



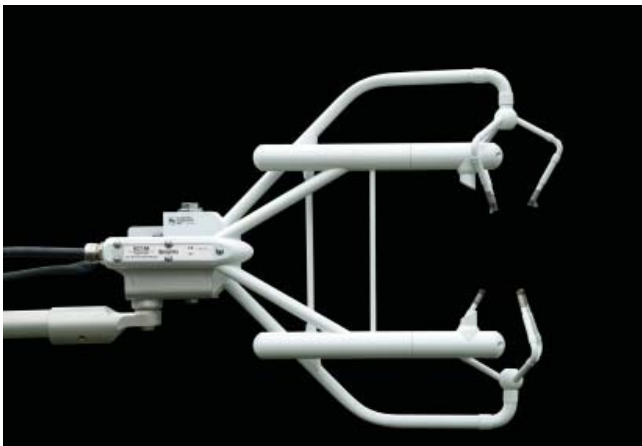
**EC150** CO<sub>2</sub> and H<sub>2</sub>O Open-Path Gas Analyzer with  
Optional 3D Sonic Anemometer Head

# EC150

## CO<sub>2</sub> and H<sub>2</sub>O Open-Path Gas Analyzer with Optional 3D Sonic Anemometer Head



EC150 with optional Sonic Anemometer Head



EC150 with optional Sonic Anemometer Head

Campbell Scientific's EC150 is an in-situ open path analyzer specifically designed for eddy covariance flux measurements. As a stand-alone analyzer, it simultaneously measures absolute carbon dioxide and water vapor densities, air temperature, and barometric pressure. With the optional CSAT3A sonic anemometer head, the EC150 also measures three dimensional wind speed and sonic air temperature.

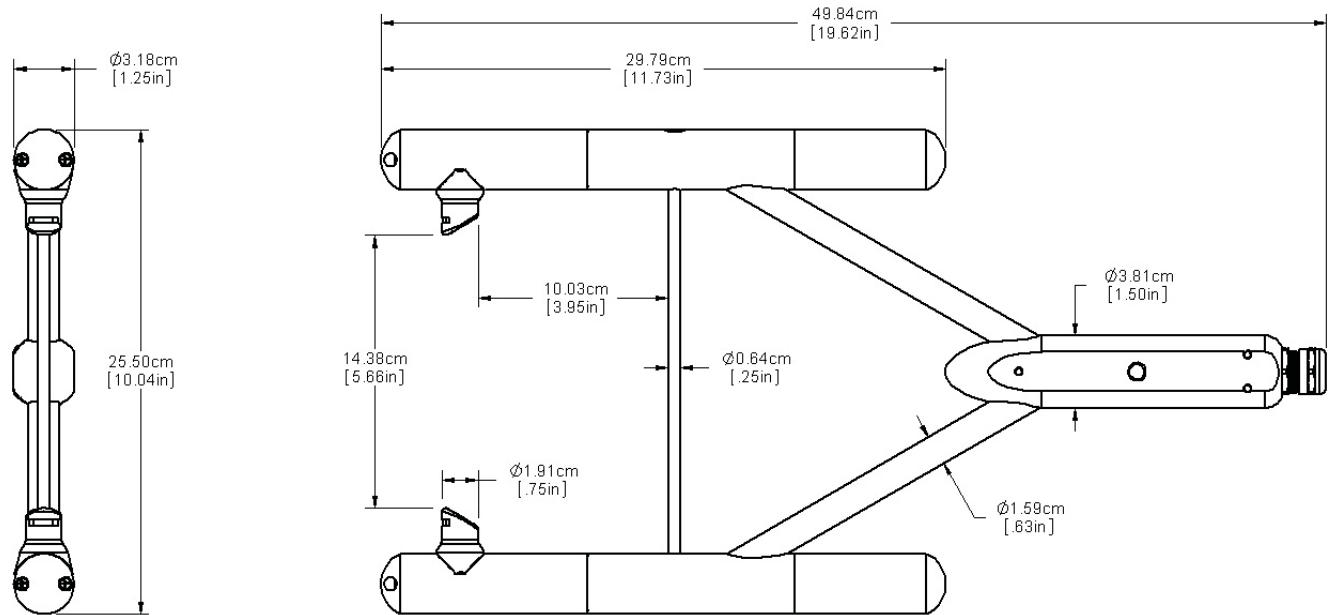
### Features/Benefits

- Unique optical layout allows for a slim aerodynamic shape with minimal wind distortion and body heating
- Measurements are temperature compensated without active heat control
- Co-located analyzer and sonic anemometer measurement volumes
- Integrated analyzer and sonic anemometer mounting
- 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 CO<sub>2</sub>, H<sub>2</sub>O, 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 Outputs\*

- $U_x$  (m/s)
- $U_y$  (m/s)
- $U_z$  (m/s)
- Sonic Temperature ( $^{\circ}\text{C}$ )
- Sonic Diagnostic
- $\text{CO}_2$  Density ( $\text{mg}/\text{m}^3$ )
- $\text{H}_2\text{O}$  Density ( $\text{g}/\text{m}^3$ )
- Gas Analyzer Diagnostic
- Ambient Temperature ( $^{\circ}\text{C}$ )
- Atmospheric Pressure (kPa)
- $\text{CO}_2$  Signal Strength
- $\text{H}_2\text{O}$  Signal Strength

\*A CSAT3 Sonic Anemometer Head is required for the first five outputs.



## Ordering Information

### Flux Sensor

**EC150**  $\text{CO}_2$  and  $\text{H}_2\text{O}$  Open-Path Gas Analyzer

#### Sensing Heads Options (must choose one)

- GH Gas Analyzer Only
- SH CSAT3A and Gas Analyzer (see Carrying Case Options)

#### Sonic Carrying Case Options

- NC No Sonic Case
- SC Sonic Carrying Case

#### 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. A 25-ft length is recommended. A cable termination option must be chosen for each of the cables (see below).

- CABLEPCBL-L** Two-conductor, 16-AWG cable with a Santoprene® jacket is used to power the EC150.
- CABLE4CBL-L** Four-conductor, 22-AWG cable with drain wire and Santoprene jacket is used to attach the SDM connector on the EC150 electronics box.
- CABLE2TP-L** Two-twisted pair, 22-AWG cable with drain wire and Santoprene jacket is used to attach the Analog Output connector on the EC150 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).

#### Cable Termination Options (must choose one)

- PT Cable terminates in stripped and tinned leads for direct connection to a datalogger's terminals.
- PW Cable terminates in a connector for attachment to a prewired enclosure.

## Gas Analyzer Specifications<sup>a, b</sup>

Refer to CSAT3 Product Brochure for Sonic Anemometer Specifications

### Factory Calibrated Range

CO <sub>2</sub> :	0 to 1830 mg/m <sup>3</sup> (0 to 1000 ppm)
H <sub>2</sub> O:	0 to 42 g/m <sup>3</sup> (-60° to +35°C dew point)
Ambient Temperature:	-30° to +50°C
Pressure:	70 to 106 kPa

**Operating Temperature:** -30° to +50°C

**Power:** 5 W (steady state and power up)  
at 10 to 16 Vdc

**Gas Path Separation/  
Sonic Volume:** 6 cm (2.36 in)

**Path Length:** 15.37 cm (6.05 in)

**Fundamental  
Measurement Rate:** 150 Hz

**Output Rate:** 5 to 50 Hz; user programmable

**Output Bandwidth:** 5, 10, 12.5, 20, or 25 Hz;  
user programmable

**Output Signal:** SDM, RS-485, USB, 2 16-bit DACs  
for CO<sub>2</sub> and H<sub>2</sub>O (0 to 5 Vdc)

**Auxiliary Inputs:** air temperature and pressure

### Dimensions

Head Housing Diameter:	3.2 cm (1.25 in)
Head Length:	29.7 cm (11.7 in)
Electronics:	24.1 cm x 35.6 cm x 14 cm (9.5 in x 14 in x 5.5 in)

### Weight

**Analyzer and Cable:** 2 kg (4.4 lb)  
**Electronics:** 3.2 kg (7 lb)

**Cable Length:** 3 m (9.8 ft) from analyzer  
to electronics

### CO<sub>2</sub> Performance

#### Zero Drift with Temperature

**(maximum):** ±0.55 mg/m<sup>3</sup>/°C  
(±0.3 μmol/mol/°C)

#### Gain Drift with Temperature

**(maximum):** ±0.1% of reading/°C

**Noise RMS (maximum)<sup>c</sup>** 0.2 mg/m<sup>3</sup> (0.15 μmol/mol)

#### Sensitivity to H<sub>2</sub>O

**(maximum):** ±5.6 x 10<sup>-5</sup> molCO<sub>2</sub>/molH<sub>2</sub>O

### H<sub>2</sub>O Performance

#### Zero Drift with Temperature

**(maximum):** ±0.037 g/m<sup>3</sup>/°C  
(±0.05 mmol/mol/°C)

#### Gain Drift with Temperature

**(maximum):** ±0.3% of reading/°C

**Noise RMS (maximum)<sup>c</sup>** 0.004 g/m<sup>3</sup>  
(0.006 mmol/mol)

#### Sensitivity to CO<sub>2</sub>

**(maximum):** ±0.05 molH<sub>2</sub>O/molCO<sub>2</sub>

## Barometer Specifications

### -BB Basic Barometer

<b>Manufacturer:</b>	Freescale MPXAZ6115A and Freescale MPXV7007DP
<b>Total Accuracy:</b>	±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

<b>Manufacturer:</b>	Vaisala PTB110 and Freescale MPXV7007DP
<b>Total Accuracy:</b>	±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

<b>Manufacturer:</b>	BetaTherm 100K6A11A	<b>Total Accuracy:</b>	±0.15°C (-30° to +50°C)
----------------------	---------------------	------------------------	-------------------------

<sup>a</sup>Subject to change without notice.

<sup>b</sup>A temperature of 20°C and pressure of 101.325 kPa was used to convert mass density to concentration.

<sup>c</sup>The noise RMS specifications assume 25°C, 597 mg/m<sup>3</sup> CO<sub>2</sub> density, 85 kPa, 14 g/m<sup>3</sup> water density, and 25 Hz bandwidth.

