Product review

Mechanical pressure measuring instruments



WIKA

Part of your business

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Ability to meet any challenge

As a family-run business acting globally, with over 8,500 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.



Efficient logistics



Fully automatic production



Certified calibration laboratories

WIKA product lines

The WIKA programme covers the following product lines for various fields of application.

Electronic pressure measurement

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 piezo-resistive, WIKA is the leading manufacturer worldwide that develops and produces the full range of today's leading sensor technologies.

Mechatronic pressure measurement

As a result of the almost unlimited options for different combinations of mechanical and electrical connections, an extraordinary range of instrument variants is possible. Various digital and analogue output signals are also available for these measuring instruments.
For our measuring instruments we use latest sensors, tested in automotive applications millions of times over. They work without any kind of mechanical contact, consequently they are wear-resistant, and there's absolutely no influence on the mechanics.

Mechanical pressure measurement

Indicating pressure gauges for gauge, absolute and differential pressure with Bourdon tube, diaphragm or capsule pressure elements have been tested millions of times over. These instruments cover scale ranges from 0 … 0.5 mbar to 0 … 7,000 bar and indication accuracies of up to 0.1 %.

Diaphragm seals

WIKA diaphragm seals, mounted with pressure gauges, pressure transducers, pressure transmitters etc., are recognised and valued internationally for the most difficult of measuring tasks. The measuring instruments can therefore be used at extreme temperatures (-130 … +400 °C), and with aggressive, corrosive, heterogeneous, abrasive, highly viscous or toxic media. The optimal diaphragm seal designs, materials and filling media are available for each application.

Electrical temperature measurement

Our range of products includes thermocouples, resistance thermometers (also with on-site display), temperature switches as well as analogue and digital temperature transmitters for all industrial applications. Measuring ranges from -200 … +1,700 °C are covered.

Mechatronic temperature measurement

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).

Mechanical temperature measurement

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.

Level measurement

WIKA has a comprehensive range of level measuring instruments available for temperatures up to 450 °C, specific gravity from 400 kg/m^3 and pressure ranges up to 500 bar. This includes standard instruments and customised products.

Flow measurement

Orifice plates, meter runs, flow nozzles, Venturi tubes and pitot tubes are part of our portfolio of primary flow elements and restriction orifices. The wide range of our products is able to cover the majority of industrial applications. Customised solutions can be developed to meet your special needs.

Calibration technology

WIKA offers a broad product range of calibration instruments for the physical units of measurement for pressure and temperature, and for electrical measurands. Numerous patents ensure unmatched performance from many of our calibration instruments. The range of services covers the calibration of pressure and temperature measuring instruments in our accredited DKD/DAkkS calibration laboratories and a mobile service to calibrate your instruments on site.

For all product lines product reviews are available.

Pressure gauges for relative pressure

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 in accordance with the European standard EN837-1 (except for model 116.15 and 111.12 in NS27).

For the individual models, various approvals such as EAC, GL and KBA exist. For information on which approvals apply to the individual models, please refer to the data sheets or the product pages on www. wika.de.
For measuring points with high dynamic loads, such as fast load cycles or vibrations, a liquid-filled design should be used.

111.10

Standard version



Nominal size:	40, 50, 63, 80, 100, 160 mm
Scale range:	-1 … 0 to 0 … 400 bar (max. 40 bar with 160 mm)
Accuracy class:	1.6/2.5
Data sheet:	PM 01.01

111.11

Welding gauge per ISO 5171



Nominal size:	40, 50, 63 mm
Scale range:	0 … 0.6 to 0 … 400 bar
Accuracy class:	2.5
Data sheet:	PM 01.03

111.12

Standard version, back mount



Nominal size:	27, 40, 50, 63, 80, 100 mm
Scale range:	NG 27: 0 … 4 to 0 … 25 bar und 0 … 100 to 0 … 400 bar NG 40 ...100: -1 … 0 to 0 … 400bar
Accuracy class:	1.6/2.5 (NS 27: 4.0)
Data sheet:	PM 01.09, PM 01.17 (NS 27)

111.16, 111.26

Panel mounting series, with/without spring clips



Nominal size:	40, 50, 63 mm, model 111.26 also 80 mm
Scale range:	-1 … 0 to 0 … 400 bar
Accuracy class:	1.6/2.5
Data sheet:	PM 01.10, PM 01.15

116.15

DirectDrive



Nominal size:	36, 41 mm
Scale range:	0 … 185 to 0 … 450 bar
Accuracy class:	4.0/2.5
Data sheet:	PM 01.16

113.13

Plastic case, with liquid filling



Nominal size:	40, 50, 63 mm
Scale range:	-1 … 0 to 0 … 400 bar
Accuracy class:	2.5
Ingress protection:	IP65
Data sheet:	PM 01.04

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 (EN837-1) ■ Temperature: 2.5 °C
Data sheet:	PM 01.23

THM10

Bimetal thermomanometer



Nominal size:	63, 80 mm
Scale range:	■ Pressure: 0 … 10 bar ■ Temperature: 0 ... 120 °C
Connection location:	Lower mount or back mount
Special feature:	■ Simultaneous measurement of pressure and temperature ■ Shut-off valve selectable ■ Various process connections
Data sheet:	PM 01.24

Pressure gauges for relative pressure

Bourdon tube pressure gauges with increased corrosion resistance

The application areas for these gauges, manufactured entirely in stainless steel, are gaseous and liquid aggressive media that are not highly viscous or crystallising, also in aggressive ambience. They are suitable for scale ranges from 0 … 0.6 to 0 … 7,000 bar.

Dependant upon the pressure range and the instrument type, overpressure safety of up to a maximum of 5 x full scale value is possible. To this point, the measuring accuracy is maintained. Liquid filling the case ensures a precise instrument display, even with high dynamic pressure loads and vibrations.

131.11

Stainless steel version, standard



Nominal size:	40, 50, 63 mm
Scale range:	■ NS 40: 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 bis 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

Precision pressure gauges

These measuring instruments are used whenever there is a high requirement for accuracy in the measurement.
Depending upon the instrument model, accuracies of 0.1, 0.25, or 0.6 of full scale value can be measured.

The pressure ranges cover from 0 … 6 mbar to 0 … 6,000 bar, and are suitable for calibration tasks. For each of the gauges specified here, a DKD/DAkkS certificate can be provided.

312.20

Test gauge series, Ø 160 mm



Nominal size:	160 mm
Scale range:	0 … 0.6 to 0 … 600 bar
Accuracy class:	0.6
Ingress protection:	IP54
Data sheet:	PM 03.01

332.50, 333.50

Test gauge series Ø 160 mm



Nominal size:	160 mm
Scale range:	0 … 0.6 to 0 … 1,600 bar
Accuracy class:	0.6
Ingress protection:	IP65
Data sheet:	PM 03.06

332.30, 333.30

Test gauge series, safety version



Nominal size:	160 mm
Scale range:	0 … 0.6 to 0 … 1,600 bar
Accuracy class:	0.6
Ingress protection:	IP65
Data sheet:	PM 03.05

342.11

Test gauge series, class 0.1, Ø 250 mm



Nominal size:	250 mm
Scale range:	0 … 1 to 0 … 1,600 bar
Accuracy class:	0.1
Ingress protection:	IP54
Data sheet:	PM 03.03

610.20, 630.20

Test gauge series, for low pressures, Ø 160 mm



Nominal size:	160 mm
Scale range:	0 … 10 to 0 … 600 mbar
Accuracy class:	0.6
Ingress protection:	IP54
Data sheet:	PM 06.09

612.11

Test gauge series, for low pressures, Ø 250 mm



Nominal size:	250 mm
Scale range:	0 … 6 to 0 … 400 mbar
Accuracy class:	0.1/0.25
Ingress protection:	IP54
Data sheet:	PM 06.04

Pressure gauges for relative pressure

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 measuring 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

Capsule pressure gauges for very low pressures

These gauges are particularly suited to gaseous media. The scale ranges are between 0 … 2.5 mbar and 0 … 1,000 mbar in accuracy classes from 0.1 to 2.5.
Capsule pressure gauges consist of two circular, corrugated diaphragms, joined together around the edge with a pressure-tight seal. Overpressure protection is possible in certain cases.

These pressure measuring instruments are used mainly within medical, vacuum, environmental and laboratory technology for contents measurement and filter monitoring.

611.10

Standard version



Nominal size:	50, 63 mm
Scale range:	0 … 25 to 0 … 600 mbar
Accuracy class:	1.6
Ingress protection:	IP54
Data sheet:	PM 06.01

611.13

swikap, plastic version



Nominal size:	50, 63 mm
Scale range:	0 … 60 to 0 … 600 mbar
Accuracy class:	2.5
Ingress protection:	IP53
Data sheet:	PM 06.12

612.20

Industrial series



Nominal size:	63, 100, 160 mm
Scale range:	0 … 6 to 0 … 600 mbar
Accuracy class:	1.6
Ingress protection:	IP54
Data sheet:	PM 06.02

614.11

Edgewise panel design, for panel mounting



Nominal size:	72 x 72, 96 x 96, 144 x 144, 144 x 72 mm
Scale range:	■ NS 72 x 72: 0 … 25 to 0 … 600 mbar ■ NS 96 x 96: 0 … 10 to 0 … 600 mbar ■ NS 144 x 144: 0 … 6 to 0 … 600 mbar ■ NS 144 x 72: 0 … 4 to 0 … 600 mbar
Accuracy class:	1.6
Data sheet:	PM 06.05

632.50

Stainless steel version



Nominal size:	63, 100, 160 mm
Scale range:	■ NS 63: 0 … 40 to 0 … 600 mbar ■ NS 100: 0 … 16 to 0 … 600 mbar ■ NS 160: 0 … 2.5 to 0 … 600 mbar
Accuracy class:	1.6
Ingress protection:	IP54
Data sheet:	PM 06.03

Pressure gauges for differential pressure

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

A2G-10

For low pressures in ventilation applications



Nominal size:	110 mm
Scale range:	0 … 50 to 0 … 12,500 Pa
Accuracy class:	±3 %
Ingress protection:	IP54
Data sheet:	PM 07.40

700.01

Compact design, magnetic piston and compression spring



Nominal size:	80 mm
Scale range:	0 … 400 mbar to 0 … 10 bar
Accuracy class:	±3 % with increasing differential pressure
Ingress protection:	IP54
Data sheet:	PM 07.14

700.02

Magnetic piston and compression spring with separating diaphragm



Nominal size:	80 mm
Scale range:	0 … 160 mbar to 0 … 2.5 bar
Accuracy class:	±5 % with increasing differential pressure
Ingress protection:	IP54
Data sheet:	PM 07.14

711.12

Bourdon tube, with parallel entry



Nominal size:	100, 160 mm
Scale range:	0 … 0.6 to 0 … 1,000 bar
Accuracy class:	1.6
Ingress protection:	IP33
Data sheet:	PM 07.02

716.11

Capsule, with parallel entry, for low pressures



Nominal size:	63, 100, 160 mm
Scale range:	■ NS 63: 0 … 16 to 0 … 400 mbar ■ NS 100: 0 … 6 to 0 … 250 mbar ■ NS 160: 0 … 4 to 0 … 250 mbar
Accuracy class:	1.6
Ingress protection:	IP54
Data sheet:	PM 07.07

DPG40

DELTA-plus, with integrated working pressure indication



Nominal size:	100 mm
Scale range:	0 … 0.25 to 0 … 10 bar
Accuracy class:	2.5
Ingress protection:	IP65
Data sheet:	PM 07.20

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

732.15

Cryo gauge, stainless steel version



Nominal size:	100, 160 mm
Scale range:	0 … 40 to 0 … 4,000 mbar
Accuracy class:	1.0 … 2.5
Ingress protection:	IP65
Data sheet:	PM 07.29, PM 07.30

712.15

Cryo gauge, Cu-alloy



Nominal size:	100, 160 mm
Scale range:	0 … 40 to 0 … 4,000 mbar
Accuracy class:	1 … 2.5
Ingress protection:	IP65
Data sheet:	PM 07.29, PM 07.30

Pressure gauges for absolute pressure

Absolute pressure gauges are used when measured pressures are independent of the natural fluctuations in atmospheric pressure. The pressure of the measured media is determined against a reference pressure, which corresponds to the absolute pressure zero point. For this, the reference chamber is completely evacuated, so that there is a near-perfect vacuum in it.

The scale ranges are between 0 … 25 mbar and 0 … 25 bar absolute, with accuracy classes of 0.6 to 2.5. Applications for these high-precision measuring instruments are, for example, monitoring of vacuum pumps and vacuum packing machines. They are also used in laboratories, in order to monitor condensation pressures or to determine the vapour pressure of liquids.

532.51, 532.52, 532.53, 532.54

Stainless steel version for gases and liquids



Nominal size:	100, 160 mm
Scale range:	0 … 25 mbar to 0 … 25 bar abs high overpressure safety
Accuracy class:	0.6 … 2.5
Ingress protection:	IP54
Data sheet:	PM 05.02



Accessories

910.80

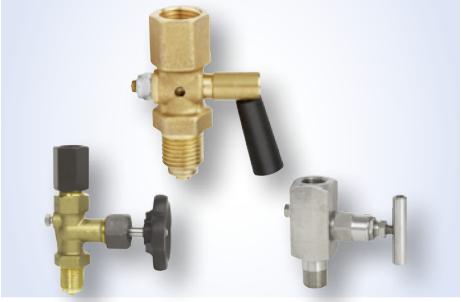
Monoflange



Application:	For pressure gauge isolation
Data sheet:	AC 09.17

910.10, 910.11, 910.81

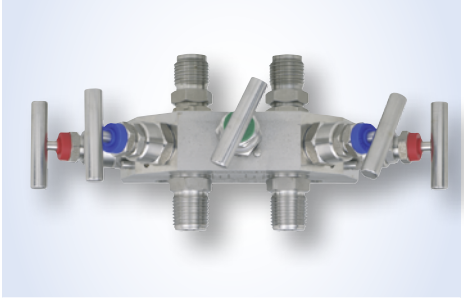
Stopcocks and shut-off valves



Application:	For pressure gauge isolation
Data sheet:	AC 09.01, AC 09.02, AC 09.18

910.25

Pressure compensating valve for differential pressure gauges



Application:	For isolating, pressure compensating as well as purging and venting differential pressure gauges
Data sheet:	AC 09.11

910.15

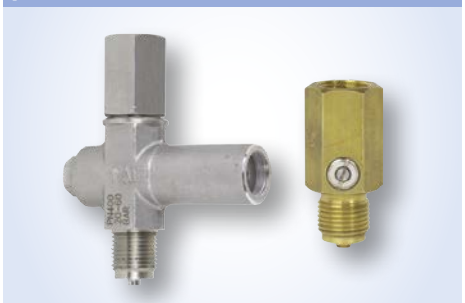
Syphon



Application:	For the protection of pressure gauges from excessive pulsation and heat
Data sheet:	AC 09.06

910.12, 910.13

Snubbers and overpressure protectors



Application:	For the protection of pressure gauges from pressure surges and pulsations or overpressures
Data sheet:	AC 09.03, AC 09.04

910.14, 910.17

Adapters and sealings



Application:	For mounting pressure gauges and for sealing the connections
Data sheet:	AC 09.05, AC 09.08

910.16

Instrument mounting bracket



Application:	For mounting pressure gauges
Data sheet:	AC 09.07

Possibilities for combination and assembly

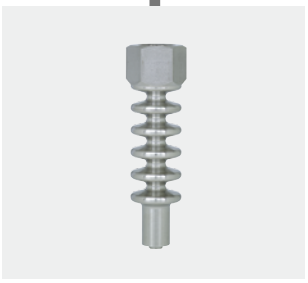
Assembly of the diaphragm seal and measuring instrument may be made via a rigid direct connection or a flexible capillary. The “rigid” assembly is made by a direct threaded connection or by welding the measuring instruments to the diaphragm seal or via an adapter. For high temperatures a cooling element can be fitted between seal and instrument.



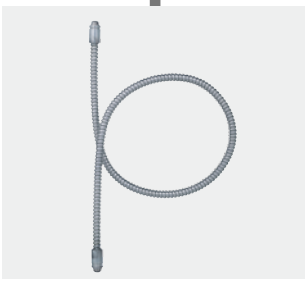
Mechanical pressure measuring instruments



Direct assembly



Cooling element



Capillary



Diaphragm seals with threaded connection



Diaphragm seals with flange connection



Diaphragm seals with sterile connection

The configuration of the combination of pressure measuring instruments and diaphragm seals depends, among other things, on the application conditions in which the assembly must work.
Please do not hesitate to ask us for advice regarding the selection of suitable diaphragm seals and the best configuration for your specific application.

The right solution

Your design

We deliver our measuring instruments just as you require. Cases and dials, scales, cables, sealings and much more can be manufactured with your logo or to the design you wish. We can also provide you with complete technical documentation in your design, with your model designation and corresponding packaging.





Scale 1:1

Miniaturisation solves installation problems

The trend for miniaturisation demands intelligent solutions. The use of small gauges, e.g. in nominal sizes between 23 mm and 27 mm, makes installation possible in plants with minimal available space. Precise instrument read-out is nevertheless ensured.
These measuring instruments are used, for example, in pneumatics, in medical engineering and in machine building.

Special applications

For pure media
These pressure gauges are used for the highest demands of purity within the process medium.
Particular application areas are the semiconductor and electronics industries, medical engineering and bio, genetic and pharmaceutical technology.



For level measurement in cryotechnology
Differential and working pressure are measured centrally in a single instrument. With only 4 different measuring cells, from 0 … 80 mbar to 0 … 2,300 mbar, all usual tank sizes are covered. Scaleable measuring ranges (turndown to max. 1 : 3.5). Optionally with transmitter for differential pressure indication and/or working pressure indication. Optionally with remote data transfer module intelliMETRY.

Mechatronic pressure measuring instruments

Nearly all mechanical WIKA pressure measuring instruments can be fitted with electrical switch contacts or transmitters. In addition we also offer you a wide variety of high quality pressure switches.

You can find these instruments in the WIKA product review “Mechatronic pressure measuring instruments”.



Pressure gauges with electrical output signal

intelliGAUGE®






Pressure gauges with switch contacts

switchGAUGE






Measuring principles of mechanical pressure measuring instruments

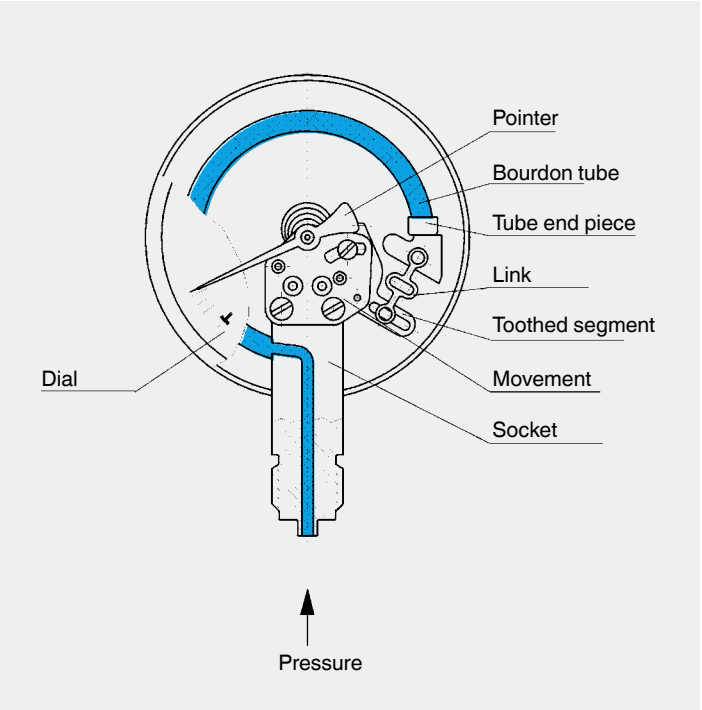
Mechanical pressure measuring instruments are produced with Bourdon tube, diaphragm, capsule and corrugated tube pressure elements and are accordingly different. The pressure elements are made of copper alloys, alloyed steels or produced in special materials for specific measuring applications. Pressures are only measurable in conjunction with a reference pressure. The atmospheric pressure serves as reference pressure. The pressure gauge shows how much the measured pressure is higher or lower in relation to the given atmospheric pressure (overpressure measuring instrument).

The pressure is shown in standard scale ranges on the dial by the pointer. Liquid-filled pressure gauges offer optimal protection against destruction by high dynamic pressure loads or vibrations as a result of their damping.
Switching operations can be carried out when combined with switch contacts and electrical output signals (for example 4 … 20 mA) can be used for industrial process automation in combination with transmitters.

1. Bourdon tube pressure gauges

Bourdon tubes are radially-formed tubes with an oval cross-section. The pressure of the media acts on the inside of this tube. The end of the tube which is not fixed moves, this movement being a measurement for the pressure. This movement is indicated by a pointer.

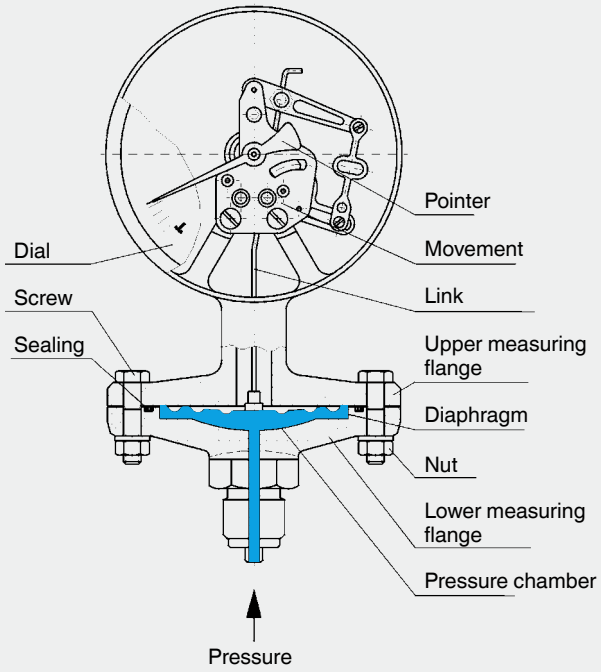
The circular-shaped tubes, bent at an angle of approx. 250°, are used for pressures up to approx. 60 bar. Used for higher pressures are tubes with a number of superimposed coils of the same diameter (helical tubes) or spiral coils at one level (spiral tubes). Bourdon tubes can only be protected against overload to a limited extent. For particularly difficult measuring operations the pressure gauge can be provided upstream with a diaphragm seal as separation or protection system.
The scale ranges are between 0 … 0.6 bar and 0 … 7,000 bar with an indication accuracy (accuracy class) from 0.1 to 4.0.

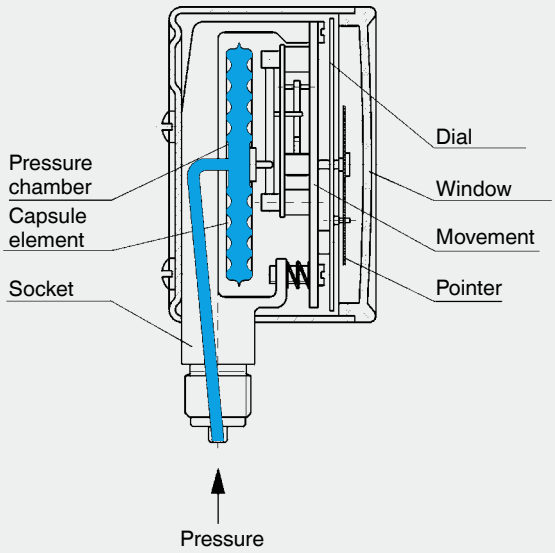


Measuring principles of mechanical pressure measuring instruments

2. Diaphragm pressure gauges

Diaphragm elements are circular-shaped, corrugated membranes. They are either clamped around the rim between two flanges or welded and subject to the pressure of the media acting on one side. The deflection caused in this way is used as a measurement for pressure and is indicated by means of a movement.
Compared with Bourdon tubes the diaphragm elements have a relatively high activating force. Due to the annular clamping of the element they are less sensitive to vibration.
The diaphragm element can be subject to higher overload through load take-up points (by bringing the diaphragm element up against the upper flange). Moreover, the measuring instrument can also be protected against extremely corrosive media by coating with special material or covering with foil.
Wide connection ports, open connecting flanges and purging plugs can be integrated for measuring highly viscous, contaminated or crystallising media.
The scale ranges are between 0 … 16 mbar and 0 … 40 bar in the accuracy classes from 0.6 to 2.5.





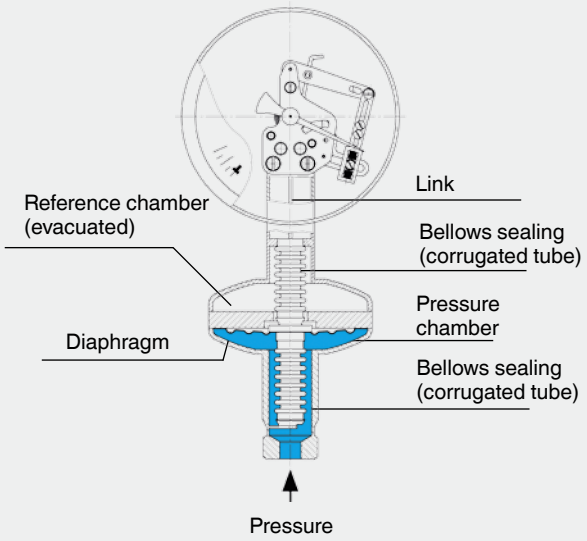
3. Capsule pressure gauges

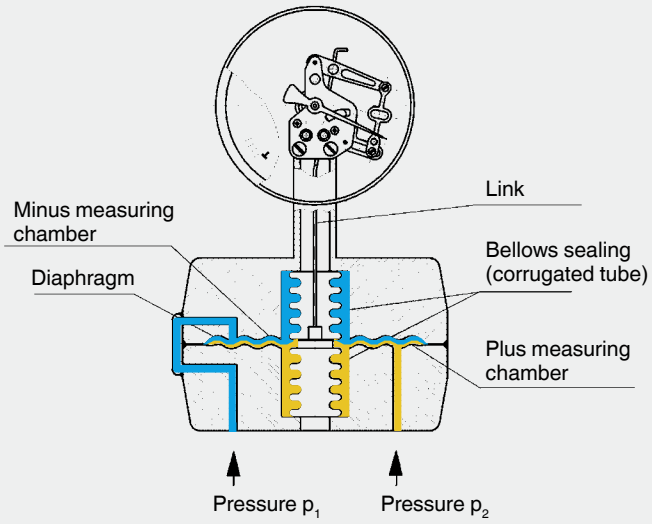
The capsule element comprises two circular-shaped, corrugated diaphragms, joined together around the rim with a pressure-tight seal.
The pressure acts on the inside of this capsule and the generated stroke movement is indicated by means of a movement as a measurement of pressure.

Capsule pressure gauges are especially suitable for gaseous media and relatively low pressures. Overpressure protection is possible within certain limits.
The activating force is increased if a number of capsule elements are connected mechanically in series (a so-called capsule element “package”).
The scale ranges are between 0 … 2.5 mbar and 0 … 0.6 bar in the accuracy classes from 0.1 to 2.5.

4. Pressure gauges for absolute pressure

These instruments are used when pressures are to be measured independent of the natural fluctuations in atmospheric pressure. As a general rule all the known forms of tubes and measuring principles can be applied.
The pressure of the media to be measured is determined against a reference pressure, which corresponds to the absolute pressure zero point. For this purpose an absolute vacuum is given as reference pressure in a reference chamber on the side of the pressure element not subject to pressure.This function is achieved by sealing off the appropriate measuring chamber or surrounding case. The transmission of the pressure element's movement and the pressure indication follow in the same way as with the already described overpressure gauges. The scale ranges are between 0 … 16 mbar and 0 … 25 bar in the accuracy classes from 0.6 to 2.5.





5. Pressure gauges for differential pressure

The difference between two pressures is determined directly and shown on the differential pressure gauge. Here again all of the tube forms and measuring principles known from overpressure gauges can be applied.
Two sealed media chambers are separated by the pressure element(s). If both working pressures are the same, the measuring element cannot make any movement and no pressure will be indicated. A differential pressure reading is only given when one of the pressures is either higher or lower. Low differential pressures can be measured directly even in the case of high static pressures. Very high overpressure safety is achieved with diaphragm elements.
The permissible static pressure and the overpressure safety on the j and i side must be observed.
Transmission of the pressure element movement and pressure indication is the same as with the already described overpressure gauges in the majority of cases.
The scale ranges are between 0 … 2.5 mbar and 0 … 40 bar in the accuracy classes from 0.6 to 2.5.

Applications

- Filter technology (monitoring of filter pollution)
- Level measurement (in closed tanks)
- Flow measurement (pressure drop)

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