

# Black Diamond Hybrid MWD

The Black Diamond Hybrid MWD system combines a 25+ year track record of market leading MWD system development and support with current industry defining measurement, transmission and detection technologies. Combining the best components in the industry, the system delivers unparalleled performance and reliability while maintaining the low operating costs that are demanded in an increasingly competitive industry.



## Features and Benefits

### Robust Architecture

The system is built on the proven Tensor Elite platform, benefiting from the Tensor Elite Rotary Connector system which delivers unrivaled ease of use and reliability in even the harshest of drilling environments. Short Module length, and the omission of standalone Interconnects, minimize tool-string length and mitigate a key failure mode of most systems. Simple rigsite assembly and handling reduces impact on rig time and risk of operator error.

### High Accuracy Directional Sensor

High reliability tri-axial MEMS Accelerometers and solid-state Magnetometers provide the most accurate and stable measurements with minimal power consumption. High frequency data sampling delivers advanced shock, vibration, and stick-slip logging for drilling feedback, and Continuous Inclination and Azimuth for finely-tuned steering capabilities.

### Integrated Digital Processor and Power Supply

Advanced digital signal processing optimizes data management and system control while ensuring power usage is minimized. 24 MB memory records an extensive suite of logging, environmental and diagnostic data sets. Fully configurable tool set up ensures operational requirements are always met. System control can be modified downhole using both Flow and Rotation activated downlinking.

### High Speed Pulser

The market leading Pulser utilizes a rotary shear valve to deliver pulse widths as short as 0.1 second and unmatched performance in high solids/ high LCM operations. The uncompensated design removes the risks associated with internal hydraulic failure. 8 MB of on-board memory tracks a full suite of diagnostic measurements allowing detailed post-run analysis.

The Lower End is assembled from a proven combination of industry leading components designed to manage high flow/ high wash environments. It is highly configurable to meet the full range of hydraulic conditions while handling the most extreme shock and vibration events.

### Market Leading Eclipse Touch Surface System

By coupling unrivaled performance with an enviable ease of setup and use, the system is recognized as the market leader in North America. Advanced algorithms automatically select and apply processing from a suite of 100+ filters delivering an unmatched ability to detect and decode data in even the harshest of drilling environments. Highly-intuitive user interface minimizes training requirements. Fully configurable WITS In/ Out and a highly reliable wireless transmission system ensure data is easily shared.



## Black Diamond Hybrid MWD - Specifications

Technical Specifications				
Collar O.D.	4.75 in.	6.75 in.	8.0 in.	9.5 in.
Tool Connections	3 ½ in. IF	4 ½ in. IF	6 ¾ in. REG	7 ¾ in. REG
Flow Rate Range	100 - 400 usgpm	150 - 800 usgpm	400 - 1,200 usgpm	400 - 1,200 usgpm
Max. Dogleg Rotation	15°/ 100 ft	10°/ 100 ft	7°/ 100 ft	4°/ 100 ft
Max. Dogleg Sliding	30°/ 100 ft	21°/ 100 ft	14°/ 100 ft	7°/ 100 ft
Max. Mud Weight	18 ppg	Max. Pressure	15,000 psi	
Max. Temperature Operating	302 °F	Max. Sand	1.0 % at maximum fluid velocity	
Max. LCM Tolerance	40-50 ppb any type, thoroughly and evenly mixed, with use of surface drill pipe screens			

Sensor Specifications		
Directional	Tri-axial Magnetometers MEMS Accelerometers	
Measurement	Range	Accuracy
Inclination	0 - 180°	+/- 0.1°
Azimuth (10°-90° Inc)	0 - 360°	+/- 0.25°
Toolface - Gravity	0 - 360°	+/- 0.75°
Toolface - Magnetic	0 - 360°	+/- 0.75°
Dip Angle	-90 - 90°	+/-0.4°
Total Gravity Field	+/- 2g	+/- 2.5 mG
Total Magnetic Field	+/- 8 Gauss	+/- 300 nT
Continuous Inclination	<10 gRMS	+/- 0.2°
Continuous Azimuth	< 10 gRMS	+/- 0.5°
Shock	1000g	0.5msec, half sine
Gamma	NaI Scintillation	
Parameter	Range	Accuracy
Gamma	0 - 1023 API	+/- 3%
Resolution	1 API	

Surface System Specifications			
Display			
Screen	15-inch LED Touch Screen	Length	15.6" (396 mm)
Height	12.2" (310 mm)	Width	2.32" (59 mm)
Weight	~ 15 lbs (7 kg)	Certification	Zone 1, Intrinsically Safe
Power			
Input Power	100-120/ 200-240 VAC	Frequency	50/ 60 Hz
Current	2A		
Processor			
RAM	16 GB DDR3	Memory	250 GB SSD
Inputs Panel			
Pressure Transducer	19-pin Amphenol (4-10 mA)	PC Interface	USB
Radio Input	Radio 900 MHz	Networking Inputs	LAN, WiFi, Cellular

