

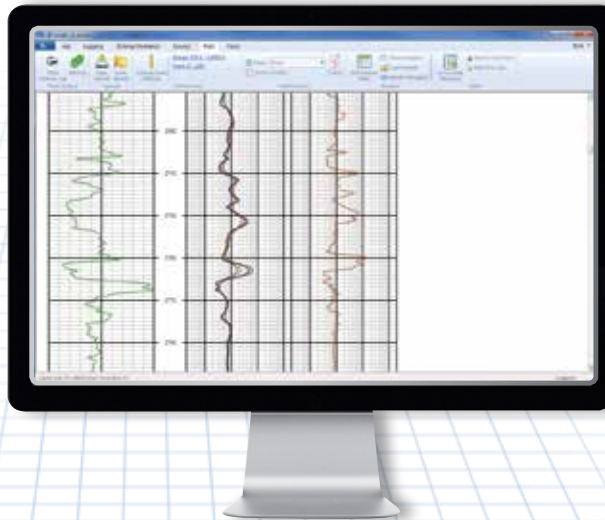
The Advanced Solution - Resistivity Tool Integration

Resistivity Tool Integration provides a full MWD & LWD solution. It combines resistivity, measure while drilling, gamma and pressure to form a complete 31.5' instrument.

No rig floor assembly, means no sweat!

Resistivity Tool Integration consists of dual transmitters per receiver pair spacings and two measurement frequencies. It provides 8 resistivity measurements, compensated for borehole and electrical errors, in all muds and drilling fluids whether they are oil based or salt saturated. All downhole measurements are presentable in both real time and memory, fully customizable dependent upon specific well requirements. This includes, in conjunction with resistivity, MWD steering, gamma, annular pressure, borehole pressure, shock and vibration. Incorporate these measurements to improve geosteering effectiveness and provide high quality tools for analyzing the downhole environment.

Quickly and simply prepare higher resolution LWD logs with the assistance of improved data rates or take memory logs for an even greater picture of the downhole environment.



Mechanical & Environmental Specifications

Tool Outer Diameter (nom.)	4.75"	6.75"	8.25"
Tool Outer Diameter (max. @ wearbands)	5.25"	7.25"	8.75"
Makeup Length (w/o saver subs)	176"	176"	TBD
Makeup Length with MWD	32'	32'	32'
Max. Flow Rate	350 USGPM	750 USGPM	1,200 USGPM
Connections	3.5" IF / NC38 4.5"	IF / NC50	6 5/8"
Dogleg Severity - Sliding (max.)	25° / 100'	16° / 100'	14° / 100'
Dogleg Severity - Rotating (max.)	12.5° / 100'	8° / 100'	7° / 100'
Operating Temperature Range	0 - 175° C	0 - 175° C	0 - 175° C
Survival Temperature Range	-55 - 185° C	-55 - 185° C	-55 - 185° C
Pressure (max.)	20,000 PSI	20,000 PSI	20,000 PSI

VERTEX
DOWNHOLE

“Our Resistivity Tool Integration has advanced engineering design, provides real time data, eliminates measurement delays and enhances precision by canceling receiver channel noise.”

Applications and Benefits:

- Geosteering
- Reserve calculations
- Optimized completion design
- Maximize pay-zone exposure
- Invasion profiling/permeability indication
- Formation evaluation while drilling in all well trajectories
- Managed pressure drilling/equivalent circulating density monitoring.
- Wireline-quality resistivity measurements in hard to reach deviated sections

Pressure Measurement Specifications

	Range	Accuracy
Borehole Pressure	0 - 20,000 PSI	±20 PSI
Annular Pressure	0 - 20,000 PSI	±20 PSI

Phase-Difference Resistivity Measurement Specifications

Frequency	Spacing	Range	Accuracy	Range	Accuracy
400 kHz	22"	0.1 - 10 ohm·m	±2%	0.1 - 400 ohm·m	±2 mmho/m
	40"	0.1 - 10 ohm·m	±2%	0.1 - 400 ohm·m	±2 mmho/m
2.0 MHz	22"	0.1 - 50 ohm·m	±2%	0.1 - 3,000 ohm·m	±0.3 mmho/m
	40"	0.1 - 50 ohm·m	±2%	0.1 - 3,000 ohm·m	±0.3 mmho/m

Attenuation Resistivity Measurement Specifications

Frequency	Spacing	Range	Accuracy	Range	Accuracy
400 kHz	22"	0.1 - 3 ohm·m	±5%	3 - 10 ohm·m	±18 mmho/m
	40"	0.1 - 3 ohm·m	±3%	3 - 10 ohm·m	±10 mmho/m
2.0 MHz	22"	0.1 - 15 ohm·m	±5%	15 - 50 ohm·m	±4 mmho/m
	40"	0.1 - 15 ohm·m	±3%	15 - 50 ohm·m	±2 mmho/m

Additional Operating Specifications

Input voltage of 18-36V from downhole lithium batteries. Input power, on average, is less than 6 Watts. Logging memory capacity is more than 200 hours of resistivity and pressure data.

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