



# Ultrasound detection:

Keeping an ear to the bottom line.

**C**ompressed air has become a major workhorse in many industries and businesses. Automotive manufacturing, pulp and paper, water and wastewater systems, foundries, chemical processing, communications, aviation, electronics, food and beverage, textiles—new applications are being discovered every day.

But it takes a lot to convert surrounding air into clean, usable compressed air, and compressed air systems are usually the most costly energy user in many facilities. System inefficiencies can lead to wasted energy, hazardous operations, environmental pollution, and a dramatic loss of revenues and quality assurance.

Industry sources estimate that the total connected capacity of U.S. compressed air systems exceeds 17 million horsepower. Of this total, an estimated 20 - 35 percent of air compression energy costs could be saved; U.S. industry could save billions of dollars annually on its energy costs by maintaining energy-efficient systems.

## Staying a step ahead with preventive maintenance

To track down compressed air leaks caused by vibration, holes in hoses, loose joints, and cracks, industry experts recommend a complete audit on your system. A thorough survey also checks for improper pressures, compressor size, pipe runs, and filter and dryer types.

Through the Comprehensive Services Program (CSP), TVA and the distributors of TVA power provide state-of-the-art engineering services, including inspections of water, steam, air, and vacuum systems using airborne ultrasound technology. CSP's certified technicians perform on-site consultations, audits, tagging, and reports.

Early detection is invaluable for cost avoidance. Comprehensive Services can help you drastically reduce leakage, ensuring safer, more economical operations, with less down time.

## A grateful customer

The Saturn Corporation in Spring Hill, Tennessee is one of several examples of eye-popping savings using ultrasound detection.

According to surveys of the Saturn factory, over 3,000 compressed air leaks have been identified. To date, Saturn has benefited from the technology with an estimated yearly savings in excess of \$250,000.

## Take control with the Comprehensive Services Program's energy solutions.

Can you afford to let your efficiency and profitability quietly trickle away? Call your local electric power provider for a consultation today!

### How many leaks do you have?

Let's say you hunt down and eliminate four compressed air leaks, sized 1/8" (0.3 cm) each at 100 psi . . . You save

**\$16,808 per year!**

(\$4,202 per leak, based on a cost of \$0.31/mcf, 8,760 hrs.)

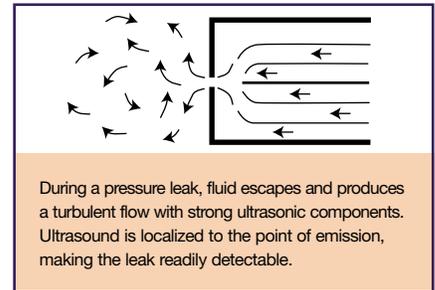
Twenty-five such leaks could be costing you **\$105,050 per year!**

## Frequently asked questions about ultrasound detection

### How does it work?

When a fluid (liquid or gas) escapes, it moves from the high-pressure side through the leak site to the low-pressure side, where it expands rapidly and produces a turbulent flow, with strong ultrasonic (extremely short wave) components. The intensity of the signal falls off rapidly from the source, allowing the exact spot of a leak to be located.

Airborne ultrasound instruments are light, hand-held guns that isolate sounds as subtle changes begin to occur in mechanical equipment. The instruments use an electronic process to convert the ultrasounds into the audible range that users can hear and recognize through headphones.



### Which is better: thermography or ultrasound detection?

As diagnostic tools, infrared thermography (which reveals hot spots) and airborne ultrasound detection can complement each other. Often, a faulty electrical connection will produce detectable ultrasound before it generates enough heat to be detected by thermographic imaging. Likewise, thermography can highlight hot spots or cold areas that ultrasound equipment may never detect.

### I run a very noisy factory. Will technicians be able to detect tiny cracks and leaks?

Ultrasound detection devices are so sensitive they can hear an eye blink. Even in the loudest facilities, pitch adjustments can cut through background interference and discriminate among equipment sounds to pinpoint the smallest of leaks. Accessories like sound shields can further enhance the equipment's capabilities.

### Can this equipment track down vacuum leaks?

Vacuum leaks may be located in the same manner as fluids (liquid or gas). The difference is a lower intensity sound due to the turbulence occurring within the vacuum chamber—a bit more difficult to discern.

### What about explosive or flammable gas detection?

Ultrasound equipment can also be used for detecting hazardous material leaks, but special accessories may be required. For this special type of inspection technicians use only equipment rated intrinsically safe.

### What kinds of problems can ultrasound troubleshoot and eliminate?

Ultrasound testing can home in on everything from compressed air leaks and steam trap and valve leaks to inefficient machinery, air infiltration, and electrical emissions. Contact modules can be added to the equipment to detect non-airborne ultrasound. Some of the most common plant applications:

- Air powers controls
- Actuators
- Instrumentation
- Cleaning
- Air tools
- Blow-offs
- Pressure and vacuum leak detection (tubes in boilers, heat exchangers, condensers, chillers, distillation columns, vacuum furnaces, specialty gas systems)
- Hydraulic valve bypass
- Steam trap testing (leaking or clogged)
- Valve blow-by monitoring
- Compressor valve analysis
- Pump cavitation monitoring
- Bearing testing/trending (motors, pumps)
- Gear/gear box inspection
- General mechanical inspection
- Tanks and pipe system testing (integrity of seals and gaskets)
- Cockpit window leaks
- Wind noise and water leak detection
- Hatch/marine leak inspection
- Electrical inspection (anomalies in switchgear)
- Coal fineness monitoring
- Flow/no flow/solid flow detection
- Electrical (arcing/tracking/corona)
- Bearing lubrication failure (fatigue failure, flooding of or lack of lubricant)