TEMPERATURE SENSOR ASSEMBLY

100093 TEMPERATURE SENSOR (REF)

23 INCHES +/-1/2 INCH

MS3101F16S-1P (REF)

CONTRACT NO.

APPROVALS DATE

DRAWN D.ADAMS 07/91

CHECKED RN 7/25/91

ISSUED TJS 7/30/91

SCALE ~

CLIMATRONICS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:

FRACTIONS DECIMALS ANGLES
= XX = XXX =

MATERIAL

FINISH

NEXT ASSY USED ON

APPLICATION DO NOT SCALE DRAWING

SIZE FSCM NO. DWG. NO. 102090 REV. B

A 52332 102090

SHEET 1 OF 2
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1.0 INTRODUCTION

Climatronics’ P/N 100093 Series Temperature sensors consist of an epoxy coated thermistor composite housed in a variety of probe casings. The thermistor composite exhibits relatively large resistance changes in response to small temperature changes and is interchangeable within specifications.

Depending on the type of thermistor composite and casing used, virtually any meteorological temperature range can be precisely measured. The P/N 100093 air temperature sensor consists of a two thermistor composite encased in a stainless steel sheath. The P/N 100093-2 air temperature sensor is similarly encased but utilizes a three thermistor composite to extend the measurement range. The P/N 100093-3 air temperature sensor is used when a fast response measurement is required. This sensor is constructed with the two thermistor composite directly exposed to the air but surrounded by a protective cage. The P/N 100093-4 Water/Soil temperature sensor also includes the two thermistor composite which is coated in a special plastic material for protection from water and soil environments. The sensors are typically installed in one of Climatronics' temperature shields and can be provided with calibration traceable to NIST.

2.0 SPECIFICATIONS

P/N 100093: Air
P/N 100093-4: Water/Soil

Accuracy & Interchangeability:
±0.15°C (±0.27°F) over Full range
Range: -30.0°C to 50.0°C (-22.0°F to 122.0°F)
Time Constant: 3.6 seconds
Linearity: ±0.16°C (±0.29°F)

P/N 100093-2: Expanded Range

Accuracy & Interchangeability:
±0.10°C (±0.18°F) over Full range
Range: -50.0°C to +50.0°C (-58.0°F to 122.0°F)
Time Constant: 3.6 seconds
Linearity: ±0.16°C (±0.29°F)

3.0 INSTALLATION

When purchased with a Climatronics system, the sensor is usually preinstalled in one of our temperature shields. For test, calibration or replacement, installation instructions are included in the appropriate Climatronics Temperature Shield Manual Section.

4.0 USER DEFINED OPTIONS

Not Applicable
5.0 THEORY OF OPERATION

The resistance of each thermistor, which makes up the thermistor composite, varies as the temperature changes. This variation of resistance with temperature is a known function but is not linear. When the thermistor is connected in a network of the type shown on Pages 3 and 4, a voltage that varies as the temperature changes is obtained. This voltage is approximately linear with temperature (±0.16°C). The thermistor signal is used by a Climatronics Temperature Signal Conditioner, which includes the non-sensor portion of the network as part of its circuitry.

The wiring of the various types of thermistor probes is shown below:

6.0 CALIBRATION

To check the calibration of the sensor, a calibration bath should be used. Follow the instructions below:

Equipment Needed:

1. The sensor to be checked.
2. A transfer standard sensor, accurate to ±0.05°C at 0.0°C.
3. A Thermos type container
4. Crushed, distilled water ice.
5. A thermal Mass*.
6. Precision Ohm meter.

* A thermal mass is used to keep the sensor and transfer standard in a thermally stable environment during calibration. An aluminum block or another metal block with a similar high heat transfer factor is suggested.

Procedure:
The object is to measure the accuracy of the sensor. To do this, the sensor output must be monitored. You should disconnect the sensor from the signal conditioner. If the sensor is wired into a system and cannot be removed, be sure the system electronics are calibrated within their tolerances. This last method checks the accuracy of the entire system.
A. Remove the sensor from its shield.

B. Pour some crushed ice and distilled water mixture into the container.

C. Put the sensor and the transfer standard in the thermal mass (if used). Place the thermal mass in the container; or, put both sensors in the container.

NOTE: The sensors should be making good mechanical contact with the thermal mass, use a heat sink compound if available.

D. Fill the container up with more of the crushed ice and distilled water mixture.

E. Occasionally, stir the mixture and compare the sensor's values. The Standard should measure 0.0°C ± 0.1°C. The sensor being tested should measure the same value as the Standard ± its accuracy tolerance. As the ice melts add more crushed ice to keep the mixture at equilibrium.

F. It is recommended that at least one additional calibration point be checked. Use a liquid bath with a temperature in the middle to high range of the sensor (i.e., 16°C or 61°F).

**7.0 MAINTENANCE**

The sensor is virtually maintenance free and needs only to be periodically cleaned of any foreign substances which may have adhered to it. If the sensor should fail, it must be replaced. Consult Climatronics if this occurs.

**Note:** Probes used in Delta temperature configurations have been matched for greater accuracy than standard configuration probes.
null
NOTES:
1. REMOVE JACK SUPPLIED WITH ITEMS 1, 2, + 5

TABLE I

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