

AccuMP Mud Pulse MWD System

Drill ahead with 100% confidence using Ryan's patented AccuMP Mud Pulse MWD system. It provides reliable and accurate measurements automatically for both unmanned survey and directional drilling applications.

The AccuMP™ system is driven by Ryan's patented positive mud pulsing system. The system is proven in the roughest drilling environments and reliably provides accurate data for unmanned survey and directional drilling applications that require tool face and gamma. Ryan's advanced signal processing techniques enable reliable and accurate decoding. The system utilizes state-of-the-art sensor technology to ensure quality measurements.

Real-time directional survey and gamma data are viewable on a rig floor display and can be remotely monitored via a wireless connection. All transmitted data is available via WITS format in real-time. Surveys are decoded automatically with all transmitted data stored in the surface system and tool memory. Strict quality control measures are used to ensure real-time data quality. All memory data is analyzed by experts to ensure quality using Ryan's proprietary diagnostic software.

Advantages of AccuMP

| Features | Benefits |
|---|---|
| No wellsite assembly required | Increases reliability with fewer hands on the tool at the wellsite |
| Long battery life (500+ hours) | Provides long-lasting run times that reduce trip risk on long jobs |
| 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 drill |
| 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 |



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MWD System Specifications

| | |
|-----------------------|--|
| Sensor Accuracy | Inclination $\pm 0.1^\circ$ (Range: 0–180°) |
| | Azimuth $\pm 1.0^\circ$ (Range: 0 - 360°) |
| | Tool face $\pm .1^\circ$ (Range: 0–360°) |
| | Continuous Inc: ± 0.1 (Range: 0° - 165°) |
| | Gamma ray $\pm 2\%$ (Range: 0°C–150°C); $\pm 5\%$ (150°C–175°C) $\pm 0.1^\circ$ |
| Signal Transmission | Positive mud pulse |
| Collar Size | 4 3/4 in. OD x 30 ft. x 3 1/2 IF box pin |
| | 6 1/2 in. OD x 30 ft. x 4 1/2 XH box pin |
| | 8 in. OD x 30 ft. x 6 5/8 reg or NC56 box pin |
| Flow Ranges | 4 3/4 in. : 150–325 gpm |
| | 6 1/2 in. : 300–850 gpm |
| | 8 & 9 1/2 in. : 300–1300 gpm |
| Sand Content | < 1% by volume |
| LCM Tolerance | 25 lbs/bbl medium well mixed LCM |
| Battery Life | 500 hours |
| Operating Temperature | 175°C (347°F) |
| Maximum Pressure | 20,000 psi |
| Dog Leg Capability | API connection limited |
| Max. Vibration, g | 20 (rms, random, 15–1,000 Hz) |
| Max. Shock, g | 500 |
| 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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