MSA
The Safety Company

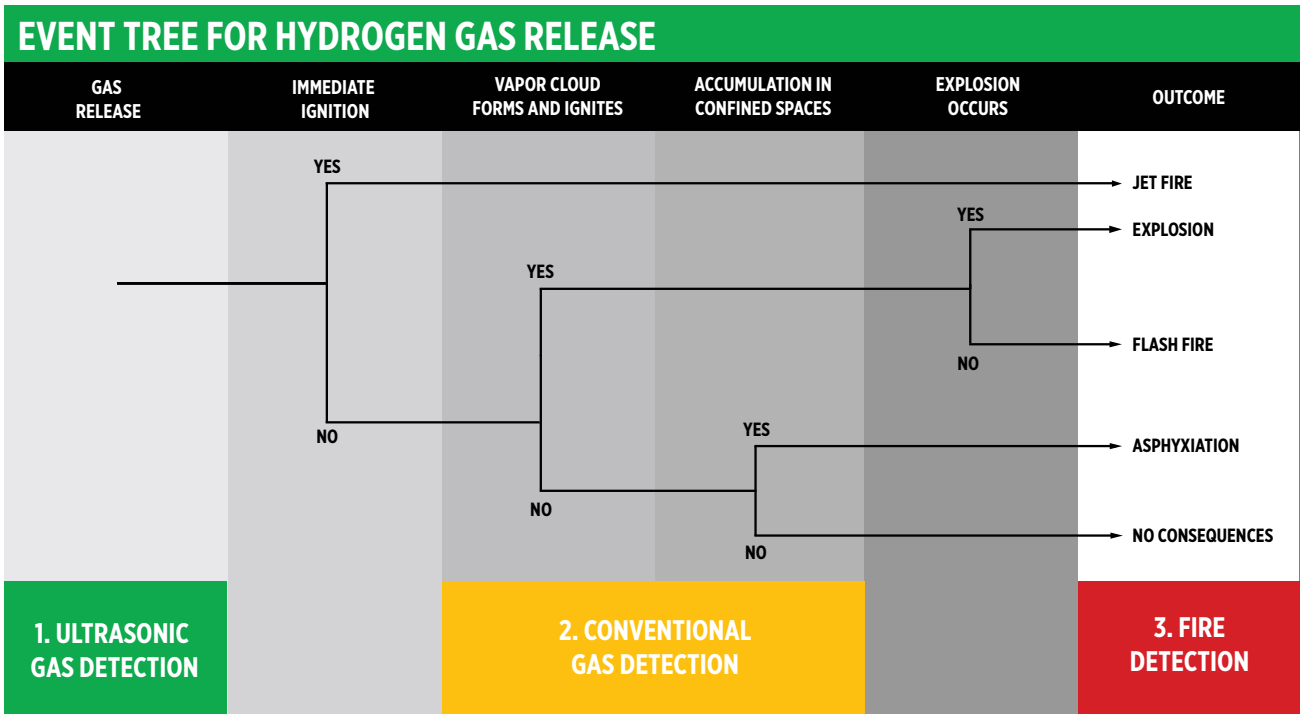
Sensor Technologies for Hydrogen Detection

Technical Guide

SAFEGUARDING
PEOPLE, PLACES & THE PLANET

Protection Layers for Hydrogen Leaks

Despite the number of fixed gas and flame detectors installed within a given system, a leak or fire can still go undetected if it doesn't reach a gas sensor or can't be seen by a flame detector.



The latest generation of gas and fire detection systems employ a more comprehensive layered approach that mimics human senses. Ultrasonic sensors "hear" gas leaks, conventional sensors "sniff" gases, and optical type sensors "see" flames.

LEAK DETECTION LAYER

Ultrasonic gas detection ensures the earliest possible response

GAS DETECTION LAYER

Conventional gas detection technologies help mitigating risks

FIRE DETECTION LAYER

Undetected hydrogen leak can result in fire and explosions

General Hydrogen Sensing Technologies Characteristics

Sensor Characteristics	Site Application	Safety Application	Technology Pros	Technology Cons	MSA Products
Ultrasonic Leak Monitoring					
• Typical detection ranges: 17-28m depending on microphone technology[1] • Detects sound pressure of a leak • Varying microphone life[1] • Calibration required if out of tolerance[1]	• Monitoring processes with high pressure • Compressor and turbine rooms • Storage tanks and pipework	• Faster detection technology giving early warning • Fast emergency shutdown of process areas and equipment	• Instant leak detection with processing algorithms[2]—at the speed of sound • Reliable for outdoor or ventilated areas • Not affected by changing wind or direction of the leak	• Doesn't indicate concentration of the gas • Only suitable for pressurized installations	• Observer® i Ultrasonic Gas Leak Detector
[1] 92 ft. (28 m) detection range, with long-life electret microphone and capability for on-site microphone replacement and calibrations, with the Observer-i Detector. *[2] MSA's ANN—artificial neural network algorithms prevent false alarms and offer plug-and-play installation without the need for site surveys.*					
Point Catalytic Bead					
• Detects various explosive gases • Typical measuring range: 0-100% LEL[1] • Varying sensor life depending on application[1]	• Monitoring processes with high and low pressure • Compressor and turbine rooms • Storage tanks and pipework	• Explosion hazard detection • Initiating ventilation • Personnel alert • Emergency shutdown • Accurate measurement of gas for determining required action	• Provides %LEL gas measurement • Easy to install and maintain • Optional remote sensor mounting and remote calibrations[2]	• Cannot identify gas detected, as it responds to many combustible gases in LEL range	• ULTIMA® X5000 Gas Monitor • General Monitors® S5000 Gas Monitor • TG5000 Gas Monitor
[1] MSA XCell® Sensor with extra-large beads, supported by mechanical posts offering > 5-year life and 0-20% LEL optional range. *[2] CalGard Remote Calibration Adapter accessory allows for accurate, remote calibrations from safe location of above MSA detectors.*					
Point Electrochemical					
• Typical measuring range: 0-1,000 ppm • 1-2 year sensor life	• Hydrogen test facilities • Hydrogen storage monitoring • Low and high pressure process areas • Confined space monitoring	• Monitoring for early leak detection • Initiating ventilation • Personnel alert • Emergency shutdown • Accurate measurement of gas for determining required action	• Very low concentration measurement in ppm • Easy to install and maintain • Optional remote sensor mounting[1]	• Cross sensitivity to other gases	• ULTIMA X5000 Gas Monitor • General Monitors S5000 Gas Monitor • TG5000 Gas Monitor
[1] Dual sensor configuration available with ULTIMA X5000/General Monitors S5000 Gas Monitors for catalytic bead and electrochemical sensors.					
UV/IR Fire Detection					
• Fast response time[1] • Medium detection range[1] • Typical 90° - 125° field of view[1]	• Hydrogen storage monitoring • Process areas supervision • Compressor and turbine rooms	• Invisible hydrogen flame detection preventing explosions	• UV and IR radiation required for alarm • Large coverage area optimal for short range and wider physical spaces • Independent output notification—typically UV – 12 mA & IR – 8 mA	• Can be blinded by dirt, soot, as well as water, ice[2] • IR heat source presence can falsely trigger IR sensor portion[3] • UV energy can be detected at very long distances due to reflectivity[3]	• General Monitors FL500-H2 UV/IR Flame Detector
[1] FL500-H2 Flame Detector has FM approved performance with 3 s response time, 59 ft. (18 m) detection range and 125° field of view. *[2] MSA's Continuous Optical Path Monitoring (COPM) checks optical path integrity every 2 minutes.* *[3] Advanced flicker discrimination circuitry helps prevent false alarms caused by lightning, arc-welding, hot objects, and other sources of radiation.*					

MSA's Layered Hydrogen Gas & Flame Monitoring

The system that combines several layers and various hydrogen gas and fire detection solutions provide the best, most reliable protection within each unique plant layout. All the detection solutions provide specific advantages depending upon application environments, and all have limitations.

Detection layers reduce the incidence of hazard propagation, preventing hazards from escalating into catastrophic consequences. Through a combination of technology we can better detect gas leaks and flames, enhancing the effectiveness of gas and fire detection systems.

MSA—The Safety Company

Established in 1914, MSA Safety Incorporated is the global leader in the development, manufacture, and supply of safety products that protect people and facility infrastructures. Many MSA products integrate a combination of electronics, mechanical systems, and advanced materials to protect users against hazardous or life-threatening situations. The company's comprehensive product line is used by workers around the world in a broad range of markets, including the oil, gas, and petrochemical industry, the fire service, the construction industry, mining, and the military. MSA's core products include self-contained breathing apparatus, fixed gas and flame detection systems, portable gas detection instruments, industrial head protection products, firefighter helmets and protective apparel, and fall protection devices. With 2021 revenues of $1.4 billion, MSA employs approximately 4,800 people worldwide. The company is headquartered north of Pittsburgh in Cranberry Township, PA, and has manufacturing operations in the United States, Europe, Asia, and Latin America. With more than 40 international locations, MSA realizes approximately half of its revenue from outside North America. For more information visit MSA's web site at www.MSAsafety.com.

Our Mission

MSA's mission is to see to it that men and women may work in safety and that they, their families, and their communities may live in health throughout the world.

MSA: SAFEGUARDING PEOPLE, PLACES, & THE PLANET

Note: This Bulletin contains only a general description of the products shown. While product uses and performance capabilities are generally described, the products shall not, under any circumstances, be used by untrained or unqualified individuals. The products shall not be used until the product instructions/user manual, which contains detailed information concerning the proper use and care of the products, including any warnings or cautions, have been thoroughly read and understood. Specifications are subject to change without prior notice. MSA is a registered trademark of MSA Technology, LLC in the US, Europe, and other Countries. For all other trademarks visit https://us.msasafety.com/Trademarks.

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