

/ Application Note

Hydrogen Safety

H₂



Hydrogen as energy carrier has great potential for clean, zero-carbon industries and is considered to be one of the most promising candidates for replacing fossil fuel sources that contribute significantly to the anthropogenic climate change.

Hydrogen is highly flammable even in small quantities when combined with normal air; ignition can occur at a volume ratio of hydrogen to air as low as 4%vol due to the oxygen in the air and the simplicity and chemical properties of the reaction. However, hydrogen is not classified as toxic. The storage and use of hydrogen is particularly challenging because, as a gaseous fuel, it escapes easily, can be ignited with little energy input, has a wide range of flammable fuel-air mixtures, has buoyancy, and can embrittle metals, all of which must be considered for safe operation.

/ Processes

Hydrogen leaks can occur at all stages of the value chain, from production to storage, transport and use. Fast detection with high specificity without cross-sensitivities is essential to identify leaks at a very early stage with a very low false positive rate.

/ Typical process data

Most leak detection applications are performed at ambient conditions. Since hydrogen is lighter than air, it collects under roofs and overhangs, where it poses an explosion hazard.

With a lower explosive limit (LEL) of 4%vol, alarm levels are typically set to 1%vol or 0.5%vol H₂.

/ Motivation

Hydrogen leak detection is critical for safe operation to protect human life and plant facilities.

/ Solution

NEO Monitors' LaserGas™ III H₂ analyzer and detector is using the unique properties of lasers that allow gas measurements in real time with high sensitivity and selectivity. With this device, hydrogen leaks can be detected very quickly so that appropriate countermeasures can be initiated.

Thanks to the line-of-sight measurements, only one device is needed to cover a larger area instead of multiple point sensors. An integrated permanent health check ensures proper functionality at all times; the design is IEC61508 compliant.

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LaserGas™ III H2



- Single path & Open path configurations
- Contactless
- Fast response time
- Sensitive
- Selective
- No zero-drift
- Internal health check
- No consumables
- ATEX/CSA/SIL2 certifications

LDL, % volum	0.1	
Response time, s	≤1	
	Min	Max
Range, % vol (*)	5	100
OPL, m (*)	0.7	30
Process pressure, bara (*)	0.5	10
Process temperature, °C (*)	-50	250

(*) Other ranges on request.

/ Benefits

- Well proven measurement technique
- Highly reliable real time analyzer
- Easy to install and operate
- Low maintenance cost



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