

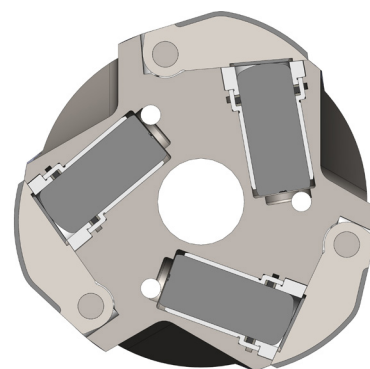
SureSteer™ Rotary Steerable System



Designed for directional drilling applications throughout the world, the APS Technology SureSteer™ Rotary Steerable System (RSS) combines high-performance functionality with the straightforward directional control procedures used with steerable motors. Easily programmable downhole and easy to use, the SureSteer™ is offered in two hole sizes and multiple configurations. It is designed to maximize build rates and match competing systems' advanced trajectory control.

Optimal Performance and Wellbore Quality

The SureSteer™ steering assembly houses the steering pads, directional measurement and control electronics, and electrical and hydraulic systems, which are driven and powered by an integrated turbine and alternator system. Electronics provide timing signals to the hydraulic manifold to control the steering direction and duty cycle to achieve the desired directional objectives.



SureShot™ MWD Integration

The SureSteer™ RSS provides real-time, near-bit inclination while rotating and azimuthal gamma ray* imaging for precise wellbore placement and control. Fully integrated with the APS SureShot™ MWD system for continuous tool monitoring and real-time feedback, the RSS reduces time spent downlinking. Depending on the deployment method, the RSS can also be linked to other APS MWD/LWD products for higher-level, comprehensive trajectory and geosteering control.

Modes of Operation

Using proprietary technology, the SureSteer™ RSS can be programmed to utilize a closed-loop feedback system for vertical or tangent angle control and can operate with surface-supplied instructions to efficiently drill any directional well plan. All parameters, such as operating mode, steering direction, and desired build rate (operational duty cycle) are programmable downhole via downlink. A robust but simple downlinking method allows for switching between modes or turning the tool off for events such as wiper trips, drilling out, or backreaming.

* Applicable for 6 3/4-in. rotary steerable systems. Azimuthal gamma ray (AZG) is not integral to 4 3/4-in. tools.

SureSteer™ Rotary Steerable System



Product Specifications

The SureSteer™ can be run alone or with a variety of drilling motors. The specifications below are shown for the SureSteer™ RSS alone. Contact our sales office for details.

SureSteer™ 475		DIM	DESCRIPTION	DIM	SureSteer™ 675	
6.0 in. (152.4mm)	6.75 in. (171mm)		Nominal Hole Size		8.50 in. (215.9mm)	8.75 in. (222.3mm)
1.4 ft (0.4m)		A	Bit Box to Center of Steering Pad	A	1.2 ft (0.36m)	
9.3 ft (2.8m)		B	Bit Box to Center of Sleeve Stabilizer	B	10.0 ft (3.10m)	
N/A			Azimuthal Gamma Measure Point	C	3.0 ft (0.91m)	
17.2 ft (5.24m)		D	Gamma Measure Point (typical)	D	18.3 ft (5.58m)	
21.6 ft (6.58m)		E	MWD Measure Point (typical)	E	22.6 ft (6.89m)	
BHA Dependent		F	Overall Length Including Pulser	F	BHA Dependent	
5.8 in. (147.3mm)	6.6 in. (167.6mm)		Steering Pad Dia. Retracted	G	8.4 in. (212mm)	8.6 in. (219mm)
6.6 in. (167.6mm)	7.0 in. (177.8mm)		Steering Pad Dia. Extended		8.9 in. (225mm)	9.1 in. (230mm)
5.75 in. (146 mm)		H	Steering Pad Upset Dia.	H	7.6 in. (193mm)	
5.938 in. (150.8mm)	6.688 in. (169.9mm)	J	Stabilizer Dia.	J	8.438 in. (214.3mm)	8.687 in. (220.6mm)
3 1/2 in. API REG box			Bottom Connection		4 1/2 in. API REG box	
3 1/2 in. IF box			Top Connection – Standard, Housing		4 1/2 in. IF box	
OPERATIONAL						
150 to 350 gpm (9.5 to 22 l/sec)			Flow Rate		300 to 750 gpm (19 to 47 l/sec)	
350 RPM			Maximum Drillstring Rotation Speed		350 RPM	
13,200 ft-lb (17,896 N-m)			Maximum Operating Torque (Return to Service)		31,000 ft-lb (50,165 N-m)	
9,700 ft-lb (13,150 N-m)			Make-Up Torque		27,500 ft-lb (37,285 N-m)	
200 psi @ 350 gpm (1.4 MPa @ 22 l/sec) with water			Pressure Drop		<200 psi @ 450 gpm (<1.4 MPa @ 28 l/sec) with water	
436,000 lb (197.8 t)			Maximum Overpull (Return to Service)		950,000 lb (430.9 t)	
Bit Limited			Maximum Weight-on-Bit		Bit Limited	
To 12°/100 ft (3.93°/10m)			Build Rate Capability		To 12°/100 ft (3.93°/10m)	
15°/100 ft (4.92°/10m)			Maximum Bend Radius – Rotating		13°/100 ft (4.26°/10m)	
21°/100 ft (6.89°/10m)			Maximum Bend Radius – Sliding		20°/100 ft (6.56°/10m)	
ENVIRONMENTAL						
350°F (175°C)			Maximum Temperature		350°F (175°C)	
20,000 psi (137.9 MPa)			Maximum Pressure		20,000 psi (137.9 MPa)	
WORKING FLUID LIMITATIONS						
<1% by volume			Maximum Sand Content		<1% by volume	
50 lb/bbl medium nut plug			LCM Tolerance		50 lb/bbl medium nut plug	
Not Allowed (mud filter screen required)			Mud Debris		Not Allowed (mud filter screen required)	
<9% by volume recommended			Solids Content		<9% by volume recommended	

Measurement distances can vary by method of deployment. Typical values shown for a single-collar DG-only system.