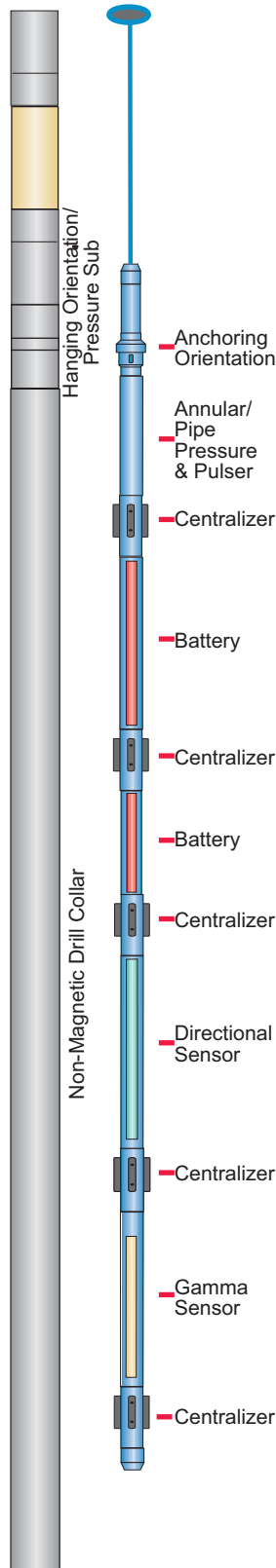


EFIELD Electromagnetic MWD

Lightning-Fast Data Transmissions

Scientific Drilling's Electromagnetic Measure-While-Drilling (MWD) (EFIELD) uses electromagnetic wave propagation to transmit downhole data to the surface >4 times faster than conventional MWD mud pulse systems.

EFIELD Data rates are so fast a survey can be performed during pipe connections in less than 30 seconds. Toolface updates are up to 4 second intervals. EFIELD transmits raw magnetic vector components to enable "ranging" using a proprietary method fully tested on parallel well drilling projects.



ADVANTAGES

- Operates with conventional mud even when lost circulation material is pumped.
- Operates with no returns.
- Operates when drilling with aerated mud (gas, nitrogen, air)
- Drilling with air can increase rate of penetration (ROP) by a factor of 4 compared to mud operations.
- Saves ~70% connection time while drilling in any medium.
- Uses bidirectional communications.
- Has no moving parts.
- Maintains minimal pressure drop.
- Can be used for ranging projects.
- Retrievability - optional.

Multi-Faceted Drilling Applications

EFIELD has many uses in the oil and gas industry, in addition to general drilling applications. EFIELD

is used for:

- Normal mud drilling
- Under-balanced drilling with air/aerated mud, nitrogen, air, gas, diesel, or oil
- River crossings
- Coal bed methane, air-mist

Exceptional Feature Versatility

EFIELD's outer diameter is 1.75 in. (4.45cm) and can be configured for collar sizes 3.125 in. (7.94cm) to 9.5 in. (24.13cm). EFIELD's length varies from 27 ft (8m) to 32 ft (9.75m). The survey probe sensing point is 3 to 4 ft from the bottom of the tool. EFIELD can be used with "long wire" (upper gap) technology to increase depth capability to greater than 13,000 ft. The downhole sensor package includes:

- Inclination
- Azimuth
- Toolface (highside+magnetic)
- Vibration (peak+average)
- Gamma (optional), focused gamma (optional)

Additional optional sensors:

- Annulus & drill pipe pressure
- PRT (Propagation Resistivity)
- GAIN (near bit inc/gamma)
- Smart Motor

Technical Specifications		
Tool Collar Sizes:	3.125" (7.94cm) 3.5" (8.89cm) 4.75" (12.07cm) 6.25" (16.5cm)	6.5" (16.5cm) 6.75" (17.15cm) 8" (20.32cm) 9.5" (24.13cm)
Lost Circulation Material (LCM):	No limit	
Dog Leg Degree/ 100 ft Outer Diameter	Sliding: 12 (8") 20 (6.6") 28 (4.75") 60 (3.5") 65 (3.125")	Rotating: 7 (8") 10 (6.5") 12 (4.75") 20 (3.5") 20 (3.125")
Temperature Rating:	330°F (165°C)	
Pressure Rating:	20,000 psi (137,900 kPa)	
Sensor Accuracy	Toolface: ± 0.15° > 3° Azimuth: ± 0.25° > 3° Inclination: ± 0.15° all angles	

