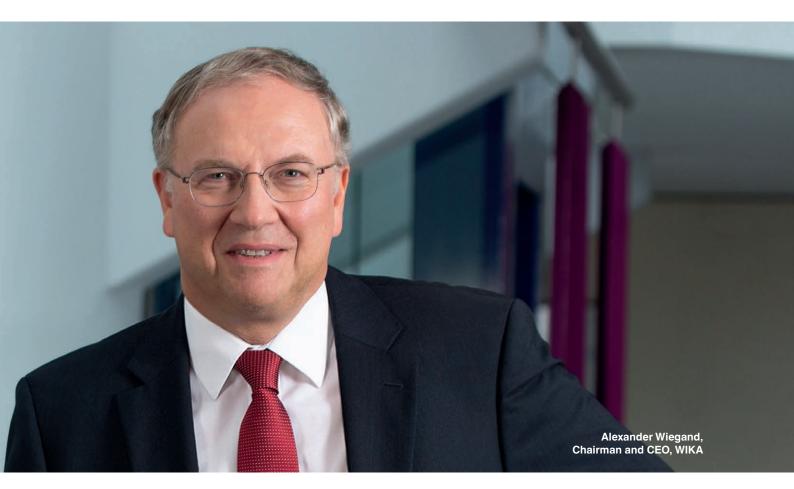


# Diaphragm seals – combinations and accessories





### About us

As a family-run business acting globally, with 10,200 highly qualified employees, the WIKA group of companies is a worldwide leader in pressure and temperature measurement. The company also sets the standard in the measurement of level, force and flow, and in calibration technology.

Founded in 1946, WIKA is today a strong and reliable partner for all the requirements of industrial measurement technology, thanks to a broad portfolio of high-precision instruments and comprehensive services. With manufacturing locations around the globe, WIKA ensures flexibility and the highest delivery performance. Every year, over 50 million quality products, both standard and customer-specific solutions, are delivered in batches of 1 to over 10,000 units.

With numerous wholly owned subsidiaries and partners, WIKA competently and reliably supports its customers worldwide. Our experienced engineers and sales experts are your competent and dependable contacts locally.

### Contents

| Technical information 4                      |    |  |
|--|----|--|
| Diaphragm seal models                        |    |  |
| <ul> <li>With flange connection</li> </ul>   | 8  |  |
| <ul> <li>With threaded connection</li> </ul> | 11 |  |
| <ul> <li>With hygienic connection</li> </ul> | 12 |  |
| Engineered solutions 17                      |    |  |
| Service 18                                   |    |  |
| Accessories                                  | 19 |  |

### **Diaphragm seals**

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



## **Operating principle**

Diaphragm seals are mounted to existing connections, which are welded to a pipeline, a process reactor or a tank.

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. A diaphragm seal and its components are perfectly matched to each other to ensure a reliable measurement.

Diaphragm seals offer the advantage that they can be easily dismounted, e.g. for cleaning or calibration purposes.

#### Pressure measuring instrument

- Pressure gauge
- Process transmitter
- Pressure switch

#### System fill fluid

#### Mounting type

- Direct mounting
- Capillary
- Heat sink

#### Diaphragm

#### Diaphragm seal

- Upper body of diaphragm seal
- Lower body of diaphragm seal

#### Process connection

- Threaded connection
- Flange connection
- Hygienic connection

# Combinations with measuring instruments

WIKA diaphragm seals can be connected to almost all pressure gauges, process transmitters, pressure switches or pressure sensors. Mounting may be made via a direct connection, a cooling element or a capillary.

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

The optimal diaphragm seal designs, materials, system fill fluids and accessories are available for each application. The configuration of the combination of pressure measuring instruments and diaphragm seals depends, among other things, on the application conditions in which the diaphragm seal system must work.

For the diaphragm seals, test certificates and approvals for special applications can be supplied.



#### The realisation of your individual solution



Create your perfect diaphragm seal solution together with us. From the wide variety of realisable combinations, our technology experts will find a proven solution for your application. As required, we will adapt our systems to your individual application.

Talk to us - we are happy to provide you with advice!

### **System fill fluids**



| Designation                   | Identifica-<br>tion num-<br>ber | Solidi-<br>fication<br>point | Boiling/<br>degradation point | Density at<br>25 °C | Kin. Viscosity at 25 °C | Comments   |
|-------------------------------|---------------------------------|------------------------------|-------------------------------|---------------------|-------------------------|--|
|                               | KN                              | °C                           | °C [°F]                       | °C [°F]             | cSt                     |  |
| Silicone oil                  | 2                               | -45                          | +300                          | 0.96                | 54.5                    | Universal application                                  |
| 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                    | Oxygen 1) and chlorine                                 |
| Methylcyclopentane            | 30                              | -130                         | +60                           | 0.74                | 0.7                     | For very low temperatures                              |
| High-temperature silicone oil | 32                              | -25                          | +400                          | 1.06                | 47.1                    | For high temperatures                                  |
| Neobee <sup>®</sup> M-20      | 59                              | -35                          | +260                          | 0.92                | 10.0                    | FDA 21 CFR 172.856, 21 CFR<br>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<br>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<br>178.3620(a); USP, EP, JP |

#### Other system fill fluids on request

Note:

- The stated lower temperature limit is a purely physical characteristic of the system fill fluid. The resulting response time has to be calculated and evaluated separately.
- The upper temperature limit for a diaphragm seal system is further restricted by the operating pressure and the diaphragm. To determine the upper temperature limit for the individual diaphragm seal system, a calculation is required.

<sup>1)</sup> For oxygen applications the following values per BAM test (Federal Institute for Materials Research and Testing) apply:

| Maximum temperature | Maximum oxygen pressure |
|---------------------|-------------------------|
| to 60 °C            | 50 bar                  |
| > 60 °C to 100 °C   | 30 bar                  |
| > 100 °C to 175 °C  | 25 bar                  |

### Materials, coatings

#### **Special materials**

The diaphragm provides for the separation from the medium. The pressure is transmitted to the measuring instrument via the system fill fluid which is inside the diaphragm seal system.

| Materials                           | Unified numbering system<br>(UNS) |
|-------------------------------------|-----------------------------------|
| Tantalum                            | R05200                            |
| Hastelloy C276 2.4819               | N10276                            |
| Hastelloy C22 2.4602                | N06022                            |
| Inconel 600 2.4816                  | N06600                            |
| Incoloy 825 2.4858                  | N08825                            |
| Inconel 625 2.4856                  | N06625                            |
| Monel 400 2.4360                    | N04400                            |
| Nickel 200 (2.4066)                 | N02200                            |
| Nickel 201 (2.4068)                 | N02201                            |
| Titanium 3.7035 (class 2)           | R50400                            |
| Titanium 3.7235 (class 7)           | R52400                            |
| Stainless steel 1.4404 (316L)       | S31603                            |
| Stainless steel 1.4435 (316L)       | S31603                            |
| Stainless steel 1.4539 (904L)       | N08904                            |
| Stainless steel 1.4541 (321)        | S32100                            |
| Stainless steel 1.4571 (316Ti)      | S31635                            |
| Stainless steel 1.4304 (304L)       | S30403                            |
| Stainless steel 1.4466 (urea grade) | S31050                            |
| Stainless steel 1.4542 (630)        | S17400                            |
| Duplex 2205 1.4462                  | S31803                            |
| Superduplex 1.4410                  | S32750                            |
| Zirconium                           | R58120                            |

#### Coatings

Stainless steel with ECTFE

Stainless steel with PFA (FDA; 21 CFR 177.1550 and 21 CFR 177.2440) Stainless steel with antistatic PFA (suitable for Ex applications) Stainless steel with gold plating, various coating thicknesses: ~6, 25, 40 μm Stainless steel with gold-rhodium (gold ~4 μm, rhodium ~0.1 ... ~0.2 μm) Stainless steel with Wikaramic<sup>®</sup>

Other materials and coatings on request



The standard material for diaphragm seals is stainless steel 316L. For the wetted parts, a wide range of steels, special materials and coatings are available for almost all diaphragm seal designs.

### With flange connection

The combinations of diaphragm seals with flange connection can be used for processes with aggressive, adhesive, corrosive, highly viscous, environmentally hazardous or toxic media. With its connection dimensions, the flange-type diaphragm seal is suitable for all currently used standard flanges.

Another modification of this model is the diaphragm seal with extended diaphragm, which, among other things, is used at thick and/or insulated process lines or vessel walls. Cell-type diaphragm seals are used with a blind flange at the process.

Nominal sizes in DN 15  $\dots$  125 and DN  $\frac{1}{2}^{"}$   $\dots$  5". Standards in EN, ASME (former ANSI), GOST, API and JIS

#### Internal diaphragm

| 990.12       |  | 990.16            |   | 990.45           |  |  |
|--------------|--|-------------------|---|------------------|--|--|
| Threaded d   | esign  | High-press        | High-pressure version   |                  | High-temperature version   |  |
|              |  |                   |   |                  |  |  |
| Application  | General applications in<br>the process industry; for<br>small flange connections<br>(≤ DN 25/1") and pressures<br>≥ 40 bar | Application<br>PN | Process industry; for<br>small flange connections<br>( $\leq$ DN 25/1") and pressures<br>$\geq$ 400 bar<br>400 (class 2500) | Application      | <ul> <li>Process industry with<br/>particularly high medium<br/>temperatures from 360 °C<br/>[680 °F] to a maximum of<br/>450 °C [842 °F]</li> </ul> |  |
| PN           | 10 250 bar<br>(class 150 1500)   | Data sheet        | DS 99.08  | PN<br>Data sheet | 40 bar (class 400 600)<br>DS 99.45   |  |
| Data sheet   | DS 99.31   |                   |   |                  |  |  |
| 990.26       |  | 990.41            |   |                  |  |  |
| Internal dia | phragm   | Large work        | ing volume, threaded design   |                  |  |  |
|              | an and a second  |                   |   |                  |  |  |
| Application  | Process industry; for  | Application       | For mounting to pressure  |                  |  |  |

measuring instruments for differential pressure or for low

10 ... 100 bar (class 150 ... 300)

pressures.

DS 99.32

PN

Data sheet

| small flange connections<br>(≤ DN 25/1") |
|--|
| 10 40 bar (class 150 300)                |
| DS 99.26                                 |
|  |

#### Flush diaphragm

| 990.28      |   | 990.29      |  | 990.35        |  |
|-------------|---|-------------|--|---------------|--|
| Cell-type   |   | Flange-type | with extended diaphragm  | Cell-type wit | h extended diaphragm   |
|             |   |             |  |               |  |
| Application | Process and petrochemical<br>industries with high measuring<br>requirements | Application | Process and petrochemical<br>industries, particularly for thick<br>or insulated vessel walls | Application   | Process and petrochemical<br>industries, particularly for thick<br>or insulated vessel walls |
| PN          | 10 100 (400) bar<br>(class 150 2500)  | PN          | 10 100 (400) bar<br>(class 150 2500)   | PN            | 10 100 (400) bar<br>(class 150 600)  |
| Data sheet  | DS 99.28  | Data sheet  | DS 99.29   | Data sheet    | DS 99.30   |

### 990.27

Flush diaphragm



| Application | Process and petrochemical<br>industries with high measuring<br>requirements |
|-------------|---|
| PN          | 10 250 (400) bar<br>(class 150 2500)  |
| Data sheet  | DS 99.27  |

### 990.23

With rotatable retainer flange



| Application | For use in the pulp and paper industry |
|-------------|--|
| PN          | 40 bar<br>(class 400 / 600)            |
| Data sheet  | DS 99.34                               |

### With flange connection

By using welding flanges for the connection to the process, a compact assembly can be realised at the measuring point with block flanges or saddle flanges. In addition, stress from vibration, potential leakage points and installation and maintenance costs are reduced. The measuring instrument is in a vertical position. Depending on the pressure rating, the fixing is made using a different number of screws.

The process connection is realised directly at the flange.

#### Flush diaphragm for installation via block or saddle flange



#### In-line diaphragm seals

| 981.10      |  | 981.27      |  |  |
|-------------|--|-------------|--|--|
| Cell-type   |  | Flange-type |  |  |
|             |  |             |  |  |
| Application | For direct, permanent instal-<br>lation in pipelines; for flowing<br>media; for measuring points<br>free of dead space | Application | For direct, permanent instal-<br>lation in pipelines; for flowing<br>media; for measuring points<br>free of dead space |  |
| PN max.     | 400 bar (class 150 2500)   | PN max.     | 16 or 40 bar (class 150 300)   |  |
| Data sheet  | DS 98.28   | Data sheet  | DS 98.27   |  |

### With threaded connection

The combinations of diaphragm seals with threaded connection can be used for processes with aggressive, corrosive, environmentally hazardous or toxic media. The diaphragm seals are available with female or male thread in their basic design.

The wide variety of available process connections enables many different adaptations without any problems.

Process connections with female or male threads in G 1/4 ... 1 1/2 and 1/4 ... 11/2 NPT.



#### 990.34

Welded design



| Application | Machine-building, plant-con-<br>struction and process-industry<br>applications with high require-<br>ments |
|-------------|--|
| PN          | 160, 400, 600 or 1,000 bar   |
| Data sheet  | DS 99.04   |

### 990.40

Large working volume, threaded design



| Application | For mounting to pressure<br>measuring instruments for<br>differential pressure or for low<br>pressures. |
|-------------|---|
| PN max.     | 40 bar  |
| Data sheet  | DS 99.06  |

## With hygienic connection

#### These combinations of diaphragm seals with pressure measuring instruments in hygienic design can be used for processes with gases, compressed air or vapour and also with liquid, pasty, powdery and crystallising media.

The diaphragm seals resist the temperatures that occur and meet the requirements for sterile connections.

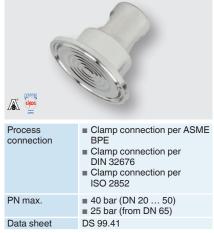
SIP and CIP criteria, which are an essential requirement for sanitary applications, are met by using WIKA diaphragm seals.

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 in-line diaphragm seals meets the stringent demands made on hygienic instrumentation and is suitable for even the most difficult measuring requirements.

#### 990.22, 990.52, 990.53

## **Clamp connection**









#### **Threaded connections**

| 990.18<br>Milk thread f | fitting per DIN 11851               | 990.19<br>Threaded co | nnection SMS standard               | 990.20<br>Threaded cor | nnection IDF standard         |
|-------------------------|-------------------------------------|-----------------------|-------------------------------------|------------------------|-------------------------------|
|                         |                                     | Ĩ                     |                                     |                        |                               |
| Process connection      | Grooved union nut/threaded coupling | Process connection    | Grooved union nut/threaded coupling | Process connection     | Thread with grooved union nut |
| PN max.                 | 40 or 25 bar                        | PN max.               | 40 or 25 bar                        | PN max.                | 40 or 25 bar                  |
| Data sheet              | DS 99.40                            | Data sheet            | DS 99.40                            | Data sheet             | DS 99.40                      |

#### Homogenisers

990.21

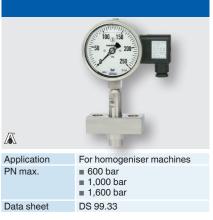
Threaded connection APV-RJT standard



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

#### 990.30

#### For homogenisers



The model 990.30 mechanical pressure measuring instrument has been specifically developed for homogenising processes, where there are extremely dynamic pressure loads.

Complex structural features allow pressures of up to 2,500 bar and ensure a long service life.

### With hygienic connection

#### Manufacturer-specific connections

#### 990.60

**NEUMO BioControl®** 



| Process    | For installation into the NEUMO |
|------------|---------------------------------|
| connection | BioControl <sup>®</sup> system  |
| PN max.    | 16 bar (size 50 80)             |
|            | 70 bar (size 25)                |
| Data sheet | DS 99.55                        |



connection PN max. Data sheet

910.60

16 bar AC 09.14





990.50 **NEUMO BioConnect® connection** 



BioControl® and BioConnect® are registered trademarks of the company NEUMO. VARINLINE® is a registered trademark of the company GEA Tuchenhagen GmbH.

The in-line diaphragm seal is perfectly suited for use with flowing media. With the seal being completely integrated into the process line, measurements do not cause any disturbing turbulences, corners, dead spaces or other obstructions in the flow direction. The in-line diaphragm seal is clamped directly into the pipeline. With in-line diaphragm seals with their perfectly circular cylindrical form, the medium flows through unhindered and effects the self-cleaning of the measuring chamber. Different nominal widths allow the in-line diaphragm seals to be adapted to any pipeline cross-section.

#### In-line diaphragm seals

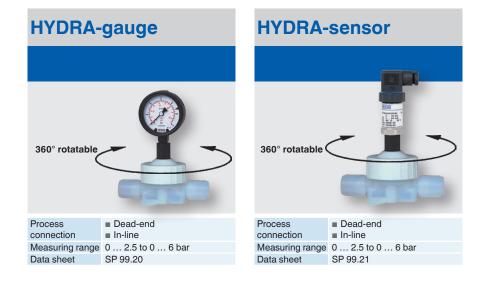
| 981.18                |  | 981.22             |  |
|-----------------------|--|--------------------|--|
| Milk thread fit       | ting DIN 11851                                 | TRI-CLAMP®         | )  |
|                       |  |                    |  |
| Process<br>connection | Thread   | Process connection | TRI-CLAMP®, clamp DIN 32676, ISO 2852                              |
| PN max.               | ■ 40 bar (DN 20 … 40)<br>■ 25 bar (from DN 50) | PN max.            | <ul> <li>40 bar (DN 20 40)</li> <li>25 bar (from DN 50)</li> </ul> |
| Data sheet            | DS 98.40                                       | Data sheet         | DS 98.52   |

| 981.50   |   | 981.51                |   |
|--|---|-----------------------|---|
| NEUMO BioConnect®                              |   | Aseptic connection    |   |
|  |   |                       |   |
| Process<br>connection<br>PN max.<br>Data sheet | NEUMO BioCon-<br>nect <sup>®</sup> thread or flange<br>■ 16 bar (thread)<br>■ 70 bar (flange)<br>DS 98.50 | Process<br>connection | <ul> <li>DIN 11864-1 threaded<br/>connection</li> <li>DIN 11864-2 flange</li> <li>DIN 11864-3 clamp connec-<br/>tion</li> </ul> |
|  |   | PN max.<br>Data sheet | 16 40 bar<br>DS 98.51   |

### **HYDRA-line diaphragm seal systems**

This product family has 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 doublediaphragm 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. Any falsification of the measuring result or the destruction of the sensor element is avoided.

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



### **Diaphragm monitoring**

WIKA's patented double-diaphragm design is the solution for critical processes where neither the medium should find its way into the environment, nor should the system fill fluid find its way into the product.

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

#### **DMS27**

Diaphragm monitoring system with flange connection





#### **DMS34**

Diaphragm monitoring system with threaded connection

Threaded connection

Process industry

Monel

DS 95.18

PATENTED US 2018180505, DE 102016015447. CN 108240885

Process

Material

connection

Application

Data sheet

#### **DMS-FP**

Diaphragm monitoring system with hygienic connection

PATENTED US 2018180505, DE 102016015447 CN 108240885





| Process<br>connection | Clamp connection per<br>DIN 32676            |
|-----------------------|--|
| Application           | Sanitary applications                        |
| Material              | Stainless steel 1.4435 (316L),<br>UNS S31603 |
| Data sheet            | DS 95.20                                     |

#### **Process connections**

| DMSU21SA   |   |  |
|--|---|--|
| Diaphragm monitoring system with<br>HART <sup>®</sup> protocol |   |  |
| US 10794787,<br>NL 2019251                                     |   |  |
| Process<br>connection  | <ul> <li>Clamp connection per<br/>DIN 32676 or ISO 2852</li> <li>Aseptic threaded pipe<br/>connection per DIN 11864-1</li> <li>Aseptic flange connection per<br/>DIN 11864-2</li> <li>Aseptic clamp connection per<br/>DIN 11864-3</li> <li>Ingold connection with union<br/>nut</li> <li>VARIVENT<sup>®</sup></li> </ul> |  |
| Application  | Pharmaceutical industry and<br>aseptic food processing  |  |
| Material   | Stainless steel 1.4435 (316L)<br>UNS S1603  |  |
| Data sheet   | DS 95.11  |  |



Extensive information can be found in the flyer "Diaphragm monitoring for diaphragm seals" at www.wika.de.

### Service for diaphragm seal systems

Process transmitter model DPT-10 with two diaphragm seals Has your system failed unexpectedly and a smooth process flow is no longer possible?

Send us your instrument and we will restore its functionality in line with your wishes.

Through our globally established service centres we can support you at any location and guarantee short delivery times.

> Extensive information can be found in our flyer "Replacement service for diaphragm seal systems with process transmitters" at www.wika.de.



Replacement service for diaphragm seal systems with process transmitters

> WIKA Fort of your business

WIKA Fren et yeer basisen

### Order catalogue "Diaphragm seal systems with short delivery times"

These combinations of diaphragm seals with pressure measuring instruments particularly stand out for their very fast availability.

Universally applicable diaphragm seal systems are suitable for demanding applications in diverse industries.



Extensive information can be found in our brochure "Diaphragm seal systems with short delivery times" at www.wika.de.

### Accessories

- Flushing rings
- Block and saddle flanges
- Plug screws
- Valves
- Instrument mounting brackets and adapters
- Union nuts
- Transition pieces
- Connection adapters, e.g. VARINLINE<sup>®</sup>, clamp, aseptic, welding sleeves, weld stubs
- Indicator for panel mounting

### **Certificates and approvals**

Given the increasing demands in terms of quality and product safety of industrial products, certified measuring instruments for pressure contribute considerably to the safety of the production processes. Therefore we offer a wide range of approvals and certificates.





#### **Tests**

- PMI test
- Roughness measurement
- Coating thickness measurement
- Dye penetrant test
- Surface roughness
- Leak test
- Pressure test

#### **Approvals**

- Pressure equipment directive
- EHEDG
- 3-AFDA
- NACE
- BAM
- EAC
- GOST
- ATEX

#### Certificates

- Ingress protection
- Material proof
- RoHS
- Oil- and grease-free
- Accuracies of the span
- Switching accuracy
- Indication accuracy
- Food contact materials



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