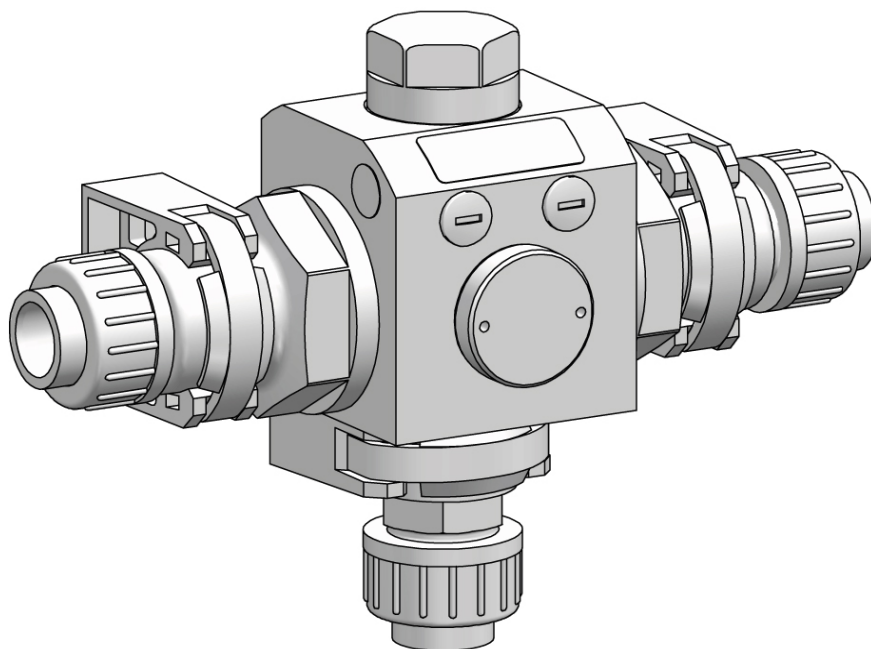


Vacuum changeover switch **CVS** Operating instructions



Read the operating manual!

The user is responsible for installation and operation related mistakes!

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1 Notes for the Reader

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

Observe the following principles:

- Read the entire operating manual prior to commissioning the product.
- ensure that everyone who works with or on the product has read the operating manual and follows the instructions.
- maintain the operating manual throughout the service life of the product.
- pass the operating manual on to any subsequent owner of the product.

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 electrical voltage
	Danger from poisonous 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 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 to eliminate the dangers that can arise while handling the product. 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.	

	NOTE
Do not dispose of the device in the domestic waste! Do not dispose the device via the domestic waste. ⇒ The device and its packaging must be disposed of in accordance with locally-valid laws and regulations. ⇒ Dispose of different materials separately and ensure that they are recycled.	

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 and system functions,
- Failure of required maintenance and repair methods,
- Environmental hazard and danger of injury from chlorine gas leakage.

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 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

2.4 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	
	Respirator mask
	Protective goggles
	Protective clothing
	Protective gloves

Table 3: Personal protective equipment required

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

- Installation
- Commissioning
- Shut-down
- Maintenance work
- Disposal

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.

Trained persons have attended all trainings offered by the operator.

2.5.3 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	■ Hydraulic installations ■ Commissioning ■ Taking out of operation ■ Fault rectification ■ Maintenance ■ Repairs ■ Disposal
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".
- Information on usage and environment (see section 5 "Technical data" on page 9) is not adhered to.
- If people operate the product who are not adequately qualified to carry out their respective activities.
- Unauthorised changes are made to the product by the user.

3.2 Intended purpose

The vacuum changeover switch permits automatic changeover between two chlorine gas supplies during vacuum operation.

3.3 Foreseeable misuse

The following section provides information regarding the device applications which are classified as non-intended use. This section is intended to allow you to detect possible misuse in advance and to avoid it.

Foreseeable misuse:

- You use a dosing medium other than chlorine gas.

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:

- Vacuum Changeover Switch CVS
- Three connections
- Assembly kit
- Operating instructions
- Electrical contacts (optional)

4.2.2 Function

Both sides of the product are separated from each other by mobile diaphragms. The pressure ratio between the two sides changes abruptly when the first gas container has been emptied completely. If the pressure ratio at the diaphragms of the second side predominates, the CVS switches over by moving the diaphragms. A lever mechanism holds the diaphragm in position.

4.2 Design and function

4.2.1 Design

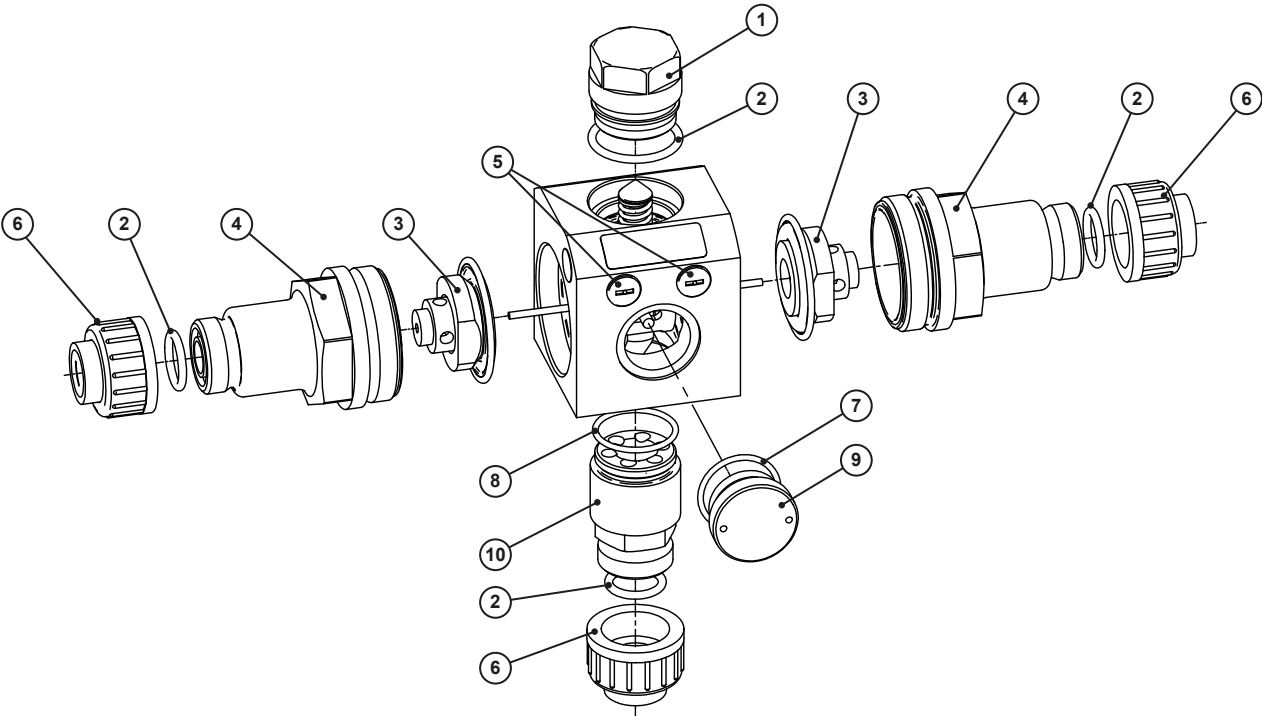


Fig. 1: Design

Item	Description
1	Adjustment plug
2	Seals Ø20.2
3	Diaphragm mount
4	Side connections
5	Dummy plug

Table 5: Position numbers

Item	Description
6	Connections
7	Seal Ø33
8	Seal Ø33
9	Window plug
10	Medium connection

5 Technical data

Information		Value
Material		Chlorine-resistant materials such as PVC, PMMA, PVDF, FPM and Hastelloy
Max. flow rate	8/12	4 kg Cl ₂ /h
	12/16	10 kg Cl ₂ /h
	DN15	
Operating pressure		-1 ... 0 bar
switching point		-0.2 ... -0.4 bar
Load capacity of electrical contacts		max. 48 V DC / 0.5 A / 10 W
Weight		approx. 1 kg
Ambient temperature		0 - 55 °C

Table 6: Technical data

6 Dimensions

All dimensions in millimetres (mm).

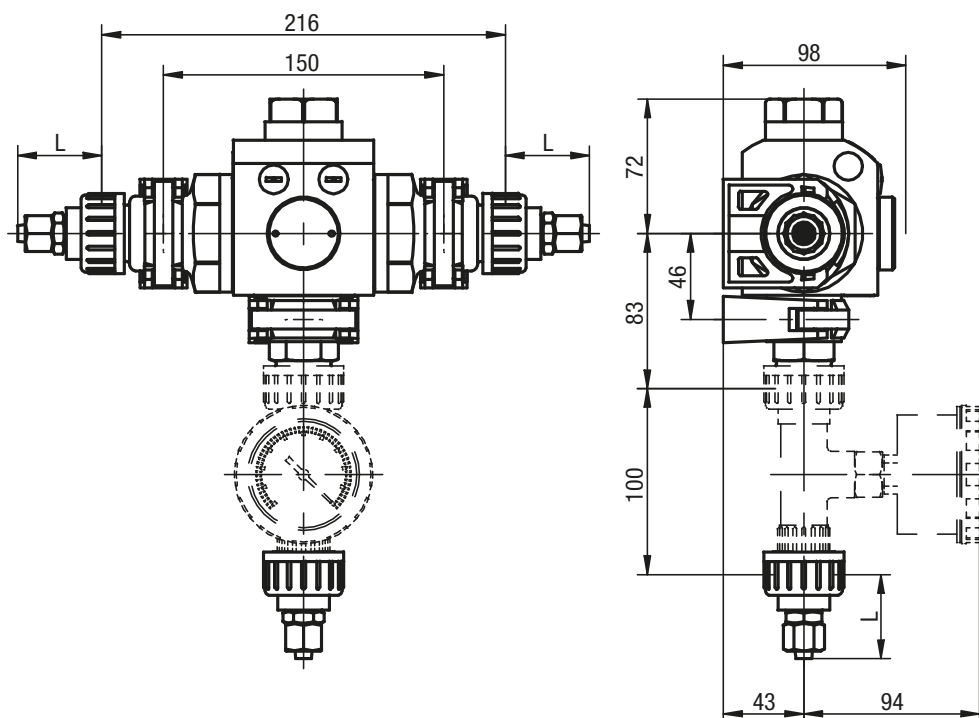


Fig. 2: Dimensional drawing

Connection	L
Hose connection 8/12	45
Hose connection 12/16	55
Glue-in connection DN 15 / d 20	19

Table 7: Dimension L

7 Installation

7.1 Installation on the wall

Resources required:

- ✂ Assembly kit
- ✂ Drill (8 mm)
- ✂ Slotted screwdriver

Perform the following steps:

1. Drill the three drillholes for wall mounting of the device. The exact dimensions are stated in section 6 "Dimensions" on page 9.
 2. Press the rawlplugs into the drillholes.
 3. Screw the three wall brackets from the assembly kit into the rawlplugs.
 4. Secure the product to the three pipe clips.
 5. Connect the three connections to their piping system. Use the PE hoses or PVC pipes as a vacuum line.
- ✓ **The product is fitted to the wall.**

7.2 Setting the switching point



DANGER

Danger to life from application errors!

The adjustment plug can be unscrewed from the housing without a clip. Unscrewing the adjustment plug too far from the housing causes a leakage from which chlorine can escape or through which ambient air can penetrate the vacuum system.

- ⇒ Do not unscrew the adjustment plug from the housing completely.
- ⇒ Take account of the O-ring. Stop unscrewing the adjustment plug from the housing when you see the O-ring.
- ⇒ Ensure strict compliance with the instructions included in this section.

You can adapt the switching point of the changeover unit to your system. The possible adjustment range is from -0.2 ... -0.4 bar.

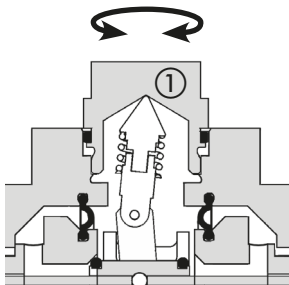


Fig. 3: Adjusting the adjustment plug

Precondition for action:

- ✓ The installation has now been completed.
- ✓ The chlorine gas system is ready for use.

Perform the following steps:

1. Screw the adjustment plug (pos. 1) into the housing until you can no longer see the O-ring.
2. Screw the adjustment plug into the housing by a further revolution.
3. Function test: Open the chlorine supply on one side and close the chlorine supply on the other side of the device. Commission the chlorine gas system by activating the injector.
 - ▶ The device should change over audibly once.

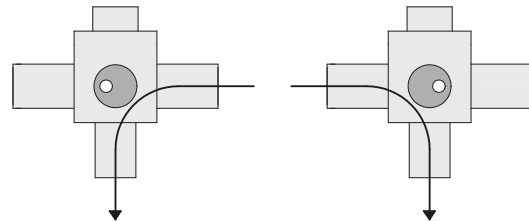


Fig. 4: Position indicator

If the device does not changeover:

- ➔ Unscrew the adjustment plug from the housing by one revolution and repeat step 3.
 - 4. You can now change the changeover point so as to adjust it to your chlorine gas system.
- ✓ **Switching point set.**

7.3 Fitting the remote indication

You can read out the current position of the changeover unit by fitting a remote indication unit.

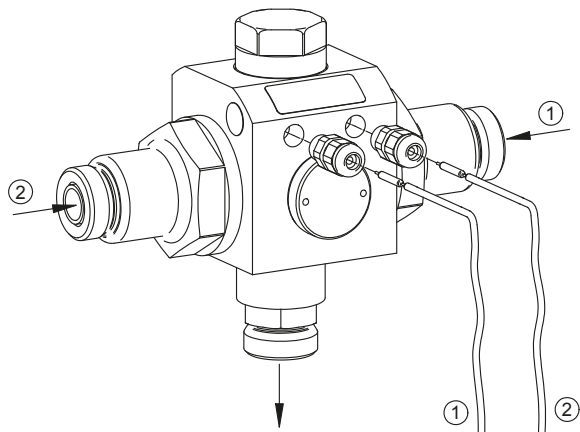


Fig. 5: Installing reed contacts

Precondition for action:

✓ A set of electrical contacts is ready.

Resources required:

✂ 2 reed switches with cable

✂ 2 cable screw connections M12x1.5

Perform the following steps:

1. Unscrew both dummy plugs (pos. 5) from the housing.
2. Screw both cable screw connections into the housing.
3. Slide the two reed switches completely into the housing through the cable screw connections.
4. Tighten the cable screw connections.
 - ▶ The reed switch is closed for gas take-off from the right. The reed switch is closed for gas take-off from the left.

✓ **Remote indication unit fitted.**

8 Maintenance



An overview of the individual components with their position numbers is provided on page 8.

8.1 Maintenance intervals

Interval	Maintenance
After 1 year (minor maintenance)	■ Dismantle and clean the device ■ Replace wearing parts (O-rings, diaphragms)
After 3 years (major maintenance)	■ Dismantle and clean the device ■ Replace wearing parts (O-rings, diaphragms) ■ Replace the shift assembly ■ Replace the diaphragm mount

Table 8: Maintenance intervals

8.2 Shutdown

You must shut down the device before disassembly.

Perform the following steps:

1. Close the chlorine tank valves connected to the device. Secure the valves with the protective caps intended for this purpose.
2. Evacuate the residual chlorine from the lines using the injector.
3. Flush the device with dry air or nitrogen if possible.

✓ **Shutdown completed.**

8.3 Disassembly

Device maintenance requires its complete disassembly.

Precondition for action:

- ✓ You have completed the shutdown in accordance with section 8.2.

Resources required:

- ✂ Open-end spanner AF 55 mm, AF 36 mm, AF 32 mm
- ✂ Face spanner Ø 3 mm

Perform the following steps:

1. De-install the device from the system piping by disconnecting the three hydraulic connections and removing the wall bracket.
2. Unscrew the three union nuts and disconnect the connections (pos. 6).
3. Unscrew both side connections (pos. 4) from the housing using the open-end spanner AF 55 mm.
4. Remove the two diaphragm mounts (pos. 3).
5. Unscrew the adjustment plug (pos. 5) from the housing using the open-end spanner AF 36 mm.

6. Unscrew the medium connection (pos. 10) from the housing using the open-end spanner AF 32 mm.
7. Unscrew the window plug (pos. 9) from the housing using the face spanner.
8. Remove the shift assembly.

✓ **Disassembly completed.**

8.4 Minor maintenance

Precondition for action:

- ✓ You have shut down the device.
✓ You have completed disassembly in accordance with section 8.3.

Resources required:

- ✂ Maintenance set (1 year)
- ✂ Open-end spanner AF 55 mm, AF 36 mm, AF 32 mm
- ✂ Face spanner Ø 3 mm

Perform the following steps:

1. De-install the device from the system piping by disconnecting the three hydraulic connections and removing the wall bracket.
2. Unscrew the three union nuts and disconnect the connections (pos. 6).
3. Unscrew both side connections (pos. 4) from the housing using the open-end spanner AF 55 mm.
4. Remove the two diaphragm mounts (pos. 3). Disconnect the diaphragm mount using an open-end spanner AF 32 mm, replace the diaphragms and re-fit the diaphragm mount.
5. Unscrew the adjustment plug (pos. 5) from the housing using the open-end spanner AF 36 mm.
6. Unscrew the medium connection (pos. 10) from the housing using the open-end spanner AF 32 mm.
7. Remove the shift assembly.
8. Check all components for visible damage.
9. Clean all components with warm water or isopropyl alcohol.
10. Replace all the O-rings.
11. Proceed with section 8.6.

✓ **Minor maintenance completed.**

8.5 Major maintenance

Precondition for action:

- ✓ You have shut down the device.
- ✓ You have completed disassembly in accordance with section 8.3.

Resources required:

- ✖ Maintenance set (3 years)
- ✖ Open-end spanner AF 55 mm, AF 36 mm, AF 32 mm
- ✖ Face spanner Ø 3 mm

Perform the following steps:

1. De-install the device from the system piping by disconnecting the three hydraulic connections and loosening the wall bracket.
2. Unscrew the three union nuts and disconnect the connection (pos. 6).
3. Unscrew both side connections (pos. 4) from the housing using the open-end spanner AF 55 mm.
4. Remove the two diaphragm mounts (pos. 3). Replace both diaphragm mounts.
5. Unscrew the adjustment plug (pos. 5) from the housing using the open-end spanner AF 36 mm.
6. Unscrew the medium connection (pos. 10) from the housing using the open-end spanner AF 32 mm.
7. Remove the shift assembly.
8. Check all components for visible damage.
9. Clean all components with warm water or isopropyl alcohol.
10. Replace all the O-rings.
11. Replace the shift assembly.
12. Proceed with section 8.6.

✓ **Major maintenance completed.**

8.6 Installation

	CAUTION
Danger of damage during installation. The shift assembly can soon suffer damage during installation. Such damage cannot be repaired and requires replacement of the shift assembly. ⇒ Pay careful attention during installation of the shift assembly. ⇒ Make sure that the two axes of the shift assembly always lie in the recesses intended for this purpose.	

Precondition for action:

- ✓ You have completed maintenance.

Resources required:

- ✖ Open-end spanner AF 55 mm, AF 36 mm, AF 32 mm
- ✖ Face spanner Ø 3 mm

Perform the following steps:

1. Screw the medium connection (pos. 10) into the housing.
2. Insert the shift assembly in the housing and centre it using the medium connection. Place the spring and the centring pin into the shift assembly from above.
 - ▶ The lower centring pin must lie centrally in the intended recess.
3. Screw the adjustment plug (pos. 1) into the housing. Make sure that the shift assembly does not twist.
 - ▶ The medium connection and the adjustment plug hold the shift assembly in the housing and you can move the mechanism.
4. Insert a diaphragm mount in a side connection and screw the this into the housing.
5. Place the second diaphragm mount in the second side connection.
6. Turn the device onto its side so that the side connection fitted in step 4 is below. Screw the second side connection into the housing. Make sure that the axis of the shift assembly lies centrally in the intended recesses. The shift assembly can suffer damage if it twists during this step.
7. Screw the three connections (pos. 6) onto the device using the union nuts.

✓ **Installation completed.**

9 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
The changeover unit does not switch over.	Switching point not adapted to system.	Set the switching point (see section 7.2 "Setting the switching point" on page 10).
	Insufficient injector suction capacity.	Check the injector.
	The vacuum line has a leak.	Check the vacuum line.
	Diaphragms or O-rings have a leak.	Perform minor maintenance (see section 8.4 "Minor maintenance" on page 12).
	The changeover unit is soiled.	
Changeover switch switches in only one direction.	The vacuum line has a leak.	Check the vacuum line.
	Diaphragms or O-rings have a leak.	Perform minor maintenance (see section 8.4 "Minor maintenance" on page 12).
The changeover unit switches too early, although the chlorine tanks on the corresponding side are not empty.	Gas take-off temporarily too high. As a result, the chlorine tank valve ices up.	Ensure even gas take-off.
	Switching point not adapted to system.	Set the switching point (see section 7.2 "Setting the switching point" on page 10).
Remote signalling not operational.	The reed switch does not close.	Check the contacts and if necessary, slide them into the housing as far as possible.
	The reed switch does not open.	

Table 9: Troubleshooting

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.

