Electro-Trac™ EM MWD System

In 2014 GE Oil & Gas acquired the majority of proprietary electromagnetic telemetry (EM) technology and a fleet of EM tools from Sharewell Energy Services, including the Electro-Trac™ EM MWD System which joins the GE MWD proven portfolio. These advanced EM MWD telemetry technologies combined with our global support network and best-in-class downhole sensing technology offers customers a more complete solution.

Description

The state-of-the-art Electro-Trac EM MWD system combined with our industry standard Tensor downhole sensors to provide an accurate, reliable and cost effective EM MWD solution. The Electro-Trac Data Fusion surface receiver is based on a completely new and revolutionary approach to EM telemetry signal processing improving noise immunity and extending both the transmitted data rate and operating range of EM MWD.

Configuration

Electro-Trac EM MWD is based on the GE Tensor retrievable MWD architecture enabling customers to utilize standard BHA components and common Tensor parts across their tool fleet. Apart from the downhole probe, a Gap Sub is the only non-standard BHA component required. The Surface System provides bidirectional EM communication to ensure optimal data transmission to TD.

Applications

Conventional drilling
- Pad drilling: vertical, directional and horizontal drilling

Underbalanced drilling
- Aerated muds, foam, mist and air applications

Risk Mitigation
- Lost circulation zones/high LCM applications

Unconventional drilling
- Coal bed methane/coal seam gas
- Mining/degasification

Features & benefits v Mud Pulse Telemetry

Reduced NPT risk
- No moving parts: less wear and tear, simpler maintenance
- LCM tolerant: no plugged pulsers or LCM limitations

Improved drilling efficiency
- Data without fluid circulation: surveys during connection
- Up to 12 bps: less hidden NPT orienting mud motor
- Less pressure drop: increased flow for improved hole cleaning

Extended applications
- Independent of drilling fluid properties: operates in air, mist, foam and underbalanced applications
- Independent of flow rate: improved performance for unconsolidated kick-offs & through lost circulation zones

Features & benefits v other EM MWD

Efficient equipment rig up
- Single lift to load pre-assembled probe into standard collar

Reduced LIH risk & NPT exposure
- Retrievable probe, standard BHA components
- Can replace Electro-Trac with Tensor MWD without tripping

Extended longevity
- Up to 200 hrs. on a single battery with typical field settings
- Proprietary Gap Sub ceramic coating techniques and sealants

Extended operating envelope
- Patented Data Fusion processing of multiple signal inputs
- Delivers up to 13,000 ft. TVD range and up to 12 bps
- Less geological limitations than other systems due to ability to decode highly attenuated signals

Tensor compatible
- Reduced equipment costs, fleet use of compatible sensors, spares and other components result in improved equipment utilization and reduced inventory costs

Gap Sub specifications				
Collar O.D. (in)		4¾"	6½ - 6¾"	7¾"
Collar I.D. (in)		2½" - $2^{11}/_{16}$"	$2^{13}/_{16}$" - 3¼"	3¼"
Gap Sub length (ft) (shoulder to shoulder)*		54"	56"	52"
Tool connections		3½" IF Box x Pin	4½" IF or XH Box x Pin	$6^{5}/_{8}$" Reg Box x Pin
Maximum drilling torque (ft-lbs)		8,000	24,000	42,000
Maximum dogleg severity	Sliding (deg/100')	25	18	8
	Rotating (deg/100')	15	10	5
Maximum pressure drop (psi)		100	100	100
Probe specifications				
Probe size O.D.		1.875"		
Probe length (ft)		25.5 ft. and 26.9 ft. with Gamma (minimum - adjusted to monel length)		
Pressure rating		20,000 psi		
Operating temperature		0°C to 150°C		
Survival temperature		-40°C to 150°C		
Sand content		0.25% or trace as measured at suction		
Minimum flow rate (air drilling)		Recommend 40 gpm fluid		
Maximum flow rate (gpm) - dependent on drill collar ID Not recommended to exceed 40 ft/s Maximum for typical range of collar ID's		250 - 300	450 - 800	1,200
Battery		Hermetically-sealed Lithium Thionyl Chloride cells & batteries		
Battery life		Up to 200 operating under typical operating conditions (6 bps & 50% power)		
Surface system specifications				
Rig floor display & rig floor sensors		ATEX Zone 1, CE certified		
Surface system		110v, UL & CE[1] certified		
Downlink power amplifier - max. power		200W, UL & CE[1] certified		
System specifications				
Transmitted data rates (bits per second)		2 to 12 BPS (field selectable)		
Update rates (seconds)	Toolface	8 to 12 seconds (4 parameters, user selectable)		
	Survey (standard)**	20 to 30 seconds (8 parameters, user selectable)		
Downlinking		Yes - By EM Transmission to Electro-Trac tool - User selectable operating frequency (Hz)		
Transmitted parameters	Steering	Field programmable		
	Survey	Field programmable		
	Query	Asynchronous query via EM downlink		
Operating limits				
Shock	Operating	1,000 g, 0.05 ms, ½ sine		
	Survival	2,000 g, 0.05 ms, ½ sine		
Vibration	Operating	15 g peak (50 to 800 Hz sine) - 10 gms (random max.)		
	Survival	30 g peak (50 to 800 Hz sine) - 20 gms (random max.)		
Sensor specifications				
Directional sensor package		Tri-axial fluxgate magnetometers and Q-Flex accelerometer package		
Directional measurement		Range	Resolution	Accuracy
Inclination		0 - 180°	0.1°	±0.1°
Azimuth		0 - 360°	0.1°	±0.25°
Tool face		0 - 360°	1.0°	±0.5°
Total Magnetic Field (TMF)		0 - 70 µT	0.137 µT	0.003 µT
Dip		-90 - 90°	0.1°	±0.15
GT		0 - 1,000 g	0.0001 g	
Total Gravity Field (GT)		0 - 2.000 g	0.001 g	±0.001 g
Temperature sensor		-32° - 302°	0.1°F	±2°F
Gamma sensor package		Sodium Iodide Scintillator Crystal		
Gamma measurement		Sensitivity	Resolution	Accuracy
		1.7 Cts/API	6.8"	±5%

1 - CE certification pending
* Double Gap Sub
** Standard Survey = Inclination, Azimuth, Dip, Mag Field and Total Gravity

* Electro-Trac is a trademark of General Electric Company

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