



Application note

Control and monitoring of glove box atmospheres

Continuous trace moisture and oxygen measurement

Introduction

Glove boxes vary in size and shape but they are all characterized by openings that allow a person to insert their hands into the box. Gloves with long cuffs are tightly sealed around each of the openings on the front panel. When a person inserts their hands and arms into the box the gloves allow the product to be handled while the integrity of the internal conditions remains intact.

Application

These conditions or micro-environments allow the operator to run processes that are either part of a manufacturing process (e.g. semiconductor industry) or a research project that requires special conditions, for example in the development of new drugs. In many cases, the glove box also has a protective function for the operator, protecting him from exposure to hazardous substances.

Producing a modified atmosphere simply means maintaining a controlled environment with conditions that differ from normal, or ambient conditions. To provide that controlled and pure environment, inert gases are used to blanket the glove box and provide a neutral background environment.

The space inside the glove box is continuously purged with dry, inert gas such as nitrogen, argon or helium. This micro-environment requires monitoring and control.

The technology and instrumentation play an important role in the accurate and continuous measurement of moisture and oxygen levels.

Technologies for monitoring glove box atmospheres

Panametrics, a Baker Hughes business, develops innovative measurement solutions for gas and liquid applications in many industries including oil and gas, petrochemical, metal heat treating, power, and renewable energy.

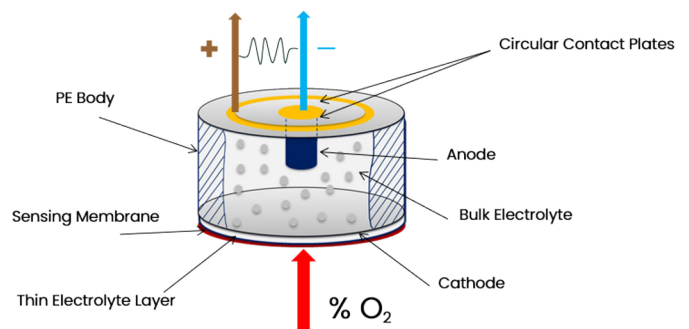
With over 10,000 glove box atmosphere-monitoring devices installed, Panametrics products prove their performance and reliability every day.

Galvanic fuel cell for oxygen, converting oxygen to electrical energy

One of the best methods for measuring low-ppm oxygen is galvanic fuel cell technology.

This electrochemical cell converts oxygen to an electrical signal. It is self-contained and has a long life. The sensor is insensitive to background gas changes.

Galvanic fuel cells are fast, accurate, and easy to use.



Aluminum Oxide for Moisture

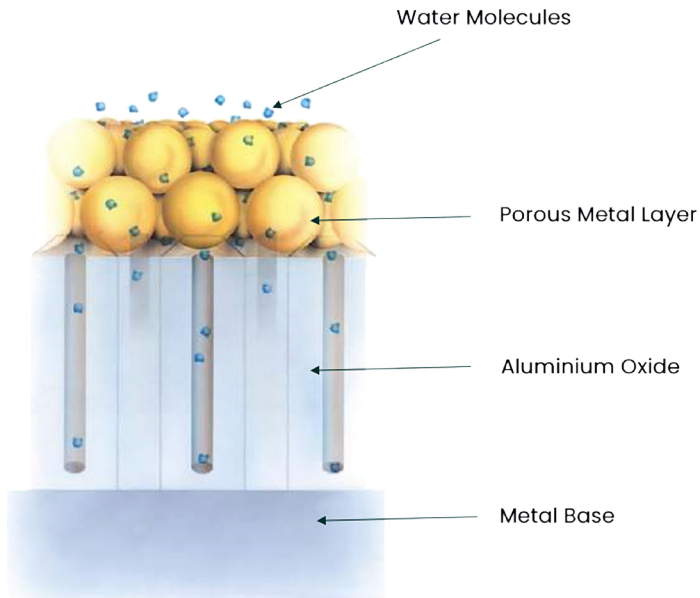
Changing electrical properties with water

Aluminum oxide is the most widely used technology for trace moisture measurement.

An aluminum oxide sensor consists of a metal base, aluminum oxide layer, and a vapor deposited metal layer on top.

Water molecules entering the aluminum oxide pores will change the electrical properties of the sensor. This electrical response is calibrated to varying moisture levels.

These sensors are cost effective, cover a wide concentration range, and are very fast.



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
[linkedin.com/company/panametricscompany](https://www.linkedin.com/company/panametricscompany)

Panametrics Solutions

VeriDri, Moisture Transmitter for Trace Moisture Measurement

Panametrics aluminum oxide moisture sensors have set the standard in process moisture measurement for more than 60 years.

Key benefits

- Large dynamic measurement range
- Many range options are available in dew point and PPMv
- Compact transmitter



oxy.iQ, Analyzer for Trace Oxygen Measurement

Proven galvanic fuel technology provides superior performance.

Key benefits

- Compact, innovative design for easy installation
- Intuitive user interface to easily select range, view diagnostics, 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



Baker Hughes 