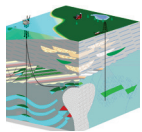
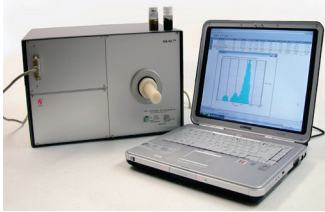


# Magnetic Resonance Measurements for Mud Logging (MR-ML™)



KMS Technologies – KJT Enterprises Inc. and their alliance partner NMR Plus Inc. of Canada have developed new technology to evaluate rock and fluid properties in real time while drilling. The product is a mobile NMR relaxometer designed for NMR mud logging, water-cut, and on-site core analysis. The approach is based on Low Field NMR (Nuclear Magnetic Resonance) measurements and is intended for faster and more reliable identifying of hydrocarbon-bearing reservoirs while drilling a well (mud logging). Drill cuttings and micro-samples of hydrocarbons delivered to the surface are used to make the measurements. The new NMR application provides better results when used in conjunction with conventional techniques.



## Features

- Portable (~25 kg)
- Formation evaluation and petrophysical parameters during mud logging
- Real time pore pressure prediction densities
- NMR log calibration parameters
- Low cost NMR log substitution
- Competitively priced NMR devices and software
- User friendly Windows-based interface
- Advanced inversion methodology for T<sub>2</sub> distribution
- Porosity, permeability, S<sub>wirr</sub> on-site or in a laboratory
- One-button software for major applications (mud logging)
- Calibration and tune functions
- Full spectrometer acquisition software for 'expert' NMR applications
- NMR simulator, Bi-modal mode, multiple measurement set-up and execution (optional).

<b>Specification sheet</b>	<b>MR-ML™ instrument</b>
<i>Minimum time to first sampling point (TE) on NMR relaxation curve, ms</i>	0.15
<i>Maximum number of sampling points on NMR relaxation curve</i>	11,000
<i>Maximum duty cycle of RF transmitter</i>	25 %
<i>Wait time, ms</i>	50-60,000
<i>NMR frequency, MHz</i>	0.5-5
<i>Maximum sample size, inches</i>	Up to 4
<i>S/N full size water sample</i>	> 300
<i>Maximum warm-up time, min</i>	< 20
<i>Line input power</i>	120 V/220 V, 6 A
<i>Operating system</i>	Windows 7
<i>Communications</i>	USB (decoupled from PC)
<i>Dimensions (can be mounted in 19" cabinets/racks), inches</i>	Width-19", Height/Depth - 10.5"
<i>Weight, lb</i>	50

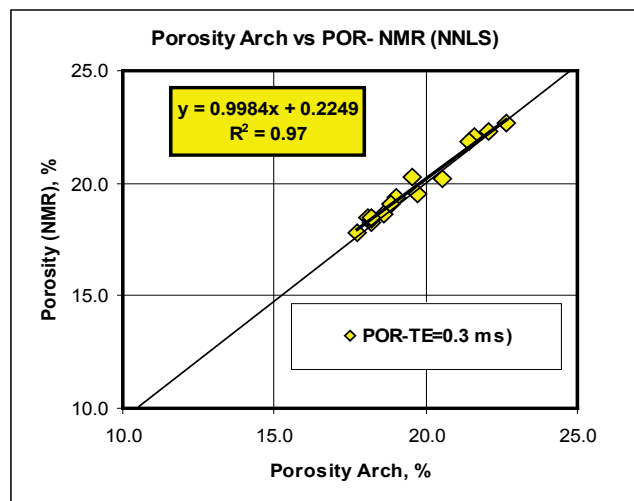
## KMS Technologies

KJT Enterprises Inc.  
6420 Richmond Ave., Suite 610  
Houston, TX, 77057  
USA

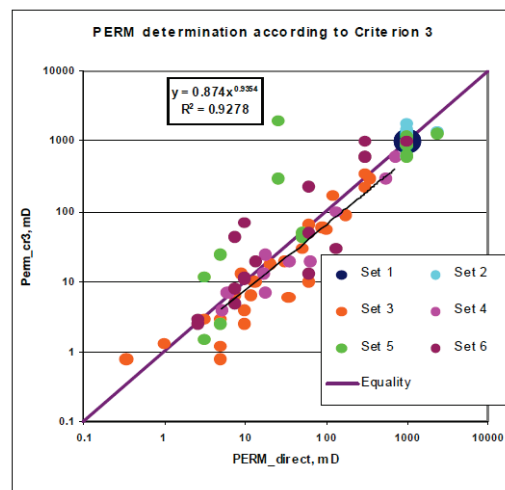
Tel.: +1.713.532.8144  
Fax: +1.713.532.7776  
Email:

[info@KMSTechnologies.com](mailto:info@KMSTechnologies.com)  
[www.KMSTechnologies.com](http://www.KMSTechnologies.com)

We benchmarked the instruments many times to verify estimating errors. The error of estimating the total NMR signal amplitude  $A_s$  depends on the properties of the rock under study and of accepted measurement modes. The relative error of  $A_s$  routine measurements ( $\delta$ ) is less than  $\pm 1.5\%$ .



**Figure 1:** Archie Porosity versus Porosity NMR.



**Figure 2:** Permeability conventional versus Permeability NMR.

Figures 1 and 2 display the accuracy of the total porosity and permeability measurement respectively. The figures compare porosity and permeability values obtained by NMR measurements with those resulting from conventional laboratory techniques.

Fully water-saturated rock cuttings provide the most preferable conditions for evaluating permeability from NMR measurements. The figures demonstrate high coefficients of correlation NMR measurements with a conventional method of porosity and permeability estimations.