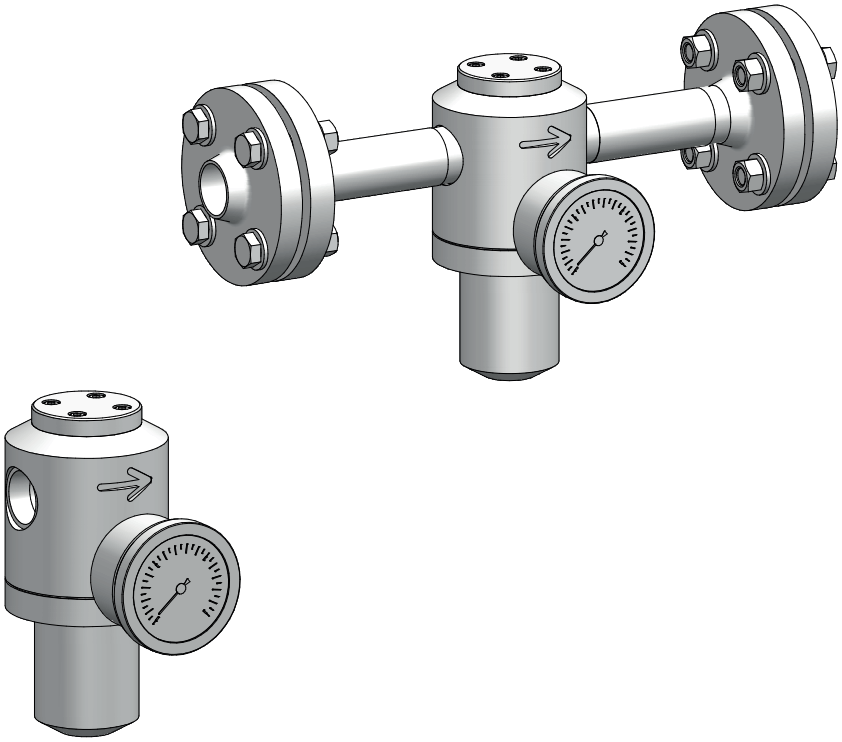
Pressure reducing valve
C 7110
Operating instructions



Read the operating manual!

The user is responsible for installation and operation related mistakes!

Original operating instructions

BA-20701-02-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.
PLEASE NOTE	Refers to a danger which, if ignored, may lead to risk to the machine and its function.

Tab. 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 of damage to machine or functional influences

Tab. 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 Identification of action instructions

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.
- ⇨ When carrying out any work on the system, use a respirator mask with a Type B gas filter that complies with EN 14387.
- ⇨ 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 deficient safety equipment!

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.

CAUTION

Increased risk of accidents due to insufficient qualification of personnel!

The device may 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.

PLEASE 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).

PLEASE 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 major unit und system functions.
- Failure of required maintenance and repair methods
- Danger for individuals through dangerous dosing media
- Danger to the environment caused by chlorine 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
	Protective gloves
	Safety shoes

Tab. 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 gas 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
- Personal suitability for the respective activity
- Sufficient qualification for the respective activity
- Training in how to handle 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 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.

2.6.3 Personnel tasks

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

Tab. 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 10) 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.
- The user uses different dosing media than those indicated in the order.
- 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 device is used to reduce the pressure of chlorine gas in order to prevent chlorine reliquification in the piping system and in the downstream devices.

3.3 Prohibited dosing media

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

- All media apart from gaseous chlorine
- Technically not 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:

- Pressure reducing valve C 7110 basic device
- Operating instructions

Optional accessories:

- Pressure gauge
- Pipe clips

4.2 Design and function

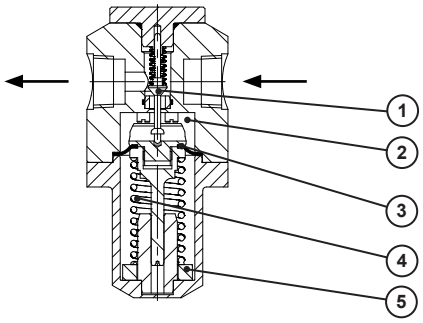


Fig. 1: Cross section C 7110

No.	Description
1	Cone
2	Diaphragm chamber
3	Diaphragms
4	Spring
5	Adjusting ring

Tab. 5: Description of components

The chlorine flows into the valve from the right, around the ball (1) into the membrane chamber (2) and to the output on the left-hand side. The increasing pressure in the membrane chamber presses the membrane (3) against the spring (4), and the membrane moves downwards. As a result, the cone (1) also moves downwards and thus closes the opening to the diaphragm chamber. With falling pressure in the membrane chamber, the spring (4) presses membrane and the ball (1) back upwards. Thus, constant pressure is generated in the membrane chamber. The pressure is set by using the number of adjusting rings (5) under the pre-tensioned spring. The valve has a very compact design. Therefore, the output pressure at full flow is approx. 0.5 bar lower than when the system is down. The optional pressure gauge displays the reduced pressure.

4.2.1 Installation examples

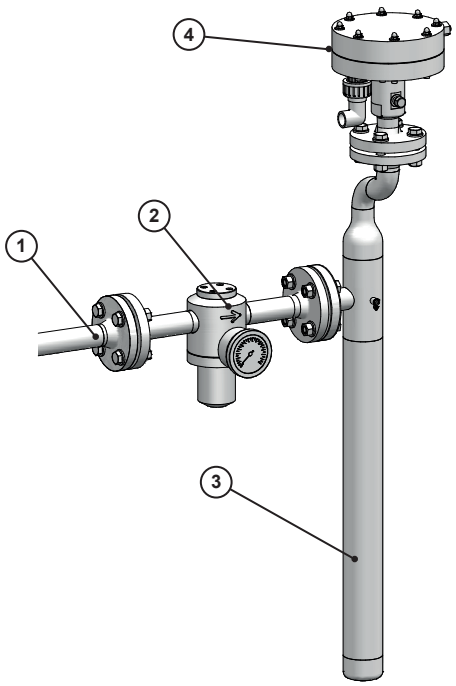


Fig. 2: Installation example C 7110 pressure reducing valve

No.	Description
1	Pressurized manifold
2	Pressure reducing valve C 7110
3	Moisture eliminator
4	Vacuum Regulator C 2700-V

Tab. 6: Description of components

4.3 Liquid chlorine in chlorine gas dosing systems

Liquid chlorine can have two main consequences in vacuum regulators:

- The accretion of dirt can result in malfunctions.
- Liquid chlorine can damage plastic plastic parts which are suitable only for gaseous chlorine.

Therefore the penetration of liquid chlorine into the units must be avoided.

Liquid chlorine in chlorinators can be caused by the condensation of chlorine gas and the connection of a new drum.

4.3.1 Liquid chlorine from condensation

The line system from the chlorine gas tank to the vacuum regulator is under the positive pressure from the chlorine gas tank. This pressure depends on the temperature. Example: At 20 °C, the system has a positive pressure of approx. 5.7 bar.

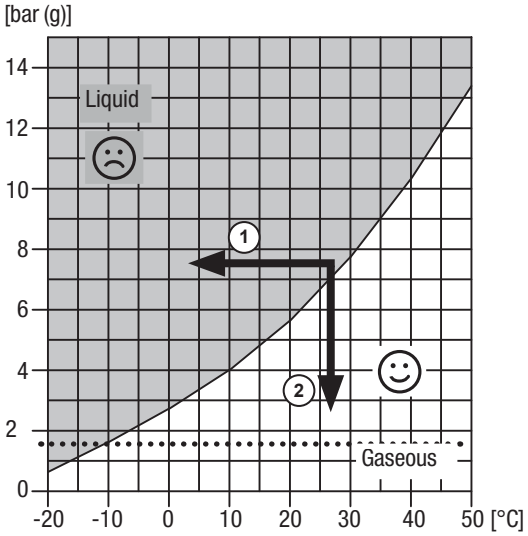


Fig. 3: Vapour pressure curve for chlorine

Item	Alteration	Effect
1	Cooling	Gaseous chlorine condenses
2	Reducing the pressure	Chlorine remains gaseous

Tab. 7: Change of state in the diagram

Condensation occurs at any place in the pressure system which is colder than the chlorine gas tank. The diagram shows a leftwards movement (arrow 1) in the area "liquid".

These situations occur, for example, due to extreme temperature variations during day and night. Chlorine barrel or chlorine cylinders have a large mass which cool down more slowly than pipes and devices during the night. The line is cooler and fills with liquid chlorine.

4.3.2 Effect of the pressure reducing valve

The pressure reducing valve reduces the pressure. In the diagram, this means a move downwards into the "gaseous" area" (arrow 2). The danger of condensation is prevented for the subsequent installation. The controlled output pressure of the valve is set to a positive pressure of 1.5 bar by default (dotted line). This means that the chlorine can only condense below -10 °C.

4.4 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.

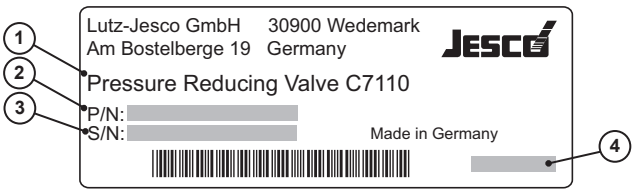


Fig. 4: Rating plate C 7110

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

Tab. 8: Rating plate

5 Technical data

Specification and Unit			Value
Chlorine gas flow rate		kg/h	200
Nominal pressure			PN16
Set output pressure		bar	1.5
Optional pressure gauge	Measuring range	bar	0 – 16
	Size	mm	Ø63
	Accuracy	%	±2.5 % of scale value
	Contact load rating		50 V / 0.5 A / 10 W
Material in contact with the media			Steel, Monel, PTFE, FPM, Hastelloy
Connections Input/Output			1" NPT female thread Flange DN25/PN40
Weight (with pressure gauge)		kg	11 approx.
Max. ambient temperature		°C	+55
Max. air humidity		%	90 (non condensing)

Tab. 9: Technical data

6 Dimensions

All dimensions in mm

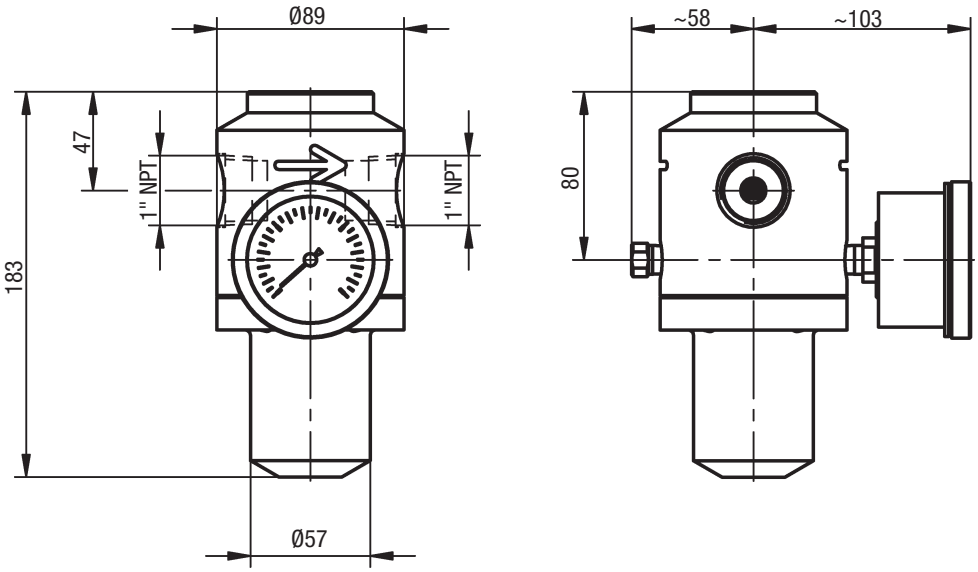


Fig. 5: Dimensional drawing C 7110 with female thread

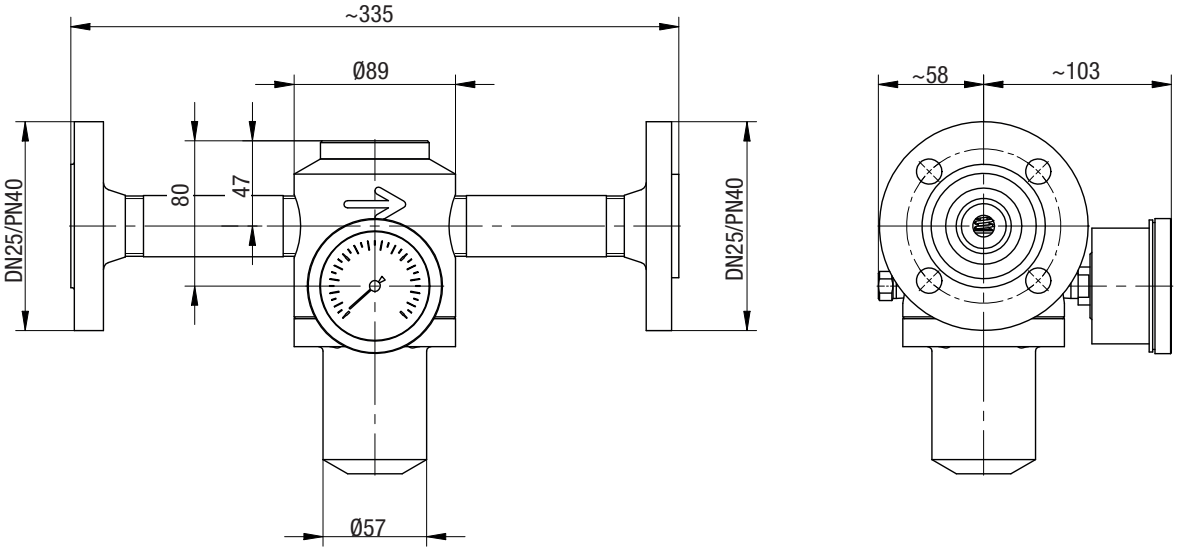


Fig. 6: Dimensioned drawing C 7110 with flange

7 Installation

DANGER

Danger to life from chlorine poisoning!

There is an increased risk of accidents during the installation of the device. Chlorine can escape if the chlorine gas tank valve is opened before installation of the system piping has been completed.

⇨ Make sure that the chlorine gas tank valve is closed and the residual chlorine has been sucked up using the injector before performing any work on the device.

⇨ Secure the chlorine gas tank valve against unintentional opening.

⇨ Make sure that all the components in the system have been installed correctly and the injectors are ready for operation before opening the chlorine gas tank valve.

PLEASE 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 the tool intended for this purpose.

⇨ Note the specified torque.

7.1 Principles

The pressure reducing valve is installed in the line in accordance with the direction of the arrow.

The room must fulfil the following minimum requirements:

- Secured against access by unauthorised persons
- Protected against weather conditions
- Frost-free
- Permissible ambient temperature adhered to (see section 5 “Technical data” on page 10)
- Room of sufficient size to allow trouble-free assembly as well as inspection and maintenance of the device at all times
- Good venting possible

7.2 Installing the device

7.2.1 Assembly using a flange connection

PN40 flanges with tongue and groove in accordance with EN 1092 Form C and D are located at the ends of the pressure reducing valve. Corresponding counter-flanges must be used to make the flange connection.

Pre-conditions for actions:

✓ The transport protection of the equipment is removed.

✓ The flange sealing faces are free from contamination and damage.

✓ The flange seals must be clean, undamaged and dry.

✓ Bolts, nuts and washers are clean and undamaged.

✓ The distance between the pipe flanges equals the length of the pressure reducing valve.

Any bolts, nuts and washers that are removed during installation must be replaced with new ones. Used bolts, nuts and washers may only be installed if they are in new condition.

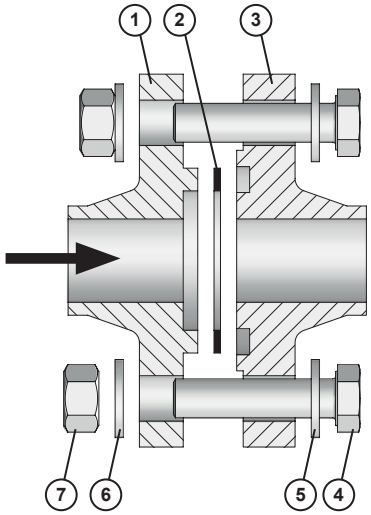


Fig. 7: Installing the flange connection

Perform the following working steps:

1. Lubricate the sliding faces and thread of bolts, nuts and washers e.g. using fitting grease or PTFE grease.
2. Place the flat seal (2) into the groove of the connection flange (3). Assemble the seal in dry condition.
3. Mount the tongue flange (1). Make sure that the flat gasket (2) does not slip.
4. Fit the bolts (4), washers (5, 6) and nuts (7) by hand.
5. Tighten the bolts evenly alternately crosswise in three stages: 20 Nm, 35 Nm, 50 Nm. After this, retighten all the bolts to the full target tightening torque (50 Nm).
6. Setting the seal (adapting to the flange seal surface) can make it necessary to retighten the bolts. For this reason, retighten the bolts to 50 Nm after a few hours.

✓ **Flange connection assembled**

7.2.2 Assembly using a threaded connection

Organic sealing materials must not be used for assembling the fittings and pipes. For this purpose, only Teflon tape or specially approved sealing agents (such as anaerobic sealing compounds) may be used.

Precondition for action:

✓ The transport protection is removed.

✓ The threads are metallic bright.

Perform the following working steps:

1. Clean the thread with a fat-dissolving cleaning agent, e.g. alcohol.
2. Allow the thread to dry completely.
3. Apply the thread sealant to the external thread in a circular motion to the start of the thread. Leave the first thread clear. Apply the thread sealant all the way down to the root of the thread to thoroughly grease the thread flank.

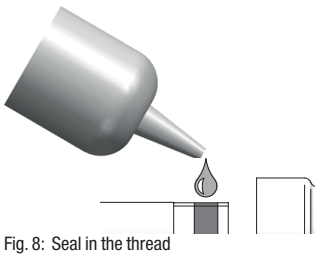


Fig. 8: Seal in the thread

4. Insert the threaded pin into the internal thread and apply a little thread sealant to the internal thread.
5. Screw the parts by hand. The tightening torque is up to 150 Nm.
6. Remove excess thread sealant with a cloth.

PLEASE NOTE

Leakage due to incorrect installation

To ensure that the connection is correctly aligned, it is necessary under certain circumstances to turn the thread anticlockwise. When the connection is loosened, bubbles form in the adhesive, which can lead to leakages.

⇨ Only turn the thread anti-clockwise.

⇨ If the orientation is not correct after the connection has been tightened, repeat steps 1 – 5.

7. Allow the bond to harden for at least 12 hours prior to the leak test.

✓ **The pipeline with a threaded connection has been assembled.**

7.3 Completing the installation

Check that all the connections are leak proof after completing installation.

DANGER

Chlorine gas can escape due to systems that are leaky or not installed correctly!

Chlorinators constitute an increased safety risk if they have not been properly installed, if an adequate leak test has not been performed or if the devices are not in good condition.

⇨ Before placing the system into operation, have it checked by technical personnel to ensure that it is in the proper condition and leak-tight.

⇨ 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.

CAUTION

Damage on the device from a corrosive atmosphere!

In the long-term, the atmosphere in the chlorine gas room can have a corrosive effect on the exposed metal surfaces. The corrosive effect can cause damage even if no major leaks develop and the limit values for oxidative materials in the atmosphere is maintained.

⇨ Protect your device against long-term damage by painting it after performing installation and a successful leak test.

⇨ Paint all uncovered metal surfaces on the device. You must dismantle the device again for maintenance.

Check the pressure system of the chlorine gas tank for leaks up to the vacuum regulator in two stages:

1. Leak test with nitrogen
2. Leak test with chlorine

7.3.1 Carrying out the leak test with nitrogen

You are strongly recommended to carry out this inspection before carrying out the leak test with chlorine, since it shows leaks in the pressure system without the risk of chlorine escaping.
As an alternative, you can carry out the inspection using dry compressed air.

Precondition for action:

✓ All the open connections of the pressure system were closed correctly.

✓ All the shut-off valves in the pipe system were opened.

✓ A nitrogen cylinder with a pressure reducer (0 – 25 bar) has been connected.

Perform the following working steps:

1. Slowly raise the system pressure at the nitrogen cylinder's pressure reducer to 10 bar.
2. Close the nitrogen cylinder's valve.
3. Apply soap solution to all the potential leaks.
   ▶ Bubbles form at leak locations (with a possible time delay).
4. Close the outlet on the nitrogen cylinder's pressure reducer and observe the pressure gauge in the installation.
   ▶ The pressure must not drop within one hour.
5. Repair the leak. Allow any adhesive surfaces to harden sufficiently and repeat the leak test with nitrogen.

✓ **Leak test with nitrogen carried out.**

7.3.2 Carrying out the leak test with chlorine gas

DANGER

Danger to life from chlorine poisoning!

If you start the leak test with chlorine gas before the entire system has been installed and the injectors are ready for operation, chlorine gas may not be extracted immediately in the event of a leak.

⇨ Make sure that all the components in the plant are installed correctly and the injectors are ready for operation before starting the leak test with chlorine gas.

⇨ Put on protective clothing before carrying out the leak test with chlorine gas.

Precondition for action:

✓ The leak test with nitrogen has been carried out successfully.

✓ All the open connections of the pressure system were closed correctly.

✓ All shutoff valves in the piping system have been closed.

✓ The injector is ready for operation.

Resources required:

🛠 Cylinder with ammonia solution

Perform the following working steps:

1. Briefly open the chlorine gas tank valve and close it again.
2. Open the first valve in the pipe line, starting from the chlorine gas tank.

PLEASE NOTE

Damage to the plant by the ammonia solution

If the ammonia solution comes into contact with the plant, this leads to corrosion on the equipment.

⇨ Make sure that you do not spill any ammonia.

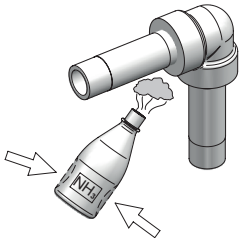


Fig. 9: Leak test with ammonia

3. Carry out the ammonia test at the pipeline section up to the first closed valve: Hold an open bottle containing the ammonia solution close to the pipe and make slight pumping motions with the plastic bottle. Ammonia steam with chlorine forms a white vapour and makes even very small leaks visible.
4. Open additional downstream valves in the pipe line in sections. In each case, let a little chlorine gas into the system and close the valves again. Then carry out the ammonia test at this pipe line section and the associated fittings.
5. Proceed in this manner until all piping and fittings have been tested for leaks.

If you find leaks:

1. Close the chlorine gas tank valve.
2. Use the ejector to suck off the remaining chlorine.
3. Operate the chlorination installation for approx. 5 minutes with nitrogen or dry compressed air at approximately 5 bar.
4. Switch off the injector at the booster pump.
5. Repair the leak. Allow any adhesive surfaces to harden sufficiently and repeat the leak test.

If you do not find any leaks:

1. Close the chlorine gas tank valve.
2. Depressurise the system using the injector to evacuate the piping.
3. Switch off the injector at the booster pump.

✓ **Leak test with chlorine gas completed.**

8 Operation

The pressure-reducing valve does not require any special operation. The device has been factory-set to a fixed positive pressure of 1.5 bar.

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.

The chlorine gas tank valves must be closed.

The further procedure depends on the type of accident and should be planned and executed by professional personnel.

8.2 Check intervals

You must check the components of the chlorine system for leaks on a daily basis and after maintenance or commissioning work.

9 Shutdown

9.1 Short-term shutdown

Perform the following working steps:

1. Close the chlorine gas container valves.
2. Use the ejector to suck off the remaining chlorine.
3. If present, connect the service valve between the dosing device and the injector.
4. Switch off the injector.

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

9.2 Long-term shutdown

Perform the following working steps:

1. Close the chlorine gas container valves.
2. Use the ejector to suck off the remaining chlorine.
   ▶ The vacuum in the piping system increases. Check the vacuum using a pressure gauge until a constant value has been reached.
3. Switch off the injector.
4. If present, connect the service valve between the dosing device and the injector.
5. Close all the open connections to protect the lines and devices from humidity and dirt.

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

9.3 Storage

Ensure ideal storage conditions where possible:

- The storage place must be cold, dry, dust-free and moderately ventilated.
- temperatures between +0 °C and +55 °C.
- Relative air humidity must not exceed 95 %

Perform device maintenance when commissioning after a long operating downtime.

9.4 Disposal of old equipment

- Before disposing of the old equipment, you must clean off the remaining chlorine by rinsing it with nitrogen or air.
- The device must be disposed of in accordance with applicable local laws and regulations. It should not be disposed of as domestic waste!
- As the disposal regulations may differ from country to country, please consult your supplier if necessary.

10 Maintenance

Products by Lutz-Jesco are manufactured to the highest quality standards and have a long service life. However, some parts are subject to operational wear. This means that regular visual inspections are necessary to ensure a long operating life. Regular maintenance will protect the device from operation interruptions.

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 10.2 “Preparing the device for maintenance” on page 18.

PLEASE 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.

⇨ Keep the connection of the contact vacuum meter closed so that humidity cannot penetrate

10.1 Maintenance intervals

To avoid hazardous incidents, chlorinators must be regularly maintained. This table gives you an overview of maintenance work and the intervals at which you must carry it out. The next few sections provide instructions for carrying out this work.

Interval	Maintenance
After 1 year	■ Cleaning the device ■ Check the diaphragm ■ Renew valve seat ■ Replace wearing parts ■ Replace all seals ■ Functional control
After 5 years	■ Replace the pressure gauge

Tab. 10: Maintenance intervals

The position numbers stated here related to Fig. 10 “Dismantle the device” on page 18.

The state of the diaphragm (8) must be checked, especially its elasticity and the degree of deformation on the mounting edge. If the edge remains compressed by more than 0.2 mm after disassembly, it must be replaced.

In some cases, regional regulations may require shorter maintenance intervals. Maintenance intervals depend only on how frequently the equipment is used. Chemical wear of rubber parts, for example, begins with the initial medium contact and continues irrespective of the usage.

10.2 Preparing the device for maintenance

Perform the following working steps:

1. Close the chlorine gas container valves.
2. Use the ejector to suck off the remaining chlorine.
   ▶ The vacuum in the piping system increases.
3. Check the vacuum using a pressure gauge until a constant value has been reached.
4. Switch off the injector.
5. Dismantle the device so that the maintenance can be performed on a workbench.
6. Close all the connections to protect the lines and devices from humidity and dirt.

✓ **The device has been prepared for maintenance.**

10.3 Device maintenance

Precondition for action:

✓ The system has been prepared for maintenance.

✓ The maintenance set is available.

Resources required:

🛠 Allen key

🛠 Plastic tool for dismantling O-rings

🛠 Cleaning alcohol

🛠 Silicone grease

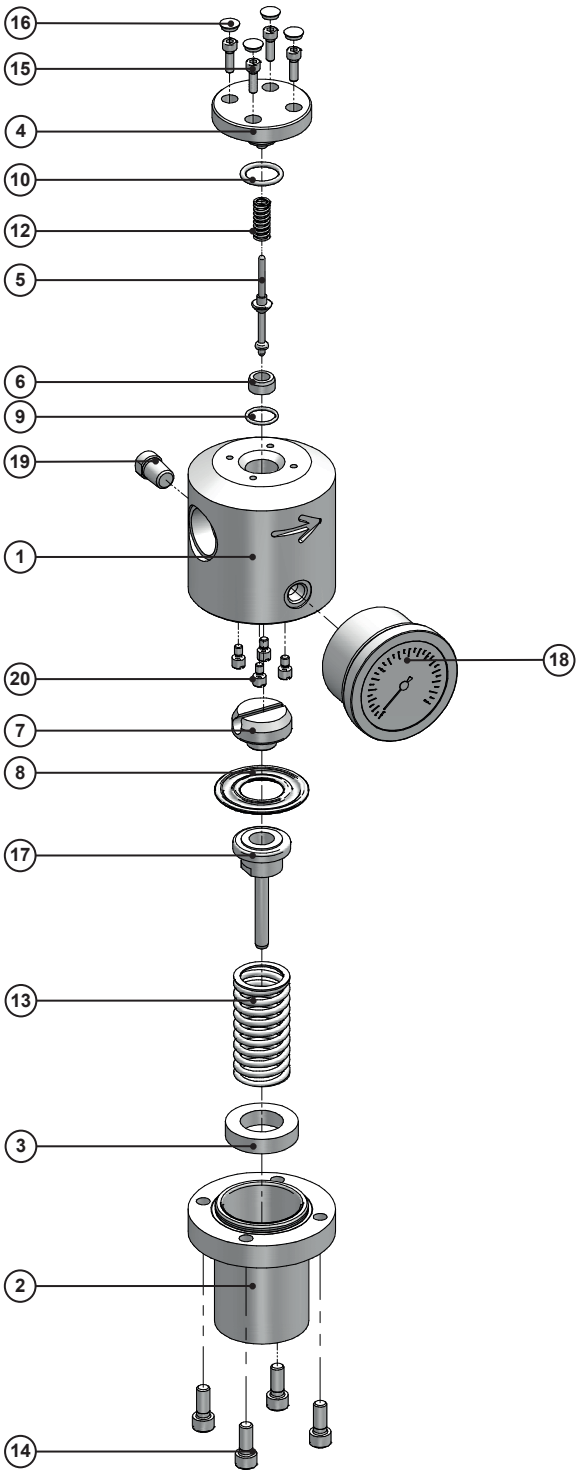


Fig. 10: Dismantle the device

10.3.1 Dismantle the device

Perform the following working steps:

1. Unscrew the four screws (14) from the upper section (2) and remove the spring (13) and the adjusting rings (3).
2. Push the unit consisting of the diaphragm mount (7), diaphragm (8) and guide (17) to the side so that you can remove it downwards.

3. Check the diaphragm (see section 10.1). To change the diaphragm, insert a screwdriver through the groove of the diaphragm mount (7) and open the screw connection with an open-end spanner.
4. Unscrew the four screws (15) from the valve cap (4) and remove the spring (12), control cone (5) and valve seat (6) from the lower section (1).
5. Using a suitable tool, remove the O-ring (10) from the valve cap (4) and the O-ring (9) from the lower section.
6. Remove the pressure gauge.

✓ **Device disassembled.**

10.3.2 Cleaning the device

Perform the following working steps:

1. Clean all parts thoroughly with a soft cloth. Warm water or alcohol is suitable for this purpose.
2. Clean the pressure gauge (see chapter 10.4).
3. Allow all components to dry well.
4. Perform a visual check on all parts. Pay particular attention to tensioning surfaces for the diaphragms. Replace the damaged parts.

✓ **Device cleaned.**

10.3.3 Assembling the device

The numbers stated here related to Fig. 10 “Dismantle the device” on page 18.

Perform the following working steps:

1. Lightly grease the large O-ring (10) with silicone grease and fit it onto the valve cap (4).
2. Lightly grease the small O-ring (9) with silicone grease and fit it in the lower section (1).
3. Place the dry valve seat (6) in the valve body.
4. Install the control cone (5) and the spring (12).
5. Place the cover (4) carefully onto the lower section (1).
6. Rub the screws (15) with fitting grease and insert them in the cover. Tighten the screws with approx. 3 Nm.
7. Place the diaphragm (8) on the diaphragm mount (7).
8. Screw the diaphragm mount (7) into the guide (17) with approx. 20 Nm.
9. Push the unit consisting of the diaphragm mount (7), diaphragm (8) and guide (17) sideways over the control cone (5) so that its thicker part is located in the groove of the diaphragm mount.
10. Insert the dry adjusting rings (3) into the upper section (2).
11. Grease the large spring (13) with fitting grease and insert it into the upper section (2).
12. Carefully place the upper section (2) onto the lower section (1).
13. Rub the screws (14) with fitting grease and insert them into the upper section (2). Tighten the screws with approx. 3 Nm.

✓ **Device assembled.**

10.4 Cleaning the pressure gauge

CAUTION

Damage to the pressure gauge!

Pressure gauges are measurement devices which are adjusted by specialists when manufactured. Pressure gauges that have been disassembled must be tested and readjusted by the manufacturer.

⇨ Do not dismantle pressure gauges.

⇨ Do not allow any soiling to enter the pressure gauge.

⇨ Do not allow any water to enter the pressure gauge.

The maintenance on the pressure gauge restricts itself to a visual check and the cleaning of the connection.

Precondition for action:

✓ The system has been prepared for maintenance (see chap. 10.2).

Resources required:

- PTFE strip
- Cotton swabs
- Cleaning alcohol

Perform the following working steps:

1. Unscrew the pressure gauge from the device.
2. Remove the PTFE strip from the thread.
3. Check the input of the pressure gauge for contamination. Remove the soiling with cleaning alcohol. At the same time, hold the pressure gauge with the connection facing downwards so that soiling cannot fall into the pressure gauge. Do not use a pointed tool, so that the protective film on the plate spring is not destroyed.
4. If the pressure gauge is not immediately reconnected, seal the connection airtight.
5. Fit the pressure gauge with approx. 5 long PTFE strips.

✓ **Pressure gauge cleaned.**

10.5 Finishing maintenance

Perform the following working steps:

1. Make a note of the date and scope of the maintenance performed.
2. Attach a sticker displaying the maintenance date to the device.
3. Follow the instructions in section 7 “Installation” on page 12.

✓ **Maintenance completed.**

11 Troubleshooting

See below for information about how to rectify faults on the device or the system. If you cannot eliminate the fault, please consult with the manufacturer on further measures or return the device for repair.

Fault	Possible cause	Remedy
Throughflow too low	Insufficient chlorine gas tanks connected or some are empty. Note: At 25 °C, a chlorine drum can provide a max. 10 kg/h continuously. The delivery rate is lower at lower temperatures.	Replace empty chlorine gas tanks and connect more tanks if necessary.
The output pressure rises slowly upon system shutdown until the input pressure is reached.	The valve is soiled. Note: Should the output pressure upon system shutdown be 0.5 bar higher than during operation, this does not represent an error.	Carry out maintenance.

Tab. 11: Troubleshooting

12 Exploded view C 7110 pressure reducing valve

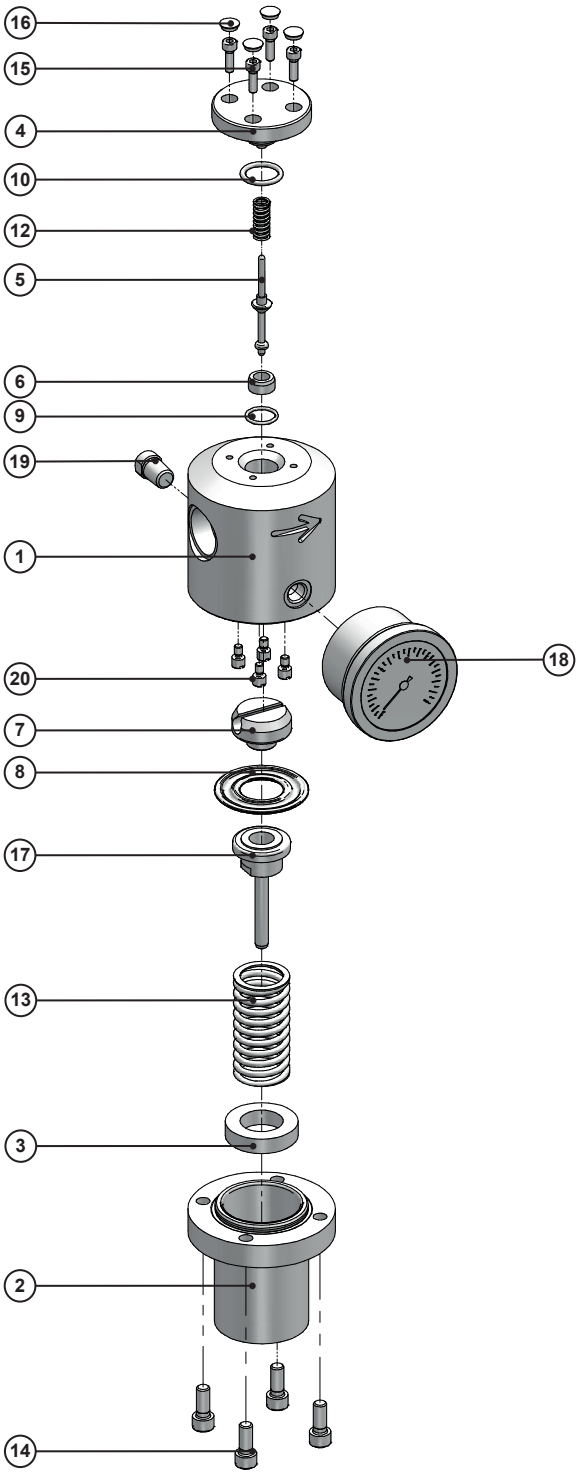


Fig. 11: Exploded view C 7110 pressure reducing valve

Position	No.	Description
1	1	Lower section
2	1	Upper section
3	2	Adjusting ring
4	1	Valve cap
5	1	Control cone
6	1	Valve seat
7*	1	Diaphragm mount
8	1	Ring diaphragm
9*	1	O-ring
10*	1	O-ring
12*	1	Compression spring
13	1	Compression spring
14*	4	Cylinder head screw
15*	4	Cylinder head screw
16	4	End cap
17	1	Guide
18	1	Pressure gauge or contact pressure gauge
19	1	Plugs
20	4	Stop screw

Tab. 12: Exploded view C 7110 pressure reducing valve

* contained in maintenance kit

Maintenance kits

Part	Content
Maintenance kit (for annual service)	■ Diaphragms ■ Valve seat ■ O-rings ■ Small spring ■ Cylinder head screws ■ End cap ■ Flange seals

Tab. 13: Maintenance kits

13 Notes to EU conformity

The device falls under the purview of the pressure equipment directive 2014/68/EU.

The values stated below do not exceed the limit values. Therefore, it is designed and manufactured in accordance with valid good engineering practice This pressure device may not carry a CE marking and an EU declaration of conformity will not be issued.

Device designation:	Pressure reducing valve
Type:	C 7110
Nominal diameter:	DN25
Max. temperature:	55 °C
Medium:	Chlorine, fluid group 1

The device fulfils all the demands made by the directive(s)

2014/68/EU	Pressure equipment directive

14 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: .....

15 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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.....

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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.

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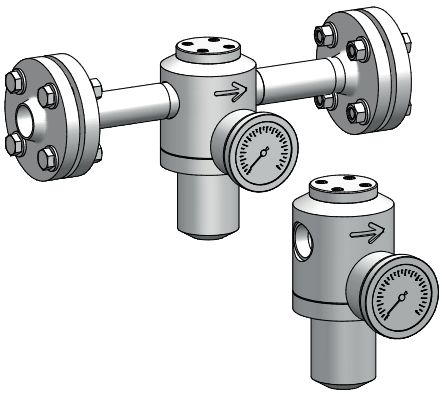

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Operating instructions
Pressure reducing valve C 7110