



## LEADING THE INDUSTRY IN PERFORMANCE, EFFICIENCY AND RELIABILITY

Altitude's WPR (Wave Propagation Resistivity) integrates third party industry leading technology with our FUSION MWD technology platform.

Altitude's WPR sub is a spatially compensated, dual frequency (400 kHz and 2 MHz), dual spacing device designed for wireline-equivalent logging-while-drilling (LWD) and measurement-after-drilling (MAD) services in all well types. The FUSION WPR tool is equipped with multiple transmitters and receivers to provide various depths of investigation near bore and deeper into the formation. This allows for investigation of fluid properties in the formation from 2" up to 48" from the wellbore.

### FEATURES

- Real-time data transmission
- Symmetrical design
- Centrally located receiver antennas
- Real-time compensation
- Operates in all mud types
- Additional downhole storage of high resolution data retrieved and processed as required

### BENEFITS

- Real-time compensation eliminating invasion effects due to measurement delays
- Improved accuracy through cancellation of variations in receiver channels

### APPLICATIONS

- Geosteering
- Log correlation
- Logging-while-tripping
- Air and foam drilled wells

## GENERAL SPECIFICATIONS

Tool Size	Borehole size	Maximum Dogleg Severity		Connection
		Sliding	Rotating	
4.75" / 121 mm	5.625–6.125" 142–165 mm	25°/100'	13°/100'	NC38
6.75" / 172 mm	8.375–9.875" 213–251 mm	10°/100'	10°/100'	NC50
8.0" / 204 mm	12.125–14.75" 308–375 mm	15°/100'	8°/100'	6 <sup>5</sup> / <sub>8</sub> REG

## ENVIRONMENTAL

Operating Temperature

0° to 347°F (0° to 150°)

Pressure

20,000 psi (138 MPa)

## COMPENSATION RESISTIVITY MEASUREMENTS

Frequency	Measurement	Range	Accuracy
2 MHz	Phase Difference All Spacing	0.1–4,000 ohm-m	± 2% [0.1–25ohm-m] ± 0.5 mmho / m [above 25 ohm-m]
	Attenuation Near Spacing	0.1–300 ohm-m	± 2% [0.1–25 ohm-m] ± 1.0 mmho / m [above 25 ohm-m]
	Attenuation Far Spacing	0.1–500 ohm-m	± 2% [0.1–25 ohm-m] ± 1.0 mmho / m [above 25 ohm-m]
400 kHz	Phase Difference All Spacing	0.1–4,000 ohm-m	± 1% [0.1–25 ohm-m] ± 1.0 mmho / m [above 25 ohm-m]
	Attenuation Near Spacing	0.1–300 ohm-m	± 1% [0.1–25 ohm-m] ± 2.0 mmho / m [above 25 ohm-m]
	Attenuation Far Spacing	0.1–500 ohm-m	± 1% [0.1–25 ohm-m] ± 2.0 mmho / m [above 25 ohm-m]

## TRANSMITTER / RECEIVER SPACING

	UH					DH
	T <sub>1</sub>	T <sub>2</sub> *	R <sub>1</sub>	R <sub>2</sub>	T <sub>3</sub> *	T <sub>4</sub>
in.	-36.0	-22.5	-4.25	+4.25	+22.5	+36.0
mm	-914.4	-571.5	-107.9	+107.9	+571.5	+914.4

## DEPTH OF INVESTIGATION, VERTICAL RESOLUTION

R <sub>f</sub> = 1 ohm-m R <sub>xO</sub> = 0.5 ohm-m	Depth of Investigation		Vertical Resolution**
	Short Spacing Radius	Long Spacing Radius	
2 MHz Phase Difference	21" / 533 mm	28" / 711 mm	8" / 203 mm
400 kHz Phase Difference	30" / 762 mm	39" / 991 mm	12" / 305 mm
2 MHz Attenuation	34" / 866 mm	44" / 1,118 mm	8" / 203 mm
400 kHz Attenuation	52" / 1,321 mm	66" / 1,676 mm	12" / 305 mm
R <sub>f</sub> = 1 ohm-m R <sub>xO</sub> = 0.5 ohm-m	Depth of Investigation		Vertical Resolution*
	Short Spacing Radius	Long Spacing Radius	
2 MHz Phase Difference	26" / 660 mm	37" / 940 mm	8" / 203 mm
400 kHz Phase Difference	36" / 914 mm	49" / 1,245 mm	12" / 305 mm
2 MHz Attenuation	40" / 1,016 mm	53" / 1,346 mm	8" / 203 mm
400 kHz Attenuation	60" / 1,524 mm	76" / 1,930 mm	12" / 305 mm

\*Not included in 3.5 and 3.75 in. size  
\*\*90% response in conductive beds

Third party manufacturer specifications



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