

# DOWNHOLE TECHNOLOGY

## INDUSTRY LEADING MULTI TELEMETRY MWD

Improve performance and drill longer without tripping for the MWD with the power of multiple telemetry systems.

Introducing HDR, a new generation of MWD tools intended to keep you on bottom drilling for as long as possible. The system combines EM and Mud Pulse technology to ensure that wellbore telemetry is delivered to the surface in any drilling environment.

The tool is fully adjustable for any drilling application and can be assembled as a standalone Mud Pulse tool, EM tool, or a combination of both. Each telemetry system can be active at the same time which gives you the benefit of load sharing logging data and there are no delays when switching between EM and Mud Pulse.

The EM transmitter is capable of operating at higher speeds and at greater depths than legacy EM MWD systems and a robust receiver contains advanced decoding innovations to handle logging through even the most challenging formations. Two-way communication allows operators to adjust parameters of the down-hole tool on the fly and the EM transmitter can be placed in idle mode to save power.

The standard bottom mounted tool string is fully retrievable but a non-retrievable, top mounted assembly is optionally available. Additional logging sensors such as shock, vibration, continuous inclination and pressure are also available to extend the capabilities of this powerful platform.

The HDR MWD system is cost-effective, reliable and has the best overall performance on the market, period.

## FEATURES

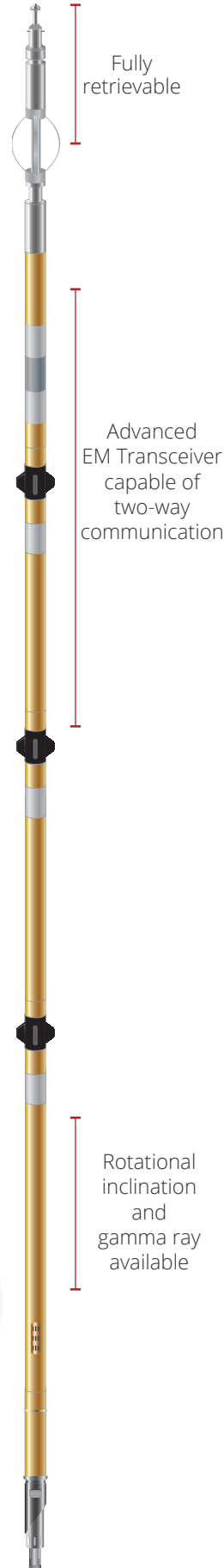
- ✓ **Rugged and reliable**, capable of operating in high pressure (20,000psi) and high temperature (150 °C) conditions.
- ✓ **Fully retrievable**, the entire tool can be mounted into a standard non-magnetic drill collar for easy installation.
- ✓ Multiple battery capable for extended down-hole operations.
- ✓ **Have confidence** while drilling in EM inhibitive formations, just switch to mud pulse whenever EM signals aren't decoding.

## OPERATING PARAMETERS

Collar Sizes	3-1/2", 4 3/4", 6 1/2", 8"
Tool Length	9 - 12m
Battery Capacity	42Ah
EM Operating Frequency	2 - 12 Hz
Mud Pulse Data Rate	1 - 3 bits/s
EM Rate Data Rate	4 - 16 bits/s

## HIGH PERFORMANCE MUD PULSE

Achieve faster Mud Pulse data rates by using HDR capable pulser modules. Improved valve actuation and enhanced durability increases the down-hole endurance and longevity of the pulser while advanced detection techniques minimize noise and reduce signal interference.



# Here's why the HDR Tool is the best on the Market



**The HDR MWD system features state-of-the-art Intelligent Channel Coding (ICC) technology to achieve higher data rates in noisy environments.**

ICC technology uses proprietary “noisy channel” encoding algorithms to encode uplink packets. Using ICC increases the aggregate receive sensitivity of the surface receiver allowing for increased operational depths using much smaller received signals. ICC also provides “on the fly” adjustment of the EM uplink signal to maximize channel throughput and avoid ambient noise sources.

## **High Performance Multi-mode Surface Receiver**

The Multi-Mode Surface Receiver (MMSR) is a “modally agile” receiver which automatically adjusts to the ICC content sent from the down-hole tool. The MMSR allows the tool to autonomously make adjustments to the ICC channel content without operator intervention or the need for a reverse communications channel. This gives the surface receiver greater noise immunity than conventional single-mode EM receivers which translates into better performance in unfavorable EM formations.

## **ADVANCED EM CONTROL MODULE**

The next generation EM transmitter used in the HDR tool allows you the flexibility and control to maximize operational the capabilities of the system.

- **Plug and Play** compatibility with standard orientation sensors and gamma modules.
- **High Performance** 32-bit RISC processor to facilitate Intelligent Channel Coding EM algorithms
- **High Efficiency** adaptive-output power amplifier that saves battery power by adjusting to changing formation lithology.

## **TWO-WAY COMMUNICATION**

**The two-way EM Communications Link allows tool parameters to be altered during pumps-off to accommodate for changing down-hole conditions without tripping to reprogram.**

- Down-link to reconfigure the EM tool (steering/survey sequences, power, carrier channel and tool mode)
- Down-link to query the tool and receive detailed diagnostics, asynchronous data and missed surveys.