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TRACE-GAS N_2O analyzer

(LAS - Laser Absorption Spectroscopy)

Example: Leak detection

ppb
CO measurable*
range

The TRACE-GAS N_2O analyzer combines reliability, fast response and easy handling in one instrument. Developed for a calibration-free and direct measurement of N_2O.

+ no cross sensitivities

+ low adsorption effects

+ no calibration required

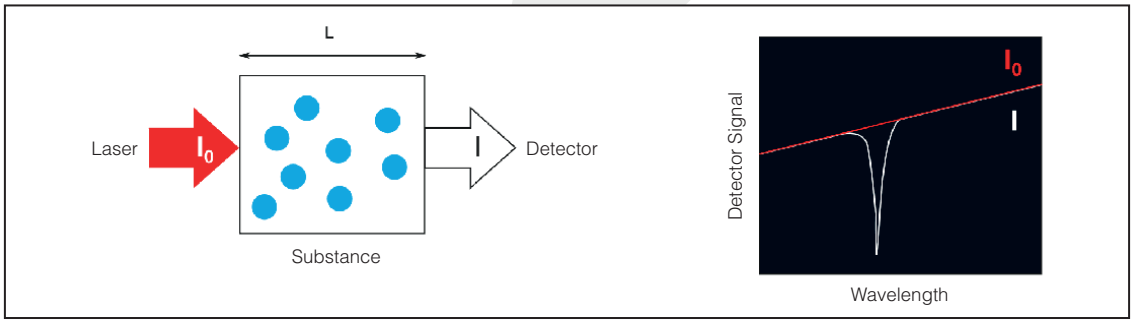
* on demand

- no consumables required
- no formation of condensate
- selective continuous real-time measurement
- quick response
- low detection limit
- suitable for plant control
- nearly maintenance-free
- long life span
- resistant to chemicals
- long term signal stability

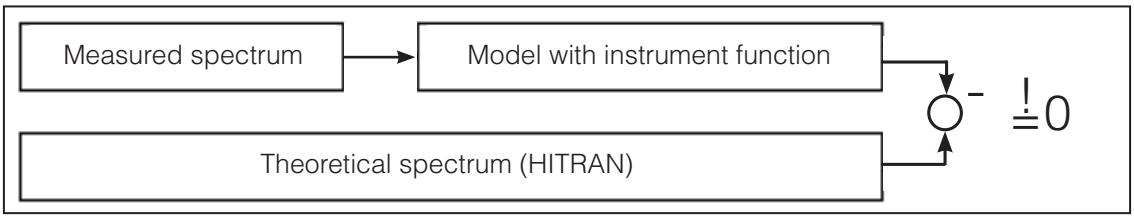
TRACE-GAS
www.trace-gas.com

The smart and calibration-free measuring method for N_2O

The highly precise LAS (Laser Absorption Spectroscopy) measurement principle is based on absorption of specific light wavelengths by molecules to be detected. The infrared laser is tunable to 1/1,000 wave numbers and long-term stabilized to the corresponding absorption wavelengths. The determination of the concentration follows the Lambert-Beer's light absorption law, evaluating the relation between intensity of transmitted (I) to incident light (I_0) at the detector. The method is not subjected to drift and insensitive to pollution.

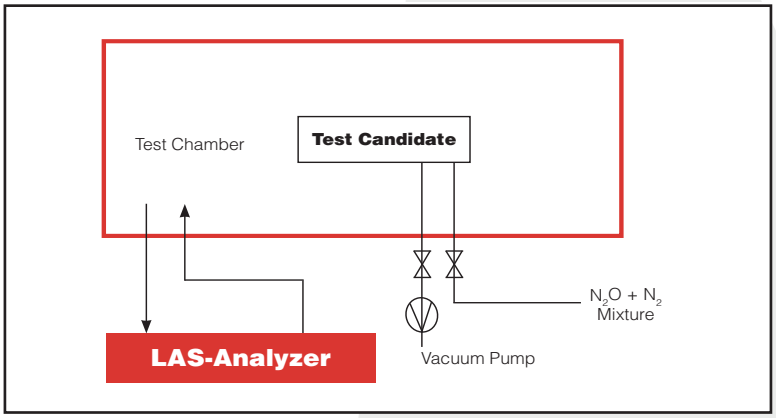


The measured spectrum and the model for the instrument function are compared with the HITRAN database containing the theoretical absorption spectrum of N_2O. The analysis algorithm continuously verifies the absence of divergences and ensures a correct measurement.



If the measured spectrum ever differs from the theoretical spectrum, the system issues a warning. In this situation users can visually inspect the absorption spectrum to discover the reason fast.

For the **detection of leaks**, a $N_2O + N_2$ mixture is inserted into a test candidate. If leaks in the test candidate are present, gas starts to escape into the chamber, and is detected by the N_2O analyzer installed there. Even smallest traces can be detected this way. This is the particular advantage of Knestel LAS analyzers, which dispose of a very low detection limit. Thanks to this property, it is possible to make use of N_2O test gas which in practice is very easy to handle.



Scheme: leak detection

Benefits at a glance

Direct physical measurement

Selective and continuous measurement of the concentration from the spectrum in MID-IR range.

> Real spectroscopy (no measurement of auxiliary parameters)

Calibration-free and physically traceable

No regular calibration of the end point is required, since the measurement is exclusively based on Lambert-Beer's light absorption law and the HITRAN database. As influences of other parameters are absent, the measurement is calibration-free and physically traceable.

> Time-consuming calibration procedures are not necessary

No cross sensitivities

The narrow-band tunable laser source ensures highest selectivity for N_2O. A plausibility check of the transmission spectrum is continuously running, profiting from a smart algorithm. Misinterpretation of the results is prevented.

> Selective measurement of N_2O in every operating state

> Divergencies are reliably detected and users are informed by means of a warning

No condensation, fast response time, low adsorption effects

As the pressure and temperature stabilized measuring chamber is kept in vacuum state, it is (thanks to the correspondingly lowered dew-point) protected from formation of condensate. The high (adjustable) flow, together with the vacuum, enables a fast response time and reduces adsorption and delay effects to a minimum.

> Outstanding conditions for safe plant control and optimized cycle times

Operation without consumables

No calibration gas, chemical substances or exchange of service parts required.

> Minimal operating costs

Hot measurement (LASmini)

> Hot measurement of rawgas up to 190 °C, eliminating the need for a cost-intensive dilution unit.

	LAS	LASmini (hot)
Technical data		
Ambient temperature	10...35 °C (non condensing)	
Inlet pressure	800...1,100 mbar	
Gas flow	~ 1.5 l/min	≤ 1 l/min
Communication	Modbus TCP/IP + Analog output 4...20 mA	
Dimensions (L x W x H)	567 x 485 x 221 mm	390 x 483 x 176 mm
Weight	approx. 19 kg	approx. 13 kg
Supply voltage	100 - 240 V AC / 50 - 60 Hz	
Heatable	-	up to 190 °C
User interface	7“ LCD (capacitive touch)	
Specifications		
Measuring range (FS) min.	0...10 ppm	0...100 ppm
max.	0...1,000 ppm	0...10,000 ppm
Limit of detection (LOD)[1] @ t_{10}-t_{90} ≤ 10 s	≤ 5 ppb (3σ, 100s)	≤ 0.2 ppm (3σ, 100s)
Linearity (greater of)	≤ ± 0.05 ppm or ± 1% MV[2]	≤ ± 2 ppm or ± 1% MV
Zero drift	≤ 5 ppb in 10 h	≤ 0.2 ppm in 10 h
Span drift	≤ ± 1% FS in 10 h	

[1]specified for constant ambient temperature, flow and inlet pressure
[2]measured value

Versions available

LAS analyzer
- incl. pump, HMI, tubing

ready for use

LASmini analyzer
- incl. pump, HMI, tubing

ready for use

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