



Assembly of Seals

General information

1 Assembly of Seals

2 Types of seals

⚠ WARNING

High-pressure injection - leakage due to incorrect assembly!

Incorrect assembly can lead to leakages of the product. Hydraulic fluid can emerge. Pay attention to the mounting position of the the sealing system.

2.1 Piston rod seal - interior seal

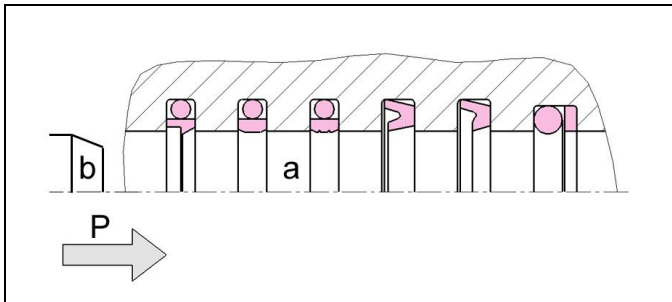


Figure 1: Piston rod seal with pressure direction

a Housing, bushing, etc.	P Pressure direction
b Piston, bolt, calibration, etc.	

2.2 Piston seal - exterior seal

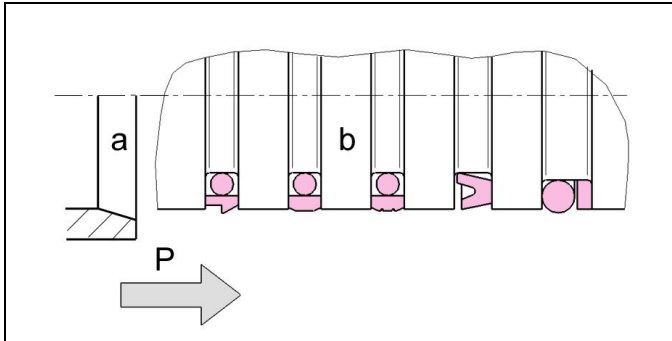


Figure 2: Piston seal with pressure direction

a Housing, bushing, calibration, etc.	P Pressure direction
b Piston, bolt, etc.	

2.3 General mounting instructions

To avoid damages and resulting leakages, the following has to be considered before mounting:

- To guarantee a safe assembly, insertion chamfers in the housing **(a)** or at the piston rod are **(b)** required. If the housing or piston does not have any insertion chamfers, corresponding mounting sleeves should be used.
- Sharp edges (burrs) at the sealing point have to be carefully deburred. If required, threads have to be covered for assembly.
- **Attention:** In the case of damages at the running surfaces (sealing surfaces), the product has to be sorted out. Damages cause a permanent leakage.
- Machining residues, as swarf, dirt and other foreign particles must be removed from the sealing slots and sealing surfaces. Carefully clean all components.
- Assembly is facilitated by slight lubrication of the bore hole in the housing **(a)** or the piston rod **(b)**. **Attention:** Pay attention to compatibility of the pressure fluid.
- Do not use sharp-edged mounting tools.

i Note

Compatibility of the lubricants with the sealing material has to be considered.

- Do not use any fats with solid additions, e.g. molybdenum disulphide or zinc sulphide.

3 Mounting - piston rod seal

3.1 Mounting in split slots



Figure 3: Mounting in a split slot (split threaded bushing)

If a sealing package is mounted in a split slot, only the sequence of mounting as per the corresponding seal design must

be considered. The individual sealing elements must not be twisted.
The seals are calibrated by means of the piston rod.

Note

Pay attention that a sufficient insertion taper is available.

When mounting the bushing into the housing it is recommendable to leave the piston rod inserted. This offers the seals a guide and they tend less to slip.

3.2 Mounting in closed slots

The sealing packages consist partly of two components. In the shown examples mounting is made by means of a sealing ring with an O-ring as a preload element.

After observing and applying the general mounting instructions, proceed as follows:

- First insert the O-ring into the slot.
Note: The O-ring must not be twisted!
- If no assembly aids are available, deform the sealing ring to a kidney shape (1, 2).
Attention: There must not be any kinks (plastic deformation), since these can lead to leakages.
- In this shape the sealing ring (1) is inserted in direction of the arrow into the slot.
Attention: Pay attention to the correct position of the sealing lip to the pressure side (see fig. 1). Make sure that the seals are mounted in the correct slot, since some times there are two slots. These are provided with a main (primary) seal and an auxiliary (secondary) seal (see fig. 3.).

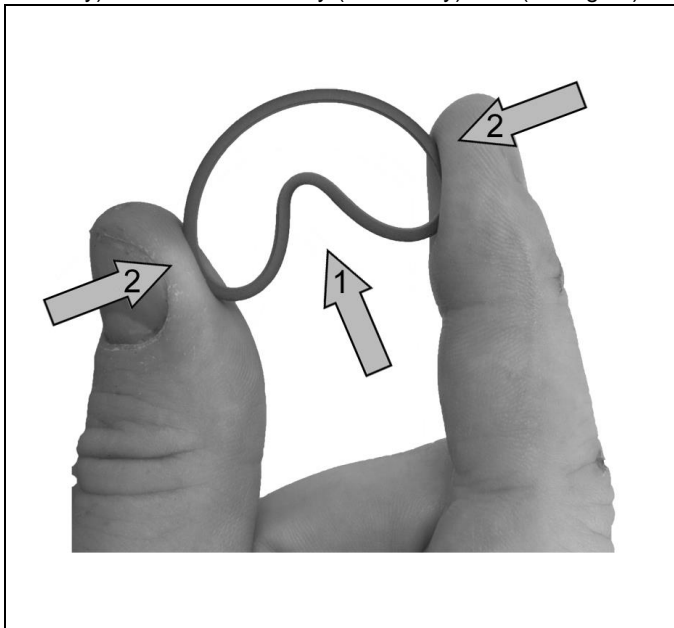


Figure 4: Deform the sealing ring to a kidney shape.

- As soon as the sealing is correctly placed in the slot, press the sealing with the finger circularly into the slot (3).

Notes to the figures: For better a representation, the closed slot has been milled to two levels.



Figure 5: Mounting in a closed slot

- Then calibrate with a mandrel. The mandrel should correspond to the rod diameter ($\varnothing X -0.1 \text{ mm}$). For insertion, a chamfer of min. 3 mm with an inclination of 15 to 20° must be provided. The transition edge (chamfer to diameter) should be radiused by 1 to 2 mm.

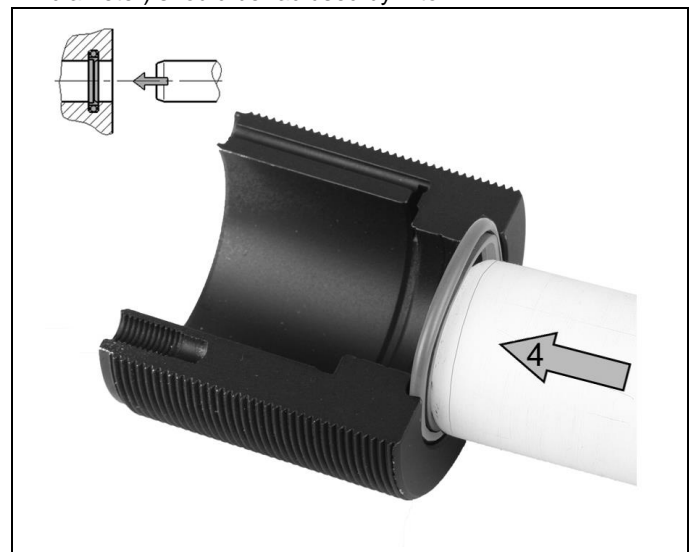


Figure 6: Mounting in a closed slot with a calibration mandrel.

The calibration mandrel has to be manufactured from synthetic material (e.g. polyamide or polyoxymethylene) with good sliding characteristics and low abrasion in order to exclude damage of the sealings.

For calibration also the piston rod itself can be used, if there is a sufficient taper. These can also be slightly oiled.

4 Assembly of exterior seals

4.1 Mounting in closed slots

Bearing in mind the chapter "General mounting instructions", the mounting of exterior / piston seals in closed slots is relatively unproblematic.

Note

In general, the assembly process should be made very quickly to guarantee an optimum resilience of the sealing ring.

It is recommended to use assembly aids (see fig. 10).

If no assembly aids are available, the following should be considered:

- By heating in oil, water or with hot air to approx. 80°C mounting of the seals is facilitated. This encourages the recovery (expansion and then resilience).
Attention: In single-acting applications pay attention to the correct position of the sealing lip to the pressure side (see fig. 2).
- To expand the sealing rings, do not use sharp-edged items, since they could damage the seals.
- The sealing is mounted by inserting one side into the slot. The protruding edge is slipped over by means of the shaft of a screwdriver.



Figure 7: Mounting in a closed slot without assembly aid.

- Calibration of the sealing is made by means of an calibration mandrel or by the housing. If the housing is used for calibration, pay attention that the insertion chamfer is long enough.



Figure 8: Calibration of an exterior seal by means of a tool.

4.2 Mounting in closed slots by means of an assembly aid

For optimum mounting of exterior seals the use of assembly tools - expanding or mounting sleeve - is recommended.

4.2.1 Use of expanding sleeves

Expanding sleeves are thin-walled, conical sleeves made of steel or plastic materials, with good sliding properties and low surface roughness to avoid damages at the seals.

The assembly process has to be made as follows:

- Push the seal onto the expanding sleeve.
Attention: In single-acting applications pay attention to the correct position of the sealing lip to the pressure side (see fig. 2). Uniformly push the sealing onto the perimeter.
- Put the expanding sleeve onto the exterior geometry (e.g. piston or housing).
Note: The expanding sleeve should have an interior stop to allow direct mounting of the seal in the slot.
- Calibration of the sealing is made by means of an calibration mandrel or by the housing. If the housing is used for calibration, pay attention that the insertion chamfer is long enough.



Figure 9: Mounting in a closed slot with an expanding sleeve

4.2.2 Use of expanding and mounting sleeves

When using expanding and mounting sleeves, the seal with the mounting sleeve is pushed on. This avoids jamming of the seal and is to be preferably used as optimum mounting method.

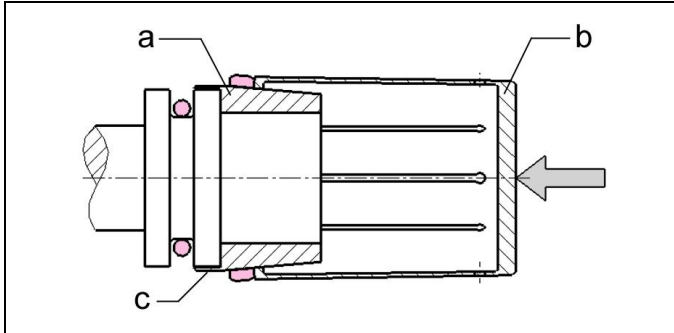


Figure 10: Mounting in a closed slot with expanding and mounting sleeves

a Expanding sleeve (metal)	c Centering collar of the expanding sleeve
b Mounting sleeve (e.g. polyamide or polyoxymethylene)	

5 Mounting O-ring / back-up ring

5.1 Mounting procedure

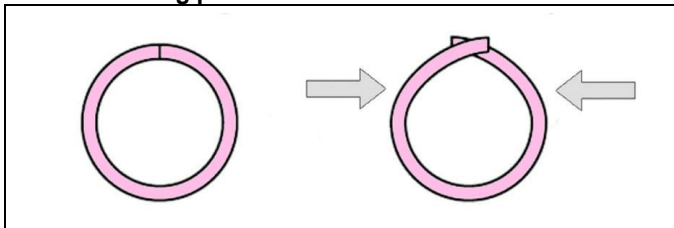


Fig. 11: Twist the spacer (slit version)

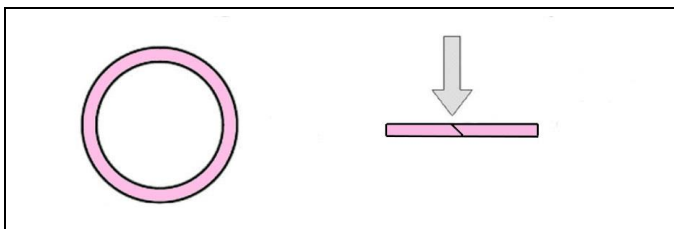


Fig. 12: Slitting the spacer

NOTE

Intact spacer (not slit)

When fitting the spacer to an outer diameter, the intact O-ring must be slit in advance. Make sure to slit the O-ring crosswise (see illustration Slitting the spacer).

Caution

Material damage!

Edges can be sharp. Insert seal carefully.

- Tension the spacer by twisting.
- Insert spacer, but do not overtwist.
- For easy installation moisten O-ring with oil.
- Insert O-ring, but do not twist.
- If required, insert a second spacer, O-ring is between two spacers.

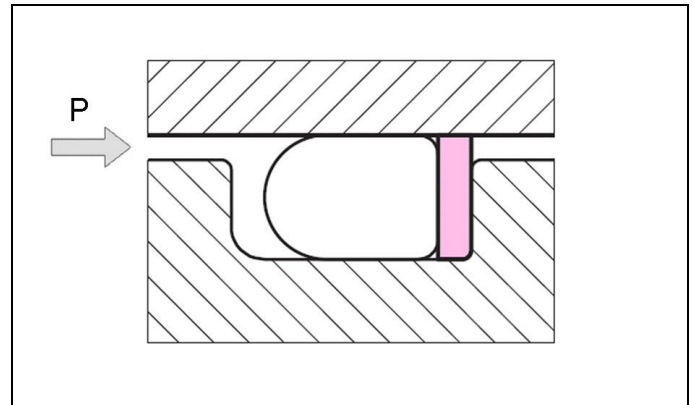


Fig. 13: Spacer mounting, pressure direction one side

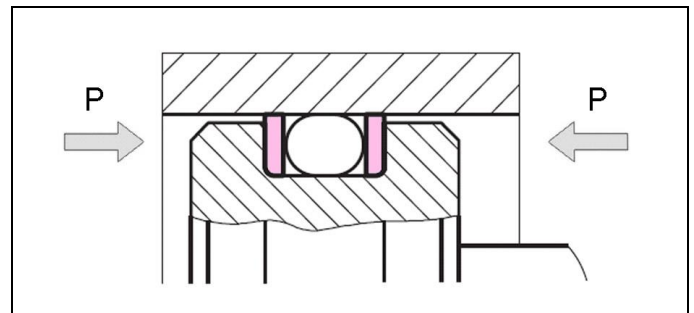


Fig. 14: Spacer mounting, pressure direction two sides

6 Storage

CAUTION

Damage due to incorrect storage of components

In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion on/in the element can occur.

- Storage in the packaging and moderate environmental conditions.
- The product must not be exposed to direct sunlight, since UV light may cause serious damage to the seals.