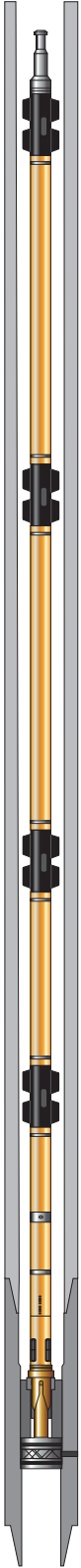


Tensor Elite™ MWD System



The Tensor Elite™ MWD system's proven design is compatible with collar diameters from 3 ½ in. to 9 ½ in. and operates at flow rates from 75 to 1,200 gpm. Industry leading sensors and electronics, coupled with a trusted mechanical architecture create an MWD system which delivers exceptional accuracy and reliability while minimizing the total cost of ownership.

The Black Diamond commitment to customer success is demonstrated by an exemplary support network encompassing market leading repair services, comprehensive training (both e-learning and hands-on), localized support teams, and a dedicated website delivering best in class support materials.

Features and Benefits

Reliable

Drawing on an established reputation in the industry, Tensor Elite provides high quality, reliable down-hole systems for directional surveying and formation logging. The Black Diamond quality processes ensure products are manufactured and maintained to a uniform high standard.

Rotary Connectors

Utilizing Rotary Connectors between tool modules ensures reliable and repeatable safe connection while minimizing service cost and improving system reliability.

Calibration Stability

Tensor Elite is recognized as having one of the most stable directional calibrations in the industry. The resultant reduced frequency of calibrations allows maximum fleet utilization.

Cost Efficient

The system operates in standard non-magnetic drill collars. The positive pulser can be routinely serviced in less half a day enabling quick turnaround of equipment. Extended battery life (+400 hours per battery) is achieved through energy efficient hardware and intelligent power management software.

Modular

Flexible module configuration enables alternative sensor positions. Modules are interchangeable between collar sizes for flexibility of use. Short, lightweight modules allow cost-effective logistics, assembly and maintenance turnaround.

Retrievable and Reseatable

The Tensor Elite MWD probe can be retrieved and reseated. In the event that the pipe becomes stuck in a hole, the MWD probe can be "fished" reducing the risk of loss. This capability also enables efficient probe upgrade and battery replacement if operations require.

High Temperature as Standard

The Tensor system is recognized as the system of choice for hot hole applications, with 175 °C (347 °F) a non-premium standard.

Optimized Telemetry

Downlink capability allows the operator to select the optimum transmission sequence and data resolution for each application with minimal impact on rig operations.

Tensor Elite MWD System - Specifications

Technical Specifications					
Collar O.D.	3.5 in.	4.75 in.	6.75 in.	8.25 in.	9.5 in.
Tool Connections	2 7/8 in. I.F.	NC 38	NC 50	6 5/8 in. REG	7 5/8 in. REG
Equivalent Collar Stiffness (OD x ID)	2.96 in. x 2.25 in.	4.75 in. x 2.81 in.	6.71 in. x 3.25 in.	7.93 in. x 4.00 in.	9.42 in. x 4.00 in.
Make-up Torque	3,500 lbf-ft	9,600 lbf-ft	30,000 lbf-ft	54,000 lbf-ft	62,000 lbf-ft
Flow Rate Range	75-165 usgpm	100-300 usgpm	150-800 usgpm	400-1,200 usgpm	400-1,200 usgpm
Max. Dogleg Rotation	50°/ 100 ft	15°/ 100 ft	10°/ 100 ft	8°/ 100 ft	4°/ 100 ft
Max. Dogleg Sliding	100°/ 100 ft	30°/ 100 ft	21°/ 100 ft	14°/ 100 ft	7°/ 100 ft
Probe OD	1.875 in.	Max. Pressure	20,000 psi	Max. Mud Weight	18 ppg
Max. Temperature Operating	347 °F / 365 °F	Max. Sand	1.0 % at maximum fluid velocity		
Max. LCM Tolerance	40 ppb any type, thoroughly and evenly mixed, with use of surface drill pipe screens				

Sensor Specifications					
Directional	Tri-axial fluxgate magnetometers and Q-flex accelerometers		Gamma	NaI Scintillation	
Measurement	Range	Accuracy	Parameter	Specification	
Inclination	0 - 180°	+/- 0.1°	Memory Update	7.2 samples/ ft at 50 ft/hr	
Azimuth	0 - 360°	+/- 0.25°	Real Time Update	3.6 samples/ ft at 50 ft/hr rotating 2.4 samples/ ft at 50 ft/hr sliding	
Toolface - Magnetic	0 - 360°	+/- 0.5°	Resolution	1 API	
Toolface - Gravity	0 - 360°	+/- 0.5°	Sensitivity	2.5 counts per API	
TMF	0 - 100 μT	+/- 0.075 μT	Memory	32 Mb.	
Dip	-90 - 90°	+/-0.15°	Sampling Period	Programmable 1-60 seconds	
GT	0 - 2.000 g	+/- 0.001 g			
Temperature	-32 - 392 °F	+/- 1 °F			
Peak Shock	0 - 250 g	+/- 1 g			

Surface System Specifications	
Surface System	Eclipse Touch
Pressure Transducer	4 - 20 mA, 0-5000 psi, Zone 1, intrinsically safe
Hook Load Sensor	4 - 20 mA, - 0 100 klb, Zone 1, intrinsically safe
Depth Encoder	Incremental, Two Channel in quadrature, Zone 1, intrinsically safe

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TENSOR ELITE
MWD & LWD EXCELLENCE