



Rugged, Accurate, Versatile

Can be used in a variety
of applications

Overview

The 109 is a rugged, accurate probe that measures air, soil, and water temperature for a variety of applications. It consists of a thermistor encapsulated in an epoxy-filled aluminum housing.

The housing protects the thermistor allowing the 109 to be buried or submerged. The 109 measures from -50° to $+70^{\circ}\text{C}$.

Benefits and Features

- › Versatile product—measures air, soil, or water temperature
- › Wide temperature measurement range
- › Compatible with most Campbell Scientific dataloggers
- › Easy to install or remove
- › Durable

Installation

Air Temperature

When exposed to sunlight, the 109 should be housed in a 41303-5A, 41303-5B, or RAD06 6-plate radiation shield. The louvered construction of these radiation shields allows air to pass freely through the shield thereby keeping the sensor at or near ambient temperature. The shields' white color reflects solar radiation.

The RAD06 uses a double-louvered design that offers improved sensor protection from driving rain, snow, insect intrusion and has lower self-heating in bright sunlight combined with higher temperatures ($> 24^{\circ}\text{C}$ ($\sim 75^{\circ}\text{F}$)) and low wind speeds ($< 2 \text{ m s}^{-1}$ ($\sim 4.5 \text{ mph}$)) giving a better measurement.

The 41303-5A and RAD06 attaches to a crossarm, mast, or user-supplied pipe with a 2.5 to 5.3 cm (1.0 in to 2.1 in) outer diameter.

The 41303-5B attaches to a CM500-series pole or a user-supplied pole with a 5.1 cm (2.4 in) outer diameter.

Water Temperature

The sensor can be submerged to 15 m (50 ft) or 21 psi. The 109 is not weighted, and therefore the installer should either add a weighting system or secure the sensor to a fixed, submerged object, such as a piling.

Soil Temperature

The 109 is suitable for shallow burial only. Placement of the sensor's cable inside a rugged conduit may be advisable for long cable runs—especially in locations subject to digging, mowing, traffic, use of power tools, or lightning strikes.



Ordering Information

Temperature Sensor

When ordering the temperature sensor, you must choose a cable length option and cable termination option.

109-L Temperature Sensor (-50° to +70°C).

Cable Length Options (choose one)

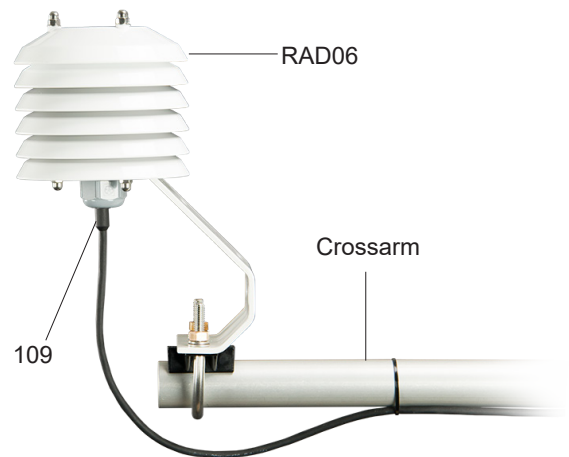
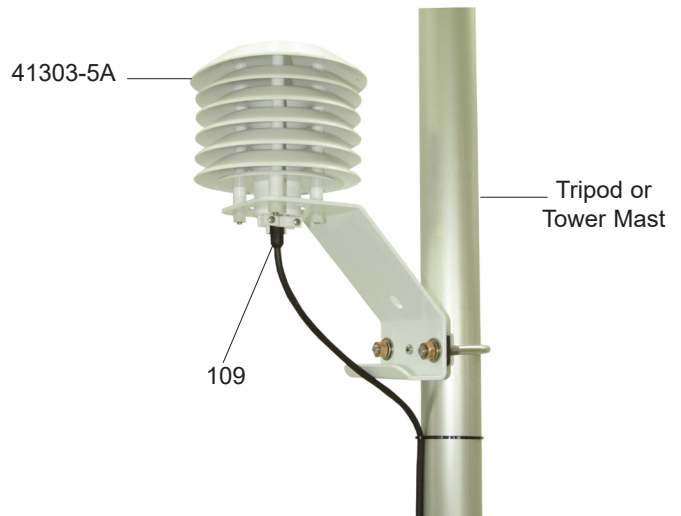
- 10** 10 ft (3 m) cable length recommended for mounting sensor directly to the mast or leg at a 2 m height.
- 17** 17 ft (5 m) cable length recommended for mounting sensor on a 2 ft crossarm at a 2 m height or atop a CM106B, CM110, or UT10.
- 33** 33 ft (10 m) cable length recommended for mounting sensor on a 2 ft crossarm atop a CM115, CM120, or UT20.
- 50** 50 ft (15 m) cable length recommended for mounting sensor on a 2 ft crossarm atop a UT30 tower.
- U-L** User-defined cable length. Enter length, in feet, after the -L. See Cable Length Recommendation Table below.

Cable Termination Options (choose one)

- PT** Cable terminates in stripped and tinned leads for direct connection to a datalogger's terminals.
- PW** Cable terminates in connector that attaches to a prewired enclosure.
- CWS** Cable terminates in a connector for attachment to a CWS900-series interface, which allows it to be used in a wireless sensor network.

Solar Radiation Shield for Air Temperature Measurements

- 41303-5A** 6-Plate R. M. Young Radiation Shield with U bolts for attachment to a Campbell Scientific crossarm or mast.
- 41303-5B** 6-Plate R. M. Young Radiation Shield with Band Clamp for attachment to a CM500-series or similar pole.
- RAD06** 6-Plate MetSpec Radiation Shield with U bolts for attachment to a Campbell Scientific crossarm or mast.



Cable Length Recommendations for Air Temperature Measurement¹

2 m Height	CM106B ²	CM110 ²	CM115 ²	CM120 ²	UT10	UT20	UT30
3.4 m (11 ft)	4.3 m (14 ft)	4.3 m (14 ft)	5.8 m (19 ft)	7.3 m (24 ft)	4.3 m (14 ft)	7.3 m (24 ft)	11.3 m (37 ft)

Notes:

1. The lengths assume the sensor is mounted at the end of a 2 ft crossarm.
2. The lengths assume the enclosure is mounted to the tripod mast. If it is mounted to the leg base, add 0.6 m (2 ft) to the cable length.

Specifications

- › Sensor: Measurement Specialties™ 10K3A1iA Thermistor
- › Tolerance: ±0.2°C over 0° to 70°C range
- › Temperature Measurement Range: -50° to +70°C
- › Steinhart-Hart Linearization Error: ≤ 0.03°C (-50° to 70°C)
- › Interchangeability Error: ±0.1°C over 0° to 70°C range increasing to ±0.5°C at -50°C
- › Time Constant in Air: 30 to 60 s in a wind speed of 5 m s⁻¹
- › Maximum Cable Length: 305 m (1000 ft)
- › Maximum Submersion Depth: 15 m (50 ft)
- › Sensor Length: 10.4 cm (4.1 in)
- › Sensor Diameter: 0.76 cm (0.3 in)
- › Weight with 10 ft cable: 136 g (5 oz)
- › View EU Declaration of Conformity Documentation at: www.campbellsci.com/109



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March 7, 2017