

AMC Monitoring for Inorganic Gases

SEMICONDUCTOR

SI2000 Series Analyzers



Improve Yield with Early Warning
of Contamination Events!

- **Real time AMC monitoring in cleanrooms, FOUP and FAB Equipment**
- **Fast, continuous analysis in seconds**
- **Virtually no downtime or consumables cost**
- **Factory conformance data packs with every analyzer**
- **Extreme accuracy for event confirmation**
- **No field calibration required**

Introduction

Yield declines and process upsets due to airborne molecular contamination (AMC) have been well documented. But analytical instruments that monitor and warn against contamination events can require frequent re-calibration resulting in significant downtime for the production lines. The slow speed of response experienced by these analyzers has also been a significant obstacle to providing true real-time process data for inorganic AMC monitoring in Semiconductor applications. Today, the Picarro SI2000 Series analyzers offer the power of highly sensitive laser spectroscopy for AMC cleanroom monitoring in a reliable, easy-to-use, compact design. These laser analyzers offer significant advantages compared with incumbent AMC measurement techniques, such as ion-mobility spectrometry (IMS) and ion chromatography. Both legacy techniques suffer the inadequacies of high costs of ownership, performance shortfalls and slow speeds of response.

Proven in Use

Enclosed in a standard 19-inch enclosure paired with a multi-port sequencer and datalogging PLC, these

analyzers are currently installed in several major semiconductor users' FAB locations. These analyzers are monitoring cleanroom air at *parts per trillion* level concentrations in real time with adherence to the process industry standard: IEC 61207 for performance and several SEMI standards for verified MDL and the calculations of reliability and safety. Optimized for long-term stability, the Picarro laser analyzers do not require field calibration and are ideal for continuous operation.

The SI2000 series analyzers can be commissioned and operating within minutes. The analyzers 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, Analogue 4-20 mA or Modbus outputs. Users can connect remotely with the analyzer's Linux OS through a standard Remote Desktop connection or with similar remote login software. Picarro's Industrial Service Engineers provide factory training & FAT support, repair services and analyzer startup & commissioning services.

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Performance Specifications	SI2103	SI2108	SI2205	SI2306	
	NH ₃	HCl	HF	HF	NH ₃
Precision	≤ 300 ppt (10 sec), ≤ 100 ppt (100 sec)	≤ 45 ppt (10 sec), ≤ 15 ppt (100 sec)	≤ 30 ppt (10 sec), ≤ 10 ppt (100 sec)	≤ 30 ppt (10 sec), ≤ 10 ppt (100 sec)	≤ 300 ppt (10 sec), ≤ 100 ppt (100 sec)
Lower Detectable Limit (100 sec., 3σ)	300 ppt	45 ppt	30 ppt	30 ppt	300 ppt
Method Detection Limit (per Semi C10-1109)	500 ppt	250 ppt	500 ppt	500 ppt	500 ppt
Linearity (per IEC 61207)	±1%	±1%	±1%	±1%	±1%
Accuracy at span	±5% @ full scale	±5% @ full scale	±5% @ full scale	±5% @ full scale	±5% @ full scale
Accuracy at zero	±100 ppt	±50 ppt	±25 ppt	±25 ppt	±100 ppt
Instrument-to-Instrument Consistency	±5% @ full scale ±100 ppt @ zero	±5% @ full scale ±50 ppt @ zero	±5% @ full scale ±25 ppt @ zero	±5% @ full scale ±25 ppt @ zero	±5% @ full scale ±100 ppt @ zero
Measurement Range	0 – 10 ppm	0 – 1 ppm	0 – 500 ppb	0 – 500 ppb	0 – 10 ppm
Measurement Interval	< 3 seconds	< 3 seconds	< 4 seconds	< 4 seconds	
Sample Flow Rate	~ 2 slm	~ 2 slm	~ 2 slm	~ 2 slm	
Combined Response Times (T90/10 + T10/90) @ 20 ppb	< 3 min	< 3 min	< 3 min	< 3 min	
Fall Times T90/10 @ 20 ppb	< 1 min	< 1 min	< 1 min	< 1 min	

SI2000 Series System Specifications

Measurement Technique	Cavity Ring-Down Spectroscopy
Calibration Period Recommendation	Calibration not required - Initial validation at 6 months, then every 12 months thereafter
Time Required to Perform Validation	Estimated at <15 minutes per manufacturer's instructions
Measurement Cell Temperature Control	±0.005 °C
Measurement Cell Pressure Control	±0.0002 atm
Operating Temperature	15 to 35 °C (operating); -10 to 50 °C (storage)
Ambient Humidity	<99% RH non-condensing
Accessories	Pump (external, included), keyboard (included), mouse (included), LCD monitor (optional), Maintenance Kit (optional)
Communication Interfaces	RS-232, Ethernet, USB, analog 0–10 V, Modbus, 4-20mA(optional)
Fittings	1/4" Swagelok® PFA Fittings
Dimensions	Analyzer: 19" W × 7.875" H × 20.7" D (48.3 × 20 × 52.6 cm)
Weight	75 lbs. (34.10 kg) including pump
Power Requirements	100–240 VAC, 47–63 Hz (auto-sensing), <260 W start up (total): 110 W (analyzer), 120 W (pump) at steady state
Warranty	12 Months
Certifications	CE Mark
Country of Manufacture	USA