



Explora Directional Drilling, LLC

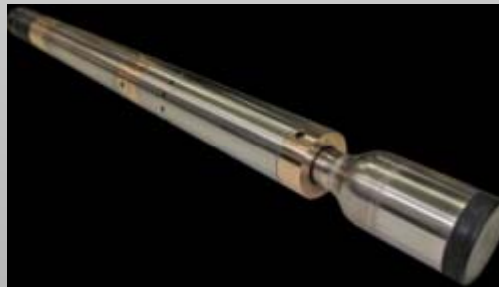
Enhanced Drilling Solutions

Vibration Dampener Tool

Description

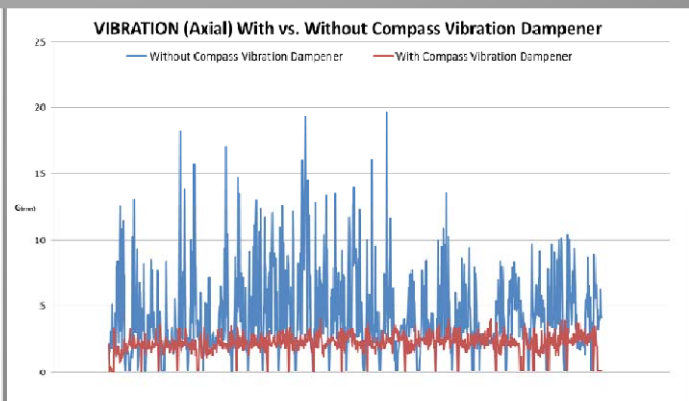
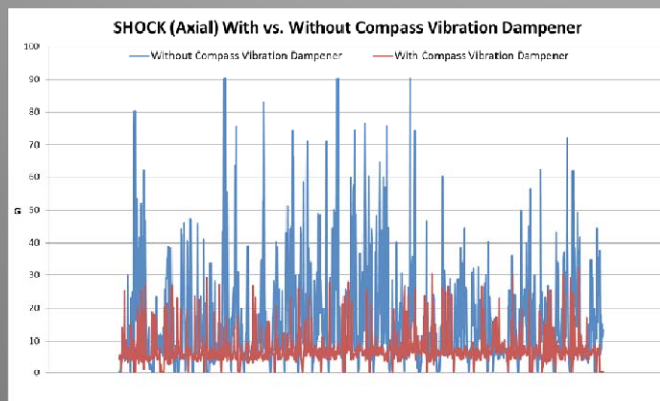
In today's market, drilling programs are becoming more aggressive as companies try to shave days off of their drilling time. That means that down-hole tools such as the MWD/LWD components are being exposed to higher levels of shock and vibration than was typical in the past. Unfortunately, as drilling conditions have become increasingly harsh, the markets tolerance for MWD failures is rapidly decreasing.

Explora uses a combination of dampening techniques to protect the MWD/LWD tools from excessive shock and vibration. The tool is piston compensated in order to improve reliability and overall performance. A internal locking mechanism makes loss of high-side a virtual impossibility.



Features

- Reduces axial shock and vibration up to 50% in normal drilling environments and up to 70% in harsh drilling environments
- Lubricated anti-rotational and compression chambers isolated from sands/solids content with sealing features
- Special hardening process, instead of coating or plating, to provide extended life cycles and smooth dampening action
- Quick and easy servicing
- Proven results from the harshest environments
- Protects the entire down-hole MWD/LWD tool string
- Double-acting dampening on compression and extension
- Piston compensated
- Engineered to prevent loss of high-side in the harshest of environments





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Annular Pressure While Drilling (APWD)

Benefits

- Real Time pressure monitoring
- Fully retrievable
- Better Hole Cleaning monitoring
- Detecting Kicks and Influxes
- Reduced drilling expenses
- At close to the bit as possible

Features

- Adapts to conventional mud pulse tools
- Memory recordable
- Equivalent Circulation Density (ECD) measurements
- Can be logged to Gamma software

Applications

- Reservoir Pressure Management
- Drilling Optimization
- Improved ECD Management
- Maintain tight overbalance to optimize ROP
- Maintain tight overbalance without reducing safety



Annular Pressure While Drilling Specifications			
Nominal Tool O.D.	4 3/4"	6 1/2"	8"
Connection	3 1/2" IF	4 1/2" XH	6 5/8" Reg
Length Feet/Meter	6 / 1.83		
Temp Rating (Celsius)	150°C / 350°F		
Pressure Ranges PSI	0 to 20,000		
Accuracy	3%		
Sample Rate	1 every 15 seconds		
Resolution	3.3 PSI		



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Vibration Monitoring System (VMS)

The drilling environment can introduce severe vibration to the drill string. The results of the drill string vibration can cause excessive bit fatigue, reduced ROP, premature Mud Motor failure and premature MWD/LWD failure. The VMT tool informs the driller when bit bounce and pipe whirl is occurring to change drilling parameters to reduce fatigue and damage to down-hole equipment.

Explora Directional Drilling introduces the Vibration Monitoring System (VMS). The VMS tool measures only 12 inches and can be placed anywhere within the MWD/LWD tool string.

Benefits

- Real Time vibration monitoring
- Early warnings of excessive vibration
- Reduced damage to down-hole equipment
- Optimize ROP
- Drilling Optimization

Features

- Adapts to conventional mud pulse tools
- X, Y and Z axis monitoring
- Memory recordable
- Measures Shock and Vibration
- Can be logged to Gamma software

Applications

- Drilling with Agitators
- Monitoring of Bit Bounce
- Monitoring of Pipe Whirl (Pipe Bending)
- Monitoring of Stick and Slip
- Early detection of Bit failure



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Slim Hole MWD System



Explora Directional Drilling can provide Slim Hole MWD systems capable of providing Directional and Gamma Ray services in many types of wells including short radius wells at build rates not previously available through conventional MWD technology. It is the perfect tool for re-entry of wells where small production strings are used. For deeper drilling applications, the tool will facilitate keeping pressure losses to a minimum and flow to a maximum for better cleaning and cooling. The tool as a long downhole life and is low maintenance which is complemented by its long battery life and low power consumption. It is fully retrievable and increases efficiency by saving time and money by eliminating pipe trips.

Modular MWD System Overview	
Available Sensors	Directional, Gamma, Tool Temp
Tool Configuration	UBHO Sub and Probe
Tool O.D. (Available)	2 7/8", 3 1/2" 4 3/4"
Max Dogleg Severity	109° / 100 ft
Max Operating Temp	175C / 350F
Max Hydrostatic Pressure	25,000 PSI
Flow Rate	75 - 150 GPM (2 1/5" Collar ID)
System Operation	
Telemetry Type	Positive Mud Pulse
Survey Transmission Time	90 Seconds
Tool Face Update Rate	17 seconds average
Absolute Accuracies	
Gravity Tool Face	+/- 0.05 to +/- 3.0, Programmable
Point Accuracy	0.15 = 2 ft per 1,000 ft displacement
Magnetic Tool Face	+/- 0.05 to +/- 3.0, Programmable
Azimuth	+/- 0.1 (inclination > 5)
Inclination	+/- 0.1
Crossover to High Side Tool Face	Programmable to any value desired (5 deg is typical)
Repeatability	Inclination +/- 0.05 Azimuth +/- 0.05
Readout Resolution	Inclination, 0.1 Azimuth 0.1, Tool Face 1.0
Gamma Sample Rate	One per 1.8 secs measured 20 per minute in downhole memory. Programmable.
Gamma Memory Capacity	120 - 600 hours as function of program



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Azimuthal Gamma Ray

Explora Directional Drilling provides a step up from traditional gamma logging – Azimuthal Gamma Logging. With the increasing shift in high-angle and horizontal drilling, there has been a quest for more comprehensive and higher quality gamma ray capabilities. Knowing if the boundaries are being entered above or below takes the guess work away for engineers and geologists. This enables for quicker decisions on wellbore changes for Geologists to react immediately.

With our technology advancements, Explora Directional Drilling is able to offer real-time azimuthal capabilities of equally spaced sectors within the borehole.

Environmental	
Survival Temp	180° C (356° F)
Max Heat/Cool	+/-3° C (37.4° F) / Minute
Vibration (3 axis)	30 G
50-300 Hz	
Random	
Shock (Z-axis)	500 G, 0.5 mS
Shock (Y-axis)	500 G, 0.5 mS

Mechanical	
Diameter	1.36" w/o housing 1.875" w/ housing
Length (make up)	17.6" w/o housing 45" w/ housing
Weight	5.7 lb w/o housing 25 lb w/ housing
Operating Temp	-40° C to 175° C (-40° F to 347° F)
Material	BeCu
Pressure	20,000 PSI

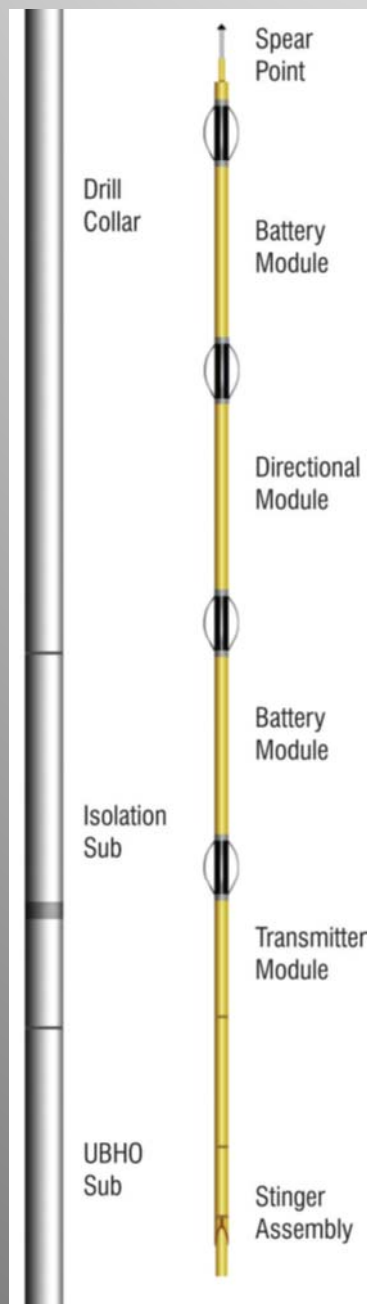
Performance	
Sensitivity	1.1 Counts per API w/o housing 0.82 Counts per API w/ housing
Accuracy	+/- 5% to 150° C (302° F) +/- 10% to 175° C (347° F)
Resolution	6.8"
Gamma Window	30° - 120°
Rotation Speed Range	10 - 200 rpm
Inclination Range	70° - 110°



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Electromagnetic (EM) MWD System



Electromagnetic telemetry is a method of transmitting data from an MWD assembly that resides just above the drill bit. An EM telemetry system is used for transmitting data from the down-hole assembly, which is operationally attached to a drill string, to a telemetry receiver system.

EM-MWD uses electromagnetic waves to transmit down-hole measured data in real-time to the surface during conventional and underbalanced drilling programs. EM telemetry transmits information through the formation to the surface antenna, where it is received and sent to a data acquisition system to be decoded and processed. This tool is particularly attractive in wells drilled with unconventional drilling fluids such as foam, mist or aerated mud. Explora Directional Drilling's EM equipment is also fully retrievable.

Features and Benefits

- Tool-Face Update Rate - .35 = 6 secs / .6 = 12 secs
- Survey Transmission Time – Typical is 20 secs (Function of pulse width and data qualifiers)
- Sensors Available – Directional/Gamma/Tool Temp/Pressure
- Max Operating Temp – 150°C / 302°C
- Flow Rate – From 35 to 1100 gpm



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Inclination and Gamma @ Bit

Features

- At Bit Inclination measurements
- At Bit Gamma measurements
- Signal Strength measurements
- Adapts to any Mud Motor type
- Tri Axle accelerometers, Tri Axle magnetometers
- Continues At-Bit inclination measurements
- Vibration measurements
- Temperature measurements
- Shock and Vibration management
- Works in oil and water base mud systems
- All information is in Real-Time and recorded memory

Applications

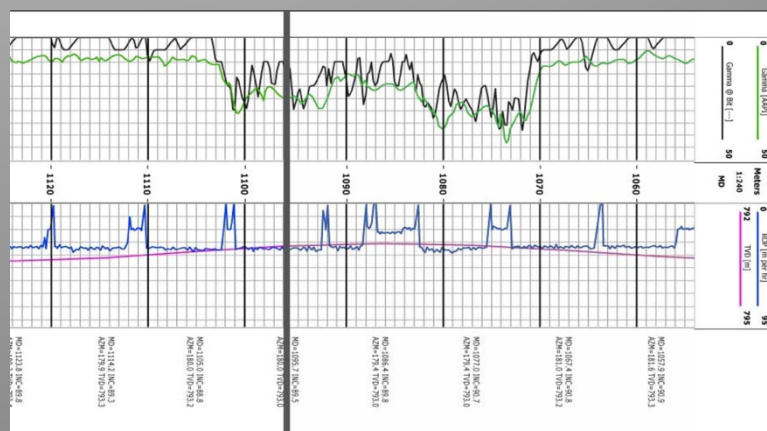
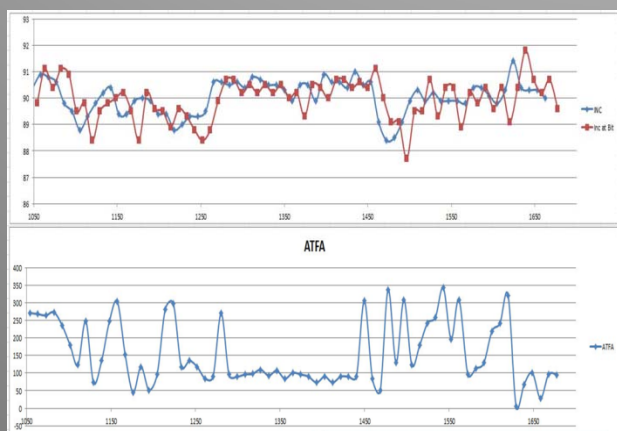
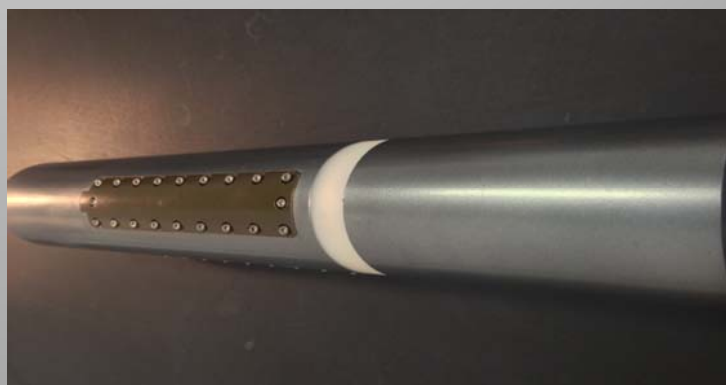
- Directional Drilling
- Geo-steering
- All drilling environments (mud, underbalanced, air)

Benefits

- At Bit measurements – 0.3 meters bit to sensor
- Quicker Geo-Steering decisions
- Quicker drilling decision processes
- Accurate Drilling control
- Reduced Dog-Leg severity
- Optimized well trajectory

Specifications

- Length: 26 inches / .66 meters
- OD: 4 3/4" and 6 1/2"
- Sensor Inclination Accuracy: +/- 0.2 degrees
- Temperature: 150°C / 300°F





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Resistivity Tool

Explora Directional Drilling is proud to offer Resistivity tools to our clients. The resistivity tool can provide propagation resistivity measurements with a reliable, robust collar design and a power consumption that is remarkably low. We are able to provide the most accurate logs over the widest operating range.

Features

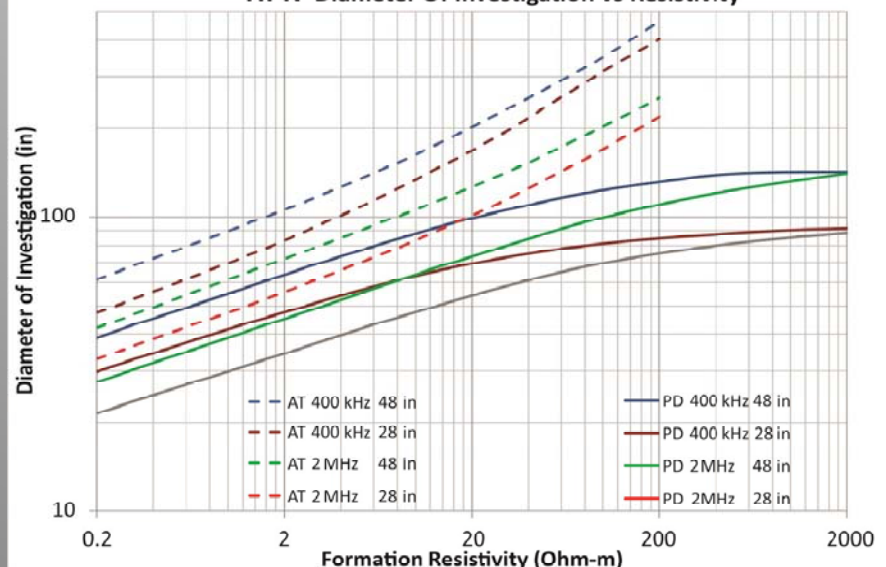
- Propagating Wave Technology with performance (2MHz and 400 KHz)
- Lower maintenance cost
- Unmatched 175°C / 350°F performance 4 ¾" to 8"
- True replacement for Wireline Resistivity
- Memory dump or real-time data
- 8 Curves

Benefits

- Lower cost than competitive systems
- Modular design for adaptive bit to sensor placement
- Can be used in collar sizes 4 ¾" to 8"
- Can be run in both oilbase and waterbase drilling mud



HPR Diameter Of Investigation vs Resistivity





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Rotary Steerable Applications

Currently Under Development