

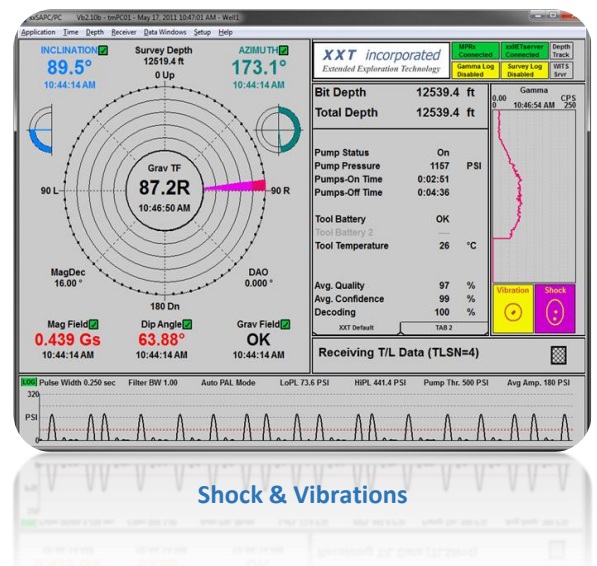
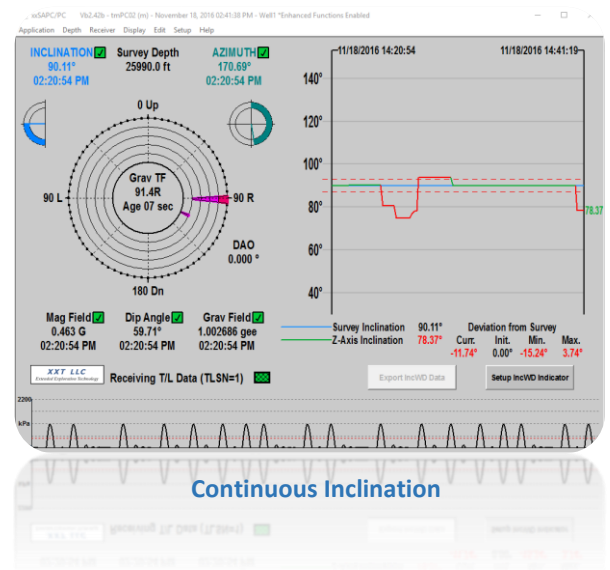
Mud Pulse MWD System

Features

- Inclination while drilling measurements.
- Ruggedized packaging, field proven to 185°C.
- Real-time and recorded 3- axis shock and vibration data.
- Optional Gamma Ray sensor with ruggedized scintillation counter and photomultiplier tube.
- Rotation Detection & Dynamic Sequencing optimizes telemetry for maximum data transmission.

Advantages

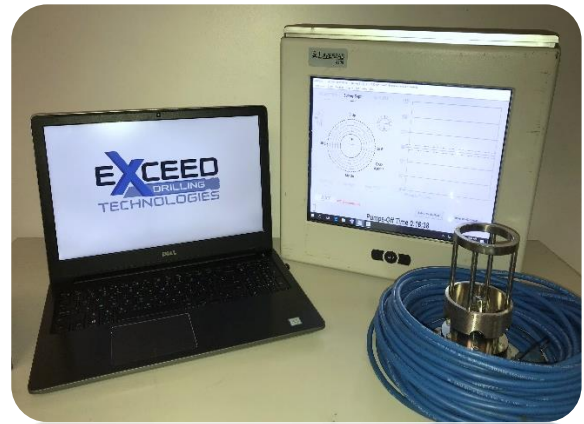
- Intelligent power management for maximum battery life.
- Optimized data management to exploit pulser bandwidth.
- Rich acquisition software allows full control of all aspects of the operation.
- High-speed battery switching eliminates system failure due to primary battery fault.



High quality data transmission and self correction to optimize drilling speed capability



MWD Kit



Surface System

General Tool Specifications

| General Tool Specifications | | | | Directional Sensor | | Gamma Sensor | |
|---|---------------------------------|---|----------------------|--|--------------------------|------------------------------------|---------------------------|
| Tool Diameter / Length | 1 7/8" O.D. / 22.27 - 39.8ft. | Gamma Capable | Yes | MTF/GTF switching, (inclination degrees) | >1° angle (selectable) | Gamma ray detection type | Scintillator: NaI crystal |
| Tool Centralization Range (NMDC - I.D.) | 2.20" - 4.00" | Survey while drilling: Sliding / Rotating | Yes / No | Survey time | 90-240 sec. (selectable) | Gamma Accuracy (over output range) | +/- 2% |
| Maximum dogleg severity | 100° / 100ft | Down link | Yes | Tool face update time | 6 - 24 sec. (selectable) | Vertical Resolution | 6.8" |
| Maximum working pressure, psi | 20000 (138,000 kpa) | Downhole memory | Yes | Inclination accuracy | +/- 0.05° | Mud Property Information | |
| Maximum operating temperature | 185°C - 365°F | Maximum bit pressure / drop | No limit | Azimuth accuracy | +/- 0.5° | LCM | <50lbs. / bbl |
| Survey Trigger | Cycle pumps | Retrievable / Reinsertable | Yes | Tool face accuracy | +/- 0.5° | Solid Content | Maximum 40% |
| Transmission trigger | Pumps on | Pressure drop (psi through tool) | approx. 0.33 psi/gpm | Dip angle accuracy | +/- 0.1° | Low Gravity Solids | <10% |
| Telemetry type | Positive Pulse | Survey sensor offset (from btm of MWD NMDC) | 16 ft | Shock measurement | +/- 400g | Sand Content | Maximum 0.5% |
| Power source (operating time, hours) | Lithium Battery (200-500 hours) | Gamma sensor offset (from btm of MWD NMDC) | 12 ft | Vibration measurement | +/- 200g | Maximum mud weight | <19 lb. |