

N₂O, CH₄, CO₂, NH₃ and H₂O Gas Concentration Analyzer

PICARRO



- Simultaneously measures five gases in air: N₂O, CH₄, CO₂, NH₃, and H₂O
- Parts-per-billion sensitivity brings excellent rate-of-rise quantification
- Rapid response time and continuous measurements provide data at high temporal resolution
- Integrates easily with chamber systems. Field-proven platform
- Automatically corrects data for presence of water vapor

The **Picarro G2508 gas concentration analyzer** radically simplifies soil flux studies by simultaneously measuring five gases—N₂O, CH₄, CO₂, NH₃, and H₂O—to provide a complete picture of greenhouse gas soil emissions. Greenhouse gas exchange between soil and the atmosphere is a critical step in the global nitrogen and carbon cycles. The G2508 easily integrates with soil chambers, and there is no

need to assemble and synchronize separate gas analyzers to observe the behavior of all the major greenhouse gases. The G2508 employs precise cavity ring-down spectroscopy (CRDS) technology to measure gas concentrations to parts-per-billion (ppb) sensitivity with negligible drift. And unique Picarro algorithms provide automatic water correction of N₂O, CH₄, CO₂ and NH₃.

G2508 Performance Specifications and Typical Performance in Air

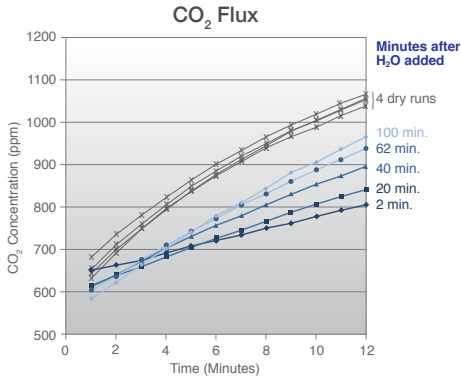
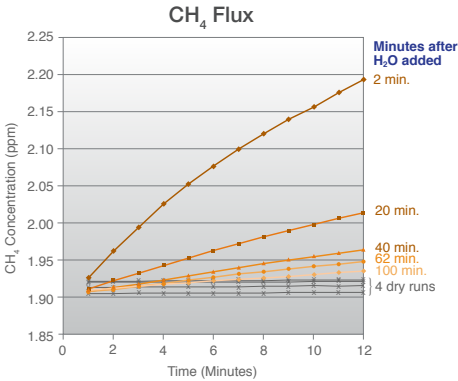
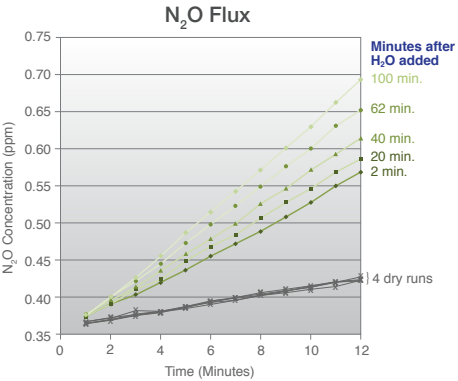
Parameters	N ₂ O	CH ₄	CO ₂	NH ₃	H ₂ O
Precision Raw (1σ)	<25 ppb + 0.05% of reading Typical = 5.0 ppb*	<10 ppb + 0.05% of reading Typical = 0.3 ppb*	<600 ppb + 0.05% of reading Typical = 240 ppb*	<5 ppb + 0.05% of reading Typical = 0.16 ppb*	<500 ppm
Precision 1 min (1σ)	<10 ppb + 0.05% of reading Typical = 1.1 ppb*	<7 ppb + 0.05% of reading Typical = 0.1 ppb*	<300 ppb + 0.05% of reading Typical = 74 ppb*	<3 ppb + 0.05% of reading Typical = 0.07 ppb*	<250 ppm
Precision 5 min (1σ)	<5 ppb + 0.008% of reading Typical = 0.6 ppb*	<5 ppb + 0.02% of reading Typical = 0.1 ppb*	<200 ppb + 0.05% of reading Typical = 38 ppb*	<1 ppb + 0.05% of reading Typical = 0.04 ppb*	<100 ppm
Guaranteed Spec Range	0.3–200 ppm	1.5–12 ppm	380–5000 ppm	0–300 ppb	0–3%
Operating Range	0–400 ppm	0–15 ppm	0.02–2%	0–2 ppm	0–7%
Measurement Rate	<8 secs	<8 secs	<8 secs	<8 secs	<8 secs
Typical Gas Response (Rise-Fall 10-90%, 90-10%)	~8 secs	~8 secs	~8 secs	See Note below	See Note below
Report Dry Mole Fraction	Yes	Yes	Yes	Yes	N/A

Note: The response of H₂O and NH₃ are limited by the adsorption of these species to the surfaces of the experimental apparatus. While the analyzer will accurately measure the concentration of NH₃ and H₂O within the cavity, calculating the actual flux of NH₃ and H₂O from the soil with these measurements will be convolved by the adsorption dynamics within the system.

* Typical performance is defined as the median of testing results from 50 sequentially built G2508 analyzers. As measured for typical ambient concentrations.

Analyzer specificity: Picarro's CRDS technology utilizes extremely narrow spectral regions, which greatly reduces the likelihood of interference from other gas species when compared to other spectral measurement techniques. However, in real-world samples, interferences can happen. Picarro has included interference detection software and has tested and characterized the effects of the following species for this analyzer:

G2508 Trace Gases	N ₂ O Sensitivity
Carbon Dioxide	None - Automated correction good to 20,000 ppm CO ₂
Methane	None - Automated correction good to 200 ppm CH ₄
Ammonia	None - Automated correction good to 2 ppm NH ₃
Ethane	0.2 ppb N ₂ O/ppm C ₂ H ₆ tested up to 120 ppm
Ethylene	0.5 ppb N ₂ O/ppm C ₂ H ₄ tested up to 16 ppm
Acetylene	Not for use with acetylene experiments
Background Gas	Designed for use in ambient air, not for use with highly varying or enriched N ₂ , O ₂ , H ₂ , or He
ChemDetect™ Software	Unique Picarro algorithms detect and flag data which may be inaccurate due to spectroscopic interference
G2508 System Operation Parameters	Specifications
Ambient Temperature	10 to 35°C
Ambient Humidity	<85% RH, non-condensing
Sample Pressure	300 to 1,000 Torr (40 to 133 kPa)
Sample Flow Rate	~230 sccm
Sample Humidity	<99% RH, non-condensing, Water correction tested to 25°C dew point
Sample Temperature	-10 to 45°C
Cavity Temperature Control	+/-0.005°C
Cavity Pressure Control	+/-0.0002 atm
Closed-loop/Recirculation Capability	Compatible with Picarro Closed System Pump A0702
Inlet Fittings	¼" Swagelok®
Dimensions	17" w x 7" h x 17.5" d (43.2 x 17.8 x 44.6 cm) not including 0.5" feet
Weight	50 lbs (22.6 kg)
Power Requirements	100–240 VAC; 50/60 Hz (auto-sensing); < 375 W at start-up (total). Steady-state operation: 120 W (analyzer), 150 W (pump).
Installation	Benchtop (standard) or 19" rack mount chassis (optional)
Accessories	Included: Keyboard, mouse. Optional: LCD monitor. Excluded: Vacuum pump
Options	A0702, Picarro Closed System Pump S0528, O ₂ sensor for O ₂ measurements and correction in varying O ₂ environments S0517, Extended CH ₄ operating range up to 800 ppm



Simulated rain event in closed-system chamber lab study: Concentration time series for dry and wet dirt measurements of N₂O, CH₄ and CO₂ are shown (concentrations measured before and after adding water to soil). After adding water, N₂O emission rate triples in 2 min and continues to rise, while CH₄ emission rate spikes and then decreases, and CO₂ emission rate is suppressed but recovers slowly. Contact Picarro for more details and the latest data related to this study.