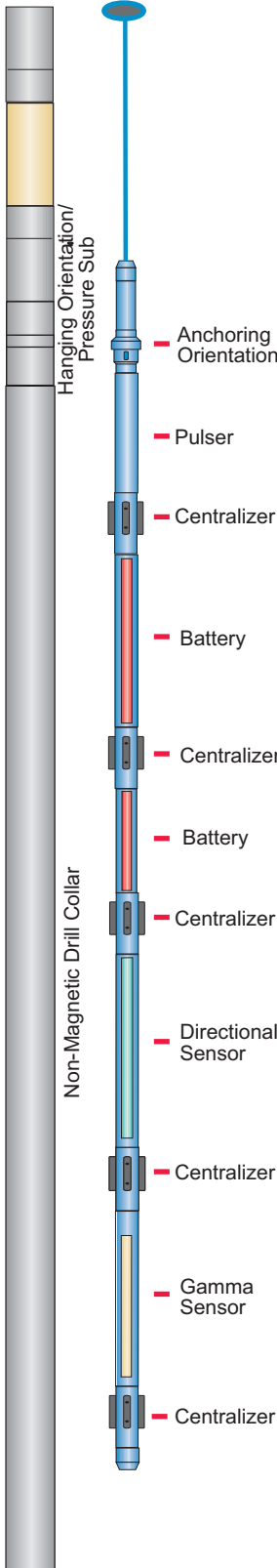


E-FIELD Electromagnetic MWD

Lightning-Fast Data Transmissions

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

E-FIELD 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. E-FIELD 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 bi-directional communications.
- Has no moving parts.
- Maintains minimal pressure drop.
- Can be used for ranging projects.
- Retrievability - optional.

Multi-Faceted Drilling Applications

E-FIELD has many uses in the oil and gas industry. In addition to general drilling applications, E-FIELD is used for:

- Normal mud drilling
- Under-balanced drilling with air/aerated mud, nitrogen, air, gas, diesel, or oil
- River crossings
- Coal Bed Methane

Exceptional Feature Versatility

The survey probe sensing point is 3 to 4 ft from the bottom of the tool. E-FIELD 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 / RMS)
- Gamma (optional), focused gamma (optional)

Additional optional sensors:

- Annulus & 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" (15.87cm)	6.5" (16.5cm) 8" (20.32cm) 9.5" (24.13cm)
Lost Circulation Material (LCM):	No limit	
Dog Leg Degree/ 100 ft Outer Diameter:	Sliding: 12 (8") 20 (6.5") 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:	MWD 302°F (150°C)	
Pressure Rating:	20,000 psi (137,900 kPa)	
Sensor Accuracy:	Gravity Toolface: ± 0.15° > 3° Magnetic Toolface: ± 0.15° < 3° Azimuth: ± 0.25° > 3° Inclination: ± 0.15° all angles	

