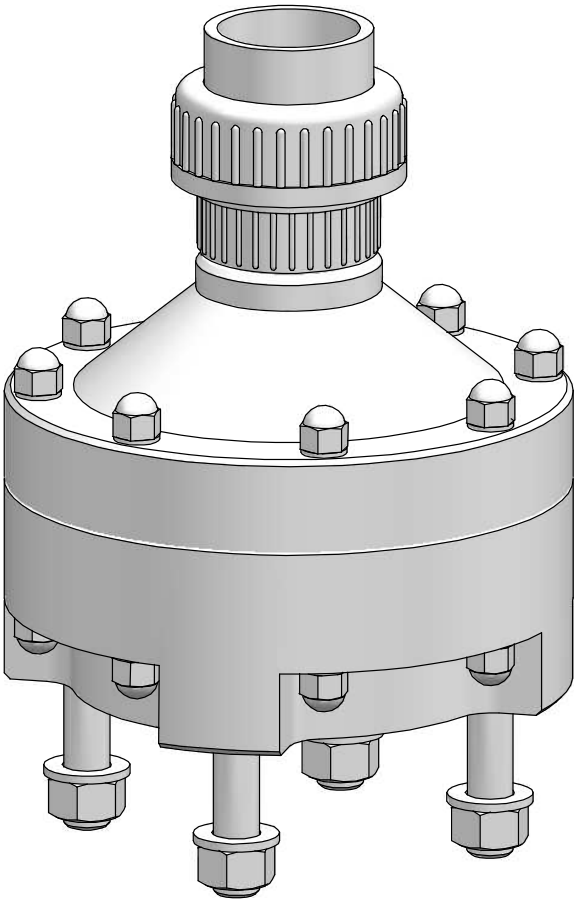
Injector non-return valve
C 3101
Operating instructions



Read the operating manual!

The user is responsible for installation and operation related mistakes!

Original operating instructions

BA-26420-02-V01

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
	General danger
	Danger from poisonous substances
	Danger from electrical voltage
	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.

DANGER

Danger to life from chlorine poisoning!

Chlorine is poisonous. In severe cases, breathing in chlorine may lead to death. It irritates the eyes, the respiratory system and the skin.

- ⇨ Use sufficient personal protective equipment.
- ⇨ Use a respirator mask with gas filter type B that complies with EN 14387 during any work on the system.
- ⇨ Always comply with the accident prevention regulations that apply at the place of use.
- ⇨ Get rid of leaks without delay. You must get rid of even very minor leaks without delay. Together with the humidity, chlorine forms hydrochloric acid and corrosion results in rapidly increasing leakage.
- ⇨ Use only chlorine-resistant seals.
- ⇨ Only use seals once. Reusing them leads to leaks.

DANGER

Danger to life from missing safety device!

Chlorinators without gas warning devices are an increased safety risk, since it is not possible to detect escaping chlorine gas in good time or at all.

- ⇨ Install a gas warning device.

WARNING

Increased risk of accidents due to insufficient qualification of personnel!

Chlorinators and their accessories must only be installed, operated and maintained by personnel with sufficient qualifications. Insufficient qualification will increase the risk of accidents.

- ⇨ Ensure that all action is taken only by personnel with sufficient and corresponding qualifications.
- ⇨ Prevent access to the system for unauthorised persons.

NOTE

Damage to the plant due to the formation of hydrochloric acid

Chlorine gas is highly hygroscopic. This means that humidity enters the system at any open connection on devices or pipes, which results in the formation of hydrochloric acid and contamination. thus inevitably causing damage to the units.

- ⇨ Keep all connections (including in the vacuum system and on all devices not currently in use) closed at all times.

2.2 Information about chlorine

Chlorine is a hazardous substance. The chemical element chlorine is a greenish-yellow, toxic gas with a pungent odour, which can be detected in the air at concentrations below 1 ppm (= 1 ml/m³).

Chlorine is 2.5 times heavier than air and accumulates at ground level.

Chlorine is extremely toxic for water organisms. The reason for the toxicity of chlorine is its extraordinary reactivity. It reacts with animal and vegetable tissue and thus destroys it.

Air with a chlorine gas content of 0.5 -1% leads to a quick death in mammals and humans, as it attacks the respiratory tract and the pulmonary alveolus (formation of hydrogen chloride or hydrochloride acid).

NOTE

Faults due to insufficient chlorine quality

Impurities in the chlorine gas form deposits in devices and valves and can attack the components chemically. This can lead to malfunctions.

- ⇨ Only use technically pure chlorine that meets the following requirements:
  - Mass content of chlorine at least 99.5%
  - Water content max. 20 mg/kg

  Chlorine that complies with EN 937 meets these requirements.

2.3 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 functions of the device and of the corresponding system,
- failure of required maintenance and repair methods,
- danger to persons,
- danger to the environment caused by substances leaking from the system.

2.4 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 regulations on handling hazardous substances,
- environmental protection provisions,
- applicable standards and legislation.

2.5 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	
	Respirator mask
	Protective clothing
	Safety shoes
	Protective gloves

Table 3: Personal protective equipment required

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

- Commissioning,
- All work on gas-bearing sections of the plant,
- Changing the chlorine tank,
- Shut-down,
- Maintenance work,
- Disposal.

2.6 Personnel qualification

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

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

- attendance at all the training courses offered by the owner,
- sufficient qualification for the respective activity,
- training in how to handle the device,
- knowledge of safety equipment and the way this equipment functions,
- familiar with this operating manual,
- 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 device unsupervised,
- sufficient training that they can work on the device under the supervision and guidance of a trained specialist.

These operating instructions differentiate between these user groups:

2.6.1 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.

2.6.2 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.

Trained persons have attended all trainings offered by the operator.

2.7 Personnel tasks

In the table below, you can check what personnel qualifications are required for the respective tasks. Only people with appropriate qualifications are allowed to perform these tasks!

Qualification	Activities
Specialist staff	■ Transportation ■ Assembly ■ Hydraulic installations ■ Commissioning ■ Taking out of operation ■ Fault rectification ■ Maintenance ■ Repairs ■ Disposal
Trained persons	■ Storage ■ Control

Table 4: Personnel qualification

3 Intended use

3.1 Notes on product warranty

Any non-designated use of the device can impair its function and the protection provided. This leads to invalidation of any warranty claims!

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

- the device is operated in a manner which is not consistent with these operating instructions, particularly safety instructions, handling instructions and the section "Intended Use".
- Information on usage and environment (see section 5 “Technical data” on page 9) is not adhered to.
- If people operate the device who are not adequately qualified to carry out their respective activities.
- No original spare parts or accessories of Lutz-Jesco GmbH are used.
- Unauthorised changes are made to the device.
- Maintenance and inspection intervals are not adhered to as required or not adhered to at all.
- The device is commissioned before it or the corresponding system has been correctly and completely installed.
- Safety equipment has been bridged, removed or made inoperative in any other way.

3.2 Intended purpose

The injector non-return valve C 3101 stop return water. This ensure the system remains dry.

It may only be used with technically pure chlorine with a minimum mass content of 99.5%.

3.3 Prohibited dosing media

The device must not be used for the following media and substances:

- all media apart from gaseous chlorine
- not technically pure chlorine with a mass content of less than 99.5%

4 Product description

4.1 Scope of delivery

Please compare the delivery note with the scope of delivery. The following items are part of the scope of delivery:

- Diaphragm non-return valve
- Double sealing system
- Fittings and connections depending on the version
- Connections on the non-return side
- Operating instructions

4.2 Design and function

4.2.1 Device design

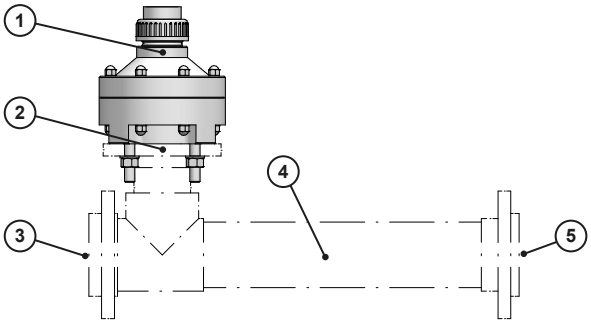


Fig. 1: Device design

Item	Description
1	Chlorine gas input
2	Chlorine gas output
3	Water inlet
4	Mixing zone
5	Finished mixture

Table 5: Components

4.2.2 Function description

A dosing system must supply the injector with chlorine gas. If the injector does not suck in any chlorine gas, the non-return valve must stop immediately. Immediate braking is an essential function. For large non-return valves, the opening pressure can be increased with the correct springs.

4.3 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

No.	Description
1	Product name
2	Material
3	Part number
4	Serial number
5	Month / year of manufacture

Table 6: Rating plate

5 Technical data

Information		Value	
Throughput		80 kg/hr	200 kg/hr
Nominal diameter input		DN 32	DN 40
Nominal diameter output		DN 40	
Max. operating vacuum		- 1013 mbar	
Max. operating pressure		16 bar	
Material in contact with the media	Housing, diaphragm support	PVC	
	Diaphragm clamping ring	PTFE	
	Stop piece, seal carrier	PVDF	
	Spring	2.4602	
	Seals	FPM	
	Screws	A4, brass treated	
Weight		approx. 5 kg	
Protection class		IP65	
Ambient temperature		0 – 55 °C (no direct sunlight)	
Air humidity		Max. 95 %	

Table 7: Technical data

6 Dimensions

All dimensions in millimetres (mm).

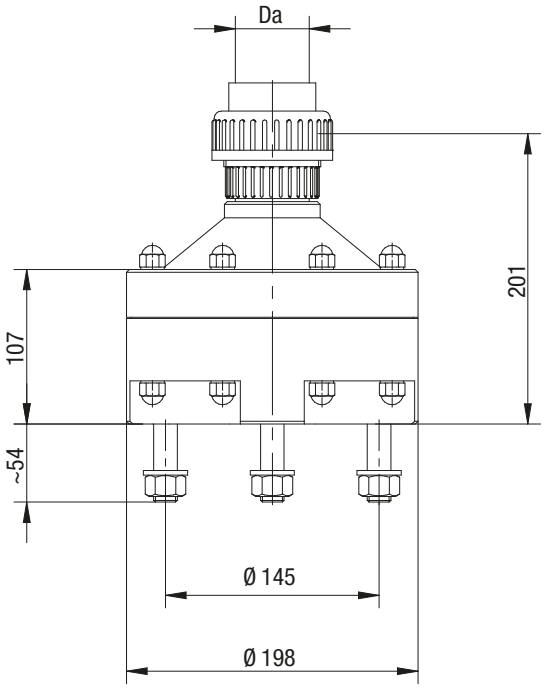


Fig. 3: Dimensional drawing

Da	DN
Ø 40 mm	32
Ø 50 mm	40

Table 8: Pipe lengths of the calculation

7 Installation

NOTE

Damage to the system due to incorrect installation

The failure to observe installation instructions (e.g. use of unsuitable tools, incorrect torque) can damage the system parts.

⇨ Use suitable tools.

⇨ Note the specified torque.

7.1 Installation location

Install the non-return valve directly on or near the injector. Further information can be found in the following sections.

The room must fulfil the following minimum requirements:

- secured against access by unauthorised persons,
- protected against weather conditions,
- adheres to permissible ambient temperature (see section 5, “Technical data” on page 9),
- the room must comply with the locally valid prescriptions.

7.2 Hydraulic installation

Non-return valves must be mounted vertically and will only work properly when the output is pointing downwards. If the injector was mounted vertically, an angle piece must be mounted between the injector and non-return valve for the inlet.

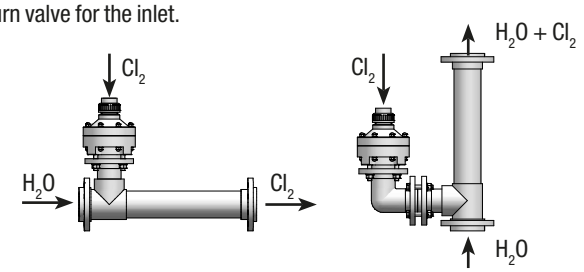


Fig. 4: Vertical installation position of non-return valve

7.2.1 Connecting the injector

The pipe diameter must be DN65 (max. 1 m) for the connection between non-return valve and injector, and must not be reduced.

Precondition for action:

✓ The inside of the line is clean and dry.

✓ The sealing surfaces are free of contamination and damage.

Resources required:

🛠 Torque wrench

🛠 Assembly paste

Perform the following working steps:

1. Lubricate the screws, nuts and washers on the sliding surfaces and in the thread, using assembly paste or PTFE grease, for example.
2. Place the O-ring in the groove.
3. Mount the screws in the drill holes.
4. Connect the unit to the injector by tightening all the screws to max. 10 Nm.

✓ **Connection to injector is completed.**

7.2.2 Connecting the chlorine gas supply

The pipe diameter must be adapted according to its length when connecting the non-return valve and chlorine gas supply. Use the following table for the pipe calculation. If the diameter is too small, the piping will be insufficient for the required dosage.

	Length (m)				
	10	**20**	**50**	**100**	**200**
DN32/d40	150 kg/hr	120 kg/hr	80 kg/hr	50 /kg/h	40 kg/hr
DN40/d50	250 kg/hr	210 kg/hr	140 kg/hr	100 kg/hr	70 kg/hr
DN50/d63	420 kg/hr	360 kg/hr	260 kg/hr	190 kg/hr	130 kg/hr
DN65/d80	750 kg/hr	650 kg/hr	490 kg/hr	370 kg/hr	260 kg/hr

Table 9: Pipe lengths of the calculation

Precondition for action:

✓ The vacuum line is fixed with sufficient pipe clamps and meets the connection in an un-tensioned state.

✓ All parts are clean and dry.

✓ The yellow transport protection has been removed.

Resources required:

🛠 Pipe cutter

🛠 File or chamfer tool

🛠 PVC adhesive and cleaning agent

🛠 Non-fuzzing paper towels

Perform the following working steps:

1. Cut the PVC pipe at right angles. Make a chamfer on the pipe exterior (approx. 3 mm x 20°).
2. Clean the pipe and the bushing with the cleaning agent recommended by the manufacturer of the adhesive.
3. Glue the pipe in the connection. Follow the instructions for the PVC adhesive.
4. Mount the connection on the device. Ensure that the O-ring is fitted.
5. Tighten the union nut by hand.
6. Allow the bond to harden for at least 3 hours prior to the leak test.

✓ **Adhesive connection is completed**

7.3 Installation example

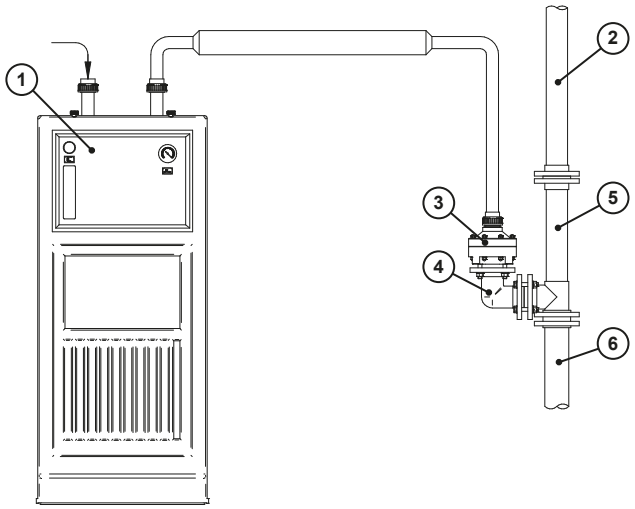


Fig. 5: Installation example

Item	Description
1	Dosing device
2	Reaction section (L = DN x 10)
3	Injector non-return valve C 3101
4	Angle piece
5	Injector
6	Reaction section (L = DN x 5)

Table 10: Components

8 Operation

The non-return valve starts and stops automatically during operation.

8.1 Shutting down in an emergency

DANGER

Danger to life from chlorine poisoning!

Chlorine is poisonous. In severe cases, breathing in chlorine may lead to death. It irritates the eyes, the respiratory system and the skin.

- ⇨ If chlorine escapes, leave the room immediately.
- ⇨ Use sufficient personal protective equipment.
- ⇨ If chlorine gas escapes, wear a Type 2 self-contained breathing apparatus that complies with EN 137.
- ⇨ Only initiate counter measures after putting on the protective equipment.
- ⇨ Given a serious escape and insufficient equipment or qualifications, leave the work to professional emergency services personnel. Do not take any unnecessary risks!

The measures depend on the type of accident and should be planned and executed by professional personnel.

8.2 Shut-down

8.2.1 Short-term shut-down

Perform the following working steps:

1. Close the chlorine tank valves.
2. Use the injector to suck off the remaining chlorine.
3. Switch off the injector.

✓ **Chlorinator shut down for the short term.**

8.2.2 Long-term shutdown

Perform the following working steps:

1. Close the chlorine tank valves.
2. Use the injector to suck off the remaining chlorine.
3. If possible, operate the chlorine gas system for approximately five minutes with nitrogen or dry compressed air.
4. Switch off the injector.
5. Close all the connections to protect the lines and devices from humidity and dirt.

✓ **Chlorinator shut down for the long term.**

The device remains in the installation location during the operating pause. All connections remain closed. The voltage supply should remain active so that condensate is unable to gather in the electrical devices.

Ensure ideal storage conditions where possible:

- The storage place must be cold, dry, dust-free and generously ventilated.
- Climactic conditions: see 5 “Technical data” on page 9.

8.3 Disposal

NOTE

Do not dispose of the device in household waste!

Do not dispose of electrical appliances with household waste.

- ⇨ Dispose of the unit and its packaging material in accordance with local laws and regulations.
- ⇨ Dispose of different materials separately and recycle them.
- ⇨ Before disposing of the old equipment, you must clean off the remaining chlorine by rinsing it with nitrogen or air.
- ⇨ Devices returned to the manufacturer must be sent risk-free and with a declaration of no objection (see page 21)

9 Maintenance

DANGER

Danger to life from chlorine poisoning!

Do not carry out maintenance or any other work on the chlorinator until the system has been decommissioned and all of the chlorine gas has been removed from the lines. The failure to follow this instruction presents a significant risk of injury.

⇨ Prior to any maintenance work, prepare the system in accordance with section 9.2 “Preparing the system for maintenance” on page 14.

⇨ Use a breathing apparatus with gas filter type B that complies with EN 14387 when dismantling the device.

NOTE

Damage to the system due to corrosion

Water in chlorine carrying system components combines with chlorine to form hydrochloric acid and leads to corrosion.

⇨ After maintenance work is complete, remove all water residues from the system before placing it into operation.

9.1 Maintenance intervals

Subject the chlorinator to regular maintenance, to prevent malfunctions. Perform the maintenance in the following intervals:

Interval	Maintenance
After 1 year	■ Replace the O-rings ■ Replace the air wiper ■ Replace the ring diaphragm
After 3 years	■ Replace the spring ■ Replace the piston ■ Replace the protective caps ■ Replace the nuts

Table 11: Maintenance intervals

In some cases, regional regulations may require shorter maintenance intervals. Carry out maintenance before recommissioning the system after a long period out of service.
Maintenance intervals not depend only on how frequently the equipment is used. Chemical wear, for example of rubber parts, begins with the initial medium contact and continues irrespective of the usage.

9.2 Preparing the system for maintenance

Perform the following working steps:

1. Close the valves of the chlorine tanks.
2. Use the injector to suck off the remaining chlorine.
3. Run the chlorinator for approximately five minutes with nitrogen or dry compressed air.
4. Switch off the injector.
5. Stop the injector water, e.g. by closing the ball valves.

✓ **The system is prepared for maintenance.**

9.3 Device Maintenance

Precondition for action:

✓ Section “9.2 Preparing the system for maintenance” was performed.

✓ The replacement parts are free of damage.

Resources required:

🛠 Maintenance kit

🛠 Face spanner SW 4 and SW 5

🛠 Face spanner SW13 and 24 (10 and 50 Nm)

🛠 PTFE grease

🛠 Breathing apparatus with gas filter type B that complies with EN 14387

9.3.1 Dismantling the non-return valve

Please note the exploded view on page 18.

Perform the following working steps:

1. Loosen the union nut (item 1) of the non-return valve.
2. Loosen all connections to the chlorine gas output.
3. Remove the device from the piping.
4. Loosen and remove the 8 screws on the housing (items 19 - 22).
   ▶ The spring will force apart the housing.
5. Remove the diaphragm disc (item 8) and the attached parts.
6. Unscrew the piston (item 7) using the face spanner SW 5.
7. Unscrew the wiper (item 14) and remove the seals (items 11 - 13) from the valve.
8. Unscrew the diaphragm clamping ring (item 10) from the diaphragm disc and remove the diaphragm.
9. Dispose of all used O-rings, the wiper and the diaphragm. In addition, replace the spring (item 15), piston, protective caps (item 19) and nuts (item 22) every three years.
10. Carefully clean all the other parts and inspect them for visible damage.

✓ **Non-return valve is dismantled.**

9.3.2 Installing the non-return valve

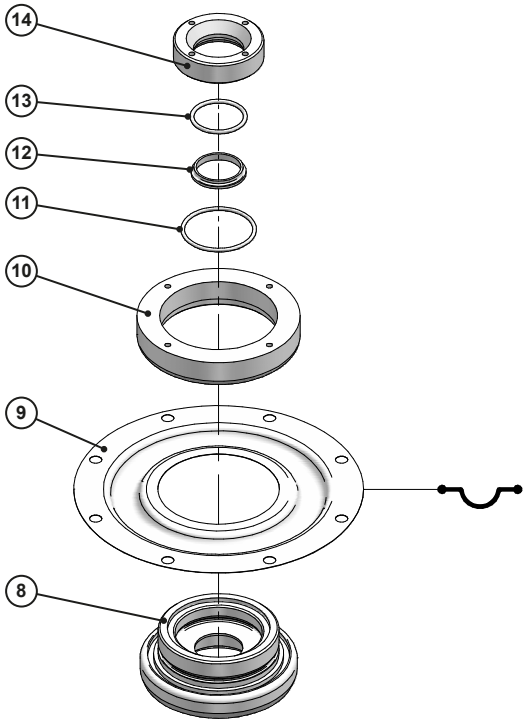


Fig. 6: Alignment of the diaphragm during installation

1. Attach the diaphragm disc (item 8) to the face spanner SW 5.
2. Place the diaphragm (item 9) on the diaphragm disc. Ensure that the curvature of the diaphragm is pointing downwards.
3. Place the diaphragm clamping ring (item 10) on the diaphragm.
4. Take a second face spanner SW 4 and turn the diaphragm clamping ring by 45° until it is secure.
5. Place the seal carrier (item 14) on the side with the four holes. Place the seals (items 11 - 13) in the seal carrier.
6. Screw the seal carrier in to the diaphragm disc and tighten it with at least 5 Nm.

▶ Diaphragm disc installation is complete.

7. Push the O-ring (item 6) onto the piston (item 7). Lightly coat the O-ring with PTFE grease.
8. Insert the piston into the top part of the housing (item 5).
9. Insert the O-ring (item 3) into the screw-in part (item 4).
10. Insert the pre-assembled diaphragm disc into the top part of the housing and align it with the eight holes.
11. Insert the O-ring (item 17) into the bottom part of the housing (item 18).
12. Position the spring (item 15) on the stop piece (item 16).
13. Put all the parts together and screw the housing together using the eight screws (items 19 - 22).
14. Insert the four face screws (items 23 - 25) into the bottom part of the housing. Tighten the nuts with 10 Nm.
15. Screw the union nut (item 1) and the flange bushing (item 2) to the top part of the housing with 5 Nm.

✓ **Non-return valve is installed.**

9.4 Functional control

Carry out a functional control after maintenance by slowly increasing the pressure in the piping system to the set point.

If no leakage occurs within 5 minutes, the injector non-return valve is deemed tight.

10 Troubleshooting

All possible errors are listed in this table.

Problem	Symptom	Possible cause
System is not producing anything.	Water flows silently.	Ball valves closed.
	Water flows loudly.	Injector is installed the wrong way around.
	Water flows loudly, but without any effect.	Injector is installed the right way around but is not positioned correctly.
System is not producing enough.	Water flows loudly, but without sufficient effect.	Injector is installed correctly but positioning is not quite right. The flow may be able to be controlled with a pressure reducer (throttle or open). Contact the manufacturer.

Table 12: Troubleshooting

11 Spare parts

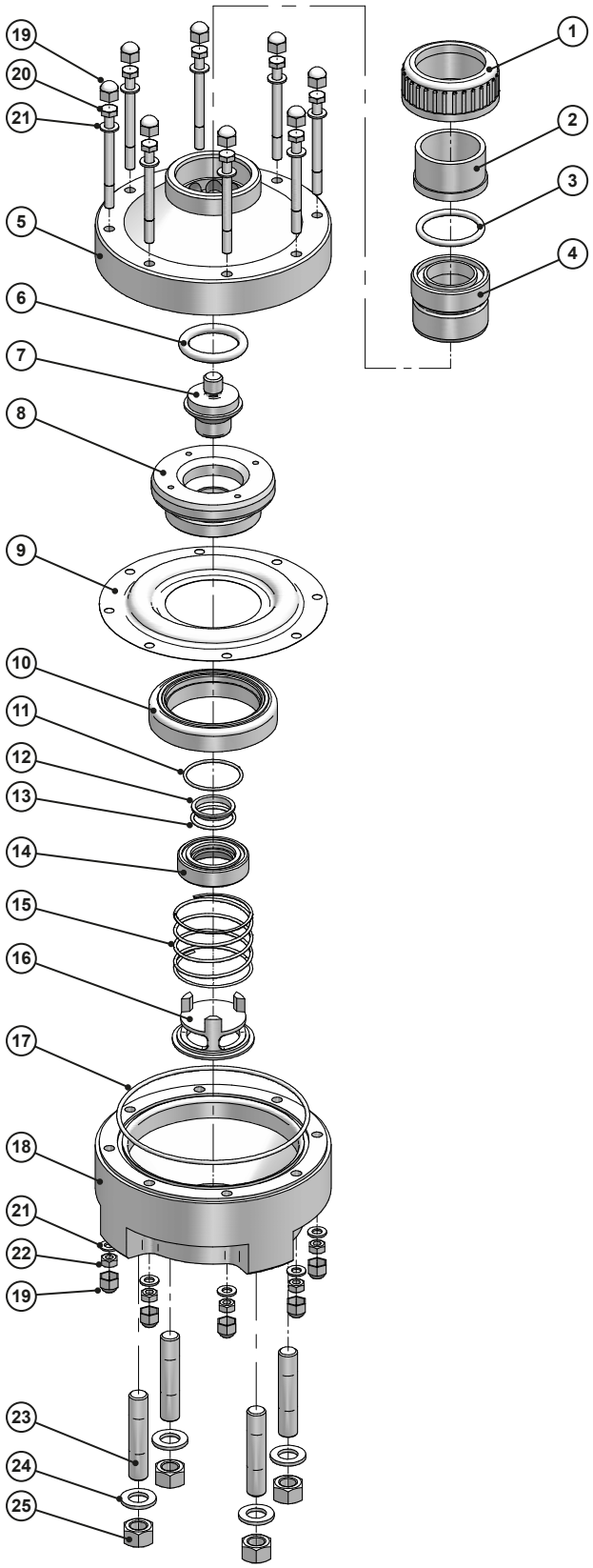


Fig. 7: Exploded view

Item	No.	Description
1	1	Union nut
2	1	Flange bushing
3	1	O-ring
4	1	Screw-in part
5	1	Housing, top part
6	1	O-Ring Ø 42 x 8
7	1	Piston
8	1	Diaphragm disc
9	1	Ring diaphragm
10	1	Diaphragm clamping ring
11	1	O-Ring Ø 45 x 2.4
12	1	Wiper Ø 36 x 30 x 5
13	1	O-Ring Ø 32 x 2.6
14	1	Wiper M60 x 2
15	1	Spring
16	1	Stop piece
17	1	O-Ring Ø 155 x 3.5
18	1	Housing, bottom part
19	16	Protective cap
20	8	Screw
21	16	Washer
22	8	Union nut
23	4	Screw
24	4	Washer
25	4	Union nut

Table 13: Individual components for C 3101

12 Notes to EU conformity

The injector non-return valve C 3101 does not fall within the scope of the Machinery Directive 2006/42/EC.

The injector non-return valve C 3101 does not fall within the scope of the Pressure Equipment Directive 2014/68/EU.

The values stated below do not exceed the limit values according to article 4, paragraph 1. Therefore the injector non-return valve C 3101 is designed and manufactured according to good engineering practice. According to article 4, paragraph 3, the injector non-return valve C 3101 as a pressure device cannot bear a CE label and an EU declaration of conformity cannot be issued.

Device designation:	Non-return valve
Type:	C 3101
Pressure stage:	PN16
Nominal diameter:	DN 32 / DN 40
Max. temperature:	55°C
Medium:	Water (H_2O)

Manufacturer and distributor of the injector non-return valve C 3101 is:

Lutz-Jesco GmbH / Am Bostelberge 19 / 30900 Wedemark / Germany

13 Declaration of no objection

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: .....