

AccuWave Electromagnetic MWD System



Ryan's patented AccuWave Electromagnetic MWD system provides reliable and accurate measurements for unmanned survey and directional drilling applications.

The AccuWave™ EM MWD system offers reliable high-speed data transmission from downhole to surface in all drilling fluid types. Data is transmitted continuously using low frequency electromagnetic waves and has unlimited LCM tolerance. Designed for the harshest drilling conditions, the system utilizes the same rugged electronics packaging system found in the entire Ryan MWD product line to provide survey, tool face, gamma and advanced measurement data. The surface equipment employs the latest in signal processing technology to enable accurate decoding in high-noise environments. A low power consumption design enables extended tool runs.

Real-time directional survey and gamma data are viewable via a Class 1/Div 2 rig floor display and can be remotely monitored from anywhere around the world. Surveys are decoded automatically and stored in both the surface system and tool memory. All decoded data is available via WITS format in real time. Strict quality control measures are used to ensure real-time data quality. All memory data is analyzed by our experts to ensure quality using Ryan's proprietary diagnostic software.

Advantages of AccuWave

Features	Benefits
No wellsite assembly required	Increases reliability with fewer hands on the tool at the wellsite
Transmits in all drilling fluids	Operates in water, oil, and air/foam based drilling fluid environments
Accurate directional surveys and API-calibrated gamma	Provides precise surveys for position calculation and gamma calibrated to API standards for cohesion across offset logs
All data stored in memory	Provides high-resolution data post drilling
Continuous Inclination	Enhances positional awareness, eliminates check shots, and results in a smoother wellbore
Shock & Vibration	Measures downhole vibrations to help avoid hazardous drilling conditions before problems arise
Smart Telemetry	Optimizes rotating and sliding sequences for steerability and data logging
No moving parts	Provides high reliability and unlimited LCM tolerance
Surveys transmitted during connection	Eliminates all downtime associated with acquiring mud pulse surveys



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AccuWave EM MWD System Specifications

Data Resolution	Inclination: $\pm 0.1^\circ$ (Range: $0^\circ - 180^\circ$)
	Azimuth: $\pm 1.0^\circ$ (Range: $0^\circ - 360^\circ$)
	Tool Face: $\pm 1.0^\circ$ (Range: $0^\circ - 360^\circ$)
	Continuous Inc: $\pm 0.1^\circ$ (Range: $15^\circ - 165^\circ$)
	Gamma Ray: $\pm 2\%$ (Range: $0^\circ\text{C} - 150^\circ\text{C}$); $\pm 5\%$ ($150^\circ\text{C} - 175^\circ\text{C}$)
Signal Transmission	Electromagnetic
Operating Frequency	2-20 Hz
Collar Size	4¾ in. OD x 30 ft. x 3½ IF box pin
	6½ in. OD x 30 ft. x 4½ XH box pin
	8 in. OD x 30 ft. x 6% API reg. or NC56 box pin
Flow Ranges	4¾ in.: 0-325 GPM
	6½ in.: 0-800 GPM
	8 in.: 0 - 1200 GPM
Sand Content	< 1% by Volume
LCM Tolerance	No limit
Battery Life	250 - 500 hours (formation dependent)
Operating Temperature	175°C (347°F)
Maximum Pressure	20,000 psi
Max. Vibration, g	20 (rms, random, 15–1,000 Hz)
Max. Shock, g	500
Dog Leg Capability	API connection limited
Service Type/Support	Manned or unmanned—24 x 7 x 365



The Ryan MWD product line is a proprietary family of advanced systems originally developed by Navigate Energy Services, which was acquired by Nabors in 2013, and represents the latest in technology developed specifically for the unique requirements of land-based drilling applications. These tools are suited for applications where high reliability, precise wellbore placement, and drilling efficiency are crucial for success. This patented technology allows Ryan to provide a unique service to our

customers that enables them to cost-effectively drill and accurately hit their targets. Our experienced engineering team and highly skilled field technicians are focused on addressing operator's unique needs and providing the highest level of quality service and customer support in the industry.

Contact us today to experience the Ryan difference.



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