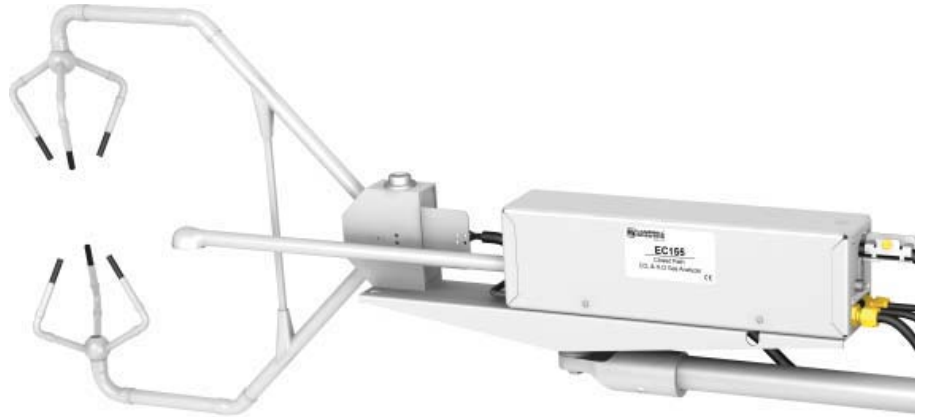


EC155

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



Campbell Scientific's EC155 is a closed path analyzer specifically designed for eddy covariance flux measurements. It simultaneously measures absolute carbon dioxide and water vapor mixing ratio, sample cell temperature and pressure, and three-dimensional wind speed and sonic air temperature.



EC155 gas analyzer and 3D sonic anemometer.

Features/Benefits

- Slim aerodynamic shape with minimal wind distortion
- Measurements are temperature compensated without active heat control
- Analyzer and sonic anemometer measurements are temporal 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
- EC155 heated sample intake
- Field rugged
- Field serviceable (easy access to chemical bottles and sample cell)
- 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

EC155 Outputs*

- U_x (m/s)
- U_y (m/s)
- U_z (m/s)
- Sonic Temperature (°C)
- Sonic Diagnostic
- CO₂ Mixing Ratio (μmol/mol)
- H₂O Mixing Ratio (mmol/mol)
- Gas Analyzer Diagnostic
- Cell Temperature (°C)
- Cell Pressure (kPa)
- CO₂ Signal Strength
- H₂O Signal Strength
- Differential Pressure (kPa)

*A CSAT3A Sonic Anemometer Head is required for the first five outputs.

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 and Cables:	1.7 kg (3.7 lb)
Output Bandwidth:	5, 10, 12.5, 20, or 25 Hz; user programmable	EC155 Head and Cables:	3.9 kg (8.5 lb)
Output Signal:	SDM, RS-485, USB	Mounting Hardware:	0.4 kg (0.9 lb)
		EC100 Electronics:	3.2 kg (7 lb)
		Umbilical Cable Length:	3 m (9.8 ft) from EC155/CSAT3A head to electronics

Gas Analyzer Specifications^a

Factory Calibrated Range		Noise RMS (maximum)^b:	0.15 $\mu\text{mol/mol}$
CO₂:	0 to 1000 ppm	Sensitivity to H₂O (maximum):	$\pm 5.6 \times 10^{-5}$ molCO ₂ /molH ₂ O
H₂O:	0 to 83 ppt (-60° to +37°C dew point)		
Ambient Temperature:	-30° to +50°C		
Sample Cell Volume:	5.9 cm ³ (0.36 in ³)		

CO₂ Performance

Zero Drift with Temperature (maximum):	± 0.3 $\mu\text{mol/mol/}^\circ\text{C}$
Gain Drift with Temperature (maximum):	$\pm 0.1\%$ of reading/ $^\circ\text{C}$

H₂O Performance

Zero Drift with Temperature (maximum):	± 0.05 mmol/mol/ $^\circ\text{C}$
Gain Drift with Temperature (maximum):	$\pm 0.3\%$ of reading/ $^\circ\text{C}$
Noise RMS (maximum)^b:	0.006 mmol/mol
Sensitivity to CO₂ (maximum):	± 0.05 molH ₂ O/molCO ₂

Sonic Anemometer Specifications^a

Accuracy^c

Offset Error	
u_x, u_y:	$< \pm 8.0$ cm s ⁻¹
u_z:	$< \pm 4.0$ 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 $\pm 6^\circ$ of horizontal:	$< \pm 2\%$ of reading

Measurement Resolution^d

u_x, u_y:	1 mm s ⁻¹ rms
u_z:	0.5 mm s ⁻¹ rms
c:	15 mm s ⁻¹ (0.025 $^\circ\text{C}$)

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

-BB Basic Barometer

Manufacturer:	Freescale MPXAZ6115A and Freescale MPXV7007DP
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

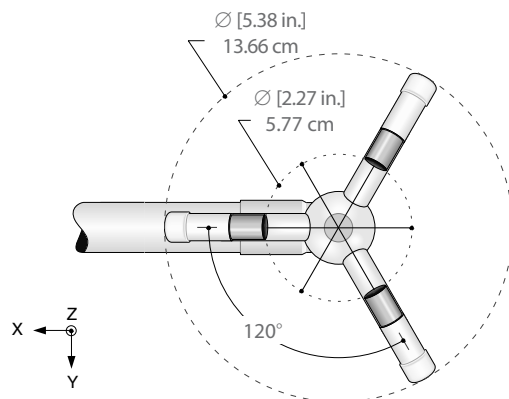
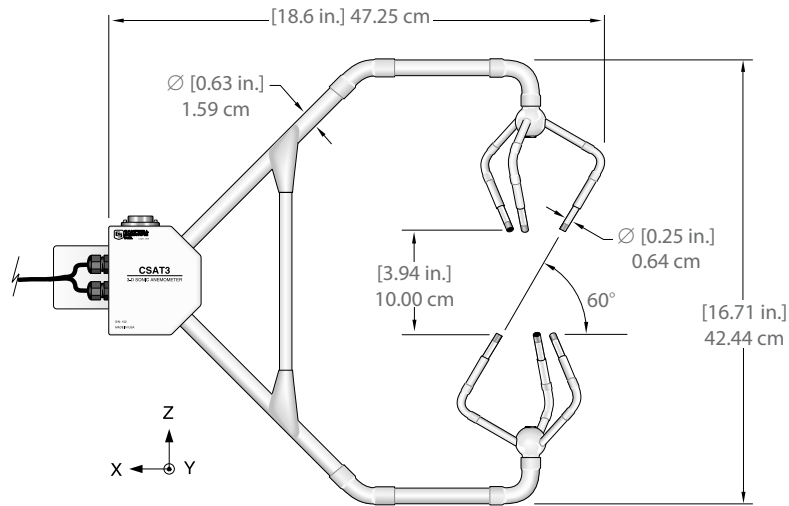
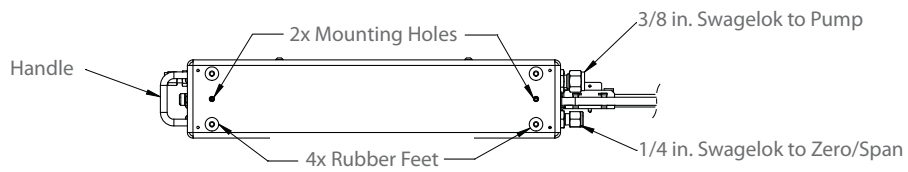
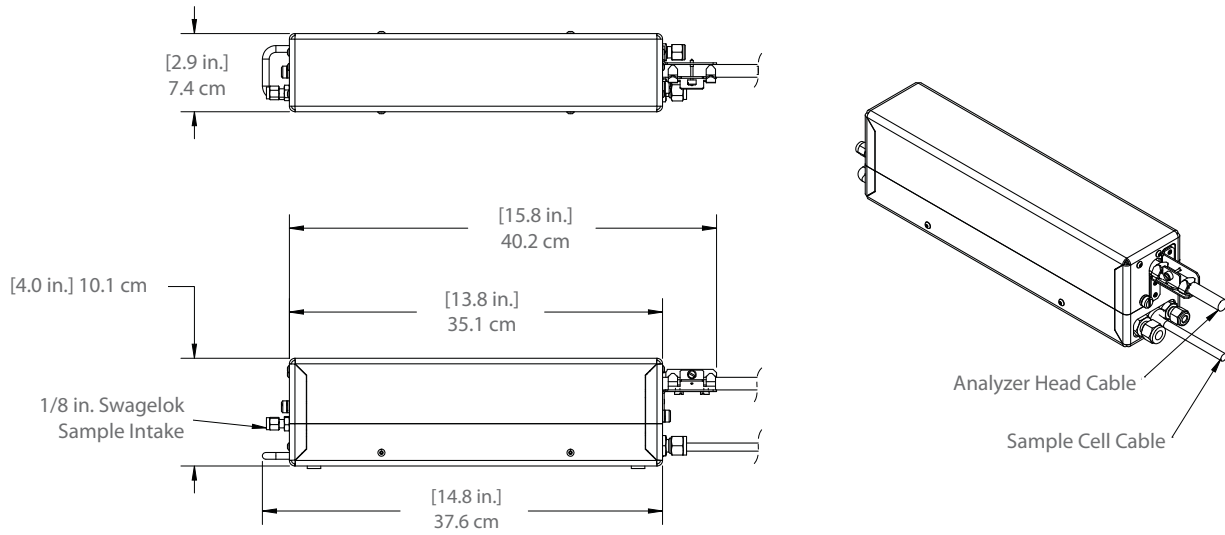
Manufacturer:	Vaisala PTB110 and Freescale MPXV7007DP
Total Accuracy:	± 0.85 kPa (0° to +60°C); rises linearly from 0.85 kPa at 0°C to 1.90 kPa at -30°C

^aSubject to change without notice.

^bThe noise RMS specifications assume 25°C, 85 kPa, 326 $\mu\text{mol/mol}$ CO₂ concentration, 19 mmol/mol H₂O concentration, and 25 Hz bandwidth.

^cThe accuracy specification for the sonic anemometer is for wind speeds < 30 m s⁻¹ and wind angles between $\pm 170^\circ$.

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



Ordering Information

Flux Sensors

EC155 CO₂ and H₂O Closed-Path Gas Analyzer

Sample Cell Options (must choose one)

- SI** Sample Cell with Intake
- SN** Sample Cell with No Intake

Sensing Heads Options (must choose one)

- GH** Gas Analyzer Only
- SH** CSAT3A and Gas Analyzer

Sonic Carrying Case Options

- NC** No Sonic Case
- SC** Sonic Carrying Case

Pressure Sensor Option (must choose one)

- BB** Basic Barometer
- EB** Enhanced Barometer

EC155 Carrying Case Option

- NG** No EC155 Case
- GC** EC155 Carrying Case

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 EC155.

CABLE4CBL-L Four-conductor, 22-AWG cable with drain wire and Santoprene jacket is used to attach the SDM connector on the EC155 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).

