Joyce/Dayton offers Bevel Gear Jacks in several designs including:
• Translating
• Keyed for non-rotation
• Keyed for traveling nut (KFTN)
A guide for ordering is on page 150.
**BEVEL GEAR JACKS**

**ORDERING INFORMATION**

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

### Joyce Bevel Gear® Jacks

<table>
<thead>
<tr>
<th>Model</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG150S</td>
<td>BG150D</td>
</tr>
<tr>
<td>BG250S</td>
<td>BG250D</td>
</tr>
<tr>
<td>BG375S</td>
<td>BG375D</td>
</tr>
<tr>
<td>BG450S</td>
<td>BG450D</td>
</tr>
</tbody>
</table>

Follow the design tips (pp. 151-154).
Detailed product information (pp. 155-158).
Right hand screw threads standard.

**Sample Part Number:** **BG150SU2S-12.25-STDX-STDX-STDX-X**

#### Jack Configuration

- **U**=Upright
- **I**=Inverted

#### End Conditions

- **1**=T1 (plain end)
- **2**=T2 (load pad)
- **3**=T3 (threaded end)
- **4**=T4 (male clevis)

#### Jack Design

- **S**=Translating
- **K**=Keyed for Non Rotation
- **N**=Traveling Nut

#### Encoders and Electronic Limit Switches

- **ENCX**=Encoder (p. 178)
- **ELS2**=2 Position Electronic Switch
- **ELS4**=4 Position Electronic Switch
- **ELS6**=6 Position Electronic Switch

#### 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>

**Number of DPDT Switches**

- **NOTE:** Will always be 0 for LS7 models

**Available Positions**

<table>
<thead>
<tr>
<th>Available Positions</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NOTE:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Screw Stops (p. 10) and Boots (p. 170)**

Screw stops are optional on Bevel gear jacks. When specified, the closed height of the jack and protection tube length may be increased.

**Screw Stop Codes**

- **ST0**=Extending
- **ST1**=Retracting
- **ST2**=Both

*Specify as many options as needed*

**Screw Stops**

- **ST0**=Extending
- **ST1**=Retracting
- **ST2**=Both

**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**

**Bevel Gear Jack Rise**

Rise is travel expressed in inches and not the actual screw length.

**Screw Stop (p. 10)** and **Boots (p. 170)**

Screw stops are optional on Bevel gear jacks. When specified, the closed height of the jack and protection tube length may be increased.

**X**=Standard Jack, no additional options

**S**=Additional Specification Required (comment as necessary)

**Protective Boots**

- **B**=Protective Boot
- **D**=Dual Protective Boot

**Finishes**

- **F1**=Do Not Paint
- **F2**=Epoxy Paint
- **F3**=Outdoor Paint

**Process**

- **ACME Screw**

**Screw Stops**

- **ST0**=Extending
- **ST1**=Retracting
- **ST2**=Both

*Specify as many options as needed*

**Encoder and Electronic Limit Switches**

- **ENCX**=Encoder (p. 178)
- **ELS2**=2 Position Electronic Switch
- **ELS4**=4 Position Electronic Switch
- **ELS6**=6 Position Electronic Switch

**Sample part Number:** Bg150Su2S-12.25-STDX-STDX-STDX-X

**Joyce Bevel Gear® Jacks**

- **Bg150S**
- **Bg150D**
- **Bg250S**
- **Bg250D**
- **Bg375S**
- **Bg375D**
- **Bg450S**
- **Bg450D**

Follow the design tips (pp. 151-154).
Detailed product information (pp. 155-158).
Right hand screw threads standard.
BEVEL GEAR JACKS 

SPECIFICATIONS AND DESIGN TIPS

<table>
<thead>
<tr>
<th>Model</th>
<th>Dynamic Capacity</th>
<th>Static Lead Capacity</th>
<th>Screw</th>
<th>Bevel Gear Ratio</th>
<th>Pinion Turns for 1&quot; Travel</th>
<th>Pinion Torque (In. Lbs.)</th>
<th>Screw Torque</th>
<th>Jack Efficiency</th>
<th>Jack Cooling Time</th>
<th>Base Weight (Lbs.)</th>
<th>Add for Each Inch of Travel (Lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG150-S</td>
<td></td>
<td>14,000 lbs.</td>
<td></td>
<td>.375P ACME</td>
<td>2.65:1</td>
<td>.059W*</td>
<td>.151W*</td>
<td>38.5%</td>
<td>38 min.</td>
<td>42</td>
<td>.8</td>
</tr>
<tr>
<td>BG150-D</td>
<td></td>
<td>14,000 lbs.</td>
<td></td>
<td>.375P / .500L ACME 2C</td>
<td>2.65:1</td>
<td>.060W*</td>
<td>.169W*</td>
<td>45.6%</td>
<td>38 min.</td>
<td>42</td>
<td>.8</td>
</tr>
<tr>
<td>BG250-S</td>
<td></td>
<td>30,000 lbs.</td>
<td></td>
<td>.500P ACME 2C</td>
<td>2.15:1</td>
<td>.111W*</td>
<td>.227W*</td>
<td>34.2%</td>
<td>82 min.</td>
<td>140</td>
<td>2.6</td>
</tr>
<tr>
<td>BG250-D</td>
<td></td>
<td>30,000 lbs.</td>
<td></td>
<td>.500P / .750L ACME 2C</td>
<td>2.15:1</td>
<td>.133W*</td>
<td>.272W*</td>
<td>42.6%</td>
<td>82 min.</td>
<td>140</td>
<td>2.6</td>
</tr>
<tr>
<td>BG375-S</td>
<td></td>
<td>66,000 lbs.</td>
<td></td>
<td>.666P ACME 2C</td>
<td>3.52:1</td>
<td>.098W*</td>
<td>.329W*</td>
<td>31.5%</td>
<td>192 min.</td>
<td>230</td>
<td>4.1</td>
</tr>
<tr>
<td>BG375-D</td>
<td></td>
<td>66,000 lbs.</td>
<td></td>
<td>.666P / 1.333L STUB ACME</td>
<td>3.52:1</td>
<td>.134W*</td>
<td>.448W*</td>
<td>46.0%</td>
<td>192 min.</td>
<td>230</td>
<td>4.1</td>
</tr>
<tr>
<td>BG450-S</td>
<td></td>
<td>218,000 lbs.</td>
<td></td>
<td>.500P ACME 2C</td>
<td>3.1</td>
<td>6</td>
<td>.125W*</td>
<td>.356W*</td>
<td>21.9%</td>
<td>262 min.</td>
<td>5.5</td>
</tr>
<tr>
<td>BG450-D</td>
<td></td>
<td>200,000 lbs.</td>
<td></td>
<td>.500P / 1.00L ACME 2C</td>
<td>3.1</td>
<td>3</td>
<td>.154W*</td>
<td>.438W*</td>
<td>35.5%</td>
<td>262 min.</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Important Note: *Not self-locking, may lower under load. Brake motors or external locking systems are recommended.

**D**: Double Lead Screws.

**S**: Single Lead Screws. These jacks are self-locking.

**W**: Load in Pounds.

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

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

**Load**: 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.

**Cooling Time**: Based on time to cool from 200°F to 70°F (ambient).

Design Tips:

1. A PV (pressure/velocity) value must be calculated for each application. The continuous running time should not exceed the corresponding T (time) value. Refer to instructions and graphs on pages 152 and 153.

2. Cooling time data on these charts is calculated based on limiting the lifting nut temperature rise from 70°F to 200°F (100° below dropping point of grease).

3. Check single lead versus double lead screws in each case. A double lead screw may be the appropriate choice due to increased efficiency while offering the same performance characteristics.

4. JAX® software is a useful design aid to determine the following:
   - The allowable static compression load for a given rise (or use Column Loading Chart on page 154)
   - The allowable dynamic load for a given rise
   - System horsepower and torque – also see item #5

5. 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.

6. When selecting multiple bevel gear jacks for an interconnected row or system (page 195) careful attention must be given to the input and output shaft rotations. For example, if the input shaft rotation on the first jack is clockwise, the output shaft(s) on that same jack will rotate counter-clockwise. To insure all jacks raise and lower in unison, alternating jacks must be specified with right and left hand acme screw threads. For example, if you have five jacks interconnected in a straight line and the first jack is right hand, the third and fifth jack will also need to be ordered as right hand and the second and fourth jack will need to be ordered as left hand. Bevel gear jacks are supplied standard with right hand acme screws. To order the left hand acme screw option, add an "L" to the end of your bevel gear jack part number as shown on page 150.

7. Joyce Bevel Gear® “S” Series (single lead) jacks are inherently self-locking. A brake is required for “D” series (double lead) jacks, which may lower under load.

8. Bevel gear jacks are furnished with one input shaft in position #2. Jacks may be ordered with up to three input shafts located at any combination of positions #1, 2, or 3.

9. Joyce Bevel Gear® jacks are designed for oil bath (EP-90 gear lubricant) or grease operation. The upper bearing is grease lubricated through a fitting on top of the jack. Grease must be applied directly to the lifting screw.

10. Typically jacks are mounted upright with the base plate parallel to the horizon. If the base plate is oriented any other way, contact Joyce/Dayton for lubrication and other instructions.
In many applications, Joyce Bevel Gear® jacks are more efficient and faster than wormgear driven jacks. To determine the suitability of a bevel gear jack for your application, use the steps below to calculate load, travel speed and duty cycle.

**Step 1**  Determine load in pounds.

**Step 2**  Determine velocity in feet / minute (fpm).

**Step 3**  Determine duty cycle in terms of minutes operation / minutes resting (or time on / time off).

**Step 4**  Calculate PV.

\[
PV = \frac{\text{load} \times \text{velocity} \text{ (fpm)}}{1000}
\]

**Step 5**  Calculate cooling time (T).

\[
T = \frac{\text{Cooling time (p. 151)}}{\text{time on} \times \text{time off}}
\]

**Step 6**  Plot the points for PV and T on the appropriate graph (below or on the next page). If the point falls below the line, the application is satisfactory. If it is above the line, recalculate T for the next larger size jack. Each jack size has a different cooling time (p. 151).

**Step 7**  Calculate horsepower.

\[
\text{RPM} = \frac{\text{Velocity in fpm} \times 12 \times \text{input turns per one-inch travel (from chart on p. 151)}}{(\text{load} \times \text{RPM})}
\]

Horsepower = Pinion torque (from chart) x load x RPM

---

**Note:** PV = load x velocity (fpm) / 1000  
T = the maximum running time in minutes before a complete cooling time is required.
**BEVEL GEAR JACKS EXAMPLE AND THERMAL GRAPHS**

**Example:** A 5000-pound load must be raised 30 inches in 15 seconds. The load remains in position for two minutes. It is then lowered and remains lowered for 30 seconds. The cycle begins again. Determine the appropriate bevel gear jacks and calculate horsepower required.

**Step 1**  Load = 5000 pounds

**Step 2**  Velocity = 30 inches in 15 seconds = 10 fpm

**Step 3**  Duty cycle = Time on / Time off
- Time on = 15 seconds up + 15 seconds down = 30 seconds = 0.5 min
- Time off = 2 minutes up + 30 seconds down = 2 minutes 30 seconds = 2.5 minutes

**Step 4**  \[ PV = \frac{(5000 \times 10)}{1000} = 50 \]

**Step 5**  \[ T = 38 \text{ (for BG150)} \times \left( \frac{0.5}{2.5} \right) = 7.6 \]

**Step 6**  The point for PV, 50, and T, 7.6 falls below the line for BG 150 D and above the line for BG 150S, therefore BG 150 D is appropriate. (reference BG150 chart on p. 152)

**Step 7**  \[ \text{RPM} = 10 \times 12 \times 5.38 = 645.6 \]
\[ \text{Horsepower} = \frac{(0.066 \times 5000 \times 646)}{63,025} = 3.38 \]

**Note:** \[ PV = \frac{\text{load} \times \text{velocity (fpm)}}{1000} \]
\[ T = \text{the maximum running time in minutes before a complete cooling time is required.} \]
Joyce Bevel Gear® Jacks Column Loading Chart


The horizontal portion of each line represents the jack’s maximum static capacity.
BEVEL GEAR JACKS

BG 150 - 1 1/2° SCREW

Upright

Typical Plan View

Inverted

END CONDITIONS (SHOWN AT MINIMUM CLOSED POSITION)

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

BG 250 - 2 1/2" SCREW

Upright

Upright keyed

Inverted

Inverted keyed

Typical Plan View

END CONDITIONS (SHOWN AT MINIMUM CLOSED DIMENSIONS) (DOES NOT APPLY TO INVERTED KEYED)

END CONDITIONS (SHOWN AT MINIMUM CLOSED DIMENSIONS)

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

joycedayton.com

sales@joycedayton.com 800-523-5204
BEVEL GEAR JACKS

BG 375 - 3 3/4" SCREW

Upright

- TOP OF JACK
- TYPE 1 PLAIN END
- TYPE 2 LOAD PAD
- TYPE 3 THREADED END
- TYPE 4 MALE CLEVIS END

Upright keyed

- END CONDITIONS (SHOWN AT MINIMUM CLOSED DIMENSIONS)

Upright traveling nut

- RISE + 0
- Ø4 1/2
- Ø3 1/2
- 1 1/2

Inverted

- RISE + 0
- Ø5 1/2
- Ø9
- 1 1/2

Inverted keyed

- RISE + 0
- Ø6
- 1 5/8

Typical Plan View

- Ø1 1/16 (4) HOLES ON Ø6 B.C.
- 3-12 UN 2A
- 3 1/2
- Ø1 1/2

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

BG 450 - 4 1/2" SCREW

Typical Plan View

Upright traveling nut

Inverted traveling nut

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