

# $\delta^{13}\text{CH}_4$ and $\text{C}_2\text{H}_6$ -to- $\text{CH}_4$ Gas Analyzer

# PICARRO



- Simultaneously measures  $\delta^{13}\text{CH}_4$  and  $\text{C}_2\text{H}_6$ -to- $\text{CH}_4$  ratio
- Measures  $\text{CO}_2$  and  $\text{H}_2\text{O}$  vapor, and reports dry mole fractions
- Field-deployable for real-time  $\text{CH}_4$  emissions source attribution
- Small cavity (35 mL) for fast sample turnover time
- High precision and low drift with outstanding temperature and pressure (T&P) stability

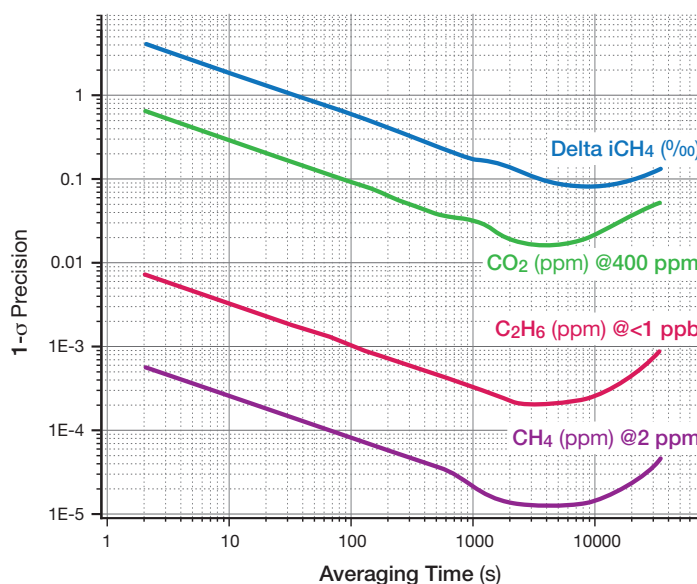
The **Picarro G2210-i Analyzer** is designed to address the scientific community's need for real-time methane emissions source attribution. High-precision atmospheric methane and ethane measurement capabilities, combined with carbon dioxide and water vapor measurements, provide the user with a unique tool to measure and determine the source of methane emissions—including landfills, fracking sites and abandoned oil and gas wells.

Methane ( $\text{CH}_4$ ) is responsible for about 20% of global warming, and about 60% of methane emissions originate from anthropogenic activities. Long-term trend analysis reveals a consistent renewed increase in methane since 2007. The Picarro analyzer is ideal for discerning and measuring the source of methane emissions real-time in the field or through grab-sample measurements in the lab.

The analyzer measures  $\delta^{13}\text{CH}_4$  at 0.5 – 1.0 ‰ precision, and it measures concentrations of  $\text{CH}_4$  to less than 0.1 parts-per-billion (ppb) and  $\text{C}_2\text{H}_6$  to less than 1 ppb (all precision measurements at a 5-minute average). It also measures  $\text{CO}_2$  and  $\text{H}_2\text{O}$  in dry mole fractions. And it performs all measurements with negligible drift for continuous high-quality data collection. Patented Picarro cavity ring-down

spectroscopy (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 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.

## Allan Deviation Plot



G2210- <i>i</i> Performance Specifications				
Specifications	C <sub>2</sub> H <sub>6</sub>	CH <sub>4</sub>	CO <sub>2</sub>	δ <sup>13</sup> CH <sub>4</sub>
Precision (1σ, 5-minute average)	<1 ppb	<0.1 ppb	<200 ppb	0.5 – 1.0 ‰
Dynamic Range	0 – 100 ppm	1.5 – 30 ppm	300 – 2000 ppm	2 – 30 ppm

G2210- <i>i</i> System Operating Specifications		
Mode Switching	Mode 1: Single range (2 – 30 ppm [CH <sub>4</sub> ] + δ <sup>13</sup> CH <sub>4</sub> ) with [C <sub>2</sub> H <sub>6</sub> ] measurements.	Mode 2: [CH <sub>4</sub> ] + [C <sub>2</sub> H <sub>6</sub> ] with faster scan rate and no δ <sup>13</sup> C measurement.
Measurement Frequency	Mode 1: ~0.8 – 1 Hz	Mode 2: ~1.5 Hz
Gas matrix	~20% O <sub>2</sub> in air (approximately ambient concentrations)	
Interferences	This instrument is designed to measure the specified gases in an ambient air or air-like matrix. There may be interference from elevated levels of other gases, such as H <sub>2</sub> S, other VOCs. In addition, high concentrations of helium can have a permanently damaging effect on pressure sensor valves and other hardware.	
Flow Rate	~40 sccm	
Stability	The Picarro advantage for isotopic measurements is long-term stability with infrequent calibration. Ideally, this analyzer could be used in the field for months at a time with limited calibration requirements.	
Measurement Technique	Cavity Ring-Down Spectroscopy (CRDS)	
Measurement Cell Temperature Control	±0.005°C	
Measurement Cell Pressure Control	±0.0002 atm	
Sample Temperature	-10 to +45°C	
Sample Pressure	300 to 1000 Torr (40 to 133 kPa)	
Sample Flow Rate	100 sccm	
Sample Humidity	<99% RH non-condensing @40°C, no drying required	
Ambient Temperature Range	+15 to +35°C (operating), -10 to +50°C (storage)	
Ambient Humidity	<99% RH non-condensing	
Outputs	RS-232, Ethernet, USB	
Fittings	¼" Swagelok®	
Dimensions (single box system)	17"w x 18"d x 7"h (43 x 46 x 18 cm)	
Weight	95 lbs (43 kg)	
Power Consumption	300W at power up and 210W at steady state	

Compatible Peripherals: Small Sample Introduction Module (SSIM A0314) and 16-port Distribution Manifold (A0311)

Check with Picarro for DC power source setup in case of field deployment.