



## CPEC300, CPEC306, and CPEC310

Closed-Path Eddy-Covariance Flux Systems



## State of the Art

Systems ideal for top-level research

### 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. Three models are offered that support different applications:

- CPEC300—A basic, entry-level, closed-path eddy-covariance flux system that is a good solution for sites with fewer sensors and a short tower
- CPEC306—A mid-level, expandable, closed-path eddy-covariance 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 eddy-covariance 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 CDM-A116 16-channel analog input module is ordered with a CPEC306 or CPEC310 to connect additional energy-balance and meteorological sensors. The CDM-A116 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 now-available 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™ datalogger program requires minimal input from station operator
  - Active system flow control; EC and zero/span flows set by datalogger program variables
  - System operates continuously during inclement weather
  - Heated sample intake prevents condensation
  - Installation requires minimal tools
- Excellent system frequency response (see graph on next page)

- 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<sup>a</sup>) and wireless (Wi-Fi, RF, cellular<sup>a</sup>, satellite<sup>b</sup>)

<sup>a</sup>Collecting high frequency time series is possible, but may be cost prohibitive.

<sup>b</sup>Only online statistics can be collected using satellite.

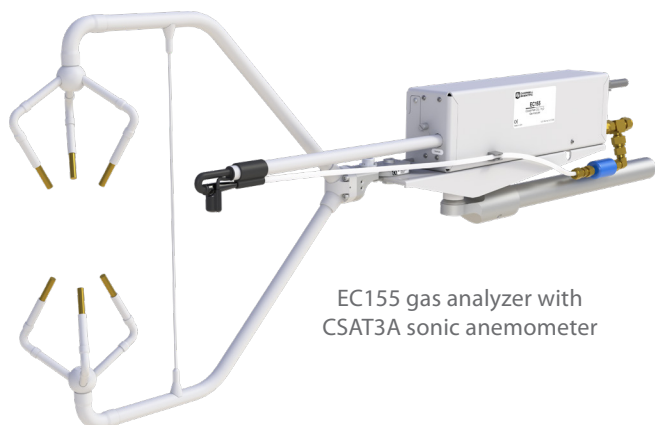
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[www.campbellsci.com.au/cpec300](http://www.campbellsci.com.au/cpec300)



## Science Measurements

CO<sub>2</sub> and H<sub>2</sub>O 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. The CPEC300 has only two enclosures: the EC100 enclosure of the CPEC300 that contains the CR6 datalogger, and the pump module enclosure. Both the CPEC306 and CPEC310 have two enclosures: a fiberglass enclosure that houses the CR6 datalogger, pump module, and optional CDM-A116, 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.

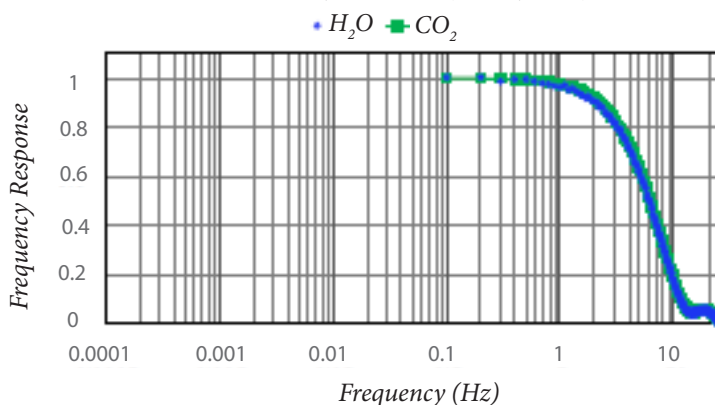
## CPEC300-series Pump Module

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. An integral cable connects the pump module to the CPEC300 enclosure, which provides power, temperature measurement and control, pressure measurement, and pumping speed measurement and control. 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<sub>2</sub> span, and H<sub>2</sub>O span measurements.

*CPEC300-Series System Frequency Response*



## Specifications<sup>c</sup>

- 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/cpec300](http://www.campbellsci.com/cpec300), [www.campbellsci.com/cpec306](http://www.campbellsci.com/cpec306), or [www.campbellsci.com/cpec310](http://www.campbellsci.com/cpec310)

### System Enclosure

- Dimensions  
CPEC300: 34 x 25 x 13 cm (13.4 x 9.8 x 5.1 in)  
CPEC306/310: 54 x 44.5 x 29.7 cm (21.3 x 17.5 x 11.7 in)
- Weight  
CPEC300: 4.02 kg (8.85 lb)  
CPEC306: 13.72 kg (30.25 lb)  
CPEC310: 15.36 kg (33.85 lb)  
CDM-A116 Module: 0.88 kg (1.95 lb)

<sup>c</sup>Refer to the EC155 and CSAT3A product brochures for closed-path gas analyzer and sonic anemometer specifications.

### Pump Module

- Cable Length for CPEC300: 3.0 m (10 ft)
- Inlet Connection for CPEC300: 3/8 inch Swagelok®
- Pressure Sensor Range: 15 to 115 kPa
- Pumping Speed: 3 to 9 LPM (automatically controlled at the set point, typically 8 LPM)
- Dimensions for CPEC300: 35.6 x 29.2 x 13.5 cm (14.0 x 11.5 x 5.3 in)
- Weight for CPEC300 without mounting bracket: 5.4 kg (11.8 lb)

### CPEC310 Three-Valve Module

- Inlets: Zero, CO<sub>2</sub> span, and H<sub>2</sub>O span
- Outlets: Analyzer and H<sub>2</sub>O 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)



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