

# Installation, Operating & Maintenance Instructions

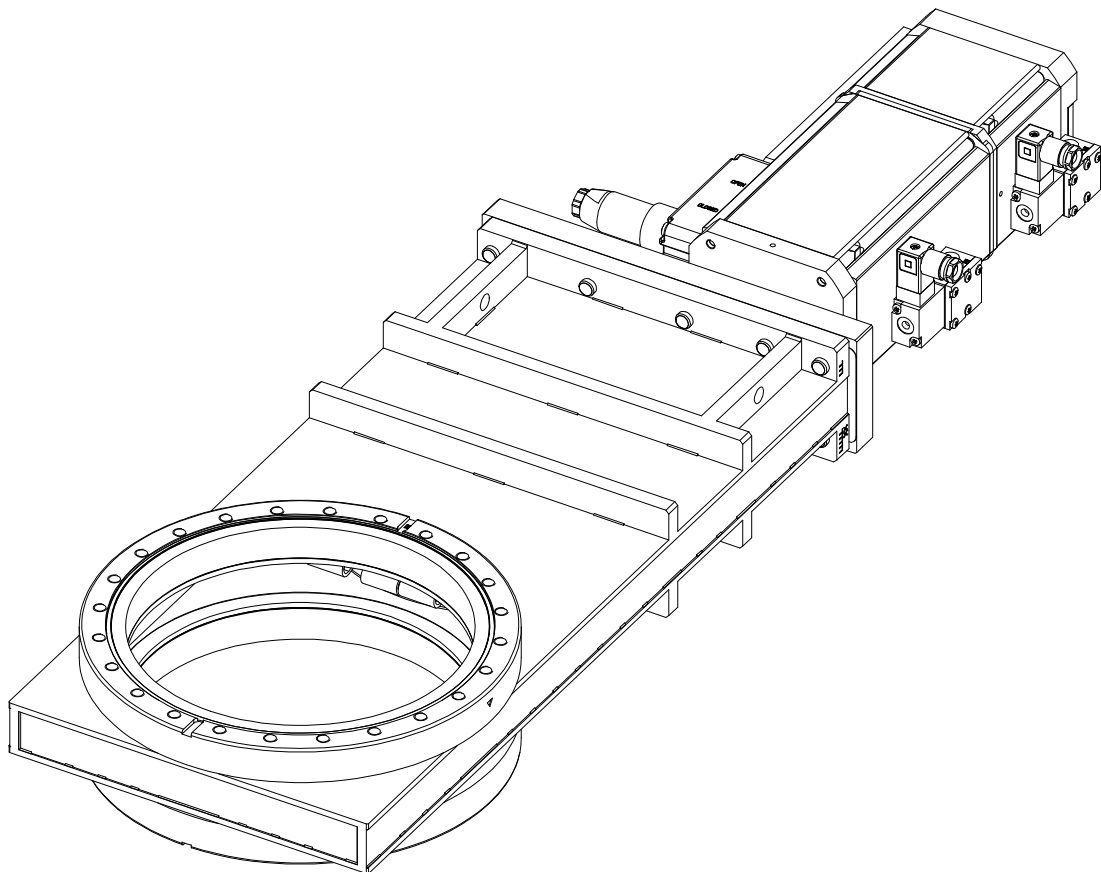
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## UHV gate valve with 3-position pneumatic actuator

**Series 108**  
**DN 63 – 200 mm (I. D. 2½ – 8")**

This manual is valid for the following product ordering number/s:  
**108 . . . E28/48**



Sample picture

## Imprint

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## Contents

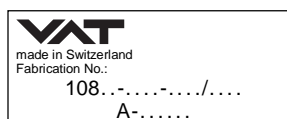
<b>1</b>	<b>Description of product.....</b>	<b>5</b>
1.1	Identification of product.....	5
1.2	Use of product.....	5
1.3	Related documents.....	5
1.4	Important information.....	5
1.5	Technical data.....	5
<b>2</b>	<b>Safety .....</b>	<b>6</b>
2.1	Compulsory reading material.....	6
2.2	Danger levels .....	6
2.3	Personnel qualifications.....	7
2.4	Safety labels.....	7
<b>3</b>	<b>Design and Function.....</b>	<b>8</b>
3.1	Design.....	8
3.2	Function .....	8
<b>4</b>	<b>Installation .....</b>	<b>9</b>
4.1	Unpacking .....	9
4.2	Installation into the system.....	9
4.2.1	Admissible forces and bending moments .....	11
4.3	Compressed air connection .....	12
4.4	Electrical connection.....	12
<b>5</b>	<b>Operation .....</b>	<b>13</b>
5.1	Normal operation.....	13
5.2	Operation under increased temperature.....	13
5.3	Behavior in case of compressed air pressure drop.....	13
5.4	Behavior in case of power failure .....	13
5.4.1	Manual emergency operation.....	13
5.5	Trouble shooting.....	14
<b>6</b>	<b>Maintenance .....</b>	<b>15</b>
6.1	Maintenance intervals.....	15
6.2	Required tools .....	15
6.3	Adjustment of the intermediate position .....	16
6.4	Replacement of valve gate / mechanism unit .....	18
<b>7</b>	<b>Repairs .....</b>	<b>23</b>
<b>8</b>	<b>Dismounting and Storage.....</b>	<b>24</b>
8.1	Dismounting .....	24
8.2	Storage .....	25
<b>9</b>	<b>Packaging and Transport .....</b>	<b>26</b>
9.1	Packaging .....	27
9.2	Transport.....	27
<b>10</b>	<b>Disposal .....</b>	<b>28</b>

<b>11</b>	<b>Spare parts</b> .....	<b>29</b>
<b>12</b>	<b>Appendix</b> .....	<b>30</b>

# 1 Description of product

## 1.1 Identification of product

The fabrication number and order number are fixed on the product directly or by means of an identification plate.



← Fabrication number

← Order number

## 1.2 Use of product

Use product for clean and dry vacuum applications only. Other applications are only allowed with the written permission of VAT.

## 1.3 Related documents

- Product data sheet
- Dimensional drawing

## 1.4 Important information



This symbol points to a very important statement that requires particular attention.

### Example:



VAT disclaims any liability for damages resulting from inappropriate packaging.

## 1.5 Technical data

See product data sheet and dimensional drawing.

## 2 Safety

### 2.1 Compulsory reading material

Read this chapter prior to performing any work with or on the product. It contains important information that is significant for your own personal safety. This chapter must have been read and understood by all persons who perform any kind of work with or on the product during any stage of its serviceable life.

	NOTICE
	<p><b>Lack of knowledge</b>            Failing to read this manual may result in property damage.            Firstly, read manual.</p>



These Installation, Operating & Maintenance Instructions are an integral part of a comprehensive documentation belonging to a complete technical system. They must be stored together with the other documentation and accessible for anybody who is authorized to work with the system at any time.

### 2.2 Danger levels



	⚠ DANGER
	<p><b>High risk</b>            Indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>

	⚠ WARNING
	<p><b>Medium risk</b>            Indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>

	⚠ CAUTION
	<p><b>Low risk</b>            Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.</p>

	NOTICE
	<p><b>Command</b>            Indicates a hazardous situation which, if not avoided, may result in property damage.</p>

## 2.3 Personnel qualifications

	 <b>WARNING</b>
	<p><b>Unqualified personnel</b>            Inappropriate handling may cause serious injury or property damage.            Only qualified personnel are allowed to carry out the described work.</p>

## 2.4 Safety labels


Label	Part No.	Location on valve
	T-9001-156	Protective cover

Table 2-1

### 3 Design and Function

#### 3.1 Design

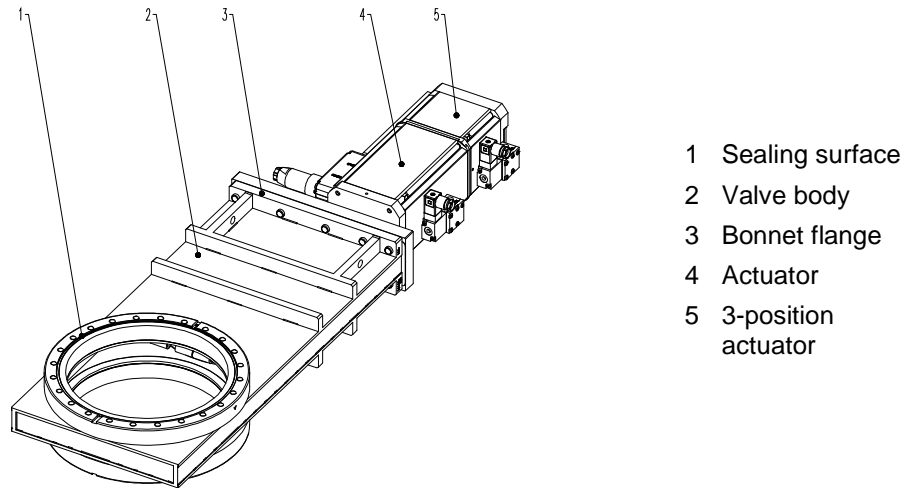


Figure 3-1

#### 3.2 Function

The valve features the VATLOCK sealing technology. This means, the valve is mechanically locked in the closed position. In the open position, the mechanism is not locked. Leaf springs hold gate and counter plate against the carriage with the ball retainers. The ball pairs are in the detents. For closing, the mechanism is moved forward into the closing position. The locking starts after the leaf spring stop touches the body. The ball retainers move the ball pairs out of the detents. Gate and counter plate are spread apart. The gate seal is pressed against the sealing surface without scuffing. The arrangement of the ball pairs ensures an increase of the sealing force with vacuum on either side of the gate. During opening the movements proceed in the reverse order. See «Figure 3-2».

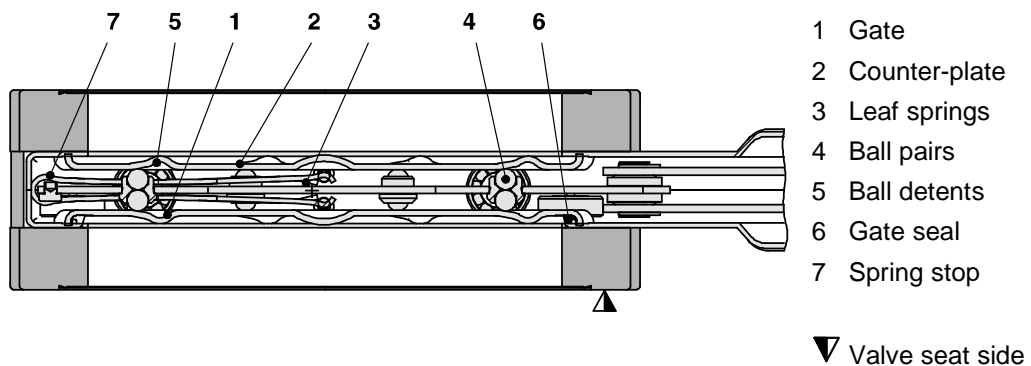



Figure 3-2



## 4 Installation


	<b>⚠ WARNING</b>
	<p><b>Unqualified personnel</b> Inappropriate handling may cause serious injury or property damage. Only qualified personnel are allowed to carry out the described work.</p>


### 4.1 Unpacking




- Make sure that the supplied products are in accordance with your order.
- Inspect the quality of the supplied products visually. If it does not meet your requirements, please contact VAT immediately.
- Store the original packaging material. It may be useful if products must be returned to VAT.

### 4.2 Installation into the system

	<b>⚠ WARNING</b>
	<p><b>Movable parts</b> Human body parts may get jammed and severely injured. Do not connect or supply electrical power and compressed air before the product is completely mounted in the system.</p>

	<b>NOTICE</b>
	<p><b>Contamination</b> Product may get contaminated. Always wear cleanroom gloves when handling the product.</p>

	<b>NOTICE</b>
	<p><b>Inappropriate tools</b> Sealing surfaces may get damaged. Do not use sharp-edged tools.</p>

<b>NOTICE</b>	
	<p><b>Wrong tightening torque</b></p> <p>Valve body and screws may get damaged. Use tightening torque according the size of the screws.</p>

<b>NOTICE</b>	
	<p><b>Too long screws</b></p> <p>Valve body may get deformed and / or malfunctions may occur. Use only screws recommended by VAT.</p>

1. Identify flange type according the fabrication number on the identification plate; see chapter «1.1 Identification of product».

Example: 108... – C... / ... = Flange type CF-F, metric thread

Valve			Maximum screw-in depth «X» in mm				
			Flange types				
Nom. I. D. mm	inch		<b>C</b>	<b>U</b>	<b>P</b>	<b>J</b>	<b>T</b>
63	2½	X =	13	13	13	13	15
100	4	X =	13	13	13	13	15
160	6	X =	13	13	13	13	15
200	8	X =	13	13	15	15	19
			C = CF-F, metric thread		P = ISO-F	T = ASA-LP	
			U = CF-F, UNF thread		J = JIS		

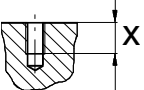


Table 4-1

2. Remove protective covers from body flanges.
3. Clean sealing surfaces and seals of both flanges; see (1) and (2) according to «Figure 4-1» on page 11.



The valve seat side is marked with the symbol «∇» on flange «A».

4. Put valve to the mounting position.
5. Mount the four screws (3) according to «Figure 4-1» on page 11, evenly in crosswise order until the seal touches the sealing surface.

6. Tighten all screws with the torques appropriate for their property classes.

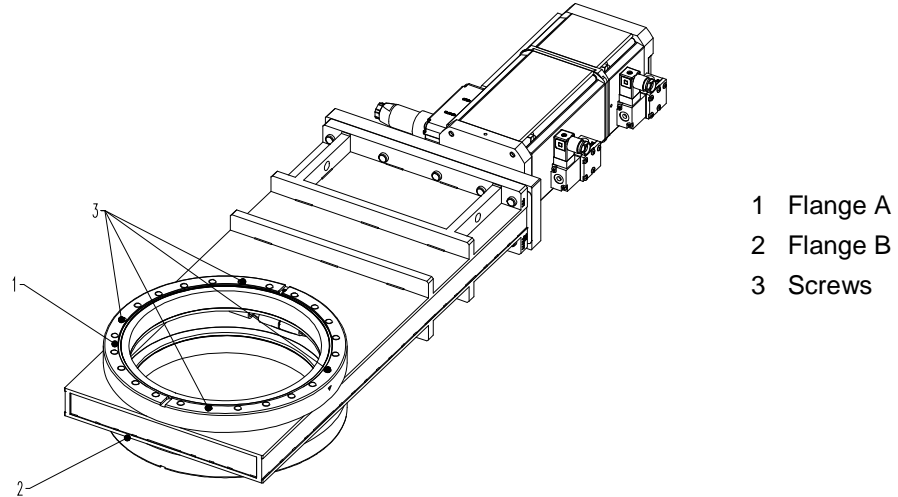


Figure 4-1

#### 4.2.1 Admissible forces and bending moments



Forces from evacuating the system, from the weight of other components or from baking can lead to deformation of the valve body and to malfunction of the valve. The stress has to be relieved by suitable means, e.g. bellows sections.

The following forces or moments are admissible:

DN (nom. I.D.)		Axial tensile or compressive force «FA»		Bending moment «M»	
mm	inch	N	lbf	Nm	lbf · ft
63	2½	2000	448	80	59
100	4	2500	560	100	74
160	6	3000	672	150	110
200	8	3000	672	150	110
If a combination of both forces («FA» and «M») occurs, the values mentioned above are invalid. Please contact VAT for more information.					

The diagram shows a vertical valve stem assembly. A solid arrow labeled 'FA' points to the left, representing axial force. A dashed curved arrow labeled 'M' indicates a bending moment around the stem.

Table 4-2

### 4.3 Compressed air connection

	<b>WARNING</b>
	<p><b>Valve in open position</b>            Risk of injury when compressed air is connected to the valve.            Connect compressed air only when:</p> <ul style="list-style-type: none"> <li>- valve is installed in the vacuum system</li> <li>- moving parts cannot be touched</li> </ul>

Use clean, dry or slightly oiled air only.

Admissible air pressure range, see product data sheet.

1. Connect compressed air according to the product data sheet and dimensional drawing.

### 4.4 Electrical connection

	<b>DANGER</b>
	<p><b>Electric shock</b>            Parts being under voltage will result in serious injury or death.            Do not touch parts being under voltage.</p>

	<b>NOTICE</b>
	<p><b>Wrong voltage</b>            Electrical components may get damaged.            Supply electrical components with the correct voltage.</p>

1. Connect solenoid valve according to the product data sheet and dimensional drawing.
2. Connect position indicator according to the product data sheet and dimensional drawing.
3. Connect heater (option) according to the product data sheet and dimensional drawing.

## 5 Operation



### **WARNING**

#### **Unqualified personnel**

Inappropriate handling may cause serious injury or property damage.  
Only qualified personnel are allowed to carry out the described work.



### **WARNING**

#### **Movable parts**

Human body parts may get jammed and severely injured.  
Do not operate before product is installed completely into the vacuum system.

### 5.1 Normal operation

Valve is opened and closed pneumatically.

### 5.2 Operation under increased temperature

Maximum allowed temperature, see product data sheet.

**Note:** After bake-out check and re-torque the bonnet screws.

### 5.3 Behavior in case of compressed air pressure drop

See product data sheet.

### 5.4 Behavior in case of power failure

See product data sheet.

#### 5.4.1 Manual emergency operation



### **WARNING**

#### **Movable parts**

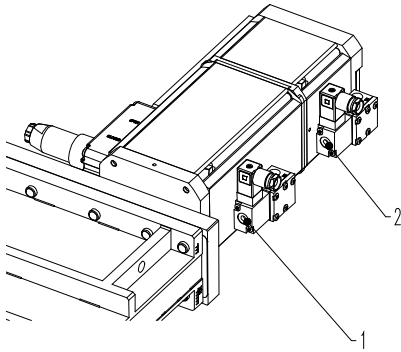
Human body parts may get jammed and severely injured.  
Keep human body parts away from movable parts.



Only valid for the ordering number 108...-..48 (with solenoid valve)

In case of a power failure, the valve can be actuated manually if compressed air is available.

**Standard solenoid valve**



**Press push-button 1 + 2:**  
valve opens

**Release push-button 1 + 2:**  
valve closes

**Press only push-button 1:**  
valve gate moves to the intermediate position

Figure 5-1

**5.5 Trouble shooting**

Failure	Check	Action	See
Valve does not close / open	Air pressure	Connect compressed air	«4.3 Compressed air connection»
	Operating pressure	Adjust operating pressure	Product data sheet
	Voltage at solenoid valve	Connect voltage	«4.4 Electrical connection»
Leak at gate	Gate seal all right?	Replace valve gate	«6.4 Replacement of valve gate / mechanism unit»
	Gate damaged or contaminated?	Replace valve gate	«6.4 Replacement of valve gate / mechanism unit»
	Operating pressure	Adjust operating pressure	Product data sheet
Leak at body	Bonnet seal and sealing surface all right?	Clean sealing surface – if necessary, replace bonnet seal	«6.4 Replacement of valve gate / mechanism unit», steps 1 to 6
	Bellows all right?	Contact VAT	www.vatvalve.com

Table 5-1

If you need any further information, please contact one of our service centers. You will find the addresses on our website [www.vatvalve.com](http://www.vatvalve.com).

## 6 Maintenance

	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>Unqualified personnel</b> Inappropriate handling may cause serious injury or property damage. Only qualified personnel are allowed to carry out the described work.</p>
	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>Hazardous components</b> Human body parts may get jammed and severely injured. Before starting maintenance: – disconnect compressed air supply – disconnect electrical power supply</p>
	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>Movable parts</b> Human body parts may get jammed and severely injured. Keep human body parts away from movable parts.</p>

### 6.1 Maintenance intervals

Under clean operating conditions the valve does not require any maintenance during 50 000 cycles. After 50 000 cycles, VAT recommends replacing the mechanism unit; see chapter «6.4 Replacement of valve gate / mechanism unit».

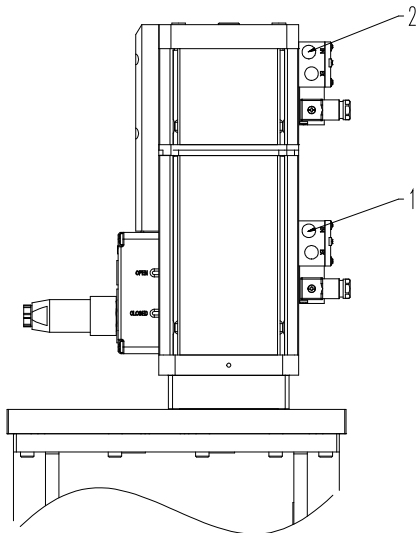
For more information or a general overhaul please contact one of our service centers. You will find the addresses on our website [www.vatvalve.com](http://www.vatvalve.com).

### 6.2 Required tools

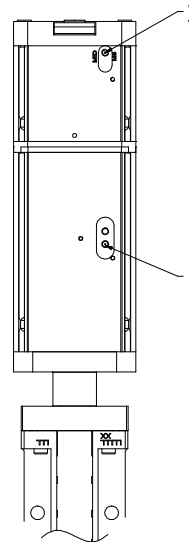
- Tool Ø6 – Ø10 mm
- Torque wrench 20 Nm / 45 Nm
- Cleanroom wiper soaked with alcohol (2% methyl ethyl ketone)

### 6.3 Adjustment of the intermediate position

With solenoid valves



Without solenoid valves



Adjustment screw position

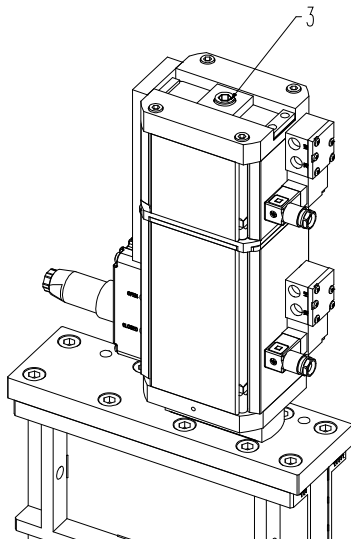


Figure 6-1



### Adjustments with solenoid valves

1. Activated solenoid valve (1); see «Figure 6-1» on page 16.
2. De-activated solenoid valve (2).
3. Adjust the intermediate position by turning the adjustment screw (3).

### Adjustments without solenoid valves

1. Supply compressed air to the “OPEN” port (1).
2. Supply compressed air to the “MID” port (2).
3. Adjust the intermediate position by turning the adjustment screw (3).






It may happen that the carrier nut inside the actuator disengages from the adjustment screw (3). This can happen when:

- 1 The supplied compressed air pressure is not as specified; see product data sheet and dimensional drawing.
- 2 The adjustment screw (3) is still being turned in counter-clockwise direction after the mechanism has reached the closed position.

Follow the instructions below in order to recapture the carrier nut:

1. Supply 1 bar / 15 psig of compressed air to the “OPEN” port (1)
2. Turn the adjustment screw (3) in clockwise direction until the carrier nut is completely recaptured (VAT recommend to carry out 20 full turns!).
3. Adjust the intermediate position according to chapter «6.3 Adjustment of the intermediate position».

## 6.4 Replacement of valve gate / mechanism unit

	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>Loaded spring steel sheet</b> Human body parts may get jammed and severely injured. Do not put human body parts between valve gate and spring steel sheet.</p>
	<p style="text-align: center;"><b>NOTICE</b></p> <p><b>Contamination</b> Product may get contaminated. Always wear cleanroom gloves when handling the product.</p>
	<p style="text-align: center;"><b>NOTICE</b></p> <p><b>Inappropriate tools</b> Sealing surfaces may get damaged. Do not use sharp-edged tools.</p>

1. Vent chambers on either side to atmospheric pressure.
2. Open the valve.
3. Disconnect compressed air supply.
4. Disconnect electrical power supply.
5. Remove screws (1) according to «Figure 6-2» on page 19.
6. Withdraw actuator / mechanism unit carefully from body without touching the body wall; see «Figure 6-2» on page 19.
7. Standard vulcanized gate seal: continue with step 9
8. **Option:** Gate seal with O-ring (follow the below steps)
  - Remove gate seal from groove, use O-ring removal tool
  - Check and clean sealing surface of valve seat
  - Install new gate seal
  - Press O-ring uniformly in crosswise order (diagonal) into groove
  - Insert actuator / mechanism unit in reverse order
9. Remove locking ring (5) according to «Figure 6-3» on page 19.
10. Withdraw bolt (4) by pulling it downwards according to «Figure 6-3» on page 19.

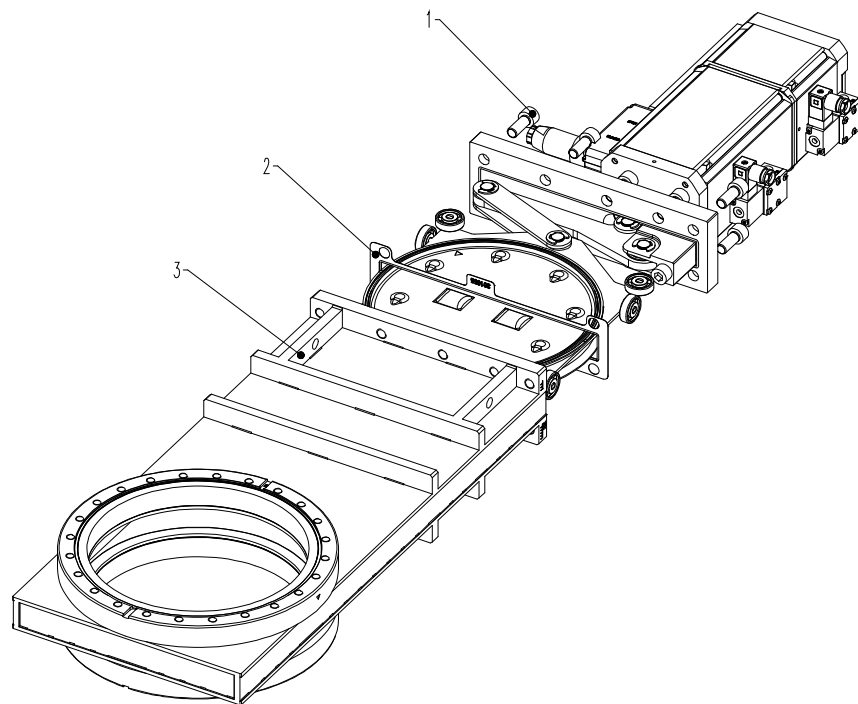


Figure 6-2

- 1 Screw
- 2 Bonnet seal
- 3 Valve body

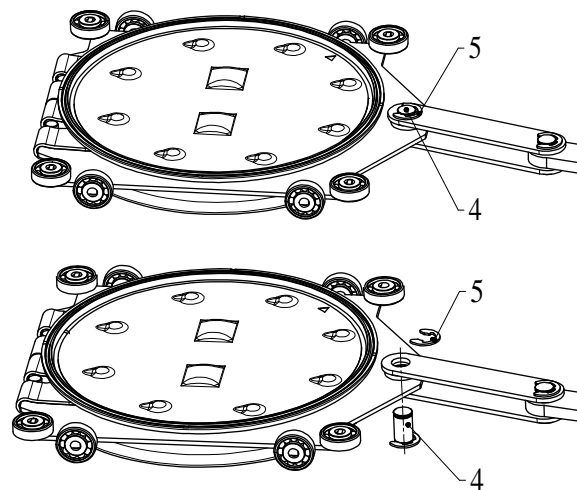


Figure 6-3

- 4 Bolt
- 5 Locking ring

11. Put valve gate and ball guidance to the horizontal position so that the locking balls cannot escape.



For dismounting and mounting the valve gate always use tool (1) according to «Figure 6-4». The tool may be ordered from VAT.  
For details see chapter «11 Spare parts».

12. Lift valve gate (2) by hand and insert tool (1) between valve gate (2) and ball guidance (3); see «Figure 6-4» and «Figure 6-5» on page 21.
13. Remove valve gate in direction of the arrow; see «Figure 6-4» on page 20.

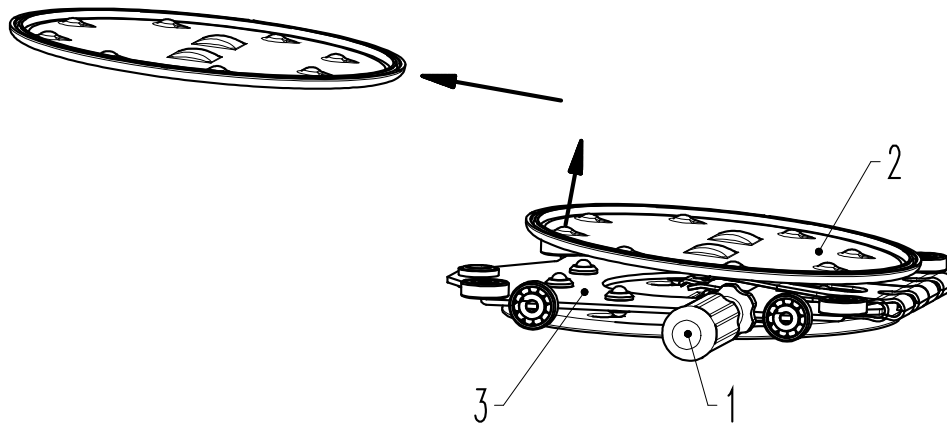


Figure 6-4

- 1 Tool; see chapter «11 Spare parts»
- 2 Valve gate
- 3 Ball guidance

14. Insert new valve gate in reverse order.



The markings  $\Delta$  and  $\nabla$  (2) according to «Figure 6-5» on page 21 on ball guidance and valve gate must face each other.

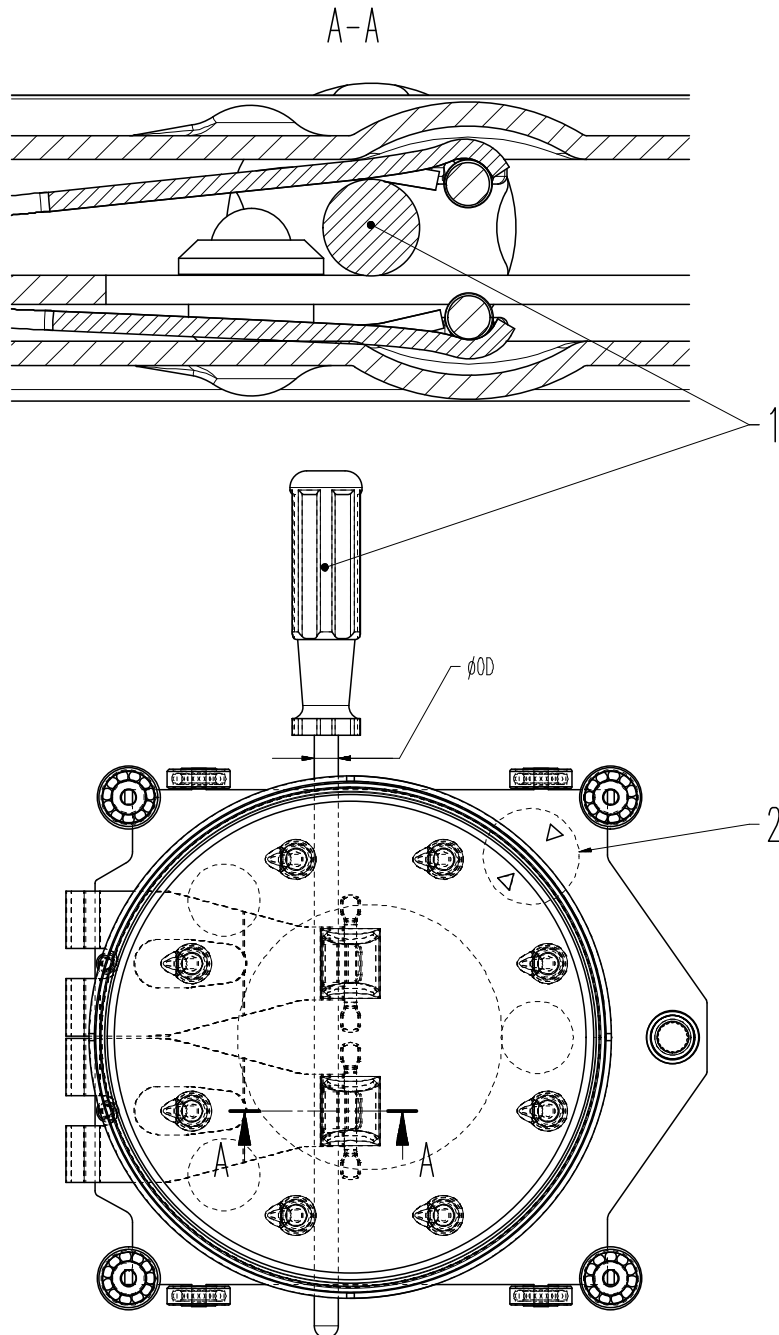


Figure 6-5

- 1 Tool; see chapter «11 Spare parts»
- 2 Markings

15. Withdraw tool according to «Figure 6-4» on page 20.
16. Mount bolt (4) according to «Figure 6-3» on page 19.
17. Mount locking ring (5) according to «Figure 6-3» on page 19.
18. Clean sealing surface of bonnet flange, use cleanroom wiper.
19. Replace bonnet seal.
20. Insert actuator / mechanism unit into body without touching the body wall.
21. Mount screws (1) according to «Figure 6-2» on page 19.



Tighten screws in crosswise order with the following torques:

DN 63 – 160	20 Nm / 15 lbf·ft
DN 200	45 Nm / 33.5 lbf·ft

22. Connect electrical power supply.
23. Connect compressed air supply.

Valve is ready for use.



## 7 Repairs

Repairs may only be carried out by the VAT service staff. In exceptional cases, the customer is allowed to carry out the repairs, but only with the prior consent of VAT.

Please contact one of our service centers. You will find the addresses on our website [www.vatvalve.com](http://www.vatvalve.com).

## 8 Dismounting and Storage

	<b>WARNING</b>
	<p><b>Unqualified personnel</b>                  Inappropriate handling may cause serious injury or property damage.                  Only qualified personnel are allowed to carry out the described work.</p>

	<b>WARNING</b>
	<p><b>Hazardous components</b>                  Human body parts may get jammed and severely injured.                  Before dismantling the product</p> <ul style="list-style-type: none"> <li>– disconnect compressed air supply</li> <li>– disconnect electrical power supply</li> </ul>

	<b>WARNING</b>
	<p><b>Movable parts</b>                  Human body parts may get jammed and severely injured.                  Keep human body parts away from movable parts.</p>

	<b>NOTICE</b>
	<p><b>Contamination</b>                  Product may get contaminated.                  Always wear cleanroom gloves when handling the product.</p>


### 8.1 Dismounting


	<b>NOTICE</b>
	<p><b>Valve in open position</b>                  Valve mechanism may get damaged if valve is in open position.                  Close valve before dismantling the valve from the system.</p>

1. Close valve.
2. Carry out the steps according to chapter «4 Installation» in reverse order.  
 Pay attention to the safety instructions!



## 8.2 Storage

<b>NOTICE</b>	
	<p><b>Wrong storage</b></p> <p>Inappropriate temperatures and humidity may cause damage to the product.</p> <p>Valve must be stored at:</p> <ul style="list-style-type: none"><li>– relative humidity between 10% and 70%</li><li>– temperature between +10 °C and +50 °C</li><li>– non-condensing environment</li></ul>

<b>NOTICE</b>	
	<p><b>Inappropriate packaging</b></p> <p>Product may get damaged if inappropriate packaging material is used.</p> <p>Always use the original packaging material and handle product with care.</p>

1. Clean / decontaminate valve.
2. Cover all valve openings with a protective foil.
3. Pack valve appropriately by using the original packaging material.

## 9 Packaging and Transport

	⚠ WARNING
	<p><b>Unqualified personnel</b>                  Inappropriate handling may cause serious injury or property damage.                  Only qualified personnel are allowed to carry out the described work.</p>


	⚠ WARNING
	<p><b>Harmful substances</b>                  Risk of injury in case of contact with harmful substances.                  Remove harmful substances (e. g. toxic, caustic or microbiological ones) from valve before you return the valve to VAT.</p>

	NOTICE
	<p><b>Inappropriate packaging</b>                  Product may get damaged if inappropriate packaging material is used.                  Always use the original packaging material and handle product with care.</p>



- When returning products to VAT, please fill out the VAT form «Declaration of Chemical Contamination» and send it to VAT in advance. The form can be downloaded from our website [www.vatvalve.com](http://www.vatvalve.com).
- If products are radioactively contaminated, the VAT form «Contamination and Radiation Report» must be filled out. Please contact VAT in advance.
- If products are sent to VAT in contaminated condition, VAT will carry out the decontamination procedure at the customer's expense.

## 9.1 Packaging


<b>NOTICE</b>	
	<p><b>Valve in open position</b> Valve mechanism may get damaged if valve is in open position. Make sure that the valve is closed.</p>

1. Cover all valve openings with a protective foil.
2. Pack valve appropriately, by using the original packaging material.



VAT disclaims any liability for damages resulting from inappropriate packaging.

## 9.2 Transport

<b>NOTICE</b>	
	<p><b>Inappropriate packaging</b> Product may get damaged if inappropriate packaging material is used. Always use the original packaging material and handle product with care.</p>



VAT disclaims any liability for damages resulting from inappropriate packaging.

## 10 Disposal

Observe the local regulations for disposal

	<b>WARNING</b>
	<p><b>Harmful substances</b>            Environmental pollution.            Discard products and parts according to the local regulations.</p>

	<b>WARNING</b>
	<p><b>Unqualified personnel</b>            Inappropriate handling may cause serious injury or property damage.            Only qualified personnel are allowed to carry out the disposal.</p>

	<b>NOTICE</b>
	<p><b>Improper disposal</b>            Some built-in materials can cause damage, if improperly handled.            - When disposing, take into account all the different materials used</p>



- Hire an authorised waste disposal company to dispose of the waste in a professional manner.

## 11 Spare parts



### NOTICE

#### Non-original spare parts

Non-original spare parts may cause damage to the product.  
Use original spare parts from VAT only.



- Please specify the fabrication number of the product when you place an order for spare parts; see chapter «1.1 Identification of product». This is to ensure that the appropriate spare parts are supplied.
- VAT makes a difference between spare parts that may be replaced by the customer and those that need to be replaced by the VAT service staff.
- «Table 11-1» only contains spare parts that may be replaced by the customer. If you need any other spare parts, please contact one of our service centers. You will find the addresses on our website [www.vatvalve.com](http://www.vatvalve.com).

Description	Part No.	Quantity per valve	Maintenance procedure see chapter
Bonnet seal (Item 2 as per «Figure 6-2», page 19)	On request	1	«6.4 Replacement of valve gate / mechanism unit»
Gate with vulcanized seal	On request	1	«6.4 Replacement of valve gate / mechanism unit»
Mechanism, completely	On request	1	«6.4 Replacement of valve gate / mechanism unit»
Tool Ø6 mm	434168	1	«6.4 Replacement of valve gate / mechanism unit»
Tool Ø8 mm	434164	1	«6.4 Replacement of valve gate / mechanism unit»
Tool Ø10 mm	419421	1	«6.4 Replacement of valve gate / mechanism unit»
O-ring removal tool	234859	1	«6.4 Replacement of valve gate / mechanism unit»

Table 11-1

## 12 Appendix