

Positive Mud Pulse

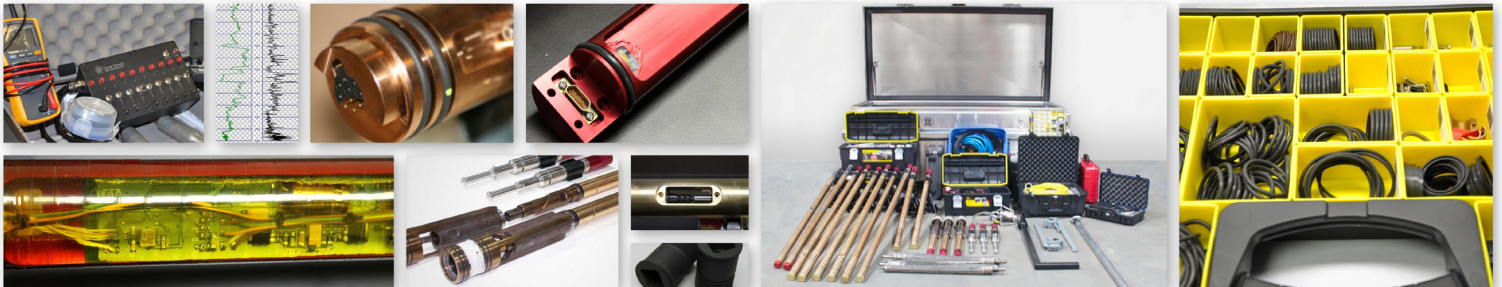
The positive mud pulse MWD system is a complete solution to transmit surveys, telemetry, gamma ray and vibration data to the surface in real-time using pressure signals in the wellbore. The bottom mounted tool is fully retrievable and has a modular design for easy transportation and assembly at the rig site.

Adjustable module layouts allow for alternative sensor positions and ensure operational flexibility. Operators can customize the tool configuration and down-linking allows for adjustable logging sequences.

Precision trimmed centralizers ensure the tool stays in place while drilling and shock mitigation technology absorbs vibration, decreases wear and improves overall MTBF. A reliable and robust MWD system for today's aggressive drilling conditions.

FEATURES

- ✓ Rugged down-hole directional modules; down-linking capabilities with variable survey and telemetry sequences
- ✓ Motor driven pulser with anti-plugging technology, excellent performance in LCM and high solid environments
- ✓ Industry standard gamma probes and logging software
- ✓ 400+ downhole hours on one battery
- ✓ Wireline retrievable and re-insertable design (minimum 2.25" I.D.)
- ✓ High operating temperature (175 °C) and pressure (20,000 psi)
- ✓ Simple operation using a wide range of flow rates and rotary speeds
- ✓ On-board rotary sensor enables alternative telemetry sequences and faster LWD data rates while rotating



TOOL SPECIFICATIONS

TOOL LENGTH	Pulser/Gamma Combo w/ 1 Battery - 5.8m (19ft) Pulser/Gamma Combo w/ 2 Batteries - 7.36m (24.15ft)
SIZE	47.625mm O.D. (1.875")
PRESSURE RATING	137,895 kPa, (20,000 psi)
ESTIMATED BATTERY CONSUMPTION	300-480 hours (medium-rate single 36V battery) 240-380 hours (medium-rate dual 29V battery) 180-260 hours (medium-rate dual 29V battery w/gamma) Consumption factors include resolution and pulse width settings
MAXIMUM TEMPERATURE	150 °C (302 °F) 175 °C (347 °F) available
RECOMMENDED ROTARY SPEED	60 RPM
OPERATIONAL MODES	Operator selectable survey and steering sequences, resolution and pulse width settings
DOWNLINK CAPABILITY	Pumps ON/OFF sequences allow for mode selection, steering and survey sequences, and pulse width settings

OPERATING SPECIFICATIONS AND LIMITS

DATA TRANSMISSION TYPE	Positive Mud Pulse
COLLAR SIZES	89mm-203mm (3.5"-8") Additional sizes available
OPERATING FLOW RATE	0.28 – 4.45 m ³ /min (75-1200 gpm)
WIRELINER RETRIEVABILITY	Retrievable and Re-insertable
MINIMUM I.D. FOR RETRIEVABILITY	57mm (2.25")
FLOW SWITCH	Vibration
POWER SUPPLY	Lithium 28 VDC / 3 amp (21 VDC / 5 amp available)
SHOCK LIMIT	1000g, 0.5 msec, ½ sine all axes
VIBRATION LIMIT	5 – 30 Hz @ 1" double amplitude, 30 – 500 Hz, 20g all axes
BEND RADIUS	20° / 10m
LCM TOLERANCE	40 - 50 ppb concentration, any size, premixed
OPERATING PULSE WIDTH	0.600-2.00 sec
DATA TRANSMISSION RATE	10 – 28 sec
ROTARY SENSOR	Yes (RFS available)
MEAN TIME TO SERVICE	Pulser ≈ 500 – 700 hours Electronics ≈ 1200 – 1800 hours

SENSOR SPECIFICATIONS

PARAMETER	RANGE	ACCURACY
Inclination	0 - 180°	+/- 0.10°
Azimuth	0 - 360°	+/- 0.25°
Tool Face	0 - 360°	+/- 0.50°
Dip Angle	0 - +/- 90°	+/- 0.15°
Magnetic Field	0 – 100 μT	+/- 0.075 μT
Temperature	-35 - 200°C	+/- 0.5°C

