

POWERDRIVE ORBIT RSS

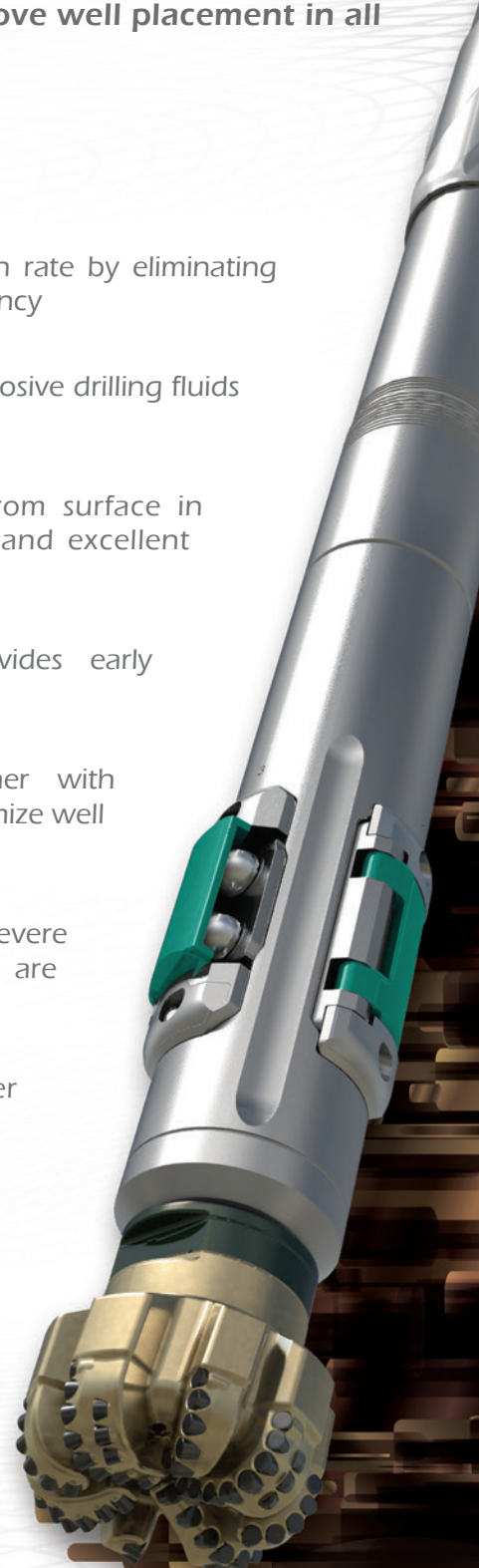
The Phoenix PowerDrive Orbit Rotary Steerable System is a performance focused push-the-bit RSS that delivers precisely positioned, high quality wellbores while ensuring maximum drilling efficiency. The PowerDrive Orbit was designed to reduce drag with full rotation, improve rate of penetration (ROP), decrease stick/slip and improve well placement in all conventional and complex environments.

BENEFITS

- ▶ Fully rotational steering system improves penetration rate by eliminating stationary components that cause friction and inefficiency
- ▶ Pad design with metal-to-metal sealing to handle corrosive drilling fluids and severe downhole conditions
- ▶ Dual downlink options to fulfill all commands from surface in any rig type, enabling real-time decision making and excellent trajectory control
- ▶ Eight-sector near-bit azimuthal gamma ray provides early identification of zones of interest
- ▶ Six-axis continuous survey measurements together with automated inclination and azimuth closed loops, optimize well placement, trajectory control and borehole quality
- ▶ Enhanced durability to operate where stick/slip, severe shock and torque and complex hydraulic systems are significant risks
- ▶ Ability to steer at high surface RPM (350) for a faster ROP and improved stick/slip control

APPLICATIONS

- ▶ High-performance drilling
- ▶ Complex fluid systems
- ▶ Extended-reach drilling



SPECIFICATIONS

Parameter	4.75"	6.75"	9.00"	
Mechanical	Nominal OD, in (mm)	4.75 (120.7)	6.75 (171.5)	9 (228.6)
	Overall Length, ft (m)	13.50 (4.11)	13.53 (4.12)	14.05 (4.28)
	Max. Dogleg Severity, $^{\circ}$ /100 ft ($^{\circ}$ /30 m) ¹	10 (10)	8 (8)	5 (5)
	Hole Sizes, in (mm)	5 $\frac{3}{4}$ –6 $\frac{3}{4}$ (146.1–171.5)	8 $\frac{1}{2}$ –8 $\frac{3}{4}$ (215.9–222.3)	12 $\frac{1}{4}$ –18 $\frac{1}{8}$ (311.2–460.4)
	Bit Speed, rpm	0–350	0–350	0–350
	Max. Weight on Bit, lbf (N) ²	31,000 (137,894)	180,000 (800,679)	370,000 (1,645,841)
	Max. Torque on Bit, ft.lbf (N.m) ³	9,000 (12,202)	18,500 (25,082)	45,000 (61,011)
	Max. Overpull, lbf (N)	340,000 (1,512,395)	1,100,000 (4,893,044)	1,800,000 *8,006,799)
	Passthrough (DLS Sliding), $^{\circ}$	30	16	10
	Bit Connection (box)	3 $\frac{1}{2}$ Reg	4 $\frac{1}{2}$ Reg	6 $\frac{5}{8}$ or 7 $\frac{5}{8}$ Reg
Hydraulics ⁵	Flow Range, gal/min (L/min) ⁴	120–355 (454–1,343)	210–970 (794–3,671)	280–2,000 (1,059–7,571)
	Max. Mud Density, lbm/gal (kg/L)	24 (2.88)	24 (2.88)	24 (2.88)
	Max. Sand Content, %	1	1	1
	Lost Circulation Material, lbm/bbl (kg/L) ⁶	35 (0.13) ⁷	50 (0.19) ⁷	50 (0.19) ⁷
	Acidity Level, pH	9.5–12	9.5–12	9.5–12
	Oxygen, ppm	1	1	1
Measurements ⁸	Max. Temperature, $^{\circ}$ F ($^{\circ}$ C)	302 (150)	302 (150)	302 (150)
	Max. Pressure, psi (MPa)	20,000 (137.9)	20,000 (137.9)	20,000 (137.9)
	Inclination Offset to Tool Bottom, ft (m)	6.93 (2.11)	7.19 (2.19)	7.81 (2.38)
	Azimuth Offset to Tool Bottom, ft (m)	9.03 (2.75)	9.39 (2.86)	10.01 (3.05)
	Azimuthal Gamma Ray	Eight Bin	Eight Bin	Eight Bin
	Average Gamma Ray	API Calibrated	API Calibrated	API Calibrated
	Gamma Ray Offset to Tool Bottom, ft (m)	6.03 (1.84)	6.39 (1.95)	7.01 (2.14)
	Vibration Range (Axial), g _n	0–35	0–35	0–35
	Vibration Range (Radial), g _n	0–75	0–75	0–75
	Shock Range, g _n	625	625	625
	Shock and Vibration Axis	Triaxial	Triaxial	Triaxial
	Magnetic Field Cone of Exclusion	None	None	None
	Automated Loop	Inc. & Azimuth	Inc. & Azimuth	Inc. & Azimuth
Downlinking Method	Flow & RPM	Flow & RPM	Flow & RPM	

¹ Value dependent on application—bit, BHA, parameters, formation type, etc.

² Maximum at 0-ft.lbf torque on bit; bit recommendations should be considered

³ Maximum at 0-lbf weight on bit

⁴ Dependent on mud density

⁵ Special configuration available for silicate muds

⁶ Depends on the type of LCM

⁷ Alternative LCM configuration available (up to 120 lbm/bbl)

⁸ Sensor offsets and tool weight vary depending on hole size configuration