

Focused Magnetic Resonance Tool

Provides accurate porosity, fluid saturation, and pore-size distribution at multiple depths of investigation

Applications

- Lithology-independent porosity
- Fluid identification and saturation
- Hydrocarbon characterization and viscosity
- Moveable-hydrocarbon identification in laminated, low-contrast, or complex formations
- Permeability index
- Capillary pressure

Features and Benefits

- Minimizes borehole effects while maximizing formation response with an eccentered sidewall-focused design and high-efficiency antenna
- Delivers precise data in high-salinity wells (0.015 ohm-m) and large boreholes without a mud excluder
- Enables radial saturation profiling and faster logging speeds with multifrequency operation
- Maximizes multidimensional-inversion response and accuracy by incorporating unique acquisition sequences that provide enhanced fluid identification and characterization
- Offers a unique pre-job planning process that selects the acquisition sequence to client requirements and the wellbore environment
- Provides stationary measurements via comprehensive activation sequences
- Yields one-dimensional spectra for T1 and T2 at the wellsite, and provides single-pass data for advanced post-processing multidimensional inversion for T1, T2, and diffusion constant
- Offers variable logging speeds depending on the selected activation sequence

Tool Description

The focused magnetic resonance (FMR) tool provides accurate porosity, fluid saturation, and pore-size distribution at multiple depths of investigation. Based on the same principles used in medical magnetic resonance imaging technology (MRI), the FMR offers unique acquisition sequences that both quantify and characterize rock and fluid types.

Post processing of FMR tool data provides critical rock and fluid information, including porosity, pore-size distribution, permeability, viscosity, capillary pressure, hydrocarbon type, and saturation.



The Weatherford focused magnetic resonance (FMR) tool provides a complete nuclear magnetic resonance (NMR) formation-evaluation solution.



Focused Magnetic Resonance Tool

Specifications

Measurement

Data	Porosity, T1, and T2 distributions
Depth of investigation	1.7 in (3.8 cm) to 4.3 in (11.4 cm)
Antenna aperture	18 in. (45.7 cm)
Minimum echo spacing	0.4 ms
Number of frequency bands	16
Measurement Range	Porosity: 0 to 100 pu T2: 0.3 to 3000 ms T1: 1 to 10000 ms
Accuracy	Total NMR porosity: ± 1 pu at BHT

*Based upon pre-job acquisition planning.

Mechanical

Diameter	Sonde: 5 in. (12.7 cm) Electronics: 4.25 in. (10.8 cm) Energy cartridge: 3.38 in. (8.6 mm)
Length	23.5 ft (7.16 m)
Weight	780 lb (326.6 kg)
Maximum temperature	350°F (177°C)
Maximum pressure	20,000 psi (138 MPa)
Minimum hole size	5.875 in (14.92 cm)
Maximum hole size	No limit
Minimum mud salinity	0.015 ohm-m

