

Ultrasonic Gas Leak Detection – Your First Line of Defense

Introduction:

An “emerging” sensing technology has recently taken its place as a field-proven solution in the gas detection industry. For many years now, detecting combustible gas leaks has been accomplished through the use of catalytic bead and infrared point detectors along with open path infrared perimeter detectors. We can now greatly extend the coverage provided by those solutions, as well as overcome some of their serious limitations, through the use of ultrasonic gas sensing technology.

Ultrasonic technology has been around since the early 1930’s. Shortly after WWII researchers in Japan began to explore the medical diagnostics capability of ultrasound. Needless to say, a new era in modern technology had begun. In the past 20 years ultrasonic sensing has become the leading standard in many different industries, including gas measurement for custody transfer and, of course, leak detection.

Why is leak detection so important? Leak detection is your first line of defense against any toxic or combustible gas leak in the event of defective seals or gaskets, valve misalignment, or failure of flanges or other equipment.

Advantages to using ultrasonic leak detectors:

- Detects gas leak before a hazardous concentration is present
- Not affected by any adverse weather conditions
- The gas cloud does not have to make contact with the sensor in order for detection to take place
- Detection is instantaneous for all types of gas leak (toxic or combustible)
- Not affected by wind direction
- Not affected by noisy environments (audible noise is not an issue)
- Wide area coverage with a single unit (up to 40 meter radius)

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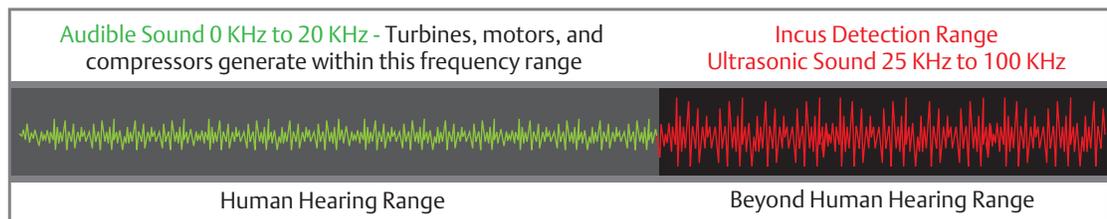
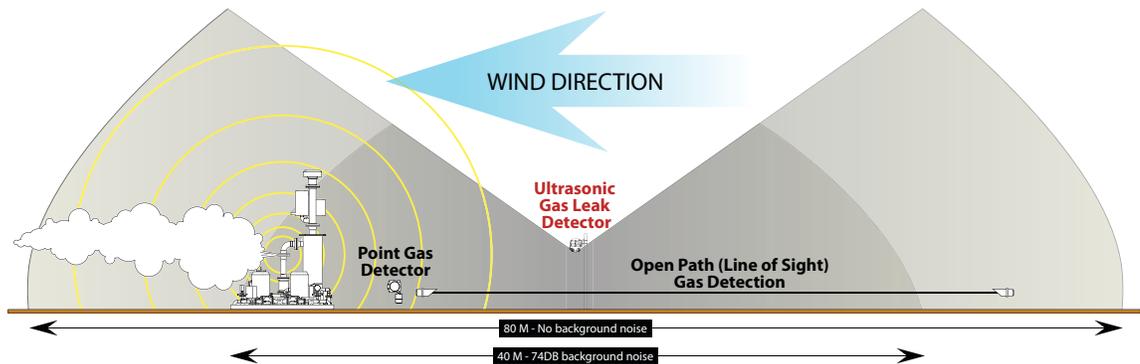
Challenges

- Not suited for detecting very low pressure leaks (below 30 psi)
- Cannot distinguish what is leaking, e.g. air/nitrogen/methane
- Time delays must be properly configured for pressure releases, etc

There are only two types of ultrasonic leak detectors on the market today. The first utilizes traditional ultrasonic sensing technology through the use of a moving metal diaphragm (microphone) that requires frequent calibration and periodic replacement. Because of its design, mounting orientation is also limited and it can be affected by temperature changes. This unit also has a single sensor element that covers a max range of a 12 meter radius with medium background noise

The latest ultrasonic sensing technologies uses a resonant sensor. The active element is a piezo-electric material (which converts mechanical deformation into electrical voltage) embedded in a ceramic medium. These sensors have an extremely high chemical resistance and a wide frequency range response band. The unit can be mounted in any orientation required for the application. Its sensor design has no moving parts so wear and tear is completely eliminated. The Emerson Incus Ultrasonic Gas Leak Detector is equipped with four of these sensors, which covers a max range of 40 meters radius from the detector! In addition, each unit leaves the factory calibrated for life and will never expire. There is no zeroing or calibration required and no consumptive sensor elements to replace, ever.

Figure 1 - Diagram Showing the Coverage of Emerson's Ultrasonic Gas Leak Detector.

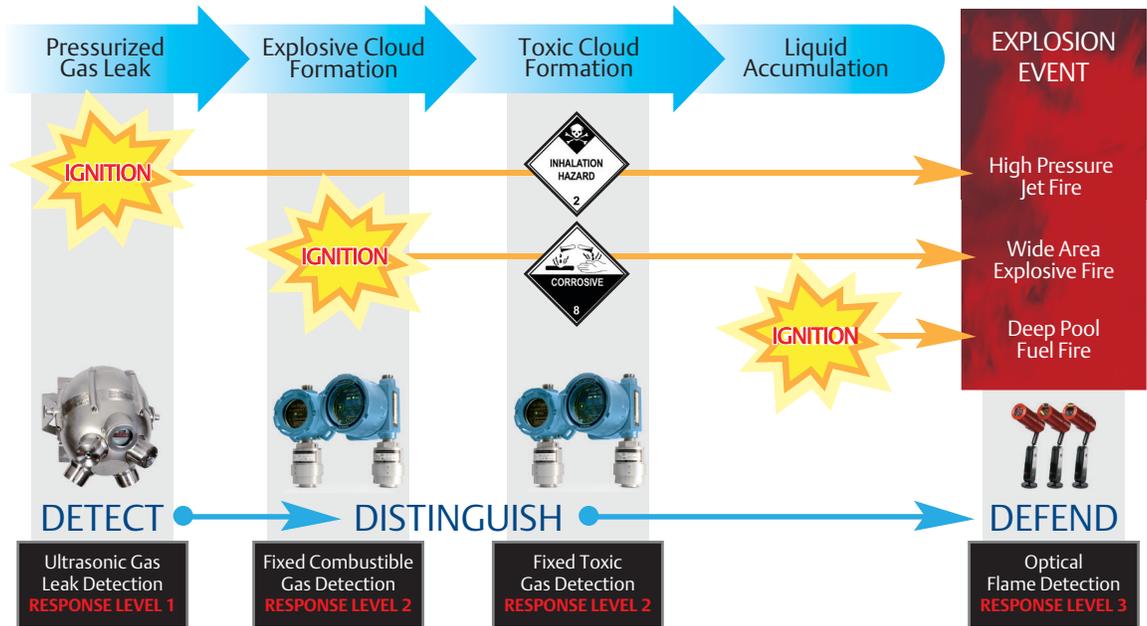


As industry evolves, so does the demand for non-conventional fuel sources which will continue to push the natural gas industry to its limits. At the end of the day, production will continue to grow, fueled by environmental legislation and demand for cleaner, higher grade fuels. Rising pressure on non-conventional production will go hand in hand with a comprehensive approach to safety. New facilities should be designed with the latest safeguards from potential hazards; old facilities should be revisited to ensure sufficient coverage is in place are to minimize abnormal safety events and limit downtime.

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Safety systems that deploy a diverse range of detection technologies can counteract the serious impacts of gas leaks and the potential for fire and explosions. Preventing equipment or property damage, production downtime, personal injury, and even loss of life is critical to any plant's ongoing operational directives. A combination of Emerson ultrasonic leak detectors, gas monitors, and flame detectors is particularly effective because they are entirely complementary and cover the three defense level of detection. The first stage is the immediate leak stage, the second is during the gas cloud formation or accumulation stage, and the third is during the ignition stage.

Figure 2 - Pressurized Gas Release Episode - Event • Effect • Defence



The vulnerabilities of any one detection solution are offset by the strengths of the others when utilizing this comprehensive approach to coverage, so hazards have fewer chances of propagating undetected. Such diverse safety systems, combined with a design that mitigates leakage and eliminates possible ignition sources, provides a sound approach for delivering reliable coverage in any hazardous industrial environment. Emerson is driven to insuring that our customers have the most advanced and comprehensive flame, gas, ultrasonic, and oil mist detection technology available in order to protect life, property, and productivity.

HEADQUARTERS

Emerson Process Management

Flame & Gas Detection

2721 Hopewell Place NE
Calgary, Alberta, Canada T1Y 7J7

T +1 (403) 219 0688

T +1 866 347 3427

F +1 (403) 219 0694

safety.csc@emerson.com

www.emersonprocess.com/safety

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