

Aspirated Thermocouple with Radiation Shield

Model ASPTC

Campbell Scientific's ASPTC uses a fine-wire thermocouple mounted in an aspirated radiation shield to provide highly accurate air temperature measurements. One ASPTC can measure absolute air temperature, or two ASPTCs can make delta temperature measurements. Often, the ASPTC replaces, or is measured in addition to, the TCBR thermocouples in a Bowen ratio system.

Thermocouple

The fine-wire thermocouple consists of a chromel wire and a constantan wire joined at a measurement junction. Temperature is determined by measuring the differences in potential created at the junction of the two wires. A reference temperature measurement (typically measured at the datalogger wiring panel) is required. Options for measuring the reference temperature include:

- CR10XTCR thermistor that connects to the CR10X wiring panel
- Thermistor built into the CR800, CR1000, CR3000, or CR5000 wiring panel
- PRT built into the wiring panel of the CR9050 or CR9051E input module for the CR9000X Measurement and Control System
- PRT built into the wiring panel of the CR723T input card for the CR7 Measurement and Control System

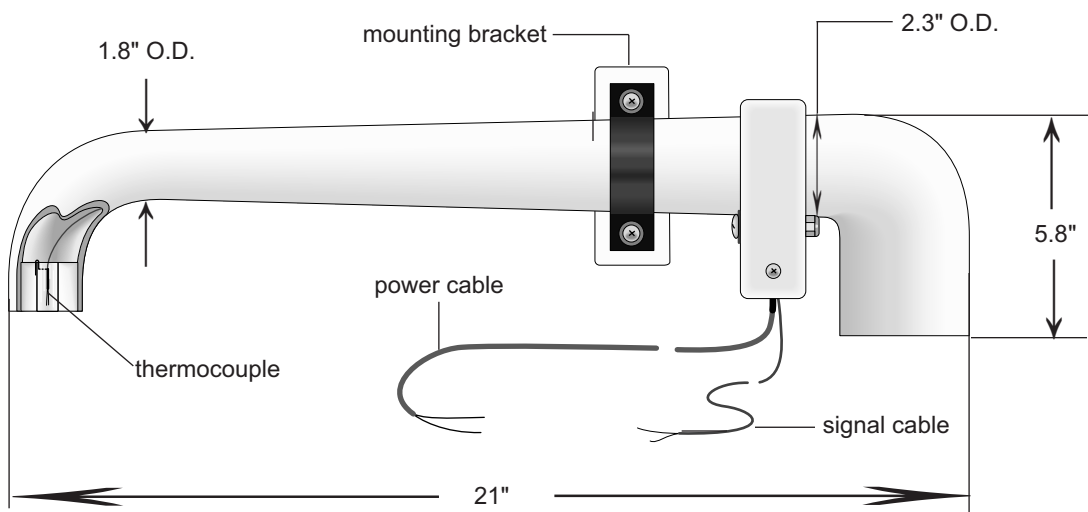
Please note that our CR200-series and CR510 dataloggers are not compatible with thermocouples, and therefore cannot be used to measure the ASPTC.

Aspirated Radiation Shield

The aspirated radiation shield consists of an elongated tube constructed from white UV stabilized polyethylene that provides low thermal conductivity and heat retention. A fan draws air across the measurement junction, which reduces solar loading on the thermocouple. The radiation shield also protects the thermocouple, increasing the thermocouple's durability.



These Bowen ratio systems at a sorghum field near Lincoln, Nebraska include ASPTCs attached to the upper and lower Bowen ratio arms.



Mounting Options

The ASPTC can be mounted to a tripod or tower via the UT018 crossarm, a Bowen ratio arm, or a user-supplied crossarm that has a square cross section (1.5" x 1.5"). When using a Bowen ratio arm, the ASPTC intake should be mounted at the same height as the water vapor intake.

Power Considerations

The ASPTC is typically powered with a user-supplied deep cycle battery that is recharged with an SP20R or SP65 solar panel; for high current drain systems two SP65 solar panels may be used to provide 130 W of power. The datalogger's rechargeable battery can only be used if it is connected to ac power. For help on analyzing your system's power requirements, refer to our Power Supply product literature or application note.

Ordering Information

- ASPTC-L-LP Aspirated Thermocouple with Radiation Shield and user-specified signal and power cable lengths; enter the signal length (in feet) after the L and enter the power cable length (in feet) after the -LP. In a standard configuration, lead lengths of 15' are recommended for both the signal and power cables (ASPTC-L15-LP15).
- UT018 Tower Mounting Bracket with 2' Crossarm
- BRA/UPR Upper Bowen Ratio Arm
- BRA/LWR Lower Bowen Ratio Arm

Specifications

Weight: 1.9 lbs (0.86 kg)

Shield

Material: UV stabilized polyethylene

Dimensions: 21" (53.3 cm) length, 5.8" (14.7 cm) height, 2.3" (5.8 cm) large OD, 1.8" (4.6 cm) small OD

Fan

Air Velocity at Thermocouple: 5.5 m @ 12 Vdc

Life Expectancy : 60,000 hrs @ 25°C

Current Drain: 140 mA @ 25°C

Thermal Fuse: opens @ 640 mA

Operating Range: 6 to 14 Vdc

Radiation Error: <0.2°C radiation @ 1100 W m⁻² irradiance

Reverse Polarity Protected

Thermocouple

Type: Chromel-Constantan

Diameter: 0.003" (0.0762 mm)

Typical Output: 60 μ V/°C

Accuracy: temp. error = reference temp. error + TC output error + TC voltage error + linearization error

Where: TC output error = deviation from standards published in NIST Monograph 175
linearization error = difference between the NIST standard and the datalogger's
polynomial approximation

Refer to the "Thermocouple Measurement" section in your datalogger manual for more information.



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