

Frequently Asked Questions

about the Los Gatos Research

Fast Greenhouse Gas Analyzer

1. What does the Fast Greenhouse Gas Analyzer do?

The Los Gatos Research (LGR) Fast Greenhouse Gas Analyzer (FGGA) measures trace concentrations of methane (CH₄), carbon dioxide (CO₂) and water vapor (H₂O) simultaneously in flowing gaseous samples (usually air) at rates up to ≥ 10 Hz. It is an essential tool for researchers wanting to measure greenhouse gas (GHG) emissions, understand the transport of greenhouse gases through the atmosphere, or participate in studies of these key greenhouse gases. The high speed and flexibility of the analyzer makes it particularly valuable for eddy covariance and chamber flux measurements. For applications involving measurements of limited volumes, the FGGA may be optionally configured with the ability to measure discrete gas samples via syringe injection.

2. What are the key benefits of the LGR FGGA compared to other analyzers on the market?

There are many benefits, but the key ones include:

- **All three gases measured simultaneously at ≥ 10 Hz:** The LGR FGGA is the only instrument on the market that can measure all three gases simultaneously at ≥ 10 Hz. With other systems, you have to pick which two of the three you want to measure or use significantly slower measurement rates. This makes the FGGA the best choice for eddy covariance flux measurements and for all other applications that require fast, reliable measurements of these critical greenhouse gases
- **Precision:** LGR's FGGA has guaranteed precision of 0.25 ppbv, 35 ppbv, and 35 ppmv for methane, carbon dioxide, and water vapor, respectively; better than other analyzers on the market.
- **Measurement Range:** LGR's FGGA has an extremely large measurement range and is capable of measuring methane from 0 to 1000 ppmv, carbon dioxide from 0 to 100000 ppmv (10%), and water vapor from 0 to 70000 ppmv (7%). No other multi-gas analyzer provides ultra-precise measurements over such a wide range of mixing ratios.
- **Power Consumption:** LGR's FGGA, including its internal pump, requires only 100 watts of power. Low power usage is particularly important in field locations and other applications with limited power availability. External pumps required for the highest data rates would require additional power.
- **Technology:** The founder of Los Gatos Research (Dr. Anthony O'Keefe) invented the first cavity enhanced absorption based technique called Cavity Ringdown Spectroscopy (CRDS)¹. Since then, LGR has made several improvements to this technology. The fourth-generation, patented, Off-axis ICOS technology used in all our commercial analyzers has several advantages over first-generation CRDS systems such as being alignment insensitive, having a much shorter measurement time, and not requiring expensive and power consuming auxiliary components. Visit our website at www.LGRinc.com/resources/technology for more details.
- **Reliability:** LGR's technology is simple to use, rugged and easy to manufacture. As a result, many LGR instruments have been in use for more than 4 years with no reported issues.

3. Can I view the measured high resolution absorption spectra as it is recorded on an FGGA?

Yes, of course. The ability to review the spectra can be an important diagnostic tool especially if interferences are suspected. On all LGR Analyzers, the measured spectra can be viewed in real time or recalled from memory. If a manufacturer doesn't let you see their spectra, what are they hiding?

4. Is the FGGA durable enough to be used for field (non-laboratory) applications?

Yes. In fact, LGR's FGGA is the ideal choice for field applications:

- **Low Power:** In field applications, minimizing power consumption is often critical.
- **Rugged:** The patented Off-Axis ICOS technology is relatively alignment insensitive so it is largely immune to the effects of vibration and rough handling that can occur during field deployments.
- **Optional features and Accessories:** Several options are available for field measurements including:
 - Multiport Inlet Unit – provides the ability for the analyzer to automatically control up to 16 separate input sources
 - Syringe Injection – allows samples to be manually injected into the analyzer via syringe, greatly enhancing the flexibility of the instrument.
- **Field Experience:** LGR instruments are in use on all 7 continents in some of the toughest environments.

5. Other manufacturers claim that temperature control, pressure control, wavelength monitoring, and shock testing are necessary for high quality measurements. Is this true?

This is completely untrue. Just compare the spec sheets and speak to our customers. The reality is competitor's systems require those "features" because of the technology they use. LGR's more advanced technology outperforms (faster, higher accuracy and precision, wider dynamic range) competing technology in a system that is far simpler, easier to use, requires less power, and is less expensive.

6. Other manufacturers claim that they are the only ones to test every analyzer 100% to specifications before shipping. Is this true?

This is completely untrue. Los Gatos Research tests all of our analyzers to all of our published specifications before being approved for shipment. In fact, our manufacturing specifications go far beyond our published, guaranteed specifications.

7. What are some technical references for the FGGA Analyzer?

A more complete list is given on our website, but here are some good articles written using a methane only version of the FGGA analyzer (copies or links are on our website www.lgrinc.com/resources):

"Large tundra methane burst during onset of freezing" Mastepanov Mikhail; Sigsgaard Charlotte; Dlugokencky Edward J; Houweling Sander; Ström Lena; Tamstorf Mikkel P; Christensen Torben R, Nature, 2008; 456(7222): 628-30

"Extensive Methane Venting to the Atmosphere from Sediments of the East Siberian Arctic Shelf," Science, Vol. 327. no. 5970, pp. 1246 - 1250 DOI: 10.1126/science.1182221

"A compact and stable eddy covariance set-up for methane measurements using off-axis integrated cavity output spectroscopy," D. M. D. Hendriks, A. J. Dolman, M. K. van de Molen, and J. van Huissteden, Discussion EGU Atmos. Chem. Phys. Discuss., 7, 11587–11619, 2007

"Methane fluxes during the initiation of a large-scale water table manipulation experiment in the Alaskan Arctic tundra", Zona, D., W. C. Oechel, J. Kochendorfer, K. T. P. U, A.N. Salyuk, P.C. Olivas, S.F. Oberbauer, and D.A. Lipson, Global Biogeochem, Cycles (in press) doi:10.1029/2009GB003487

8. How do I get more information or purchase a system?

Contact us anytime at:

+1-650-965-7772 or sales@lgrinc.com

In some countries we use distributors to better support our customers. Check our website (www.lgrinc.com/about/distributors) for a list and contact information.

¹"Cavity ring-down optical spectrometer for absorption measurements using pulsed laser sources," Anthony O'Keefe and David A.G. Deacon, *Review of Scientific Instruments*, (ISSN 0034-6748), vol. 59, Dec. 1988