PICARRO

The World's Leading Instruments for Carbon and Water Cycle Measurements

# PICARRO G2121-i Isotopic Carbon-Analyzer

## Isotopic Carbon-Analyzer coupled to sample preparation systems


- *High-precision & high-accuracy with minimal drift*
- *Two-fold dynamic range (2000ppm-4000ppm)*
- *Field and laboratory deployable with no consumables*
- *Installed and operational in 60 minutes*
- *Rugged and insensitive to changes in ambient temperature*
- *For use with CM-CRDS and the AutoMate Sample Preparation device only*

**Figure and data: Analysis of five acetanilide solid samples using CM-CRDS.**

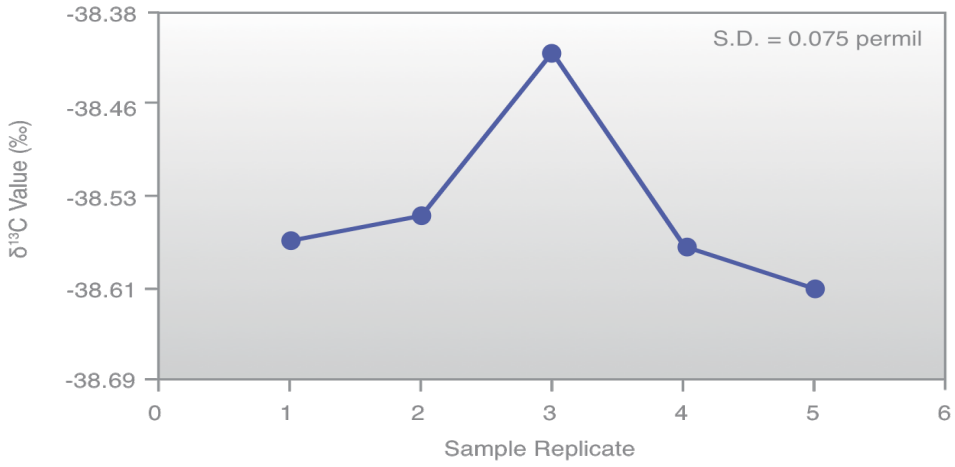


*Fig 1. Analysis of five acetanilide solid samples using Picarro Combustion Module (CM) coupled to the G2121-i CRDS. The standard deviation of the d13C values of the five sample replicates is outstanding.*

**Advantage Note:** The Picarro G2121-*i* Isotopic $CO_2$ Analyzer is capable of measuring stable isotope ratios of carbon in $CO_2$ and total $CO_2$ concentration when coupled to a sample preparation front-end such as an Elemental Analyzer (EA), a Dissolved Inorganic Carbon acidification module or with Picarro's Combustion Module (CM) designed by Costech. The analyzer is based on Picarro's unique Cavity Ring Down Spectroscopy (CRDS), a time-based measurement utilizing a near-infrared laser to measure a spectral signature of the molecule. Gas is circulated in an optical measurement cavity with an effective path length of up to 20 kilometers. A patented, high-precision wavelength monitor makes certain that only the spectral feature of interest is being monitored, greatly reducing the analyzer's sensitivity to interfering gas species, and enabling the high-precision $_{13}C$ isotope measurements even if there are other gases present. As a result, the analyzer maintains high linearity, high precision, and high accuracy over a two-fold dynamic range (2000ppm-4000ppm) with minimal calibration required. Precise temperature and pressure control systems designed into the Picarro G2121-*i* ensure accurate measurements over long periods of time with minimal use of calibration gases or standard reference material. The analyzer itself is exceptionally rugged and insensitive to changing ambient temperature, essentially drift and maintenance free, and requires no consumables, thereby offering significant ease-of-use and cost of ownership benefits.

Easily transportable from site to site, the analyzer can be set up and acquiring data within 60 minutes. The gas concentration is displayed in real-time with no post-processing required, and is continuously archived to the analyzer's internal hard drive. Designed to operate both in laboratories and in field settings, the analyzer can be remotely accessed for data monitoring with the analyzer's internal Windows-based PC and control it through a standard

Remote Desktop connection or with similar remote login software. The analyzer can also use the internet connection to automatically synchronize with an atomic clock time service.

**Note:** If customers wish to use the G2121-*i* for atmospheric applications, they will need to purchase the Picarro Ambient Air Certification (P/N A0502) or they may expect a significant reduction in precision and accuracy at ambient air conditions. Also, it is important to remember that in the case of dual use (ambient and high concentration) two separate calibrations should be performed; one for the high concentration $CO_2$ level with $N_2$ as a background gas and one at ambient air conditions. Picarro provides an isotopic calibration software utility that streamlines this process.

**About Picarro CRDS**

Picarro's unique Cavity Ring-Down Spectroscopy (CRDS) system is a time-based measurement system that uses a near-infrared laser to quantify spectral features of molecules in a sample gas passed through an optical measurement cavity. An effective path length of up to 20 kilometers inside the cavity results in exceptional instrument precision and sensitivity. The optical cavity is thermally controlled to ensure minimal drift, even in the harshest environments. Precise temperature and pressure control systems designed into the analyzer ensure accurate measurements over long periods of time as well as allow extremely infrequent calibration. Picarro CRDS systems all include a patented, high-precision wavelength monitor that makes certain the analyzer only monitors spectral features of interest. For researchers, the CM-CRDS delivers a best-in-class combination of flexibility, speed, high-precision, and ease of use that sets a new standard for bulk stable isotope analysis.

| **Targeted Performance Specification** | |
|---|---|
| **Gas Species** | **Precision (5min pulse average)** |
| $\delta^{13}C$ in $CO^2$ | <0.4 ‰ (0.2-0.3 ‰ typical) sample-to-sample |
| $_{12}CO_2$ Concentration Range | 2000ppm – 4000ppm |

| **System Specifications** | |
|---|---|
| **Measurement Technique** | CRDS |
| **Range** | $CO_2$: 2000-4000 ppm |
| **Measurement Interval** | ~10 seconds |
| **Sample Temperature** | -10 to 45 °C |
| **Sample Flow Rate** | < 0.1 slm at 760 Torr, no filtration required |
| **Sample Pressure** | 300 to 1000 Torr (40 to 133 kPa) |
| **Sample Humidity** | < 99% R.H. non-condensing @ 40 °C, no drying required |
| **Temperature** | 10 to 35 °C (operating) -10 to 50 °C (storage) |
| **Humidity (ambient)** | < 99% R.H. non-condensing |
| **Other Gases Measured** | $H_2O$ |
| **Accessories** | Pump (external), keyboard, mouse, LCD monitor (optional) |
| **Outputs** | RS-232, Ethernet, USB, analog (optional) 4-20 mA / -10 – 10V |
| **Fittings** | ¼" Swagelok ® |
| **Dimensions** | Analyzer: 17" w x 7" h x 17.55" d (43.18 x 17.78 x 44.57 cm) not incl. 0.5" feet<br>External Pump: 5.6" w x 6.4" h x 11.9" d (14.3 x 16.3 x 30.3 cm) |
| **Installation** | Benchtop |
| **Weight** | 60.4 lbs (27.4kg), includes external pump |
| **Power Requirements** | 90-120 VAC, 50/60 Hz, 220 VAC, 50 Hz, < 300 W |