3D MWD SYSTEM

The 3D MWD System is a platform that is able to support the most advanced technologies in the directional drilling industry. It serves as a foundation for Flashlight inclination and gamma at bit, Omega propagation resistivity, annular pressure while drilling, and vibration monitoring while drilling tools.

Description

Pulse Directional Technologies' state-of-the-art **3D MWD System** combines industry standard measurements to provide an accurate, reliable, and cost effective solution to MWD and LWD. With multiple telemetry speeds coupled with the latest in digital signal processing for noise immunity. Data can be sent to surface fast and efficiently independently of drilling conditions.

Configuration

The 3D MWD system is a fully retrievable MWD system that can be configured from a D&I only system to a full MWD/LWD platform. The MWD can be configured to include gamma, at bit measurements, annular pressure while drilling, and shock and vibration measurements. Sensors can be added and removed in the field, as required, to reduced lost in hole exposure

FEATURES & BENIFITS

Field Programmable

- Vertical, directional and horizontal drilling.
- Multiple telemetry speeds for higher log data density and fast survey times.
- Operator configurable static and dynamic data.
- Programmable for extended battery life up to 400 circulating hours per battery pack.

Fully retrievable

- Reduce LIH exposure.
- Field replaceable fin centralizer cutter.

Surface Equipment

- Wireless surface equipment option for easy setup.
- Touch screen display with depth input for standalone operations.
- Wired surface equipment for reliable connection.
- WITS and WITSML output.

  Software able to calculate minimum curvature surveys.

Telemetry

- M-ary Encoding for deeper depths and longer battery life.
- Higher speed telemetry allows for higher log density.

APPLICATIONS

Conventional drilling

Vertical, Directional and Horizontal drilling

Coiled Tubing Drilling

Auto survey feature allows for continuous survey while drilling.

Unconventional Drilling

Coal bed methane/coal seam gas.

Mining/degasification.

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PDT
Pulse Directional Technologies

Tool Sizes and Flow Ranges						
Collar Size O.D. Inches	**3.5"**	**4.75"**	**6.5"**	**6.75"**	**8"**	**9.5"**
Collar Size I.D. Inches	2.25	2.6875"	2.8125"	2.8125"	3.5"	3.5"
Nominal MWD Collar Length ft.	31'	31'	31'	31'	31'	31'
MWD Collar Weight in Lbs.	601	1276	2821	3100	4278	6479
Tool Length D&I ft.	22.7'	22.7'	22.7'	22.7'	22.7'	22.7'
Tool Length D&I and Gamma ft.	25.59'	25.59'	25.59'	25.59'	25.59'	25.59'
Tool Length D&I with APWD ft.	25.6'	25.6'	25.6'	25.6'	25.6'	25.6'
Tool Length with D&I, APWD and Gamma ft.	28.5'	28.5'	28.5'	28.5'	28.5'	28.5'
Tool Length D&I and Vibration ft.	24.16'	24.16'	24.16'	24.16'	24.16'	24.16'
Tool Length D&I, Vibration and Gamma ft.	27.0'	27.0'	27.0'	27.0'	27.0'	27.0'
Tool Length D&I Vibration and APWD ft.	27.0'	27.0'	27.0'	27.0'	27.0'	27.0'
Tool Length D&I, Vibration, Gamma, and APWD ft.	29.95'	29.95'	29.95'	29.95'	29.95'	29.95'
Probe O.D. Inches	1.875"	1.875"	1.875"	1.875"	1.875"	1.875"
Flow Ranges GPM	75-165	100-300	150-600	150-600	400-1200	400-1400
Environmental Specifications						
Max Operating Pressure	20,000 psi					
Max Operating Temperature	175°C, 347°F					
Max Vibration G's	20g rms 5 - 1,000Hz					
Max Shock	50 G's					
Power Source	Lithium Battery Pack					
Transmission	Full wave or Positive Pulse					
Sand Content	0.5% by Volume					
LCM ppg	50 ppg medium Nut plug					
Data Transmission Speeds (User Programmable)						
Survey Times From pumps On (minutes)	1 min 54 sec. - 7 min.					
Tool face Time (Seconds)	4.5 - 12 Seconds					
Gamma Time (Seconds)	4.5 - 12 Seconds					
D&I Measurement Specifications						
Inclination Range	0.0° - 180°					
Inclination Resolution	0.1 °					
Inclination Accuracy	±0.1°					
Inclination Repeatability	±0.05°					
Azimuth Range	0.0° - 360°					
Azimuth Resolution	0.1°					
Azimuth Accuracy	±0.5°					
Azimuth Repeatability	±0.25°					
Tool Face Range	0.0° - 360°					
Tool Face Accuracy	±1°					
Tool Face Repeatability	±1°					

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Magnetic Field Strength Range (Gauss)	0 - 2 Gauss
Magnetic Field Strength Resolution (Gauss)	0.001 Gauss
Magnetic Field Accuracy	±0.003 Gauss
G-total Range G's	0-2 G's
G-total Resolution	0.001 G's
G-total Accuracy G's	±0.0075 G's
Dip Angle Range	-90° to 90°
Dip Angle Resolution	0.1°
Dip Angle Accuracy	±0.3°
D&I Measurements Calibration Standard	Calibrated to 175C
Gamma Detector Type	Scintillation
Gamma Range	0 - 1024 API
Gamma Accuracy	1 cps
Gamma Calibration Standard	Calibrated to API standards
Surface Equipment	
Rig Floor Display and Rig Sensors	Class 1, Div. 2
Surface Equipment Power	110V-220V AC
Surface Equipment Data Output options	Wits or Aramco WITSML
Surface Equipment Options	Wired or Wireless

APWD Sensor Measurements Specifications						
Sensor Full Scale Range psi.	0 - 15,000 psi 0- 20,000 psi and 0 - 29,000 psi options					
Sensor Accuracy	+/- 0.1% of full scale					
Repeatability	+/-1 psi					
Sampling Rate	1Khz					
Dynamic Pressure Measurements Update Time	New update every 30 seconds					
Dynamic Pressure Measurements Sample Time	30 Seconds					
Static Measurement 1 Peak Pressure	Peak Pressure While pumps are off					
Static Measurement 2 Average Pressure	Average Pressure while pumps are off for user selectable time					
Maximum Operating Temperature	175C					
Maximum Shock	1000 g, 0.05ms, 1/2 Sine					
Maximum Vibration	15 g peak (50 to 800 Hz sine - 10 g rms random					
Max Tool O.D. inches	2.00"					
Nominal Tool O.D.	1.875"					
APWD Sub Sizes and Specifications						
Collar Size O.D. Inches	**3.5"**	**4.75"**	**6.5"**	**6.75"**	**8"**	**9.5"**
Collar Size I.D. Inches	N/A	2.6875"	2.8125"	2.8125"	3.5"	3.5"
Nominal MWD Collar Length ft.	N/A	7.84'	7.84'	7.84'	7.84'	7.84'
Collar Weight in Lbs.	N/A	322.6	713.44	784	1081.92	1638.56
Tool Length D&I ft.	N/A	23.38'	23.38'	23.38'	23.38'	23.38'
Vibration Monitor Specifications						

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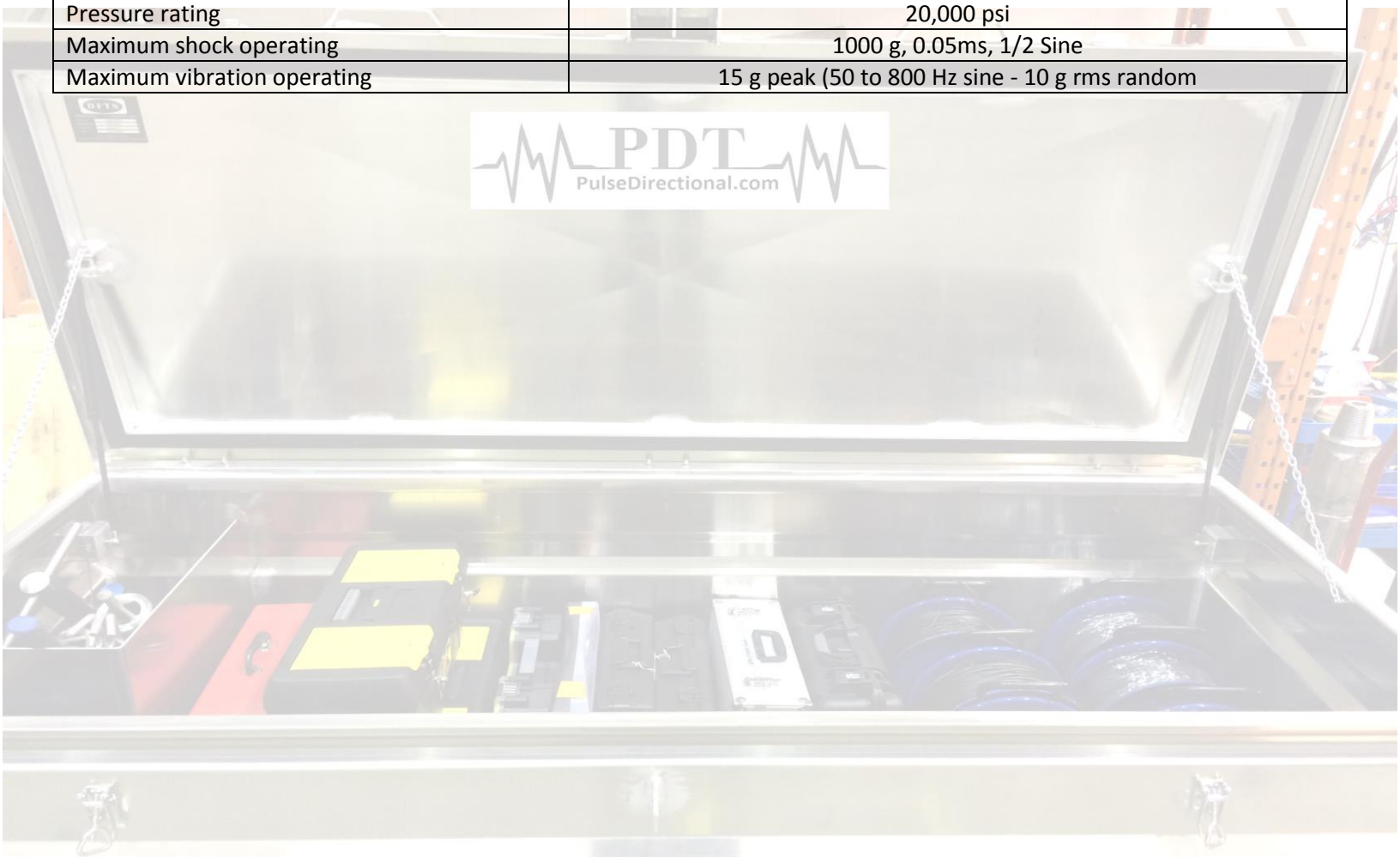
Length ft.	1.77'
Tool O.D. inches.	1.875"
Shock measurement range	250g
RMS vibration measurement range	250g
Shock measurement accuracy	+/- 1g
rms vibration measurement accuracy	+/- 1g
Maximum operating temperature	175C
Pressure rating	20,000 psi
Maximum shock operating	1000 g, 0.05ms, 1/2 Sine
Maximum vibration operating	15 g peak (50 to 800 Hz sine - 10 g rms random



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