	65	43	32	26		
	32:1	48.00	119	105	93	71	54	45	39		
B50	10 <sup>2</sup> / <sub>3</sub> :1	16.00	170	88	65	38	25	19	15		
	32:1	48.00	53	59	54	43	34	28	24		
B75	10 <sup>2</sup> / <sub>3</sub> :1	10.66	217	110	80	47	30	23			
	32:1	32.00	164	112	91	63	46	37			
B100	12:1	16.00	222	117	87	52	35	26			
	36:1	48.00	71	84	78	61	48	39			

\* Of Input Shaft for 1" of Rise

\*\* When calculating duty limit factor, if actual RPM<sub>s</sub> value is between columns, use the next higher RPM value.



# B-Series, Column Buckle Chart

The maximum estimated screw length (ESL) values in the chart below are based on a **2:1 factor of safety against column buckle**, and on a standard design with a top plate or a rotating design travel nut. Increased load screw lengths are not shown where the slenderness ratio exceeds 400.



**Screw lengths with a column buckle above the dotted line in Chart 2 below (lower than 200) comply with AISC maximum slenderness ratio specified for design and fabrication of structural steel buildings.** This data is for reference only and is not a limiting factor, except as required.

$$\frac{K \cdot L}{r} \leq 200$$

K = Column Factor

L = Extended Screw Length (ESL)

r = Radius of Gyration

See Table on page 73 for r values.

### 1. Determine extended screw length (ESL)

The ESL is the distance in inches the load screw can extend from the housing. See catalog for the model selected to determine ESL.

### 2. Determine the adjusted screw length (ASL)

The chart below is for a standard design top plate or the rotating design travel nut. For other design configurations you must adjust the ESL value using the F factor multiplier to determine the adjusted screw length.  
ASL = ESL x F

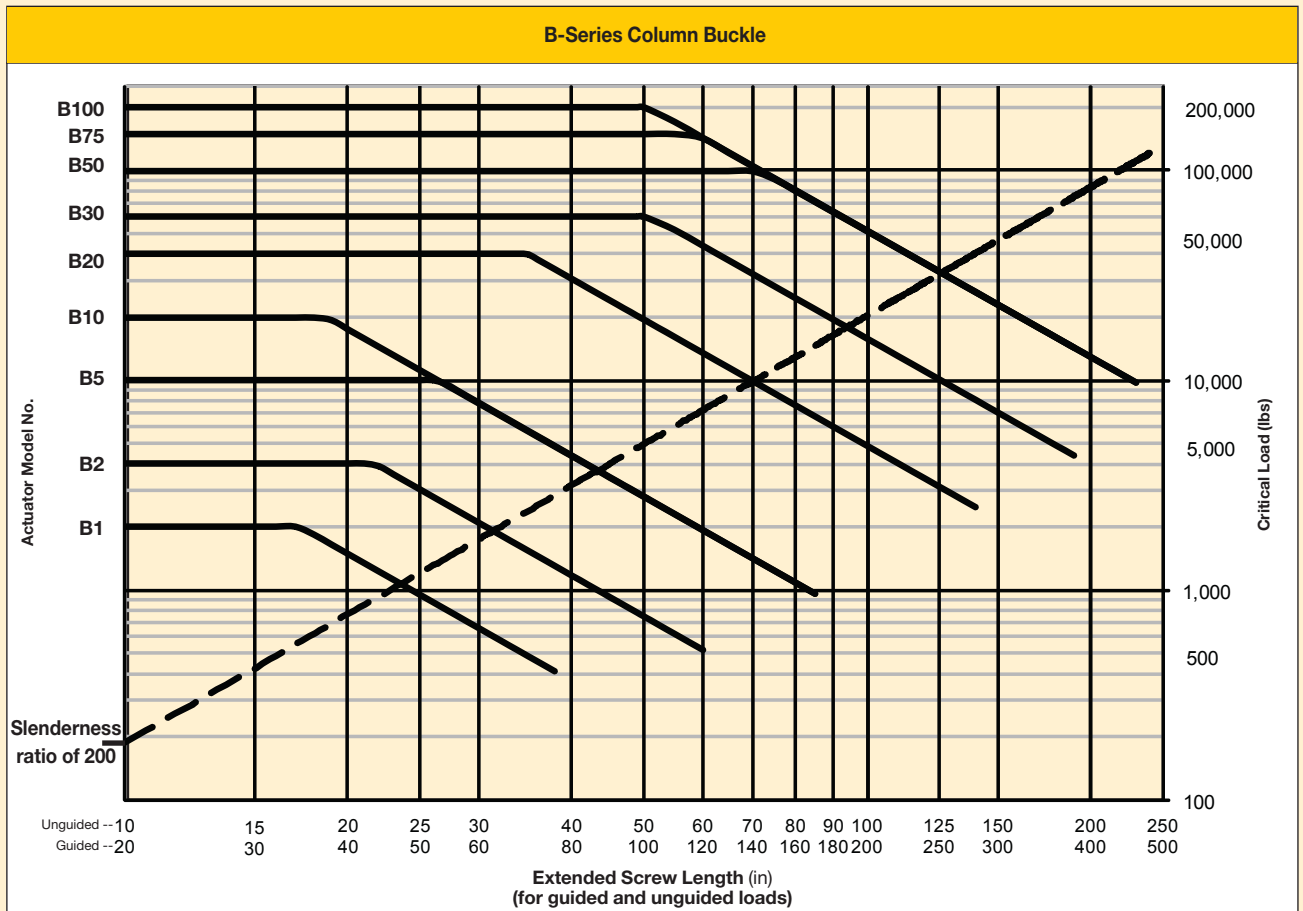
### 3. On the chart below draw a horizontal line to represent the maximum load (P<sub>1</sub>).

Using the set of ESL values that apply to your design (guided or unguided), draw a vertical line to represent the ESL or ASL. All of the actuators above the point of intersection will be acceptable.

▼ TABLE 9

Design Configuration	F Factor	K Factor	
		(Guided)	(Unguided)
Standard Design Top Plate	1	0.65	1.3
Rotating Design Traveling Nut	1	0.65	1.3
Standard Design Clevis End	1.25	0.80	1.6
Keyed Design Top Plate	1.25	0.65	1.3
Keyed Design Clevis End	2	0.65	1.6

▼ CHART 2



# Key / Anti-Rotation Options



## Key Designed

In applications where rotation cannot be prevented externally, a Keyed Design Actuator should be used. These Actuators models are keyed internally to prevent rotation of the screw to produce linear motion.

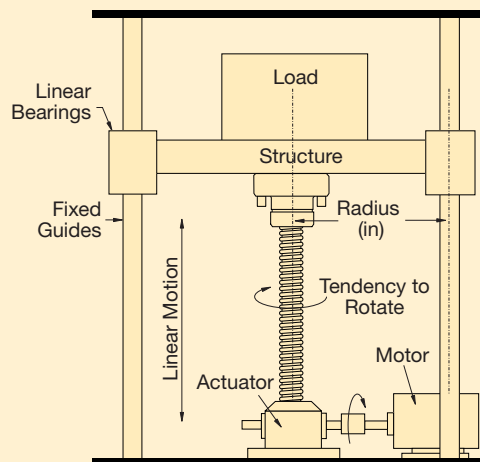
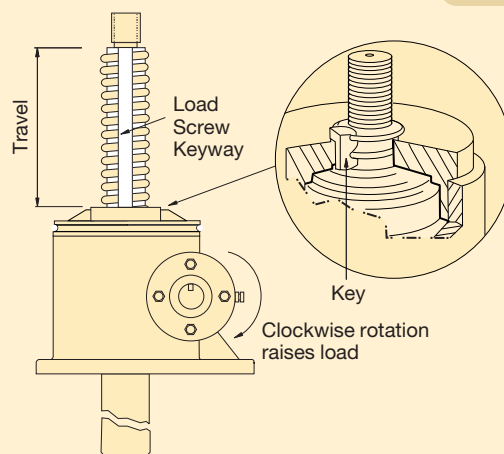
## Key Torque

Key torque is the amount of torque measured in in-lbs that must be overcome to prevent load screw rotation.

## Three general methods used to overcome key torque

1. Use of external guiding of the load as shown in the illustration below. This method is highly recommended for all applications involving side thrust or column buckle and is mandatory for horizontal applications.
2. Configure a system using two or more actuators attached to the load. (A rigid structure bolted to more than one UNI-LIFT® will not rotate.)
3. Using a keyed load screw (keyway full length of Acme Screw). This form of internal guiding is the least preferred method of preventing load screw rotation. Should it become necessary to have a keyed load screw, the load should be no more than 25% of rated capacity in order to minimize key friction problems. Contact ENERPAC for assistance in selecting the properly sized keyed UNI-LIFT® Actuator.

Key torque for all actuators models is provided below.



$$\text{Guide Thrust} = \frac{(\text{Unit Key Torque From Table}) \times f}{(\text{Radius}) \times \text{Number of Guides}}$$

## ▼ Load Screw Key Torque (output torque at full load)

Capacity (tons)	Unit Key Torque (in-lbs)
1/4	38
3/4 (40 TPI)	98
3/4 (20 TPI)	130
1	196
2	479
3	718
4	1399
5	1756
8	3151
10	4694
15	7705
20	11,411
25	15,375
30	22,587
40	37,006
50	49,421
75	78,142
100	123,947

For reduced loads, key torque is reduced proportionately. Multiply table values by load proportion factor.

$$f = \frac{\text{Actual Load (lbs)}}{\text{Rated Capacity (lbs)}}$$



### Rotation Prevention

Rotation of Load Screw or Traveling Nut must be prevented in order to produce travel (linear motion).



### Guide Sizing

Guides must be sized to prevent bending or deflection and aligned in true position with the Actuator and the Load Screw. If more than one unit is attached to a common structure, the tendency to rotate is resisted by reaction in the structure, instead of the guides.

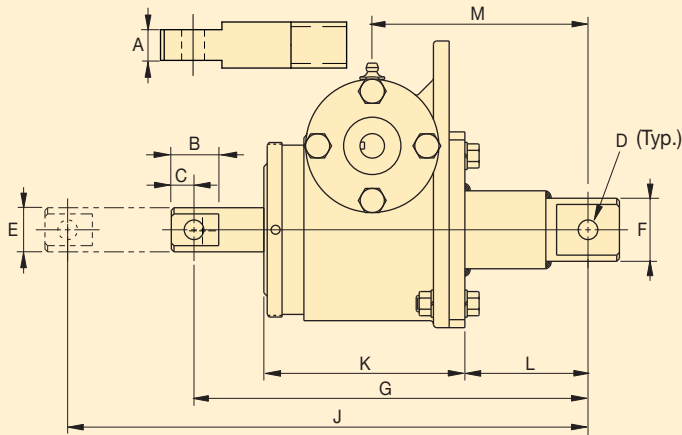


### WARNING! Keyed Rated Capacity

For keyed applications where operating loads are expected to exceed 25% of rated capacity, contact Enerpac for technical assistance.



# Double Clevis Dimensions



- A** = Width of flat
- B** = Length of flat
- C** = End of clevis to center line of pin hole
- D** = Diameter of pin hole
- E** = Diameter of clevis end
- F** = Diameter of clevis end (Tube End)
- G** = Closed height pin to pin
- J** = Extended height pin-to-pin
- K** = Height of UNI-Lift® housing
- L** = Length from pin hole (tube end) to housing
- M** = Length from pin hole (tube end) to input shaft



## Online UNI-LIFT® Configurator



The UNI-LIFT® Configurator guides you through a step-by-step process to properly configure the actuator for your system.

The configurator calculates the torque and horsepower requirements of your system with downloadable and scaled 2D and 3D drawings.

Please visit [www.enerpac.com/unilift](http://www.enerpac.com/unilift) to learn more about UNI-LIFT® Actuators.

## ▼ DIMENSIONAL CHART

Model Number*	A	B	C	D	E	F	G	J	K	L	M
	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)
<b>B2</b>	.75	1.50	.75	.41	1.00	1.38	9.25 + Travel	G + Travel	6.31	1.18 + Travel	3.25 + Travel
<b>B5</b>	1.00	2.00	1.00	.66	1.50	2.13	13.62 + Travel	G + Travel	9.04	2.06 + Travel	4.75 + Travel
<b>B10</b>	1.25	2.50	1.25	.78	1.75	2.50	14.79 + Travel	G + Travel	9.19	2.34 + Travel	5.16 + Travel
<b>M2</b>	0.75	1.50	0.75	0.41	1.00	1.38	7.38 + Travel	G + Travel	4.44	1.18 + Travel	3.25 + Travel
<b>M3</b>	0.75	1.50	0.75	0.41	1.00	1.38	7.00 + Travel	G + Travel	4.06	1.18 + Travel	3.25 + Travel
<b>M4</b>	1.00	2.00	1.00	0.66	1.50	2.13	9.75 + Travel	G + Travel	5.18	2.06 + Travel	5.00 + Travel
<b>M5</b>	1.00	2.00	1.00	0.66	1.50	2.13	10.06 + Travel	G + Travel	5.50	2.06 + Travel	4.75 + Travel
<b>M8</b>	1.25	2.50	1.25	0.78	1.75	2.50	12.56 + Travel	G + Travel	6.43	2.34 + Travel	5.66 + Travel
<b>M10</b>	1.25	2.50	1.25	0.78	1.75	2.50	11.41 + Travel	G + Travel	5.68	2.34 + Travel	5.16 + Travel
<b>M15</b>	1.50	2.50	1.25	0.91	2.25	2.50	12.91 + Travel	G + Travel	6.81	2.34 + Travel	5.66 + Travel
<b>M20</b>	1.75	2.75	1.38	1.03	2.50	3.13	17.2 + Travel	G + Travel	7.56	2.69 + Travel	6.63 + Travel

\*Double Clevis option limited to model shown above.



# Double Clevis Column Buckle



The Pin-to-Pin values in the Chart 3 are based on a 2:1 factor of safety against column buckle, on a Double Clevis Actuator.

Increased load screw lengths are not shown where the slenderness ratio exceeds 400.

### 1. Determine maximum extended height pin-to-pin (J)

The maximum extended height is the distance between the clevis pins, in the fully extended position. Refer to page 78.

### 2. Determine the maximum unit load: (P<sub>1</sub>, lbs.)

On multi-unit systems where load is not equally distributed, change P<sub>1</sub> to the greatest load supported by one unit.

$$P_1 = \frac{P_2}{N} \quad P_2 = \text{Total system load}$$

N = Number of actuators

### 3. Select correct size actuator

On the chart below draw a horizontal line to represent the maximum load [P<sub>1</sub>]. Draw a vertical line to represent the maximum extended height [J]. All of the actuators below the point of intersection will be acceptable.

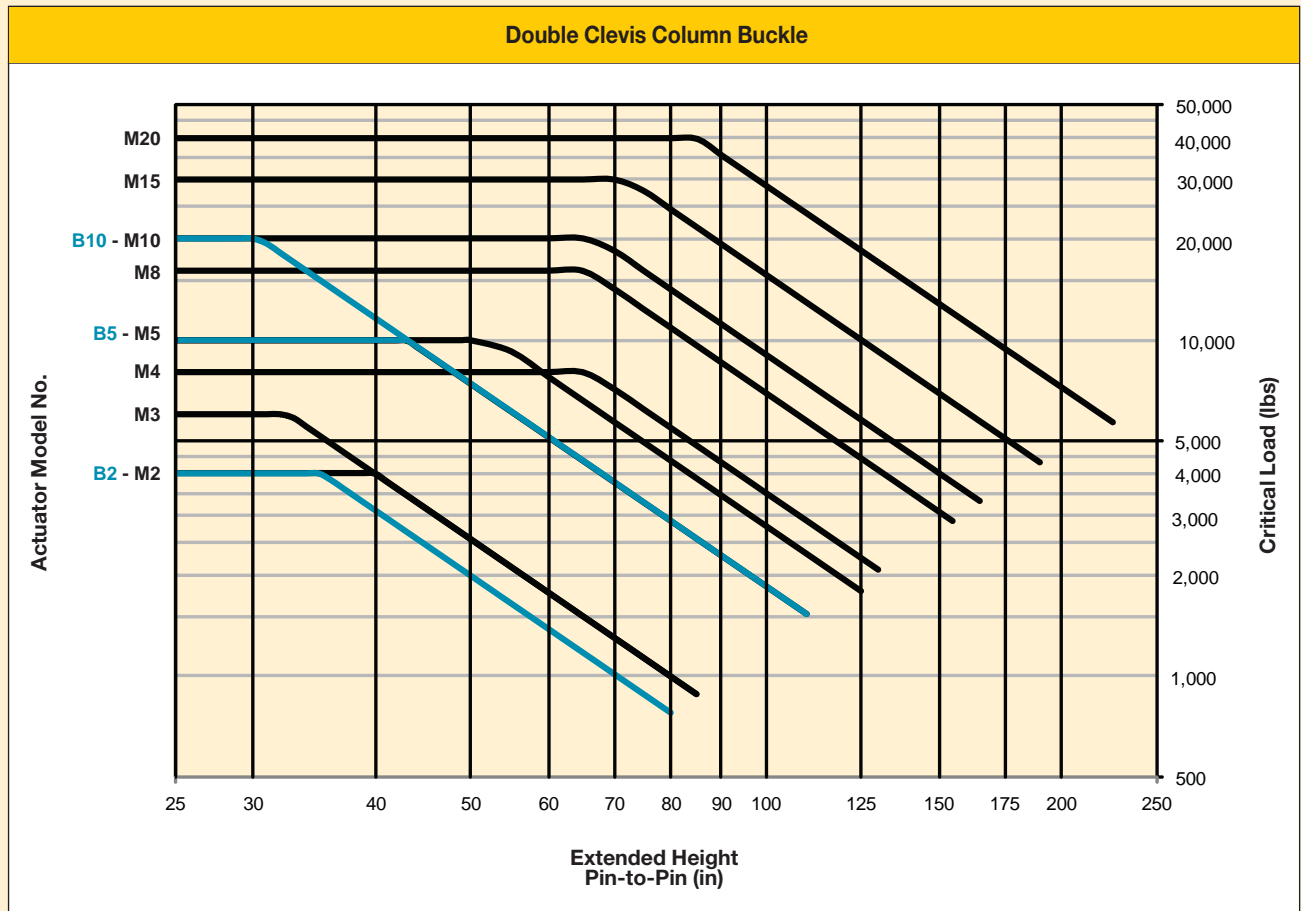


### Contact Enerpac!

Contact the Enerpac office nearest to you for advice and technical assistance in the layout of your ideal UNI-LIFT® System.

You can also ask Enerpac for assistance by e-mail at: [unilift@enerpac.com](mailto:unilift@enerpac.com).

▼ CHART 3





# Application Example

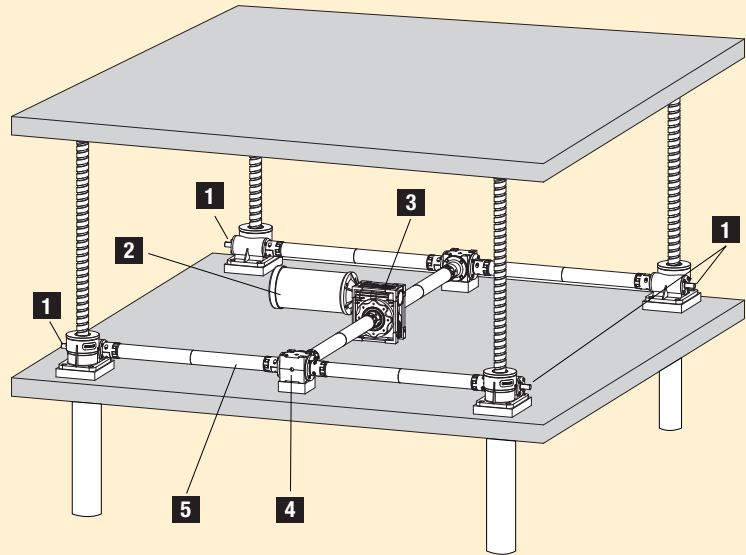
Lift a 30,000 pound Turbine Engine 20 inches in 90 seconds. Lifting will occur three times per hour, once a month, inside a clean factory.

A lifting frame secures the engine and positions the actuators so the load is equally distributed. Linear slides handle side loads and a hard stop is part of the frame.

The lifting frame will place the center of the actuator load screws on a 10 foot square. 460 Volt 3-phase power is available, preference for a standard 1750 RPM motor. The illustration shows an Upright Translating Design with a Top Plate.

They are looking for a complete lift system.

Determine the part numbers for these items:



## 1 Mechanical Actuator

## 2 Motor

## 3 Gear Reducer

## 4 Mitre Gear Box

## 5 Shafting

## 1 Mechanical Actuator

### Determine Uni-Lift Actuator Model

See steps 1-7 on page 68 for detailed explanations.

#### 1. Determine the maximum load on one actuator (P<sub>1</sub> lbs)

The load is equally distributed.

$$P_1 = \frac{P_2}{N} = \frac{30,000}{4} = 7,500 \text{ lbs}$$

#### 2. Select the actuator size

Per the drawing, the actuators will be in compression, follow the additional steps 1-3 on page 71.

- No additional allowances are needed for boots and for other miscellaneous clearances.

Travel = 20 inches = ESL

ASL = ESL x F = 20 x 1 = 20 inches

- The load is guided, placing this information on chart 1, page 71, shows actuators with a capacity of 4 tons and higher are acceptable. This is not a high cycle application, so 100% of crated capacity will be used. To minimize cost the lowest tonnage is selected as a starting point, this is the **M4**.

#### 3. Determine desired load screw velocity (V<sub>d</sub> in/min)

One way travel under load is 20 inches in 1.5 minutes

$$V_d = \frac{\text{Rise}}{t_2} = \frac{20}{1.5} = 13.33 \text{ in/min}$$

#### 4. Determine desired input speed: (RPM<sub>d</sub>)

**M4** has three different ratios, start with the low ratio, this will generally yield the lowest shaft speed.

TPI = Turns of the input shaft for 1 inch of rise

$$\text{RPM}_d = \text{TPI} \times V_d = 16 \times 13.33 = 213 \text{ RPM}$$

#### 5. Determine actual load screw velocity (V in/min)

The 7.5 to 1 reducer gives us the closest desired input speed.

$$\text{Input Speed} = \frac{1750}{7.5} = 233 \text{ RPM}$$

$$V = \frac{\text{RPM}}{\text{TPI}} = \frac{233}{16} = 14.58 \text{ in/min}$$

The desired velocity (V<sub>d</sub>) is 13.33, this should be acceptable.

#### 6. Calculate the required duty cycle time (D<sub>1</sub> in/min)

In absence of other information, the average ambient temperature inside a factory is assumed to be 80 degrees.

$$D_1 = \frac{(2 \times \text{Travel} \times C_h)}{V} = \frac{(2 \times 20 \times 3)}{14.58} = 8.23 \text{ min/hour}$$

$$D_2 = \frac{((180 - T_a) \times P \times L_2)}{100 \times P_4} = \frac{((180 - 80) \times 8000 \times 23)}{100 \times 7500} = 24.53 \text{ min/hour}$$

D<sub>1</sub> < D<sub>2</sub>, the M4 low ratio in this application is within acceptable duty cycle limits

**Actuator Model Number is M4U020OLT**



## 2 Motor

### Determine Motor

See steps 1-7 on page 69 for detailed explanations.

#### 1. Determine unit running load proportion factor (f)

Check with customer, unless told otherwise, assume  $P_2 = P_3$

$$f = \frac{P_3}{(P \times N)} = \frac{30,000}{(8000 \times 4)} = 0.94$$

#### 2. Determine unit running torque ( $T_1$ , in-lbs)

$$T_1 = (T \times f) + T_o = (202 \times 0.94) + 5 = 195 \text{ in-lbs}$$

#### 3. Determine system running torque ( $T_2$ , in-lbs)

See page 66, question #11, for arrangement efficiency ( $e_1$ )

$$T_2 = \frac{(T_1 \times N)}{e_1} = \frac{(195 \times 4)}{0.8} = 975 \text{ in-lbs}$$

#### 4. Determine system power, (System hp)

See page 66, question #11, for reducer efficiency ( $e_2$ )

$$\text{hp} = \frac{(T_2 \times \text{RPM}_s)}{63025 \times e_2} = \frac{(975 \times 233)}{(63025 \times 0.9)} = 4.01 \text{ hp}$$

#### 5. Determine system starting torque ( $T_{S2}$ , in-lbs)

$$T_{S2} = \frac{([(T_s \times f] + T_o) \times N]}{e_2} = \frac{([(342 \times .094] + 5) \times 4]}{0.9} = 1,451 \text{ in-lbs}$$

#### 6. Determine motor starting torque ( $T_{sm}$ , in-lbs)

$$T_{sm} = \frac{T_{S2}}{(R \times e_2)} = \frac{1451}{(7.5 \times 0.9)} = 215 \text{ in-lbs}$$

#### 7. Determine motor running torque ( $T_{rm}$ , in-lbs)

$$T_{rm} = \frac{T_{S2}}{(R \times e_1)} = \frac{975}{(7.5 \times 0.8)} = 163 \text{ in-lbs}$$

#### 8. Select the Motor

See page 49 for motor specifications, select motor with values that are  $\geq$  the calculated hp,  $T_{sm}$ , and  $T_{rm}$

**UM17 - 5 hp 1750 RPM 3 Phase 184TC Frame**

## 3 Gear Reducer

See pages 52 and 53 for product details.

#### 1. Determine system running torque ( $T_2$ , in-lbs)

See page 66, question #11, for arrangement efficiency ( $e_1$ )

The reducer must drive all 4 actuators.

$$T_2 = \frac{(T_1 \times N)}{e_1} = \frac{(195 \times 4)}{0.8} = 975 \text{ in-lbs}$$

#### 2. Select the Gear Reducer

See page 53 for gear reducer specifications, select gear reducer with output torque  $\geq$  system running torque  $T_2$  and match the selected motor frame size.

**UGRD2 – Size C Gear 7.5 to 1 ratio**

## 4 Mitre Gear Box

See pages 54 and 55 for product details.

#### 1. Determine mitre gear box torque ( $T_m$ in-lbs)

Each mitre box must drive 2 actuators

$$T_m = T_1 \times N = 195 \times 2 = 390 \text{ in-lb}$$

#### 2. Select the Mitre Box

See page 54 for mitre box specifications, select mitre box with input hp, output torque, and maximum input RPM  $\geq$  actual motor hp, calculated mitre box  $T_m$ , and actual gear reducer output RPM

**UMG5 – Size 5 Mitre Box**



## 5 Shafting

See pages 49, 52 - 54, and 58 for product details. Create drawing of the system layout to help determine shaft dimensions.

### 1. Determine Shaft Size

Select shaft size with maximum torque rating => actual motor starting torque ( $T_{sm}$ ) x ratio.

$$T_{sm} \text{ actual} \times \text{ratio} = (436 \times 7.5) = 3270 \text{ in-lbs.}$$

**Shaft Size 4 maximum torque rating of 3540 in-lbs (page 58)**

For ease of installation, use the same size shafting for all positions.

### 2. Determine Shaft Model Number for Shaft ER and FR

The layout is symmetrical, both shafts will be the same.

Calculate shaft to shaft distance on drawing

$$60 - 5.26 - 5.72 - 2.26 = 46.80 \text{ in.}$$

Identify Gear Reducer shaft diameter = 1.25 in.

Identify Mitre Box shaft diameter = 1.00 in.

Use Shaft Matrix Chart on page 58 to determine model number

**US4B0468FH, quantity 2x**

### 3. Determine Shaft Model Number for Shaft AE, BE, CF, and DF

The layout is symmetrical, all 4 shafts will be the same.

Calculate shaft to shaft distance on drawing

$$60 - 4.18 - 5.09 = 50.73 \text{ in.}$$

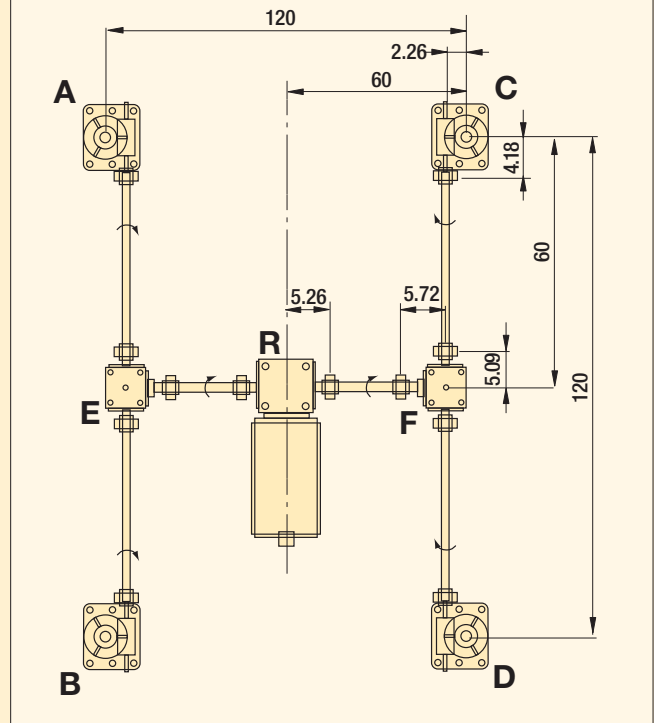
Identify Actuator shaft diameter = 0.75 in.

Identify Mitre Box shaft diameter = 1.00 in

Use Shaft Matrix Chart on page 58 to determine model number

**US4B0507DF, quantity 4x**

Dimensions shown in inches.



# Configuring Your UNI-LIFT Actuator On-Line



[www.enerpac.com/unilift](http://www.enerpac.com/unilift)  
for latest Enerpac Uni-Lift® information

Visit the Enerpac Web Site and use the UNI-LIFT® Configurator to properly select the type, ratio, and size of the machine or ball screw actuator for your application.

- Provides instant results that are downloadable in 2D and 3D CAD
- Configuration snapshot is generated from your selection input
- Supports imperial and metric units
- Informative help topics guide you through the entire process

Sample Configuration Report ▶

Configuration Report  
Uni-Lift  
For contact information visit [www.enerpac.com](http://www.enerpac.com)

Project: E501 Example Date:  
Prepared By: Uni-Lift Order Number Matrix:

Uni-Lift #	Model	Size	Mtg Style	Scr Cfg	ESL (in)	Ratio	End Cfg	Boot	Stop Nut	Mtr Ada	Limit SW
1	M	4	U	T	20.0	L	TP				
2	M	4	U	T	20.0	L	TP				
3	M	4	U	T	20.0	L	TP				
4	M	4	U	T	20.0	L	TP				

**Input Data**

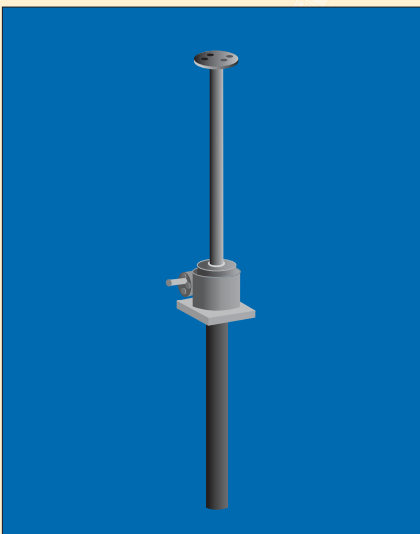
# of Uni-Lifts: 4  
 The Load is: Guided  
 Compression  
 Load Screw Travel: 20.0 Inches  
 Balanced: Yes  
 Max Load on One Lift: 7,500 Pounds  
 Total Static Load: 30,000 Pounds  
 Total Running Load: 30,000 Pounds  
 Factor of Safety Required: 2.0  
 Slenderness Ratio Required: 400  
 Ambient Temperature: 80 Fahrenheit  
 Required Cycles/Hour: 3 Cycles  
 Motor Speed: 1,725 RPM  
 Reducer Ratio: 7.50:1  
 Gear Ratio: 5.3:1  
 Turns Per Inch (TPI): 16

**Results**

	English		Metric	
Input Speed:	230	RPM	230	RPM
Linear Velocity:	14.38	In/Min	365.1	mm/Min
One-Way Travel Time:	1.39	Minutes	1.39	Minutes
Max Cycles/Hour:	12.23	Cycles	12.23	Cycles
Horse Power:	3.80	HP	2.84	KW
Motor Starting Torque:	241	In-Lbs	27.17	N-m
Motor Running Torque:	139	In-Lbs	15.69	N-m
Unit Run Torque:	188	In-Lbs	21.25	N-m
Slenderness Ratio Calc:	39		39	
Factor of Safety Calc:	2.1		2.1	
Key Torque:	1,312	In-Lbs	148.21	N-m

Uni-Lift  
For contact information visit [www.enerpac.com](http://www.enerpac.com)  
[Contact Us](#)

◀ Sample 3D File





## Marine

**100-Ton UNI-LIFT® Actuators help keep the ferry dock running**

*Engineers utilized two (2) UNI-LIFT® 100-ton Actuators with 15' of travel to raise and lower the ramp on each ferry dock along the Mississippi River, USA. The Department of Transportation engineers needed a way of lifting and lowering ramps during high and low tide conditions, while holding up to the harsh environmental conditions of the Gulf Coast.*



## Aircraft Maintenance

**Aircraft docking systems need the flexibility and precision of UNI-LIFT® Actuators**

*UNI-LIFT® Actuators are used for scheduled aircraft maintenance overhauls. Engineers at this repair station decided that UNI-LIFT® Actuators were the perfect choice to position and adjust the complex scaffolding that was set up around the aircraft. Their precision movement and flexibility has proven to be an asset in getting the job done efficiently and safely.*

## Material Handling

**UNI-LIFT® are used in many different material handling applications**

*UNI-LIFT® Actuators are used extensively in a variety of material handling applications. Whether used to position conveyer belts, place tension on overhead beams or to move heavy-duty equipment, UNI-LIFT® Actuators are the ideal solution for many jacking, tensioning, and positioning applications. Whether you have one or multiple lifting points, UNI-LIFT® Actuators are the perfect solution for many different OEM material handling applications.*





## Fabrication

**UNI-LIFT® positions sections of segmental bridge forms**

*Fabricators use UNI-LIFT® 10-Ton Actuators to position fabricated sections of forms used in precast segmental bridge sections. UNI-LIFT® Actuators were used due to the harsh environmental location of the casting facility. The engineers were also able to operate the Actuators from an overhead centralized location so that each section came together as needed. This process saves time in the form setup making the job run more efficiently than previous methods.*



## Motion Control

**UNI-LIFT® are key to a variety of motion control applications**

*When controlled motion is required, many design engineers in virtually every industry around the world use UNI-LIFT® Mechanical and Ball Screw Actuators for their precision, power and performance. UNI-LIFT® accessories provide flexibility and expandability in heavy-duty motion control solutions.*

## Manufacturing

**5-ton Double Clevis Actuators keep the doors of these plating tanks running smoothly**

*When engineers needed a quick and compact way of opening the large doors of these plating tanks, they selected a UNI-LIFT® solution. The application utilizes two 5-ton double-clevis Actuators, with a motor and a limit switch box mounted on each. The operator just pushes a button to open the doors and pushes another to close them. This method greatly enhances operator safety and helps prevent cross-contamination between tanks.*





▼ Complete the following information to select the right products:

**NOTE: This Worksheet is available for print on-line at: [www.enerpac.com/unilift](http://www.enerpac.com/unilift)**

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Company: \_\_\_\_\_ Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ Email: \_\_\_\_\_

**Total System Load:** \_\_\_\_\_ **Is the Load Equally Distributed:** Yes \_\_\_\_\_ No \_\_\_\_\_

**If No, what is the Maximum Load On One Actuator:** \_\_\_\_\_

**No. of Actuators in System:** \_\_\_\_\_ **Travel Required:** \_\_\_\_\_

**Travel Speed Required/Min:** \_\_\_\_\_ **Linear Speed Requirements:** Min. \_\_\_\_\_ Max. \_\_\_\_\_

**Is the Load Guided?** Yes \_\_\_\_\_ No \_\_\_\_\_

**No Side Thrust Force is Allowed on Screw** (Application with side thrust force requires external guiding of load)

**Load Condition:**

Compressed \_\_\_\_\_ Tension \_\_\_\_\_ Both \_\_\_\_\_

**Mounting Style:**

Upright \_\_\_\_\_ Inverted \_\_\_\_\_ Double Clevis \_\_\_\_\_

**Screw Configuration:** (\*Keyed Actuators are to be used at 25% of rated capacity )

Translating \_\_\_\_\_ Rotating \_\_\_\_\_ \*Keyed \_\_\_\_\_ Anti-Backlash \_\_\_\_\_

**Operating Cycles:** Per Hour \_\_\_\_\_ Hours/Day \_\_\_\_\_ Days/Week \_\_\_\_\_

**Drive:**

Manual \_\_\_\_\_ Electric \_\_\_\_\_ Air \_\_\_\_\_ Hydraulic \_\_\_\_\_

**Power Available:**

Voltage \_\_\_\_\_ Phase \_\_\_\_\_ Cycle (Hz) \_\_\_\_\_

**Environmental:** (Check all that apply)

Wet \_\_\_ Oil \_\_\_ Corrosive \_\_\_ Dirt \_\_\_ Dust \_\_\_ Vibration \_\_\_ Explosion Proof \_\_\_ Shock/Impact \_\_\_

**Ambient Temperature:** (Specify Range) \_\_\_\_\_

**Ball Screw Application:**

Brake Stopping Distance (in) \_\_\_\_\_ Life Expectancy \_\_\_\_\_

**Accessories Required:** (Check all that apply)

Top Plate \_\_\_\_\_ Clevis End \_\_\_\_\_ Motor Adaptor \_\_\_\_\_ Stop Nut \_\_\_\_\_ Limit Switch \_\_\_\_\_

Bellows Boots \_\_\_\_\_ Encoder \_\_\_\_\_ Hand Wheels \_\_\_\_\_ Couplings \_\_\_\_\_ Reducers \_\_\_\_\_

Mitre Gear Boxes \_\_\_\_\_ Shafts \_\_\_\_\_ Custom Controls \_\_\_\_\_







## Enerpac Offers Other Linear Actuation Products Including...



### 5000 PSI LINEAR TIE ROD CYLINDERS

...to suit your application

- 5 - 30 ton models
- 2 - 12 inch stroke
- Low friction design
- Variety of mounting options

*Other models available upon request.*

*Request Enerpac E214 catalog for more information.*



### 10,000 PSI INDUSTRIAL CYLINDERS

...the most complete in the industry

- 5 - 1000 ton models
- 1/2 - 48 inch stroke
- Single- and double-acting models
- Variety of end and mounting accessories

*Other models available upon request.*

*Request Enerpac E326 catalog for more information.*



### THE MOST COMPREHENSIVE HIGH-PRESSURE PUMPS AVAILABLE

...tough, dependable, innovative

- Hand, air, electric or gasoline models
- Single or double-acting versions
- Configurable valve options
- Hoses, fitting and other accessories available

*Other models available upon request.*

*Request Enerpac E326 catalog for more information.*



**Note:** Unless specified in the sales order, the services of a field engineer are not included with the purchase of Enerpac UNI-LIFT® Actuators and related equipment. Installation, maintenance and safety instructions must be given to all personnel directly responsible for the installation, maintenance and operation of the UNI-LIFT® equipment.

## General Guidelines and Installation

The customer is responsible for ensuring that there are no destructive conditions which could affect the UNI-LIFT® Actuator(s) or complementing equipment. Conditions that may be considered destructive include, but are not limited to:

1. Excessive input speeds
2. Extreme shock loading
3. Mechanical or thermal overloading
4. Exceeding recommended duty cycles
5. Side loading of the load screw

Each UNI-LIFT® Actuator in the system must be specified in accordance with the stated requirements and precautions contained in this Catalog. All calculations and specifications must be reviewed and approved by the customer's application design engineer in advance of installation.

### Be certain that:

- The rated capacity of the UNI-LIFT® Actuator exceeds the maximum load that may be applied to it during use.
- The maximum allowable input shaft speed (RPM<sub>i</sub>) of the UNI-LIFT® Actuator will not be exceeded.



**NOTE:** For maximum input speeds and other UNI-LIFT® specifications, refer to the Motor Sizing Charts on pages 69 and 74 in this section for your Actuator.

- The foundation for the UNI-LIFT® Actuator is sufficiently rigid to maintain correct alignment with connected machinery and that it has sufficient strength to support the maximum load.
- The foundation has a flat mounting surface to assure uniform support for the UNI-LIFT® Actuator. Be sure the opening in the foundation for the protective tube or the load screw is as small as possible, so that the unit is supported over the greatest possible area.
- The method of preventing load screw rotation (so that translation will occur) is sufficiently strong. Refer to the Load Screw Key Torque on page 77 for complete details.

## Lubrication Procedure

New UNI-LIFT® Actuators are shipped with grease in the housing. Lubrication is recommended at regular intervals. Such intervals are determined by the duty cycles of the Actuator, but should be performed a minimum of once every 60 days.

Please see the instruction sheet that accompany your UNI-LIFT® product for more information.



### WARNING !

Never perform any maintenance, lubrication adjustment or repair procedures on a UNI-LIFT® Actuator or any associated transmission equipment until you are absolutely certain that the prime mover cannot be remotely or automatically started. Always lockout power before beginning procedures. Make sure the load is properly supported before the UNI-LIFT® brake or other holding devices are removed.



## Lubricant Requirements

The lubricant should not be corrosive to gears or to ball or roller bearings and must be neutral in reaction. In addition, the lubricant must be oxidation resistant and must be non-channeling. Operating temperatures must be considered when selecting lubricants. Enerpac recommends the following extreme pressure greases or their equivalents.

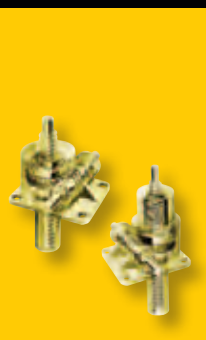
1. For operation up to 180° F [82° C]: Use lithium based grease, it should have a viscosity of 840 to 890 SUS at 100° F, and 76 to 84 SUS at 210° F.
2. For operation up to 400° F [204° C]: Use DuBois MPG-2 Grease, NLGI Grade 2. If another brand of high temperature grease is used, it should have a viscosity of 539 SUS @100° F.
3. For operation down to -100° F [-73° C]: Use Shell Aero Shell Grease 7 (Low temperature aviation synthetic hydrocarbon microgel grease).

**Note:** Standard UNI-LIFT® models are designed to operate at 80° F [27° C] with a 100° F temperature rise. For higher temperatures, special seals are required. Contact Enerpac for additional information.



## Special Requirements

USDA approved grease for food industry applications and special grease for extremely low temperature applications below -100° F [-73° C] is available. Contact Enerpac for additional information.



## Actuator Overview

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## Machine Screw Actuators

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## Ball Screw Actuators

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## Actuator Accessories

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### Brazil

Power Packer do Brasil Ltda.  
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Toll Free: Tel: 0800 891 5770

### Canada

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Toll Free: Tel: +1 800 268 4987 – Fax: +1 800 461 2456

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Actuant China Ltd.  
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Fax: +86 0512 5335 9690

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Toll Free:  
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### The Netherlands, Belgium, Luxembourg, Central and Eastern Europe, Baltic States, Greece, Turkey and CIS countries

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### ENERPAC Integrated Solutions B.V.

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technical  
information  
for UNI-LIFT®  
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