Magnus® Saker Rotary Steerable System

Delivers precise control, rugged reliability, and fast drilling performance in complex environments

Applications

- Single-run vertical, curve, and lateral drilling
- High dogleg-severity (DLS) applications
- Extended-reach drilling
- High-performance, motorized rotary-steerable drilling when combined with the Weatherford HyperLine™ drilling motor
- Geosteering applications when combined with the Weatherford Wave™ suite of logging-while-drilling (LWD) sensors

Features and Benefits

- Extended-reach ruggedized pads deliver greater lateral force for improved formation engagement.
- Optimized valve system with ruggedized, encapsulated motors resists erosion, shock, and vibration for reliable performance.
- Advanced thermal management enhances electronic reliability in high-temperature environments.
- Upgraded control algorithms and firmware ensure precise valve positioning and rapid pad activation.
- High-resolution at-bit sensors provide accurate trajectory control and geosteering.
- Continuous turbine power and split-chassis electronics deliver stable, long-duration operation.
- Laser-applied, hard-facing, and strategic fluid diffusers protect against erosion and wear in harsh environments.
- Enhanced magnet bearing tolerates solids and debris for extended service life.

Tool Description

The Magnus Saker rotary steerable system (RSS) is engineered for the harshest drilling environments, delivering exceptional reliability and control in high-temperature, high-shock conditions. Fully ruggedized from end to end, the system withstands extreme vibration, abrasive fluids, and thermal stress while maintaining precise steering performance.

Designed for complex well profiles, including high dogleg severity and extended-reach drilling, the Magnus Saker RSS stays downhole longer, enabling operators to push boundaries in the most demanding formations. Its architecture combines extended-reach pads, an advanced steering control system, and a robust, continuous power source that ensures consistent performance and supports extended drilling runs in extreme conditions.

The Weatherford Magnus Saker RSS has a push-the-bit design with features that improve drilling performance.

Near-bit inclination and near-bit azimuth plus gamma ray sensors

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Specifications

Mechanical

RSS	Magnus 475	Magnus 675	Magnus 825	Magnus 950	Magnus 1100	
BIAS collar size	5 in.	7 in.	8-3/8 in.	9-1/2 in.	11 in.	
Hole size range	5-7/8 to 6-3/4 in.	8-3/8 to 9-1/4 in.	9-7/8 to 10-5/8 in.	12 to 14-1/2 in.	14-3/4 to 18-1/2 in.	
Minimum overall tool length	17.0 ft (5.2 m)	17.0 ft (5.2 m)	17.45 ft (5.3 m)	18.2 ft (5.5 m)	18.2 ft (5.5 m)	
Overall tool weight[1]	900 lb (408 kg)	1,850 lb (840 kg)	2,850 lb (1,293 kg)	3,750 lb (1,700 kg)	5,275 lb (2,600 kg)	
Top connection	3-1/2 in. IF (NC 38) box	4-1/2 in. IF (NC 50) box	5-1/2 in. IF box	5-1/2 in. IF box	5-1/2 in. IF box (8-1/4 in. barrel collar)	7-5/8 in. API Reg box (9-1/2 in. barrel collar)
Makeup torque (top)	9,900 to 10,900 ft-lb (13,424 to 14,740 N·m)	30,000 to 33,000 ft-lb (40,675 to 44,740 N·m)	53,000 to 56,000 ft-lb (71,860 to 75,925 N·m)	53,000 to 56,000 ft-lb (71,860 to 75,925 N·m)	53,000 to 56,000 ft-lb (71,860 to 75,925 N·m)	75,000 to 78,000 ft-lb (101,690 to 105,755 N·m)
Bottom connection	3-1/2 in. API Reg box	4-1/2 in. API Reg box	6-5/8 in. API Reg box	6-5/8 in. API Reg box	7-5/8 in. API Reg box	
Makeup torque (bottom)[2]	6,600 to 8,000 ft-lb (8,948 to 10,847 N·m)	20,000 to 22,000 ft-lb (27,115 to 29,830 N·m)	38,000 to 42,000 (51,521 to 56,944 N·m)	38,000 to 42,000 (51,521 to 56,944 N·m)	58,000 to 64,000 ft-lb (78,635 to 86,770 N·m)	
Maximum tension	300,000 lbf (133,447 daN)	610,000 lbf (271,342 daN)	1,000,000 lbf (444,822 daN)	1,125,000 lbf (500,424 daN)	1,550,000 lbf (689,474 daN)	
Maximum operating torque at the bit	8,840 ft-lb (11,985 N·m)	17,850 ft-lb (24,201 N·m)	25,500 ft-lb (34,573 N·m)	25,000 ft-lb (34,573 N·m)	51,850 ft-lb (70,299 N·m)	
Maximum drilling rpm[3]	350	300	300	300	300	
Maximum weight on bit	Limit based on bit specifications					
Dogleg severity (DLS) capability[4]	8°	10°	6°	6°	5°	
Minimum kickoff angle vertical	No limit, kick off from vertical					
Maximum operating pressure	30,000 psi (206.8 MPa)	30,000 psi (206.8 MPa)	25,000 psi (172.4 MPa)	25,000 psi (172.4 MPa)	25,000 psi (172.4 MPa)	
Maximum operating temperature[5]	329°F (165°C)					
Maximum flow rate	350 gal/min (1,325 L/min)	700 gal/min (2,650 L/min)	1,200 gal/min (4,524 7L/min)	1,200 gal/min (4,542 L/min)	1,400 gal/min (5,300 L/min)	

[1] Tool weight is for the standard configuration.
[2] Drill bit makeup torques are typical torques for PDC bits. Drill bit spec sheet should be referenced.
[3] Maximum rpm is the average, not the peak, rpm.
[4] Dogleg severity is in degrees per 100 ft (30 m).
[5] Maximum temperature limited to 302°F (150°C) with turbine generator power.

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Specifications (continued)

Mechanical

RSS	Magnus 475	Magnus 675	Magnus 825	Magnus 950	Magnus 1100
Maximum pass-thru dogleg (rotating)[1]	15°	14°	7°	6°	6°
Maximum pass-thru dogleg (sliding)[1]	30°	17°	14°	12°	12°
Maximum sand content	2%				
Maximum LCM content	50 lb/bbl (non-fibrous)				
Near-bit inclination/ azimuth sensor to bit box	5.5 ft (1.7 m)	6.0 ft (1.8 m)	6.1 ft (1.9 m)	6.85 ft (2.1 m)	6.85 ft (2.1 m)
Autopilot steering control	3D autopilot (inclination/azimuth)				

[1] The RSS may require a high-dogleg-specific BHA configuration.

Azimuthal Gamma Ray (Optional)

RSS	Magnus 475	Magnus 675	Magnus 825	Magnus 950	Magnus 1100
Gamma ray sensor to bit box	6.0 (1.8 m)	6.4 ft (1.9 m)	6.5 ft (2.0 m)	7.2 ft (2.2 m)	7.2 ft (2.2 m)
Measurement range, AAPI	0 to 500 API	0 to 750 API			
Accuracy at 100 API	±2.5 API				
Vertical resolution[1]	14.5 in. (370 mm)	15.0 in. (380 mm)	16.0 in. (410 mm)	16.5 in. (420 mm)	19 in. (480 mm)

[1] Vertical resolution indicates the distance over which 90% of the response occurs.

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Specifications (continued)

Drilling Dynamics

RSS	Magnus 475	Magnus 675	Magnus 825	Magnus 950	Magnus 1100
Measurements	Axial vibration, lateral vibration, RPM, low-frequency torsional oscillation (LFTO) stick-slip high-frequency torsional oscillation (HFTO)				
Vibration measurement range[1]	0 to 250 g				
Sample rate	1,024 Hz				
Measurement range for rpm	0 to 833 rpm				
Identifiable frequency range	0 to 350 Hz				

[1] Vibration measurement range is relevant to axial, lateral, and tangential vibration measurements.