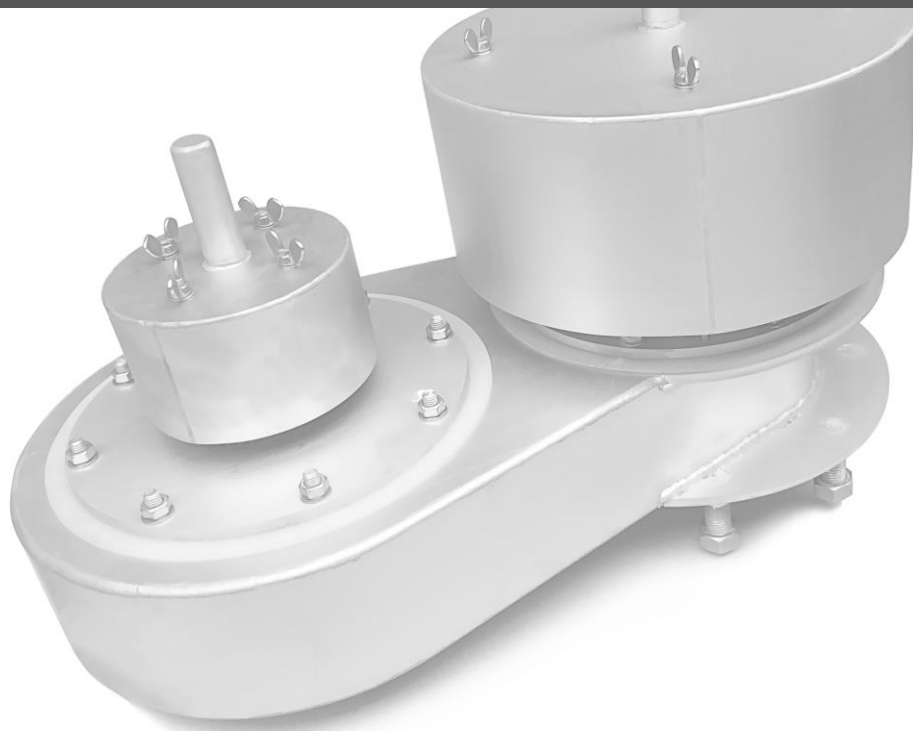


# User manual

Safety valves (Vacuum-overpressure safety valve and vacuum safety valve)

Type	: Manual safety valve
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Location	: Honselersdijk





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## Introduction

Before anything else, we'd like to congratulate you with the purchase of a PRESSCON vacuum-overpressure safety valve or a vacuum safety valve. The vacuum-overpressure safety valve and vacuum safety valve will provide safety against overpressure and a vacuum for your buffer tank. To clarify the usage and functioning of your vacuum-overpressure safety valve and vacuum safety valve we offer you this manual.

### 1. Precautions and safety instructions

During working with the vacuum-overpressure safety valve and the vacuum safety valve there are several safety hazards that need to be taken into account. These are important both while working and installing the safety valves. We highly recommend taking these safety hazards into account before proceeding to work with the vacuum-overpressure safety valve and the vacuum safety valve.

Symbol	Description	Applies to
	<p><b>WORKING WITH HEIGHTS,</b></p> <p>Vacuum-overpressure safety valves and vacuum safety valves that are mounted on a vertical or horizontal buffer tank are usually placed a couple of metres from the ground. In most cases while working on the safety valves, the height exceeds 2,5 metres. This is why working on the safety valves is considered working with heights. It automatically means that a safety harness or other adequate fall protection is mandatory.</p>	<ul style="list-style-type: none"> <li>- Vacuum-overpressure safety valve on a vertical buffer tank;</li> <li>- Vacuum safety valve on a horizontal buffer tank.</li> </ul>
	<p><b>HOT PARTS AND STEAM,</b></p> <p>The nitrogen above the water in the vertical buffer tank has a humidity of 100% and is able to reach a temperature of 90°C. So the housing of a safety valve and the steam that is released can be hot. During disassembling a safety valve or the safety pallets there is an increased risk of injury caused by combustion. Take appropriate measures for this. Use fitting safety apparel and consider for example the direction of the wind.</p>	<ul style="list-style-type: none"> <li>- Housing of the vacuum-overpressure safety valve on a vertical buffer tank;</li> <li>- The releasing of nitrogen by the vacuum-overpressure safety valve;</li> <li>- Housing of the vacuum safety valve on a horizontal buffer tank.</li> </ul>
	<p><b>ADDITIONAL EXPOSURE TO HOT STEAM,</b></p> <p>In some cases the safety valve as an extra cover of insulation material. Keep in mind that this enables the hot steam to rise higher when the nitrogen is being released.</p>	<ul style="list-style-type: none"> <li>- The releasing of nitrogen by the vacuum-overpressure safety valve which is covered with additional insulation material.</li> </ul>

## 2. Application

### **Application vacuum-overpressure safety valve**

The application of the PRESSCON vacuum-overpressure safety valve is the following:

The vacuum-overpressure safety valve is placed near the caged ladder on 0,5 m. out the cylindrical side of the vertical buffer tank on the roof. The vacuum-overpressure safety valve then provides the vertical buffer tank with protection against vacuum and overpressure.

### **Application vacuum safety valve**

The application of the PRESSCON vacuum safety valve is the following:

Two vertical pieces of tube with welding flanges are welded on the two highest ends of a horizontal buffer tank. The tubes have a diameter of 2" . On each of the flanges a PRESSCON vacuum safety valve is mounted. The vacuum safety valve provides protection for the horizontal buffer tank against vacuum.

### 3. Construction

#### 3.1 Vacuum-overpressure safety valve

The image below is a schematically drawn image of the vacuum-overpressure safety valve.

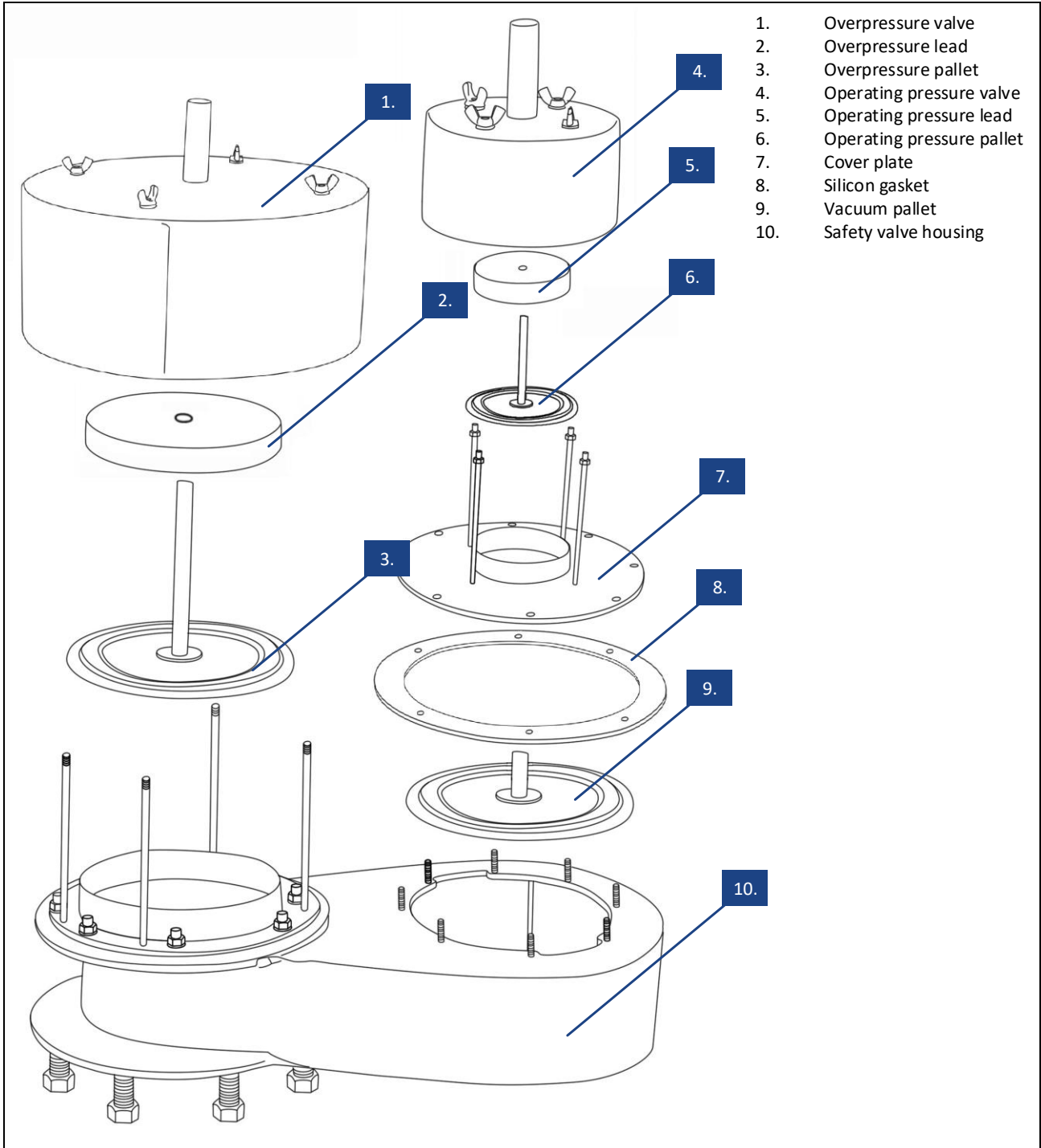


Figure 1. Vacuum-overpressure safety valve

### 3.2 Vacuum safety valve

The image below is a schematically drawn image of the construction of a vacuum safety valve.

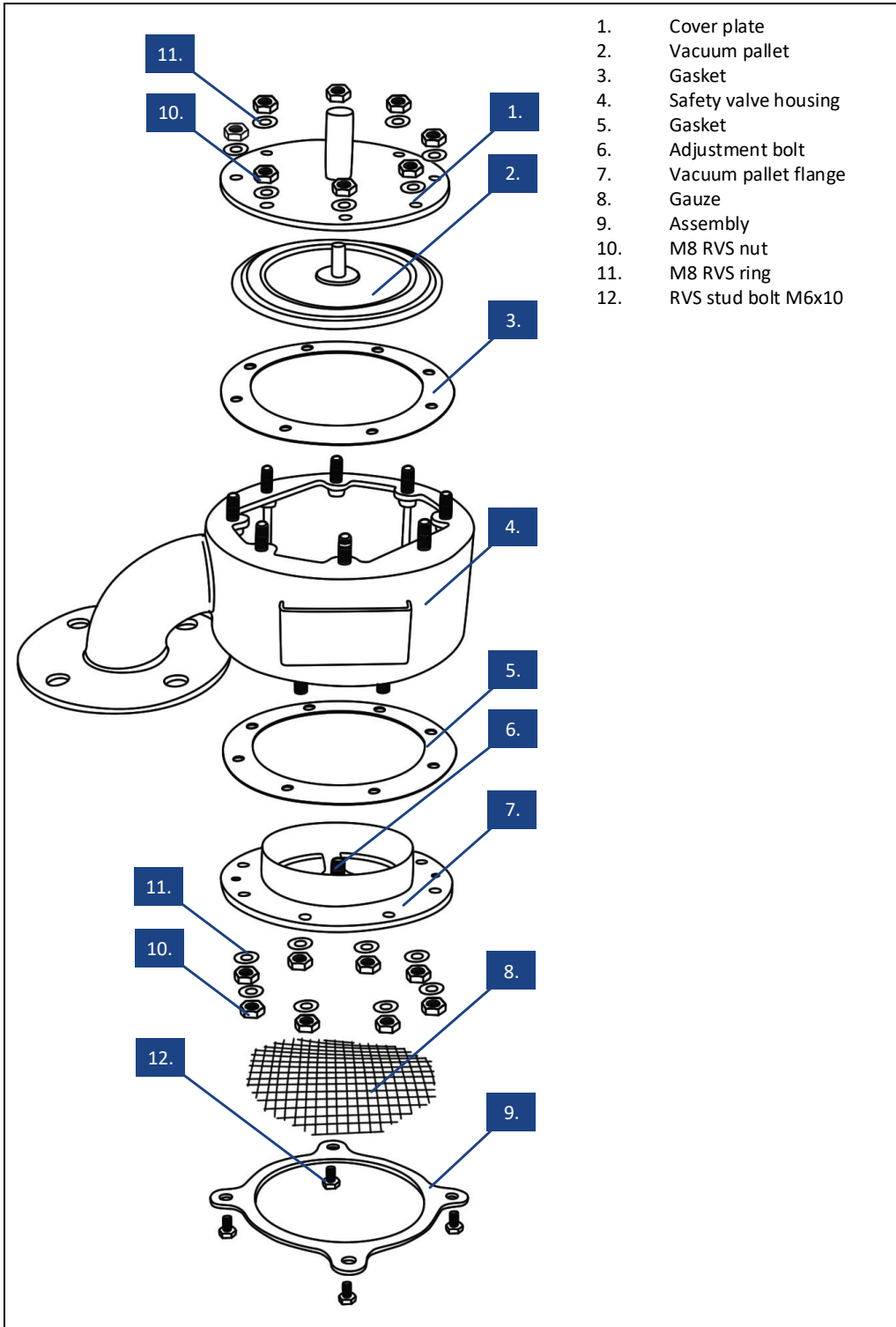


Figure 2. Vacuum safety valve

## 4. Functioning of the safety valves

### 4.1 Operation of a vacuum-overpressure safety valve

If the pressure of the nitrogen above the water rises above the maximum operating pressure for any reason, the operating pressure side of the vacuum pressure relief valve opens. This creates an open connection to the outside air. The excess nitrogen can flow away through the opening. The working pressure valve remains open until the pressure equals the operating pressure.

If the pressure keeps rising and reaches the maximum overpressure, the overpressure safety valve will also open. The vacuum relief valve remains open until the pressure falls below the maximum overpressure.

When the pressure drops and a vacuum is created between -2 and -4 mbar, the vacuum relief valve on the vacuum side opens. Due to the pressure difference between the outside and inside air, outside air flows in. The pallet is lifted until the pressure difference is equalised.

By using a PRESSCON vacuum-overpressure safety valve the possibility of an unacceptable over- or under pressure altering the lasting shape of the tank is prevented. To guarantee a correct operation of the vacuum-overpressure safety valve it is prohibited to change the lead weights in the safety valve in any way.

### 4.2 Operation of a vacuum safety valve

If water flows from the buffer tank and causes a decrease in the water level, then the water level will foremost decrease in the vacuum safety valve. If the water in the housing of the vacuum safety valve drops more, a vacuum will be created. When a vacuum exists between -2 and -2 mbar, the pallet of the seating will be lifted. This causes an open connection with the outside air. Because of the differential pressure between outside and inside, outside air will flow into the buffer tank. The differential pressure is settled. By applying a PRESSCON vacuum-overpressure safety valve the possibility of an unacceptable over- or under pressure altering the lasting shape of the tank is prevented. To guarantee a correct operation of the vacuum safety valve it is absolutely prohibited to turn the adjusting screw on the downside of the valve. The adjusting screw is adjusted and secured in the factory.

## 5. Construction

PRESSCON has aimed to make the construction of the vacuum-overpressure safety valve as simple as possible. Except for the flange for the mounting on the tank, only the gasket under the pallets is capable of leaking. A very durable rubber is chosen as the material for the gasket. As a seal between the inside and the outside, a combination of a stainless steel seating with a special rubber has been chosen. An important feature of this special rubber is its lack of permit for dirt to attach itself to the rubber. The rubber is also very heat resistant. The vacuum-overpressure and vacuum safety valve are constructed in such a way that after assembly they are completely resistant to a plurality of pressures that can occur at a vertical or horizontal buffer tank.



## 6. Mounting

### **Mounting the vacuum-overpressure safety valve**

The mounting of the vacuum-overpressure safety valve is as follows:

Make sure there are no irregularities on the flange of the vacuum-overpressure safety valve other than the placed components of the manufacturer. Loosen all the RVS nuts on the threaded ends. Place a rubber gasket of the correct dimensions on de welding flange. Place the vacuum-overpressure safety valve on the flange with the threaded ends through the holes in the welded flange. Tighten the nuts on the threaded ends. Make sure that all the nuts are all tightened even. Make sure that the connection between the welded flange and the valve is leak-proof. The valve is now company ready.

### **Mounting the vacuum safety valve**

The mounting of the vacuum safety valve is as follows:

Make sure there are no irregularities on the flange of the vacuum safety valve other than the placed components of the manufacturer. Place a rubber gasket on the welded flange. Place the vacuum safety valve on the four holes on the welded flange. Place 4 M16 bolts through the holes and place 4 M16 nuts on the bottom side. Make sure all the nuts are tightened even. Make sure that the connection between the welded flange and the valve is leak-proof. The valve is now company ready.

## 7. Test

Each PRESSCON produced vacuum-overpressure safety valve and vacuum safety valve is adjusted and tested according to the regulations. Every vacuum-overpressure safety valve or vacuum safety valve is provided with a unique serial number. The serial number is also mentioned on the test certificate. The test certificate is added to the manual.

## 8. Maintenance

Every vacuum-overpressure safety valve and vacuum safety valve has to be checked yearly to guarantee a correct operation. It is advised to let the vacuum-overpressure safety valve and the vacuum safety valve be checked once a year and revised once every two years. The vacuum-overpressure safety valve can be revised on the site by a mechanic of PRESSCON or an instructed technician. The vacuum safety valve can only be revised in the factory of PRESSCON. There is an exchange program available with revised vacuum safety valves in stock.

### 8.1 Maintenance for vacuum-overpressure safety valves

#### 8.1.1 Annual check-up of the vacuum-overpressure safety valve

To check if the vacuum-overpressure safety valve is working satisfactorily, the annual inspection should be performed according to the following work instruction.

1. Start by checking the pressure of the nitrogen blanket. This can be seen on the display of the nitrogen generator.
2. Then climb the buffer tank and check whether the safety device is blowing or not. The type plate of the safety valve indicates the operating pressure and the maximum pressure. Decide on the basis of this information if the safety valve should be blowing off or if this should be closed.



**Caution!** When opening the vacuum overpressure safety device, steam is released with a temperature of 90°C. It is recommended to wear protective gloves and additional protective clothing.

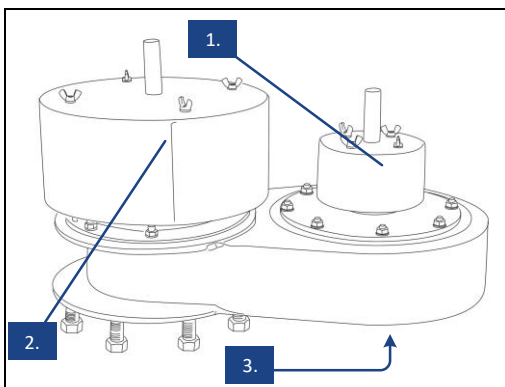
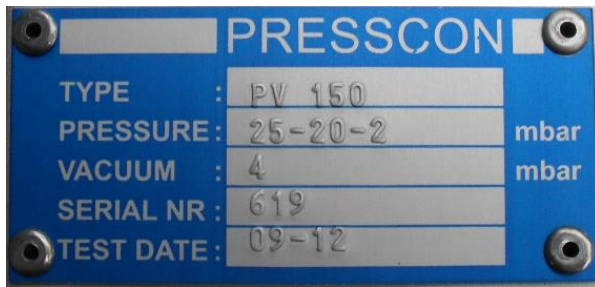


Figure 3. Vacuum-overpressure safety valve

Example: This safety valve as the pressure of "25-20-2", which means:



De smallest valve opens at	20 mbar	(Operating pressure)	(Figure 3 no. 1)
The big valve opens at	25 mbar	(Maximum pressure)	(Figure 3 no. 2)
The vacuum valve opens at	-2 mbar	(Vacuum)	(Figure 3 no. 3)

If the pressure is lower than 20 mbar the safety valve should be closed;  
 If the pressure is higher than 20 mbar the smallest valve should be open;  
 If the pressure is higher than 25 mbar the big valve should be open too.

3. Make sure the pallets (valves) of the safety valve don't clamp. If the pallets are shortly lifted by hand, they should seal off immediately and should not linger. The safety valve and the pallets can be very hot, so it might be convenient to use a tool to lift the pallets up.
4. Are the silicon rings of the pallets in order? Disassembly the safety valve according to 8.1.3 'Methods for the revision of the vacuum-overpressure safety valve.' and inspect the silicon rings on irregularities and their suppleness.

### 8.1.2 Criteria for the replacing of the vacuum and overpressure pallets.

During the check-up of the vacuum and overpressure pallets the following criteria have to be taken into account. These determine if the pallets have to be replaced or not. The pallets have to be replaced if:

1. One of the pallets doesn't seal off correctly automatically. The pallets are always replaced in a set. So the overpressure pallet, operating pressure pallet and vacuum pallet need to be renewed as a set.
2. It is contractually agreed upon that the vacuum and overpressure pallets will undergo a preventive renewal every two years. This has to be mentioned in the maintenance contract of the PRESSCON expansion system.

### 8.1.3 Methods for the revision of the vacuum-overpressure safety valve.

The vacuum-overpressure safety valve that is mounted on a vertical buffer tank can be revised on the spot according to the following work instructions. These do not apply to the vacuum safety valves on a horizontal buffer tank. For the revision of the vacuum-overpressure safety valve the pallets must be replaced. Proceed as follows:

1. Disassembly both lids (Figure 4 no. 1) of the safety valve by loosening the wing nuts on the top.
2. Depressurise the buffer tank by tilting one of the overpressure pallets (Figure 4 no. 2). This way, the nitrogen can escape from the tank. **Beware of the steam that forms by doing this! The pressure of the nitrogen blanket now turns to 0 mbar. This generates a 'Pressure Minimal' alarm on the nitrogen generator.**
3. Remove both pallets (Figure 4 no. 2) when all steam has been blown off.
4. Disassembly the cover mounted on the housing of the safety valve. (Figure 4 no. 3). This can clamp a bit because of the old gasket. The cover needs to be pried off by hand because of the risk of damage that would cause an inability to close off correctly.
5. Remove the old silicon gasket (Figure 4. no. 4) and renew the vacuum pallet (Figure 4. no. 5).
6. Place a new silicon gasket (Figure 4. no. 4) on the housing of the safety valve and mount the cover back on (Figure 4. no. 3). Tighten the nuts evenly.
7. Place new overpressure pallets (Figure 4. no. 2) and put the lead of the old pallets on the new pallets.
8. Place the lids of the safety valve (Figure 4. no. 1) back and attach it with the wing nuts.

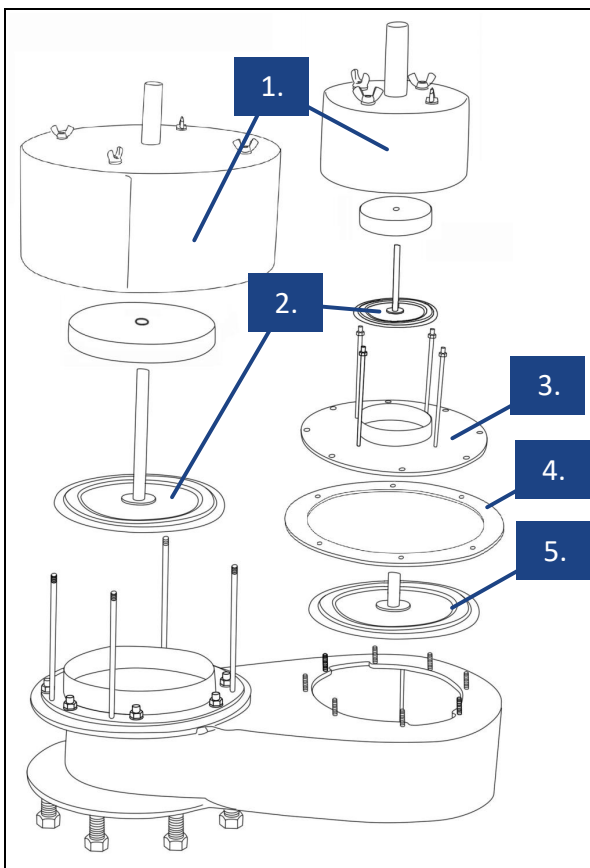


Figure 4. Vacuum-overpressure safety valve

## 8.2 Maintenance for vacuum safety valves

### 8.2.1 Annual check-up of the vacuum safety valve

To check if the vacuum safety valve works satisfactorily, an annual visual inspection needs to be conducted. The vacuum safety valve passes this visual inspection if the following criteria are met:

- The vacuum safety valve is free of leakage that would cause water to flow out of the buffer tank;
- The gaskets of the vacuum safety valve and between the safety valve and the welded flange look undamaged and do not give rise to suspected water or air leakage.

### 8.2.2 Revision of the vacuum safety valve

PRESSCON advises to let the vacuum safety valve be revised every two years. The vacuum safety valve can only be revised in the factory of PRESSCON. An exchange program with revised vacuum safety valves in stock is accessible for this. The vacuum safety valve needs to be demounted of the horizontal buffer tank. The disassembling of the old vacuum safety valve and the mounting of the revised vacuum safety valve needs to be carried out by a licensed installer that will be able to safely relieve the pressure of the buffer tank and vacuum safety valve.

## 9. Technical data

### 9.1 Technical data vacuum-overpressure safety valves

#### 9.1.1 Technical data PV 200/25/20-2

Material housing	: RVS 304
Material M16 tread ends	: RVS 304
Material nuts	: RVS 304
Material cover	: RVS 304
Material gasket	: Special rubber
Material M8 tread ends	: RVS 304
Material valve plate	: RVS 304
Material valve seat	: RVS 304
Material seal	: Special rubber
Flange connection	: DN 200 PN6 (ND6)
Treaded ends	: 8 pieces M16, including nuts
Overpressure opening	: 25 mbar(o) (1,025 bar absolute)
Operating pressure opening	: 20 mbar(o) (1,020 bar Absolute)
Opening pressure vacuum	: -2 tot – 4 mbar(o)(0,998 – 0,996 bar absolute)
Maximum temperature	: 120 C

#### 9.1.2 Technical data PV 150/25/20-2

Material housing	: RVS 304
Material M16 tread ends	: RVS 304
Material nuts	: RVS 304
Material cover	: RVS 304
Material gasket	: Special rubber
Material M8 tread ends	: RVS 304
Material valve plate	: RVS 304
Material valve seat	: RVS 304
Material seal	: Special rubber
Flange connection	: DN 150 PN6 (ND6)
Treaded ends	: 8 pieces M16, including nuts
Overpressure opening	: 25 mbar(o) (1,025 bar absolute)
Operating pressure opening	: 20 mbar(o) (1,020 bar Absolute)
Opening pressure vacuum	: -2 tot – 4 mbar(o)(0,998 – 0,996 bar absolute)
Maximum temperature	: 120 C

#### 9.1.3 Technical data PV 80/25/20-2

Material housing	: RVS 304
Material M16 tread ends	: RVS 304
Material nuts	: RVS 304
Material cover	: RVS 304
Material gasket	: Special rubber
Material M8 tread ends	: RVS 304
Material valve plate	: RVS 304
Material valve seat	: RVS 304
Material seal	: Special rubber
Flange connection	: DN 80 PN6 (ND6)
Treaded ends	: 4 pieces M16, including nuts
Overpressure opening	: 25 mbar(o) (1,025 bar absolute)
Operating pressure opening	: 20 mbar(o) (1,020 bar Absolute)
Opening pressure vacuum	: -2 tot – 4 mbar(o)(0,998 – 0,996 bar absolute)
Maximum temperature	: 120 C

## 9.2 Technical data vacuum safety valves

### 9.2.1 Technical data PV100-2-F

Material housing	: RVS 304
Material nuts	: RVS 304
Material cover	: RVS 304
Material gasket	: Special rubber
Material M8 tread ends	: RVS 304
Material valve plate	: RVS 304
Material valve seat	: RVS 304
Material seal	: Special rubber
Flange connection	: DN 100 PN6 (ND6)
Holes	: 4 pieces, suitable for M16 bolts
Continues pressure	: 1,5 bar(o) (2,5 abs.)
Maximum peak pressure	: 3 bar(o) (4 abs.)
Opening pressure vacuum	: -2 tot – 4 mbar(o)(0,998 – 0,996 bar absolute)
Maximum temperature	: 120 C

### 9.2.2 Technical data PV80-2-F

Material housing	: RVS 304
Material nuts	: RVS 304
Material cover	: RVS 304
Material gasket	: Special rubber
Material M8 tread ends	: RVS 304
Material valve plate	: RVS 304
Material valve seat	: RVS 304
Material seal	: Special rubber
Flange connection	: DN 80 PN6 (ND6)
Holes	: 4 pieces, suitable for M16 bolts
Continues pressure	: 1,5 bar(o) (2,5 abs.)
Maximum peak pressure	: 3 bar(o) (4 abs.)
Opening pressure vacuum	: -2 tot – 4 mbar(o)(0,998 – 0,996 bar absolute)
Maximum temperature	: 120 C

### 9.2.3 Technical data PV50-2-F

Material housing	: RVS 304
Material nuts	: RVS 304
Material cover	: RVS 304
Material gasket	: Special rubber
Material M8 tread ends	: RVS 304
Material valve plate	: RVS 304
Material valve seat	: RVS 304
Material seal	: Special rubber
Flange connection	: DN 50 PN 10/16
Holes	: 4 pieces, suitable for M16 bolts
Continues pressure	: 1,5 bar(o) (2,5 abs.)
Maximum peak pressure	: 3 bar(o) (4 abs.)
Opening pressure vacuum	: -2 tot – 4 mbar(o)(0,998 – 0,996 bar absolute)
Maximum temperature	: 120 C

## 10. Warranty

PRESSCON guarantees a warranty on the materials and the construction for 12 months after the selling date. This under the condition that the placement of the vacuum-overpressure safety valve or vacuum safety valve has been performed by expert and skilled personnel, in accordance with these mounting prescriptions. The installation has to be provided with correctly, and according to the prescriptions, adjusted pressure safety equipment at all times on the water side. The maximum temperature is set at 120°C. The PRESSCON vacuum-overpressure safety valves and vacuum safety valves that are applied at systems where there are impurities in the water in the form of oil and in the case of oil residue and the like in the buffer tank, and in this way are able to hinder the operation of the valves, are excluded from the warranty. It should always be ensured that the installation, including the vacuum-overpressure safety valve or vacuum safety valve, is not able to freeze.



## 11. Appendix

In addition to this document, the description of the content extends to the following appendices:

Appendix ID	Description	Version
-	-	V0.0_R00

## 12. Document history

Version **1.0** to **2.0** indicates : **Modification**, in lay-out, structure or other major modifications;

Version **1.0** to **1.1** indicates : **Supplement**, a chapter of paragraph has been added to the document;

Revision **\_R01** to **\_R02** indicates : **Correction**, an image, language error or text error has been corrected.

Version	Date	Modification
1.0_R01	15-01-2016	First concept release
	19-01-2016	Chapter 8.1.1. text under example, grammar corrected; Chapter 8.2.1. 2nd line, grammar corrected.
2.0_R00	22-03-2021	Minor textual changes. Safety warning added 8.1.1
3.0_R00	07-04-2021	New layout

### 13. To Conclude

This manual has been written in order to support the mechanic, installer or customer in adjusting, modifying or working with a product of PRESSCON. Its aim is to maintain and possibly improve the quality of its products. If additional information or support is requested then PRESSCON can be consulted through the following information.

<b>PRESSCON</b>	Tel:	<b>+31 (0) 174 648 300</b>
Veilingweg 27 A	Web:	<u><a href="http://www.presscon.nl">www.presscon.nl</a></u>
2675 BR Honselersdijk	E-mail:	<u><a href="mailto:info@presscon.nl">info@presscon.nl</a></u>