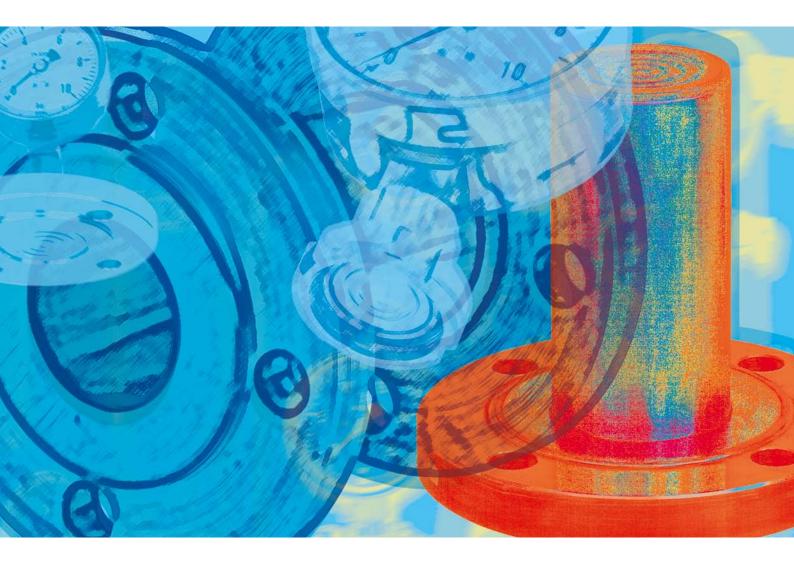
Product review

Diaphragm seals





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The modern high-bay warehouse ensures efficient logistics



Fully automatic production of measuring instruments

Ability to meet any challenge

Our knowledge for your success

In the course of the last six decades the name WIKA has become a symbol for sophisticated solutions in the field of pressure and temperature measurement.

Our ever increasing ability is the basis for implementation of innovative technologies in the form of reliable products and efficient system solutions.

We owe our leading position in the world market to the consistent dedication towards premium quality, to which, today, 7,000 employees of the WIKA group of companies are committed. More than 500 experienced sales staff ensure that our customers are individually and competently advised and looked after from the outset. Anywhere and any time.

Made by WIKA

The development and high-tech production in our owned modern production facilities (Germany, Brazil, China, India, Canada, Poland, Switzerland, South Africa and U.S.A.) is the best warranty for our flexibility.

Whether SMD automatic insertion machines, CNC automatic machining centres, welding robots, laser welding, sputterers, thermotransfer printing or thin film production - we exploit all possibilities to achieve above-average results. And the end result: More than 43 million quality products are delivered year in, year out, in more than 100 countries. Worldwide, approximately 350 million WIKA measuring instruments are in use.



DKD/DAkkS accredited calibration laboratories for pressure and temperature

Certified quality

The WIKA quality assurance management system has been certified in accordance with ISO 9001 since 1994. The quality and safety standards of our company meet the standard systems of several countries.

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 retroaction to the mechanics.

Mechanical pressure measurement

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

Diaphragm seals

WIKA diaphragm seals, fitted 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 (- 90 ... +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, covering measuring ranges from -200 ... +1,600 °C.

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 changeover. 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 as required.

Level measurement

WIKA has a comprehensive range of level measuring instruments available for temperatures up to 450 °C, specific gravity from 400 kg/m³ and pressure ranges up to 420 bar. This includes standard instruments and customised products.

Calibration technology

WIKA offers a broad product spectrum of calibration instruments for the physical measured values of pressure and temperature, and for electrical measured values. A multitude of specific patents ensure unmatched performance characteristics with many of our calibration instruments. The range of services comprises 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.

Diaphragm seals with flange connection

For WIKA diaphragm seals with flange connection the corrosion resistant stainless steel 316L is used as standard diaphragm material. Special materials are available on request.

Nominal sizes: DN 25 to DN 125/DN 1" to DN 5" Standards: EN, ASME (former ANSI) Options: ISO, CSA, JIS, customer-specific versions on request



990.28

Cell-type



990.29

Flange-type with extended diaphragm



Application:	Process and petrochemical industries,
	particularly for thick or insulated tank walls
PN max:	10 100 (400) bar (class 150 2,500)
Data sheet:	DS 99.29

990.35

Cell-type with extended diaphragm



990.15

Block flange or saddle flange



Application:	In connection with block flange or saddle
	flange in the chemical engineering and
	petrochemical industries
PN max:	100 or 250 bar
Data sheet:	DS 99.35

990.23

Application:

Data sheet:

PN max:

Pulp and paper industry



For use in the pulp and paper industry
40 bar
DS 99.34

Diaphragm seals

With its connection dimensions, the flange-type diaphragm seal is suitable for all currently used standard flanges and is mounted in lieu of a blind flange. The cell-type design is a sub-category, which is used with a blind flange at the tapping flange. Another modification of this model is the diaphragm seal with extended diaphragm, which, among other things, is used at thick and/or insulated product pipelines or tank walls.

Diaphragm in-line seals

The diaphragm in-line seal also belongs to the family of flange-type diaphragm seals. With the seal being integrated into the process line, measurements are not affected by any turbulences, corners, dead spaces or other obstructions. This application makes the designing of special measuring point connections unnecessary.

990.26

Internal diaphragm



990.12

Internal diaphragm, threaded design



990.41

Data sheet

 Large working volume, threaded design

 Image: state of the state of the

DS 99.32

981.10

Diaphragm in-line seal, cell-type



981.27

Diaphragm in-line seal, flange-type



Data sheet

DS 98.28

Diaphragm seals with threaded connection

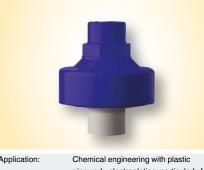
Diaphragm seals with threaded connection are available with female or male thread in their basic design. Due to the wide variety of available process connections they can be mounted to many different fittings without any problems. Usually the fittings are T-pieces which are integrated into a pipeline, or welding sockets which are welded to a pipeline.

Options:

Nominal sizes: G 1/4 ... 11/2, 1/4 ... 11/2 NPT male or female Customer-specific versions and special materials on request

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

990.36

Small diaphragm seal with flush diaphragm



990.10

Threaded design



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

990.34

Welded design



160, 400, 600 or 1,000 bar

DS 99.04

990.	38
550	00

Welded design, economic design



Application:	Standard applications in the process
	industry; for aggressive, contaminated or
	heterogeneous media
PN max:	90 bar
Data sheet:	DS 99.05

990.40

Large working volume, threaded



Application:	To combine with capsule or diaphragm
	pressure gauges and transmitters for low
	pressures
PN max:	40 bar
Data sheet:	DS 99.06

970.1x

PN max:

PN max:

Data sheet:

Data sheet

Diaphragm probe seal



Particularly for flowing, heterogeneous media; at pressures from 100 bar 600 bar DS 97.01

Diaphragm seals with sterile connection

Due to their construction, many measuring instruments are not suitable for use in sterile processes. In order to meet the requirements for a sterile connection, diaphragm seal systems are used.

Diaphragm seal systems can withstand the cleaning vapour temperatures occurring in the SIP processes and thus ensure a sterile connection between the medium to be measured and the diaphragm seal. Stainless steel 316L (1.4435) is used as standard material, various special materials are also available. SIP and CIP criteria, which are an essential requirement for sanitary applications, are met by using diaphragm seals. These acronyms stand for the sterilisation and cleaning of the wetted parts in the process.

The combination of pressure measuring instruments with flush diaphragm seals or diaphragm in-line seals meets the stringent demands made on hygienic instrumentation and is suitable for even the most difficult measuring requirements.

990.17

DRD connection



PN max: 25 bar Data sheet: DS 99.39

990.18

Milk thread fitting per DIN 11851



2/**3**/2

 Process connection: Grooved union nut/threaded coupling

 PN max:
 40 or 25 bar

 Data sheet:
 DS 99.40

990.19

Thread SMS standard



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

990.20

Thread IDF standard



Process connection: Thread with grooved union nut PN max: 40 or 25 bar Data sheet: DS 99.40

990.21

Thread APV-RJT standard



 Process connection: Thread with grooved union nut

 PN max:
 40 or 25 bar

 Data sheet:
 DS 99.40

990.24

VARIVENT[®] connection



Process connection: For installation into the VARINLINE® access unit or connecting flange

PN max: 25 bar	
PIN max. 25 bar	PN max:
Data sheet: DS 99.49	Data sheet:

VARIVENT® and VARINLINE® are registered trademarks of the company Tuchenhagen

Diaphragm seals with sterile connection

990.52

Clamp per DIN 32676



990.53

Clamp per ISO 2852



Process connection: Clamp PN max: 40 bar (DN 20 ... DN 50) 25 bar (from DN 65) Data sheet: DS 99.41

990.22

Tri-clamp



40 bar (DN 20 ... DN 50) PN max: 25 bar (from DN 65) Data sheet: DS 99.41

990.50

NEUMO BioConnect® connection



Higher pressures on request

DS 99.50

990.51

Aseptic connection per DIN 11864



Process connection	: DIN 11864-1 threaded connection
	DIN 11864-2 flange
	DIN 11864-3 clamp connection
PN max:	16 40 bar depending on the process
	connection
Data sheet:	DS 99.51

990.60

NEUMO BioControl®



990.30

Data sheet:

For homogenisers



BioControl® and BioConnect® are registered trademarks of the company NEUMO

981.18

Diaphragm in-line seal, milk thread fitting DIN 11851



Process connection: Thread (other connections on request)

PN max:	40 bar (DN 20 DN 40)
	25 bar (from DN 50)
Data sheet:	DS 98.40

981.22

Diaphragm in-line seal, Tri-clamp



981.51

Diaphragm in-line seal, aseptic connection



981.50

A

Diaphragm in-line seal, NEUMO BioConnect[®]



	Process connection:	NEUMO BioConnect® thread or flange
	PN max:	16 bar (thread)
		70 bar (flange)
		Higher pressures on request
	Data sheet:	DS 98.50

983.18

Diaphragm in-line seal with integrated temperature measurement, milk thread fitting per DIN 11851



Process connection:	DIN 11851 thread
PN max:	40 bar (to DN 50)
	25 bar (from DN 65)
Data sheet:	DS 98.46

983.22

Data sheet:

Diaphragm in-line seal with integrated temperature measurement, clamp

DS 98.51



Process connection: Tri-clamp PN max: 40 bar (to DN 50) 25 bar (from DN 65) Data sheet: DS 98.46

HYDRA-line diaphragm seal systems

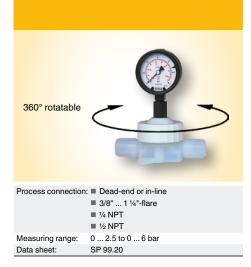
Our pressure measuring instruments of the HYDRA-line product family have been developed in co-operation with well-known customers in the semiconductor industry. The complete product concept has been adapted to the special requirements of the process equipment and UHP chemicals distribution system sectors.

The patented HYDRA double diaphragm system enables a safe and reliable separation of the pressure sensor from the process medium.

Simultaneously diffusing process media such as HF or HCI vapours are given off to the environment to avoid any falsification of the measuring result or the destruction of the sensor element.

All wetted parts are made of PFA or PTFE UHP grade.

HYDRA-gauge



HYDRA-sensor



	3/8" 1 ¼"-flare
	■ 1/4 NPT
	■ ½ NPT
Measuring range:	0 2.5 to 0 6 bar
Data sheet:	SP 99.21

HYDRA-dry

Measuring range:

Data sheet:



0 ... 1 to 0 ... 6 bar

SP 99.22

HYDRA-indicator



Accessories

910.20

Saddle flange



910.19

Block flange



Process connection: E For welding into the product pipeline E DN 15 ... DN 150 Perm. temperature: Max. 250 °C Data sheet: AC 91.01

910.23



	- DIN 15 DIN		
Perm. temperature:	Max. 250 °C		
Data sheet:	AC 91.01		

910.27

Flushing ring for flanges per EN 1092-1 and ASME B 16.5



910.60

NEUMO BioControl[®] housing



BioControl® and BioConnect® are registered trademarks of the company NEUMO

Technical information

Diaphragm seals

By using diaphragm seals, pressure measuring instruments can be adapted to even the harshest of conditions within process industries. A diaphragm made of the appropriate material separates the medium to be measured from the measuring instrument.

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. The instrument is connected to the diaphragm seal via a cooling element, a capillary or directly. By connecting the measuring instrument via diaphragm seals even the most difficult measuring requirements can be met.

A wide variety of designs and material combinations are possible, enabling pressures from approx. 10 mbar to 1,600 bar to be measured, while dealing with other factors such as extreme temperatures (ranging from -90 °C ... +400 °C) and aggressive, corrosive, abrasive, highly viscous, heterogeneous, toxic or aseptic media, thus allowing accurate pressure measurements even under extreme conditions.

WIKA is able to provide diaphragm seals with test certificates and approvals for use in hazardous areas as well as for special sanitary applications, for instance in the food, biotechnology and pharmaceutical industries (e.g. sanitary standards 3A, FDA or EHEDG).



We differentiate between the following standard types of diaphragm seals:

Diaphragm seals

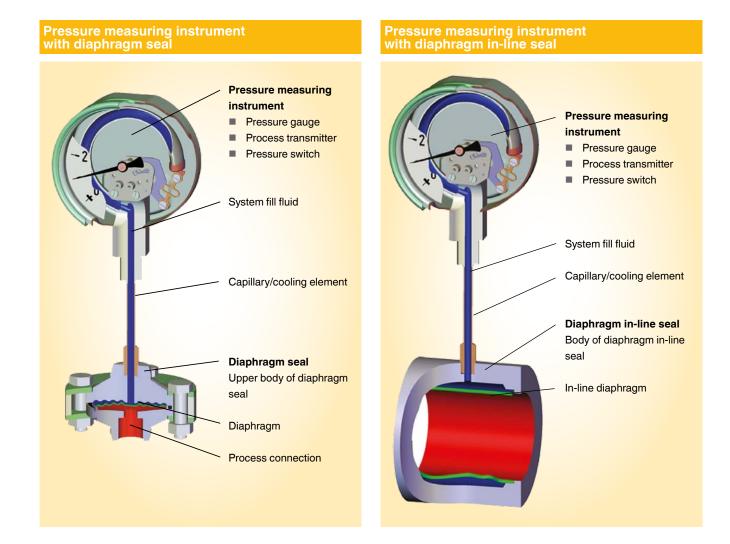
Diaphragm seals are mounted to existing fittings or flanges. Usually the fittings are T-pieces which are integrated into a pipeline, or welding sockets which are welded to a pipeline, the process reactor or a tank.

This diaphragm seal type offers the advantage that the "contact surface" between pressure medium and diaphragm is relatively large, thus ensuring accurate pressure measurement, especially for very low pressures (< 600 mbar). The fact that they can be easily dismounted, e.g. for cleaning or calibration purposes, is a further advantage.

Diaphragm in-line seals

The diaphragm in-line seal is perfectly suited for use with flowing media. With the seal being completely integrated into the process line, measurements are not affected by any turbulence, corners, dead spaces or other obstructions in the flow direction. The diaphragm in-line seal is installed directly into the pipeline; this makes the designing of special measuring point connections unnecessary.

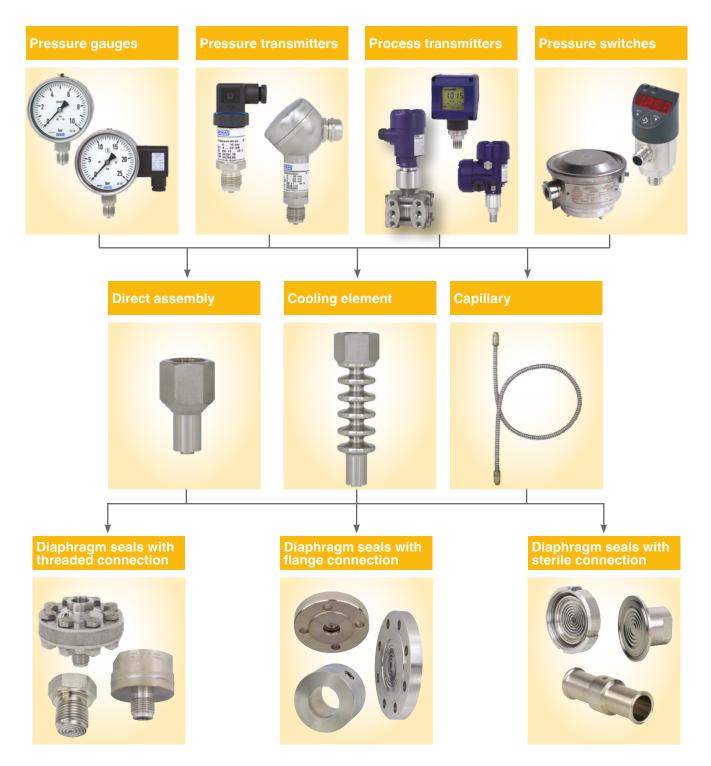
In comparison with other designs with grooves or noncircular geometry, diaphragm in-line seals with their perfectly circular cylindrical form are self-cleaning. Different nominal widths allow the in-line diaphragm seals to be adapted to any pipeline cross-section.



13

Possibilities for combination with diaphragm seals

Assembly of the diaphragm seal and measuring instrument may be made via a rigid connection or a flexible capillary. The "rigid" assembly is made by a direct threaded connection or 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.



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.

Materials and system fill fluids

The standard material for diaphragm seals is stainless steel 316L. Numerous wetted parts are available for nearly all diaphragm versions.

Table 1: Standard wetted part materials for diaphragm seals:

Material	Brief description	Material	Brief description
Stainless steel			Mat. no. 2.4066/2.4068
	1.4541, 1.4542, 1.4539	Platinum	Pt
Duplex 2205	Mat. no. 1.4462	Tantalum	Та
Superduplex	Mat. no. 1.4410	Titanium	Mat. no. 3.7035 / 3.7235
Gold	Au	Zirconium	Zr
Hastelloy C22	Mat. no. 2.4602	Ceramic	wikaramic®
Hastelloy C276	Mat. no. 2.4819	Polytetrafluorethylene	PTFE
Inconel alloy 600	Mat. no. 2.4816	Perfluoralkoxy	PFA
Inconel alloy 625	Mat. no. 2.4856	Copolymer of ethene and	ECTFE (Halar [®])
Incoloy alloy 825	Mat. no. 2.4858	chlortrifluorethylene	
Monel alloy 400	Mat. no. 2.4360	Other materials on request	

System fill fluids

WIKA offers a broad range of system fill fluids between the diaphragm seal and the measuring instrument for a wide variety of applications. For each application specially selected fluids are available.

Name	Identification number	Solidification point	Boiling/ degradation point	S.G. at temperature 25 °C	Kin. viscosity at temperature 25 °C	Notes
	KN	°C	°C	g/cm³	cSt	
Silicone oil	2	-45	+300	0.96	54.5	Standard
Glycerine	7	-35	+240	1.26	759.6	FDA 21 CFR 182.1320
Silicone oil	17	-90	+200	0.92	4.4	for low temperatures
Halocarbon	21	-60	+175	1.89	10.6	for oxygen and chlorine
Methylcyclopentan	30	-130	+60	0.74	0.7	for low temperatures
High-temperatur silicone oil	32	-25	+400	1.06	47.1	for high temperatures
Caustic soda	57	-50	+95	1.24	4.1	
Neobee [®] M-20	59	-35	+260	0.92	10.0	FDA 21 CFR 172.856, 21CFR 174.5
DI water	64	+4	+85	1.00	0.9	for ultrapure media
Silicone oil	68	-75	+250	0.93	10.3	
DI water/propanol mixture	75	-30	+60	0.92	3.6	for ultrapure media
Medicinal white mineral oil	92	-15	+260	0.85	45.3	FDA 21 CFR 172.878, 21 CFR 178.3620(a); USP, EP

Table 2: Standard system fill fluids (others on request):

Note:

The stated lower temperature limit (solidification point) is a pure physical characteristic of the system fill fluid. Calculate and evaluate the resulting response time separately.

The upper temperature limit (boiling/degradation point) for a diaphragm seal system is further restricted by the working pressure and the diaphragm

To determine the upper temperature limit for the individual diaphragm seal system, a calculation is required.

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