

# PowerDrive vorteX Max

High-powered rotary steerable system

## APPLICATIONS

- High-performance drilling
- Unconventional reservoirs
- Extended-reach drilling (ERD)
- Harsh drilling conditions

## BENEFITS

- Maximizes on-bottom ROP
- Increases the ability to accurately control trajectory while delivering superior performance
- Reduces the required need for intervention from the surface during drilling

## FEATURES

- Fully rotating RSS with self-steering mode for both inclination and azimuth downhole closed loops
- Optimized power section for maximum power delivery
- High-rpm steerability up to 350 rpm
- Advanced IDEAS\* integrated dynamic design and analysis platform for optional drive system optimization
- Optional ROPO\* rate of penetration optimization software
- Enhanced power with incorporated DynaForce\* high-performance drilling motor

PowerDrive vorteX Max\* high-powered 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.

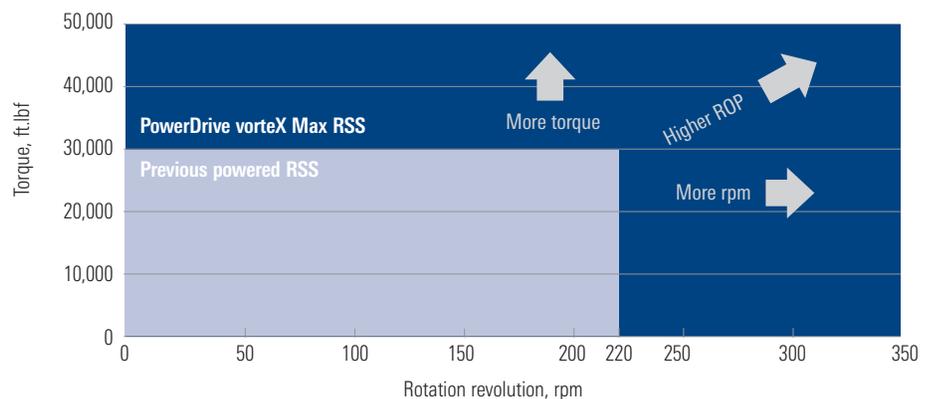
In any drilling environment, the PowerDrive RSS family delivers the power required to place wells accurately with superior borehole quality while ensuring maximum drilling efficiency.

### More power for maximum on-bottom ROP

PowerDrive vorteX Max RSS is the only fully rotating RSS that delivers higher ROP with more power, improved downhole reaction, and tighter directional control. Designed for drilling operations requiring a large number of high-quality, accurately placed wells, this next-generation powered RSS features a unique self-steering mode for both inclination and azimuth. And its robust design excels under tougher drilling conditions, enabling a wider rpm and torque operating window. By using optional advanced modeling techniques, Schlumberger can provide a customized drive system and power section ideal for each application.

### Ruggedized motor and advanced steerability

The motor built into the PowerDrive vorteX Max RSS is designed and tested with highly demanding drilling conditions, providing maximum heavy-duty power. The reinforced lower end fortifies the BHA, incorporating a high-capacity bearings section and a drive shaft that enables consistently more power and torque delivery to the bit. While the PowerDrive vorteX Max RSS is ruggedized for reduced component failures, increased reliability, and improved fatigue life, it is also nimble. The BHA takes advantage of steerability with a high WOB and at high rpm—up to 350 rpm—optimizing the output from the power section. The PowerDrive vorteX Max RSS uses advanced automated algorithms for hold inclination and azimuth, which are customizable to specific challenges. Functional toolface updates can be as fast as one per second, which allow continuous trajectory control and minimum wellbore tortuosity. Deploying the PowerDrive vorteX Max RSS results in superior borehole quality with a faster steering reaction, delivering the maximum performance with minimal surface intervention.



Drilling performance comparison between PowerDrive vorteX Max RSS and a conventional powered RSS tool.

# PowerDrive vortex Max

Specifications	PowerDrive vortex Max 500 RSS	PowerDrive vortex Max 700 RSS	PowerDrive vortex Max 962 RSS
Nominal OD, in [mm]	5 [127]	7 [178]	9% [244]
Overall length, ft [m]	Dependent on power section configuration		
Dogleg severity (DLS) capability, °/100 ft [°/30 m] <sup>†</sup>	10 [10]	8 [8]	5 [5]
Hole sizes, in [mm]	6–6¼ [152–171]	8½–8¾ [216–222]	12¼–17½ [311–445]
Bit speed, rpm	0–350	0–350	0–350
Mechanical			
Maximum weight on bit, lbf [N] <sup>‡</sup>	30,000 [133,447]	55,000 [244,652]	120,000 [533,787]
Maximum torque on bit, ft.lbf [N.m] <sup>§</sup>	12,000 [16,270]	30,000 [40,675]	65,000 [88,128]
Maximum overpull, lbf [N]	72,000 [320,272]	192,000 [854,059]	350,000 [1,556,878]
Passthrough (DLS sliding), °	30	16	10
Bit connection (box)	3½ Reg	4½ Reg	6¾ Reg or 7¾ Reg
Hydraulics			
Flow range, galUS/min [L/min] <sup>††</sup>	120–350 [455–1,327]	210–800 [796–3,032]	400–1,200 [1,516–4,548]
Maximum mud density, lbm/galUS [kg/L]	24 [2.88]	24 [2.88]	24 [2.88]
Maximum sand content, %	1	1	1
Lost circulation material (LCM), lbm/bbl [kg/L] <sup>††</sup>	35 [0.13]	50 [0.19]	50 [0.19]
Acidity level, pH	9.5–12	9.5–12	9.5–12
Oxygen, ppm	1	1	1
Pressure and temperature			
Maximum temperature, degF [degC]	302 [150]	302 [150]	302 [150]
Maximum pressure, psi [MPa]	20,000 [137.9]	20,000 [137.9]	20,000 [137.9]
Measurements <sup>§§</sup>			
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 [1.83]	6.39 [1.94]	7.01 [2.13]
Vibration range (axial), g <sub>n</sub>	0–35	0–35	0–35
Vibration range (radial), g <sub>n</sub>	0–75	0–75	0–75
Shock range, g <sub>n</sub>	625	625	625
Shock and vibration axis	Triaxial	Triaxial	Triaxial
Magnetic field cone of exclusion	None	None	None
Specifics			
Automated loop	Yes	Yes	Yes
Downlinking method	Flow and rpm	Flow and rpm	Flow and rpm

<sup>†</sup> Value dependent on application—bit, BHA, parameters, formation type, etc.

<sup>‡</sup> Maximum at 0-ft.lbf torque on bit; bit recommendations should be considered.

<sup>§</sup> Maximum at 0-lbf weight on bit.

<sup>††</sup> Dependent on mud density.

<sup>‡‡</sup> Depends on the type of LCM.

<sup>§§</sup> 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. Modeling is required to ensure the correct elastomer is selected based on temperature and mud type to ensure optimal performance.

[slb.com/powerdrive](http://slb.com/powerdrive)