

Predictable, peak drilling performance in any well

TRU-Steer ultimate rotary steerable service

Until now, your fields and formations defined how far and how fast you could drill. In harsh or high-temperature environments, conventional downhole tools often struggled to withstand severe drilling dysfunction, leading to inefficient operations or extremely expensive damage and re-trips. Regardless of a reservoir's significant production potential, it would be considered nonviable or uneconomical.

Baker Hughes is changing that with the **TRU-Steer™ ultimate rotary steerable service**. This service breaks free from traditional drilling limitations, providing you with predictable, peak performance in any well—so you can confidently reach more reservoirs that matter.

Save days. Produce more.

The TRU-Steer service raises the bar in well delivery efficiency through an evolutionary new design built for ultimate performance. It neutralizes destructive drilling dysfunction at the source, protecting the entire bottomhole assembly—not just the rotary steerable system (RSS)—from damage. As a result, operators can now focus on performance and reach greater depths without risk of tool damage or failures—eliminating costly

nonproductive time and reducing days on well.

To further enhance your drilling performance, we've specifically designed the **PermaForce-TRU™ PDC bit** with a first-of-its-kind shankless matrix PDC technology and new cutter technology to optimize and elevate steering. This bit supports a higher rate of penetration (ROP) in challenging formations—with less risk of bit damage and extended run-life downhole.

Precise well placement is equally critical to accessing a reservoir's full value. To help place your well precisely and stay on track, the TRU-Steer service offers advanced wellbore trajectory control features and highly calibrated directional sensor packages that autonomously autocorrect and self-position to stay within the predefined target. The result—a smoother wellbore with less tortuosity, reduced drag, and fewer limits on well length.

Unlock more reservoirs

To achieve peak drilling performance regardless of the environment, the TRU-Steer service incorporates a ruggedized system that includes:

- The ability to neutralize drilling dysfunction at the source for

Applications

- Reservoirs that were previously nonviable or uneconomical
- High-temperature, harsh drilling environment formations
- From simple to complex 3D wellbore for ultimate performance
- Onshore, shelf or deep water

Benefits

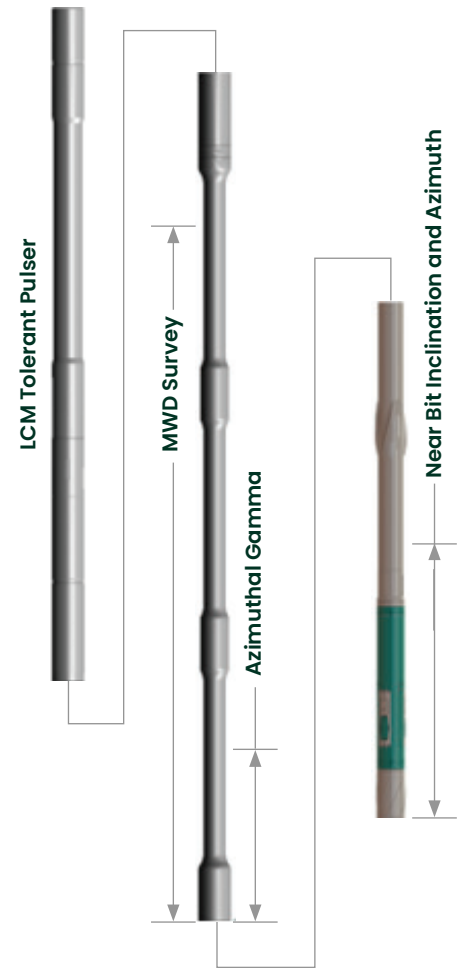
- Allows longer runs with higher reliability, improves wellbore placement, and builds a smoother wellbore for improved completions operations
- Withstands harsh environments and high temperature with durable hardware
- Increases the operating envelope even in challenging downhole environment, without additional hardware/tools or complex setups

reliable drilling performance in harsh environments.

- The Baker Hughes multichip modules (MCMs) and circuit boards, which reliably extend the drilling envelope up to 175°C (347°F).
- A newly designed, high-temperature, lost-circulation-material (LCM)-tolerant, measurement-while-drilling (MWD) and telemetry tool that delivers proven reliability in extreme drilling conditions.

The TRU-Steer service is compatible with the Baker Hughes suite of formation evaluation, reservoir mapping, and navigation services to support confident decisions while drilling.

Contact Baker Hughes to learn how the TRU-Steer service and PermaForce-TRU PDC drill bit can expand your drilling opportunities and boost your production potential by breaking free from traditional drilling limits.



TRU-Steer bottom hole assembly

BHA SPECIFICATIONS

Tool size	6-3/4 in.	171.45 mm
Borehole size	8-3/8 in. – 9-7/8 in.	212.8 – 250.8 mm
Max. build rate	15°/100 ft	15°/30 m
Max. collar OD	7 in.	178.00 mm
Steerable stabilizer	7-9/16 in.	192.09 mm
BHA length – typically	37.8 ft	11.5 m
BHA weight – typically	3,090 lb	1 400 kg
Length of steering sleeve	3.35 ft	1.02 m
Top connection	NC50 Box	
Bottom connection		
8-3/8-in. – 8-3/4-in. hole size	4-1/2-in. API Reg. box	
9-1/2-in. – 9-7/8-in. hole size	6-5/8-in API Reg. box	

OPERATING SPECIFICATIONS AND LIMITS

Tool size	6-3/4 in.	171.45 mm
Transmission rate – LCM Tolerant Pulser	up to 4 bps	
Flow range ^{1), 2)}	300–750 gpm	1 135–2 840 lpm
Max. WOB	56,200 lb	250 kN
Max. drilling torque (at Bit)	15,500 ft-lb	21 kNm
Max. torque to failure (at Bit)	23,500 ft-lb	32 kNm
Max. overpull to failure	764,000 lb	3 400 kN
Maximum pass-through dogleg		
Rotating	15°/100 ft	15°/30 m
Sliding	30°/100 ft	30°/30 m
Max. tool rotation	400 rpm	
Max. RPM variation	±50 maximum deviation from mean rpm (e.g. 100 rpm: rpm range=50-150), limited by maximum tool rotation specification	
Max. temperature ³⁾	347°F	175°C
Max. hydrostatic pressure ⁴⁾	20,000 psi	1380 bar
Pressure drop across bit	No limitation	
Max. sand content	1% max. volume, according to API 13B (<0.5% recommended)	
Max. LCM	50 ppb (143 kg/m ³) medium nut plug, cedar fiber (Any pumping of LCM must be carried out according to operations manual)	
Max. axial, lateral, and tangential vibration	Refer to Supplemental Technical Specification TDS-20-60-0000-00	

SENSOR SPECIFICATIONS

Steering unit

Near bit inclination	
Sensor type	Tri-axial accelerometer and magnetometer
Range	0°–180°
Accuracy	0°–30° ±1.0° 30°–90° ±0.3°
Dynamics – Steering unit	
Steering unit measurements	Axial, lateral, and tangential vibration, RPM, stick-slip severity
Range	
Vibration	0–70 g-rms, DC 0–460 Hz
RPM	–1000 to +1,000 rpm ±1.0% accuracy
Real time options	Vibrations in g-rms, downhole RPM, stick-slip severity
Memory options	min., max., average vibrations in g-rms and as severity levels; min., max., average RPM, stick-slip, and backward rotation severity levels

MWD

Azimuthal gamma ray	
Sensor type	Nal scintillation
Range	0–500 API
Accuracy	±5 API @ 100 API and 60 ft/hr
Azimuthal measurement	4 sectors
Vertical resolution	6 in. (153 mm)
Directional survey	
Sensor type	Triaxial accelerometer and magnetometer
Range	
Inclination	0–180°
Azimuth	0–360°
Accuracy ⁵⁾	
Inclination	±0.1°
Azimuth	±1.0°
Dynamics – MWD	
MWD measurements	Axial and lateral vibration
Range	
Vibration	0–25 g-rms, DC 0–120 Hz
Memory options	min., max., average vibrations in grms and as severity levels
Pressure ⁶⁾	Service upon request with the reconfigured LCP
Measurement	Annular Pressure (ECD)
Range	25,000 psi (1725 bar)
Resolution	+/- 0.15% FS, 5 psi (0.345 bar)

1) Only one drilling fluid turbine configuration is used for the whole flow range.

2) Minimum tool flow rate for downlink operation is 350 gpm (1,325 lpm).

3) 175 C is the survival temperature of the tool

4) 30,000psi variant is available for Steering Head upon request, used for a different system.

5) Sensor accuracy is only one contributor to all-up directional survey accuracy. The Baker Hughes position uncertainty model provides the definitive quantification of system accuracy in all applications and operating environments.

6) Annular Pressure is optional, available upon request

This BHA configuration is for a high temperature optimized high build up rate applications. Additional configurations containing formation evaluation tools, or for specific applications can be selected.

In the event a well/section is completed with at least one failed rib and without being operated Out-Of-Specification (OOS) [as per GOP-20-70-0000-01-01 OOS Policy and Procedures Manual], this will not be considered as tool failure.