Schlumberger

PowerDrive ICE

UltraHT rotary steerable system

APPLICATIONS

- Drilling of complex 3D ultraHPHT wells

BENEFITS

- Expands normal operating window to 200 degC [392 degF]
- Reduces cost by eliminating trips
- Saves time by eliminating staging procedure
- Optimizes drilling performance and enhances hole quality
- Can be rerun even after being exposed to high temperatures

FEATURES

- Proprietary ultraHT-rated electronics to 200 degC
- Innovative pad actuation design with metal-to-metal seals
- Automatic hold inclination and azimuth capability
- UltraHPHT BHA when run with TeleScope ICE* ultraHT MWD service

PowerDrive ICE* ultraHT 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.

Engineered for durability in extreme drilling conditions

The PowerDrive ICE ultraHT RSS makes advanced drilling a reality—even at 200 degC—bringing the benefits of a fully rotating system to ultraHT wells. Its ultraHT-rated proprietary electronics are ruggedized for extreme conditions to ensure reliable, uninterrupted performance. While non-HT-rated electronics can fail after just 6 hours at temperatures close to 200 degC, the PowerDrive ICE system has been verified to

- 2,000 hours at temperatures exceeding 200 degC
- 35,000 hours at 200 degC
- 2 million shocks at 200 degC.

Optimal trajectory without compromise

By increasing performance in extreme environments, the PowerDrive ICE RSS eliminates the need for special operating procedures. Drillers can unlock the production potential of ultraHT reservoirs with improved well trajectory while saving rig time and operating cost.

High-density data for precision drilling

The PowerDrive ICE ultraHT RSS steers automatically and provides precise directional control. It combines with the TeleScope ICE ultraHT measurements-while-drilling service to form the first BHA specifically designed to operate at 200 degC. High-density data enables real-time drilling optimization and well placement and effective targeting of productive zones, leading to maximized ROP.

PowerDrive ICE

Specifications		PowerDrive ICE 675 RSS
Mechanical	Nominal OD, in [mm]	6¾ [171.5]
	Overall length, ft [m]	34.26 [10.44]
	Dogleg severity (DLS) capability, °/100 ft [°/30 m]†	8 [8]
	Hole sizes, in [mm]	8½ [215.9]
	Bit speed, rpm	0–350
	Maximum weight on bit, lbf [N]‡	105,600 [669,902]
	Maximum torque on bit, ft.lbf [N.m]§	18,500 [25,082]
	Maximum overpull, lbf [N]	1,000,000 [4,448,222]
	Passthrough (DLS sliding), °	16
	Bit connection (box)	4½ Reg
Hydraulics‡‡	Flow range, galUS/min [L/min]††	275–800 [1,040–3,028]
	Maximum mud density, lbm/galUS [kg/L]	21 [2.52]
	Maximum sand content, %	1
	Lost circulation material (LCM), lbm/bbl [kg/L]§§	50 [0.19]
	Acidity level, pH	9.5–12
	Oxygen, ppm	1
Pressure and temperature	Maximum temperature, degF [degC]	392 [200]
	Maximum pressure, psi [MPa]	30,000 [206.8]
Measurements	Inclination offset to tool bottom, ft [m]	13.30 [4.05]
	Azimuth offset to tool bottom, ft [m]	13.30 [4.05]
	Shock range, g_n	500
	Shock axis	Triaxial
	Magnetic field cone of exclusion	None
Specifics	Automated loop	Azimuth and inclination
	Downlinking method	Flow

† 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.

†† Dependent on mud density.

‡‡ Special configuration available for silicate muds.

§§ Depends on the type of LCM.

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

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