



Sensor Technologies for Hydrogen Detection

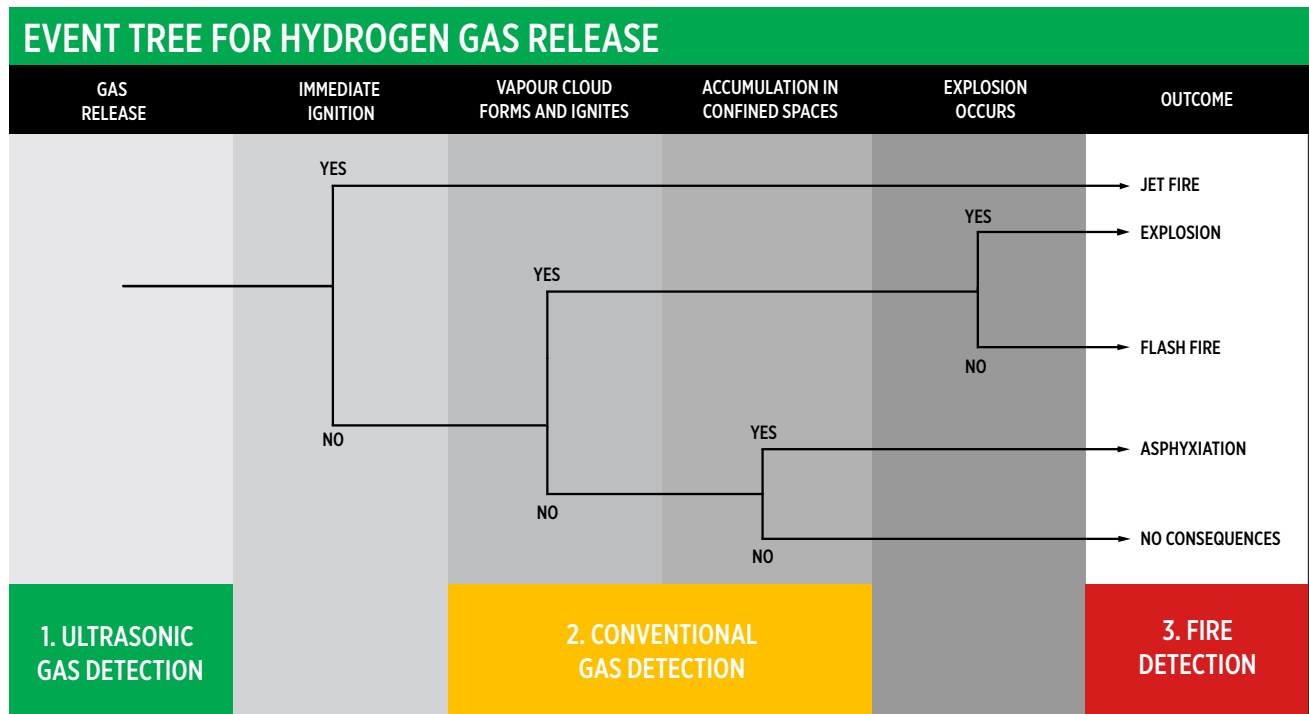
Technical Guide




WE KNOW WHAT'S AT STAKE.

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					
<ul style="list-style-type: none"> Typical detection ranges: 17-28m depending on microphone technology¹ Detects sound pressure of a leak Varying microphone life¹ Calibration required if out of tolerance¹ 	<ul style="list-style-type: none"> Monitoring processes with high pressure Compressor and turbine rooms Storage tanks and pipework 	<ul style="list-style-type: none"> Faster detection technology giving early warning Fast emergency shutdown of process areas and equipment 	<ul style="list-style-type: none"> Instant leak detection with processing algorithms² – at the speed of sound Reliable for outdoor or ventilated areas Not affected by changing wind or direction of the leak 	<ul style="list-style-type: none"> Doesn't indicate concentration of the gas Only suitable for pressurised installations 	<ul style="list-style-type: none"> Observer^{®i}
<ol style="list-style-type: none"> 28m detection range, with long-life electret microphone and capability for on-site microphone replacement and calibrations, with the Observer-i. 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					
<ul style="list-style-type: none"> Detects various explosive gases Typical measuring range: 0-100 %LEL¹ Varying sensor life depending on application¹ 	<ul style="list-style-type: none"> Monitoring processes with high and low pressure Compressor and turbine rooms Storage tanks and pipework 	<ul style="list-style-type: none"> Explosion hazard detection Initiating ventilation Personnel alert Emergency shutdown Accurate measurement of gas for determining required action 	<ul style="list-style-type: none"> Provides %LEL gas measurement Easy to install and maintain Optional remote sensor mounting and remote calibrations² 	<ul style="list-style-type: none"> Cannot identify gas detected, as it responds to many combustible gases in LEL range 	<ul style="list-style-type: none"> ULTIMA[®] X5000 General Monitors S5000 PrimaX[®] P Series 47K
<ol style="list-style-type: none"> MSA XCell[®] sensor with extra-large beads, supported by mechanical posts offering > 5-year life and 0-20% LEL optional range. CalGard Remote Calibration Adapter accessory allows for accurate, remote calibrations from safe location of above MSA detectors. 					
Point Electrochemical					
<ul style="list-style-type: none"> Typical measuring range: 0-1,000 ppm 1-2 year sensor life 	<ul style="list-style-type: none"> Hydrogen test facilities Hydrogen storage monitoring Low and high pressure process areas Confined space monitoring 	<ul style="list-style-type: none"> Monitoring for early leak detection Initiating ventilation Personnel alert Emergency shutdown Accurate measurement of gas for determining required action 	<ul style="list-style-type: none"> Very low concentration measurement in ppm Easy to install and maintain Optional remote sensor mounting¹ 	<ul style="list-style-type: none"> Cross sensitivity to other gases 	<ul style="list-style-type: none"> ULTIMA[®] X5000 General Monitors S5000 PrimaX[®] P
<ol style="list-style-type: none"> Dual sensor configuration available with ULTIMA X5000 / General Monitors S5000 for catalytic bead and electrochemical sensors. 					
UV/IR Fire Detection					
<ul style="list-style-type: none"> Fast response time¹ Medium detection range¹ Typical 90° - 125° field of view¹ 	<ul style="list-style-type: none"> Hydrogen storage monitoring Process areas supervision Compressor and turbine rooms 	<ul style="list-style-type: none"> Invisible hydrogen flame detection preventing explosions 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Can be blinded by dirt, soot, as well as water, ice² IR heat source presence can falsely trigger IR sensor portion³ UV energy can be detected at very long distances due to reflectivity³ 	<ul style="list-style-type: none"> FL500-H2
<ol style="list-style-type: none"> FL500-H2 has FM approved performance with 3s response time, 18m detection range and 125° field of view. MSA's Continuous Optical Path Monitoring (COPM) checks optical path integrity every 2 minutes. 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

Our business is safety. We've been the world's leading manufacturer of high-quality safety products since 1914. MSA products may be simple to use and maintain, but they're also highly-sophisticated devices and protective gear—the result of countless R&D hours, relentless testing and an unwavering commitment to quality that saves lives and protects millions of hard working men and women each and every day. Many of our most popular products integrate multiple combinations of electronics, mechanical systems and advanced materials to help ensure that users around the world remain protected in even the most hazardous of situations.

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: WE KNOW WHAT'S AT STAKE.

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 operates in over 40 countries worldwide. To find an MSA office near you, please visit **[MSAsafety.com/offices](https://www.msasafety.com/offices)**.