

MRV SYSTEMS ALAMO FLOAT

The [MRV Systems](#) ALAMO (Air Launched Autonomous Micro-Observer) is an autonomous vertically profiling float. It conforms to the U.S. Navy A-size specification, and is 12.1 cm diameter by 83.8 cm length. It is capable of 200 cycles to 1200 meters (5.5 Argo operating years) with a payload of 1.2 Kg. Data and control commands are telemetered via Iridium. The float may be equipped with a wide range of sensors. The Arctic Heat experiment has deployed variants including pressure-temperature (PT; Fig. S3), conductivity-temperature-depth (CTD) and CTD + PAR (photosynthetically active radiation). Sensors are manufactured by [RBR](#) and [Li-Cor](#) (PAR sensor). The float can also be equipped with an ice-protected antenna and ice avoidance command protocol.

RBR sensor specifications:



Fig. S3. ALAMO PT

Physical

Power.....240 μ W sleep 65 mW sampling
Energy/sample.....<25mJ
Energy/profile.....700J (2000dbar)
Communication.....UART, RS-232, USB-CDC
Storage.....~120M readings
Depth rating.....2000m standard, 6000m deep
Sampling speeds.....Up to 12Hz, configurable

Conductivity

Range.....0-85mS/cm
Accuracy..... \pm 0.003mS/cm
Resolution.....0.001 mS/cm
Typical Stability.....0.010 mS/cm per year

Temperature

Range.....-5 $^{\circ}$ C to 35 $^{\circ}$ C
Initial Accuracy..... \pm 0.002 $^{\circ}$
Resolution.....0.00005 $^{\circ}$ C
Time constant.....700 ms; or ~0.07 s (fast)
Typical stability.....0.002 $^{\circ}$ C/year

Pressure

Range.....2000 (dBar)
Accuracy..... \pm 0.05% full scale
Resolution.....0.001% full scale or 0.001 w.i.g.
Time Constant.....<0.01s
Typical Stability.....0.1% full scale per year

More information: <http://rbr-global.com/wp-content/uploads/2017/06/0003714revB-RBRargo-CTD.pdf>

Li-Cor LI-192 Underwater Quantum Sensor Specifications

Absolute Calibration.....	± 5% in air traceable to NIST
Sensitivity.....	Typically 4 μA per 1,000 $\mu\text{mol s}^{-1} \text{m}^{-2}$ in water
Linearity.....	Maximum deviation of 1% up to 10,000 $\mu\text{mol s}^{-1} \text{m}^{-2}$
Response Time.....	10 μs
Temperature Dependence.....	± 0.15% per °C maximum
Cosine Correction.....	Optimized for underwater and atmospheric use
Azimuth.....	< ± 1% error over 360° at 45° elevation
Operating Temperature Range.....	-40 °C to 65 °C
Size.....	3.18 cm diameter × 4.62 cm height (1.25" × 1.81")
Weight.....	227 g (0.5 lbs.)

Detector: High stability silicon photovoltaic detector (blue enhanced)

Sensor Housing: Corrosion resistant metal with acrylic diffuser for both saltwater and freshwater applications. Waterproof to withstand approximately 5500 kPa (800 psi), 560 meters.

The ALAMO float can be aircraft or ship launched. See [Video S3](#).