



E-Field gyro MWD (E-Field gMWD)

High Sped Transmission of both gyro and Magnetic Data

Scientific Drilling's Electromagnetic Measure-While-Drilling (E-Field) is available with the gyro sensor option. The E-Field 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 communication allows surveys to be performed during pipe connections, non-intrusive to drilling operations.

Multi-Faceted Drilling Applications

E-Field 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

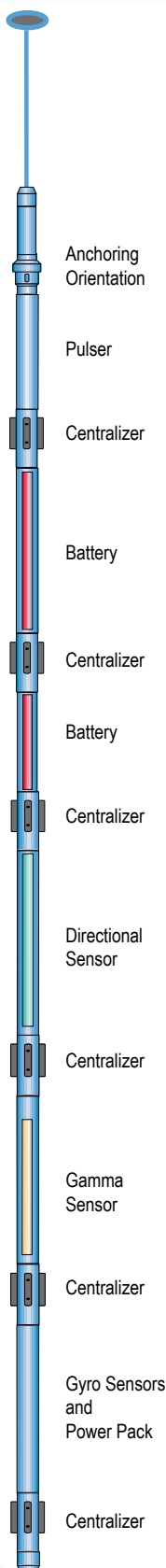
Exceptional Feature Versatility

The survey probe sensing point is 3 to 4 feet 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 feet. 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)
- Azimuthal Gamma Ray/Azimuthal Galn



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 in (7.94 cm)	6.5 in (16.5 cm)
	3.5 in (8.89 cm)	8 in (20.32 cm)
	4.75 in (12.07 cm)	9.5 in (24.13 cm)
	6.25 in (15.75 cm)	
Lost Circulation Material (LCM)	No Limit	
Dog Leg Degree/ per 100 ft O.D.	Sliding:	Rotating:
	12° (8 in)	7° (8 in)
	20° (6.5 in)	10° (6.5 in)
	28° (4.75 in)	12° (4.75 in)
	60° (3.5 in)	20° (3.5 in)
	65° (3.125 in)	20° (3.125 in)
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: $\pm 0.15^\circ > 3^\circ$	
	Magnetic Toolface: $\pm 0.15^\circ < 3^\circ$	
	Azimuth: $\pm 0.25^\circ > 3^\circ$	
	Inclination: $\pm 0.15^\circ$ all angles	
Sensor Accuracy Gyro	Subject to well profile and latitude	
Survey Transmission Time	Magnetic: 12 seconds	
	Gyro: 9 seconds + 3 minute gyro survey collection	
Power Source Operating Time	MWD Lithium 100-250 hours	
Data Rates	As fast as 14 bits per second	