CPEC306 and CPEC310

Closed-Path Eddy-Covariance Flux Systems

State of the Art

Systems ideal for top-level research

CPEC310

CPEC306

Overview

The CPEC300-series systems are turn-key, closed-path eddy-covariance (EC) flux systems for long-term monitoring of atmosphere-biosphere exchanges of carbon dioxide, water vapor, heat, and momentum. Two models are offered that support different applications:

- CPEC306 – A mid-level, expandable, closed-path, EC system that is a good solution for sites with many sensors and either a short or tall tower
- CPEC310 – A high-end, expandable, closed-path, EC system that is a good solution for sites with many sensors and either a short or tall tower, and that will use automatic zero and span. Each system typically includes an EC155 closed-path gas analyzer, CSAT3A sonic anemometer (ordered as an option), CR6 datalogger (ordered as an option), sample pump, and enclosures that house the electronics. The CPEC310 also has a valve module that provides automatic zero and span and an optional scrub module that provides a convenient source of zero gas. Often the Granite™ Volt 116 analog input module is ordered with a CPEC306 or CPEC310 to connect additional energy-balance and meteorological sensors. The Granite Volt 116 fits inside the system enclosure.

The EC155 gas analyzer's intake design and small sample cell volume (5.9 mL) provide excellent frequency response (4.3 Hz cutoff frequency) with low total system power (12 W). Additionally, the vortex intake greatly reduces maintenance and maintains frequency response compared to traditional inline filters.

Benefits and Features

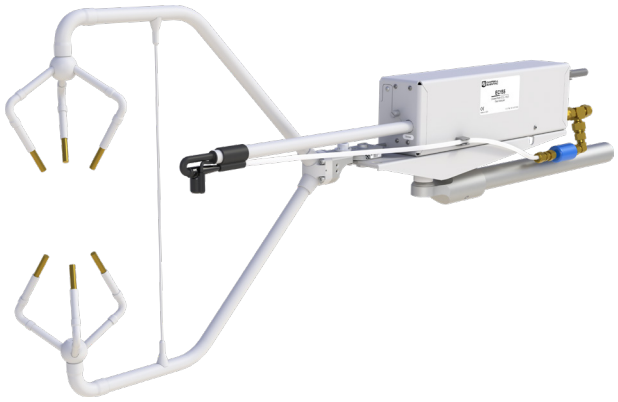
- Ease of use
  - Vortex intake greatly reduces maintenance compared to inline filters
  - EasyFlux™ data logger program requires minimal input from station operator
  - Active system flow control; EC and zero/span flows set by data logger program variables
  - System operates continuously during inclement weather
  - Heated sample intake prevents condensation
  - Installation requires minimal tools
- Excellent system frequency response
- Low power
- Onboard data storage available using microSD cards; maximum 8 GB or 8 months at 10 Hz measurement frequency
- Remote data collection, including direct (Ethernet, RS-232, short haul modem, landline[a]) and wireless (Wi-Fi, RF, cellular[a], satellite[b])

[a]Collecting high-frequency time series is possible, but may be cost prohibitive.
[b]Only online statistics can be collected using satellite.

Detailed Description

Science Measurements

CO_2 and H_2O are measured with an EC155 Closed-Path Gas Analyzer. Three-dimensional wind speed and sonic air temperature are measured with a CSAT3A sonic anemometer head.



CPEC300-Series System Enclosures

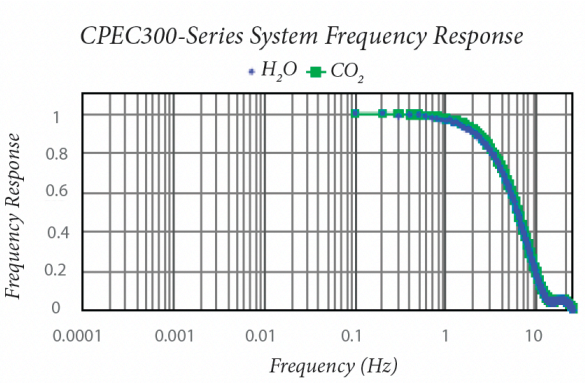
The CPEC300 series uses fewer enclosures than the previous system. Both the CPEC306 and CPEC310 have two enclosures: a fiberglass enclosure that houses the CR6 datalogger, pump module, and optional Granite Volt 116, and the EC100 enclosure for data processing. The CPEC310 can also be equipped with a scrub module for automatic zeroing of the EC155. The CPEC300-series system enclosures can be mounted to a tripod mast, CM106B tripod leg base, tower legs, or a large-diameter pole.

CPEC300-Series Pump Module

The pump module, a standard component of the CPEC300-series system, consists of a small dual-head diaphragm pump with a brushless DC motor mounted inside a fiberglass enclosure. The CPEC306 and CPEC310 come with the pump module contained within the main fiberglass enclosure.

Valve Module

The CPEC310 comes with a three-valve module that enables the system to automatically perform zero, CO_2 span, and H_2O span measurements.



Specifications[c]

- Operating Temperature: -30° to +50°C
- Input Voltage: 10.5 to 16.0 Vdc
- Power: 12 W (typical); 35 W (maximum, at cold startup)
- View the EU Declaration of Conformity document at: www.campbellsci.com/cpec306 or www.campbellsci.com/cpec310.

System Enclosure

- Dimensions
  - CPEC 306/310: 54 x 44.5 x 29.7 cm (21.3 x 17.5 x 11.7 in.)
- Weight
  - CPEC306: 13.72 kg (30.25 lb)
  - CPEC310: 15.36 kg (33.85 lb)
  - Granite Volt 116: 0.88 kg (1.95 lb)

Pump Module

- Pressure Sensor Range: 15 to 115 kPa
- Pumping Speed: 3 to 9 LPM (automatically controlled at the set point, typically 8 LPM)

CPEC310 Three-Valve Module

- Inlets: Zero, CO_2 span, and H_2O span
- Outlets: Analyzer and H_2O bypass
- Connections: 1/4 inch Swagelok
- Flow Rate: 0.5 to 5 LPM (automatically controlled at user-entered set point)
- Dimensions: 14.0 x 12.7 x 14.0 cm (5.5 x 5.0 x 5.5 in.)
- Weight: 1.5 kg (3.3 lb)

[c]Refer to the EC155 and CSAT3A product brochures for closed-path gas analyzer and sonic anemometer specifications.