Panametrics
a Baker Hughes business

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Application note

Water Electrolysis for Hydrogen Production: Process Safety and Quality

Hydrogen, Oxygen and Moisture Analysis using Advanced Technologies

Introduction

The hydrogen generated by water electrolysis is playing an increasingly important role as an energy source and carrier with a wide range of applications. It will make a major contribution to replacing traditional fuels in many applications, from fuel for heavy vehicles to replacing natural gas for heating. It is one of the key solutions in achieving a zero emissions economy by 2050.

Application

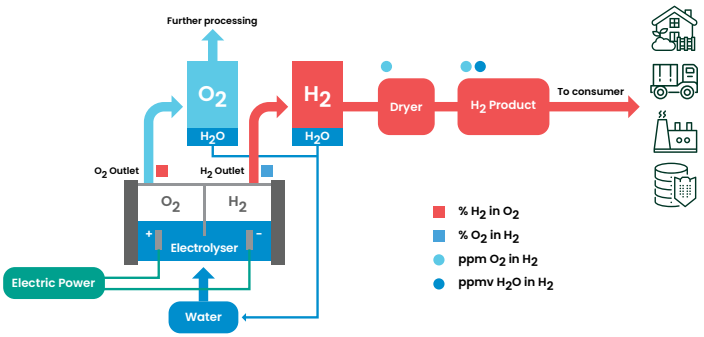
Water electrolyzers are electrochemical devices used to split water molecules into hydrogen and oxygen by passing an electrical current. The electrolyser cell is the heart of the system in which this process takes place. It consists of two electrodes immersed in an electrolyte and separated by a membrane.

To ensure the safety of the process, the hydrogen level must be monitored in the oxygen side of the membrane, to ensure there is no rupture of the membrane, allowing hydrogen and oxygen gases to mix and causing a potential explosion hazard.

Application Specifications: Hydrogen in oxygen, 0 - 5% range.

Moisture and oxygen are considered contaminants in the final produced hydrogen and hence monitored to ensure they both remain below 10 ppm. This is especially important when the hydrogen will be used to power fuel cells.

Application Specifications: Moisture in hydrogen 0 - 10 ppm and oxygen in hydrogen 0 - 10 ppm.



Typical electrolyser process

Panametrics: Tradition in Moisture and Gas Analysis

In an environment where fast and accurate results are critical to system functionality and product quality, Panametrics analyzers offer a reliable solution with superior performance.

Process Safety

XMTC, Binary Gas Analyzer

Thermal Conductivity-based technology for measuring gas concentrations in a mixture of two gases.

Key benefits

- Simple, easy-to-use and compact design reduces system solution costs
- Rugged construction and no moving parts
- Extremely stable output with real-time error detection
- Doesn't require frequent field calibration
- Essentially maintenance free by design
- Stands up to harsh environments, withstanding shock and vibration

Final Product Quality

oxy.IQ, Analyzer for Trace Oxygen Measurement

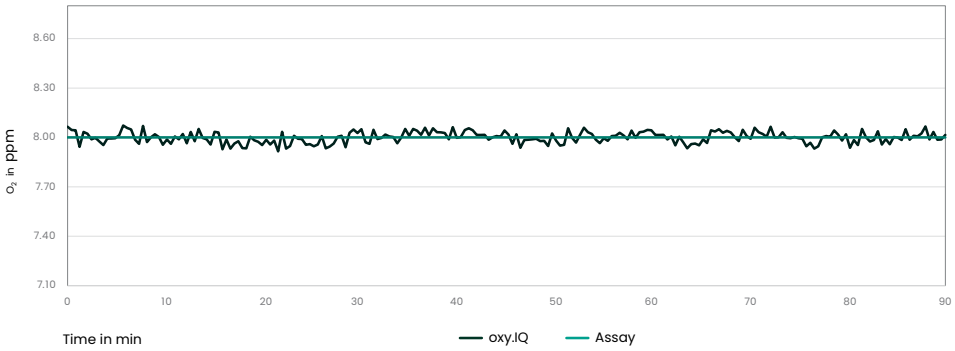
Proven galvanic fuel technology provides superior performance.

Key benefits

- Compact and innovative design, easy installation and system solution flexibility
- Built-in microprocessor, intuitive user interface to easily select range, trim outputs and perform calibration
- User-selectable ranges, calibration, sensor diagnostics with keypad simplifies programming
- Background gas insensitivity and acid gas sensor options ensure accurate measurement and analysis

Record	oxy.IQ O_2 ppm	Assay
1	7.99	8
2	7.98	8
3	7.98	8
4	7.95	8
5	8.02	8
6	7.98	8
7	7.95	8

oxy.IQ typical performance over a period of time



HygroPro™, Moisture Transmitter for Trace Moisture Measurement

Thin-film aluminum oxide technology originally patented by Panametrics.

Key benefits

- Compact transmitter with moisture, temperature, and pressure sensors mounted on a single probe allows installation where space is at a premium
- Measurements at pressures up to 5000 psig (345 bar)
- Large dynamic dew/frost point measurement range (-110 °C to +60 °C)
- Sensors are easy to replace in the field
- HART communication over the 4 – 20 mA analog output

O2.IQ and pro.IQ, Complete System Solutions

Key benefits

- Compact footprint, stainless-steel package and loop-powered transmitters provide solutions that work in safe and hazardous areas.
- Package design provides easy access to transmitter for effortless maintenance.
- Wall-mounted NEMA 4X and IP66 stainless steel package.
- The sample conditioning system provides isolation, filtration, pressure regulation, flow and pressure indication along with a clear window for easy viewing of all readings.

Panametrics, a Baker Hughes business, provides solutions in the toughest applications and environments for moisture, oxygen, liquid and gas flow measurement.

Experts in flare management, Panametrics technology also reduces flare emissions and optimizes performance.

With a reach that extends across the globe, Panametrics' critical measurement solutions and flare emissions management are enabling customers to drive efficiency and achieve carbon reduction targets across critical industries including: Oil & Gas; Energy; Healthcare; Water and Wastewater; Chemical Processing; Food & Beverage and many others.

Join the conversation and follow us on LinkedIn
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BHCS39261 (12/2023)

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