

EC150

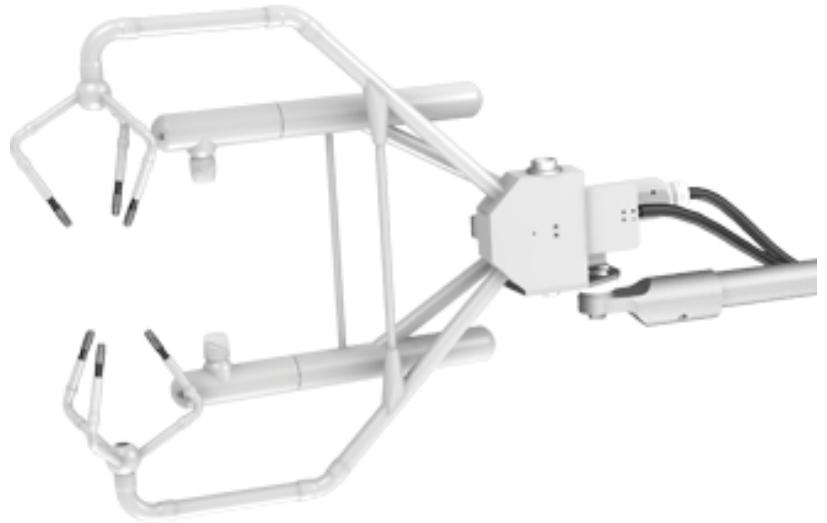
CO₂ and H₂O Open-Path Gas Analyzer and 3D Sonic Anemometer



Campbell Scientific's EC150 is an integrated in-situ open path analyzer and sonic anemometer specifically designed for eddy covariance flux measurements. It simultaneously measures absolute carbon dioxide and water vapor densities, air temperature, barometric pressure, and three dimensional wind speed and sonic air temperature.

Features/Benefits

- Unique optical layout allows for a slim aerodynamic shape with minimal wind distortion and body heating
- Measurements are temperature compensated without active heat control
- Analyzer and sonic anemometer measurements are temporally synchronized by a common set of electronics
- Low power consumption; suitable for solar power applications
- Low noise
- Maximum output rate of 50 Hz with 25 Hz bandwidth
- Tolerant to window contamination
- Angled windows to shed water
- Field rugged
- Field serviceable (easy access to chemical bottles)
- Factory calibrated over wide range of CO₂, H₂O, pressure and temperature in all combinations encountered in practice
- Extensive set of diagnostic parameters to warn of questionable data
- Fully compatible with Campbell Scientific dataloggers; field setup, configuration, and field zero and span can be accomplished directly from the datalogger



EC150 gas analyzer and 3D sonic anemometer.

EC150 Outputs

- U_x (m/s)
- U_y (m/s)
- U_z (m/s)
- Sonic Temperature (°C)
- Sonic Diagnostic
- CO₂ Density (mg/m³)
- H₂O Density (g/m³)
- Gas Analyzer Diagnostic
- Ambient Temperature (°C)
- Atmospheric Pressure (kPa)
- CO₂ Signal Strength
- H₂O Signal Strength

^aSubject to change without notice.

^bA temperature of 20°C and pressure of 101.325 kPa was used to convert mass density to concentration.

^cThe noise RMS specifications assume 25°C, 597 mg/m³ CO₂ density, 85 kPa, 14 g/m³ water density, and 25 Hz bandwidth.

^dThe accuracy specification for the sonic anemometer is for wind speeds <30 m s⁻¹ and wind angles between ±170°.

^eThe measurement resolution values for the sonic anemometer are for instantaneous measurements made on a constant signal.

General Specifications^a

Operating Temperature:	-30° to +50°C	Output Rate:	5 to 50 Hz; user programmable
Operating Pressure:	70 to 106 kPa	Auxiliary Inputs:	air temperature and pressure
Power:	5 W (steady state and power up) at 10 to 16 Vdc	Weight	
Fundamental Measurement Rate:	100 Hz	CSAT3A Head & Cables:	1.7 kg (3.7 lb)
Output Bandwidth:	5, 10, 12.5, 20, or 25 Hz; user programmable	EC150 Head & Cables:	2.0 kg (4.4 lb)
Output Signal:	SDM, RS-485, USB	EC100 Electronics:	3.2 kg (7 lb)
		Umbilical Cable Length:	3 m (9.8 ft) from EC150 head and CSAT3A head to electronics
		Gas Analyzer/Sonic Volume Separation:	6 cm (2.36 in.)

Gas Analyzer Specifications^{a, b}

Factory Calibrated Range		Sensitivity to H₂O (maximum):	$\pm 1.1 \times 10^{-4}$ molCO ₂ /molH ₂ O
CO₂:	0 to 1830 mg/m ³ (0 to 1000 ppm)		
H₂O:	0 to 42 g/m ³ (-60° to +37°C dew point)		
Path Length:	15.37 cm (6.05 in)		

CO₂ Performance

Zero Drift with Temperature (maximum):	± 0.55 mg/m ³ /°C (± 0.3 μ mol/mol/°C)
Gain Drift with Temperature (maximum):	$\pm 0.1\%$ of reading/°C
Noise RMS (maximum)^c	0.2 mg/m ³ (0.15 μ mol/mol)

H₂O Performance

Zero Drift with Temperature (maximum):	± 0.037 g/m ³ /°C (± 0.05 mmol/mol/°C)
Gain Drift with Temperature (maximum):	$\pm 0.3\%$ of reading/°C
Noise RMS (maximum)^c	0.004 g/m ³ (0.006 mmol/mol)
Sensitivity to CO₂ (maximum):	± 0.1 molH ₂ O/molCO ₂

Sonic Anemometer Specifications^a

Accuracy^d

Offset Error	
u_x, u_y:	< ± 8.0 cm s ⁻¹
u_z:	< ± 4.0 cm s ⁻¹
Gain Error	
Wind Vector within $\pm 5^\circ$ of horizontal:	< $\pm 2\%$ of reading
Wind Vector within $\pm 10^\circ$ of horizontal:	< $\pm 3\%$ of reading
Wind Vector within $\pm 20^\circ$ of horizontal:	< $\pm 6\%$ of reading

Measurement Resolution^e

u_x, u_y:	1 mm s ⁻¹ rms
u_z:	0.5 mm s ⁻¹ rms
c:	15 mm s ⁻¹ (0.025°C)

Speed of Sound: Determined from 3 acoustic paths; corrected for crosswind effects

Rain: Innovative ultrasonic signal processing and user installable wicks considerably improve the performance of the anemometer under all rain events

Barometer Specifications^a

-BB Basic Barometer

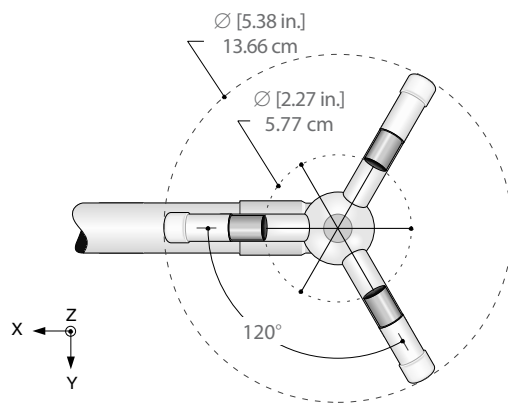
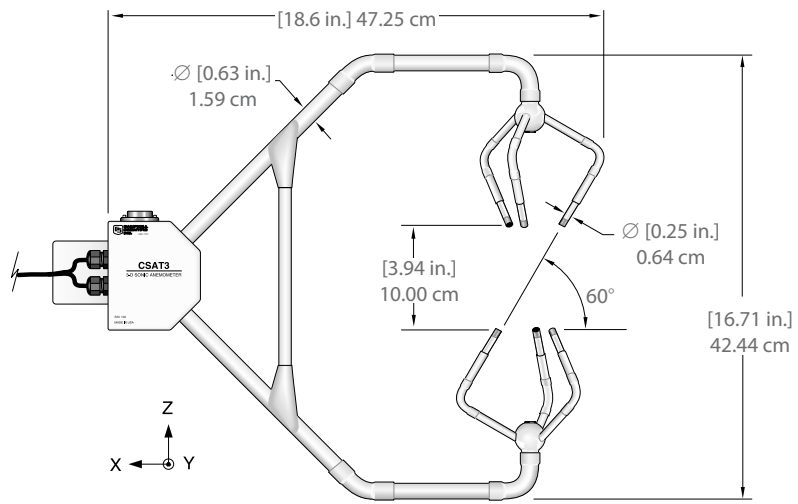
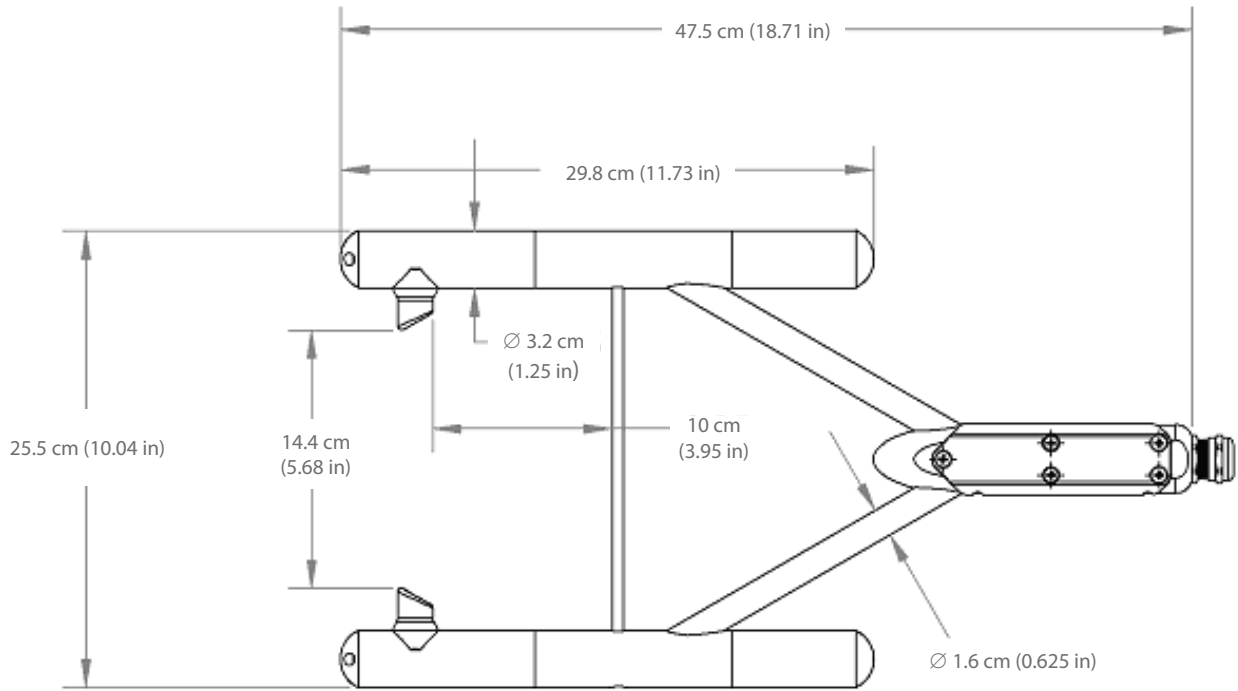
Manufacturer:	Freescale MPXAZ6115A
Total Accuracy:	± 2.2 kPa (0° to +85°C); rises linearly from 2.2 kPa at 0°C to 5.5 kPa at -30°C

-EB Enhanced Barometer

Manufacturer:	Vaisala PTB110
Total Accuracy:	± 0.85 kPa (0° to +60°C); rises linearly from 0.85 kPa at 0°C to 1.90 kPa at -30°C

Ambient Temperature Specifications^a

Manufacturer:	BetaTherm 100K6A11A	Total Accuracy:	$\pm 0.15^\circ\text{C}$ (-30° to +50°C)
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Ordering Information

Flux Sensor

EC150 CO₂ and H₂O Open-Path Gas Analyzer

Pressure Sensor Options (must choose one)

- BB Basic Barometer
- EB Enhanced Barometer

EC150 Carrying Case Options

- NG No EC150 Case
- GC EC150 Carrying Case

Zero and Span Accessories

26390 EC150 Zero and Span Shroud Kit

27278 EC150 Lab Stand Kit

Cables

For the following cables, enter the length, in feet after the -L, and choose -PT for the cable termination option. A 25-ft cable length is recommended.

CABLEPCBL-L Two-conductor, 16-AWG cable with a Santoprene® jacket is used to power the EC100 electronics box.

CABLE4CBL-L Four-conductor, 22-AWG cable with drain wire and Santoprene jacket is used to attach the SDM connector on the EC100 electronics box.

CABLE3TP-L Three-twisted pair, 24-AWG cable with drain wire and Santoprene jacket is recommended for use with the RS-485 output (<500 ft length).



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