

# N<sub>2</sub>O, CH<sub>4</sub>, CO<sub>2</sub>, NH<sub>3</sub> and H<sub>2</sub>O Gas Concentration Analyzer

# PICARRO



- Simultaneously measures five gases in air: N<sub>2</sub>O, CH<sub>4</sub>, CO<sub>2</sub>, NH<sub>3</sub>, and H<sub>2</sub>O
- 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— N<sub>2</sub>O, CH<sub>4</sub>, CO<sub>2</sub>, NH<sub>3</sub>, and H<sub>2</sub>O—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 N<sub>2</sub>O, CH<sub>4</sub>, and CO<sub>2</sub>.

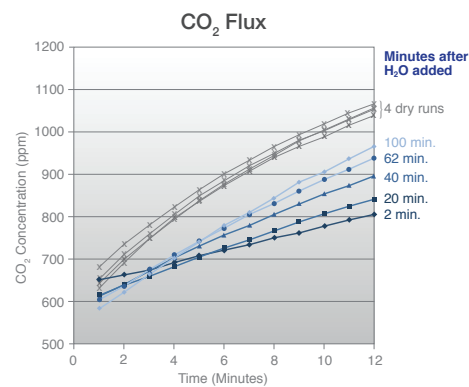
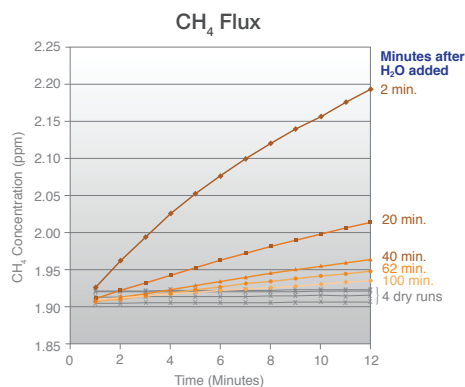
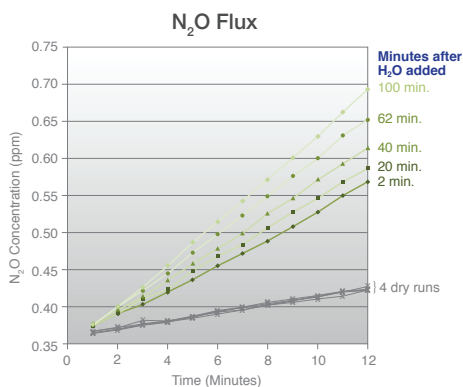
G2508 Performance Specifications in Air

Specification	N <sub>2</sub> O	CH <sub>4</sub>	CO <sub>2</sub>	NH <sub>3</sub>	H <sub>2</sub> O
<b>Precision Raw (1σ)</b>	<25 ppb +0.05% of reading	<10 ppb +0.05% of reading	<600 ppb +0.05% of reading	<5 ppb +0.05% of reading	<500 ppm
<b>Precision 1 min (1σ)</b>	<10 ppb +0.05% of reading	<7 ppb +0.05% of reading	<300 ppb +0.05% of reading	<3 ppb +0.05% of reading	<250 ppm
<b>Precision 5 min (1σ)</b>	<5 ppb +0.008% of reading	<5 ppb +0.02% of reading	<200 ppb +0.05% of reading	<1 ppb +0.05% of reading	<100 ppm
<b>Guaranteed Spec Range</b>	0.3–200 ppm	1.5–12 ppm	380–5000 ppm	0–300 ppb	0–3 %
<b>Operating Range</b>	0–400 ppm	0.5–15 ppm	0.02–2 %	0–2 ppm	0–7 %
<b>Measurement Rate</b>	<8 seconds	<8 seconds	<8 seconds	<8 seconds	<8 seconds
<b>Typical Gas Response (Rise-Fall 10-90%, 90-10%)</b>	~8 seconds	~8 seconds	~8 seconds	See Note below	See Note below
<b>Report Dry Mole Fraction</b>	Yes	Yes	Yes	No	N/A

**Note:** The response of H<sub>2</sub>O and NH<sub>3</sub> are limited by the adsorption of these species to the surfaces of the experimental apparatus. While the analyzer will accurately measure the concentration of NH<sub>3</sub> and H<sub>2</sub>O within the cavity, calculating the actual flux of NH<sub>3</sub> and H<sub>2</sub>O from the soil with these measurements will be convolved by the adsorption dynamics within the system.

**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 <sub>2</sub> O Sensitivity
Carbon Dioxide	None - Automated correction good to 20,000 ppm CO <sub>2</sub>
Methane	None - Automated correction good to 200 ppm CH <sub>4</sub>
Ammonia	None - Automated correction good to 2 ppm NH <sub>3</sub>
Ethane	0.2 ppb N <sub>2</sub> O/ppm C <sub>2</sub> H <sub>6</sub> tested up to 120 ppm
Ethylene	0.5 ppb N <sub>2</sub> O/ppm C <sub>2</sub> H <sub>4</sub> 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 <sub>2</sub> , O <sub>2</sub> , H <sub>2</sub> , 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	10–35°C
Ambient Humidity	<99% 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	-10–45°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	100–240 VAC, 47–63 Hz (auto-sensing), <260 W start-up; 110 W at steady state
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 <sub>2</sub> sensor for O <sub>2</sub> measurements and correction in varying O <sub>2</sub> environments S0517, Extended CH <sub>4</sub> 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 N<sub>2</sub>O, CH<sub>4</sub> and CO<sub>2</sub> are shown. After adding water, N<sub>2</sub>O emission rate triples in 2 min and continues to rise, while CH<sub>4</sub> emission rate spikes and then decreases, and CO<sub>2</sub> emission rate is suppressed but recovers slowly. Contact Picarro for more details and the latest data related to this study.