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## 1. Information on This Operating Instruction

- The manual is aimed at specialists and semi-skilled personnel.
- Please read the instructions carefully before carrying out any operation and keep the specified order.
- Thoroughly read and understand the information in chapter 2 "Safety Instructions".

If you have any problems or questions, please contact your supplier or contact us directly at:



### ARMANO Messtechnik GmbH Location Beierfeld

Am Gewerbepark 9 • 08344 Grünhain-Beierfeld  
Tel.: +49 3774 58 – 0 • Fax: +49 3774 58 – 545  
mail@armano-beierfeld.com

### Location Wesel

Manometerstraße 5 • 46487 Wesel-Ginderich  
Tel.: +49 2803 9130 – 0 • Fax: +49 2803 1035  
mail@armano-wesel.com

### 1.1 Pictographs Used in This Manual

In this manual, pictographs are used as hazard warnings.

Particular information, instructions and restrictions designed for the prevention of personal or substantial property damage:



**WARNING!** Is used to warn you against an imminent danger that may result in personal injury or death.

**IMPORTANT!** Is used to warn you against a possibly hazardous situation that may result in personal, property or environmental damage.

**CAUTION!** Is used to draw your attention to important recommendations to be observed. Disregarding them may result in property damage.



Passages in the text containing **explanations, information or advice** are highlighted with this pictograph.



The following symbol highlights **actions** you have to conduct or **instructions** that have to be strictly observed.

### 1.2 Exclusion of Liability

The diaphragm seals and in-line seals were designed and manufactured following a careful selection of standards to be complied with as well as further technical specifications. They therefore comply with the state of the art and guarantee maximum safety. This safety is achieved in industrial practice only if all necessary measures are taken. The necessary measures are subject to the due diligence of the user of the diaphragm and in-line seals.

In particular, the user shall ensure that:

- the diaphragm seals and the in-line seals are used only for their intended purpose (⇒ chapter 3 “Device Description”).
- there exist proven safety mechanisms, which avoid any risks for personnel or devices.
- the chemical seal and all components involved are only operated when in a flawless and fully functional condition, when the installation and commissioning was carried out correctly and when regular maintenance is conducted.
- the personnel, which operates the chemical seal, has access to this manual at all times and has read and understood this manual.
- the chemical seals shall only be mounted, commissioned, maintained and put out of operation by authorized, trained and instructed personnel, which is able to independently recognize potential hazards.
- the chemical seals must always be handled with the care necessary for a measuring instrument.



**Applications that are not explicitly listed as according to regulations, are improper to intended purpose!**

We accept no liability for any damage or malfunction resulting from incorrect installation, inappropriate use of the device or failure to follow the instructions in this manual.

# Operating Instructions

## Diaphragm Seals / In-line Seals

### 1.3 General Information

Please inspect the transport packaging and the delivered goods immediately upon their receipt to determine their integrity and completeness. In case of returns, please use the original packaging. Should a reason for complaint arise, please return the instrument with a precise description of faults to our factory.

Please support us in improving this operating instruction. We will gladly accept your advice.

This operating instruction is only valid combined with the enclosed data sheet and the model overview 7000, which comprise the following information:

- construction type
- permissible medium temperatures (standard application and Ex-application)
- permissible ambient temperature
- material chemical seal body/material diaphragm
- filling fluid
- nominal pressure range

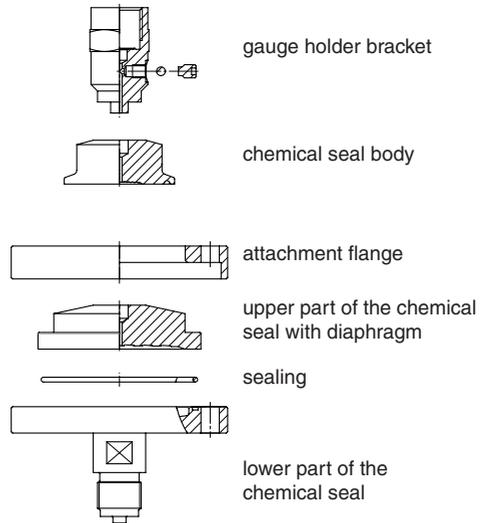
The chemical seals are manufactured in accordance with the corresponding valid standards. Chemical seals extend the fields of application of pressure measuring instruments for

- pressure
- vacuum
- compound ranges
- absolute pressure and
- differential pressure

of

- Bourdon tube pressure gauges
- pressure switches
- transmitters
- pressure transducers.

Here, pressure ranges of just a few mbar up to 1000 bar and higher can be realised. Chemical seals can be mounted directly, via cooling element or capillary line. They consist of a body with instrument connection, process connection and diaphragm, or of an upper part with instrument connection, diaphragm and a lower part with process connection. We use copper or Viton sealings as standard.



Typical application examples of chemical seals:

- the medium would clog the pressure inlet port and the Bourdon tube
- the medium is very aggressive
- there are high demands for hygiene
- the ambient temperature at the measuring point or the medium temperature is too high for the measuring instrument
- the measuring point is difficult to reach
- the medium is toxic
- the measuring instrument needs to be extremely overrange protected
- the chemical seal acts as damping element
- the measuring point has to be heated

# Operating Instructions

## Diaphragm Seals / In-line Seals

Three basic construction types meet the most different measurement requirements:

- **Diaphragm seal**



- **Capsule seal**



- **In-line seal**



In-line seals are integrated directly into the process line. They are less temperature-sensitive than diaphragm seals and are particularly suitable for applications, which are absolutely free of dead space, with circulating, highly viscous media, with media tending to swirl and for applications with frequent changes of the medium.

**Further information on the instruments can be found in the data sheets 7000 ff.**

## 2. Safety Instructions

Please read this operating instruction thoroughly before installing the device.

Disregarding the containing warnings, especially the safety instructions, may result in danger for people, the environment, and the device and the system it is connected to.

The instrument corresponds with the state of engineering at the time of printing. This concerns the operating mode and the safe operation of the device.

In order to guarantee that the device operates safely, the operator must act competently and be conscious of safety issues.

The ARMANO Messtechnik GmbH provides support for the use of its products either personally or via relevant literature. The customer verifies that our product is fit for purpose based on our technical information. The customer performs customer and application specific tests to ensure that the product is suitable for the intended use. With this verification, all hazards and risks are transferred to our customers. Our warranty expires in case of inappropriate use.

### **Qualified personnel:**

The personnel that is charged for the installation, operation and maintenance of the instrument must hold a relevant qualification. This can be based on training or relevant tuition. The personnel must be aware of this manual and have access to it at all times.

# Operating Instructions

## Diaphragm Seals / In-line Seals



### General safety instructions:

- In all work, the existing national regulations for accident prevention and safety at the workplace must be complied with. Any internal regulations of the operator must also be complied with, even if these are not mentioned in this manual.
- Use the device in its perfect technical condition only. Damaged or defective instruments need to be checked immediately and replaced if necessary.
- Only use appropriate tools for mounting, connecting and dismantling the device.
- The instruments have to be protected against coarse contamination and high ambient temperature deviations.
- Nameplates or other information on the device shall neither be removed nor obliterated, since otherwise any warranty and manufacturer responsibility expires.



**IMPORTANT! Disregarding the respective regulations may result in severe personal injuries and/or property damage.**

In order to ensure measurement accuracy and durability of the instrument and to avoid damage, the limit values have to be strictly observed.

In case of visible damage or malfunctions, the instrument must be put out of operation immediately. All parts have to be protected against direct contact during the installation of the instrument and the connections.



### Special safety instructions:

Warnings, which are specifically relevant to individual operating procedures or activities, are to be found at the beginning of the relevant sections of this operating instruction.

### 3. Device Description

Chemical seal systems are closed systems consisting of the components chemical seal with or without capillary line and pressure measuring instrument.

The connections must under no circumstances be disconnected or opened in any way.

Slightest leakages cause loss of transfer fluid, which again leads to measuring errors or the impairment of the function.

Due to their low thickness of just a few  $\mu\text{m}$ , the diaphragms are very sensitive and must not be damaged.



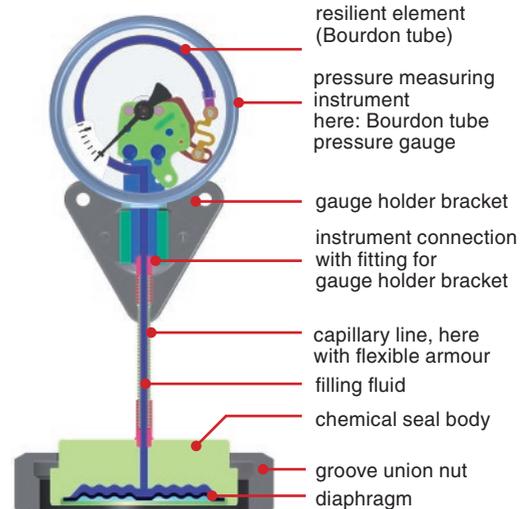
In addition to the information in this manual, please also regard the information in the manuals of the respectively mounted pressure measuring instruments.

### 4. Function

The interior of the chemical seal system, between diaphragm and pressure measuring instrument, is completely filled with a transfer fluid (here marked in blue).

When pressure acts on the resilient diaphragm located at the process, it transfers the pressure to the pressure measuring instrument via the transfer fluid.

If a capillary line is required for an application, it can affect the response time of the entire system, depending on the type of pressure measuring instrument, measuring range, length, cross-section and viscosity of the transfer fluid.



### 5. Mounting Instructions

- Please check if you have the suitable instrument for the case of application.
- Store the chemical seal in its original packaging until mounting, and protected against damage caused by external influences.
- Sealed filling ports or screw fittings must not be damaged.
- Any damage to the diaphragm has to be avoided. Remove the protection cap immediately before mounting.
- To ensure the required tightness and proper functioning, appropriate sealings have to be used for mounting.
- For mounting, proper screws, nuts etc. according to the respective fitting standards have to be used.

#### For capillary lines:

- Do not buckle capillary lines.
- Min. bending radius 150 mm (5.91").
- Fasten capillary lines vibration-free.
- Max. height difference 7 m (22.97'), with halocarbon 4 m (13.12'). For vacuum applications, the max. height difference is accordingly smaller.
- For differential pressure versions with 2 capillary lines, consider the symmetry during installation. For versions see check list for chemical seals.

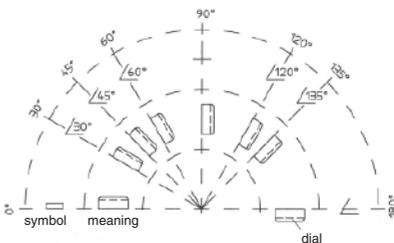
### 6. Hygienic Chemical Seals

#### 6.1 Description 3-A Approval

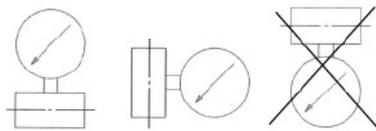
For chemical seals with clamp and those according to DIN 11 851, only sealings with 3-A approval shall be used. The used sealings need to be self-centering and substantially flush with the medium side. Rubber sealings for CIP applications according to 3-A need to comply with Class I or Class II.

#### Determination of the installation position:

The installation position of the pressure gauges is indicated by the position symbol on the dial. If there is no position symbol on the dial, the pressure gauges shall be installed vertically (according to DIN EN 837).



The medium shall be able to drain. Please do not install pressure gauge and chemical seal upside down.



Parts welded to the tank need to be flush-mounted to the inner wall of the tank. The maximum surface roughness of the weld seams shall be  $R_a = 0.8 \mu\text{m}$ .

# Operating Instructions

## Diaphragm Seals / In-line Seals

### 3-A Cleaning recommendation:

Cleaning Out Of Place (COP) or  
Cleaning In Place (CIP)

#### COP:

chemical seal:

MDM 7335

in-line seal:

RDM 7633

homogenizers:

MDM 7390, MDM 7390.23, MDM 7390.39,  
MDM 7390.43, MDM 7390.46, MDM 7390.54,  
MDM 7390.55, MDM 7390.56, MDM 7390.57,  
MDM 7390.61, MDM 7390.76

#### CIP:

chemical seals:

MDM 7310, MDM 7350, MDM 7315, MDM 7355,  
MDM 7340, MDM 7340.1, MDM 7340.6, MDM 7311,  
MDM 7319, MDM 7391, MDM 7313, MDM 7310.1,  
MDM 7310.2, MDM 7310.3, MDM 7315.1,  
MDM 7315.2, MDM 7315.3, MDM 7393,  
MDM 7393.12, MDM 7393.13, MDM 7393.1,  
MDM 7393.2, MDM 7393.3, MDM 7340.48,  
MDM 7340.61, MDM 7340.62, MDM 7340.58,  
MDM 7340.63, MDM 7340.64, MDM 7317,  
MDM 7317.1, MDM 7317.2, MDM 7317.10,  
MDM 7317.11, MDM 7317.12, MDM 7394.1,  
MDM 7394.11, MDM 7394.12, MDM 7394,  
MDM 7394.21, MDM 7394.22, MDM 7340.44,  
MDM 7340.45, MDM 7340.46, MDM 7340.5,  
MDM 7340.9, MDM 7340.15

in-line seals:

RDM 7631, RDM 7634, RDM 7635, RDM 7636,  
RDM 7631.1, RDM 7639, RDM 7635.1, RDM 7639.4,  
RDM 7635.4

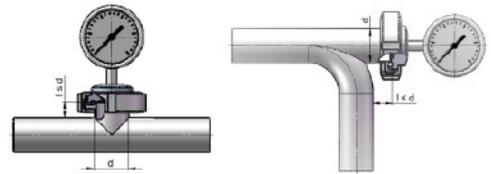
- Please note for transmitters and pressure gauges:  
The 3-A approval only applies with attached chemical seal.
- Basically, the 3-A approval of a chemical seal only applies if a corresponding 3-A approved counter fitting is used.

### 6.2 Chemical Seals with EHEDG Approval

The designated process connections comply with the EHEDG position paper for approved couplings using special sealings, which are indicated as applicable or welded in (available at the website [www.ehedg.org](http://www.ehedg.org)). A list of potential suppliers of special sealings is available at the ARMANO Messtechnik GmbH.

Only if the diaphragm seal is mounted correctly on the connection port it is possible to clean it as described in the EHEDG approval.

Dead zones on t-pieces and connection ports must be kept as short as possible. For all pipe diameters, the length of the dead space should be smaller than its diameter ( $l \leq d$ ) (⇨ figure).



For more information see EHEDG Guidelines No. 10 and No. 37.

### 7. Permissible Ambient and Operating Temperature

For the design of the chemical seal system it must be ensured that permissible ambient and process temperatures according to data sheet or order-based agreement do not exceed the maximum or fall below the minimum temperature. Fluctuating temperatures, especially when using a capillary line, affect the accuracy of the measuring system.

### 8. Application of Chemical Seals in Potentially Explosive Areas

Basically, chemical seals are suitable for the installation in or at potentially explosive areas. However, they do not fall within the scope of the directive 2014/34/EC, as they do not contain any own potential ignition sources.

When using chemical seals in potentially explosive areas, the following aspects have to be taken into account anyway:

- The resilient elements (pressure gauges) used with the chemical seals have to be approved for the respective connected zone (process) and for the ambient zone (environment).
- The permissible ambient temperatures of pressure transmitters or pressure gauges must not be exceeded.

Electrostatic charges at the chemical seal must be avoided:

- Chemical seals made of plastic or with plastic coating/lining are not allowed (exception: antistatic coating without lining).
- The chemical seal as well as the tank or the tubing have to be earthed.

In order to ensure the tightness of the chemical seal and thus to avoid zone entrainment, please note the following:

- The mounting of a chemical seal to the tank/tubing shall be carried out permanently technically tight. This shall be ensured by measures according to TRBS 2152 part 2.
- The chemical seal with its diaphragm shall be chemically and mechanically resistant against the process media.
- The chemical seal shall have at least the same mechanical strength (pressure range) as the tank or the tubing.

**Further requirements for the application in particular zones:**

#### **Application in or at potentially explosive areas of zones 20, 21 or 22:**

The maximum medium temperature shall not exceed  $\frac{2}{3}$  of the ignition temperature (dust cloud) of the potentially explosive dusts and shall be at least 75 °C (167 °F) below the glow temperature (ignition temperature of a 5 mm dust layer). Furthermore, the maximum operating temperature shall be lower than the volume dependent self ignition temperature of the dust.

#### **Application at potentially explosive areas of zone 0:**

The mounting to zone 0 may only be executed with a flame arrester and may not exceed the operating temperature of 60 °C (140 °F) for pressure measuring instruments (see also in the manual of the flame arrester).

# Operating Instructions

## Diaphragm Seals / In-line Seals

### 9. Maintenance/Cleaning, Storage and Transport



#### **CAUTION! Material damage and loss of warranty!**

Any modifications or interventions in the device, made by the customer, might damage important parts or components. Such intervention leads to the loss of any warranty and manufacturer's responsibility!

→ Never modify the device or perform any repairs yourself.

#### **Maintenance:**

Our chemical seals are maintenance-free.

To ensure measurement accuracy and reliability of functioning, we recommend to regularly check the instruments. For this, the instrument must be separated from the process and checked by using a pressure test device.

The instrument cannot be repaired by the operator. In case of faults, which cannot be eliminated without interference in the device, please return the instrument to the manufacturer for repair. Any arising repairs may only be executed by the manufacturer. A description of the medium or a declaration of contamination must be enclosed to the repair order.

#### **Cleaning:**

- Clean the device with a dry or slightly dampened soft cloth.
- Do not use any sharp objects or aggressive agents for cleaning.

#### **Storage and transport:**

- Use the original packaging or comparable packaging for storage/for transport.
- Avoid impacts or strong vibrations.
- Protect the device against damage caused by external influences.
- During storage, the specified temperature limits of mounted pressure measuring instruments must not be exceeded (for pressure gauges see DIN EN 837-1 and DIN EN 837-3).

### 10. Dismounting and Disposal



#### **WARNING! Risk of injury!**

Never remove the device from a system in operation.

Make sure that the system is switched off professionally.

#### **Before dismounting:**

Check before dismounting, whether the system

- is switched off,
- is in a safe and currentless state,
- is unpressurised and cooled down.

#### **Dismounting:**

Pay attention to potentially leaking media. Take appropriate precautions to collect them.

#### **Disposal:**

Please help us protect our environment and dispose of or recycle the used materials according to the respective and valid regulations

or

send the device back to your supplier or to the ARMANO Messtechnik GmbH.

### 11. CE Conformity

**CE** The CE marking of the instruments certifies the conformity with prevailing EU directives for placing products on the market within the European Community. The following directive applies:

2014/68/EU (PED)

Pressure measuring instruments by ARMANO Messtechnik GmbH with a pressure  $>0.5$  bar are, defined as pressure equipment parts, subject to the Pressure Equipment Directive 2014/68/EU.

Our pressure measuring instruments according to DIN EN 837-1 "Bourdon tube pressure gauges" receive the CE-marking in accordance to the conformity assessment procedure if the upper range value is 200 bar and above.

Pressure gauges with flange connections  $>DN 25$  or  $1"$  or thread connection  $>1"$  receive the CE-marking if the upper range value is 0.5 bar and above.

For the CE-marking, a nameplate is fixed on the outside of the case:



Production Location  
Grünhain-Beierfeld



Production Location  
Wesel-Ginderich

Measuring instruments with a pressure range  $>0.5$  bar and  $<200$  bar, which are subject to article 4 paragraph 3, do not receive a CE-marking.

Chemical seals, supplied unmounted, are considered CE marked if the limit parameters, specified in the declaration of conformity, come into effect.

## 12. Declaration of Conformity

### EU-Konformitätserklärung nach DIN EN ISO/IEC 17 050-1

### EU Declaration of Conformity according to DIN EN ISO / IEC 17 050-1

Für die nachfolgend bezeichneten Erzeugnisse

#### DRUCKMITTLER

Typ MDM 7190 gemäß Datenblatt 7190  
Typ MDM 72.. gemäß Datenblatt 7210, 7211, 7280  
Typ MDM 73.. gemäß Datenblatt 7300, 7301, 7302, 7303, 7390  
Typ MDM 74.. gemäß Datenblatt 7400  
Typ MDM 75.. gemäß Datenblatt 7500, 7501, 7502, 7505, 7590  
Typ MDM 76.. gemäß Datenblatt 7600, 7630, 7680  
Typ MDM 79.. gemäß Datenblatt 7935, 7952

We hereby declare for the following named goods

#### CHEMICAL SEALS

Model MDM 7190 according to data sheet 7190  
Model MDM 72.. according to data sheet 7210, 7211, 7280  
Model MDM 73.. according to data sheet 7300, 7301, 7302, 7303, 7390  
Model MDM 74.. according to data sheet 7400  
Model MDM 75.. according to data sheet 7500, 7501, 7502, 7505, 7590  
Model MDM 76.. according to data sheet 7600, 7630, 7680  
Model MDM 79.. according to data sheet 7935, 7952

wird hiermit bestätigt, dass sie den jeweils gültigen Normen entsprechen und gemäß den Bestimmungen folgender Richtlinie gefertigt werden:

#### 2014/68/EU (Druckgeräte-Richtlinie)

Druckmittler mit Anschlussnennweiten > DN 25/1" bzw. Gewindeanschlüssen > 1" werden in Verbindung mit einem angebaute Druckmessgerät mit Messbereichen >0,5 bar (mechanisch oder elektronisch) folgendem Konformitätsbewertungsverfahren unterzogen:

#### Modul A2 „Interne Fertigungskontrolle mit Überwachung der Abnahme“

Benannte Stelle:  
TÜV NORD Systems GmbH & Co. KG  
Meidericher Straße 16  
D-47058 Duisburg

Kennnummer: **0045**

Die CE-Kennzeichnung erfolgt mittels Aufkleber auf dem Messgeräteegehäuse.

that they comply with the valid standards and are manufactured according to the requirements of directive:

#### 2014/68/EU (Pressure Equipment Directive)

Chemical seals attached to a pressure measuring instrument with pressure ranges >0.5 bar (mechanical or electronic), with process connections > DN 25/1" or thread connections > 1" are subjected to the following conformity assessment procedure:

#### Module A2 "Internal Production Control with Surveillance of Final Assessment"

Notified body:  
TÜV NORD Systems GmbH & Co. KG  
Meidericher Straße 16  
D-47058 Duisburg

Identification number: **0045**

The CE-marking is made via sticker on the instrument case.

005 EU-Konformitätserklärung Druckmittler Ausg. 12/18

Diese Erklärung wird verantwortlich für den Hersteller:  
This declaration is issued under the sole responsibility of the manufacturer:

#### ARMANO Messtechnik GmbH

abgegeben durch / by  
Grünhain-Beierfeld, 2018-12-10

**Bernd Vetter**  
Geschäftsführender Gesellschafter / Managing Director

**ARMANO**

#### ARMANO Messtechnik GmbH

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