



CSAT3AH

Replacement Heated Sonic Head



Flux Measurements in All Climates Year-Round

Overview

The CSAT3AH is integrated into EC150 and CPEC3XX stations that are deployed in cold climates. The easy-to-use CSAT3AH sonic anemometer features smart heating that delivers just the right amount of heat to keep the instrument free of ice and snow, enabling continuous and reliable flux data in cold environments. The CSAT3AH is designed to prevent ice accumulation on the sensor, avoiding prolonged periods of data loss.

The CSAT3AH features smart heating that automatically applies the necessary amount of heat only when needed. Moreover, real-time data flags indicate when the heaters are turned on so that these moments can be taken into account when analyzing data.

The CSAT3AH is a heated version of the [CSAT3A 3-D Sonic Anemometer](#). The specifications of the CSAT3AH are the same as those of the CSAT3A with regard to wind measurements.

Benefits and Features

- › Two-zone heating to keep both the transducers and body of the sonic anemometer free of snow and ice
- › Heater controller with environmental feedback to ensure power budgeting
- › Streamlined heater integration to ensure maintenance of sonic aerodynamics
- › Integrated data flagging, providing critical information when heaters were operating
- › Harsh Sonic Environment option available for adding conformal coating to transducers to better withstand corrosive environments

Specifications

Measurement Path Length › 5.8 cm (2.3 in.) horizontal
› 10.0 cm (3.94 in.) vertical

Path Angle from Horizontal 60°

Construction Sealed sonic transducers and electronics

Anemometer Head Materials Stainless-steel tubing

Electronics Box Materials Welded aluminum

Operating Temperature Range -40° to +50°C

Voltage Supply › 10 to 16 Vdc



	» <i>Note: Heaters require separate power source than that of the sensor; see below.</i>
Current	» 200 mA (60 Hz measurement rate) » <i>Note: Heaters require separate power source than that of the sensor; see below.</i> » 100 mA (20 Hz measurement rate)
Digital SDM Output Signal	CSI 33.3 k baud serial interface for data logger/sensor communication. (Data type is 2-byte integer per output plus 2-byte diagnostic.)
Support Arm Diameter	1.59 cm (0.63 in.)
Transducer Diameter	0.64 cm (0.25 in.)
Transducer Mounting Arm Diameter	0.84 cm (0.33 in.)
Anemometer Head Dimensions	47.3 x 42.4 cm (18.6 x 16.7 in.)
Anemometer Head Weight	1.7 kg (3.7 lb)
CSAT3H Heater Controller Dimensions	26.7 x 21.8 x 15.7 cm (10.5 x 8.6 x 6.2 in.)
CSAT3H Heater Controller Weight	1.88 kg (4.15 lb)

Heater Power Requirements

Heaters	6.2 A (@ 24 Vdc)
Arms and Strut	» 0.74 A nominal (@ 24 Vdc) » 2.46 A at maximum heating (@ 24 Vdc)
Transducer Fingers	» 1.13 A nominal (@ 24 Vdc) » 3.75 A at maximum heating (@ 24 Vdc)
Total System Power	» 6.2 A at maximum heating (@ 24 Vdc) » 1.86 A nominal (@ 24 Vdc)
Controller Current Required	30 mA (heaters off [quiescent] @ 24 Vdc)

Measurements

Outputs	u_x , u_y , u_z , c (u_x, u_y, u_z) are wind components referenced to the anemometer axes; c is speed of sound.)
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Speed of Sound	Determined from three acoustic paths; corrected for crosswind effects.
Measurement Rate	Programmable from 1 to 60 Hz, instantaneous measurements. Two over-sampled modes are block averaged to either 20 Hz or 10 Hz.
Output Bandwidths	5, 10, 12.5, or 20 Hz
Output Rate	10, 20, 25, or 50 Hz
Measurement Resolution	» Resolution values are for instantaneous measurements made on a constant signal; noise is not affected by sample rate. » 15 mm/s (0.025°C) rms (c) » 0.5 mm/s rms (u_z) » 1 mm/s rms (u_x, u_y)
Offset Error	» $< \pm 4.0$ cm/s (u_z) » Offset error and gain error values assume the -30° to +50°C range, wind speeds of < 30 m/s, and wind angles between $\pm 170^\circ$. » $< \pm 8.0$ cm/s (u_x, u_y)
Gain Error	» $< \pm 3\%$ of reading (wind vector within $\pm 10^\circ$ of horizontal) » $< \pm 6\%$ of reading (wind vector within $\pm 20^\circ$ of horizontal) » Offset error and gain error values assume the -30° to +50°C range, wind speeds of < 30 m/s, and wind angles between $\pm 170^\circ$. » $< \pm 2\%$ of reading (wind vector within $\pm 5^\circ$ of horizontal)
Rain	Innovative ultrasonic signal processing and user-installable wicks considerably improve the performance of the anemometer under all rain events.

Digital USB and RS-485 Output Signal

Baud Rate	230400 bps (maximum)
Data Type	Comma-delimited ASCII

SDM, USB, and RS-485 Digital Outputs Reporting Range

Full-Scale Wind	± 65.535 m/s autoranging between four ranges (Least significant bit is 0.25 to 2 mm/s.)
Speed of Sound	300 to 366 m/s (-50° to +60°C) Least significant bit is 1 mm/s (0.002°C).

For comprehensive details, visit: www.campbellsci.com/csats3ah