




Chemical | Petrochemical | Oil & Gas | Sanitary applications

# Special solutions with electrical thermometers



Smart in sensing



Alexander Wiegand,  
Chairman and CEO, WIKA

## About us

As a family-run business acting globally, with over 9,300 highly qualified employees, the WIKA group of companies is a worldwide leader in pressure and temperature measurement. The company also sets the standard in the measurement of level, force and flow, and in calibration technology.

Founded in 1946, WIKA is today a strong and reliable partner for all the requirements of industrial measurement technology, thanks to a broad portfolio of high-precision instruments and comprehensive services.

With manufacturing locations around the globe, WIKA ensures flexibility and the highest delivery performance. Every year, over 50 million quality products, both standard and customer-specific solutions, are delivered in batches of 1 to over 10,000 units.

With numerous wholly owned subsidiaries and partners, WIKA competently and reliably supports its customers worldwide. Our experienced engineers and sales experts are your competent and dependable contacts locally.



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# Special applications in electrical temperature measurement

In the area of electrical temperature measurement, within its standard portfolio, WIKA already offers an extensive selection of products and accessories for a wide variety of applications.

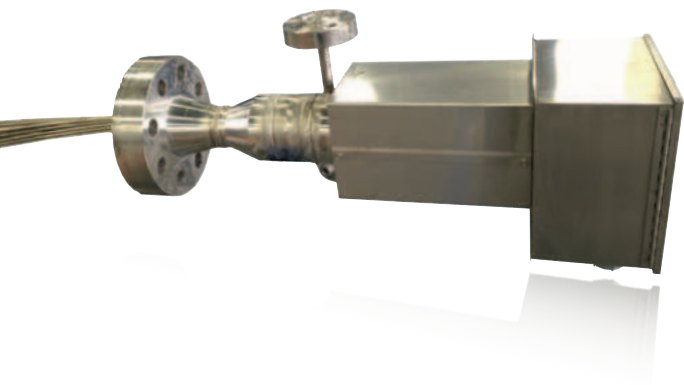
In addition to this, customer-specific solutions represent a key element of the electrical temperature measurement

product range. These are developed, manufactured and tested individually for your applications.

As a further service, we offer on-site installation of the measuring instruments. Our service teams operate internationally and are happy to come to you.



WIKA measuring instruments are available with numerous approvals and certificates.



Multipoint thermometers for radial multipoint measurements in petrochemical processes

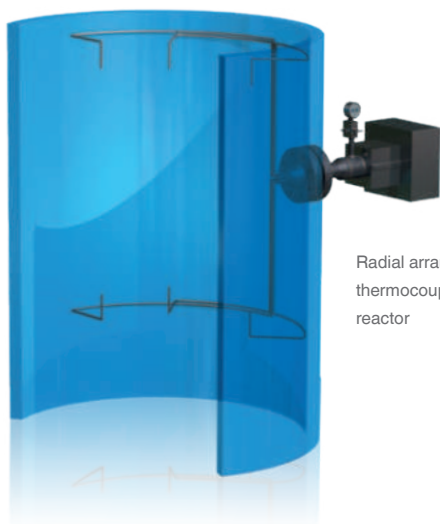
# Temperature profiling in reactors



Processes in chemical or petrochemical plants demand diverse, and often highly specialised measurements of the process parameters.



WIKA and Gayesco have over 60 years experience in the development and manufacture of temperature measuring instruments for industrial applications. For example, multipoint thermometers can be implemented for the recording of complex temperature profiles in reactors. One important task also fulfilled by multipoint thermometers is in the detection of localised heat concentrations ("hotspots") or in the detection of critical exothermic reactions - known as "thermal runaway".



Radial arrangement of the thermocouples within the reactor













**Left:** Different solutions for tubeskin temperature measurement

**Centre:** Technicians from the WIKA/ Gayesco service team during the installation of a REFRACTO-PAD®

**Right:** WELD-PAD with guide channel and heat shield of the XTRACTO-PAD®.



High-temperature  
thermocouples with various  
thermowell materials

# In furnaces and combustion chambers



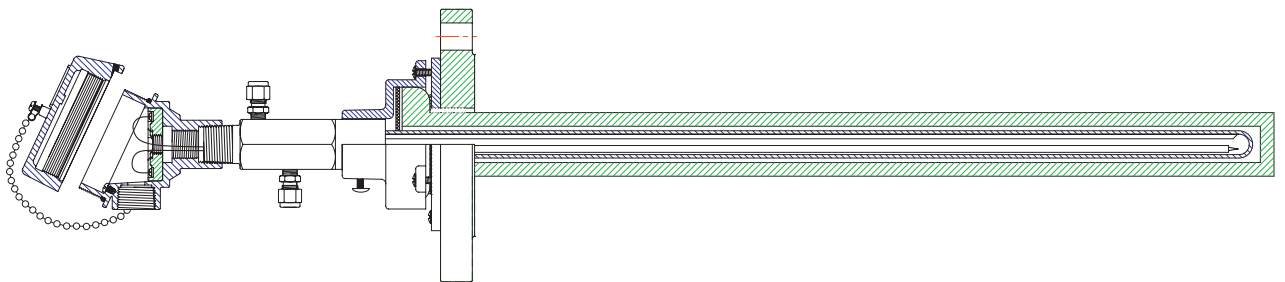
Measurements in industrial furnaces with temperatures of up to 1,700 °C (3,092 °F) represent a challenge.

The individual selection of the materials used and decades of experience in the design and manufacture of thermocouples for high-temperature operation form the foundations for process safety.

Through the accurate monitoring of the pipe temperature in combustion chambers, an optimal efficiency is ensured for the plant.

On request, the expert mounting of the temperature measuring instruments can be carried out by a WIKA/Gayesco service team.

## High-temperature thermocouple in Ex version





Double safety through primary and secondary safety chambers for the connection head

## Robust and safe

Special process conditions, such as those which prevail in gasification reactors or GtL processes, require tailored solutions.



The 3-times longer service life at temperatures up to 1,700 °C (3,092 °F) in process pressures of up to 65 bar (943 psi) enable a reduction of plant downtime.

The sapphire protection tube shields the precious metal thermocouple from poisonous process media. This enables cost savings by eliminating the use of expensive purging systems which are typically used in these applications to extend sensor life.



Double protection of the thermocouple through a ceramic exterior protection tube in combination with a sapphire inner protection tube











Coatings made of plastic or with tantalum cover protect against corrosive media.

## In corrosive media

High corrosive loads due to aggressive process media place high demands on the thermowells used.



Through the individual engineering and the variety of available materials, special alloys and coatings, the measuring point can be optimally adjusted to the process requirements.

All safety-related design specifications and customer requests can be taken into consideration when designing the measuring point.



Measuring point as a cutaway sample with forged Hastelloy thermowell in Vanstone design







The right coating for each use











Stellite® thermowell using Air Plasma Spraying (APS) for general applications, e.g. in sewage treatment plants or in the paper industry

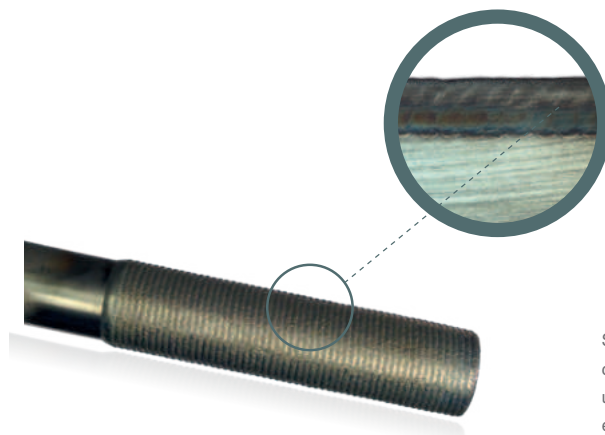
## For abrasive loads



Hard and abrasive components in the media are everyday occurrences for many processes. They frequently lead to premature failure of equipment.

With abrasive loads, using suitable materials such as Stellite®, significantly increases the service life.

Various processes for the Stellite® coating ensure a high process reliability in a multitude of high-load applications such as e.g. FCC units.



Stellite® coatings using laser cladding or PTA processes up to 3.2 mm thicknesses, e.g. for use in FCC units







High-pressure thermocouple  
with lens-type sealing ring

## With high pressures



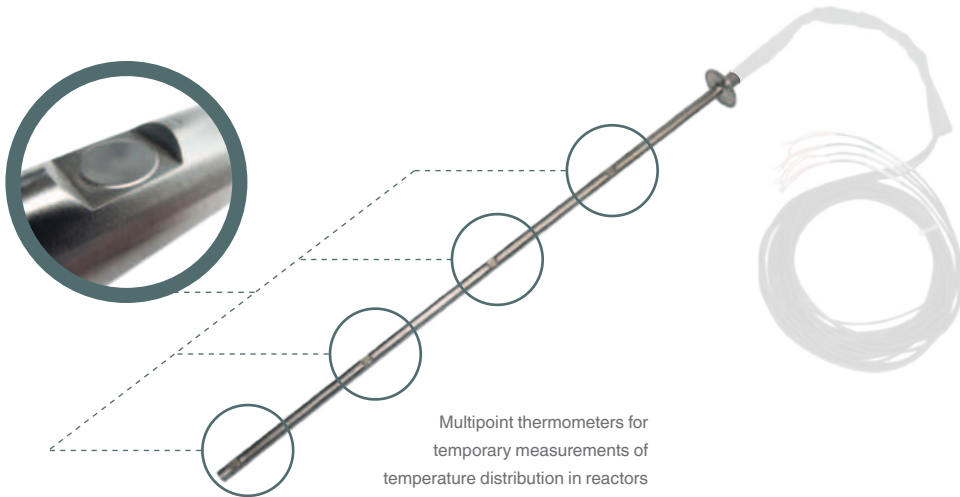
The process of manufacturing LDPE (Low Density Polyethylene) is made at pressures of approx. 3,000 bar (43,500 psi), where the temperature curve in the high-pressure tubular and autoclave reactors is an important process variable.

Specific materials with high-yield characteristics and special manufacturing processes such as vacuum soldering, ensure the high quality of these products, individually matched to your requirements.

Each high-pressure thermocouple is designed and manufactured in accordance with customer requirements. Through pressure testing up to 6,000 bar (87,000 psi), we ensure the high demands on safety and reliability.



High-pressure screw-in  
thermocouples

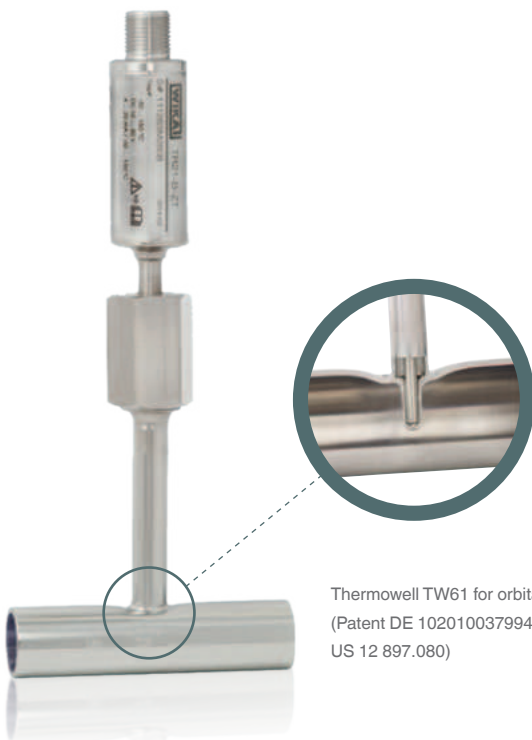


## In sterile processes

The particularly high requirements of sanitary applications are ensured through the use of approved materials, the lowest surface roughness and patented dead-space free connection geometries for thermowells for orbital welding into pipelines.



Dead-space free multipoint thermometers with the shortest response times are just one example of an application-specific special solution.



Thermowell TW61 for orbital welding  
(Patent DE 102010037994,  
US 12 897.080)







Representation of the flow conditions for a dead-space free thermowell vs. conventional design with collaring





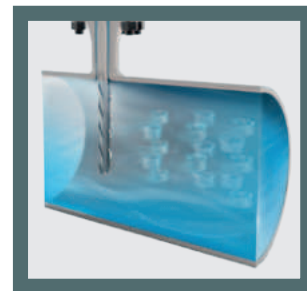
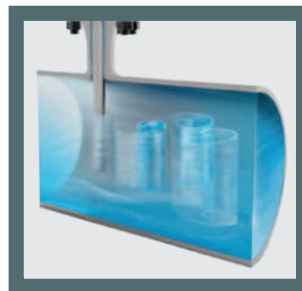






**Left:** Kármán vortex street for a thermowell with an incident flow

**Right:** Diffuse vortex shedding behind a thermowell in ScrutonWell® design



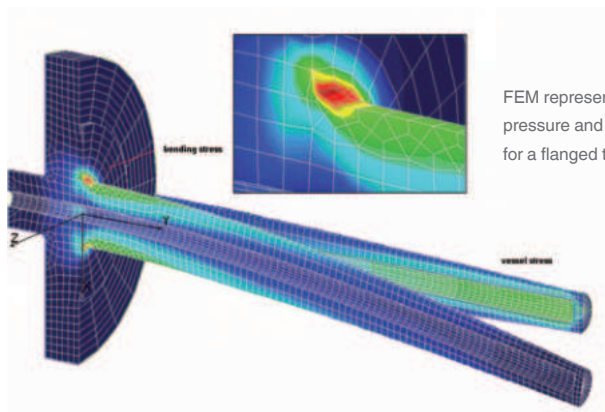
## Exact calculations



To prevent the failure of thermowells, in particular at high flow rates, WIKA offers the design calculation in accordance with ASME PTC 19.3 TW-2016.

For designs outside the validity of this standard, an FEM calculation can be carried out.

In order to effectively dampen the excitation leading to vibration, the new ScrutonWell® design can be used.



FEM representation of the pressure and bending load for a flanged thermowell



Flanged thermowell in ScrutonWell® design

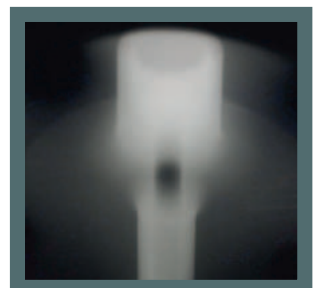




PMI test



Liquid penetrant  
inspection



Radiographic  
examination

## Best connections

Tested and approved welding procedures, as well as the possibility of extensive non-destructive testing in accordance with internationally recognised standards or customer requirements ensure the quality of our products.

**We are happy to advise you on further customer-specific solutions.**



**Smart in sensing**

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