

# PICARRO G2401

## CO<sub>2</sub> + CO + CH<sub>4</sub> + H<sub>2</sub>O

### CRDS Analyzer



Highest performance field-deployable analyzer for measuring atmospheric trace gases.

- Simultaneous and continuous measurement of four atmospheric trace gases
- Globally recognized for precision, accuracy, and portability
- Meets the WMO Data Quality Objectives for CO, CO<sub>2</sub> & CH<sub>4</sub>
- Lowest drift of any continuous greenhouse gas measurement instrument
- Unique water correction automatically reports dry gas mol fractions

**Advantage Note:** Picarro's near-infrared Cavity Ring-Down Spectroscopy (CRDS) technology is capable of measuring CO<sub>2</sub>, CO, CH<sub>4</sub> and water vapor down to parts-per-billion (ppb) sensitivity with negligible drift for months of continuous high quality data collection. The G2401 also features Picarro's unique water correction software, which automatically reports dry gas mol fractions to help reduce research complexity and consumable costs. From remote station monitoring on Oregon mountain tops to in situ measurements on the Eiffel tower, researchers the world over have field-proven Picarro analyzers.

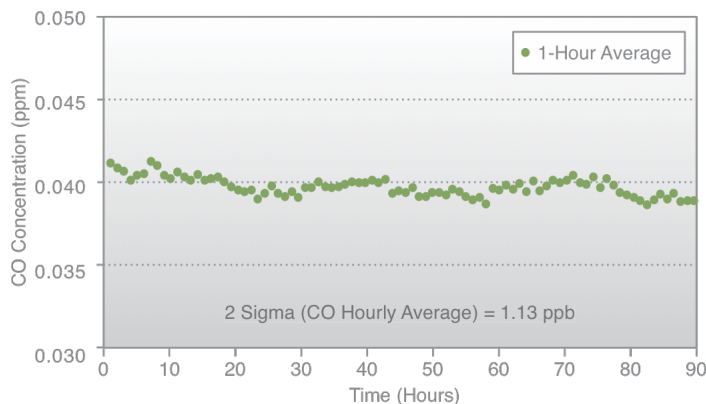
**Compliant with International Networks:** The World Meteorological Organization (WMO), and other international networks, such as the Integrated Carbon Observation System (ICOS), publish detailed performance requirements for CO<sub>2</sub>, CH<sub>4</sub> and CO measurements made at their associated atmospheric monitoring stations. Picarro tests and guarantees that the G2401 meets these requirements. The unique

combination of continuous 4-species measurement, high precision, field deployability, and long-term reliability makes the G2401 the instrument of choice for greenhouse gas measurements.

**Picarro's Patented CRDS Technology:** The heart of the Picarro analyzer is a sophisticated time-based measurement that uses a laser to quantify spectral features of gas phase molecules in an optical cavity. Picarro's patented CRDS technology enables an effective measurement path length of up to 30 kilometers in a compact cavity, which results in exceptional precision and sensitivity with a small footprint. Because lasers drift in all instruments, Picarro uses a patented, high-precision wavelength monitor to maintain absolute spectral position and the most accurate peak quantification of any instrument. For researchers, Picarro analyzers deliver a best-in-class combination of precision, accuracy, and ease of use.

**Portable & Ruggedly Build for Field Deployment:** The rack-mountable, small and easy to transport Picarro G2401 can be running within minutes, and can operate for months without user interaction. In order to ensure measurement fidelity over long periods of time, even in the harshest environments, Picarro's meticulously designed optical cavities incorporate precise temperature and pressure control. Scientists using these systems have reported the highest quality data, day in and day out, with fewer calibrations than other spectral absorption-based instruments.

**Easy Data Management & Instrument Control:** The analyzer can be configured to automatically deliver data in the format best suited to the application. Digital (RS-232) or analog data can be transmitted via



CO Drift - 90 Hours with Reference Gas

Ethernet at user-defined intervals or output in real-time. access data remotely.  
Or a Remote Desktop connection can be used to

Guaranteed Performance Specifications <i>in dry air</i>	CO <sub>2</sub>	CO	CH <sub>4</sub>	H <sub>2</sub> O
<b>Precision (5 sec / 5 min / 60 min, 1<math>\sigma</math>)</b> <i>Reference gas not needed</i>	< 50 ppb / 20 ppb / 10 ppb	< 15 ppb / 1.5 ppb / 1 ppb	< 1 ppb / 0.5 ppb / 0.3 ppb	< 30 ppm / 5 ppm / n/a
<b>Max Drift at STP (over 24 hrs / 1 month)</b> <b>(peak-to-peak, 50-minute average)</b> <i>Reference gas not needed</i>	100 ppb / 500 ppb	10 ppb / 50 ppb	1 ppb / 3 ppb	100 ppm $\pm$ 5% of reading
<b>Max Uncertainty using Reference Gas</b> <b>(1 hr average, 2<math>\sigma</math>)</b> <i>WMO Data Quality Objective for GAW Stations</i>	< 50 ppb	< 2 ppb	< 1 ppb	n/a
<b>Reproducibility (10 min, 1<math>\sigma</math>)</b> <sup>[1]</sup> <i>ICOS Atmospheric Station Specification</i>	< 50 ppb	< 1 ppb	< 0.5 ppb	n/a
<b>Automated Determination of Dry Mol Fraction</b>	Included	Included	Included	n/a
<b>Operating Range</b>	0 – 1000 ppm	0 – 5 ppm	0 – 20 ppm	0 – 7 %v H <sub>2</sub> O
<b>Guaranteed Specifications Range</b>	300 – 500 ppm	0 – 1 ppm	1 – 3 ppm	0 – 3 %v H <sub>2</sub> O
<b>Measurement Interval</b>	< 5 seconds	< 5 seconds	< 5 seconds	< 5 seconds
<b>Rise/Fall time (10 - 90 % / 90 - 10%)</b>	< 5 seconds	< 5 seconds	< 5 seconds	< 5 seconds

<sup>[1]</sup> When alternately measuring a dry natural air cylinder for 30 minutes and ambient air for 280 minutes with statistics based on last 10 minute average data of 30 minute cylinder measurement.

System Specifications	
<b>Measurement Technique</b>	Cavity Ring-Down Spectroscopy (CRDS)
<b>Measurement Cell Temperature Control</b>	+/- 0.005 °C
<b>Measurement Cell Pressure Control</b>	+/- 0.0002 atm
<b>Sample Temperature</b>	-10 to 45 °C
<b>Sample Pressure</b>	300 to 1000 Torr (40 to 133 kPa)
<b>Sample Flow Rate</b>	< 0.4 slm at 760 Torr, no filtration required
<b>Sample Humidity</b>	< 99 % R.H. non-condensing @ 40 °C, no drying required
<b>Ambient Temperature Range</b>	10 to 35 °C (operating) -10 to 50 °C (storage)
<b>Ambient Humidity</b>	< 99 % R.H. non-condensing
<b>Accessories (Included)</b>	Pump (external), keyboard, mouse, LCD monitor (optional)
<b>Outputs</b>	RS-232, Ethernet, USB, analog (optional) 0 – 10 V
<b>Fittings</b>	1/4" Swagelok ®
<b>Dimensions</b>	Analyzer: 17" w x 7" h x 17.55" d (43.18 x 17.78 x 44.57 cm) not incl. 0.5" feet External Pump: 7.5" w x 4" h x 11" d (19 x 10.2 x 28 cm)
<b>Installation</b>	Benchtop (standard) or 19" rack mount chassis (optional)
<b>Weight</b>	59.3 lbs (26.9 kg), includes external pump
<b>Power Requirements</b>	100 - 240 VAC, 47 - 63 Hz (auto-sensing), < 260 W start-up (total); ~ 110 W (analyzer) + 80 W (pump) at steady state

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.