

TILDAS Compact Single Laser N₂O Analyzer

Unprecedented precision and time response for N₂O and H₂O with options for CO & CO₂ or CH₄ in a compact, transportable package



Features

- < 30(10) ppt precision for N₂O in 1(100) s at 2200 or 2230 cm⁻¹.
- < 60(20) ppt precision for N₂O in 1(100) s at 1270 cm⁻¹
- Fast time response (10 Hz).
- Choice of N₂O/CO at 2200 cm⁻¹, N₂O/CO/CO₂ at 2230 cm⁻¹ or N₂O/CH₄ at 1270 cm⁻¹.
- All measurement choices include a determination of H₂O, allowing for the report of dry air mixing ratios.

Applications

- Determination of stratosphere/troposphere exchange.
- Laboratory measurements of discrete samples.
- Mobile measurements aboard aircraft, marine, and ground-based platforms.
- Atmosphere-biosphere exchange via chamber studies or eddy covariance flux measurements.

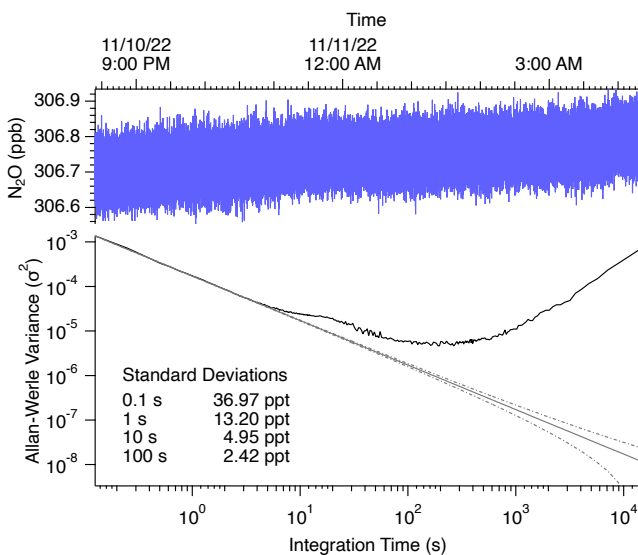
Advantages

- Time response up to 10 Hz enables eddy covariance studies.
- Powerful TDLWintel software provides flexible instrument control and real-time data analysis.
- Valve control capable of complex scheduling and automatic background and calibrations.
- 19" rack mountable for easy installation.
- Turn-key design allows unattended operation in remote field sites.

TILDAS TECHNOLOGY

Aerodyne instruments use **tunable infrared laser direct absorption spectroscopy (TILDAS)** at mid-IR wavelengths to probe molecules at their strongest "fingerprint" transition frequencies. We further enhance sensitivity by employing a patented multi-pass broad-band absorption cell that provides optical path lengths up to 400 meters. Direct absorption spectroscopy allows for fast (<1 sec) absolute trace gas concentrations without need for elaborate calibration procedures. Moreover, TILDAS instruments are relatively free of measurement interference from other molecular species, enabling extremely specific detection.

Aerodyne specializes in collaboration and custom design. Please contact us if you would like to discuss additional measurement options and applications.



Rugged, field-ready instruments

Direct absorption spectroscopy allows for highly specific and accurate gas detection

Mid-IR detection enables maximum measurement sensitivity

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Specifications

N₂O/CO precision @ 2200 cm⁻¹ (1σ)

	1 sec	100 sec
N ₂ O	30 ppt	10 ppt
CO	100 ppt	40 ppt
H ₂ O	10 ppm	5 ppm

N₂O/CO/CO₂ precision @ 2200 cm⁻¹ (1σ)

	1 sec	100 sec
N ₂ O	30 ppt	10 ppt
CO ₂	100 ppb	40 ppb
CO	1 ppb	0.4 ppb
H ₂ O	10 ppm	5 ppm

N₂O/CH₄ precision @ 1270 cm⁻¹ (1σ)

	1 sec	100 sec
N ₂ O	60 ppt	20 ppt
CH ₄	300 ppt	100 ppt
H ₂ O	10 ppm	5 ppm

Time Response

1-10 Hz data rate

< 0.1 s minimum Rise/Fall time (1/e)

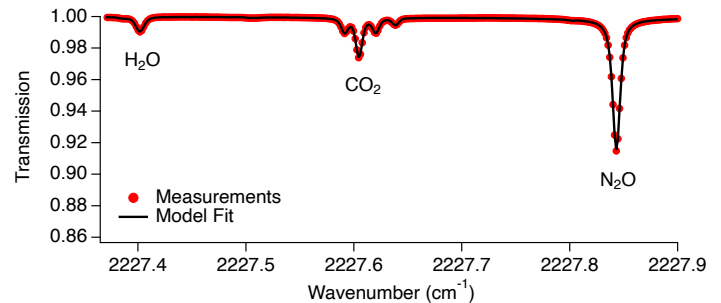
(depends on vacuum pump)

Enhanced Measurement Options

16 channel valve control for complex sampling

Low volume multi-pass cell for limited sample size and power pumps

Experimental spectrum @ 2230 cm⁻¹ acquired at 1 Hz



Installation

19" rack mountable or benchtop

Operating Conditions

Operating temperature: -20 to +40 °C

Sample flow rate: 0 to 20 slpm

Instrument Components

Core instrument

Thermoelectric chiller

Keyboard, mouse, and monitor

Vacuum pump (customer specified)

Inlet sampling system (customizable)

Data Outputs

RS-232, USB drive, ethernet

Size, Weight, Power

Dimensions: 440 mm x 660 mm x 6U (267mm)
(W x D x H)

Weight: 35 kg (core instrument) + 15 kg (chiller) +
pump weight

Electrical Power: 250 W, 120/240 V, 50/60 Hz
(without pump)

REFERENCES

Lebague, Benjamin, et al., Comparison of nitrous oxide (N₂O) analyzers for high-precision measurements of atmospheric mole fractions, *Atmospheric Measurement Techniques*, 9, 1221-1238, 2016.

Shurpali, N.J., et al., Neglecting diurnal variations leads to uncertainties in terrestrial nitrous oxide emissions, *Scientific Reports*, 6, 25739, 2016.

Rannik, Ü., et al., Intercomparison of fast response commercial gas analysers for nitrous oxide flux measurements under field conditions, *Biogeosciences* 12, 2, 415-432, 2015.