



Klasmeier
Präzision in Temperatur



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alitech



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**Precision thermometers
handmade in Germany**

Resistance thermometers and thermocouples



Thermometer manufactory

Precision thermometers manufactured by hand

In Klasmeier's **exacal** manufactory, the precision thermometers are manufactured by careful handwork in Fulda/Germany.

In addition to the design of the actual thermometers, another focus is on the development of our own tools and production processes. For design, production and final DAkkS calibration, no external suppliers are needed apart from the raw materials. This independence guarantees the high quality of the thermometers.

An overview of the manufacturing process



Mechanical manufacturing

Required components, such as handles or prototypes for further development, are produced by machining.



Noble metal welding process

Thermocouple wires and connecting cables are welded using hydrogen and oxygen, which are not stored in bottles, but are produced from water in a 2:1 mixing ratio by electrolysis. This guarantees the purity of the fuel gas.



Laser welding

Extremely delicate connections, such as the connecting wires of the temperature sensors, are welded under the microscope with precision lasers.



Thermal processing of thermo material

One area of expertise is the specific thermal processing of thermocouple wires. Our annealing processes ensure a stable metallurgical and thermoelectrically homogeneous condition of the eXcal thermocouples. Thermal processing of thermo material.



Annealing of resistance thermometers

Resistance thermometers are completely annealed according to our customised annealing cycles in a specially designed annealing furnace with oxygen circulation.



3D printing process

Insulation components and complex plastic parts inside the handles, such as strain reliefs, are produced using a modern 3D printing process. This offers us many advantages. Complex designs are produced without manual workarounds and without expensive tools. This saves a lot of time and money. Using 3D printing, eXcal thermometers can be customised as a modular system.



SPRT

(Standard Platinum Resistance Thermometers)

Robust Secondary SPRT Reference Thermometer for the Accurate Temperature Measurement

Our SPRT (Standard Platinum Resistance Thermometers) are used as calibration standards in precision temperature measurement and for accurate temperature measurement in challenging applications. Designed to meet the needs of research, industry, and quality control, these thermometers offer excellent accuracy and reliability. The SPRT (Standard Platinum Resistance Thermometers) meet the requirements of the ITS-90.



Secondary SPRT Reference Thermometer (-200 °C to 250 °C)

Model: **eXcal 216** | Low Temperature

Secondary SPRT Reference Thermometer (-100 °C bis 430 °C)

Model: **eXcal 217** | Most commonly used

Secondary SPRT Reference Thermometer (-100 °C bis 670 °C)

Model: **eXcal 215** | High Temperature

Primary Standard Platinum Resistance Thermometer SPRT (-200 °C bis 670 °C)

Model: **eXcal 230** | Full range high end

DISCOVER
OUR PRECISION
THERMOMETERS –
SCAN THE CODE!



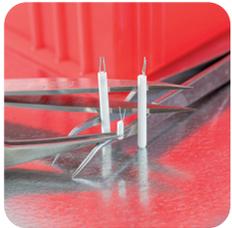
eXacal technology

eXacal precision thermometers were designed from scratch. The development time took over four years. All the components used were carefully designed and coordinated with each other. The developed handle, which functions as a technology provider, is of particular importance. Thanks to its modular design, eXacal thermometers can be combined in almost any way.



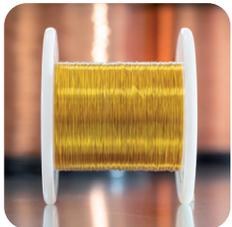
The handle as a technology support

Our eXacal thermometers can be assembled as a modular system in almost any way. This is made possible by our aluminium handle, which is assembled with an individually 3D-printed insert for each thermometer. Important components such as strain reliefs, inert gas fillings or different protection tubes can thus be freely combined.



Temperature detectors from our own manufactory

For the thermometers, we use wire-wound Pt100 ceramic resistors as the temperature detector. They are handmade and carefully stabilised. Three hand-picked types are used. They each represent the best compromise between design, stability, hysteresis and self-heating.



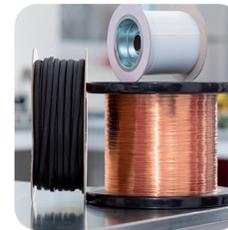
Thermometer wire

For the thermometer wire at the temperature detector and in the capillaries we use noble metals and no commercial sheath wires. Depending on the temperature range, these are pure silver or platinum. In this way we reduce thermoelectric effects and reduce inherent voltages in the thermometer.



Protection tubes

Protection tubes are selected with respect to thermal stress and the condition of the atmosphere. In order to optimally protect the temperature detector from mechanical and chemical influences, protection tubes made of pure ceramics, noble metals, high-temperature alloys or sapphire are used, depending on the application.



Connection wires

Connection cables for thermocouples and resistance thermometers are assembled by hand. Copper wires made of a low-stress copper alloy are used, which was specially produced for our thermometers. The insulation sheath is a strong textile sheath made of heat-treated fibreglass protection hose which is resistant to high temperatures. This protects the individual wires from mechanical stress, high temperatures and organic solvents.



eXacal temperature detectors

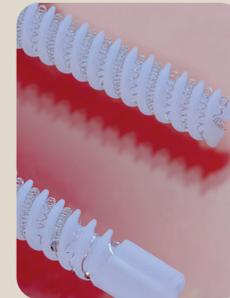
Precision down the smallest detail

In the world of thermometry, **the precision of the temperature detector** is a **crucial factor for the accuracy and reliability** of a thermometer. As specialists in precision temperature measurement, our thermometer manufacturing is one of the few global producers that **develop and produce temperature detectors in-house** – a characteristic that sets us apart and underlines our commitment to the highest quality and customization.

The eXacal temperature detectors represent our expertise and our focus on high-precision temperature measurements, **harmonized with the International Temperature Scale of 1990 (ITS-90)**, and separate from the conventional DIN EN 60751 standard. With a **temperature range from -200 °C to 670 °C**, we cover the relevant calibration ranges of the ITS-90, from the temperature fixed points argon to aluminum.

The production of a temperature detector is a work of art in itself...

...a highly complex, filigree process in which ultra-pure platinum wire is threaded extremely fine by hand under a microscope onto a carrier body made of ceramic or quartz, for example. Before threading, the platinum wire must be wound into a coil using a specially designed winding machine.



These highly delicate temperature detectors, which must be protected from environmental influences, are assembled in our thermometer factory and made into precision thermometers.

Our temperature detectors are characterised in particular by compliance with the ITS-90 criteria. These are the requirements that a thermometer must meet in order to be labelled as an “SPRT standard thermometer” according to ITS-90.

The temperature coefficient (TC), or the alpha value, is not considered according to DIN EN 60751, but is represented as a so-called W value, whereby eXacal temperature detector meet the requirement of W-gallium ≥ 1.11807 . This guarantees the purity of the fuel gas.



Precise Thermometer Calibration for the Highest Standards

Rely on our DAkKS-accredited calibration according to DIN EN ISO/IEC 17025 for your Standard Platinum Resistance Thermometers (SPRTs).

We calibrate your SPRTs across the full temperature range of ITS-90 and guarantee the highest accuracy and traceability to international standards.



Finding the right calibration solution for you.



Our Services

- ✓ Accredited calibration of SPRTs (length ≥ 300 mm)
- ✓ Temperature range: -196 °C to $+961$ °C – full ITS-90 coverage
- ✓ Calibration method: fixed-point calibration at ITS-90 fixed points
- ✓ Selectable calibration accuracy – from melting-point to high-end freezing-point calibration
- ✓ Suitability testing per DIN EN ISO/IEC 17043:2023
- ✓ In-house repair service for SPRTs

Your Benefits



Full flexibility in accuracy

You choose:

Melting-point calibration

(cost-effective, slightly higher uncertainty)

High-end freezing-point calibration

(ultra-low uncertainty for highest demands)



Fast turnaround in 5 working days

Minimize downtime – your reference thermometers are ready quickly.



Minimal measurement uncertainties

Achieve the highest precision: we bring out the best in your thermometer.



All-in-one solution

Complete package: calibration, suitability testing, repair – all under one roof.



Central location in Fulda Germany

Easily accessible – drop off your SPRT or use our secure courier service.



Paperless documentation

Legally signed and accessible at any time via our modern cloud solution.

Your solution for reliable proficiency testing in temperature according to DIN EN ISO/IEC 17043

A proficiency test is a process used to assess a laboratory's capability regarding a specific parameter or calibration item. The measurement results from multiple labs are compared to check accuracy, demonstrate competence, or identify potential weaknesses.



Deutsche
Akkreditierungsstelle
D-EP-15224-01-00

Proficiency tests are especially vital for accredited laboratories as part of their quality management system, and they help increase customer confidence in the reliability of your results.

Because quality doesn't happen by chance:

Our DAKKS Accreditation Certificate



DAKKS Accreditation Certificate for Proficiency Testing (Klasmeier)



Annex to the Accreditation Certificate