

Standard platinum resistance thermometer (SPRT) Model CTP5000-R25

WIKA data sheet CT 61.25

Applications

- Reference thermometer for very accurate temperature measurements in a range of $-200 \dots +670 \text{ }^{\circ}\text{C}$ [$-328 \dots +1,238 \text{ }^{\circ}\text{F}$]
- Precision standard platinum resistance thermometer (SPRT) designed to realise the international temperature scale ITS-90 over the range $-200 \dots +670 \text{ }^{\circ}\text{C}$ [$-328 \dots +1,238 \text{ }^{\circ}\text{F}$]
- Comparative calibration in tube furnaces and liquid baths

Special features

- Resistance at $0 \text{ }^{\circ}\text{C}$ ($R(\text{TPW})$): $25 \Omega \pm 0.5 \Omega$
- $R(\text{Ga})/R(\text{TPW})$: Ratio not less than 1.11807
- Reproducibility: $\pm 1 \text{ mK}$
- Self-heating: $\pm 2 \dots \pm 3 \text{ mK}$ with 1 mA and the thermometer in unstirred water

Description

The model CTP5000-R25 standard platinum resistance thermometer (with model Tinsley 5187SA design) is the result of many years' practical experience and cooperation with the National Physical Laboratory, Teddington, UK, where primary resistance and thermometry standards are maintained.

This four-terminal standard platinum resistance thermometer (SPRT) is designed to realise, with the highest accuracy, the International Temperature Scale ITS-90 over the range $-196 \dots +660 \text{ }^{\circ}\text{C}$ [$-321 \dots +1,220 \text{ }^{\circ}\text{F}$] and is suitable for ITS-90 calibration up to a maximum temperature of $660.323 \text{ }^{\circ}\text{C}$ [$1,220.581 \text{ }^{\circ}\text{F}$] (aluminium freezing point).

The resistance element is of pure platinum coiled and mounted in a strain-free construction. The former is of fused silica and great care is taken to ensure freedom from contamination. All the joints are welded, the four leads from



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the element to the seal in the thermometer head are heavier gauge platinum, thereby avoiding the generation of thermal electromotive forces (EMF) at the junction with the element.

The leads are brought through a hermetic seal at the head of the thermometer and joined via low-loss terminals to copper flex in a specially constructed cable with four conductors. The cable is made with PTFE insulation to ensure low dielectric loss so that the thermometer may be used with either DC or AC measuring systems.

The terminations are gold-plated copper spade lugs. The thermometer tube is specially treated to avoid radiation loss by the piping effect in its walls. Each thermometer is supplied with a purpose-made carrying case.

Stainless steel protection sheath

To avoid damage, the thermometer may be supplied with a protective stainless steel sheath, outside diameter 8 ... 9 mm [0.31 ... 0.35 in], fitted into the thermometer head by means of three screws.

The thermometer is calibrated without the sheath and when it is in position the response time is increased to about 20 seconds.

Specifications

Basic information	
Temperature range	-200 ... +670 °C [-328 ... +1,238 °F]
Max. temperature	
Handle	Max. 80 °C [176 °F]
Cable	Max. 80 °C [176 °F]
Type of measuring element	Pt25
Resistance at 0 °C [32 °F]	25 ±0.5 Ω
Connection method	4-wire connection
Material	Platinum resistance
Calibration	Suitable for calibration per ITS-90 up to a maximum temperature of 660.323 °C [1,220.581 °F] (freezing point aluminium)
Probe	
Gas filling	Dry argon / oxygen mixture
Sheath material	Fused quartz
Case	
Dimensions	680 x 170 x 70 mm [26.77 x 6.69 x 2.76 in]
Weight	2.4 kg [5.29 lb.] (including thermometer)

Accuracy specifications ¹⁾	
Tolerance class per EN 60751	Class A
Temperature coefficient	$\alpha = 0.003926$
R(Ga)/R(TPW)	Ratio not less than 1.11807
Reproducibility	±1 mK
Basic accuracy	±1 mK
Annual drift ²⁾	±5 mK
Typical stability	±1 mK
Recommended measurement current	1 mA
Self heating error in water at 0 °C [32 °F]	±2 ... ±3 mK with 1mA in un-stirred water
Reference conditions	
Ambient temperature	23 ±2 °C [73 ±2 °F]
Humidity	40 % r. F. ±25 % r. h.

1) Specifications may deviate; they depend on the use of the thermometer. The specified values are typical values for use in laboratories.

2) Previous ageing is required. Recommendation = $T_{\max} + 10 \text{ K}$ over 20 h

Electrical connection	
Connection type	■ Flying leads ■ 5-pin Din connector ■ SMART plug ■ Banana plugs ■ Gold-plated copper spade lugs
Cable	
Length	2.5 m [8.20 ft] with low thermal EMF For high temperatures
Material	PTFE sheath

Certificates

Description	
Certificates	■ Without ■ Acceptance test certificate 3.1 with W value verification ■ Acceptance test certificate 3.1 in accordance with DIN EN 10204 (factory calibration) ■ Acceptance test certificate 3.1 in conjunction with a readout instrument (6 test points) ■ Report for ITS-90 suitability
Calibration	■ Without ■ DAkkS/UKAS calibration certificate (traceable and accredited in according with ISO/IEC 17025) ■ DAkkS/UKAS calibration certificate (traceable and accredited in according with ISO/IEC 17025 with a readout instrument (6 test points)
Test points for calibration certificate	■ Without ■ -40 °C, -20 °C, 0 °C, +50 °C, +70 °C and +100 °C ■ Fixed point TP Water, MP Gallium ■ Fixed point TP Argon, TP Mercury, TP Water ■ Fixed point TP Mercury, TP Water, MP Gallium ■ Fixed point TP Argon, TP Mercury, TP Water, FP Indium ■ Fixed point TP Argon, TP Mercury, TP Water, FP Indium, FP Tin ■ Fixed point TP Argon, TP Mercury, TP Water, FP Tin, FP Zinc ■ Fixed point TP Argon, TP Mercury, TP Water, FP Tin, FP Zinc, FP Aluminum ■ Fixed point low temperature: TP Mercury, TP Water, MP Gallium, FP Indium and comparison measurement -196 °C / -80 °C ■ Fixed point medium temperature: TP Mercury, TP Water, MP Gallium, FP Indium, FP Tin, FP Zinc ■ Fixed point high temperature: TP Water, MP Gallium, FP Indium, FP Tin, FP Zinc, FP Aluminum ■ Customized calibration points
Recommended calibration interval	1 year (dependent on conditions of use)

Legend:

TP = Triple point

MP = Melting point

FP = Freezing point

→ For approvals and certificates, see website

Six typical calibration ranges for calibration in accordance with the international temperature scale (ITS-90)

Fixed point	Temperature		Uncertainty in $\pm$ mK					
	$^{\circ}\text{C}$	$[^{\circ}\text{F}]$	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6
TP argon	-189.3442	[-308.8196]	0.5	-	0.5	0.5	0.5	0.5
TP mercury	-38.8344	[-37.9019]	0.3	0.3	0.3	0.3	0.3	0.3
TP water	0.01	[32.02]	0.1	0.1	0.1	0.1	0.1	0.1
MP gallium	29.7646	[85.5763]	-	0.2	-	-	-	-
FP indium	156.5985	[313.8773]	-	-	1	1	-	-
FP tin	231.928	[449.470]	-	-	-	1	1	1
FP zinc	419.527	[787.149]	-	-	-	-	1.2	1.2
FP aluminium	660.323	[1,220.581]	-	-	-	-	-	2

The CTP5000-R25 thermometer is suitable for calibration to a maximum temperature of 660.232 $^{\circ}\text{C}$ [1,220.581 $^{\circ}\text{F}$].

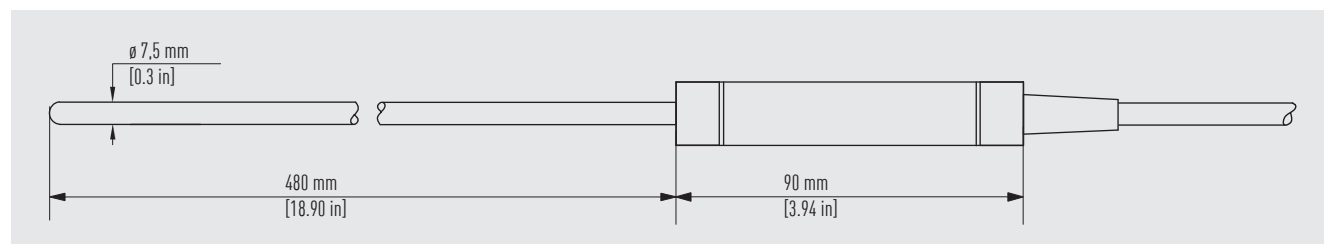
TP = Triple point

MP = Melting point

FP = Freezing point

Uncertainty typical for NMIs, not for accredited laboratories.

Dimensions in mm [in]



Dimensions	
Probe tube length	$l = 480 \text{ mm [18.90 in]}$ $\varnothing = 7.5 \text{ mm [0.30 in]}$
Head / Handle	$l = 90 \text{ mm [3.54 in]}$ $\varnothing = 23 \text{ mm [0.91 in]}$
Immersion depth	Min. 300 mm [11.81 in] Max. 400 mm [15.75 in]
Active sensor length	35 mm [1.37 in]

Accessories and spare parts

Description	Order code
	CTX-A-R2
SMART DIN plug 5 pin	-G-
DIN plug 5 pin	-C-
Ordering information for your enquiry:	
1. Order code: CTX-A-R2 2. Option:	↓ []

Scope of delivery

- Model CTP5000-R25 standard platinum resistance thermometer (SPRT) in accordance with specification
- Carrying case, robust

Ordering information

CTP5000-R25 / Connection of the probe / Calibration / Test point for the calibration certificate / Number of test points / Calculation of constant / Additional ordering information

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