



# E-Field gyro MWD (EMgMWD)

## High Speed Transmission of Both Gyro and Magnetic Data

Scientific Drilling's Electromagnetic Measurement-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 five seconds. Fast data rate combined with two-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 aerated mud, nitrogen, gas, diesel, or oil
- In-fill drilling

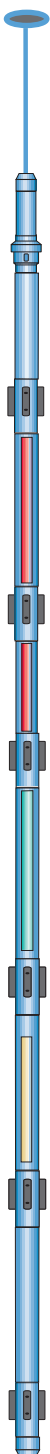
## Exceptional Feature Versatility

The survey probe sensing point is three to four feet from the bottom of the tool. E-Field gMWD 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)

## Additional Sensor Options:

- Gamma, focused gamma, gamma near bit
- Pressure While Drilling (PWD)
- LWD Propagation Resistivity Tool (PRT)
- Radial & Focused Gamma Ray
- Smart Motor (Near-Bit Inclination & Azimuthal Gamma Ray)
- Azimuthal Galn



Anchoring Orientation

Pulser

Centralizer

Battery

Centralizer

Battery

Centralizer

Directional Sensor

Centralizer

Gamma Sensor

Centralizer

Gyro Sensors and Power Pack

Centralizer



## 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 is independent of pump operations as well as drilling media.
- Retrievable when specially configured.
- Gyro section can be powered on and off with talk down command from surface.
- Uses bidirectional communications.

## TECHNICAL SPECIFICATIONS

<b>Tool Collar Sizes</b>	3.125 in (79.4 mm)	6.5 in (165.1 mm)
	3.5 in (88.9 mm)	8 in (203.2 mm)
	4.75 in (120.7 mm)	9.5 in (241.3 mm)
<b>Dog Leg Degree per 100 ft O.D.</b>	<b>Sliding:</b>	<b>Rotating:</b>
	12° (9.5 in)	5° (9.5 in)
	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)	
<b>Pressure Rating</b>	20,000 psi (30,000 available) (137,900 kPa)	
<b>Temperature Rating</b>	MWD 302°F (150°C) Gyro 302°F (150°C)	
<b>Lost Circulation Material (LCM)</b>	No Limit	
<b>Sensor Accuracy Magnetic</b>	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	
<b>Sensor Accuracy Gyro</b>	Subject to well profile and latitude	
<b>Data Rate</b>	As fast as 14 bits per second	
<b>Survey Transmission Time</b>	Magnetic: 12 seconds Gyro: 9 seconds + 3 minute gyro survey collection	
<b>Power Source</b>	MWD Lithium Battery	
<b>Operating Time</b>	100-250 hours	

Specifications are subject to change without notice.

**The Leading Force in Wellbore Navigation**



Scientific Drilling