CuraTerrae

LSE NH_3-1710

air monitoring of Ammonia

[Ambient air]

A new solution for air pollution monitoring

LSE Monitors has developed a robust and cost-effective analyzer based on photo acoustics with a quantum cascade laser.
The concentration of NH_3 in sample air is continuously determined with a detection limit of 0.025 ppm and a time resolution of 2 seconds.

Continuous ammonia measurements in ambient air

Ammonia (NH_3) plays an important role in neutralizing atmospheric acids like sulphuric or nitric acid.

Thereby particulate matter is formed, which has a negative impact on human health and contributes to radiative forcing. Excess of NH_3 can result in eutrophication, loss of biodiversity and soil acidification in sensitive ecosystems. This is a problem in a growing fraction on our planet.

Agriculture is by far the most dominant contributor to anthropogenic NH_3 emissions. The worldwide NH_3 emissions will most likely increase in the future. Therefore large scale continuous monitoring of the NH_3 concentration will help to determine the effects of measures taken to reduce the ammonia emissions.

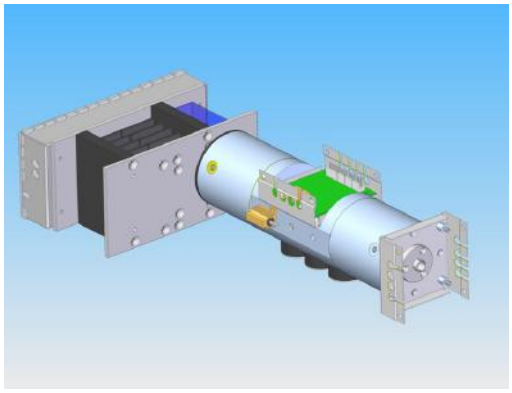
- *Very low detection limit (ppb range)*
- *No consumables, turnkey instrument*
- *Active gas sampling by integrated pump*
- *Virtually maintenance-free instrument*
- *User-friendly software*
- *Large color graphics with touch screen*
- *CE certified*
- *Two-year warranty*

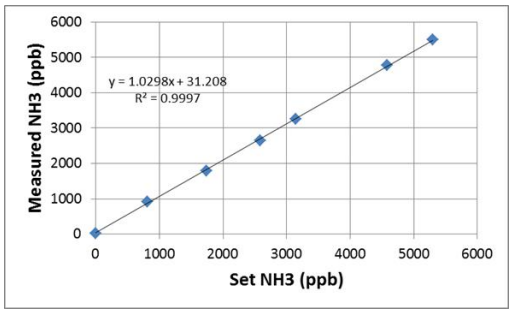
LSE Monitors

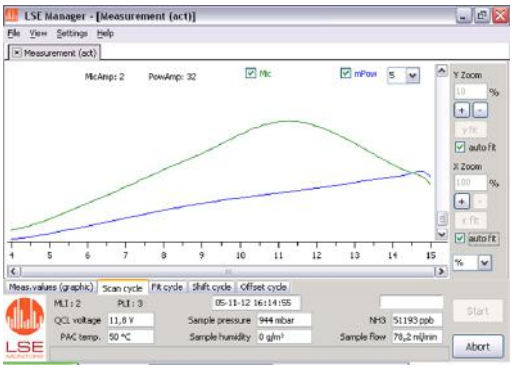
LSE Monitors is a joint venture between Sensor Sense BV in Nijmegen and Synspec BV in Groningen, combining knowledge of laser research, electronic design and analyser production.

Concept of measurement

Infrared light produced by a quantum cascade laser is directed through a measurement cell. This cell is continuously flushed with sample gas. An integrated pump sucks ambient air through the monitor. If ammonia is present in the sample gas, the pressure increases as a result of ab-sorption of the laser light. The laser light intensity is modulated at an acoustic frequency of 1600 Hz and the resulting pressure modulation is measured by small microphones. The amplitude is proportional to the ammonia concentration.







Specifications

Noise (1σ, 2 s)	0.025 ppm
Range	0 - 15 ppm, on request tuneable to higher conc.
Precision	a maximum precision of 0.025 ppm or 2 % of measured value, whichever is the biggest
Time resolution	2 s
$T_{90-10\%}$ at 30 ppm	10 s
$T_{90-10\%}$ at 5 ppm	15 s
Linearity	$R^2 > 0.9995$
Sample flow rate	80 –140 ml/min

Validation

Interval	we advice every 30 days
Calibration gas	Preferrably cylinder with NH_3 in dry air for high range, permation tube + dry air for low range

Requirements

Sample temperature	5 - 30°C
Sample pressure	stable during measurements, 0.7 - 1.0 atm
Sample humidity	non-condensing for T > 25°C and relative humidity between 0 and 90%
Voltage supply	230 Vac, 110 Vac available on request
Coating of gas connections	we advice PFA or Silcosteel
Tubing material	we advice PFA tubing
Gas connections	Swagelock compatible, 1/8''

Technical data

Dimensions	suited for installation in 19" rack, 3 Standard Height Units (12 cm), depth 37,2 cm
Weight	8 kg
Power demand	200 W
Communication connections	1 x Ethernet, 1 x RS232, 4 x USB 4 x Analogue and 7 x Digital outputs 4 x Analogue and 4 x Digital inputs
Protocols available	Hessen-Bayern, AK