

MGAPRIME H2 – PRECISE MEASUREMENT OF HYDROGEN CONCENTRATION IN FLUE GASES



VISION HYDROGEN: “Water is the coal of the future. Tomorrow’s energy is water, which has been disassembled by electric current”. These visionary words were written by Jules Vernes already in the year 1875. Green hydrogen, which has been generated from renewable energy, is a key element of a sustainable, future oriented energy system. The MGAprime H2 is a vision come true to further enforce energy transition by its capability of highly precise and long term measurements.

Hydrogen in combustible gases. In order to further utilize the installed infrastructure in regards of gas distribution and usage, hydrogen, besides other applications, may well be used as combustible gas. In this context, admixtures to natural gas in a range of 10% up to 30% are foreseeable in the near future. More so the usage of hydrogen with up to 100 Vol% is being researched in various combustion processes. Impacts of such admixtures on the infrastructure and especially the combustion itself are presently subject of scientific research.

Hydrogen in flue gases. Already the combustion of common fossil fuels may generate a hydrogen content in the flue gas of several hundred ppm’s. It is to be expected that the bandwidth of possible hydrogen concentrations in flue gas will increase significantly if hydrogen is added to the combustible gas or the combustible gas consists completely of hydrogen. Unburnt parts of the combustible gas can lead to a hydrogen slip, adding up to several 10.000 ppm. For a complete analysis of the combustion process the flue gas measurement must be able to handle this increased hydrogen concentration.

Challenge of hydrogen. Many flue gas analysers use electrochemical cells to measure the concentration of various gas components. But particularly the high concentrations of

hydrogen limit the accuracy of such measuring principles. Noticeable drifts of signals and cross sensitivities, which cannot be compensated completely, will occur. As a consequence, high concentration of hydrogen worsens the accuracy of measurements, concerning nitrogen oxides (NO_x) as well as hydrogen itself.

Innovative measuring technique: The technical solution to conquer this challenge consists of using an analysing technology which is insensitive to hydrogen impacts. The MGAprime H2 uses a NDIR bench for up to 8 gas components, which is one of the most accurate ones on the market. This is underlined by the fact that this MRU developed infrared measuring technique in the model MGAprime Q is certified according EN 15267 QAL-1. In the model MGAprime H2 this measuring technique is being supplemented by electrochemical H2 cells, which cover the large range of 0...20.000 ppm. A paramagnetic oxygen sensor covers the range of 0...25%. By means of this unique combination of high grade NDIR and reference technique all flue gas components may be determined most accurately and remaining cross sensitivities are successfully compensated.

Successful measuring application: Various independent test measurements proved that the MGAprime H2, configured for hydrogen measurements, is a most compact and save solution to measure hydrogen slip in flue gases.

The MGAprime H2 from MRU has been developed as a portable automatic measuring system (P-AMS). Thus this unit is one of the first of its kind on the market.

This certified measuring system provides a complete solution for any measuring task and consist of:

- gas sampling probe: a new development of MRU, incl. heated sample gas filter
- heated gas sampling line
- the analysing unit itself, which contains gas conditioning incl. gas cooler and filter as well as the analysing modules. Thereby gas cooler and NDIR bench represent a complete inhouse development of MRU, ensuring an efficient and compact design.

Numerous measuring applications: This analyser can measure up to 10 gas components simultaneously (H₂, O₂, CO, CO₂, NO, NO₂, N₂O, SO₂, CH₄, C₃H₈), in part by implementing a standard reference method.

That makes it suitable for a lot of emission measuring tasks at industrial facilities, large boilers as well as small domestic boilers.

Clearly arranged human interface: The large touch display enables easy operation and a variety of presentation modes as text or graphical output.

Simple and uncomplicated setup: Besides its innovative measuring technique and the user friendly concept of operation, the all metal housing is another unique feature. The MGAprime H2 has been designed as a compact and completely self contained unit, with gas sampling, gas conditioning, gas cooler and sensor elements. This resolves the daily problem of having to transport bulky measuring equipment to measuring sites, difficult to access. With this compact and easy to handle complete solution, an uncomplicated, quick and simple analysing setup will be ensured.

Author Contact Details

Dierk Ahrends, Head of Product Management • MRU GmbH

- Fuchshalde 8 +12, 74172 Neckarsulm, Obereisesheim, Germany • Tel: +49 7132 9962 0
- Email: info@mru.de • Web: www.mru.eu

