DATASHEET FLOW METERS IN ELECTROLYSER MEMBRANE TESTING A068

APPLICATION NOTE

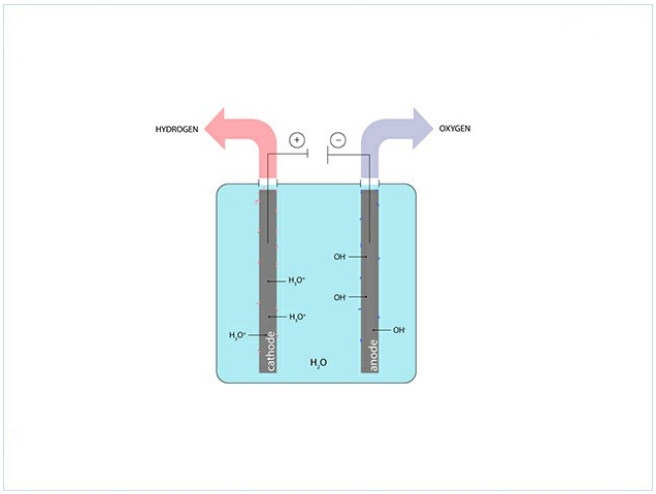
Electrolyser membrane testing

In Electrolyser membrane testing, flow meters play a role. By means of electrolysis and other physical processes, water is splitted into hydrogen and oxygen. Both gases are separated from each other with a membrane, to obtain hydrogen as pure as possible.
Bronkhorst supports this process development by delivering mass flow controllers for hydrogen and oxygen flows.

Read more about the solution using two flow meters measuring the oxygen and hydrogen flow.

Sustainable energy

Development towards our sustainable energy system has gained popularity. The need for more energy-efficient, better- & cost-effective technology is at the highest level ever. This includes the development and application of electrolysers to generate hydrogen.



Hydrogen seems to be playing a vital role in our energy backbone, for energy storage, high-power industrial users and to some extent for domestic heating appliances. Hydrogen is also an important sustainable feedstock for several other chemical processes. The common way to generate hydrogen is still the chemical way using SMR (Steam Methane Reforming). SMR involves the reaction of hydrocarbons such as natural gas, with steam at hot temperatures. In this process, hydrogen is released from the natural gas with the greenhouse gas carbon dioxide as a by-product which is often captured and stored to prevent release in our atmosphere.

To balance supply and electrical demand from renewable energy sources such as wind- and solar farms, surplus energy can be converted to hydrogen by electrolysers executing the electrolysis process.

Application requirements

As part of electrolyser development, the performance of the membrane that separates the hydrogen side from the oxygen side, is measured. To that end, both hydrogen and oxygen are supplied to the membrane in known amounts in an accurate way. Besides that, the flows that leave the membrane need to be measured accurately as well.

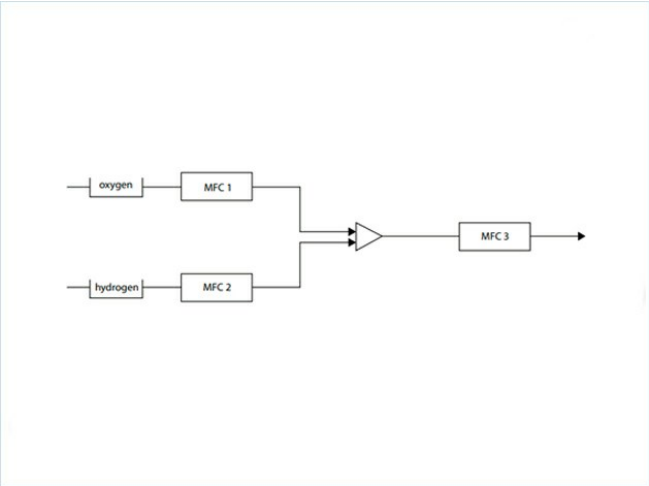
Important topics

- Control accuracy
- Measurement accuracy

Process solution

In the experimental setup, with two mass flow controllers – a mini CORI-FLOW M14 for oxygen and a EL-FLOW Prestige for hydrogen - hydrogen and oxygen are fed to the membrane in a controlled way. The permeate - i.e. the part of the feed that passes the membrane - enters a three way valve where a choice can be made to measure the flow rate or the composition of the permeate gas flow.

The flow rate is measured using another EL-FLOW Prestige device, and the gas composition by means of a binary gas sensor. This sensor can only handle a specific mass flow. The three mass flow controllers/meters used in this experimental setup were doing an excellent job. In addition, during a short period of time another mini CORI-FLOW M14 was ordered, to measure the mass flow of the retentate - i.e. part of the feed that is retained by the membrane.



Flow scheme

Recommended Products

EL-FLOW PRESTIGE FG-201CV

Min. flow 0,14…7 mln/min
Max. flow 0,4…20 ln/min

Pressure rating 64 bar

100 selectable gases

Customized I/O configurations

MINI CORI-FLOW™ M12V14I

Flow range 0…200 g/h

Pressure rating 100 bar

Independent of fluid properties

High accuracy, fast control

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