

FS-EM

Full Sensor EM MWD

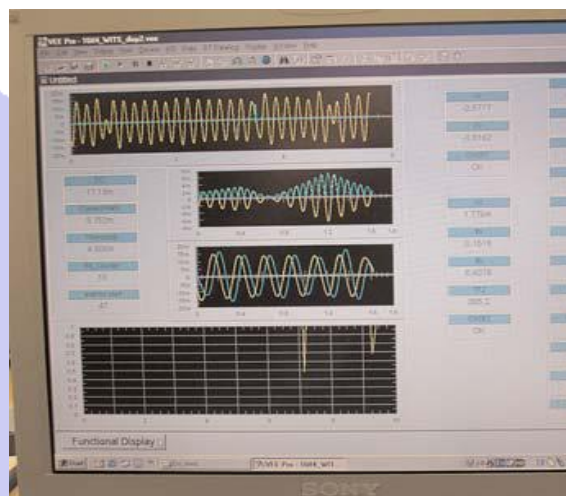
Our first full EM kit was produced in 1997, and underwent a process of continuous improvement over the next 12 years. With this latest of three generations of our EM system, the new Full Sensor EM (FS-EM) system, we have a tool design that draws on comprehensive study of electromagnetism and at the same time brings together the improvements made possible with our field testing expertise. Our philosophy of product design is thus based in equal part on rugged practicality and advanced theory and is present in the design of all the constituent elements of the EM system: the receiver, transmitter, antenna and gap sub. This has allowed us to offer you consistently high performance parameters of power efficiency, speed and operating depth.



Our wireless receiver station

Invest in an efficient EM MWD fleet with Cryoton FS-EM

Our EM tool offers speeds upwards of 3 bps, and operating depths of over 4 km. It comes equipped with a full set of directional and gamma sensors, our proprietary signal processing software, and rugged triple-insulation gap sub for power-efficient signal transmission.



Our signal decoding software

FS-EM Features

- Continuous Wave mode of transmission - the power efficient way to transmit signal through formation.
- Constant current automatic lithology compensation – provides power conservation during operation and signal reliably in challenging formations.
- Accurate and cost-efficient downhole sensor package – directional and gamma (pressure coming soon).
- Ultra low-noise receiver technology - based on leading edge scientific techniques.
- High signal output from downhole, achieved through economical transmitter design and our proprietary gap sub.
- Cryoton's performance rugged Gap sub - triple-insulated gap sub designed for no current leakage and with extra mechanical strength.
- Advanced mechanical durability - no moving mechanical parts, durable retrievable bulkhead, EM antenna stronger than the inner tool string, Cryoton EM gap sub stronger than all other BHA components.
- Proprietary signal processing software package, tool fully surface-programmable.
- Talk-back while downhole through pump control - change EM power and frequency on demand.
- Intelligent flow switch - provides flow information and option to automatically double EM signal strength on-connection.
- Wireless transmission between remote receiver and MWD interface box (which with no cable to stretch can be placed anywhere, e.g. the doghouse)

FS-EM Specifications

Operating:		
Transmission Mode	Continuous Wave	
Wireline Retrievability	Fully retrievable	
Typical Operating Depth (no repeater)	12,000 ft (4,000 m)	
Data Rate	3 bps (6 bps high speed version coming soon)	
Battery	2x standard Lithium batteries	
Typical Battery Life	Over 150 hours per battery	
Maximum Power Draw	10W	
Gap Sub OD available	8", 6 1/2", 4 3/4", 3 1/2"	
Tool Programming	Fully surface programmable	
Downlink	Pump-control: EM power and frequency downhole-programmable	
Sensor Specifications	Range	Resolution
Inclination	±90°	±0.2°
Azimuth	0-360°	±1°
Tool Face	0-360°	±1.5°
Gamma ray	0-500 AAPI	±2 AAPI
Temperature	0-150°C	±0.6°C
Battery voltage	15-30V	±0.1V
Downhole:		
Operating Temperature	150C (302F)	
Maximum Pressure	20,000 psi (137.9 MPa)	
Shock	1,000g	
Vibration	30-500Hz 20g all axes	
Surface:		
Operating Temperature	-23 to 52C (-9 to 126F)	
Storage Temperature	-40 to 52C (-40 to 52C)	

Cryoton (UK) Ltd also provides:

CW-EM: Cryoton's mud pulse add-on EM: upgrade your existing Tensor-compatible MWD system with EM transmission, and reuse your existing MWD sensor package and user interface.

Custom-built EM solutions: add-on EM for non industry-standard mud pulse systems.



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