



## 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 you to bury the

109 in soil or submerge it in water. The 109 measures from  $-50^{\circ}$  to  $+70^{\circ}\text{C}$ , and it outputs a 0 to 2.2 V signal when using 2500 mV excitation.

### Benefits and Features

- › Versatile product—measures air, soil, or water temperature
- › Wide temperature measurement range
- › Compatible with most Campbell Scientific data loggers
- › Easy to install or remove
- › Durable
- › Compatible with the CWS900-series interfaces, allowing it to be used in a wireless sensor network

### Detailed Description

#### 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, and insect intrusion, and it 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 attach 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.

## Specifications

Sensor Description	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 <sup>-1</sup> )
Maximum Submersion Depth	15 m (50 ft)
Maximum Cable Length	305 m (1000 ft)
Probe Length	10.4 cm (4.1 in.)
Probe Diameter	0.76 cm (0.3 in.)
Weight	136 g (5 oz) with 3.05-m (10-ft) cable

For comprehensive details, visit: [www.campbellsci.com/109](http://www.campbellsci.com/109) 



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