


Application Brochure

Gas Detection for Hydrogen Electrolysers

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International Gas Detectors

Gas Detection for Hydrogen Electrolysers

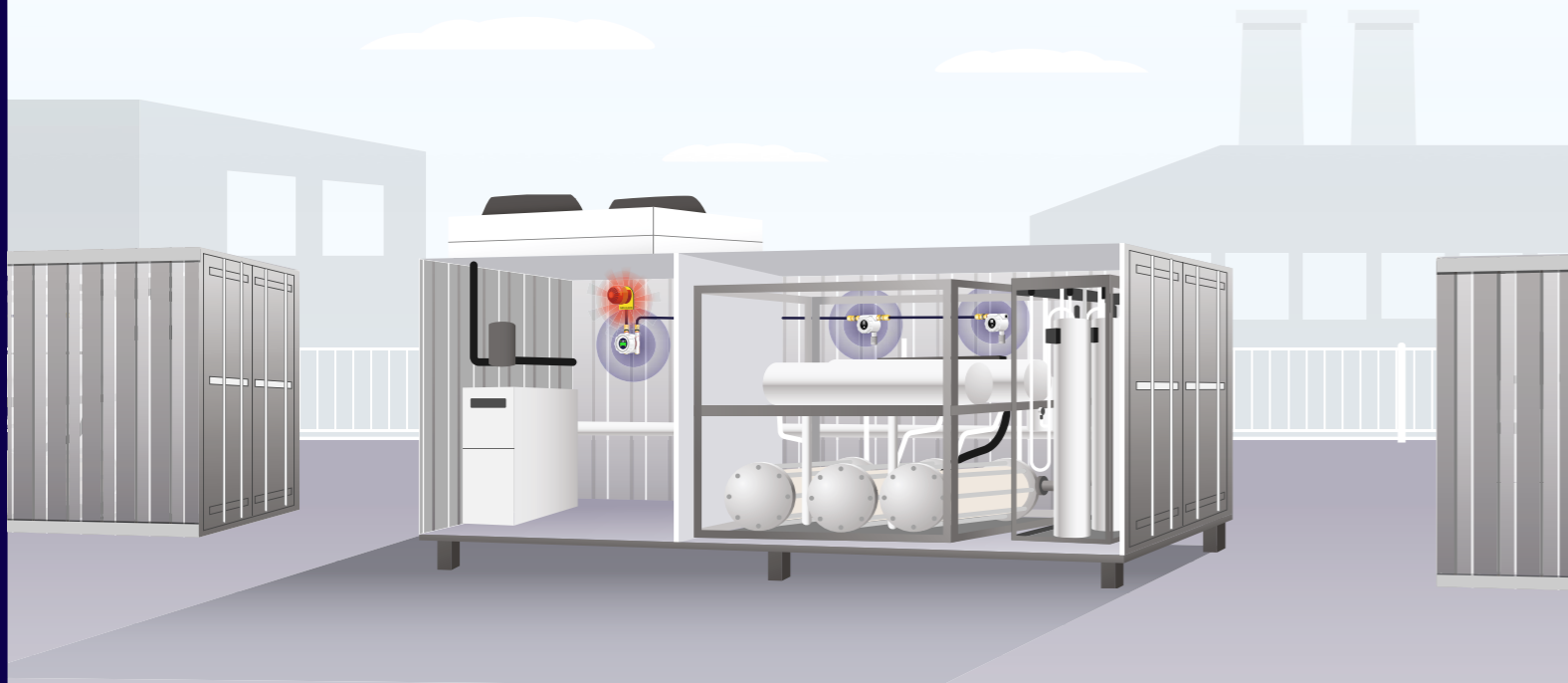
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What is the Application?

The Hydrogen Economy is a rapidly growing sector of the energy market, offering a huge range of opportunities across the globe. Containerised hydrogen solutions are one of these major opportunities, offering huge growth potential in the hydrogen generation sub-sector of the energy market.

Hydrogen generation, as the name suggests, is the production of hydrogen to be used as an alternative to Fossil fuels. Hydrogen can be generated through various processes, electrolysis is just one method. When teamed with green electricity generation, electrolysis offers a clean method to generate H₂ and store energy.

Many electrolysers use containerised solutions. Electrolysis in hydrogen production is the process of using an electric current to split water into hydrogen and oxygen. These solutions can use electricity, either from solar, wind or wave, to generate green hydrogen energy to be utilised in the world's journey to net zero.



What are the Hazards?

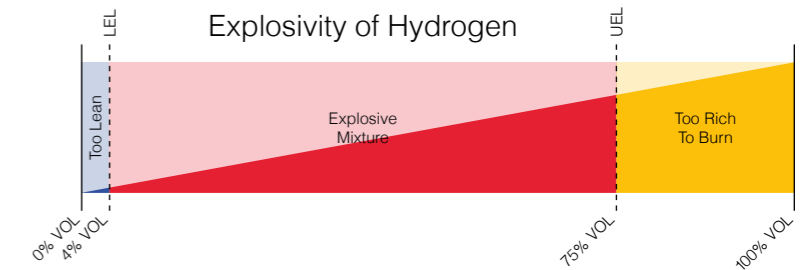
One of the obvious hazards for this industry is the hydrogen gas itself. H₂ is the smallest known molecule in the universe, and is prone to leaking from containment. Hydrogen is also flammable at a wide range in air and can ignite at 0.017mj; even lower than the flammability of gasoline. Therefore, hydrogen fuel presents a huge explosive gas hazard, meaning sufficient detection is paramount, particularly in enclosed containerised installations.

Containerised hydrogen generator applications in particular present an elevated oxygen hazard due to the process of electrolysis releasing a large by-product of oxygen, if leaked. Elevated levels of oxygen will increase the flammability potential in the atmosphere. With an already highly flammable substance like hydrogen present, an oxygen leakage can make the possibility of an explosion far more likely.

Additionally, oxygen-enriched atmospheres can be highly toxic to personnel. Inhaling air with an increased percentage of oxygen can cause cells to be damaged rapidly, resulting in bleeding, respiratory distress and, blindness. Oxygen enrichment presents multiple hazards to applications such as these.

As demonstrated, hydrogen energy applications can cause a multitude of hazards. Detectably Better gas detection is required to ensure that both people and plant are kept safe from these hazards.

	H ₂	Flammable
	O ₂	Toxic & Oxidizing

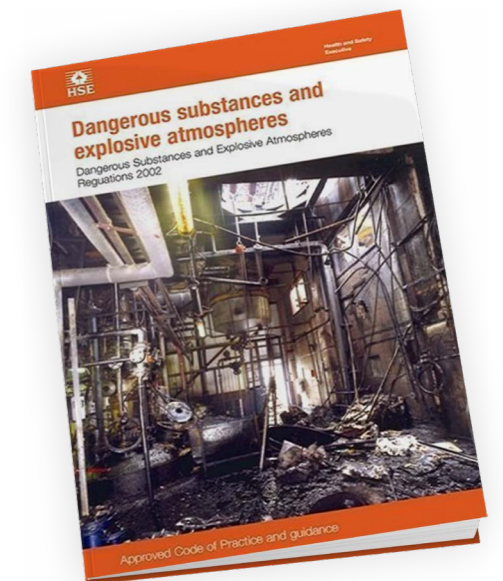


What is the Government Legislation?

Hydrogen currently comes under general health and safety risk assessment, DSEAR and ISO standards.

However, it is important to be continually up to date with any developments in this area.

	DSEAR	<25% LEL
	1st Alarm	10% LEL
	2nd Alarm	20% LEL

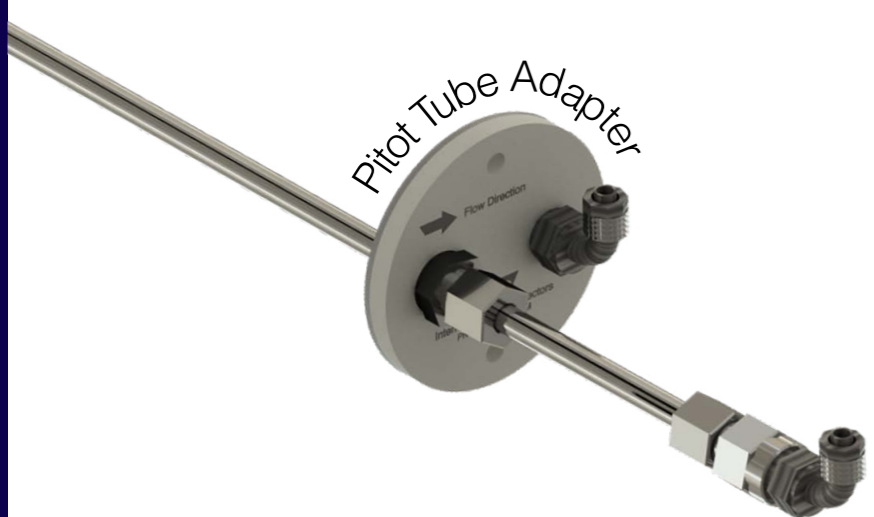


Hydrogen Production Recommended Products

For the Hydrogen Economy, IGD recommends implementing a gas detection system that automates the detection of gas, protection of personnel and safe shutdown of processes, preventing fire, explosion, or exposure.

The following methodologies are based on IGDs proven experience with electrolyser manufacturers, utilising 20ft and 40ft containerised solutions. However, some applications may have larger systems requiring more points of detection and strategically placed sensors. For example, some applications may need to monitor ventilation to ensure hydrogen is not being recirculated.

IGD has successfully implemented 0-1,000 parts per million detectors using our Pitot Duct Adaptor. This ensures the sensor is outside of the ventilation duct, but is still dynamically monitoring using the Pitot assembly. This increases the sensor lifetime and ensures simple maintenance.



If you are unsure about your application or how many detectors are required, talk to us today. Our team are on hand to provide a recommended system and take on the design responsibilities.

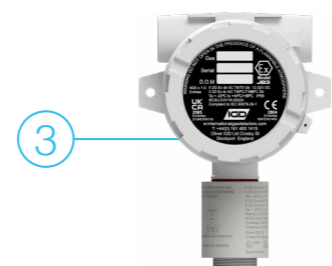
With 100+ years in gas detection innovation, design and manufacture, we are your **Detectably Better choice** for hydrogen gas detection.



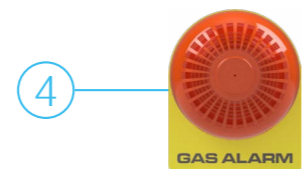
1 TOC-635 Plus Control Panel



2 TOC-903-X5 Dual ATEX Detector Transmitter



3 TOC-750X ATEX Area Detector



4 Beacon Sounder

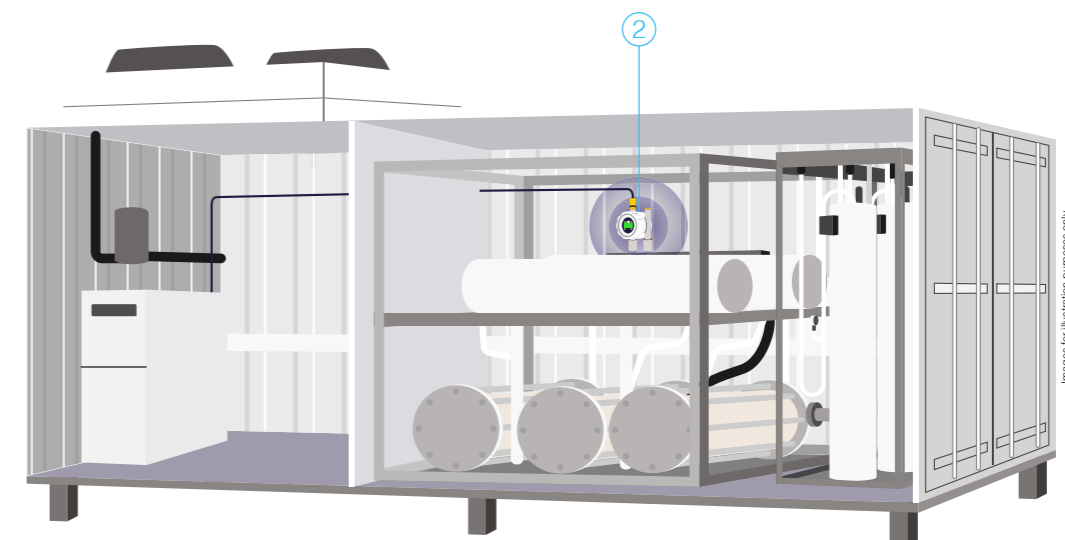
20ft Hydrogen Electrolyser Container Standalone TOC-903-X5

The traditional method of installing gas detection equipment is to have the gas detector transmitter in the hazardous area with outputs going to a custom PLC or control system.

IGD has expanded on this traditional method by adding 2 sensor types to one transmitter. Now you can have both a Hydrogen 0-100% LEL detector (our MK8 Pellistor) with a 0-25% VOL O₂ detector (our Solid Polymer O₂ sensor).

This drastically reduces CAPEX and installation costs as you are reducing the number of transmitters and wiring requirements.

Furthermore, the TOC-903-X5 detector transmitter has a local display to allow calibration and setup to be completed, at the transmitter, by a single person.



Key Benefits

- + Reduced CAPEX installation costs with dual sensor capability
- + Non-intrusive display for local calibration
- + Analogue and relay outputs to connect to the electrolyser's control unit
- + Performance tested to 60079-29 series standards
- + ATEX/IECEX Certified

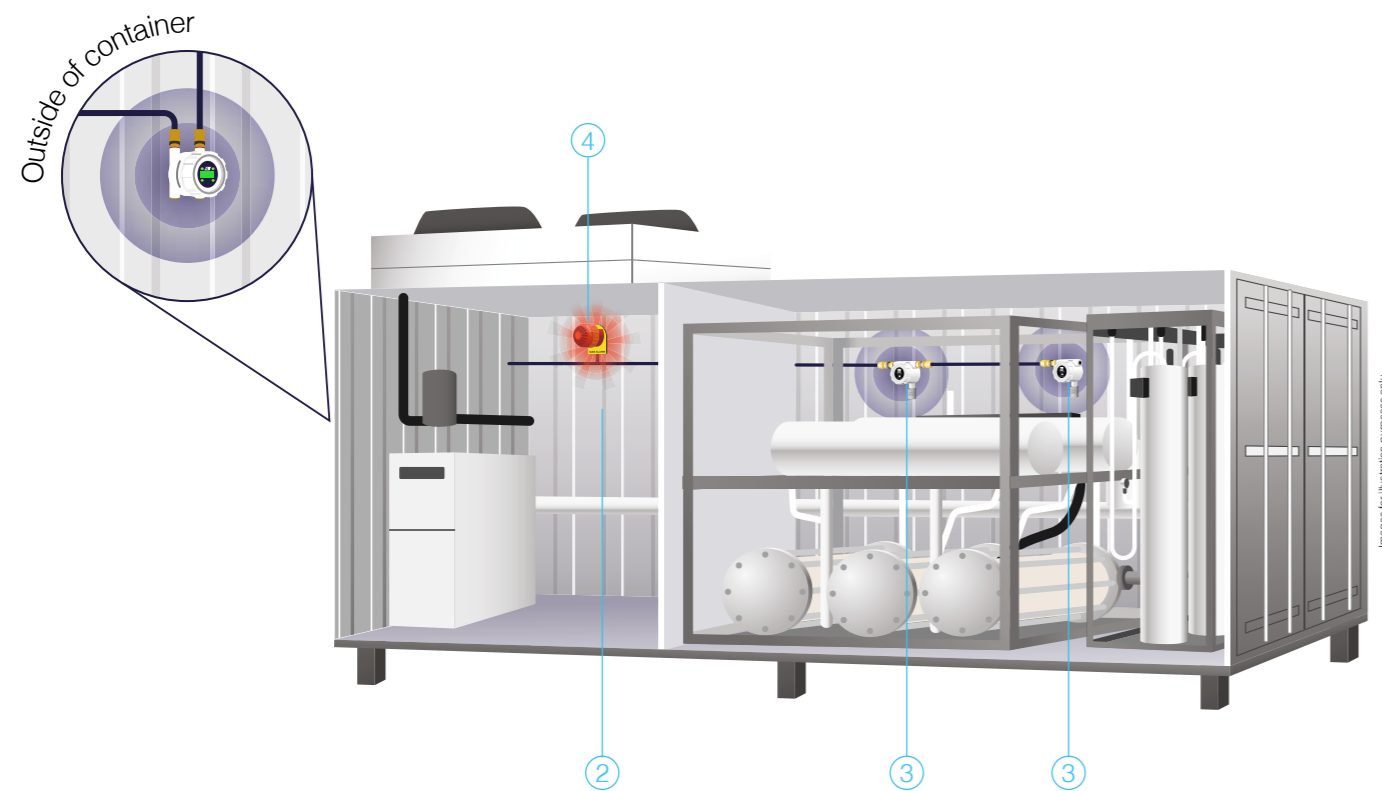
20ft Hydrogen Electrolyser Container Remote Detectors with TOC-903-X5

Expanding on the traditional method of installing gas detection, IGD has further enhanced this offering with our TOC-903-X5 and TOC-750X remote detectors. Unlike the traditional method where the transmitter is in the hazardous area, with remote detectors, the transmitter is out of the hazardous area. This has many benefits.

Firstly, it allows you to see the alarm status before entering the container, as the transmitter is placed outside of the environment. This increases safety as it ensures personnel can see the live gas readings and alarm states before entering the electrolyser.

Secondly, it allows more strategic placement of the gas detectors where the hydrogen and oxygen leak will most likely occur. In this case, our TOC-903-X5 is now a 2-channel ATEX controller with the analogue and relay outputs to connect to the electrolyser control system.

Installation is also simpler as the two, TOC-750X are daisy-chained together on a single 2-Core cable highway, from the TOC-903-X5 transmitter. As the TOC-750X detectors are communicating digitally to the TOC-903-X5 transmitter, it allows for automatic alarm and sensor setup and reduces time on site.



Key Benefits

- + Transmitter provides entry control with live gas reading before entry
- + Allows for more strategic placement of gas detectors for H₂ and O₂ leaks
- + Simple installation with IGD's 2-Wire Addressable setup
- + Analogue and relay outputs to the electrolyser's control unit
- + ATEX Zone 1 and 2 Control unit for increased IP protection

40ft Hydrogen Electrolyser Container Addressable System

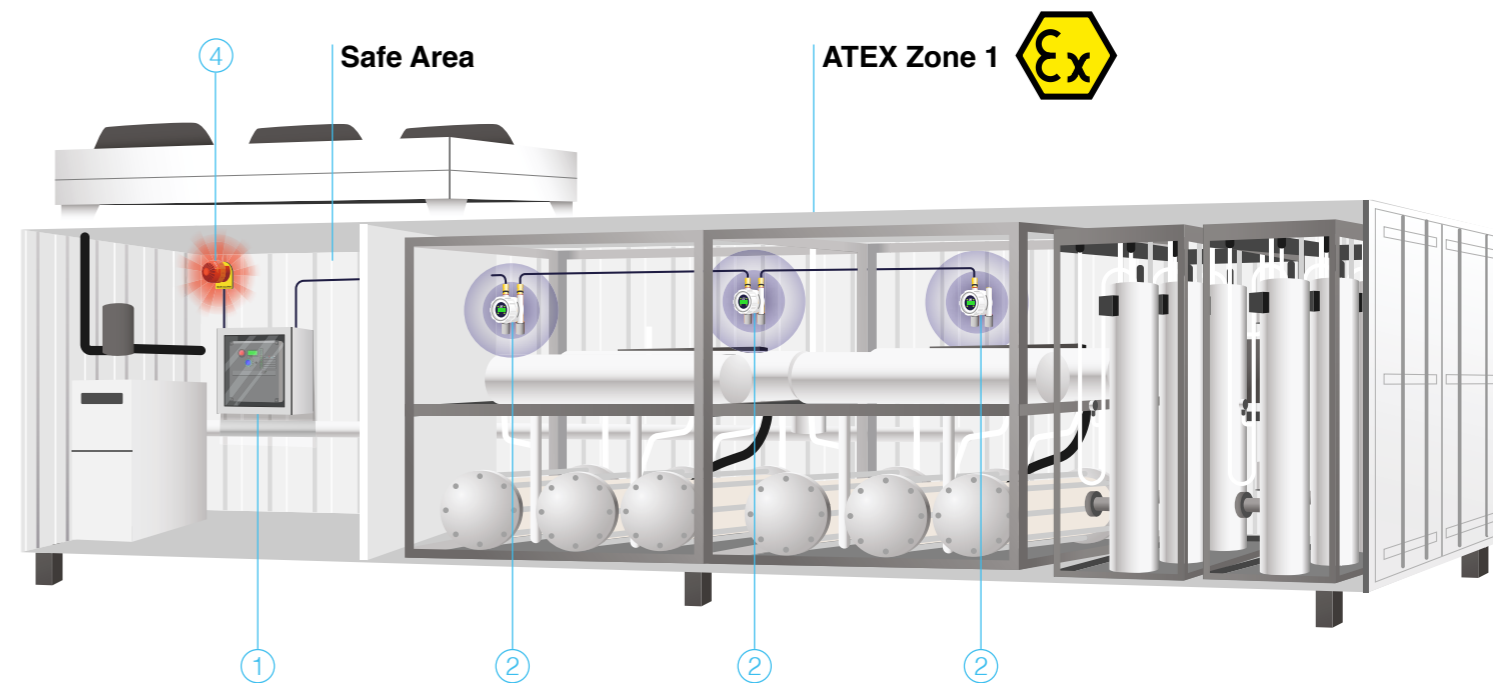
An addressable system for a larger 40ft electrolyser container requires the implantation of more detectors. These containers also have ATEX and safe areas. These applications perfectly suit 2-Wire addressable technology, as it reduces cabling requirements and CAPEX expenditure, whilst increasing safety.

Our TOC-635 PLUS controller is placed outside of the zoned areas, installed inside of a field box enclosure to provide increased IP protection and entry control. Detectors daisy chain to the controller using IGD's Sentinel+™ addressable technology. A single, 2-Core cable for power and communication, connects all detectors.

By utilising the TOC-903-X5 you can reduce CAPEX expenditure by having H₂ and O₂ sensors on the same transmitter. This has the added benefit of minimising the space required for gas detectors.

Our addressable systems are tested to the 60079-29-1 series of standards, including performance testing. This ensures that once implemented, you have a gas detection system tested to international standards. Our TOC-635 PLUS system allows for easy setup with just 1-Click of a button.

Finally, it has outputs including Modbus, BACNET and relays to connect to the electrolyser's control systems.



Key Benefits

- + Increased detection coverage whilst reducing CAPEX costs
- + Increased safety with live gas readings displayed outside of the hazardous environment
- + Performance tested to international standard 60079-29-1
- + Simple installation with just a 2-Core cable highway
- + One-person calibration via non-intrusive display
- + Plug and play setup with 1-Click automatic system setup
- + Increased installation flexibility with 2-Wire Addressable technology

Hydrogen Electrolysers Recommended Products

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All our fixed devices are supplied with a 10-Year warranty.

See terms and conditions.



TOC-635 Plus



Key Features

- + Live digital readings and at-a-glance status via illuminated display
- + Simple installation via 2-Wire Addressable technology
- + One-click automatic alarm & system setup
- + Simple calibration process via on-board Wi-Fi
- + Stores up to 1,000 downloadable events
- + Certified and performance tested to the internationally recognised 60079-29-1 standard

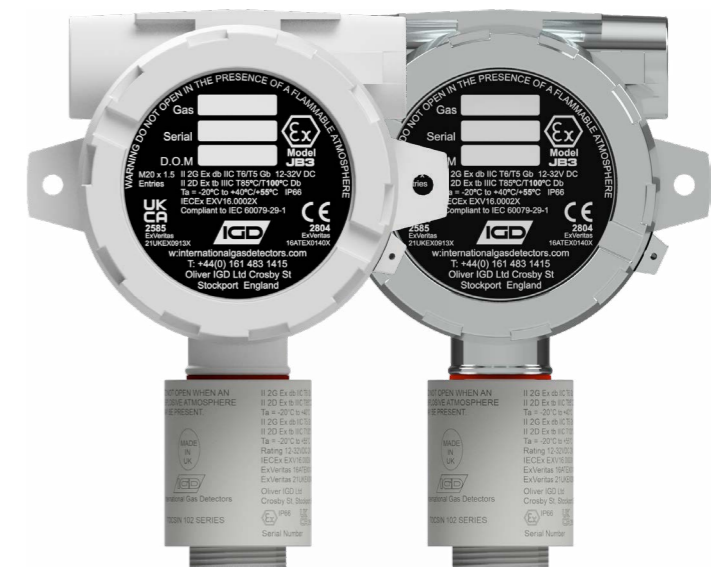
TOC-903-X5



Key Features

- + At-a-glance detector status via illuminated display
- + Certified and performance tested to internationally recognised 60079-29-1 standard
- + ATEX and IECEx Zone 1 and 2 for Gas, 21 and 22 for Dust
- + Smart plug and play sensor technology
- + Dual sensor and remote gas detector options
- + One-person calibration via non-intrusive display
- + Enhanced versatility with standalone and addressable output option

TOC-750X



Aluminium Alloy

Stainless Steel

Key Features

- + Blind detector reduces overall CAPEX cost
- + Smart plug and play sensor technology
- + 2-Wire Addressable technology for simple installation
- + Certified and performance tested to the internationally recognised 60079-29-1 standard
- + ATEX and IECEx Zone 1 and 2 (Gas), 21 and 22 (Dust)

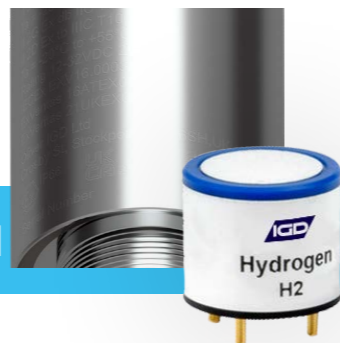
Hydrogen Production Recommended Technologies

Not only do we manufacture our devices with detectably better technology, but our technology is also backed by **over a century of experience** in gas detection.

Our commitment and focus on gas detection technology alone ensures that you will receive the best safety equipment on the market. Furthermore, all of our training, manufacturing and servicing is done by in house experts, for peace of mind in both product and services.

At IGD we believe in providing the best sensor technologies to perfectly suit your application. We develop all of our sensors with our century of experience in mind, providing you with the perfect solution. Below are the sensors that our experts have recommended for the Hydrogen economy:

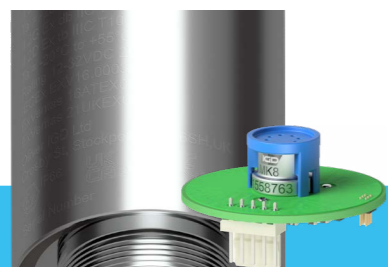
Electrochemical



Our electrochemical sensor provides low-level parts per million (PPM) H₂ detection. Recommended for applications that require:

- + Low-level detection (i.e. ventilation duct monitoring)
- + Detecting the leak quickly and early on, rather than detecting for flammability levels later

MK8 Pellistor



Using catalytic pellistor technology and specific to only flammable gases, the MK8 offers a wide array of features benefiting the Hydrogen industry:

- + Poison resistance from inhibiting materials and gases, for greater accuracy and safety
- + Long operational life reducing cost of replacements
- + Versatility for a range of environments
- + Minimal zero drift for continuous accuracy
- + Unaffected by humidity and operates over a wide temperature range

Solid Polymer



Our solid polymer oxygen is unique to IGD and is highly reliable, providing benefits such as:

- + Non-consumptive, meaning no degradation overtime unlike lead-based oxygen sensors
- + Reduced cost and increased reliability
- + Reduced nuisance alarms for a more efficient and uninterrupted working day
- + Effective detection for 5 years, 5-10x longer than typical lead-based sensors

Hydrogen Production IGD Aftercare+ & Training



IGD believes in providing support for our clients. From OEM electrolyser manufacturers, to end users utilising our equipment. As such we offer versatile training to support each client profile.


For OEM and electrolyser manufacturers we provide free training on our gas detection systems, allowing you to install, commission and, provide on-going calibration on our gas detection equipment.

At IGD we believe it's important to understand the fundamentals of gas detection, why it's needed, and how to safely operate our equipment.

We pride ourselves in providing Detectably Better support, so we created a free training academy which is externally approved by the training body CPD UK.



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“After working with IGD on what was an initial gas detection system; the service levels, price and delivery has always been excellent. The support from IGD has been a huge help in getting the most out of the equipment.”

Peter – Experts Safety Compliance

“Our search for a reliable, cost effective and simple H2 detection solution brought us to IGD. Their ultra responsive and helpful customer service, and technical teams were critical components in the seamless integration of their technology into our projects, ensuring the safe operation of our hydrogen systems for our clients.”

Brad Arnold – Creo International

“Super efficient gas detection service. The service of our gas detection system by IGD was excellent. The whole process was dealt with efficiently.”

Stephane - Lab Manager - FAAM Labs