NEW

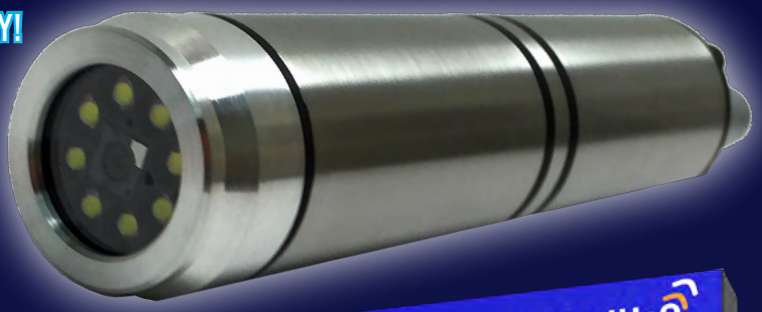
# Next Generation Water Leak* Detection and Water Loss Services

*Automatically Measures Leaks in Gallons Per Minute -- Repeatable & Reliable. No Third-Party Interpretation. No Operator Judgement. No Guesswork. No Coding.

**ADD TO YOUR WATER LOSS PREVENTION BUDGET TODAY!**

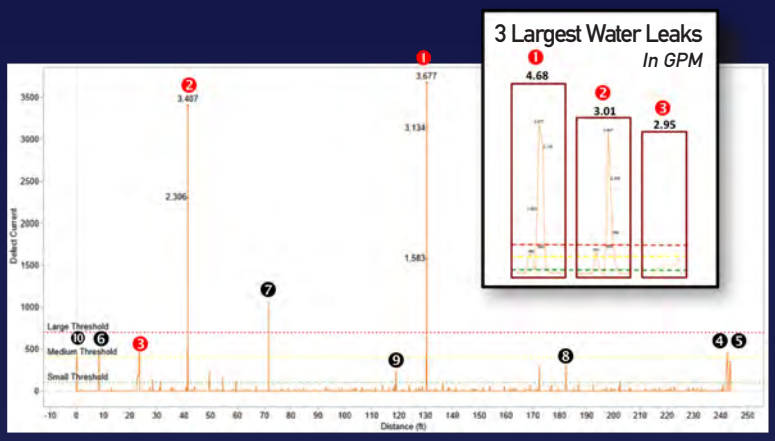
## Electro Scan's Exclusive Services Help Satisfy SB 555 Requirements

- Low Voltage Conductivity Sensor
- High Definition CCTV
- Pressure Sensor
- Acoustic Hydrophone



*Low Voltage Conductivity Leak Detection is Here!*

The water industry's first reliable & repeatable tool to locate & measure water leaks and water losses in pressurized water distribution & transmission mains.





Automatically measures each leak's location, size, and GPM. USEPA tested and in accordance with ASTM F2550-13.

Precisely locate leaking cracks, pinholes, bad joints, & defective service connections, and calculate estimated water loss in gallons per minute.


*U.S. Patent # 9143740. Multiple U.S. and International Patents Pending.*

*Services Exclusively Available From Electro Scan Inc.*

**electro scan inc.**

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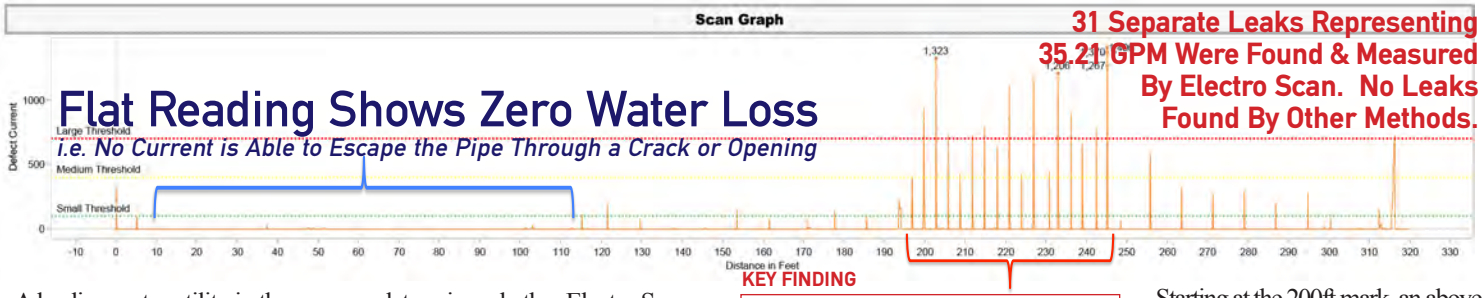
CASE STUDY

# New 4-in-1 Probe Locates & Measures Water Losses




KEY FINDING

**60ft OF WATER MAIN RESPONSIBLE FOR 75% OF TOTAL LEAKAGE.**

A leading water utility in the Western United States owns and operates four (4) reservoirs, delivering potable water and irrigation water to residential, commercial, and agricultural customers.

While the main function of its reservoirs serve as water storage for its rapidly growing municipal area, they also serve as important recreational centers.

A network of open channel canals also run throughout of much of the metropolitan area, helping distribute water.

With a reputation as a leader in innovation and an active leak detection program, the utility was one of the first in North America to trial low conductivity testing, working with Electro Scan, to conduct a test of a 315ft, 27in diameter water main.

Undergoing several previous inspections, using legacy survey techniques, the utility wanted to determine whether Electro Scan could identify specific defect locations. Results, were available in minutes, with Electro Scan finding a 50ft section with a dozen defects, showing leaks at each joint.

***Acoustic-No Defects***

***Underwater CCTV-No Defects***

***Dewatered Dry CCTV-No Defects***

Starting at the 200ft mark, an above ground visual inspection quickly saw traces of water bubbling up through the ground as verification, but no specifics as to the number or severity of each defect flow in the pipe.

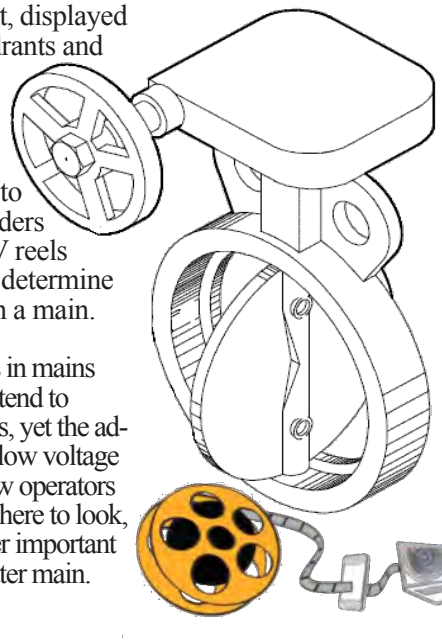
# High Definition CCTV Camera Aids Navigation Through Main

A key component of Electro Scan's 4-in-1 water probe is a high definition closed-circuit television (CCTV) camera.

While CCTV cameras are relatively new to the internal assessment of water mains while in service, the biggest reason to have a camera integrated to its probe is to assist in the navigation through hydrant stubs, ensure that gate valves are open, not closed, and most importantly, to determine when the probe has actually entered a main.

Geographic information systems have allowed most utilities to improve the positional accuracy of valves, hydrants, meters, and mains. But, displayed distances between hydrants and mains, for example, tend to be simple straight line distances, instead of accurate pipe distances needed to correlate footage encoders on standardized CCTV reels necessary to precisely determine entry and exit points in a main.

Of course, water leaks in mains under pressure, will not tend to show on CCTV cameras, yet the addition of Electro Scan's low voltage conductivity sensor show operators and engineers exactly where to look, while also showing other important conditions inside the water main.



# Why We Can't Hear A LEAK?


## ... and Earlier Today!

*Not much has changed in 100 Years.*

***Pictured above a modern day (2015) acoustic leak detection conducted by a Great Lakes Region water utility. A contract worker attaches a hydrophone listening device for under 60 seconds to find leaks. At least it is fast, easy, and inexpensive. And, no leak was found.***

Pinpointing water losses using acoustic sensors, data loggers, and correlators may be coming to an end as Electro Scan introduces its patented and international patent pending low voltage conductivity pipe condition assessment technology.

Since the early days, water crews have been challenged to hear leaks in water mains.

Years later, the ability to measure sound vibrations to accurately locate and measure defect flows remains a challenge.

### Drawbacks of Acoustic Sensors, Data Loggers, and Correlators

- Ambient noise interference.
- Variable water table heights affect results.
- Unable to assess innovative pipe materials, especially PE & HDPE pipes.
- Different results for different pipe diameters.
- Leak size is difficult or unable to determine.
- Multiple false-positive readings.
- Repair clamps on previous leaks will be bypassed by acoustic waves.
- Inability to quantify defect flows rates in GPM.
- Customer's continuous water use generates similar sound as a leak.
- Affected by changes in backfill materials.
- Lengthy data processing & reporting times.
- Lack of repeatability, by crew, by equipment.
- Special training required for field crews.
- Need for third-party data interpretation.
- Misses silent or undetected leaks.

Given the numerous drawbacks of acoustic sensors, utilities should not consider the installation of permanent acoustic monitoring stations to 'listen' for leaks.

The inaccurate, inconsistent, and incorrect condition assessment of our nation's water mains represents a key risk for water loss surveys. And, given similar drawbacks using electromagnetic, helium tracers, infrared thermography, and sonar, utilities have not had adequate assessment tools to support repair, renewal, and rehabilitation decisions — until Electro Scan's new breed of GPM-based tools.

### What Does Electro Scan Deliver?

***For Each Defect That Leaks***

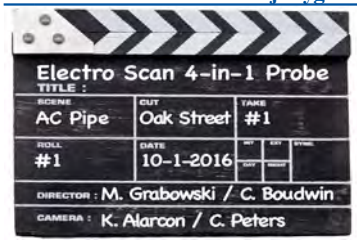
- Location of Pipe Openings.*
- Starting Point, Ending Point, and Maximum Defect Current (Height).
- Classification as Large, Medium, Small.
- Classification as Large, Moderate, or Severe Defect Flow.
- Total Estimated Defect Flow in GPM.**
- Total Pipe Segment Defect Flow in GPM.**

* Location accuracy of 0.4 inches or 1 cm.
** Volume accuracy ±30%.

## WaterElectroScan YouTube Channel Leads Industry With 415,000 Views*

Unmatched in the Trenchless Technology industry, Electro Scan's Water Channel has become a social media darling, breaking records for YouTube views as compared to all other competitors in the leak detection market.

"Cut & Paste" the URL below to see why 'WaterElectroScan' is one of the most exciting innovations in water.
https://www.youtube.com/channel/UCMcRCXbnnZMhkHrxGdjTSyg/videos





2015 Electro Scan's New Leak Detection Technology
186,656 views

2015 WEFTEC Team Underwater HD CCTV Camera
57,515 views

2015 Electro Scan for Water Leak Detection
49,882 views

2015 Electro Scan Newsletter - Press Check
44,232 views


2015 Mark Grabowski Chief Disruption Officer
32,258 views

1989 UK Water Privatization Ads - Compilation
30,454 views

YouTube™

*Total of eight videos 415,434 as of October 1, 2016.

# Low Voltage Conductivity Testing Recommended for Pre- & Post Water Main CIPP Lining Projects

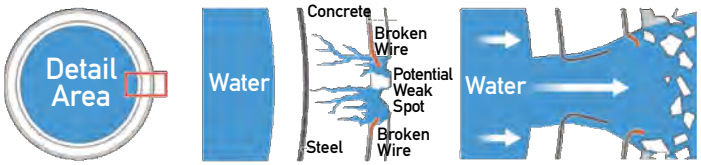
Fresh from its recommendation for Pre- and Post Cured-In-Place Pipe (CIPP) for sewers, Electro Scanning Inspection is also being recommended for Water Main CIPP projects.


**Electro Scan Recommended For**

1. Pre-CIPP Assessment
2. Post-CIPP Assessment
3. Post-Service Reinstatement


Since pressure testing is not reliable after service connection reinstatement, Electro Scan is now recommended to certify pipe liners as leak-free.

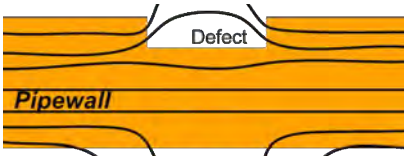
## Electro Scan Overcomes Problems With Legacy Testing Methods of PCCP

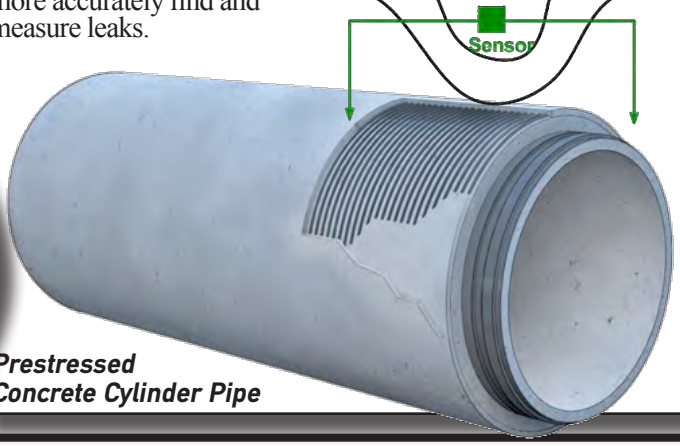



NOTE: Due to the high number of false-positive data points, method must detect +20 broken wires before repair is warranted.

Continued challenges linking specific anomalies found using electromagnetic sensors to be linked to actual or potential leak locations has opened the field to new technologies, like Electro Scan, that more accurately find and measure leaks.

***Inability to accurate find active water leaks, has limited the timely detection of large diameter water main breaks.***



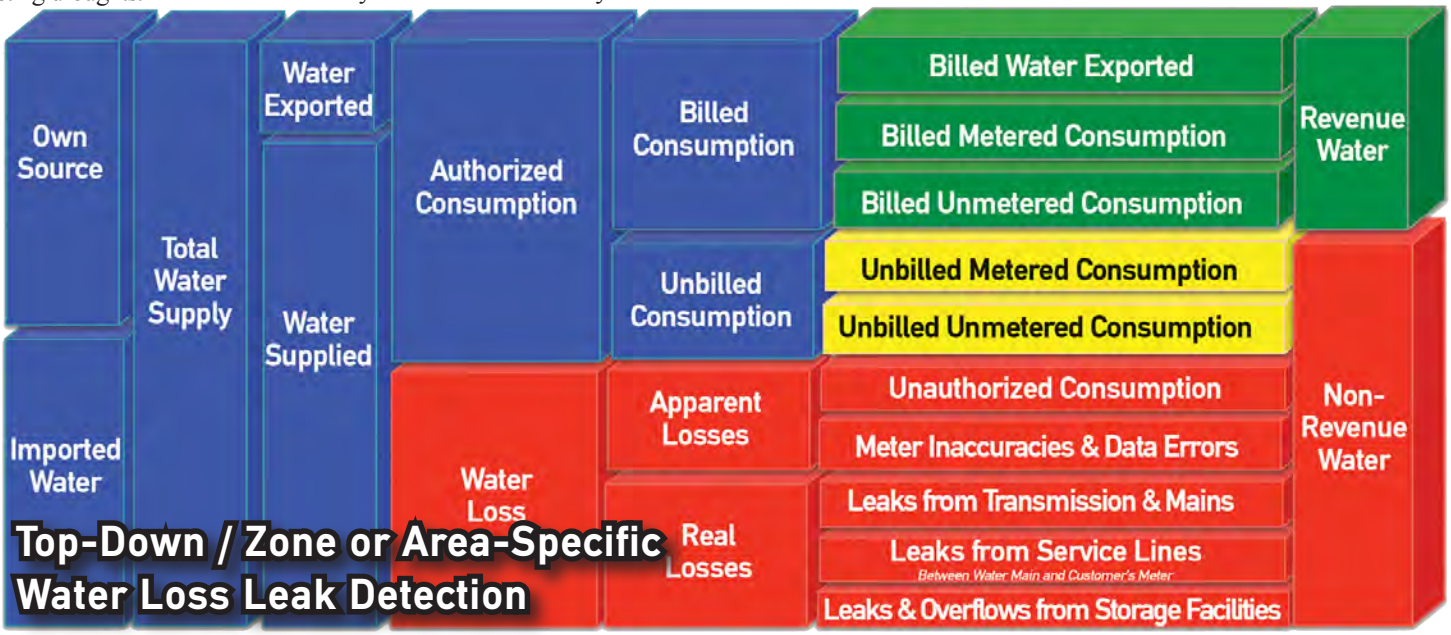

***Prestressed Concrete Cylinder Pipe***

# SB 555 Establishes Toughest Standard in the United States For Auditing, Identifying, Reporting & Reducing Water Losses

Rob Emanuel, Mayor, City of Chicago has famously said "Never let a good crisis go to waste." Seizing on the severe drought in the western states, and California in particular, legislators appear to have moved aggressively to prevent the impact of future, long lasting droughts.

SB 555, signed by Governor Brown in September 2015, represents the toughest standards in the United States, by mandating the measurement of Apparent Losses and Real Losses within five years. In fact, all 450 California water utilities must identify "steps taken in the preceding year to increase the validity of data entered into the final audit, reduce the volume of apparent losses, and reduce the volume of real losses" and meet performance standards for the volume of water losses.

**Advantage:** Low Voltage Conductivity to locate & measure leaks.


*Source: AWWA Water Audits and Loss Control Programs, Manual of Water Supply Practices, M36, 4th Edition, 2016.*

# Prolonged Leaks in Small Diameter Pipes Are Worse Than Main Breaks in Larger Pipes

## Do The Math!

Is your water utility focused more on finding leaks in your transmission mains instead of your distribution system?

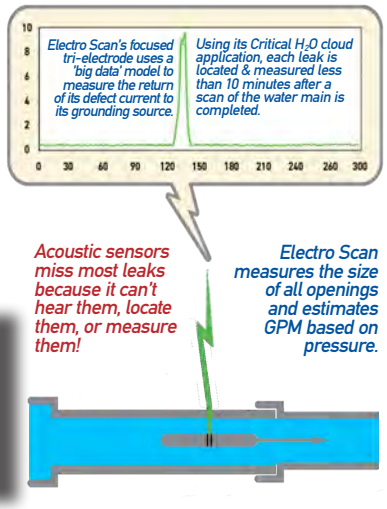
Experts agree that the constant flow of low-level leaks causes more water loss than the spectacular water main breaks that are shown on the nightly news.

**Do the Math…**

= 5-gpm leak running 100 days
= **720,000 gallons**

= 500-gpm leak running 4 hours
= **120,000 gallons**

### *How Does Low Voltage Conductivity Find Leaks?*




# New AWWA M77 'Manual of Practice' To Feature Low Voltage Leak Detection

In June 2016 AWWA's Water Main Condition Assessment Committee, M77 published its draft first edition Water Supply Manual of Practice, including Electro Scan's Low Voltage Leak Detection technology.

Ahmad Habibian, Ph.D., P.E., Black & Veatch, Buried Infrastructure & Conveyance Practice (Gaithersburg, MD), headed the leak detection chapter, while Dan Ellison, PE, SE, Senior Professional Associate, HDR (Ventura, Calif.) was responsible for the overall delivery of the new Manual of Practice.

As part of the chapter on Leak Detection, major techniques for detecting and measuring water losses, include:

- Acoustic inspection - external.
- Acoustic inspection - internal.
- Electromagnetic testing.
- Helium tracer testing.
- Low voltage conductivity testing.

Key steps to developing the new M77 Manual of Practice, discussed at the meeting, included finalizing key subcommittees, preliminary chapter assignments, and adherence to a rigorous manuscript review schedule.

Topics for the new manual include developing a condition assessment project or program, asset identification, spatial analysis of historical leaks & main breaks, choosing an assessment method, field work planning, desktop condition assessment, corrosion surveys, estimating asset life expectancy, and prioritizing pipes for assessment or renewal.

AWWA supports fifty (50) manuals of practice, previously relying on M36 Water Audits and Loss Control Programs (2016) 4rd Edition to help manage leaks.

The emphasis of the First Edition M77 Water Main Condition Assessment manual is to provide data that has a sufficient level of detail and locational accuracy and to validate, estimate, justify, and improve the quality of rehabilitation decision making.

# Electro Scanning Services Automatically Locates & Measures Defects in GPM

## Advanced Software Automatically Captures Start, End, Length, and Volume of Each Defect Flow

A high desert city in the Western United States is known for its water quality, sometimes having sources of water coming into its water treatment plant that is more pure than some urbanized treated and delivered water.

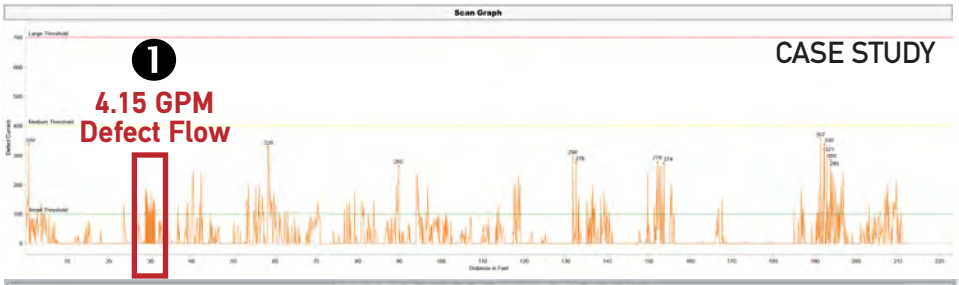
As a result, it is important to ensure that some of its most difficult to access water mains are inspected to determine current levels of water loss and help validate water audit information.

Using Electro Scan's low voltage conductivity leak detection technology, Electro Scan's field crew conducted a leak detection survey in less time than it took to arrive at the job site from the main road.

Individual defect locations shown in the Table (*Right*) and corresponding to the first 42ft of the pipe, measures the height of its defect grade (i.e. Small, Medium, Large), Defect Start (ft), Defect End (ft), Defect Length, and GPM Flow.

As shown in prior USEPA studies, consulting engineers and water utility professionals should not necessarily focus on the defect height or grade, but instead, focus on the area 'under the curve' determining the Total Gallons Per Minute (GPM) of defect flow.

CASE STUDY




**Defect by Location in Pipe**

| Analysis Defect Grade | Defect Start (ft) | Defect End (ft) | Defect Length (ft) | GPM Flow |
|---|---|---|---|---|
| Small | 26.653 | 27.044 | 0.390 | 0.860 |
| Small | 28.828 | 29.596 | 0.768 | 1.950 |
| Small | 29.760 | 29.914 | 0.154 | 0.470 |
| Small | 30.256 | 31.023 | 0.768 | 1.730 |
| Small | 33.510 | 33.510 | 0.000 | 0.130 |
| Small | 36.620 | 36.620 | 0.000 | 0.170 |
| Small | | | | 0.150 |
| Small | | | | 0.420 |
| Small | | | | 1.300 |
| Small | 41.820 | 41.820 | 0.000 | 0.220 |
| | 48.240 | | | |

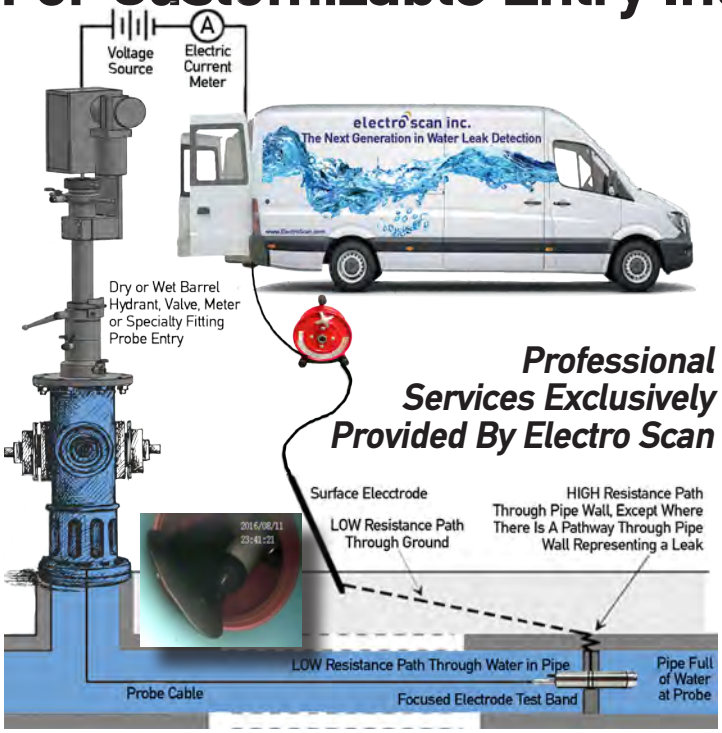
1 4.15 GPM

# How Does Electro Scan Services Compare To Industry Competitors?

Electro Scan's low voltage conductivity services does not rely on your parent's hit or miss leak detection data logger. Representing a new breed of water loss leak detection solutions -- without the need for third party data interpretation or operator guesswork. Electro Scan Services provides unbiased, unambiguous pipe condition assessment and leak detection data unlike anything used by water utilities in the past -- like comparing an, iPhone to 8-track tape players.

Adding a legacy acoustic hydrophone to show what water utilities are missing, Electro Scan is expected to amaze and disrupt suppliers of temporary and permanent devices used either internally or externally to assess pressurized water mains of distribution or transmission systems.

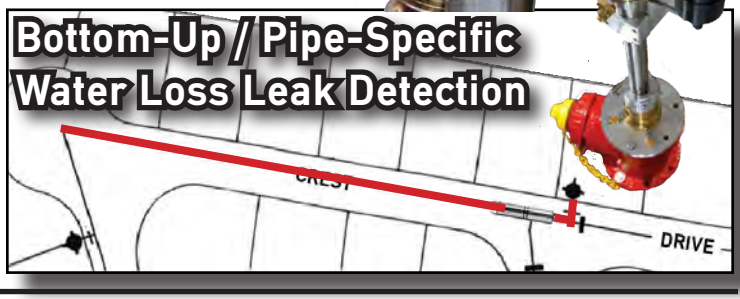
# Electro Scan Partners with Industry Leader ULC Robotics For Customizable Entry Into Pressurized Water Mains



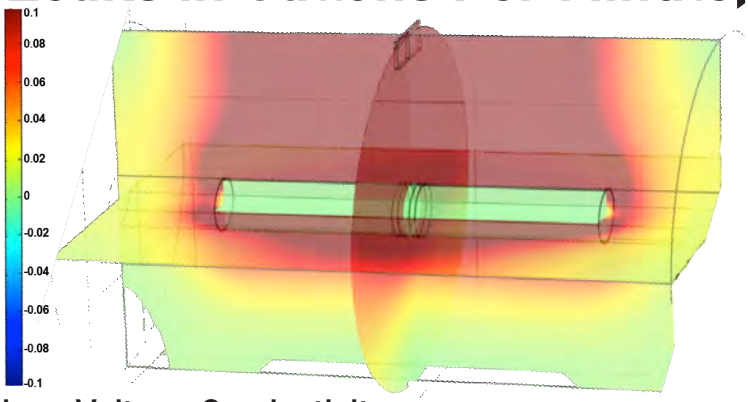

Partnered with ULC Robotics, Hauppauge, NY, Electro Scan now utilizes ULC's launch device to enter fire hydrants, air valve, flow meters, gate valves, and other pressure fittings, to deploy its low voltage multi-sensor leak detection probe.

Patent protected, ULC's launcher gives Electro Scan unprecedented entry and access to pressurized pipes without interrupting services.

***Patented Pressure Pipe Entry/Launcher System***

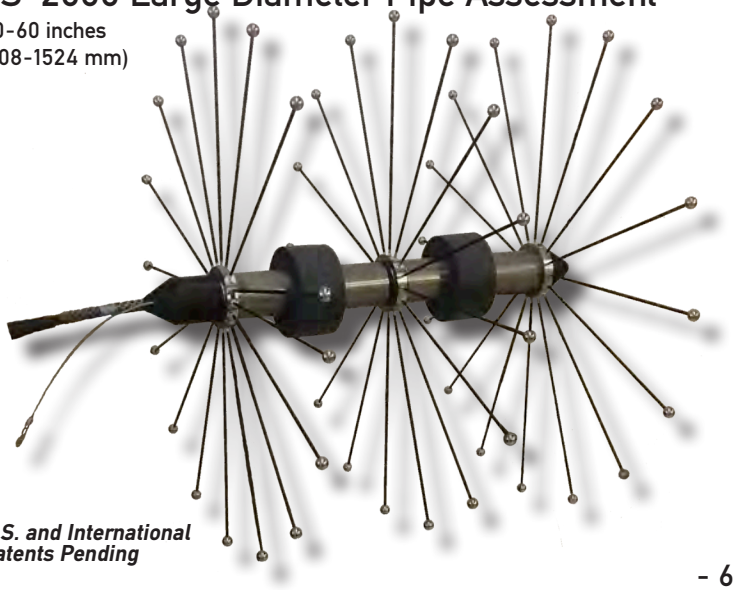



# Large Diameter Sensor from Electro Scan Inc. Measures Leaks in Gallons Per Minute, Missed By Other Techniques




## Low Voltage Conductivity ES-2060 Large Diameter Pipe Assessment

20-60 inches
(508-1524 mm)



***U.S. and International Patents Pending***

Ask any water or sewer utility about evaluating leak detection technologies and we are sure you will get an ear full.

Lack of repeatability, requirements for third-party interpretation, complex data models, limitations of pipe materials, persistent false-positive readings, and interference from ambient noise, are just some of the frustration of water managers. Add to that the inability to supply an accurate location and estimated GPM, and Board Meetings can get quite unruly.

That is, until water utilities understand that a new technology has arrived – Electro Scan's Low Voltage Conductivity Technology – that overcomes the weaknesses of legacy acoustic sensors, data loggers, correlators, electromagnetic, remote field eddy, magnetic flux, and ultrasonic testing.

Contact Electro Scan today at info@electroscan.com and learn about the world's leading leak detection solution and how your agency can take advantage of its patented and patent pending technology.

## Chuck Hansen Comes Out of Retirement To Lead Electro Scan & Accelerate Growth

Selling a company for $100 million after turning 50 years old might make some people buy a house on a beach and never look back. But, not Chuck Hansen. Founder & former Chairman of Hansen Information Technologies, and developer of some of the world's largest water & sewer asset management systems, Hansen founded Electro Scan Inc. in 2011 to introduce low voltage conductivity leak detection technology for sewer, water, and gas pipelines.

"I was always disappointed to see our customers rely on incomplete or inaccurate information to prioritize their repairs & rehabilitation, especially using faulty CCTV reports, acoustic, or wall thickness measurements," says Hansen. "By comparison, I saw earlier versions of low voltage technology, and knew it needed a few software improvements to make it more reliable and repeatable, with results stated in gpm or l/s."

Located in Sacramento in the original building where he started Hansen Software in 1983 with his Dad and brother, Scott, Electro Scan Inc. has offices in London (England), Melbourne (Australia), Toronto (Canada), Frankfurt (Germany) and Miami, Florida.

***Chuck Hansen***
***Founder, Electro Scan Inc.***
***and***
***Former Founder & Chairman of Hansen Software (Sold in 2007).***

# Electro Scan's Next Generation Leak Detection Tools Include Cloud-Based Platform for Decision Support

Electro Scan's cloud-based Critical$H_2$0 solution represents the centerpiece of its data management solution. Already deployed and activated around the world utilizing Amazon's AWS S3 architecture, 2015 winner of Gartner's Magic Quandrant analysis for cloud vendors.

Electro Scan's Critical$H_2$0 allows each low voltage conductivity scan -- anywhere in the world -- once completed and saved on its authorized local mobile computer, to be able to be accessed in minutes. "Leaks represent non-revenue water that must be fixed as soon as possible,"states Chuck Hansen.

Premium water customers are able to view streaming video, with tabular data stored, scrubbed, processed, calibrated, catalogued, and secured on a 24 hour x 7 day a week x 365 days a year basis -- with all information presented in a user-friendly web page without the need for third party data interpretation.

"By taking away the guesswork that surrounds acoustic sensors, data loggers, helium tracers, and wall thickness analysis tools, managers can now count on highly repeatable and reliable low voltage data," states Hansen. "Managers can now immediately find their biggest leaks and prioritize their work using Electro Scan as their decision support."

## *Electro Scan Expedites 'Finding & Fixing' Water Losses*


## Final Reports Available in Minutes. Not Hours, Days or Weeks.

### 1 New 4-in-1 Probe

Electro Scan patent-pending water probe combines low voltage conductivity, CCTV, pressure, and acoustic sensors for a 360-degree assessment of pipes.

### 2 Mobile Apps

Data is conveniently viewed by operators in the field using a specifically designed curb-side app that displays and stores all real-time data streams.

### 3 Live Video Streaming

Capturing video in both HD and low resolution formats, premium customers are able to view live streaming video from their office or home.

### 4 Video Cloud Storage

Like a live report from your evening news, all video transmissions, are also securely stored in the Electro Scan Critical $H_2O$ cloud.

### 5 Raw Data Transfer

Raw data, such as low voltage, acoustic, pressure, temperature, distance, direction, time, and a number of other attributes, are stored in packets for transmission.

### 6 Amazon Cloud

Unsurpassed in its global reach, Amazon has made available its corporate servers to allow leading businesses to utilize its worldwide network of integrated servers.

### 7 Critical $H_2O$ Cloud

Supporting over 500 clients and growing, Electro Scan's cloud represents a 24x7 off-site resource allowing all client data to be stored and secured in an advanced multi-tenant architecture.

### 8 Critical $H_2O$ Interface

Developed using HTML 5 and Python, the Electro Scan development team releases new features on a quarterly basis.

### 9 Desktop Access

No software is required to download or store on your office or home desktop, just your User ID and Password and connection to the Internet.

### 10 Third Party Integration

Low voltage conductivity is fundamentally changing how water and sewer mains are prioritized for rehabilitation, and how pipes are certified before acceptance.

Asset Management, Citizen Relationship Management (CRM), Enterprise Resource Management (ERP), Hydraulic Modeling, Geographic Information Systems (GIS), and other third-party applications may utilize the data rich portability of the Electro Scan metadata.

# Reliable, Repeatable, & Measurable Water Loss Leak Detection Services

## Pipe Specifications Especially Designed For Advanced Pipe Materials.

| | |
|---|---|
| Operating Pressure Range | 0-90 PSI. |
| Location Accuracy | 0.4 inches (1cm). |
| Conveyance Type | Pressurized or gravity mains. |
| Insertion Tube Launch | Fire Hydrants, Air Valves, Gate Valves, Flow Meters, Hot Taps, Pressure Fittings. |
| Required Flow | 1 ft (305mm) per second (fps). |
| Transport | Parachute. |
| Pipe Materials | Asbestos Cement (AC), Cement-Mortar Lined and Coated Steel Pipe (CMSP), Cured In-Place Pipe (CIPP), Fiberglass Reinforced Pipe (FRP), High-Density Polyethylene Pipe (HDPE), Prestressed Concrete Cylinder Pipe (PCCP), Polyethylene Pipe (PE), Polyvinyl Chloride (PVC), and Reinforced Concrete Pipe (RCP). |

## Multi-Sensor Probe Find Leaks Not Detected by Acoustic, Electromagnetic, Helium Tracers or CCTV.

| | |
|---|---|
| Probe Length | 6.25 inches (158.75mm). |
| Rigid Length | 10 inches (254mm). |
| Cable | Neutral buoyant. |
| Cable Type | Fiber optic and copper. |
| Single Point Access Range | 1,000ft (305m) range or 2,000ft (610m) range from since point of access. |

## Low Voltage Conductivity Next Generation Defect Location & Measurement (GPM or LPS).

| | |
|---|---|
| Voltage | 11 volts, AC, RMS. |
| Current (max) | 40 mA. |
| Electrical Array | Focused tri-electrode array. |
| Defect Flow Calculation | Gallons per minute (gpm) or Liters per second (lps). |
| ASTM F2550-13 | Yes. Able to automatically locate all cracks, fissures, broken joints, leaking service connections, by measuring the change in electrical current able to pass through the wall of a pipe. |

## High Definition CCTV In-Pipe Navigation for Documenting Location of Low Voltage Defects.

| | |
|---|---|
| Resolution | 1920 x 1080, 30 fps, H.264 compressed stream. |
| Minimum Illumination | 6 Lux at F2.8. |
| Output Compressed Video Formats | Digital (.AVI and .MP4); High-sensitivity complementary metal–oxide–semiconductor (CMOS) image sensor combined with an advanced image processor superior video and still image quality. |
| Focus | Fixed position, autofocus, auto white balance, and image stabilization. |
| Focal Length | 5.3mm. |
| Video Streams | Two simultaneous video streams, including a high quality stream for archiving and a low quality stream for live viewing on mobile devices, each with independently configurable resolution & bit rate streaming that can be output to specific network addresses. |
| Text Overlay | Built-in overlay generators allow up to 160 text characters to be positioned anywhere in the video frame. |
| Snapshot | Capture and store hi-res jpg 4096 x 3096. |
| Lighting | 8 LEDs, 4500 Lumens. |

## Pressure Sensor In-Pipe PSI to Help Calculate Defect Flow Rate at Specific Leak Locations.

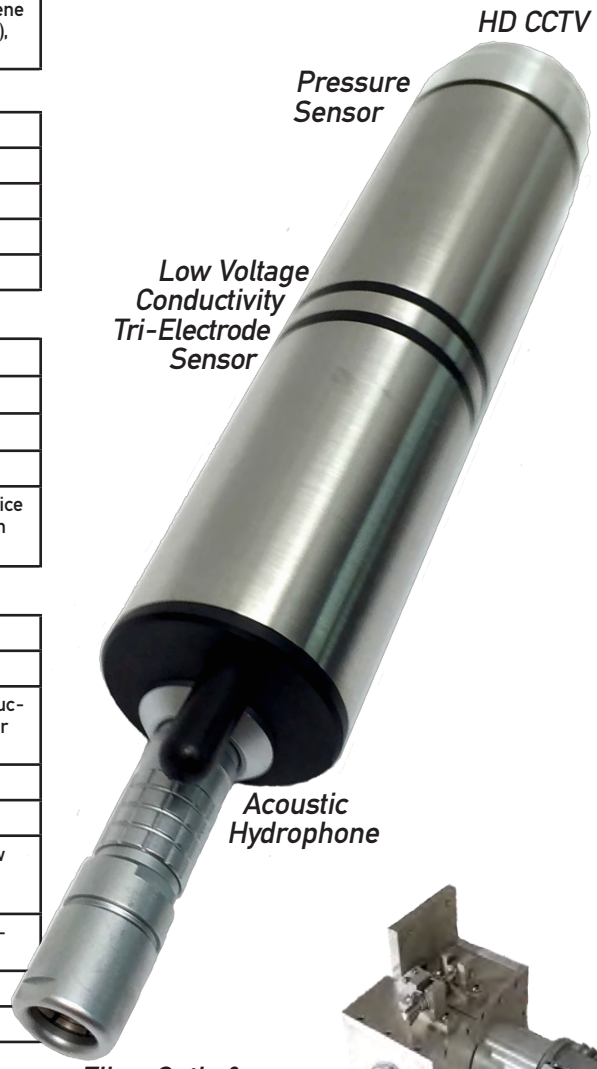
| | |
|---|---|
| Type | Media compatible piezoresistive silicon pressure sensor. |
| Digital Output | 24-bit ΔΣ ADC pressure sensor. |
| Temperature Monitoring | Integrated for accurate pressure calculation compensation. |

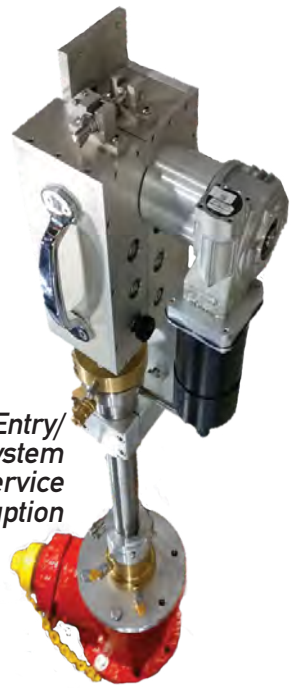
## Acoustic Hydrophone Legacy Method to Assess Metallic Fittings & Benchmark to New Standards.

| | |
|---|---|
| Frequency Range | 1Hz to 170 kHz, omnidirectional. |

**Lean Product Design & Adoption of Low Voltage Conductivity Technology Overcomes Major Drawbacks of Legacy Leak Detection Methods**

## Electro Scan 4-in-1 Sensor




*"Electro Scan's Water Loss Leak Detection Services combines legacy acoustic technology — showing the limited data that utilities have been getting — with our next generation low voltage technology — to deliver the industry's most reliable, repeatable, and unambiguous leak location and estimated leakage rate, in either gallons per minute or liters per second."*

*Chuck Hansen, Chairman, Electro Scan Inc.*
*Former Founder & Chairman, Hansen Information Technologies Inc. (1983-2007)*

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