

OP-2 Open Path CO₂ Analyzer for Ecophysiological Research



The OP-2 provides simultaneous rapid measurement of atmospheric fluctuations of carbon dioxide and water vapor. It has been specially designed to be used in conjunction with a sonic anemometer for eddy-covariance studies, where the correlation between fluctuations in CO₂ and H₂O with vertical wind speed are used to estimate vertical fluxes of CO₂ and water vapor.

Traditionally these measurements are made using a “closed path” analyzer, such as an ADC2250. Although the ADC2250 itself has a very fast response time (0.1 second), there is always a lag time between the sampling area and the analyzer some centimeters away.

Now using “state of the art” gas analyzer technology, OP-2 has been especially developed to overcome these delayed responses.

Open Path Analyzer

To ensure the fastest possible response to atmospheric changes OP-2 features an Open Path analyzer allowing free air movement within the path length of the analyzer. A near immediate response to gas changes is therefore achieved.



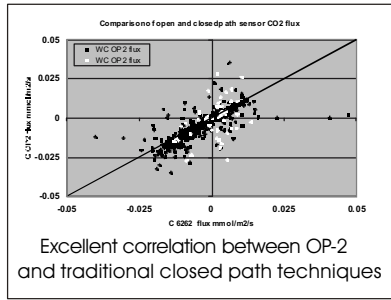
The longer the path length the higher the resolution achieved. With a path length of 80cms, the OP-2 achieves a very high level of resolution. The use of a multiple folded paths (4 x 20 cm) maintains the compact nature of the instrument.

How does it work ?- A source is focused by a high quality lens through a weather-sealed, sapphire window into the “Open Path”. A spherical mirror at the end of the path reflects back to a central mirror and then back to the spherical mirror. The radiation is finally reflected to a second sapphire window and lens to focus through a fast shutter wheel (50Hz) containing narrowband filters for CO and H₂O. The IR radiation terminates on the window of a super cooled PbSe detector.

OP-2 features

- ▶ Open path design / Immediate response
- ▶ Simultaneous CO₂ /H₂O
- ▶ 0.02ppm CO₂ resolution
- ▶ Weather proof
- ▶ Power by 12V DC
- ▶ Typical use with sonic anemometer and other environmental sensors

Designed for long term field monitoring



The OP-2 system consists of the analyzer itself, a power supply unit, and interconnecting cables. OP-2 is designed for long term field monitoring and it is therefore weather proofed against environmental conditions. The sophisticated yet robust electronics are housed in the rear section of the instrument, and are weather sealed with a cover sleeve and o-rings. A calibration hood is provided, which serves also to protect the instrument in transit. The cable connectors are also sealed. Installation is quick and simple.

Continuous Voltage outputs corresponding to concentrations of CO₂ and H₂O are transferred to an appropriate data acquisition system, via a shielded signal cable. For eddy covariance determinations, OP-2 is commonly used in combination with a sonic anemometer, the output of which would also be transferred to the data logging system.

The OP-2 is powered by a 12 Volt DC source, which may be via a battery, solar panel or mains supply.

Applications

Crop modelling
Forest canopies
Urban ecology
Oceanography
Climatic Change
Grassland studies



Technical Specifications

Measurement Technique:	Open path, absolute, infrared (NDIR) analyzer. Simultaneous CO ₂ and H ₂ O measurements.
CO ₂ :	Typical calibration range 200 - 600 ppm Resolution 0.02 ppm
H ₂ O:	Typical calibration range 0 - 40 mb Resolution 0.05 mb
Optical path:	80 cm (4 x folded 20 cm path)
Physical path:	20 cm
Optics:	All exposed optics coated for weather and abrasion resistance
Detector:	Thermo-electrically cooled lead selenide (PbSe)
Filter system:	3 narrow band pass filters. Sampling at 3000 RPM (50Hz)
Analog Outputs:	Nominal 15 Hz. +/- 5V, user-selectable final gain and offset. Temperature compensated. Calibrated to absolute densities.
Power Requirements:	Nominal 12 Volts DC (9.5 to 18) unregulated at 1.4 A, 17 W.
Construction:	Anodized aluminum. Entire assembly weather proofed. Calibration sleeve included. Instrument cable 5.5m.
Mounting:	Flexible mounting system accepts standard hardware.
Operating temperature range	-25 C to 45 C
Weight and Dimensions:	
Dimensions:	Cylindrical; 37 cm length x 7.6 cm diameter
Weight:	1.1kg



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