

# Latest Water Leak Detection Method by Fuji Quatro Correlator



 **FUJI TECOM INC.**



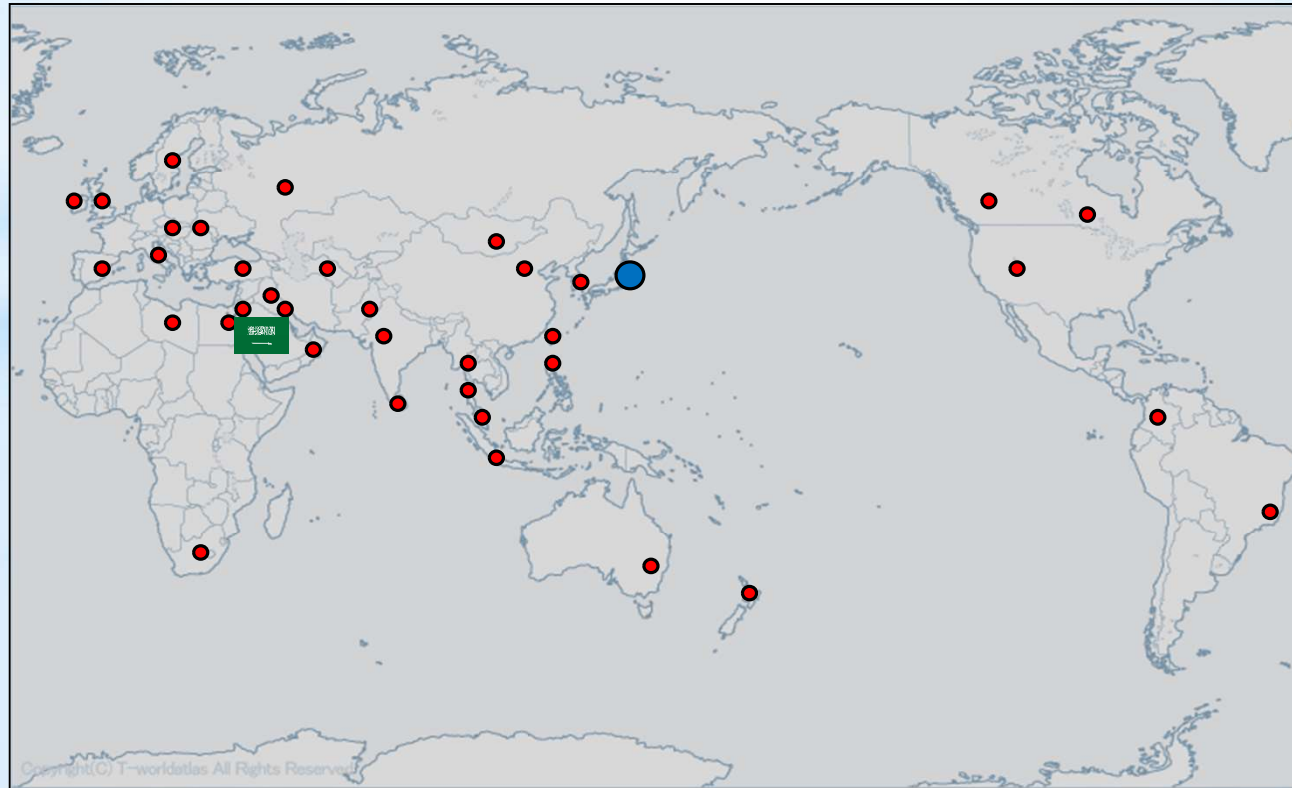
**We, Fuji Tecom Inc., have been contributing to development for the engineering of water leak detection for more than 60 years, and are a leading manufacturer and exporter of the instruments related for water management, maintenance, and its services.**

**The operation equipment and its technical education are most important for water leak prevention work.**



# Worldwide Service and Support

**40 distributors all over the world**



# 4 MAIN BUSINESS LINES

1. Water Leak Detecting
2. Pipeline & Cable Locating
3. Water Leak Monitoring System
4. Consulting and Training



# DIGITAL QUATRO CORRELATOR

## LC-5000





- Correlator pinpoints locations of leakage **automatically** by the arrival time difference between the two sensors which vibration as leakage come up from leak points.
- Leak points between two sensors are **accurately** detected in a short time.

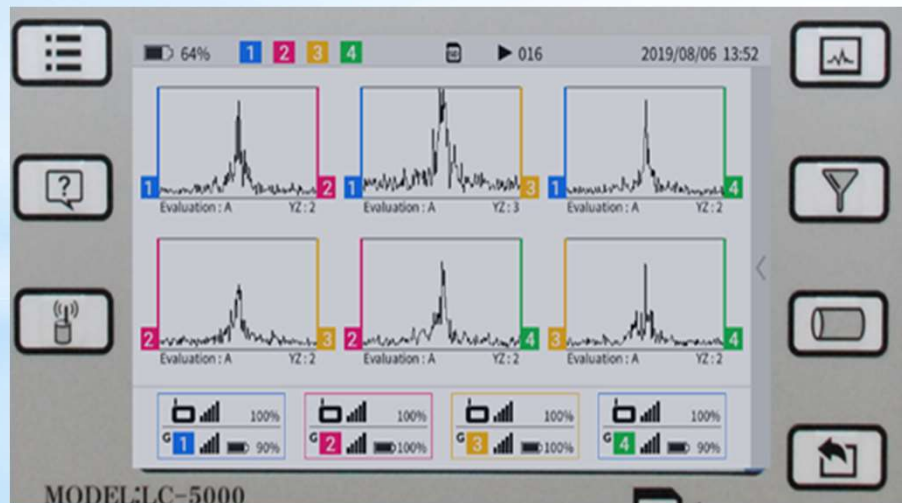
## The Sensors

- The sensors are adopted piezoelectric element with strong magnetic force on the tips.
- The piezoelectric element picks the vibration comes up from the leak point and converts into a voltage.



# Automated Analysis System

Easy operation via **automated analysis** of data came from sensors and waveform data is shown on the display of the main unit during survey.





# Situation for Correlation Investigation

## Poor road conditions

- Difficult for regular hearing surveys on grass or soil

## Countless external noise

- Difficult to conduct regular hearing surveys in areas with high traffic volume, such as national highways

## Mixed similar sounds

- Similar sound is generated nearby and leak noise volume is too small to detect

# Formula for Calculation of Leak Point



LC-5000 calculates the length between leakage and sensors by measuring time distance leak noise arrives at each sensors.

$$L_{\text{Leak Point}} = \frac{D - V \times Td}{2}$$

(V×Td) : Delayed length

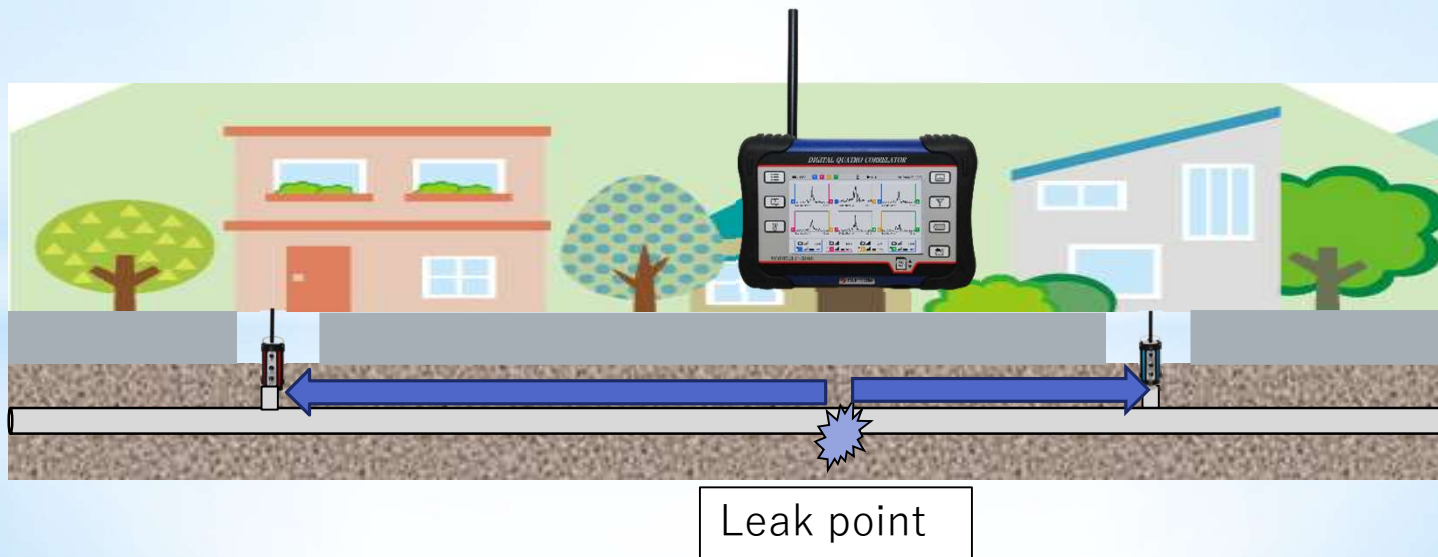
\*Velocity depends on pipe material and diameter

# List for Velocity of Each Pipe Diameter

Pipe Material	Diameter	Velocity
<b>DIP</b> (Ductile Cast-Iron Pipe)	<b>100mm/4inch</b>	<b>1311m/sec</b>
<b>GP</b> (Galvanized Steel Pipe)	<b>100mm/4inch</b>	<b>1289m/sec</b>
<b>CIP</b> (Cast Iron Pipe)	<b>100mm/4inch</b>	<b>1280m/sec</b>
<b>ACP</b> (Asbestos Cement Pipe)	<b>100mm/4inch</b>	<b>1079m/sec</b>
<b>PVC</b> (Polyvinyl Chloride Pipe)	<b>100mm/4inch</b>	<b>418m/sec</b>
<b>PE</b> (Polyethylene Main Pipe)	<b>100mm/4inch</b>	<b>274m/sec</b>

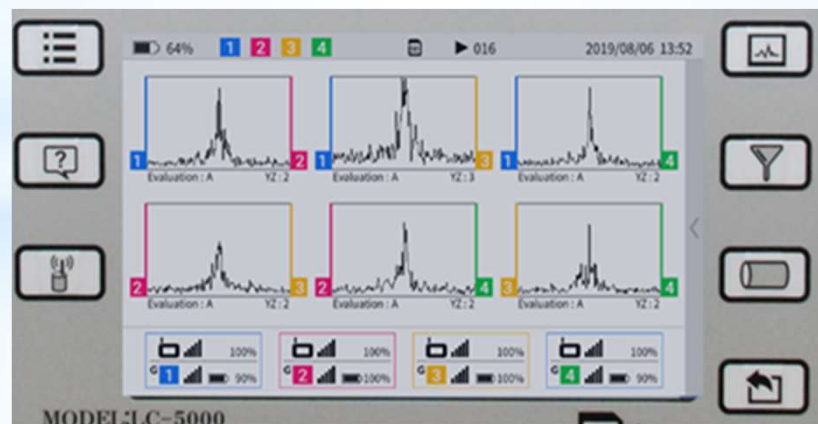
# Conditions for Effective Two-point Correlation

- ① **The same leak sound** travels to both sensors and can be picked.
- ② The location of pipeline is clear.
- ③ **The length of pipeline** between sensors measured.
- ④ **The pipe material and diameter** are confirmed.



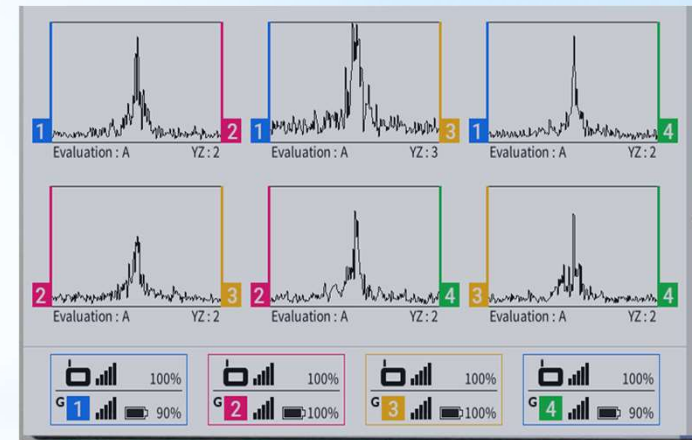
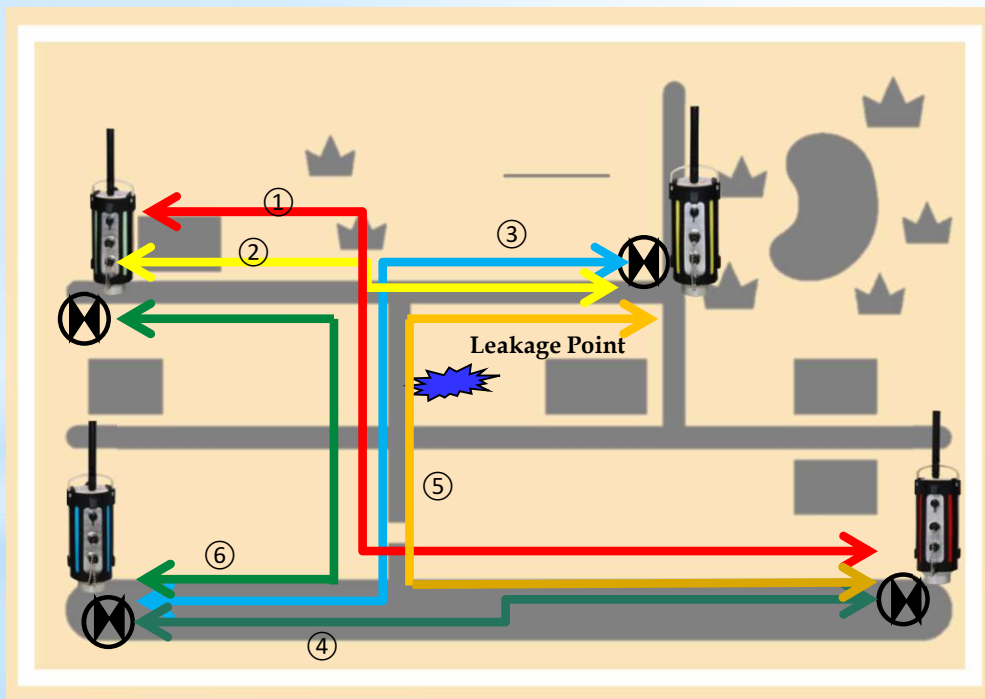
# Strong Point of Quatro Core

- Real time simultaneous correlation
- 6 correlations at once on one screen
- Monitoring with logger mode



# Advantage of Quatro Core 1

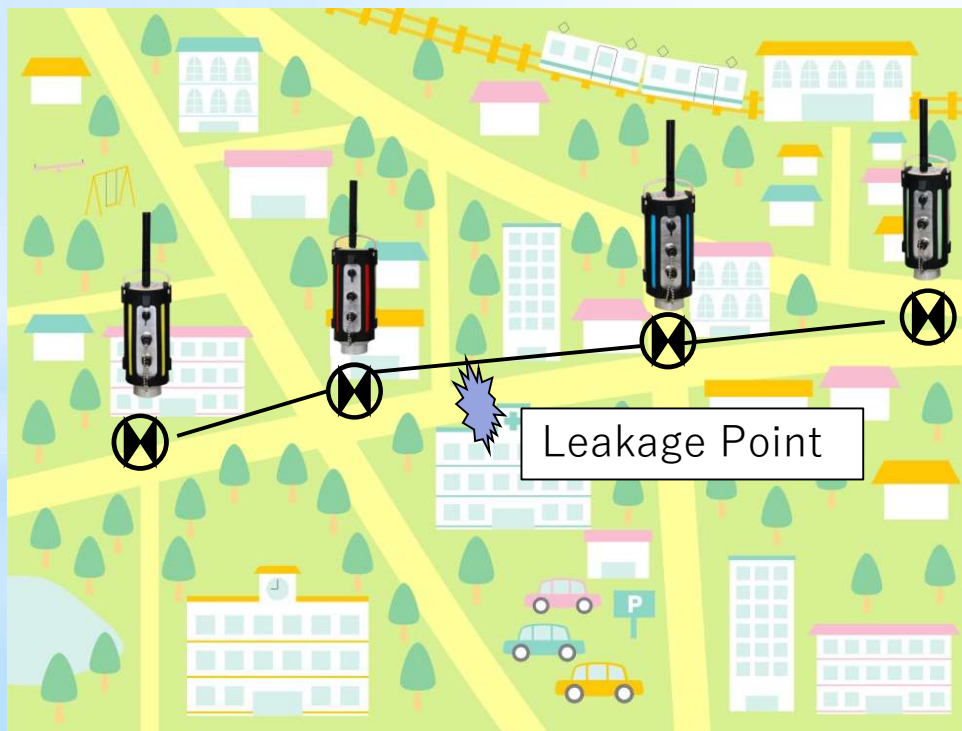
**6 ways simultaneous correlation**  
and its work shown on one screen.



**Enables for simultaneous correlation up to six ways with four sensors**

# Advantage of Quatro Core 2

**When there are some valves on the same pipeline**



Since 4 sensor correlation can approach a leak point in more than two ways, detection accuracy is improved and more stable.

# Advantage of Quatro Core 3

## Relay mode:

**Use of sensors as a relay receiver makes wireless communication distance way longer and avoids poor connection due to obstacles.**



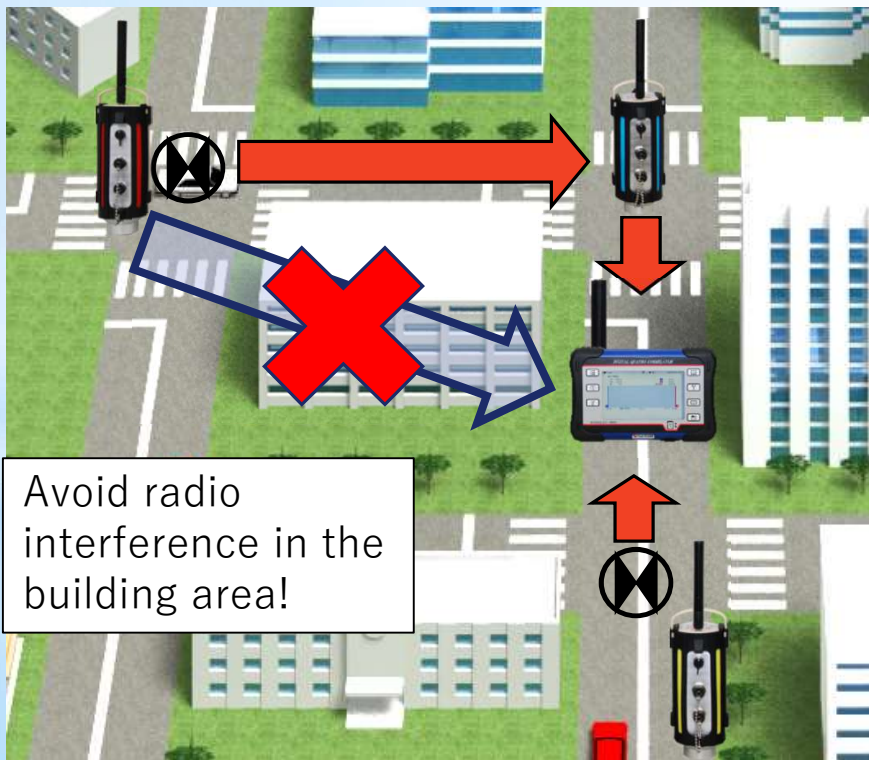




# Advantage of Quatro Core 3

## - Relay mode techniques 2 -

Effective for locations over crowded with buildings.



Sensors with **relay mode** avoid to travel directly through obstacles and provide you comfortable radio wave conditions.

# Advantage of Quatro Core 3

## Logger mode:

Logger mode allows recorded leakage data to be correlated back in different time.

It performs correlation of sound data picked up at the appointed time and can be set anytime including night time. Its effective for busy situations such as traffic jam and during nights.



## Advantage of Quatro Core 5

- 1. Filter for large diameter pipes adopted**  
(Up to  $\varphi 3000\text{mm}$ )
- 2. Recalculation function**  
(Recorded leakage data during survey could be recalculated after resetting of pipe information. )
- 3. Recorrelation function**  
(Data can anytimes be recollated)

## Pipe Data Handling (Main Unit)

PIPE MATERIAL	DIAMETER (mm)	PIPE MATERIAL	DIAMETER (mm)
Ductile Cast Iron	75 to 2600	Polyethylene for Water Distribution	50 to 300
Cast Iron	75 to 1500	Stainless for Water Supply	8 to 300
Asbestos	75 to 500	General Stainless	13 to 50
PVC	13 to 300	Copper	8 to 150
Lead	10 to 50	Galvanized Steel	10 to 800
PolyethyleneI	10 to 50	Arc Welded Carbon Steel	350 to 2000
PolyethyleneII	10 to 50	Reinforced Plastic	200 to 3000
Polyethylene100	90 to 335	Vinyl Chloride Lining Steel	15 to 150



**HG-10AII:**  
**Water Leak Detector**



**LNL-1:**  
**Leak Noise Logger System**

**FSB-8D:**  
**Digital Sound Detector**



**Listening Stick**



**PL-G:**  
**Pipeline and Cable Locator**



**F-90M: Metal Locator**

# Training Program

**We also provide you lectures to help your skills up.**

**Our training program shows you the latest Technology & Technique for Pipeline Operation and Leak Detection with Survey Instruments.**

**You will have practical experience and knowledge with several trainings at our yard for work on your actual fields.**



# Training Site

1. Pipeline Operation / Maintenance and Leak detection
2. Introduction of survey equipment
3. Technical instruction of survey instruments
4. Comparison of various leak types & site conditions

Various different diameter, depth, and material pipes Installed to demonstrate possible leaks on actual fields. (CIP, GP, PVC, PE)





**Thank you for your attention**