

# Frequently Asked Questions

about the Los Gatos Research

## Liquid Water Isotope Analyzer (model LWIA-24d)

### 1. What does the LWIA-24d do?

The LWIA-24d measures the isotopic ratios  $\delta^{18}\text{O}$  ( $^{18}\text{O}/^{16}\text{O}$ ) and  $\delta\text{D}$  ( $^2\text{H}/^1\text{H}$ ) in liquid water samples. These types of measurements provide a useful tool for investigating hydrological processes in surface and groundwater systems as well as for doubly labeled water studies.

### 2. What are the key benefits of the LGR LWIA-24d?

There are many benefits, but the key ones include:

- **Speed:** When configured with the optional Autoloader, the LWIA-24d can measure at least 800 injections per day. This is significantly faster than competitive instruments and is achieved without sacrificing data quality.
- **High Precision Mode:** LGR's LWIA-24d can be run in a high precision mode for applications requiring the highest precision and accuracy
- **Power Consumption:** LGR's LWIA-24d and autoinjector require only 150 watts. Low power usage is particularly important in field locations with limited power.
- **Technology:** LGR pioneered the use and development of cavity enhanced absorption spectroscopy methods. The founder of LGR invented the first cavity enhanced absorption technology called Cavity Ringdown Spectroscopy (CRDS).<sup>1</sup> Since then, LGR invented Integrated Cavity Output Spectroscopy (ICOS) and Off-Axis ICOS, which is the technology used in the LWIA-24d, as well as LGR's other commercial analyzers. The advanced, patented Off-axis ICOS technology has several advantages over conventional, first-generation, CRDS systems such as being alignment insensitive (and thus significantly more rugged), having a much shorter measurement time, and not requiring expensive and power consuming auxiliary components. Visit [www.LGRinc.com/resources/technology](http://www.LGRinc.com/resources/technology) for more details.
- **Reliability:** LGR's technology is simple to use, operate and manufacture. As a result, many LGR instruments have been in use for more than 4 years with no reported issues.

### 3. Is the LWIA-24d durable enough to be used for field (non-laboratory) applications?

Yes. In fact, LGR's LWIA-24d 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 alignment insensitive so it is relatively immune to the effects of vibration and rough handling that can occur during field deployments.
- **Optional features:** Several options are available for field measurements including:
  - i. Continuous Water Sampler that allows direct sampling from lakes, rivers, streams, rainfall, etc.
  - ii. Remote access and control from anywhere in the world via the Internet.
- **Field Experience:** LGR instruments are in use on all 7 continents in some of the toughest environments.

### 4. Can I view the measured high-resolution absorption spectra as it is recorded on an LWIA-24d?

Certainly. The ability to review measured spectra in real time can help users characterize instrument operation. On an LWIA-24d, the absorption spectra can be viewed in real time or recalled from memory. LGR allows users to view absorption spectra on all its instruments.

### 5. Other manufacturers claim that the LGR LWIA-24d has "memory" problems. Is this true?

This is completely untrue. Sample memory is eliminated by over-injection or multiple injections of the same sample, in a manner similar to conventional IRMS systems. In general, 6 injections per sample are sufficient to adequately eliminate memory effects.

<sup>1</sup> 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

**6. Some manufacturers claim that expensive temperature control systems, pressure controllers, wavelength monitoring, and shock testing are necessary for reliable 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) competing technology in a system that is simpler, easier to use and less expensive.

**7. Other manufacturers claim that the LGR LWIA-24d needs mirror cleaning. Is this true?**

This is completely untrue. LGR's LWIA-24d does not require mirror cleaning.

**8. Why should I buy a system that measures only liquid water when I could buy one system to measure both liquid water and water vapor?**

It is easy to analyze batch vapor samples with our liquid water instrument and liquid water samples with our water vapor instrument. However, we carefully considered this issue and consciously decided to build separate instruments, each optimized for a specific application. Most customers are primarily interested in either liquid water or water vapor measurements and our focus on one measurement type per instrument allows us to make the best instrument possible for that particular application. If both types of measurements are needed, for the price of one competitive analyzer, you could almost buy two LGR analyzers (one liquid and one vapor), which would enable simultaneous measurements of liquid water and water vapor isotopes at two different locations.

**9. It seems counterintuitive that your systems are better than the competitors, but also less expensive. Usually it is the other way around.**

LGR systems are less expensive because of our advanced technology and our business practices. LGR instruments are simpler to manufacture with fewer components, yet provide unsurpassed performance. Why pay for unnecessary and complex components when you don't have to?

**10. What are some technical references for the LWIA-24d?**

A more complete list is given on our website, but here are two good articles (copies or links are on our website [www.lgrinc.com/resources](http://www.lgrinc.com/resources)):

"High-Frequency Field Deployable Isotope Analyzer for Hydrological Applications," Manish Gupta, Elena Berman, Chris Gabrielli, Tina Garland, J. McDonnell, Water Resources Research, Water Resources Research, 45, W10201, doi:10.1029/2009WR008265

"High Resolution Pore Water  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  Measurements by  $\text{H}_2\text{O}(\text{liquid})\text{-H}_2\text{O}(\text{vapor})$  Equilibration" L.I Wassenaar, M.J . Hendry, V.L. Chostner, and G.P. Lis, Environmental Science and Technology, 2008, 42 (24), pp 9262–9267

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

Contact us anytime at +1-650-965-7772 or [sales@lgrinc.com](mailto:sales@lgrinc.com)

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