

PowerDrive Xcel

Rotary steerable system

APPLICATIONS

- Sidetracking
- Zone-of-exclusion (ZOE) drilling
- Geostopping
- Dogleg severity (DLS) assurance
- Extended-reach drilling (ERD)

BENEFITS

- Delivers sidetracking capabilities
- Increases geological certainty near the bit
- Provides redundant control for trajectory optimization and superior reliability
- Enables both higher DLS and smoother well profiles
- Enables longer runs in standard PowerDrive vorteX* RSS configurations

FEATURES

- Gyroscopic sensor with accelerometers and magnetometers
- Total gamma ray sensor placed near the bit
- Shock and vibration sensor to monitor downhole drilling dynamics on three axes
- Configurable bend to enable higher DLS and smoother well profiles
- Advanced inclination and azimuth autosteering to provide advanced tangent control
- Reinforced critical components for enhanced durability
- No need for lithium batteries
- Inertial directional control toggled by a downlink
- QuikDownlink* continuous-circulation downlink service

PowerDrive Xcel* RSS is part of the PowerDrive* RSS family of fully rotating steerable systems that minimize the risk of sticking. The entire family has a complete direction and inclination sensor package close to the bit for precise well placement and independently generates power for 3D steering and control.

In any drilling environment, the PowerDrive RSS family delivers the power required to place wells accurately with superior borehole quality while ensuring maximum drilling efficiency.

System redundancy for unrestricted drilling

The PowerDrive Xcel RSS was designed for use in high-profile directional drilling operations. In contrast with many RSS units, which rely on a magnetic and gravity field measurement for steering control in areas with high magnetic interference, such as drilling out of a whipstock window and close to offset wells or ferrous formations, the PowerDrive Xcel RSS provides inertial directional control in deviated sections. This feature, which can be toggled on and off by a downlink, enables tight directional control even through the magnetic ZOE. Its gyro can also be used as a redundant backup system to magnetic control.

The PowerDrive Xcel RSS also has the ability to sense magnetic and inertial stick/slip as well as shock and vibration on three axes, enabling the tool to completely monitor downhole drilling for maximum drilling performance in any environment.

Versatile and customizable

The system features automated closed loops for simultaneous inclination and azimuth and can be customized for ERD applications to optimize the curvature delivery and provide tighter control in long tangent sections. Reinforced critical components deliver greater durability for extended periods and through harsh environments. Evolving from one size fits all to an optimal configuration to maximize performance, PowerDrive Xcel RSS can be also configured to improve the curvature delivery in DLS assurance applications and to deliver on challenging environments.

The PowerDrive Xcel RSS has a gamma ray sensor placed near the bit, which enables geostopping, early identification of zones of interest, and more accurate data that enhances real-time decision making.



PowerDrive Xcel

| Specifications | | PowerDrive Xcel 675 RSS | PowerDrive Xcel 900 RSS |
|----------------------------------|--|----------------------------|----------------------------|
| Mechanical | Nominal OD, in [mm] | 6¾ [171.5] | 9 [228.6] |
| | Overall length, ft [m] | 24.93 [7.60] | 27.89 [8.50] |
| | Dogleg severity (DLS) capability, °/100 ft [°/30 m] [†] | 8 [8] | 6.5 [6.5] |
| | Hole sizes, in [mm] | 8¾–10¾ [212.7–269.9] | 12–17½ [304.8–444.5] |
| | Bit speed, rpm | 350 | 350 |
| | Maximum weight on bit, lbf [N] [‡] | 55,000 [244,652] | 75,000 [333,617] |
| | Maximum torque on bit, ft.lbf [N.m] [§] | 18,500 [25,082] | 45,000 [61,011] |
| | Maximum overpull, lbf [N] | 1,000,000 [4,448,222] | 1,000,000 [4,448,222] |
| | Passthrough (DLS sliding), ° | 15 | 12 |
| Bit connection (box) | 4½ Reg | 6¾ Reg or 7¾ Reg | |
| Hydraulics ^{§§} | Flow range, galUS/min [L/min] ^{††} | 260–805 [984–3,047] | 260–1,800 [984–6,813] |
| | Maximum mud density, lbm/galUS [kg/L] | No limit | No limit |
| | Maximum sand content, % | 2 | 2 |
| | Lost circulation material (LCM), lbm/bbl [kg/L] ^{†††} | 50 [0.19] | 50 [0.19] |
| | Acidity level, pH | 9.5–12 | 9.5–12 |
| | Oxygen, ppm | 1 | 1 |
| Pressure and temperature | Maximum temperature, degF [degC] | 302 [150] | 302 [150] |
| | Maximum pressure, psi [MPa] | 20,000 [137.9] | 20,000 [137.9] |
| Measurements ^{†††} | Inclination offset to tool bottom, ft [m] | 14.50 [4.42] | 16.20 [4.94] |
| | Azimuth offset to tool bottom, ft [m] | 12.90 [3.93] | 14.60 [4.45] |
| | Average gamma ray | Yes | Yes |
| | Gamma ray offset to tool bottom, ft [m] | 15.83 [4.82] | 10.89 [3.32] |
| | Vibration range (axial), g _n | 0–30 | 0–30 |
| | Vibration range (radial), g _n | 0–60 | 0–60 |
| | Shock range, g _n | 500 | 500 |
| | Shock and vibration axis | Triaxial | Triaxial |
| Magnetic field cone of exclusion | None | None | |
| Specifics | Automated loop | Azimuth and inclination | Azimuth and inclination |
| | Downlinking method | Flow and rpm | Flow and rpm |

[†] Value dependent on application — bit, BHA, parameters, formation type, etc.

[‡] Maximum at 0-ft.lbf torque on bit; bit recommendations should be considered.

[§] Maximum at 0-lbf weight on bit.

^{††} Universal joint will require rebuild beyond 50,000 lbf overpull at the joint.

^{†††} Dependent on mud density.

^{§§} Special configuration available for silicate muds.

^{†††} Sensor offsets and tool weight vary depending on hole size configuration.

Refer to the Schlumberger Shock and Vibration references for details regarding axial, lateral, and torsional limits of tools.

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