Onshore Technical Marketing

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5. Masts and Substructures - Signature Series
6. Masts and Substructures - Velocity Series
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Masts and Substructures

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**The Ideal™ Series**

The Ideal™ Rig Series defines reliability and versatility. This versatile series with straight-leg mast design includes some of our most popular, field-proven rigs. Comprised of the Ideal, Ideal Prime, Drake and Ideal Box Rigs, the Ideal™ Series has evolved alongside the drilling industry to accommodate a wide array of your drilling demands, integrating improvements in technology and engineering with proven designs and equipment.

**Notes**

- Ideal Rig base box measurement excludes attached Drawworks Skid Base and pin-on Steel Toe™ walking foot, pinned to V-door side of substructure base box.
- The Ideal Prime base box measurement excludes pin-on Steel Toe™ walking base foot, pinned to V-door side of substructure base box.

### Dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>units</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideal Rig</td>
<td></td>
<td>52'</td>
<td>34'</td>
<td>18'</td>
<td>21'</td>
<td>25'</td>
<td>85'</td>
<td>142'</td>
<td>167'</td>
</tr>
<tr>
<td>Ideal Box</td>
<td></td>
<td>55'</td>
<td>36'</td>
<td>19'</td>
<td>21'</td>
<td>25'</td>
<td>85'</td>
<td>167'</td>
<td>177'</td>
</tr>
<tr>
<td>Ideal Prime</td>
<td></td>
<td>62'</td>
<td>42'</td>
<td>20'</td>
<td>23'</td>
<td>28'</td>
<td>85'</td>
<td>170'</td>
<td>185'</td>
</tr>
<tr>
<td>Drake Rig</td>
<td></td>
<td>46'</td>
<td>34'</td>
<td>12'</td>
<td>18'</td>
<td>22'</td>
<td>85'</td>
<td>136'</td>
<td>158'</td>
</tr>
</tbody>
</table>

### Conventional Substructures and Drilling Masts — Ideal™ Series

- **Hook Capacity**
  - Tons: 375
  - Metric: 340.2

- **Mast Height**
  - 142': 14.2

- **Base Width**
  - 12': 3.6

- **Pipe Set-Back Capacity**
  - Lbs: 500,000

- **Casing Capacity**
  - Lbs: 750,000

- **Pipe Rack Capacity (Stands)**
  - Lbs: 100

- **Floor Height**
  - Lbs: 5

- **Collector/Choker Height**
  - Lbs: 0.5

- **Drum Table Spanning**
  - Lbs: 0

- **Standard Crank Weave (Crane)**
  - Lbs: 0

- **Measure on Cluster**
  - Lbs: 0
Notes

- Racking board height can be adjusted within a range of dimension # so as to accommodate varying stand heights.

### Conventional Substructures and Drilling Masts — Signature Series

<table>
<thead>
<tr>
<th>Rig Model</th>
<th>units</th>
<th>SEAM 1000</th>
<th>SEAM 1500</th>
<th>SEAM 2000</th>
<th>European 2000</th>
<th>ME 1500</th>
<th>ME 2000 DC</th>
<th>ME 2000 AC</th>
<th>ME 2000</th>
<th>Mono Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Height Capacity</strong></td>
<td>tons</td>
<td>200</td>
<td>300</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>500</td>
<td>500</td>
<td>600</td>
<td>550</td>
</tr>
<tr>
<td><strong>Base Width</strong></td>
<td>m</td>
<td>2.19</td>
<td>3.19</td>
<td>3.19</td>
<td>3.19</td>
<td>4.39</td>
<td>5.55</td>
<td>5.55</td>
<td>4.39</td>
<td>5.25</td>
</tr>
<tr>
<td><strong>Winch</strong></td>
<td>type</td>
<td>DSGD-250</td>
<td>DSGD-250</td>
<td>DSGD-250</td>
<td>DSGD-250</td>
<td></td>
<td>DSGD-375</td>
<td>DSGD-375</td>
<td></td>
<td>DSGD-450</td>
</tr>
<tr>
<td><strong>Pipe Set-Up Capacity</strong></td>
<td>tons</td>
<td>226.5</td>
<td>250</td>
<td>250</td>
<td>275</td>
<td>400</td>
<td>500</td>
<td>500</td>
<td>324</td>
<td>550</td>
</tr>
<tr>
<td><strong>Casing Capacity</strong></td>
<td>tons</td>
<td>490.0</td>
<td>580.0</td>
<td>580.0</td>
<td>580.0</td>
<td>800.0</td>
<td>1,000.0</td>
<td>1,000.0</td>
<td>608.0</td>
<td>708.0</td>
</tr>
<tr>
<td><strong>Pipe Racking Capacity</strong></td>
<td>tons</td>
<td>337.5</td>
<td>375.5</td>
<td>375.5</td>
<td>375.5</td>
<td>550.0</td>
<td>609.0</td>
<td>609.0</td>
<td>387.5</td>
<td>468.0</td>
</tr>
<tr>
<td><strong>Floor Height</strong></td>
<td>m</td>
<td>5.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>8.5</td>
<td>10.5</td>
<td>10.5</td>
<td>6.5</td>
<td>8.0</td>
</tr>
<tr>
<td><strong>Cylinder Clearance Height</strong></td>
<td>m</td>
<td>9.1</td>
<td>10.6</td>
<td>10.6</td>
<td>10.6</td>
<td>13.75</td>
<td>17.0</td>
<td>17.0</td>
<td>9.1</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>Rig Capacity</strong></td>
<td>type</td>
<td>16&quot; DC:</td>
<td>8.5&quot; DC:</td>
<td>6.5&quot; DC:</td>
<td>4.5&quot; DC:</td>
<td>9.5&quot; DC:</td>
<td>11.5&quot; DC:</td>
<td>11.5&quot; DC:</td>
<td>6.5&quot; DC:</td>
<td>8.5&quot; DC:</td>
</tr>
<tr>
<td><strong>Floor Weight</strong></td>
<td>m</td>
<td>3.7</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>6.5</td>
<td>8.0</td>
<td>8.0</td>
<td>5.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>
Custom Terrain Series

The Custom Terrain Series Rigs are purpose-built to perform in demanding terrains and extreme temperature environments. With designs ranging from arctic, desert, well, and train applications, these rigs continue drilling downhole no matter the conditions above ground.

Notes

* Dimensions represent our standard offering. Contact our sales team for more information.

### Dimensions

<table>
<thead>
<tr>
<th>Terrain Series</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desert Rig</td>
<td>42' 0&quot;</td>
<td>42' 0&quot;</td>
<td>20' 6&quot;</td>
<td>25' 0&quot;</td>
<td>30' 0&quot;</td>
<td>85' 0&quot;</td>
<td>152' 0&quot;</td>
<td>182' 0&quot;</td>
</tr>
<tr>
<td>Arctic Rig</td>
<td>36' 0&quot;</td>
<td>37' 0&quot;</td>
<td>28' 0&quot;</td>
<td>33' 0&quot;</td>
<td>38' 0&quot;</td>
<td>85' 0&quot;</td>
<td>142' 0&quot;</td>
<td>172' 0&quot;</td>
</tr>
<tr>
<td>High-Prime</td>
<td>27' 0&quot;</td>
<td>31' 0&quot;</td>
<td>18' 0&quot;</td>
<td>22' 0&quot;</td>
<td>26' 0&quot;</td>
<td>85' 0&quot;</td>
<td>142' 0&quot;</td>
<td>172' 0&quot;</td>
</tr>
<tr>
<td>Well Rig</td>
<td>18' 0&quot;</td>
<td>20' 0&quot;</td>
<td>22' 0&quot;</td>
<td>26' 0&quot;</td>
<td>29' 0&quot;</td>
<td>85' 0&quot;</td>
<td>142' 0&quot;</td>
<td>172' 0&quot;</td>
</tr>
</tbody>
</table>

### Conventional Substructures and Drilling Masts — Terrain Series

<table>
<thead>
<tr>
<th>Rig Model</th>
<th>Conventional Rig</th>
<th>Arctic Rig</th>
<th>Train Rig</th>
<th>Heli Rig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hook Capacity</td>
<td>t</td>
<td>t</td>
<td>t</td>
<td>t</td>
</tr>
<tr>
<td>Mast Type</td>
<td>Telescopic or Cantilever</td>
<td>Telescopic or Cantilever</td>
<td>Cantilever</td>
<td>Cantilever</td>
</tr>
<tr>
<td>Mast Height</td>
<td>127' 0&quot;</td>
<td>127' 0&quot;</td>
<td>142' 0&quot;</td>
<td>167' 0&quot;</td>
</tr>
<tr>
<td>Base Width</td>
<td>15' 0&quot;</td>
<td>15' 0&quot;</td>
<td>25' 0&quot;</td>
<td>25' 0&quot;</td>
</tr>
<tr>
<td>Raising Method</td>
<td>Cylinder/Sling line</td>
<td>Cylinder/Sling line</td>
<td>Cylinder/Sling line</td>
<td>Cylinder/Sling line</td>
</tr>
<tr>
<td>Drawworks Model</td>
<td>(10 to 14)</td>
<td>(10 to 14)</td>
<td>(12)</td>
<td>(12)</td>
</tr>
<tr>
<td>Substructure Type</td>
<td>Single Shot / Cylinder / Winch / Drawworks</td>
<td>Single Shot / Cylinder / Winch</td>
<td>Single Shot / Cylinder / Winch</td>
<td>Single Shot / Cylinder / Winch</td>
</tr>
<tr>
<td>Pipe Set-Back Capacity</td>
<td>250 kips to 700 kips</td>
<td>250 kips to 600 kips</td>
<td>250 kips to 600 kips</td>
<td>250 kips to 600 kips</td>
</tr>
<tr>
<td>Casing Capacity</td>
<td>200 kips to 750 kips</td>
<td>200 kips to 750 kips</td>
<td>200 kips to 750 kips</td>
<td>200 kips to 750 kips</td>
</tr>
<tr>
<td>Pipe Racking Capacity</td>
<td>(140 - 270)</td>
<td>(270)</td>
<td>(270)</td>
<td>(270)</td>
</tr>
<tr>
<td>Floor Height</td>
<td>20' 0&quot;</td>
<td>20' 0&quot;</td>
<td>20' 0&quot;</td>
<td>20' 0&quot;</td>
</tr>
<tr>
<td>Cellar/Clearance Height</td>
<td>19' 0&quot;</td>
<td>19' 0&quot;</td>
<td>19' 0&quot;</td>
<td>19' 0&quot;</td>
</tr>
<tr>
<td>Rotary Table Opening</td>
<td>27&quot;</td>
<td>27&quot;</td>
<td>27&quot;</td>
<td>27&quot;</td>
</tr>
<tr>
<td>Standard Crown</td>
<td>16&quot;</td>
<td>16&quot;</td>
<td>16&quot;</td>
<td>16&quot;</td>
</tr>
</tbody>
</table>

*Fastline and Deadline sheaves not included
### The Velocity™ Series

NOR'F's Velocity Rig Series offers fast-moving "super single" rigs designed with fewer transport loads, allowing for quick transport between rig sites. The Velocity Series sets the standard for speed.

#### Notes
- All Velocity Series rigs are equipped with pipe handling systems which eliminate the need for a racking board and setback area.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>units</th>
<th>Rig Model</th>
<th>Rapid Rig</th>
<th>Vertical Slant (VSR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>mph</td>
<td>ft/min</td>
<td>250</td>
<td>140</td>
</tr>
<tr>
<td>Hook Capacity</td>
<td>tons</td>
<td>ft/min</td>
<td>250</td>
<td>140</td>
</tr>
<tr>
<td>Mast Height</td>
<td>ft</td>
<td>ft</td>
<td>124.38</td>
<td>23.16</td>
</tr>
<tr>
<td>Base Width</td>
<td>ft</td>
<td>ft</td>
<td>2.13</td>
<td>0.64</td>
</tr>
<tr>
<td>Raising Method</td>
<td></td>
<td></td>
<td>Cylinder Based</td>
<td>Cylinder Based</td>
</tr>
<tr>
<td>Diameters</td>
<td>in</td>
<td>in</td>
<td>362.88</td>
<td>91.44</td>
</tr>
<tr>
<td>Substructure</td>
<td></td>
<td></td>
<td>Pipe Line Cylinder</td>
<td>Pipe Line Cylinder</td>
</tr>
<tr>
<td>Casing Capacity</td>
<td>bbls</td>
<td></td>
<td>50000</td>
<td>28000</td>
</tr>
<tr>
<td>Floor Height</td>
<td>ft</td>
<td>ft</td>
<td>61.54</td>
<td>17.22</td>
</tr>
<tr>
<td>Collar/Clearance Height</td>
<td>in</td>
<td>in</td>
<td>5.68</td>
<td>3.84</td>
</tr>
<tr>
<td>Drill Floor Opening</td>
<td>in</td>
<td>in</td>
<td>37.5</td>
<td>27.5</td>
</tr>
<tr>
<td>Standard Crown Hookgroove</td>
<td></td>
<td></td>
<td>10.5</td>
<td>2.64</td>
</tr>
</tbody>
</table>

*Fastline and Deadline sheaves not included.*

---

**Conventional Substructures and Drilling Masts - Velocity Series**

<table>
<thead>
<tr>
<th>Rig Model</th>
<th>units</th>
<th>Rapid Rig</th>
<th>Vertical Slant (VSR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>36'-10&quot;</td>
<td>30'-0&quot;</td>
<td>6'-4&quot;</td>
</tr>
<tr>
<td>B</td>
<td>20'-6&quot;</td>
<td>19'-4&quot;</td>
<td>1'-2&quot;</td>
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<tr>
<td>C</td>
<td>14'-0&quot;</td>
<td>14'-0&quot;</td>
<td>12'-6&quot;</td>
</tr>
<tr>
<td>D</td>
<td>100'-0&quot;</td>
<td>96'-0&quot;</td>
<td>90'-0&quot;</td>
</tr>
</tbody>
</table>

---

**Notes**
- For reference only, please contact your local sales contact for more information.

---

**Dimensions**

<table>
<thead>
<tr>
<th>Velocity Series units</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rig Height (ft)</td>
<td>80'-0&quot;</td>
<td>75'-4&quot;</td>
<td>72'-6&quot;</td>
<td>72'-4&quot;</td>
</tr>
<tr>
<td>Rig Height (m)</td>
<td>24.38</td>
<td>23.16</td>
<td>22.46</td>
<td>22.14</td>
</tr>
<tr>
<td>Base Width (ft)</td>
<td>7'-0&quot;</td>
<td>6'-4&quot;</td>
<td>6'-0&quot;</td>
<td>5'-11&quot;</td>
</tr>
<tr>
<td>Base Width (m)</td>
<td>2.13</td>
<td>1.93</td>
<td>1.80</td>
<td>1.80</td>
</tr>
<tr>
<td>Raising Method</td>
<td>Cylinder Based</td>
<td>Cylinder Based</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mountain Height (in)</td>
<td>36&quot;</td>
<td>36&quot;</td>
<td>36&quot;</td>
<td>36&quot;</td>
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<tr>
<td>Substructure</td>
<td>Pipe Line Cylinder</td>
<td>Pipe Line Cylinder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casing Capacity (bbls)</td>
<td>50000</td>
<td>28000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collar/Clearance Height (in)</td>
<td>5.68</td>
<td>3.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drill Floor Opening (in)</td>
<td>37.5</td>
<td>27.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Crown Hookgroove (in)</td>
<td>10.5</td>
<td>2.64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

*Refer to sheet for additional details not included.*
Description

Spend less time rigging up and down by simply, and safely, walking to your next well. Our innovative Steel Toe™ walking system moves your rig while keeping critical equipment stationary or mounted in place and ready for the next well. Wireless controls ensure safe operations by allowing your personnel to stay at safe distances during moves. We configure the system, maximizing the effectiveness of your operations. The system consists of four 40’ lift and slide walking toes, modifications to the substructure and system controls. The integrated cable management system, gravity mud return, high pressure piping extensions and choke reconfigurations integrate your backyard for full functionality.

Value Added Benefits

• Reduced release-to-spud and required crane time
• Customized installation and product offerings
• Ability to walk with a full-rated setback
• Capability to change direction and walk along the X or Y axis
• Allows rig to walk in 45° increments and spin
• Ability to leave rig walkers installed in the Ideal™ Rig substructure base boxes during pad-to-pad rig moves

Key Components

• Steel Toe 1000 walking feet
• BOP beams and hoists to support
• BOP stack while walking
• Flowline manifold or catch and scalping tank
• High pressure piping for mud
• Festoon cable management system
• System controls options: wireless, remote, tethered back-up power or manual hydraulic controls
• Structural modifications
• Powered by rig HPU

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal system total stroke</td>
<td>24 inches</td>
</tr>
<tr>
<td>Maximum wire wing stroke</td>
<td>1 inch</td>
</tr>
<tr>
<td>Clearance under substructure*</td>
<td>3 inches</td>
</tr>
<tr>
<td>Clearance under feet**</td>
<td>3 inches</td>
</tr>
<tr>
<td>Number of rolling cylinders</td>
<td>48</td>
</tr>
<tr>
<td>Number of bearing pads</td>
<td>4</td>
</tr>
<tr>
<td>Maximum walking distance</td>
<td>120 feet</td>
</tr>
</tbody>
</table>

*when fully extended and includes substructure deflection
**when fully retracted

Starting Position

Substructure Raised

Travel Along Rollers

Substructure Lowered

Rear Steel Toe

Front Steel Toe

Ideal™ Rig Application
Drill Floor Equipment

10. Onshore Top Drives
11. BX-Elevators
12. X-Series Manual Side Door Elevators
14. Elevator Spider and FMS Tool
15. Power Slips
16. Rotary Tables
17. High Pressure Manifolds
18. Onshore Iron Roughnecks
19. Stand Transfer Vehicle (STV) & Pipecat
## TDS-11SA

- **37,100 lbs** of continuous drilling torque
- **250 tons** rotating and hoisting capacity
- **37,100 lb-ft** continuous drilling torque
- **800 horsepower**

The TDS-11SA is the largest-selling single design in the history of top drives since its introduction in 1997.

### Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horsepower Rating</td>
<td>37,100 lbs</td>
</tr>
<tr>
<td>Horsepower Rating</td>
<td>2,500 kW</td>
</tr>
<tr>
<td>Torque (lbs)</td>
<td>800 horsepower</td>
</tr>
<tr>
<td>Torque (hp)</td>
<td>37,100 lb-ft</td>
</tr>
<tr>
<td>Torque (hp)</td>
<td>800 horsepower</td>
</tr>
</tbody>
</table>

### DRILLING PARAMETERS

- **Max. Speed**: 228 RPM
- **Max. Torque**: 5,500 lb-ft

### TRANSMISSION

- **Max Speed**: 228 RPM
- **Max Torque**: 5,500 lb-ft

### RATING CAPACITIES

- **Max. Breakout Torque**: 2,250 lb-ft
- **Max. Make-up Torque**: 1,000 lb-ft

### Weight

- **27,000 lb (12,240 kg)**

### Technical Information

- **Combining the TDS-11SA top drive design, which is the largest-selling single design in the history of top drives, with added power density and torque, the TDS-11SH is the most powerful top drive of its size. This means faster and deeper drilling, both vertically and horizontally, to help you reach your payload in even the most demanding formations. With the ability to interface with automatic control systems and various software enhancements options, the TDS-11SH also puts safety and efficiency at the forefront of your operations.**

## TDS-11SH

- **800 HP**
- **500 tons APLAC rated hoisting capacity**
- **37,100 lb-ft continuous drilling torque at 110 RPM**
- **65,000 lb makeup torque**

### Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horsepower Rating</td>
<td>800 horsepower</td>
</tr>
<tr>
<td>Horsepower Rating</td>
<td>6,000 kW</td>
</tr>
<tr>
<td>Torque (lbs)</td>
<td>37,100 lb-ft</td>
</tr>
<tr>
<td>Torque (hp)</td>
<td>800 horsepower</td>
</tr>
</tbody>
</table>

### DRILLING PARAMETERS

- **Max. Speed**: 228 RPM
- **Max. Torque**: 5,500 lb-ft

### TRANSMISSION

- **Max Speed**: 228 RPM
- **Max Torque**: 5,500 lb-ft

### RATING CAPACITIES

- **Max. Breakout Torque**: 2,250 lb-ft
- **Max. Make-up Torque**: 1,000 lb-ft

### Weight

- **27,000 lb (12,240 kg)**

### Technical Information

- **Combining the TDS-11SA top drive design, which is the largest-selling single design in the history of top drives, with added power density and torque, the TDS-11SH is the most powerful top drive of its size. This means faster and deeper drilling, both vertically and horizontally, to help you reach your payload in even the most demanding formations. With the ability to interface with automatic control systems and various software enhancements options, the TDS-11SH also puts safety and efficiency at the forefront of your operations.**

## TDS-10SH

- **400 HP**
- **250 tons rotating and hoisting capacity**
- **2,248 lb-ft continuous drilling torque at 85 RPM**
- **55,000 lb breakout torque**

### Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horsepower Rating</td>
<td>400 horsepower</td>
</tr>
<tr>
<td>Horsepower Rating</td>
<td>3,000 kW</td>
</tr>
<tr>
<td>Torque (lbs)</td>
<td>2,248 lb-ft</td>
</tr>
<tr>
<td>Torque (hp)</td>
<td>550 horsepower</td>
</tr>
</tbody>
</table>

### DRILLING PARAMETERS

- **Max. Speed**: 212 RPM
- **Max. Torque**: 4,500 lb-ft

### TRANSMISSION

- **Max Speed**: 212 RPM
- **Max Torque**: 4,500 lb-ft

### RATING CAPACITIES

- **Max. Breakout Torque**: 1,500 lb-ft
- **Max. Make-up Torque**: 750 lb-ft

### Weight

- **18,000 lb (8,164 kg)**

## Technical Information

- **Combining the TDS-11SA top drive design, which is the largest-selling single design in the history of top drives, with added power density and torque, the TDS-11SH is the most powerful top drive of its size. This means faster and deeper drilling, both vertically and horizontally, to help you reach your payload in even the most demanding formations. With the ability to interface with automatic control systems and various software enhancements options, the TDS-11SH also puts safety and efficiency at the forefront of your operations.**
The BX 3, 4, and 5 elevators improve both rig safety and efficiency. Since the introduction of the BX 1 and 2 elevators in 1996, our engineers have continuously strived to improve the operations reliability and safety of its design, resulting in the present BX 3, 4, and 5 design.

- One door bushing is spring loaded with linkage connecting it to a locking pin
- Rotator for easier handling
- Hydraulically actuated elevator
- Hydraulic cylinders
- Quick and easy change of changeable bushings
- Trigger mechanism

### Technical specifications BPX1™

<table>
<thead>
<tr>
<th>Actuation</th>
<th>Hydraulic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control system</td>
<td>Automatic remote controlled (stand-alone control panel or drill)</td>
</tr>
<tr>
<td>Dimension [LxWxH]</td>
<td>43.62'' x 55.94'' x 27.86''</td>
</tr>
<tr>
<td>Weight</td>
<td>2,145 lbs</td>
</tr>
<tr>
<td>Tubular types</td>
<td>Casing, drill collar (slide)</td>
</tr>
<tr>
<td>Tubular size range (ips)</td>
<td>2 3/4'' to 7 3/4''</td>
</tr>
<tr>
<td>Changing slips</td>
<td>Manually</td>
</tr>
<tr>
<td>Load rating</td>
<td>Up to 350 Tons</td>
</tr>
<tr>
<td>Power down force</td>
<td>N/A</td>
</tr>
<tr>
<td>Fluid pressure</td>
<td>2,000 - 2,500 psi (hydraulic)</td>
</tr>
<tr>
<td>Flow rate</td>
<td>5 to 7 gpm</td>
</tr>
<tr>
<td>Ambient temp range</td>
<td>-18°F up to 125°F (-30°C up to +55°C)</td>
</tr>
<tr>
<td>Link size</td>
<td>24'' x 34''</td>
</tr>
<tr>
<td>Use of rotator</td>
<td>Yes</td>
</tr>
<tr>
<td>CE</td>
<td>Yes</td>
</tr>
<tr>
<td>ATEX</td>
<td>Yes</td>
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</tbody>
</table>

The BX 3, 4, and 5 elevators improve both rig safety and efficiency. Since the introduction of the BX 1 and 2 elevators in 1996, our engineers have continuously strived to improve the operations reliability and safety of its design, resulting in the present BX 3, 4, and 5 design.

- One door bushing is spring loaded with linkage connecting it to a locking pin
- Rotator for easier handling
- Hydraulically actuated elevator
- Hydraulic cylinders
- Quick and easy change of changeable bushings
- Trigger mechanism

### Technical specifications BPX3™

<table>
<thead>
<tr>
<th>Actuation</th>
<th>Hydraulic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control system</td>
<td>Automatic remote controlled (stand-alone control panel or drill)</td>
</tr>
<tr>
<td>Dimension [LxWxH]</td>
<td>26.43'' x 40.99'' x 17.90''</td>
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<tr>
<td>Weight</td>
<td>1,600 lbs</td>
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<tr>
<td>Tubular types</td>
<td>Casing, drill collar (slide)</td>
</tr>
<tr>
<td>Tubular size range (ips)</td>
<td>7'' to 7 3/4''</td>
</tr>
<tr>
<td>Changing slips</td>
<td>Manually</td>
</tr>
<tr>
<td>Load rating</td>
<td>Up to 350 Tons</td>
</tr>
<tr>
<td>Power down force</td>
<td>N/A</td>
</tr>
<tr>
<td>Fluid pressure</td>
<td>2,000 - 2,500 psi (hydraulic)</td>
</tr>
<tr>
<td>Flow rate</td>
<td>5 to 7 gpm</td>
</tr>
<tr>
<td>Ambient temp range</td>
<td>-18°F up to 125°F (-30°C up to +55°C)</td>
</tr>
<tr>
<td>Link size</td>
<td>24'' x 34''</td>
</tr>
<tr>
<td>Use of rotator</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The BX 3, 4, and 5 elevators improve both rig safety and efficiency. Since the introduction of the BX 1 and 2 elevators in 1996, our engineers have continuously strived to improve the operations reliability and safety of its design, resulting in the present BX 3, 4, and 5 design.

- One door bushing is spring loaded with linkage connecting it to a locking pin
- Rotator for easier handling
- Hydraulically actuated elevator
- Hydraulic cylinders
- Quick and easy change of changeable bushings
- Trigger mechanism

### Technical specifications BPX4-35™

<table>
<thead>
<tr>
<th>Actuation</th>
<th>Hydraulic</th>
</tr>
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<tbody>
<tr>
<td>Control system</td>
<td>Automatic remote controlled (stand-alone control panel or drill)</td>
</tr>
<tr>
<td>Dimension [LxWxH]</td>
<td>30.43'' x 42.26'' x 20.50''</td>
</tr>
<tr>
<td>Weight</td>
<td>2,278 lbs</td>
</tr>
<tr>
<td>Tubular types</td>
<td>Casing, drill collar (slide)</td>
</tr>
<tr>
<td>Tubular size range (ips)</td>
<td>7'' to 7 3/4''</td>
</tr>
<tr>
<td>Changing slips</td>
<td>Manually</td>
</tr>
<tr>
<td>Load rating</td>
<td>Up to 500 Tons</td>
</tr>
<tr>
<td>Power down force</td>
<td>N/A</td>
</tr>
<tr>
<td>Fluid pressure</td>
<td>2,000 - 2,500 psi (hydraulic)</td>
</tr>
<tr>
<td>Flow rate</td>
<td>5 to 7 gpm</td>
</tr>
<tr>
<td>Ambient temp range</td>
<td>-18°F up to 125°F (-30°C up to +55°C)</td>
</tr>
<tr>
<td>Link size</td>
<td>24'' x 34''</td>
</tr>
<tr>
<td>Use of rotator</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The BX 3, 4, and 5 elevators improve both rig safety and efficiency. Since the introduction of the BX 1 and 2 elevators in 1996, our engineers have continuously strived to improve the operations reliability and safety of its design, resulting in the present BX 3, 4, and 5 design.

- One door bushing is spring loaded with linkage connecting it to a locking pin
- Rotator for easier handling
- Hydraulically actuated elevator
- Hydraulic cylinders
- Quick and easy change of changeable bushings
- Trigger mechanism

### Technical specifications BPX4-50™

<table>
<thead>
<tr>
<th>Actuation</th>
<th>Hydraulic</th>
</tr>
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<tbody>
<tr>
<td>Control system</td>
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<tr>
<td>Tubular types</td>
<td>Casing, drill collar (slide)</td>
</tr>
<tr>
<td>Tubular size range (ips)</td>
<td>7'' to 7 3/4''</td>
</tr>
<tr>
<td>Changing slips</td>
<td>Manually</td>
</tr>
<tr>
<td>Load rating</td>
<td>Up to 500 Tons</td>
</tr>
<tr>
<td>Power down force</td>
<td>N/A</td>
</tr>
<tr>
<td>Fluid pressure</td>
<td>2,000 - 2,500 psi (hydraulic)</td>
</tr>
<tr>
<td>Flow rate</td>
<td>5 to 7 gpm</td>
</tr>
<tr>
<td>Ambient temp range</td>
<td>-18°F up to 125°F (-30°C up to +55°C)</td>
</tr>
<tr>
<td>Link size</td>
<td>24'' x 34''</td>
</tr>
<tr>
<td>Use of rotator</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Technical specifications BPX5™

<table>
<thead>
<tr>
<th>Actuation</th>
<th>Hydraulic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control system</td>
<td>Automatic remote controlled (stand-alone control panel or drill)</td>
</tr>
<tr>
<td>Dimension [LxWxH]</td>
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</tr>
<tr>
<td>Weight</td>
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<tr>
<td>Tubular types</td>
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</tr>
<tr>
<td>Tubular size range (ips)</td>
<td>7'' to 7 3/4''</td>
</tr>
<tr>
<td>Changing slips</td>
<td>Manually</td>
</tr>
<tr>
<td>Load rating</td>
<td>Up to 500 Tons</td>
</tr>
<tr>
<td>Power down force</td>
<td>N/A</td>
</tr>
<tr>
<td>Fluid pressure</td>
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</tr>
<tr>
<td>Link size</td>
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</tr>
<tr>
<td>Use of rotator</td>
<td>Yes</td>
</tr>
</tbody>
</table>

- For reference only, please contact your local sales contact for more information.
SMX

The X-series elevators handle all sizes of collar-type tubing, drill pipe and casing. The SMX has a patented latch & lock arrangement mounted on the elevator door. The handle protects the latch from accidental opening. Both latched operate from a single handle.

- 8C qualified
- For handling collar type casing, collar type tubing, and drill collars
- Tool is fit for manual operation
- Lock and unlock one-hand operation
- Latching/locking by closing door
- Latched and locked verification; separate action and incorporated in design
- Round ears for easy rotating in links
- Easy to rig up
- Hinge up bushings
- Lower link ears are 8C rated for 5 ton slings
- Handling grupp on elevator back for easy handling
- Handling handle for link mount is available (part number 50006435); (optional; can also be used for other applications)
- SMX series (8 frames) replaces SLX, S SD and SX type elevators (15 frames)

SLX

The X-series elevators handle all sizes of collar-type tubing, drill pipe and casing. The SMX has a patented latch & lock arrangement mounted on the elevator door. The handle protects the latch from accidental opening. Both latched operate from a single handle.

- 8C qualified
- For handling collar type casing, collar type tubing, and drill collars
- Tool is fit for manual operation
- Lock and unlock one-hand operation
- Latching/locking by closing door
- Latched and locked verification; separate action and incorporated in design
- Round ears for easy rotating in links
- Easy to rig up
- Hinge up bushings
- Lower link ears are 8C rated for 5 ton slings
- Handling grupp on elevator back for easy handling
- Handling handle for link mount is available (part number 50006435); (optional; can also be used for other applications)
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SX

The X-series elevators handle all sizes of collar-type tubing, drill pipe and casing. The SMX has a patented latch & lock arrangement mounted on the elevator door. The handle protects the latch from accidental opening. Both latched operate from a single handle.

- 8C qualified
- For handling collar type casing, collar type tubing, and drill collars
- Tool is fit for manual operation
- Lock and unlock one-hand operation
- Latching/locking by closing door
- Latched and locked verification; separate action and incorporated in design
- Round ears for easy rotating in links
- Easy to rig up
- Hinge up bushings
- Lower link ears are 8C rated for 5 ton slings
- Handling grupp on elevator back for easy handling
- Handling handle for link mount is available (part number 50006435); (optional; can also be used for other applications)
- SMX series (8 frames) replaces SLX, S SD and SX type elevators (15 frames)

SLX-DD

The X-series elevators handle all sizes of collar-type tubing, drill pipe and casing. The SMX has a patented latch & lock arrangement mounted on the elevator door. The handle protects the latch from accidental opening. Both latched operate from a single handle.

- 8C qualified
- For handling collar type casing, collar type tubing, and drill collars
- Tool is fit for manual operation
- Lock and unlock one-hand operation
- Latching/locking by closing door
- Latched and locked verification; separate action and incorporated in design
- Round ears for easy rotating in links
- Easy to rig up
- Hinge up bushings
- Lower link ears are 8C rated for 5 ton slings
- Handling grupp on elevator back for easy handling
- Handling handle for link mount is available (part number 50006435); (optional; can also be used for other applications)
- SMX series (8 frames) replaces SLX, S SD and SX type elevators (15 frames)
The SJH horizontal pick-up elevator is designed to pick up tubulars lying flat on a surface without having to lift the tubulars prior to closing the elevator. The elevator is capable of lifting drill pipe, reeved pipe, or drill collars and casing. It will handle single joints of pipe straight from a cantilever off-line stand building systems.

SJL and SPL single-joint, center-latch elevators are designed to replace unsafe rope slings for hoisting collar-type pipe into position. The SJL 90° elevator enables the crew to handle pipe properly, help avoid damage to pipe threads and reduce the chances of accident or injury. The SPL elevator is the same as the SJL elevator except that the SPL elevator is designed for use on tapered pipe, conforming to API specifications for extreme line casing.

The S JL and SPL single-joint, center-latch elevators are designed to replace unsafe rope slings for hoisting collar-type pipe into position. The SJL 90° elevator enables the crew to handle pipe properly, help avoid damage to pipe threads and reduce the chances of accident or injury. The SPL elevator is the same as the SJL elevator except that the SPL elevator is designed for use on tapered pipe, conforming to API specifications for extreme line casing.

The SPL single-joint elevator is designed for running single joints of tubing and casing from V-door to well center. It is double hinged for use with the CRT Casing Running Tool, or any other stabblerless operation. Ergonomically designed handles with cast on stop pins prevent the lifting sling shackle from pinching hands. Suitable for loads up to 5 STon / 4.5 Tonne.

- Designed for pick-up and running single joints of tubing and casing from V-door to well center
- 2-way access due to double hinge pin arrangement
- Double hinged for use with CRT Casing Running Tool
- No loose parts, as hinge pins are contained within the body halves
- Clear visual gripping points for safe operation
- Ergonomically designed handles, with cast on stop pins prevent the lifting sling shackle from pinching hands
- Suitable for loads up to 5STon / 4.5 Tonne.

The SJX single joint elevator is designed for running single joints of tubing and casing from V-door to well center. It is double hinged for use with the CRT Casing Running Tool, or any other stabblerless operation. Ergonomically designed handles with cast on stop pins prevent the lifting sling shackle from pinching hands. Suitable for loads up to 5STon / 4.5 Tonne.

- Designed for pick-up and running single joints of tubing and casing from V-door to well center
- 2-way access due to double hinge pin arrangement
- Double hinged for use with CRT Casing Running Tool
- No loose parts, as hinge pins are contained within the body halves
- Clear visual gripping points for safe operation
- Ergonomically designed handles, with cast on stop pins prevent the lifting sling shackle from pinching hands
- Suitable for loads up to 5 STon / 4.5 Tonne.

Load Rating (STon/Tonne) | Size Range (Inches) | Max. Weight Range (lbs/kg)
--- | --- | ---
2.7/6.6 | 2.7/6.6-13.2/33.5 | 40-194 (18-88)

SPL and SJX single-joint, center-latch elevators are designed to replace unsafe rope slings for hoisting collar-type pipe into position. The SJX 90° elevator enables the crew to handle pipe properly, help avoid damage to pipe threads and reduce the chances of accident or injury. The SJX elevator is the same as the SJL elevator except that the SJX elevator is designed for use on tapered pipe, conforming to API specifications for extreme line casing.

The SJX single joint elevator is designed for running single joints of tubing and casing from V-door to well center. It is double hinged for use with the CRT Casing Running Tool, or any other stabblerless operation. Ergonomically designed handles with cast on stop pins prevent the lifting sling shackle from pinching hands. Suitable for loads up to 5 STon / 4.5 Tonne.

- Designed for pick-up and running single joints of tubing and casing from V-door to well center
- 2-way access due to double hinge pin arrangement
- Double hinged for use with CRT Casing Running Tool
- No loose parts, as hinge pins are contained within the body halves
- Clear visual gripping points for safe operation
- Ergonomically designed handles, with cast on stop pins prevent the lifting sling shackle from pinching hands
- Suitable for loads up to 5 STon / 4.5 Tonne.
The BJ-250 elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The 250-Ton model is designed for medium to long strings of smaller casing. The main body of these units can be dressed as a casing elevator or a spider. The upper unit is dressed as an elevator, using a bottom guide and a bell guide. The lower unit is dressed as a spider, using a top guide to aid in centering the casing. The unitized design of the slip assembly allows the tool to grip casing with uniform circumferential pressure, ensuring a safe hold while minimizing the possibility to damage the pipe. The unit is either manual or air operated. A double hinged door permits the unit to be rapidly installed on the casing or removed.

**Technical Specifications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight without slip assembly (lbs/kg)</th>
<th>Max. weight slips set w/inserts (lbs/kg)</th>
<th>Casing size ranges (inches)</th>
<th>Load rating (s Ton/Tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BJ-250</td>
<td>1,986 / 907</td>
<td>550 / 250</td>
<td>2% to 7%</td>
<td>250 / 226</td>
</tr>
<tr>
<td></td>
<td>Loading (s Ton/Tonne)</td>
<td>Normal operating pressure (psi/kPa)</td>
<td>Max. operating pressure (psi/kPa)</td>
<td>Min. allowed ambient temperature</td>
</tr>
<tr>
<td></td>
<td>608 / 276</td>
<td>85 / 585</td>
<td>1,250 / 861</td>
<td>-5°F / -20°C</td>
</tr>
<tr>
<td></td>
<td>Weight FMS with slips and guides (lbs/kg)</td>
<td>4,106 / 1,871</td>
<td>Min. allowed ambient temperature</td>
<td>9°F / 5°C</td>
</tr>
<tr>
<td></td>
<td>Pipe sizes ranges (inches)</td>
<td>4% to 7%</td>
<td>Max. allowed ambient temperature</td>
<td>120°F / 48°C</td>
</tr>
</tbody>
</table>

The BJ-350 elevator/spider tool is designed for running completion strings, eliminating the need for scaffolding. It enables rings to handle completion strings and casing up to 7" in diameter with large tubulars or control lines. The unit is a companion tool to the "BJ" style 250-Ton elevator/spider. The slip power down force generated allows the FMS to take the torque reaction of the string with the string weight not being sufficient to resist retreating, and it eliminates the need for a manual tong. The powered down slips allow the first joint of casing to be run with the FMS. The replaceable slip and insert carriers are set/raised by the operator using remote controls.

**Technical Specifications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight without slip assembly (lbs/kg)</th>
<th>Max. weight slips set w/inserts (lbs/kg)</th>
<th>Casing size ranges (inches)</th>
<th>Load rating (s Ton/Tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BJ-350</td>
<td>2,507 / 1,140</td>
<td>650 / 295</td>
<td>2% to 7%</td>
<td>350 / 317</td>
</tr>
<tr>
<td></td>
<td>Loading (s Ton/Tonne)</td>
<td>Normal operating pressure (psi/kPa)</td>
<td>Max. operating pressure (psi/kPa)</td>
<td>Min. allowed ambient temperature</td>
</tr>
<tr>
<td></td>
<td>608 / 276</td>
<td>85 / 585</td>
<td>1,000 / 6,895</td>
<td>-5°F / -20°C</td>
</tr>
<tr>
<td></td>
<td>Weight FMS with slips and guides (lbs/kg)</td>
<td>4,106 / 1,871</td>
<td>Min. allowed ambient temperature</td>
<td>9°F / 5°C</td>
</tr>
<tr>
<td></td>
<td>Pipe sizes ranges (inches)</td>
<td>4% to 7%</td>
<td>Max. allowed ambient temperature</td>
<td>120°F / 48°C</td>
</tr>
</tbody>
</table>

The FMS275 is a hydraulic operated near-flush mounted slip for running completion strings, allowing the tong connection height to be lowered 1 meter (3 ft), thus eliminating the need for scaffolding. This gives the rig crew more room to work by removing the spider body from the top of the rig floor. The unit is designed to fit standard 37° rotary tables and can be used in combination with the 500-Ton 14" Varco type elevator spider. The slip power down force generated allows the FMS to take the torque reaction of the string with the string weight not being sufficient to resist retreating, and it eliminates the need for a manual tong. The powered down slips allow the first joint of casing to be run with the FMS. The replaceable slip and insert carriers are set/raised by the operator using remote controls.

**Technical Specifications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight without slip assembly (lbs/kg)</th>
<th>Max. weight slips set w/inserts (lbs/kg)</th>
<th>Casing size ranges (inches)</th>
<th>Load rating (s Ton/Tonne)</th>
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</thead>
<tbody>
<tr>
<td>FMS275</td>
<td>3,050 / 1,380</td>
<td>550 / 250</td>
<td>2% to 7%</td>
<td>250 / 226</td>
</tr>
<tr>
<td></td>
<td>Loading (s Ton/Tonne)</td>
<td>Normal operating pressure (psi/kPa)</td>
<td>Max. operating pressure (psi/kPa)</td>
<td>Min. allowed ambient temperature</td>
</tr>
<tr>
<td></td>
<td>608 / 276</td>
<td>85 / 585</td>
<td>1,250 / 861</td>
<td>-5°F / -20°C</td>
</tr>
<tr>
<td></td>
<td>Weight FMS with slips and guides (lbs/kg)</td>
<td>4,106 / 1,871</td>
<td>Min. allowed ambient temperature</td>
<td>9°F / 5°C</td>
</tr>
<tr>
<td></td>
<td>Pipe sizes ranges (inches)</td>
<td>4% to 7%</td>
<td>Max. allowed ambient temperature</td>
<td>120°F / 48°C</td>
</tr>
</tbody>
</table>

The FMS375 is mounted flush with the rig floor, allowing the casing connection height to be lowered 1 meter (3 ft), thus eliminating the need for scaffolding. This gives the rig crew more room to work by removing the spider body from the top of the rig floor. The unit is designed to fit standard 37° rotary tables and can be used in combination with the 500-Ton 14" Varco type elevator spider. The slip power down force generated allows the FMS to take the torque reaction of the string with the string weight not being sufficient to resist retreating, and it eliminates the need for a manual tong. The powered down slips allow the first joint of casing to be run with the FMS. The replaceable slip and insert carriers are set/raised by the operator using remote controls.

**Technical Specifications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight without slip assembly (lbs/kg)</th>
<th>Max. weight slips set w/inserts (lbs/kg)</th>
<th>Casing size ranges (inches)</th>
<th>Load rating (s Ton/Tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMS375</td>
<td>3,610 / 1,635</td>
<td>650 / 295</td>
<td>2% to 7%</td>
<td>350 / 317</td>
</tr>
<tr>
<td></td>
<td>Loading (s Ton/Tonne)</td>
<td>Normal operating pressure (psi/kPa)</td>
<td>Max. operating pressure (psi/kPa)</td>
<td>Min. allowed ambient temperature</td>
</tr>
<tr>
<td></td>
<td>608 / 276</td>
<td>85 / 585</td>
<td>1,000 / 6,895</td>
<td>-5°F / -20°C</td>
</tr>
<tr>
<td></td>
<td>Weight FMS with slips and guides (lbs/kg)</td>
<td>4,106 / 1,871</td>
<td>Min. allowed ambient temperature</td>
<td>9°F / 5°C</td>
</tr>
<tr>
<td></td>
<td>Pipe sizes ranges (inches)</td>
<td>4% to 7%</td>
<td>Max. allowed ambient temperature</td>
<td>120°F / 48°C</td>
</tr>
</tbody>
</table>

The Varco-500 14" elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The main body of these units can be dressed as a casing elevator or as a spider. The upper unit is dressed as a spider, using a top guide to aid in centering the casing. A double hinged door permits the unit to be rapidly installed on the casing or removed.

**Technical Specifications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight without slip assembly (lbs/kg)</th>
<th>Max. weight slips set w/inserts (lbs/kg)</th>
<th>Casing size ranges (inches)</th>
<th>Load rating (s Ton/Tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varco-500 14&quot;</td>
<td>4,175 / 1,900</td>
<td>600 / 272</td>
<td>2% to 7%</td>
<td>500 / 454</td>
</tr>
<tr>
<td></td>
<td>Loading (s Ton/Tonne)</td>
<td>Normal operating pressure (psi/kPa)</td>
<td>Max. operating pressure (psi/kPa)</td>
<td>Min. allowed ambient temperature</td>
</tr>
<tr>
<td></td>
<td>608 / 276</td>
<td>85 / 585</td>
<td>2,000 / 13,790</td>
<td>-5°F / -20°C</td>
</tr>
<tr>
<td></td>
<td>Weight FMS with slips and guides (lbs/kg)</td>
<td>4,106 / 1,871</td>
<td>Min. allowed ambient temperature</td>
<td>9°F / 5°C</td>
</tr>
<tr>
<td></td>
<td>Pipe sizes ranges (inches)</td>
<td>4% to 7%</td>
<td>Max. allowed ambient temperature</td>
<td>120°F / 48°C</td>
</tr>
</tbody>
</table>

The Varco-500 24¾" elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The main body of these units can be dressed as a casing elevator or as a spider. The upper unit is dressed as an elevator, using a bottom guide and bell guide. The lower unit is dressed as a spider, using a top guide to aid in centering casing.

**Technical Specifications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight without slip assembly (lbs/kg)</th>
<th>Max. weight slips set w/inserts (lbs/kg)</th>
<th>Casing size ranges (inches)</th>
<th>Load rating (s Ton/Tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varco-500 24¾&quot;</td>
<td>6,992 / 3,171</td>
<td>600 / 272</td>
<td>2% to 7%</td>
<td>500 / 454</td>
</tr>
<tr>
<td></td>
<td>Loading (s Ton/Tonne)</td>
<td>Normal operating pressure (psi/kPa)</td>
<td>Max. operating pressure (psi/kPa)</td>
<td>Min. allowed ambient temperature</td>
</tr>
<tr>
<td></td>
<td>608 / 276</td>
<td>85 / 585</td>
<td>2,000 / 13,790</td>
<td>-5°F / -20°C</td>
</tr>
<tr>
<td></td>
<td>Weight FMS with slips and guides (lbs/kg)</td>
<td>4,106 / 1,871</td>
<td>Min. allowed ambient temperature</td>
<td>9°F / 5°C</td>
</tr>
<tr>
<td></td>
<td>Pipe sizes ranges (inches)</td>
<td>4% to 7%</td>
<td>Max. allowed ambient temperature</td>
<td>120°F / 48°C</td>
</tr>
</tbody>
</table>
Technical Marketing Sheet

Power Slips

**Technical Specifications**

**Actuation:** Spring

**Control System:** Manual

**Dimension/Location:** Width: 40", Height: 37"

**Weight:** 1,040 lbs

**Rotary Configuration:** Fits in Master Bushing

**Tubular Type:** Drill pipe

**Tubular Size Range:** 6" - 14"

**Changing Slips:** Manually

**Load Rating:** Up to 750 tons

**Backup Torque:** --

**Centering Device:** --

**Top Cover:** No

**Interlocking:** No

**Slip-Set Signal Confirmation:** No

**Slip-Up Signal Confirmation:** No

**API:** Yes

**CE:** Yes

**ATEX:** No

---

**Technical Specifications**

**Actuation:** Spring

**Control System:** Manual

**Dimension/Location:** Width: 34", Height: 41.5"

**Weight:** 1,600 lbs

**Rotary Configuration:** Fits in Master Bushing

**Tubular Type:** Drill pipe

**Tubular Size Range:** 6" - 14"

**Changing Slips:** Manually

**Load Rating:** Up to 750 tons

**Backup Torque:** --

**Centering Device:** --

**Top Cover:** No

**Interlocking:** No

**Slip-Set Signal Confirmation:** No

**Slip-Up Signal Confirmation:** No

**API:** Yes

**CE:** Yes

**ATEX:** No

---

**Technical Specifications**

**Actuation:** Electric/Hydraulic

**Control System:** Automatic/Remote Controlled (hand or foot controlled)

**Dimension/Location:** Width: 36.6", Height: 27.5"

**Weight:** 365 lbs

**Rotary Configuration:** Fits in Master Bushing

**Tubular Type:** Drill pipe

**Tubular Size Range:** 6" - 14"

**Changing Slips:** Manually

**Load Rating:** --

**Backup Torque:** --

**Centering Device:** --

**Top Cover:** No

**Interlocking:** No

**Slip-Set Signal Confirmation:** No

**Slip-Up Signal Confirmation:** No

**API:** N/A

**CE:** No

**ATEX:** No

---

**Technical Specifications**

**Actuation:** Electric/Hydraulic

**Control System:** Automatic/Remote Controlled (hand or foot controlled)

**Dimension/Location:** Width: 39.88", Height: 35.5"

**Weight:** 5,600 lbs

**Rotary Configuration:** Fits in NOV Pro-Line Master Bushing over 27"- 37" OD

**Tubular Type:** Drill pipe, casing, drill collar, tubing

**Tubular Size Range:** 6" - 14"

**Changing Slips:** Using a special tool to ensure

**Load Rating:** 350 tons

**Backup Torque:** --

**Centering Device:** --

**Top Cover:** Yes

**Interlocking:** Yes

**Slip-Set Signal Confirmation:** Yes

**Slip-Up Signal Confirmation:** No

**API:** Yes

**CE:** Yes

**ATEX:** Yes

---

**Technical Specifications**

**Actuation:** Spring

**Control System:** Automatic/Remote Controlled (hand or foot controlled)

**Dimension/Location:** Width: 26", Height: 27.5"

**Weight:** 300 lbs

**Rotary Configuration:** Fits in Master Bushing

**Tubular Type:** Drill pipe, casing, drill collar, tubing

**Tubular Size Range:** 6" - 14"

**Changing Slips:** Using a special tool to insure

**Load Rating:** 350 tons

**Backup Torque:** --

**Centering Device:** --

**Top Cover:** Yes

**Interlocking:** No

**Slip-Set Signal Confirmation:** Yes

**Slip-Up Signal Confirmation:** Yes

**API:** Yes

**CE:** Yes

**ATEX:** Yes

---

*Model shown above is the PS-16 with air cylinders on the side. These are not found on the actual PS-15 model.*
### Technical Specifications

<table>
<thead>
<tr>
<th>RST-375</th>
<th>RST-495</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table size</strong></td>
<td>3/8&quot;</td>
</tr>
<tr>
<td><strong>Actuation</strong></td>
<td>Hydraulic</td>
</tr>
<tr>
<td><strong>Control system</strong></td>
<td>Automatic remote controlled (control panel)</td>
</tr>
<tr>
<td><strong>Weight (depends on size topcover)</strong></td>
<td>80,000 lbs</td>
</tr>
<tr>
<td><strong>Load rating (static)</strong></td>
<td>3,000 psi</td>
</tr>
<tr>
<td><strong>Torque max</strong></td>
<td>41,650 ft-lb</td>
</tr>
<tr>
<td><strong>Max. back-up torque</strong></td>
<td>40,000 ft-lb</td>
</tr>
<tr>
<td><strong>Speed max (continuous)</strong></td>
<td>5 RPM</td>
</tr>
<tr>
<td><strong>Max. working pressure</strong></td>
<td>3,000 psi (hydraulic)</td>
</tr>
<tr>
<td><strong>Max. flow rate</strong></td>
<td>75 gpm</td>
</tr>
<tr>
<td><strong>Ambient temperature range</strong></td>
<td>-4°F up to 131°F (-20°C up to 55°C)</td>
</tr>
</tbody>
</table>

*For reference only, please contact your local sales contact for more information.*
Features and Benefits

• Lightweight pipex grating system with anti-slip coating
• Double Isolation valves with suitable pressure rating

Technical Specifications

- Choke & Kill 3” 5K
  - Working pressure: 10,000 psi
  - Temperature class: -29°C – 177°C
  - Ring groove inlay: CRA 625
  - API standards: API 6A / 16C & STD 53
  - Local pressure transmitter: 4-20 mA
  - Choke size: 3”
  - Choke actuator: hydraulic
  - Choke model: NOV MPX-40D
  - Manufacturing certification: ISO 9001-2008
  - Transport dimensions (L x W x H): 3.9 m x 2.9 m x 2.2 m
  - Weight: 22,000 kg

- Choke & Kill 4” 10K / 4” 5K
  - Working pressure: 15,000 psi
  - Temperature class: -29°C – 177°C
  - Ring groove inlay: CRA 625
  - API standards: API 6A / 16C & STD 53
  - Local pressure transmitter: 4-20 mA
  - Choke size: 4”
  - Choke actuator: hydraulic
  - Choke model: NOV MPX-40D
  - Manufacturing certification: ISO 9001-2008
  - Transport dimensions (L x W x H): 6.3 m x 2.7 m x 2.2 m
  - Weight: 23,000 kg

- Choke & Kill 4” 15K / 3” 15K
  - Working pressure: 20,000 psi
  - Temperature class: -29°C – 177°C
  - Ring groove inlay: CRA 625
  - API standards: API 6A / 16C & STD 53
  - Local pressure transmitter: 4-20 mA
  - Choke size: 3”
  - Choke actuator: hydraulic
  - Choke model: NOV MPX-40D
  - Manufacturing certification: ISO 9001-2008
  - Transport dimensions (L x W x H): 5.1 m x 2.8 m x 2.9 m
  - Weight: 22,000 kg

*For reference only, please contact your local sales contact for more information.
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rig@nov.com nov.com
**ST-80C**

- **Technical Specifications**
  - Controls: Local manual, remote manual, console, integrated toolstirrer controls
  - Mount: Pedestal with floor-mounted socket
  - Pedestal Rotation: ±90° (manual)
  - Minimum Weight: 7,800 lbs (3,538 kg)
  - Tool Joint Connection: 4 1/8" to 8 1/2"
  - Spin Speed: 75 RPM with 5" DP, 35 GPM
  - Spin Torque: 75 RPM with 5" DP, 35 GPM
  - Maximum Make-up Torque: 56,000 ft-lbs (75,000 Nm)
  - Maximum Breakout Torque: 35,000 ft-lbs (47,500 Nm)
  - Connection Height: 23" to 59" (584 mm to 1,498 mm)
  - Horizontal Travel: 60" (1,524 mm) or 15" to 25" added reach
  - Vertical Adjustment: 36" (914 mm) or 72" (1,828 mm)
  - Casing Ready: No
  - Torque Wrench Angle: 30°

ST-80CL

- **Technical Specifications**
  - Controls: Local manual, remote, console, integrated NOV drillers control
  - Mount: Pedestal with floor-mounted socket
  - Pedestal Rotation: ±90° (power slew)
  - Minimum Weight: 11,500 lbs (5,216 kg)
  - Tool Joint Connection: 3 1/2" to 9¾"
  - Spin Speed: 80 RPM with 5" DP, 45 GPM
  - Spin Torque: 100 RPM with 5" DP, 45 GPM
  - Maximum Make-up Torque: 100,000 ft-lbs (136,000 Nm)
  - Maximum Breakout Torque: 65,000 ft-lbs (87,800 Nm)
  - Connection Height: 30" to 66" (762 mm to 1,676 mm)
  - Horizontal Travel: 60" (1,524 mm) or 96" (2,438 mm)
  - Vertical Adjustment: 36" (914 mm)
  - Casing Ready: No
  - Torque Wrench Angle: 60°

**ST-100**

- **Technical Specifications**
  - Controls: Local manual, remote, console, integrated toolstirrer controls
  - Mount: Pedestal with floor-mounted socket
  - Pedestal Rotation: ±90° (manual and power slew)
  - Minimum Weight: 9,400 lbs (4,263 kg)
  - Tool Joint Connection: 4 1/8" to 8 1/2"
  - Spin Speed: 75 RPM with 5" DP, 35 GPM
  - Spin Torque: 75 RPM with 5" DP, 35 GPM
  - Maximum Make-up Torque: 56,000 ft-lbs (75,000 Nm)
  - Maximum Breakout Torque: 35,000 ft-lbs (47,500 Nm)
  - Connection Height: 23" to 65" (584 mm to 1,651 mm)
  - Horizontal Travel: 100" (2,540 mm)
  - Vertical Adjustment: 42" (1,067 mm)
  - Casing Ready: No
  - Torque Wrench Angle: 30°

**ST-120**

- **Technical Specifications**
  - Controls: Local manual, remote, console, integrated toolstirrer controls
  - Mount: Pedestal with floor-mounted socket
  - Pedestal Rotation: ±90° (power slew)
  - Minimum Weight: 19,800 lbs (8,981 kg) installed weight
  - Tool Joint Connection: 3 7/8" to 10"
  - Spin Speed: 80 RPM (nominal on 5" DP)
  - Spin Torque: 80 RPM (nominal on 5" DP)
  - Maximum Make-up Torque: 100,000 ft-lbs (136,000 Nm)
  - Maximum Breakout Torque: 65,000 ft-lbs (87,800 Nm)
  - Connection Height: 31.5" to 73.4" (800 mm to 1,864 mm)
  - Horizontal Travel: 144" (3,658 mm)
  - Vertical Adjustment: 42" (1,067 mm)
  - Casing Ready: No
  - Torque Wrench Angle: 60°

For reference only, please contact your local sales contact for more information.
**STV**

The Stand Transfer Vehicle (STV) is a fingerboard mounted system designed to perform the functions of a derrick. It does not lift stands of tubulars, but guides the top of the stand between the elevators and the fingerboard.

The STV system includes the fingerboard and a carriage mounted arm which rides up and down rails which are integral to the diving board. The pipe handling head is designed to capture rather than grip the stand. This prevents adverse loading due to the lean of the stand present when the pin is in the setback and the box is at well center.

The pipe handling head consists primarily of two arms and a body. The two arms are connected to the body via parallel linkages and one hydraulic cylinder. The arm is a double parallelogram type modeled after those used on Iron Roughnecks.

**Technical Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area classification</td>
<td>Zone 5</td>
</tr>
<tr>
<td>Hydraulic requirements</td>
<td>35 GPM-2000 psi</td>
</tr>
<tr>
<td>Compressed air</td>
<td>120 ps</td>
</tr>
<tr>
<td>Weight (guide arm only)</td>
<td>2500 lbs</td>
</tr>
<tr>
<td>Extension force</td>
<td>1800 lbs</td>
</tr>
<tr>
<td>Retraction force</td>
<td>1200 lbs</td>
</tr>
<tr>
<td>Max radial force at extension</td>
<td>1500 lbs</td>
</tr>
<tr>
<td>Tubular capacities</td>
<td>3 1/2” drill pipe to 10” collars</td>
</tr>
</tbody>
</table>

**PipeCat**

The function of the PipeCat laydown system is to move tubulars between the catwalk and drill floor. The primary moving component is the trough. The trough is used to lift and lower the tubulars and is driven by a winch mounted on the underside of the V-Door. When the trough is lowered into the catwalk, a system of pipe racks, indexer arms, and kicker arms are used to load tubulars to and from the trough. Pipe racks may be installed on one or both sides of the catwalk. A skate is used to position tubulars along the length of the trough.

When the trough is raised to the drill floor, the skate is used to push tubulars to well center, and to receive tubulars as they are unloaded from the elevators. The PipeCat laydown system is operated using an Amphion™ control system and is powered by an external electrical power source and an external hydraulic power unit. The illustrations below show examples of laydown system layouts. Refer to the assembly drawings, schematics, and documentation supplied with this manual for exact configuration details.

**Technical Specifications**

<table>
<thead>
<tr>
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</tr>
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<tr>
<td>Retraction force</td>
<td>1200 lbs</td>
</tr>
<tr>
<td>Max radial force at extension</td>
<td>1500 lbs</td>
</tr>
<tr>
<td>Tubular capacities</td>
<td>3 1/2” drill pipe to 10” collars</td>
</tr>
</tbody>
</table>

**PC-5-47**

The function of the PipeCat laydown system is to move tubulars between the catwalk and drill floor. The primary moving component is the trough. The trough is used to lift and lower the tubulars and is driven by a winch mounted on the underside of the V-Door. When the trough is lowered into the catwalk, a system of pipe racks, indexer arms, and kicker arms are used to load tubulars to and from the trough. Pipe racks may be installed on one or both sides of the catwalk. A skate is used to position tubulars along the length of the trough.

When the trough is raised to the drill floor, the skate is used to push tubulars to well center, and to receive tubulars as they are unloaded from the elevators. The PipeCat laydown system is operated using an Amphion™ control system and is powered by an external electrical power source and an external hydraulic power unit. The illustrations below show examples of laydown system layouts. Refer to the assembly drawings, schematics, and documentation supplied with this manual for exact configuration details.

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<table>
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<tr>
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<tr>
<td>Compressed air</td>
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<tr>
<td>Retraction force</td>
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<tr>
<td>Max radial force at extension</td>
<td>1500 lbs</td>
</tr>
<tr>
<td>Tubular capacities</td>
<td>3 1/2” drill pipe to 10” collars</td>
</tr>
</tbody>
</table>

**PC-5-65**

The function of the PipeCat laydown system is to move tubulars between the catwalk and drill floor. The primary moving component is the trough. The trough is used to lift and lower the tubulars and is driven by a winch mounted on the underside of the V-Door. When the trough is lowered into the catwalk, a system of pipe racks, indexer arms, and kicker arms are used to load tubulars to and from the trough. Pipe racks may be installed on one or both sides of the catwalk. A skate is used to position tubulars along the length of the trough.

When the trough is raised to the drill floor, the skate is used to push tubulars to well center, and to receive tubulars as they are unloaded from the elevators. The PipeCat laydown system is operated using an Amphion™ control system and is powered by an external electrical power source and an external hydraulic power unit. The illustrations below show examples of laydown system layouts. Refer to the assembly drawings, schematics, and documentation supplied with this manual for exact configuration details.

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<tr>
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<tr>
<td>Tubular capacities</td>
<td>3 1/2” drill pipe to 10” collars</td>
</tr>
</tbody>
</table>
Drawworks

22. ADS Drawworks
23. DSGD-375 & SSGD-250
Our Automated Drawworks systems (ADS) provides drillers with enhanced heating control capabilities that increase the efficiency, productivity and safety of the drilling process. These drawworks are equipped with AC motors which provide significantly more performance and have made possible a machine that requires approximately half the space and weight with less maintenance than traditional drawworks.

**ADS-10SD**

**Technical Specifications**

**DESIGN DATA**

- Max hook load 12 lines: 463.5 T (1,064 kN)
- Max hook load 10 lines: 413.5 T (938 kN)
- Weight: 14,995 kg (33,000 lb)
- Dimensions (Length): 24’ 11” x 11’ 3” x 11’ 1” (760 x 343 x 338 cm)
- Wire rope diameter: 1 1/4” (6.35 mm)
- Drive: 36” x 24” (914 x 609 mm)

**DRILLING MOTOR**

- Type: NOV DM-15
- Number of motors: 2
- HP per motor: 1,150 HP

**ADS-1500 SS**

**Technical Specifications**

**DESIGN DATA**

- Max hook load 12 lines: 367.5 T (8,300 kN)
- Max hook load 10 lines: 341.5 T (7,566 kN)
- Weight: 3,612 kg (7,970 lb)
- Dimensions (Length): 14’ 3” x 26’ 9” x 10’ 6” (434.5 x 815 x 320 cm)
- Wire rope diameter: 1 3/16” (6.03 mm)
- Drive: 36” x 16” (914 x 406 mm)

**DRILLING MOTOR**

- Type: NOV CM-202
- Number of motors: 2
- HP per motor: 1,150 HP

**ADS-2000SD**

**Technical Specifications**

**DESIGN DATA**

- Max hook load 10 lines: 346 T (780 kN)
- Max hook load 8 lines: 286.6 T (649 kN)
- Weight: 2,668 kg (5,875 lb)
- Dimensions (Length): 20’ 8” x 13’ 9” x 10’ 8” (634 x 414 x 324 cm)
- Wire rope diameter: 1 1/4” (6.35 mm)
- Drive: 36” x 16” (914 x 406 mm)

**DRILLING MOTOR**

- Type: NOV CM-202
- Number of motors: 2
- HP per motor: 1,150 HP

**ADS-30D**

**Technical Specifications**

**DESIGN DATA**

- Max hook load 14 lines: 793 T (1,798 kN)
- Max hook load 12 lines: 698 T (1,563 kN)
- Weight: 10,020 kg (22,000 lb)
- Dimensions (Length): 144.3” x 290” x 136” (366.5 cm x 736.6 cm x 345.4 cm)
- Wire rope diameter: 1 5/8” (41.27 mm)
- Drive: 36” x 36” (914 x 914 mm)

**DRILLING MOTOR**

- Type: NOV CM-202
- Number of motors: 2
- HP per motor: 1,150 HP

**ADS-3000**

**Technical Specifications**

**DESIGN DATA**

- Max hook load 12 lines: 483.5 T (1,086 kN)
- Max hook load 10 lines: 413.5 T (938 kN)
- Weight: 64,325 lbs (39,177 kg)
- Dimensions (Length): 248” x 119” x 111.5” (630 cm x 302.3 cm x 283.2 cm)
- Wire rope diameter: 1” (25.4 mm)
- Drum size: 30” x 55” (76.2 cm x 139.7 cm)

**DRILLING MOTOR**

- Type: NOV CM-202
- Number of motors: 2
- HP per motor: 1,150 HP
The DSGD-375 drawworks features a direct drive design ideal for rig applications where space, weight, and power are important considerations. Service braking is achieved using an AC motor, which is also the prime mover for the drawworks. Emergency brakes (2) are spring applied, pneumatic release calipers.

SSGD-250 drawworks is a single speed, gear driven drawworks rated at 1,500 HP driven by a single AC drilling motor. Because of its low weight and compact size, the SS GD-250 is easy to transport, making it ideal for land rigs. Service braking is achieved using the AC motor which is also the prime mover. Emergency brakes (2) are spring applied, hydraulic release calipers. The SS GD-250 is provided with a dedicated HPU for brake operation.

### DSGD-375

#### Technical Specifications

**DESIGN DATA**

- Max hook load: 8 lines 250 sT (226.8 mT)
- Max hook load: 6 lines 191 sT (173.3 mT)
- Max block speed: 8 lines 305 fpm @ 60,000 lbs (1.55 m/s @ 725 kN)
- Weight: 71,309 lbs (32,345 kg)
- Dimensions (LxWxH): 221.0" x 137" x 117.6" (561.3 cm x 348 cm x 298.7 cm)
- Wire rope diameter:
- Drum size: 36" x 71" (91.4 cm x 180.3 cm)
- Drum diameter @ root of grooving: 26.5" (67.3 cm)
- Continuous power: 1,500 Hp
- Intermittent power: 1,800 HP
- Lube pump rating: 22 GPM @ 150 PSI
- Oil sump capacity: 226 US GAL. (857 L)
- Skid dimensions (L x W): 221" x 108" (561.3 cm x 274.3 cm)

#### GEAR RATIO

- Overall gear ratios: 9:1

#### BRAKES

- Number of brake discs: 2
- Brake disc cooling method: Air cooling
- Brake disc diameter: 72" (182.9 cm)
- Brake disc thickness: 4" (10.2 cm)

#### DRILLING MOTOR

- Type: NOV CM632UUT
- Number of motors: 1
- HP per motor: 1,500

### SS GD-250

#### Technical Specifications

**DESIGN DATA**

- Max hook load: 12 lines 375 sT (340.2 mT)
- Max hook load: 10 lines 318.5 sT (288.9 mT)
- Weight: 68,746 lbs (31,183 kg)
- Dimensions (LxWxH): 282.4" x 163.1" x 105.4" (717.3 cm x 414.3 cm x 267.7 cm)
- Wire rope size: 1-1/16"
- Maximum ambient temperature: 104°F (40°C)
- Drum size: 27" x 56" (68.6 cm x 142.2 cm)
- Drum diameter @ root of grooving: 28" (71.1 cm)
- Continuous power: 1,500 Hp
- Intermittent power: 1,800 HP
- Lube pump rating: 19 gpm @ 250 PSI (72L/min @ 1,724 kPa)
- Oil sump capacity: 100 US Gal. (379 L)
- Skid dimensions (L x W): 282.4" x 130" (717.3 cm x 330.2 cm)

#### GEAR RATIO

- High gear: 7.99:1
- Low gear: 11.95:1

#### BRAKES

- Number of brake discs: 2
- Brake disc cooling method: Air cooling
- Brake disc diameter: 60" (152.4 cm)
- Brake disc thickness: 4" (10.2 cm)

#### DRILLING MOTOR

- Type: NOV CM632UUT
- Number of motors: 1
- HP per motor: 1,500
Compact Drive Systems

Compact Drive System - Liquid Cooled

Features:
- Onboard pre-charge circuitry
- 6/12/18/24 pulse configurable
- Reduced height and footprint to fit any tight space
- Reserve cooling tank
- Isolation between modules for easy diagnostics
- Induction / PM switchable firmware
- Modular design and configure flexibility
- Excellent serviceability and accessibility
- Proven interface with NOV control and machinery

The Compact Drive LC (Liquid Cooled) systems share all the features with Drill Force LC systems but with a reduced height and footprint. The systems still offer the best reliability and seamless integration with NOV control systems and machinery. NOV proprietary liquid cooling design provides the best cooling capacity and redundancy. High thermal dissipation guarantees the continuous drilling and breaking operations without thermal failures.

Compact Drive Systems - Air Cooled

Features:
- Onboard pre-charge circuitry
- Dedicated VFD sections for each drilling equipment
- Reduced height and footprint to fit any tight space
- Induction / PM switchable firmware
- Modular design and configure flexibility
- Excellent serviceability and accessibility
- Proven interface with NOV control and machinery

The Compact Drive AC (Air Cooled) Systems have reduced height and footprint to meet the most confined switchgear room design. With reduced size, the compact drives still keep the reliability and integration with NOV control systems and machinery. Dedicated VFD sections provide more configurable products and flexibility to arrange the VFD sections for different layouts.

Compact Drive LC Specifications

<table>
<thead>
<tr>
<th>DC Bus Rating</th>
<th>Rectifier Size</th>
<th>Output Power</th>
<th>Rated Temperature</th>
<th>Min. Press. Range</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4000/8000 A</td>
<td>3200 A</td>
<td>560/1120/1600 kW</td>
<td>40 / 45° C</td>
<td>28-60 psi</td>
<td>CE C440-1</td>
</tr>
<tr>
<td>Peak Fault Bracing</td>
<td>Chopper Voltage</td>
<td>Continuous Current</td>
<td>0.5 A/V</td>
<td>900/1000/1100V</td>
<td>0.5 A/V</td>
</tr>
<tr>
<td>System IP Rating</td>
<td>Chopper Continuous Power</td>
<td>Overload Current</td>
<td>0.5 A/V</td>
<td>900/1000/1100V</td>
<td>0.5 A/V</td>
</tr>
<tr>
<td>N42 / IP 20</td>
<td>1200/1400 kW</td>
<td>93/178/353 A</td>
<td>Bottom/Top</td>
<td>0°C</td>
<td>225 kW / 765 Btu/hr</td>
</tr>
</tbody>
</table>

Compact Drive AC Specifications

<table>
<thead>
<tr>
<th>DC Bus Rating</th>
<th>Rectifier Size</th>
<th>Output Power</th>
<th>Rated Temperature</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4000/8000 A</td>
<td>2500 A</td>
<td>450/900/1400 kW</td>
<td>40 / 45° C</td>
<td>CE C440-1</td>
</tr>
<tr>
<td>Peak Fault Bracing</td>
<td>Chopper Voltage</td>
<td>Continuous Current</td>
<td>0.5 A/V</td>
<td>900/1000/1100V</td>
</tr>
<tr>
<td>System IP Rating</td>
<td>Chopper Continuous Power</td>
<td>Overload Current</td>
<td>0.5 A/V</td>
<td>900/1000/1100V</td>
</tr>
<tr>
<td>N42 / IP 20</td>
<td>1200/1400 kW</td>
<td>72/144/222 A</td>
<td>Bottom/Top</td>
<td>0°C</td>
</tr>
</tbody>
</table>
Description

Effortlessly monitor your well site with one robust, low maintenance, and extensible wireless system. Pharos is an intrinsically safe, modular, low-power and efficient wireless data-acquisition (DAQ) system that monitors many applications, and is especially suited to those difficult-to-instrument regions and tools. Patent pending technology optimizes battery life, with every bit of capacity going toward meaningful work and automatically entering sleep mode when not in use. The modular system approach separates out the power source, radio transceivers, and sensor bus through the use of connectorized, quick-disconnect cabling.

Features
• Wireless data acquisition
• Low power requirements
• Long battery life
• Quick start up in all temperatures
• Reliable long range signal
• Easy to incorporate new signals
• Intrinsically safe
• Modular
• Quick-disconnect cabling

Applications
• Encoder position
• Inclination angle
• Proximity sensing
• Vibration monitoring
• Shock monitoring
• Torque/bending/hookload sensing
• Load-pin monitoring
• Pressure sensing

Radio Node
Each radio node comes equipped with one unamplified transceiver and one amplified transceiver for additional range. If even more range is needed, flash an additional radio node with Repater™ software and insert as many repeaters as needed to make sure the signal is strong. Each radio node contains internal low-power sensors, including two 3-axis accelerometers, a 3-axis gyroscope, a temperature sensor, a primary battery fuel gauge, and a proximity sensor on each face of the device. It also has an external connector with a multi-functional GPIO and the ability to power and communicate with external sensors on the RS485 BUS.

Battery Pack

Power & Communications J-Box

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*For reference only, please contact your local sales contact for more information.
### Technical Specifications

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>MIN</th>
<th>NOMINAL</th>
<th>MAX</th>
<th>UNITS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATTERY PACK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage Output: 3.6 - 3.9 V Voltage output of battery pack</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current Output: 400 - 625 μA Current of power source</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td></td>
<td>3.6</td>
<td>mA</td>
<td>Power Output: 0 - 15 mA Power of the battery pack</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Capacity: 65,536 Current rollover count</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>5.1</td>
<td>Ω</td>
<td>Voltage Input: 3.3 - 5.5 V Required input voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Resolution: 1024 ppr Encoder angular resolution, 10-bit</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
<td>50</td>
<td>Ω</td>
<td>Current Input: 10 - 50 mA Typical supply current</td>
</tr>
<tr>
<td>RF COMMUNICATIONS J-BOX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage Output: 4.95 - 5.491 V Output voltage of power barrier</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>30</td>
<td>V</td>
<td>Voltage Input: 20 - 24 V Required input voltage to Radio Node</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current Output: 100 mA Current output of TP S61222 on pin 5, used to power sensor BUS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ADXL362 Range: +/- 2 - +/- 8 g Range of ADXL362 digital MEMs 3-axis accelerometer, 12-bit resolution</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ADXL362 Data Rate: 12.5 - 400 Hz Sample and data output rate of ADXL362</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FXAS21002C Range: +/- 250 - +/- 2000 deg/s Range of FXAS2100C digit al MEMs 3-axis gyroscope, 16-bit resolution</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ADXL375 Data Rate: 0.1 - 3200 Hz Sample and data output rate of ADXL375</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Temperature Sensor: -40 - 125°C Range of temperature sensor</td>
</tr>
<tr>
<td>Pilot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Low Power) Absolute, Multi-turn encoder</td>
</tr>
<tr>
<td>Battery Box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current Output (Nominal): 4 - 5 mA Current output of encoder</td>
</tr>
<tr>
<td>PSU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current Output (Nominal): 4 - 5 mA Current output of encoder</td>
</tr>
<tr>
<td>Battery Power (Negative)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current Output (Nominal): 4 - 5 mA Current output of encoder</td>
</tr>
<tr>
<td>Sensor Power (Positive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current Output (Nominal): 4 - 5 mA Current output of encoder</td>
</tr>
<tr>
<td>Breakout</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Breakout: 30 - 594 ppr Encoder digital resolution, 18-bit</td>
</tr>
<tr>
<td>Turbo Barrier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Turbo Barrier: 85 - 3500 mm Turbofrictional behavior</td>
</tr>
<tr>
<td>POWER &amp; COMMUNICATIONS J-BOX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage Output: 20 - 24 V Voltage output of Power &amp; Communications J-Box</td>
</tr>
<tr>
<td></td>
<td>4.5</td>
<td></td>
<td>5</td>
<td>V</td>
<td>Voltage Output: 4.5 - 5.1 V Voltage output of power barrier</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td></td>
<td>4</td>
<td>Ω</td>
<td>Current Input: 100 mA Typical supply current</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>342</td>
<td>μA</td>
<td>Current Output: 342 μA Tip current of power barrier</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td></td>
<td>10</td>
<td>W</td>
<td>Power Output: 1.2 - 10 W Tip power of power barrier</td>
</tr>
</tbody>
</table>

### Hazardous Location Specifications

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>EXPLOSION-PROOF MARKINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATTERY PACK</td>
<td>Class 1, Division 1, Groups C-D, T4, Ex ia IIB T4 Ga</td>
</tr>
<tr>
<td></td>
<td>Class 1, Division 1, Groups C-D, T4, Ex ia IIB T4 Ga</td>
</tr>
<tr>
<td></td>
<td>Class 1, Division 2, Groups C-D, T4, Ex ib Gb</td>
</tr>
<tr>
<td></td>
<td>North America: II 3 (2) G Ex nA [ib Gb] IIB T4 Gc</td>
</tr>
<tr>
<td></td>
<td>North America: II 3 (1) G Ex nA [ia Ga] IIB T4 Gc</td>
</tr>
<tr>
<td>ENCODER</td>
<td>Class 1, Division 1, Groups C-D, T4, Ex ia IIB T4 Ga</td>
</tr>
<tr>
<td></td>
<td>Class 1, Division 2, Groups C-D, T4, Ex ib Gb</td>
</tr>
<tr>
<td></td>
<td>North America: II 3 (2) G Ex nA [ib Gb] IIB T4 Gc</td>
</tr>
<tr>
<td></td>
<td>North America: II 3 (1) G Ex nA [ia Ga] IIB T4 Gc</td>
</tr>
<tr>
<td>POWER &amp; COMMUNICATIONS J-BOX</td>
<td>Class 1, Division 1, Groups C-D, T4, Ex ia IIB T4 Ga</td>
</tr>
<tr>
<td></td>
<td>Class 1, Division 2, Groups C-D, T4, Ex ib Gb</td>
</tr>
<tr>
<td></td>
<td>North America: II 3 (2) G Ex nA [ib Gb] IIB T4 Gc</td>
</tr>
<tr>
<td></td>
<td>North America: II 3 (1) G Ex nA [ia Ga] IIB T4 Gc</td>
</tr>
</tbody>
</table>
Amphion is National Oilwell Varco’s modular, fully integrated, networked, and field-proven drilling control solution delivered in a compact, comfortable, and cost-effective package. Amphion manages, controls, and monitors rig floor equipment to ensure safe, efficient and seamless operations. Configurable, expandable and with a future-looking platform, the Amphion control system adds value to your operations.

Amphion-FE

General Features:
- Integrated Talkback system
- Integrated CCTV system
- Optional cabin control integration (HVAC, wipers, lighting, etc.)
- Integrated drilling instrumentation through RigSense/MSI
- Up to four touchscreens for monitoring and control
- Adjustable touchscreen position

Chair Features:
- Durable leather material
- Removable seat cover
- Adjustable pedestal support
- T-position electric adjustments including height, rotation, setback angle and lumbar support

Control Features:
- Ergonomic joystick control
- Integrated control buttons and knobs
- Optional trackball for remote HMI control
- Emergency stop button(s)
- Multiple levels of redundancy
- Intuitive and user-friendly graphic interface
- Touchscreens with fast response time
- User selectable information displays
- Multiple language options
- Selectable units of measure
- Alarms and diagnostic screens

Amphion-WAW

General Features:
- Integrated CCTV system
- Electric weight indicator
- Optional cabin control integration (HVAC, wipers, lighting, etc.)
- Integrated drilling instrumentation through RigSense/MSI
- Up to four touchscreens for monitoring and control
- Adjustable touchscreen position

Chair Features:
- Durable leather material
- Removable seat cover
- Pedestal support
- Swing chair for sit/stand operation
- T position adjustments including height, rotation, setback angle and lumbar support

Control Features:
- Emergency stop button(s)
- Ergonomic joystick control
- Integrated control buttons and knobs
- Multiple levels of redundancy
- Intuitive and user-friendly graphic interface
- Touchscreens with fast response time
- User selectable information displays
- Multiple language options
- Selectable units of measure
- Alarms and diagnostic screens

Amphion-SUW

General Features:
- Integrated CCTV system
- Electric weight indicator
- Optional cabin control integration (HVAC, wipers, lighting, etc.)
- Integrated drilling instrumentation through RigSense/MSI
- Up to four touchscreens for monitoring and control
- Adjustable touchscreen position

Chair Features:
- Durable leather material
- Removable seat cover
- Pedestal support
- Swing chair for sit/stand operation
- T position adjustments including height, rotation, setback angle and lumbar support

Control Features:
- Ergonomic joystick control
- Integrated control buttons and knobs
- Emergency stop button(s)
- Intuitive and user-friendly graphic interface
- Touchscreens with fast response time
- User selectable information displays
- Multiple language options
- Selectable units of measure
- Alarms and diagnostic screens
Pressure Control Equipment

34. 6012 BOP
35. LXT BOP
36. SBOP
The 6012 Ram Type BOP is a rugged and powerful BOP capable of operating in a wide range of service conditions. Harsh chemical environments and extreme temperatures have little effect. The 6012 comes standard with a proven trim package that includes Xylan coating in the through bores, ram cavities and all wellbore wetted surfaces, 625 Nickel alloy inlay is included in all ring grooves, and hard plating on dynamic sealing surfaces.

The 6012 can also be outfitted with large bore bonnets and tandem boosters in conjunction with SBRs or the Model 6000 Shear Blind Rams. The unit comes standard with manual locking screws to ensure ram position in event of hydraulic pressure loss.

The 6012 offers a variety of options
- Size range from 7" to 26 ¾"
- Configurable body
- Double and Single body
- Shearing options

Standard Offering
- 625 nickel alloy
- Xylan coating on all wellbore wetted surfaces
- Hard plating on dynamic sealing surfaces
- Hydraulic operation

Available Bonnet Options
- Standard fixed pipe and casing rams bonnets
- Shearing bonnets
- Shearing bonnets with tandem boosters
- Shear all bonnet

Available Ram Options
- Pipe and casing rams
- VBR
- SBR
- 6000
- SAR

13'' Shown, All other sizes (7'', 11'', 16'', 20'', 21'', 26'') available upon request.

Hydraulic Operating Data

<table>
<thead>
<tr>
<th>Size</th>
<th>Working Pressure (lb/in²)</th>
<th>Gals to open</th>
<th>Gals to close</th>
<th>Clos. ratio</th>
<th>Gals to open</th>
<th>Gals to close</th>
<th>Clos. ratio</th>
<th>Shearing ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-5/8''</td>
<td>5000</td>
<td>6.6</td>
<td>6.6</td>
<td>7.8:1</td>
<td>10.5</td>
<td>17.9</td>
<td>10.8:1</td>
<td>17.8:1</td>
</tr>
</tbody>
</table>

SINGLE - 13-5/8'' 10M

<table>
<thead>
<tr>
<th>Size</th>
<th>STD 'W'</th>
<th>STD 'H'</th>
<th>STD 'D'</th>
<th>STD 'E'</th>
<th>STD 'F'</th>
<th>STD 'G'</th>
<th>STD 'H'</th>
<th>STD 'D'</th>
</tr>
</thead>
<tbody>
<tr>
<td>13''</td>
<td>3000</td>
<td>5.3</td>
<td>5.1</td>
<td>6.1</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

DOUBLE - 13-5/8'' 10M
7-5/8'' 3/5K & 10K LXT Ram BOP Specifications

**Technical Specifications**

<table>
<thead>
<tr>
<th></th>
<th>Single</th>
<th>Double</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bore Size</strong></td>
<td>7''</td>
<td>7''</td>
</tr>
<tr>
<td><strong>Working Pressure</strong></td>
<td>5,000 psi</td>
<td>5,000 psi</td>
</tr>
<tr>
<td><strong>Piston Size</strong></td>
<td>5''</td>
<td>5''</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF/F</td>
<td>34.625''</td>
<td>39.625''</td>
</tr>
<tr>
<td>FS/F</td>
<td>26.25''</td>
<td>29.625''</td>
</tr>
<tr>
<td>S/F</td>
<td>18''</td>
<td>22''</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>42''</td>
<td>42''</td>
</tr>
<tr>
<td><strong>Length (handle to handle)</strong></td>
<td>128.25''</td>
<td>115.83''</td>
</tr>
<tr>
<td><strong>Gallons to Open (1 set)</strong></td>
<td>4.86 gallons</td>
<td>12.63 gallons</td>
</tr>
<tr>
<td><strong>Gallons to Close (1 set)</strong></td>
<td>5.12 gallons</td>
<td>12.88 gallons</td>
</tr>
</tbody>
</table>

**Benefits:**
- Smaller dimension (length and height)
- Lighter weight
- Improved safety (no hammering bolts in confined areas)
- Quicker ram changes
- Easy ram access for faster and easier ram servicing
- Standard HGS service
- Most models compatible with Low Force Shears

**11-3/4'' LXT**

**Technical Specifications**

<table>
<thead>
<tr>
<th></th>
<th>Single</th>
<th>Double</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bore Size</strong></td>
<td>13-5/8''</td>
<td>13-4/8''</td>
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<tr>
<td><strong>Working Pressure</strong></td>
<td>5,000 psi</td>
<td>10,000 psi</td>
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<tr>
<td><strong>Piston Size</strong></td>
<td>10''</td>
<td>15.25''</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF/F</td>
<td>34.12''</td>
<td>44.87''</td>
</tr>
<tr>
<td>FS/F</td>
<td>25.38''</td>
<td>36.75''</td>
</tr>
<tr>
<td>S/F</td>
<td>16.63''</td>
<td>24.87''</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>26.88''</td>
<td>26.38''</td>
</tr>
<tr>
<td><strong>Length (handle to handle)</strong></td>
<td>80.38''</td>
<td>71.58''</td>
</tr>
<tr>
<td><strong>Gallons to Open (1 set)</strong></td>
<td>2.46 gallons</td>
<td>2.46 gallons</td>
</tr>
<tr>
<td><strong>Gallons to Close (1 set)</strong></td>
<td>2.80 gallons</td>
<td>2.80 gallons</td>
</tr>
</tbody>
</table>

**Benefits:**
- Smaller dimension (length and height)
- Lighter weight
- Improved safety (no hammering bolts in confined areas)
- Quicker ram changes
- Easy ram access for faster and easier ram servicing
- Standard HGS service
- Most models compatible with Low Force Shears

**11-10M LXT**

**Technical Specifications**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Bore Size</strong></td>
<td>11''</td>
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<tr>
<td><strong>Working Pressure</strong></td>
<td>5,000 psi</td>
<td>5,000 psi</td>
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<tr>
<td><strong>Piston Size</strong></td>
<td>8.5''</td>
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<tr>
<td><strong>Height</strong></td>
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<td>FF/F</td>
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<td>FS/F</td>
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<td>S/F</td>
<td>18.68''</td>
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<td><strong>Width</strong></td>
<td>26.50''</td>
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<td><strong>Length (handle to handle)</strong></td>
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<td>71.58''</td>
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<tr>
<td><strong>Gallons to Open (1 set)</strong></td>
<td>2.46 gallons</td>
<td>2.46 gallons</td>
</tr>
<tr>
<td><strong>Gallons to Close (1 set)</strong></td>
<td>2.80 gallons</td>
<td>2.80 gallons</td>
</tr>
</tbody>
</table>

**Benefits:**
- Smaller dimension (length and height)
- Lighter weight
- Improved safety (no hammering bolts in confined areas)
- Quicker ram changes
- Easy ram access for faster and easier ram servicing
- Standard HGS service
- Most models compatible with Low Force Shears
To accommodate a wide range of sizes and pressures, the Shaffer™ Spherical BOP comes in two different configurations - bolted cover and wedge cover:

- Rugged, reliable sealing element provides positive seal after hundreds of tests to full working pressure.
- Strong, simple construction — only five major parts.
- Compact body saves space. Height is 15 to 20% less than height of some other annular BOPs.
- Simple hydraulic system. Only two hydraulic connections are needed.
- Wear rings on moving parts prevent metal-to-metal contact. This feature prolongs preventer life.
- Suitable for H2S service. Standard models are suitable for internal H2S service, and simple bolt and lifting shackle changes convert them for external H2S service.
- Servicing is easy. Element can be changed without getting mud or grit into the hydraulic system.
- Steel segments reinforce sealing element but do not protrude into well bore when element is open.
- Element design provides long stripping life.

---

### Working Pressure

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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<tbody>
<tr>
<td>10,000</td>
<td>X</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td>3,000</td>
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<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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### Bolted Cover Configuration

- Nut
- Stud
- Shackle
- Upper Housing
- Packing Element
- Sealing Element
- Sealing Element OD
- Adapter Ring
- Piston
- Wear Ring
- Wear Piston OD
- Wear Piston Upper ID
- Wear Piston Lower ID
- Lower Housing
- Hydraulic Ports

### Wedge Cover Configuration

- Nut
- Stud
- Locking Ring
- Locking Segment
- Screw
- Key
- Upper Housing
- Packing Element
- Sealing Adapter Top
- Sealing Adapter OD
- Sealing Adapter Upper ID
- Sealing Adapter Lower ID
- Piston
- Wear Ring
- Wear Piston OD
- Wear Piston Upper ID
- Wear Piston Lower ID
- Screw
- Lifting Eye
- Shackle
- Upper Housing
- Adapter Ring
- Piston
- Lower Housing
- Hydraulic Ports

---

**Estimated Weight W/ Element**

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stud Flange</td>
<td>17,518 lbs (7,946 kg)</td>
</tr>
</tbody>
</table>

---

**Wellbore Characteristics**

- Working Pressure: 5,000 PSI (341 Bar)
- Test Pressure: 7,500 PSI (518 Bar)

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**Hydraulic Operator Characteristics**

- Working Pressure: 1,500 PSI (103 Bar)
- Test Pressure: 2,250 PSI (155 Bar)
- Volume to open: 14.59 gallons (55.2 liters)
- Volume to close: 25.56 gallons (96.8 liters)
- Hydraulic Connections: 1 1/2” Female NPT

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*For reference only, please contact your local sales contact for more information.*
Pumping and Circulation

38. 12-P160 Triplex Mud Pump
39. Brandt Centrifuges
40. Brandt Shakers
41. Brandt Shaker screens
42. Brandt Agitators
National Oilwell Varco’s 12-P-160 Mud Pump provides smooth performance. It’s construction is robust and durable for use in most environments. The 12-P-160 is rated @ 1,600 input horsepower (1,193 kW) at 120 strokes per minute with a 12 inch (304 mm) stroke. Multiple liner sizes allow pressure and volume to handle circulation in deep drilling applications.

The mud pumps advanced fluid end design gives exceptionally smooth triplex performance. In addition, this unique design facilitates last inspection and easy servicing. Compact engineering provides higher efficiency in less space. The pump’s light weight and flexible design makes it easily adaptable to varied rig configurations. This provides flexibility as drilling requirements and conditions change.

Power End
- Fabricated steel frame construction
- One-piece forged steel construction crankshaft, connecting rod and piston shaft
- Adaptability to a variety of drive arrangements on either sides or on both sides
- Premium roller bearings to enhance smooth performance and efficiency
- Pressurized lubrication system

Belt Drive
- Belt life in excess of 10 years delivers an effective drive solution with the lowest cost of ownership in the industry
- No requirement for lube oil filter, cables, cable trays, MCC cubicles, starters

Forged Steel Crankshaft
- One piece forged steel crankshaft with pressed fit bearing journals
- Naturally balanced for smooth running
- No casting
- No welding

Optional Accessories
- Hyd-LIGHT™ piston rod
- BLack-JAK™ Torque master quick change valve cover retention tool
- Pneumatic pump rotation tool

Warranties
- The standard module carries a three-year, 100% warranty against cracking
- The premium module has a four-year, 100% warranty against cracking
- Crankshaft carries a seven year limited warranty

Quiet Blower
- 3000 scfm Quiet Blower eliminates approximately 82 dba

Condition Monitoring
- Local display graphs the pump power end vibrations and temperatures
- Trending of pump data to identify and predict maintenance needs
- Can also be used to record pumping data (strokes per minute), which can be exported via flash card to rig computer

Performance 12-P-160

<table>
<thead>
<tr>
<th>Technical Specifications</th>
<th>Technical Marketing Sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fluid End Modules</strong></td>
<td></td>
</tr>
<tr>
<td>NOV offers a choice of fluid end modules and valve covers for 12-P-160 pump model to select the fluid end module that exactly matches the drilling requirements. The 12-P-160 can be equipped with either the standard or premium forged, two-piece interchangeable fluid ends.</td>
<td></td>
</tr>
<tr>
<td>• Cold worked for longer life - The internal bores of the standard modules are shot peened. The premium modules have auto-fretted bores.</td>
<td></td>
</tr>
<tr>
<td>• The benefits of these processes are increased module fatigue life and greater resistance to stress corrosion cracking</td>
<td></td>
</tr>
<tr>
<td>• High pressure modules</td>
<td></td>
</tr>
</tbody>
</table>

**Fluid End key features**
- Two-piece modular cylinder design is completely interchangeable between modules
- Fast Change™ screw-type valve covers, which facilitate quick removal and installation are currently standard
- Suction manifold can be equipped with front or side inlet connections
- Discharge piping connects from either side
- Piston and liner chambers are easily accessible and fully open
- Two-piece piston rod construction allows removal of pistons without disturbing liner
- Easy-to-operate clamps give positive locking for liners and piston rod assemblies
- Spray system cools and lubricates piston and liner surfaces

**Technical Information**
- Weight, Reefer center of three deck sections, inches (cm) 56 (142)
- Height, Reefer center of deck sections, inches (cm) 69 (175)
- Overall length of deck section, inches (cm) 209 (530)
- Minimum deck opening height, inches (cm) 13 (33)
- Weight, Reefer top of gear case, inches (cm) 51 (129)
- Weight, Shipboard (gear case, inches (cm) 62 (157)
- Maximum input horsepower (kW) 1600 (1193)
- Rated pump speed, rpm 120
- Maximum fluid cylinder bore size, inches (cm) 8 (20)
- Discharge connection, psi (kPa) 10,000 (690)
- Suction connection, psi (kPa) 100 (700)
- Height complete, less flange, lbs. (kg) 54,700 (24,810)

**Performance 12-P-160**

<table>
<thead>
<tr>
<th>Pressure (psi)</th>
<th>Liner size</th>
<th>Gallons Per Minute (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>297</td>
<td>PSI 400</td>
<td>297</td>
</tr>
<tr>
<td>367</td>
<td>PSI 500</td>
<td>367</td>
</tr>
<tr>
<td>529</td>
<td>PSI 600</td>
<td>529</td>
</tr>
<tr>
<td>621</td>
<td>PSI 700</td>
<td>621</td>
</tr>
<tr>
<td>720</td>
<td>PSI 800</td>
<td>720</td>
</tr>
<tr>
<td>772</td>
<td>PSI 900</td>
<td>772</td>
</tr>
</tbody>
</table>

*Both 4,500 psi and 5,000 psi are available*
**HS-2172**

### Description
The HS-2172 series centrifuge uses high G-forces to separate fine solids from liquid. The HS-2172 centrifuge is able to exert up to 2,684 G's on the drilling fluid.

### Technical Specifications
- **Part number**: 20690
- **Water capacity**: 550 gpm (2082 lpm)
- **Weight**: 15500 lbs (7031 kg)
- **Bowl diameter**: 21 in (533 mm)
- **Bowl length**: 72 in (1829 mm)
- **Bowl speed**: 3000 max; 2400 typical
- **Drive**: VFD
- **G-Force**: 2684

**Dimensions**: 174 in x 84 in x 47 in (4400 mm x 2134 mm x 1168 mm)

**Main drive (bowl)**: 150 hp

**Back drive (conveyor)**: 40 hp

**Beach angle**: 5°

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**HS-1960**

### Description
The HS-1960 series centrifuge uses high G-forces to separate fine solids from liquid. The HS-1960 centrifuge is able to exert up to 2,480 G's on the drilling fluid.

### Technical Specifications
- **Part number**: 20000
- **Water capacity**: 350 gpm (1325 lpm)
- **Weight**: 11600 lbs (5262 kg)
- **Bowl diameter**: 19.4 in (493 mm)
- **Bowl length**: 60 in (1524 mm)
- **Bowl speed**: 3000 max; 2400 typical
- **Drive**: VFD
- **G-Force**: 2480

**Dimensions**: 180 in x 83 in x 44 in (4572 mm x 2108 mm x 1118 mm)

**Main drive (bowl)**: 125 hp

**Back drive (conveyor)**: 40 hp

**Beach angle**: 5°

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**HS-2000**

### Description
The HS-2000 series centrifuge uses high G-forces to separate fine solids from liquid. The HS-2000M is able to exert up to 2,617 G's on the drilling fluid.

### Technical Specifications
- **Part number**: 15670
- **Water capacity**: 250 gpm (946 lpm)
- **Weight**: 8800 lbs (7031 kg)
- **Bowl diameter**: 18 in (457 mm)
- **Bowl length**: 60 in (1524 mm)
- **Bowl speed**: 3200 max; 2600 typical
- **Drive**: VFD
- **G-Force**: 2617

**Dimensions**: 172 in x 40 in x 48 in (4369 mm x 1016 mm x 1219 mm)

**Main drive (bowl)**: 75 hp

**Back drive (conveyor)**: 30 hp

**Beach angle**: 5°

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**HS-3400**

### Description
The HS-3400 series centrifuge uses high G-forces to separate fine solids from liquid. Three models are available: HS-3400FS, HS-3400VSD and HS-3400FVS. The HS-3400FVS is able to exert up to 3,180 G's on the drilling fluid.

### Technical Specifications
- **Part number**: 10849
- **Water capacity**: 200 gpm (757 lpm)
- **Weight**: 4800 lbs (2177 kg)
- **Bowl diameter**: 14 in (2177 mm)
- **Bowl length**: 49.5 in (1257 mm)
- **Bowl speed**: 3200 max; 2200 typical
- **Drive**: Fixed
- **G-Force**: 2036

**Dimensions**: 98 in x 69 in x 44 in (2489 mm x 1753 mm x 1118 mm)

**Main drive (bowl)**: 40 hp

**Back drive (conveyor)**: N/A

**Beach angle**: 10°
**VSM 300™**

**Description**
The VSM 300 is a balanced elliptical motion, fine screen shaker which utilizes three screen decks, an integrated scalping deck, a primary fine screen deck and a drying deck. This unit is ideal for offshore and clay/gumbo formations, it is an extremely simple machine to operate requiring little maintenance. The primary screen deck employs a PNEUMOSEAL™ bladder system for securing the screens. The screen changes can be carried out in 2-3 minutes by one operator. This unit has a fixed deck angle of 0° in the feed zone and 7° on the incline screen ramp. No adjustments are required.

**Technical Specifications**
- **Vibration**: Balanced Elliptical
- **Screen and Deck Type**: (4) Screws, Scalping Deck (0°), (4) Screws, Primary Deck (+7°), (2) Screws, Drying Deck (+7°)
- **Basket Angle**: Fixed
- **Special Features**: Pneumatic Screen Clamping
- **Screen Type**: Pretension Repairable
- **Deck Area**: (2754 mm x 1870 mm x 1505 mm) 20.5 ft² (1.9 m²)
- **G-Force**: 5.3-6.3-7.3 G's
- **Motor Data**: (2) 4.0 hp (3.0 kw)
- **Screen Type**: Pretension Repairable
- **Basket Angle**: Adjustable (0° to +7°)
- **Special Features**: Pneumatic Basket Adjustment
- **Screen Type**: Pretension Repairable
- **Deck Area**: (3077 mm x 1711 mm x 1600 mm) 32.1 ft² (2.9 m²)
- **Weight**: 5370 lbs (2436 kg)
- **Dimensions**: 108 in x 74 in x 59 in
- **Weir Height**: 39 in. (991 mm)
- **Motor Data**: (2) 4.0 hp (3.0 kw)
- **Screen Type**: Pretension Repairable
- **Basket Angle**: Adjustable (0° to +7°)
- **Special Features**: Pneumatic Basket Adjustment
- **Screen Type**: Pretension Repairable
- **Deck Area**: (3077 mm x 1711 mm x 1600 mm) 32.1 ft² (2.9 m²)
- **Weight**: 5370 lbs (2436 kg)
- **Dimensions**: 108 in x 74 in x 59 in
- **Weir Height**: 39 in. (991 mm)
- **Motor Data**: (2) 4.0 hp (3.0 kw)

**KING COBRA™ VENOM™**

**Description**
The KING COBRA VENOM is a fine screen shaker with several motor/ starter options producing linear or tuned elliptical motion. The KING COBRA VENOM provides a lower profile than the KC Hybrid shaker. It utilizes CONSTANT-G CONTROL technology which increases the shakers G-Force during drilling operations to optimize capacity and finer screening. The shaker is almost always located at the flow line unless it is preceded by a "scraping" or gumbo separator. The shaker removes a large percentage of drill cuttings before the mud is circulated through the surface mud system. It is ideal for offshore and workover projects. The shaker is almost always located at the flow line unless it is preceded by a "scraping" or gumbo separator. The shaker removes a large percentage of drill cuttings before the mud is circulated through the surface mud system, leading to improved performance of downstream solids control equipment.

**Technical Specifications**
- **Vibration**: Linear and tuned elliptical
- **Screen and Deck Type**: (2) Screws Contour Plus (0°, +5°, +5°, +5°)
- **Basket Angle**: Adjustable (0° to +7°)
- **Special Features**: PNEUMOSEAL™ bladder system for securing the screens
- **Screen Type**: Pretension Repairable
- **Deck Area**: 26.3 ft² (2.4 m²)
- **G-Force**: 8.0 G’s - 3.5 hp
- **G-Force**: 7.4 G’s- 2.5 hp “High-G” option
- **G-Force**: 6.1 G’s - 2.5 hp Fixed nominal
- **G-Force**: 7.3 -8.3 G optimal - 3.5 hp
- **Deck Area**: 26.3 ft² (2.4 m²)
- **Motor Data**: (2) 3.5 hp (2.6 kw)
- **Motor Data**: (2) 3.5 hp (2.6 kw) each - Standard
- **Weir Height**: 34.5 in. (867 mm)
- **Dimensions**: (2657 mm x 1680 mm x 1346 mm) 26.3 ft² (2.4 m²)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)

**MINI COBRA™ 3-Panel**

**Description**
The VENOM™ is a fine screen shaker with several motor/ starter options producing linear motion. The VENOM™ is a smaller footprint and weir height design shaker for smaller land and workover rigs. The shaker is almost always located at the flow line unless it is preceded by a “scraping” or gumbo separator. The shaker removes a large percentage of drill cuttings before the mud is circulated through the surface mud system, leading to improved performance of downstream solids control equipment.

**Technical Specifications**
- **Vibration**: Linear
- **Screen and Deck Type**: (2) Screws (0°, +5°, +5°)
- **Basket Angle**: Adjustable (0° to +7°)
- **Special Features**: N/A
- **Screen Type**: Pretension Repairable
- **Deck Area**: 25.4 ft² (2.4 m²)
- **G-Force**: 6 Nominal
- **Motor Data**: (2) 2.5 hp (1.9 kw)
- **Motor Data**: 2.5 hp (1.9 kW) each - Standard
- **Weir Height**: 24 in. (610 mm)
- **Dimensions**: (2657 mm x 1680 mm x 1346 mm) 26.3 ft² (2.4 m²)
- **Telescopic Screen Angle**: Adjustable (-5° to +3°)
- **Telescopic Screen Angle**: Adjustable (-5° to +3°)
- **Telescopic Screen Angle**: Adjustable (-5° to +3°)
- **Telescopic Screen Angle**: Adjustable (-5° to +3°)
- **Telescopic Screen Angle**: Adjustable (-5° to +3°)

**KING COBRA™ HYBRID**

**Description**
The KING COBRA HYBRID shaker combines the reliable KING COBRA skid, back tank, and screen angle adjustment features with the rugged KING COBRA VENOM basket shaker. The basket’s patented CONTOUR PLUS™ design reduces the liquid pool depth to provide better conveyance of drilled solids across the screens. Configured for +0° at the feed panel and +5° on the remaining panels, the CONTOUR PLUS design minimizes basket angle elevation and achieves drier solids and increased screen life by decreasing the mud pool weight over the screens.

**Technical Specifications**
- **Vibration**: Linear or Dual
- **Screen and Deck Type**: (4) Screws (0°, +5°, +5°, +5°)
- **Basket Angle**: Adjustable (0° to +7°)
- **Special Features**: N/A
- **Screen Type**: Pretension Repairable
- **Deck Area**: 33.4 ft² (3.1 m²)
- **G-Force**: 6.1 G’s - 2.5 hp
- **G-Force**: 7.4 G’s- 3.5 hp “High-G” option
- **G-Force**: 8.0 G’s - 3.5 hp
- **G-Force**: 7.3 -8.3 G optimal - 3.5 hp
- **Deck Area**: 33.4 ft² (3.1 m²)
- **Motor Data**: 2.5 hp (1.9 kW) each - Standard
- **Weir Height**: 24 in. (610 mm)
- **Dimensions**: (3077 mm x 1711 mm x 1600 mm) 32.1 ft² (2.9 m²)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)
- **Telescopic Screen Angle**: Adjustable (0° to +3°)

**Optional Certifications**
- ATEX Zone 1, CE Ex II 2 G c IIB T4 Gb; Ta -20°C to +40/55°C
- ATEX Zone 1, CE Ex II 2 G c IIB T4 Gb; Ta -20°C to +40/55°C
- ATEX Zone 1, CE Ex II 2 G c IIB T4 Gb; Ta -20°C to +40/55°C
- ATEX Zone 1, CE Ex II 2 G c IIB T4 Gb; Ta -20°C to +40/55°C
- ATEX Zone 1, CE Ex II 2 G c IIB T4 Gb; Ta -20°C to +40/55°C

**Wellbore Technologies**

**BRANDT™ Shakers**

**KING COBRA™ HYBRID**

**KING COBRA™ HYBRID**
**Description**

The VENOM series shale shaker screens utilize an advanced frame design and unique mesh combinations to effectively and efficiently separate detrimental drilled solids from drilling fluid. All VENOM Screens are designed to fit all COBRA™, KING COBRA™, and LCM-3D series shakers. All VENOM Series Screens are API RP 13c Compliant.

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**Technical Specifications**

<table>
<thead>
<tr>
<th>VENOM SCREENS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Mesh</td>
</tr>
<tr>
<td>API Availability</td>
</tr>
<tr>
<td>MT Cut Point Range</td>
</tr>
<tr>
<td>MT NBOA</td>
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<tr>
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<td>FT NBOA</td>
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<td>HF Cut Point Range</td>
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<td>HF NBOA</td>
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<tr>
<td>PXL Cut Point Range</td>
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---

**VENOM™ Screens**

**VSM-300™ Screens**

**VSM™ Multi-Sizer Screens**

---

**Description**

The VSM 300 series shale shaker screens utilize an advanced frame design and unique mesh combinations to effectively and efficiently separate detrimental drilled solids from drilling fluid. All VSM 300 Series Screens are API RP 13c Compliant.

---

**Technical Specifications**

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<td>Scalper Weight</td>
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<td>Scalper Dimensions (Length)</td>
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**Technical Specifications**

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**Technical Specifications**

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<td>Scalper Weight</td>
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<tr>
<td>Scalper Dimensions (Length)</td>
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BRANDT™ Agitators

MA-20RG

Description
The MA-RG series mud agitators are horizontally mounted motor with a helical-bevel gearbox. They are heavy duty mechanical mixers used for viscous fluids such as drilling fluids. The gearbox utilizes a helical-bevel gear drive system that reduces the rotational speed of the motor to drive the impeller(s). MA-RG series agitators are very compact. Their low profile reduces headroom requirements and provides more layout space on top of the tanks. The 1:1 height to width ratio results in a lower center of gravity, providing stability and safety should the impeller encounter a sudden shock load. MA-RG agitators use a mounting skid for robust installation. They also utilize the same impellers as the VMAI Agitators, the main difference being the size and mounting configuration. Multiple sizes and locations of impeller configurations are available. MA-RG agitators are sized to meet all drilling rigs needs and have a large and successful install base worldwide.

Technical Specifications
Dimensions (less shaft and impeller)
- Length: NEMA: 46 ⅜ in (1177 mm) IEC: 46 ⅜ in (1177 mm)
- Width: NEMA: 26 in (660 mm) IEC: 26 in (660 mm)
- Height: NEMA: 20 ¼ in (512 mm) IEC: 20 ½ in (521 mm)

Weight 750 lb (340 kg)

Gearbox Helical-Bevel
- Nominal Gearbox Ratio 34:39:1
- Maximum Torque 24,780 in-lb (2,799.76 Nm)
- Impeller Shaft Diameter 3 in (76.2 mm)
- Impeller Shaft Weight 24 lb/ft (35.7 kg/m)

MA-10RG

Description
The MA-RG series mud agitators are horizontally mounted motor with a helical-bevel gearbox. They are heavy duty mechanical mixers used for viscous fluids such as drilling fluids. The gearbox utilizes a helical-bevel gear drive system that reduces the rotational speed of the motor to drive the impeller(s). MA-RG series agitators are very compact. Their low profile reduces headroom requirements and provides more layout space on top of the tanks. The 1:1 height to width ratio results in a lower center of gravity, providing stability and safety should the impeller encounter a sudden shock load. MA-RG agitators use a mounting skid for robust installation. They also utilize the same impellers as the VMAI Agitators, the main difference being the size and mounting configuration. Multiple sizes and locations of impeller configurations are available. MA-RG agitators are sized to meet all drilling rigs needs and have a large and successful install base worldwide.

Technical Specifications
Dimensions (less shaft and impeller)
- Length: NEMA: 59 in (1499 mm) IEC: 65 ¾ in (1670 mm)
- Width: NEMA: 27 ¾ in (704 mm) IEC: 23 in (582 mm)
- Height: NEMA: 26 ⅛ in (663.6 mm) IEC: 30 in (760 mm)

Weight 1300 lb (590 kg)

Gearbox Helical-Bevel
- Nominal Gearbox Ratio 31:28:1
- Maximum Torque 42,480 in-lb (4,799.6 Nm)
- Impeller Shaft Diameter 3.25 in (82.6 mm)
- Impeller Shaft Weight 28.2 lb/ft (35.7 kg/m)

MA-RGC

Description
The MA-RG-C horizontal agitator uses a triple reduction helical bevel gearbox driven by a C-face motor with a close coupling style. This variation also features a base plate instead of a mounting skid, reducing the overall height.

Technical Specifications
Dimensions
- Length: NEMA: 34 1/2 in. (876mm) NEMA: 17 in (432 mm)
- Width: NEMA: 11 1/8 in (283 mm)
- Height: NEMA: 11 1/8 in (283 mm)

Weight 340 lb (154.2 kg)

Features
- Explosion proof motors & starters (optional)
- Provides optimal mixing
- Triple reduction helical gearbox
- Baseplate mounted & motor direct mounted

Benefits
- Can be used in a variety of locations
- Lowers mud cost
- Quiet, efficient, low operational temperature
- Small footprint
- Requires less headroom

Impellers
- Available with flat blades (radial flow), contour blades (axial flow) and canted blades (radial/axial flow). The impellers are sized according to tank volume and expected duty. Active mud system compartments such as solids removal sections, mud mixing sections, and slug pits which need a higher shear force to produce immediate mixing, are another consideration in impeller sizing.

Shafts
- Several types of shafts are offered. Mild steel shafts are cut to length and joined to the gearbox output shaft with a rigid coupling. Solid shafts are keyed at the bottom for adjustment of impeller height. Hollow pipe shafts are available on select models for use in deep tanks. They are supplied in flanged sections and bolted together making them ideal when lifting height is limited.

Technical Specifications
- Explosion proof motors & starters (optional)
- Provides optimal mixing
- Triple reduction helical gearbox
- Baseplate mounted & motor direct mounted

Benefits
- Can be used in a variety of locations
- Lowers mud cost
- Quiet, efficient, low operational temperature
- Small footprint
- Requires less headroom

Impellers
- Available with flat blades (radial flow), contour blades (axial flow) and canted blades (radial/axial flow). The impellers are sized according to tank volume and expected duty. Active mud system compartments such as solids removal sections, mud mixing sections, and slug pits which need a higher shear force to produce immediate mixing, are another consideration in impeller sizing.

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Technical Specifications
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### Other Calculations

#### For Rotating Objects

\[ HP = \frac{T \times N}{5252} \]

\[ T = \text{Torque (lb-ft)} \]
\[ N = \text{Speed (rpm)} \]

#### Objects in Linear Motion

\[ HP = \frac{F \times V}{33000} \]

\[ F = \text{Force (lbs)} \]
\[ V = \text{Velocity (ft/min)} \]

#### For Pumps

\[ HP = \frac{GPM \times \text{Head} \times \text{Efficiency of Pump}}{173.3 \times \text{Efficiency of Pump}} \]

\[ GPM = \text{Gallons Per Minute} \]
\[ \text{Head} = \text{Heights of Water} \]
\[ \text{Efficiency of Pump} = 100\% \]
\[ PSI = \text{Pounds per Inch} \]

#### For Fans and Blowers

\[ HP = \frac{CFM \times P SF}{229 \times \text{Efficiency of Fan}} \]

\[ CFM = \text{Cubic Feet per Minute} \]
\[ P SF = \text{Pounds per Square Foot} \]
\[ PW = \text{Inches of Water Gauge} \]
\[ PSI = \text{Pounds per Square Inch} \]
\[ \text{Efficiency of Fan} = 100\% \]

#### Note:

- Gallons are US gallons unless otherwise specified. Barrels are 42 US gallons.
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