Bench Tree®
Complete Solutions for MWD - LWD

Product Sheet

Applications

- Directional and horizontal drilling
- Custom drilling
- SAGD drilling

Benefits

- Improves reliability and accuracy by removing the legacy joint and reducing the connector count
- Enhances flexibility since it can be integrated into existing MWD-LWD systems, while providing advanced features
- Reduces downtime because the single chassis helps eliminate misalignments and failures

Features

- High-operating temperature: 175°C (347°F), 185°C (365°F)
- High-speed communications via CAN or qBUS (auto detected)
- Patented instantaneous dynamic synchronization
- Drilling Dynamics: RPM, shock, vibration, temperature, continuous inclination, azimuth, stick-slip
- Mode change with flow and/or rotation status
- Built-in diagnostics
- Customization available

3D-Instrument

Directional and Drilling Dynamics Instrument

Bench Tree's 3D-Instrument (3D-I) is a fully integrated directional solution that provides operators with precise and dependable information to maximize drilling efficiency and pay zone exposure in directional and horizontal wells. The durable, single chassis—at 28.75 inches (730.25 mm) in length—includes an orientation module, downhole processor, and electronic power supply to control MWD-LWD systems, such as pulser, gamma and resistivity.

The 3D-I is at the heart of Bench Tree's Short MWD system, enabling easy gamma and HPR resistivity integration. It is also ideal for use in many legacy and proprietary systems, and is compatible with standard pulsers and gamma sensors.

Enhanced Performance

The 3D-I's directional stability and accuracy is unmatched in the industry, and incorporates Bench Tree's proven high-temperature electronics and superior magnetometers and accelerometers. The chassis design improves reliability and accuracy over other configurations since the lap joint is removed and the connector system is reduced; thus, eliminating mechanical misalignments and connector failures between the orientation and electronics modules. The instrument is delivered with fully calibrated digital outputs by Bench Tree's patented calibration method.

Easily Upgrade MWD-LWD Systems

Since the 3D-I can be integrated into most standard legacy MWD-LWD systems, it provides added flexibility during drilling operations, and offers an innovative and competitive solution. The backward compatibility of the module allows service companies to upgrade their MWD fleets over time. The 3D-I's short length allows it to be run with the m+ Pulser and a gamma ray sensor in a single standard pressure barrel. Proprietary MWD-LWD systems can also be structured around the 3D-I module because it is semicustomizable for those with special requirements.

To maximize your drilling efficiency and wellbore accuracy, contact the Bench Tree sales team for assistance.

www.benchtree.com

Covered by one or more of the following U.S. or international patents:
U.S. 9,038,735; U.S. 9,091,143; U.S. 9,062,537; U.S. 9,250,100

Physical Specifications

Parameter / Feature	Values / Ranges
Size	1.38 x 28.75 in. (3.51 x 70.03 cm)
Weight	3.3 lb (1.5 kg)
Operating voltage	7 to 36VDC
Operating power	< 2W peak watt
Communications	Q-bus, CAN, or customer spec.
Connections	MDM, 15P & 15S, 10 thru wires
Built-in sensors (memory and real time)	Temperature, precision mags, precision accelerometers (Q-Flex®), shock, vibration, rotation
Gamma	Pulse or bus
Flow	From flow module signal or bus

Performance Specifications

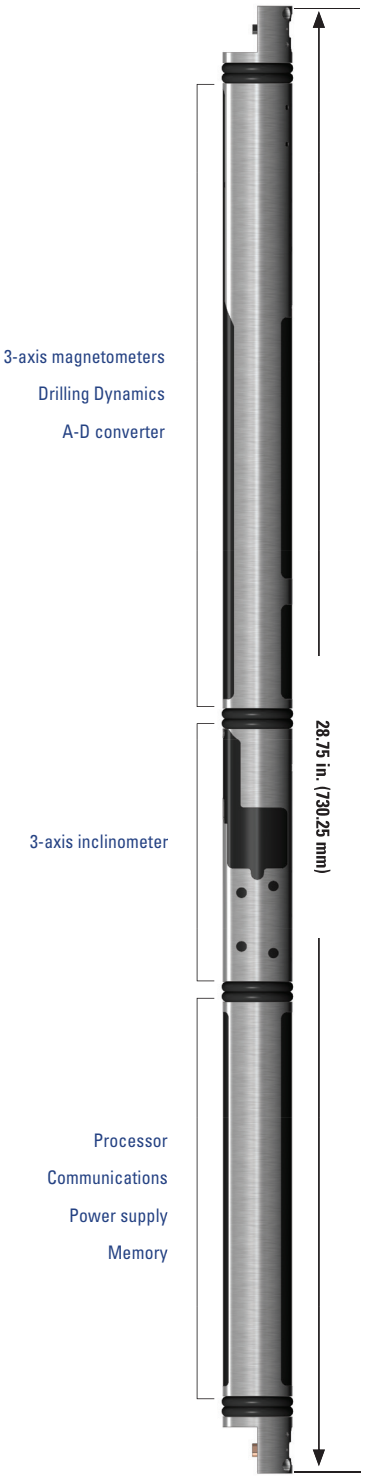
Parameter / Feature	Values / Ranges
Accuracy, std configuration [1]	
Inclination	<±0.1°
Azimuth (dip A <70°, 90° incl) [2]	<±0.2°
Gravity	<±1.5 mg
Dip	<±0.15°
Total mag field	<±0.75 mGauss
Temperature	<±1°C (<±1.8°F)
Rotation (0 to 300)	±12 RPM
Drilling inclination	±0.35° typical
Memory	32 Mb
Memory download time	<10 minutes
Drilling Dynamics	Memory and real time

Environmental Specifications for Performance

Parameter / Feature	Values / Ranges			
	Low	Max for standard models		
Operating temp, std[3]	25°C	150°C	175°C	185°C
Survival temperature	-40°C	200°C	200°C	200°C
Temperature ramp	3°C / minute max			
Vibration	20g Grms, 30 to 1000 Hz			
Shock	1000g 0.5mSec-½Sine			

1: Tighter performance on request
2: Accuracy is achieved in a clean and controlled environment using a calibrated reference
3: Contact Bench Tree for other ranges

Q-Flex® is a Registered Mark of Honeywell
Metric units are approximations



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