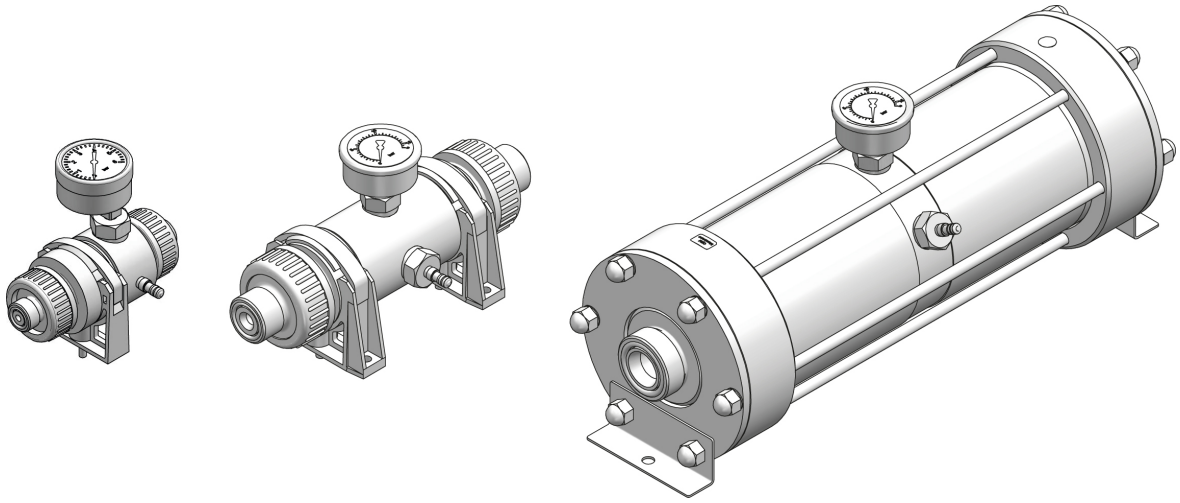
Pulsation dampener

Operating instructions



Read the operating manual!

The user is responsible for installation and operation related mistakes!

Original operating instructions

BA-12701-02-V05

Dosing Conveying Control | Liquids Gases Systems

Table of Contents

1 Notes for the Reader

This operating manual contains information and behaviour rules for the safe and designated operation of the device.

Observe the following principles:

- Read the entire operating manual prior to starting-up the device.
- Ensure that everyone who works with or on the device has read the operating manual and follows it.
- Maintain the operating manual throughout the service life of the device.
- Pass the operating manual on to any subsequent owner of the device.

1.1 General non-discrimination

In this operating manual, only the male gender is used where grammar allows gender allocation. The purpose of this is to make the text easy to read. Men and women are always referred to equally. We would like to ask female readers for understanding of this text simplification.

1.2 Explanation of the signal words

Different signal words in combination with warning signs are used in this operating manual. Signal words illustrate the gravity of possible injuries if the risk is ignored:

Signal word	Meaning
DANGER	Refers to imminent danger. Ignoring this sign may lead to death or the most serious injuries.
WARNING	Refers to a potentially hazardous situation. Failure to follow this instruction may lead to death or severe injuries.
CAUTION	Refers to a potentially hazardous situation. Failure to follow this instruction may lead to minor injury or damage to property.
NOTE	Refers to a danger which, if ignored, may lead to risk to the machine and its function.

Table 1: Explanation of the signal words

1.3 Explanation of the warning signs

Warning signs represent the type and source of a danger:

Warning sign	Type of danger
	Danger point
	Danger from corrosive substances
	Danger of damage to machine or functional influences

Table 2: Explanation of the warning signs

1.4 Identification of warnings

Warnings are intended to help you recognise risks and avoid negative consequences.

This is how warnings are identified:

Warning sign	**SIGNAL WORD**
Description of danger. Consequences if ignored. ⇨ The arrow signals a safety precaution to be taken to eliminate the danger.	

1.5 Instruction for action identification

This is how pre-conditions for action are identified:

✓ Pre-condition for action which must be met before taking action.

🛠 A resource such as a tool or auxiliary materials required to perform the operating instructions.

This is how instructions for action are identified:

➔ Separate step with no follow-up action.

1. First step in a series of steps.
2. Second step in a series of steps.

▸ Result of the above action.

✓ **Action completed, aim achieved.**

2 Safety

2.1 General warnings

The following warnings are intended to help you eliminate the dangers that can arise while handling the device. Risk prevention measures always apply regardless of any specific action.

Safety instructions warning against risks arising from specific activities or situations can be found in the respective sub-chapters.

WARNING

Caustic burns or other burns through dosing media!

You may come into contact with dosing media when working on the device, valves and connections.

⇨ Use sufficient personal protective equipment.

⇨ Flush the device with a non-dangerous liquid (e.g. water). Ensure that the liquid is compatible with the dosing medium.

⇨ Release pressure in hydraulic parts.

WARNING

Danger from unsuitable materials!

The materials of the device and of the hydraulic parts of the system must be suitable for the dosing medium used. Should this not be the case, the dosing media may leak.

⇨ Make sure that the materials you are using are suitable for the dosing medium.

⇨ Make sure that the lubricants, adhesives, sealants, etc. that you use are suitable for the dosing medium.

WARNING

Danger from too high a pressure!

All devices and hydraulic fittings on the dosing system must be operated below the maximum permissible pressure. Overly-high pressure peaks can result in the bursting of system parts, the release of dosing medium and injury.

⇨ After installation, adjust the pulsation damper with adjustable pre-tension pressure to the operating conditions of the system.

CAUTION

Danger when changing the dosing medium!

Changing the dosing media can provoke unexpected reactions, damage to property and injury.

⇨ Clean the device and the system parts in contact with the media thoroughly before changing the dosing medium.

2.2 Hazards due to non-compliance with the safety instructions

Failure to follow the safety instructions may endanger not only persons, but also the environment and the device.

The specific consequences can be:

- Failure of important device functions,
- Failure of required maintenance and repair methods,
- Danger for individuals through dangerous dosing media,
- Danger to the environment caused by substances leaking from the system.

2.3 Working in a safety-conscious manner

Besides the safety instructions specified in this operating manual, further safety rules apply and must be followed:

- Accident prevention regulations,
- Safety and operating provisions,
- Safety provisions for handling dangerous substances (mostly the safety data sheets to dosing media),
- Environmental protection provisions,
- Applicable standards and legislation.

2.4 Personal protective equipment

Based on the degree of risk posed by the dosing medium and the type of work you are carrying out, you must use corresponding protective equipment. Read the Accident Prevention Regulations and the Safety Data Sheets to the dosing media find out what protective equipment you need.

You will require the minimum of the following personal protective equipment:

Personal protective equipment required	
	Protective goggles
	Protective clothing
	Protective gloves

Table 3: Personal protective equipment required

Wear the following personal protective equipment when performing the following tasks:

- Installation
- Maintenance

2.5 Personnel qualification

Any personnel who work on the product must have appropriate special knowledge and skills.

Anybody who works on the product must meet the conditions below:

- Attendance at all the training courses offered by the owner,
- Personal suitability for the respective activity,
- Sufficient qualification for the respective activity,
- Training into the handling of the device,
- Knowledge of safety equipment and the way this equipment functions,
- Knowledge of this operating manual, particularly of safety instructions and sections relevant for the activity,
- Knowledge of fundamental regulations regarding health and safety and accident prevention.

All persons must generally have the following minimum qualification:

- Training as specialists to carry out work on the product unsupervised,
- Sufficient training that they can work on the product under the supervision and guidance of a trained specialist.

These operating instructions differentiate between these user groups:

2.5.1 Specialist staff

Thanks to their professional training, knowledge, experience and knowledge of the relevant specifications, specialist staff are able to perform the job allocated to them and recognise and/or eliminate any possible dangers by themselves.

2.5.2 Trained persons

Trained persons have received training from the operator about the tasks they are to perform and about the dangers stemming from improper behaviour.

In the table below you can check what qualifications are the pre-condition for the respective tasks. Only people with appropriate qualifications are allowed to perform these tasks!

Qualification	Activities
Specialist staff	■ Installation ■ Maintenance
Trained persons	■ Control

Table 4: Personnel qualification

3 Intended use

3.1 Notes on product warranty

Any non-designated use of the product can compromise its function or intended protection. This leads to invalidation of any warranty claims!

Please note that liability is on the side of the user in the following cases:

- The product is operated in a manner which is not consistent with this operating manual, particularly the safety instructions, handling instructions and the section "Intended use".
- If people operate the product who are not adequately qualified to carry out their respective activities.
- No original spare parts or accessories are used.
- Unauthorised changes are made to the device.
- The user uses different dosing media than those indicated in the order.
- The user does not use dosing media under the conditions agreed with the manufacturer such as modified concentration, density, temperature, contamination, etc.

3.2 Intended purpose

Pulsation dampers are fittings for dosing systems. Depending on the task, they are used to protect the system against over-strong pulsation or to increase the dosing accuracy.

You can install pulsation dampers on the suction or pressure side of a pump, thereby solving different problems. Its necessity depends on the individual structure of the dosing system and the hydraulic system.

3.2.1 Use on the suction side

Pulsation dampers generate an equal inlet in a hydraulic system which leads to the suction valve of a dosing pump.

A pulsation damper fitted in front of the suction valve of the dosing pump can prevent breakaway of the liquid column (cavitation).

3.2.2 Use on the discharge side

Strong pressure peaks can develop on the discharge side of a dosing pump. The frequency of the pressure strokes can cause the hydraulic lines of the dosing system to vibrate (pulsation). The vibrations can damage the hydraulic system or system components.

4 Product description

4.1 Design

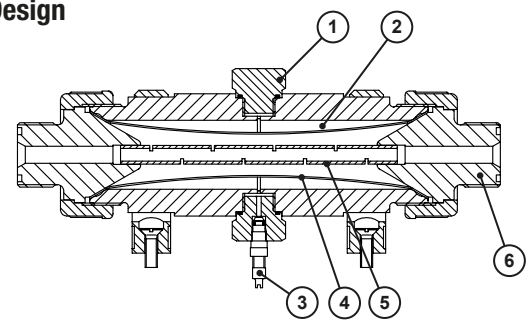


Fig. 1: Design

No.	Description
1	Connection for the pressure gauge
2	Gas cushion
3	Filler valve
4	Hose diaphragm
5	Support pipe
6	Dosing medium connection

Table 5: Design

4.2 Rating plate

There is information on the equipment about safety or the product's way of functioning. The information must stay legible for the duration of the service life of the product.

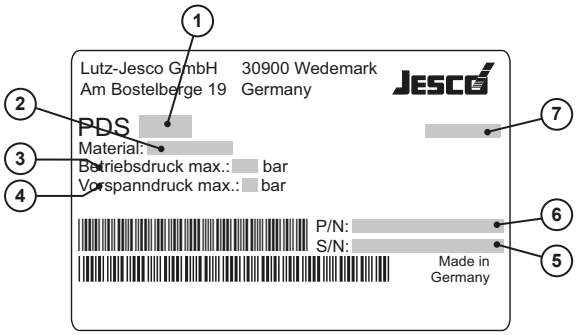


Fig. 2: Rating plate Pulsation dampener

No.	Description
1	Product, type, nominal size
2	Materials in contact with the media
3	Maximum operating pressure
4	Maximum pre-tension pressure
5	Serial number
6	Part number
7	Month / year of manufacture

Table 6: Rating plate

5 Technical data

Type		PDS 80	PDS 250	PDS 750	PDS 2500	PDS 7500
Store volume		80 cm³	250 cm³	750 cm³	2500 cm³	7500 cm³
Connection		G 3/4	G1 1/4	G1 1/4	G2	G2 3/4
Stroke volume of dosing pump		15 ml/stroke	40 ml/stroke	120 ml/stroke	400 ml/stroke	1200 ml/stroke
Pre-tension pressure		Max. 6 bar				Max. 2.5 bar
Maximum operating pressure		10 bar				4 bar
Casing material		PVC / PP / PVDF				
Approved media temperature	PVC	0 - 35 °C				
	PP	0 - 50 °C				
	PVDF	0 - 80 °C				
Approved ambient temperature	PVC	0 - 40 °C				
	PP	0 - 60 °C				
	PVDF	0 - 80 °C				
Diaphragm materials		CSM / FPM				
Pressure gauge measuring range		0 - 6 / 0 - 16 bar				
Pressure gauge material		Brass / stainless steel				

Table 7: Technical data

6 Dimensions

All dimensions in millimetres (mm).

PDS 80

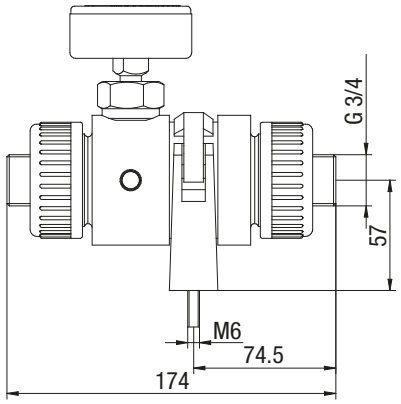


Fig. 3: Dimensioned drawing PDS 80

PDS 250

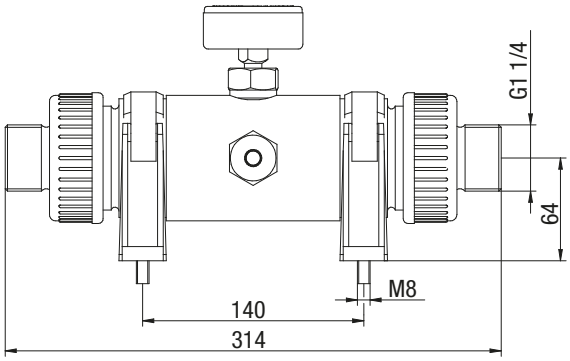


Fig. 4: Dimensioned drawing PDS 250

PDS 750

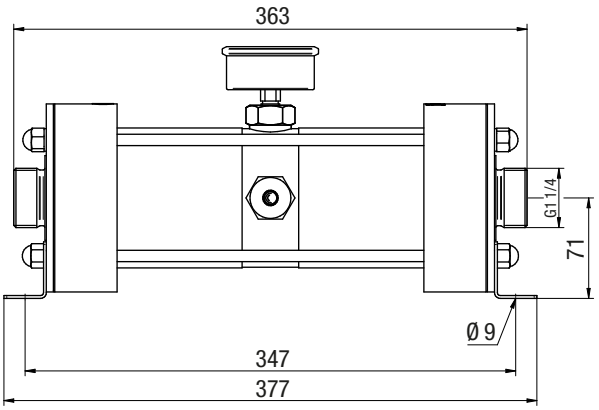


Fig. 5: Dimensioned drawing PDS 750

PDS 2500

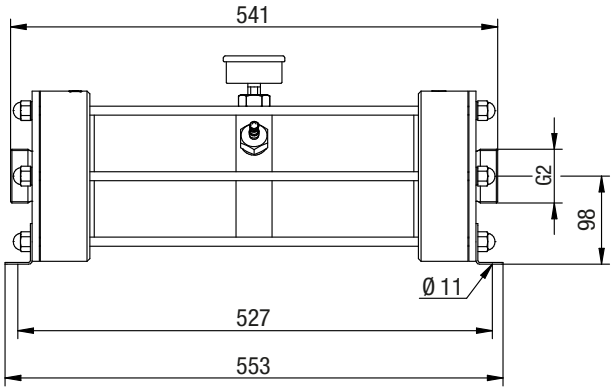


Fig. 6: Dimensioned drawing PDS 2500

PDS 7500

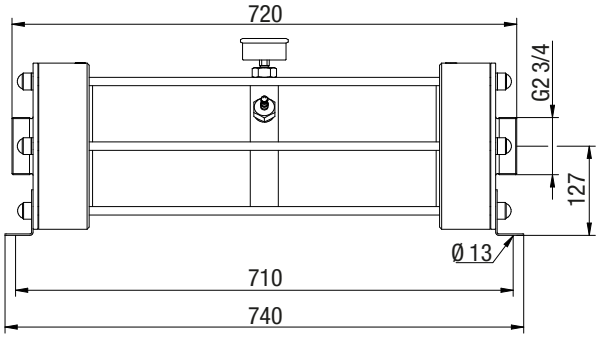


Fig. 7: Dimensioned drawing PDS 7500

7 Installation

7.1 Principles

Pulsation dampers can only damp pressure peaks and pulsations correctly if they are installed correctly. Comply with the following basic rules:

- Always install the pulsation damper as close to the source of the pulses as possible.
- Install the pulsation damper closely behind the dosing pump pressure valve.
- Install the connection lines as straight as possible and in the same diameter as the connections of the pulsation damper.
- Fix large pulsation dampers additionally on the wall.
- Make sure that the connection lines do not transfer mechanical tension to the pulsation damper.

7.2 Pre-tension

WARNING

Danger from too high a pressure!

All devices and hydraulic fittings on the dosing system must be operated below the maximum permissible pressure. Overly-high pressure peaks can result in the bursting of system parts, the release of dosing medium and injury.

⇨ Do not fill the device with more than the permissible pre-tension pressure.

⇨ When filling, use a pressure gauge to read off the pressure.

⇨ Check the pressure during operation and comply with the permissible operating pressure.

Pulsation dampers are operated with “pre-tension”. The pre-tension pressure is the pressure of the gas cushion with a pressureless piping system.

- Fill the pulsation damper with compressed air or nitrogen using the filling valve and with the piping system pressureless.
- Use a pressure gauge to set the pre-tension pressure to 60% of the expected average operating pressure. Formula: Operating pressure x 0.6 = pre-tension pressure
- Use the filling valve cover cap to protect the valve.
- Check the pre-tension pressure regularly.

7.3 Connection with and without T-piece

You can install the pulsation damper directly on the throughflow or using a T-piece. Fig. 8 shows an installation plan for the installation with a T-piece (V3), a shutoff valve (V1) and a shutoff valve for pressure relief (V2):

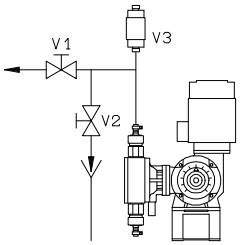


Fig. 8: Installation plan with T-piece

7.4 Use as a suction air vessel

You can also mount the pulsation damper on the suction side of the dosing pump. The pulsation damper serves as an air vessel and stores a portion of the dosing medium. This prevents pulsation or cavitation during the suction stroke.

When using it as a suction air vessel, comply with the following rules:

- Do not set any pre-tension pressure.
- Given pulsation in the suction line, you can lightly increase the pre-tension pressure by pressing on the valve during the suction stroke with a pointed object. A small amount of air will flow in the pulsation damper and reinforces the positive effect.

8 Maintenance

8.1 Maintenance intervals

This table gives you an overview of maintenance work and the intervals at which you must carry it out. The next few sections contain instructions for carrying out this work.

Maintenance	Frequency
Check the connections	Regularly
Check the pre-tension pressure	Regularly
Replace the hose diaphragm	Upon wear or leakage

Table 8: Maintenance intervals

8.2 Replace tube-type diaphragm

8.2.1 PDS 80 / 250

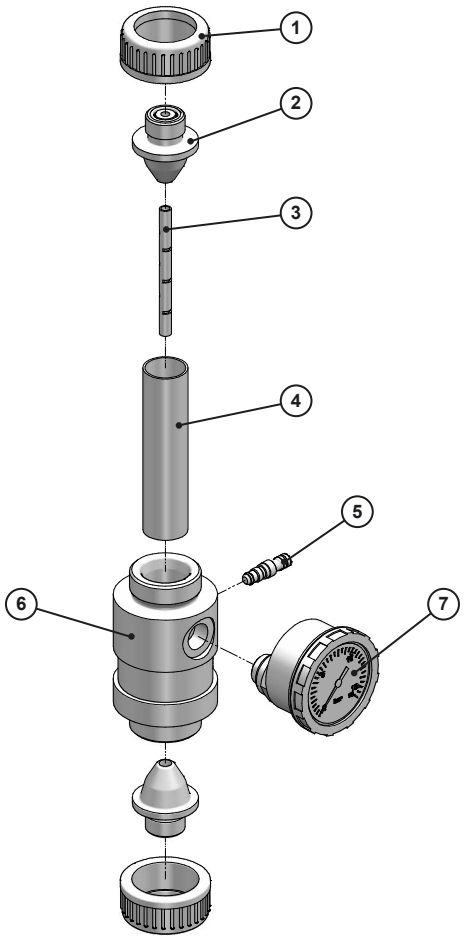


Fig. 9: Exploded view PDS 80

Precondition for action:

✓ You have de-installed the device from the system piping and flushed it.

✓ You have completely relieved the pre-tension pressure by pressing on the filling valve with a pointed object, until no more pressure is released.

🛠 Silicone grease

🛠 Open-end spanner

🛠 Screwdriver

🛠 Strap wrench

Perform the following working steps:

1. Unscrew the pressure gauge (7) and the filling connection (5, only with PDS 250) from the housing (6) using the open-end spanner.
2. Unscrew the two union nuts (1) using the strap wrench.
3. Working carefully, lever the two seal cones (2) out of the housing using a screwdriver.
4. Pull out the support pipe (3).
5. Loosen the hose diaphragm (4) at both ends of the housing and remove it.
6. Clean all parts and check them for damage.
7. Slide the new hose diaphragm into the housing until both ends protrude equally.
8. Place a seal cone on the end of the hose diaphragm and press it tight.
9. Paint the two external threads on the housing with silicone grease.
10. Screw the union nut on the housing and tighten it hand tight.
11. Slide the support pipe from the opposite side into the bore of the seal cone
    ▶ You can see through the seal cone and the support pipe.
12. Insert the second seal cone on the opposite end, centre the support pipe and press the seal cone tight.
13. Screw the second union nut onto the housing and tighten both union nuts using the strap wrench.
14. Screw the pressure gauge and the filling connection (only PDS 250) into the housing and tighten it carefully using the open-end spanner.
15. Fill the device with pre-tension pressure and perform a leak test (see “Leak test” on page 13).

✓ **The hose diaphragm has been changed.**

8.2.2 PDS 750 / 2500 / 7500

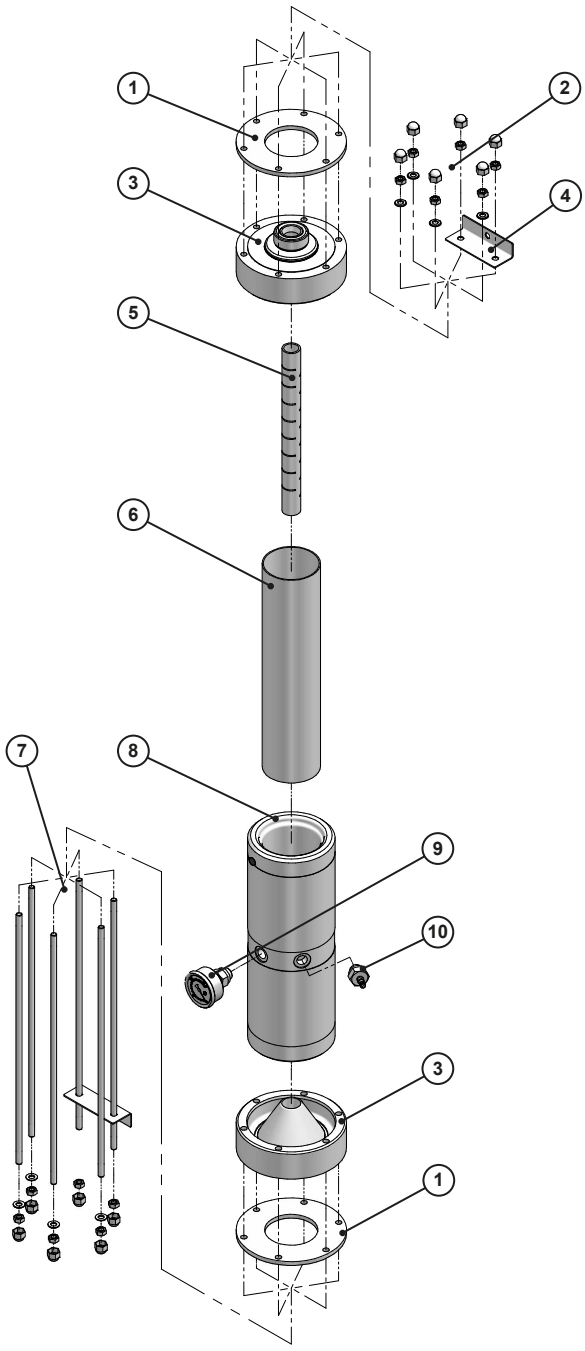


Fig. 10: Exploded view PDS 2500

Precondition for action:

✓ You have de-installed the device from the system piping and flushed it.

✓ You have completely relieved the pre-tension pressure by pressing on the filling valve with a pointed object, until no more pressure is released.

🛠 Torque key

🛠 Fork wrench

🛠 Open-end spanner

🛠 Plastic hammer

Perform the following working steps:

1. Unscrew the pressure gauge (9) and the filling connection (10) from the housing (8) using the open-end spanner.
2. Remove the protective cap from the hexagon nuts (2) and unscrew them.
3. Pull all spacer bolts (7) from the housing and remove then two flanges (1).
4. Remove the two seal cones (3) from the housing using a plastic hammer.
5. Pull out the support pipe (5).
6. Loosen the hose diaphragm (6) at both ends of the housing and remove it.
7. Clean all parts carefully and check them for damage.
8. Slide the new hose diaphragm into the housing until both ends protrude equally.
9. Paint both ends of the housing with silicone grease on the outside diameter.
10. Screw the union nut on the housing and tighten it hand tight.
11. Press the seal cone with the hose diaphragm into the housing.
12. Slide the support pipe from the opposite side into the bore of the seal cone.
    - ▶ You can see through the seal cone and the support pipe.
13. Insert the second seal cone on the opposite end, centre the support pipe and press the seal cone tight.
14. Place a flange and the angle bracket (4) on a seal cone and slide the spacer bolt into the housing.
15. Insert the second flange and the angle bracket on the seal cone and screw the nuts hand tight.
16. Tighten the nuts equally and crosswise with the corresponding torque.
    - ▶ PDS 750: 10 Nm, PDS 2500: 20 Nm, PDS 7500: 30 Nm
17. Working carefully, screw in the pressure gauge and the filling connection and tighten them.
18. Fill the device with pre-tension pressure and perform a leak test (see “Leak test” on page 13).

✓ **The hose diaphragm has been changed.**

8.3 Leak test

If your device no longer performs its function correctly and the pre-tension pressure falls within a short time, you can perform a leak test.

Precondition for action:

✓ You have de-installed the device from the system piping.

✓ The device has been flushed with water.

🛠 Torque key

🛠 Fork wrench

Perform the following working steps:

1. Check the pre-tension pressure.
   ▶ The pre-tension pressure should amount to c. 6 bar.
2. Place the device completely in a water bath or use leakage spray.
   ▶ Leakages are recognised via gas bubbles. Replace damaged parts.

✓ **The leak test has been completed.**

9 Declaration of no objection

Please copy the declaration, stick it to the outside of the packaging and return it with the device.

Declaration of no objection

Please fill out a separate form for each appliance!

We forward the following device for repairs:

Device and device type: ..... Part-no.: .....

Order No.: ..... Date of delivery: .....

Reason for repair: .....

.....

.....

Dosing medium

Description: ..... Irritating: ☐ Yes ☐ No

Properties: ..... Corrosive: ☐ Yes ☐ No

We hereby certify, that the product has been cleaned thoroughly inside and outside before returning, that it is free from hazardous material (i.e. chemical, biological, toxic, flammable, and radioactive material) and that the lubricant has been drained.

If the manufacturer finds it necessary to carry out further cleaning work, we accept the charge will be made to us.

We assure that the aforementioned information is correct and complete and that the unit is dispatched according to the legal requirements.

Company / address: ..... Phone: .....

..... Fax: .....

..... Email: .....

Customer No.: ..... Contact person: .....

Date, Signature: .....

10 Warranty claim

Warranty claim

Please copy and send it back with the unit!

If the device breaks down within the period of warranty, please return it in a cleaned condition with the complete warranty claim.

Sender

Company: ..... Phone: ..... Date: .....

Address: .....

Contact person: .....

Manufacturer order no.: ..... Date of delivery: .....

Device type: ..... Serial number: .....

Nominal capacity / nominal pressure: .....

Description of fault: .....

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Service conditions of the device

Point of use / system designation: .....

.....

.....

Accessories used (suction line etc.): .....

.....

.....

.....

.....

Commissioning (date): .....

Duty period (approx. operating hours): .....

Please describe the specific installation and enclose a simple drawing or picture of the chemical feed system, showing materials of construction, diameters, lengths and heights of suction and discharge lines.