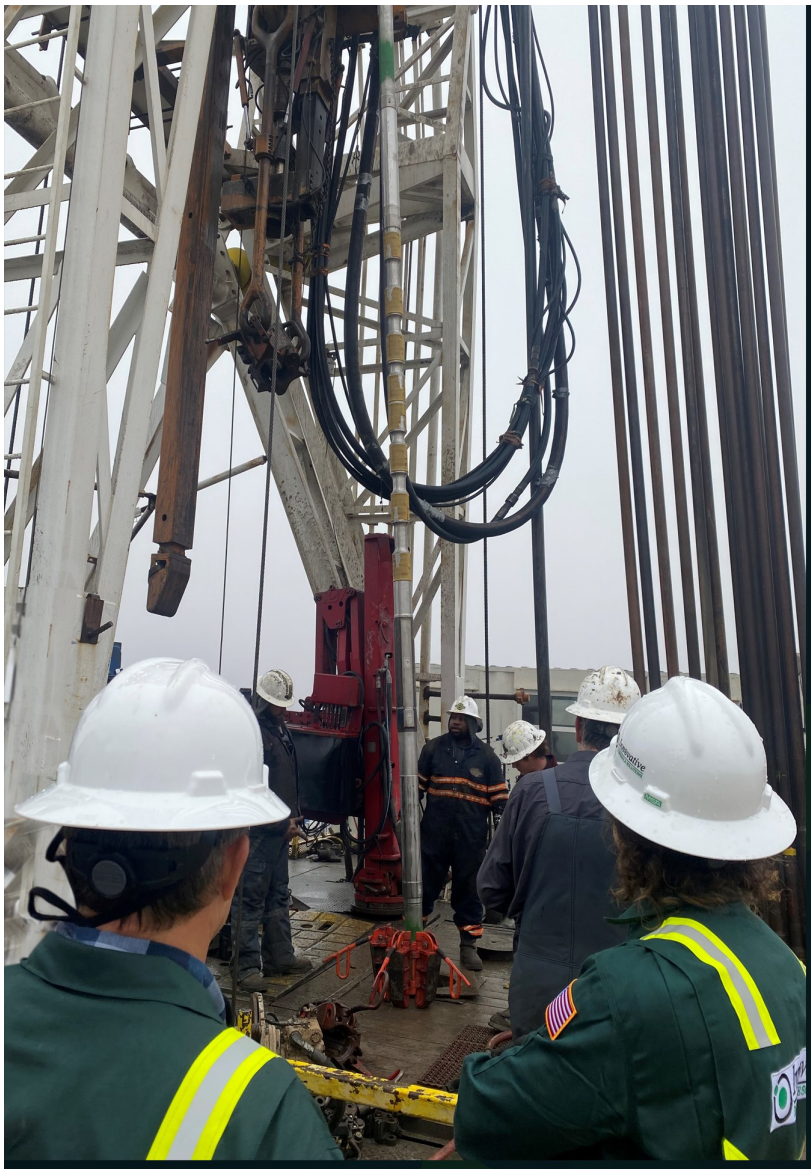

Innovative
DOWNHOLE SOLUTIONS

DRIVING INNOVATION IN THE OIL AND GAS INDUSTRY

RAPIDEDGE HIGH-TEMPERATURE HIGH-SPEED MWD SYSTEM

Innovative Downhole Solutions' RapidEdge MWD System is designed to meet the extreme challenges in today's drilling market. The rugged design, operational to 175°C and 20,000 psi, combined with high-speed mud pulse telemetry is the ideal solution for demanding drilling and logging-while-drilling applications.

- Sustained data rates of up to 4 bits/second before compression
- Data compression provides 4:1 increase in data rate for image transmission
- High temperature, high pressure
- Support for two azimuthal or non-azimuthal gamma ray sensors
- Ability to bin azimuthal gamma data from any gamma sensor
- Fully characterized gamma ray measurement

FEATURES & BENEFITS

- Modular MWD system
- Allows for fast real-time updates at high drilling rates
- Ruggedized sensors and electronics
- High reliability pulser
- Smart controller with field configurable real-time data items
- High vibration events trigger real-time transmission to optimize drilling performance
- Further data rate improvement by optional transmission of azimuthal data while rotating and toolface data white sliding
- Continuous synchronization – does not require pump cycles to resync detection
- Optional pressure transducer for pulser diagnostics, pressure downlink, and pump detection
- High bit to pulse ratio for efficient power consumption
- Ideal for integration with LWD and RSS tools demanding high data rates
- Can be used with wireless short hop systems

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CUSTOMER DELIVERABLES

Gamma Ray	Directional	Vibration & RPM	Diagnostics
Apparent GR Corrected GR Environmental Corrections Azimuthal Measurement	Survey Inclination & Azimuth Continuous Inclination & Azimuth While Drilling	Lateral & Axial RMS Vibration Lateral & Axial Shock Rate Lateral& Axial Peak Shock RPM High-Resolution Shock & RPM Data	Pulser Diagnostics Real-Time Data Storage Sensor Data Storage

GENERAL SPECIFICATIONS

Tool Size	4 3/4”	6 1/2” - 6 3/4”	8 - 8 1/4”	9 1/2”
Nominal OD*	4.75” *121 mm*	6.50 - 6.75” *159 - 171 mm*	8 - 8.25” *203 mm*	9.50” *241 mm*
Nominal ID*	2.50” *64 mm*	3.25” *83 mm*	3.50” *89 mm*	3.50” *89 mm*
Connections (Up / Down)	NC-38 (Box / Pin)	NC-50 (Box / Pin)	6 5/8 Reg (Box / Pin)	7 5/8 Reg (Box / Pin)
Maximum Flow Rate	350 gpm *1,325 lpm*	700 gpm *2,650 lpm*	900 gpm *3,407 lpm*	1,200 gpm *4,543 lpm*
Make-up Torque	9,986 lbf-ft *13,539 N-m*	23,385 - 26,675 lbf-ft *31,706 - 36,166 N-m*	43,812 - 46,935 lbf-ft *59,401 - 63,635 N-m*	79,536 lbf-ft *107,836 N-m*
Maximum Drilling Torque	9,900 lbf-ft *13,422 N-m*	23,000 - 26,000 lbf-ft *31,183 - 35,251 N-m*	43,000 - 46,000 lbf-ft *58,300 - 62,368 N-m*	79,000 lbf-ft *107,110 N-m*
Tool Length* (D&I, GR, Pulser, Vibration)	330” + 48”			
Dogleg Capability	API connection limited			
Operating Temperature	-4 to 347°F *(-20 to 175°C)*			
Maximum Pressure	20,000 psi *(137.9 MPa)*			
Maximum LCM / Sand	50 lb per bbl medium nut plug LCM / 1% Sand			

*Other collar sizes available upon request.

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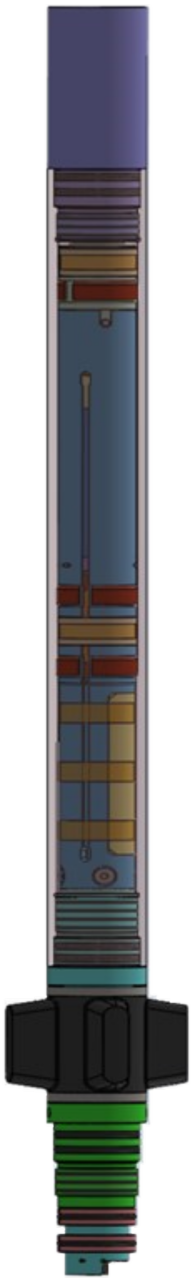
STANDARD GAMMA RAY

	Sensor Specifications
Sensor Package	High-Sensitivity High-Temperature Scintillation Detector
Sonde Diameter	1.875”
Measurement Range	0—1200 API
Measurement Precision	± 3% at 180 ft/hr, 6” Samples
Measurement Accuracy	± 2 API
Vertical Resolution	8”
Azimuthal Measurement	Using External Shield (1.7:1 Azimuthal Sensitivity)
Azimuthal Data	16-bin Recorded Quadrant, Up/Down in Real-time



AZIMUTHAL GAMMA RAY — OPTIONAL

	Sensor Specifications
Sensor Package	High-Sensitivity High-Temperature Large Scintillation Detector
Sonde Diameter	2.5”
Measurement Range	0—1200 API
Measurement Precision	± 2% at 180 ft/hr, 6” Samples
Measurement Accuracy	± 2 API
Vertical Resolution	8”
Azimuthal Measurement	Using Internal Shield (3:1 Azimuthal Sensitivity)
Azimuthal Data	32-bin Recorded 16-bin Compressed, Quadrant, Up/Down in Real-time

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DIRECTIONAL MEASUREMENT

	Sensor Specifications
Sensor Package	High-Accuracy High-Temperature Directional Package
Sonde Diameter	1.875”
Inclination Range	0—180°
Inclination Accuracy	± 0.1° at Surveys, ± 1° While Drilling
Azimuth Range	0—360°
Azimuth Accuracy	± 0.5°at Surveys, ± 2° While Drilling
Toolface Accuracy	± 0.2°While Sliding, ± 1.5° While Drilling (for Azimuthal Data Binning)
Total Gravity Field Accuracy	2.5 mg Total Spread
Total Magnetic Field Accuracy	250 nT Total Spread
Surveys	Short Survey: INC, AZM, Stability and Status Flags Long Survey: 3-Axis Gravity + 3-Axis Magnetic Measurements

VIBRATION, RPM, TOOLFACE, AND TEMPERATURE MEASUREMENTS

	Sensor Specifications
Vibration Sensor	3-Axis Accelerometer
Toolface Sensor	2-Axis Magnetometer + 2-Axis Accelerometer
Vibration RMS Measurements	X, Y, Z, and Lateral, 0-30 g ± 5%
Shock Measurements	X, Y, Z Shock Peak and Rate, ± 200 g ± 5%
RPM Measurement	-500—1000 rpm ± 2%
Temperature Measurement	0—175°C ± -1°C
Toolface Accuracy	± 2° (for Azimuthal Data Binning)

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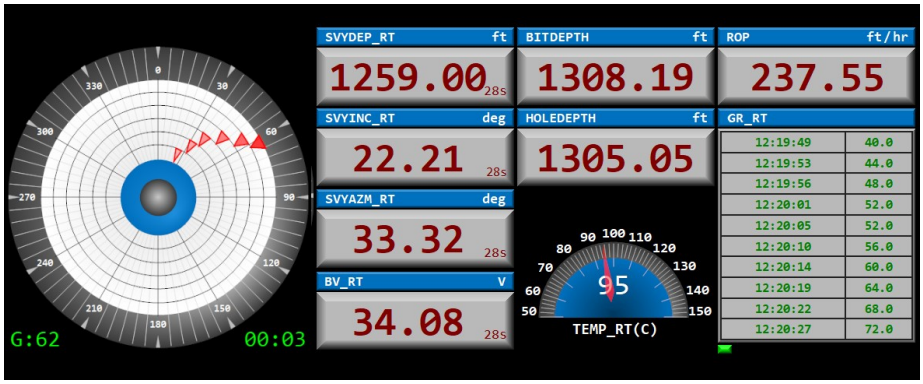
SURFACE EQUIPMENT



DATA RATES

Maximum Data Rate	Equipment Required
1.5 bps	1 Pressure Transducer
2.5 bps	2 Pressure Transducers
4 bps	2 Pressure Transducers, 1 Pump Stroke Counter per Pump

Azimuthal data items are compressed in downhole firmware and uncompressed in the surface software, which increases effective data rate by a factor of 4 for these items

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