



# APPLICATION NOTE

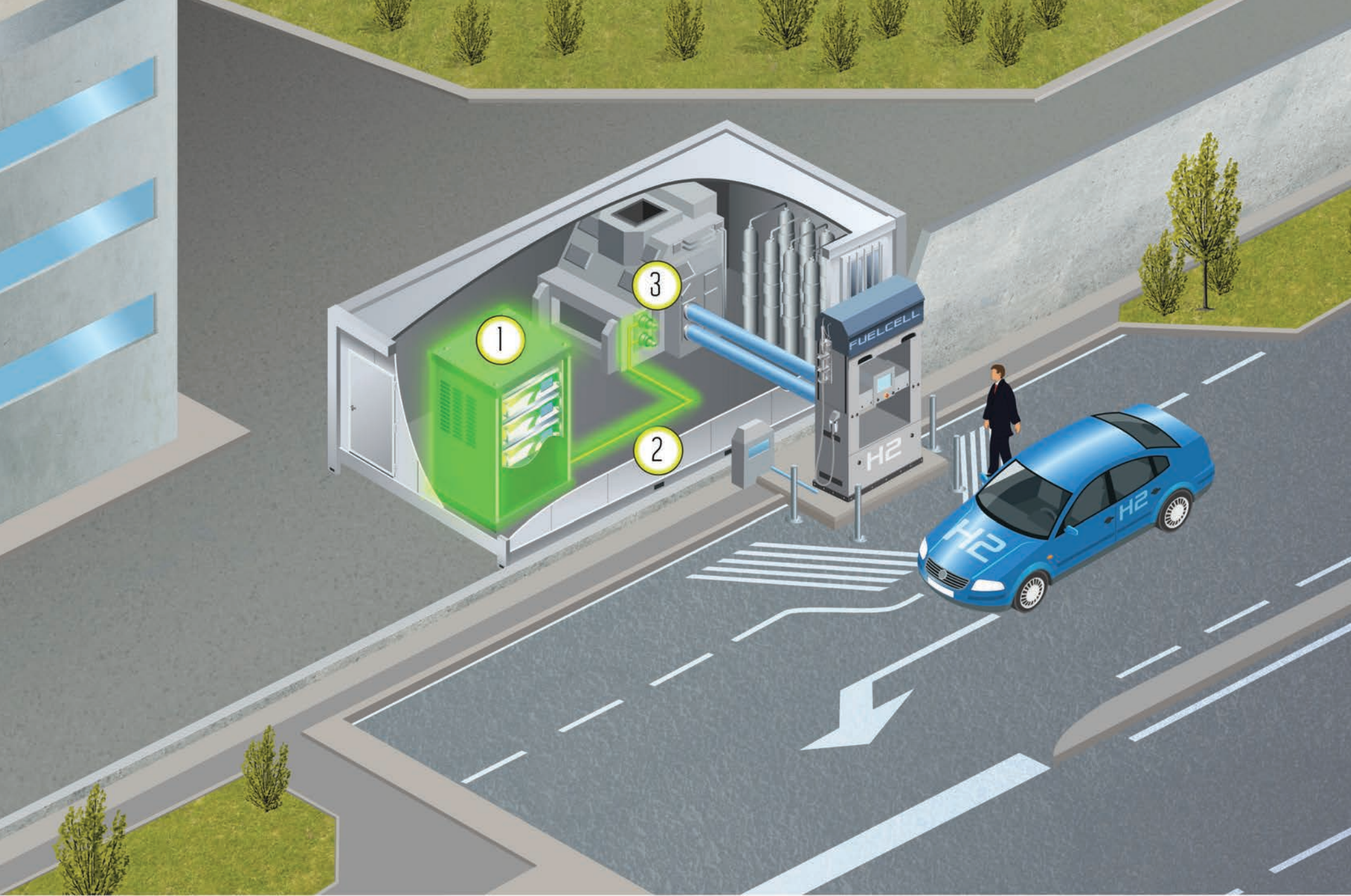


**ProCeas<sup>®</sup>**  
THE ACCURATE  
ANALYZER  
FOR H<sub>2</sub> PURITY CONTROL

 Multicomponent  
and highly  
sensitive

 Ease of use and  
fast response  
time

 Low maintenance  
and no drift



1



ProCeaS

2



Sampling Line

3



Sonic Nozzle

## WHY DO YOU NEED TO CONTROL IMPURITIES IN HYDROGEN ?

In a time when the world is looking for cleaner sources of energy, hydrogen is seen by many as an interesting alternative for cars, trains, etc. The fast evolution of the hydrogen sector brings industrials to find new solutions to control the purity of hydrogen.

Quality of hydrogen is critical to insure that impurities does not affect the lifetime of fuel cells, engines, turbines. Gas such as sulfur and halogenated compounds can be problematic.

## WHAT ARE THE RECOMMENDATIONS FOR MAXIMUM CONTENT OF IMPURITIES?

ISO 14687-2 specifies the critical impurities and maximum levels to be detected in hydrogen.

COMPONENT	ISO 14687-2 LIMITS (ppm)
H <sub>2</sub> O	5
TOTAL HYDROCARBONS MAINLY CH <sub>4</sub>	2
O <sub>2</sub>	5
He	300
N <sub>2</sub> / Ar	100
CO <sub>2</sub>	2
CO	0,2
TOTAL SULFUR COMPOUNDS MAINLY H <sub>2</sub> S	0,004
HCHO	0,01
HC <sub>2</sub> H	0,2
NH <sub>3</sub>	0,1
TOTAL HALOGENATED COMPOUNDS MAINLY HCl	0,05

## ProCeas® HYDROGEN PURITY ANALYZER TECHNOLOGY

The ProCeas® uses the patented OFCEAS technology, based on extractive absorption spectroscopy.

This laser based technology is able measure gases down to sub-ppb levels of concentration, with an unforeseen quality of measurement in term of accuracy and repeatability. The ProCeas® samples the gas at low pressure, with an internal pressure below 100 mbar absolute. This dilution reduces the volume needed to get a correct measurement, and optimizes the response time of the analyzer. In the end the system requires really small samples of hydrogen.

Finally, ProCeas® has an integrated auto calibration of the measurement system, allowing no drift under normal use of the instrument.

ProCeas® is able to analyze a large range of impurities with limited service and maintenance costs.

## ProCeas® KEY FEATURES

- Highly sensitive
- Low detection level (sub-ppb)
- Complete pre-calibrated laser infra-red spectrometer
- No Zero drift and no Span drift - No daily calibration required
- No nitrogen, zero air, purge or other carrier gas
- Multigas analyser (H<sub>2</sub>S, CO, CO<sub>2</sub>, CH<sub>4</sub>, O<sub>2</sub>, NH<sub>3</sub>, H<sub>2</sub>O, HCHO, etc.)
- Limited volume of sample needed for an analysis

## ProCeas® HYDROGEN PURITY

Is a complete pre-calibrated multicomponent (H<sub>2</sub>S, CO, CO<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>O, O<sub>2</sub>, NH<sub>3</sub>, H<sub>2</sub>O, HCHO, etc.) laser infrared spectrometer for measurements of impurities in hydrogen.

COMPONENT	ISO 14687-2 LIMITS (ppm)	LOD ProCeas® <sup>A</sup> (ppm)
H <sub>2</sub> O	5	0,01
CH <sub>4</sub>	2	0,001
O <sub>2</sub>	5	1
CO <sub>2</sub>	2	0,2
CO	0,2	0,001
H <sub>2</sub> S	0,004	0,001
HCHO	0,01	0,001
HCO <sub>2</sub> H	0,2	0,005
NH <sub>3</sub>	0,1	0,001
HCl	0,05	0,001

<sup>A</sup> limit of detection 3 Sigma



240, rue Louis de Broglie  
Les Méridiens Bât A  
F-13593 Aix-en-Provence Cedex  
Tel : + 33 (0)4 42 61 29 40  
info@ap2e.com

[www.ap2e.com](http://www.ap2e.com)