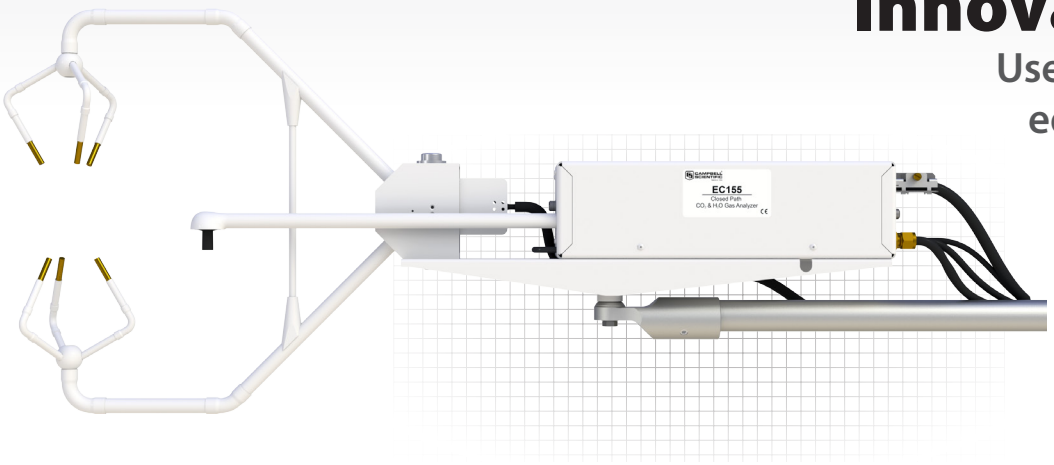
CAMPBELL SCIENTIFIC®
WHEN MEASUREMENTS MATTER

EC155

Closed-Path CO_2/H_2O Gas Analyzer

Innovative Design

Use as part of closed-path eddy-covariance system



Overview

Campbell Scientific's EC155 is a closed-path analyzer specifically designed for eddy-covariance flux measurements. The EC155 is part of the CPEC200 closed-path eddy-covariance system and can be combined with the CSAT3A sonic anemometer as shown above. The CPEC200 system also provides the sample pump, datalogger, optional valve module, and optional scrub module to provide a zero air source. The EC155 with anemometer simultaneously measures absolute carbon dioxide and water vapor mixing ratio, sample cell temperature and pressure, and three-dimensional wind speed and sonic air temperature.

Benefits and Features

- Low power consumption; suitable for solar power applications
- Low noise
- Small sample cell for excellent frequency response
- Fully integrated intake assembly for easy installation and use
- Integrated zero/span connection for simplifies field zero/span
- Slim aerodynamic shape with minimal wind distortion
- Measurements are temperature compensated without active heat control
- Analyzer and sonic anemometer measurements are synchronized by a common set of electronics
- Maximum output rate of 50 Hz with 25 Hz bandwidth
- Heated sample intake
- Field rugged
- Field serviceable
- Factory calibrated over wide range of CO_2, H_2O, pressure and temperature in all combinations encountered in practice
- Extensive set of diagnostic parameters
- Fully compatible with Campbell Scientific dataloggers; field setup, configuration, and field zero and span can be accomplished directly from the datalogger
- Speed of Sound: Determined from 3 acoustic paths; corrected for crosswind effects
- Rain: Innovative signal processing and transducer wicks considerably improves performance of the anemometer during precipitation events

EC155 Outputs

- U_x (m/s)*
- U_y (m/s)*
- U_z (m/s)*
- Sonic Temperature (°C)*
- Sonic Diagnostic*
- CO_2 Mixing Ratio (µmol/mol)
- H_2O Mixing Ratio (mmol/mol)
- Gas Analyzer Diagnostic
- Cell Temperature (°C)
- Cell Pressure (kPa)
- CO_2 Signal Strength
- H_2O Signal Strength
- Differential Pressure (kPa)
- Source Temperature (°C)

**Requires a CSAT3A Sonic Anemometer Head.*

General Specifications[a]

- Operating Temperature: -30° to +50°C
- Operating Pressure: 70 to 106 kPa
- Input Voltage: 10 to 16 Vdc
- Power @ 25°C: 5 W (steady state and power up)
- Measurement Rate: 100 Hz
- Output Bandwidth: 5, 10, 12.5, 20, or 25 Hz; user programmable
- Output Options: SDM, RS-485, USB, analog
- Auxiliary Inputs: air temperature and pressure
- Weight
  EC155 Head and Cables: 3.9 kg (8.5 lb)
  CSAT3A Head and Cables: 1.7 kg (3.7 lb)
  Mounting Hardware: 0.4 kg (0.9 lb)
  EC100 Electronics: 3.2 kg (7 lb)
- Cable Length: 3 m (10 ft) from EC155/CSAT3A to EC100
- Sample Intake/Sonic Volume Separation: 15.6 cm (6.1 in.)

Gas Analyzer Specifications[a]

- Sample Cell Volume: 5.9 cm^3 (0.36 in^3)

Performance

	CO_2	H_2O
Precision RMS (maximum)[b]	0.15 µmol/mol	0.006 mmol/mol
Calibrated Range	0 to 1000 µmol/mol	0 mmol/mol to 37°C dewpoint
Zero Drift with Temperature (maximum)	±0.3 µmol/mol/°C	±0.05 mmol/mol/°C
Gain Drift with Temperature (maximum)	±0.1% of reading/°C	±0.3% of reading/°C
Cross Sensitivity (maximum)	±1.1 x 10^{-4} mol CO_2 /mol H_2O	±0.1 mol H_2O/mol CO_2

Sonic Anemometer Specifications[a]

Measurement Path

- Vertical: 10.0 cm (3.9 in.)
- Horizontal: 5.8 cm (2.3 in.)

Transducer Diameter

- 0.64 cm (0.25 in.)

Accuracy[c]

- Offset Error
  u_x, u_y: <±8.0 cm s^{-1}
  u_z: <±4.0 cm s^{-1}
- Gain Error
  Wind Vector within ±5° of horizontal: <±2% of reading
  Wind Vector within ±10° of horizontal: <±3% of reading
  Wind Vector within ±20° of horizontal: <±6% of reading
- Measurement Precision RMS
  u_x, u_y: 1 mm s^{-1}
  u_z: 0.5 mm s^{-1}
  Sonic Temperature: 0.025°C

Barometer Specifications[a]

	-BB Basic Barometer	-EB Enhanced Barometer (Vaisala PTB110)
Total Accuracy	±3.7 kPa at -30°C, falling linearly to ±1.5 kPa at 0°C (-30° to 0°C), ±1.5 kPa (0° to 50°C)	±0.15 kPa (-30° to +50°C)
Measurement Rate	10 Hz	1 Hz

[a]Subject to change without notice.
[b]Nominal conditions for precision verification test: 23°C, 86 kPa, 400 µmol/mol CO_2, 12°C dewpoint, and 20 Hz bandwidth.
[c]The accuracy specification for the sonic anemometer is for wind speeds <30 m s^{-1} and wind angles between ±170°.