New-Generation Drilling Tools
Knight Oil Tools is the exclusive manufacturer and provider of Megaton drilling jars, energizers and shock tools. The Megaton impact tools are manufactured in Broussard, Louisiana by Knight Manufacturing LLC, a service line of Knight Oil Tools. Knight Manufacturing has maintained certifications in both API 7-1 and 5CT specifications for more than five years, as well as maintaining certifications for threading of NOV Grant Prideco Double Shoulder Proprietary Rotary Shoulder Connections. The Megaton impact tools are manufactured in conformance to API Q1 Specification. Since these tools are manufactured in-house, Knight Oil Tools is able to provide superior quality control and on-time delivery.

A Proven Performer
The Megaton product line has a proven track record in various oil and gas producing areas worldwide that dates back to 2004. The Megaton tools have been used in most U.S. markets with exceptional results. The Megaton product line has provided exceptional results in both drilling and fishing operations throughout these areas. The wells ranged from ultra-deepwater to multi-lateral, extended-reach horizontal.

With a strong track record and Knight Oil Tools’ manufacturing capabilities, the Megaton product line is a field-proven extension to the Rental Tool Services line of existing products.

Megaton Drilling Jar Frees the Toughest Stuck Pipe
The Megaton drilling jar with Ulti-Torq connections, was developed to incorporate the features of both hydraulic and mechanical jars. Its unique design combines both hydraulic time delay and an optional mechanical lock in one dual-acting drilling jar. The Megaton drilling jar provides several distinct advantages over conventional hydraulic or mechanical drilling jars.

Added Flexibility for Any Operation
Megaton drilling jars are double-acting hydraulic and can be dressed with or without an internal mechanical lock. If dressed with the internal mechanical lock, there are no additional requirements for a safety clamp during transport to the rig site or while the jar is racked back in the derrick. If dressed without the internal mechanical lock, the jar will be sent out in the fully open position with a safety clamp installed. This flexibility allows the jars to be run in any wellbore scenario regardless of the location in the drill string or weight below the jars.
Megaton™ Drilling Jar

**Features**

- Involute spline drive section provides the option for torque transmission while jarring
- Tool BSR designed to ensure even stress distribution across length of tool
- Low-friction seals
- Valve design includes unique jet to provide improved filtering of hydraulic fluid and ensure consistent delay times
- Can accommodate any BHA based on flexibility of tool
- Large pump open area

**Simple Tool Operation**

The Megaton drilling jar is operated by the simple up and down motion of the drill string. The intensity of the up-jarring force is directly proportional to applied tension, while the down-jarring force is directly proportional to the slack-off weight applied.

**Dressed with Internal Mechanical Lock**

In the up-jarring mode, as the applied tension exceeds the lock setting, the mechanical lock releases and the hydraulic delay sequence begins. After a brief time delay, the mandrel is suddenly released and accelerates to the fully extended position.

In the down-jarring mode, as the compression force applied to the jar exceeds the down lock setting, the mechanical lock releases and the hydraulic delay sequence begins. After a brief time delay, the mandrel is released and moves freely to the fully closed position.

**Specifications**

<table>
<thead>
<tr>
<th>Tool Size Nominal</th>
<th>4.7</th>
<th>6.2</th>
<th>6.6</th>
<th>7.1</th>
<th>8.1</th>
<th>9.6</th>
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</thead>
<tbody>
<tr>
<td>Lock Setting UP in</td>
<td>18 - 23</td>
<td>20 - 26</td>
<td>22 - 28</td>
<td>24 - 30</td>
<td>26 - 32</td>
<td>28 - 34</td>
</tr>
<tr>
<td>Lock Setting DOWN in</td>
<td>9 - 11</td>
<td>11 - 16</td>
<td>13 - 19</td>
<td>15 - 21</td>
<td>17 - 23</td>
<td>19 - 25</td>
</tr>
<tr>
<td>Hydraulic Delay UP 10,000 B in</td>
<td>40 - 60 sec</td>
<td>35 - 55 sec</td>
<td>30 - 45 sec</td>
<td>25 - 40 sec</td>
<td>20 - 30 sec</td>
<td>15 - 25 sec</td>
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<tr>
<td>Hydraulic Delay DOWN 12,000 B in</td>
<td>2 - 5 sec</td>
<td>2 - 5 sec</td>
<td>2 - 5 sec</td>
<td>2 - 5 sec</td>
<td>2 - 5 sec</td>
<td>2 - 5 sec</td>
</tr>
</tbody>
</table>

**Please note that all above loads and time delays are approximate only**

*Only applicable when dressed with internal mechanical lock

**MECHANICAL LOCK SETTINGS (Nominal)**

- Can be dressed with or without internal mechanical lock
- If dressed with mechanical lock, tool can be racked back in the derrick in any position without danger of firing
- Can be run in compression or tension
- Fully-interchangeable upper and lower connectors to accommodate various connection sizes
- High-stress areas optimized to ensure balance with regard to bend stiffness ratio

**RENTAL TOOL SERVICES**

**JAR AND ENERGIZER SERIES**

| Tool Size OD (New) inches (mm) | 4.89 (124) | 6.36 (162) | 6.73 (171) | 7.125 (181) | 8.28 (210) | 9.69 (246) |
| Bore ID (inches (mm)) | 2.25 (57) | 2.44 (62) | 2.56 (65) | 2.75 (70) | 3.00 (76) | 3.25 (83) |
| Downpull Max pre-jarring (at jet) in (kN) | 80 (42) | 95 (50) | 105 (57) | 115 (60) | 125 (68) | 135 (72) |
| Torque Yield in (kN) | 402 (71) | 450 (78) | 490 (88) | 520 (91) | 560 (100) | 600 (105) |
| Torsional Yield in (Nm) | 32,200 (43,657) | 37,100 (48,825) | 47,400 (57,849) | 57,100 (69,822) | 64,000 (76,930) | 71,400 (86,814) |
| Max Drilling hrs (at 150°F) hours | 350 (150) | 350 (150) | 350 (150) | 350 (150) | 350 (150) | 350 (150) |
| Weight Approx lbs (kg) | 1,320 (600) | 2,420 (1,100) | 2,860 (1,300) | 3,350 (1,520) | 4,600 (2,090) | 6,400 (2,910) |

**PUMP OPEN FORCE**
Advantages and Benefits

- All energizers are two-way (double-acting)
- All energizers are two-stage
- Protects top-side equipment in shallow sections
- Concentrates impact to stuck point
- Simple push-pull operation

The Megaton™ Energizer

Megaton Energizer—Maximizing the Megaton Drilling Jar

The Megaton Energizer is a two-way tool that stores pipe stretch for use when jarring up and down. The energy is stored in a number of steel disc springs that are compressed when the tool is activated. It operates automatically with the jar while protecting the drill string and surface equipment from damaging shock waves.

In a drill string without a Megaton Energizer, the impact of a jar is dependent on pipe stretch (overpull) and the ability of the drill pipe to contract when the jar is released. When used as a supplement to the Megaton drilling jar, Belleville disc springs compressing inside the Megaton Energizer compensate for limited pipe stretch in shallow or deviated holes. These compressed springs provide stored energy so that high impact is achieved if the hydraulic force extending the impact tool is greater than WOB, the tool will open, compressing the spring assembly from the lower end until the tool reaches a balance. If the pump-open force is less than WOB, the tool will close, compressing the spring assembly from the upper end until the tool reaches a balance.

Jarring with the Megaton Shock Tool

The Megaton shock tool is sprung in both directions when jarring in the down and up directions to ensure that the bit/mill remains on bottom.

Megaton Shock Tool Impact and Vibration Reduction Sub

The Megaton shock tool is the new-generation impact tool that incorporates both proven and new technology for superior performance. Using Belleville-style disc springs, a unique dampening system and pump-open force enable the Megaton shock tool to produce maximum bit performance. During drilling or milling, the tools will normally be run partially compressed, enabling compensation in both up and down directions to ensure that the bit/mill remains on bottom.

Megaton Shock Tool Operation

The Megaton shock tool incorporates a pressure-balancing piston that equalizes pressure inside the tool with the pressure inside the drill string. Because of this, the pressure drop across the bit will tend to extend the tool. The amount will depend on a balance between Weight On Bit (WOB) and pump-open force. If the hydraulic force extending the impact tool is greater than WOB, the tool will open, compressing the spring assembly from the upper end until the tool reaches a balance. If the pump-open force is less than WOB, the tool will close, compressing the spring assembly from the upper end until the tool reaches a balance.

Megaton Shock Tool Features

- Tool sprung in both directions
- Metal-to-metal contact when jarring up
- Hydrostatically balanced
- Involute spline design is stabilized and will not build angle
- Internal mechanical safety bearing
- Tool is fully stress relieved both internally and externally

Megaton Shock Tool Benefits

- Reduced bit/mill bounce
- Extended bit/mill life and performance
- Reduced shock loads transferred through drill string, protecting SMO equipment
- Increased ROP
- Extended connection life
- Lower drilling cost per foot

**Specifications**

<table>
<thead>
<tr>
<th>Shock Tool Series</th>
<th>Units</th>
<th>47</th>
<th>62</th>
<th>66</th>
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<tbody>
<tr>
<td>Tool Size OD (In)</td>
<td>inches (mm)</td>
<td>4.83 (124)</td>
<td>6.36 (162)</td>
<td>6.73 (171)</td>
<td>8.26 (210)</td>
<td>9.67 (246)</td>
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<tr>
<td>Bore ID</td>
<td>inches (mm)</td>
<td>2.25 (57)</td>
<td>2.56 (65)</td>
<td>2.75 (70)</td>
<td>3.25 (83)</td>
<td>3.75 (95)</td>
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<tr>
<td>Tensile Yield</td>
<td>lbf (kN)</td>
<td>1,059,000 (4,760)</td>
<td>1,260,000 (5,630)</td>
<td>1,380,000 (6,220)</td>
<td>2,160,000 (9,640)</td>
<td>2,608,000 (11,800)</td>
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<tr>
<td>Torquing Yield</td>
<td>ft-lbf (Nm)</td>
<td>1,059,000 (4,760)</td>
<td>1,260,000 (5,630)</td>
<td>1,380,000 (6,220)</td>
<td>2,160,000 (9,640)</td>
<td>2,608,000 (11,800)</td>
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<tr>
<td>Pump Open Area</td>
<td>sq in (sq mm)</td>
<td>7.45 (4,794)</td>
<td>12.1 (77,420)</td>
<td>14.06 (88,610)</td>
<td>21.5 (133,000)</td>
<td>26.0 (163,400)</td>
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<tr>
<td>Max Temp (standard)</td>
<td>°F (°C)</td>
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<tr>
<td>Max Temp (high)</td>
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<td>Weight Capacity</td>
<td>lb (kg)</td>
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<td>1,100 (500)</td>
<td>1,320 (600)</td>
<td>2,208 (1000)</td>
<td>3,080 (1400)</td>
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