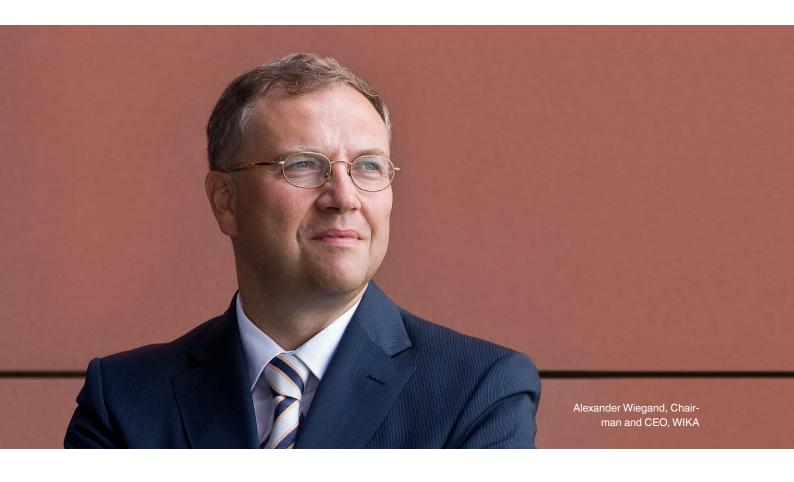
Pressure
Temperature
Level
Flow
Calibration technology

Power generation







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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WIKA – Your partner in the power plant industry

In all areas of power generation – from conventional power plants, through nuclear power plants to decentralised systems such as CHP and biomass plants – pressure, temperature, level measuring instruments and also primary flow elements from WIKA are in use.

The demands on measuring instruments are as diverse as their fields of application. In hazardous areas and in nuclear plants, in aggressive as well as non-aggressive environments, our measuring instruments fulfil the highest requirements. Individually tailored advice and proposals, to match solutions to your needs, supplement our extensive offering of products and services.

Our expertise and dependability, in addition to our worldwide sales and service network, has made WIKA a global contracting partner with many well-known names in the international power plant industry.

All around the world – Close to the customer

With manufacturing locations around the globe, we ensure the highest flexibility and delivery performance. Some WIKA manufacturing locations: Germany (HQ), Australia, Brazil, Canada, China, India, Italy, Korea, Malaysia, Poland, Russia, Singapore, Switzerland, South Africa and USA











Proximity to our customers is essential for efficient solutions. Whether standard products or custom designs: Working with you we'll find the right concepts for your requirements.

To meet this demand wherever it arises, we are a strong group of companies with a worldwide presence through our wholly-owned subsidiaries. Our experienced engineers and sales specialists are your competent and reliable contacts locally. They know the country-specific conditions, standards and applications, and will dedicate the time for your individual requirements.

Thus, around the world you have access to our unique know-how and product range. Whether you want to measure up to 0.5 mbar or up to 700 bar, to determine the pipe wall temperatures at the boiler or require a computational proof of your thermowells, whether you will measure a continuous level or wish to monitor a limit level, wish to record a flow through an orifice plate, Venturi or pitot tube, whether in a conventional power plant or in a nuclear one:

For each application, we offer the right solution for you.

Certified safety

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.

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.



















Fieldbus systems

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 power engineering.

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)
- 4 ... 20 mA with a superimposed HART® protocol
- PROFIBUS® PA
- FOUNDATION™ Fieldbus



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



Wake frequency calculation

Wake frequency calculations are carried out as a mathematical confirmation of the strength for thermometer thermowells with respect to the static and dynamic loads under the process conditions. In the last years they have gained more and more importance. While in the past, for many years, experience defined the design of thermowells with the end user, today the dimensions of the thermowell are matched to the process through computation.

The most prevalent basis for this calculation, worldwide, is ASME PTC 19.3. Through the wake frequency calculation, a greater safety in operation for all types of plant is already achieved in the planning phase. Thus, even before commissioning, expensive failures of measuring points and

the associated risks and downtime are prevented. With complex measuring points, an intensive session with the plant operators also leads to a constructive solution.

Increased safety with high process loads

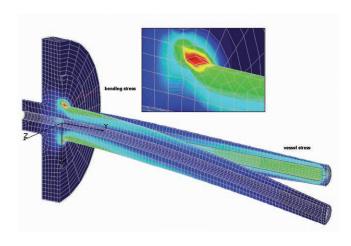
Calculations for establishing the stability of thermowells make it possible to minimise or eliminate the possibility of damage to the thermowells even before the plants where they are used are commissioned. The calculations can be made in accordance with ASME PTC 19.3 or Dittrich/Klotter. The following process parameters are required to complete the calculations:

- Flow rate in m/s
- Medium density in kg/m³
- Temperature in °C
- Pressure in bar

Independently of the thermowells' method of manufacture, the results of the wake frequency calculation are always divided into two parts: Firstly, the dynamic view on vibration failures through operation at resonance and secondly, the static load through external pressure.

Non-destructive tests

The most common non-destructive tests for thermowells are the pressure test, the liquid penetrant inspection and the PMI test.



Hydrostatic pressure test

This test is carried out using external pressure on flanged thermowells, and using an internal pressure test for welded or threaded thermowells. The level of the test pressure is determined according to the construction of the thermowell and the flange used. Common pressures used are between 60 and 500 bar (1.5 times the flange pressure rating) for between 3 and 15 minutes.



Pressure

The WIKA programme is divided into a number of product lines and is thus suited to the widest range of applications. In addition, many instruments can be combined with each other or can be extended, for example with diaphragm seals, capillaries or thermowells.

Transmit

WIKA offers a complete range of electronic pressure measuring instruments: Pressure sensors, pressure gauges with output signal and process transmitters for the measurement of over-, absolute and differential pressure. The different pressure measuring instruments are used for the monitoring of overpressure, in level measurements on tanks and vessels, and also for flow measurement in combination with an orifice plate or a Venturi tube.

Switch

In our measuring instruments we utilise the latest sensor technology which has been tested and proven in each plant component in the power plant industry. These work without any kind of mechanical contact, consequently they are wear-resistant, and there's absolutely no influence on the mechanics. Furthermore the direct switching of electrical loads up to AC 250 V / 20 A is enabled. The instruments can be used in all safety-critical applications (SIL certificate).

Display

Indicating pressure gauges for over-, absolute and differential pressure with Bourdon tube, diaphragm or capsule pressure elements have been proven millions of times over. Since these measuring instruments work independently of any power supply, they can be used in parallel to electrical transmitters, particularly in safety-related applications for pressure monitoring.











Instrumentation valves and accessories

Very often, pressure measuring instruments are installed in combination with valves to enable an easy separation from the process for recalibration or replacement.

WIKA offers a wide range of valves, valve manifolds and monoflanges, which can perform shut-off, venting and compensating functions.

A variety of sizes and connection types, such as NPT, G and IEC connection, and also mounting brackets for wall or pipe mounting are available.

Instrumentation valves









Protective devices







Temperature

Within the power plant industry, temperature plays an important role and is used in almost all circuits. One will find this measurement technology in 2 out of 3 measurements, among others, for boiler or flue gas plant protection; however, temperature sensors is also installed in many control circuits. For all of these demanding applications, WIKA has the right sensor and transmitter.

Transmit

Our range of products includes thermocouples, resistance thermometers as well as analogue and digital temperature transmitters for all applications in power plants.

Display

Our dial thermometers work on the bimetal, expansion or gas actuation principle. This enables scale ranges of -200 ... +700 °C in different class accuracies, response times and resilience to environmental influences. Diverse connection designs, stem diameters and individual stem lengths enable a flexible measuring point design. Dial thermometers with capillaries are particularly versatile. All thermometers are suited for operation in a thermowell if necessary.

Switch

As a result of the integration of switch contacts and output signals into our mechanical temperature measuring instruments, we can offer a wide variety of combined instruments. Furthermore the direct switching of electrical loads up to AC 250 V / 20 A is enabled. The instruments have been developed especially for safety-critical applications in accordance with IEC 61508 (SIL 2). On customer request the use of high-quality and corrosion-resistant wetted materials is confirmed by a 3.1 certificate.

Thermowells

So that thermometers can work even under extreme process loads, we offer a wide range of thermowells. The thermowells can also be supplied in special materials such as Hastelloy and titanium or with various coatings depending on the process requirements.





Tubeskin temperature measurement

The aim of tubeskin temperature measurement is to monitor the maximum permissible temperature curves and with this to prevent a premature overheating of the piping. Due to the accuracy of the tubeskin thermocouples, the operator can ensure the boiler operation of their plant, increase the service life of the boiler tubes and optimise the efficiency.

A simple installation is ensured through a secure weld fitting



to the pipe wall, suitable for every nominal width of pipe. This also offers a fast replacement during the tight maintenance schedules of a shutdown.

Temperature measurements within gas turbines

Modern gas turbines are designed to utilise the energy from gases as efficiently as possible. For this, the most important criterion is to operate the combustion at as a high a temperature as possible, without exceeding the limits of use of blades and case. Of course, the turbine must also respond quickly to changes in load, thus, in addition to the accuracy, the speed of the temperature measurement also becomes increasingly important.



Inside a gas turbine, conditions are extreme: Temperatures of up to 800 °C, high flow rates and strong vibrations. WIKA thermocouples and thermowells also work safely and reliably in these harsh cases of application.

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Level

WIKA offers a wide range of level measuring instruments for temperatures up to $450\,^{\circ}$ C or pressure ranges up to $400\,^{\circ}$ D we have a comprehensive range of bypass level indicators, level sensors and magnetic float switches available.

Display

- Bypass level indicators
- Sight glass level indicators

Transmit

- Submersible pressure sensors
- Continuous measurement with float

Switch

- Float switches
- Optoelectronic switches







Sight glass level indicators on steam generators

With this level indicator design, the liquid is encapsulated between two transparent sight glasses. This allows the liquid to be looked through and thus provides a clear indication of the level. Transparent level indicators are available in double-cover plate design for pressure ranges up to PN 100. They are the most suitable indicators for steam applications above 35 bar, where mica shields have to be used to protect the sight glasses from corrosion by the steam boiler water.





Bypass level indicators on low-pressure pre-heaters or feedwater tanks

In a communicating bypass chamber mounted to the side of a vessel a float moves with the level of the medium to be measured.

The magnetic field of the radial-symmetric magnetic system positioned in the float at submersion height activates the magnetic roller display attached to the outside of the bypass chamber as well as the switching and measuring elements. This proven measurement system can be combined with further independent measurement principles such as a guided-wave radar system, a reed measurement chain or a limit switch. Thus for independent measurements, only two process connections are required, a full redundancy in the measurement is possible and a visual level measurement is permanently available.

Replacement service for diaphragm seal systems

WIKA diaphragm seal systems mounted with process transmitters from WIKA and all well-known manufacturers are recognised and valued internationally. The optimal diaphragm seal designs, materials and filling media are available for the most difficult measuring requirements and for each application.

By using diaphragm seals, the measuring instruments can be used at extreme temperatures from -90 to +400 °C and with aggressive, corrosive, heterogeneous, abrasive, highly viscous or toxic media.

The special materials and coatings employed by WIKA ensure a long service life for the diaphragm seal. However, we do recommend having regular service intervals, depending on the media used, at which the diaphragm seal can be replaced.



In this way, in addition to cost savings, you also create the certainty of being able to continue producing with the latest technology. With a preventative replacement, scheduled in line with planned shut-downs to your plant, you can reduce downtimes.

Advantages of our replacement service

Only in rare cases must defective diaphragm seal systems be replaced completely. With the testing and replacement, WIKA offers you a service package with clear cost savings through the further utilisation of your existing process transmitter.

Further advantages

- New calibration of the system
- Hydrostatic pressure test for differential pressure
- Current material certificate
- Current approvals, e.g. for power plants
- State-of-the-art weld seam at the system (AD 2000)



Primary flow elements

Our portfolio for primary flow elements includes orifice plates, meter runs, flow nozzles, Venturi tubes, pitot tubes and restriction orifices.

With our extensive product range we are in a position to cover almost all applications within power plants. As a result of our many years of experience, we can develop customised solutions to meet your specific needs.

Calibration

For many customers, the accuracy of the measurement is a key criterion. Often, a best-in-class measurement is required in terms of the accuracy, the precision and the reproducibility. With this we will support you during the entire planning and manufacturing – our focus is the best solution for your project, the guarantee of high quality and a calibration certificate in accordance with ASME PTC6, ISPESL and IBR standards.

Typical applications

- Feedwater volume measurement
- Injection volume measurement
- Steam volume measurement
- Lubricating oil volume measurement
- High-pressure meter run







Lifecycle solutions for SF₆ gas

For over 50 years, SF_6 gas has been used successfully in various industrial applications.

Most of the $SF_{\rm e}$ gas volume is used in switchgear and switch-disconnectors in electricity transmission and distribution.

In medium and high-voltage switchgear of the electricity grid operators, the gas acts as an extremely efficient insulation medium and operates as the arc quenching during the switching process.

SF₆ gas measurement

Instrumentation

The monitoring of the SF_6 gas condition serves for plant safety.

Product variants:

- Mechanical gas density indicators
- Mechanical gas density monitors with alarm contacts
- Mechanical gas density switches without display
- Gas density transmitters with analogue output
- Gas condition transmitters with digital output

Analytic and detection instruments

The plant safety of SF_6 gas-insulated equipment is reduced significantly through low concentrations of SF_6 decomposition products. In operation, these arise through arcing in moist or impure SF_6 gas. WIKA offers a complete product line for gas analytics, including accessories.

Leakage detection instruments enable accurate detection and quantification of leakage points. The timely detection and sealing of the smallest of leaks reduces environmental impact and saves on the refilling of leaked gas quantities.

Connecting parts

For the filling or evacuation procedure for SF_6 tanks, reliable connection technology is required in order to prevent gas leakage and to enable efficient operation. WIKA connecting parts fulfil the highest customer requirements, and include valves, couplings, hoses and other components.

Filling and handling equipment

The service operations for the evacuation and filling of SF_6 tanks, or the processing of contaminated SF_6 gas, must be carried out with the appropriate equipment and by trained personnel. The WIKA product portfolio for filling and handling equipment covers everything to do with the handling of SF_6 gas.











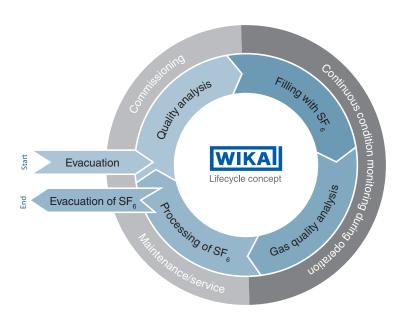
Lifecycle

Designing for a service life of up to 40 years requires both the use of high-quality components and an adequate maintenance strategy. WIKA is the only company to offer a product portfolio and comprehensive application experience for the entire ${\rm SF}_{\rm 6}$ gas lifecycle - everything from one source. Our customers can thus access in-depth know-how – from planning to the disposal of ${\rm SF}_{\rm 6}$ gas-filled equipment.

SF₆ gas academy

In order to identify potential for improvement in the SF_{ϵ} gas lifecycle, in-depth knowledge about SF_{ϵ} gas characteristics and legislation is required.

The " ${\rm SF_6}$ gas academy" initiative was launched to create a cooperative learning environment and to develop best practice solutions in conjunction with experts. Each seminar is individually tailored to the needs of the participants.



Services

- Commissioning
- Repair and maintenance
- Calibration
- Quality analyses
- Loan instruments

On request we can also carry out the services on your premises.

Calibration technology

From individual components ...

WIKA is the ideal partner for solutions in calibration technology, whether a single service instrument is required quickly on site, or whether a fully automated calibration system needs to be designed for the laboratory or production. We are able to offer an appropriate solution for each application. In relation to the measuring task and the measurands, the following product matrix will assist you.



Portable pressure generation

Test pumps serve as pressure generators for the testing of mechanical and electronic pressure measuring instruments through comparative measurements. These pressure tests can take place in the laboratory or workshop, or on site at the measuring point.



Measuring components

High-accuracy pressure sensors and very stable standard thermometers are ideal for applications as references in industrial laboratories. Due to their analogue or digital interfaces, they can be connected to existing evaluation instruments.



Hand-helds, calibrators

Our hand-held measuring instruments (process tools) offer a simple capability for measurement or simulation of all established measurands on site. They can be operated with a wide variety of pressure sensors or thermometers.

... to a fully automated system



Digitally indicating precision measuring instruments

High-accuracy digital precision measuring instruments are ideal for applications as reference standards in industrial laboratories, enabling high-accuracy calibration. They feature exceptionally simple handling and an extensive range of functionality.



Digital precision instruments and controllers

Due to their integrated controller, these instruments offer exceptional convenience. Typically, a fully automated setting of the required value can be set via the interface.



Fully automated calibration systems as complete solu-

Fully automated calibration systems are customer-specific, turnkey installations which can be fitted in laboratories as well as in the production environment. With integrated reference instruments and calibration software, calibration certificates can be generated and archived in a simple and reproducible way.

■ Pressure ■ Temperature

■ Current, voltage, resistance



Calibration services

Our calibration laboratories have been calibrated for pressure and temperature for over 30 years. Since 2014, our calibration laboratory has also been accredited for the electrical measurands DC current, DC voltage and DC resistance. Since 2017, the factory calibration for length measuring instruments has been expanding our portfolio.

- ISO 9001 certified
- DKD/DAkkS accredited (in accordance with DIN EN ISO/ IEC 17025)
- Co-operation in the DKD/DAkkS working groups
- Over 60 years of experience in pressure and temperature measurement
- Highly qualified, individually trained personnel
- Latest reference instruments with the highest accuracy

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
- Comparison calibration in calibration baths and tube furnaces with an accuracy of down to 1.5 mK
- Calibration at fixed points of ITS90 with the smallest possible measurement uncertainties
 - Triple point of mercury (-38.8344 °C)
 - Triple point of water (0.01 °C)
 - Melting point of gallium (29.7646 °C)
 - Solidification point of tin (231.928 °C)
 - Solidification point of zinc (419.527 °C)
 - Solidification point of aluminium (660.323 °C)
- In accordance with the appropriate DKD/DAkkS directives

Current, voltage, resistance



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

Length



- Factory calibration within 10 working days
- Replacement of the measuring device if required
- Calibration of special-purpose gauges according to customer drawings
- Calibratable measuring devices
 - Caliper gauges to 800 mm
 - Testing pins to 100 mm
 - Ring gauges and plug gauges to 150 mm
 - Tapered thread gauges to 150 mm
 - Gauge blocks to 170 mm (also possible as a set)
 - others on request

On site (pressure and temperature



In order to have the least possible impact on the production process, we offer you a time-saving, on-site DAkkS calibration throughout Germany.

- In our calibration van or on your workbench
- With a DAkkS accreditation for pressure from -1 bar ... +8,000 bar
 - with accuracies between 0.025 % and 0.1
 % of full scale for the standard used
- With a DAkkS accreditation for temperature from -55 °C ... +1,100 °C

Contractor business

WIKA has been active in the contractor business for more than 30 years. Together with international partners we realise large projects all over the world. Thus we are more than a reliable supplier of high-quality measuring instruments:

As a competent partner we develop - together with you - products and solutions made custom-fit to your requirements.





Support from the very beginning

During all phases of the project WIKA remains your competent partner: Starting with planning in the basic and detail engineering, through realisation and implementation of the project, all the way to the after-sales support. WIKA provides ready-to-use instruments for direct implementation.

Acceptance tests

Our customers have the opportunity to perform acceptance tests on WIKA products prior to delivery. This increases the security in the product coordination. This means that you can be sure that all instruments will also arrive at the place of use in excellent condition.



Tag signs

At WIKA, the measuring point numbers required within the project business can be engraved onto stainless steel tags or onto flanges. Furthermore, they can be printed onto adhesive labels or dials.



Project-related documentation

Not only can we prepare data sheets, dimensional drawings and operating instructions especially for your project, but we can also provide material certificates, product certificates, quality plans, welding procedure tests, PMI tests, etc. To your design, in many languages and in either digital or print format.

Summary of projects completed



WIKA has been undertaking international projects for many years, not only in conventional power plants, such as coal and gas generation plants, but also in nuclear power plants. As a result of their extensive product portfolio, WIKA is respected as a complete supplier within the project business.

Gas/Combined cycle power plants

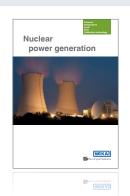
- Franken I project (Germany)
- Irsching project (Germany)
- Ghent project (Belgium)
- Rijnmond project (Netherlands)
- Gonyu project (Hungary)
- Malzenice project (Slovakia)
- T-Power project (Belgium)
- Knapsack project (Germany)
- Shuweihat project (UAE)
- Wang Noi project (Thailand)
- Sagunto project (Spain)
- Shedgum project (Saudi Arabia)

Brown coal/hard coal fired power plants

- Maritza project (Bulgaria)
- Belchatov project (Poland)
- RDK 8 project (Germany)
- Lünen project (Germany)
- Tuzla 5 project (Bosnia Herzegovina)
- Nikola Tesla project (Serbia)

Nuclear power plants

For applications in nuclear power plants, WIKA offers a comprehensive product portfolio, both for the primary and also the secondary circuits. Our instruments conform to even the highest demands of safety and functionality (1E, K1, LOCA).



Extensive information can be found in our brochure "Nuclear power generation" at www.wika.de.

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