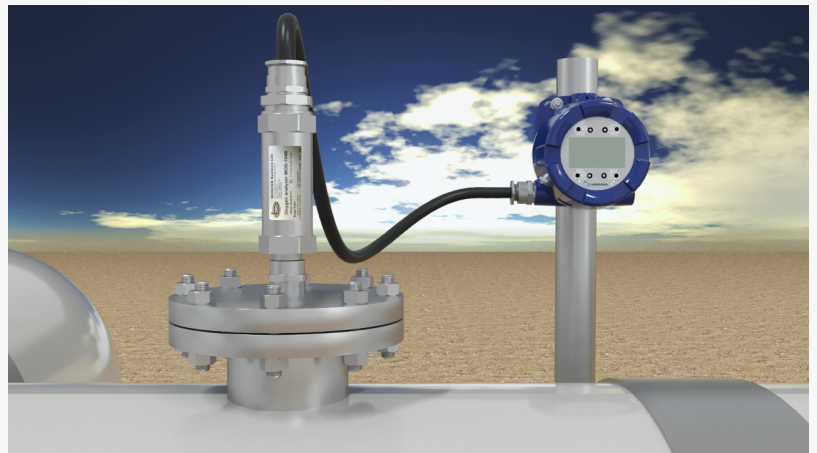


Optimizing Green Hydrogen Production with In-Situ Gas Analysis

Cutting-edge monitoring tools will enable operators to optimize the performance of their electrolyzers, ensuring the highest levels of safety and gas purity

LONDON, UNITED KINGDOM, September 5, 2024 /EINPresswire.com/ -- Green hydrogen production has emerged as a key element in the global effort to transition towards sustainable energy solutions. By utilizing renewable energy sources such as solar, wind, and hydroelectric power, green hydrogen production offers a carbon-neutral pathway by decomposing water into hydrogen and oxygen through electrolyzers. [Modcon Systems](#), a leader in process analytics, is at the forefront of optimizing this process through advanced technologies and innovative solutions for gas monitoring.



Electrolyzers, the core technology in hydrogen production, can be classified into two main types: Alkaline Electrolyzers, which use a liquid alkaline electrolyte like potassium hydroxide (KOH), and Proton Exchange Membrane (PEM) Electrolyzers, which utilize a solid polymer membrane. Each type presents unique advantages. Alkaline electrolyzers are recognized for their durability and lower operational costs, while PEM electrolyzers are favored for their high-purity hydrogen output, making them ideal for applications like fuel cells.

In the electrolysis process, an anode and cathode are separated by an electrolyte, and water is split into hydrogen and oxygen gases. The anode produces oxygen, and hydrogen is generated at the cathode. The choice of electrode materials, such as nickel or platinum, is critical to ensuring efficient gas production and durability under harsh electrolysis conditions. High-purity

water is used to minimize impurities in the electrolyzer, further improving the purity and efficiency of the hydrogen produced.

Monitoring the electrolysis process in real-time is essential to ensure operational efficiency and safety. Traditional gas analysis methods, which often involve sample extraction, pressure reduction, and venting, can pose risks, particularly in high-pressure hydrogen systems. In contrast, Modcon offers in-situ gas analysis solutions, which provide real-time monitoring of hydrogen and oxygen levels without compromising safety or environmental integrity.

Modcon's advanced analyzers, the MOD-1040 Oxygen Analyzer and the MOD-1060 Hydrogen Analyzer, are specifically designed for in-situ monitoring. The MOD-1040 utilizes optical sensor technology to provide precise oxygen measurement, while the MOD-1060, based on the principle of thermal conductivity, is ideal for measuring gases like hydrogen and oxygen with differing thermal properties. These analyzers are strategically placed at key points in the electrolyzer system, including the anode and cathode outlets, the electrolyzer cell outlet, the gas purification system inlet and outlet, and storage and distribution points. By monitoring these critical sample points, operators can ensure gas purity, detect leaks, and maintain operational efficiency.

To further enhance system integration, Modcon has developed a special sample manifold that allows the installation of both the MOD-1040 and MOD-1060 analyzers, along with pressure and temperature sensors, directly in the process stream. This manifold system is designed with the capability for on-site calibration, eliminating the need for dismounting the analyzers, thus minimizing maintenance downtime and ensuring uninterrupted monitoring.

Modcon's solutions offer numerous benefits for green hydrogen production, including a wide measurement range, fast response times, high accuracy, and precision. These analyzers are designed for low maintenance, reducing the need for frequent calibration and replacement. Additionally, they provide enhanced safety by reducing the risk of explosions and fires, supported by ATEX / IECEx / SIL2 approvals. Their versatility makes them suitable for monitoring gases across various industries, and their operational efficiency leads to significant cost savings by simplifying system design and reducing the need for hazardous area classifications.

As the demand for green hydrogen grows, Modcon's advanced technologies and innovative solutions will play a critical role in ensuring the safety, efficiency, and scalability of hydrogen production. These cutting-edge monitoring tools will enable operators to optimize the performance of their electrolyzers, ensuring the highest levels of safety and gas purity.

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