U-Series
Subsea Screw Jacks & Bevel Gearboxes
The Power Jacks

**U-Series:**

strength in depth

The U-Series is a new proposition from Power Jacks: a range of subsea products specifically designed to operate at maximum efficiency in an underwater environment.

The U-Series range includes the Subsea Screw Jack and Subsea Bevel Gearbox, with proven depth ratings of up to 3000m as standard, and the design capabilities to go even deeper if required.

A long-established specialist in electro-mechanical jacking and actuation, we already supply linear motion and mechanical rotary power transmission in subsea applications. With the U-Series, we’ve added a new dimension to our subsea service offering to the offshore oil & gas industry.

And because it’s based on engineering experience and expertise that have served Power Jacks customers well for more than a century, you know it’s designed to the highest standards – and manufactured to last.

New subsea options... new confidence in your operations.
Electro-mechanical jacking and actuation: what it means for you

**Higher Performance**
- Accurate and smooth delivery of force
- Wide range of actuation as the stroke position is easily and quickly varied
- Resistant to a wide range of temperature variations
- Complete control of the entire motion profile using standard control methods
- Repeatable and accurate positioning

**Reduced Costs**
- Generally cheaper in comparison to a hydraulic system when the required ancillary hydraulic equipment is included
- Machinery requires less maintenance
- Less manual intervention on machinery to set up processes
- Reduced downtime caused by hazardous fluid leaks
- Only use power when moving the load

**Increased Safety**
- Screw Jacks can be self-locking so hold position even with no power connection
- No high-pressure oil leaks

**Easier To Control**
- Easy to install using standard mechanical and electrical solutions
- Controls simple to programme and tune, even for multiple synchronised axes
- Simple mechanical shaft or electric cable extensions for systems spanning long distances
- No risk of loss of pressure or leaks in long pipe runs, as can be the case with hydraulics

**More Environmentally Friendly**
- No hazardous hydraulic fluid - so risk of contaminating the environment is significantly reduced or eliminated entirely
- Reduced health and safety requirements due to absence of hazardous hydraulic fluid
- No need to dispose of hydraulic fluid at any point during or after operations

THEY POSSESS ALL THE QUALITIES YOU’D EXPECT OF POWER JACKS PRODUCTS – STRENGTH, RELIABILITY, DURABILITY AND HIGH PERFORMANCE. AND THAT MEANS THEY’RE IDEALLY SUITED TO OPERATE IN THE TOUGHEST SUBSEA CONDITIONS, ANYWHERE IN THE WORLD.
The Power Jacks

**U-Series:**
Whatever you need them for...

Subsea Screw Jacks

Linear motion and positioning to perform tasks such as:

- Tilt/Pivot
- Lift/Lower
- Position
- Roll/Slide
- Open/Close
- Tension
- Lock/Unlock

Bevel Gearboxes

For applications when you need mechanical rotary power transmission to:

- Turn through 90° angle
- Be split into multiple drive lines
- Reduce the speed of the mechanical drive
- Adjust rotational position
- Deliver a combination of all of the above – in one unit
Our Subsea Screw Jacks and Bevel Gearboxes are already proven in use in a variety of applications, including (but not limited to):

1. Pig launch/Receiver Positioning
2. ESP umbilical connector actuator
3. Raising and lowering subsea caisson
4. ROV operated clamp connector
5. Locking pin push-pull actuator for FSPO mooring chain
6. ROV operated clamp release mechanism for pipe connector
7. Subsea riser release mechanism
8. Multi quick connector plate drive mechanism (ROV operated) for MQC parking receptacle
The Power Jacks

U-Series: Screw Jacks

- Proven depth ratings up to 3000m subsea as standard (deeper on request)
- Pressure compensated or flooded designs available
- Capacities up to 2000 kN (200Te) as standard
- Capacities up to 35000 kN (3500Te) on request
- Machine Screw Jacks
- Translating and rotating screw configurations
- Full stainless steel Screw Jacks
- Self-locking (the products only use power when moving)
- Anti-rotation mechanism for unconstrained loads
- Anti-backlash mechanism for axial positioning
- Option for reinforced shaft design for up to 300% higher torque transmission

- Reinforced sealing
- Dual nut (safety nut) fail safe load-holding option
- Shock load rated units
- Full range of anti-corrosion options
- ROV drive interfaces
- Low (-65°C) to High (+250°C) temperature solutions available
- Vibration resistant designs
- Full range of feedback devices for speed, position, rotation, wear and load monitoring control
- Special custom designs available to meet your exact requirements
# Performance

Full Stainless Steel Construction

<table>
<thead>
<tr>
<th>Model</th>
<th>UM-0025</th>
<th>UM-0050</th>
<th>UM-0100</th>
<th>UM-0200</th>
<th>UM-0300</th>
<th>UM-0500</th>
<th>UM-1000</th>
<th>UM-1500</th>
<th>UM-2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity (kN)</td>
<td>25</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>Lifting Screw diameter x pitch (mm)</td>
<td>30 x 6</td>
<td>40 x 9</td>
<td>55 x 12</td>
<td>65 x 12</td>
<td>95 x 16</td>
<td>120 x 16</td>
<td>160 x 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gear Ratios</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn of worm for raise of lifting screw</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Input Power (kW)</td>
<td>Option 1</td>
<td>1.5</td>
<td>3</td>
<td>3.75</td>
<td>3.75</td>
<td>6</td>
<td>11.25</td>
<td>18.5</td>
<td></td>
</tr>
<tr>
<td>Start up Torque at full load (Nm)</td>
<td>Option 1</td>
<td>19.8</td>
<td>56</td>
<td>115.9</td>
<td>263.8</td>
<td>480</td>
<td>900</td>
<td>2025</td>
<td></td>
</tr>
<tr>
<td>Weight (kg) – stroke = 150mm</td>
<td>8.17</td>
<td>15.88</td>
<td>24.72</td>
<td>45</td>
<td>86</td>
<td>195</td>
<td>553</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg) per extra 25mm</td>
<td>0.21</td>
<td>0.32</td>
<td>0.57</td>
<td>0.86</td>
<td>1.58</td>
<td>2.49</td>
<td>4.31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Option 1

<table>
<thead>
<tr>
<th>Gear Ratio</th>
<th>6:1</th>
<th>6:1</th>
<th>8:1</th>
<th>8:1</th>
<th>10/3:1</th>
<th>10/3:1</th>
<th>12:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw jack Static Efficiency</td>
<td>0.201</td>
<td>0.213</td>
<td>0.206</td>
<td>0.181</td>
<td>0.149</td>
<td>0.132</td>
<td>0.131</td>
</tr>
<tr>
<td>Screw jack Dynamic Efficiency</td>
<td>0.264</td>
<td>0.281</td>
<td>0.272</td>
<td>0.242</td>
<td>0.205</td>
<td>0.181</td>
<td>0.178</td>
</tr>
</tbody>
</table>

## Option 2

<table>
<thead>
<tr>
<th>Gear Ratio</th>
<th>24.1</th>
<th>24:1</th>
<th>24:1</th>
<th>24.1</th>
<th>32:1</th>
<th>32:1</th>
<th>36:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw jack Static Efficiency</td>
<td>0.115</td>
<td>0.117</td>
<td>0.132</td>
<td>0.116</td>
<td>0.084</td>
<td>0.079</td>
<td>0.079</td>
</tr>
<tr>
<td>Screw jack Dynamic Efficiency</td>
<td>0.167</td>
<td>0.172</td>
<td>0.190</td>
<td>0.169</td>
<td>0.128</td>
<td>0.120</td>
<td>0.123</td>
</tr>
</tbody>
</table>

## Standard Depth Rating

<table>
<thead>
<tr>
<th>m</th>
<th>3000</th>
<th>3000</th>
<th>3000</th>
<th>3000</th>
<th>3000</th>
<th>3000</th>
<th>3000</th>
<th>3000</th>
<th>3000</th>
</tr>
</thead>
</table>

## Flooded Design Available

| Y | Y | Y | Y | Y | Y | Y | Y | Y |

## Pressure Compensated Design Available

| Y | Y | Y | Y | Y | Y | Y | Y | Y |

1. All metric machine screws have a trapezoidal thread form, single start as standard (diameter x pitch).
2. For loads of 25% to 100% of Screw Jack capacity, torque requirements are approximately proportional to the load.
3. Efficiency values for standard grease lubricated worm gear box and lifting screw.
4. For performance of anti-backlash and anti-rotation (keyed) models, consult our Power Jacks experts.

Standard construction:

5. Stainless steel Screw Jack rated for rated capacity in tension or compression for static or dynamic movement.
7. Paint finish = Power Jacks Standard Subsea Yellow (other colours available on request).
8. Other materials, plating and paint specifications are available to suit all applications and budgets.

Please supply depth rating required with enquiry.
Rotating Screw Jacks Configuration

Lead Screw Options
1. Standard 1 x Pitch
2. 2 x Pitch
3. No Pilot End
4. Left Hand Thread
5. Larger Diameter Screw

Bellows Boot with Breather Vent

ROV Torque receptacle (torque bucket)

ROV Lifting Handle

ROV Paddle Drive

Hand Wheel

Protection Cap

Subsea Limit Switch (Sensor) - ‘rotation monitor’

Double Hub Nut

Safety Nut

Double Hub

Safety Nut

Standard Nut

Standard Nut

Motor Adaptor

Subsea Bevel Gearbox

ROV Lifting Handle

Coupling

Drive Shaft

Available with single or double shaft

Subsea Electric Motor

Available with single or double shaft
Translating Screw Jacks Configuration

- Bellows Boot with Breather Vent
- Top Plate
- Clevis End
- Fork End
- Rod End
- ROV Torque receptacle (torque bucket)
- ROV Lifting Handle
- ROV Paddle Drive
- Hand Wheel
- Protection Cap
- Subsea Limit Switch (Sensor) - ‘rotation monitor’
- Subsea Electric Motor
- Subsea Bevel Gearbox
- Motor Adaptor
- Coupling
- Drive Shaft
- Inverted
- Upright
- Anti-Rotation Key Adaptor *
- Secondary Guide
- Subsea Limit Switches
- Trunnion
- Trunnion Feet
- Lead Screw Options
  1. Standard 1 x Pitch
  2. 2 x Pitch
  3. Anti-Rotation (Keyed)
  4. Left Hand Thread

Lead Screw Options
1. Standard 1 x Pitch
2. 2 x Pitch
3. Anti-Rotation (Keyed)
4. Left Hand Thread

Available as:
1. Standard
2. Anti-Rotation (Keyed)
3. Anti-Backlash
4. Safety Nut
Or combination of above with single or double shaft

*For use with Anti-Backlash and some Safety Nut models only
THE U-SERIES SUBSEA BEVEL GEARBOXES:
A PROVEN AND RELIABLE TECHNOLOGY
FOR SUBSEA DRIVE SOLUTIONS.

The range has been developed from Power Jacks’ Neeter Drive Range-N bevel gearboxes, which are used worldwide and in most industry sectors – including subsea oil & gas and even submerged nuclear applications.
### Performance

<table>
<thead>
<tr>
<th>Series</th>
<th>35</th>
<th>37</th>
<th>38</th>
<th>39</th>
<th>40</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gear Ratios</td>
<td>1:1, 1.5:1, 2:1, 3:1, 4:1 available on all sizes except the 35-Series where the 4:1 ratio is not available</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque (Nm)</td>
<td>Nominal#1</td>
<td>46</td>
<td>115</td>
<td>328</td>
<td>481</td>
<td>1353</td>
</tr>
<tr>
<td></td>
<td>Max Running#2</td>
<td>93</td>
<td>187</td>
<td>505</td>
<td>935</td>
<td>3088</td>
</tr>
<tr>
<td></td>
<td>Max Start-Up</td>
<td>1 40</td>
<td>281</td>
<td>758</td>
<td>1403</td>
<td>4632</td>
</tr>
<tr>
<td>Input Speed</td>
<td>Max (rpm)</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
</tr>
<tr>
<td>Thermal Limit</td>
<td>Power (kW)</td>
<td>3.3</td>
<td>9</td>
<td>20.5</td>
<td>49</td>
<td>90</td>
</tr>
<tr>
<td>Backlash</td>
<td>arcmin</td>
<td>9 to 16</td>
<td>9 to 16</td>
<td>9 to 16</td>
<td>7 to 10</td>
<td>7 to 10</td>
</tr>
<tr>
<td>Efficiency</td>
<td>(%)</td>
<td>95% - 98%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Life</td>
<td>(hours)</td>
<td>&gt;10000</td>
<td>&gt;10000</td>
<td>&gt;10000</td>
<td>&gt;10000</td>
<td>&gt;10000</td>
</tr>
<tr>
<td>Housing Material</td>
<td>SG Iron or Stainless Steel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Depth Rating</td>
<td>(m)</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
</tr>
<tr>
<td>Flooded Design Available</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Pressure Compensated Design Available</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Reinforced Shaft Design Available#3</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

The above table is set out on the basis of the following nominal values:

1. Shock-free operation
2. Operating time per day = eight hours
3. Maximum 20 starts per hour (torque x 1.5 permissible)
4. Duty cycle 100%
5. When selecting gearboxes take the thermal capacity into consideration
6. Ambient temperature for operation -10°C to +50°C permissible

Notes:

#1 Nominal torque values at running speeds of 1500 rpm
#2 Maximum running torque value at speed of 10 rpm
#3 Up to 300% higher torque transmission

Please supply depth rating required with enquiry.
Subsea Bevel Gearboxes: design & configuration

Shaft Configurations
- 2, 3 or 4-way
- Solid or hollow shaft
- Special configurations available
- ROV torque receptacle integrated to gearbox drive
- ROV paddle adapter fitted to input drive shaft
- Motor adapter for direct connection of subsea motor to gearbox input
- Service life of 10,000 hours for all gearbox sizes
- Input speed up to 3,000 rpm maximum

Gearbox Housing
A rugged compact design made from a highly durable SG iron as standard or stainless steel on request. It provides a strong housing that firmly and accurately holds the gear set in a reservoir of quality lubricant suited to the demands of subsea work.

Subsea Design Features
- Proven depth ratings up to 3000m subsea as (deeper on request)
- Pressure compensated or flooded designs available
- Full stainless steel designs available
- Reinforced sealing
- Full range of anti-corrosion options
- ROV drive interfaces
- Low [-65°C] to High [+250°C] temperature solutions available
- Vibration and shock load resistant designs
- Full range of feedback devices for speed, position and rotation
- Special custom designs available to meet your exact requirements

Standard Gearbox
- Six gearbox sizes
- 35, 37, 38, 39, 40, 42 Series
- Nine gearbox configurations
- Gear ratios: 1:1, 1.5:1, 2:1, 3:1, 4:1 as standard
- Special gear ratios available on request, e.g. 1.25:1
- Torque ratings up to 20000 Nm
- Option for reinforced shaft design for up to 300% higher torque transmission

Reliable Spiral Bevel Gear
With a proven design already used in millions of gearboxes, the Precision Spiral Bevel Gears, with accurate gear mesh, deliver high torque with smooth and quiet transmission.

Corrosion Protection
- To suit all economic needs
- Standard subsea paint finish
- Customer specified paint
- Plated finish
- Stainless steel

by an expert team of experienced Power Jacks engineers, the U-Series Subsea Bevel Gearbox has been introduced with a simple objective in mind: to provide our customers with a new solution that’s all about versatility.
It can be engineered for the most demanding and complex applications. It’s also defined by performance excellence, a long service life and a durability that’s the hallmark of Power Jacks products. In short, the perfect solution for extreme subsea operations.

**Solid Shaft**

- 2 Way
- 2 Way Reversed
- 3 Way
- 3 Way Reversed
- 4 Way

**Hollow Shaft**

- 2 Way
- 2 Way Reversed
- 3 Way
- 4 Way

**Accessories**

- Hand Wheel
- ROV Paddle Drive
- ROV Lifting Handle
- ROV Torque Receptacle
The Power Jacks

U-Series:
Jacking Systems

SCREW JACKS CAN BE CONNECTED TOGETHER IN SYSTEMS SO THAT MULTIPLE UNITS CAN BE OPERATED AND CONTROLLED TOGETHER.

These arrangements or configurations can be built in many formats with the use of bevel gearboxes, motors, reduction gearboxes, drive shafts, couplings and motion control devices.

Four of the most popular system configurations are the 'H', 'U', 'T' and 'I' configured jacking systems. Note that multiple screw jacks can be linked together mechanically or electrically: the latter is useful if there is no space for linking drive shafts.

Jacking systems are not limited to the number of screw jacks shown here. They are regularly supplied to clients with 2, 4, 6, 8 jack systems. Larger systems can extend to 16 screw jacks or more. With the use of electronic synchronisation/control, multiple systems or screw jacks can be used in unison – extending the possible number of screw jacks used in unison to more than 100. To facilitate electronic control of screw jacks, feedback devices are available, mounted on the screw jack, bevel gearbox, motor or other system component.
"H" Configuration System

"U" Configuration System

"I" Configuration System

"T" Configuration System
Lifting & Positioning Solutions

Power Jacks are specialist industrial engineers providing design, manufacturing and services of quality industrial lifting, positioning and load monitoring equipment.

Our products are supplied globally across many sectors including Industrial Automation, Energy, Transport, Defence and Civil.

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