

$\delta^{15}\text{N}$ and $\delta^{18}\text{O}$ Isotopic and Nitrous Oxide Gas Concentration Analyzer

PICARRO



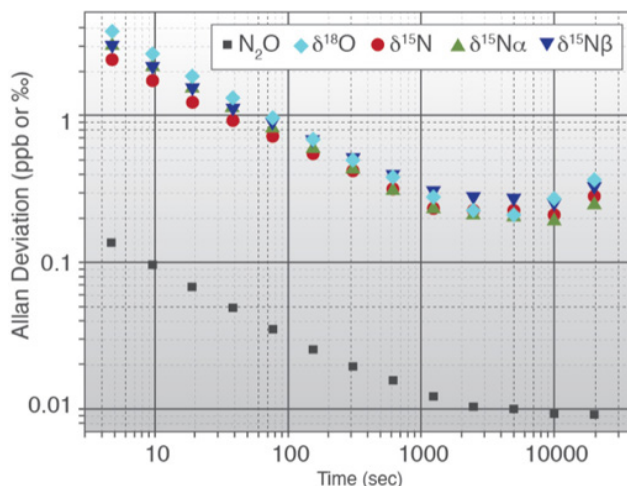
- High-precision at atmospheric concentrations
- Excellent long-term stability and low drift
- $\delta^{15}\text{N}$ compound-specific and site-specific measurements
- $\delta^{18}\text{O}$ measurement
- Field station* and laboratory deployable
- Cryogen-free, continuous operation

The **Picarro PI5131-*i* isotopic and gas concentration analyzer** enables simultaneous measurements of site specific and bulk $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$ in N_2O . With N_2O being a very potent greenhouse gas, Picarro provides an ideal solution for discerning and measuring the source of N_2O emissions real-time in the field or through grab-sample measurements in the lab. The isotopomers of N_2O can be used to probe sources and sinks in the global nitrogen cycle by identifying nitrification and denitrification processes in soils and water. Investigating terrestrial and oceanic N_2O cycles improves predictive models and the understanding of human contributions to global warming. The analyzer measures $\delta^{15}\text{N}$, $\delta^{15}\text{N}^\alpha$, $\delta^{15}\text{N}^\beta$ with a precision of 0.5‰, and it measures $\delta^{18}\text{O}$ at 0.7‰ (all precision measurements are at a 10-minute average).

Picarro's small, 48 cc, measurement cell and the reduced pressure ensures better stability, lower noise, and improved capability to handle small samples. It also produces the most compact design of any N_2O isotope analyzer.

Operating in the Mid-IR spectrum, Picarro's unique cavity ring-down spectroscopy (CRDS) technology provides unsurpassed performance by leveraging the stability of time-based measurement with the precision produced by an over 8 km optical path length.

Allan Deviation Plot



PI5131- <i>i</i> Performance Specifications			
Specifications	N ₂ O (concentration)	δ ¹⁵ N, δ ¹⁵ N ^α , δ ¹⁵ N ^β	δ ¹⁸ O
Precision (1-σ, 10 min)	<0.05 ppb	<0.7‰	<0.7‰
Precision (1-σ, 300 sec)	<0.1 ppb	<1‰	<1‰
Max Drift (> 24 hrs, peak to peak, 1 hr average)	<0.2 ppb	<3‰	<3‰
Measurement Range (ppb N ₂ O in Air)	300–1500		
Measurement Interval	<10 sec		
Response Time @ 30 sccm (Rise/Fall Time 10–90%)	<30 sec		

PI5131- <i>i</i> System Specifications	
Measurement Technique	Cavity Ring-Down Spectroscopy (CRDS)
Measurement Cell Temperature Control	±0.005°C
Measurement Cell Pressure Control	±0.0002 atm
Sample Temperature	-10 to 45°C
Temperature Sensitivity	N ₂ O concentration: <0.005 ppb/°C (typical 0.001 ppb/°C) N ₂ O isotopes: <0.1‰/°C
Sample Pressure	300 to 1000 Torr (40 to 133 kPa)
Sample Flow Rate	<50 sccm at 760 Torr, no filtration required
Sample Humidity	0–2% v H ₂ O (18°C dew point), non-condensing
Ambient Temperature Range	15 to 35°C (operating) -10 to 50°C (storage)
Ambient Humidity	<99% R.H. non-condensing
Accessories	Included: Pump (external), keyboard, mouse Optional: LCD monitor, Maintenance Kit
Data Outputs	RS-232, Ethernet, USB, Modbus, 4-20mA (optional)
Compatible Peripherals	Gas Autosampler, Small Sample Introduction Module 2 (SSIM2), 16-Port Distribution Manifold
Sample Inlet Connection	¼" stainless steel Swagelok® tube fitting
Dimensions	Analyzer: 16.65" w x 9.25" h x 30.25" d (42.3 x 23.5 x 76.8 cm) including feet External pump: 7.5" w x 4" h x 11" d (19.1 x 10.2 x 27.9 cm)
Installation	Benchtop or 19" rack mount
Weight	71 lbs (32.2 kg) for analyzer 14.3 lbs (6.5 kg) for external pump
Power Requirements	100–240 VAC; 50/60 Hz; < 400 W (total) Steady-state operation: 250 W (analyzer) and 150 W (pump)
Certifications	CE Certificate of Conformity

* Field Station Deployability:
 The PI5131-*i* system is the most conducive laser-based isotopic analyzer on the market today for field station use by virtue of its light weight, small footprint and low power consumption.
 System transportation requirement: failure to transport in the Picarro shipping crate will void warranty.
 Please check with Picarro for DC power source set up and for chamber measurement recommendations.