ENIGMA DL-6HB

HYBRID DATA LOGGERS

KEY COMPONENTS

1. Hydrophones & caps carrying case
2. Eight position data transfer case
3. Three Data loggers w/ magnet base
4. Three Data loggers w/plug-in base
5. Three Hydrophone and cable kits
6. Three SS 2.5" Hydrant Caps
7. Data transfer USB cable
8. Enigma Classic PC Software
9. Enigma web portal

Hydrophone carrying case w/SS hydrant caps and a data transfer case with 8 position loggers space.

DESCRIPTION

The Enigma DL-6HB combines the Enigma DL-3 Standard and Enigma DL-3H Hydrophone systems into a single package. The system includes three vibration-sensing loggers for external pipe acoustic measurements and three hydrophone-equipped loggers for direct pressure-wave measurements within the water column. This configuration allows the operator to select either standard vibration sensing or hydrophone sensing depending on pipe material, diameter, and field conditions. Both logger types are operated and processed using the same host software platform. Standard vibration loggers and hydrophone loggers are not intended to be mixed within the same correlation deployment. A single deployment supports up to three standard correlations when using vibration loggers, or up to three hydrophone correlations when using hydrophone loggers.

MULTI-POINT NETWORK CORRELATION

After retrieval, the recorded leak sound data is transferred to the host software for correlation analysis. The software processes the acoustic data from each logger pair to calculate and display leak locations between all deployed loggers. Pipe sections, logger positions, and calculated leak locations are displayed graphically to provide a visual representation of the survey area and correlation results.

SEPARATING GENUINE WATER USAGE

Each logger records during three sample periods, typically spaced one hour apart. A characteristic of leak noise is that it is always constant and so if the correlation peak is not present during all three samples then it is due to water use and not leakage.

OPTIMUM LEAK SENSING

Overnight use provides ideal conditions for leak detection. This is because background acoustic noise from traffic, water usage and other sources, is lowest and, at the same time, water system pressure can be higher which greatly aids leak sound propagation.

SPECIFICATIONS

CORRELATION DATA LOGGERS

Sensors	Data logger	Hydrophone
Type	Integral Accelerometer	Hydrophone connected externally
Frequency range	1 - 2,400 Hz	1- 2400 Hz
Sensitivity	10 V/g	-195dB
Attachment	Integral magnet	1"NPT connection + pipe adapters

Sampling

Rate	4860 Hz
Resolution	24-bit
Number of epochs	1, 2, or 3
Epoch duration	60 seconds
Max total recording time	180 seconds

Power

Type	Dual lithium cells
Replaceable	At factory or service center
Operating life	>5 years

Physical

Dimensions	104mm (high) x 59mm (diameter)
Material	Aluminum
Waterproof rating	IP68 Rated - Submersible.
Operating temperature	14°F - 160°F (-10°C to +60°C)

DATA TRANSFER CASE

Host Communications

Type	USB
Rate	2.5 Mbits/sec

Memory

Data Store	32MB static Ram

Communications

Type	Optical - Infrared
Rate	2.5 Mbits/sec

Power Supply

Type	User replaceable alkaline 4 cell pack
Physical Dimensions	Holds 8 loggers 410 x 325 x 172 mm
Material	Rugged high impact plastic
Waterproof rating	IP65 Rated
Operating temperature	14°F - 160°F (-10°C to +60°C)

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3 YEAR LIMITED WARRANTY

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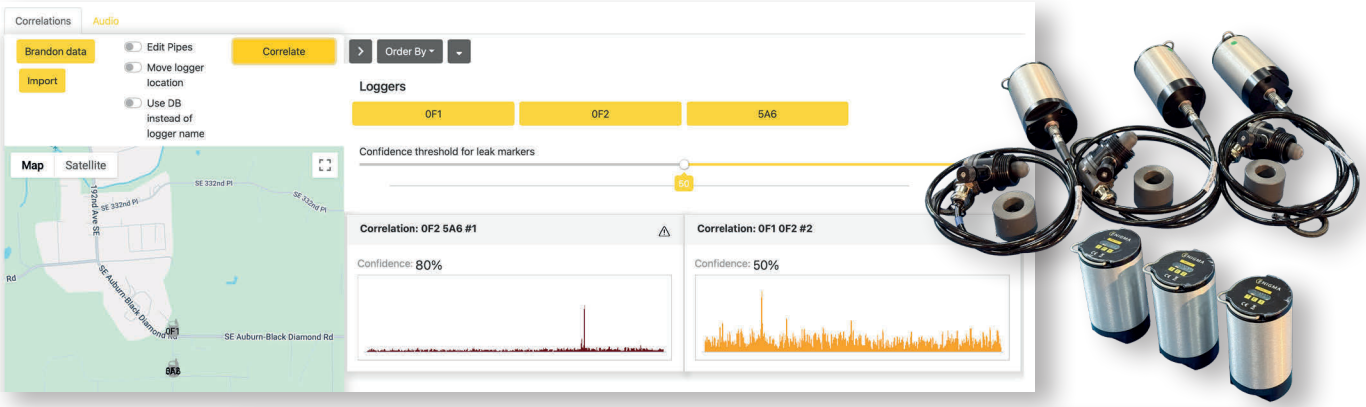
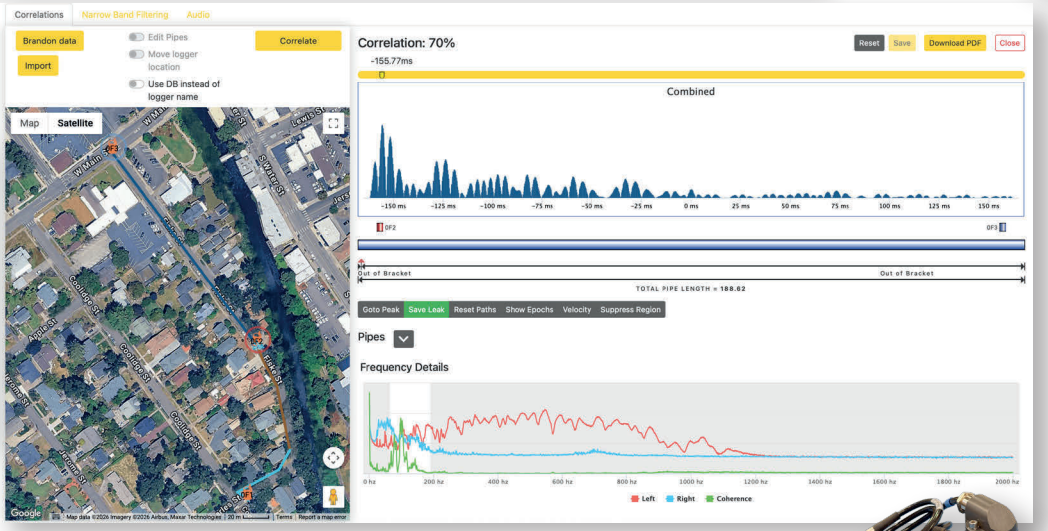
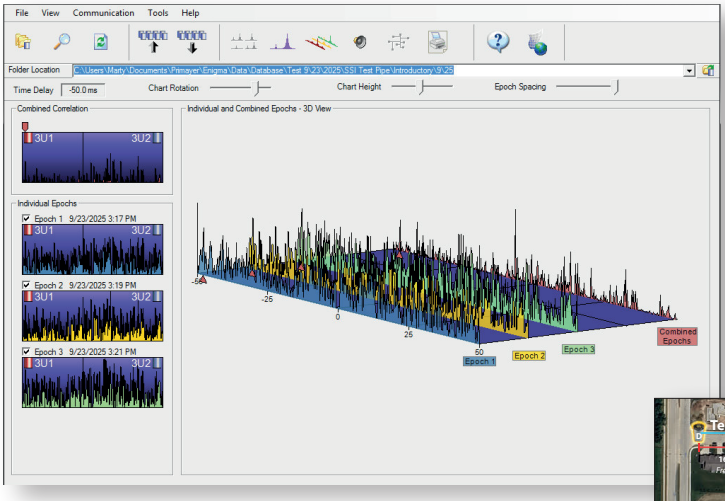
HYBRID DATA LOGGERS

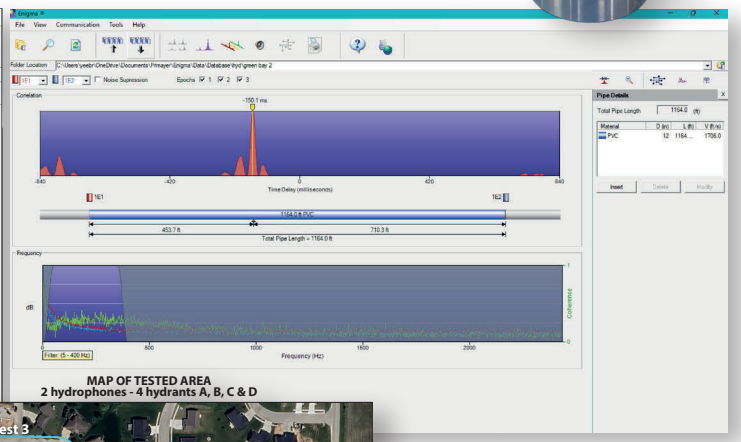
CORRELATION SCREENS - CLOUD VERSION



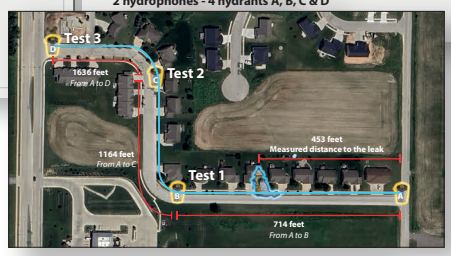


CORRELATION SCREENS - PC VERSION





MAP OF TESTED AREA
2 hydrophones - 4 hydrants A, B, C & D



	Distance between sensors	Distance to leak Cloud Analysis	Distance to Leak Laptop Analysis	Test w/Enigma 8
Test 1 (Hydrant A to B)	714'	462'	460'	Inconclusive
Test 2 (Hydrant A to C)	1164'	456'	454'	
Test 3 (Hydrant A to D)	1636'	431'	459'	

Pipe
Distance

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