

Isotopic N₂O measurements, anywhere



LGR delivers

Isotopic N₂O Analyzer ($\delta^{15}\text{N}^\alpha$, $\delta^{15}\text{N}^\beta$, $\delta^{15}\text{N}$, $\delta^{18}\text{O}$, N₂O)

Features and Benefits

- Measurements of site-specific isotopic nitrogen in N₂O (¹⁴N¹⁵N¹⁶O, ¹⁴N¹⁵N¹⁶O, N₂O)
- Measurements of $\delta^{15}\text{N}$, $\delta^{15}\text{N}^\alpha$ and $\delta^{15}\text{N}^\beta$ enable quantification of N₂O sources and sinks
- Measurements of $\delta^{18}\text{O}$ allow quantification of nitrification processes.
- No cryogenics or water cooling
- High-resolution absorption spectra are viewable for instrument diagnostics
- (optional) Multiport Inlet Unit enables measurements at multiple locations
- (optional) Dynamic Dilution System extends upper range of measurements by 100x
- (optional) Manual Injection allows measurements of small volume samples via syringe

LGR's Isotopic N₂O Analyzer is the world's first commercial analyzer capable of measuring isotopic site-specific nitrogen and isotopic oxygen in nitrous oxide.

The intramolecular distribution of ¹⁵N in N₂O can provide useful information about the geochemical cycle of N₂O because many biological and chemical processes have distinct isotopic signatures. N₂O is a linear, non-symmetric molecule (N–N–O), with one nitrogen atom at the center (α site) and one at the end (β site). Therefore, one can distinguish between two structural isomers containing one heavy isotope of nitrogen, namely ¹⁴N¹⁵N¹⁶O and ¹⁵N¹⁴N¹⁶O, referred to as ¹⁵N $^\alpha$ and ¹⁵N $^\beta$, respectively.

Employing a quantum cascade laser along with LGR's patented cavity enhanced laser absorption spectroscopy technique (Off-axis ICOS), LGR's Isotopic N₂O Analyzer provides continuous and precise analysis of the site-specific isotopic ratios $\delta^{15}\text{N}^\alpha$, $\delta^{15}\text{N}^\beta$, and $\delta^{18}\text{O}$, of N₂O directly and without any preconcentration or water cooling.

In addition, the Isotopic N₂O Analyzer is part of LGR's "Enhanced Performance" (EP) series which incorporates proprietary internal thermal

control and provides ultra-stable measurements with unsurpassed precision, accuracy and drift. Moreover, only LGR's analyzers provide reliable *guaranteed* measurements at mole fractions more than 20 times ambient levels.

This novel instrument may be used by researchers to elucidate processes in soil and wastewater incubation experiments (e.g., bacterial denitrification method) as well as in ambient air for source allocation.

LGR Analyzers use LGR's Off-axis ICOS technology, a fourth-generation cavity enhanced laser absorption technique. Off-axis ICOS has many advantages over conventional Cavity Ringdown Spectroscopy (CRDS) techniques such as being alignment insensitive, having a much shorter measurement time, and not requiring expensive and power consuming auxiliary components.

LGR Analyzers include an internal computer that can store data practically indefinitely on an internal hard drive and send real-time data to a data logger through its digital (RS232) outputs. In addition, all LGR Analyzers may be fully accessed and controlled over the Internet for remote diagnostics and unattended operation.

Isotopic N₂O Analyzers

Performance Specifications

Model 914-0022 (N₂O, δ¹⁵N^α, δ¹⁵N^β, δ¹⁵N)

Precision (1σ, 100 seconds, N₂O > 300 ppb):

N₂O: 0.2 ppb

δ¹⁵N, δ¹⁵N^α, δ¹⁵N^β: better than 1 ‰

Model 914-0027 (N₂O, δ¹⁵N^α, δ¹⁵N^β, δ¹⁵N, δ¹⁸O)

Precision (1σ, 300 seconds, N₂O > 300 ppb):

N₂O: 0.2 ppb

δ¹⁵N, δ¹⁵N^α, δ¹⁵N^β, δ¹⁸O: better than 1 ‰

Maximum Drift (15 min average, at STP, over 24 hrs):

N₂O: 1 ppb

δ¹⁵N, δ¹⁵N^α, δ¹⁵N^β, δ¹⁸O: less than 1 ‰

Measurement Rates:

User-selectable: up to 1 Hz

Measurement Range (meets all specs):

N₂O: 0.3 – 100 ppm (model 914-0022)

N₂O: 0.3 – 100 ppm (model 914-0027)

Operational Range:

N₂O: 0 – 1000 ppm

Temperature/Humidity:

Operating Temperature: 0 – 45 °C

ambient humidity: non-condensing (0-100% RH)

Fittings:

Inlet: 3/8"

Outlet (internal vacuum pump): 1/4"

Outputs:

digital (RS-232), Ethernet, USB

Power Requirements:

115/230 VAC, 50/60 Hz, 400 watts (steady state)

Dimensions (compatible with instrument racks):

14" x 45" x 17"

Weight:

68 kg



Ordering Information

Part Number 914-0022 (measures N₂O, δ¹⁵N^α, δ¹⁵N^β, δ¹⁵N)

Part Number 914-0027 (measures N₂O, δ¹⁵N^α, δ¹⁵N^β, δ¹⁵N, δ¹⁸O)

Accessories

908-0003-9001: Multiport Inlet Unit –
Automated control of up to 16 inlet ports

908-0003-9002: Multiport Inlet Unit –
Automated control of up to 8 inlet ports

907-0005-9002: Dynamic Dilution System –
Extends upper measurement range by 100x through
automated sample dilution with zero air

908-0005-9002: Syringe Injection –
Allows measurements of discrete samples via manual injection

904-0002: Data Logging System – multi-channel data logging
system records and synchronizes serial (RS-232) outputs from
multiple LGR analyzers and other devices (GPS, anemometers)



Instrument complies with 21 CFR 1040.10 and 1040.11