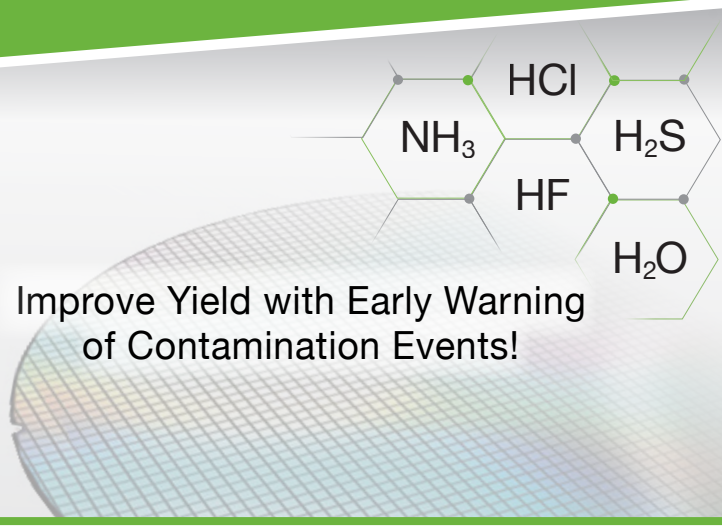
AMC Monitoring for Inorganic Gases

SI2000 Series Analyzers

PICARRO



- **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) has been well documented. 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

In a standard rack mounted 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 the lowest possible concentration level 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, Analog 4-20mA 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.

Performance Specifications	SI2104	SI2108		SI2306	
	H_2S	HCl	H_2O	HF (SI2205 for HF only)	NH_3 (SI2103 for NH_3 only)
Precision	≤1.5 ppb (10 sec), ≤0.5 ppb (100 sec)	≤45 ppt (10 sec), ≤15 ppt (100 sec)	20 ppm + (8 x %H_2O) (10 sec) 10 ppm + (4 x %H_2O) (100 sec)	≤30 ppt (10 sec), ≤10 ppt (100 sec)	≤300 ppt (10 sec), ≤100 ppt (100 sec)
Lower Detectable Limit (100 sec., 3σ)	1 ppb	45 ppt	30 ppm	30 ppt	300 ppt
Method Detection Limit (per Semi C10-1109)	3 ppb	250 ppt	40 ppm	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	±2 ppb	±50 ppt	±40 ppm	±25 ppt	±100 ppt
Instrument-to-Instrument Consistency	±5% @ full scale ±2 ppb @ zero	±5% @ full scale ±50 ppt @ zero	±5% @ full scale ±40 ppm @ zero	±5% @ full scale ±25 ppt @ zero	±5% @ full scale ±100 ppt @ zero
Measurement Range	0–10 ppm	0–2 ppm	0–40000 ppm	0–1 ppm	0–10 ppm
Measurement Interval*	<4 seconds	<3 seconds		<4 seconds	
Sample Flow Rate	~0.4 slm	~2 slm		~2 slm	
Combined Response Times (T90/10 + T10/90) @ **20 ppb**	<20 sec (100 ppb challenge)	<3 min	<20 sec (10,000 ppm challenge)	<3 min	
Fall Times T90/10 @ 20 ppb	<10 sec (100 ppb challenge)	<1 min	<10 sec (10,000 ppm challenge)	<1 min	

*Measurement interval at span may increase as much as 2x above listed values.

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)
Sample Inlet Connection	1/4" Stainless Steel Swagelok® Tube Fitting (recommended 1/4" OD PFA Tubing)
Dimensions	Analyzer: 17" w × 8.38" h x 24.4" d (43.2 × 21.3 × 62 cm)
Weight	73 lbs. (33.18 kg) including external pump
Power Requirements	100–240 VAC, 47–63 Hz (auto-sensing), <400 W (total): 250 W (analyzer), 150 W (pump) at steady state
Warranty	12 Months
Certifications	CE Mark
Country of Manufacture	USA

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