



Now with Vortex Technology

Use as part of closed-path eddy-covariance system

Overview

Campbell Scientific's EC155 closed-path analyzer incorporates vortex technology for reduced maintenance, an absolute pressure sensor in the sample cell for more accurate measurements, and a sample cell with improved corrosion protection. The EC155 can be combined with the CSAT3A sonic anemometer, as shown in the main image. The revised CSAT3A has a more aerodynamic and rigid design.

The EC155 is ordered as part of a CPEC300-series system (CPEC300, CPEC306, or CPEC310), which also includes the sample pump, data logger, 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

- › Vortex Intake (U.S. Pat. No. 9,217,692) greatly reduces maintenance frequency compared to traditional in-line filters
- › Heated inlet increases protection against condensation
- › More accurate pressure measurements with the new sample cell absolute pressure sensor
- › Fully integrated, detachable intake
- › Improved corrosion protection with stainless-steel sample cell
- › Improved sonic temperature from more rigid CSAT3 geometry
- › Stream-lined, aerodynamic CSAT3A mounting
- › Slim aerodynamic shape with minimal wind distortion

Specifications

Operating Temperature Range	-30° to +50°C
Operating Pressure	70 to 106 kPa
Input Voltage Range	10 to 16 Vdc
Power	5 W (steady state and power up) at 25°C
Measurement Rate	60 Hz

Output Bandwidth	5, 10, 12.5, or 20 Hz (user-programmable)
Output Options	SDM, RS-485, USB, analog (CO ₂ and H ₂ O only)
Auxiliary Inputs	Air temperature and pressure
EC100 Barometer Accuracy	› ±1.5 kPa (> 0°C), increasing linearly to ±3.7 kPa at -30°C (basic)

	› ± 0.15 kPa (-30° to +50°C) (enhanced)
Sample Intake/Sonic Volume Separation	15.6 cm (6.1 in.)
Warranty	3 years or 17,500 hours of operation (whichever comes first)
Cable Length	3 m (10 ft) from EC155/CSAT3A to EC100
Weight	› 3.9 kg (8.5 lb) for EC155 head and cables › 1.7 kg (3.7 lb) for CSAT3A head and cables › 0.4 kg (0.9 lb) for mounting hardware › 3.2 kg (7 lb) for EC100 electronics

Gas Analyzer

Sample Cell Thermistor Accuracy	$\pm 0.15^\circ\text{C}$ (-30° to +50°C)
Sample Cell Pressure Accuracy	± 1.5 kPa (> 0°C), increasing linearly to ± 3.7 kPa at -30°C

Gas Analyzer - CO₂ Performance

Accuracy	› Assumes the following: the gas analyzer was properly zero and spanned using the appropriate standards; CO ₂ span concentration was 400 ppm; H ₂ O span dewpoint was at 12°C (16.7 ppt); zero/span temperature was 25°C; zero/span pressure was 84 kPa; subsequent measurements made at or near the span concentration; temperature is not more than $\pm 6^\circ\text{C}$ from the zero/span temperature; and ambient temperature is within the gas analyzer operating temperature range. › 1% (Standard deviation of calibration residuals.)
Precision RMS (maximum)	0.15 $\mu\text{mol/mol}$ Nominal conditions for precision verification test: 25°C, 86 kPa, 400 $\mu\text{mol/mol}$ CO ₂ , 12°C dewpoint, and 20 Hz bandwidth.
EC100 ingress protection	IP65

Gas Analyzer - CO₂ Performance

Calibrated Range	0 to 1,000 $\mu\text{mol/mol}$ (0 to 3,000 $\mu\text{mol/mol}$ available upon request.)
Zero Drift with Temperature (maximum)	± 0.3 $\mu\text{mol/mol}/^\circ\text{C}$
Gain Drift with Temperature (maximum)	$\pm 0.1\%$ of reading/ $^\circ\text{C}$
Cross Sensitivity (maximum)	$\pm 1.1 \times 10^{-4}$ mol CO ₂ /mol H ₂ O

Gas Analyzer - H₂O Performance

Accuracy	› Assumes the following: the gas analyzer was properly zero and spanned using the appropriate standards; CO ₂ span concentration was 400 ppm; H ₂ O span dewpoint was at 12°C (16.7 ppt); zero/span temperature was 25°C; zero/span pressure was 84 kPa; subsequent measurements made at or near the span concentration; temperature is not more than $\pm 6^\circ\text{C}$ from the zero/span temperature; and ambient temperature is within the gas analyzer operating temperature range. › 2% (Standard deviation of calibration residuals.)
Precision RMS (maximum)	0.006 mmol/mol Nominal conditions for precision verification test: 25°C, 86 kPa, 400 $\mu\text{mol/mol}$ CO ₂ , 12°C dewpoint, and 20 Hz bandwidth.
Calibrated Range	0 to 72 mmol/mol (38°C dewpoint)
Zero Drift with Temperature (maximum)	± 0.05 mmol/mol/ $^\circ\text{C}$
Gain Drift with Temperature (maximum)	$\pm 0.3\%$ of reading/ $^\circ\text{C}$
Cross Sensitivity (maximum)	± 0.1 mol H ₂ O/mol CO ₂

Sonic Anemometer

Measurement Path	› 10.0 cm (3.9 in.) vertical › 5.8 cm (2.3 in.) horizontal
Transducer Diameter	0.64 cm (0.25 in.)
Range	› ± 30 m s ⁻¹ (for u _x) › ± 60 m s ⁻¹ (for u _y) › ± 8 m s ⁻¹ (for u _z) › -50° to +60°C (for T _s) › $\pm 170^\circ$ (for wind direction)

For comprehensive details, visit: www.campbellsci.eu/ec155 



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