HIFI HDS MICRO™

TIER 1

Fiber Optic Sonic & Ultrasonic Array for Fluid Migration Analysis

Hifi Micro™ is a fiber optic acoustic sensor array, using Hifi's patented HDS™ technology. Micro™ is specifically designed for detecting and characterizing fluid migration, even through multiple strings of casing. Finding the source of leaks can be challenging. Micro™ provides the most advanced leak detection data on the market today.

Hifi HDS leak detection logging suite. The Micro is a valuable component of our world class leak detection logging suite. This package is designed to solve well integrity problems both faster and with a higher level of confidence than ever before. The four corner stones are Micro, Macro, Ventmeter, and Intelligent Logging Techniques.

High Sensitivity means the Micro™ tool using Hifi HDS™ technology is able to detect and characterize extremely low rate leaks with extreme precision and pinpoint accuracy. The Micro™ tool offers a Signal to Noise Ratio unmatched by competitors.

Noise reduction is a challenge for any sensor system. Hifi Micro™ is not a distributed fiber measurement; instead, it utilizes Bragg gratings and Hifi' HDS™ interrogation methods that don't introduce unwanted system noise. Plus, by utilizing fiber optics it eliminates Electromagnetic Interference (EMI).

Passive Sonar Signal Processing techniques are used to obtain sound direction. Wells tend to propagate sound very effectively; in some cases 1000's of meters. Being able to determine the origin of different sounds in the well and separating this nuisance data from useful data allows for very effective and robust pinpointing of the leak's location.

hifi

This service is brought to you by Tier1 in partnership with Hifi

Combinability - Hifi Multiline supports multiple Micro™ arrays, most standard cased hole evaluation tools such as GR / CCL / CBL / CHAT can all be run in combination with the Micro™ tool. This reduces cost to the operator by shortening logging time. It can also be deployed into horizontal wellbores via e-line Tractor tools and specialized Coil Tubing units.

Verified - tested at the Alberta Research Center down hole flow simulation chamber, the measurement is based on definitive laws of physics, and provides a much more robust and reliable measurement over traditional methods. Micro™ has been run in over 1000 wells in Canada and US with excellent results.

Control costs by identifying the source of the leak on the first logging attempt. Avoid costly multiple intervention attempts.

APPLICATIONS

- Surface Casing Vent Flow source identification
- Gas Migration source identification
- Casing / Thread Leak Identification
- Cross Flow Identification
- Pressure Testing Bridge Plugs

BENEFITS

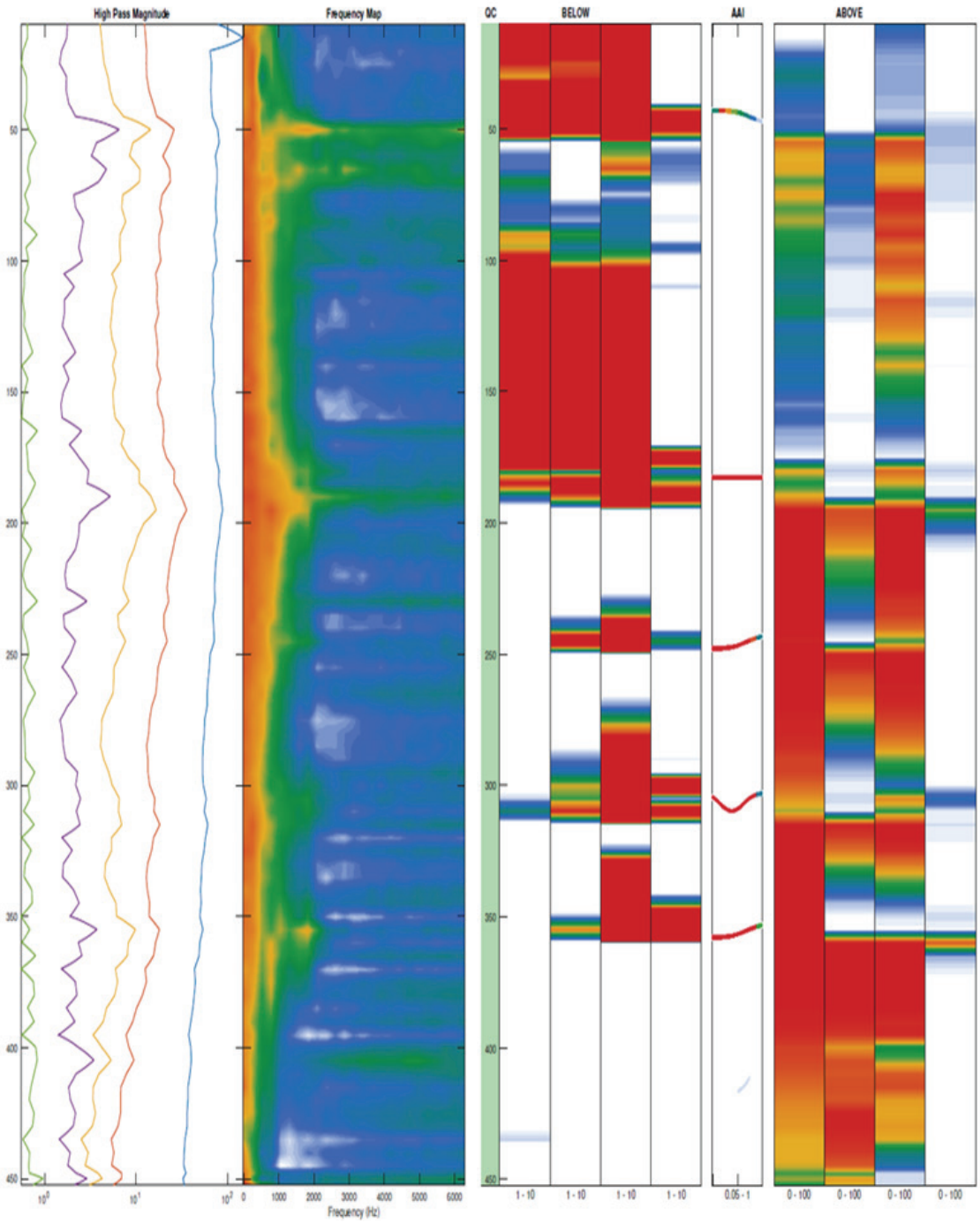
- All frequency bands including ULTRASONIC
- Simplified Data Interpretation
- Improved Source Identification
- Locate casing and thread leaks to within centimeters
- Effective in detecting low flow rates
- Large pressure differentials not required
- Fiber rated up to 300 degrees C

HIFI HDS MICRO™

TIER 1 ENERGY SOLUTIONS

HIFI HDS MICRO™

Surface Casing Ventflow Example with Interpretation Visualization



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TIER 1 ENERGY SOLUTIONS

HIFI HDS MICRO™ TOOL SPECIFICATIONS

Assembly Length	114.33 (in) 290.40 (cm), standard configuration
Assembly Weight	41.0 (lb) 18.60 (kg), standard configuration
Maximum Assembly Outer Diameter (O.D.)	2.250 (in) 5.715 (cm), housing, stainless steel
Assembly Configurability	Cablehead amd MiQro Sensor to Titan Pin. Cablehead and Crossover to Titan Pin
Deployment Method	Wireline or coil tubing
Retrievability	Tool assembly is wireline retrievable, Titan 1-7/16 Fish Neck
Power Sources	None
Telemetry	None
Spatial Resolution	Infinite, dependent on measurement system
Survey Data Configuration	User-configurable sample duration and resolution
Data Logging	Point type measurement
Compatible Depth Acquistion System	Most, contact Hifi Engineering for clarification

PERFORMANCE	
Frequency Response	20-100000 (Hz)
Magnatude Response	.001-50 (radian)
Phase Response	1-100 (%)

OUTPUTS (FILE FORMAT)	
Phase	.fig, .pdf, .las
Magnatude	.fig, .pdf, .las
Acoustic	.wav, .bdata

OPERATIONAL	IMPERIAL	METRIC
Operating Temperature	-31 to 212 (°F)	-35 to 100 (°C)
Operating Pressure, maximum	5000 (psi)	35 (Mpa)
Maximum Trip Rate, maximum	60 (meter per minute)	197 (feet per minute)
Tensile Strength, maximum	5000 (lb)	2268 (kg)
Electrical Feed Through Rating	7 (A) at 500 (V)	--

DIMENSIONS	LENGTH		DIAMETER (MAX)	
Cablehead Assembly	43.630 (in)	110.820 (cm)	2.125 (in)	5.398 (cm)
Cablehead with Crossover to Titan Pin	52.870 (in)	134.290 (cm)	2.125 (in)	5.398 (cm)
Fish Neck	5.000 (in)	12.700 (cm)	1.438 (in)	3.653 (cm)
MiQro Tool Assembly	70.700 (in)	179.578 (cm)	2.250 (in)	5.715 (cm)
Bottom to Center of Sensor Zone	28.375 (in)	72.073 (cm)	N/A	N/A
MiQro Tool Assembly with Transport Cases	85.900 (in)	218.186 (cm)	2.880 (in)	7.315 (cm)