

Pressure
Temperature
Level
Force
Flow

Measurement technology for the **aluminium industry**





Alexander Wiegand,
Chairman and CEO, WIKA

About us

As a family-run business acting globally, with over 10,000 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 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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WIKA – Your partner in the aluminium industry

To increase productivity and product quality in primary metallurgy, WIKA supports you with a comprehensive portfolio of process instrumentation that enables flexible operation and complete process monitoring.

Our robust and reliable measuring instruments have been developed on the basis of many years of application experience and can withstand even extreme process conditions. Customers trust our instrumentation solutions for measurements under high-pressure conditions up to 10,000 bar or at extreme process temperatures up to 2,000 °C, e.g. for the melting of metals or in applications with highly abrasive process media.

With WIKA's product portfolio, from innovative force, pressure, temperature, level and flow instrumentation to calibration technology and service offerings, your equipment can operate more efficiently and produce high-quality products while increasing profitability and flexibility.

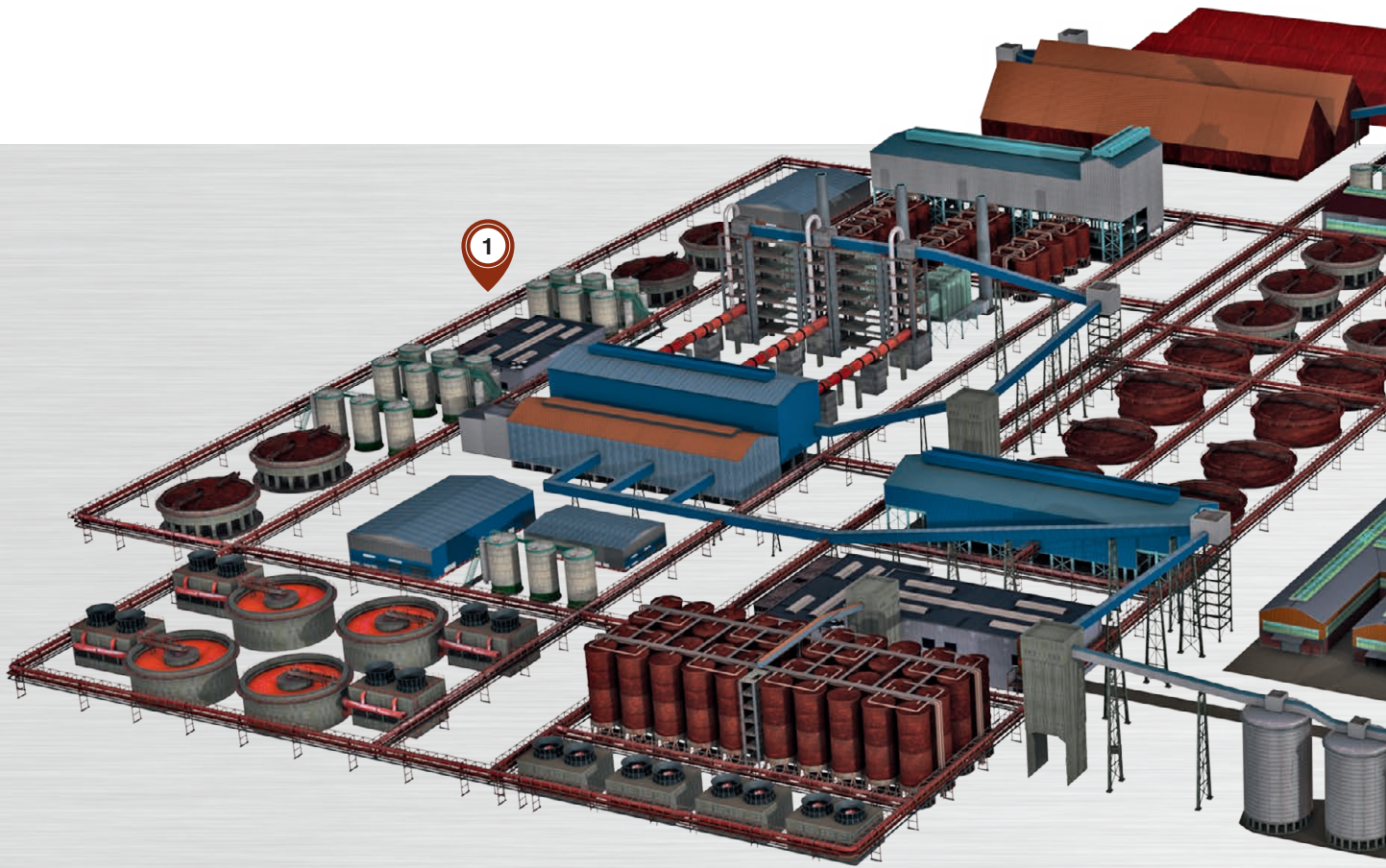
Whether standard products or custom designs: Working with you we'll find the right concepts for your requirements.

Aluminium industry

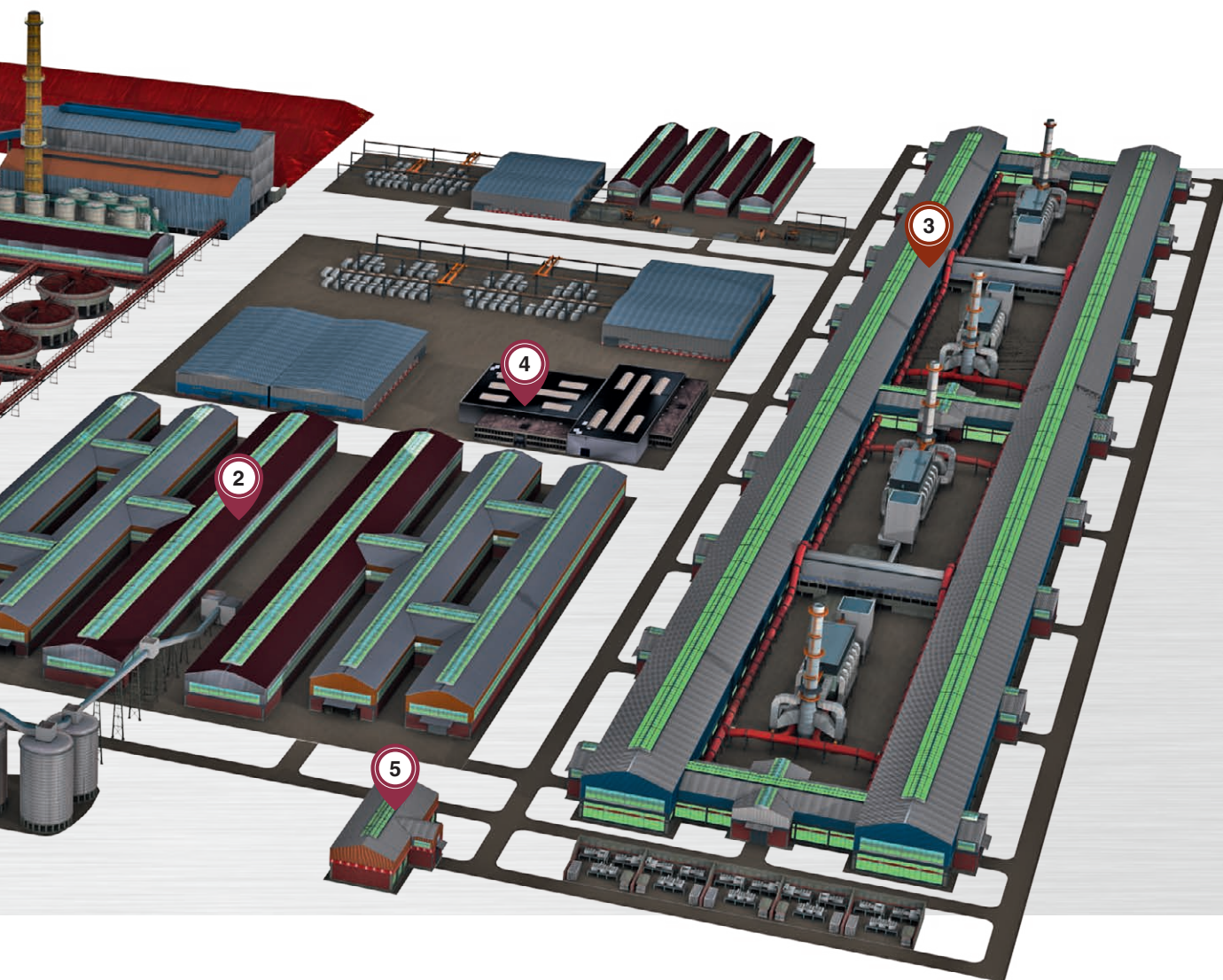
Today, aluminium is the second most-frequently used metal in the world. This is because aluminium has a unique combination of attractive properties - light weight, high strength, very easy to mould and excellent corrosion resistance are only the most important ones.

Aluminium is one of the materials of the future. In the long term, the global trend in primary aluminium is very positive. According to forecasts, demand is expected to increase by 50 percent by 2050 and reach well over 100 million tons.

Aluminium features very good recyclability and is one of the most commonly recycled metals. Energy consumption during aluminium smelting is only five to ten percent of the energy used in new production.



- ① Alumina refinery
- ② Anode carbon plant
- ③ Primary aluminium smelter
- ④ Casting house
- ⑤ Calibration & service centre



Detailed information
can be found online



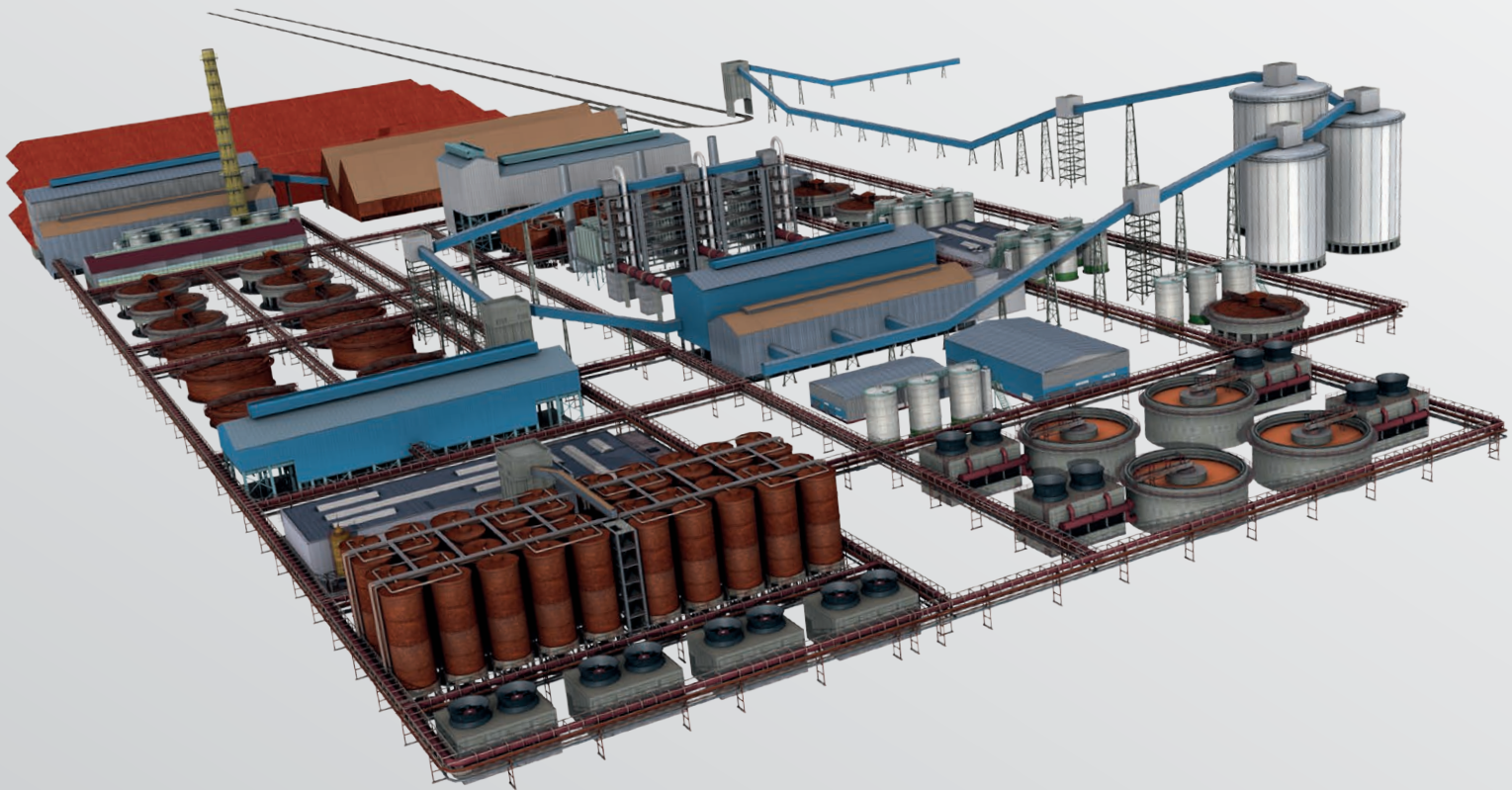
Alumina refinery

for the highest demands

Globally, most commercial alumina refineries use the Bayer process to refine aluminium oxide from bauxite ore. Extraction of aluminium from its ore and subsequent processing into finished products takes place in a series of successive operations that are largely independent of each other. The process conditions within the alumina refinery - caustic concentration, temperature, pressure, flow and level - are set depending on the properties of the bauxite ore. The most significant risk in an alumina refinery is the mechanical overpressure of a digester.

There, bauxite ore reacts with caustic soda under high pressure and high temperature. In the past, major explosions have occurred due to failures of process instrumentation devices and pressure relief systems, resulting in major damage to vessels and equipment.

The optimal use of raw materials, energy and process steam can be guaranteed by the use of reliable and accurate flow, pressure, level and temperature measuring instruments from WIKA to ensure strict process control.



Detailed information
can be found online





PSM-700



UPT-20



DPT-10 with 990.27 and 990.29

Pressure



TC80



TR10-F



TG54

Temperature



BZG



BNA



OLS

Level



F1136



F3831



F1211

Force



FLC-CO



DMA



FLC-WG

Flow



CPH7000



CPH7650



CTR3000 with CTS3000

Calibration

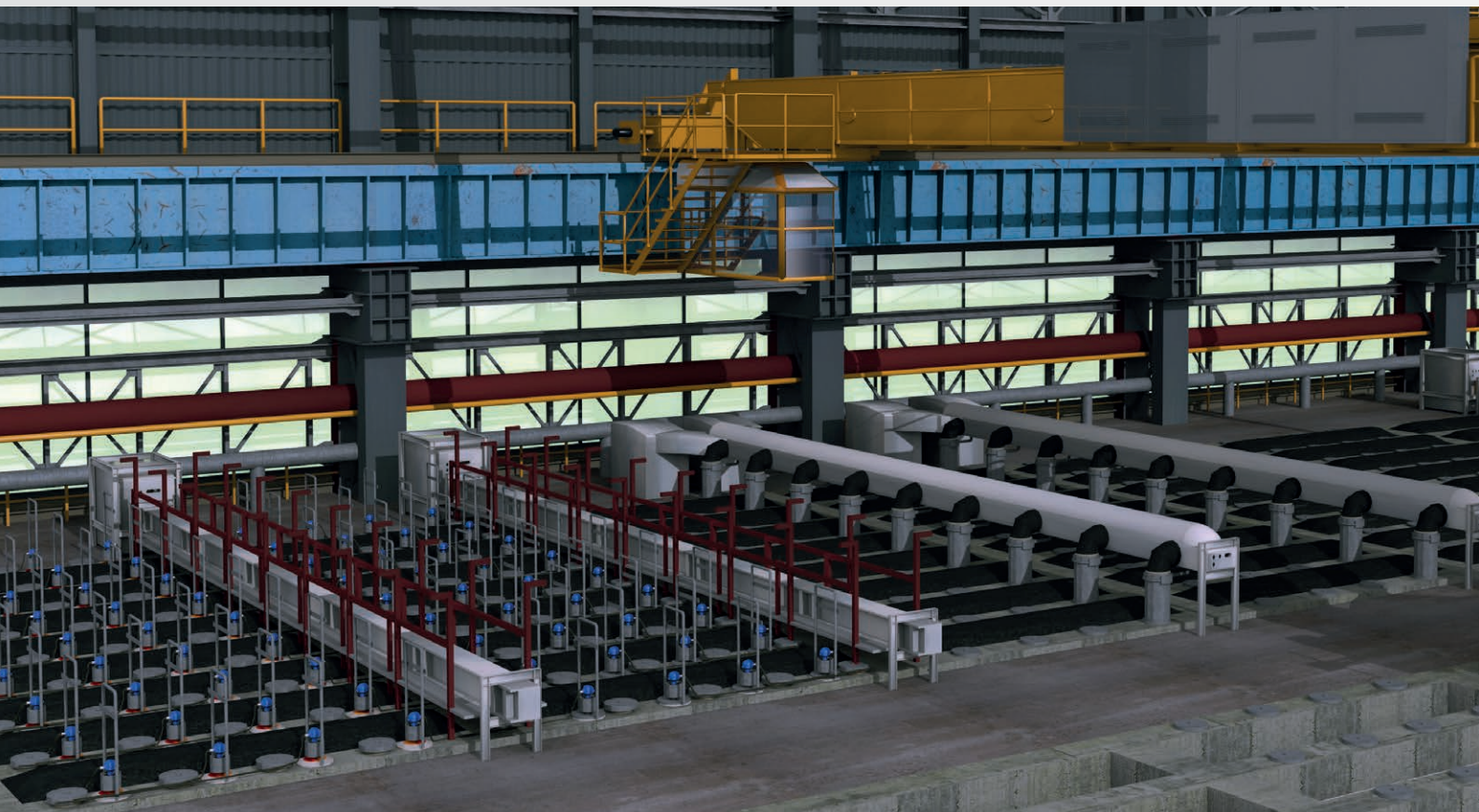
Anode carbon plant

Ensuring the quality of anodes

After the mixture of petroleum coke, resin, aggregates and recycled used anodes, the mass is shaped ("green anodes"). In the anode furnace, the green anodes are gradually heated to the range of 1,100 to 1,120 °C and slowly cooled again. The entire heating cycle can take 16 to 28 days.

The goal of firing the green anode is to produce properties such as sufficient mechanical strength, thermal shock, high electrical conductivity, and low chemical reactivity. One of the main requirements of anode baking is that all anodes, regardless of their location, are exposed to the same temperatures.

For the anode furnaces, WIKA offers a range of accurate, reliable and robust measuring instruments designed to control high temperatures, ultra-low pressures and primary flow elements to optimise the anode baking process, significantly reducing the risk of low-quality anodes.



Detailed information
can be found online





CPT-21



A2G-90



A2G-50

Pressure



TC80-H



T32



TR10-C

Temperature



F9302



F3831



F2802

Force



FLC-HHR-FP



FLC-2300



FLC-CO

Flow



CTR2000



CPC 6050



CPH7000-Ex

Calibration

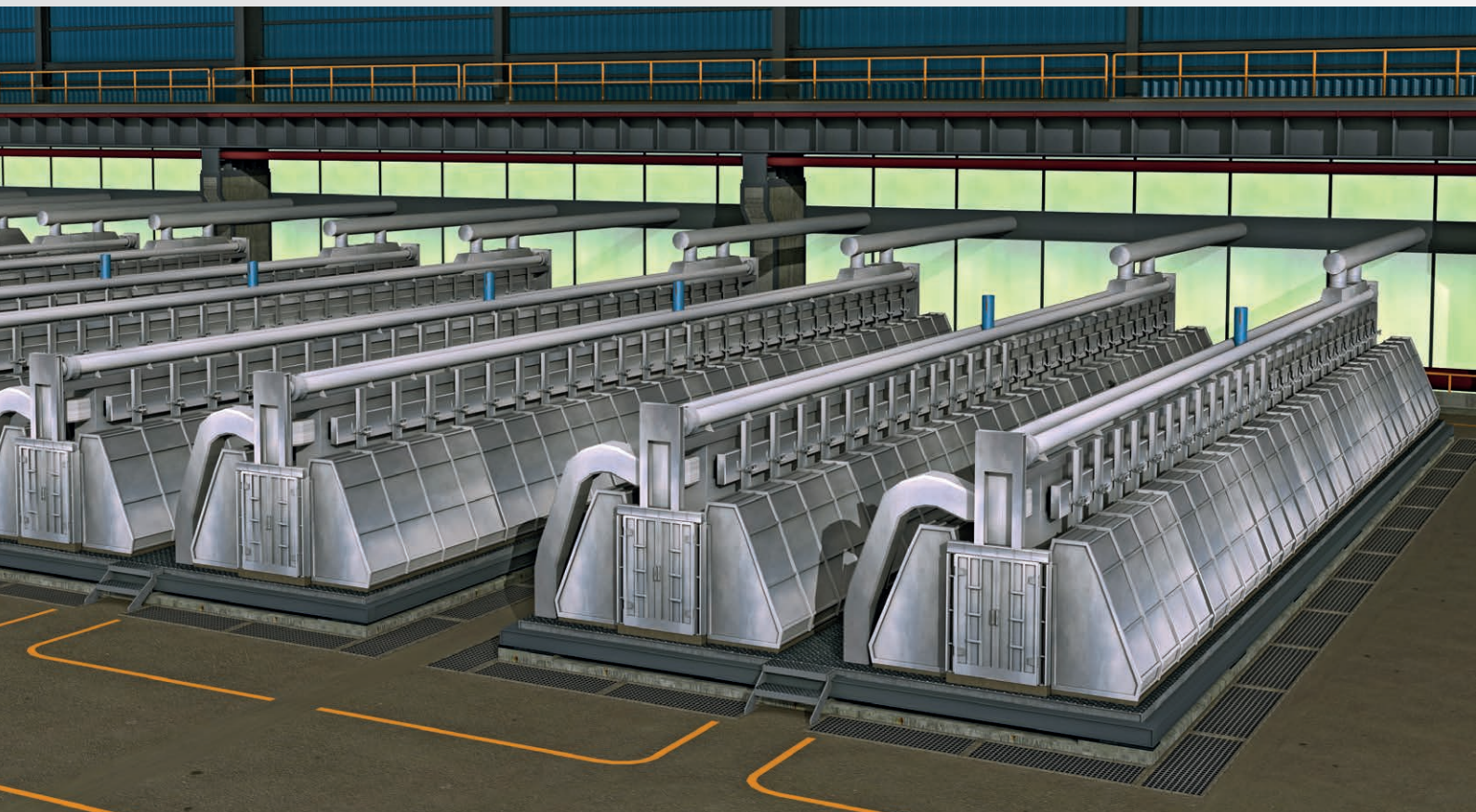
Primary aluminium smelter

Productivity and cell efficiency

The bath temperature is one of the most-important parameters for achieving optimum cell operation. It is necessary to measure the bath temperatures as frequently and as accurately as possible.

Thus, abnormalities in the cell can be detected and necessary measures taken to achieve a stable cell operation (e.g. addition of bath additives). WIKA offers a variety of solutions for reliable temperature measurement in aluminium reduction cells.

Precise temperature control is crucial for the efficiency of aluminium plants. Our experience in manufacturing and calibrating temperature measuring instruments enables you to meet your exact requirements and standards.



Detailed information
can be found online





UPT-20



IS-3



PGS43.100

Pressure



TC80-H



TC40



TC59

Temperature



F1136



F4812



F1211

Force



FLC-HHR-PP



FLC-HHR-FP



FLC-CO

Flow



Pascal 100



CTH7000



CTD9300

Calibration

Casting house

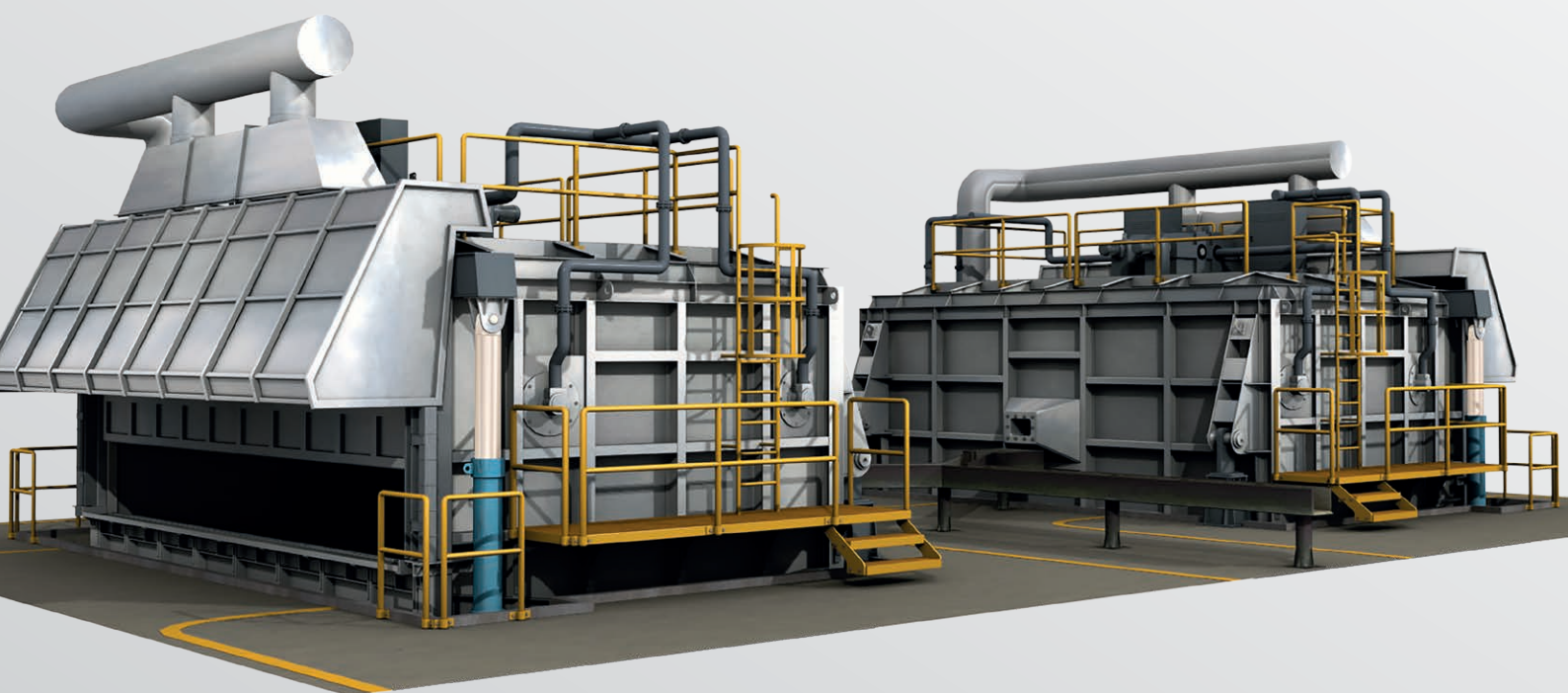
High reliability for high availability

Low weight with high strength, high load capacity and extreme flexibility – these are the characteristics of modern sophisticated aluminium alloys. The use of aluminium in the construction of modern transportation can save up to a third of the weight – and thus fuel.

In the age of mobility, aluminium is the material of choice. The efficiency of a casting house is measured in cost per ton of aluminium produced. To increase this, it is essential to monitor the temperature of liquid aluminium.

The flow temperature of the hot metal is determined while it flows through the channels.

For the temperature measurement of molten aluminium, immersion thermocouples from WIKA are durable and extremely precise.



Detailed information
can be found online





A-10



612.20



PSM-700

Pressure



TR10-F



TC40



TC80

Temperature



GLS-1000



RLT-1000



OLS-H

Level



F3831



F2301

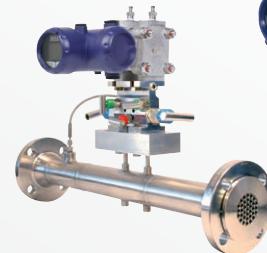


F2802

Force



FLC-2200P



FLC-HHR-FP



FLC-CO

Flow



CPG1500



CTD9100-110



CPH7000

Calibration

Calibration & service centre

Consultation, design, implementation - all from one source

Precise calibration instruments are the starting point for resolving your test requirements. However, they only form one part of a high-performance calibration system. From our extensive product range, we can design a complete and individual solution for you which contains all the relevant components: with adaptability for test items, pressure and vacuum supply, components for pressure control and fine adjustment, through to voltage supply and multimeters for the calibration of electrical test items.

Our particular strength lies in the project planning, development and the building of complete, individual, application-specific systems – from simple manual work stations through to fully automated test systems in production lines.

Complete test assembly for
pressure, temperature and electrical
measurands



Detailed information
can be found online



Versatile support

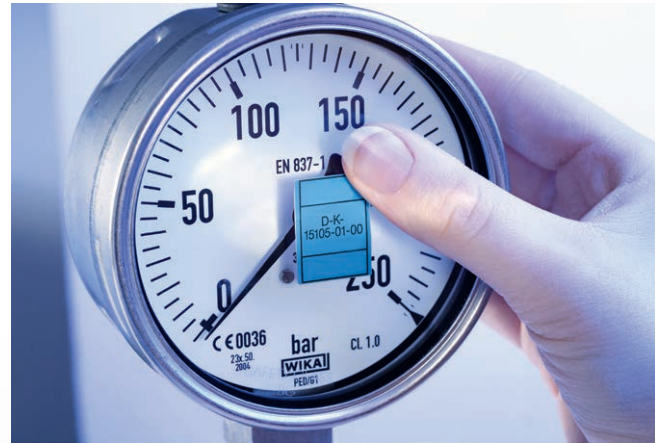


Our worldwide laboratories are accredited in accordance with ISO 17025. We perform our own research and actively contribute our experience in DKD/DAkkS working groups and standards committees.

The calibration, maintenance and repair of your measuring instruments is carried out in full consideration of the latest national and international standards in our own WIKA calibration laboratory or on-site with you.

Should your measuring instrument not meet the required specifications, the deficiencies identified are immediately corrected.

As an independent service provider, naturally, we offer our services for measuring instruments from all manufacturers.



Pressure controller CPC4000



CPH7000-Ex



Precision thermometer CTR3000 with Multiplexer CTS3000

Calibration service

Manufacturer-independent calibration – fast and precise for ...

Pressure



- -1 bar ... +8,000 bar (to +9,500 bar possible with factory calibration)
- Calibration using working standards (precise electrical pressure measuring instruments) or high-accuracy reference standards (pressure balances)
- With an accuracy of 0.003 % ... 0.01 % of reading
- In accordance with the directives DIN EN 837, DAkkS-DKD-R 6-1 or EURAMET cg-3

Temperature



- -196 °C ... +1,200 °C
- Comparative calibration in calibration baths and tube furnaces with an accuracy of down to 1.5 mK
- Calibration at the fixed points of the ITS90 with the smallest-possible measurement uncertainties (mercury, water, gallium, tin, zinc, aluminium)
- In accordance with the appropriate DKD/DAkkS directives

Current, voltage and resistance



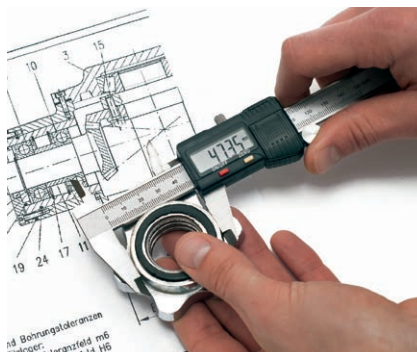
- DC current from 0 mA ... 100 mA
- DC voltage from 0 V ... 100 V
- DC resistance from 0 Ω ... 10 kΩ
- In accordance with the directives VDI/VDE/DGQ/DKD 2622

Force



- 2.5 N ... 6 MN
- Factory calibration
- With a system accuracy of up to 0.01 % with pressure loading or 0.02 % with tensile loads
- In accordance with directive DIN EN 10204

Length



- Factory calibration
- Replacement of the measuring device if required
- Calibration of special-purpose gauges in accordance with customer drawings
- Calibratable measuring devices
 - Calliper gauges to 800 mm
 - Testing pins up to 100 mm
 - Ring and plug gauges up to 150 mm
 - Tapered thread gauges up to 150 mm
 - Others on request

Materials

For high-pressure measurement, high-strength stainless steel is used, while for pressure measurements at elevated temperatures, temperature-resistant stainless steel is needed. For processes involving highly aggressive media – in combination with diaphragm seals/gauges with diaphragm for pressure measurement, or thermowells for temperature measurement – an extensive range of chemically resistant materials is available. In this case, all wetted parts are made of this special material.

Diaphragm seals are manufactured from 316L stainless steel (1.4404/1.4435) as a standard. If diaphragm seals are required with wetted parts in special metals, then these are „metallically bonded“ using one of WIKA's patented procedures. The junction between the diaphragm and the diaphragm seal body is designed to be diffusion-tight, vacuum protected and tear-resistant, and also resistant to all extremes of temperature to which the diaphragm seal might be exposed.

With pressure and differential pressure measuring instruments using diaphragm elements, wetted parts can be manufactured in the widest range of special materials. Measuring systems for Bourdon tube instruments are manufactured in 316L stainless steel (1.4404) as standard. All pressure-bearing materials used can be supplied with a 3.1 sub-supplier certificate.



Large range of special materials and coatings

Stainless steel	Nickel
Duplex 2205	Gold
Hastelloy B3	Platinum
Hastelloy C22	Tantalum
Hastelloy C276	Titanium
Incoloy alloy 825	Zirconium
Inconel alloy 718	Ceramic
Duratherm	Polytetrafluorethylene PTFE
Monel alloy 400	Perfluoroalkoxy PFA

Mounting arrangements

WIKA is happy to support you in the selection of the correct components for your application. Alongside the extensive selection of instrumentation valves and accessories, WIKA also offers qualified assembly of different individual components into a complete measuring arrangement (‘‘hook-up’’). In addition to the valves and protective devices described here, combination with diaphragm seal systems is also possible.



Certified safety

Quality assurance

In aluminium production, extensive quality standards are stringently specified. WIKA ensures this through an effective quality assurance system.

Safety integrity level

The safety integrity level (SIL) of a component is certified through a manufacturer's declaration on the basis of an FMEDA (failure modes, effects and diagnostic analysis). The FMEDA is a systematic evaluation of the random failure behaviour of the component.

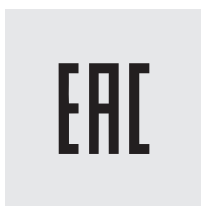
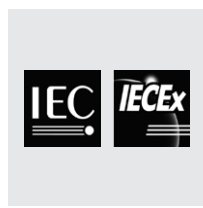
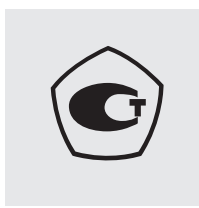
With this, the statistical values of individual components and their functional correlations are jointly assessed. The results are quantified data on the probability of failure and the reliability of the components.



International approvals/certificates

High-quality components are essential for safe and reliable production processes. They are a precondition for highly efficient processes, helping to avoid danger to people, environment and property. Rigorous testing of the instruments

used, by national and international authorised bodies, results in reliability and stable workflows. WIKA instruments offer a wide range of approvals and certificates worldwide.



Electrical output signals

Bus technology

The general trend towards using digital bus systems instead of the conventional field instruments with an analogue output signal is also being seen in the aluminium industry. Advantages:

- Higher accuracy
- Reduced wiring requirements
- Possibility of parameterisation
- Extended diagnostics of field instruments
- Improved process monitoring
- Reliable digital signal transmission

To plant managers this means a cost reduction and an increased availability of their plants.

Standard output signals

Based on the variety of output signals available our measuring instruments can be easily integrated into any plant concept. Among others, the following standard output signals are available:

- Analogue (e.g. 4 ... 20 mA, 0 ... 10 V)
- Analogue 4 ... 20 mA, design per ATEX Ex II 2G Ex ia IIC T4/T5/T6
- 4 ... 20 mA with a superimposed HART® protocol
- PROFIBUS® PA
- FOUNDATION™ Fieldbus

Interoperability

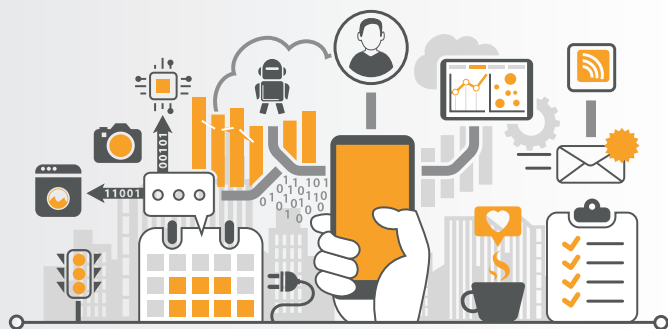


Internal and also external tests certify the compatibility of our transmitters with almost all open software and hardware tools.

Time for networking

Internet of Things

IOT



Wireless sensors are no longer simply suppliers of measured values. Rather, the sensors can, in addition, be combined with extensive intelligence, so their performance is multiplied.

Autonomous wireless platform

Temperature sensors with SAW technology for low-voltage and medium-voltage switchgear

The robust, wireless, fully passive sensors operate maintenance-free in high electromagnetic fields and in high current and voltage environment (e.g. 20 kA, 545 kV). This enables direct measurement on the inside of this critical industrial equipment.

The unique temperature sensor has been designed for critical applications in power plants. SAW temperature sensors can be connected directly to the conductors, no battery or power source is required. They feature easy installation and maintenance. For new plants, they are also available as a retrofit solution.



Easy access

to precise measured data

Do you have to react quickly and flexibly to requirements? WIKA offers you a versatile digital pressure gauge with data logger for long-term monitoring.

The accuracy of digital measurement technology and the simplicity of an analogue gauge are brought together in this digital pressure gauge CPG1500, which in terms of performance, ease-of-use, and instrument features, is unmatched in the pressure measurement market.



When monitoring plants from remote locations or mobile units that cover long distances, a variety of protocols are available, such as LoRaWAN™, Sigfox, NB-IoT, LTE, CAT-M1 and Bluetooth, depending on the availability in each country.

Wireless networks and wireless process instrumentation require great know-how and careful planning. At WIKA, we are pleased to support you in this.

Talk to us.



Engineered solutions

Miniature multipoint thermometers

In principle, miniature multipoint thermometers are made from individual measuring probes with low diameters, which measure the temperature at different positions or heights. Each individual probe is protected with a sheath from either stainless steel or a special alloy. The individual thermocouples can be combined within a single thermowell. This design is used where the generation of a temperature profile is required, but the weight or size of the multipoint thermometer is limited. These designs are available in a number of variants.



Temperature measurement in pilot plants

For research and development, processes are often built in pilot plants. Since the measurement of temperature data for the understanding of a new or modified process is of utmost importance, the thermocouple must be designed and manufactured carefully. Since the operation of pilot plants is on a smaller scale, the sensors must be scaled down, so as not to influence the processes taking place. At the same time it is important that the measured temperatures are correct. These factors are of utmost relevance and must already be taken into account during design.

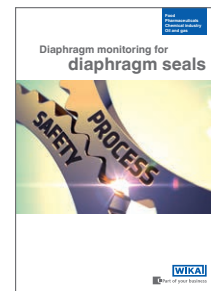
Diaphragm monitoring for critical processes

WIKAI's patented double-diaphragm design is the solution for critical processes where neither the medium should find its way into the environment, nor should the system fill fluid find its way into the product (patent no. Germany: DE102016015447, China: CN108240885, Netherlands: NL2019251, USA: US2018180505).

In the event of a diaphragm rupture, a second diaphragm in the diaphragm seal system ensures the reliable separation of the environment and the process. The measuring task can still be performed. Time to act – without any risk for the process.

You can choose between the following basic models:

- Double-diaphragm system with flange connection and all-welded, flush diaphragm
- Double-diaphragm system with threaded connection and internal, all-welded diaphragm



Extensive information can be found in the flyer "Diaphragm monitoring" at www.wika.com



Diaphragm seals

Diaphragm seals are always used when the conditions at the point of usage deviate from the permissible specifications for the pressure measuring instrument. These are, for example:

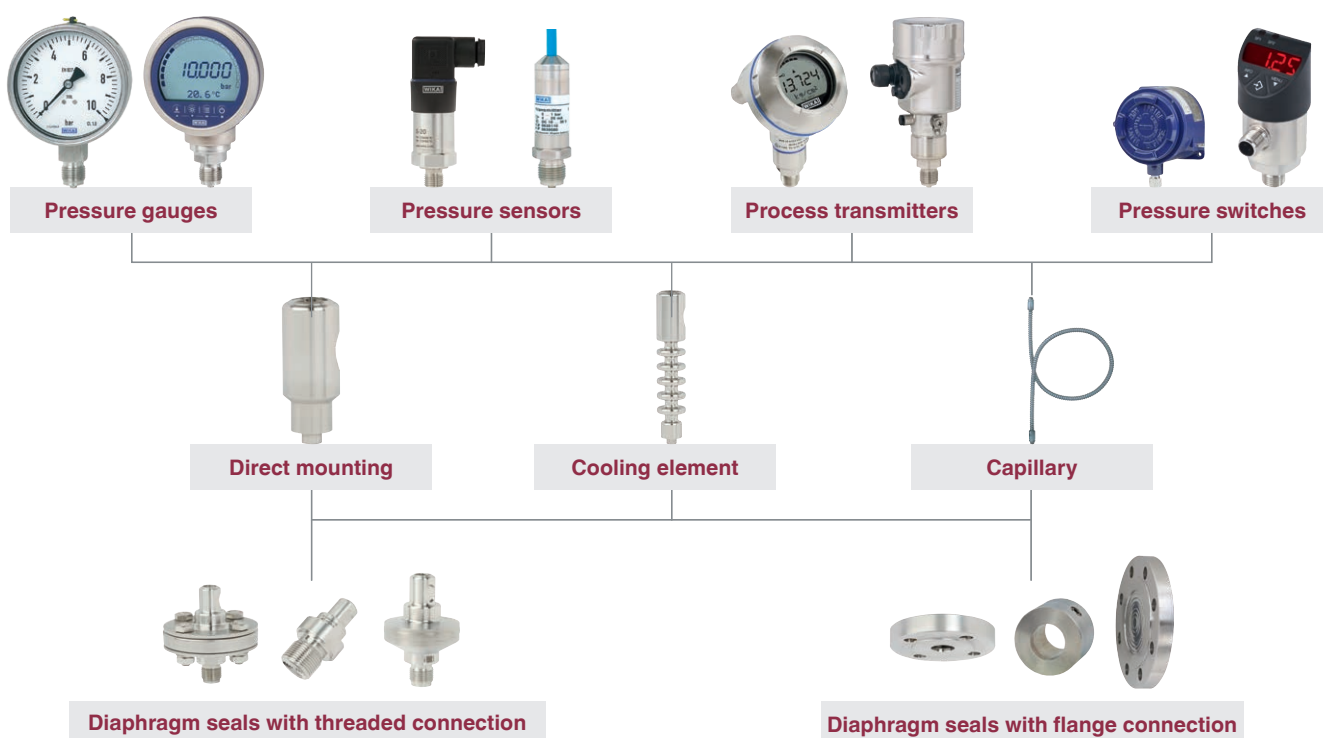
- Too low or too high temperatures of the media
- Aggressive media
- Particle-laden media (also where there is scale formation in the hot-water systems)
- Abrasive media
- Highly viscous media

A further application is the connection of the measuring point with a remotely mounted pressure measuring instrument.

Diaphragm seals are delivered by WIKA as ready-to-use, filled systems. These consist of the diaphragm seal itself (the process connection), the mounting element and the pressure measuring instrument. All components are perfectly matched to one another.

The combined systems can withstand a pressure of 10 mbar up to 3,600 bar at extreme temperatures (-130 ... +400 °C) and with a wide variety of media, thus enabling accurate pressure measurements under extreme conditions.

Our programme is rounded off by test certificates and approvals for specific applications.



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