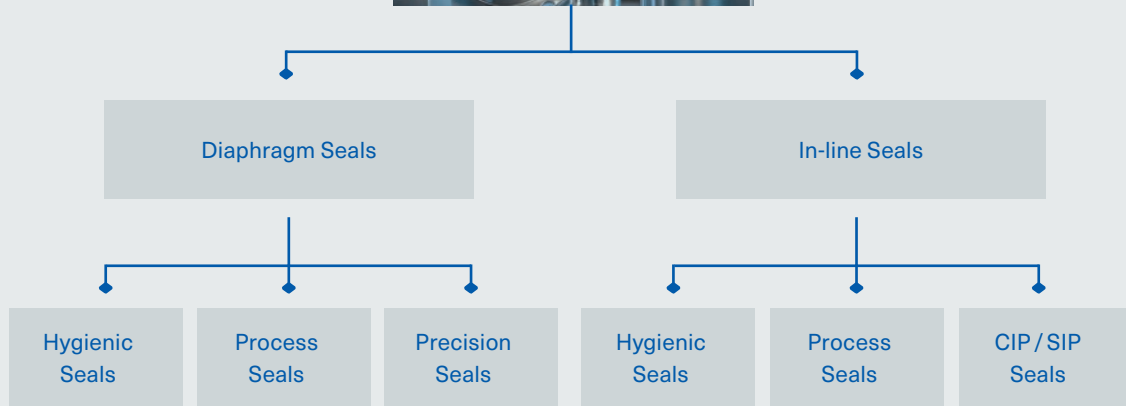


ARMANO



## Chemical Seal Mounting



## Quality Made in Germany

### Chemical Seals

The ARMANO Messtechnik GmbH represents tradition and innovation in the production and distribution of precision pressure and temperature measuring instruments, which have an excellent reputation worldwide – for more than 100 years.

We are continually developing customer-specific solutions for a variety of applications requiring pressure and temperature measuring technology. Their use is manifold and there are always new applications.

In this brochure, you will find our range of diaphragm seals and in-line seals.

Your instrument is not listed here? Jointly, we will find a suitable solution for your application.

Do not hesitate to contact us!

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## Our Products at a Glance



Mechanical Pressure Measurement



Electronic Pressure Measurement



Chemical Seal Mounting



Calibration Technology



Mechanical Temperature Measurement



Electrical Temperature Measurement



Thermowells & Accessories

## Certificates and Approvals

Our company is certified according to the highest quality standards and our product portfolio meets the highest quality demands. We do not only manufacture according to product-specific instrument standards, we also offer versions with special approvals for application areas with specific requirements. The ARMANO Messtechnik GmbH is certified according to DIN EN ISO 9001.



SIL 2  
SIL 3



## Application

### Application Fields of Chemical Seals

Due to their design, pressure measuring instruments often have orifices, shoulders and undercuts. A lot of media might clog the pressure measuring instrument and in food and pharmaceutical applications bacteria and viruses can accumulate.

Aggressive media cause corrosion damage in the pressure measuring instrument. In such cases of application, chemical seals offer a solution. They extend the fields of application of measuring instruments for pressure, vacuum, compound ranges, absolute and differential pressure, i.e. Bourdon tube pressure gauges, pressure switches, transmitters and pressure transducers. Here, pressure ranges of just a few mbar up to 3000 bar and higher can be realised.

Chemical seals can be mounted directly, or via cooling element/capillary line between chemical seal and measuring instrument (see page 14).

Chemical seals consist of a body with process connection and a diaphragm or tube as separating element, which prevents the medium from entering the measuring unit or sensor element.



### Chemical Seals are Mounted to the Measuring Instrument ...

- ◆ if the **medium must not enter the measuring unit**, e.g. in case of heterogeneous, viscous media, or media that tend to harden or crystallise and thus might clog parts such as pressure inlet port and Bourdon tube.
- ◆ if, due to **corrosion resistance**, the wetted parts have to be made of special materials that are not suitable for the construction of elastic elements for pressure measuring instruments.
- ◆ if the **medium is toxic or environmentally hazardous** and must not be able to enter the environment or the atmosphere, e.g. in case of leakage of the measuring element due to overload or wear. Chemical seals offer effective additional protection by separating the medium from the measuring element.
- ◆ if processes and regulations place particularly **high demands on hygiene**, e.g. in the food/bio/pharmaceutical industries (free of wetted dead spaces, very good cleaning possibilities). ARMANO also offers EHEDG and 3-A certified instruments for these applications.
- ◆ if the **ambient temperature at the measuring point or the temperature of the medium is too high for the measuring instrument**. By using a chemical seal with cooling element or capillary line, the measuring instrument can be separated from the temperature.
- ◆ if the **installation conditions at the measuring point are unfavourable** or if mechanical vibrations and pulsations should be kept away from the measuring instrument. By using a chemical seal with capillary line it is possible to separate the measuring instrument from the measuring point and mount it at a suitable location.

## Construction Types

### Connection to the Process

The most commonly used chemical seal types are diaphragm seals and in-line seals. The diaphragm seal is coupled to the medium, whereas the in-line seal can be inserted into the medium flow.

### Diaphragm Seals

Diaphragm seals are available in a variety of flange, process and hygienic fittings. This ensures easy adaption of the diaphragm seals to pipelines and vessel walls by means of T-pieces or tube sockets.

Diaphragm seals are available in a wide range of special materials and coatings, enabling even pressure measurements of highly corrosive media.

Electrochemical finishing (electropolishing) in-house provides ARMANO diaphragm seals with the very high surface qualities that are standard in food / bio / pharmaceutical industries.



### In-line Seals

In-line seals are used in the medium flow. The measuring membrane is tubular and offers metrological advantages over diaphragm seals, especially for small tube diameters. Due to their self-draining design and the construction free of dead spaces, in-line seals are particularly appreciated in the food and pharmaceutical industries.

Using the in-house CIP / SIP cleaning system, ARMANO has developed in-line seals that can withstand this demanding cleaning process.

Even extremely small in-line seals with a nominal diameter of up to 10 mm can be manufactured and are applied for particularly high-quality media in the pharmaceutical industry.



## Membrane

The membrane is an elastic separating element. It can be manufactured from a wide range of materials and, if necessary, provided with a protection foil or coating, thus ensuring that suitable versions are available for almost any medium.

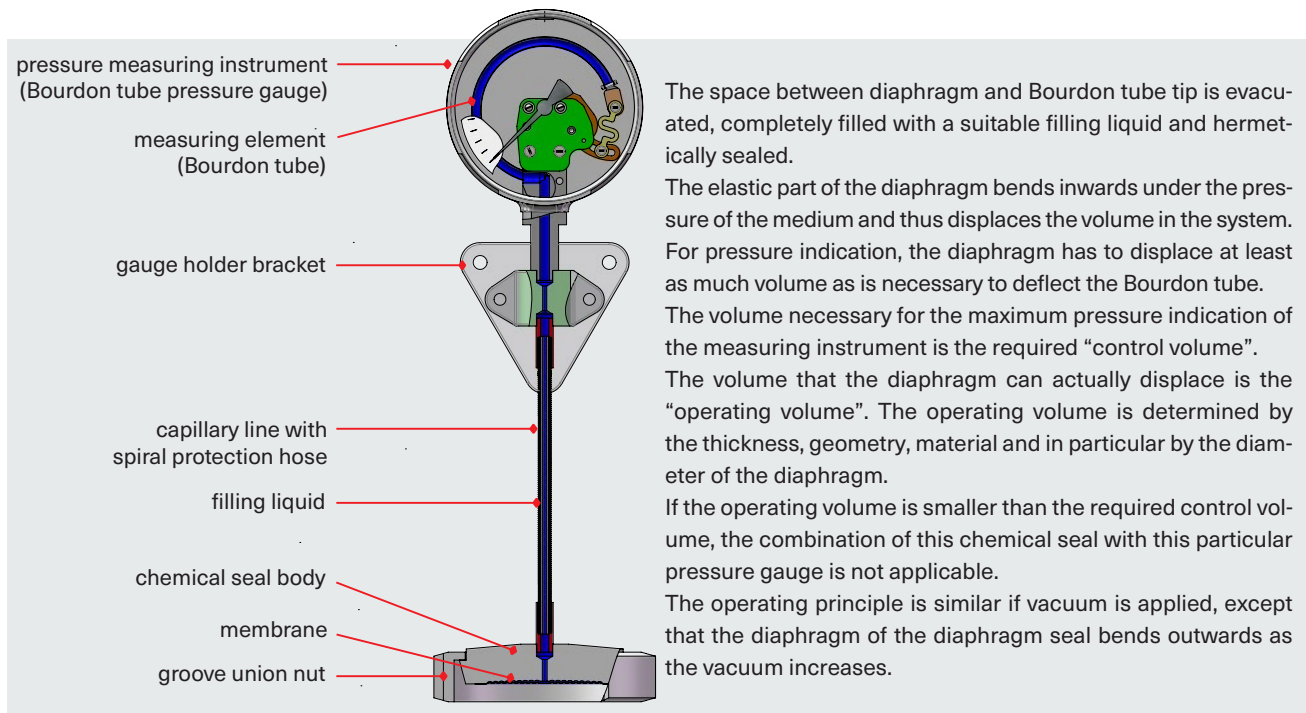
Thickness depending on version: 30 µm to 200 µm  
Processing: mainly laser-welded

The membrane must not be touched improperly. Any contact with hard objects or high-pressure water jets, etc. can cause permanent damage.



## Operating Principle of Chemical Seals

The essential part of a chemical seal is the usually welded separating element, which can be a diaphragm, a tube or an immersion shaft tube. This separating element is not a measuring element such as an up to 1 mm thick diaphragm (cf. model overview 3000), which transfers the medium pressure via a fixed connection to an indicating pointer move. It rather serves to keep the medium away from the actual measuring system with the least possible influence on the measuring result. The most common chemical seals are diaphragm seals mounted on Bourdon tube pressure gauges. Thus, the basic operating principles are explained below based on this construction type.



### The Structure Pattern of the Chemical Seal Separating Membrane

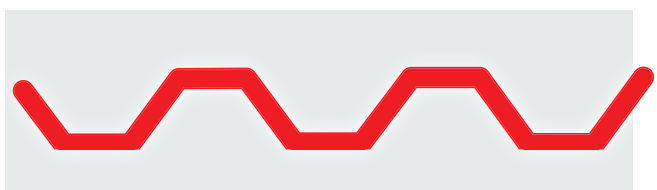
A standard chemical seal separating membrane from ARMANO has a concentric structure pattern that resembles a sine wave. The pattern guarantees that the membrane operates with very small measuring errors. The sinus membrane geometry ensures that the measuring error is as small as possible and that it is linear. Over a wide range, the characteristic curve of the sinus membrane can be described as a linear equation. The sinus membrane geometry is widely used and can be applied easily for pressure measuring instruments with a measuring error of up to 0.5 %.

For precision applications, such as the use of mechanical and electrical process pressure measuring instruments, which often have accuracies < 0.5 %, ARMANO has developed the High-Soft Membrane. This membrane can compensate very large volume fluctuations with almost no counteracting force. In comparison to the sinus membrane geometry, here the membrane-related measuring error is smaller by a factor of 100. ARMANO supplies many standard chemical seals with a high-soft membrane at no extra cost.

Sinus Membrane



High-Soft Membrane



## Process-related Influences

If the measuring task cannot be solved with standard pressure measuring instruments, diaphragm seals or in-line seals are applied. The list of influencing factors includes, for example, the aggressiveness of the medium, the excessive temperatures or the required sterility.

A measuring point with chemical seal can only meet the requirements in an optimal way if all influencing factors are known. For your support, ARMANO offers checklists with which a chemical seal measuring point can be easily described. These checklists can be downloaded from the ARMANO website.

The following should be known about the process and the measuring point:

### Important Process Parameters



- ◆ What kind of medium is to be measured?
- ◆ What is the viscosity of the medium?
- ◆ What is the aggregate state of the medium?
- ◆ What is the process pressure?
- ◆ What is the process temperature?
- ◆ Is there any pulsation?
- ◆ Is there negative pressure / vacuum?



### Important Ambient Parameters



- ◆ What are the mounting conditions of the measuring instrument?
- ◆ Which type of pressure (e.g. vacuum) is measured?
- ◆ What is the ambient temperature range?
- ◆ Is there any vibration?



### Important Cleaning Parameters



- ◆ What is the cleaning temperature?
- ◆ Which cleaning agent is used?
- ◆ Is cleaning or sterilisation carried out with steam?
- ◆ Is cleaning carried out with pressurised water?
- ◆ Are the measuring devices sterilised or autoclaved?
- ◆ Is cleaning carried out in the process (CIP / SIP)?



### Are there any certifications required?



- ◆ EHEDG, 3-A or FDA in food and pharmaceutical sectors
- ◆ NACE MR0175 for the oil production
- ◆ NACE MR0103 for oil processing
- ◆ GOST approvals for Eastern Europe
- ◆ CRN approval for the use of pressure measuring instruments in Canada
- ◆ Stamp confirmation certificate according to AD 2000W





## Metrological Influences

In addition to process-related factors, there are also metrological factors that must be considered when designing a chemical seal to ensure that the measuring instrument and the mounted chemical seals function as expected. If the metrological influencing factors are well-known, the metrological properties of the chemical seal system can be mathematically calculated in advance.

### The following data are required for a chemical seal calculation:



- ◆ Medium temperature
- ◆ Ambient temperature at the pressure measuring instrument, or the temperature range to be expected
- ◆ Instrument-specific factors, such as filling volume and control volume
- ◆ Mounting of the pressure measuring instrument to the chemical seal, e.g. length of the capillary line, height differences of the chemical seals for tank measurements
- ◆ Depending on the distance between chemical seal and pressure measuring instrument, a response delay occurs, the so-called floating time

### Temperature

Depending on version and filling, chemical seals are available for process temperatures from  $-90\text{ °C}$  to  $+400\text{ °C}$ .

The standard reference temperature for chemical seal systems with attached measuring instrument is  $+20\text{ °C}$ .

Deviating ambient or medium temperatures cause a volume change of the filling liquid. This changes the pressure within the system, which causes an additional indication error.

For inquiries and orders, temperatures deviating from  $+20\text{ °C}$  (min./max. values, if applicable) must be indicated by all means, so that the version and the calibration can be optimised for the operating conditions.

#### The temperature influences can be reduced by

- ◆ suitable filling liquids
- ◆ selecting the largest possible diameter of the membrane
- ◆ keeping the volume in the system as small as possible
- ◆ keeping the measuring instrument away from the temperature by mounting a capillary line or a cooling element between chemical seal and measuring instrument (strongly recommended for temperatures above  $+100\text{ °C}$ !)

#### Operating and cleaning temperature

We differentiate between operating temperature ( $t_A$ ) and cleaning temperature ( $t_R$ ), especially for instruments for the food / bio / pharmaceutical industries.

- ◆  $t_A$  is the operating temperature at the membrane (process temperature).  
Our instruments are adjusted for  $t_A +20\text{ °C}$  as standard. Adjustments for other operating temperatures are optionally available.
- ◆  $t_R$  is the maximum permissible temperature during cleaning / sterilisation processes (without pressure indication). The standard maximum permissible cleaning temperature for our chemical seal series MDM 73... and RDM 763... is  $+150\text{ °C}$ . (There are restrictions for a few types and nominal widths). CIP/SIP cleaning is possible for separately approved diaphragm seals. Autoclavable pressure measuring instruments are available as well.

### Height Difference (for Instruments with Capillary Line)

If the measuring device and the chemical seal are not on the same reference plane, this difference in height affects the measurement due to the hydrostatic pressure of the liquid column.

When ordering, it is absolutely necessary to specify a height difference to ensure that any resulting measurement error can be compensated by appropriate calibration.

In general, the following applies to chemical seals with capillary line:

If vacuum occurs or can occur, the pressure measuring instrument must be mounted at least 40 cm below the chemical seal!

### Floating Time

The indication may be delayed in systems with capillary line. This delay is called floating time and may be intentional for additional damping in certain cases. The floating time is affected by:

- ◆ the viscosity of the filling liquid
- ◆ the internal diameter of the capillary line
- ◆ the length of the capillary line
- ◆ the control volume of the measuring instrument

## Process Connection

Depending on the industry, certain process connection types have been established, e.g. flanges are generally used by customers in the chemical or petrochemical industry, while so-called clamp connections are frequently requested in the pharmaceutical sector. To support our customers with the selection, we have divided our chemical seals into product families.

|                          |   |                                |   |
|--------------------------|---|--------------------------------|---|
| <b>Flange connection</b> | <b>for chemical and petrochemical industries</b>  | <b>(e.g. data sheets 75..)</b> | ✓ |
| <b>Clamp connection</b>  | <b>for food / bio / pharmaceutical industries</b> | <b>(e.g. data sheets 73..)</b> | ✓ |
| <b>Thread connection</b> | <b>for engineering and plant construction</b>     | <b>(e.g. data sheets 74..)</b> | ✓ |

Chemical seals with process connections according to a wide range of standards and in various nominal sizes from our standard product range are available from stock. In addition, we manufacture numerous customer-specific special versions.

## Instrument Connection

### ..vd8 ✓

Direct welding of the chemical seal to the measuring instrument has been standard for years and is superior to screwed chemical seals, e.g. for hygienic design diaphragm seals.

#### DW-Line (Double Weld)

In order to meet the special requirements even more effectively, especially in the food / bio / pharmaceutical industries, ARMANO has developed the DW-Line pressure gauges for chemical seal mounting.

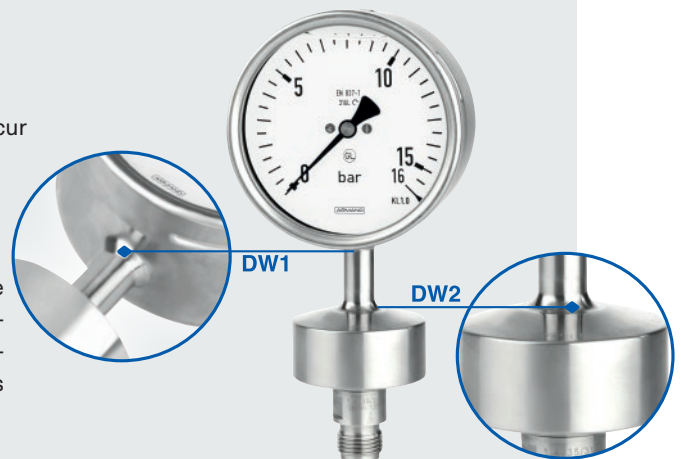
In contrast to the classical mounting versions, the DW-Line pressure gauges have special design features that significantly improve the DW-Line chemical seal system.

DW – Double Weld are Bourdon tube pressure gauges, which are welded to the chemical seal. The case of the pressure gauge is welded to the circular connecting piece (DW1) and the circular connecting piece is welded to the chemical seal (DW2). For this purpose, the circular connecting piece has a d8x5 process connection and the chemical seal has a corresponding bore.

#### Advantages:

- ◆ Pressure gauge welded to chemical seal – not screwed
- ◆ The filling port is within the pressure gauge – no leakage can occur
- ◆ No loss of filling liquid due to temperature change
- ◆ Reduced temperature error due to less filling liquid
- ◆ Standard front-to-back sizes

DW-Line pressure gauges are available over a wide pressure range and in all common case sizes. DW-Line pressure gauges with nominal case sizes 63 and 100 can be supplied as SDL DW-Line measuring device in combination with the common hygienic connections particularly fast and at a reasonable price.



### ..vG ½ female ✓

Of course, ARMANO also offers classical chemical seals with a G ½ or M20x1.5 female thread connection screwed to the pressure measuring instrument.

### Other Connections ✓

Several thread options are available, whereas we do not recommend NPT connections.

# Materials

## For Each Task the Right Material

In many applications, chemical seals are fitted if the medium must not come into contact with the measuring instrument because the medium causes corrosion in the pressure measuring instrument. In other areas of application, a non-stick coating or a protective barrier against gas diffusion / permeation is necessary.

Depending on the medium, different materials are applied, with our standard material stainless steel 316L being used in a large number of applications. If the requirements concerning the necessary resistance are increasing, we have several further materials that can be applied.

Coatings and foils on the membrane or other wetted parts further enhance the resistance for the application of critical media. Especially regarding media that must be locked against diffusion (permeation)<sup>1)</sup>, chemical seals offer special protection with the application of additional corresponding coatings.

Basically, the wetted parts of a chemical seal should always be made of a suitable material. This can be achieved in three ways:

- Homogeneous Chemical Seal**  
Chemical seal body and the membrane are made of one material
- Two-phase Chemical Seal**  
Chemical seal body is made of high-strength material (e.g. 316L) and wetted parts are made of special material
- Coated Chemical Seal**  
Chemical seal body is made of high-strength material and wetted parts are coated

## Overview of the Materials

|                 |              |                |       |
|-----------------|--------------|----------------|-------|
| Stainless steel | Yellow       | PTFE (grey)    | Green |
| Duplex steel    | Yellow       | PTFE (black)   | Green |
| Titanium        | Yellow       | PTC            | Green |
| Tantalum        | Blue         | PFA            | Green |
| Monel           | Yellow, Blue | PFA (rot)      | Green |
| Inconel         | Yellow, Blue | Gold           | Green |
| Hastelloy       | Yellow, Blue | ECTFE (Halar®) | Green |
| Nickel          | Yellow, Blue | Rubber coating | Green |

**The following factors may change the process suitability of the materials incl. membrane, wetted parts and coatings:**

- ◆ temperature
- ◆ pressure
- ◆ oxidising environments
- ◆ applied sealing materials or seals
- ◆ position of installation
- ◆ medium composition
- ◆ chemical / mechanical medium properties (abrasion)

<sup>1)</sup> Permeation is the superordinate term for diffusion. At permeation, the medium (e.g. chemicals) permeates the protective coating of the chemical seal and may damage it. In order to avoid this process, materials offering sufficient protection have to be applied.

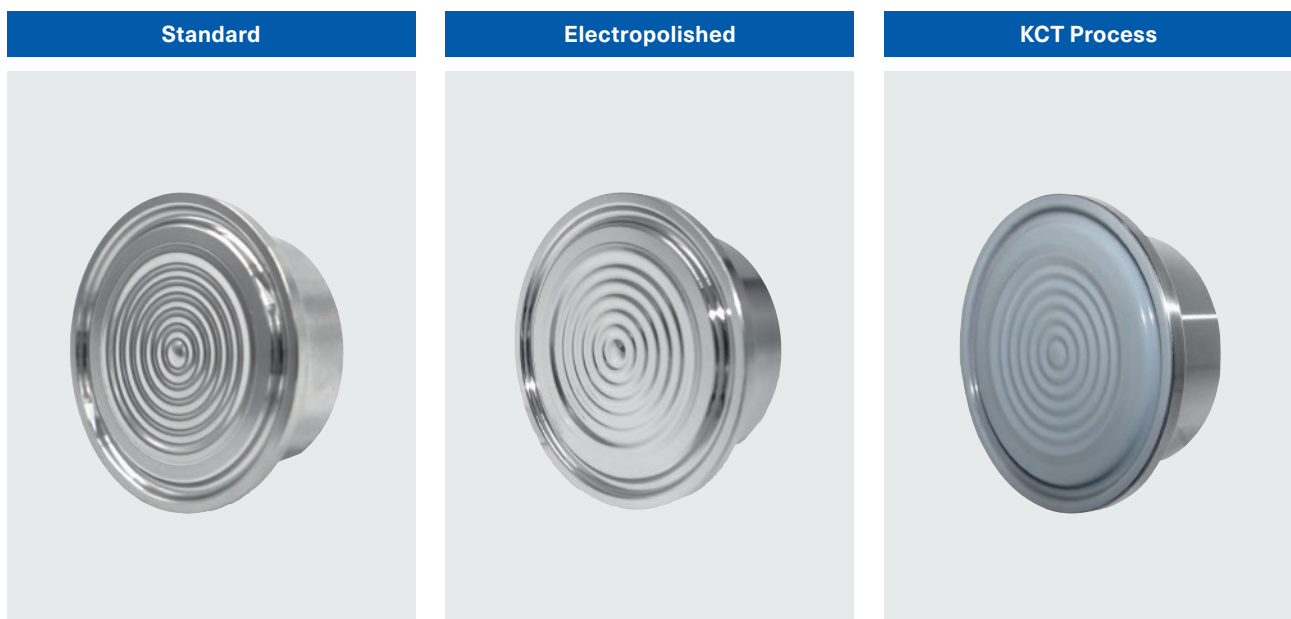
## Surface Quality

### Requirements on the Surface Quality

In addition to the non-stick properties obtained e.g. by PTFE coatings, the surface finish of the wetted parts plays an important role, especially in food / bio / pharmaceutical industries. Here, residue-free cleaning is required and recesses in which bacteria or fungi could grow are to be avoided.

Many hygienic chemical seals from ARMANO have EHEDG and 3-A approvals, which confirm their good cleaning properties and surface quality.

An essential aspect for the protection of food / bio and pharmaceutical products against contamination is the hygienic design of the chemical seals. Roughness values such as  $R_a$  0.8  $\mu\text{m}$  to  $R_a$  0.2  $\mu\text{m}$  (electropolished) serve as quality characteristics. The surface roughness should be smaller than the size of the substances adhering to the surface in order to achieve a direct wetting of the residual dirt with cleaning-active substances during the cleaning phase.



## Tightness

### Absolutely Leakage-free

Each chemical seal is subjected to a helium leak test up to  $10^{-9}$  mbar l/s after the membrane has been welded in. The complete measuring system is checked again shortly before the filling process. This ensures that all connections of the finished system are absolutely leakage-free, otherwise filling fluid leaks and the pressure measuring system loses its functionality.

## Filling Liquids

The selection of the filling liquids is crucial for the operating temperature range of a chemical seal. Both minimum and maximum medium and ambient temperatures must be taken into account when selecting the appropriate filling.

In addition, the filling liquid must be compatible with the medium, especially for media such as oxygen and chlorine, or for devices for food/bio/pharmaceutical industries. This is necessary in the rare case that a membrane is damaged, e.g. due to particles in the medium, and filling liquid enters the medium.

| Filling Liquid  |               | Permissible Medium Temperatures <sup>1)</sup> |               | Density g/cm <sup>3</sup> at 20 °C | Dynamic Viscosity kg/m x s at 20 °C | Coefficient of Compressibility 1 / bar x 10 <sup>-5</sup> | Coefficient of Volume Expansion 1 / °C | Specifics   |
|---|---------------|---|---------------|------------------------------------|-------------------------------------|---|--|---|
| External Name   | Ordering Code | Vacuum <sup>2)</sup>                          | Pressure      |                                    |                                     |   |  |   |
| <b>General Applications</b>                             |               |   |               |                                    |                                     |   |  |   |
| Silicone oil  | FA1           | –   | –20 / +200 °C | 0.97                               | 0.337                               | 10.1  | 0.00 092                               |   |
| Silicone oil  | FA2           | –90 / +80 °C                                  | –90 / +120 °C | 0.92                               | 0.004                               | 9.3   | 0.00 113                               |   |
| Silicone oil  | FA5           | –40 / +180 °C                                 | –40 / +400 °C | 0.96                               | 0.048                               | 9.8   | 0.00 100                               |   |
| Silicone oil  | FA6           | –40 / +180 °C                                 | –40 / +300 °C | 0.96                               | 0.048                               | 10.1  | 0.00 100                               |   |
| <b>Food / Bio / Pharmaceutical Applications</b>         |               |   |               |                                    |                                     |   |  |   |
| Vegetable oil   | FN1           | –10 / +200 °C                                 | –10 / +300 °C | 0.91                               | 0.063                               | 6.5   | 0.00 082                               | FDA   |
| White oil (paraffin oil)                                | FN2           | –10 / +150 °C                                 | –10 / +300 °C | 0.87                               | 0.066                               | 8.5   | 0.00 087                               | FDA, silicone-free                                      |
| Glycerin  | FN3           | –   | 10 – 200 °C   | 1.26                               | 1.410                               | 2.2   | 0.00 050                               | FDA, for O <sub>2</sub> up to 60 °C / 25 bar            |
| Glycerin / water  | FN4           | –   | –10 / +120 °C | 1.23                               | 0.150                               | 2.5   | 0.00 050                               |   |
| Neobee®   | FN7           | –10 / +130 °C                                 | –20 / +200 °C | 0.92                               | 0.0111                              | 8.6   | 0.00 086                               | FDA   |
| <b>Oxygen Applications, Chlorine Applications, etc.</b> |               |   |               |                                    |                                     |   |  |   |
| Halocarbon  | FO1           | –40 / +80 °C                                  | –40 / +175 °C | 1.85                               | 0.012                               | 8.3   | 0.00 079                               | for O <sub>2</sub> (up to 60 °C / 160 bar) and chlorine |



<sup>1)</sup> deviations only via development department  
<sup>2)</sup> also valid for compound ranges

## Accessories



**SpR**

Version flushing ring for diaphragm seals  
Data sheet 7.7001



**KEIRv**

Version cooling element  
Data sheet 7.7002



**FLv / FL**

Version capillary lines  
Data sheet 7.7003

Flushing rings for flange and cellular (“pancake”) type diaphragm seals can be mounted between process connection and chemical seal if media residues or cloggings at the chemical seal connection are to be expected.

The two lateral flushing bores allow for purging of accumulated particles in front of the diaphragm and for ventilation of the pressure chamber.

We recommend decoupling the measuring instruments for medium temperatures from 100 °C. Depending on the instrument model, the temperature limit may also be lower.

Cooling elements can be applied for medium temperatures up to +300 °C.

Capillary lines with chemical seal are not only used to separate a measuring instrument from the measuring point due to high temperatures, but also to install it at a suitable place in case of unfavourable installation conditions at the measuring point or if the instrument is to be mounted in a control room away from the process line.

Furthermore, capillary lines help to keep disruptive mechanical vibrations and/or pulsations away from the pressure measuring instrument.

A mounting device for the measuring instrument is required for systems with capillary line, e.g. gauge holder brackets, rear flanges or front flanges for pressure gauges.

Never use the capillary line of a chemical seal to carry or move the instrument! The welding joints should be stressed as little as possible. Above all, do not bend a capillary line. This would increase the floating time or leakages might occur, causing the system to lose its functional capability.

We supply capillary lines:

- ◆ made of stainless steel
- ◆ bending radius min. 150 mm
- ◆ with spiral protection hose made of stainless steel
- ◆ length 0.5 – 10 m, in 0.5 m increments
- ◆ maximum length also depends on medium and ambient temperatures, pressure range and chemical seal type, details upon request
- ◆ options e.g.: spiral protection hose with PE cover, deviating capillary line lengths



**Adapt FS**

Version flame arrester  
flame penetration protection  
with ATEX approval

Data sheet 11001



**Process Connection Pieces**

Within the meaning of the ATEX Directive 2014/34/EU, our chemical seals are components and can therefore be mounted in explosion-hazardous areas (zones 1 and 2) without any further conformity assessment procedures.

For mounting to zone 0, the chemical seals have to be equipped with a type-approved protection system, our flame arrester Adapt FS.

For chemical seals with connections for food and aseptic applications MDM 73.. and RDM 763.., upon request we can also supply:

- ◆ welded connection pieces flush or with thread
- ◆ sealings
- ◆ clamps
- ◆ union nuts

## Service

### Mounting of Components from other Manufacturers

Upon request, we can also mount measuring instruments from other manufacturers, provided that they are suitable. Technical data sheets and operating instructions for the external device as well as information on the required control volume are indispensable and must be provided on request or when sending in the device.



### Repair Service



Our service includes the calibration, adjustment and repair of measuring instruments (including those from other manufacturers). Please note, however, that repairs of measuring instruments with chemical seal are relatively costly. Therefore, these systems should always be handled with special care, cf. the notes on the capillary line (page 14) and on the diaphragm (page 10).

Prior to sending in an instrument for repair, all wetted parts have to be cleaned thoroughly. This applies especially to media that are hazardous to health. Always enclose a declaration of contamination with the repair order. PDF versions for printing can be found at [www.armano-messtechnik.com](http://www.armano-messtechnik.com) (Downloads/Declaration of Contamination).

**Declaration of Contamination**

**ARMANO**

Recipient:  ARMANO Messtechnik GmbH, Division: Pressure, Vertrieb: Mess- und Drucktechnik, Am: Industriestraße 2, 44791 Gröden-Waibling, Germany.  ARMANO Messtechnik GmbH, Division: Pressure, Vertrieb: Mess- und Drucktechnik, Am: Industriestraße 2, 44791 Gröden-Waibling, Germany.

The repair, maintenance, use or disposal of instruments and components will only be assured if this declaration of contamination is filled out completely and accurately.

The instrument may be repaired if this declaration is not ticked, which results in a delay of the workflow. A separate declaration has to be completed for each single instrument.

This declaration is to be checked and signed by authorized qualified staff only.

**1) Description of the instrument**

Model: \_\_\_\_\_  
 Serial number: \_\_\_\_\_  
 Instrument number: \_\_\_\_\_  
 Pressure number: \_\_\_\_\_  
 Delivery date: \_\_\_\_\_

**2) Reasons for the substitution**

\_\_\_\_\_

**3) Condition of the instrument**

| Why it is checked?                   | Yes                      | No                       | Unknown                  |
|--------------------------------------|--------------------------|--------------------------|--------------------------|
| Using medium if possible             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Using medium if necessary            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Employing production-ready materials | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| All parts mechanically tested        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Purging agent                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Purging method                       | _____                    |                          |                          |

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 www.armano-messtechnik.com

F-066

### Special Versions

Numerous customer solutions are available for almost all models. Thus, only a few examples are specified below. Further possibilities can be found in the data sheets or other technical documents of the respective models. Further individual special configurations are available upon request. No matter what requirements and needs your application has, together with our technicians we will find an ideal solution for you – please contact us!



# Enquiries and Orders

We are pleased to offer our help and answer any of your questions and provide background information on our chemical seals. We can only optimise the measuring instrument for your specific case of application when receiving exact, complete information on the process or a precise specification of the required chemical seal measuring system.

As explained previously, information on temperature and installation conditions, but also on the occurrence of vacuum etc. is essential to avoid additional measuring errors.

We have prepared checklists for you to help you with the specification of your instruments. PDF versions as fillable document and for printing can be found at [www.armano-messtechnik.com](http://www.armano-messtechnik.com) (Downloads / Checklists).



- ◆ Checklist Pressure Measuring Instruments with Chemical Seal
- ◆ Checklist Differential Pressure Gauges with Chemical Seal

If you know the desired version and the temperatures correspond to the standard / reference values, the following information is sufficient in addition to the order text for the measuring instrument:

- ◆ Chemical seal type
- ◆ Process connection / nominal width
- ◆ PN
- ◆ Material
- ◆ Capillary line length, if necessary (information on the gauge holder bracket)
- ◆ Other possible features

## Any Questions?

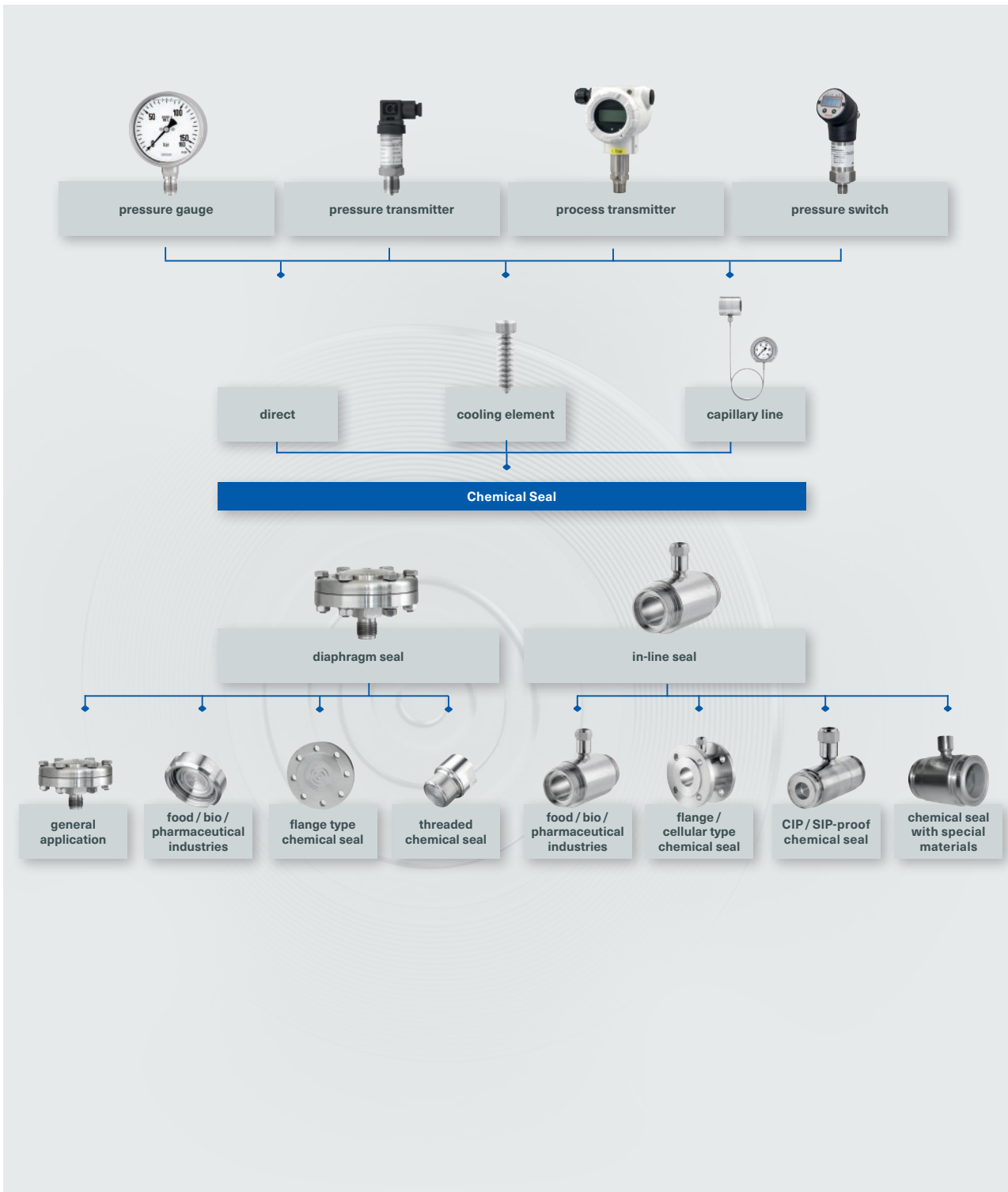
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# Combination Matrix with Measuring Instruments



## Diaphragm Seals

### General Applications

The three-part design (attachment flange, upper part and lower part) allows the combination of different materials and the selection of various process connections (male thread or flange connections), thus providing a wide range of applications. The diaphragm is welded to the upper part.



**All-rounder With Particularly Good Metrological Properties**

#### MDM 7210v

|                       |   |
|-----------------------|---|
| Process connection    | male thread or flange                     |
| Nominal pressure      | PN 40 or PN 100                           |
| Material              | stainless steel 316L (others see page 11) |
| Instrument connection | vd8<br>vG 1/2 female                      |
| Data sheet            | 7210                                      |



**Compact Metal Sealed up to 400 °C**

#### MDM 7210.L

|                       |   |
|-----------------------|---|
| Process connection    | male thread                               |
| Nominal pressure      | PN 100, optional PN 250                   |
| Material              | stainless steel 316L (others see page 11) |
| Instrument connection | vd8<br>vG 1/2 female                      |
| Data sheet            | 7210.L                                    |



**For High-pressure Applications up to 250 bar**

#### MDM 7211v

|                       |   |
|-----------------------|---|
| Process connection    | male thread or flange                     |
| Nominal pressure      | PN 250                                    |
| Material              | stainless steel 316L (others see page 11) |
| Instrument connection | vd8<br>vG 1/2 female                      |
| Data sheet            | 7211                                      |



**For High Pressure up to 600 bar  
Metal Sealed  
Suitable for High Temperatures**

#### MDM 7280v

|                       |   |
|-----------------------|---|
| Process connection    | female thread                             |
| Nominal pressure      | PN 600                                    |
| Material              | stainless steel 316L (others see page 11) |
| Instrument connection | vd8<br>vG 1/2 female                      |
| Data sheet            | 7280                                      |

# Diaphragm Seals

## For Food / Bio / Pharmaceutical Industries

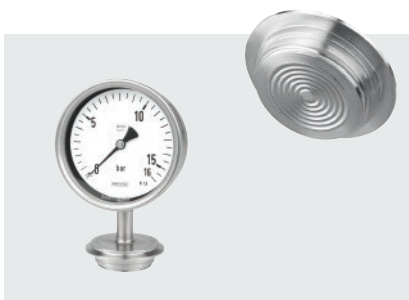
Diaphragm seals of the type series 73.. are particularly suitable for food / bio / pharmaceutical industries. These chemical seals can withstand cleaning temperatures up to max. 150 °C and maintain roughness values of  $R_a$  0.8  $\mu$ m, thus ensuring a hygienic, aseptic design between medium and chemical seal.



### For Hygienic Applications

#### MDM 73.. MDM 73..v

|                       |   |
|-----------------------|---|
| Process connection    | DIN 11851, APV RJT, ISO 2853 (IDF), SMS, DS 722 DRD, Clamp ISO 2852, DIN 32676, Tri-Clamp |
| Nominal pressure      | PN 10 – 40  |
| Material              | stainless steel 316L (others see page 11)   |
| Instrument connection | vd8<br>vG ½ female  |
| Data sheet            | 7300  |



### Aseptic In-line

#### MDM 73.. MDM 73..v

|                       |   |
|-----------------------|---|
| Process connection    | SÜDMO (W 500 D), Ingoldstutzen, APV-In-Line, NEUMO BioControl®, Varivent® (for Varinline® case) |
| Nominal pressure      | PN 16 – 60  |
| Material              | stainless steel 316L  |
| Instrument connection | vd8<br>vG ½ female  |
| Data sheet            | 7301  |



### Aseptic Screw Fitting According to DIN EN 11864

#### MDM 73.. MDM 73..v

|                       |   |
|-----------------------|---|
| Process connection    | DIN 11864-1<br>DIN 11864-2<br>DIN 11864-3 |
| Nominal pressure      | PN 16 – 40                                |
| Material              | stainless steel 316L (others see page 11) |
| Instrument connection | vd8<br>vG ½ female                        |
| Data sheet            | 7302                                      |



### Neumo BioConnect®

#### MDM 73.. MDM 73..v

|                       |   |
|-----------------------|---|
| Process connection    | NEUMO BioConnect®                         |
| Nominal pressure      | PN 10 – 16                                |
| Material              | stainless steel 316L (others see page 11) |
| Instrument connection | vd8<br>vG ½ female                        |
| Data sheet            | 7303                                      |

## Diaphragm Seals

### Flange Type Seals according to DIN EN, ASME and JIS

Diaphragm seals of the type series 75.. are suitable for aggressive, contaminated and hot media. Numerous common pressure gauges of our supply programme can be equipped with these chemical seals, but also pressure switches, pressure transmitters and pressure transducers. The diaphragm is welded free of dead space to the process side of the chemical seal.



**High Spec DTM and ASME Flanges**

**MDM 7510v  
MDM 7520v**

|                       |   |
|-----------------------|---|
| Process connection    | flange according to DIN EN or ASME                    |
| Nominal pressure      | PN 10 – 400<br>Class 150 – 2500                       |
| Material              | stainless steel 316L (1.4404)<br>(others see page 11) |
| Instrument connection | vd8<br>vG½ female                                     |
| Data sheet            | 7500  |



**Flanges for Small Tube Diameters**

**MDM 7511v  
MDM 7521v**

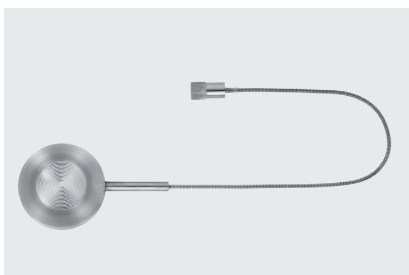
|                       |   |
|-----------------------|---|
| Process connection    | flange according to DIN EN or ASME                    |
| Nominal pressure      | PN 10 – 40<br>Class 150 – 300                         |
| Material              | stainless steel 316L (1.4404)<br>(others see page 11) |
| Instrument connection | vd8<br>vG½ female                                     |
| Data sheet            | 7501  |



**Flanges with Extension Tube**

**MDM 7515v  
MDM 7525v**

|                       |   |
|-----------------------|---|
| Process connection    | flange according to DIN EN or ASME                    |
| Nominal pressure      | PN 10 – 40<br>Class 150 – 300                         |
| Material              | stainless steel 316L (1.4404)<br>(others see page 11) |
| Instrument connection | vd8<br>vG½ female                                     |
| Data sheet            | 7502  |



**Cellular Type Seal**

**MDM 7550 – 7565**

|                       |   |
|-----------------------|---|
| Process connection    | intermediate flange acc. to DIN EN or ASME            |
| Nominal pressure      | PN 16 – 400<br>Class 150 – 2500                       |
| Material              | stainless steel 316L (1.4404)<br>(others see page 11) |
| Instrument connection | capillary line with G½ female                         |
| Data sheet            | 7505  |

# Diaphragm Seals

## Thread Connection

Diaphragm seals of the type series 74.. with thread connection are universally usable and are primarily used in engineering and plant construction.



**Flush-mounted**

**MDM 7410v**

|                       |  |
|-----------------------|--|
| Process connection    | male thread<br>G ½ B to G 2 B                |
| Nominal pressure      | PN 600                                       |
| Material              | stainless steel 316L<br>(others see page 11) |
| Instrument connection | vd8<br>G ½ female                            |
| Data sheet            | 7400   |



**Flush-mounted  
Tapered Version**

**MDM 7420v**

|                       |  |
|-----------------------|--|
| Process connection    | male thread<br>½" NPT to 2" NPT              |
| Nominal pressure      | PN 600                                       |
| Material              | stainless steel 316L<br>(others see page 11) |
| Instrument connection | vd8<br>G ½ female                            |
| Data sheet            | 7400   |



**Flush-mounted  
for Chemical Seals with Union Nut**

**MDM 7450v**

|                       |  |
|-----------------------|--|
| Process connection    | hexagon union nut<br>G 1 to G 2              |
| Nominal pressure      | PN 600                                       |
| Material              | stainless steel 316L<br>(others see page 11) |
| Instrument connection | vd8<br>G ½ female                            |
| Data sheet            | 7400   |



**Welded  
Up To 600 bar**

**MDM 7910v / MDM 7980v**

|                       |  |
|-----------------------|--|
| Process connection    | G ½ B<br>½" NPT                              |
| Nominal pressure      | PN 250<br>PN 600                             |
| Material              | stainless steel 316L<br>(others see page 11) |
| Instrument connection | vd8<br>vG ½ female                           |
| Data sheet            | 7935   |



**Fully Welded  
Up To 1000 bar**

**MDM 7952v**

|                       |  |
|-----------------------|--|
| Process connection    | high pressure<br>M 16x1.5 female             |
| Nominal pressure      | PN 1000                                      |
| Material              | stainless steel 316L<br>(others see page 11) |
| Instrument connection | G ¼ female                                   |
| Filling liquid        | glycerin                                     |
| Data sheet            | 7952   |

## In-line Seals

### For Food / Bio / Pharmaceutical Industries



**For Hygienic Applications**

**RDM 763..v**

|                       |  |
|-----------------------|--|
| Process connection    | DIN 11851, APV RJT, ISO 2853 (IDF), SMS Clamp ISO 2852, DIN 32676, Tri-Clamp |
| Nominal pressure      | PN 10 – 40   |
| Material              | stainless steel 316L (others see page 11)                                    |
| Instrument connection | vd8 vG½ female   |
| Data sheet            | 7630   |

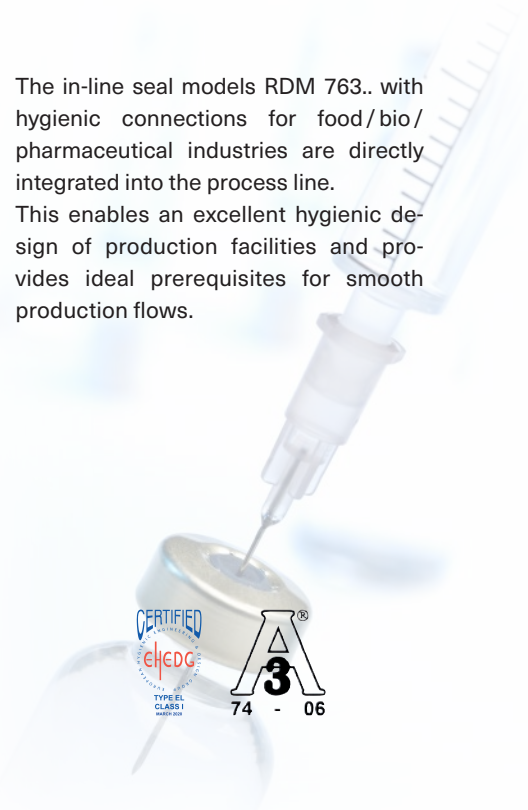


**With Aseptic Connection**

**RDM 763..v**

|                       |  |
|-----------------------|--|
| Process connection    | DIN 11864-1<br>DIN 11864-2<br>DIN 11864-3<br>Neumo BioConnect® |
| Nominal pressure      | PN 10 – 40   |
| Material              | stainless steel 316L (others see page 11)                      |
| Instrument connection | vd8 vG½ female   |
| Data sheet            | 7630   |

The in-line seal models RDM 763.. with hygienic connections for food/bio/pharmaceutical industries are directly integrated into the process line. This enables an excellent hygienic design of production facilities and provides ideal prerequisites for smooth production flows.



## Industrial Applications

The in-line seal models RDM 7690 to 7695.1 with flange and cellular type connection are directly integrated into the process line.

This provides ideal prerequisites for smooth production flows.



**Flange Type**

**RDM 7690.1v acc. to DIN EN  
RDM 7695.1v acc. to ASME**

|                       |   |
|-----------------------|---|
| Process connection    | flange according to DIN EN or ASME        |
| Nominal pressure      | PN 10 – 40<br>Class 150 – 300             |
| Material              | stainless steel 316L (others see page 11) |
| Instrument connection | vd8 vG½ female                            |
| Data sheet            | 7600                                      |



**Cellular Type**

**RDM 7690v acc. to DIN EN  
RDM 7695v acc. to ASME**

|                       |   |
|-----------------------|---|
| Process connection    | cellular type according to DIN EN or ASME |
| Nominal pressure      | PN 10 – 400<br>Class 150 – 2500           |
| Material              | stainless steel 316L (others see page 11) |
| Instrument connection | vd8 vG½ female                            |
| Data sheet            | 7600                                      |

# Chemical Seals For Special Applications



**Medium Resistant as Plastic Version**

**MDM 7190**

|                       |  |
|-----------------------|--|
| Specifics             | effective shielding of pressure measuring instruments against aggressive media |
| Process connection    | G ¼ female or G ½ female   |
| Nominal pressure      | PN 10 at 20 °C   |
| Material              | upper part PP<br>diaphragm EPDM / PTFE<br>lower part PVC-U, PP, PVDF           |
| Instrument connection | G ¼ female or G ½ female   |
| Filling liquid        | Glysantin®   |
| Data sheet            | 7190   |



**For Pulp and Paper Industries**

**MDM 7590v**

|                       |   |
|-----------------------|---|
| Specifics             | connection to the measuring instrument: screwed, via capillary line, quadrant pipe 90° or with vibration damper |
| Process connection    | DN 48<br>tube length 15 mm  |
| Nominal pressure      | PN 40   |
| Material              | stainless steel 316L<br>(others see page 11)  |
| Instrument connection | vd8   |
| Filling liquid        | silicone oil  |
| Data sheet            | 7590  |



**For Ermeto Fitting**

**RDM 7680**

|                       |   |
|-----------------------|---|
| Specifics             | with cutting ring fitting metal sealing |
| Process connection    | Ermeto fitting<br>M 18x1.5              |
| Nominal pressure      | PN 250                                  |
| Material              | stainless steel 1.4404<br>(316L)        |
| Instrument connection | vd8<br>vG ½ female                      |
| Filling liquid        | silicone oil                            |
| Data sheet            | 7680                                    |



**For Homogenising Machines**

**MDM 7390v**

|                       |  |
|-----------------------|--|
| Specifics             | attachment block flange stainless steel 316L   |
| Process connection    | homogeniser connection                         |
| Nominal pressure      | PN 600   |
| Material              | stainless steel 1.4435<br>(others see page 11) |
| Instrument connection | vd8  |
| Data sheet            | 7390   |



**Capsule Seal**

**TDM 7710**

|                       |                                   |
|-----------------------|-----------------------------------|
| Specifics             | immersion shaft tube length 90 mm |
| Process connection    | union nut<br>G 1 female           |
| Nominal pressure      | PN 600                            |
| Material              | stainless steel (316L)            |
| Instrument connection | ¾ female                          |
| Filling liquid        | glycerin                          |
| Data sheet            | 7710                              |



**Speed Line  
e.g. Clamp**

**RCh / RChG  
- 3 vDW**

|                       |   |
|-----------------------|---|
| Specifics             | pressure gauge (case / connection piece welded) |
| Process connection    | depending on the type                           |
| Nominal size          | 63, 100, 160                                    |
| Material              | depending on the type                           |
| Instrument connection | vd8   |
| Case filling          | with / without                                  |
| Data sheet            | 1201.7 / 1211.7                                 |



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