Hydrogen Peroxide (H_2O_2) Gas Concentration Analyzer

Continuous Monitoring for Sterilization & Bio-Decontamination Processes

PICARRO

Avoid Oxidation of Sensitive Pharmaceuticals!

- Continuously measures parts-per-billion (ppb) levels of hydrogen peroxide (H_2O_2)
- Built-in software ensures compliance with electronic records regulations
- Aeration cycle real-time monitoring
- Infrequent maintenance, no wet chemistry or consumables required

The **Picarro PI2124 gas concentration analyzer** ensures ultra-low residual hydrogen peroxide levels to help avoid oxidation and safeguard drug stability in isolated GMP pharmaceutical manufacturing applications. Production environment decontamination with vaporized hydrogen peroxide (VHP) is the industry standard. While VHP technology offers many performance and safety benefits, residual H_2O_2 can easily oxidize pharmaceutical products. Biologic products are especially vulnerable, often showing significant oxidation even when exposed to low concentrations of H_2O_2 (ppb range).

The Picarro PI2124 analyzer can continuously measure H_2O_2 levels down to 3 ppb with precision better than 1 ppb. The analyzer is optimized for GMP applications. Installation and operation qualification is quick and easy, as is validation with commercially available surrogate gases. The built-in software of the PI2124, designed to assist with 21 CFR part 11 compliance, offers strict regulations on electronic records, time stamps and audit trails. Combined with detailed validation reports, software and system documentation, the PI2124 offers comprehensive and tightly controlled data management software that complies with pharmaceutical and commercial manufacturing regulations.

Operating the PI2124 analyzer is simple and cost-effective—it requires no wet chemistry or consumables. Patented Picarro cavity ring-down spectroscopy (CRDS) technology has no moving parts and incorporates wavelength monitoring, providing long-term stability and reliability, as well as infrequent calibration and maintenance.

PI2124 Performance Specifications	Specifications**
Precision (1σ, 10 sec) **Precision** (1σ, 300 sec)	<3 ppb + 0.1% of reading <1 ppb + 0.1% of reading
Lower Detection Limit (3σ, 300 sec)	<3.0 ppb
Zero Drift* (72 hours) **Zero Drift** (1 month)	±2.5 ppb -5 ppb/+10 ppb
Accuracy	±5% of reading
Measurement Range	0–100 ppm
Measurement Interval	~10 sec
Response Time *(Rise/Fall Time 10–90% / 90–10%)*	<1 min

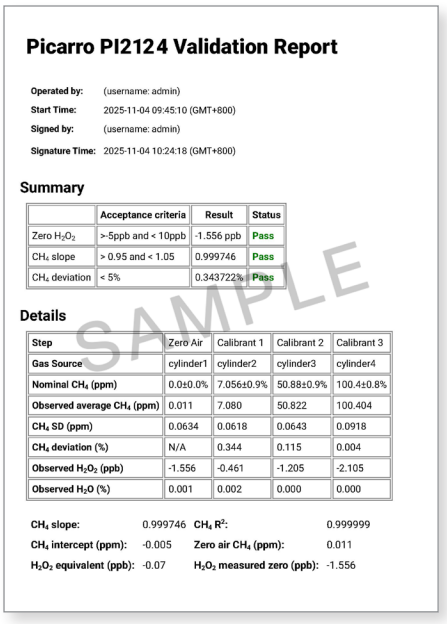
** Picarro analyzers do not require a zero reference gas or zero cartridge to operate or meet specifications.*
*** Specifications and an instrument-specific testing report (Certificate of Compliance) provided with every analyzer purchase.*

PI2124 System Specifications	
Measurement Technique	Cavity Ring-Down Spectroscopy
Measurement Cell Temperature Control	±0.005°C
Measurement Cell Pressure Control	±0.0002 atm
Sample Temperature	-10 to 45°C
Sample Flow Rate	<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)
Ambient Humidity	<99% R.H. non-condensing
Other Gases Measured	H_2O, CH_4
Accessories	Pump (external, included), keyboard & mouse (included), LCD monitor (optional)
Communication Interfaces	RS-232, Ethernet, USB, analog 4-20mA, Modbus
Fittings	1/4" Swagelok® PFA Fittings
Dimensions	17" w x 8.38" h x 21" d (43.2 x 17.9 x 53.3 cm) including feet, not including small external pump module, 7.5" w × 4" h × 11" d (19 × 10.2 × 28 cm)
Weight	73 lbs (33.2 kg) including pump
Power Requirements	100–240 VAC, 50/60 Hz (auto-sensing), <260 W start up (total): 110 W (analyzer), 35 W (pump) at steady state
Certifications	CE Mark, CDRH
Country of Manufacture	USA
System Validation	Includes software wizard for analyzer validation using CH_4 as surrogate gas standard

Software and User Accounts Regulations

Regulations Features	Not Signed In	Picarro Sign In	Operator	Technician	Administrator
Config Menu/Settings (requires additional sign in to access validation or user admin)		✓			✓
View Data Viewer	✓		✓	✓	✓
Change Displayed Data		✓	✓	✓	✓
Quit Measuring			✓	✓	✓
Configure 4-20mA Output		✓			
H_2O_2 Validation				✓	✓
Change displayed data (full access)					✓
User Administration					✓

PI2124 Validation Report



Picarro PI2124 Validation Report

Operated by: (username: admin)
Start Time: 2025-11-04 09:45:10 (GMT+800)
Signed by: (username: admin)
Signature Time: 2025-11-04 10:24:18 (GMT+800)

Summary

	Acceptance criteria	Result	Status
Zero H_2O_2	>-5ppb and < 10ppb	-1.556 ppb	Pass
CH_4 slope	> 0.95 and < 1.05	0.999746	Pass
CH_4 deviation	< 5%	0.343722%	Pass

Details

Step	Zero Air	Calibrant 1	Calibrant 2	Calibrant 3
Gas Source	cylinder1	cylinder2	cylinder3	cylinder4
Nominal CH_4 (ppm)	0.0±0.0%	7.056±0.9%	50.88±0.9%	100.4±0.8%
Observed average CH_4 (ppm)	0.011	7.080	50.822	100.404
CH_4 SD (ppm)	0.0634	0.0618	0.0643	0.0918
CH_4 deviation (%)	N/A	0.344	0.115	0.004
Observed H_2O_2 (ppb)	-1.556	-0.461	-1.205	-2.105
Observed H_2O (%)	0.001	0.002	0.000	0.000

CH_4 slope: 0.999746 **CH_4 R^2:** 0.999999
CH_4 intercept (ppm): -0.005 **Zero air CH_4 (ppm):** 0.011
H_2O_2 equivalent (ppb): -0.07 **H_2O_2 measured zero (ppb):** -1.556

SAMPLE

PICARRO

41-0099 Rev. B
LIT CODE: 260203

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