

DigiCorr

Digital Leak Noise Correlator

Introduction

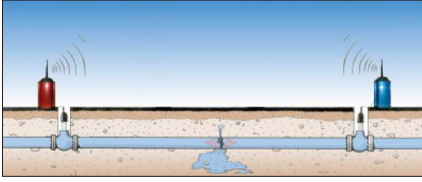
The DigiCorr Leak Noise Correlator is the world's first and only digital correlator—uniquely designed to provide a complete solution to leakage management issues facing the modern water utility such as on demand, real-time leak pinpointing, flexible leak analysis, systematic leak surveying and the need for powerful leakage management tools. DigiCorr's patented computerized acoustic technology can accurately pinpoint pipeline leaks of all sizes within a typical error of less than three feet.

Using DigiCorr, water utilities can reduce their unaccounted-for water, realistically recovering 75 percent or more of their current leakage. By employing DigiCorr throughout their pipeline operations, utilities can increase their operational efficiency with proactive pipeline maintenance, improve their emergency management and customer satisfaction, and maximize revenues by delivering and billing for all water produced.

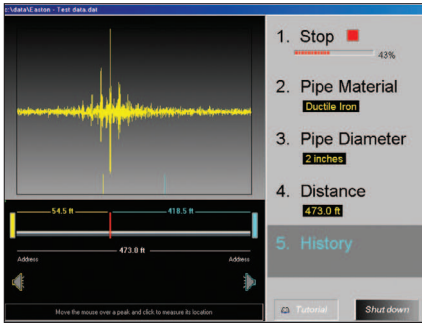
Smart Listening

Digital correlation relies on vibration sensors that sense the turbulence from pipeline leaks. Turbulence from leaks in pressurized pipelines creates traveling pressure waves which propagate through the fluid of a buried pipeline. The velocity of the propagation depends both on the fluid and on the dimensions and material of the pipe. Digital correlation measures the difference in propagation time of the pressure wave from the leak to each sensor. The exact location of the leak source is then pinpointed using the measured time and known velocity.





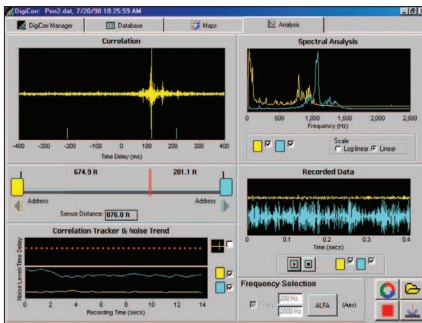
Installation



Rapid response



DigiCorr survey



Advanced analysis

How It Works

Deploy

Two Field Sensor Units (FSUs) are deployed at remote locations on the pipeline. FSUs mount non-intrusively on pipelines at long range up to one mile apart. The FSUs have precision time-keeping, processing and data storage capabilities, together with digital radio links to a rugged, portable PC. The FSUs are synchronized by radio from the PC and then make 90-second recordings. During the recording, the FSU processors independently assess the vibration signals, encode the leak sound component and save the recorded data in memory.

Retrieve & Analyze

After recording, data from the FSUs is transferred to PC via radio. Leak sources appear as peaks in the Correlation Display. DigiCorr's patented Advanced Leak Frequency Analysis (ALFA™) accurately and individually pinpoints leaks within a few seconds following data transfer. ALFA uniquely processes each recorded leak sound, eliminating analog filtering and greatly accelerating the process of pinpointing a leak. ALFA improves the leak signal-to-noise ratio enabling detection of inaudible, difficult-to-find leaks and resolves multiple leak sounds simultaneously.

If a leak is present outside the span of the sensors, DigiCorr can detect the direction of the leak. One or both sensors can then be moved and a new recording made to pinpoint the leak. In this way, a significant length of pipe, such as a 20-mile section under failing hydrostatic test, can be quickly and effectively scanned to detect and pinpoint the location of leaks.

Systematic Leak Surveying

DigiCorr integrates distribution system maps (from paper copy, graphics files, GIS) directly into the software user interface. Complete recordings are saved automatically into a survey database, together with associated map, pipe and correlation information.

Powerful Digital Processing

The difference in the digital technology used in DigiCorr versus the analog technology used in all other correlators is fundamental to DigiCorr's speed and accuracy. DigiCorr's digital technology senses leak noise significantly below the threshold of human hearing. The sound is immediately digitized at the sensor and transmitted with the quality of a CD recording.

- > DigiCorr's sensitivity is approximately 30 times greater than analog technology
- > True digital recording and radio transmission preserves the fine detail of the leak sound, enabling pinpointing of even the quietest, most difficult-to-find leaks
- > Unique capability of saving actual acoustic data to disk, enabling replay, print and email of leak data
- > Advanced signal processing such as ALFA, digital mapping and special processing for different types of pipes are only possible in a digital system

Field Sensor Units (FSU)

Pipeline Sensors

- > Accelerometers
 - Sensitivity: 12 V/g
 - Noise: < 0.016 $\mu\text{g}/\sqrt{\text{Hz}}$
 - Bandwidth: 1 – 4,000 Hz
- > Hydrophones are available for in-flow measurements

FSU Radio Transceivers

- > Noise-free digital transmission
- > ISM/LAN 2.4 GHz spread spectrum, license-free worldwide, FCC/ETSI approved
- > Range (line-of-sight) up to 10,000 feet (3 km)
- > Two-way communication with base station radio transceiver

Data Acquisition

- > Intelligent automatic gain: 10 – 80,000
- > 16-bit data acquisition, 92 dB dynamic range, sampling rate = 5 kHz

Power Supply

- > Intelligent power management
- > Up to 32 hours battery life, rechargeable & replaceable
- > Re-charger for FSUs from AC outlet or standard auto DC

Physical Characteristics

- > Dimensions: 4.25" x 4" x 8"
(10.8 cm x 10.2 cm x 20.3 cm)
- > Weight: 6.5 lbs (3 kg)
- > Rugged, metal, weatherproof enclosure

Base Station Computer

Physical Characteristics

- > Rugged (impact, grit, water-resistant) computer; Pentium processor, TFT color, bright sunlight-readable screen (DigiCorr software will run on any PC using Microsoft® Windows™ with at least 32 MB RAM and 800 x 600 display resolution)
- > Rugged, weather-resistant stereo headphones

Digital Radio Transceiver

- > Dimensions: 5" x 3.25" x 1"
(12.7 cm x 8.3 cm x 2.5 cm)
- > Weight: 1 lb (0.5 kg)
- > Rugged, metal, weatherproof enclosure

DigiCorr Software

- > ALFA™ (Automatic Leak Frequency Analysis)
- > Easy-to-use Microsoft® Windows®
- > High-resolution display of correlation function, onscreen, landmarked location of detected leaks
- > Correlation range: \pm 880 milliseconds
- > 15 types of pipe materials, including multiple sections of different pipes
- > Automatic sound velocity measurement
- > 16-bit stereo/mono sound playback
- > Visual inspection of sound recording
- > Spectral (FFT) analysis capability
- > Digital filters with full manual frequency band selection available:
 - High-pass: 1-2,000 Hz
 - Low-pass: 10-2,500 Hz in steps of 1 Hz
- > Automatic assessment of leak probability
- > Elimination of spurious noise events
- > Reanalysis of same data possible
- > Manual selection of possible leaks from correlation function
- > Data storage (any number of studies)
- > Database & mapping module

Technical specifications

Digital Audio Processor Unit

- > Frequency range: 30 - 4,000Hz
- > Power supply: 2 AA alkaline batteries
- > Battery life: >12.5 hours continuous listening
- > Display: LCD
- > Protection: IP54, weatherproof, splashproof
- > Weight: 15 oz (408.2 g)
- > Dimensions: 5" x 3.5" x 1.5"
(12.7 cm x 8.9 cm x 3.8 cm)

Universal Sensor

- > High-resolution accelerometer
- > Sensitivity: 20 V/g
- > Resolution: 0.05 µg /√Hz
- > Protection
 - IP68, waterproof, fully submersible
 - Shockproof to 6,000 g

Ground Microphone Unit

- > Dimensions
 - Height: 34" (86.36 cm)
 - Disk: 4.5" (11.43 cm)
- > Weight: 2 lbs (910 g) with sensor attached
- > Materials:
 - Rod: anodized aluminum
 - Disk: stainless steel

Accessories

- > Carrying case: Rugged, lightweight
- > Probe: Stainless steel; connects to sensor

About Itron Inc.

Itron Inc. is a leading technology provider to the global energy and water industries. Our company is the world's leading provider of intelligent metering, data collection and utility software solutions, with nearly 8,000 utilities worldwide relying on our technology to optimize the delivery and use of energy and water. Our products include electricity, gas, water and heat meters; data collection and communication systems, including automated meter reading (AMR) and advanced metering infrastructure (AMI); meter data management and related software applications; as well as project management, installation, and consulting services. To know more, start here: www.itron.com



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