

# Fixed-point calibration per ITS-90

WIKA data sheet IN 00.38

## Applications

- Pharmaceutical industry
- Industry (laboratory, workshop and production)
- Temperature sensor and transmitter manufacturers
- Calibration service companies and service industry

## Special features

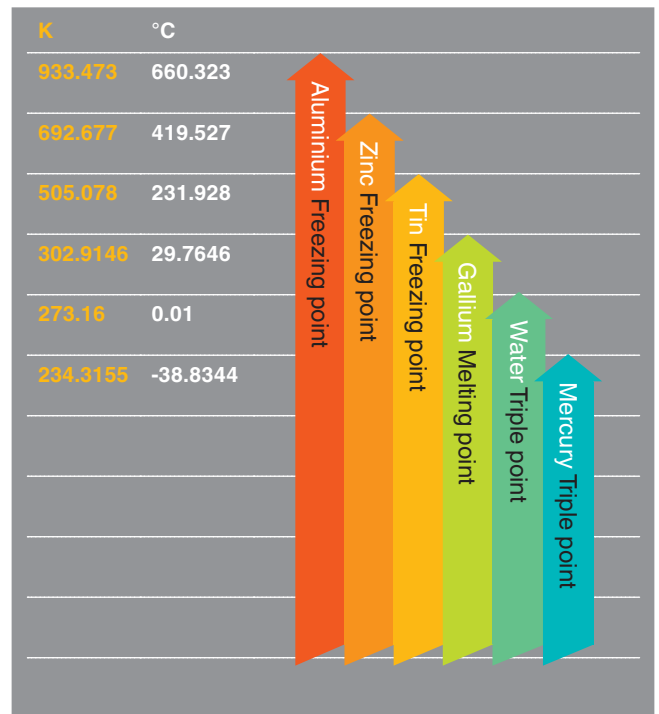
- Traceable calibration in our DAkkS accredited calibration laboratory, D-K-15105-01-00
- High accuracy down to 2 mK
- Applicable to resistance thermometers

## Description

An important element of quality is the traceability of the measuring instruments used, in order to ensure that the measurement results are related to the national and international standard by means of an uninterrupted measuring chain. The importance of the internationally recognised calibration certificate is thus increasing constantly, since only such calibration results are comparable internationally.

A minimal measurement uncertainty of down to  $\pm 2$  mK can be achieved with fixed-point calibration. Cells, in which the fixed points of high-purity materials (such as gallium or zinc) can be realised, serve as temperature sources. During the phase transition, for example, from solid to liquid, the material temperature remains constant at a constant pressure and can therefore be used for the calibration.

With some materials, alongside the phase transitions, the triple points can also be used. At this point, the three aggregate states of the respective material are in thermal equilibrium. They can be prepared very precisely and are repeatable at any time. Moreover, they can be maintained over a longer period of time.



ITS-90 fixed points  
Mercury to aluminium

The International Temperature Scale of 1990 (ITS-90) defined 17 fixed points, from the triple point of hydrogen (-259.3467 °C) to the freezing point of copper (1,084.62 °C). The WIKA laboratory, for example, calibrates at the triple points of mercury and water, at the melting point of gallium and also the freezing points of tin, zinc and aluminium. Thus, a temperature range from -38.8344 °C to 660.323 °C is covered.

Not all temperature measuring instruments are suitable for fixed-point calibration. With resistance thermometers, for example, the platinum of the sensor must fulfil specific purity criteria and its wire coiling must be free from stress.

## Typical calibration ranges for calibration in accordance with the international temperature scale (ITS-90) in our DAkkS accredited calibration laboratory, D-K-15105-01-00

Material	Type	Temperature °C	Smallest measurement uncertainty that can be quoted <sup>1)</sup>
Mercury	Triple point	-38.8344	3 mK
Water	Triple point	0.01	2 mK
Gallium	Melting point	29.7646	2.5 mK
Tin	Freezing point	231.928	5 mK
Zinc	Freezing point	419.527	5 mK
Aluminium	Freezing point	660.323	10 mK

1) Best case, if all conditions are met by the resistance thermometer to be tested

### Scope of delivery

- Calibration at the set points
- Additional testing of the thermometer: Stabilisation, determination of the suitability of the thermometer by representation of the ITS-90, determination of the part of self-heating

### Accessories

- Temperature probe model CTP5000

### Option

- Calculation of the deviation function with ITS-90
- Calculation of the deviation function as a polynomial

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