

Contact Ultrasound Sensor Valve Internal Leak Detection Solution



Streamlined Leak Detection Process

The system offers a guided, software-driven testing workflow that simplifies the inspection process. Results are visually presented in real-time, eliminating the need for manual recording or interpretation.



Non-Invasive Testing

No disassembly required, leak detection is performed externally without interrupting operations. Compatible with a wide range of valve types, including ball valves, plug valves, check valves, and butterfly valves.



Automated Leak Analysis

Leveraging empirical data, the system analyzes decibel levels and ultrasonic signal characteristics at each measurement point to automatically determine internal leak conditions, no expert interpretation required.



Leak Volume Estimation

Integrated AI models estimate leak volumes based on the ultrasonic signature at each measurement point. This quantitative assessment supports informed decision-making for valve repair or replacement.

Applications



Oil Industry

Streamline internal leak detection for crude oil and refined product pipeline valves, as well as high-pressure process gas systems.



Natural Gas

Non-invasive leak inspection of main and branch gas pipeline valves at gas processing and distribution stations, no extended shutdowns required.



Chemical Industry

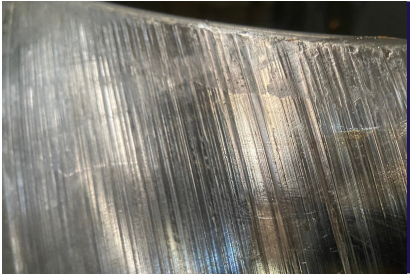
In-situ detection of valve leaks in main steam lines, steam cracking units, and boiler systems without requiring system downtime.



Pharmaceutical Industry

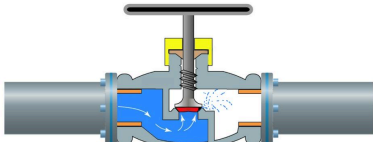
Leak detection in steam, CIP/SIP cleaning systems, and solvent/API transfer pipelines to reduce material residue and lower cleaning costs.

Acoustic Detection Principle For Internal Leaks In Valves



Seal Degradation in Valves

Over time, valve sealing surfaces may become damaged due to impurities in the pipeline medium or corrosive and erosive effects from the fluid. This can result in compromised sealing performance and internal leaks.



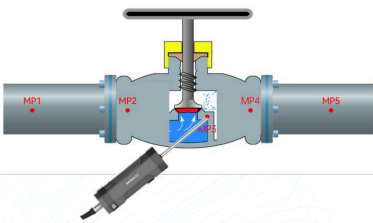
Medium Leak Through Valve

When the valve is in a fully closed position, the pressure differential between the upstream (high-pressure side) and downstream (low-pressure side) causes the medium (gas or liquid) to flow from the high-pressure zone to the low-pressure zone through any sealing defects.



Ultrasound Generation from Leak

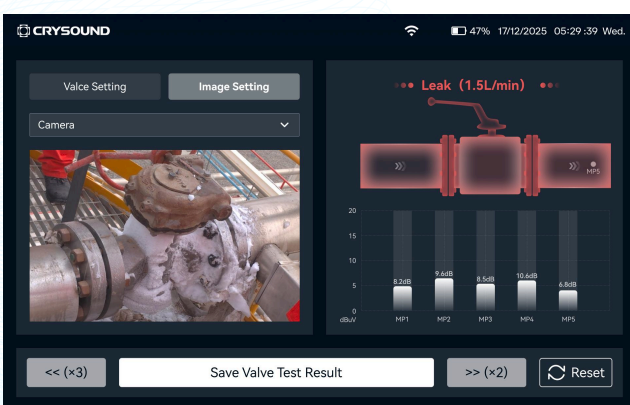
As the medium leaks through narrow gaps at high velocity, it creates turbulence, friction, and collision with internal valve components. These interactions generate high-frequency vibrations, which in turn emit ultrasonic signals.



Ultrasonic Signal Acquisition and Analysis

A contact ultrasonic sensor probe is placed on the valve body to collect signals at upstream, valve body, and downstream positions. Advanced signal processing algorithms then analyze these ultrasonic patterns, enabling accurate detection and localization of any internal leak within the valve.

Case Study



A natural gas processing station utilized Contact Ultrasound Sensor to detect internal valve leak in its main gas transmission pipelines.



A natural gas collection enterprise employed Contact Ultrasound Sensor to perform internal leak detection on critical valves along its primary gas delivery infrastructure.