

Ammonia (NH₃) Gas Concentration Analyzer

PICARRO



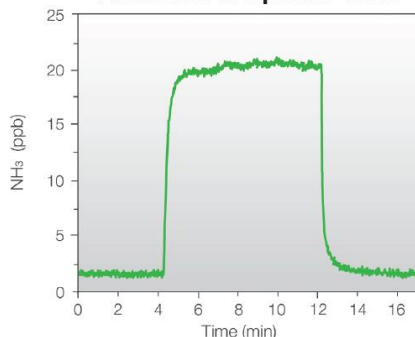
- Fast (1Hz), real-time measurements
- Best-in-class precision (<30 ppt)
- Month-long stability for infrequent validation
- Water (H₂O) and Carbon Dioxide (CO₂) measurements for correction and validation
- Small footprint, field or lab deployable with no consumables required

The Picarro G2103 gas concentration analyzer delivers ultra-precise and stable measurements of ammonia (NH₃) gas. The analyzer features a parts-per-trillion (ppt) lower limit of detection, and impressive stability with drift at ±0.5 parts-per-billion (ppb) over a full month of continuous operation. Coated (SilcoNert®) components in the critical gas pathway reduces the propensity of NH₃ molecules to adsorb onto pathway surfaces, improving the measurement response time and eliminating measurement biases. An additional carbon dioxide (CO₂) measurement is used for **surrogate validation**, simplifying and replacing the need for complex calibration procedures using difficult to use standards (see pg. 2).

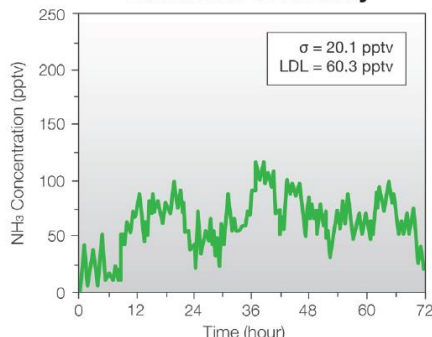
The Picarro analyzer is an ideal solution for applications that require real-time, responsive measurement of ammonia (Figure 1) and/or high levels of sensitivity and stability (Figure 2). These include, but are not limited to, urban and atmospheric air quality monitoring, studies of particulate matter 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.

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

Ammonia Response Time



Ammonia Sensitivity



Figures 1 and 2 - (Top) Typical response time for a 10-90% and 90-10% 20 ppb ammonia challenge. (Bottom) Typical noise zero drift of the G2103 analyzer over 72 hours. Changes of 0.1 ppbv would be clearly visible on this baseline.

G2103 Performance Specifications	Typical Performance**	Specifications***
Lower Detection Limit (3 σ , 300 sec)	0.03 ppb	< 0.09 ppb
Zero Drift* (peak-to-peak, 50-minute average)	± 0.04 ppb (72 hrs)	$\pm 0.15/\pm 0.5$ ppb (72 hrs/1 month)
Precision (1 σ , 1 sec)	0.19 ppb	0.50 ppb + 0.1% of reading
Precision (1 σ , 10 sec)	0.058 ppb	0.17 ppb + 0.05% of reading
Precision (1 σ , 300 sec)	0.010 ppb	0.03 ppb + 0.02% of reading
Measurement Interval	1 sec over guaranteed range	1 sec over guaranteed range
Response Time (0–20 ppb) (Rise/Fall Time 10–90% / 90–10%)	< 2 min	< 2 min
Measurement Range	Guaranteed range 0–500 ppb Operational range 0–10 ppm Extended range 0–50 ppm (Optional)	Guaranteed range 0–500 ppb Operational range 0–10 ppm Extended range 0–50 ppm (Optional)

* Picarro analyzers do not require a zero reference gas or zero cartridge to operate or meet specifications.

** Typical performance is defined as the median of testing results from 49 sequentially built G2103 analyzers. Results available upon request.

*** Specifications and an instrument-specific testing report (Certificate of Compliance) provided with every analyzer purchase.

G2103 Surrogate Gas Validation

Calibrating any gas-phase analyzer using ammonia standards is challenging. Carbon dioxide (CO₂) is a commercially available gas that has an absorption spectra adjacent to ammonia, making it an excellent surrogate gas for the validation of accuracy and linearity. Successful validation on a Picarro G2103 using CO₂ removes the need for calibration with NH₃ 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

G2103 System Specifications

Measurement Technique	Cavity Ring-Down Spectroscopy (CRDS)
Measurement Cell Temp. and Pressure Control	$\pm 0.005^\circ\text{C}$; ± 0.0002 atm
Sample Temperature	-10 to 45°C
Sample Flow Rate and Pressure	> 1.5 slm at 760 Torr; 300 to 1000 Torr (40 to 133 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 ₂ O (< 200 ppm 1 σ , 10 sec), CO ₂ (< 10 ppm 1 σ , 10 sec)
Accessories	Pump (external, included), keyboard (included), mouse (included), LCD monitor (optional), 16-port SilcoNert® coated sampling manifold (optional)
Data Outputs	Windows 10 OS (RS-232, Ethernet, USB, data streaming; optional analog 0–10 V)
Fittings	¼" Swagelok® fittings
Dimensions	Analyzer: 17" w x 7" h x 17.5" d (43.2 x 17.9 x 44.6 cm), not including 0.5" 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	47.0 lbs (21.3 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).