AERODYNE RESEARCH, Inc.

Aerodyne Mini-TILDAS N_2O Monitor

Unprecedented precision and time response for N_2O and H_2O with options for CO & CO_2 or CH_4 in a compact, transportable package.

Features:

- < 30(10) ppt precision for N_2O 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 N_2O/CO at 2200 cm^{-1}, N2O/CO/CO2 at 2230 cm^{-1} or N_2O/CH_4 at 1270 cm^{-1}.
- All measurement choices include a determination of H_2O, allowing for the report of dry air mixing ratios.

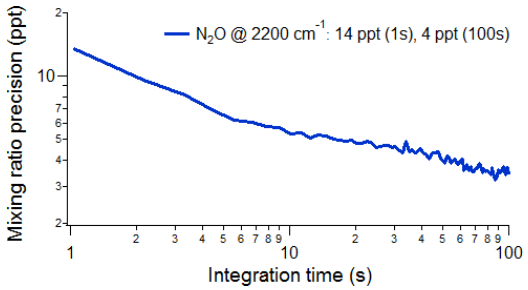
Rugged, field-ready instruments

Direct absorption spectroscopy allows for highly specific and accurate gas detection

Mid-IR detection enables maximum measurement sensitivity

TILDAS TECHNOLOGY

Aerodyne instruments use tunable infrared laser direct absorption spectroscopy (TILDAS) at mid-IR wavelengths to probe molecules at their strongest "finger-print" transition frequencies. We further enhance sensitivity by employing a patented multi-pass broad-band absorption cell that provides optical path lengths up to 76 m. 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.



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.

AERODYNE N_2O 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.

Mini-TILDAS N_2O Monitor

SPECIFICATIONS

N_2O/CO precision @ 2200 cm^{-1} (1σ)

	1 sec	100 sec
N_2O	30 ppt	10 ppt
CO	100 ppt	40 ppt
H_2O	10 ppm	5 ppm

N_2O/CO/CO_2 precision @ 2230 cm^{-1} (1σ)

	1 sec	100 sec
N_2O	30 ppt	10 ppt
CO_2	100 ppb	40 ppb
CO	1 ppb	0.4 ppb
H_2O	10 ppm	5 ppm

N_2O/CH_4 precision @ 1270 cm^{-1} (1σ)

	1 sec	100 sec
N_2O	60 ppt	20 ppt
CH_4	300 ppt	100 ppt
H_2O	10 ppm	5 ppm

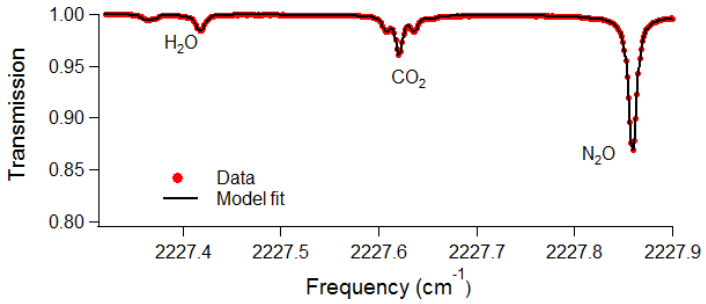
Time response

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 50 °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, 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)

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

REFERENCES

Lebegue, 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.

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Mini_NO2