

SI2205 Gas Concentration Analyzer for Hydrogen Fluoride (HF)

AMC Monitoring for Inorganic Gases

PICARRO



- Real-time AMC monitoring in cleanrooms, FOUF and fab equipment
- Fast, continuous analysis in seconds
- Virtually no downtime or consumables cost
- Free of interference from common fab chemicals
- Extreme accuracy for event confirmation
- No field calibration required

HF AMC Analyzer

As design features shrink, Airborne Molecular Contamination (AMC) is becoming a major problem in semiconductor manufacturing. If left uncontrolled, AMCs can result in reduced wafer yield and increased downtime of fab equipment for maintenance and repair.

Traditional analyzers that monitor and warn against contamination events, such as ion-mobility spectrometry (IMS) and ion chromatography, can require frequent, time-consuming re-calibration, and their slow response times make it difficult to obtain true, real-time process data. Picarro gas concentration analyzers leverage Picarro's patented Cavity Ring-Down Spectroscopy (CRDS) technology to provide the fast, accurate detection of inorganic contaminants that is crucial to the quality and efficiency of semiconductor production.

Precise, Real-time HF Monitoring

The **Picarro SI2205 gas concentration analyzer** delivers ultra-precise, parts-per-trillion (PPT) measurements of hydrogen fluoride (HF) in a reliable, easy-to-use, compact design. The SI2205 can be commissioned and operating within minutes, requires no field calibration or consumables, and can operate for months without user interaction.

Flexible Analytics

Gas concentration trending data is continuously archived to the analyzer's internal hard drive, and/or it 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.

Proven for Use in Semiconductor Production

Picarro analyzers are currently in use in several major semiconductor fabs. The analyzers can be installed as part of Picarro's SLiM 100 Lithography Process Tool Monitoring and SAM AMC Monitoring systems, or in a standard rack-mounted enclosure paired with a multi-port sequencer and datalogging PLC. The analyzers are compliant with industry standards including the IEC 61207 for performance, and several SEMI standards for verified MDL and calculations of reliability.

World-Class Support

Picarro's Industrial Service Engineers provide factory training and fabrication, assembly, and test (FAT) support, repair services, and analyzer startup and commissioning services.

Picarro SI2205 Performance Specifications

Gas Detected	Hydrogen Fluoride (HF)
Precision (1 σ)	≤ 30 ppt (10 sec), ≤ 10 ppt (100 sec)
Lower Detectable Limit (3 σ)	30 ppt
Method Detection Limit (per Semi C10-1109)	500 ppt
Linearity (per IEC 61207)	$\pm 1\%$
Accuracy at span	$\pm 5\%$ @ full scale
Accuracy at Zero	± 25 ppt
Instrument-to-Instrument Consistency	$\pm 5\%$ @ full scale ± 25 ppt @ zero
Measurement Range	0–1 ppm
Measurement Interval*	<4 seconds
Sample Flow Rate	~2 slm
Combined Response Times (T90/10 + T10/90) @ 20 ppb	<3 min
Fall Times T90/10 @ 20 ppb	<1 min

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

Picarro SI2205 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	$\pm 0.005^\circ\text{C}$
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 x 8.38" h x 24.4" d (43.2 x 21.3 x 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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3105 Patrick Henry Drive, Santa Clara, CA 95054 USA | +1 408-962-3900 | sales@picarro.com | picarro.com