N_2O and CO Atmospheric Concentration Trace Gas Analyzer

PICARRO

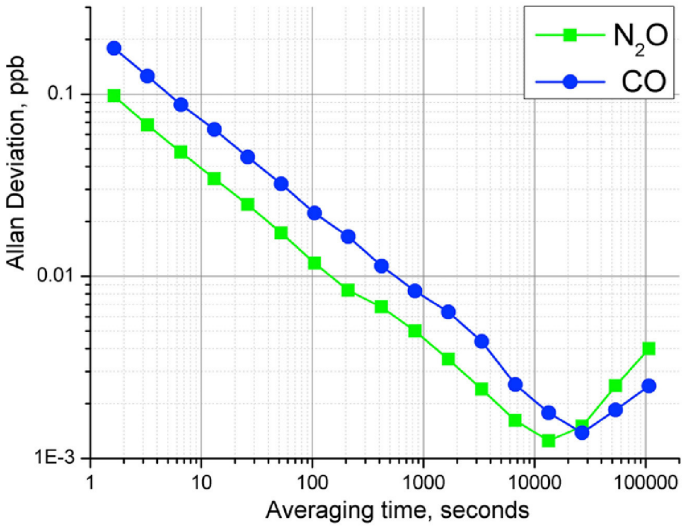
- Simultaneously measure N_2O and CO gas concentrations down to 20 ppt precision
- Excellent long term stability and low drift
- Measure H_2O vapor and report dry mole fractions
- Outstanding pressure and temperature stability
- Meet the requirements of WMO GHG compatibility goals and ICOS atmospheric stations specifications

The **Picarro PI5310 gas concentration analyzer** is designed for high-precision measurements of atmospheric nitrous oxide (N_2O) and carbon monoxide (CO). Mid-infrared (IR) cavity ring-down spectroscopy (CRDS) produces parts-per-trillion (ppt) precision over a 1 to 1,500 parts-per-billion (ppb) measurement range at less than 5 second intervals. Drift is less than 0.1 ppb, for infrequent analyzer calibration and maintenance. And water (H_2O) vapor is measured at parts-per-million (ppm) precision to correct and report N_2O and CO concentrations in dry mole fractions. The analyzer has a Linux operating system and can be configured to automatically export measurement data via Ethernet, RS-232 interface, Analog 4-20mA or Modbus outputs.

Nitrous oxide is a naturally occurring greenhouse gas that plays a critical role in the nitrogen cycle. Atmospheric concentrations, stable prior to the industrial revolution, have risen dramatically due to agricultural practices and fossil fuel combustion. Precisely measuring atmospheric N_2O is important to understanding anthropogenic forces affecting the Earth's climate.

Carbon monoxide is also a naturally occurring compound formed by incomplete combustion. Like greenhouse gases, atmospheric concentrations have increased with industrialization, primarily from fossil fuel use. Because of carbon monoxide's role in radiative forcing, precisely measuring it is vital to atmospheric monitoring. Like other Picarro greenhouse gas (GHG) analyzers, the PI5310 is ideal for long-term atmospheric measurements required by the most demanding GHG monitoring networks, such as the World Meteorological Organization (WMO) and the Integrated Carbon Observation System (ICOS).

Allan Deviation Plot



PI5310 Performance Specifications			
Parameters	N_2O	CO	H_2O
Precision (1σ, 5 sec)	<0.15 ppb (N_2O <500 ppb) **Typical = 0.10 ppb***	<0.15 ppb (CO <400 ppb) **Typical = 0.12 ppb***	<40 ppm
Precision (1σ, 5 min)	<0.03 ppb (N_2O <500 ppb) **Typical = 0.015 ppb***	<0.03 ppb (CO <400 ppb) **Typical = 0.017 ppb***	<6 ppm
Precision (1σ, 1 hr)	<0.015 ppb (N_2O <500 ppb) **Typical = 0.01 ppb***	<0.015 ppb (CO <400 ppb) **Typical = 0.01 ppb***	-
High-conc Precision (1σ, 5 min)	<0.01% of N_2O reading (N_2O >500 ppb)	<0.01% of CO reading (CO >400 ppb)	<6 ppm
Max Drift (>48 hrs, 1 hr average, peak to peak)	<0.1 ppb	<0.1 ppb	-
Measurement Range	1–1,500 ppb	1–1,500 ppb	0–3%
Measurment Interval	<3 sec **Typical = 1.7 sec**		
Response Time (Rise/Fall Time: 10%/90%)	~ 5 sec		

* Typical performance is defined as the median of testing results from > 10 sequentially built PI5310 analyzers. Results available upon request.

PI5310 System Specifications	
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	200 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	<85% R.H. non-condensing
Other Gases Measured (expected precision at 100s)**	$^{13}CO_2$ <0.01 ppm; <0.001 ppm in specialized $^{13}CO_2$ mode
Accessories	Included: Pump (external), keyboard, mouse Optional: LCD monitor, Maintenance Kit
Data Outputs	RS-232, Ethernet, USB, Modbus, 4-20mA (optional)
Sample Inlet Connection	¼" stainless steel Swagelok® tube fitting
Dimensions	Analyzer: 16.65" w x 9.25" h x 30.25" d (42.3 x 23.5 x 76.8 cm) including feet External pump: 7.5" w x 4" h x 11" d (19.1 x 10.2 x 27.9 cm)
Installation	Benchtop or 19" rack mount
Weight	71 lbs (32.2 kg) for analyzer 14.3 lbs (6.5 kg) for external pump
Power Requirements	100–240 VAC; 50/60 Hz; < 400 W (total) Steady-state operation: 250 W (analyzer) and 150 W (pump)
Certifications	CE Certificate of Conformity

Compatible Peripheral: 16-port Distribution Manifold (A0311)
Note on deployability: The PI5310 analyzer is designed for use in static installations only. Not for use in mobile platforms.
** $^{13}CO_2$ measurement without interference corrections

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