Pressure | Temperature | Level | Calibration

Water and wastewater technology

WIKA

Smart in sensing

About us

Alexander Wiegand,
Chairman and CEO, WIKA

As a family-run business acting globally, with over 9,000 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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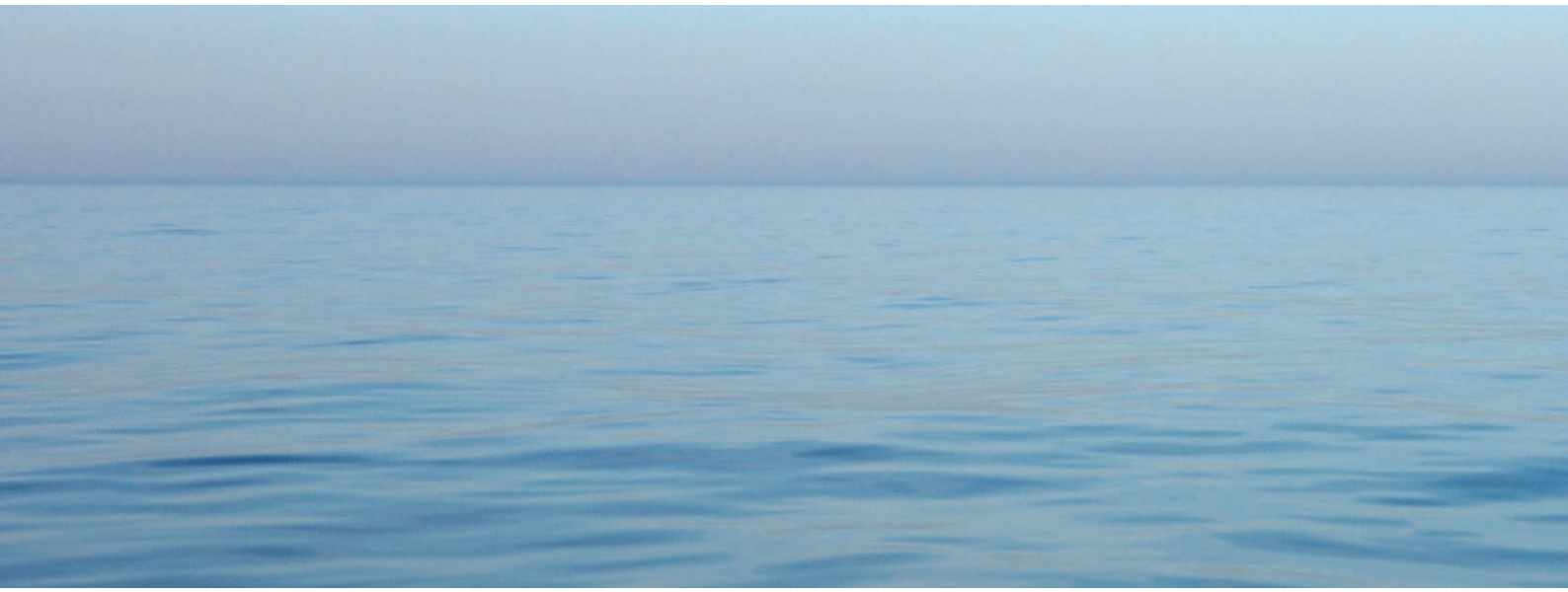
Our water

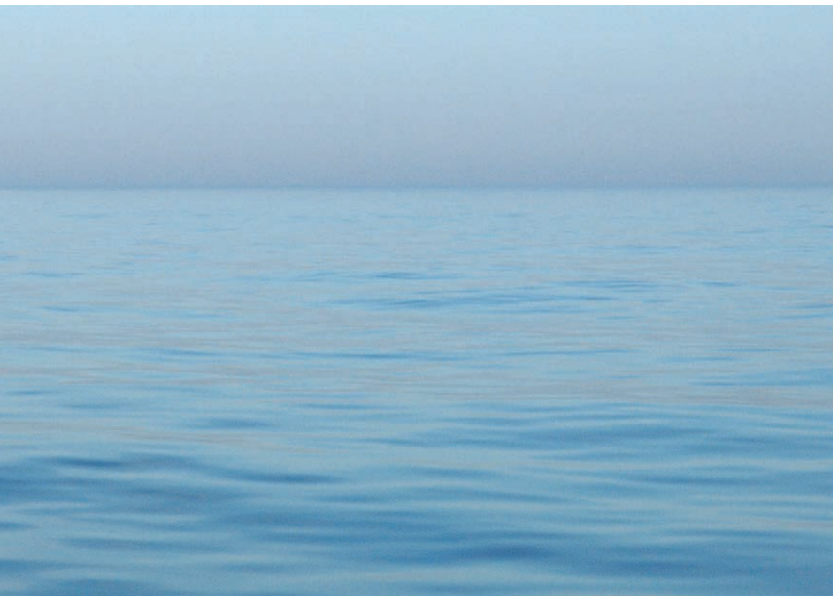


Water is the most important natural resource for both man and nature – and in seemingly abundant supply. Seemingly. Of all the immeasurable water supplies that our earth holds, only a small part is directly usable in reality. Almost everywhere where water is to be used for drinking, it must first be cleaned, softened, desalinated or sterilised.

If we look at the earth's surface, then we see that more than 70 percent is water.
Most, however, is seawater. Salty and undrinkable. Of the entire volume of all water resources, around 97 percent is salt water, and only about 3 percent is freshwater. The latter is mostly bound in glacial ice.

Against this background, it is understandable why supplies of drinking water are perhaps mankind's greatest challenge: Right now, around 1.2 billion of earth's inhabitants – more than one in six – have no access to clean drinking water.

And by 2025, experts estimate there will be over three billion. In more than 30 countries around the world persistent water shortages prevail; it is expected that, by 2025, this will be a problem for 50 countries.



The thirst grows

The global situation is worsening as the thirst for drinking water grows everywhere, and not only through the growth in world population.

Here, a particularly large part is also played by agriculture, which today, averaged around the world, requires about 70 percent of all water supplies, industry a further 20 percent, and private housing around 10 percent.

According to a forecast by the United Nations Environment Programme (UNEP), by 2025 the water demand from agriculture will have grown by 20 percent, in industry by 50 percent and in households by 80 percent.

Water, and that is the positive message, is used, but it isn't used up. The amount remains the same – only a negligible part evaporates into space.
However, the technical expenditure in using, processing and/or recycling water resources is immensely high.

Worldwide, around 500 billion euros are spent on this annually, with the trend growing continuously.

Technology can help

An important role for the better usage and development of water resources is played by modern technology for water sourcing, treatment and distribution.

Here, highly advanced systems and processes are used, which only function with reliable measurement and control technology.

As such, WIKA products and solutions contribute the world over so that water is treated carefully and sustainably as a valuable commodity.

Drinking water

Drinking water is the most elementary foodstuff – its supply therefore has the highest priority. For this reason, clean drinking water has been a UN human right since 2010.

The high demands on quality and availability through strict laws, precise guidelines and corresponding structures are, generally, so perfectly fulfilled, that drinking water, for most people in the Western world, is taken for granted. The high investment that goes into an uninterrupted water supply is not even recognised by most consumers.

Drinking water is obtained from the widest variety of sources: groundwater, rain water, surface water (particularly from rivers and lakes), and increasingly also from the sea. Depending on its origin, it must be conditioned for human consumption, or for other uses, with a greater or lesser technological investment. This includes processes such as filtration, desalination, de-acidification, degassing, disinfection and the removal of unwanted substances such as iron and manganese.

For the public water supply in Germany, the DIN 2000 and 2001 standards are precisely defined.
In these, amongst other items, the requirements for drinking water as well as for the design, building and operation of supply plants are specified exactly.

From deep down

In many countries, especially in Europe, the primary source of drinking water is from groundwater. In Germany this accounts for approximately 70 percent of the water supply. The water extracted from various depths – quite often several hundred metres under the earth's surface – as a rule is hygienically perfect.

Powerful submersible pumps transport the groundwater to the surface. The ratio between the water extraction and the replenishment of groundwater must be consistently and carefully controlled. This is achieved through level probes, also known as submersible pressure transmitters, which permanently measure the water level. They must be particularly low-maintenance and long-lasting.

WIKA submersible pressure transmitters from stainless steel have been applied for many years in drinking water supply. The measuring instruments can be easily installed and operated completely submerged in water. They deliver reliable measuring signals throughout the years.

From the sea

Many populated centres with drinking water shortages are located right near the sea.
The treatment of strongly saline seawater for usage to the quality of drinking water is a proven process.

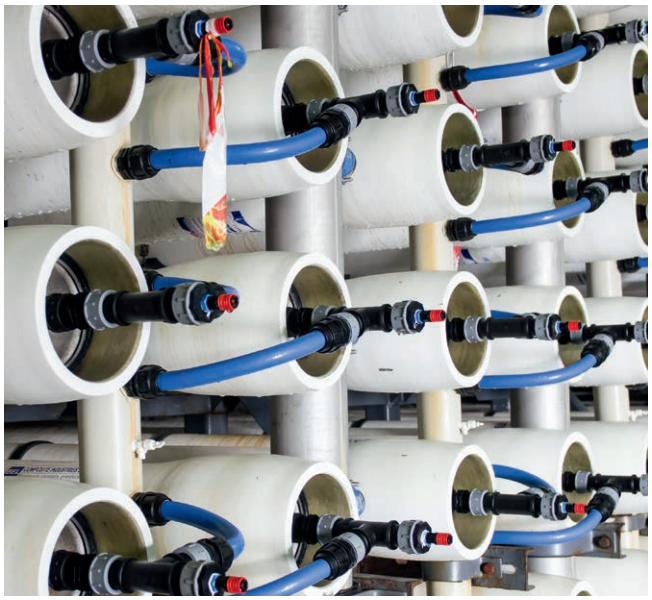
Through continuous development and optimisation, the production costs have been reduced dramatically and thus the desalination of seawater can be realised cost-effectively.

Desalination thus contributes globally to the securing of drinking water supplies which are able to satisfy the continuously rising demands of conurbations.
Two treatment methods, in particular, have become established: reverse osmosis and distillation processes.

Reverse osmosis

is a filtration process, in which the seawater is forced through a diaphragm. In the process, the pollutants are retained by the diaphragm, while the cleaned water is collected for further use.

Since, during osmosis, the molecules flow from an area with lower concentration to an area with higher concentration, so here we are speaking of a process that is the inverse of osmosis.

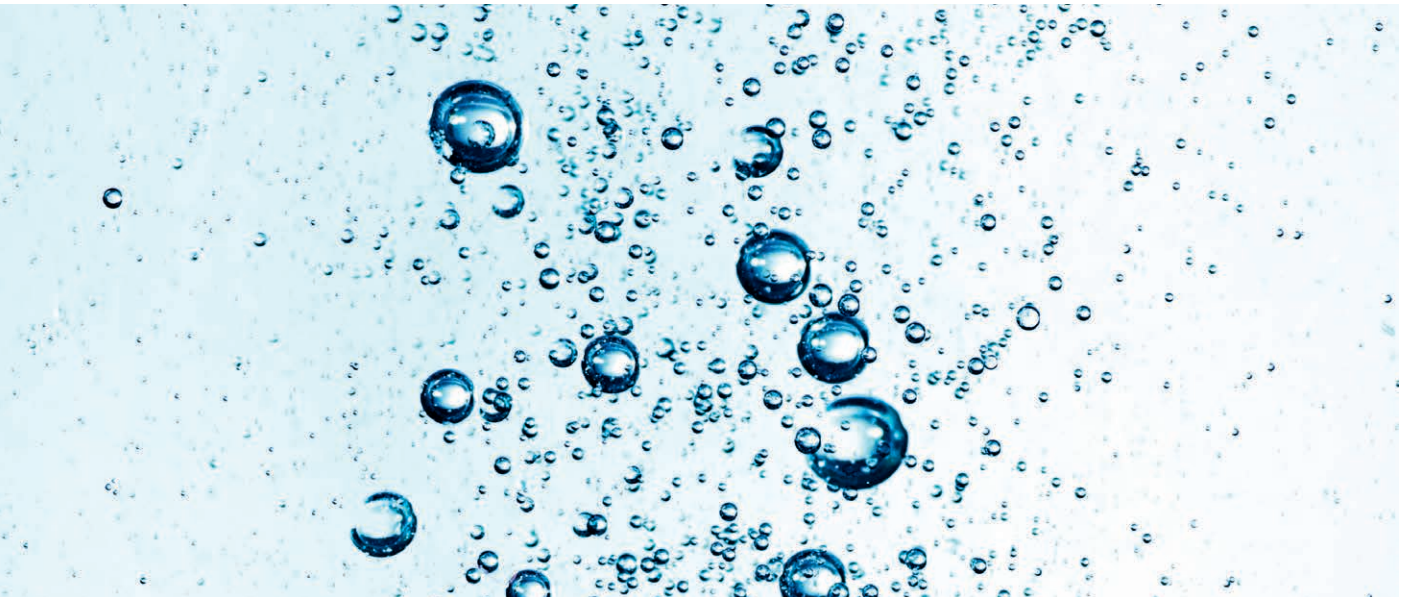


Distillation process or “MSP” (multi-stage flash evaporation)

is a thermal process in which the seawater is passed through pipes via heat recovery zones and into the end heater. Here, the seawater is heated to over 100 °C and flows back into the first chamber of the heat recovery zone.

Thus part of the seawater is evaporated due to a lower pressure, condenses on the pipes above and is collected as freshwater.

The remaining seawater flows into further chambers, where the pressure is reduced in stages, and thus further freshwater is produced.



To the consumer

In most regions, drinking water is distributed to the consumer through supply networks.
The components in these systems are water pipes, pressure regulation and measurement and monitoring devices. In most countries there are specific legal provisions that regulate the handling of drinking water.

Examples:
Thus, in the German Drinking Water Ordinance, the essence is described in § 1: "The purpose of the regulation is to protect human health from the adverse effects resulting from the contamination of water intended for human use, by ensuring its purity and fitness for consumption […]".

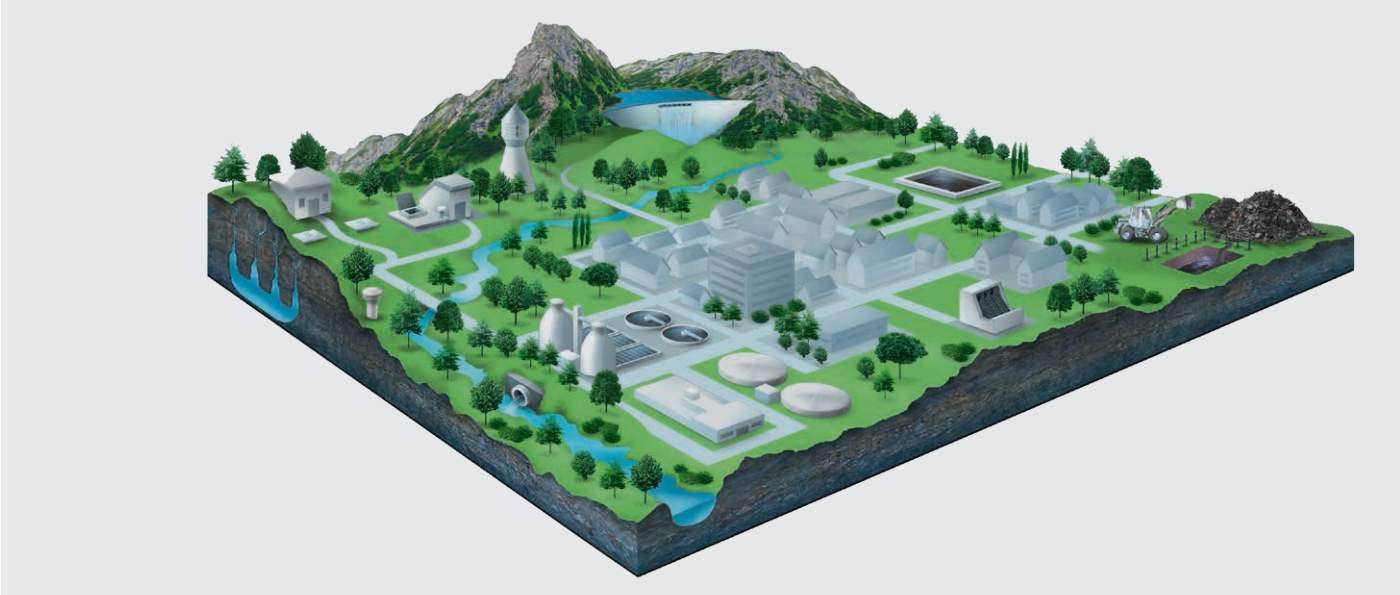
The water supply is ensured either by public or private organisations. Apart from a consistent water quality, they must, in particular, provide an adequate pressure within the supply network.

Depending on the topography in the particular supply area, the pressure must occasionally be decreased, and frequently increased. In both cases, mainly Bourdon tube gauges are used to monitor the pressure.

An important task in conjunction with this is also ensuring a constant pressure via compensatory measures during times of peak usage and also during particularly low water consumption.

For this purpose pressure transmitters (or pressure gauges with electrical output signals) are used, not directly on the pumps, but rather mounted at distributed points in the supply network, for example at valves.

Through the signal from the pressure measuring instrument, the speed of the appropriate water pump can be regulated such that the supply rate matches the requirements exactly.



Hydrostatic level measurement

Level sensors based on hydrostatic pressure measurement generally measure the level or filling height in a vessel in accordance with the following principle:

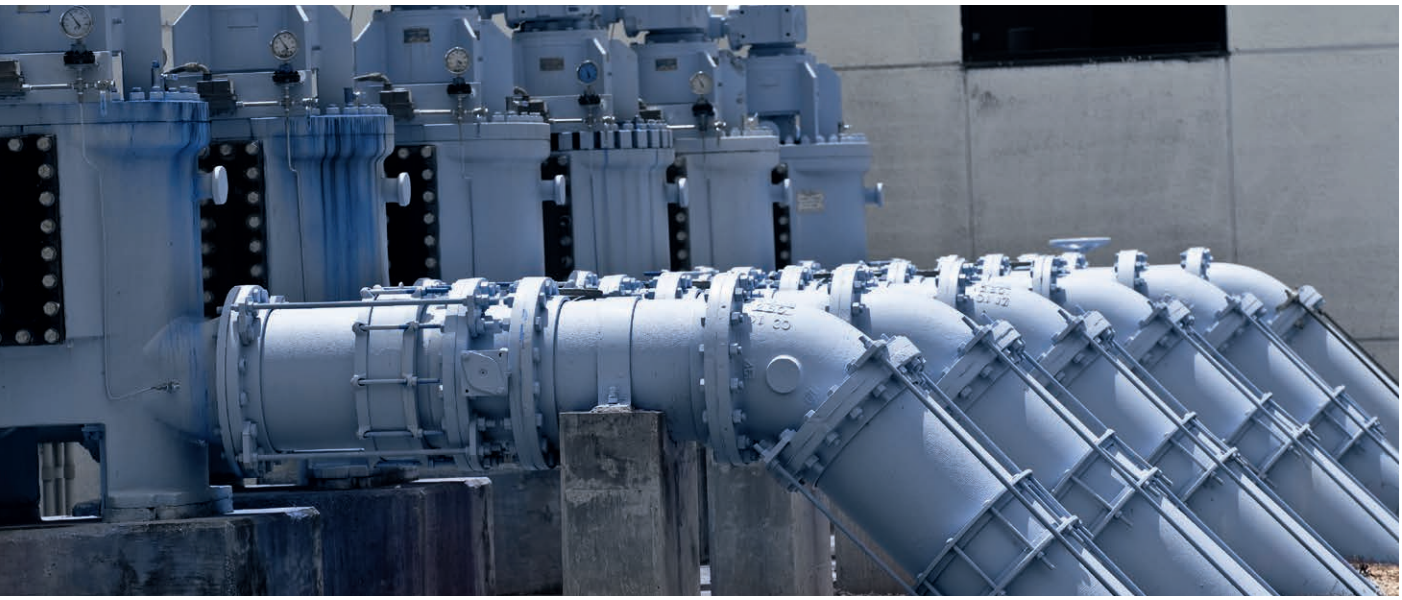
A liquid generates, through its density and the force of gravity, a weight force which increases with the filling height. This weight force, increasing proportionally with the filling height, is called the liquid column, and is not dependent on, for example, foam, turbulence or vessel fittings.

Hydrostatic pressure sensors are gaining in popularity within continuous level measurement through their simple application and quick commissioning.

So if one selects a hydrostatic pressure sensor, e.g. a WIKA model LH-20 submersible pressure transmitter/level probe, this measures the height-dependent weight force, acting from a liquid column, as a hydrostatic pressure. From the measured hydrostatic pressure and the density of the product, one can now calculate the filling height of the vessel.

Hydrostatic level measurement has enjoyed strong popularity for many years and represents by far the most frequent form of electrical level measurement. Above all, it is notable for its high reliability and its very low installation cost. Hydrostatic level measurement is therefore seen as particularly simple and robust by those that use it.

Process water



The quality requirements for water used in industry depends, primarily, on its application within the production process (e.g. cooling, boiler feed or production water).
To ensure the required water quality, depending on the quality of the raw water, a greater or lesser intensity of water treatment must be performed (filtration, softening, desalination, etc.). Ultrapure water, as in the food industry, thus increasingly becomes the standard.

Strict legal requirements and cost pressure are forcing companies to adopt ever-more complex water management. The application and consumption of the resource is optimised in a variety of ways, and the wastewater volume is thus minimised. Keyword “process-integrated environmental protection”:

Here, for example, wastewater is conditioned via various techniques (diaphragm, flotation, anaerobic processes) into renewed process water. And efficiency is also of prime importance with other commercial uses beyond industry, such as irrigation in agriculture.

SIP and CIP cleaning

Sterilisation-in-place (SIP) and cleaning-in-place (CIP) are fully automated processes for sterilisation in pharmaceutical and biotechnology plants. Here, the typical cycle temperatures normally operate in the range of 120 ... 134 °C.
These cycles are slowly cooled with pressurised water. With these processes, no components need to be taken apart for cleaning.

The individual plant segments are rinsed through in different stages with cleaning fluid, and between these with clean water. In tanks, built-in spray heads carry out these tasks.
In order to obtain an optimal result, the pressure of the cleaning jet and the rinser jet must be set exactly to the geometry of the vessel and the spray head, as well as setting it for the degree of pollution. For this, a water pressure of between 1 and 6 bar is needed.
All measuring instruments needed for these cleaning processes must fulfil the requirements of the pharmaceutical and food industries. Therefore, the pressure transmitters and mechanical measuring instruments must be installed with hygienic process connections.

Filtration of process water

Process water for cooling circuits, steam generation and chemical industry solutions should only contain a small number of electrolytes. Too high water hardness can lead to calcification while an excess of oxygen and carbon dioxide can lead to corrosion in the plant. Process water must be conditioned differently for each application, e.g. with different filtration processes. The permeate stream can be controlled by comparing the water pressure before and after the filters. For these environments pressure transmitters, above all, must be flush and free from dead space. The pressure differential determined by them can then be evaluated for the filter monitoring.

Industrial water

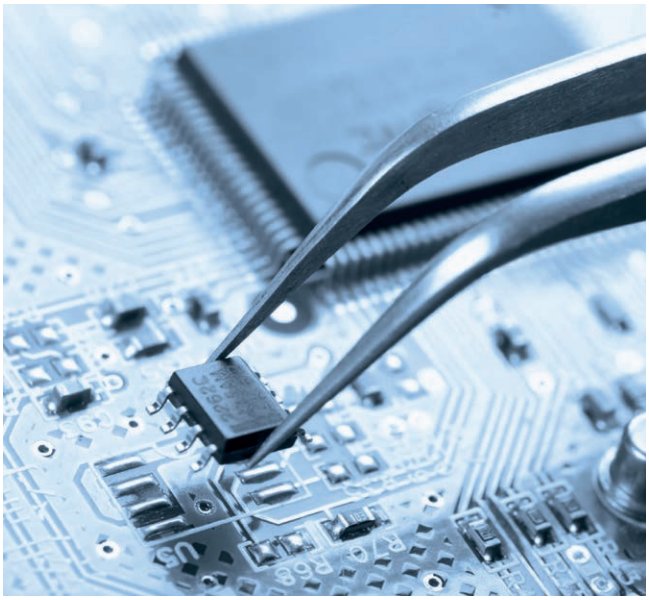
For industrial water, a cleaning standard is often needed, which is almost equally as high as for the product pipelines themselves. Also with this there must be no chance of germ growth.

Therefore, for pressure control, one should use pressure transmitters with flush diaphragms or mechanical measuring instruments with diaphragm seals fitted (dead space free).

The wetted parts of the diaphragm seals can be manufactured from corrosion-resistant materials – e.g. Hastelloy – when, for cleaning, solutions with much salt or chlorine are used.

Ultrapure water production

Ultrapure water is required for highly sensitive processes, for example, in medical engineering, the pharmaceutical and the food industry, and also in semiconductor production. Its production requires a commensurate input. Each step to remove impurities from the water requires differentiated pressure and temperature monitoring. The most frequently used, reverse osmosis, is followed, for example, by ion exchange, active carbon filtration, ultrafiltration and sanitisation, whereby all microorganisms are safely killed at temperatures of more than 80 °C.



Pharmaceutical water

The pharmaceutical industry has particularly high standards for treated water.
It must meet high quality requirements since it is used as a base material in pharmaceuticals. A correspondingly high effort is thus required in the manufacture and control of this raw material.

With the manufacture of purified water (PW) and highly purified water (HPW) in accordance with the European Pharmacopoeia, drinking water is prescribed as the starting material corresponding to the current drinking water regulations. A specific challenge is represented by the manufacture of water for injection (WFI), thus water for medicines for parenteral application, since these materials are injected directly into the body.

Raw water qualities as a starting material vary greatly and fluctuate considerably. This has the consequence that the plants must be adjusted to the local conditions in order that consistently high quality can be produced. The required quality and process parameters must be permanently monitored through specific measurement technology and analytics.

Wastewater

The treatment of wastewater from private households and industry, and from precipitation contaminated with pollutants, without doubt, rates as one of the most important responsibilities of the public utilities.

Modern wastewater treatment plants clean the wastewater mechanically and biologically in three phases, before returning it to the receiving water (streams and rivers).

The increasing contamination of the water caused by pharmaceutical matter will make a fourth stage indispensable in the foreseeable future.

The European Union, for example, is enforcing wastewater cleaning with the goal that all watercourses within its borders will be brought up to an ecologically perfect condition.

Continuously increasing requirements due to ever more-recent constraints and laws, and with that the demands on the technical equipment: automation for more safety, the highest possible equipment availability, increasing the efficiency through process procedures and energy usage.

Rain overflow basins

Rain overflow basins protect the sewage system against heavy precipitation.
They store the excess precipitated water until drier weather, when it can be gradually pumped into the sewage system. For smooth pumping, the level in the basins must be monitored continually. Submersible pressure transmitters ensure reliable level control.

Their measuring signals support the regulation of the water levels and guard against both the dry-running of the pumps and the tanks overflowing. Major damage to the pumping plant or the immediate environs of the basins is therefore prevented.

The design of submersible pressure transmitters ensures a high longitudinal and transverse water resistance for the cable and cable entry and thus a long service life: Even when submerged for many years, no water will enter the probe.

Wastewater pumping stations

Pumps control the heartbeat of numerous processes in the wastewater system. Important switching points at the edges are the wastewater pumping stations or lift pumps – in Berlin, for example, 150 such stations are operated. They lift the collected wastewater to a level where it can flow naturally down, or through pressured pipes, to the sewage treatment plant. In addition to exact level measurement by submersible pressure transmitters, permanent temperature measurement protects the pumps against failure due to dry running. For this task resistance thermometers specifically designed to measure bearing temperatures are used. Integrated transmitters increase the safe and reliable transmission of the measuring signal to the control room.

Pressure transmitters

WIKA offers a complete range of electronic pressure measuring instruments: pressure sensors, pressure switches, pressure transmitters and process transmitters for the measurement of gauge, absolute and differential pressure. Our pressure measuring instruments are available in the measuring ranges 0 ... 0.6 mbar to 0 ... 15,000 bar.

These instruments come supplied with standardised current or voltage output signals (also intrinsically safe per ATEX or with flameproof enclosure), interfaces and protocols for various field buses. Whether ceramic thick film, metal thin film or piezoresistive, WIKA is the leading manufacturer worldwide that develops and produces the full range of today's leading sensor technologies.

A-10

For common demands

Non-linearity:	≤ 0.25 or 0.5 BFSL (± % of span)
Measuring range:	■ 0 … 0.6 to 0 …1,000 bar ■ 0 … 1 to 0 … 25 bar abs. ■ -1 … 0 to -1 … +24 bar
Special feature:	■ Compact design ■ Free test report ■ 2 million possible variants
Data sheet:	PE 81.60

S-20

For superior demands

Non-linearity:	≤ 0.125, 0.25 or 0.5 BFSL (± % of span)
Measuring range:	■ 0 … 0.4 to 0 … 1,600 bar ■ 0 … 0.4 to 0 … 40 bar abs. ■ -1 … 0 to -1 … +59 bar
Special feature:	■ Extreme operating conditions ■ Customer-specific variants ■ Free test report
Data sheet:	PE 81.61

O-10

OEM version

Non-linearity:	≤ 0.5 BFSL (± % of span)
Measuring range:	■ 0 … 6 to 0 … 600 bar ■ -1 … +5 to -1 … +59 bar
Special feature:	■ For OEM quantities ■ Customer-specific variants ■ Special version for applications with water as medium
Data sheet:	PE 81.65

S-11

For viscous and particle-laden media

Non-linearity:	≤ 0.2 BFSL (± % of span)
Measuring range:	■ 0 … 0.1 to 0 … 600 bar ■ 0 … 0.25 to 0 … 16 bar abs. ■ -1 … 0 to -1 … +24 bar
Special feature:	■ Flush process connection ■ Medium temperature up to 150 °C ■ Zero point and span adjustable ■ Comprehensive stocks
Data sheet:	PE 81.02

Pressure switches

PSD-30, PSD-31

Electronic pressure switch with display

Accuracy:	≤ 1 (% of span)
Measuring range:	■ 0 … 1 to 0 … 600 bar ■ 0 … 1 to 0 … 25 bar abs. ■ -1 … 0 to -1 … +24 bar
Special feature:	■ Easily readable, robust display ■ Intuitive and fast setup ■ Easy and flexible mounting configurations ■ Flush process connection (optional) ■ For temperature and level switches see www.wika.de/hattrick
Data sheet:	PE 81.67

PSA-31

Electronic pressure switch with display for sanitary applications

Accuracy of analogue signal:	≤ 1 % of span
Measuring range:	■ 0 … 1 to 0 … 25 bar ■ 0 … 1 to 0 … 25 bar abs. ■ -1 … 0 to -1 … +24 bar
Special feature:	■ Easily readable, robust display ■ Intuitive and fast setup ■ Easy and flexible mounting configurations
Data sheet:	PE 81.85

The PSD-30 and PSD-31 electronic pressure switches can be flexibly adapted to the individual mounting situation. Due to the rotation of the display and case by more than 300°, the display can be adjusted independently of the electrical connection. With the optional output signal in accordance with IO-Link, they allow a fast integration into modern automation systems. Switching output and standard 4 ... 20 mA signal are available as standard.

Process transmitters

Versatile
With electronic process transmitters, the measured value can be read on site as well as being transmitted to a process control system, a controller or a terminal.
The data transfer is achieved using an analogue 4 ... 20 mA signal or via a bus protocol. With the HART®, PROFIBUS® PA or FOUNDATION™ Fieldbus bus systems, there is the possibility to transmit further information from the process and/or measuring instrument, in addition to the primary current signals, such as the operating hours or the sensor temperature.

Large number of instrument variants
With the different diaphragm materials or coatings, the most suitable version for each operating environment can be selected. In some cases, for particularly aggressive media or high process temperatures, special materials such as tantalum, Hastelloy or specific surface coatings are the most suitable solution.

UPT-20

Universal process transmitter with standard connection, Ex intrinsically safe

Non-linearity:	≤ 0.1 (% of span)
Output signal:	4 … 20 mA, HART®
Measuring range:	■ 0 … 0.4 to 0 … 1,000 bar ■ 0 … 1.6 to 0 … 40 bar abs. ■ -0.2 … +0.2 to -1 … +40 bar
Special feature:	■ Multi-functional display (optional) ■ Freely scalable measuring range ■ Simple menu navigation ■ Conductive plastic case or stainless steel case ■ Large LC display, rotatable
Data sheet:	PE 86.05

UPT-21

Universal process transmitter with flush process connection

Non-linearity:	≤ 0.1 (% of span)
Output signal:	4 … 20 mA, HART®
Measuring range:	■ 0 … 0.4 to 0 … 600 bar ■ 0 … 1.6 to 0 … 40 bar abs. ■ -0.2 … +0.2 to -1 … +40 bar
Special feature:	■ Multi-functional display (optional) ■ Freely scalable measuring range ■ Simple menu navigation ■ Conductive plastic case or stainless steel case in hygienic design ■ Large LC display, rotatable
Data sheet:	PE 86.05

IPT-10, IPT-11

Process pressure transmitter, intrinsically safe or with flameproof enclosure

Non-linearity:	≤ 0.075 … 0.1 (% of span)
Output signal:	4 … 20 mA, HART® protocol (optional), PROFIBUS® PA, FOUNDATION™ fieldbus
Measuring range:	■ 0 … 0.1 to 0 … 4,000 bar ■ 0 … 0.1 to 0 … 60 bar abs. ■ -1 … 0 to -1 … +60 bar
Special feature:	■ Freely scalable measuring ranges (turndown to 30 : 1) ■ Case from plastic, aluminium or stainless steel ■ Flush process connection (optional) ■ With integrated display and instrument mounting bracket for wall/pipe mounting (optional)
Data sheet:	PE 86.11

Level measurement for special requirements
The internal digital signal processing, combined with proven sensors, guarantees high accuracy and the best long-term stability. Measurement in vessels is one of the most varied tasks in sensor technology. For the measurement of filling height, level, concentration of specific substances, density, layer separation or volume, there are a whole range of different measuring methods and sensors available. Instruments within vessels or instruments mounted on the vessel cover are not suitable, for example, with aggressive or strongly foaming liquids. Process transmitters lend themselves to these measurements.

DPT-10

Differential pressure transmitter, intrinsically safe or with flame-proof enclosure

Non-linearity:	≤ 0.075 … 0.15 (% of span)
Output signal:	4 … 20 mA, HART® protocol (optional), PROFIBUS® PA
Measuring range:	0 … 10 mbar to 0 … 40 bar
Special feature:	■ Freely scalable measuring ranges (turndown to 30 : 1) ■ Static load 160 bar, optionally 420 bar ■ Case from plastic, aluminium or stainless steel ■ With integrated display and instrument mounting bracket for wall/pipe mounting (optional)
Data sheet:	PE 86.21

Mechatronic and mechanical pressure measuring instruments

Mechatronic measuring instruments

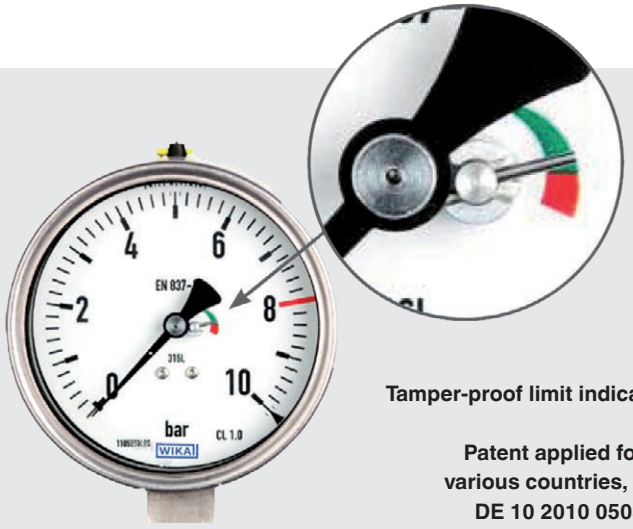
Wherever the process pressure has to be indicated locally and, at the same time, a signal transmission to the central control or remote centre is desired, the intelliGAUGE® instruments can be used.

Through the combination of a mechanical measuring system and electronic signal processing, the process pressure can be read securely, even if the voltage supply is lost.

Our offer is completed by the mechatronic pressure gauges with switch contacts, making it possible to simultaneously monitor the equipment and to switch circuits.

Limit indicator

The limit indicator, which is available as an option, finds its application wherever overpressures must be displayed with certainty and not be tampered with. The limit indicator is a mechanical display fitted on the dial, with two settings: If the indicator is in the green area, the pressure limit being monitored has not been exceeded. If the indicator is found in the red area, the set pressure range has been exceeded at least once. In this case, the indicator will remain permanently locked and protected from tampering in the red area.



Tamper-proof limit indicator

Patent applied for in various countries, e.g. DE 10 2010 050340

Pressure gauges with switch contacts

PGS23

Bourdon tube, stainless steel version

Nominal size:	100, 160 mm
Scale range:	0 ... 0.6 to 0 ... 1,600 bar
Accuracy class:	1.0
Ingress protection:	IP65
Data sheet:	PV 22.02

PGS43

Diaphragm, stainless steel version

Nominal size:	100, 160 mm
Scale range:	0 ... 25 mbar to 0 ... 25 bar
Accuracy class:	1.6
Ingress protection:	IP54, filled IP65
Data sheet:	PV 24.03

Pressure gauges with electrical output signal

The multi-functional intelliGAUGEs present a cost-effective and, at the same time, reliable solution for nearly all pressure measurement applications. They combine the analogue indication of a mechanical pressure gauge, needing no external power, with the electrical output signal of a pressure transmitter. These hybrid instruments are available with all commonly used electrical signals. The sensor works in a non-contact way, without any influence on the measurement signal. Many of the instruments can be delivered in accordance with ATEX Ex II 2 G ia.

Depending on the pressure gauge, the following electrical output signals are possible:

- 0.5 ... 4.5 V (ratiometric)
- 4 … 20 mA, 2-wire
- 4 ... 20 mA, 2-wire with Ex approvals
- 0 … 20 mA, 3-wire
- 0 … 10 V, 3-wire

For pressure gauges with nominal sizes 100 and 160 mm, the electrical output signals can also be combined with switch contacts.

PGT01

Bourdon tube, standard version

Nominal size:	40 mm
Scale range:	0 … 1.6 to 0 … 10 bar
Accuracy class:	2.5
Ingress protection:	IP40
Data sheet:	PV 11.01

PGT02

Bourdon tube, standard version, for panel mounting

Nominal size:	40 mm
Scale range:	0 … 1.6 to 0 … 10 bar
Accuracy class:	2.5
Ingress protection:	IP40
Data sheet:	PV 11.02

PGT10

Bourdon tube, plastic case

Nominal size:	40, 50 mm
Scale range:	0 … 1.6 to 0 … 400 bar
Accuracy class:	2.5
Ingress protection:	IP41
Data sheet:	PV 11.05

PGT11

Bourdon tube, stainless steel case

Nominal size:	40, 50, 63 mm
Scale range:	0 … 1.6 to 0 … 400 bar
Accuracy class:	2.5
Ingress protection:	IP41
Data sheet:	PV 11.06

intelliGAUGE®

PGT21

Bourdon tube, stainless steel case

Nominal size:	50, 63 mm
Scale range:	0 … 1.6 to 0 … 400 bar
Accuracy class:	1.6/2.5
Ingress protection:	IP65, optional IP67
Data sheet:	PV 11.03

PGT23.063

Bourdon tube, stainless steel version

EAC

Nominal size:	63 mm
Scale range:	0 … 1 to 0 … 1,000 bar
Accuracy class:	1.6
Ingress protection:	IP54, filled IP65
Data sheet:	PV 12.03

PGT23.100, PGT23.160

Bourdon tube, stainless steel version

Ex EAC

Nominal size:	100, 160 mm
Scale range:	0 … 0.6 to 0 … 1,600 bar
Accuracy class:	1.0
Ingress protection:	IP54, filled IP65
Data sheet:	PV 12.04

PGT43

Diaphragm, stainless steel version

Ex EAC

Nominal size:	100, 160 mm
Scale range:	0 ... 16 mbar to 0 ... 25 bar
Accuracy class:	1.6
Ingress protection:	IP54, filled IP65
Data sheet:	PV 14.03

Differential pressure gauges with switch contacts

DPS40

DELTA-switch, differential pressure switch

Nominal size:	100 mm
Scale range:	0 … 0.25 to 0 … 10 bar
Switch point repro-ducibility:	1.6 %
Ingress protection:	IP65
Data sheet:	PV 27.21

DPGS40

DELTA-comb, with integrated working pressure indication and micro switch

Nominal size:	100 mm
Scale range:	0 … 0.25 to 0 … 10 bar
Accuracy class:	2.5 (optional 1.6)
Ingress protection:	IP65
Data sheet:	PV 27.20

DPGT40

DELTA-trans with integrated differential pressure and working pressure indication

Nominal size:	100 mm
Scale range:	0 … 0.25 to 0 … 10 bar
Accuracy class:	2.5 (optional 1.6)
Ingress protection:	IP65
Data sheet:	PV 17.19

DPGS43

Stainless steel version

Nominal size:	100, 160 mm
Scale range:	0 … 16 mbar to 0 … 25 bar
Accuracy class:	1.6
Ingress protection:	IP54, filled IP65
Data sheet:	PV 27.05

DPGS43HP

Stainless steel version, high overpressure safety

Nominal size:	100, 160 mm
Scale range:	0 … 60 mbar to 0 … 40 bar
Accuracy class:	1.6
Ingress protection:	IP54, filled IP65
Data sheet:	PV 27.13

DPGT43

Differential pressure, stainless steel version

Nominal size:	100, 160 mm
Scale range:	0 ... 16 mbar to 0 ... 25 bar
Accuracy class:	1.6
Ingress protection:	IP54, filled IP65
Data sheet:	PV 17.05

Mechanical differential pressure gauges

Differential pressure gauges work with a wide range of pressure elements. With this variety, measuring ranges from 0 ... 0.5 mbar to 0 ... 1,000 bar and static overlay pressures up to 400 bar are possible.

These differential pressure gauges are used to monitor

- the pollution degree in filter systems
- the level in closed tanks
- the overpressure in clean rooms
- the flow of gaseous and liquid media
- and they control pumping plants

732.14

Stainless steel version, high over-pressure safety up to max. 400 bar

Nominal size:	100, 160 mm
Scale range:	■ 0 ... 60 to 0 ... 250 mbar (measuring cell DN 140) ■ 0 ... 0.25 to 0 ... 40 bar (measuring cell DN 82)
Accuracy class:	1.6
Ingress protection:	IP54
Data sheet:	PM 07.13

732.51

Stainless steel version, all-metal media chamber

Nominal size:	100, 160 mm
Scale range:	0 … 16 mbar to 0 … 25 bar
Accuracy class:	1.6
Ingress protection:	IP54
Data sheet:	PM 07.05

Mechanical pressure switches

Mechanical pressure switches open or close a circuit, depending on whether the pressure is rising or dropping.
Due to the use of high-quality micro switches, the mechanical pressure switches are notable for their high precision and long-term stability. Furthermore the direct switching of electrical loads up to AC 250 V / 20 A is enabled, while simultaneously ensuring a high switch point reproducibility.

Many mechanical pressure switches come with a SIL certificate and are thus particularly suited for safety-critical applications. In addition, with their 'intrinsically safe' and 'flameproof enclosure' types of protection the pressure switches are ideally suited for permanent use in hazardous environments.

for gauge pressure

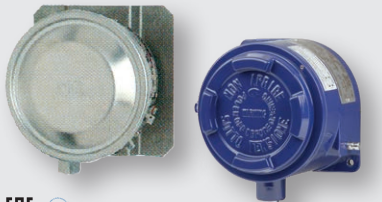
MW, MA

Diaphragm element

Setting range:	0 … 16 mbar to 30 ... 600 bar
Ignition protection type:	Ex ia or Ex d
Switch:	1 or 2 x SPDT or 1 x DPDT
Switching power:	AC 250 V / 20 A DC 24 V / 2 A
Data sheet:	PV 31.10, PV 31.11

BWX, BA

Bourdon tube



Setting range:	0 … 2.5 to 0 … 1,000 bar
Ignition protection type:	Ex ia or Ex d
Switch:	1 or 2 x SPDT or 1 x DPDT
Switching power:	AC 250 V / 20 A DC 24 V / 2 A
Data sheet:	PV 32.20, PV 32.22

PCS, PCA

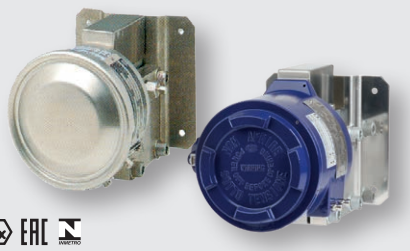
Compact pressure switch

Setting range:	-0.2 ... 1.2 to 100 … 600 bar
Ignition protection type:	Ex ia or Ex d
Switch:	1 x SPDT or DPDT
Switching power:	AC 250 V / 15 A DC 24 V / 2 A
Data sheet:	PV 33.30, PV 33.31

for differential pressure

DW, DA

Differential pressure switch



Setting range:	0 … 16 mbar to 0 … 40 bar
Ignition protection type:	Ex ia or Ex d
Static pressure:	10, 40, 100 or 160 bar
Switch:	1 or 2 x SPDT or 1x DPDT
Switching power:	AC 250 V / 20 A DC 24 V / 2 A
Data sheet:	PV 35.42, PV 35.43

Diaphragm pressure gauges

Diaphragm pressure gauges for high overpressure safety
The application areas for these gauges with diaphragm pressure element are gaseous and liquid aggressive media. Instruments with open connecting flanges are even suitable for highly viscous and contaminated media, also in aggressive ambience.
Typical scale ranges are from 0 ... 16 mbar to 0 ... 40 bar. Dependant upon the pressure range and the instrument model, overpressure safety of 3 x or 5 x full scale value is possible as standard.

For special designs, an overpressure safety of 10, 40, 100 or 400 bar is possible, with the measurement accuracy maintained. Liquid filling the case ensures a precise instrument display, even with high dynamic pressure loads and vibrations. Special wetted-parts materials are available as options.

422.12, 423.12

Industrial series, grey cast iron case

Nominal size:	100, 160 mm
Scale range:	0 … 16 mbar to 0 … 40 bar
Accuracy class:	1.6
Ingress protection:	IP54
Data sheet:	PM 04.02

432.50, 433.50

Stainless steel version

Nominal size:	100, 160 mm
Scale range:	0 … 16 mbar to 0 … 25 bar
Accuracy class:	1.6
Ingress protection:	IP54
Data sheet:	PM 04.03

432.36, 432.56

Stainless steel version, high overpressure safety up to max. 400 bar

Nominal size:	100, 160 mm
Scale range:	0 … 16 mbar to 0 … 40 bar
Accuracy class:	1.6
Ingress protection:	IP54
Data sheet:	PM 04.07

Bourdon tube pressure gauge

Bourdon tube pressure gauges for general applications
These pressure gauges are suitable for liquid and gaseous media, so long as they are not highly viscous or crystallising and do not attack copper alloy parts. The scale ranges cover pressures from 0.6 ... 1,000 bar.

These instruments are manufactured to EN 837-1 (Bourdon tube pressure gauges; dimensions, metrology, requirements and testing). For measuring points with high dynamic loads, such as fast load cycles or vibrations, a liquid-filled design should be used.

131.11

Stainless steel version, standard

Nominal size:	40, 50, 63 mm
Scale range:	■ NS 40, 50: 0 … 1 to 0… 600 bar. ■ NS 63: 0 … 1 to 0 … 1,000 bar
Accuracy class:	2.5
Data sheet:	PM 01.05

222.30, 223.20

Safety version, stainless steel, high pressure

Nominal size:	160 mm
Scale range:	0 … 2,000 to 0 … 7,000 bar
Accuracy class:	1.0
Data sheet:	PM 02.09

232.36, 233.36

Safety version, stainless steel, high overpressure safety

Nominal size:	100, 160 mm
Scale range:	0 … 0.6 to 0 … 40 bar
Accuracy class:	1.0
Data sheet:	PM 02.15

232.30, 233.30

Safety version, stainless steel

Nominal size:	63, 100, 160 mm
Scale range:	■ NS 63: 0 … 1 to 0… 1,000 bar ■ NS 100: 0 … 0.6 to 0 … 1,000 bar ■ NS 160: 0 … 0.6 to 0 … 1,600 bar
Accuracy class:	1.0 (NS 100, 160), 1.6 (NS 63)
Ingress protection:	IP65
Data sheet:	PM 02.04

232.50, 233.50

Stainless steel version

Nominal size:	63, 100, 160 mm
Scale range:	■ NS 63: 0 … 1 to 0 … 1,000 bar ■ NS 100: 0 … 0.6 to 0 … 1,000 bar ■ NS 160: 0 … 0.6 to 0 … 1,600 bar
Accuracy class:	1.0/1.6 (NS 63)
Ingress protection:	IP65
Data sheet:	PM 02.02

113.53

Standard version, with liquid filling

Nominal size:	40, 80, 100 mm
Scale range:	-1 … 0 to 0 … 400 bar
Accuracy class:	1.6 (NS 80, 100), 2.5 (NS 40)
Ingress protection:	IP65
Data sheet:	PM 01.08

212.20

Industrial series

Nominal size:	100, 160 mm
Scale range:	0 … 0.6 to 0 … 600 bar
Accuracy class:	1.0
Data sheet:	PM 02.01

213.40

Forged brass case, with liquid filling

Nominal size:	63, 80, 100 mm
Scale range:	-1 … 0 to 0 … 1,000 bar
Accuracy class:	1.0 (NS 100), 1.6 (NS 63 and 80)
Ingress protection:	IP65
Data sheet:	PM 02.06

213.53

Stainless steel case, with liquid filling

Nominal size:	50, 63, 100 mm
Scale range:	■ NS 50: -1 … 0 to 0 … 400 bar ■ NS 63, 100: -1 … 0 to 0 … 1,000 bar
Accuracy class:	1.0 (NS 100), 1.6 (NS 50, 63)
Ingress protection:	IP65
Data sheet:	PM 02.12

214.11

Edgewise panel design, for panel mounting

Nominal size:	144 x 72, 144 x 144, 96 x 96, 72 x 72
Scale range:	■ NS 144 x 72, 144 x 144, 96 x 96: 0 ... 0.6 to 0 ... 1,000 bar ■ NS 72 x 72: 0 … 0.6 to 0 … 400 bar
Accuracy class:	1.6, 1.0
Ingress protection:	IP42
Data sheet:	PM 02.07

100.02

Thermomanometer for pressure and temperature measurement

Nominal size:	63, 80 mm
Scale range:	■ Pressure: 0 … 1 to 0 … 16 bar ■ Temperature: 0 … 100 to 0 … 150 °C
Accuracy class:	■ Pressure: 2.5 (EN 837-1) ■ Temperature: 2.5 °C
Data sheet:	PM 01.23

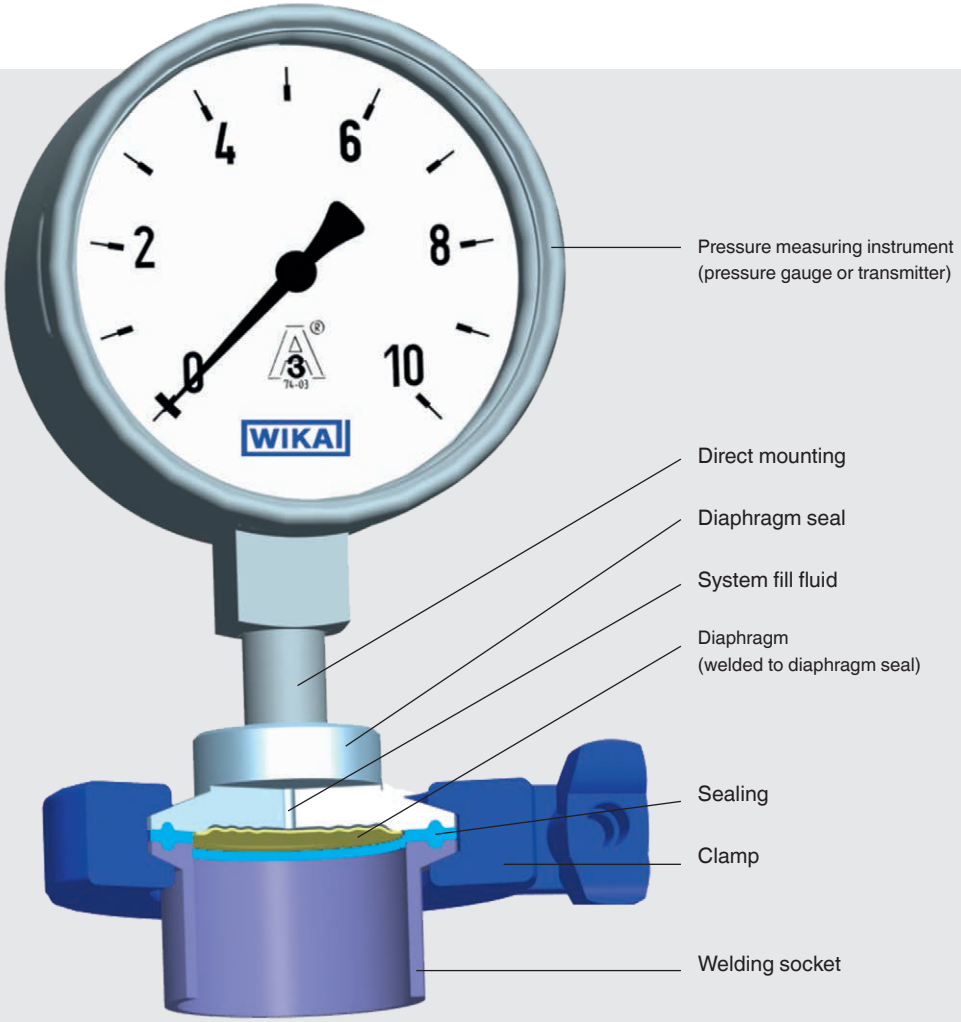
Connection to the process with diaphragm seals

Diaphragm seals

Diaphragm seals separate the pressure gauge, pressure transmitter or pressure switch from the measuring medium and ensure a process connection which is either free of dead spaces or where dead spaces are reduced to a minimum.
The isolation is achieved by means of a flexible metal diaphragm. The internal space between the diaphragm and the pressure measuring instrument is completely filled with a system fill fluid. The process pressure is transmitted by the elastic diaphragm into the fluid and from there to the measuring instrument.

Advantages of diaphragm seals

In contrast to ceramic principles, with diaphragm seals - as a result of the measuring cell's metallic construction - additional sealing elements are eliminated, and so the maintenance burden is significantly reduced. Ceramic measuring cells exhibit a high sensitivity to dynamic loads. With any sudden pressure spikes, the ceramic cell can be destroyed. In these cases, combinations of pressure measuring instruments and diaphragm seals are clearly preferable.



990.31

Plastic body, threaded design

Application:	Chemical engineering with plastic pipework, electroplating; particularly for wastewater and agricultural fertilisers
PN max:	10 bar
Data sheet:	DS 99.02

990.34

Welded design

Application:	Machine-building, plant-construction and process-industry applications with high requirements
PN:	160, 400, 600 or 1,000 bar
Data sheet:	DS 99.04

990.10

Threaded design

Application:	General applications in the process industry
PN:	25, 100 or 250 bar
Data sheet:	DS 99.01

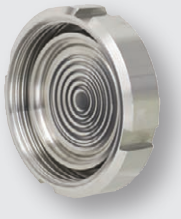
990.27

Flush diaphragm

Application:	Process and petrochemical industries with high measuring requirements
PN:	10 … 250 (400) bar (class 150 … 2,500)
Data sheet:	DS 99.27

990.18

Milk thread fitting per DIN 11851



Process connection:	Grooved union nut/threaded coupling
PN max:	40 or 25 bar
Data sheet:	DS 99.40

981.22

In-line diaphragm seal, Tri-clamp

Process connection:	Tri-clamp, clamp DIN 32676, ISO 2852
PN max:	■ 40 bar (DN 20 … 40) ■ 25 bar (from DN 50)
Data sheet:	DS 98.52

Electrical temperature measurement

Design of an electrical thermometer

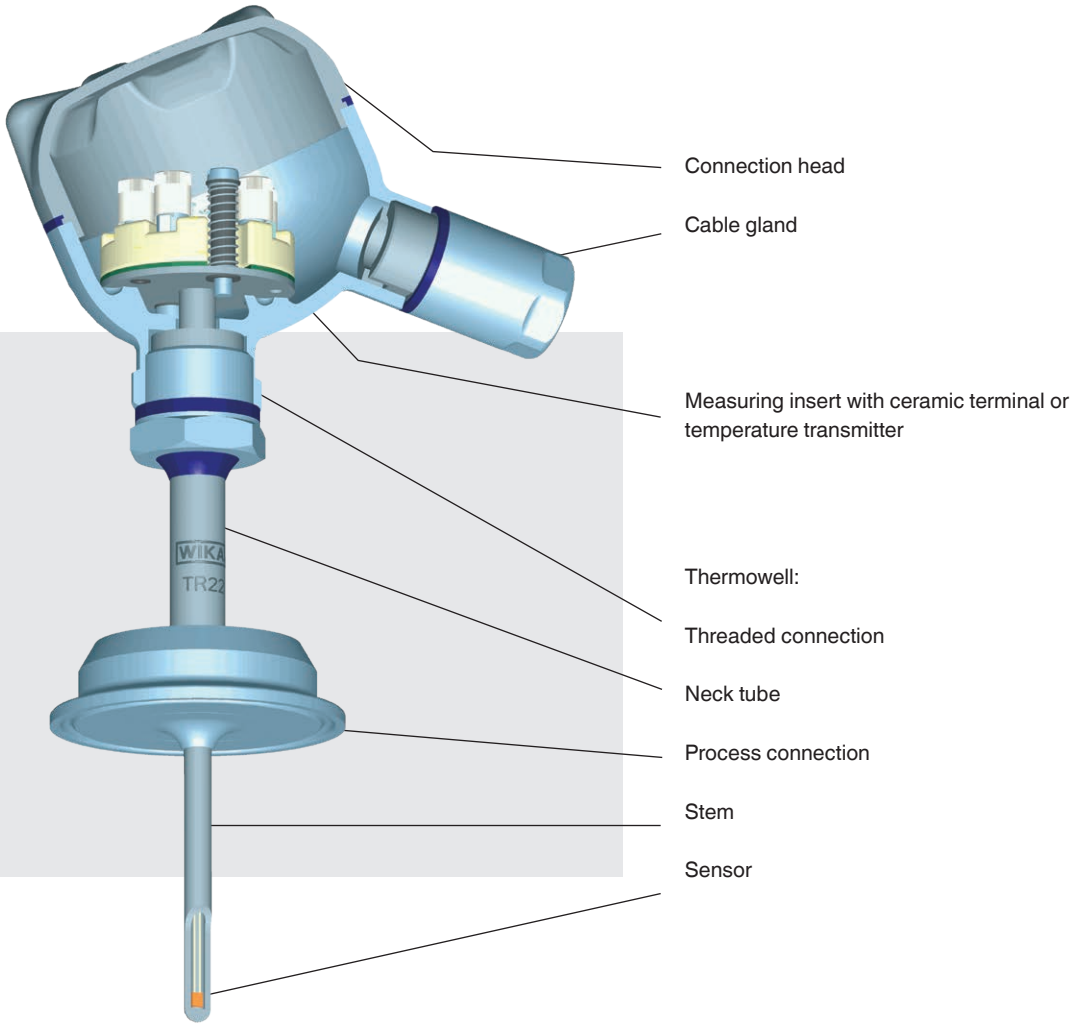
An electrical thermometer, as a rule, is modular in design and consists of **3 main components**: the **thermowell**, the **connection head** and the **measuring insert**.

The thermowell is used for adapting the thermometer to the process and to protect the sensor against the sometimes harsh process conditions.

In the connection head, the electrical connection of the measuring insert is made, which can either be fitted with a ceramic cap or a temperature transmitter.

With a rotatable screw connection between the thermowell and the connection head, this can be rotated in the desired direction, and in addition, if required, the connection head can be removed together with the measuring insert.

This allows the thermometer, with the entire measuring chain, to be calibrated directly on site without having to disconnect the electrical connections. This avoids having to open the process, and thus a potential risk of contamination is minimised.



Design of an electrical thermometer with thermowell

Temperature switches and resistance thermometers

TSD-30

Electronic temperature switch

Sensor element:	Pt1000
Measuring range:	-20 … +80 °C
Switching output:	1 or 2 (PNP or NPN), analogue output (optional)
Data sheet:	TE 67.03

TF35

OEM screw-in thermometer with plug connection

Measuring range:	-50 … +250 °C
Measuring element:	Pt100, Pt1000, NTC, KTY, Ni1000
Special feature:	■ Compact design ■ Very high vibration resistance ■ Ingress protection of IP54 to IP69K, depending on the connector
Data sheet:	TE 67.10

TF43

OEM insertion thermometer for refrigeration technology

Measuring range:	-50 … +105 °C
Measuring element:	Pt100, Pt1000, NTC
Special feature:	■ Plastic-moulded measuring element ■ Waterproof ■ Compatible with market-standard refrigeration controllers
Data sheet:	TE 67.13

Resistance thermometers

Resistance thermometers are particularly suited, as a result of their quality and measurement accuracy, to applications in the food and beverage industry and also the pharmaceutical, biotechnology and cosmetics manufacturing industries.

Resistance thermometers are equipped with metallic-conductor based sensor elements which change their electrical resistance as a function of temperature. The connection to the evaluation electronics (transmitter, controller, display, chart recorder, etc.) can be made with a 2-, 3- or 4-wire circuit, depending on the application.

TR33

Miniature design

Sensor element:	1 x Pt100, 1 x Pt1000
Measuring range:	-50 … +250 °C
Output:	Pt100, Pt1000, 4 … 20 mA
Data sheet:	TE 60.33

TR34

Miniature design, explosion-protected

Sensor element:	1 x Pt100, 1 x Pt1000
Measuring range:	-50 … +250 °C
Output:	Pt100, Pt1000, 4 … 20 mA
Data sheet:	TE 60.34

TR40

Cable resistance thermometer

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-200 … +600 °C
Connection method:	2-, 3- and 4-wire
Cable:	PVC, silicone, PTFE
Data sheet:	TE 60.40

TR50

Surface resistance thermometer

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-50 … +250 °C
Connection method:	2-, 3- and 4-wire
Process connection:	Surface mounting
Data sheet:	TE 60.50

TR53

Bayonet resistance thermometer

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-50 … +400 °C
Connection method:	2-, 3- and 4-wire
Process connection:	Bayonet
Data sheet:	TE 60.53

TR55

With spring-loaded tip

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-50 … +450 °C
Connection method:	2-, 3- and 4-wire
Process connection:	Compression fitting
Data sheet:	TE 60.55

Resistance thermometers for ultrapure water

TR21-A

Miniature design with flange connection

Sensor element:	Pt100
Measuring range:	-50 … +250 °C
Output:	Pt100, 4 … 20 mA
Connection to thermowell:	Removable G ⅜"
Data sheet:	TE 60.26

TR21-B

Miniature design for orbital welding

Sensor element:	Pt100
Measuring range:	-50 … +250 °C
Output:	Pt100, 4 … 20 mA
Connection to thermowell:	Removable G ⅜"
Data sheet:	TE 60.27

TR21-C

Miniature design with welded flange connection

Sensor element:	Pt100
Measuring range:	-50 … +250 °C
Output:	Pt100, 4 … 20 mA
Connection to thermowell:	Welded
Data sheet:	TE 60.28

TR22-A

With flange connection

Sensor element:	Pt100
Measuring range:	-50 … +250 °C
Connection to thermowell:	Removable M24
Data sheet:	TE 60.22

TR22-B

For orbital welding

Sensor element:	Pt100
Measuring range:	-50 … +250 °C
Connection to thermowell:	Removable M24
Data sheet:	TE 60.23

TR25

In-line resistance thermometer

Sensor element:	Pt100
Measuring range:	-50 … +250 °C
Connection method:	3- or 4-wire
Data sheet:	TE 60.25

Digital indicators, temperature controllers

With digital indicators, the measured values from electrical temperature sensors or from pressure and temperature transmitters are shown on a display. Integrated alarm outputs enable, in addition, the control of the measured process values. Even simple two-position control, such as level control, is possible with the switching outputs from the digital indicators.

Temperature controllers are used to control the temperature in production processes or for the temperature regulation of raw materials and finished products in storage and transport vessels. With the help of switchable set points, different set points can be easily selected. Via optional serial interfaces, controllers can be connected to a network and connected to a higher-level control room.

DI10, DI25, DI30, DI32-1, DI35

For panel mounting, 48 x 24, 96 x 48, 96 x 96 mm

Input:	Standard signals or multi-function input for resistance thermometers, thermocouples and standard signals
Output:	2 … 4 switch points
Power supply:	■ DC 9 … 28 V (DI32-1, DI25) ■ AC 100 … 240 V (DI25, DI30, DI35) ■ Supply from the 4 … 20 mA current loop (DI10)
Optional special features:	■ Integrated transmitter supply (DI25, DI30, DI35) ■ Analogue output signal (DI25, DI35) ■ Wall-mounting case (DI10, DI30)
Data sheet:	AC 80.06, AC 80.13, AC 80.02, AC 80.05, AC 80.03

SC64

For panel mounting, 64 mm, round

Input:	Pt100 or PTC
Control mode:	Simple 2-point controller
Monitoring output:	Relay switching output 16 A, 250 V
Power supply:	■ AC 230 V ■ AC 12 … 24 V or DC 16 … 32 V
Data sheet:	AC 85.25

CS4M, CS4H, CS4L and CS4R

For panel mounting, 48 x 24, 48 x 96, 96 x 96 mm, for rail mounting (only CS4R), 22.5 x 75 mm

Input:	Multi-function input for resistance thermometers, thermocouples and standard signals
Control mode:	PID, PI, PD, P, ON/OFF (configurable)
Monitoring output:	Relay or logic level DC 0/12 V to control an electronic switch relay (SSR) or analogue current signal 4 … 20 mA
Power supply:	■ AC 100 … 240 V ■ AC/DC 24 V
Data sheet:	AC 85.06, AC 85.03, AC 85.04, AC 85.05

Temperature transmitters

Transmitters convert the temperature-dependent change in resistance of resistance thermometers or the temperature-dependent voltage change in a thermocouple into a proportional standard signal. The most commonly used standard signal is the analogue 4 ... 20 mA signal, though digital signals (fieldbus) are gaining more and more importance.
By using intelligent circuit concepts with analogue 4 … 20 mA signals, any sensor errors that occur are signalled and simultaneously transmitted with the measured value over a two-wire line (current loop).

The conversion and transmission of the standard signals (analogue or digital) is made over long distances and completely fail-safe.
A temperature transmitter can either be mounted directly at the measuring point in the connection head or on a DIN rail in a cabinet.

T12

Universally programmable digital transmitter

Input:	Resistance thermometers, thermocouples
Accuracy:	< 0.2 %
Output:	4 … 20 mA
Special feature:	PC configurable
Data sheet:	TE 12.03

T15

Digital temperature transmitter

Input:	Resistance thermometers, thermocouples, potentiometers
Accuracy:	< 0.1 %
Output:	4 … 20 mA
Special feature:	The fastest and simplest configuration on the market
Data sheet:	TE 15.01

T32

HART® transmitter

Input:	Resistance thermometers, thermocouples, potentiometers
Accuracy:	< 0.1 %
Output:	4 … 20 mA, HART® protocol
Special feature:	TÜV certified SIL version (full assessment)
Data sheet:	TE 32.04

T53

FOUNDATION™ Fieldbus und PROFIBUS® PA transmitter

Input:	Resistance thermometers, thermocouples, potentiometers
Accuracy:	< 0.1 %
Special feature:	PC configurable
Data sheet:	TE 53.01

T91

Analogue transmitter, 3-wire, 0 ... 10 V

Input:	Resistance thermometers, thermocouples
Accuracy:	< 0.5 or < 1 %
Output:	0 … 10 V, 0 … 5 V
Special feature:	Fixed measuring range
Data sheet:	TE 91.01, TE 91.02

TIF50, TIF52

HART® field temperature transmitter

Input:	Resistance thermometers, thermocouples, potentiometers
Accuracy:	< 0.1 %
Output:	4 … 20 mA, HART® protocol
Special feature:	PC configurable
Data sheet:	TE 62.01

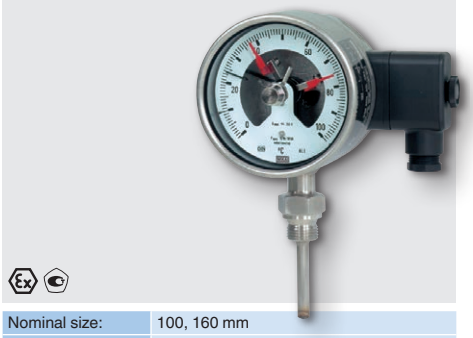
Mechatronic and mechanical temperature measuring instruments

The mechanical temperature measuring instruments work on the bimetal, expansion or gas actuation principle and cover scale ranges from -200 … +700 °C. All thermometers are suited for operation in a thermowell if necessary.
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.

With switch contacts the pointer position triggers a change-over. Electrical output signals are realised via an additional, independent sensor circuit (resistance thermometer or thermocouple).

55 with 8xx

Bimetal thermometer, stainless steel version



Nominal size:	100, 160 mm
Scale range:	-70 … +30 to 0 … 600 °C
Wetted parts:	Stainless steel
Option:	Liquid damping to max. 250 °C (case and sensor)
Data sheet:	TV 25.01

73 with 8xx

Gas-actuated thermometer, stainless steel version

Nominal size:	100, 160, 144 x 144 mm
Scale range:	-80 … +60 to 0 … 700 °C
Wetted parts:	Stainless steel
Option:	■ Capillary ■ Liquid damping (case)
Data sheet:	TV 27.01

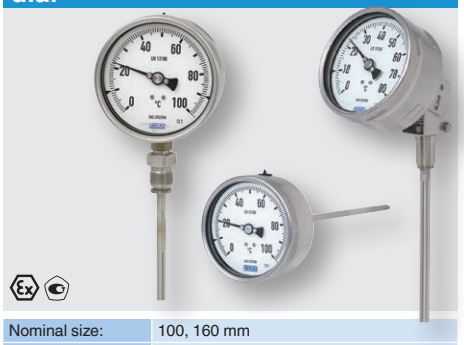
55

Bimetal thermometer, stainless steel version, axial and radial, adjustable stem and dial

Nominal size:	63, 100, 160 mm
Scale range:	-70 … +70 to 0 … +600 °C
Wetted parts:	Stainless steel
Option:	Liquid damping to max. 250 °C (case and sensor)
Data sheet:	TM 55.01

R73, S73, A73

Gas-actuated thermometer, axial and radial, adjustable stem and dial



Nominal size:	100, 160 mm
Scale range:	-200 … +50 to 0 … +700 °C
Wetted parts:	Stainless steel
Option:	■ Liquid damping (case) ■ Contact bulb
Data sheet:	TM 73.01

Thermowells

For connecting the thermometer to a process line or a vessel, WIKA offers a comprehensive programme of thermowells. Here, the following thermowell groups can be distinguished:

- Thermowells with flange connections, such as clamp or milk thread fitting to DIN 11851, are integrated into the process via an existing connection welded into the pipe or tank. For aseptic processes, it is recommended that the connection is made via VARIVENT® or NEUMO BioControl® flanges.
- For a direct connection of the thermowell into the pipeline, thermowells are available which are fitted via an orbital weld or via a hygienic process connection sandwiched into the pipeline (patent applied for, patent no. GM 000984349).
- For temperature measurement in tanks and larger vessels, the thermowells can be welded to the tanks with welding balls or welding collars. One should however take care that the inner welding seam is polished and passivated after welding.

TW10

Solid-machined with flange

Thermowell form:	Tapered, straight or stepped
Nominal width:	ASME 1 … 4 inch DIN/EN DN 25 … 100
Pressure rating:	ASME to 2,500 lbs (DIN/EN to PN 100)
Data sheet:	TW 95.10, TW 95.11, TW 95.12

TW15

Solid-machined to screw in

Thermowell form:	Tapered, straight or stepped
Head version:	Hexagon, round with hexagon, or round with spanner flats
Process connection:	½, ¾ or 1 NPT
Data sheet:	TW 95.15

TW20

Socket weld (solid-machined)

Thermowell form:	Tapered, straight or stepped
Welding diameter	1.050, 1.315 or 1.900 inch (26.7, 33.4 or 48.3 mm)
Pressure rating:	3,000 or 6,000 psig
Data sheet:	TW 95.20

TW22

Fabricated with flange connection for sanitary applications

Aseptic connection:	■ DIN 11851 ■ DIN 32676 ■ Tri-clamp ■ VARIVENT® ■ BioControl®
Thermowell material:	Stainless steel 1.4435
Data sheet:	TW 95.22

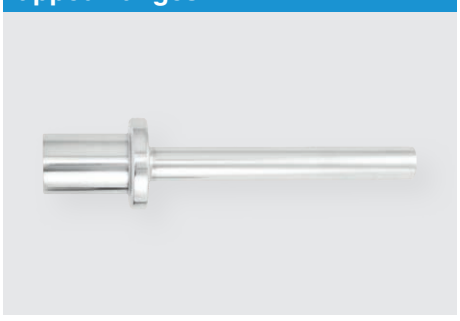
TW25

Weld–in (solid-machined)

Thermowell form:	Tapered, straight or stepped
Head diameter:	Up to 2 inch (50.8 mm)
Data sheet:	TW 95.25

TW30

Vanstone (solid-machined) for lapped flanges



Thermowell form:	Tapered, straight or stepped
Nominal width:	ASME 1, 1½ or 2 inch
Pressure rating:	ASME up to 2,500 lbs
Data sheet:	TW 95.30

TW35

Threaded (fabricated) (DIN 43772 form 2, 2G, 3, 3G)

Thermowell form:	Form 2, 2G, 3 or 3G
Material:	Stainless steel
Instrument connection:	M24 x 1.5 rotatable
Data sheet:	TW 95.35

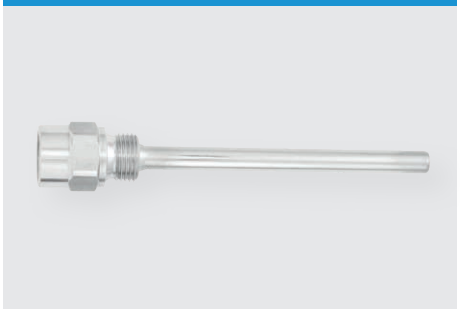
TW40

Fabricated with flange (DIN 43772 form 2F, 3F)

Thermowell form:	Form 2F or 3F
Nominal width:	DIN/EN DN 25 … 50 ASME 1 … 2 inch
Pressure rating:	DIN/EN up to PN 100 (ASME up to 1,500 psig)
Data sheet:	TW 95.40

TW45

Threaded (fabricated, DIN 43772 form 5, 8)



Thermowell form:	Form 5 or 8
Material:	Stainless steel or copper alloy
Data sheet:	TW 95.45

TW50

Threaded (solid-machined, DIN 43772 form 6, 7, 9)

Thermowell form:	Form 6, 7 or 9
Data sheet:	TW 95.50

TW55

Solid-machined for weld-in or with flange (DIN 43772 form 4, 4F)

Thermowell form:	Form 4 or 4F
Nominal width:	DIN/EN DN 25 … 50 ASME 1 … 2 inch
Pressure rating:	DIN/EN up to PN 100 (ASME up to 2,500 psig)
Data sheet:	TW 95.55

TW60

Solid-machined, with sterile connection

Process connection:	Tri-Clamp, conical coupling
Nominal width:	1 … 3 inch

TW61

For orbital welding for sanitary applications

Tube standard:	DIN 11866 row A, B, C
Material:	Stainless steel 1.4435
Data sheet:	TW 95.61

Bypass level indicators

Continuous level measurement via visual indication of the level without power supply

Advantages

- Simple, robust design
- Level displayed proportional to volume or height
- Pressure- and gas-tight separation between chamber and display/measuring equipment
- Individual design and corrosion resistant materials make the products suitable for a broad range of applications
- Pressure range from vacuum up to 500 bar
- Temperature range up to 450 °C
- Density ≥ 400 kg/m³
- Explosion-protected versions
- Interface measurement and overall level from Δ density ≥ 100 kg/m³

Options

The following instruments can be attached externally to the bypass level indicator to provide additional functionality:

Level sensors

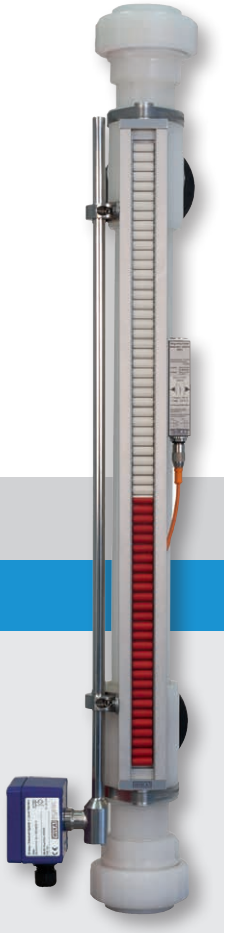
These are used as measured value pick-ups for the continuous monitoring and recording of the level in connection with external transmitters. They transform the resistance value of the level sensors into a standardised analogue signal that is proportional to the height of the level. 2-wire, head-mounted transmitters are available in the versions 4 ...20 mA programmable, HART® protocol, PROFIBUS® PA and FOUNDATION™ Fieldbus.

Magnetic switches

These serve to detect the limits of filling levels. They generate a binary signal which can be fed to down-stream signalling or control equipment.

Magnetic display with and without scale

Two-coloured, continuous visual indication of the current level without power supply.



BNA-P

Plastic version

Material:	PVDF, PP
Process connection:	Flange: DIN, ANSI, EN
Pressure:	PVDF 6 bar, PP 4 bar
Temperature:	-25 … +80 °C
Density:	≥ 800 kg/m³
Data sheet:	LM 10.01

BNA

Stainless steel version

Material:	Austenitic steels, 6Mo, Hastelloy, titanium, Monel, Inconel, Incoloy, Duplex, Super Duplex
Process connection:	■ Flange: DIN, ANSI, EN ■ Thread ■ Weld stub
Temperature:	-160 … +450 °C
Density:	≥ 400 kg/m³
Data sheet:	LM 10.01

Bypass level indicators, PLUS series

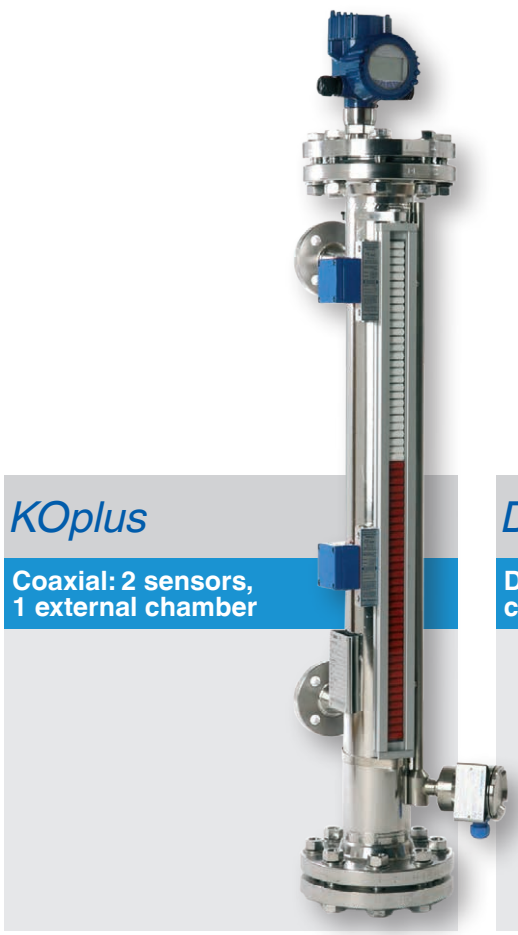
Combines the tried-and-trusted bypass with further independent measuring principles

PLUS
- Guided microwave (TDR)
- Reed measuring chain
- Magnetostrictive
- Limit switch (magnetic, tuning fork)

The wide range of combination possibilities offer a very large application spectrum.

Advantages
- Compact design
- Only 2 process connections required
- Absolute measuring redundancy possible
- Visual level measurement constantly given
- Up to 3 independent measuring principles possible
- Customer-specific designs

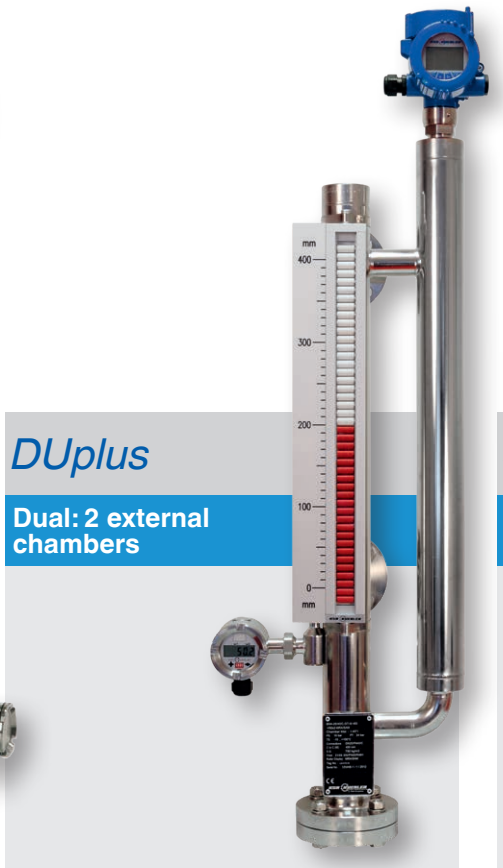
Output signals/communication
2- and 4-wire technology, 4 … 20 mA, HART®, PROFIBUS® PA, FOUNDATION™ Fieldbus/DTM/FDT (PACTware™)



KOplus

Coaxial: 2 sensors, 1 external chamber

Material:	Stainless steel, 6Mo, Hastelloy, titanium, Monel, Inconel, Incoloy, Duplex, Super Duplex
Pressure:	0 … 40 bar
Temperature:	-200 … +400 °C
Density:	≥ 400 kg/m³



DUplus

Dual: 2 external chambers

Material:	Stainless steel, 6Mo, Hastelloy, titanium, Monel, Inconel, Incoloy, Duplex, Super Duplex
Pressure:	0 … 400 bar
Temperature:	-200 … +400 °C
Density:	≥ 400 kg/m³

SIplus

Single: 1 external chamber

Material:	Stainless steel, 6Mo, Hastelloy, titanium, Monel, Inconel, Incoloy, Duplex, Super Duplex
Pressure:	0 … 400 bar
Temperature:	-200 … +400 °C
Density:	≥ 400 kg/m³

Magnetic float switches

For vertical installation

A float with a permanent magnet moves reliably along with the liquid level on a guide tube. Within the guide tube is fitted a reed contact (inert gas contact), which is energised, through the non-magnetic walls of the float and guide tube, by the approach of the float magnet.

By using a magnet and reed contact the switching operation is non-contact, free from wear and needs no power supply. The contacts are potential-free. Magnetic float switches are also available with multiple switch points. The switch functions always refer to a rising liquid level: normally open, normally closed or change-over contact.

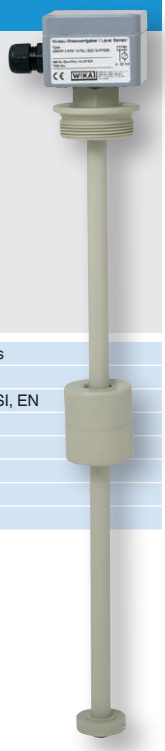
FLS-S

Stainless steel version, for vertical installation

Switch points:	Max. 8 switch points
Process connection:	■ Mounting thread ■ Flange: DIN, ANSI, EN
Guide tube length:	Max. 6,000 mm
Pressure:	0 … 100 bar
Temperature:	-196 … +300 °C
Density:	≥ 390 kg/m³
Data sheet:	LM 30.01

FLS-P

Plastic version, for vertical installation



Switch points:	Max. 8 switch points
Process connection:	■ Mounting thread ■ Flange: DIN, ANSI, EN
Guide tube length:	Max. 5,000 mm
Pressure:	0 … 3 bar
Temperature:	-10 … +100 °C
Density:	≥ 400 kg/m³
Data sheet:	LM 30.01

ELS

For lateral mounting

External chamber:	Aluminium, red bronze, stainless steel
Process connection:	Threaded pipe connection GE10-LR galvanised steel
Pressure:	Up to 6 bar
Temperature:	-30 … +300 °C
Data sheet:	LM 30.03

FLS-H

Hygienic version

Process connection:	All common process connections with hygienic design
Guide tube length:	Max. 6,000 mm
Pressure:	0 … 6 bar
Temperature:	-40 … +200 °C
Density:	≥ 300 kg/m³
Data sheet:	LM 30.01

LSD-30

Electronic level switch, with display

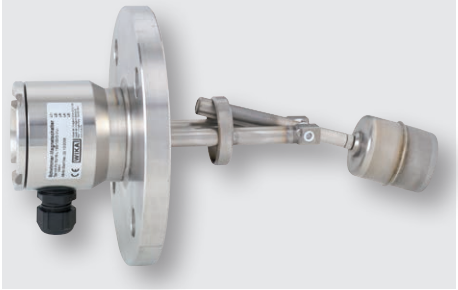
Measuring range:	Sensor length 250, 370, 410, 520, 730 mm
Density:	≥ 0.7 g/cm³ (NBR float)
Switching output:	■ 1 or 2 (PNP or NPN) ■ Analogue output (optional)
Process connection:	G ¾ A, ¾ NPT
Data sheet:	LM 40.01

For horizontal installation

Through the use of a float for a max. of 2 switch points a bistable switch behaviour can be achieved, meaning that the switching status also remains available, when the filling level continues to rise above or drop below the switch point. The float switch is simple to mount and maintenance-free, so the costs of mounting, commissioning and operation are low.

HLS-S

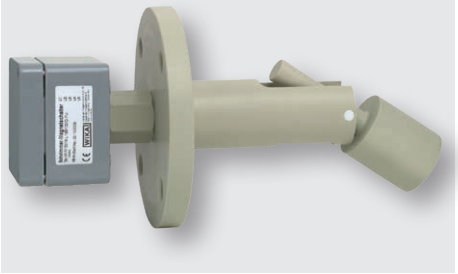
Stainless steel version, for horizontal installation



Process connection:	Flange: DIN, ANSI, EN
Pressure:	0 … 232 bar
Temperature:	-196 … +350 °C
Density:	≥ 600 kg/m³
Material:	Stainless steel, titanium
Data sheet:	LM 30.02

HLS-P

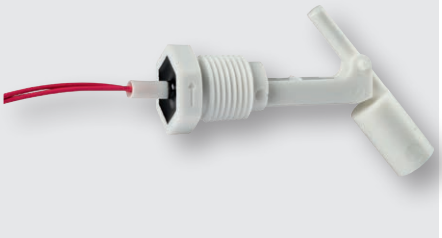
Plastic version, for horizontal installation



Process connection:	Flange: DIN, ANSI, EN
Pressure:	0 … 3 bar
Temperature:	-10 … +80 °C
Density:	≥ 750 kg/m³
Material:	PP
Data sheet:	LM 30.02

HLS-M1

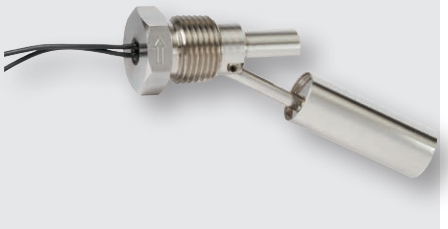
Plastic version, with cable outlet



Process connection:	■ ½" NPT (installation in the tank from outside) ■ G ¼" (installation in the tank from inside)
Pressure:	1 bar
Temperature:	-10 … +80 °C
Material:	PP
Electrical connection:	Cable
Data sheet:	LM 30.06

HLS-M2

Stainless steel version, with cable outlet



Process connection:	■ ½" NPT (installation in the tank from outside) ■ G ¼" (installation in the tank from inside)
Pressure:	5 bar
Temperature:	-40 … +120 °C
Material:	Stainless steel 1.4301
Electrical connection:	Cable or connector
Data sheet:	LM 30.06

Level sensors

These sensors with reed-chain technology are used for level measurement in liquid media. They work on the float principle with magnetic transmission.

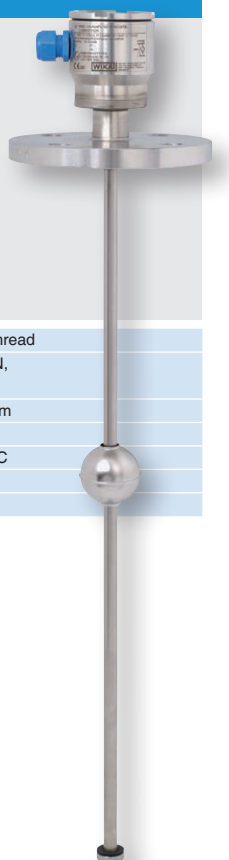
The float's magnetic system in the guide tube actuates a resistance measuring chain that corresponds to a 3-wire potentiometer circuit. The measurement voltage generated by this is proportional to the fill level.

Advantages

- The reliable and proven operation principle is suitable for a very wide range of applications
- Continuous measurement of levels, independent of physical and chemical changes of the liquid such as foaming, conductivity, dielectric, pressure, vacuum, temperature, vapours, condensation, bubble formation, boiling effects, density change
- Signal transmission over long distances
- Simple installation and commissioning, onetime calibration only, no recalibration necessary
- Interface measurement and overall level from Δ density ≥ 100 kg/m³
- Explosion-protected versions
- Output signal 4 … 20 mA, HART®, PROFIBUS® PA, FOUNDATION™ Fieldbus
- Resolution ≥ 5 mm
- Level displayed proportional to volume or height
- In combination with limit switches, stepless setting of the limit values possible over the entire measuring range
- High repeat accuracy of the set points
- Cable and plug versions

FLR-S

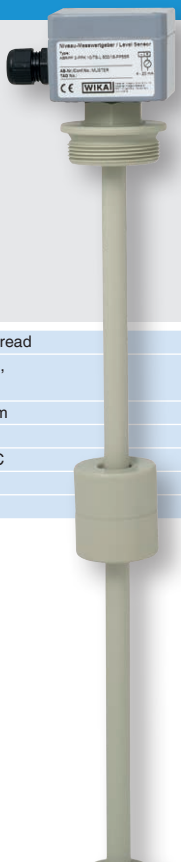
Stainless steel version



Process connection:	■ Mounting thread ■ Flange: DIN, ANSI, EN
Guide tube length:	Max. 6,000 mm
Pressure:	0 … 100 bar
Temperature:	-80 … +200 °C
Density:	≥ 400 kg/m³
Data sheet:	LM 20.02

FLR-P

Plastic version, PP, PVDF, PP



Process connection:	■ Mounting thread ■ Flange: DIN, ANSI, EN
Guide tube length:	Max. 5,000 mm
Pressure:	0 … 3 bar
Temperature:	-10 … +100 °C
Density:	≥ 800 kg/m³
Data sheet:	LM 20.02

FLR-H

Hygienic version

Process connection:	All common process connections in hygienic design
Guide tube length:	Max. 6,000 mm
Pressure:	0 … 10 bar
Temperature:	-40 … +200 °C
Density:	≥ 400 kg/m³
Data sheet:	LM 20.02

Submersible pressure transmitters

Submersible pressure transmitters are available in a wide range of different versions for level measurement on open and closed vessels, tanks, drinking water wells, deep wells and wastewater plants.

LS-10

Standard version

Accuracy:	≤ 0.5 (± % of span)
Measuring range:	0 … 0.25 to 0 … 10 bar
Data sheet:	PE 81.55

IL-10

Intrinsically safe

Accuracy:	≤ 0.25 or 0.5 (± % of span)
Measuring range:	0 … 0.1 to 0 … 25 bar
Special feature:	■ Explosion protection in accordance with ATEX, FM, CSA and EAC ■ Hastelloy design (optional) ■ Highly resistive FEP cable (optional)
Data sheet:	PE 81.23

LH-10

High performance

Non-linearity:	≤ 0.2 or 0.1 (± % of span)
Measuring range:	■ 0 … 0.1 to 0 … 25 bar ■ 0 … 1.6 to 0 … 25 bar abs.
Special feature:	■ Precise and reliable ■ Integrated temperature measurement (option): ■ Design out of Hastelloy® and FEP cable for especially high resistance (option)
Ingress protection:	■ IP68 permanently up to 300 m water column
Data sheet:	PE 81.09

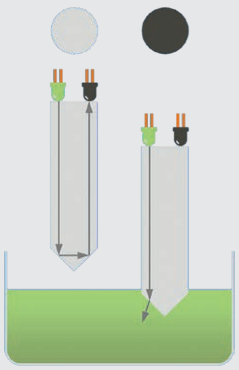
LH-20

High performance

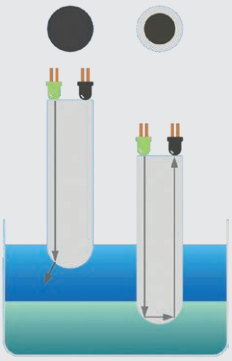
Non-linearity:	≤ 0.2 or 0.1 (± % of span)
Measuring range:	■ 0 … 0.1 to 0 … 25 bar ■ 0 … 1.6 to 0 … 25 bar abs.
Special feature:	■ Slender design ■ Scalable measuring range (optional) ■ Resistant against the harshest environmental conditions ■ Reliable and secure by double-sealed design ■ Titanium case for especially high resistance (optional)
Data sheet:	PE 81.56

Optoelectronic switches

Operating principle



Level



Interface layer

Advantages

- Recording of the level with the cone tip is independent to a large extent of the physical characteristics of the liquids such as density, dielectric constant, conductivity, colour and refractive index
- Detection of interface layers with rounded tip (OLS-S switch)
- The extremely compact design guarantees minimum space requirements and measurement in very small volumes

OLS-C01

OEM switch, compact design, standard version

Material:	Stainless steel, borosilicate glass
Process connection:	G ⅜", G ½" or M12 x 1
Pressure:	Max. 25 bar
Temperature:	-30 … +100 °C
Data sheet:	LM 31.31

OLS-C02

OEM switch, compact design, with selectable switch length

Material:	Stainless steel, borosilicate glass
Process connection:	G ½"
Pressure:	Max. 25 bar
Temperature:	-30 … +100 °C
Switch length:	65 … 3,000 mm
Data sheet:	LM 31.32

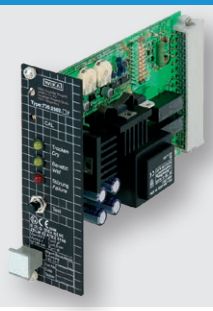
OLS-S, OLS-H

Standard and high-pressure version

Material:	Stainless steel, Hastelloy, KM-glass, quartz glass, sapphire, graphite
Process connection:	■ G ½ A
	■ ½ NPT
Pressure:	0 … 500 bar
Temperature:	-269 … +400 °C
Approval:	EX i
Data sheet:	LM 31.01

OSA-S

Switching amplifier for models OLS-S, OLS-H

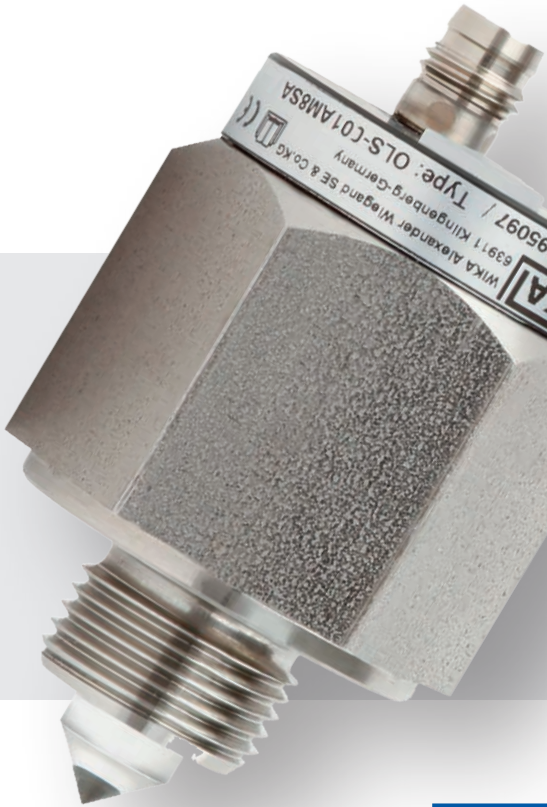


Output:	1 signal relay, 1 failure relay
Function:	High or low alarm
Time delay:	Up to 8 s
Voltage supply:	AC 24/115/120/230 V
	DC 24 V
Approval:	EX i
Data sheet:	LM 31.01

OLS-C20

Compact design, high-pressure version

Material:	Stainless steel, quartz glass
Process connection:	■ M16 x 1.5
	■ G ½ A
	■ ½ NPT
Insertion length:	24 mm
Pressure:	0 … 50 bar
Temperature:	-30 … +135°C
Data sheet:	LM 31.02



Accessories

Accessories for pressure gauges

Stopcocks

Model 910.10

Shut-off valves

Model 910.11

Adapters

Model 910.14

Sealings

Model 910.17

Snubbers

Model 910.12

Instrument mounting bracket

Model 910.16

Pressure gauge in-line filters

Model 910.22

Overpressure protectors

Model 910.13

Syphons

Model 910.15

Power supply units

Power supply unit

Model A-VA-1

Power supply unit

Model KFA6-STR-1.24.500

Ex galvanic isolator

Model SI815

Repeater power supply

Model IS barrier

Accessories for temperature measuring instruments

Thermowells

See data sheet TW 90.11

Thermowells for TF45

See data sheet TE 67.15

Worm-drive hose clip for TF44

See data sheet TE 67.14

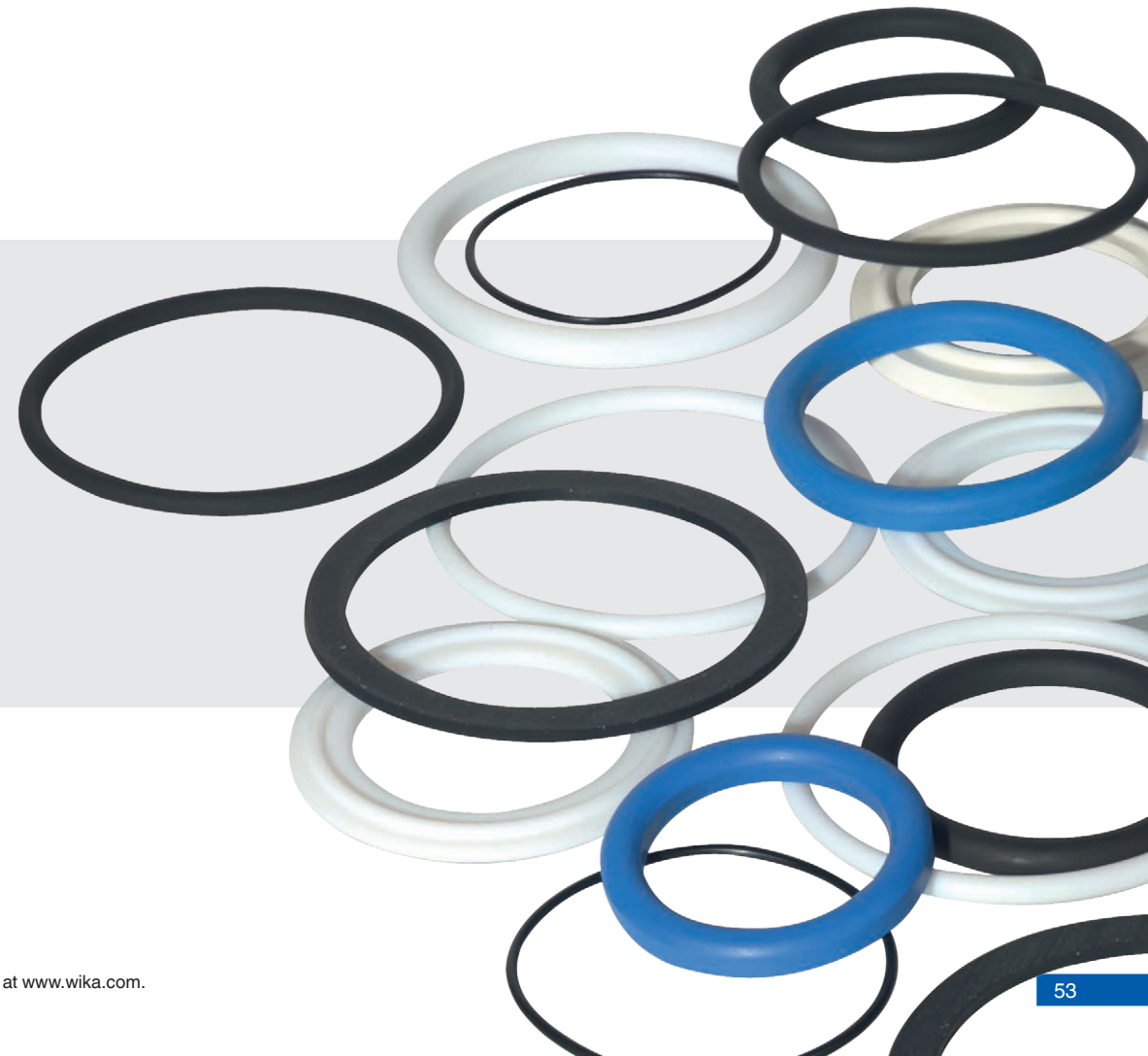
Retaining clip for TF44

See data sheet TE 67.14

Protective sun cover for TF41

See data sheet TE 67.17

Hand-held thermometer CTH6300



Further accessories can be found online at www.wika.com.

Calibration technology

From individual components ...

WIKA is the ideal partner for solutions in calibration technology, whether only 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 measurement parameters, 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-precision 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 measurement parameters 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-precision 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 automatic calibration systems as integrated solutions

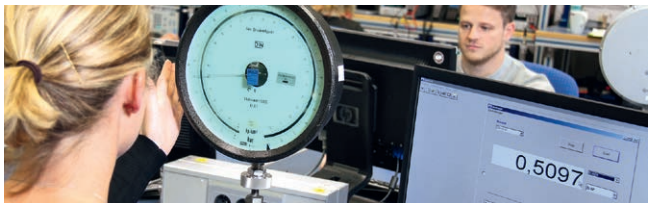
Fully automated calibration systems are customer-specific, turnkey installations which can be fitted in laboratories as well as in the production environment. With integrated reference instruments and calibration software, calibration certificates can be generated and archived in a simple and reproducible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

■ Pressure ■ temperature ■ current, voltage, resistance

Calibration services

Our calibration laboratory has been accredited for pressure since 1982 and for temperature since 1992 in accordance with DIN EN ISO/IEC 17025. Since 2014, our calibration laboratory has also been accredited for the electrical measurement parameters DC current, DC voltage and DC resistance.

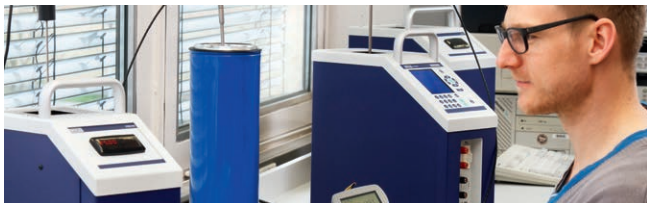
From -1 bar … +8,000 bar D-K-15105-01-00



We calibrate your pressure measuring instruments quickly and precisely:

- in the range from -1 bar ... +8,000 bar
- using high-precision reference standards (pressure balances) and working standards (precise electrical pressure measuring instruments)
- with an accuracy from 0.003 % ... 0.01 % of reading depending on the pressure range
- in accordance with the directives DIN EN 837, DAkkS-DKD-R 6-1, EURAMET cg-3 or EURAMET cg-17

From -196 °C … +1,200 °C D-K-15105-01-00



We calibrate your temperature measuring instruments quickly and precisely:

- in the range from -196 °C ... +1,200 °C
- in calibration baths, tube furnaces or at fixed points using appropriate reference thermometers
- with an accuracy of 2 mK ... 1.5 K depending on temperature and the procedure
- in accordance with the appropriate DKD/DAkkS and EURAMET directives

Electrical measurement parameters D-K-15105-01-00

We calibrate your electrical measuring instruments quickly and precisely:

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

On-site calibration D-K-15105-01-00

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

We calibrate your pressure and temperature measuring instruments quickly and precisely:

- in our calibration van or on your workbench
- with a DAkkS accreditation for pressure
  - in the range of -1 ... +8,000 bar
  - with accuracies between 0.025 % and 0.01 % of FS for the standard used
- Inspection certificates 3.1 for the measurement parameter temperature from -55 ... +1,100 °C

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13483723 04/2023 EN

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