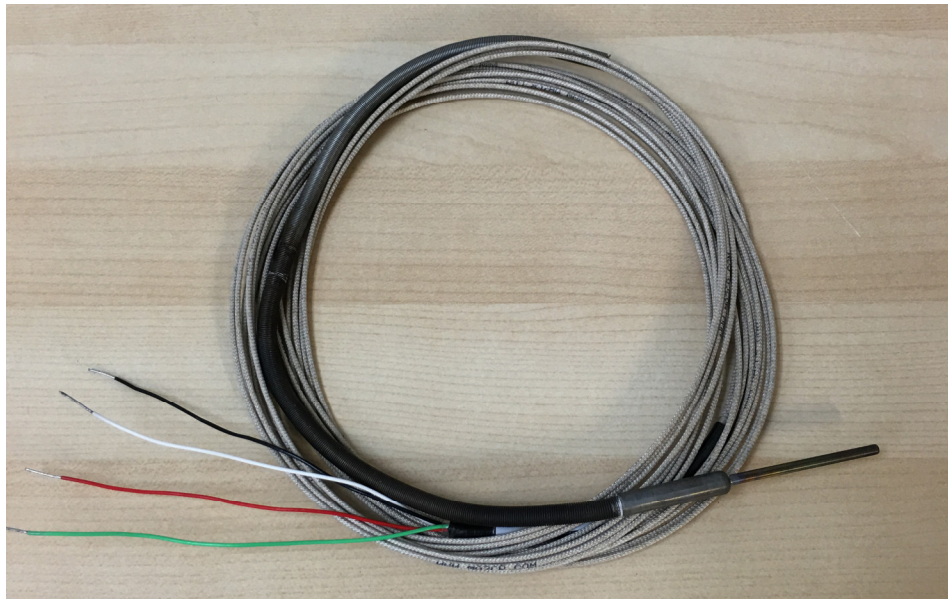


AM1643 Full Immersion Platinum Resistance Thermometer User's Guide



AccuMac

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Before you start ---- Warnings & Cautions

- ❖ **Warnings:** Follow these guidelines to avoid personal injury:
 1. Only use this instrument in the manufacture specified temperature range.
 2. The transition junction and lead wire of this instrument can become hot when it is used to measure high temperatures for extended periods of time.
 3. DO NOT use this instrument to measure the temperature of any hazardous live component.
 4. Follow all other safety guidelines listed in this user's guide.

- ❖ **Cautions:** Follow these guidelines to avoid possible damage to the instrument:
 1. Avoid mechanical shocks. DO NOT drop or slam the probe in any way. This will cause damage to the probe internally and affect its calibration and accuracy.
 2. Read Section entitled "Care and Handling Guidelines" before removing the PRT from the shipping box. Incorrect handling can damage the PRT and void the warranty.
 3. Keep the shipping container in case it is necessary to ship the PRT. Incorrect packaging of the PRT for shipment can cause irreparable damage.
 4. Calibration equipment should only be used by trained personnel.

1 Introduction

1.1 Main Application

AM1643 Full immersion Platinum Resistance Thermometer (PRT) is an interpolating instrument converting temperature to resistance. It works together with readout device to measure temperature or change of temperature. It has wide applications for dry-wells, furnace and ovens.

1.2 Main Features

- High accuracy: 0.04 °C at 0 °C
- Temperature range: : 0 °C to 420 °C
- Transition junction and lead wire can withstand high temperature up to 420 °C

1.3 Calibrations

It is recommended to calibrate this PRT annually over the full temperature range. In between annual calibrations, user can check the drift rate by comparing R₀, resistance at 0 °C, against the last calibration results. Refer to specifications section for normal drift rate.

2 Specifications

2.1 Specifications

Temperature Range	0 °C to 420 °C
Resistance at 0 °C	Nominal 100 Ω
Temperature Coefficient	0.00385 Ω/ Ω/°C
Accuracy	±0.04 °C at 0 °C ±0.05 °C at 200 °C ±0.07 °C at 420 °C
Drift	±0.04 °C at 0 °C after 100 hours at 420 °C
Short Term Stability	±0.02 °C
Thermal Shock	±0.02 °C after 10 times thermal cycles from minimum to maximum temperatures
Hysteresis	≤0.01 °C
Self-heating	50 mW/°C
Response Time	5 seconds for 63% response to step change in water moving at 3 feet per second
Measurement Current	1 mA
Minimum immersion depth	50 mm
Maximum immersion depth	Dry mediums: full immersion Liquid mediums: use protective tube if immersion depth reaches transition junction
Sensor Length	30 mm
Insulation Resistance	>500 MΩ at room temperature
Sheath Material	Inconel™
Dimension	0.125 inch X 2 inch (3 mm X 50 mm)
External Leads	Four fiberglass insulation Ni-plated copper wires, 2.5 meters (longer lead wires are available per request)
Handle Dimension	7 mm (OD) X 30 mm (L)
Optional Calibration	NIST traceable calibration and data available per request: Ordering # 5012

3 General Operations

3.1 Connecting to the readout device

The AM1643 is equipped with a four-wire cable (see Figure 1). Four lead wires are used to cancel lead wire resistance. For best results, the readout device should be equipped to handle four-terminal resistors. The lead wires can be distinguished by insulation colors. Lead wire pairs attached to each end of the sensor are identified by red/red and white/white insulation.

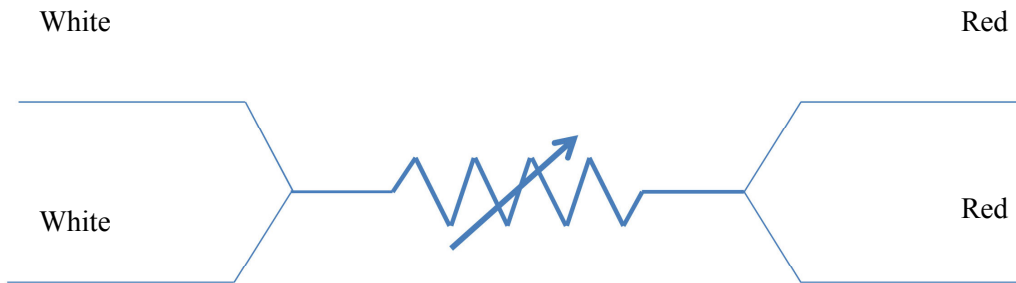


Figure1

3.2 Drive Current

AccuMac recommends 1mA as drive current to ensure the best measurement.

3.3 Stability of Readings

To achieve the best accuracy, allow sufficient time for PRT to stabilize before taking the readings.

3.4 Full Immersions

The lead wire and transition junction of AM1643 are uniquely designed to withstand the full temperature range of the PRT so it can be fully immersed in the high temperature dry mediums like ovens, furnaces etc. However, the transition junction is not moisture proof so

users need to use protective tube if immersion depth reaches transition junction when applying the PRT in liquid mediums.

3.5 Thermal EMF

Each AccuMac PRT has gone through an annealing process and stability test to minimize the thermal EMF, which is caused by either impurities of sensing element or temperature differentials at lead wires connection point.

3.6 Over Heating

A sealed sensing element of AM1643 PRT is assembled inside a metal sheath to ensure the best stability and repeatability. The seal can be breached if the PRT is over heated for an extended period of time.

4 Care and Handling Guidelines

1. DO NOT subject the PRT to any physical shocks and vibrations.
 - a. When not using the PRT, keep it in a place that's not prone to drop, slam, bang, vibration or other strong physical contacts. Use a protective box or a carrying case whenever possible.
 - b. When shipping the PRT, use protective box and other protective packaging materials to minimize mechanical shocks as much as possible.
 - c. When using dry blocks, make sure the well diameter is appropriate to allow the PRT move up and down smoothly.

2. DO NOT twist, stretch or apply excessive strains on the lead wires, especially at high temperature. The fiber glass insulation of the lead wires is prone to tear and wear under above mentioned manipulations.

3. DO NOT subject the PRT to any contaminations.
 - a. Keep the PRT as clean as possible. Avoid contaminations as much as possible.

4. DO NOT over heat.
 - a. Do not use PRT above the manufacture specified temperature range.

5. DO NOT expose the transition junction and lead wire to liquids.

5 Troubleshooting

5.1 Troubleshooting

If the PRT functions abnormally, it could be caused by several possible problem conditions that are described in this section. Try the solutions recommended and if the problems are still not solved, contact manufacture for warranty or repair service. Be sure to have the model number and serial number of your PRT available.

5.2 Problem Causes and Solutions

- a. R0 becomes higher significantly. This is likely caused by mechanical shocks. The PRT should be annealed to release the stress of platinum wires and to recover R0 value. Measure R0 of the PRT after annealing to verify.
- b. R0 unstable during the measurement. This is likely caused either by bad connections or sensor coils short. Check the connections first and if the connections are good, the PRT may be damaged.

6 Limited Warranty & Limitation of Liability

The material contained in this document is provided “as is,” and is subject to being changed, without notice, in future editions. AccuMac shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should AccuMac and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

AccuMac Corporation provides limited warranty for this PRT product to be free from defects in materials and workmanship under normal use and service. The warranty period is 1 year for the Platinum Resistance Thermometer. The warranty period begins on the date of the shipment. Parts, product repairs, and services are warranted for 90 days. The warranty extends only to the original buyer or end-user customer of an AccuMac authorized reseller. The warranty will not be extended to products that have been misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling.

To obtain warranty service, contact AccuMac Corporation at:

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