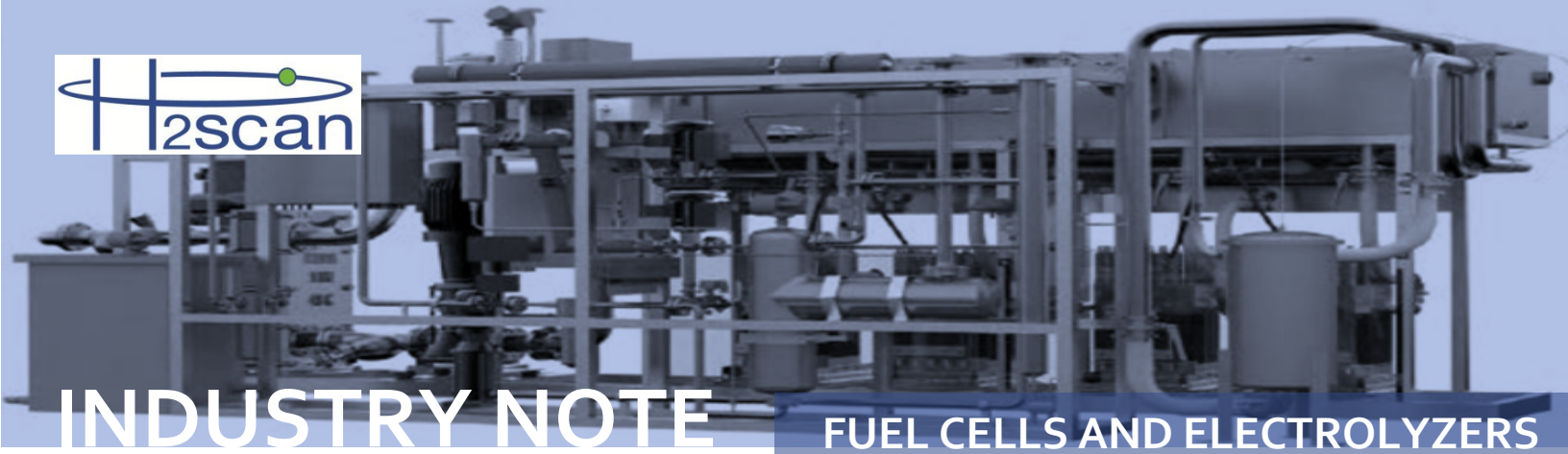


INDUSTRY NOTE

FUEL CELLS AND ELECTROLYZERS

Hydrogen Monitoring for Critical Safety

REAL TIME MONITORING FOR HYDROGEN BREAKTHROUGH AND SAFETY

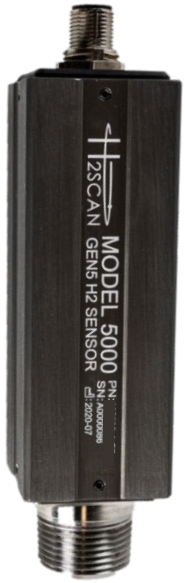
Fuel cells and electrolyzers need to continuously monitor for hydrogen to:

- Provide meaningful real time information
- Detect any leakage before it reaches critical levels
- Ensure safe operation even in remote locations
- Identify preventive maintenance needs

Global demand for fuel cells and electrolyzers is increasing exponentially, with stack sizes, hydrogen demand, and hydrogen consumption growing correspondingly. This demand is driven by a desire to de-carbonise the energy sector, since hydrogen has several advantages over natural gas or other fossil fuels: it burns cleanly and has a much higher energy density than natural gas or methane.

On the consumption side, fuel cells combine hydrogen with oxygen to produce electricity, with only water as a byproduct. Electrolyzers use electricity to split water into hydrogen and oxygen. Compared to other means of production of hydrogen, electrolysis is much cleaner and can produce large amounts of hydrogen efficiently and easily. Given the volumes of hydrogen moving through both fuel cells and electrolyzers, continuously monitoring the entire process for safety is critical.

During operation, fuel cells take in hydrogen and must be monitored for both excess hydrogen as well as for the presence of hydrogen in the excess air line. In certain types of fuel cells, such as proton exchange membrane devices, the presence of hydrogen in the air line can indicate that a problem has occurred and hydrogen is leaking across the membrane. For safety reasons, this must be detected as soon as possible to prevent reaching 4% in air, which is hydrogen's LEL.



Similarly, electrolyzers must monitor the oxygen line for any hydrogen breakthrough. Any hydrogen present must be detected quickly and accurately to enable appropriate critical safety measures to be applied immediately. This is also important as it may indicate that preventive maintenance is required.

Ideally, a hydrogen analyzer which can provide a real-time, continuous measurement will ensure safe operation of fuel cells and electrolyzers. Other common requirements are operation at pressures of multiple atmospheres and with high humidity present, often approaching 100%.

And of course, the areas where either type of product is located must be monitored in real time for any hydrogen leaks that may pose a threat to operators or other equipment. Fixed area monitors that provide a long life with reliable, false-alarm free detection should be used to protect these capital-intensive assets.

H2scan's **HY-OPTIMA™ 5000-series** hydrogen specific analyzers featuring a compact form factor for OEM integration and auto calibration to maintain accurate performance over time. The H2scan solid state, non-consumable sensor technology provides real-time continuous hydrogen concentration data even in streams with air or oxygen present. No reference or carrier gas systems are required to reliably and accurately report real-time hydrogen measurements with fast response times. For more info please visit www.h2scan.com.

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