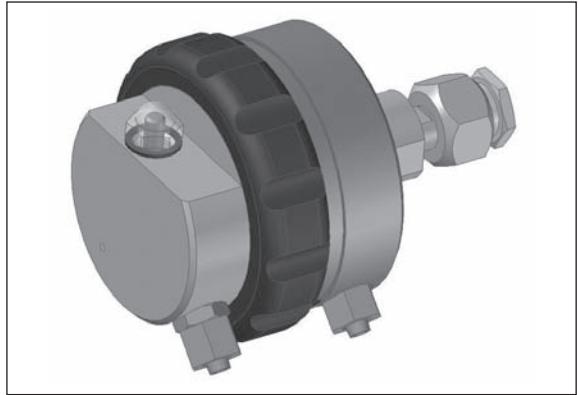


Die richtige Dosis Fortschritt CVR 10



Betriebsanleitung

Vor Inbetriebnahme Betriebsanleitung lesen!
Für künftige Verwendung aufbewahren.

Operation & Maintenance Instructions

Read these operation & maintenance instructions
before start up!
To be held for future reference.

Instructions de service

Avant la mise en service, lire les instructions de service!
A conserver pour utilisation ultérieure.

Instrucciones de Operación

Leer las instrucciones de operación antes de puesta en marcha!
Guardar para aplicaciones futuras.

Betriebsanleitung	4
Techn. Änderungen vorbehalten.	
Operation & Maintenance Instructions.....	38
Subject to technical changes.	
Instructions de service	72
Nous, nous réservons tout droit de modification.	
Instrucciones de Operación	106
Reservado el derecho a cambios técnicos.	

List of Contents

1. Safety	40
1.1 General	40
1.2 Warnings used in this Operation & Maintenance Manual	40
1.3 Qualification and training of personnel	41
1.4 Hazards due to non-compliance with safety instructions	41
1.5 Safe operation.....	41
1.6 Safety instructions for the owner/operator.....	41
1.7 Safety instructions for installation, inspection, and maintenance	41
1.8 Unauthorized modification and production of spare parts	42
1.9 Impermissible modes of operation.....	42
1.10 Dosing of chemicals.....	42
1.11 Scope of delivery	43
1.12 Special instructions for chlorine gas dosing devices and use of chlorine.....	43
2. General aspects	44
3. Function.....	44
4. Dimensions	46
5. Technical data.....	46
6. Installation	47
6.1 General instructions	48
6.1.1 Chlorine supply	48
6.1.1.1 Limited withdrawal	48
6.1.1.2 Bottle batteries.....	49
6.1.1.3 Instructions for chlorine vats	49
6.1.2 Line routing.....	50
6.1.2.1 Positive pressure lines	50
6.1.2.2 Vacuum lines	50
6.2 Assembling the devices.....	51
6.2.1 Preparation for assembly	51
6.2.2 Assembly location	51
6.2.3 Assembling the chlorine gas dosing device	52
6.2.4 Blow-out connection	52
6.2.5 Dosing connection	52
6.2.6 Electrical connection for empty warning (optional).....	52
7. Start up.....	52
7.1 Leak tests.....	53
7.1.1 Leak test of chlorine gas vacuum lines.....	53
7.1.2 Leak test of chlorine gas pressure lines	53
7.2 Starting the system.....	53
7.3 Checking the empty warning.....	54
8. Operation	54
8.1 Normal operation	54
8.2 Changing chlorine containers	54
9. Shutdown	54
9.1 Short-term shutdown (i.e. maintenance)	54
9.2 Long-term shutdown (i.e. winter break).....	54
10. Maintenance	55
10.1 General instructions	55
10.1.1 Maintenance personnel.....	55
10.1.2 Maintenance intervals.....	55
10.1.3 Preparation for maintenance.....	56
10.1.4 Recommended spare parts	56
10.1.5 Cleaning of parts.....	56
10.1.6 Required tools and consumable materials	56
10.1.7 Evaluation of parts	56
10.2 Maintenance instructions	57
10.2.1 Disassembling the CVR 10	57
10.2.2 Disassembling, cleaning and assembling of the inlet valve	58
10.2.3 Checking the inlet valve	60

10.2.4 Disassembling, cleaning and assembling of the diaphragm plate	60
10.2.5 Assembling of the CVR 10	62
10.2.6 Adjusting the electrical contact for empty warning	62
11. Spare parts CVR 10	62
12. Troubleshooting	68
13. Warranty	70

1. Safety

1.1 General

This Operation & Maintenance Manual contains basic information to be noted during installation, operation and maintenance. It is therefore essential that the Manual is read by the contractor before installing and commissioning the pump/system as well as by the relevant operating personnel / owner of the system. It must remain accessible at the dosing pump/system for reference at all times.

In addition to the general safety instructions under this main heading Safety, the special safety precautions outlined in other sections must also be observed.

1.2 Warnings used in this Operation & Maintenance Manual

This Operation & Maintenance Manual contains vital information, which may endanger people, the environment and the dosing system if disregarded. These statements are identified by the following symbols:



DANGER!

Refers to an imminent danger.

Non-compliance can lead to death or extremely serious injury.



WARNING!

Refers to a potentially hazardous situation. Non-compliance can lead to death or serious injury.



CAUTION!

Refers to a potentially hazardous situation. Non-compliance can lead to minor injury or property damage.



NOTICE!

Appears in conjunction with safety instructions, which may endanger the pump/system and its operation if disregarded.



IMPORTANT!

Draws attention to supplementary information to make the work easier and ensure trouble free operation.

Instructions that appear directly on the product, for example

- Connection identification
- Identification of electrical connection values
- Warning signs

must always be observed and must be kept in completely legible condition.

1.3 Qualification and training of personnel

The personnel employed for installation, operation, inspection and maintenance must be qualified for this work. The areas of responsibility, competence and supervision of the personnel must be precisely defined by the owner. Personnel who do not have the required knowledge must be duly trained and instructed. If necessary, this training can also be provided by the manufacturer/supplier on behalf of the dosing pump's owner. In addition, the owner of the system must ensure that the relevant personnel are fully familiar with and have understood the contents of this Operation & Maintenance Manual.

1.4 Hazards due to non-compliance with safety instructions

Failure to comply with the safety instructions may endanger not only people, but also the environment and the dosing pump/system. Non-compliance with the safety instructions can lead to the loss of all entitlement to damages.

The following hazards in particular may arise:

- Danger to people due to electrical, mechanical and chemical effects.
- Failure of dosing pump/system functions.
- Failure of specified methods for maintenance and repair.
- Danger to the environment due to leakage of hazardous substances.

1.5 Safe operation

The safety instructions contained in this Operation & Maintenance Manual must be observed. The owner is responsible for ensuring compliance with local safety regulations.

1.6 Safety instructions for the owner/operator

- Leakages must be discharged in such a way as to exclude all danger to people and the environment. Statutory regulations must be observed.
- Danger due to electric current must be excluded (for further details, refer to the German VDE standards as well as local rules and regulations).

1.7 Safety instructions for installation, inspection, and maintenance

The owner must ensure that all installation, inspection and maintenance work is undertaken by authorized and duly qualified skilled personnel who have also studied this Operation & Maintenance Manual.

The dosing pump must always come to a complete stop before starting any work on the pump. The procedure specified in this Operation & Maintenance Manual for shutting down the dosing system must be observed without fail. The device or system as well as parts of the system touching materials must be evacuated.

All safety mechanisms and guards must be refitted and reactivated as soon as the work is completed. Before placing the unit in service, the points listed in the section entitled Setup and Placing in service must be observed.

1.8 Unauthorized modification and production of spare parts

It may only be modified or converted in consultation with the manufacturer. Genuine spare parts and accessories authorized by the manufacturer ensure greater safety. Liability for damage or loss may be voided if non Lutz-Jesco parts are used.

1.9 Impermissible modes of operation

The operational safety of the device supplied can only be guaranteed when it is used in conformity with its intended use as specified in Lutz-Jesco contract documents especially the order confirmation. The limit values specified in these documents must never be exceeded.

1.10 Dosing of chemicals

CAUTION!

- When working on dosing systems, the accident prevention regulations applicable on-site must be observed and the specified personal protective equipment worn. The following standard protective clothing is recommended:



CAUTION!



Respirator



Safety gloves



Protective clothing



Safety shoes

- All people responsible for installation and maintenance of piping, hoses and accessories should wear this protective equipment.
- Before working on the plant, disconnect it from the power supply and protect it against reconnection:
- The chlorine case containers must be locked off on the main valve and on the auxiliary valve if there is one present. The dosing lines must be connected before reopening the main and auxiliary valves and before turning the power supply back on. Jobs performed on the dosing system require special safety precautions and must only be performed by specially trained employees.

1.11 Scope of delivery

IMPORTANT!

Please unpack the device and ordered accessories carefully in order not to miss small parts. Immediately compare the scope of delivery to the delivery note. If there are any discrepancies, contact your local distributor.



IMPORTANT!

1.12 Special instructions for chlorine gas dosing devices and use of chlorine

DANGER!

Chlorine is a hazardous substance. The chemical element chlorine is a greenish yellow toxic gas with a piercing odour. It is 2.5 times as heavy as air and collects near the ground. It is toxic when inhaled. In severe cases, chlorine can cause death. It is irritating to eyes respiratory organs and the skin and very toxic to water organisms. The reason for the toxicity of chlorine is the extraordinary ease with which it enters into reactions. It reacts with animal and plant tissue, destroying it in the process.

Air that contains 0.5 - 1 % chlorine gas quickly causes death in mammals and humans, having a corrosive effect on the respiratory tract and pulmonary alveoli (formation of hydrogen chloride or hydrochloric acid).



DANGER!

DANGER!

Breathing air with 0.01% chlorine can result in lethal toxic poisoning. Even a chlorine content of 0.001% (10 ppm) already has a severe effect on the lungs. 0.0001% (1 ppm) chlorine in air that is breathed still irritates respiratory organs and can be detected simply by its odour. At this level, however, there is no danger. The maximum allowable concentration is 0.5 ppm.

To prevent malfunctions, Lutz-Jesco chlorine gas dosing devices must be maintained at least once a year. In some cases local regulations may require shorter maintenance intervals. These jobs require special safety precautions and must only be performed by trained specialists.

Operating employees must be trained and must be familiar with all operating manuals and local regulations. Both must be available on site. The device/system must be checked daily or after maintenance or repair jobs to ensure there are no leaks.



DANGER!

DANGER!

Leaks may result in chlorine gas escaping. Breathing chlorine gas can cause death! Leaks must be repaired immediately. Suitable and fully functional breathing protection with filter must be worn for all jobs on system parts that convey gas and the chlorine must be removed from the system. The same applies when changing the chlorine storage container. If chlorine gas escapes, use breathing protection that does not rely on ambient air. Seals must only be used once. Reuse is not permitted as it results in leaks.



DANGER!



CAUTION!

2. General aspects

CAUTION!

The CVR 10 chlorine gas dosing device has been developed exclusively for dosing chlorine gas in pure dry form. If other gasses need to be dosed with the CVR 10 chlorine gas dosing device, a written statement should be obtained from Lutz-Jesco GmbH confirming there are no reservations for such use.

Chlorine gas is important in disinfecting drinking and bathing water, but poses a high potential danger in handling, transport and storage. Because of this, the vacuum principle is used in dosing. In this method, the pressure of the chlorine gas is reduced to a vacuum. Only after a sufficient vacuum has been established does chlorine gas then flow to the dosing point. The main safety aspect is to prevent chlorine gas from escaping. Even if a line breaks, it should only be possible for ambient air to be drawn in, not for any chlorine gas to escape.

The CVR 10 chlorine dosing device has the following components in the standard version:

- Filter for separating foreign objects from the chlorine container
- Vacuum regulator for reducing the pressure of the chlorine gas to below atmospheric pressure
- Safety valve as a blow-out valve for positive pressure in the vacuum section
- Visual empty alarm display with empty chlorine container (optionally with electrical reed contact)

3. Function

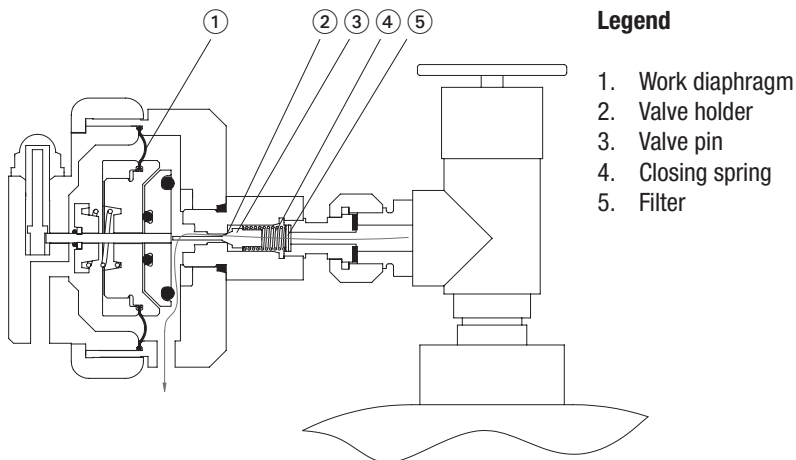
Integrated filter

The integrated filter ⑤ protects the device from dirt particles. It prevents dirt, accumulations or other solid materials from entering the device.

Vacuum control

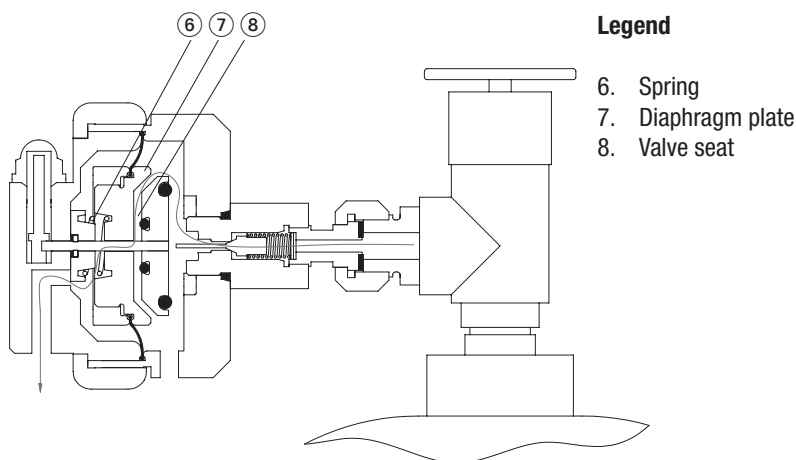
In the initial state the cone ③ is positioned on the valve seat ②. The closing spring ④ and chlorine bottle pressure press against the valve seat ②, thereby closing the system. After the injector is turned on (water jet pump) a vacuum is created.

It exerts a force acting to the right on the work diaphragm ① of the vacuum regulator. The force is transferred by the valve pin ③ to the valve cone ③, thereby allowing chlorine gas to enter the vacuum system. If the vacuum is broken, the valve cone ③ falls back onto the valve seat ② and stops the flow of chlorine gas.



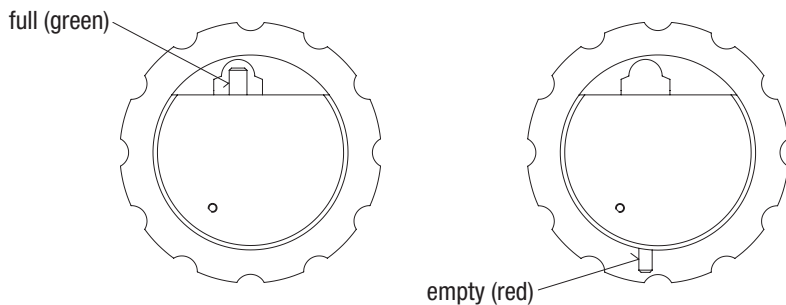
Safety valve

The safety valve prevents positive pressure from building up in the vacuum line. The smallest positive pressure produces a force to the left on the large work diaphragm ①. This causes the spring ⑥ to be compressed and the diaphragm plate ⑦ to lift away from the valve seat ⑧. A flow channel then opens up in the diaphragm plate and the positive pressure is diverted in a controlled manner.

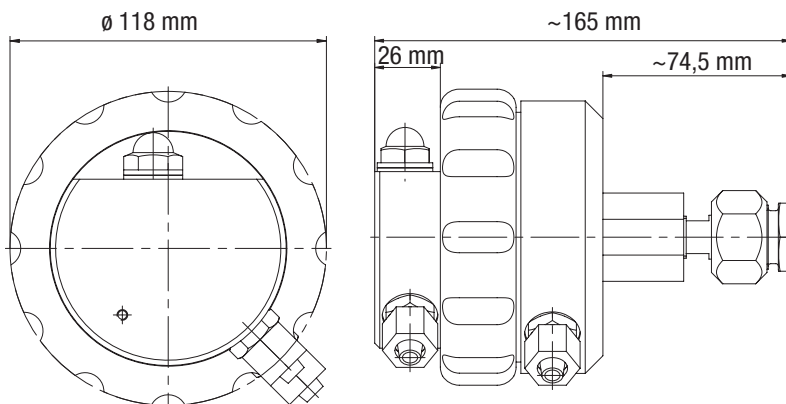


Empty warning display

When the chlorine gas container is empty, the vacuum increases because of the absence of chlorine gas flowing out. When this happens, the diaphragm moves further to the right during operation. The display pin unlocks and falls into the lower position, the green mark disappears and the red signal pin appears on the lower housing. If the optionally available reed contact is installed, the contact is closed.



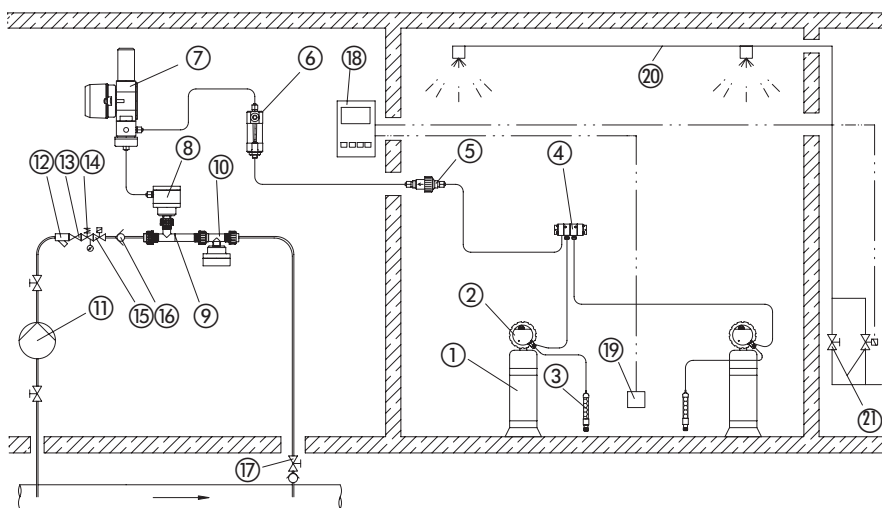
4. Dimensions



5. Technical data

Dosing quantity	up to 10 kg Cl ₂ /h
Chlorine gas input pressure	max. 16 bar
Safety valve open at	30 mbar
Operating temperature	10 °C bis 50 °C
Dimensions (W x H x D)	165 x 118 x 118 mm
Compressed gas connection	W1", G5/8, 1,030" NGO / Universal-Yoke
Vacuum connection	Hose 8/12 or 12/16
Blow-out line connection	Hose 8/12
Weight	about 1300 - 2500 g

6. Installation



Legend

- | | |
|--------------------------------------|--|
| 1 Chlorine bottle | 52 Dirt trap |
| 2 Vacuum regulator CVR 10 | 53 Lock valve |
| 3 Active carbon cartridge (optional) | 54 Pressure reducing valve with pressure gauge |
| 4 Chlorine switching device | 55 Solenoid valve |
| 5 Return lock | 56 Ball return check valve |
| 6 Flow meter | 57 Introduction of chlorine solution with locking device |
| 7 Control valve | 58 Chlorine gas warning device |
| 8 Injector return check valve | 59 Sensor for gas warning device |
| 9 Injector | 60 Sprinkler system |
| 10 Vacuum interrupter | 61 Fittings for sprinkler system |
| 11 Pressure increase pump | |



CAUTION!

6.1 General instructions

Caution!

Various local requirements and laws govern the installation and operation of chlorine gas systems. The operator is responsible for ensuring they are observed. There are also additional rules based on the latest state of the art that apply to system design and installation. Installation of chlorine devices typically follows the drawings of planning offices. Some sample installation diagrams are shown in the Lutz-Jesco "Chlorine Manual". This book also contains references to other data sheets that must be taken into account. All local and country-specific requirements must be observed during the installation.



ATTENTION!

ATTENTION!

The installation must be performed by trained specialists since even minor errors in the system design and construction may result in incorrect dosing, or could even destroy equipment or endanger the environment.



CAUTION!

CAUTION!

Always use suitable tools during the installation. For example, when tightening union nuts, use a second wrench as a counterforce to prevent the devices from turning out of place. Otherwise mechanical tensions could cause defects in components.

All threadings should be lightly greased before assembly. Use silicon grease or PTFE spray for this purpose. Then it will be easier to loosen screws from threadings after they have been in place for a long time.



NOTICE!

NOTICE!

Vaseline is not suitable for use as a grease for components in chlorine gas systems. Because of its hygroscopic effect, chlorine gas extracts the water from Vaseline, causing it to harden.



CAUTION!

CAUTION!

All devices must always be mounted in the position in which they are shown in the installation examples. Otherwise there is no guarantee against improper functionality or in some cases destruction of devices by liquid chlorine.

6.1.1 Chlorine supply

6.1.1.1 Limited withdrawal



CAUTION!

CAUTION!

The maximum extraction quantity from a chlorine container (bottle or drum) must not be exceeded. Otherwise there is a danger of the bottle icing up due to energy extraction when the chlorine evaporates. The result would be an impermissible drop in pressure in the chlorine container. Because of this, the maximum amount of chlorine that can be extracted at an air temperature of 10 °C for a chlorine bottle with a 65 kg-filling volume, for example is 650 g Cl₂/h. If the room is heated, the maximum amount that can be extracted increases to 1000 g Cl₂/h at 15°C, for example.

6.1.1.2 Bottle batteries

Type CVR 10 vacuum regulators are available for dosage output of up to 10 kg Cl₂/h. To supply dosage lines this high, several chlorine containers must be connected simultaneously to form "Bottle batteries". A common line connects all attached chlorine containers. Thus chlorine is removed simultaneously from all containers. Flexible copper lines are used as a connection between the chlorine bottle and the common line (with "resilient bends"). Each resilient bend has a bottle auxiliary valve on each end that can be closed to prevent any chlorine from escaping out of the positive pressure system when changing bottles.

CAUTION!

Chlorine gas is highly hygroscopic. Because of this, atmospheric moisture will penetrate the system whenever there is an open connection of devices or lines and lead to the formation of hydrochloric acid. Then damage to devices will be unavoidable. Therefore all connections (even on vacuum devices and vacuum lines) must be closed. Written release is required from Lutz-Jesco GmbH if chlorine gas dosing devices will be used for gasses other than chlorine.



CAUTION!

6.1.1.3 Instructions for chlorine drums

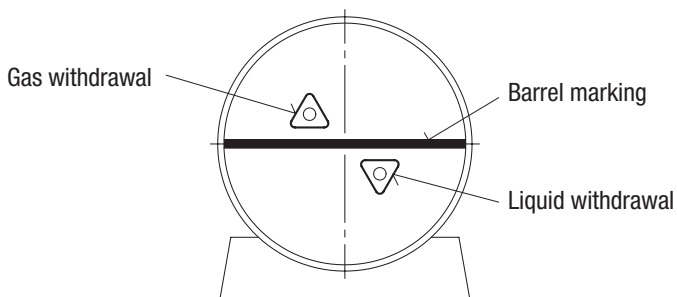
CAUTION!

Never assemble the vacuum regulator directly on the chlorine drum. After shipping, the standpipe in the drum is generally filled with liquid chlorine. To ensure it does not get into the dosing devices, a drop separator must be installed. A heating element is useful to evaporate liquid drops.

When using chlorine drums, the drum must first be turned with the mark horizontal. The upper connection is used for gaseous chlorine extraction. Chlorine drums are often used for larger dosing output requirements. Depending on the ambient temperature, up to 7 kg/h of gaseous chlorine can be extracted from a 1000 kg drum (10 °C: 3 kg/h, 15 °C: 5 kg/h, 20 °C: 7 kg/h). Chlorine drums have two connections, one for gaseous extraction (above) and one for liquid extraction (below). The drum must be turned on the supporting holder so that the pipestand is positioned vertically in the drum (mark on the drum is horizontal). The position of the connection valves does not matter, since they are usually arranged diagonally.



CAUTION!



6.1.2 Line routing

Metal and plastic lines are used for chlorine lines. Metal lines must always be used in the positive pressure area. Plastic lines (PVC pipe) are installed in the vacuum area. Hoses made of polyethylene (PE) or polytetrafluorethylene (PTFE) are used as vacuum hose connections.

6.1.2.1 Positive pressure lines

CAUTION!

Chlorine gas dosing devices made of PVC are ideally suited for gaseous chlorine. Liquid chlorine, on the other hand, acts aggressively on the devices. Because of this, liquid chlorine must not be allowed to penetrate the devices.

Positive pressure lines must be laid so that they rise continuously to the dosing devices. The same applies to flexible connection lines. The coils of the resilient bends must be positioned horizontally! This makes it possible for condensed drops to flow back into the bottle. Depending on temperature fluctuations, condensation of chlorine gas to liquid chlorine may occur in the positive pressure system. Because of this, a consistent room temperature must be ensured. A room heater is recommended. If a consistent temperature cannot be ensured for reasons of design a pressure reducer valve must be used. It reduces the temperature at which condensation begins. If necessary, the chlorine must be heated with a chlorine heater block before entering the dosing device.

6.1.2.2 Vacuum lines

Rigid PVC tubes and flexible PTFE or PE hoses are used as vacuum lines.

IMPORTANT!

PVC hoses are generally not suitable for vacuum. Diffusing chlorine gas has a corrosive effect on the fabric reinforcement that make the hose vacuum-proof. Condensation of chlorine gas is practically excluded in vacuum lines because of the low pressure. It does only generally occur above -30 °C. The temperature must in any case never fall that low because the materials would become too brittle.

The injector establishes the vacuum required to move the chlorine gas. Theoretically the maximum negative pressure is 1 bar, but in useful practical terms, the injector draws only a weak vacuum. The loss of pressure caused by tube friction in the vacuum lines must therefore not exceed max. 50 mbar.

The following table shows the required cross section of the line depending on the line length and dosing quantity.



CAUTION!



IMPORTANT!

Maximum hose length for vacuum lines

Hose length	Vacuum lines d 8/12 mm	Vacuum lines d 12/16 mm
5 m	7,0 kg Cl ₂ /h	18,0 kg Cl ₂ /h
10 m	4,0 kg Cl ₂ /h	12,0 kg Cl ₂ /h
25 m	2,5 kg Cl ₂ /h	7,5 kg Cl ₂ /h
50 m	1,7 kg Cl ₂ /h	5,0 kg Cl ₂ /h

The defining element for dimensioning the line is the total flow of chlorine gas. For example, if the line is divided up into two strands just before the dosing point, the long line must be designed for the combined chlorine gas flow.

6.2 Assembling the devices

6.2.1 Preparation for assembly

Remove the CVR 10 chlorine gas dosing device from its package in a clean, dry area. Check the device for signs of external damage. Check the device type based on the delivery slip and ensure it is complete. Leave the stoppers in the line connections. Do not remove them until just before making the connection. Prepare the connection lines on the system. Keep the chlorine gas container valves closed! They should not be opened until just before the leak test!

6.2.2 Assembly location

CAUTION!

Local requirements must be observed! This applies especially to requirements for chlorine gas rooms! The assembly location must be easily accessible for operating and maintenance personnel. The room temperature should be at least 10 °C (15-20 °C is recommended). The room temperature must not be lower than the temperature of the chlorine containers. If it is, there is a danger of the chlorine flowing back into the dosing device. If necessary, allow the chlorine container to cool off to room temperature first. The dosing device must be protected from splashed water and direct sunlight.

NOTICE!

Chlorine gas vacuum regulators operate at low working temperatures. The working pressure is about 100 mbar below the actual atmospheric pressure. It is especially important to ensure this is so for operation at higher elevations (more than 1000 m above sea level). Because atmospheric pressure decreases sharply at altitude, it must be assumed the output of the chlorine gas system will be lower.



CAUTION!



NOTICE!

6.2.3 Assembling the chlorine gas dosing device

Assembly can be directly on the shutoff valve of the chlorine bottles or on a permanently mounted connection of a chlorine gas supply line. During assembly, make certain the central axis of the device is oriented horizontally and the empty alarm signal pin is vertical. Before connecting the devices, the chlorine bottles and dosing devices must have reached room temperature.

CAUTION!

A new seal must be used each time assembly is performed. This also applies to changing bottles. The seals are deformed after being used once and no longer provide a reliable seal!

The content of the bottle must have settled after the bottled has been moved.



CAUTION!

6.2.4. Blow-out connection

NOTICE!

Before connecting the hoses, they should be heated up slightly (to about 40 °C) to prevent them from tearing. Use only suitable hoses made of PE or PTFE of the appropriate size.

Connect the hose for the blow-out line. It is best for this hose to end close to a chlorine gas sensor. We recommend connecting the end to an active charcoal cartridge to trap small quantities of chlorine gas.

CAUTION!

Local requirements must be observed!



NOTICE!



CAUTION!

6.2.5 Dosing connection

Connect the vacuum hose from the injector or other auxiliary device.

6.2.6 Electrical connection for empty warning (optional)

The electrical contact closes when the chlorine gas container is empty and the signal pin is in its lowest position.

CAUTION!

The contact is only designed for control voltages up to a maximum of 48 V and 0.25 Amps.



CAUTION!

7. Start up

CAUTION!

Chlorination systems must not be placed in operation until after they have been inspected for proper condition by an expert and in particular parts that carry gas have undergone a leak test.



CAUTION!

7.1 Leak tests

7.1.1 Leak test of chlorine gas vacuum lines

IMPORTANT!

Leaks in vacuum lines are not detected in normal operation, because no chlorine gas escapes. On the other hand, ambient air is drawn in. At the same time, however, atmospheric moisture is drawn into the line system and combines with the chlorine gas to form destructive deposits. Because of this, vacuum lines must also be checked carefully for leaks. This is done with a flow meter that is installed directly before the intake connection. The water jet flow is turned on. The floater must come to rest after a short time (with the chlorine containers closed). Otherwise ambient air is being drawn in through leaks in the vacuum system.



IMPORTANT!

7.1.2 Leak test of chlorine gas pressure lines

CAUTION!

In the case of vacuum regulators installed directly on the bottle, the positive pressure system is limited to the flange connection and intake valve. For all other systems, the line system up to the vacuum regulator must also be checked.

CAUTION!

If ammonia is being used, wear personal safety equipment!

To conduct the test, the chlorine bottle is opened slowly. All the connection points are tested with ammonia (ammonium hydroxide solution). Either pumping movements are performed close to the connection with the ammonia bottle or a rag dipped in ammonia is held close to the connection.

CAUTION!

Do not wet system parts with liquid ammonia – danger of corrosion!

Chlorine gas leaks form a white mist with the ammonia.

CAUTION!

Because of the highly corrosive nature of moist chlorine gas, all leaks quickly become larger over the course of time. Because of this, even the tiniest leak must be eliminated immediately. After the leak test is complete, close the chlorine container valves again.



CAUTION!



CAUTION!



CAUTION!



CAUTION!

7.2 Starting the system

To start the system, first open the main valve of the chlorine container. After that the injection point valve should be opened and the water jet supply turned on. If operating conditions are correct, a vacuum is created in the injector which extends through the return check valve and vacuum line to the vacuum regulator and opens the chlorine intake valve. The chlorine gas under pressure is reduced in the intake valve into the vacuum. The amount of chlorine gas can be adjusted with the needle valve. It is indicated on the upper point of the floater. In automatically regulated systems, the control valve is first locked at 100% open and the flow of chlorine gas is adjusted manually. As soon as manual trials indicate chlorine content in treated water, the measurement system is calibrated and the system is transferred to automatic operation.

7.3 Checking the empty warning

Close the chlorine container valve during operation. After a short time (1-5 min., depending on the installation and set dosing quantity) the empty alarm signal pin will drop. Open the chlorine gas container valve again and push the empty warning signal pin back up.

8. Operation

8.1 Normal operation

In normal operation of the system, the flow of chlorine gas is either adjusted automatically by the control valve or manually on the adjustment valve of the measurement glass support. In systems that work automatically, the measurement amplifier must be checked with independent comparative measurements at regular intervals and calibrated as necessary.

8.2 Changing chlorine containers

CAUTION!

Breathing chlorine gas can cause death! You must wear a respirator when changing chlorine gas containers!

Close the chlorine bottle valve tightly and connect the device for 5 min. to allow the connection to be sucked empty. Unscrew the chlorine device from the bottle and close it using a dummy plug, which will prevent moisture from entering. Close the side connection of the bottle valve with the protective cap and install the protective hood over the valve. Secure the new chlorine bottle so it is safe from accidents. Connect the chlorine dosing device using a new seal. If necessary, wait until the bottle has cooled off to room temperature. Slowly open the bottle valve and perform a leak test with ammonia.

9. Shutdown

9.1 Short-term shutdown (i.e. maintenance)

Close the chlorine bottle valve. Keep the system in operation until the floater has dropped to zero in the flow meter and the empty alarm signal pin is in the lowest position. Turn off the pressure increase pump or interrupt the supply of wetting water. Lock off injection nozzle for chlorine solution.

9.2 Long-term shutdown (i.e. winter break)

Close the chlorine bottle valve. Keep the system in operation until the floater has dropped to zero in the measuring glass and the empty alarm signal pin is in the lowest position. In case of a long-term shutdown, parts of the line and device that carry chlorine gas must be rinsed with nitrogen or dried air for about 5 min.. Turn off the jet water pump or wetting water. Connections from which chlorine-conducting lines have been clamped off must be closed air tight to prevent moist air from entering. Set



CAUTION!

the room thermostat to at least 10 °C. Close the water jet valves. Close the chlorine solution introduction point. If there is danger of frost, all parts of lines and devices that carry water must be drained.

IMPORTANT!

We recommend moving all valves to the middle position for winter shutdown so that in the spring they can be made movable in both directions.

10. Maintenance

CAUTION!

Maintenance must only be performed by authorised personnel!

10.1 General instructions

Regular maintenance saves headaches! We recommend a maintenance contract. Unless shorter intervals are required by law or local rules and regulations, all Lutz-Jesco chlorine gas dosing devices must be maintained and inspected at least once a year. This should preferably be at the beginning of a period of high demand, before being taken out of service or placed back in service again.

CAUTION!

Before any work is performed on the chlorine system, the chlorine containers must always be closed. The system must be run to empty with the injector until the measuring glass indicates zero. During maintenance, the vacuum regulator is disassembled and cleaned and the wear parts are replaced. All other components are subjected to a visual inspection and are replaced if necessary. The maintenance kit (see spare parts list) is a combination of normal wear parts. Warm water or rabbasol are suitable for cleaning components. Components must be well dried before reassembly. Compression springs are not actually wear parts. Due to moisture, however, they are also subject to chemical corrosion. They must be replaced, if corrosion occurs.

IMPORTANT!

Never push compression springs completely together to test them. This will subject them to overload.

10.1.1 Maintenance personnel

CAUTION!

Maintenance must only be performed by appropriately trained personnel. Training by the manufacturer of the devices is required.

10.1.2 Maintenance intervals

Maintenance intervals are specified in some cases by local laws and regulations and must be observed without exception. Lutz-Jesco devices must be maintained at least once a year when they are being used normally as intended. Under exceptional operating conditions, the maintenance intervals must be shortened accordingly.



IMPORTANT!



CAUTION!



CAUTION!



IMPORTANT!



CAUTION!

10.1.3 Preparation for maintenance

Refer to section 9.1 short-term shutdown.

10.1.4 Recommended spare parts

The parts which must be replaced in any case are identified in the maintenance instructions. They are available as spare parts kits. Spare parts kits contain elastomers and safety-related parts that are especially subject to wear and tear.



DANGER!

DANGER!

If these parts are not replaced, it may result in malfunction and leakage of chlorine gas.

Only original spare parts must be used. All seals must be used once only!

10.1.5 Cleaning of parts

Parts can be cleaned in warm water (max. 40 °C). Alcohol or a mild cleaning agent (for example rabbasol) may be added.



CAUTION!

CAUTION!

After cleaning and before assembly, the devices must be thoroughly dried. Parts of devices that have not been properly dried may be significantly damaged when they come in contact with chlorine gas.

10.1.6 Required tools and consumable materials



IMPORTANT!

IMPORTANT!

Special tools are required for assembly/disassembly. Otherwise the parts may be damaged under some circumstances. The following tools are required for maintenance:

- Fork wrench size 13
- Fork wrench size 19
- Fork wrench size 32
- Face pin wrench with 3 mm pin
- Belt wrench
- Phillips screwdriver 3 mm
- Pointed pliers
- Face wrench (Part No. 31631)
- PTFE seal band (Part No. 1083)
- Silicon grease (Part No. 35537)
- Cleaning agent (Part No. 97756)

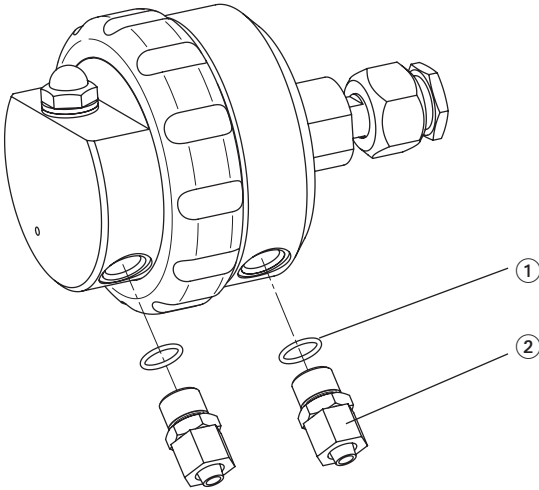
10.1.7 Evaluation of parts

Parts that do not absolutely need to be replaced during maintenance must undergo an inspection. Inspections are described in the maintenance instructions.

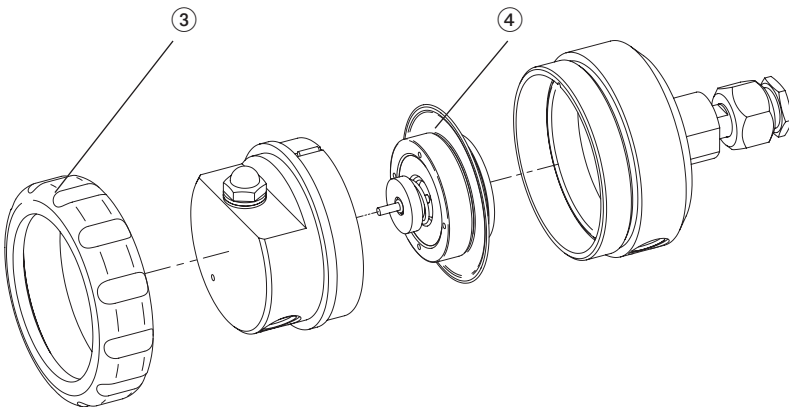
10.2 Maintenance instructions

10.2.1 Disassembling the CVR 10

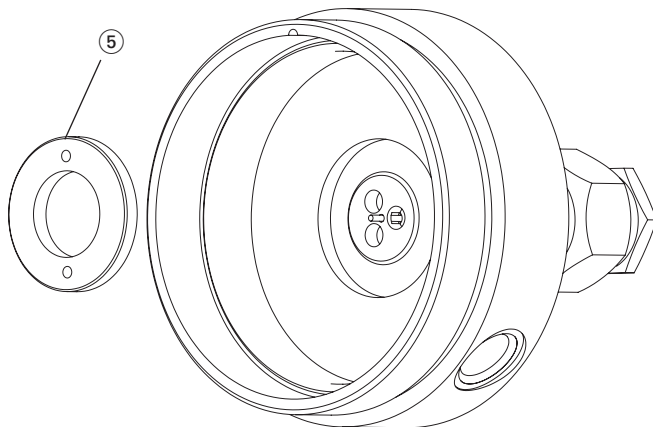
- Loosen and remove the two threaded connections ② from the vacuum regulator housing. Dispose of the used O-rings ①.



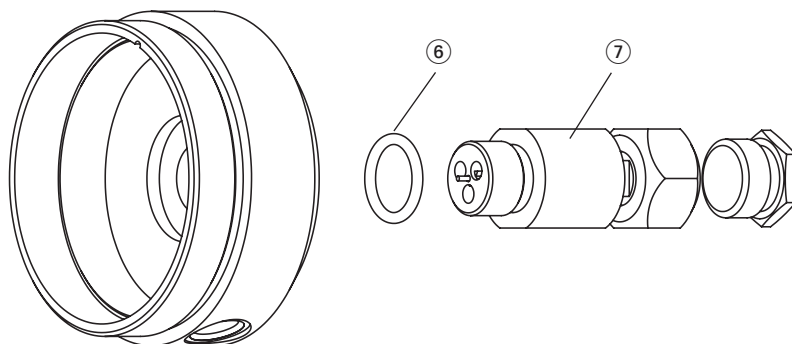
- Remove the union nut ③ (if necessary using a belt wrench).
- Carefully pull the parts of the housing apart.
- Remove the entire diaphragm plate ④



- Remove the lock nut ⑤ from the inlet valve using a face wrench (Part No. 31631).



- Loosen the entire inlet valve and remove it from the vacuum regulator housing.
- Remove the O-ring ⑥ from the inlet valve ⑦. Dispose of the O-ring ⑥.



- Untighten the viewing connection from the housing cover and remove the signal pin.

10.2.2 Disassembling, cleaning and assembling of the inlet valve

- Untighten the connection nipple from the inlet valve housing. The connection nipple is sealed with a PTFE sealing band. It must be completely removed, leaving no pieces.
- Remove the pre-filter, filter screen, inlet cone and compression spring. Dispose of the pre-filter and filter screen.
- Place all the parts of the inlet valve in a suitable cleaning fluid as described above. Resistant accumulations of dirt may need to be left in the solution longer.
- Remove any remaining deposits using a soft brush (no metal brushes!).
- After the parts have been cleaned, dry them with compressed air or warm air.

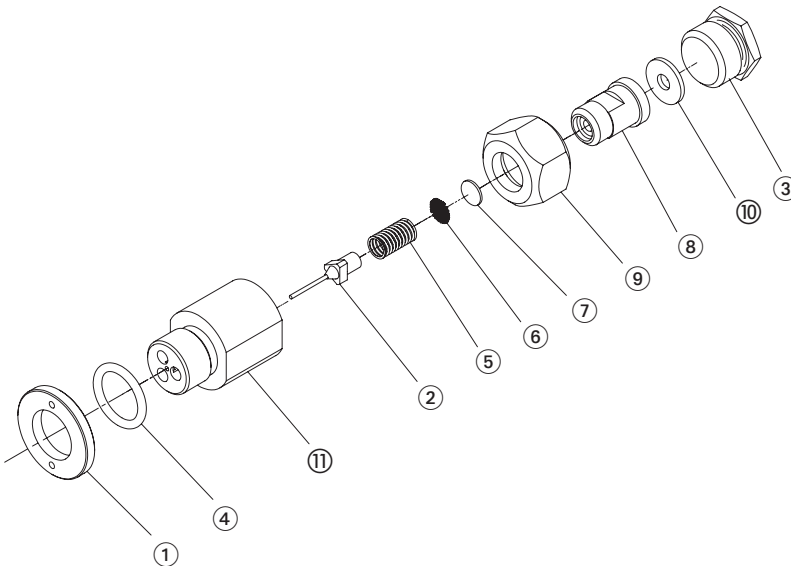
CAUTION!

The parts must be absolutely dry before they are reassembled!

- Wrap four layers of PTFE sealing band around the threading of the connecting nipple (8), clockwise as seen looking at the threading!
- Insert the sealing cone (2) and compression spring (5) into the inlet valve as shown in the drawing.
- First, place the new pre-filter (7) and then the new filter screen (6) in the connection nipple (8) and tighten the nipple in the valve housing .
- Clamp the inlet valve housing (11) into a vice grip so that the inner threading is pointing up.
- Tighten the connection nipple (8) to a torque of 70 Nm.
- Place a new O-ring (4) on the threading.



CAUTION!



Legend

- | | |
|----------------------|-------------------------------------|
| 1 Lock nut | 8 Connection nipple 3/8" NPTM - d20 |
| 2 Inlet cone | Connection nipple 3/8" NPTM - d24 |
| 3 Threaded plug 1" | 9 Union nut 1" |
| Threaded plug G5/8" | Union nut G5/8" |
| Threaded plug 1.030" | Union nut 1.030" |
| 4 *O-ring | 10 Gasket |
| 5 Compression spring | 11 Valve body 3/8" NPTF |
| 6 *Filter screen | |
| 7 *Pre-Filter | |

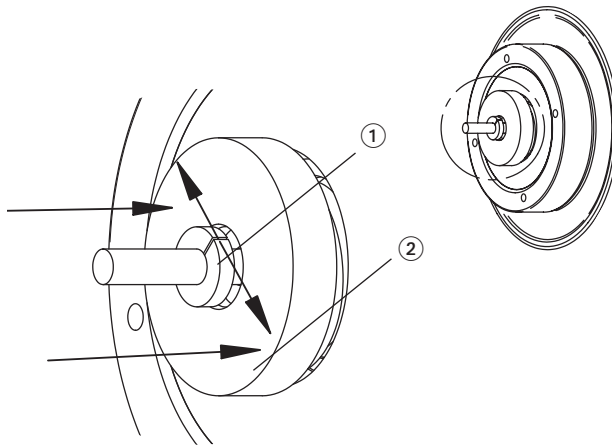
* included in spare parts kit

10.2.3 Checking the inlet valve

The inlet valve is actually the most safety-relevant valve of the entire chlorine system. Because of this, it must be checked very carefully. Dry compressed air or nitrogen is required for the check. Connect the inlet valve to compressed air with a hose and submerge in water. Bubbles must not ascend either at high pressure (6 - 16 bar) or at low pressure (0.5 bar). After the inlet valve is checked, it must be thoroughly dried and vented by pressing on the inlet cone. The leak test can also be performed with leak search spray.

10.2.4 Disassembling, cleaning and assembling of the diaphragm plate

- Remove the small O-ring from the diaphragm pin and dispose of it.
- To disassemble the diaphragm plate, press down on the spring support ② and remove the circlip ① with pointed pliers. The valve seat can now be removed with the diaphragm pin. Dispose of the circlip ①.



- Remove the two O-rings from the valve support and dispose of them.

CAUTION!

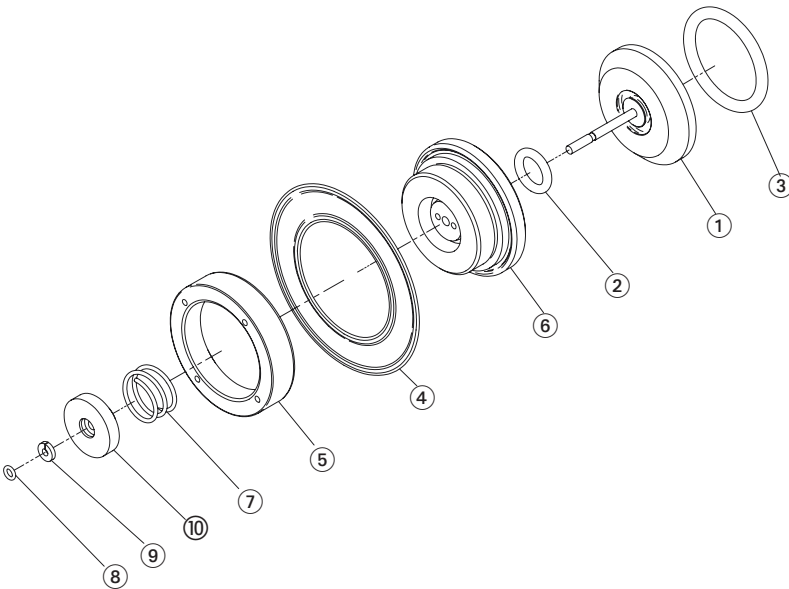
Make certain the base of the O-ring groove is not damaged during disassembly. It may be useful to remove the O-rings using a sturdy needle.

- A special clamp wrench (Part No. 31617) or face pin wrench (pin \varnothing 3 mm and 4 mm) must be used to remove the diaphragm. The diaphragm must always be replaced.
- The diaphragm plate is now fully disassembled. All parts must be cleaned and dried.
- Plastic parts must not be brittle or have bubble formations.
- The diaphragm plate must be reassembled using new wear parts. The process is the same as the disassembly but in the opposite order.



CAUTION!

- To install the new diaphragm: The threading and face of the threaded ring ⑤ must be slightly greased with silicon. First tighten the threaded ring ⑤ finger tight and then turn it max. 1/4 revolution further with the tool. The diaphragm ④ must stay in place as you do this.
- To install new O-rings ②③⑧: Position the O-rings in the groove and gently brush them into place with your thumbs until they are lying flat.
- The spring ⑦ is not a wear part, but it may be weakened after long use. The length should be at least 24 mm when it is not compressed and there should be no signs of corrosion.



Legend

- 1 Valve seat with diaphragm pin
- 2 *O-ring
- 3 *O-ring
- 4 *Shaped diaphragms
- 5 Threaded ring
- 6 Diaphragm plate
- 7 Compression spring
- 8 *O-ring
- 9 *Circlip
- 10 Spring bracket

* included in spare parts kit

10.2.5 Assembling the CVR 10

- Assembly is in the opposite order to disassembly.
- Screw the intake valve that has already been maintained into the vacuum regulator housing finger tight. The surfaces must touch each other. There must not be any gap between them.
- When assembling the vacuum regulator housing, make certain it does not twist out of place. The two hose connections must have the same position.
- Use new O-rings when screwing in the hose connections.
- Tighten the union nut finger tight.

CAUTION!

Make certain the CVR 10 is completely dry inside and out! Moisture combined with chlorine gas forms highly corrosive hydrochloric acid, which can damage the CVR 10.

- Now the CVR 10 can be connected again. Use a new connection seal.
- Place the system in operation as described in Section 5.



CAUTION!

10.2.6 Adjusting the electrical contact for empty warning

- Close the chlorine container valve during operation.
- Wait until the empty warning signal pin drops down (red pointer is visible below)
- Connect a continuity tester to the contact.
- Loosen the clamping screw.
- Move the contact up and down until you have found a position in which the contact is closed.
- Open the chlorine gas container and press the empty alarm signal pin up. The contact must now be open.

11. Spare parts CVR 10

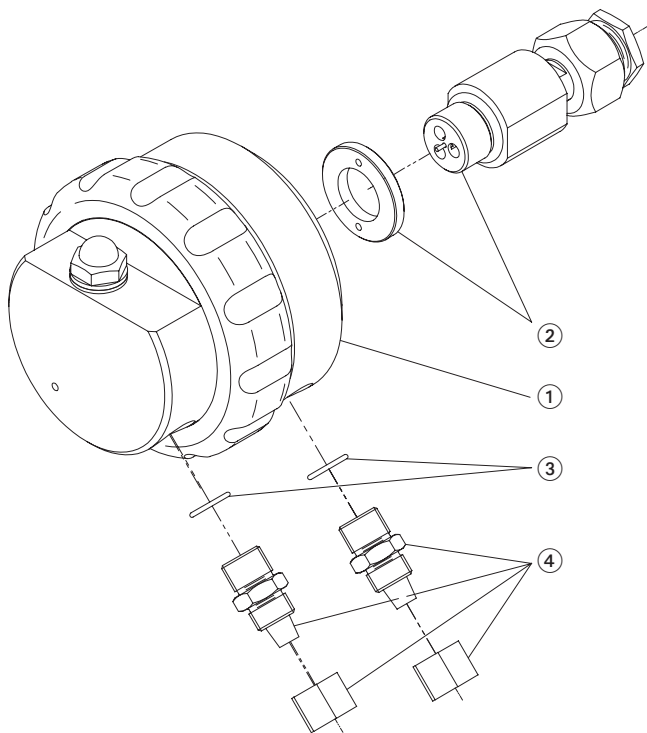
Spare parts kit

Contains all spare parts required for regular maintenance

Part number spare parts kit: 38045

The chlorine bottle connection seal must be ordered separately, depending on the connection size.

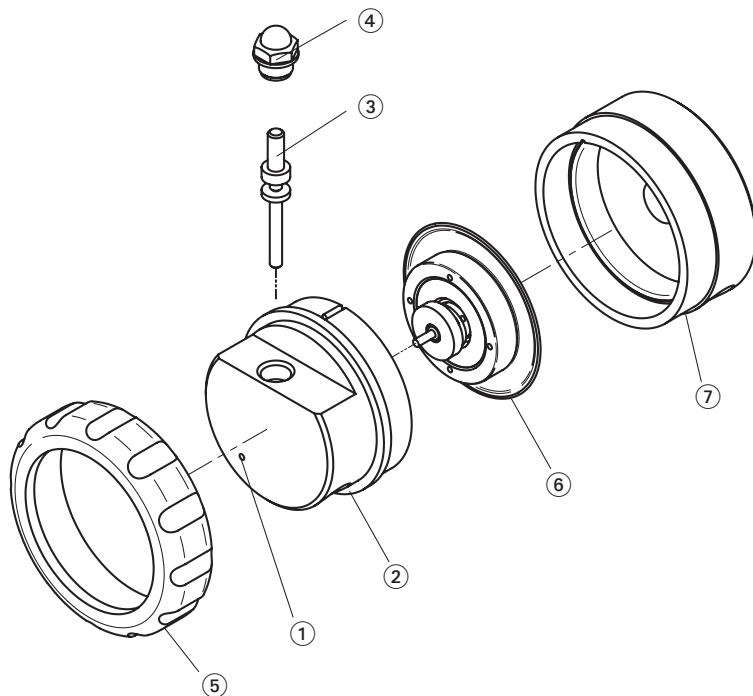
Versions of the chlorine vacuum regulator CVR 10



Item	Designation	Material	Quantity	Part No.
1	Vacuum regulator complete	Various	1	38024
2	1" inlet valve, complete „Yoke“ inlet valve, complete G5/8" inlet valve, complete 1.03" inlet valve, complete	Various	1	38010 38026 38029 38030
3	*O-ring	FPM	2	80003
4	Hose clamp connection for 8/12 hose	PVC	2	22344
4	Alternate hose clamp connection for 12/16 hose	PVC	2	34485

* included in spare parts kit

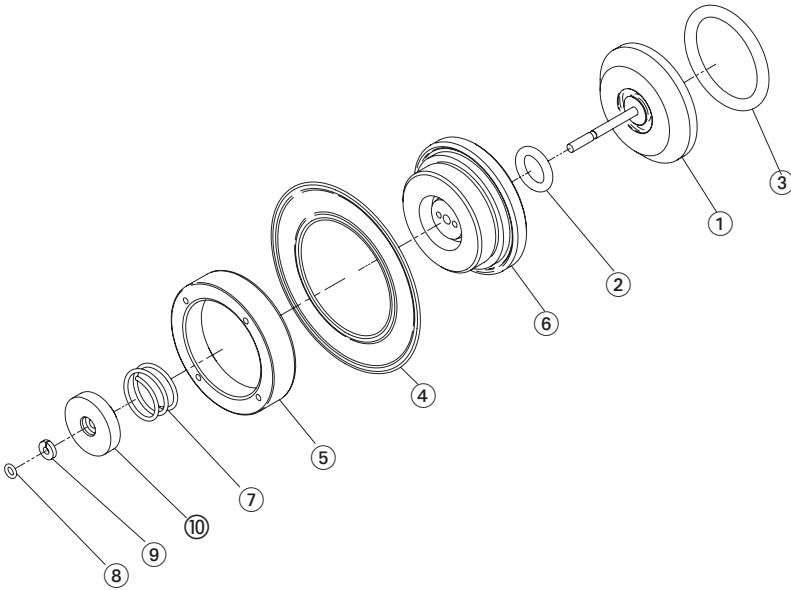
Vacuum regulator complete



Legend

- 1 Threaded pin DIN 551 - M4x11
- 2 Housing cover
- 3 Pointer red/green
- 4 Pointer viewing connection
- 5 Union nut M102x2
- 6 Diaphragm plate
- 7 Housing

Membrane plate

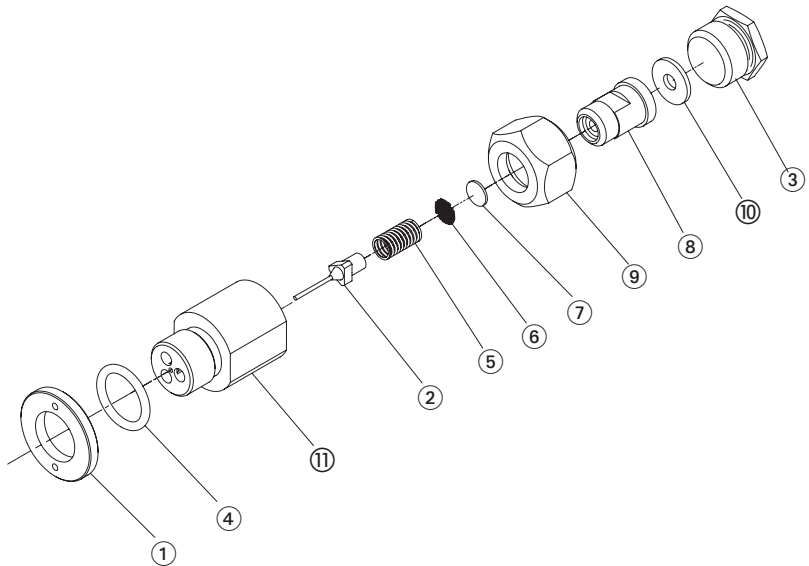


Legend

- 1 Valve seat with diaphragm pin
- 2 *O-ring
- 3 *O-ring
- 4 *Shaped diaphragms
- 5 Threaded ring
- 6 Diaphragm plate
- 7 Compression spring
- 8 *O-ring
- 9 *Circlip
- 10 Spring bracket

* included in spare parts kit

Inlet valves - 1" / G5/8" / 1.030"

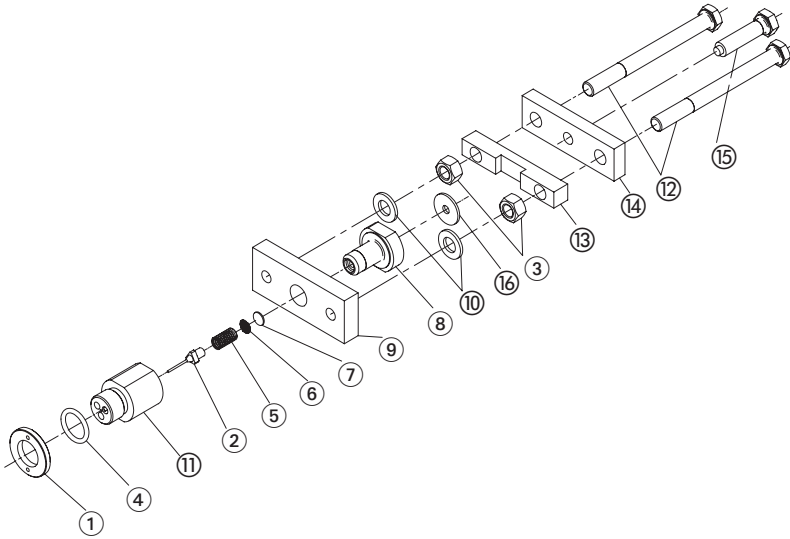


Legend

- 1 Lock nut
- 2 Inlet cone
- 3 Threaded plug 1"
Threaded plug G5/8"
Threaded plug 1.030"
- 4 *O-ring
- 5 Compression spring
- 6 *Filter screen
- 7 *Pre-filter (felt)
- 8 Connection nipple 3/8" NPTM - d20
Connection nipple 3/8" NPTM - d24
- 9 Union nut 1"
Union nut G5/8"
Union nut 1.030"
- 10 Gasket
- 11 Valve body 3/8" NPTF

* included in spare parts kit

"Universal Yoke" inlet valve



Legend

- 1 Lock nut
- 2 Inlet cone
- 3 Hexagonal nut
- 4 *O-ring
- 5 Compression spring
- 6 *Filter screen
- 7 *Pre-filter (felt)
- 8 Connection piece 3/8" NPTM - 1"
- 9 Bracket 40x15x100
- 10 Flat washer
- 11 Valve body 3/8" NPTF
- 12 Hexagonal screw
- 13 Bracket 15x15x100
- 14 Bracket 30x12x100
- 15 Clamping screw
- 16 Gasket

* included in spare parts kit

12. Troubleshooting

Type of fault	Possible cause	Recommended action
Flow meter indicates nothing or not enough flow / no gas dosing	Chlorine bottle is empty	Connect a new bottle
	Bottle valve or auxiliary valve not open	Open valves
	Vacuum system is not perfectly leak-proof and outside air is being drawn in	Find the leaks by opening the valves one after the other and eliminate the problem
	Switching device has not switched to full bottle	Activate the switching device manually, then check the switching device
	Faulty diaphragm in CVR 10	Replace diaphragm
	Filter in inlet valve is clogged	Replace filter element
	Floater is stuck in flow meter	Disassemble flow meter and clean
	Plugged dirt trap in water jet line	Clean or replace filter
	Solution addition piece plugged up	Clean the solution addition piece or open the shutoff valve
	Injector design is not powerful enough	Replace the injector. Lower the counter-pressure or increase the water jet pressure
	Injector dirty	Clean injector
	Carbonate deposits in the injector	Clean the injector with acid (for example 10% hydrochloric acid for about 5 min). If possible, set the concentration of chlorine higher (1-2 g/l) To do this, you may need to reduce the water jet pressure
In spite of correct dosing quantity, dosage in water does not include enough chlorine	Higher counter-pressure on the injector because the solution line was not laid properly	Optimise how the solution line is laid: avoid sharp bends or places where the cross section is reduced (can also be caused by unnecessary adhesive)
	Vacuum lines not dimensioned sufficiently	Lay larger vacuum lines or increase the injector suction power
Odour of chlorine in the room or chlorine gas alarm	Leaks in the high-pressure system	Close the chlorine bottle immediately (wearing a respirator) and bleed the lines completely with the injector Find leaks as described in CHECKING FOR LEAKS

Type of fault	Possible cause	Recommended action
Odour of chlorine in the room or chlorine gas alarm	The inlet valve that ensures blow-out of the safety valve is dirty	Maintain the inlet valve and safety valve as described under MAINTENANCE and replace the active charcoal if necessary. If there is a heavy accumulation of dirt in the inlet valve, check the purity of the chlorine gas and ensure proper room temperature (about 20 °C)
White precipitate in the flow meter	Vacuum system is not leak-proof and atmospheric moisture is precipitating as a white vapour	Find and eliminate the leaks. Otherwise encrustations will form that will prevent the valves from functioning properly
Water in the vacuum system	Injector return check valve is not leak-proof because it is faulty or dirty	Maintain injector return check and install return check lock
	The end of the blow-out line is under water and the safety valve is not leak-proof	Maintain the safety valve and pull the end of the blow-out line out of the water
The chlorine gas container is iced up	The withdrawal quantity is too big	Max 1% of bottle filling is permitted per hour
The mechanical empty alarm is not working	Mechanics are dirty	Clean
	Insufficient vacuum because of leaks in the vacuum installation or faulty injector	Check vacuum installation to ensure it is leak-proof, Check injector
The electrical empty alarm is not working	Contact is out of adjustment	Adjust contact
	Contact or line faulty	Replace contact



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