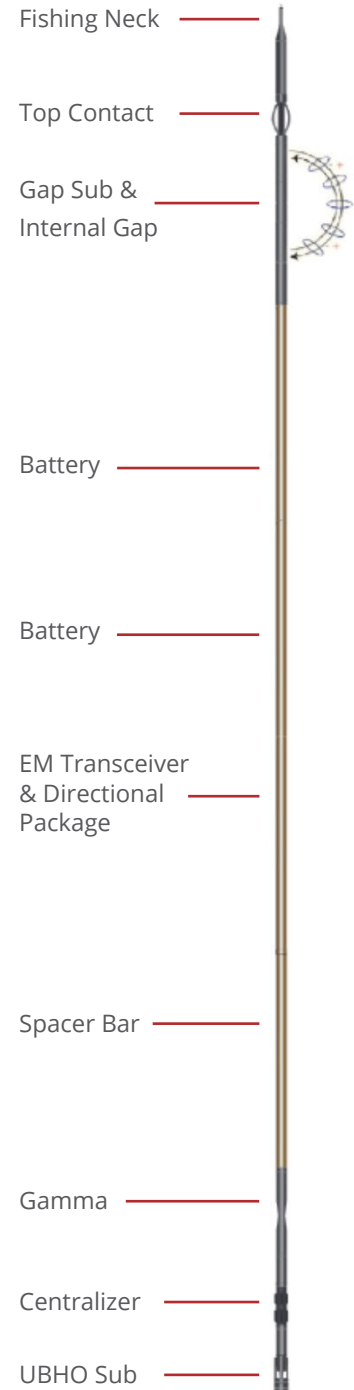


The Pacesetter Redline EM MWD system is a full featured tool that sends data from down hole to the surface by utilizing low frequency electromagnetic waves. Unlike mud pulse tools which transmit data through the mud column, our EM tools sends it's data through the formations. By not relying on the mud column our tool can operate in high LCM conditions and under-balanced drilling applications while continuing to strive in traditional drilling applications as well.

Every element of our Redline EM MWD system has been purposely designed, from power efficiency to reliability, all elements have been optimized to extend down hole operation time. Utilizing Spectra-Elink© telemetry technology with it's built-in data fusion receiver we are able to decode when other EM systems fail.

KEY FEATURES

1. Saves rig time as there is no downtime for surveying. Complete surveys are obtained in 18 to 40 seconds.
2. Two battery system allows for 10+ days of drilling.
3. Robust design with no moving parts to wear out or plug off like Mud Pulse Tools.
4. Fully retrievable with minimum ID of 54mm.
5. Two way communication. Tool settings can be changed on fly without having to pull out of the hole.



TOOL SPECIFICATIONS

Tool Length: Approx. 12m	EM Operating Frequency: 2,3,4,5,6,7,8,9,10,11,12Hz (user selectable via downlink)	Max. Pressure Drop: 80psi (total across all collars w/ modules installed & 11ppg, 15cP drilling fluid)
Tool Size: 1.875" OD	Transmitted Data Rates: 1 to 12BPS	Max. Operating Pressure: 20,000psi
Pressure Rating: 20,000psi	Transmitted Parameters: Steering: Field programmable Survey: Field Programmable Query: Asynchronous query via EM downlink	Max Differential Pressure: 10,000psi (collapse) 15,000psi (burst)
Retrievable: Yes: Min. ID is 54mm	Maximum Weight on bit: 70,000lbs	Shock: Operating: 1,000g, 0.05ms, ½ sine Survival: 2,000g, 0.05ms, ½ sine
Power: Lithium Batteries 2 Battery System: 10+ days of battery life	Maximum Drilling torque: 25,000lbs	Vibration: Operating: 15g peak (50-800Hz sine) 10grms (random max) Survival: 30g peak (50-800Hz sine) 20grms (random max)
Minimum Operating Temp: 0° (32°F)	Maximum Dogleg Severity: 4.75" Gap Subs -14° Rotating / 20° Sliding 6.50" Gap Subs -12° Rotating / 16° Sliding	Pin Yield Torque 40,000lbs
Maximum Operating Temp: 150°C (320°F)		Max. Tensile Loads 350,000lbs
Minimum Survival Temp: -40°C (-40°F)		Min. Flow Rate: 800gpm
Maximum Survival Temp: 175° (347°F)		
Downlinking: EM Transmission		

MEASUREMENT ACCURACY

PARAMETER	RANGE	RESOLUTION	ACCURACY
Inclination	0 to 180°	0.05°	+/-0.1°
Azimuth	0 to 360°	0.18°	+/-1°
Tool Face	0 to 360°	0.18°	+/-1°
Magnetic Dip	-90° to +90°	0.18°	+/-1°
Total Magnetic Field	0 to 70,000 mgauss	137 mgauss	+/-0.3 mgauss
Total Gravitational Field	0 to 2G	3.9 mG	+/-3.0mG
Gamma Ray	500 cps	2 counts per API	+/-10%
Temperature	0 to 200°C	0.39°C	+/-5°C