



# Green Hydrogen Process Analytics and Instrumentation Solution

**SIEMENS**

# Green Hydrogen Production by Water Electrolysis

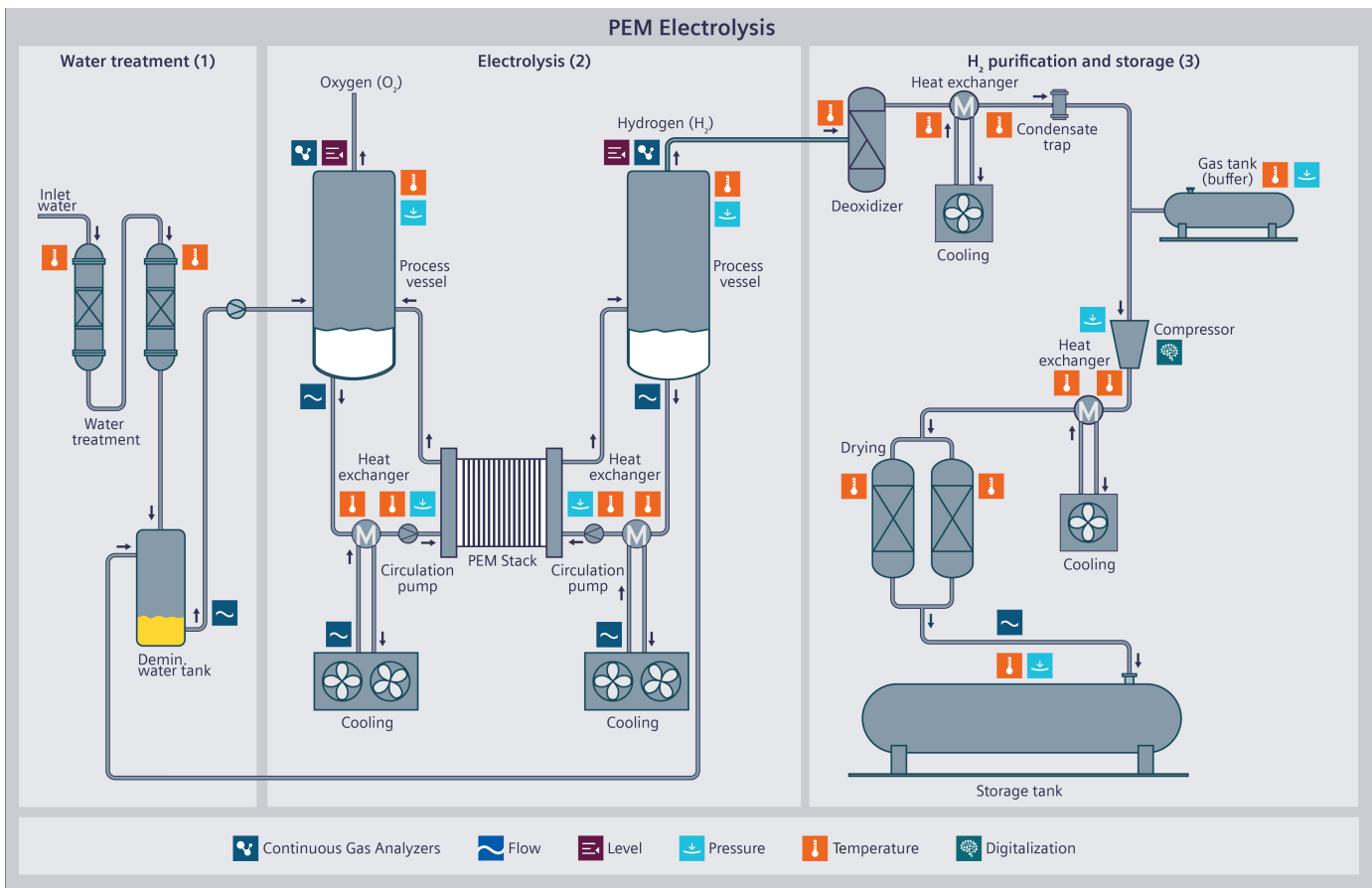
One of the most important challenges today is the **decarbonization** of the global economy, and the production of hydrogen plays a key part in this process. **Green hydrogen** is generated from renewable energy using water electrolysis such as **PEM** or **Alkaline** technologies. Water electrolysis is the separation of water into hydrogen and oxygen using electrical current.

**Process gas analyzers** and **field instrumentation** can ensure the desired quality of hydrogen is produced during electrolysis by allowing optimization of the process while maintaining safety levels.

**Siemens is committed to helping our customers transition to a clean energy future.** Transforming the everyday to create a better tomorrow.







Example of a PEM (Proton Exchange Membrane) Electrolyzer Process Chart

Process gas analyzers and instrumentation are essential for an electrolyzer plant operation.

The **electrolysis (2)** shown in the process chart is based on proton exchange membrane technology. In the **water treatment plant (1)**, a deionizer is typically installed to reach the required quality of water. The closed-loop cooling water circulation unit requires flow and temperature monitoring as it supplies the critical demineralized water for the hydrogen generation plant.

Online gas analyzer measurements are used to control the composition of the produced hydrogen and oxygen vent to ensure safety of operation and optimum **electrolysis (2)**. Temperature, level and

pressure transmitters are used as well to control and optimize the electrolysis operation. Hydrogen generated in the electrolyzer is a pure gas, saturated with water, with very low oxygen content.

Then, further **purification (3)** may be required depending on the final use of hydrogen followed by the cooling-down and compression steps before **final storage (3)**. Field instruments such as temperature and pressure transmitters are typically used in this part of an electrolyzer plant as shown in the process chart.

Flow, as well as temperature and pressure are monitored in the final storage step of an electrolyzer.

## Siemens Measurement Intelligence Portfolio for a Green Hydrogen Plant

### PROCESS GAS ANALYZER

The Siemens modular continuous gas analyzer **SIPROCESS GA700** is the ideal solution to monitor the oxygen vent and hydrogen production stream composition via thermal conductivity and paramagnetic measurement technologies. Siemens offers analyzers with different EEx protection and SIL design options that fit all different types of electrolyzers and configurations, offering high accuracy and a long-term stability measurement.

### PROCESS INSTRUMENTATION

**Siemens Process Instruments** are robust and reliable sensors with high accuracy and suitable for hydrogen applications. Our portfolio includes a wide range of pressure, temperature, level and flow transmitters, critical for an electrolyzer plant operation.

To prevent hydrogen permeation, which is the diffusion of H<sub>2</sub> molecules through the pressure sensor measuring cell, Siemens offers the **SITRANS P pressure transmitters** with standard SS 316L and Hastelloy diaphragms but as well a gold-plated diaphragm that provides longest life-time and best accuracy.

Siemens Flow portfolio for hydrogen applications consists of **SITRANS FP orifice plate**, **SITRANS FC Coriolis** and **SITRANS FS Ultrasonic**.

**Siemens SITRANS T temperature** and **SITRANS L level** devices are available with many variants and options and are suitable for a wide field of hydrogen applications.

### DIGITALIZATION

The **Siemens SITRANS IQ portfolio** can enable you to further leverage the asset optimization potential in your plant. With these solutions we can ensure minimal downtime, improve processes and effectively manage operations by means of proactive and predictive maintenance, performance measurement and reporting.

- **Siemens ASM (Analyzer System Manager) & SITRANS AID IQ (Analyzer Intelligence Director)** are our asset management and predictive maintenance solutions for analyzers.
- **Siemens SITRANS SCM IQ (Smart Condition Monitoring)** empowered by our **SITRANS Multi-sensor** enables you to monitor the condition of your plant's mechanical components such as pumps at any time.
- **Siemens APS (Asset Performance Suite)** is a plant asset management solution enabled by **artificial intelligence** to provide highest reliability and efficiency for all assets.



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