Ammonia (NH_3) Gas Concentration Analyzer

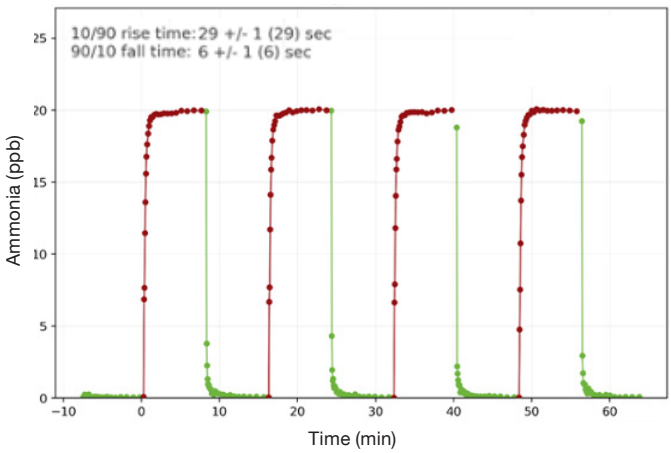
PICARRO

- Fast, continuous, real-time measurements
- Superb sensitivity, precision and accuracy
- Month-long stability for infrequent validation
- Water (H_2O) and Carbon Dioxide (CO_2) measurements for correction and validation
- Small footprint, field or lab deployable with no consumables required

The Picarro **SI2103 Gas Concentration Analyzer** delivers ultra-precise and stable measurements of ammonia (NH_3) gas. The analyzer features a parts-per-trillion (ppt) lower limit of detection, and impressive stability with negligible drift over a full month of continuous operation. Coated (SilcoNert®) components in the critical gas pathway reduces the propensity of NH_3 molecules to adsorb onto pathway surfaces, improving the measurement response time and eliminating measurement biases. An additional carbon dioxide (CO_2) measurement is used for **surrogate validation**, simplifying and replacing the need for complex calibration procedures using difficult to use standards (see pg. 2).

The Picarro analyzer is an ideal solution for applications that require real-time, responsive measurement of ammonia (Figure 1) and/or high levels of sensitivity and stability. These include, but are not limited to, urban and atmospheric air quality monitoring, studies of particulate matter formation, livestock emission quantification, vehicle emission quantification, indoor air quality and others. The analyzer has a small footprint, low power requirements, and can be unpacked and installed within minutes, whether in a laboratory or in the field.

Ammonia Response Time



Figures 1 - Typical response time of SI2103 analyzer for a 10-90% and 90-10% 20 ppb ammonia challenge.

The SI2103 analyzer can operate for months without user interaction, and concentration trending data is continuously archived to the analyzer's internal hard drive. The analyzer can be configured to automatically export measurement data via Ethernet, RS-232 interface, Analog 4-20mA or Modbus outputs.

Picarro's cavity ring-down spectroscopy (CRDS) delivers a best-in-class combination of precision, accuracy, low drift, and ease-of-use.

SI2103 Performance Specifications	Guaranteed Performance***
Lower Detection Limit (3σ, 100 sec)	300 ppt
Zero Drift* *(peak-to-peak, 50-minute average)*	±100 ppt
Precision (1σ, 10 sec) **Precision** (1σ, 100 sec)	≤300 ppt ≤100 ppt
Measurement Interval**	<4 sec
Response Time (0–20 ppb) *(Rise/Fall Time 10–90% / 90–10%)*	<1 min
Measurement Range	0–10 ppm

** Picarro analyzers do not require a zero reference gas or zero cartridge to operate or meet specifications.*
*** Measurement interval at span may increase as much as 2x above listed values.*
**** Specifications and an instrument-specific testing report (Certificate of Compliance) provided with every analyzer purchase.*

SI2103 Surrogate Gas Validation

Calibrating any gas-phase analyzer using ammonia standards is challenging. Carbon dioxide (CO_2) is a commercially available gas that has an absorption spectrum adjacent to ammonia, making it an excellent surrogate gas for the validation of accuracy and linearity. Successful validation on a Picarro SI2103 using CO_2 removes the need for calibration with NH_3 standards. To learn more about Picarro's novel and robust approach to surrogate gas validation, please contact a Picarro sales representative or application scientist at: sales@picarro.com

SI2103 System Specifications

Measurement Technique	Cavity Ring-Down Spectroscopy (CRDS)
Measurement Cell Temp. and Pressure Control	±0.005°C; ±0.0002 atm
Sample Temperature	-10 to 45°C
Sample Flow Rate and Pressure	~ 2 slm at 760 Torr; 600 to 950 Torr (80 to 127 kPa)
Sample Humidity	<99% R.H. non-condensing @ 40°C, no drying required
Ambient Temperature Range	10 to 35°C (operating); -10 to 50°C (storage)
Ambient Humidity	<85% R.H. non-condensing
Other Gases Measured (expected precision)	H_2O (<200 ppm 1σ, 10 sec), CO_2 (<10 ppm 1σ, 10 sec)
Accessories	Included: Pump (external), keyboard, mouse, Optional: LCD monitor, 16-port SilcoNert® coated sampling manifold
Data Outputs	RS-232, Ethernet, USB, analog 0–10 V, Modbus, 4-20mA (optional)
Fittings	¼" Swagelok® SS fittings (recommended ¼" OD PFA Tubing)
Dimensions	Analyzer: 17" w × 8.38" h x 24.4" d (43.2 × 21.3 × 62 cm), including feet External Pump: 7.5" w x 4" h x 11" d (19 x 10.2 x 28 cm)
Installation	Benchtop or 19" rack mount chassis
Weight	Less than 55 lbs (25 kg) for analyzer and 14.3 lbs (6.5 kg) for external pump
Power Requirements	100–240 VAC; 47– 63 Hz (auto-sensing); <375 W at start-up (total). Steady-state operation: 120 W (analyzer), 150 W (pump).

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