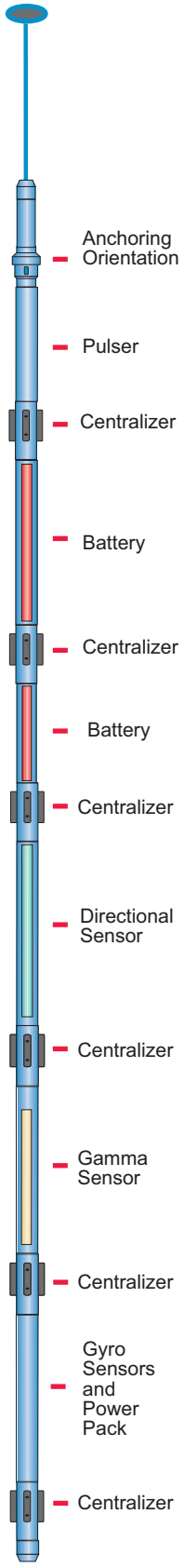
E-FIELD Gyro MWD



High Speed
Transmission of both Gyro and Magnetic Data

Scientific Drilling's Electromagnetic Measure-While-Drilling (E-FIELD MWD) is now available with the Gyro Sensor option. The EM gMWD configuration allows for fast data transmission of both gyro and magnetic surveys and toolface data.

Gyro toolface updates are available every 5 seconds. Fast data rate combined with 2-way communications allows surveys to be performed during pipe connections, non-intrusive to drilling operations.

ADVANTAGES

- Eliminates the need for wireline conveyed gyros.
- Multi Mode Surveys - gyro and/or magnetic surveys and orientations.
- Closer to bit surveys, gyro sensor at bottom of tool string.
- Data transmission independent of pump operations and fluids.
- Retrievable when specially configured.
- Gyro section can be powered on and off with talk down command from surface.
- Uses bidirectional communications.

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) Gyro 302°F (150°C)	
Pressure Rating:	20,000 psi (137,900 kPa)	
Sensor Accuracy Magnetic:	Gravity Toolface: ± 0.15° > 3° Magnetic Toolface: ± 0.15° < 3° Azimuth: ± 0.25° > 3° Inclination: ± 0.15° all angles	
Sensor Accuracy Gyro:	Subject to well profile and latitude	
Survey Transmission Time:	Magnetic : 12 seconds Gyro : 9 seconds + 3 min. gyro survey collection	
Power Source Operating Time:	MWD Lithium 100-250 hours	

Multi-Faceted
Drilling Applications

EM gMWD has many applications:

- Pad Drilling
- Normal mud drilling, under-balanced drilling with air/aerated mud, nitrogen, air, gas, diesel, or oil
- In-fill drilling

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 (gyro and magnetic)
- Toolface (gyro, highside + magnetic)
- Vibration (peak / RMS)
- Gamma (optional), focused gamma (optional), gamma near bit

Additional Sensor Options:

- Annulus & pipe pressure
- LWD PRT & Gamma Ray
- Smart Motor (N.bit inc. & gamma)

Scientific Drilling

Preliminary