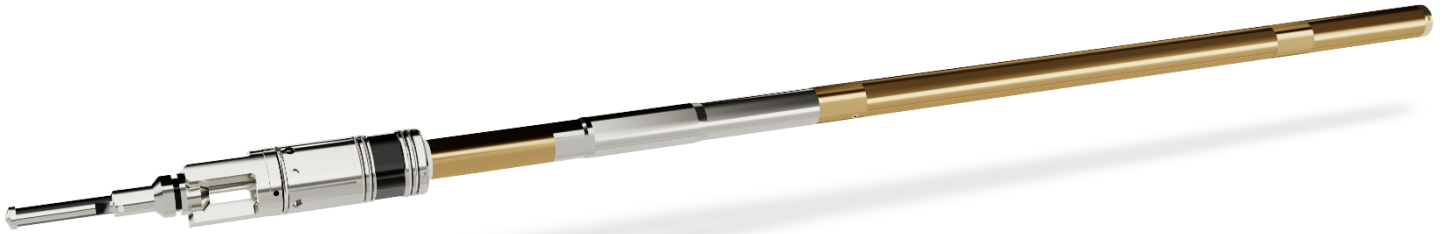


TUFFSHOT

ADVANCED, RUGGED, RELIABLE



HIGHLY INTELLIGENT

Telemetrix's diverse directional drilling experience is a key driver for its success. Established in 1994, Telemetrix technology has been proven in extreme drilling conditions on five continents and is trusted to exceed expectations in high temperature, LCM, and high shock/vibration environments.

Telemetrix's core capabilities are born out of its internal R&D teams who are continually innovating to exceed the expectations of today's Exploration and Production companies.

ABOUT THE TUFFSHOT

Built with the Bakken in mind, The Telemetrix Tuffshot has been engineered to be run in high shock high vibration environments. The TuffShot is a collar mounted MWD system which can be easily adapted to RSS LWD drilling tools.

This means operators can have confidence in their MWD when running RSS and LWD, and the convenience from a single, all-encompassing mud pulse system.

FEATURES

- Industry-leading precision
- Self-cleaning high LCM tolerance
- Downlink capability improves telemetry rates while in the hole
- RSS / LWD compatibility

BENEFITS

- Ensures confident wellbore placement
- Maximize on bottom drilling time
- Seamlessly logs all telemetry and W.I.T.S. data securely
- Adds flexibility and avoid unnecessary trips
- Adaptability for multiple drilling programs

NEWSCO TUFFSHOT APPLICATIONS

- All directional well profiles
- Onshore & Offshore wells
- Geosteering (resistivity & azm gamma)
- Medium & short radius drilling
- Performance drilling
- Deep, high shock and vibration wells
- Horizontal sections over 14,000' (3000m)
- Well temperatures up to 350°F (177°C)
- RSS compatibility
- Extreme LCM tolerance

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Tool Specifications
Imperial Units
SI Units

MWD Telemetry Type		Positive Pulse	
Wireline Retrievable /Re -Seatable		Yes / Yes	
Downlink Capable		Yes, Mud Flow Time Sequencing	
Programmable Modes of Operation		4Static, 2Dynamic	
Survey Capability While Sliding ,Rotating		Yes, No	
Continuous INC Capable		Yes	
Tool Outside Diameter	1.88"	47.8 mm	
Overall Length of Tool ⁱ	D&I Only	25'	7.62 m
	D&I + Gamma Ray	32'	9.75 m
Measurement Depths ⁱⁱ	D&I Only Electronics Sensor	8.75'	2.67 m
	D&I + GR Gamma Sensor	8.1'	2.47 m
	D&I + GR Electronics Sensor	12.1'	3.68 m
Flow Ranges	3 1/2 in	75 - 165 gpm	0.280 - 0.625m ³
	4 3/4 in	100 - 300 gpm	0.37 - 1.1m ³
	6 3/4 in	150 - 600 gpm	0.55 - 2.2m ³
	8 in	400 - 1,200 gpm	1,5 - 4,5m ³
	9 5/8 in	450 - 1,500 gpm	1.7 - 5.6m ³
Pressure Drop	@ 250 gpm (0.9 m ³)	80 psi	550 kPa
	@ 500 gpm (1.9 m ³)	110 psi	750 kPa
	@ 1000 gpm (3.8 m ³)	220 psi	1,500 kPa

Gamma Ray Sensor Specifications

Gamma Ray Sensor Specifications	Telemetry™ Ruggedized Chassis Mounted NaI Scintillation
Gamma Ray Detector Type	0 to 500 cps

Power Specifications

Power Source	Lithium Thionyl Chloride Batteries
Operating Time Per Battery Probe ⁱⁱⁱ	>400Hours

Vibration Sensor Specifications
Imperial Units
SI Units

Measurement Range (lateral)	±50g	500 m/s ²
Tool Outside Diameter	20to 500Hz	

Temperature Sensor Specifications
Imperial Units
SI Units

Measurement Range	32 to 302, [32 to 350] degF	0 to 150, [0 to 177]degC
Sensor Accuracy	±5.0 degF	±2.5 degC
Resolution	±4.0 degF	±2.0 degC

Transmission Time Specifications

Pulse Length, s	0.2	0.4	6
Static Survey, s	45	90	135
Toolface, s	11	22	33
Gamma Ray, s	3	6	9
Toolface and Gamma Ray, s	8	16	24

Environmental Specifications
Imperial Units
SI Units

Maximum Vibration	20 g	200 m/s ²
Maximum Shock	500g, 0.5ms 1/2 Sine	5,000 m/s ² 0.5ms 1/2 Sine
Operating Temperature Range	32 to 302, [32 to 350]degF	0 to 150, [0 to 177]degC
Maximum Operating Pressure	25,000 psi	172,000 kPa
Mud Sand Content	2%	
Maximum Bit Pressure Drop	No Limit	
Lost Circulation Material Size	0.5 inch (12.5mm) solids in slurry	
Lost Circulation Material Weight	100 ppb	225 kg/m ³

Surface Network Specifications
Imperial Units
SI Units

Maximum Vibration	Telemetry DRILLWELL™ ver .2.60	
Maximum Vibration	-40 to 122°F	-40 to 50°C

- ⁱ The tool will fit into one standard length (30') NMDC provided by Newsco
- ⁱⁱ Sensor depths were measured from the top of the motor dump sub to sensor points.
- ⁱⁱⁱ Battery Life is directly proportional to the Pulse Timing used.
- ^{iv} Indicates time with all checks and counts confirmed, data rate dependent.
- ≠ Standard tool configuration 32 to 302 degF [0 to 150 degC], optional Newsco350HT rating 32 to 350 degF [0 to 177 degC].