

ULTAS 200

Property	ULTAS 200 Specification
Description	A Teflon® hermetically encapsulated reference platinum resistance thermometer for accurate temperature measurements in harsh environments such as environmental chambers, autoclaves, liquid nitrogen and aggressive liquids.
Range	-200 °C to 200°C.
Accuracy	± 0.010 °C or better is possible.
Stability	± 0.010 °C or better at 0°C per annum but dependent upon use.
Sensor type	Precision wire wound sensor. BS EN 60751 Class A. 100Ω at 0 °C. 4-wire connected.
Hysteresis	± 0.010 °C or better at 0°C.
Self-heating	≤ 0.010 °C at 0°C for a 1 mA current.
Dimensions	2mm diameter cable to a 3mm diameter 50mm long stainless steel sheath.
Sheath material	Teflon® with an outer sheath of 316 stainless steel.
Cable	4-wire, PTFE insulation. 2 m long or as required. Range -200 °C to 200 °C.
Cable termination	Bare wire termination or a connector to the customer's requirement by discussion.
Markings	Unique serial number etched onto the sheath and on the end of the cable.
Testing and guarantee.	<p>Each thermometer is temperature cycled to ensure it is stable and issued with a certificate of conformity showing its resistance at 0 °C.</p> <p>Benrhos has a no-quibble replacement policy for the first 12 months against any failure due to manufacture.</p>
Similar thermometers	Fluke 5606 and 5607.
UKAS calibration	Available from Benrhos via an independent UKAS laboratory.
Notes	<ul style="list-style-type: none"> i. Other sheathed or non-sheathed options available, contact Benrhos. ii. A ULTAS 200 reference platinum resistance thermometer with a UKAS calibration is available as an audit item and for customers to assess at a nominal charge. iii. The Benrhos Izero+ ice point bath (0 °C ±0.010°C) is a convenient means of checking thermometers and referencing thermocouples.



NATIONAL PHYSICAL LABORATORY

Continuation Sheet

RESULTS continued

The calibration coefficients, as defined in ITS-90, are as follows.

coefficient	below 0.01 °C	above 0.01 °C
a	-2.13036E-02	-2.194023E-02
b	0.0	0.0

These coefficients were used to generate the accompanying table of values of resistance ratio, temperature and temperature increments.

The resistance ratio as calculated at the melting point of gallium (29.7646 °C) is 1.1136025. This is below the value specified in ITS-90, but it is unlikely that the resulting errors in the interpolation are outside the uncertainties quoted in this certificate.

The resistance ratios measured at -4.9989 °C and 34.9566 °C differ from those in the calibration table by less than the equivalent of 0.004 °C and 0.001 °C respectively.

UNCERTAINTIES

The estimated uncertainties of the calibration are as follows.

t_{90} / °C	Uncertainty / °C
-10	= 0.010
-5	= 0.010
0.01	= 0.010
35	= 0.010
70	= 0.010

The uncertainties are based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a coverage probability of approximately 95%. They include the type A and B uncertainties in the measurements and in realising the fixed point temperatures. They are taken to vary linearly between the reported values. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

NOTE

It is essential that the value of $R(0.01 \text{ °C})$ be re-determined at frequent intervals and the latest value used in the calculation of resistance ratios.