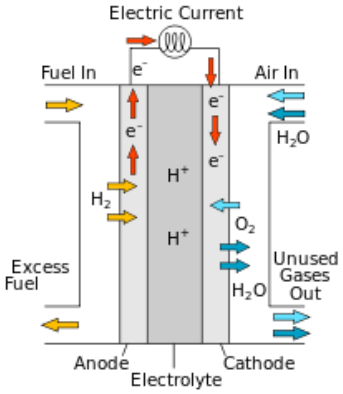
Fuel Cell Research

MBW calibration

APPLICATION



Fuel Cells will be an important part of our energy future. Research and development continues to improve the cost/performance relationship that must improve to make the technology more viable to generate clean power that emits nothing other than harmless water vapour.

Importance of Humidity

Proton exchange membrane fuel cells (PEM) depend on membrane hydration for efficiency and reliability. If the membrane is dry, resistance increases and efficiency drops. If very dry the cell will overheat and will be damaged or destroyed. Too much water can flood the gas path and reduce efficiency and eventually functionality.

Management of water in the liquid and gas phase within fuel cells is therefore one of the main development challenges. Since the $2H_2 + O_2 \rightarrow 2H_2O$ reaction is exothermic, temperature is also a key issue. At a typical working condition of 80°C/90 %rh a ±1°C temperature variation resolves ±4 %rh change, so even small variations of temperature can lead to condensation within the gas path.

Research engineers therefore need precise temperature and humidity measurement equipment for effective type testing during development.

Measurement Options:

The high temperature and humidity conditions also present a substantial challenge for measurement systems. Since most sensors are temperature dependent, calibration must be performed in the working range of the PEM test to obtain accurate data. Without heating to prevent saturation, RH sensors suffer from over saturation and accelerated drift in the high RH and temperature conditions. Even heated RH sensors will require frequent calibration to maintain repeatable data over time, and again, this should ideally be performed at, or close to, the test condition.

F-Cell in Production Soon

The F-Cell is a hydrogen fuel cell electric vehicle developed by Daimler AG and is based on the Mercedes Benz B Class.

With a range of around 400km, several hundred are now in daily use by lease customers world-wide. Daimler has announced that commercial availability of the F-Cell has been brought forward to 2014

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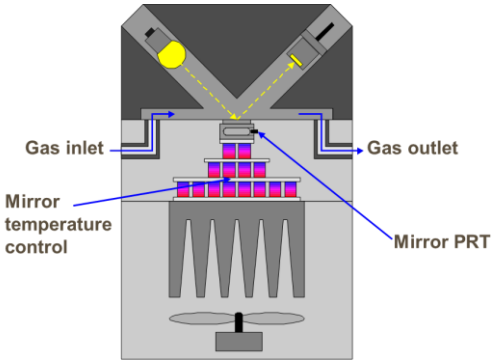
Chilled mirror dew point hygrometers provide a precise alternative for direct measurements and can be used for the calibration of RH instruments.

The control of a dew layer on a polished mirror surface using optical detection and a feedback control loop is a well-established method for precise humidity measurement. Such instruments are used as transfer standards at National Measurement Institutes and almost every accredited laboratory.



Sampling from the PEM gas feed requires heated sample paths to prevent condensation, so a heated measuring head and heated sample tubes are essential. The 373H, HX and LHX units include these features and have been successfully used by the lead fuel cell research organisations.

MBW Calibration/RH Systems:

MBW Calibration and US partner company - RH Systems manufacture chilled mirror dew point hygrometers that are internationally used by standards laboratories at national, accredited and industrial level.

Available in a range of versions covering dew/frost points over the range -95 to +95°C, the instrument range incorporates the features necessary to provide reliable and accurate measurements in all conditions.

Notable features that support application in Fuel Cell research include:

- Automated gas sampling at temperatures up to 100°C
- Heated measuring head to eliminate condensation
- Simultaneous measurement of temperature for calculation of relative humidity
- Integrated calibration function to allow on-site verification of instrument performance

For further information visit www.mbw.ch or US partner company www.rhs.com