



Mud Pulse Measurement-While-Drilling (MWD)

Leaders in MWD Technologies

Scientific Drilling is a leading provider of highly-accurate Measurement-While-Drilling (MWD) services. With over 20 years of engineering and manufacturing excellence, our MWD systems have proven reliability and cost-effectiveness worldwide.

Multi-Faceted Directional Capabilities

MPMWD's pulser systems have a variety of operating ranges and are well-suited to all lost circulation material (LCM) types. This positive pulse MWD system is fully programmable and offers an array of precision survey data outputs. The MPMWD provides accurate directional control and transmits calculated data and raw vector parameters. MPMWD provides the following borehole measurements:

- Inclination
- Azimuth
- High-side and magnetic toolface position
- Temperature
- Peak & RMS vibration
- Inclination/azimuth while sliding
- Scintillation/API gamma ray
- Pressure While Drilling (PWD)
- 2 Mhz resistivity
- MagTraC ranging
- Azimuthal Gamma Ray
- Azimuthal Gamma Inclination (Galn)

Wide Range of Applications

Scientific Drilling's Mud Pulse MWD (MPMWD) high-performance system comes in all standard collar sizes for a wide range of flow rates. This system is ideal for difficult well scenarios:

- Directional/horizontal wells
- Relief wells
- Re-entry wells

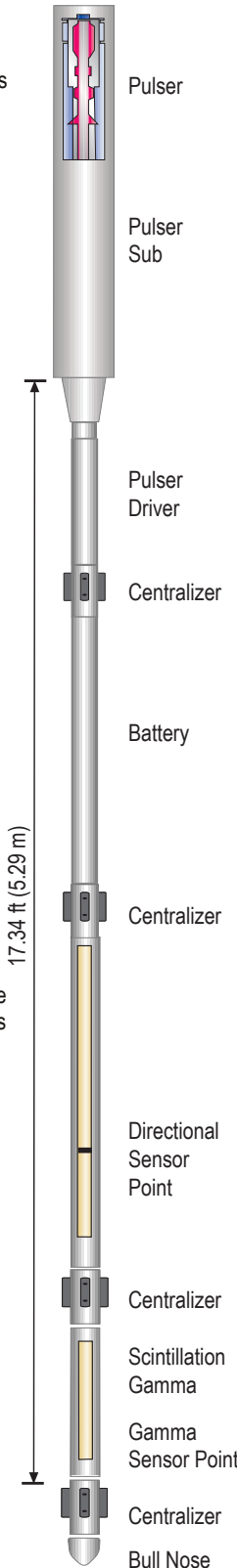
Mud Pulse MWD Design Features

The MPMWD pressure-compensated pulser design has one of the widest flow rates in the industry. MPMWD centralizers absorb shock and hold the tool in place during drilling operations. MPMWD has the following design features:

- Accurate memory logging
- Robust electronics and mechanical design
- Sonde-based electronics in interchangeable collar sizes
- Multiple flow rates without adjusting pulser

ADVANTAGES

- Good for Many Well Types. Has all standard collar sizes for multiple flow rates
- Wide Range of Measurements. Fully programmable, it produces a variety of real-time measurements
- High-Quality, Real-Time Output. Sophisticated algorithms correlate, analyze, and produce accurate real-time data



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)	14° (3.875 in)
	37° (3.5 in)	15° (3.5 in)
	40° (3.125 in)	17° (3.125 in)
Pressure Rating	20,000 psi @ 300°F (30,000 available) (137,900 kPa @ 150°C)	
Temperature Rating	302°F (150°C)	
Lost Circulation Material (LCM)	Medium nut plug 40 lbs/bbl (18kg/bbl)	
Telemetry	Positive Displacement	
Length	Fits in 30 ft (9.14 m) collar	
Maximum Bit Pressure	No Limit	
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	
Power Source	Lithium Battery	
Operating Time	300+ hours	

DIRECTIONAL SPECIFICATIONS

Length	Directional Only	Directional + Gamma Ray
	16.8 ft (5.12 m) (+ 6 ft pulser sub)	17.34 ft (5.29 m) (+ 6 ft pulser sub)
Toolface Update Period	Minimum: 7 sec @ 0.5 sec pulse width Maximum: 14 sec @ 1 sec pulse width	
Long Survey Time	Minimum: 115 seconds Maximum: 230 seconds	
Survey-While-Drilling	Sliding Yes	Rotating No

Specifications are subject to change without notice.