# Operating Instructions for Maier Rotary Joints

## Series DP

**Preface**

Keep this manual for future reference.

**Editor**

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# B General Part of the Operating Instructions for Maier Rotary Joints DP

## Contents

# 1 General

## 1.1 Information on this Manual

This manual is intended for use by the operators, the maintenance and the inspection staff. It is divided into the following sections

- Section 1 "General Part of the Operating Instructions":
  (pages with the designation B)
  This section provides general information on the manual, on safety and on handling the product
- Section 2 "Specifications and Spare Parts":
  (pages with the designation S)
  This section provides product-specific data
- Section 3 "Additional Information for Use in Hazardous Areas (EX areas)":
  (pages with the designation A)
  (only available for products certified as per directive2014/34/EC)

The operators must read and fully understand this manual and observe all instructions it contains. Exclusion of liability: We shall not be responsible in any way for damages and operational disruptions or any type of consequences whatsoever resulting from the failure to read and/or observe the instructions contained in this manual.

Read chapter 3 and the specific safety instructions in the individual chapters with particular care.

We reserve the right to technical modifications which such modifications are required to improve the rotary joint or its accessories, i.e. details and descriptions may differ from the information given in this manual.

## 1.2 Explanation of Symbols

| Symbol | Used for | Explanation |
|---|---|---|
| • | List | List of facts or instructions. No specific sequence required. |
| 1. | Instructions consisting of several individual steps | Instructions consisting of several steps which must be followed exactly in the sequence listed. Failure to observe the instructions in the correct sequence may result in damages or accidents. |
| [1] | Item number | Item number of the component mentioned in the corresponding illustration. |

# 2 Product Description

## 2.1 Intended Use

Maier rotary joints are only permitted to be used as fittings to connect pressurized pipes to rotating pressurized systems. Typical examples of such rotating pressurized systems are rollers which are heated or cooled by means of liquids or steam flowing through them. Series DP rotary joints are designed preferably for application with water. Series DP … 800 is available for application with thermal oil. Other mediums may be possible; please contact the manufacturer. Please refer to the section "Specifications and Spare Parts" for approved mediums as well as their qualities and limits; this information must be observed in the application.

Never modify the rotary joint as this can cause hazards. Install, operate and maintain the rotary joint only as described in these operating instructions. We shall not be liable for any damages and operational disruptions whatsoever resulting from failure to adhere to the operating instructions.

Always comply with all national and local regulations applicable at the place of installation concerning operational safety and the prevention of accidents.

For repairs, use only genuine Maier spare parts or standardized components explicitly approved by Maier. Using any other components can have adverse effects on the safety of the unit.

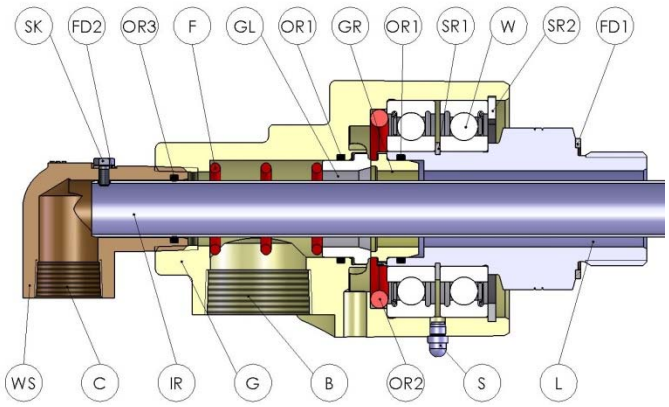
## 2.2 Reasonably Foreseeable Misuse

In case of reasonably foreseeable misuse of the product, the manufacturer's warranty will be void and the operator will be fully responsible for the consequences.

**Reasonably foreseeable misuse includes:**

- failure to observe the application data
- failure to observe the medium specifications
- failure to observe the maintenance intervals
- failure to replace wearing parts
- failure to perform maintenance work
- faulty maintenance work
- additional components mounted and conversions carried out without written approval
- use of non-genuine spare parts

## 2.3 Components



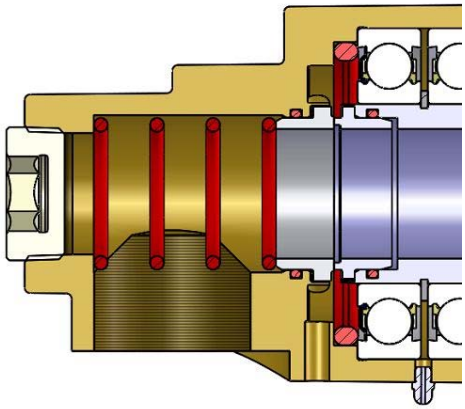

B-1

| | |
|---|---|
| SK | Hexagon screw (two-way flow design) |
| FD2 | Flat packing 2 (two-way flow design) |
| OR3 | O-ring 3 (two-way flow design) |
| F | Spring |
| GL | Mechanical seal |
| 2 x OR1 | O-ring 1 |
| GR | Counter ring |
| SR1 | Circlip 1 |
| W | Roller bearing |
| SR2 | Circlip 2 |
| FD1 | Flat packing 1 |
| WS | Elbow (two-way flow design). |
| C, B | Housing connections for the medium (the one-way flow design (single passage) has only one housing connection) |
| IR | Inner pipe (two-way flow design) |
| G | Housing (stationary) |
| OR2 | O-ring 2 |
| S | Lubricant inlet |
| L | Rotor (rotating) |

## 2.4 Function

Maier rotary joints are devices which allow you to connect stationary pressurized pipes to rotating pressurized systems. Typical examples of such rotating pressurized systems are rollers which are heated or cooled by means of liquids, gas or steam flowing through them.

The connection to the stationary pressure system (housing connection) is made by means of the stationary part of the rotary joint – the housing. There are following design variations:

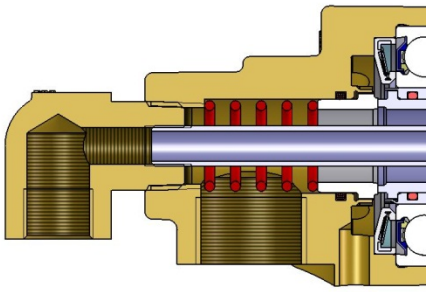


- **One-way flow design (single-passage) (DP)**: housing with one connection for supplying or discharging the medium to or from the rotating pressure system

  Small **DP** rotary joints are always delivered in one-way flow design. Two-way flow designs require elbows.

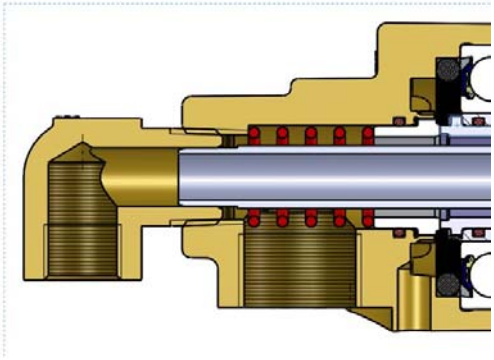
B-2

- **Two-way flow design (dual passage):**
  Rotary joint DP with elbow for supplying and discharging the medium to and from the rotating pressure system. The second flow channel is created by an inner pipe that is centered on the central axis of the rotating part. There are following design variations:



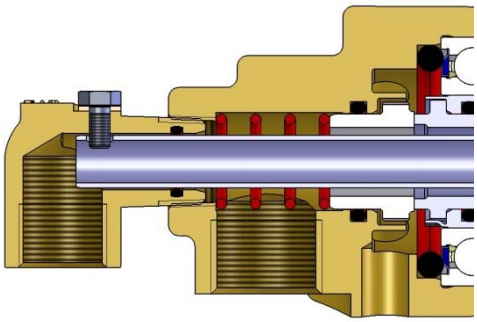
- **Stationary inner pipe (P 2):** The inner pipe is screwed into the elbow (standard version always with right-hand thread).

B-3



B-4

- **Rotating inner pipe supported in the elbow (PR 2):** The inner pipe runs inside the stationary elbow. The points of support are subject to wear.

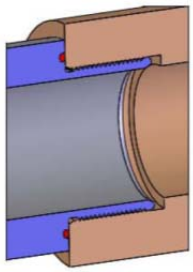


B-5

– **Stationary inner pipe with floating bearing and anti-rotation device by means of screw (PO 2):** The inner pipe is floating within an O-ring in the elbow and secured with a screw from rotating. The points of support are not subject to wear.

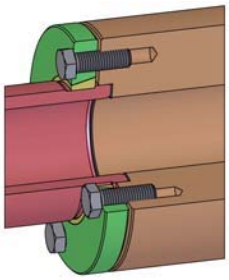
The same applies to series 800 except for the fact that the two-way flow design is equipped with an additional Viton O-ring which provides sealing between elbow and housing.

The connection to the rotating pressure system (rotor connection) is made by the rotating part of the rotary joint – the rotor. There are following design variations:

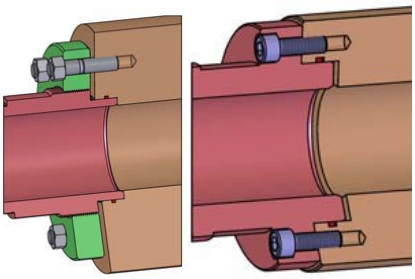


B-6

or



B-7



B-8.1 (SF) B-8.2(F)

- **Threaded connection**
  The rotor has either a right-hand or a left-hand thread (R/L) on one end.
  A sealing ring or an O-ring is used for sealing.
  DN 06 … 50 with copper ring
  DN 65 … 100 with O-ring (fig. B-6)

- **Flange connection**
  The rotor is connected to the roller by means of a K- flange (K). (DN 40 … 100)
  A flat packing is used for sealing.

The rotor is connected to the roller by means of a screw flange (SF) DN 80 and 100
or fixed flange (F) DN 65 and 75

An O-ring or a flat packing is used for sealing.

## INFORMATION

For additional information, please refer to our catalog and the corresponding dimensional drawing in the section "Specifications and Spare Parts".

# 3 Safety

## 3.1 Introduction

The rotary joint was designed and built according to the latest technology and complies with the pertinent safety regulations. However, the rotary joint may still cause dangers if it is not used as intended and according to the instructions or if it is used by untrained staff or if it is tampered with in any way.

Never tamper with the rotary joint or modify it in any way as this may adversely affect the safety and the performance of the rotary joint. We shall not be liable for any damages resulting from unauthorized modification of the rotary joint.

We strongly advise the owner/operator of the rotary joint to check his safety concept in terms of the effects a failure of the rotary joint may have on the environment. Make sure to take all additional safety measures required to protect persons and the environment.

## 3.2 General Safety Information

- Always keep the operating instructions at the installation site for quick and easy access.
- In addition to the instructions provided in this manual, you must also observe all the pertinent regulations and guidelines concerning workplace safety and prevention of accidents.
- Equip the rotary joint with a sufficient anti-rotation device.
- Use only flexible elements for housing connections. Do not apply forces to the housing via the connections.
- Only perform work on the rotary joint when the machine/system is at a standstill and the pressure released.
- Only operate the rotary joint if it is in perfect technical condition. Only use the rotary joint according to the instructions and specifications; never operate the unit outside of the framework of the specifications and performance data indicated. Be aware of all pertinent safety and danger aspects when operating the rotary joint. Immediately repair any malfunctions or problems or have such malfunctions or problems repaired as they may interfere with the safety of the rotary joint!
- The service life of counter-rotating parts is limited. Therefore, perform preventive maintenance of seals and bearings after no more than 12 months!
- If you need to dismantle safety devices for repair or maintenance of the rotary joint, you must refit such devices immediately upon completion of the work and check the proper function of the devices!
- When replacing the rotary joint, carefully fasten it to appropriate lifting gear and secure it in such a way that it cannot cause danger. Use only suitable lifting gear which is in perfect technical condition and which has a sufficient rating for the load to be lifted! Never step or work below suspended loads!
- Retighten all screw connections that you may have loosened for maintenance or repair work! Refer to the section "Specifications and Spare Parts" for information on the tightening torques.
- Use only genuine spare parts for repairs.

**INFORMATION**

For additional information refer to the section "Specifications and Spare Parts".

## 3.3 Structure of the safety Instructions

### 3.3.1 Signal words

**⚠ DANGER**

Acute danger. Failure to avoid the situation will result in death or severe injuries.

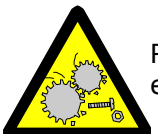
**⚠ WARNING**

Imminent danger! Failure to avoid the situation can result in death or severe injuries.

**⚠ CAUTION**

Possibly imminent danger! Failure to avoid the situation can result in injuries.

***NOTE***



Possibly dangerous situation! Failure to avoid the situation can result in damage to property.

**INFORMATION**

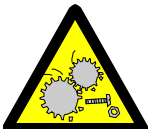
Provides additional information

### 3.3.2 Pictograms

**Warning: general hazards**
This warning pictogram highlights activities that involve several hazards.

**Warning: hot surfaces**
This warning pictogram highlights activities that involve hazards caused by hot surfaces.

**Warning: crushing hazard**
This warning pictogram highlights activities that involve hazards caused by rotating machine parts.



**Warning: equipment damages**
This warning pictogram highlights activities that may cause damage to the rotary joints due to incorrect operation.

## 3.4 Authorized Staff

Only staff that has read and fully understood these operating instructions and that is fully aware of the dangers resulting from the rotary joint as well as of the appropriate safety precautions is allowed to operate and work on Maier rotary joints. Such staff must have at least the knowledge of industrial mechanics or machine fitters who are experienced in working with pressurized components.

Every person having to do with the installation, mounting, dismantling, commissioning, maintenance and repair of the rotary joint or any other activities concerning the rotary joint must have read and fully understood the operating instructions (and, in particular, all the safety information) before taking up such activities. It is recommended that the owner of the rotary joint has each person confirm this in writing.

## 3.5 Risk Assessment and Residual Risks

Rotary joints are machine components that can be used in a large variety of machines and systems. These products are not subject to the Machinery Directive 2006/42/EC – hazards caused by this product are treated by compliance with the pertinent directive 2014/68/EC (Pressure Equipment Directive). Directive 2014/34/EC (Explosion Protection Directive) additionally applies to "ATEX" certified rotary joints.

After installation of our rotary joints into systems/machines, these are subject to the Machinery Directive and may be subject to additional directives and legislation. The user of our products is responsible for complying with all pertinent directives and legislation as well as for performing a risk assessment in accordance with these directives. Depending on the actual installation situation and the actual use of our product, risks may arise that should be avoided by design measures, if possible.

An analysis carried out by Christian Maier GmbH & Co. KG Maschinenfabrik resulted in the aspects listed below which necessitate an additional risk assessment by the user after installation of our products in the system/machine:

- If hot parts are touched or if hot or hazardous media escape under high pressure or if rotating parts draw in persons, this may result in severe burns, scalds, cuts or crushing.
  - Possible measures: Mount a protective cover around the rotary joint which prevents direct contact with hot parts, safely retains escaping medium and prevents contact with rotating parts.
  - If a cover cannot be mounted, other suitable protective measures must be taken. Always use the housing connections provided for the safe discharge of leaking medium.
- If the rotary joint blocks and rotates along with the roller, hoses can be torn off and hot or hazardous mediums may escape under high pressure.
  - Always observe the information for the design department on mounting and operation in chapter 5.
  - In particular when combining large nominal diameters with high speeds and high temperatures, it is recommended to monitor the rotary joint by means of a torque monitoring system – alternatively by means of a vibration sensor.
  - Ensure that the unit is regularly maintained as per chapter 7.

The user of our products must verify the applicability and effectiveness of the possible measures listed in the actual situation.

# 4 Transportation and Storage

**Transportation**

- Use suitable lifting gear to transport rotary joints weighing more than 25 kg.

**Storage**

- Maier rotary joints are not suited for storage in the original package for more than 6 months.
- For periods of extended shutdown or storage of the rotary joints, it is recommended to use a suitable corrosion protection sheet as provided, for example, by Cortec Corp. (www.CortecVCI.com).
- The storage room must be free from dust, sufficiently ventilated and not subject to major temperature changes (relative humidity below 65%, temperature between 15°C and 30°C).
- After a storage time of more than 2 years or when the package has been damaged or the unit has been subjected to shocks, the rotary joint must be checked in the factory or the nearest service center!
- If you want to preserve complete system components with the rotary joint attached, make sure the corrosion protection measures are compatible with the materials and sealing elements used. Otherwise there is the risk of chemical reactions and deposits at sealing and bearing elements.

# 5 Information on Mounting and Operation

The following has to be observed to ensure fast and reliable mounting, commissioning, and safe operation of the rotary joint otherwise any warranty claims will be void:

- Never operate the rotary joint outside of the specified application and performance limits.
- Smooth operation of the rotary joint is only possible if roller and intermediate flange are concentric and do not wobble!
- The information on the admissible mounting position of the rotary joint provided in the section "Specifications and Spare Parts" must be adhered to.
- Use flexible hoses to connect pipelines with the rotary joint housing. This compensates for heat expansion and vibrations.
- Never apply torsional, tensile or pressure loads to metal hoses. Observe the minimum bending radii specified by the manufacturer – if in doubt, contact your hose vendor. Section 6.2 provides examples of possible hose routings and installations. Never use axial compensators.
- Use flat packings made of pure graphite to securely seal flange connections.
- Only operate the rotary joint with a sufficiently dimensioned anti-rotation device attached to the housing. The anti-rotation device must allow for axial and radial movements of the housing. Please refer to chapter 6.3.1 for additional information.

- Install an additional safety device:
  Install a device for monitoring either the torque or the bearing by means of vibration pickup (e.g. by FAG or SKF) connected to the emergency shutdown system in order to avoid bearing damage and consequential damage.
  Refer to the section "Specifications and Spare Parts" for limit values concerning the admissible friction torques. Section 6.2 provides an example of the anti-rotation device on the housing.
  If the monitoring system is activated, the rotation of the roller should be stopped immediately and the supply of the medium should be interrupted upstream of the metal hoses.
- Center the inner pipe with the roller and the rotary joint. Wobbling and axial tension of the inner pipe will lead to malfunctions of the rotary joint.
- When the rotary joint has a large nominal diameter or a long inner pipe or is operated at high speeds, it is recommended to separate the inner pipe in the area of the rotor connection. This facilitates mounting of the rotary joint and, in case of DPR2 rotary joints, reduces the wear and tear at the bearing bush for the inner pipe.
- Operation with water exceeding 70°C:
  In order to ensure maximum reliability and service life of the seal in the rotary joint, it is recommended that the quality, treatment and conditioning of the hot water used in the rotary joint corresponds to VdTÜV Technical Chemistry Guidelines 1466 (VdTÜV - Merkblatt Technische Chemie 1466). The circulating water must have a low salt concentration and a maximum conductivity of < 100 µS/cm! Saliferous water may cause deposits in the sealing gap and premature failure of the seal.

**For ATEX-certified products (regulations 2014/34/EC)**

- Check the electrical resistance between the rotary joint and the system. If necessary, connect them with equipotential bonding strips to create the same potential on both sides.
- Determine the maximum temperature of the system. If necessary, install a safety temperature limiter.

**INFORMATION**

Refer to section 3.4 for additional information.

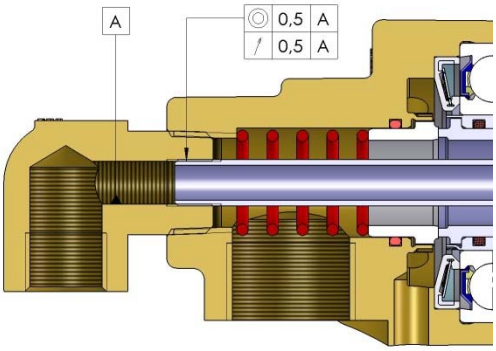
# 6 Mounting

## 6.1 Mounting the rotary joint to the roller DN 10 to 50

**INFORMATION**

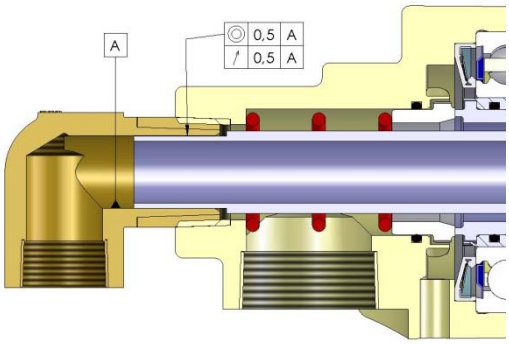
Use only flat packings made of pure graphite with metal insert.

**Preparation for mounting and separation of the inner pipe for two-way flow design (dual-passage)**



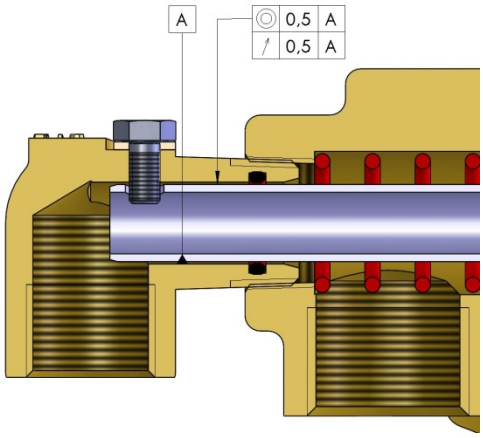

B-9

- With stationary screwed-in inner pipe (DP2) with right-hand thread:
  Make sure the inner pipe is centered on the axis of rotation.




B-10

- With rotating inner pipe (DPR2):
  Mount inner pipe into the elbow. Make sure that the bearing surface of the inner pipe is centered and that there is no tension.

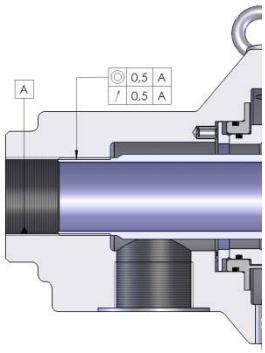



B-11

With stationary inner pipe (DPO2):
Insert inner pipe into elbow. Take care not to damage the O-ring in the elbow!

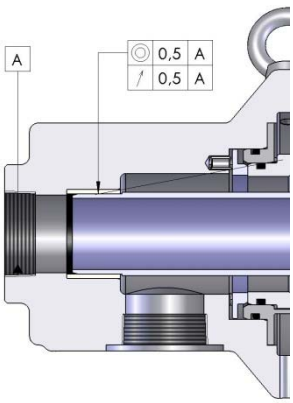
A screw secures the inner pipe against rotation.

## 6.2 Mounting the rotary joint to the roller DN 65 to 100




B-12

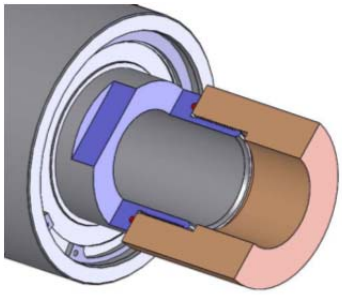
- With stationary, screwed-in inner pipe (DP2) with right-hand thread:
  Make sure the inner pipe is centered on the axis of rotation.




B-13

- With rotating inner pipe (DPR2):
  Mount inner pipe into the rotating roller. Make sure that the bearing surface of the inner pipe is centered in the rotary joint and that there is no tension.

### Mounting with threaded rotor



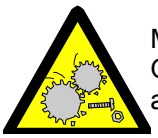
B-14

1. The rotor has either a right-hand or a left-hand thread (R/L) on one end.
   A sealing ring or an O-ring is used for sealing.
   DN 06 … 50 with copper ring
   DN 65 … 100 with O-ring (fig. B-14)

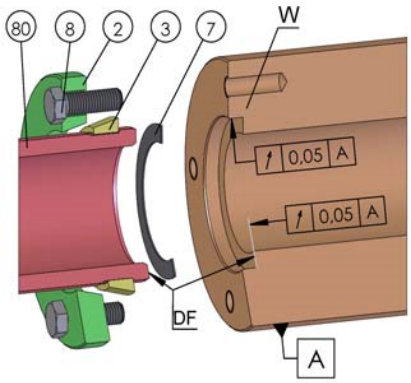
2. Screw rotary joint into the roller.

### Mounting with K flange [2] and inner ring [3]

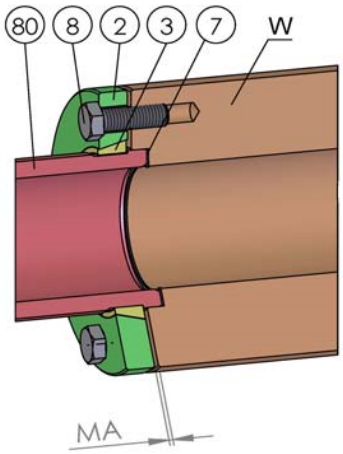
***NOTE***



Mounting with K flange and screwed flange requires a minimum distance of [MA] ≥ 1 mm. Otherwise leakage will occur at the sealing element, and the rotary joint, the inner pipe and the roller will be damaged:



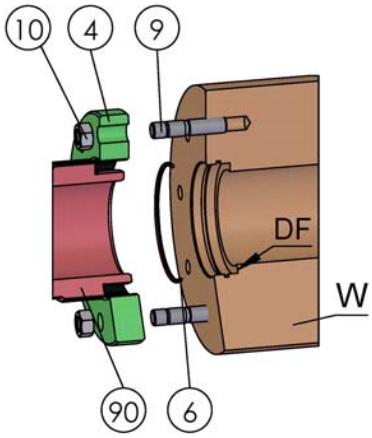

B-15



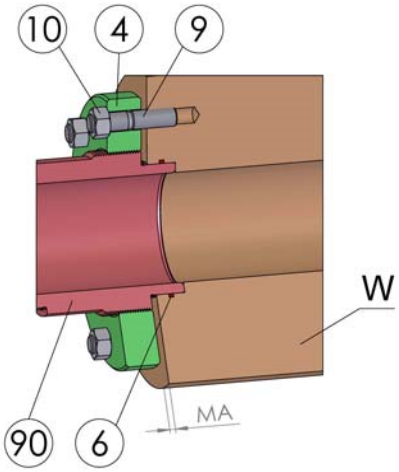

B-16

1. Clean sealing surfaces [DF], apply assembly paste and place the sealing element [7] into roller [W].
2. The flat packing as standard sealing can also be replaced by a different element, e.g. an O-ring. Refer to the section "Specifications and Spare Parts" for additional information.
3. Insert bolts into K flange [2] and put the flange onto rotor [80]. Place inner ring [3] into rotor groove.
4. Lift the rotary joint and insert it into the centering element of the roller [W]. Design with inner pipe: the inner pipe must be centered with the rotary joint and the roller [W]. If it is hard to turn the inner pipe, make sure it sits in the correct position. Wobbling and axial tension will cause malfunctions of the rotary joint.
5. If you use a flat packing [7], the rotary joint must be aligned (refer to "Aligning the rotary joint when sealing is done by means of flat packing").
6. Observe the minimum distance [MA] - otherwise leakage will occur at the sealing element and the rotary joint and the inner pipe will be damaged:
   MA ≥ 1 mm
7. Insert and tighten screws [8]. Maximum permissible tightening torque as per section "Specifications and Spare Parts".

### Mounting with screwed flange [4]



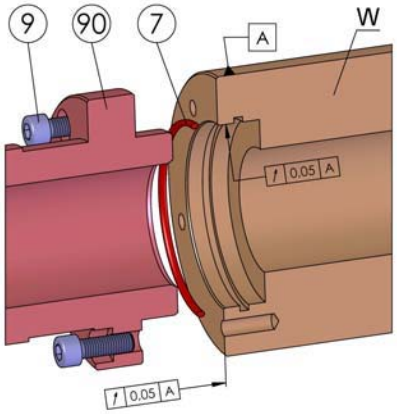

B-17



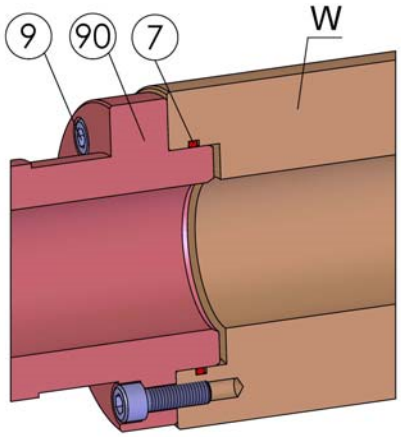

B-18

1. Clean sealing surfaces [DF], apply assembly paste and place the sealing element [6] into roller [W].
2. As a standard sealing element, the flat packing can also be replaced by a different element, e.g. an O-ring. Refer to the section "Specifications and Spare Parts" for additional information.
3. Screw flange [4] on rotor [90]. Make sure that dimension [MA] is maintained after mounting of rotor [90] to roller [W]. MA ≥ 1 mm. Otherwise leakage will occur at the sealing element and the rotary joint, the inner pipe or roller [W] will be damaged. Mount stud bolts [9].
4. Lift the rotary joint and insert it into the centering element of the roller [W]. Design with inner pipe: the inner pipe must be centered with the rotary joint and the roller [W]. If it is hard to turn the inner pipe, make sure it sits in the correct position. Wobbling and axial tension will cause malfunctions of the rotary joint.
5. If you use a flat packing, the rotary joint must be aligned (refer to "Aligning the rotary joint when sealing is done by means of flat packing").
6. Observe the minimum distance [MA] - otherwise leakage will occur at the sealing element and the rotary joint and the inner pipe will be damaged:
   MA ≥ 1 mm
7. Mount nuts [10]. Maximum permissible tightening torque as per section "Specifications and Spare Parts".

### Mounting with fixed flange (5)



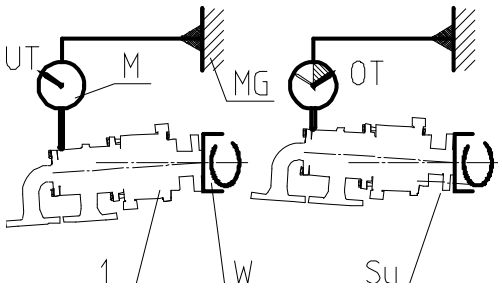

B-19




B-20

1. Mount the rotary joint to roller [W].
2. Seal with O-ring [7].
3. Fasten the rotary joint with screws [9].
4. Clean sealing surfaces, apply assembly paste and place the sealing elements into roller [W].
5. Lift the rotary joint and insert it into the centering element of the roller [W]. Design with inner pipe: the inner pipe must be centered with the rotary joint and the roller [W]. If it is hard to turn the inner pipe, make sure it sits in the correct position. Wobbling and axial tension will cause malfunctions of the rotary joint.
6. Align the rotary joint (refer to section "Aligning the rotary joint when sealing is done by means of flat packing").
7. Observe the minimum distance [MA] (see fig. B-18) - otherwise leakage will occur at the sealing element and the rotary joint and the inner pipe will be damaged: MA ≥ 1 mm
8. Insert and tighten screws [9]. Maximum permissible tightening torque as per section "Specifications and Spare Parts".

## Aligning the rotary joint when sealing is done by means of flat packing



B-21

1. Place dial gauge [M] from the static machine frame [MG] onto the rotary joint.
2. Rotate roller [W] until the dial gauge is at the bottom dead center [UT]. Mark the pointer position.
3. Rotate roller [W] until you reach the top dead center [OT].
4. Tighten the bottom screws [Su] until the dial gauge is in the central position.
5. Repeat this alignment process until concentricity complies with the tolerances specified in the table below.
6. Tighten the screws with the permissible torque as per section "Specifications and Spare Parts"!

## Permissible concentricity tolerances

| | **n ($min^{-1}$/rpm)** | | |
|---|---|---|---|
| **DN** | ≤ 100 | ≤ 400 | > 400 |
| **06 – 50** | ± 0.25 mm | | |
| **65 - 100** | | ± 0.1 mm | |

## 6.3 Connecting the Rotary Joint

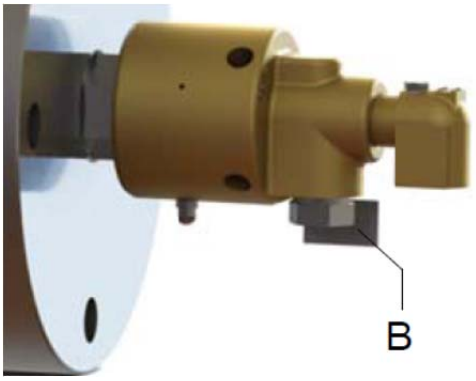
**⚠ WARNING**

For safety reasons, always provide an anti-rotation device.

**INFORMATION**

Also refer to chapter 5. for important information on this section.

### 6.3.1 Anti-rotation device

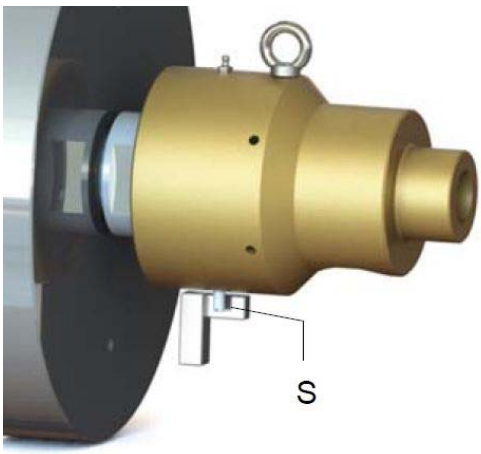



B-22

*up to DN 50*

The anti-rotation device is a radial stop at housing connection B. Make sure to observe the direction of rotation of the rotor.

The anti-rotation device has to be attached to the machine frame.




B-23

*DN 65 to 100*

Mount a corresponding radial stop for headless screw S. The stop has to be attached to the machine frame (fig. B-23). Alternatively it is also possible to attach an anti-rotation fork.

Make sure to observe the direction of rotation of the rotor.

**General information on connection lines**

The following sections show examples of the design of the flexible connection elements:

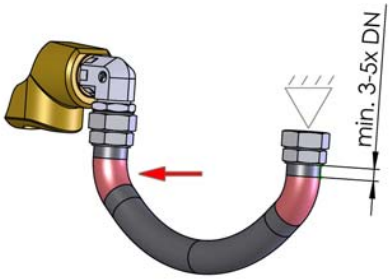
↔ Permissible movement (to be aimed for)

↔ Impermissible movement (to be avoided)

B-24

Do not compress or stretch the lines.

B-25

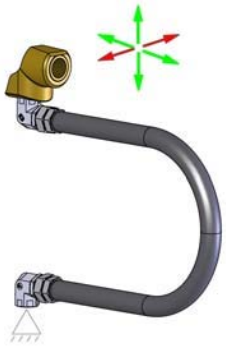



B-26

To prolong the service life, add a length of 3-5x DN per connection to the length calculated on the basis of the permissible bending radius.

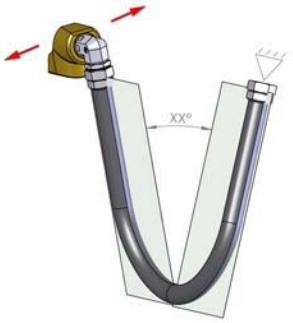
B-27

Avoid connection offset. Bear in mind that bending causes linear deformation.



B-28

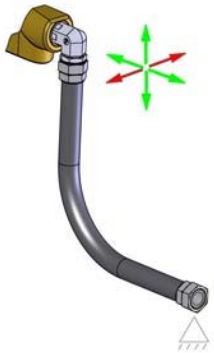
Allow for restricted degrees of freedom. Bear the smallest permissible bending radius in mind.




B-29

B-30

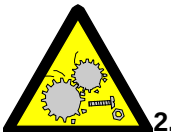
Preferably use pipe bends with fixed elbows which allow for two-way flow.
All degrees of freedom are possible without tension if the length is sufficient.



B-31

# 7 Operation

**NOTICE**



**1.** The rotary joints must never run dry as this may cause damage to the rotary joint, and the maximum permissible surface temperature may be exceeded.
As a general rule, dry-run of the rotary joint is not permissible. Exception: Test run for max. 30 minutes at maximum 10% of the admissible max. operating speed, or if operating speeds are very low, 10 1/min should not be exceeded.
A possible suitability of special rotary joints for dry run is specifically indicated in the operating instructions and the declaration of conformity.

**2.** Sudden temperature and pressure loads will cause damage to the rotary joint. Maximum temperature change during start-up $\Delta T \leq 2$ K/min.

**3.** Exceeding the permissible application data as determined in chapter "Specifications and Spare Parts" will cause damage to the rotary joint. Avoid a combination of maximum values.

## 7.1 Commissioning

- During initial commissioning, minor dripping leakage of the medium may occur during the breaking in period of the dynamic seal. The duration of the breaking in period depends on operating speed and pressure; usually, it is terminated after a few days.
- To avoid premature damage to seals in the rotary joint, it is recommended to frequently check the filters installed for the medium when a new system is put into operation for the first time. During this period, expect more soiling by particles such as chips, rust or scales in the piping system. This is particularly true if the system has not been flushed prior to commissioning.

## 7.2 During Operation

Check the following:

- Concentricity of the rotor with the roller driver
  The radial deflection in the rear area of the housing must not exceed the values listed in the section "Permissible concentricity tolerance
- Quality of the medium in the system
  Record the data checked. Refer to the section "Specifications and Spare Parts" for the default values.
- Visible leakage at the pressure relief connection
  The operating behavior of the mechanical seal does not change suddenly. Usually, an impending failure of the seal is indicated by slowly increasing leakage. This allows you to collect empirical data about the operating behavior of the rotary joint running on the system.

## 7.3 Troubleshooting

| Problem | Cause | Remedy |
|---|---|---|
| leakage at the housing through the relief holes | • mechanical seal damaged or worn | • install a new mechanical seal<br>• check the quality of the medium and the condition of the bearings |
| noise and wobbling | • insufficient lubrication<br>• bearing worn<br>• bearing damaged | • overhaul or repair; observe the lubrication intervals!<br>• replace rotary joint if damaged |
| friction torque exceeded | • bearing damaged<br>• sealing element damaged<br>• moving parts brush against each other<br>• permissible application data exceeded | • inspection of the rotary joint and the system. |
| leakage at sealing points | • flat packing or sealing element damaged<br>• screw torque of connection insufficient | • replace flat packing or sealing element during the next planned shutdown. If there is considerable leakage, immediately put the rotary joint out of operation.<br>• tighten the screws with the correct torque as per section "S Specifications and Spare parts". Do not overload screws as this will destroy them. Immediately replace overloaded screws! |

# 8 Maintenance

**INFORMATION**

Maier offers both onsite service by our experts and training of your service staff.

- Observe the safety instructions in chapter 3.
- Maintenance may only be performed by authorized staff as per chapter 3.4.
- Work on the rotary joint may only be performed when the machine/system is at a standstill and after the rotary joint has cooled down.
- When performing work on the rotary joint, always wear safety glasses to protect your eyes against escaping medium.
- Use only genuine spare parts.
- If protective equipment was removed, it must be refitted after you have finished your work. Make sure that it works properly again after reinstallation.
- All screws must be tightened with the specified tightening torque (refer to section "Specifications and Spare Parts").

## 8.1 Maintenance Plan

| Interval | Activity | Explanation |
|---|---|---|
| refer to section "Specifications and Spare Parts" | • relubricate the roller bearings if they are equipped with a lubricating nipple | lubricant quantity see section "Specifications and Spare Parts" |
| every 12 months | • replace bearings<br>• replace seals | recommended to be done by Maier customer service |

# 9 Repair

## 9.1 Tools

- Suitable lifting gear must be used to mount the rotary joint to the roller.
- A torque wrench must be used for tightening screws with a specified tightening torque.

### 9.1.1 Repair Work

### 9.1.2 Dismounting the Rotary Joint from the Roller

**Prerequisites:**

- Depressurize the rotary joint.
- Drain the medium contained in the roller.
- Remove the protective cover and the anti-rotation device.

**Procedure:**

**⚠ WARNING**

Risk of injury if medium under pressure escapes.
Make sure that shut-off valves cannot be opened inadvertently or intentionally during repair work.

**INFORMATION**

Refer to the operating instructions of the complete system for any further information on properly performing preparatory work.

1. Remove the housing connections.
2. Secure the rotary joint with a restraining belt (nominal diameter 32 - 50) or by means of the eye bolt (nominal diameter 65 and larger) and a crane.
3. Loosen the connection between rotor and roller.
   - rotor with threaded end: unscrew the rotor by applying a wrench to the wrench flats
   - rotor with flange connection: remove the flange screws. Slowly pull the rotary joint out of the roller. If the rotary joint cannot be pulled out easily, loosen it from its central position by slightly moving it up and down with the crane.

### 9.1.3 Dismantling the Rotary Joint

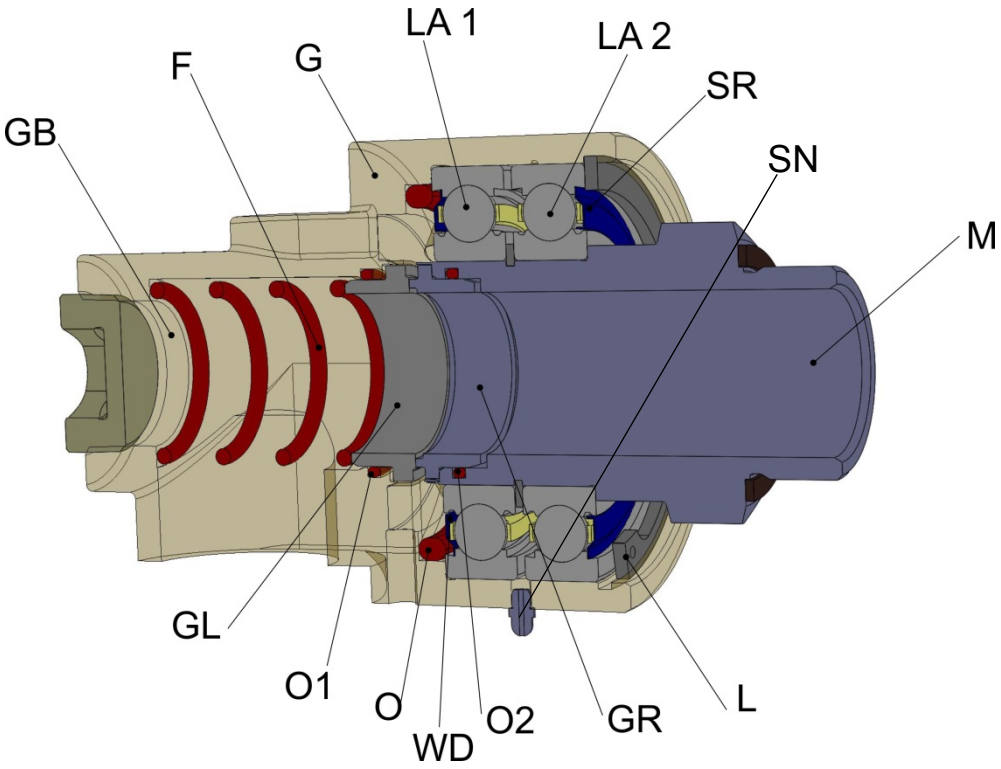
**Prerequisite**

- The rotary joint must have been dismounted from the roller.

**INFORMATION**

The structural design of the rotary joints is shown in the section "Specifications and Spare Parts".

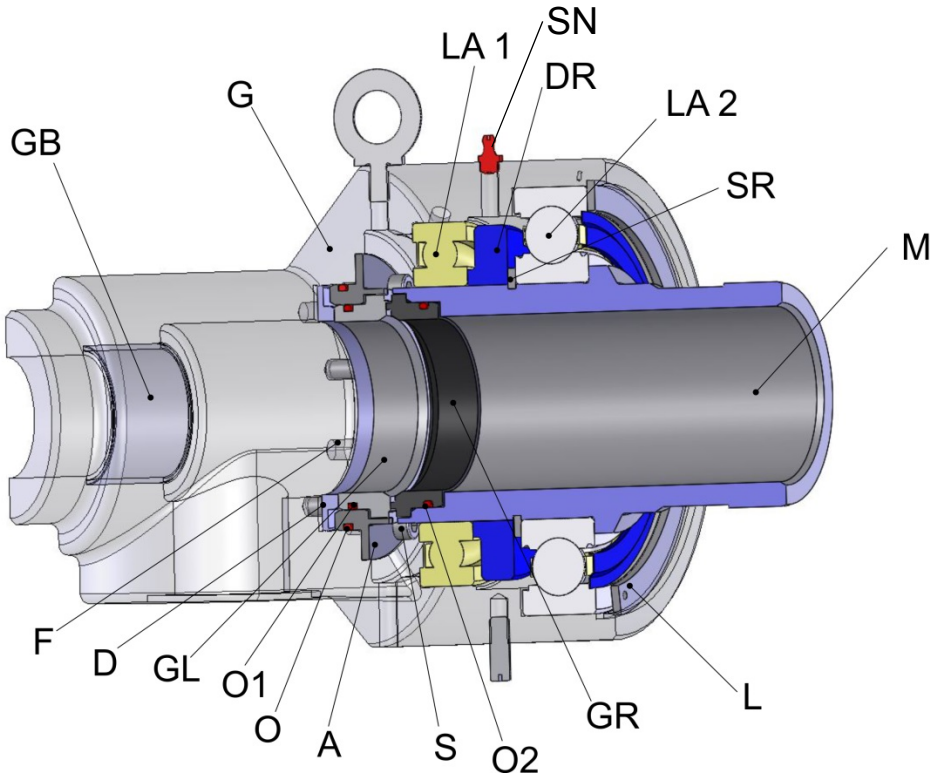
### 9.1.4 DP size DN 10 to 50




B-32

1. Remove circlip [L] situated in the housing
2. Remove rotor [M] with bearings [LA1 and LA2] from the housing [G]
3. Remove mechanical seal [GL]
4. Remove compression spring [F]
5. Remove O-ring [O1]
6. Remove counter face [GR] from rotor [M]
7. Remove O-ring [O2]
8. Strip off bearing [LA1] from rotor [M]
9. Remove circlip [SR] from rotor [M]
10. Strip off bearing [LA2] from rotor [M]
11. Remove O-Ring [O] or shaft seal [WD] (series …800) from the housing [G]
12. Replace lubrication nipple (SN) if it is damaged.

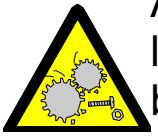
### 9.1.5 DP size DN 65 to 100




B-33

1. Remove circlip [L] situated in the housing
2. Remove rotor [M] with bearings [LA1 and LA2] from the housing [G]
3. Loosen screws (S)
4. Remove locking ring [A]
5. Remove O-ring [O]
6. Remove mechanical seal [GL]
7. Remove O-ring [O1]
8. Remove thrust collar [D]
9. Remove compression springs [F]
10. Remove counter face [GR] from rotor [M]
11. Remove O-ring [O2]
12. Strip off bearing [LA1] from rotor [M]
13. Remove spacer ring [DR] from rotor [M]
14. Remove circlip [SR] from rotor [M]
15. Strip off bearing [LA2] from rotor [M]
16. Design DPR2: remove housing bush (GB)
17. Replace lubrication nipple (SN) if it is damaged.

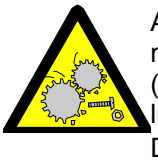
**NOTICE**



All wearing parts **V** listed in the spare and wearing parts list in section “Specifications and Spare Parts” have to be replaced.

9.1.5.1 Assembly of the rotary joint

**NOTICE**



Never grease or lubricate the sealing faces of the mechanical seal!
Apply a very thin film of a suitable lubricant to sealing rings (O-rings) and shaft seals made of elastomer. Do not bring them into contact with mineral oil based lubricants (failure of the seals due to swelling or decomposition)! Use "Parker Super-O-Lube", a lubricant for assembly by company Parker.
Do not use force to assemble the components!

**Requirement**

- Use only new original spare and wearing parts.

**Assembly**

Assembly of the components is done analogously for disassembly but in reversed order.

# S Specifications and Spare Parts

## Contents

# 1 Application data

| Series | | DP | | DP | DP-800 | DP | DPN |
|---|---|---|---|---|---|---|---|
| **Type** | | | | | | 1, 2, R2 | 1B, 1C, 2, R2 |
| **Nominal Diameter DN** | [mm] | …06 | | 10 … 50 | 10 … 50 | 65 … 100 | 10 … 50 |
| **Medium** | | Compressed air, water | Hydraulic Oil | Water | Thermal Oil | Water | Water |
| **Temperature** | min …max. °C | … 120 | … 80 | - 10 …160 | … 160 | - 10 …140 | -10 … 90 |
| **Pressure PN** | min… max. bar | … 10 | … 80 | -0,2 … 10 | … 10 | -0,2 … 10 | -0,2 … 10 |
| **Speed** | max. $min^{-1}$ | 55000 DN [mm] | | 55000 DN [mm] | 55000 DN [mm] | 55000 DN [mm] | 55000 DN [mm] |
| **Speed limite for formula values** | **max. $min^{-1}$** | 3000 | 400 | 2500 | 2500 | 850 | 2500 |

# 2 Tightening Torques for Fastening Screws in Nm at Screw Temperature 20°C

| Size | Properity class 5.6 | Properity class 8.8 |
|---|---|---|
| **M6** | 4 | 10 |
| **M8** | 10 | 24 |
| **M10** | 18 | 48 |
| **M12** | 37 | 82 |
| **M16** | 90 | 206 |
| **M20** | 175 | 400 |

**INFORMATION**

The property class is indicated by the designation of the fastening element.
Please inquire for data on other materials.

# 3 Initial lubrication and relubrication

| | |
|---|---|
| **lubricants** | The rotary joints are factory-lubricated with PETAMO GY 193, Klüber Lubrication KG (phone.:++49-(0)89-7876-271 \| www.klueber.com)<br>Lubrication at grease nipple – used grease escapes at the housing.<br>**Attention:** Warranty is forfeited when using greases not approved by us. |

| **Volume at…** | DN | mm | 06 | 10 | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 75 | 80 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Initial lubrication ($Q_E$)** | Bearing 1 | $cm^3$ *1 | - | 1,5 | 2 | 5 | 6 | 10 | 12 | 25 | 50 | 100 | 100 | 150 |
| | Bearing 2 | $cm^3$ *1 | - | 1,5 | 2 | 5 | 6 | 10 | 12 | 25 | 25 | 50 | 50 | 75 |
| **Relubrication ($Q_N$)** | Rotary joint | Strokes *2 | *3 | 2 | 4 | 5 | 6 | 8 | 10 | 15 | 20 | 40 | 40 | 50 |

*1 Grease volume as recommended value **for one** bearing (spaces filled to 50%)
*2 Strokes of a grease gun as per DIN 1283 with 1.2 cm3 per stroke and **rotary joint**

The relubrication intervals are recommended values. Reduce the intervals to one half in the case of exceptional operating or environmental conditions (such as high pressures or loads, heavy machine vibrations or polluted bearing grease). Experiences of the owner/operator can be considered in optimizing the lubrication intervals.

| **Temperature** | **up to 80 °C** | **80 °C to 120 °C** | **120 °C to 140 °C** | **140 °C to 160 °C** |
|---|---|---|---|---|
| **Intervals** | *3 Factory lifetime lubrication | Every 6 months | Every 12 weeks | Every 2 weeks |

# 4 Limit values for the friction torque at the rotary joint

Maier series DP rotary joints are equipped with contacting seals and rolling bearings. The table below lists the friction torque depending on the nominal width DN generated during rotation at maximum operating pressure and speed of rotation to allow for torque monitoring recommended for safety reasons.

## The following applies to the individual columns:

| | |
|---|---|
| Column **Normal**: | The friction torque to be expected during normal operation. |
| Column **Warning**: | If these values are exceeded, the rotary joint and the installation should be checked within the next 3 days. |
| Column **Stop**: | If these values are exceeded, **stop** the rotary joint **immediately** for safety reasons; check and repair it, if necessary! |

Friction torque for Maier rotary joints series DP
at maximum pressure PN
(Observe the information provided below)

| DN | Normal in Nm | Warning in Nm | Stop in Nm |
|---|---|---|---|
| 06 | 0,2 | 0,4 | 0,6 |
| 10 - 50 | 2 | 4 | 6 |
| 65 | 6 | 12 | 18 |
| 75 | 8 | 16 | 24 |
| 80 | 8 | 16 | 24 |
| 100 | 10 | 20 | 30 |

Further torques may be generated during operation of the rotary joint in addition to the friction torques listed. These additional torques may be caused by tilting as a result of horizontal housing connection pieces, shut-off valves mounted directly to the housing connection piece or by righting forces generated by the metal hoses for the supply of the fluid. If the roller with the connected rotary joint is to move during running, the hoses may also cause additional loads as a result of righting forces of the hoses.

All these additional loads which cause an additional torque must be considered in defining the switching point for the pre-alarm and the main alarm.

# 5 Media specification

## 5.1 Approved media for the pressure pipe

Series DP … 06 may be used for water, compressed air and hydraulic oil, the series DP and DPN for water, having the quality described below. Other media including additives (e.g. anticorrosion or antifreeze agents) must be checked for compatibility with the sealing materials at the manufacturer's site.
Thermal oil must not be used under any circumstances since the elastomers used in the units are not compatible with such media! Use only type DP … -800 rotary joints for thermal oil!

General

The quality of the Medium used plays a decisive role regarding the service life and reliability of Maier rotary joints. It is strongly recommended that the media meets the specifications listed below. Inappropriate water quality will result in heavy wear of the seals and premature failure of the rotary joint.

### 5.1.1 Section 1: **Water** at temperatures -10°C - 70°C

Row water: drinking water quality
- General: clear, no sediments
- Filtration: particle size 20 µm; max. 50µm
- Water hardness: < 3,2 mmol/l
- If required, add a suitable antifreeze agent and a silicate-free anticorrosion agent (ensure compatibility with the materials used in the unit, check back with manufacturer, if necessary).

### 5.1.2 Section 2: **Water** at temperatures > 70°C

Row water: drinking water quality
- General: clear, no sediments
- Filtration: particle size 20 µm, max. 50µm
- Water hardness: < 3,2 mmol/l
- Low salt concentration according to VdTÜV- Guideline TCh 1466 "Guideline for Circulation Water in Hot Water and Warm Water Heating Systems" ("Richtlinie für das Kreislaufwasser in Heißwasser – und Warmwasserheizungsanlagen), sheet 1
- If required, add a suitable antifreeze agent and a silicate-free anticorrosion agent (ensure compatibility with the materials used in the unit, check back with manufacturer, if necessary).

### 5.1.3 Section 3: **Thermal** oil temperature < 160 °C

| | |
|---|---|
| • Material groups: | 1. Thermal oil consisting of hydrocarbons (mineral base, group 1)<br>2. Thermal oil made of isomer mixture (synthetic base – group 2)<br>Only upon request:<br>Thermal oil consisting of uniform material (synthetic base – group 3) |
| • General: | clear, no sediments |
| • Filtration: | particle size 1969µin max. 3937µin |
| • Steam pressure*: | The steam pressure must not exceed 7,25 psi abs at maximum operating temperature. |
| *: Steam pressure is the pressure at which a liquid becomes gaseous. The steam pressure depends on the temperature of the liquid. | |
| • Specific heat conductivity: | For maximum heat dissipation in the sealing gap, the value should be as good as possible. |
| • Kinematic viscosity: | For excellent flow in the system and lubrication effect in the rotary joint, the following values should be attained:<br>- as low as possible at minimum application temperature<br>- as high as possible at maximum application temperature. |

### 5.1.4 Section 4: **Hydraulic oil** with temperature up to max. 80 °C

We recommend to use Hydraulic oil acc.to DIN 51524 or better with the purity class 21/19/16 acc. to ISO 4406/99 .It should be noted, that transport and storage has a strong influence on the oil purity. Any way, you must accurately filter the fluid when fill-ing, to ensure the oil purity required.

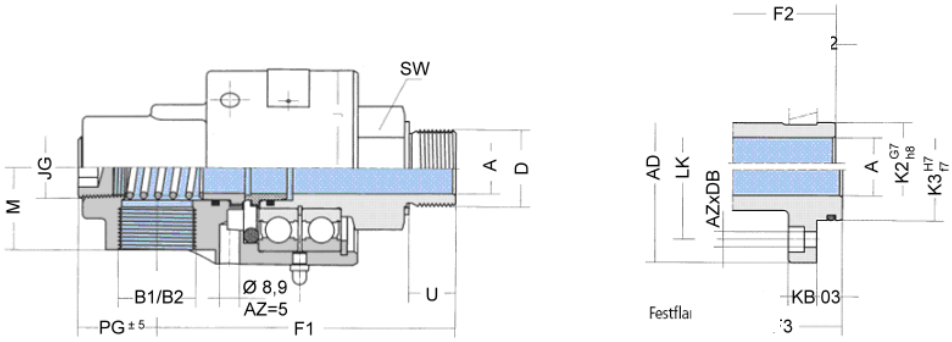
| **Particle size 4µm** | | | **Particle size 6µm** | | | **Particle size 14µm** | | |
|---|---|---|---|---|---|---|---|---|
| **ISO Code** | Particle quantity / 100ml | | **ISO Code** | Particle quantity / 100ml | | **ISO Code** | Particle quantity / 100ml | |
| | from | to | | from | to | | from | to |
| **21** | 1.000.000 | 2.000.000 | **19** | 260.000 | 500.000 | **16** | 32.000 | 64.000 |

### 5.1.5 Section 5: **Compressed air** with temperature up to max. 120 °C

Air food grade (dry and oil-free Compressed air quality acc.to DIN ISO 8573-1

| **Particle quantity /m³ Particle size d (µm)** | | | **Residual oil content** | |
|---|---|---|---|---|
| 0,1 < d <=0,5 | 0,5 < d <=1 | 1 <d <=5 | °C | (mg/m³) |
| 100.000 | 1.000 | 10 | <= +3 | 0,01 |

# 6 Outline Drawings DN 10 – 50

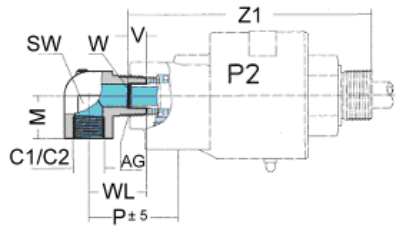



| | | DN [mm] | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|---|---|
| Housing connection | B2 =G | Type | DP 10 R 51 | DP 15 R 51 | DP 20 R 51 | DP 25 R 51 | DP 32 R 51 | DP 40 R 51 | DP 50 R 51 |
| | | Order-No. | 1112050-051 | 1112100-051 | 1112150-051 | 1112200-051 | 1112250-051 | 1112300-051 | 1112350-051 |
| | | Type | DP 10 L 51 | DP 15 L 51 | DP 20 L 51 | DP 25 L 51 | DP 32 L 51 | DP 40 L 51 | DP 50 L 51 |
| | | Order-No. | 1112051-051 | 1112101-051 | 1112151-051 | 1112201-051 | 1112251-051 | 1112301-051 | 1112351-051 |
| | | Type | | | | | | DP 40 K 91 | DP 50 K 91 |
| | | Order-No. | | | | | | 1112302-091 | 1112352-091 |
| | | Type | | | | | | DP 40 F 91 | DP 50 F 91 |
| | | Order-No. | | | | | | 1112303-091 | 1112353-091 |
| | B1=NPT | Type | DP 10 R 11 | DP 15 R 11 | DP 20 R 11 | DP 25 R 11 | DP 32 R 11 | DP 40 R 11 | DP 50 R 11 |
| | | Order-No. | 1112050-011 | 1112100-011 | 1112150-011 | 1112200-011 | 1112250-011 | 1112300-011 | 1112350-011 |
| | | Type | DP 10 L 11 | DP 15 L 11 | DP 20 L 11 | DP 25 L 11 | DP 32 L 11 | DP 40 L 11 | DP 50 L 11 |
| | | Order-No. | 1112051-011 | 1112101-011 | 1112151-011 | 1112201-011 | 1112251-011 | 1112301-011 | 1112351-011 |
| | | Type | | | | | | DP 40 K 01 | DP 50 K 01 |
| | | Order-No. | | | | | | 1112302-001 | 1112352-001 |
| | | Type | | | | | | DP 40 F 01 | DP 50 F 01 |
| | | Order-No. | | | | | | 1112303-001 | 1112353-001 |

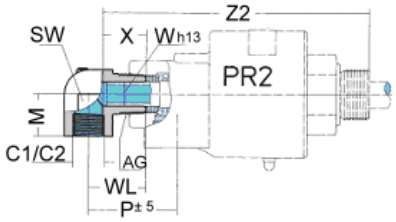
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Ø A** | 9,5 | 13 | 17,5 | 22 | 30 | 35 | 47 |
| **B1** | G $^3/_8$ | G $^1/_2$ | G $^3/_4$ | G 1 | G $1^1/_4$ | G $1^1/_2$ | G 2 |
| **B2** | $^3/_8$″ NPT | $^1/_2$″ NPT | $^3/_4$″ NPT | 1″ NPT | $1^1/_4$″ NPT | $1^1/_2$″ NPT | 2″ NPT |
| **D** | G $^3/_8$ A | G $^1/_2$ A | G $^3/_4$ A | G 1 A | G $1^1/_4$ A | G $1^1/_2$ A | G 2 A |
| **F1** | 88 | 98 | 112 | 128 | 153 | 176 | 191 |
| **F2** | | | | | | 164 | 201 |
| **F3** | | | | | | 170 | 192 |
| **Ø J** | 54 | 58 | 74 | 84 | 100 | 110 | 137 |
| **Ø K2 G7/h8** | | | | | | 50 | 65 |
| **Ø K3 H7/f7** | | | | | | 65 | 80 |
| **M** | 24 | 25 | 31 | 36 | 42 | 45 | 57 |
| **O2** | | | | | | 10 | 10 |
| **O3** | | | | | | 20 | 20 |
| **PG ±5** | 26,5 | 24 | 30 | 37 | 46 | 53,5 | 60 |
| **U** | 15 | 18 | 17 | 20 | 26 | 27 | 27 |
| **Ø AD** | | | | | | 100 | 125 |
| **AZ x Ø DB** | | | | | | 5x9 | 5x11 |
| **JG** | $^1/_4$″ NPT | $^3/_8$″ NPT | $^1/_2$″ NPT | $^3/_4$″ NPT | 1″ NPT | $1^1/_4$″ NPT | $1^1/_2$″ NPT |
| **KB** | | | | | | 15 | 15 |
| **Ø LK** | | | | | | 80 | 100 |
| **SW** | 24 | 30 | 36 | 46 | 55 | 60 | 75 |
| **Weight kg** | 0,8 | 1 | 1,8 | 2,4 | 4,5 | 6,2 | 9 |

## 6.1 P DN 10 – 50

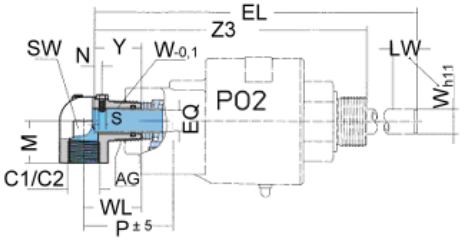
**Elbow for series DP**




**Type P 2**
for non rotating inner pipe
(with right-hand thread)




**type PR 2**
for roating inner pipe, directly born in elbow



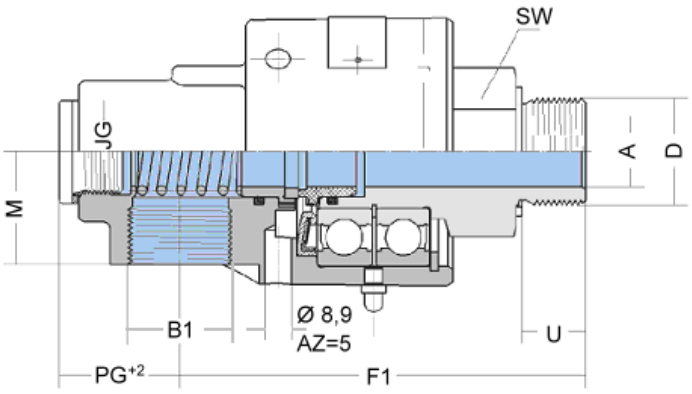

**Type PO 2**
for non-roating inner pipe, floating with elbow and O-ring, anti-rotational protection by means of screw. Inner pipe for type PO 2 available.

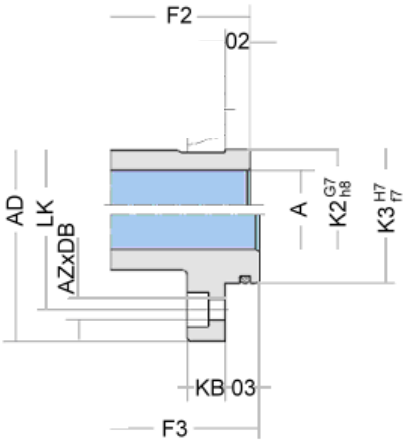
| | DN mm | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|---|
| C 1 = G | Type<br>Order-No. | P2 10 G<br>1112066 | P2 15 G<br>1112116 | P2 20 G<br>1112166 | P2 25 G<br>1112216 | P2 32 G<br>1112266 | P2 40 G<br>1112316 | P2 50<br>1112366 |
| | Type<br>Order-No. | PR2 10 G<br>1112067 | PR2 15 G<br>1112117 | PR2 20 G<br>1112167 | PR2 25 G<br>1112217 | PR2 32 G<br>1112267 | PR2 40 G<br>1112317 | PR2 50 G<br>1112367 |
| | Type<br>Order-No. | PO2 10 G<br>1112068 | PO2 15 G<br>1112118 | PO2 20 G<br>1112168 | PO2 25 G<br>1112218 | PO2 32 G<br>1112268 | PO2 40 G<br>1112318 | PO2 50 G<br>1112368 |
| C 2 = NPT | Type<br>Order-No. | P2 10 N<br>1112069 | P2 15 N<br>1112119 | P2 20 N<br>1112169 | P2 25 N<br>1112219 | P2 32 N<br>1112269 | P2 40 N<br>1112319 | P2 50 N<br>1112369 |
| | Type<br>Order-No. | PR2 10 N<br>1112070 | PR2 15 N<br>1112120 | PR2 20 N<br>1112170 | PR2 25 N<br>1112220 | PR2 32 N<br>1112270 | PR2 40 N<br>1112320 | PR2 50 N<br>1112370 |
| | Type<br>Order-No. | PO2 10 N<br>1112071 | PO2 15 N<br>1112121 | PO2 20 N<br>1112171 | PO2 25 N<br>1112221 | PO2 32 N<br>1112271 | PO2 40 N<br>1112321 | PO2 50 N<br>1112371 |
| | **C1** | G 1/4 | G 3/8 | G 1/2 | G 1/2 | G 3/4 | G 3/4 | G 1 1/4 |
| | **C2** | 1/4" NPT | 3/8" NPT | 1/2" NPT | 1/2" NPT | 3/4" NPT | 3/4" NPT | 1 1/4" NPT |
| | **M** | 18 | 20 | 26 | 28 | 35 | 38 | 45 |
| | **N** | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | **P ±5** | 42,5 | 38,5 | 51 | 59 | 74 | 82 | 98 |
| | **ØS** | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | **V** | 8 | 8 | 12 | 12 | 15 | 17 | 20 |
| | **W** | M 6x1 | G 1/8 | G 1/4 | G 3/8 | G 1/2 | G 3/4 | G 1 |
| | **Ø W h13** | 6 | 10 | 13 | 16 | 22 | 26 | 32,2 |
| | **Ø W -0,1** | 6 | 10 | 13 | 16 | 22 | 26 | 34 |
| | **X** | 21 | 19,5 | 25,5 | 28,5 | 35 | 37 | 39 |
| | **Y** | 25 | 25 | 28 | 31 | 38 | 40 | 40 |
| | **Z1** | 112 | 118 | 140 | 161 | 195 | 226 | 250 |
| | **Z2** | 125 | 129 | 153,5 | 177,5 | 215 | 246 | 269 |
| | **Z3** | 129 | 135 | 156 | 180 | 218 | 249 | 270 |
| | **AG** | 1/4" NPT | 3/8" NPT | 1/2" NPT | 3/4" NPT | 1" NPT | 1 1/4" NPT | 1 1/2" NPT |
| | **SW** | 22 | 22 | 32 | 32 | 36 | 36 | 55 |
| | **WL** | 27 | 27 | 35 | 38 | 47 | 49 | 58,5 |
| | **Weight kg** | 0,1 | 0,1 | 0,3 | 0,3 | 0,5 | 0,6 | 1,3 |

Inner pipe for Elbow PO2

| DN mm | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|
| Type<br>Order-No. | ES 10<br>1190951 | ES 15<br>1190952 | ES 20<br>1190953 | ES 25<br>1190954 | ES 32<br>1190955 | ES 40<br>1190956 | ES 50<br>1190957 |
| **ØW h11** | 6 | 10 | 13 | 16 | 22 | 26 | 34 |
| **ØEQ** | 5 | 8 | 11 | 14 | 20 | 24 | 31 |
| **EL** | 176 | 188 | 193 | 252 | 269 | 297 | 342 |
| **LW** | 55 | 55 | 55 | 75 | 55 | 55 | 75 |

## 6.2 DP … -800, DN 10 … 50

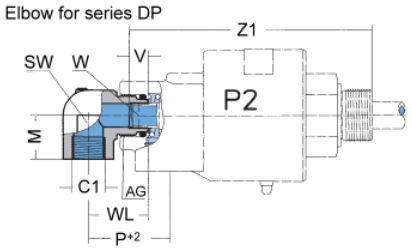


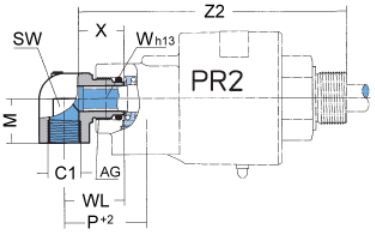

| DN mm | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|
| Type<br>Order-No. | DP 10 R 53-800<br>1112050-800 | DP 15 R 53-800<br>1112100-800 | DP 20 R 53-800<br>1112150-800 | DP 25 R 53-800<br>1112200-800 | DP 32 R 53-800<br>1112250-800 | DP 40 R 53-800<br>1112300-800 | DP 50 R 53-800<br>1112350-800 |
| Type<br>Order-No. | DP 10 L 53-800<br>1112051-800 | DP 15 L 53-800<br>1112101-800 | DP 20 L 53-800<br>1112151-800 | DP 25 L 53-800<br>1112201-800 | DP 32 L 53-800<br>1112251-800 | DP 40 L 53-800<br>1112301-800 | DP 50 L 53-800<br>1112351-800 |
| Type<br>Order-No. | | | | | | DP 40 K 93-800<br>1112302-800 | DP 50 K 93-800<br>1112352-800 |
| Type<br>Order-No. | | | | | | DP 40 F 93-800<br>1112303-800 | DP 50 F 93-800<br>1112353-800 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ø A** | 9,5 | 13 | 17,5 | 22 | 30 | 35 | 47 |
| **B1** | G 3/8 | G 1/2 | G 3/4 | G 1 | G 1 1/4 | G 1 1/2 | G 2 |
| **D** | G 3/8 A | G 1/2 A | G 3/4 A | G 1 A | G 1 1/4 A | G 1 1/2 A | G 2 A |
| **F1** | 88 | 98 | 112 | 128 | 153 | 176 | 191 |
| **F2** | | | | | | 164 | 201 |
| **F3** | | | | | | 170 | 192 |
| **ØJ** | 54 | 58 | 74 | 84 | 100 | 110 | 137 |
| **ØK2 G7/h8** | | | | | | 50 | 65 |
| **ØK3 H7/f7** | | | | | | 65 | 80 |
| **M** | 24 | 25 | 31 | 36 | 42 | 45 | 57 |
| **O2** | | | | | | 10 | 10 |
| **O3** | | | | | | 20 | 20 |
| **U** | 15 | 18 | 17 | 20 | 26 | 27 | 27 |
| **ØAD** | | | | | | 100 | 125 |
| **AZxØDB** | | | | | | 5x9 | 5x11 |
| **JG** | G 1/4 | G 3/8 | G 1/2 | G 3/4 | G 1 | G 1 1/4 | G 1 1/2 |
| **KB** | | | | | | 15 | 15 |
| **ØLK** | | | | | | 80 | 100 |
| **PG +2** | 29,5 | 25 | 33,5 | 40,5 | 49,5 | 56,5 | 62,5 |
| **SW** | 24 | 30 | 36 | 46 | 55 | 60 | 75 |
| **Weight kg** | 0,8 | 1 | 1,8 | 2,4 | 4,5 | 6,2 | 9 |

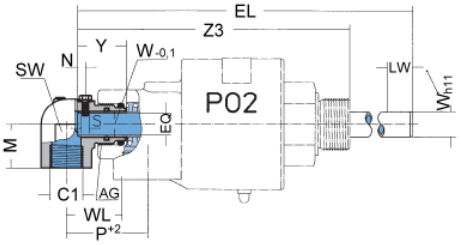
## 6.3 P … -800 DN 10 … 50




**Type P 2**
for non-roating inner pipe
(with right-hand thread)




**Type PR 2**
for roating inner pipe, directly born in elbow




**Type PO 2**
for non-roating inner pipe, floating within elbow and O-ring, anti-rotational protection by means of screw. Inner pipe for Type PO 2 available

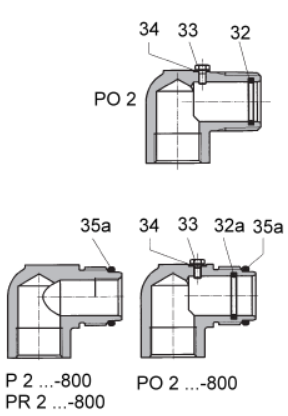
| DN mm | 10 | 15* | 20* | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|
| Type<br>Orde-No. | P2 10 G-800<br>1112066-800 | P2 15 G-800<br>1112116-800 | P2 20 G-800<br>1112166-800 | P2 25 G-800<br>1112216-800 | P2 32 G-800<br>1112266-800 | P2 40 G-800<br>1112316-800 | P2 50 G-800<br>1112366-800 |
| Type<br>Orde-No. | PR2 10 G-800<br>1112067-800 | PR2 15 G-800<br>1112117-800 | PR2 20 G-800<br>1112167-800 | PR2 25 G-800<br>1112217-800 | PR2 32 G-800<br>1112267-800 | PR2 40 G-800<br>1112317-800 | PR2 50 G-800<br>1112367-800 |
| Type<br>Orde-No. | PO2 10 G-800<br>1112068-800 | PO2 15 G-800<br>1112118-800 | PO2 20 G-800<br>1112168-800 | PO2 25 G-800<br>1112218-800 | PO2 32 G-800<br>1112268-800 | PO2 40 G-800<br>1112318-800 | PO2 50 G-800<br>1112368-800 |
| **C1** | G 1/4 | G 3/8 | G 1/2 | G 1/2 | G 3/4 | G 3/4 | G 1 1/4 |
| **M** | 18 | 20 | 26 | 28 | 35 | 38 | 45 |
| **N** | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| **P ± 2** | 36,5 | 53 | 70 | 52,5 | 66,5 | 73,5 | 87,5 |
| **ØS** | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| **V** | 8 | 8 | 12 | 12 | 15 | 17 | 20 |
| **W** | M 6x1 | G 1/8 | G 1/4 | G 3/8 | G 1/2 | G 3/4 | G 1 |
| **Ø W h13** | 6 | 10 | 13 | 16 | 22 | 26 | 32,2 |
| **Ø W -0,1** | 6 | 10 | 13 | 16 | 22 | 26 | 34 |
| **X** | 21 | 19,5 | 25,5 | 28,5 | 35 | 37 | 39 |
| **Y** | 25 | 25 | 28 | 31 | 38 | 40 | 40 |
| **Z1** | 105,5 | 132 | 159 | 154,5 | 187,5 | 217,5 | 240 |
| **Z2** | 118,5 | 143,5 | 172,5 | 171 | 207,5 | 237,5 | 259 |
| **Z3** | 122,5 | 149 | 175 | 173,5 | 210,5 | 240,5 | 260 |
| **AG** | G 1/4 A | G 3/8 A | G 1/2 A | G 3/4 A | G 1 A | G 1 1/4 A | G 1 1/2 A |
| **SW** | 22 | 22 | 32 | 32 | 36 | 36 | 55 |
| **WL** | 27 | 27 | 35 | 38 | 47 | 49 | 58,5 |
| **Weight kg** | 0,1 | 0,1 | 0,3 | 0,3 | 0,5 | 0,6 | 1,3 |

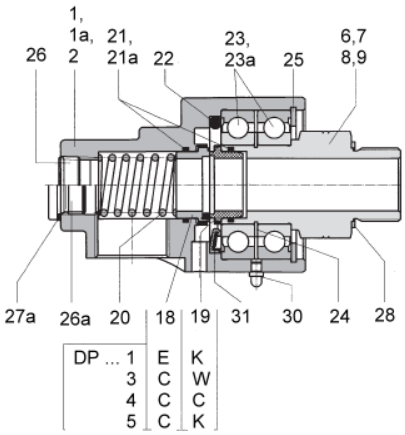
* At DN 15 und 20 :Elbow with additional adapter

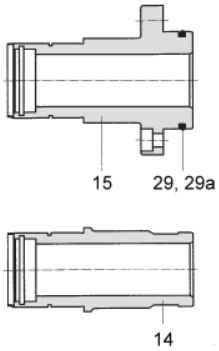
### Inner pipe for Elbow PO2 ...-800

| DN mm | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|
| Type<br>Order-No. | ES 10-800<br>1190951-800 | ES 15-800<br>1190952-800 | ES 20-800<br>1190953-800 | ES 25-800<br>1190954-800 | ES 32-800<br>1190955-800 | ES 40-800<br>1190956-800 | ES 50-800<br>1190957-800 |
| **ØW h11** | 6 | 10 | 13 | 16 | 22 | 26 | 34 |
| **ØEQ** | 5 | 8 | 11 | 14 | 20 | 24 | 31 |
| **EL** | 169,5 | 202 | 212 | 245,5 | 261,5 | 288,5 | 332 |
| **LW** | 55 | 55 | 55 | 75 | 55 | 55 | 75 |

# 7 Spare Parts DP DN 10 – 50




| | DN mm | E V | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|---|---|
| **1** | Housing G | | 1112091 | 1112141 | 1112191 | 1112241 | 1112291 | 1112341 | 1112391 |
| **1a** | Housing G-800 | | 1112091 | 1112141-100 | 1112191-100 | 1112241-100 | 1112291-100 | 1112341-100 | 1112391-100 |
| **2** | Housing N | | 1112092 | 1112142 | 1112192 | 1112242 | 1112292 | 1112342 | 1112392 |
| **6** | Rotor RG | | 1112078 | 1112128 | 1112178 | 1112228 | 1112278 | 1112328 | 1112378 |
| **7** | Rotor LG | | 1112079 | 1112129 | 1112179 | 1112229 | 1112279 | 1112329 | 1112379 |
| **8** | Rotor RN | | 1112080 | 1112130 | 1112180 | 1112230 | 1112280 | 1112330 | 1112380 |
| **9** | Rotor LN | | 1112081 | 1112131 | 1112181 | 1112231 | 1112281 | 1112331 | 1112381 |
| **14** | Rotor K | | | | | | | 1112336 | 1112386 |
| **15** | Rotor F | | | | | | | 1112337 | 1112387 |
| **18E** | Mechanical seal E | V | 1112088-001 | 1112138-001 | 1112188-001 | 1112238-001 | 1112288-001 | 1112338-001 | 1112388-001 |
| **18C** | Mechanical seal C | V | 1112088-002 | 1112138-002 | 1112188-002 | 1112238-002 | 1112288-002 | 1112338-002 | 1112388-002 |
| **19K** | Counter face K | V | 3511391-001 | 3511392-001 | 3511393-001 | 3511394-001 | 3511395-001 | 3511396-001 | 3511397-001 |
| **19W** | Counter face W | V | 3511391-002 | 3511392-002 | 3511393-002 | 3511394-002 | 3511395-002 | 3511396-002 | 3511397-002 |
| **19C** | Counter face C | V | 1112088-002 | 1112138-002 | 1112188-002 | 1112238-002 | 1112288-002 | 1112338-002 | 1112388-002 |
| **20** | Compression | E | 3511661 | 3511662 | 3511663 | 3511664 | 3511665 | 3511666 | 3511667 |
| **21** | O-ring | V | 3511809 | 3511866 | 3511721 | 3511929 | 3511947 | 3511886 | 3511696 |
| **21a** | O-rring | V | 3511809-001 | 3511866-001 | 3511721-001 | 3511929-001 | 3511947-001 | 3511886-001 | 3511696-001 |
| **22** | O-ring | V | 3511860 | 3511867 | 3511861 | 3511862 | 3511863 | 3511864 | 3511865 |
| **23** | Ball bearing | E | 3510200 | 3510079 | 3510202 | 3510203 | 3510086 | 3510204 | 3510090 |
| **23a** | Ball bearing | E | 3510077-010 | 3510079-010 | 3510097-010 | 3510082-010 | 3510086-010 | 3510087-010 | 3510090-010 |
| **24** | Circlip | | 3501000 | 3501001 | 3501002 | 3501003 | 3501008 | 3501014 | 3501030 |
| **25** | Circlip | | 3501220 | 3501219 | 3501222 | 3501223 | 3501205 | 3501221 | 3501246 |
| **26** | Screw plug | | 3500663-004 | 3500662-004 | 3500684-004 | 3500621-004 | 3500622-004 | 3500623-004 | 3500624-004 |
| **26a** | Screw plug | | 3500687 | 3500631 | 3500688 | 3500632 | 3500635 | 3500633 | 3500634 |
| **27a** | CU-seal | V | 3502114-001 | 3502116-001 | 3502115-001 | 3502120-001 | 3502111-001 | 3502117-001 | 3502118-001 |
| **28** | CU-seal | V | 350211-001 | 3502115-001 | 3502120-001 | 3502111-001 | 3502117-001 | 3502118-001 | 3502121-001 |
| **29** | O-ring | V | | | | | | 3511948 | 3511949 |
| **29a** | O-ring | V | | | | | | 3511948-001 | 3511949-001 |
| **30** | Grease nipple | | 3500918 | 3500918 | 3500918 | 3500918 | 3500918 | 3500918 | 3500918 |
| **31*** | Shaft seal | V | 3512325-001 | 3512326-001 | 3512327-001 | 3512328-001 | 3512329-001 | 3512330-001 | 3512331-001 |

* For variant -800 Pos.31 instead Pos 22. Please specify type designation when making an inquiry or placing an order.

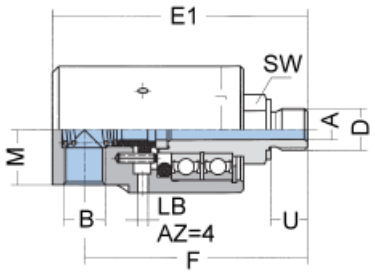
**Spare Parts for Elbows**

| | DN mm | E V | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|---|---|
| **32** | O-ring | V | 3511729 | 3511849 | 3511722 | 3511944 | 3511852 | 3511723 | 3511945 |
| **32a** | O-ring | V | 3511729-001 | 3511849-001 | 3511722-001 | 3511944-001 | 3511852-001 | 3511723-001 | 3511945-001 |
| **33** | Hex.screw | | 3500014-003 | 3500014-003 | 3500015-003 | 3500015-003 | 3500014-003 | 3500014-003 | 3500015-003 |
| **34** | Cu-seal | V | 3502122-001 | 3502122-001 | 3502122-001 | 3502122-001 | 3502122-001 | 3502122-001 | 3502122-001 |
| **35a** | O-ring | V | 3511849-001 | 3511809-001 | 3511851-001 | 3511852-001 | 3511754-001 | 3511947-001 | 3512509-001 |

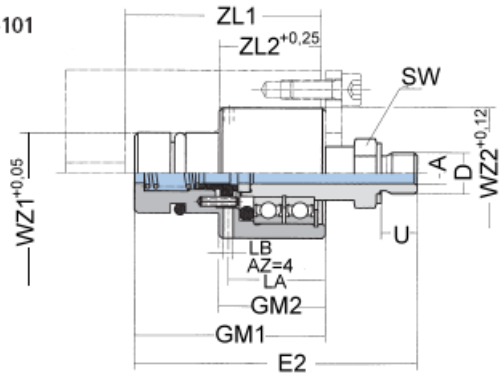
E = Spare Parts V = Wearing Parts

# 8 Outline Drawing and Spare Parts DP DN … 06

DP .. R/L 55



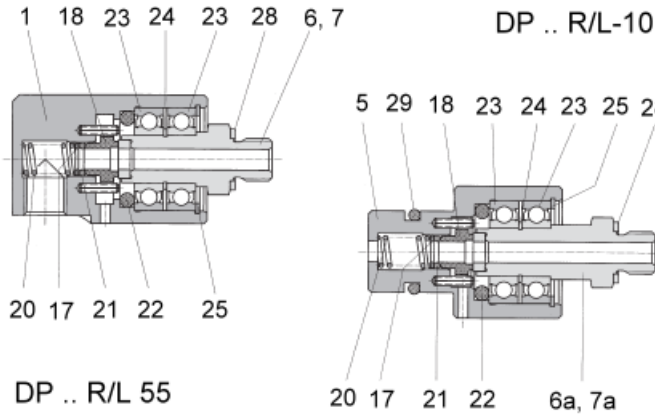

DP .. R/L -101




| DN mm | 06 |
|---|---|
| Type | DP 06 R 55 |
| Order-No. | 1112000-055 |
| Type | DP 06 L 55 |
| Order-No. | 1112001-055 |
| Type | DP 06 R -101 |
| Order-No. | 1112000-101 |
| Type | DP 06 L-101 |
| Order-No. | 1112001-101 |

| | |
|---|---|
| **Ø A** | 6,5 |
| **B** | $G^1/_4$ |
| **D** | $G^1/_4$ A |
| **E1** | 80 |
| **E2** | 89 |
| **F** | 70 |
| **ØJ** | 40 |
| **M** | 17,5 |
| **U** | 11,5 |
| **GM1** | 60 |
| **GM2** | 33,5 |
| **LA** | 30 |
| **ØLB** | 3,2 |
| **SW** | 19 |
| **WZ1** | 25,4 |
| **WZ2** | 41,66 |
| **ZL1** | 61,5 |
| **ZL2** | 32 |
| **Weight kg** | 0,3 |

Spare Parts DN 06 (¼")

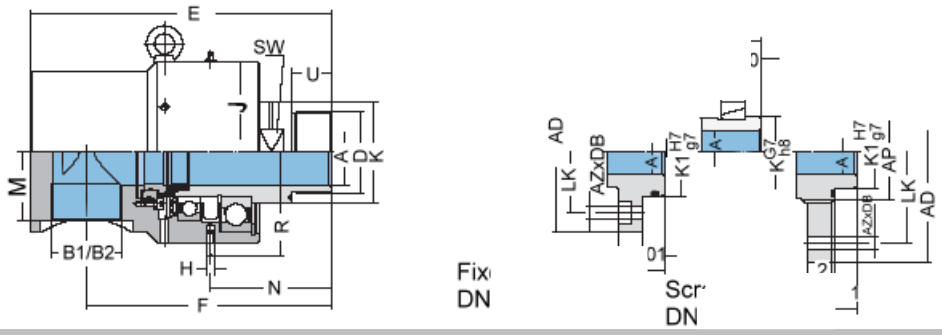



| | E V | DN mm | 06 |
|---|---|---|---|
| 1 | | Housing G | 1112041 |
| 5 | | Housing (-101) | 1112041-058 |
| 6 | | Rotor RG | 1112028-002 |
| 6a | | RotorRG (-101) | 1112028-057 |
| 7 | | Rotor LG | 1112029-002 |
| 7a | | Rotor LG (-101) | 1112029-057 |
| 17 | | Disc | 3502113-001 |
| 18 | V | Mechanical seal | 3511390-001 |
| 20 | E | Compression spring | 3511521 |
| 21 | V | O-ring | 3511704-001 |
| 22 | V | O-ring | 3511906-016 |
| 23 | E | Ball bearing | 3510047 |
| 24 | | Circlip | 3501025 |
| 25 | | Circlip | 3501200 |
| 28 | V | Cu-seal | 3502114-001 |
| 29 | V | O-ring | 3511868 |

E = Ersatzteil V = Verschleißteil

# 9 Outline Drawing DP1 DN 65 -100

for one way flow of a medium

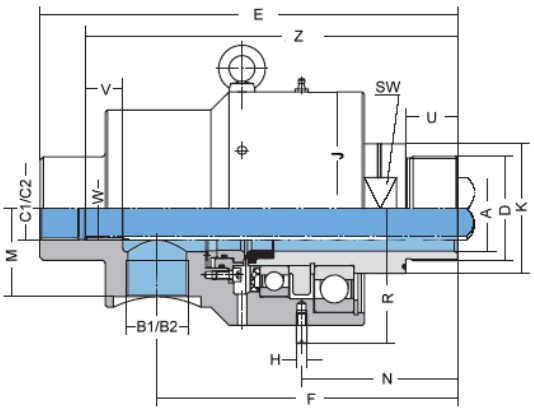


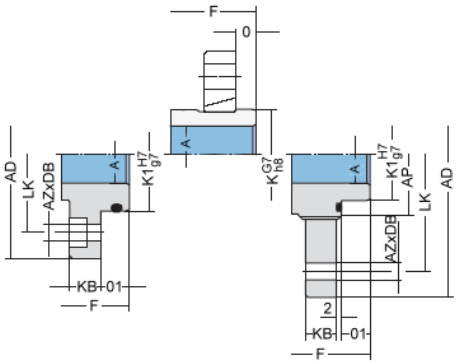

| | | DN [mm] | 65 | 75 | 80 | 100 |
|---|---|---|---|---|---|---|
| Housing connection | B1 =G | Type | DP 165 R 51 | DP 175 R 51 | DP 180 R 51 | DP 1100 R 51 |
| | | Order-No. | 1112400-051 | 1112575-051 | 1112450-051 | 1112550-051 |
| | | Type | DP 165 L 51 | DP 175 L 51 | DP 180 L 51 | DP 1100 L 51 |
| | | Order-No. | 1112401-051 | 1112576-051 | 1112451-051 | 1112551-051 |
| | | Type | DP 165 K 91 | DP 175 K 91 | DP 180 K 91 | DP 1100 K 91 |
| | | Order-No. | 1112402-091 | 11112577-091 | 1112452-091 | 1112552-091 |
| | B2=NPT | Type | DP 165 R 11 | DP 175 R 11 | DP 180 R 11 | DP 1100 R 11 |
| | | Order-No. | 1112400-011 | 1112575-011 | 1112450-011 | 1112550-011 |
| | | Type | DP 165 L 11 | DP 175 L 11 | DP 180 L 11 | DP 1100 L 11 |
| | | Order-No. | 1112401-011 | 1112576-011 | 1112451-011 | 1112551-011 |
| | | Type | DP 165 K 01 | DP 175 K 01 | DP 180 K 01 | DP 1100 K 01 |
| | | Order-No. | 1112402-001 | 1112577-001 | 1112452-001 | 1112552-001 |

| | | | | |
|---|---|---|---|---|
| **ØA** | 65 | 72 | 82 | 98 |
| **B1** | G2½ | G3 | G3 | G4 |
| **B2** | 2½″ NPT | 3″ NPT | 3″ NPT | 4″ NPT |
| **D** | G2½ A | G3 A | G3½ A | G4 A |
| **E** | 327 | 375 | 375 | 425 |
| **F** | 270 | 305 | 305 | 340 |
| **Ø H** | 10 | 10 | 10 | 12 |
| **Ø J** | 185 | 225 | 225 | 258 |
| **Ø K** | 104 | 115 | 125 | 144 |
| **Ø K G7/h8** | 85 | 87,29 | 105 | 114 |
| **Ø K1 H7/g7** | 98 | 105 | 101,7 | 120,62 |
| **M** | 62,5 | 85 | 85 | 100 |
| **N** | 134 | 151 | 151 | 169 |
| **O** | 25 | 30 | 30 | 30 |
| **O1** | 20 | 8 | 6,4 | 7,5 |
| **R** | 110 | 130 | 130 | 155 |
| **U** | 45 | 50 | 50 | 60 |
| **Ø AD** | 145 | 185 | 228,6 | 276 |
| **AZ x Ø DB** | 5x11 | 4x18 | 6x17,5 | 6x20,5 |
| **AP** | | | 141 | 160 |
| **KB** | 26 | 20 | 22,2 | 22,2 |
| **LK** | 120 | 145 | 192 | 228,6 |
| **SW** | 85 | 110 | 110 | 120 |
| **Weight kg** | 31,5 | 58 | 58 | 88 |

# 9.1 DP 2 DN 65 – 100

for two way flow of a medium designed for non-roating inner pipe



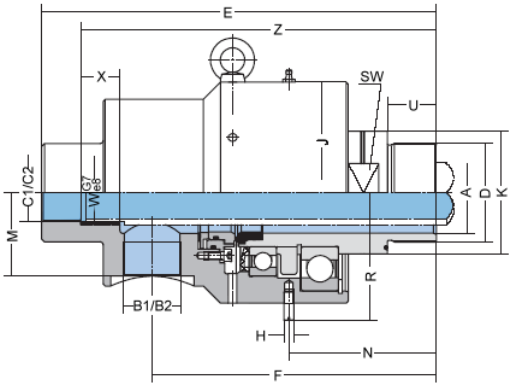



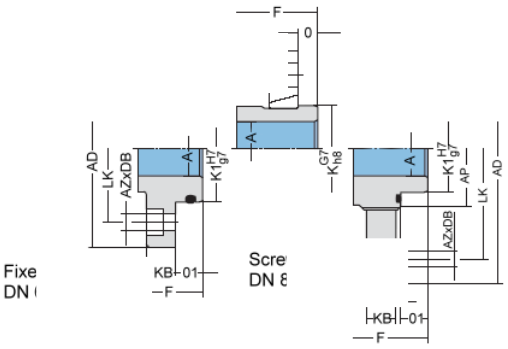

| | | DN [mm] | 65 | 75 | 80 | 100 |
|---|---|---|---|---|---|---|
| Housing connection | B1=G1 =G | Type | DP 265 R 51 | DP 275 R 51 | DP 280 R 51 | DP 2100 R 51 |
| | | Order-No. | 1112404-051 | 1112579-051 | 1112454-051 | 1112554-051 |
| | | Type | DP 265 L 51 | DP 275 L 51 | DP 280 L 51 | DP 2100 L 51 |
| | | Order-No. | 1112405-051 | 1112580-051 | 1112455-051 | 1112555-051 |
| | | Type | DP 265 K 91 | DP 275 K 91 | DP 280 K 91 | DP 2100 K 91 |
| | | Order-No. | 1112406-091 | 1112581-091 | 1112456-091 | 1112556-091 |
| | B2=C2=NPT | Type | DP 265 R 11 | DP 275 R 11 | DP 280 R 11 | DP 2100 R 11 |
| | | Order-No. | 1112404-011 | 1112579-011 | 1112454-011 | 1112554-011 |
| | | Type | DP 265 L 11 | DP 275 L 11 | DP 280 L 11 | DP 2100 L 11 |
| | | Order-No. | 1112405-011 | 1112580-011 | 1112455-011 | 1112555-011 |
| | | Type | DP 265 K 01 | DP 275 K 01 | DP 280 K 01 | DP 2100 K 01 |
| | | Order-No. | 1112406-001 | 1112581-001 | 1112456-001 | 1112556-001 |

| | | | | |
|---|---|---|---|---|
| **ØA** | 65 | 72 | 82 | 98 |
| **B1.C1** | G1½ | G2 | G2 | G2½ |
| **B2,C2** | 1½″ NPT | 2 ″ NPT | 2″ NPT | 2½″ NPT |
| **D** | G2½ A | G3 A | G3½ A | G4 A |
| **E** | 345 | 403 | 403 | 445 |
| **F** | 255 | 290 | 290 | 320 |
| **Ø H** | 10 | 10 | 10 | 12 |
| **Ø J** | 185 | 225 | 225 | 258 |
| **Ø K** | 104 | 115 | 125 | 144 |
| **Ø K G7/h8** | 85 | 87,29 | 105 | 114 |
| **Ø K1 H7/g7** | 98 | 105 | 101,7 | 120,62 |
| **M** | 62,5 | 85 | 85 | 100 |
| **N** | 134 | 151 | 151 | 169 |
| **O** | 25 | 30 | 30 | 30 |
| **O1** | 20 | 8 | 6,4 | 7,5 |
| **R** | 110 | 130 | 130 | 155 |
| **U** | 45 | 50 | 50 | 60 |
| **V** | 28,5 | 36 | 36 | 38,5 |
| **W** | G1½ | G2 | G2 | G2½ |
| **Ø AD** | 145 | 185 | 228,6 | 276 |
| **AZ x Ø DB** | 5x11 | 4x18 | 6x17,5 | 6x20,5 |
| **AP** | | | 141 | 160 |
| **KB** | 26 | 20 | 22,2 | 22,2 |
| **LK** | 120 | 145 | 192 | 228,6 |
| **SW** | 85 | 110 | 110 | 120 |
| **Weight kg** | 28 | 52 | 52 | 75 |

## 9.2 DPR2 DN 65 – 100

for two way flow of a medium designed for a roating inner pipe



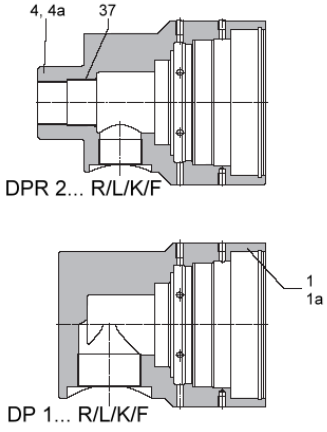



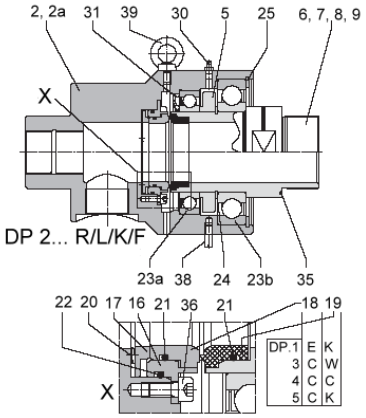

| | | DN [mm] | 65 | 75 | 80 | 100 |
|---|---|---|---|---|---|---|
| Housing connection | B1 = G1 =G | Type | DPR265 R 51 | DPR 275 R 51 | DPR 280 R 51 | DPR 2100 R 51 |
| | | Order-No. | 1112408-051 | 1112583-051 | 1112458-051 | 1112558-051 |
| | | Type | DPR 265 L 51 | DPR 275 L 51 | DPR 280 L 51 | DPR 2100 L 51 |
| | | Order-No. | 1112409-051 | 1112584-051 | 1112459-051 | 1112559-051 |
| | | Type | DP 265 K 91 | DP 275 K 91 | DP 280 K 91 | DP 2100 K 91 |
| | | Order-No. | 1112410-091 | 1112585-091 | 1112460-091 | 1112560-091 |
| | B2=C2=NPT | Type | DPR 265 R 11 | DPR 275 R 11 | DPR 280 R 11 | DPR 2100 R 11 |
| | | Order-No. | 1112408-011 | 1112583-011 | 1112458-011 | 1112558-011 |
| | | Type | DP 265 L 11 | DP 275 L 11 | DP 280 L 11 | DP 2100 L 11 |
| | | Order-No. | 1112409-011 | 1112584-011 | 1112459-011 | 1112559-011 |
| | | Type | DPR 265 K 01 | DPR 275 K 01 | DPR 280 K 01 | DPR 2100 K 01 |
| | | Order-No. | 1112410-001 | 1112585-001 | 1112460-001 | 1112560-001 |

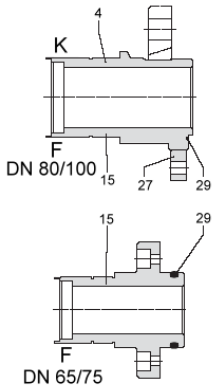
| | | | | |
|---|---|---|---|---|
| **ØA** | 65 | 72 | 82 | 98 |
| **B1.C1** | G1½ | G2 | G2 | G2½ |
| **B2,C2** | 1½" NPT | 2 " NPT | 2" NPT | 2½" NPT |
| **D** | G2½ A | G3 A | G3½ A | G4 A |
| **E** | 345 | 403 | 403 | 445 |
| **F** | 255 | 290 | 290 | 320 |
| **Ø H** | 10 | 10 | 10 | 12 |
| **Ø J** | 185 | 225 | 225 | 258 |
| **Ø K** | 104 | 115 | 125 | 144 |
| **Ø K G7/h8** | 85 | 87,29 | 105 | 114 |
| **Ø K1 H7/g7** | 98 | 105 | 101,7 | 120,62 |
| **M** | 62,5 | 85 | 85 | 100 |
| **N** | 134 | 151 | 151 | 169 |
| **O** | 25 | 30 | 30 | 30 |
| **O1** | 20 | 8 | 6,4 | 7,5 |
| **R** | 110 | 130 | 130 | 155 |
| **U** | 45 | 50 | 50 | 60 |
| **W Ø G7/e8** | 45 | 60 | 60 | 75 |
| **X** | 30 | 40 | 40 | 40 |
| **Z** | 310 | 363 | 363 | 400 |
| **Ø AD** | 145 | 185 | 228,6 | 276 |
| **AZ x Ø DB** | 5x11 | 4x18 | 6x17,5 | 6x20,5 |
| **AP** | | | 141 | 160 |
| **KB** | 26 | 20 | 22,2 | 22,2 |
| **LK** | 120 | 145 | 192 | 228,6 |
| **SW** | 85 | 110 | 110 | 120 |

| | | | | |
|---|---|---|---|---|
| **Weight kg** | 28 | 52 | 52 | 75 |

# 10 Spare Parts for series DP1, 2, R2 – DN 65 – 100



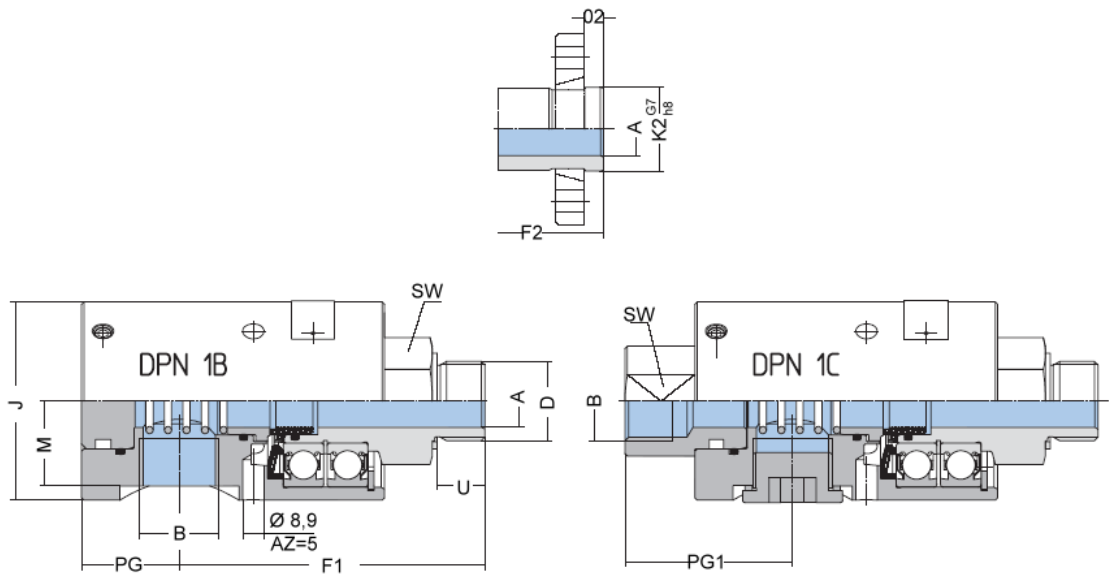




| | DN [mm] | E V | 65 | 75 | 80 | 100 |
|---|---|---|---|---|---|---|
| 1 | **Housing 1 G** | | 1112441 | 1112491 | 1112491 | 1112541 |
| 1a | **Housing 1 N** | | 1112445 | 1112495 | 1112495 | 1112545 |
| 2 | **Housing 1 G** | | 1112442 | 1112492 | 1112492 | 1112542 |
| 2a | **Housing 1 N** | | 1112446 | 1112496 | 1112496 | 1112546 |
| 4 | **Housing R2 G** | | 1112443 | 1112493 | 1112493 | 1112543 |
| 4a | **Housing R2 N** | | 1112447 | 1112497 | 1112497 | 1112547 |
| 5 | **Distance ring** | | 1112419 | 1112469 | 1112469 | 1112519 |
| 6 | **Rotor R G** | | 1112428 | 1112603 | 1112478 | 1112528 |
| 7 | **Rotor L G** | | 1112429 | 1112604 | 1112479 | 1112529 |
| 8 | **Rotor R N** | | 1112430 | 1112605 | 1112480 | 1112530 |
| 9 | **Rotor L N** | | 1112431 | 1112606 | 1112481 | 1112531 |
| 14 | **Rotor K** | | 1112436 | 1112611 | 1112486 | 1112536 |
| 15 | **Rotor F** | | 1112437 | 1112612 | 1112487 | 1112537 |
| 16 | **Fixing ring** | | 1112415 | 1112465 | 1112465 | 1112515 |
| 17 | **Thrust collar** | | 1112417 | 1112467 | 1112467 | 1112517 |
| 18E | **Mechanical seal E** | V | 1112438-001 | 1112488-001 | 1112488-001 | 1112539-001 |
| 18C | **Mechanical seal C** | V | 1112438-002 | 1112488-002 | 1112488-002 | 1112539-002 |
| 19K | **Counter face K** | V | 3511385-001 | 3511386-001 | 3511386-001 | 3511388-001 |
| 19W | **Counter face W** | V | 3511385-002 | 3511386-002 | 3511386-002 | 3511388-002 |
| 19C | **Counter face C** | V | 1112438-002 | 1112488-002 | 1112488-002 | 1112539-002 |
| 20 | **Compression spring** | E | 3511550 | 3511551 | 3511551 | 3511551 |
| 21 | **O-Ring** | V | 3511708 | 3512553 | 3512553 | 3511828 |
| 22 | **O-Ring** | V | 3512553 | 3511828 | 3511828 | 3511815-012 |
| 23a | **Ball bearing 1** | E | 3510263-006 | 3510103-006 | 3510103-006 | 3510144-006 |
| 23b | **Ball bearing 2** | E | 3510007-006 | 3510208 | 3510208 | 3510145-006 |
| 24 | **Circlip** | | 3501005 | 3501006 | 3501006 | 3501031 |
| 25 | **Circlip** | | 3501253 | 3501238 | 3501238 | 3501247 |
| 27 | **Screw flange** | | | | 1190472-009 | 1190473-012 |
| 29 | **O-Ring** | V | 3511694 | 3511901 | 3511828 | 3511716 |
| 30 | **Libric.nipple** | | 3500913 | 3500913 | 3500913 | 3500913 |
| 31* | **Shaft seal** | V | 3512358-001 | 3512319-001 | 3512319-001 | 3512334-001 |
| 35 | **O-Ring** | V | 3511894 | 3511709 | 3511828 | 3511716 |
| 36 | **Cyl. Head screw** | | 3500354-070 | 3500354-070 | 3500354-070 | 3500354-070 |
| 37 | **DU-bush** | V | 3510514 | 3510523 | 3510523 | 3510525 |
| 38 | **Slotted headless screw** | | 3500678 | 3500678 | 3500678 | 3500587 |
| 39 | **Eye bolt** | | 3500686 | 3500686 | 3500686 | 3500686 |

* Pos.31 on request for additional bearing seal. Please specify type designation when making an inquiry or placing an order!

# 11 Outline Drawing DPN1 DN 10 – 50

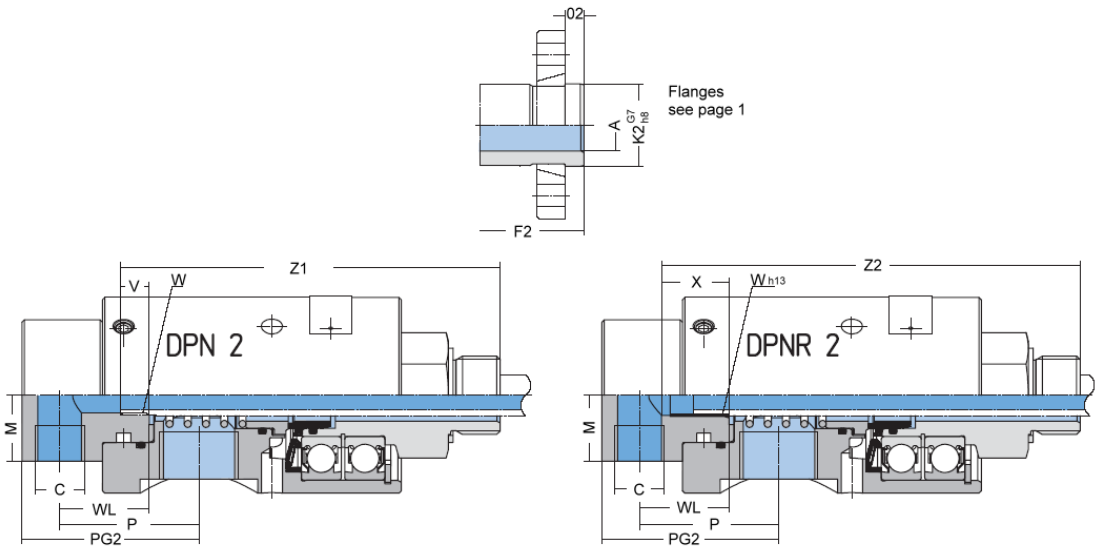
for one way flow of a medium




| DN [mm] | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|
| Type<br>Order-No. | DPN 1B10 R51<br>1113050-051 | DPN 1B15 R 51<br>1113100-051 | DPN 1B20 R 51<br>1113150-051 | DPN 1B25 R 51<br>1113200-051 | DPN 1B32 R 51<br>1113250-051 | DPN 1B40 R 51<br>1113300-051 | DPN 1B50 R 51<br>1113350-051 |
| Type<br>Order-No. | DPN 1B10 L 51<br>1113051-051 | DPN 1B15 L 51<br>1113101-051 | DPN 1B20 L 51<br>1113151-051 | DPN 1B25 L 51<br>1113201-051 | DPN 1B32 L 51<br>1113251-051 | DPN 1B40 L 51<br>1113301-051 | DPN 1B50 L 51<br>1113351-051 |
| Type<br>Order-No. | | | | | | DPN 1B40 K 91<br>1113302-091 | DPN 1B50 K 91<br>1113352-091 |
| Type<br>Order-No. | DPN 1C10 R 51<br>1113053-051 | DPN 1C15 R 51<br>1113103-051 | DPN 1C20 R 51<br>1113153-051 | DPN 1C25 R 51<br>1113203-051 | DPN 1C32 R 51<br>1113253-051 | DPN 1C40 R 51<br>1113303-051 | DPN 1C50 R 51<br>1113353-051 |
| Type<br>Order-No. | DPN 1C10 L 51<br>1113054-051 | DPN 1C15 L 51<br>1113104-051 | DPN 1C20 L 51<br>1113154-051 | DPN 1C25 L 51<br>1113204-051 | DPN 1C32 L 51<br>1113254-051 | DPN 1C40 L 51<br>1113304-051 | DPN 1C50 L 51<br>1113354-051 |
| Type<br>Order-No. | | | | | | DPN 1C40 K 91<br>1113305-091 | DPN 1C50 K 91<br>1113355-091 |
| **Ø A** | 9,5 | 13 | 17,5 | 22 | 30 | 35 | 47 |
| **B** | G $^{3}/_{8}$ | G ½ | G ¾ | G 1 | G 1¼ | G 1½ | G 2 |
| **D** | G $^{3}/_{8}$ A | G ½ A | G ¾ A | G 1 A | G 1¼ A | G 1½ A | 2 A |
| **F1** | 88 | 98 | 112 | 128 | 153 | 176 | G $^{3}/_{8}$ |
| **F2** | | | | | | 164 | 201 |
| **Ø J** | 54 | 58 | 74 | 83 | 100 | 110 | 137 |
| **Ø K2 G7/h8** | | | | | | 50 | 65 |
| **M** | 24 | 25 | 31 | 36 | 42 | 45 | 57 |
| **02** | | | | | | 10 | 10 |
| **U** | 15 | 18 | 17 | 20 | 26 | 27 | 27 |
| **PG** | 30 | 25 | 34 | 41 | 54 | 56 | 63 |
| **PG1** | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
| **SW** | 24 | 30 | 36 | 46 | 55 | 60 | 75 |
| **Weight kg** | 1,4 | 1,6 | 3 | 5 | 7,6 | 11,5 | 17 |

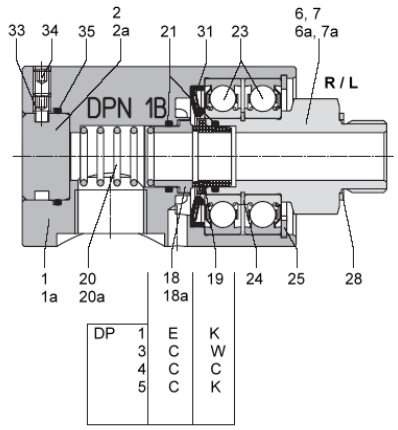
# 11.1 DPN2, DPNR2 DN 10 – 50

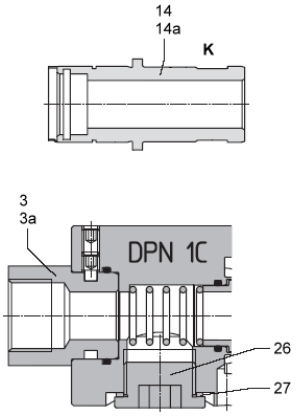
for two way flow of a medium
DPN2 for non-roating inner pipe, DPNR2 for roating inner pipe

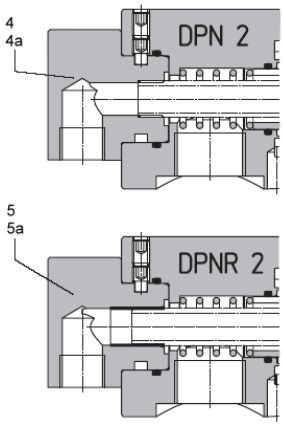



| DN [mm] | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|
| Type | DPN 210 R 51 | DPN 215 R 51 | DPN 220 R 51 | DPN 225 R 51 | DPN 232 R 51 | DPN 240 R 51 | DPN 250 R 51 |
| Order-No. | 1113060-051 | 1113110-051 | 1113160-051 | 1113210-051 | 1113260-051 | 1113310-051 | 1113360-051 |
| Type | DPN 210 L 51 | DPN 215 L 51 | DPN 220 L 51 | DPN 225 L 51 | DPN 232 L 51 | DPN 240 L 51 | DPN 250 L 51 |
| Order-No. | 1113061-051 | 1113111-051 | 1113161-051 | 1113211-051 | 1113261-051 | 1113311-051 | 1113361-051 |
| Type | | | | | | DPN 240 K 91 | DPN 250 K 91 |
| Order-No. | | | | | | 1113312-091 | 1113362-091 |
| Type | DPNR 210 R 51 | DPNR 215 R 51 | DPNR 220 R 51 | DPNR 225 R 51 | DPNR 232 R 51 | DPNR 240 R 51 | DPNR 250 R 51 |
| Order-No. | 1113063-051 | 1113113-051 | 1113163-051 | 1113213-051 | 1113263-051 | 1113313-051 | 1113363-051 |
| Type | DPNR 210 L 51 | DPNR 215 L 51 | DPNR 220 L 51 | DPNR 225 L 51 | DPNR 232 L 51 | DPNR 240 L 51 | DPNR 250 L 51 |
| Order-No. | 1113064-051 | 1113114-051 | 1113164-051 | 1113214-051 | 1113264-051 | 1113314-051 | 1113364-051 |
| Type | | | | | | DPNR 240 K 91 | DPNR 250 K 91 |
| Order-No. | | | | | | 1113315-091 | 1113365-091 |
| C | G ¼ | G $^{3}/_{8}$ | G ½ | G ½ | G ¾ | G ¾ | G 1¼ |
| **M** | 18 | 20 | 26 | 28 | 35 | 38 | 45 |
| **P** | 42,5 | 38,5 | 51 | 59 | 74 | 82 | 98 |
| **V** | 8 | 8 | 12 | 12 | 15 | 17 | 20 |
| **W** | M 6x1 | G $^{1}/_{8}$ | G ¼ | G $^{3}/_{8}$ | G ½ | G ¾ | G 1 |
| **Ø W h13** | 6 | 10 | 13 | 16 | 22 | 25 | 32 |
| **X** | 21 | 19,5 | 25,5 | 28,5 | 35 | 37 | 39 |
| **Z1** | 112 | 118 | 140 | 161 | 195 | 226 | 250 |
| **Z2** | 125 | 129 | 153,5 | 177,5 | 215 | 246 | 269 |
| **PG2** | 54 | 50 | 67 | 75 | 92 | 100 | 125 |
| **WL** | 27 | 27 | 35 | 38 | 47 | 49 | 58,5 |
| **Weight kg** | 1,5 | 1,8 | 3,7 | 5,7 | 8,6 | 13,5 | 20 |

# 12 Spare Parts for Series DPN1, 2, R2 – DN 10 – 50




| | DN [mm] | E V | 10 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Housing G | | 1112093-200 | 1112143-200 | 1112193-200 | 1112243-200 | 1112293-200 | 1112343-200 | 1112393-200 |
| 1a | Housing G | | 1112093-204 | 1112143-204 | 1112193-204 | 1112243-204 | 1112293-204 | 1112343-204 | 1112393-204 |
| 2 | Cover | | 1112095-208 | 1112145-208 | 1112195-208 | 1112245-208 | 1112295-208 | 1112345-208 | 1112395-208 |
| 2a | Cover | | 1112095-206 | 1112145-206 | 1112195-206 | 1112245-206 | 1112295-206 | 1112345-206 | 1112395-206 |
| 3 | Housing connection G | | 1112094-207 | 1112144-207 | 1112194-207 | 1112244-207 | 1112294-207 | 1112344-207 | 1112394-207 |
| 3a | Housing connectionG | | 1112094-207 | 1112144-207 | 1112194-207 | 1112244-207 | 1112294-207 | 1112344-207 | 1112394-207 |
| 4 | Elbow P2 G | | 1112066-201 | 1112116-201 | 1112166-201 | 1112216-201 | 1112266-201 | 1112316-201 | 1112366-201 |
| 4a | Elbow P2 G | | 1112066-209 | 1112116-209 | 1112166-209 | 1112216-209 | 1112266-209 | 1112316-209 | 1112366-209 |
| 5 | Elbow PR2 G | | 1112067-203 | 1112117-203 | 1112167-203 | 1112217-203 | 1112267-203 | 1112317-203 | 1112367-203 |
| 5a | Elbow PR2 G | | 1112067-211 | 1112117-211 | 1112167-211 | 1112217-211 | 1112267-211 | 1112317-211 | 1112367-211 |
| 6 | Rotor RG | | 1112078 | 1112128 | 1112178 | 1112228 | 1112278 | 1112328 | 1112378 |
| 6a | Rotor RG | | 1112078-157 | 1112128-157 | 1112178-092 | 1112228-080 | 1112278-036 | 1112328-157 | 1112378-059 |
| 7 | Rotor LG | | 1112079 | 1112129 | 1112179 | 1112229 | 1112279 | 1112329 | 1112379 |
| 7a | Rotor LG | | 1112079-157 | 1112129-157 | 1112179-092 | 1112229-080 | 1112279-036 | 1112329-157 | 1112379-059 |
| 14 | Rotor K | | | | | | | 1112336 | 1112386 |
| 14a | Rotor K | | | | | | | 1112336-163 | 1112386-163 |
| 18 | Slide ring E | V | 1112088-001 | 1112138-001 | 1112188-001 | 1112238-001 | 1112288-001 | 1112338-001 | 1112388-001 |
| 18 | Mechanical seal C | V | 1112088-002 | 1112138-002 | 1112188-002 | 1112238-002 | 1112288-002 | 1112338-002 | 1112388-002 |
| 18a | Mechanical seal C | V | 1112088-159 | 1112138-159 | 1112188-077 | 1112238-081 | 1112288-159 | 1112338-159 | 1112388-159 |
| 19K | Counter face K | V | 3511391-001 | 3511392-001 | 3511393-001 | 3511394-001 | 3511395-001 | 3511396-001 | 3511397-001 |
| 19W | Counter face W | V | 35111391-002 | 3511392-002 | 3511393-002 | 3511394-002 | 3511395-002 | 3511396-002 | 3511397-002 |
| 19C | Counter face C | V | 1112088-002 | 1112138-002 | 1112188-002 | 1112238-002 | 1112288-002 | 1112338-002 | 1112388-002 |
| 20 | Compression spring | E | 3511661 | 3511662 | 3511663 | 3511664 | 3511665 | 3511666 | 3511667 |
| 20a | Compression spring | E | 3511661-001 | 3511662-001 | 3511663-001 | 351664-001 | 3511665-001 | 3511666-001 | 3511667-001 |
| 21 | O-Ring | V | 3511809 | 3511866 | 3511721 | 3511929 | 3511947 | 3511886 | 3511696 |
| 23 | Ball bearing | E | 3510200-008 | 3510079-008 | 3510097-008 | 3510148 | 3510086-008 | 3510087-008 | 3510090-008 |
| 24 | Circlip | | 3501000-001 | 3501001-001 | 3501002-001 | 3501003-001 | 3501008-001 | 3501027 | 3501030-001 |
| 25 | Circlip | | 3501220-001 | 3501219-001 | 3501222-001 | 3501223-001 | 3501205-001 | 3501241 | 3501246-001 |
| 26 | Screw plug | | 3500631-001 | 3500688-001 | 3500632-001 | 3500635-001 | 3500633-001 | 3500634-001 | 3500641-003 |
| 27 | Copper seal | V | 3502116-001 | 3502115-001 | 3502120-001 | 3502111-001 | 3502117-001 | 3502118-001 | 3502121-001 |
| 28 | Copper seal | V | 3502116-001 | 3502115-001 | 3502120-001 | 3502111-001 | 3502117-001 | 3502118-001 | 3502121-001 |
| 31 | Shaft seal | V | 3512325-001 | 3512326-001 | 3512327-001 | 3512328-001 | 3512329-001 | 3512330-001 | 3512331-001 |
| 33 | Setscrew | | 3500576-002 | 3500576-002 | 3500516-002 | 3500516-002 | 3500534-002 | 3500534-002 | 3500586-002 |
| 34 | Setscrew | | 3502163-002 | 3502163-002 | 3500591-002 | 3500591-002 | 3500533-002 | 3500533-002 | 3500592-002 |
| 35 | O-Ring | V | 3511852 | 3512521 | 3511754 | 3511713 | 3511942 | 3512540 | 3512503 |

E = Ersatzteil V = Verschleißtei

Execution a for variant-100. Please specify type designation when making an inquiry or placing an order.!