



Gyro Measurement-While-Drilling (gMWD)

Time Saving Keeper Gyro/MWD Surveys

Scientific Drilling's Gyro Measurement-While-Drilling (gMWD) makes simultaneous use of our high-accuracy Keeper Gyro System coupled with our Mud Pulse MWD. This powerful combination facilitates fast top-hole drilling operations in a multi-well environment.

Simultaneous Gyro/Magnetic Surveys

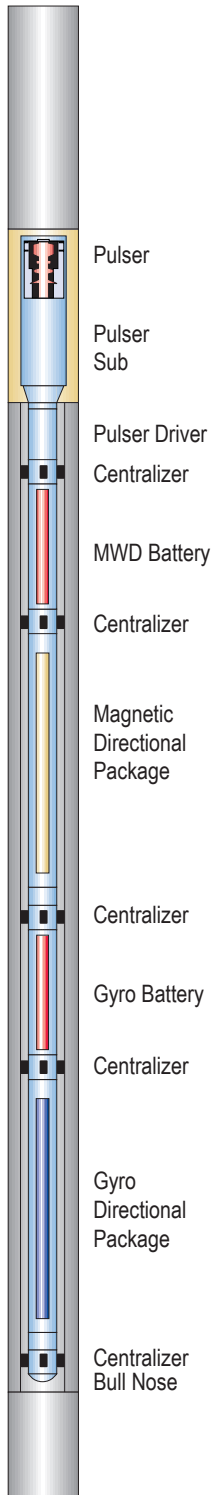
SDI's gMWD system combines gyro and magnetic surveys, enabling operational flexibility and redundant survey quality assurance. When proximity to magnetic interference sources (like adjacent casings) prevents magnetic MWD surveys, the Keeper gyro will provide inclination, azimuth and toolface. When magnetic interference is clear, the gyro can be switched off automatically, or left running to gather redundant survey data.

gMWD Proven Track Record

Scientific Drilling's reputation for engineering excellence is defined by our commitment to continuous product improvement. Having drilled more than 1.8 million feet of hole, gMWD sets the standard for high performance and ruggedness. gMWD is optimized for multi-well tophole and reentry/sidetrack applications.

gMWD's many capabilities include:

- Robust communications and power management
- Ruggedized sensor vibration and shock handling
- Fast sensor shutdown and reinitialization resulting in rapid cross correlations between gyro and magnetic sensors
- High-speed toolface
- True north-referenced "Gyro Toolface" aids in real-time steering near vertical.



ADVANTAGES

- Multi-Mode Surveys. Gyro and/or magnetic surveys and orientations together or separately
- Faster Survey Times. Just 3.5 minutes to record a survey
- Closer to Bit Surveys. Gyro sensor is 15 feet (4.57 meters) closer to the bit than standard MWD magnetic sensors
- Multi-Mode Toolfaces. Gyro or magnetic toolfaces then highside toolfaces at user-defined inclination threshold.
- Positive Pulse Telemetry.
- Rigorous calibration and quality assurance methods ensure adherence to SDI-validated instrument performance model
- Can be used in conjunction with SDI Pressure-While-Drilling, Gamma Ray, Propagation Resistivity, and Near Bit services
- Survey accuracy when magnetic reference data is in question due to interference or other magnetic field effects.

TECHNICAL SPECIFICATIONS

Tool Collar Sizes	3.125 in (79.4 mm)	6.5 in (165.1 mm)
	3.5 in (88.9 mm)	6.75 in (171.5 mm)
	3.875 in (98.4 mm)	8 in (203.2 mm)
	4.75 in (120.7 mm)	9.5 in (241.3 mm)
	6.25 in (158.8 mm)	
Dog Leg Degree per 100 ft O.D.	Sliding:	Rotating:
	12° (9.5 in)	6° (9.5 in)
	12° (8 in)	7° (8 in)
	19° (6.75 in)	8° (6.75 in)
	20° (6.5 in)	10° (6.5 in)
	20° (6.25 in)	10° (6.25 in)
	28° (4.75 in)	12° (4.75 in)
	30° (3.875 in)	30° (3.875 in)
	37° (3.5 in)	15° (3.5 in)
40° (3.125 in)	17° (3.125 in)	
Pressure Rating	20,000 psi (30,000 available) (137,900 kPa)	
Temperature Rating	MWD: 302°F (150°C) Gyro: 302°F (150°C)	
Lost Circulation Material (LCM)	Medium nut plug 40 lbs/bbl (18 kg/bbl)	
Sensor Accuracy	Azimuth accuracy is dependent on latitude, hole direction, and inclination. Consult SDI ISCWSA-Compliant Instrument Performance Model for error analysis for a specific project.	
Length	30 ft (9.14 m)	
Maximum Pressure Drop	250 psi @ 1,500 gal/min in 10 lb. mud	
Range of Flow Rates per Tool Size	Tool OD	Gallons/Minute
	3.125 – 3.875 in	50 - 200
	4.75 – 6.5 in	100 - 400
	6.25 - 6.5 in	200 - 600
	6.75 – 8 in	250 - 1,000
9.5 in	300 - 1,500	
Toolface Update Rate	8 – 14 seconds	

Specifications are subject to change without notice.

Updated November 2011