



# LSE N<sub>2</sub>O-4410

air monitoring of Nitrous oxide

## 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 N<sub>2</sub>O in ambient air is continuously determined with a sensitivity of 0.02 ppm and a time resolution of 2 s.

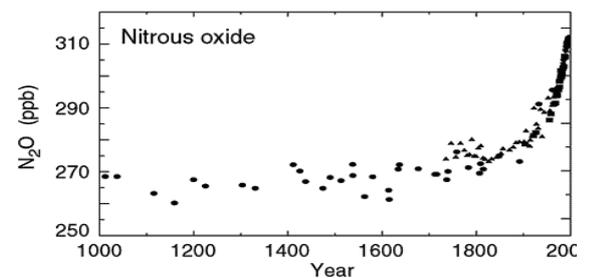


## Continuous nitrous oxide measurements in air

Nitrous oxide (N<sub>2</sub>O) is a greenhouse gas with a very big *global warming potential*. After CO<sub>2</sub> and CH<sub>4</sub> it is the most important greenhouse gas.

Nitrous oxide is naturally emitted from soils and oceans. Human activity contributes to the release of N<sub>2</sub>O through the cultivation of soil and the production and use of nitrogen fertilizers, the production of nylon, and the burning of fossil fuels and other organic matter. Since 1750, the global concentration of N<sub>2</sub>O has increased significantly.

To decrease the greenhouse gas effect, emissions must be reduced. Monitoring is then needed to follow the effect of methods to reduce nitrous oxide concentrations.



- 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



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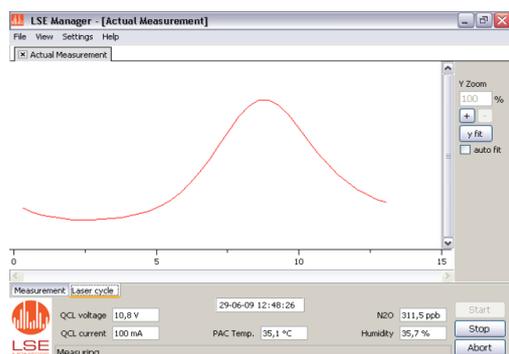
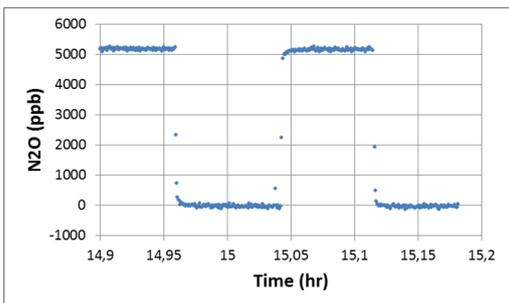
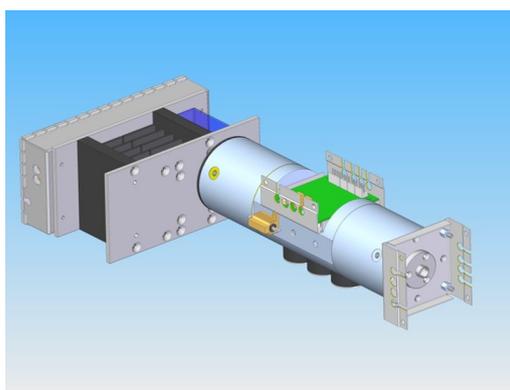
## LSE Monitors

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 N<sub>2</sub>O is present in the sample gas, the pressure increases as a result of absorption 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 N<sub>2</sub>O concentration.



## Specifications

Noise (1 $\sigma$ , 2 s)	0.020 ppm
Range	0 - 15 ppm, on request tunable to higher concentrations
Precision	a maximum precision of 0.020 ppm or 2 % of measured value, whichever is the biggest
Time resolution	2 s
Response time (T <sub>10-90%</sub> )	< 10 s
Linearity	R <sup>2</sup> > 0.999 for 0–15 ppm
Sample flow rate	80 ml/min

## Validation

Interval	we advice every 30 days
Calibration gas	a known and suited concentration of N <sub>2</sub> O in dry air

## Requirements

Sample temperature	5 - 25°C
Sample pressure	stable during measurements, 0.7 - 1.0 atm
Sample humidity	Permapure dryer must be installed to reduce the water concentration to a dewpoint temperature below 5 C.
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

**LSE monitors**

De Deimten 1 | Groningen | the Netherlands  
tel.: +31 (0) 50 526 64 54

[www.lsemonitors.nl](http://www.lsemonitors.nl) | [info@lsemonitors.nl](mailto:info@lsemonitors.nl)