Joyce high-efficiency bevel ball actuators (BB) are designed for near-continuous duty operation. BB series actuators provide higher speeds and less heat generation than other mechanical actuators and require a brake motor or other external locking device to hold position. They also offer more precise positioning and repeatability than hydraulic cylinders.

Bevel ball actuators are available in 7.5-ton to 100-ton static capacities and are able to attain travel speeds of up to 48 feet per minute. The ball screw and ball nut have a fully predictable J-10 life expectancy. Standard jacks have right hand ball screws. Left hand ball screws are available as an option. A threaded end condition is standard on translating bevel ball actuators; load pad and clevis ends are also available. KFTN designs have a plain turned end condition.

Bevel ball actuators are ideal for either single operation or multi-actuator systems. As many as three output shafts may be specified for mounting motors, limit switches, readout devices and other accessories. See page 195 for an example of a bevel gear jack system. Note that right hand and left hand screw threads are alternated in the layout.

Many options are available including oversized ball bearings, which can be specified to reduce endplay between ball screw and ball nut. All jack designs can be fitted with protective boots.

Joyce/Dayton can customize bevel ball actuators to meet your requirements.

Joyce/Dayton offers Bevel Ball Actuators in the following designs:
• Translating
• Keyed for traveling nut (KFTN)
A guide for ordering is on page 160.
**BEVEL BALL ACTUATORS ORDERING INFORMATION**

**Instructions:** Select a model number from this chart.

<table>
<thead>
<tr>
<th>Joyce Bevel Ball Actuators</th>
<th>Bevel Ball Actuator Rise</th>
<th>Screw Stops (p. 10) and Boots (p. 170)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB150</td>
<td>Rise is travel expressed in inches and not the actual screw length.</td>
<td>Screw stops are optional on bevel ball actuators. When specified, the closed height of the jack and protection tube length may be increased.</td>
</tr>
<tr>
<td>BB225</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BB300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BB400</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Evaluate column load (p. 162).
Evaluate ball nut life (p. 163).
Detailed product information (pp. 164-167).
Right hand ball screws standard.

**Sample Part Number:** BB225U3S-12-XXXX-STDX-XXXX-B

**Actuator Configuration**

<table>
<thead>
<tr>
<th>U</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upright</td>
<td>Inverted</td>
</tr>
</tbody>
</table>

**End Conditions**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T1 (plain end)</td>
</tr>
<tr>
<td>2</td>
<td>T2 (load pad)</td>
</tr>
<tr>
<td>3</td>
<td>T3 (threaded end)</td>
</tr>
<tr>
<td>4</td>
<td>T4 (male clevis)</td>
</tr>
</tbody>
</table>

**Actuator Design**

<table>
<thead>
<tr>
<th>S</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>= Translating</td>
</tr>
<tr>
<td>N</td>
<td>= Traveling Nut</td>
</tr>
</tbody>
</table>

**Encoders and Electronic Limit Switches**

<table>
<thead>
<tr>
<th>ENCX</th>
<th>ELS2</th>
<th>ELS4</th>
<th>ELS6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoder (p. 178)</td>
<td>2 Position Electronic Switch</td>
<td>4 Position Electronic Switch</td>
<td>6 Position Electronic Switch</td>
</tr>
</tbody>
</table>

**Shaft Codes**

Three shaft codes must be specified for each jack. Electronic and mechanical limit switches may be substituted for the shaft code per the tables on this page.

- STDX – Standard
- XXXX – Input shaft not required

When ordering with only one input shaft, it is recommended to order the following configuration:

XXXX-STDX-XXXX.

**Shaft 1 Code**

**Shaft 2 Code**

**Shaft 3 Code**

**Additional Options**

<table>
<thead>
<tr>
<th>X</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>= Standard Actuator, no additional options</td>
</tr>
<tr>
<td>S</td>
<td>= Additional Specification Required (comment as necessary)</td>
</tr>
</tbody>
</table>

**Protective Boots**

- pp. 170-172
- B= Protective Boot
- D= Dual Protective Boot

**Finishes**

- pp. 179
- F1= Do not Paint
- F2= Epoxy Paint
- F3= Outdoor Paint

**Process**

<table>
<thead>
<tr>
<th>Ball Screw</th>
</tr>
</thead>
<tbody>
<tr>
<td>L= Left Hand Screw</td>
</tr>
</tbody>
</table>

**Screw Stops**

Extending stops standard
• Specify as many options as needed

**Mechanical Limit Switches (pp. 174-175)**

**Ordering Example:** LA13

<table>
<thead>
<tr>
<th>Models</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS7-402</td>
<td>LI</td>
</tr>
<tr>
<td>LS8-402</td>
<td>LA</td>
</tr>
<tr>
<td>LS8-404</td>
<td>LB</td>
</tr>
<tr>
<td>LS9-502</td>
<td>LC</td>
</tr>
<tr>
<td>LS9-503</td>
<td>LD</td>
</tr>
<tr>
<td>LS9-504</td>
<td>LE</td>
</tr>
<tr>
<td>LS9-505</td>
<td>LF</td>
</tr>
<tr>
<td>LS9-506</td>
<td>LG</td>
</tr>
<tr>
<td>LS9-507</td>
<td>LH</td>
</tr>
</tbody>
</table>

**Available Positions**

<table>
<thead>
<tr>
<th>Number of DPDT Switches (see p. 175)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

**Available Positions**

<table>
<thead>
<tr>
<th>Number of DPDT Switches (see p. 175)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

**Number of DPDT Switches (see p. 175)**

**Note:** All BB actuators are available with all mounting positions.

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Custom products are available • Contact Joyce/Dayton with your requirements

sales@joycedayton.com

800-523-5204
**Design Tips**

1. Determine the load to each actuator.
2. Determine the orientation and type of load; for instance, from the chart above it may be an upright compression load or an inverted compression load.
3. JAX® software can be used to determine the following:
   - The allowable static compression load for a given rise (or use Column Loading Chart on page 162)
   - The allowable dynamic load for a given rise
   - Ball nut life (or use Life Expectancy of the ball screw chart on page 163)
   - System horsepower and torque – also see item #4
4. When a direct motor drive is used in a system, consideration must be given to the input starting torque requirements and the motor horsepower will need to be increased accordingly (JAX® software will not do this). Contact Joyce/Dayton for assistance.
5. When selecting bevel ball actuators for an interconnected row or system (p. 195), careful attention must be given to the input and output shaft rotations. For example, if the input shaft rotation on the first actuator is clockwise, the output shaft(s) on that same actuator will rotate counter-clockwise. To insure all actuators raise and lower in unison, alternating actuators must be specified with right and left hand ball screw threads. For example, if you need five actuators interconnected in a straight line and the first actuator is right hand, the third and fifth actuator will also need to be ordered as right hand and the second and fourth actuator will need to be ordered as left hand. Bevel ball actuators are supplied standard with right hand ball screws. To order the left hand ball screw option, add an "L" to the end of your bevel ball actuator part number as shown on page 160.
6. Bevel ball actuators are not self-locking. They will lower under load. A brake motor or other external locking system is required.
7. Bevel ball actuators are furnished with one input shaft (pinion) in position #2. Actuators may be ordered with up to three input shafts located at any combination of positions # 1, 2, or 3.
8. Translating bevel ball actuators are designed for grease lubrication. The upper bearing is grease lubricated through a fitting on top of the jack. Light oil must be applied directly to the lifting screw.
9. Typically actuators are mounted upright with the jack base plate parallel to the horizon. If the base plate is oriented any other way, contact Joyce/Dayton for lubrication and other instructions.

---

**Important Note:** Bevel Ball Actuators are not self-locking. Brake motors or external locking systems are required.

*W:* Load in Pounds.

**Pinion Torque (raising):** The torque required to continuously raise a given load.

**Pinion Torque (holding):** The torque required to hold a given static load in position.

**Screw Torque:** The torque required to resist screw rotation (translating design) and traveling nut rotation (KFTN design).

**Lead:** The distance traveled axially in one rotation of the lifting screw.

**Pitch:** The distance from a point on the screw thread to a corresponding point on the next thread, measured axially.
BEVEL BALL ACTUATORS  COLUMN LOADING

Bevel Ball Actuators Column Loading Chart


The horizontal portion of each line represents the jack's maximum static capacity.
BEVEL BALL ACTUATORS

BB 150 - 1 1/2" SCREW

Upright

12 9/16
TYPE 1
PLAIN END

1 1/2
TOP OF JACK

5/8
1-14 UNS 2A

1/4
Ø11/16 (4) HOLES
ON Ø3 B.C.

Ø4 1/2

1/2
Ø1000

⁺875/⁸⁷²

7 11/16
RISE + 1 1/8

Ø2 3/8

6 7/8
5 1/4
MOUNTING POSITION 1

2 5/8
3 3/8
7 9/16

1 1/16
MOUNTING POSITION 2

1/4 LG. KEYWAY

3/16 X 3/32 X

3 1/2

MOUNTING POSITION 3

Typical Plan View

Inverted traveling nut

1 1/2
RISE + 12 15/16

4 1/16
17/32

6 7/8

5 1/4
2 5/8

3 3/8
1 1/16

5/8
2 13/32
(4) HOLES

MOUNTING POSITION 3

Inverted

12 9/16

7 11/16

RISE + 1 1/8

Ø2 1/2

BASE OF JACK

BUSHING

1/2

3/16 X 3/32 X

2 1/16

2

4 5/16

VIEW A-A

Note: Drawings are artist’s conception — not for certification; dimensions are subject to change without notice.
**BEVEL BALL ACTUATORS**

**BB 225 - 2 1/4" SCREW**

Upright

- Ø6 5/8
- 1 15/16
- Ø5 3/4
- 2
- 1 1/2-12 UN 2A THREAD
- Ø1 3/4
- 5 3/4
- 3 1/2
- 1 3/4

**Typical Plan View**

- Ø13/16 (4) HOLES ON Ø4 1/8 B.C.
- 2 1/2

**END CONDITIONS (SHOWN AT MINIMUM CLOSED DIMENSIONS)**

Inverted traveling nut

- Ø3 1/2
- 1 15/16
- Ø5 3/8
- 9 3/4
- 1 19/32
- 6 11/16
- 1 11/16
- 1 15/16

Inverted

- Ø3 1/2
- RISE + 15/16

Note: Drawings are artist’s conception — not for certification; dimensions are subject to change without notice.
BEVEL BALL ACTUATORS

BB 300 - 3" SCREW

Typical Plan View

Note: Drawings are artist's conception — not for certification; dimensions are subject to change without notice.
BEVEL BALL ACTUATORS

BB 400 - 4" SCREW

Upright

Inverted

Typical Plan View

Inverted traveling nut

Upright traveling nut

Note: Drawings are artist’s conception — not for certification; dimensions are subject to change without notice.