



PICARRO

Product Catalog

Environmental Science
Instruments and Solutions



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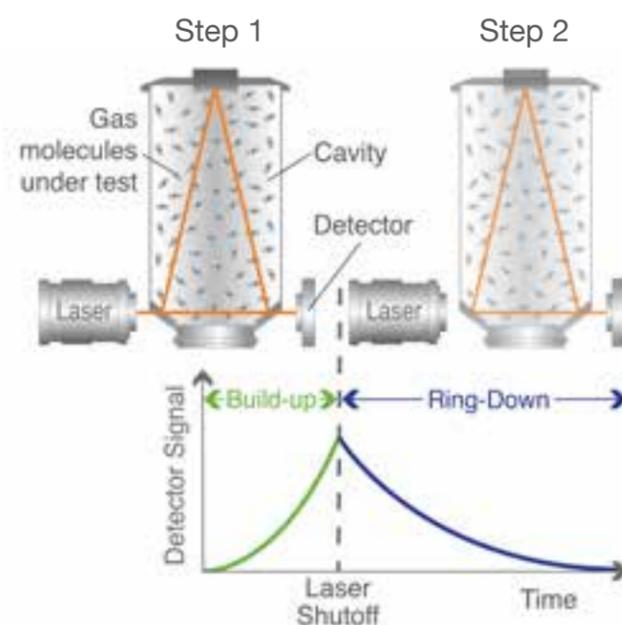
Cavity Ring-Down Spectroscopy (CRDS)

Applications requiring trace gas analysis include environmental monitoring, emissions monitoring, greener automotive engine development, semiconductor fabs, cleanroom technology and bio-pharmaceutical process monitoring. All these applications can benefit from a turnkey analyzer that provides real-time speed, high precision and sensitivity to parts per billion and beyond. And, from a practical standpoint, the ideal trace gas analyzer requires minimal or no sample preparation or dilution, and is contained in a rugged, compact platform with low operating costs. Specifically, the latter means no need for a trained technician and, optimally, the capability for remote, unmanned operation.

CRDS is the first trace-gas analysis instrumentation to meet all these needs, and it can even provide isotope ratios for environmental and biomedical applications. Just as important, the same Picarro CRDS analyzers can be used as unmanned remote monitors, industrial process sensors, and reference laboratory instruments, greatly simplifying transfer of standards and protocols. And the extraordinary low drift of these instruments means they can operate for months without recalibration in most applications.

CRDS Advantages

- Superb sensitivity, precision & accuracy with negligible drift
- Fast, continuous, real-time measurements with no interferences
- Large dynamic range with high linearity
- Field and laboratory deployable with no consumables
- Installed and operational in minutes
- Rugged and insensitive to changes in ambient temperature, pressure or vibration



Greenhouse Gas Analyzers

MODEL	CO ₂	CH ₄	N ₂ O	H ₂ O	NH ₃	CO
G2301	X	X		X		
G2401	X	X		X		X
G2401-m	X	X		X		X
G2508	X	X	X	X	s	
G2509	X	X	X	X	X	
PI5310			X	X		X

Trace Gas Analyzers

MODEL	CO ₂	CH ₄	H ₂ O	NH ₃	H ₂ CO	H ₂ O ₂	H ₂ S
G2204		X	X				X
G2307		s,sur	X		X		
PI2103	s,sur		X	X			
PI2124		s,sur	X			X	

Gas Isotope Analyzers

MODEL	CO ₂		CH ₄		C ₂ H ₆	H ₂ O			N ₂ O				
	[CO ₂]	δ ¹³ C	[CH ₄]	δ ¹³ C	[C ₂ H ₆]	[H ₂ O]	δ ² H	δ ¹⁸ O	δ ¹⁷ O	δ ¹⁵ N	δ ¹⁵ N _α	δ ¹⁵ N _β	δ ¹⁸ O
G2131-i	X	X	X			X							
G2201-i	X	X	X	X		X							
G2210-i	X		X	X	X	X							
PI5131-i										X	X	X	X
L2130-i			s			X	X	X					
L2140-i			s			X	X	X	X				

X denotes a primary measurement, s denotes a supporting measurement.

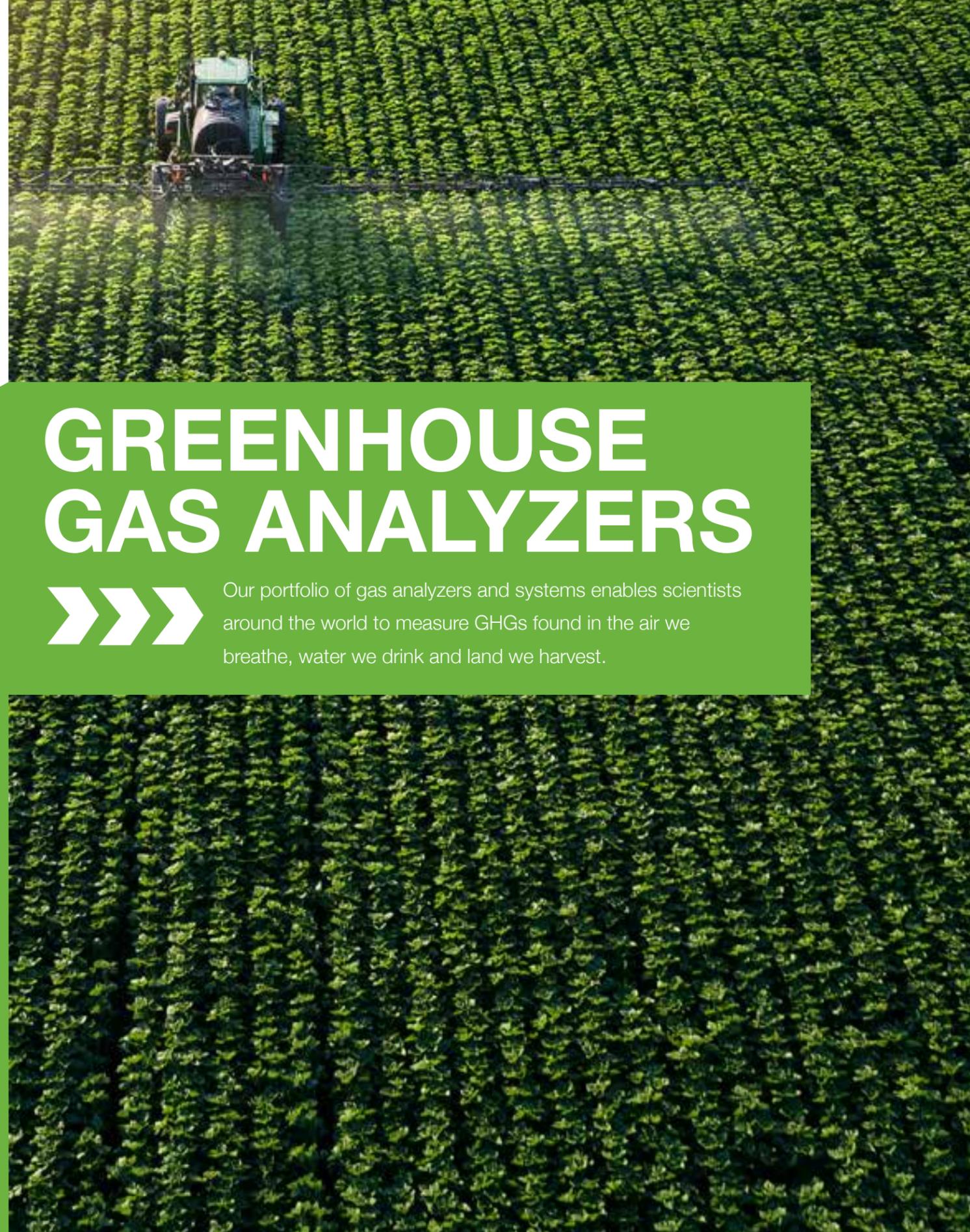
sur denotes a surrogate gas used for validation of instrument performance, which may or may not be useful for a customer's measurement purposes, depending on precision requirements.

All instruments measure water for correction purposes.

GREENHOUSE GAS ANALYZERS



Our portfolio of gas analyzers and systems enables scientists around the world to measure GHGs found in the air we breathe, water we drink and land we harvest.



G2301 Gas Concentration Analyzer

The Picarro G2301 gas concentration analyzer provides simultaneous, precise measurement of carbon dioxide (CO₂), methane (CH₄), and water (H₂O) vapor at parts-per-billion (ppb) sensitivity with negligible drift.

- Long-term stability for infrequent calibration
- Continuous measurement of three atmospheric trace gases
- Compliant with WMO and ICOS international ambient atmospheric monitoring requirements
- Water correction automatically reports dry gas mole fractions

Molecules Measured:
CO₂ CH₄ H₂O

- Related Applications:
- Air Quality
 - Atmospheric Science
 - Emissions Quantification
 - Agriculture & Soil Science



G2401 Gas Concentration Analyzer

The Picarro G2401 gas concentration analyzer provides simultaneous, precise measurement of carbon monoxide (CO), carbon dioxide (CO₂), methane (CH₄), and water (H₂O) vapor at parts-per-billion (ppb) sensitivity with negligible drift.

- Continuous measurement of four atmospheric trace gases
- Compliant with WMO and ICOS international ambient atmospheric monitoring requirements
- Water correction automatically reports dry gas mole fractions

Molecules Measured:
CO₂ CH₄ CO
H₂O

- Related Applications:
- Air Quality
 - Atmospheric Science
 - Emissions Quantification



G2401-m In-flight Gas Concentration Analyzer

The Picarro G2401-m gas concentration analyzer provides simultaneous, precise measurement of carbon monoxide (CO), carbon dioxide (CO₂), methane (CH₄), and water (H₂O) vapor at parts-per-billion (ppb) sensitivity with negligible drift.

- Continuous measurement of four atmospheric trace gases
- Allowing airborne measurements
- Rugged design for guaranteed performance during flight
- Water correction automatically reports dry gas mole fractions

Molecules Measured:
CO₂ CH₄ CO
H₂O

- Related Applications:
- Air Quality
 - Atmospheric Science
 - Emissions Quantification



G2508 Gas Concentration Analyzer

The Picarro G2508 gas concentration analyzer provides simultaneous, precise measurement of nitrous oxide (N₂O), methane (CH₄), carbon dioxide (CO₂), ammonia (NH₃), and water (H₂O) vapor.

- Parts-per-billion sensitivity for excellent rate-of-rise quantification
- Rapid response time and continuous measurements provide data at high temporal resolution
- Operates in open or closed systems and integrates easily with chamber systems
- Water correction automatically reports dry gas mole fractions

Molecules Measured:



Related Applications:

- Agriculture & Soil Science
- Ecology
- Emissions Quantification



G2509 Gas Concentration Analyzer

The Picarro G2509 gas concentration analyzer provides simultaneous, precise measurement of nitrous oxide (N₂O), methane (CH₄), carbon dioxide (CO₂), ammonia (NH₃), and water (H₂O) vapor.

- Optimized flow path for fast ammonia response
- Wide CH₄ dynamic range up to 800 ppm
- Parts-per-billion sensitivity for excellent rate-of-rise quantification
- Rapid response time and continuous measurements provide data at high temporal resolution

Molecules Measured:



Related Applications:

- Agriculture & Soil Science
- Ecology
- Emissions Quantification



PI5310 Gas Concentration Analyzer

The Picarro PI5310 gas concentration analyzer provides simultaneous, precise measurements of nitrous oxide (N₂O), carbon monoxide (CO), and water (H₂O) vapor at parts-per-trillion (ppt) sensitivity with negligible drift.

- Continuous measurement of N₂O and CO
- Mid-IR CRDS for high precision and low drift analysis
- Compliant with WMO and ICOS international ambient atmospheric monitoring requirements
- Water correction automatically reports dry gas mole fractions

Molecules Measured:



Related Applications:

- Air Quality
- Atmospheric Science
- Emissions Quantification

TRACE GAS ANALYZERS



Our portfolio of gas analyzers enables researches and industry professionals around the world to measure trace gases in ambient air, along the fence line and at emissions sources.

G2204 Gas Concentration Analyzer



The Picarro G2204 gas concentration analyzer provides simultaneous, precise measurement of hydrogen sulfide (H₂S) and methane (CH₄) at parts-per-billion (ppb) sensitivity with negligible drift for emissions measurements from landfills, refineries, paper mills, or industrial plants.

- Continuous measurement of CH₄ and H₂S concentrations
- Use for stationary monitoring or beyond the fence line remote emissions quantification
- Rugged and insensitive to changes in ambient temperature

Molecules Measured:



Related Applications:

- Air Quality
- Emissions Quantification
- Health & Safety
- Petrochemical

PI2124 Gas Concentration Analyzer



The Picarro PI2124 gas concentration analyzer measures hydrogen peroxide (H₂O₂) levels as low as 3 parts-per-billion (ppb) to help avoid oxidation and safeguard drug stability.

- Continuous, real-time H₂O₂ monitoring
- Lower Detection Limit: <3 ppb (5 minutes averaging)
- Precision: <0.5 ppb (1σ, 5 minutes averaging)
- Rise time (10–90%) and fall time (90–10%) is <2 minutes
- Software designed to assist with 21 CFR part 11 compliance

Molecules Measured:



Related Applications:

- Petrochemical
- Pharmaceutical

G2307 Gas Concentration Analyzer



The Picarro G2307 gas concentration analyzer provides precise, real-time measurement of formaldehyde (H₂CO), methane (CH₄), and water (H₂O) vapor.

- Fast, continuous, real-time measurement of H₂CO
- Long-term stability for infrequent calibration
- Small footprint, field or lab deployable with no consumables required
- Water correction automatically reports dry gas mole fractions

Molecules Measured:



Related Applications:

- Air Quality
- Atmospheric Science
- Emissions Quantification
- Health & Safety

PI2103 Gas Concentration Analyzer



The Picarro PI2103 gas concentration analyzer provides precise, real-time measurement of ammonia (NH₃) and water (H₂O) vapor. It incorporates coated components in the critical gas pathway.

- Fast, continuous, real-time measurement of NH₃
- Long-term stability for infrequent calibration
- Small footprint, field or lab deployable with no consumables required
- Water correction automatically reports dry gas mole fractions
- Unprecedented response time

Molecules Measured:



Related Applications:

- Air Quality
- Atmospheric Science
- Emissions Qualification
- Agriculture & Soil Science
- Petrochemical

GAS ISOTOPE ANALYZERS



Measure and quantify stable isotope ratios with high precision to resolve biochemical, hydrological, and geophysical processes encoded in your sample.



G2131-*i* Isotope and Gas Concentration Analyzer

The Picarro G2131-*i* isotope and gas concentration analyzer precisely and continuously measures $\delta^{13}\text{C}$ in carbon dioxide (CO_2) and CO_2 and CH_4 gas concentration for a range of applications from atmospheric and ocean science research to food and beverage origin and authenticity.

- Measure $\delta^{13}\text{C}$ in CO_2 at $>0.1\%$ precision
- Pair with peripherals to measure $\delta^{13}\text{C}$ from many sample types
- Simultaneously measure CO_2 and CH_4 gas concentrations
- Measure H_2O vapor and report dry mole fractions

Molecules Measured:



Related Applications:

- Agricultural & Soil Science
- Ecology
- Ocean Science
- Paleoclimatology
- Food & Beverage
- Petrochemical

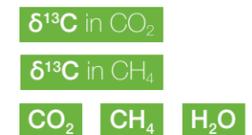


G2201-*i* Isotope Analyzer

The Picarro G2201-*i* isotope analyzer precisely and continuously measures $\delta^{13}\text{C}$ in carbon dioxide (CO_2) and in methane (CH_4) to help understand the biological and geological mechanisms that produce and consume CO_2 .

- Only field-deployable analyzer for simultaneous high-precision $\delta^{13}\text{C}$ measurements in CO_2 and CH_4
- Three measurement modes: CO_2 only, CH_4 only, and CO_2 and CH_4 combined
- Excellent precision at a fraction of IRMS operating cost—less calibration, less maintenance, no consumables

Molecules Measured:



Related Applications:

- Atmospheric Science
- Emissions Quantification
- Agricultural & Soil Science
- Ecology
- Food & Beverage
- Petrochemical

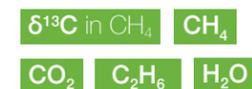


G2210-*i* Isotope Analyzer

The Picarro G2210-*i* isotope analyzer precisely, simultaneously, and continuously measures $\delta^{13}\text{C}$ in methane (CH_4) and the ethane (C_2H_6) to methane (CH_4) ratio for real-time source attribution and quantification of methane emissions.

- Simultaneously measures $\delta^{13}\text{C}_{\text{CH}_4}$ and C_2H_6 -to- CH_4 ratio
- Measure CO_2 and H_2O vapor, and reports dry mole fractions
- Field-deployable for real-time CH_4 emissions source attribution
- Small cavity (35 mL) for fast sample turnover time

Molecules Measured:



Related Applications:

- Atmospheric Science
- Emissions Quantification
- Petrochemical



PI5131-*i* Isotope and Gas Concentration Analyzer

Picarro PI5131-*i* isotope and gas concentration analyzer precisely measures site-specific and bulk $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$ in nitrous oxide (N_2O) for applications ranging from field studies of greenhouse gas emissions to laboratory investigations of the global nitrogen cycle.

- Measure $\delta^{15}\text{N}$, $\delta^{15}\text{N}_\alpha$, $\delta^{15}\text{N}_\beta$ with <0.7‰ precision
- Measure $\delta^{18}\text{O}$ in N_2O with <0.7‰ precision
- Cryogen-free, continuous operation
- Field-station and laboratory deployable for real-time or grab-sample measurements

Molecules Measured:

- $\delta^{15}\text{N}$ in N_2O
- $\delta^{15}\text{N}_\beta$ in N_2O

Related Applications:

- Agricultural & Soil Science
- Atmospheric Science
- Ecology



L2130-*i* Isotope and Gas Concentration Analyzer

The L2130-*i* isotopic water analyzer enables high-precision measurements of $\delta^{18}\text{O}$ and $\delta^2\text{H}$ from liquids, vapor, and solids, using a variety of Picarro peripherals.

- Minimal drift: calibrate once per day while measuring with sub per mil certainty
- Flexibility to measure water samples from liquids, vapor, and solids
- Small footprint, robust design, and intuitive user-interface
- Unparalleled speed allows processing of up to 900 injections per day

Molecules Measured:

- $\delta^{18}\text{O}$ in H_2O
- $\delta^2\text{H}$ in H_2O
- CH_4

Related Applications:

- Atmospheric Science
- Ecology
- Hydrology
- Ocean Science
- Paleoclimatology
- Food & Beverage
- Petrochemical



L2140-*i* Isotope and Gas Concentration Analyzer

The Picarro L2140-*i* isotopic water analyzer enables simultaneous measurements of $\delta^{18}\text{O}$, $\delta^{17}\text{O}$, $\delta^2\text{H}$ and determines ^{17}O -excess for paleoclimate, (eco) hydrology, and atmospheric science applications.

- Streamlined, simple, and simultaneous measurements of $\delta^{18}\text{O}$, $\delta^{17}\text{O}$, $\delta^2\text{H}$, and ^{17}O -excess in liquids and vapor
- Average to <15 per meg precision on ^{17}O -excess
- Unparalleled speed allows processing of up to 900 injections per day

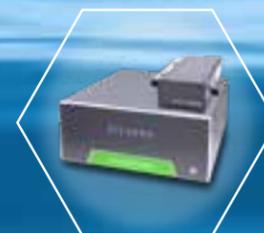
Molecules Measured:

- $\delta^{18}\text{O}$ in H_2O
- $\delta^2\text{H}$ in H_2O
- $\delta^{17}\text{O}$ in H_2O
- $\delta^{17}\text{O}$ -Excess
- CH_4

Related Applications:

- Atmospheric Science
- Ecology
- Hydrology
- Ocean Science
- Paleoclimatology

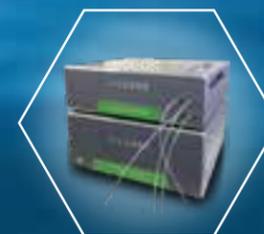
WATER PERIPHERALS



Induction Module for matrix-bound water



Standards Delivery Module for ambient vapor



Continuous Water Sampler for continuous, real-time water



Micro-Combustion Module for plant and soil waters



Vaporizer and Autosampler for liquid water



L2130-*i* Analyzer measures $\delta^{18}\text{O}$ and $\delta^2\text{H}$
L2140-*i* Analyzer adds $\delta^{17}\text{O}$ and ^{17}O -excess



Accelerate your research with Picarro's solution for a wide variety of applications, and numerous peripheral options.



High Precision Vaporizer and Liquid Autosampler

The Picarro A0211 Vaporizer and A0340 Autosampler offer exceptional precision with minimal maintenance. These peripherals fully integrate with the L2130-*i* and L2140-*i* water isotope analyzers, including onboard software control.

- Complete solution for automated analysis
- Choice of operating modes: high precision or high throughput
- Onboard software controls both Autosampler and Vaporizer
- Sample analysis conducted automatically with data reported per injection

Compatibility:

- L2130-*i*
- L2140-*i*

Related Applications:

- Hydrology
- Ocean Science
- Paleoclimatology

Continuous Water Sampler (CWS)



The Picarro A0217 Continuous Water Sampler incorporates a porous membrane that enables diffusive sampling of water isotopes. When coupled with a Picarro water isotope analyzer, high-resolution, real-time measurements of spatial and temporal features of $\delta^2\text{H}$ & $\delta^{18}\text{O}$ within water masses are simple and easy.

- Continuously monitor real-time changes in water isotopes
- Automated switching from samples to standards for calibration
- Pump directly from your water source—no discrete sampling required
- Quick and easy field deployment

Compatibility:

- L2130-*i*
- L2140-*i**

*excludes ^{17}O measurement

Related Applications:

- Hydrology
- Ocean Science

Induction Module (IM)



The Picarro A0213 Induction Module enables scientists to perform isotope analysis of matrix-bound water with high total-dissolved solids. The combination is ideal for a range of disciplines including ecophysiology, ecophysiology, and soil science.

- Prepare water extracted from samples with high total dissolved solids
- Fully integrates with the L2130-*i* and L2140-*i* water isotope analyzers
- Onboard software controls the Induction Module and analyzers

Compatibility:

- L2130-*i*
- L2140-*i**

*excludes ^{17}O measurement

Related Applications:

- Agriculture & Soil Science
- Hydrology
- Ocean Science

Micro-Combustion Module (MCM)



The Picarro A0214 Micro-Combustion Module effectively removes spectral interference for commonly occurring alcohols and plant products, including multicomponent mixtures of alcohols, terpenes, and green leaf volatiles.

- Treat samples inline to decompose interfering organics
- Improve data quality for water isotope analysis
- Easily deploy in a laboratory or in the field

Compatibility:

- L2130-*i*
- L2140-*i*

Related Applications:

- Hydrology
- Ocean Science

Standards Delivery Module (SDM)



The Picarro A0101 Standards Delivery Module makes automated delivery of isotopic water vapor standards in the field simple and reliable.

- Compact, self-contained, field deployable unit
- Collapsible standards bag eliminates head space fractionation
- Automates delivery of two standards at three concentrations per standard
- Automatic, reliable, unattended operation for weeks after setup

Compatibility:

- L2130-*i*
- L2140-*i**

*excludes ^{17}O measurement

Related Applications:

- Atmospheric Science

CARBON PERIPHERALS



SSIM 2 for small discrete gas samples



CSMP - Closed System Measurement Package



Combustion Module for solid and liquid samples



Caddy™ for solid and liquid bulk samples



Sage streamlines discrete sample analysis



AutoMate measures DIC in water and solids



Isotopic Analyzer measures $\delta^{13}\text{C}$ in CH_4 and CO_2



Don't compromise, Picarro offers instruments with excellent precision, minimal calibration, little maintenance, no consumables, at a fraction of IRMS operating cost.

Small Sample Introduction Module 2 (SSIM 2)



The Picarro A0314 Small Sample Introduction Module 2, or SSIM2, transforms all Picarro continuously-sampling analyzers into instruments capable of measuring small, discrete gas samples, as small as 20 mL. Users can effortlessly dilute samples for even smaller volumes.

- Introduce samples via syringe or gas-bag
- Single sample or automatic processing of up to 8 samples using the Picarro 16-Port Manifold (A0311)
- Built-in dilution system enables optimal concentration targeting for isotopic analysis
- Automatically measure isotopic reference gases between samples

Compatibility:

- G2131-*i*
- G2201-*i*
- G2508

Related Applications:

- Ecology
- Agricultural & Soil Science
- Health & Safety
- Petrochemical



Closed System Measurement Package

The Picarro A0701/A0702 Closed System Measurement Package enables Picarro analyzers to provide high-precision concentration and isotope ratio measurements for experiments conducted in closed, recirculating systems.

- Real-time, non-destructive concentration and isotope studies
- Have confidence in your results; minimal efflux and influx
- Ideal for small sample work; perfectly matched to our small cavity technology
- Rugged, robust analyzers for use in the field or in the lab

**bottle not included*

Compatibility:

- G2131-*i*
- G2201-*i*
- G2301
- G2401
- G2508

Related Applications:

- Ecology
- Agricultural & Soil Science



AutoMate Prep Device*

When a Picarro $\delta^{13}\text{C}$ -CO₂ analyzer is coupled with an AutoMate A0304 sample preparation device, the system provides $\delta^{13}\text{C}$ measurements of the dissolved inorganic carbon in water samples or $\delta^{13}\text{C}$ in solid carbonate samples.

- Fast, fully automatic acidification of carbonate and DIC samples
- Low, consistent blanks
- Low downtime between samples
- Small dead volume

**Not available in Europe*

Compatibility:

- G2131-*i*
- G2201-*i*

Related Applications:

- Ocean Science
- Paleoclimatology
- Petrochemical



Combustion Module (CM)

The Picarro A0201 Combustion Module enables $\delta^{13}\text{C}$ measurements of bulk samples - soils or liquid organic materials. The samples are combusted within the CM and the CO₂ that is produced flows to a Picarro analyzer to measure $\delta^{13}\text{C}$ for bulk stable isotope analysis (BSIA).

- The CM-CRDS system can automatically process up to 148 samples at a rate of one sample every 10 minutes
- The precision of the system is better than 0.3‰
- Control and data recording are managed by software on the Picarro analyzer

Compatibility:

- G2131-*i*
- G2201-*i*

Related Applications:

- Air Quality
- Ecology
- Agriculture & Soil Science
- Paleoclimatology
- Food & Beverage
- Petrochemical



Caddy™ Continuous Flow Interface

The Picarro A2100 Caddy Continuous Flow Interface connects commercially available solid and liquid bulk sample preparation instruments—including the Picarro Combustion Module—to Picarro analyzers for high-precision carbon isotope (^{13}C) measurements.

- Fully automated for high-throughput operation
- Low-cost, simple operation
- Laboratory and field deployable

Compatibility:

- G2131-*i*
- G2201-*i*

Related Applications:

- Air Quality
- Ecology
- Agriculture & Soil Science
- Paleoclimatology
- Food & Beverage
- Petrochemical
- Hydrology
- Ocean Science



AUTOMATED SAMPLING SOLUTIONS



The Picarro Automated Sampling Solutions dramatically enhance the flexibility of Picarro systems and analyzers by providing unparalleled discrete or continuous automated sample-data collection.

16-Port Distribution Manifold

The Picarro A0311 16-Port Distribution Manifold is ideal for tall tower research as well as for soil chamber applications and other functions where multipoint sampling is essential.



- Sequentially samples up to 16 sources
- Significantly enhances research flexibility and analyzer capabilities
- Integrates seamlessly with Picarro gas analyzers and software
- Quick and easy setup and simple, maintenance-free design
- Suitable for closed loop when two 16-port are coupled

Compatibility:

- All Picarro analyzers
- **Except those mentioned for A0311-s*

Related Applications:

- Air Quality
- Atmospheric Science
- Emissions Quantification
- Agricultural & Soil Science
- Ecology
- Petrochemical
- Health and Safety

16-Port Distribution Manifold (SilcoNert)

The Picarro A0311-s 16-Port Distribution Manifold is designed to optimize response time in the presence of reactive gases. It uses SilcoNert coated components and an additional vacuum pump to maintain flow in each of its 16 sampling channels.



- Flow through valve for reduced memory effects
- SilcoNert™ coating improves response time
- Simple, maintenance free design
- Sets up in minutes with standard tools

Compatibility:

- G2509
- G2204
- G2307
- PI2124
- PI2103

Related Applications:

- Air Quality
- Agricultural & Soil Science
- Health and Safety
- Pharmaceutical

Sage, Gas Autosampler

The Picarro A0344 Sage gas autosampler streamlines discrete sample analysis when paired with Picarro gas analyzers. Featuring a 150-position-vial rack for 12mL headspace vials, this system enables the analysis of up to 160 samples per day.



- Complete solution for automated analysis
- Compatible software for seamless operation
- Sample analysis conducted automatically with data reported

Compatibility:

- G2131-*i*
- G2201-*i*
- G2210-*i*
- G5131-*i*
- PI5131-*i*
- G2301
- G2401
- G2508
- G5310
- PI5310

Related Applications:

- Air Quality
- Ecology
- Agricultural & Soil Science
- Health & Safety
- Petrochemical
- Hydrology
- Ocean Science

Applications

*These are guidelines. Other analyzers may also be suitable for a particular application.

AIR QUALITY Page

G2204	Hydrogen Sulfide (H ₂ S, CH ₄).....	10
G2301	CO ₂ , CH ₄ , H ₂ O.....	7
G2307	Formaldehyde (H ₂ CO, CH ₄ and H ₂ O).....	10
G2401	CO, CO ₂ , CH ₄ , H ₂ O.....	7
G2401- <i>m</i>	Flight-ready CO, CO ₂ , CH ₄ , H ₂ O.....	7
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