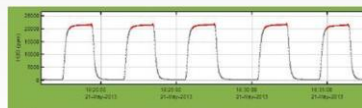


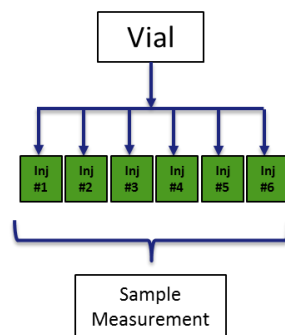
Picarro vs LGR

PICARRO

A 9-min injection provides a 4.5-min plateau where water concentration and isotopic measurement are constant. Analyzer outputs one isotopic composition that is an average of the 1-Hz measurement.



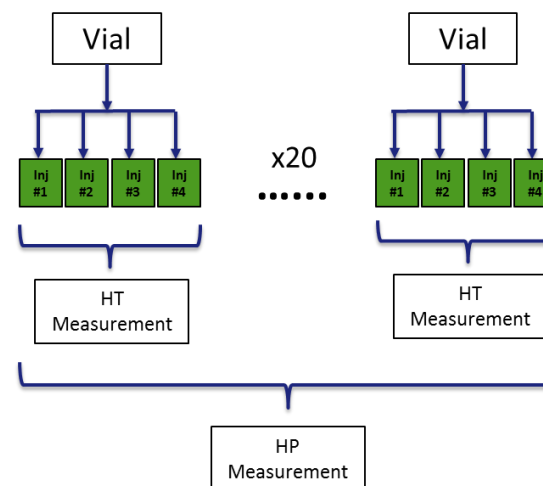
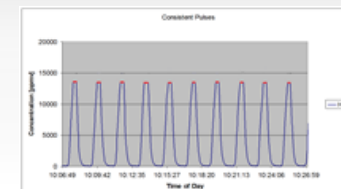
Injection Level



Sample Level

LGR

A ~1.8-min injection provides a 30-sec plateau of water concentration in the analyzer. An averaged isotopic measurement is calculated from the plateau and outputted.



	Picarro			LGR			Notes
	Precision (d18O, d17O, dD)	Precision 17O-Excess	Analytical Time	Precision (d18O, d17O, dD)	Precision 17O-Excess	Analytical Time	
Injection Level	0.1/0.1/0.4‰*	na	9 min	na	na	1.8 min	1-stdev of multiple injections
Sample Level	0.025/0.025/0.1‰	15 permeg	54 min	0.1/0.1/0.4‰	na	7.2 min	1-stdev of multiple sample measurements (HT measurements)
20-Sample Average Level	0.006/0.006/0.025‰*	4 permeg*	18 hr	0.03/0.03/0.2‰	20 permeg	144 min	1-stdev of multiple groups of 20 HT measurements (HP measurements)

* Estimated precision, non-guaranteed

Picarro vs LGR (2)

Notes:

- The diagrams and the comparative table show the difference in deriving the specifications
- Injections needed to overcome memory were not included in the comparison.

Picarro Advantages in the specifications:

- Even though Picarro and LGR can achieve the same level of precisions for d18O, d17O, dD and 17O-excess (0.025/0.0025/0.1/0.015 permils), Picarro can reach them in:
 - Fewer injections (6 vs 80)
 - Fewer sample (10.8 uL vs 144 uL)
 - Less time (54 min vs 144 min)
 - Less amount of data processing (no need to average groups of 20 sample/HT measurements)
- To obtain one HP measurement with the LGR analyzer, HT measurements require corrections for linearity and drift^[1]. On the other hand, Picarro does not require any drift correction nor post-measurement adjustments^[2].

Additional Picarro Advantages:

- Smaller footprint and lighter instrument: half the size and half the weight (20 kg vs 40 kg)
- CRDS is a more stable/lower drift technology requiring less frequent calibrations
- Picarro offers various pre-treatment modules to suit a variety of water stable isotope applications (CWS, IM, SDM, MCM)

Reference:

[1] E. Berman et al, *Measurement of d18O, d17O, and 17O-Excess in Water by Off-Axis Integrated Cavity Output Spectroscopy and isotope Ratio Mass Spectroscopy*, Analytical Chemistry, 2013, dx.doi.org/10.1021/ac402366t

[2] E. Steig et al, *Calibrated High-Precision 17O-Excess Measurements Using Cavity Ring-Down Spectroscopy with Laser-Current-Tuned Cavity Resonance*, Atmos. Meas. Tech, 2014, 7,2421-2435