

CO₂, CH₄ and H₂O Gas Analyzer

PICARRO



- Parts-per-billion sensitivity, precision and accuracy
- Field and laboratory deployable
- Lowest drift of any continuous greenhouse gas measurement instrument
- Rugged and insensitive to change in ambient temperature
- Meets the WMO Data Quality Objectives and the ICOS for CO₂ and CH₄

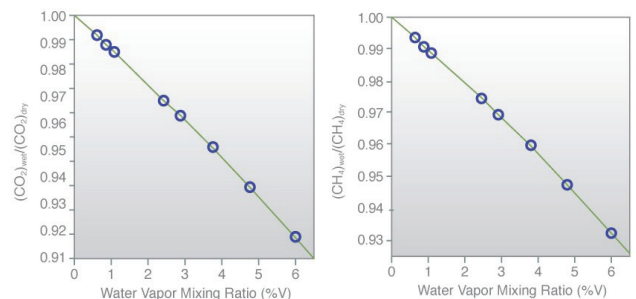
The **Picarro G2301 greenhouse gas concentration analyzer** enables simultaneous measurements of CO₂, CH₄ with part-per-billion (ppb) sensitivity and negligible drift over months of operation. The G2301 also features Picarro's unique algorithms to correct for the dilution effect of H₂O vapor and to report dry gas mole fractions of CO₂ and CH₄.

The G2301 is compliant with performance requirements established by The World Meteorological Organization (WMO), and other international networks, such as the Integrated Carbon Observation System (ICOS) for atmospheric monitoring stations.

The unique combination of continuous 3-species measurement, high precision, field deployability, and long-term reliability makes the G2301 the instrument of choice for greenhouse gas measurements.

Patented Picarro cavity ring-down spectroscopy (CRDS) technology enables an effective measurement path length of up to 20 kilometers in a compact cavity, which results in exceptional precision and sensitivity

in a small-footprint analyzer. A meticulously designed small optical cavity incorporates precise temperature and pressure control. As a result, the analyzer delivers a best-in-class combination of precision, accuracy, low drift, and ease-of-use.



Quadratic fit of CO₂wet/CO₂dry mixing ratios (left) and quadratic fit of CH₄wet/CH₄dry vs. H₂O mixing ratios (right).

Mixing ratios for carbon dioxide and methane are only meaningful when extrapolated back to dry-gas conditions. Picarro's G2301 analyzer enables you to measure dry-gas mixing ratios for carbon dioxide and methane directly in the wet gas stream. Only Picarro includes automated water vapor corrections which have been independently validated by top labs: NOAA, MPI, LSCE.

Picarro Environmental, Shock and Vibration Testing (Performed on Every Analyzer)

Thermal Ramp Testing (whole instrument)	> 12 hours operational temperature step testing from 5° to 40 °C with 40 minute soak at each 5 °C increment. Performance specs verified throughout the testing range.
Long-Term Thermal Testing (whole instrument)	One week operational temperature step testing from 30° to 40 °C with 40 minute soak at each 5 °C increment. Performance specs verified throughout the testing range.
Storage Testing (whole instrument)	-10 °C & 50 °C soak (non-oper) + post test performance confirm
Vibration Testing	2 axis, 25 Hz, 1gp-p acceleration, 15 minutes on each axis
Shock Testing Using MIL-STD 810F	Pivoted edge drops onto a hard surface (lab bench), from 4" height, all 12 edges (x, y, z axes), 2 drops each edge
Power Interruption Testing	Minimum 5 successful AC power cycle startups

G2301 Guaranteed Performance Specifications, <i>in air</i>	CO ₂	CH ₄	H ₂ O
Precision (1-σ of: Raw 5 sec / 5 min avg data) Guaranteed over operating conditions specified below	< 70 ppb / 25 ppb	< 0.5 ppb / 0.22 ppb	< 80 ppm / 30 ppm
Max Drift at STP (over 24 hrs / 1 month) *(peak-to-peak, 50-minute average) Guaranteed over operating conditions specified below	< 120 ppb / 500 ppb	< 1 ppb / 3 ppb	< 100 ppm ± 0.5% of reading
Automated Determination of Dry Mol Fraction	Included	Included	n/a
Operating Range	0 - 1000 ppm	0 - 20 ppm	0 - 7 %v (39 °C dew pt) non-condensing
Guaranteed Specifications Range	300 - 700 ppm	1 - 3 ppm	0 - 3 %v (25 °C dew pt) non-condensing
Measurement Interval (Data Rate)	< 5 seconds	< 5 seconds	< 5 seconds
Gas Response: Rise/Fall time (10-90 % / 90-10 %)	< 3 seconds	< 3 seconds	< 3 seconds
Measurement Cell Control	Temperature: +/- 0.005 °C & Pressure: +/- 0.0002 atm		

* Picarro calculates drift by subtracting the min from the max of 50 min averages taken over 30 hrs of testing

G2301 Guaranteed Operating Conditions

Ambient Temperature Range	+10 °C to +35 °C operating / -10 °C to +50 °C storage
Ambient Humidity	<99% RH non-condensing
Sample Gas Pressure	300 to 1000 Torr (40 to 133 kPa)
Sample Gas Humidity	< 99 % R.H. non-condensing
Sample Gas Temperature	-10 to 45 °C
Sample Gas Flow Rate Req.	< 0.4 slm at 760 Torr / No filtration required

G2301 System Specifications

Dimensions	Analyzer: 17" w x 7" h x 17.5" d (43.2 x 17.9 x 44.5 cm) not inc. 0.5" feet, External pump: 7.5" w x 4" h x 11" d (19 x 10.2 x 28 cm)
Weight	60.4 lbs (27.4 kg), including external pump
Power Requirements	100 - 240 VAC, 47 - 63 Hz (auto-sensing), < 260 W total at start-up 110 W (analyzer) + 80 W (pump) at steady state
Gas Inlet Fittings	¼" Swagelok ®

Included Accessories: External vacuum pump, vacuum line & fittings, keyboard, mouse, internal 160 GB hard drive

Installation: Bench-top (standard), 19" rack mount (optional), LCD monitor (optional)

Data Outputs: RS-232, Ethernet, USB, Analog (optional) 0-10 V

Optional Accessories: Integrates seamlessly with Picarro's 16-Port Distribution Manifold to simplify multi-point sampling

This product is not optimized for vehicular deployment where there is a requirement for pin-pointing precise methane source locations while driving. As a result, we do not support this product's use for natural gas leak detection or other real-time methane emissions applications while driving. The Picarro Surveyor™ system is the optimal product for such studies.

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