

# KEYDRILL HYBRID EM-MWD SYSTEM

## Overview:

KeyDrill has successfully tested its Hybrid EM-MWD system. The system integrates our advanced Mud Pulse MWD system with our newly developed, rugged, and reliable Electro-Magnetic (EM) MWD system. The combined integration achieves the hybrid capabilities of both electromagnetic and mud pulse data transmission. This tool uses the most advanced and state-of-the-art electronics, then adds additional measurement capabilities to deliver unparalleled performance. Our Hybrid EM-MWD assures that the data can be transmitted to the surface fast and efficiently when lost circulation zones, underbalanced drilling, or formation anomalies present challenges for Mud Pulse or EM systems individually.

## Features:

- Retrievable Hybrid-MWD tool.
- Run both EM-MWD and Mud Pulse MWD systems simultaneously.
- Separates easily to run as a standalone EM MWD or standalone Mud Pulse MWD system.
- Supports Survey-only EM data transmission to expedite survey time during connections.
- Field Operator customization includes programmable data sequences.
- 40 Watts Power Output Capability!
- Multiple voltage selections may be adjusted via downlink.
- Standard battery powered.
- Supports multiple batteries when necessary and supports dedicated EM power sources.
- Sleep modes are available during trips in the hole or transportation to site to conserve batteries.
- Power management and conservation options available
- Plug and Play - designed to integrate with the most current mud pulse systems in the market.
- Easily integrates with third-party tools such Rotary Steerable tools, Resistivity tools, Azimuthal Gamma tools, annular pressure tools, and many more.

## Applications:

- Air drilling
- High-speed drilling
- Underbalanced drilling
- Lost circulation or low-pressure zones

## Specifications:

Operating Temperature;	-20°C to 175°C
Max. Pressure:	20,000 PSI (138KPa)
EM Transmitter voltage:	3 Volts to 15Volts adjustable
Operating frequency:	3 to 18Hz
Data rates:	1 to 6 Bits per second
Data update rates:	16 sec @ 1 baud 3 sec @ 6 baud
Vibration:	3-Axis, 50-300Hz, Max 20G
Shock:	500G, 0.5ms
Battery Voltage:	22V to 38V
Battery Life:	80-150 operating hours (Depending on the formation and power selections)
Downhole data storage:	200 Hours
Connection Style:	Kintec, Lemo, Deutsch, or Rotatable
Dimensions:	1.875" OD x 61" L / 30 lbs. (Transmitter only) 1.875" OD x 96" L / 51 lbs. (Transmitter with Bow Springs and Spearpoint)

Parameter	Range	Resolution	Accuracy
Inclination	0 - 180°	0.05°	±0.1°
Continuous Inclination	0 - 180°	0.05°	±0.2°
Azimuth	0 - 360°	0.18°	±0.25°
Continuous Azimuth	0 - 360°	0.18°	±1.5°
Toolface	0 - 360°	0.18°	±1°
Total Magnetic Field	0 - 75000 Gamma	100	±200
Azimuthal Gamma	0 - 1023	1CPS (Max RPM 500)	±1CPS
Dynamic Up/Down Gamma	0 - 1023	1CPS (Max RPM 500)	±1CPS
Gamma	0 - 1023	1CPS	±1CPS
Annular Pressure	0 - 20,000PSI	Programmable	1% FS
Pipe Pressure	0 - 20,000PSI	Programmable	1% FS
Operational Temperature	-20 - 175°	1°	±1°
RPM	0 - 500	1 RPM	±1%

## Toolstring lengths:

Hybrid tool - Keydrill EM/DM/2 Batteries/GammaPulser:	389 Inches or 9.9 meter
Pure EM-MWD tool - Keydrill EM/DM/2 Batteries/Gamma:	354 Inch or 9 meters
Pure Mud-Pulse tool - Keydrill DM/2 Batteries/Gamma/Pulser:	310.5 Inch or 7.9 meter