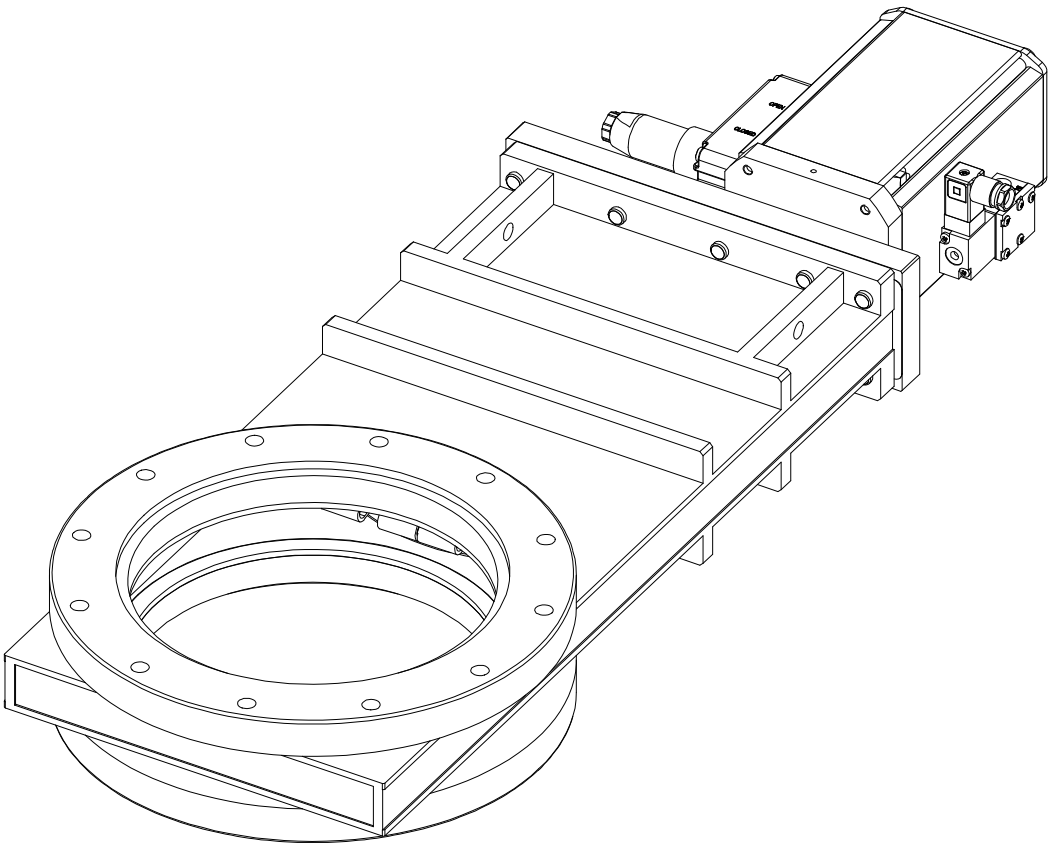
Installation, Operating & Maintenance Instructions

UHV gate valve
with pneumatic actuator

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

This manual is valid for the following product ordering numbers:
108 . . - . E14 / 24 / 34 / 44



Sample picture

Imprint

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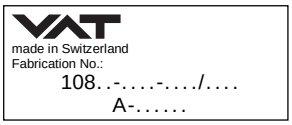
Contents

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

Lack of knowledge

Failing to read this manual may result in property damage.

Firstly, read manual.

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

High risk

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Medium risk

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Low risk

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Command

Indicates a hazardous situation which, if not avoided, may result in property damage.

2.3 Personnel qualifications

⚠ WARNING

Unqualified personnel

Inappropriate handling may cause serious injury or property damage.

Only qualified personnel are allowed to carry out the described work.

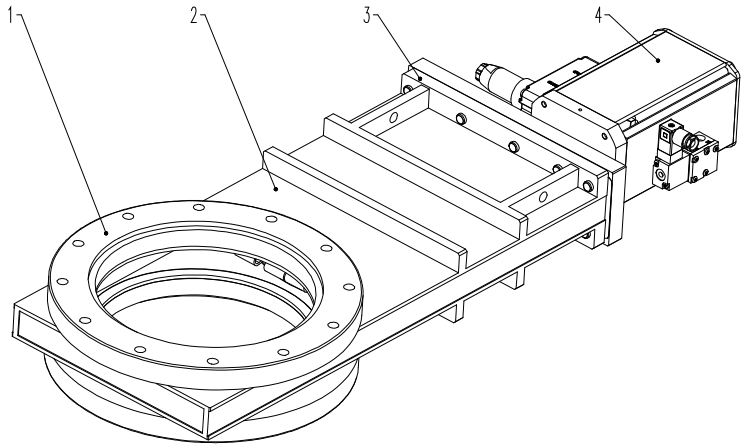
2.4 Safety labels

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

Table 2-1

3 Design and Function

3.1 Design

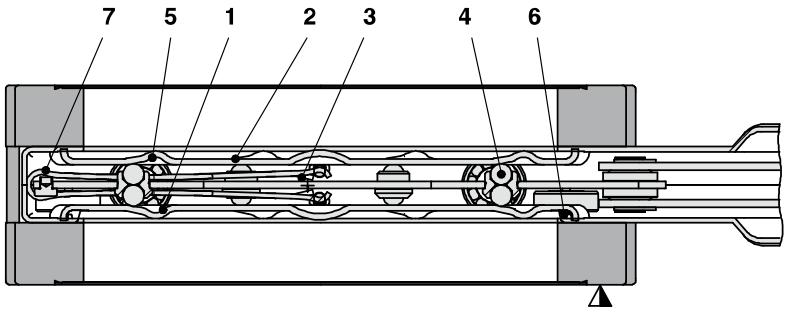


1 Sealing surface
2 Valve body
3 Bonnet flange
4 Actuator

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».



1 Gate
2 Counter-plate
3 Leaf springs
4 Ball pairs
5 Ball detents
6 Gate seal
7 Spring stop

▼ Valve seat side

Figure 3-2

4 Installation

⚠ WARNING

Unqualified personnel

Inappropriate handling may cause serious injury or property damage.

Only qualified personnel are allowed to carry out the described work.

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

⚠ WARNING

Movable parts

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.

NOTICE

Contamination

Product may get contaminated.

Always wear cleanroom gloves when handling the product.

NOTICE

Inappropriate tools

Sealing surfaces may get damaged.

Do not use sharp-edged tools.

NOTICE

Wrong tightening torque

Valve body and screws may get damaged.

Use tightening torque according the size of the screws.

NOTICE

Too long screws

Valve body may get deformed and / or malfunctions may occur.

Use only screws recommended by VAT.

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

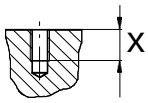
Valve			Maximum screw-in depth «X» in mm 				
Nom. I.D.			Flange types				
mm	inch		**C**	**U**	**P**	**J**	**T**
63	2½	X =	13	13	13	13	15
100	4	X =	13	13	13	13	15
160	6	X =	13	13	13	13	15
200	8	X =	13	13	15	15	19
			C = CF-F, metric thread U = CF-F, UNF thread		P = ISO-F J = JIS		T = ASA-LP

Table 4-1

2. Remove protective covers from body flanges.

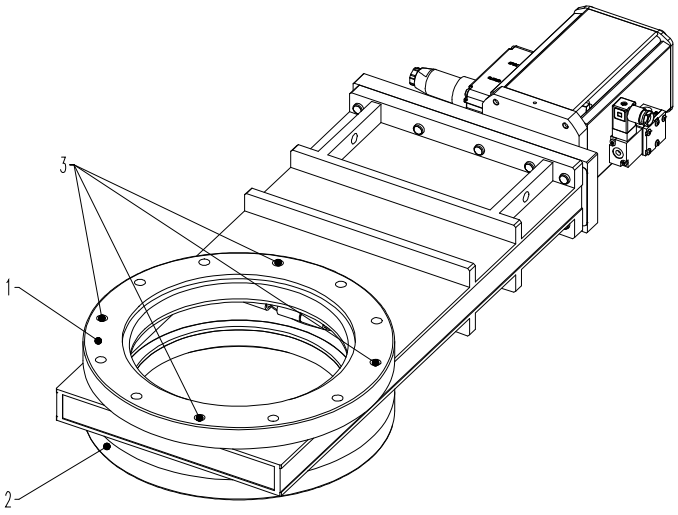
3. Clean sealing surfaces and seals of both flanges;
   see (1) and (2) according to «Figure 4-1» on page 10.

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 10, evenly in crosswise order until the seal touches the sealing surface.

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



1 Flange A
2 Flange B
3 Screws

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:

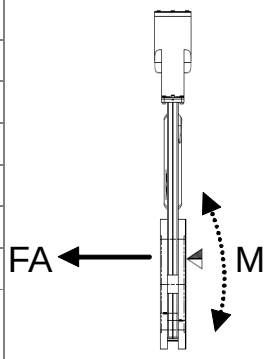
DN (nom. I.D.)		Axial tensile or compressive force «FA»		Bending moment «M»		
mm	**inch**	**N**	**lbf**	**Nm**	**lbf · ft**	
63	2½	2000	448	80	59	
100	4	2500	560	100	74	
160	6	3000	672	150	110	
200	8	3000	672	150	110	
If a combination of both forces («FA» and «M») occurs, the values mentioned above are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

Table 4-2

4.3 Compressed air connection

⚠ WARNING

Valve in open position

Risk of injury when compressed air is connected to the valve.

Connect compressed air only when:
– valve is installed in the vacuum system
– moving parts cannot be touched

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

⚠ DANGER

Electric shock

Parts being under voltage will result in serious injury or death.

Do not touch parts being under voltage.

NOTICE

Wrong voltage

Electrical components may get damaged.

Supply electrical components with the correct voltage.

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

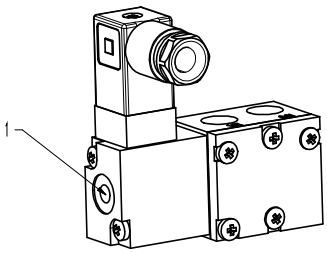
Human body parts may get jammed and severely injured.

Keep human body parts away from movable parts.

Only valid for the ordering number 108..-..**34**/**44 (**with solenoid valve)

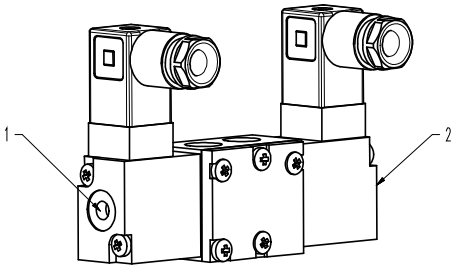
In case of a power failure, the valve can be actuated manually if compressed air is available.

Standard solenoid valve



Press push-button (1): valve opens
Release push-button (1): valve closes

Solenoid valve for impulse actuation (option)



Press push-button (1): valve opens
Press push -button (2): valve closes

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	«6.3 Replacement of valve gate (O-ring) / mechanism unit»
	Gate damaged or contaminated?	Replace valve gate	«6.3 Replacement of valve gate (O-ring) / 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	«6.3 Replacement of valve gate (O-ring) / 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.

6 Maintenance

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

	**⚠ WARNING** **Hazardous components** Human body parts may get jammed and severely injured. Before starting maintenance: – disconnect compressed air supply – disconnect electrical power supply

	**⚠ WARNING** **Movable parts** Human body parts may get jammed and severely injured. Keep human body parts away from movable parts.

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 «6.3 Replacement of valve gate (O-ring) / 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.

6.2 Required tools

- Tool Ø6 – Ø10mm; see chapter «11 Spare parts»
- Torque wrench 20 Nm / 45 Nm
- O-Ring removal tool for gates with O-ring (option); see chapter «11 Spare parts»
- Cleanroom wiper soaked with alcohol (2% methyl ethyl ketone)

6.3 Replacement of valve gate (O-ring) / mechanism unit

⚠ WARNING

Loaded spring steel sheet

Human body parts may get jammed and severely injured.

Do not put human body parts between valve gate and spring steel sheet.

NOTICE

Contamination

Product may get contaminated.

Always wear cleanroom gloves when handling the product.

NOTICE

Inappropriate tools

Sealing surfaces may get damaged.

Do not use sharp-edged tools.

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 6-1» on page 16.
6. Withdraw actuator / mechanism unit carefully from body without touching the body wall; see «Figure 6-1» on page 16
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 6-2» on page 16.
10. Withdraw bolt (4) by pulling it downwards according to «Figure 6-2» on page 16.

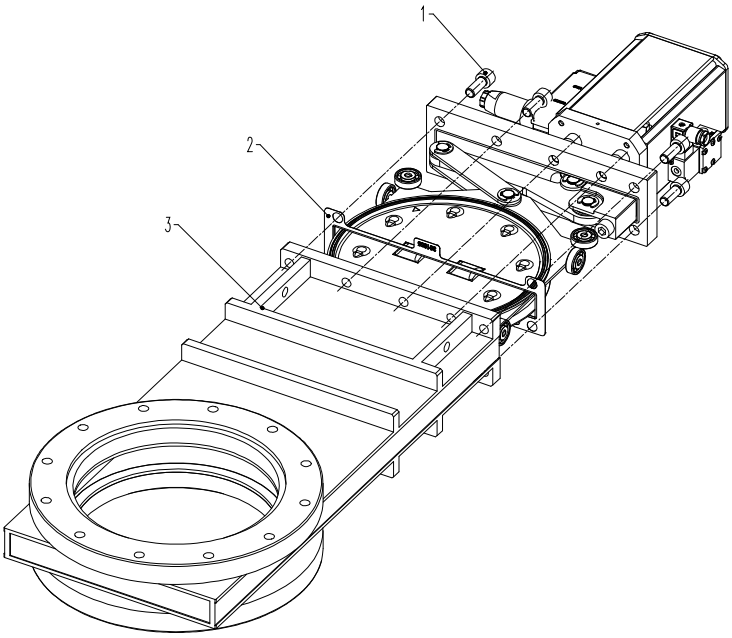


Figure 6-1

1 Screw
2 Bonnet seal
3 Valve body

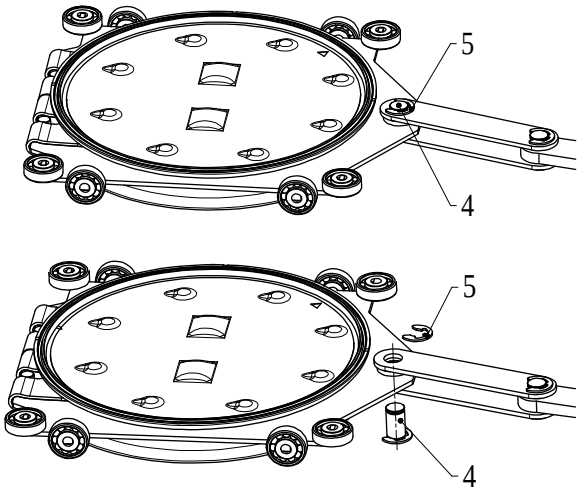


Figure 6-2

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 6-3». 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 6-3» on page 17 and «Figure 6-4» on page 18.

13. Remove valve gate in direction of the arrow; see «Figure 6-3» on page 17.

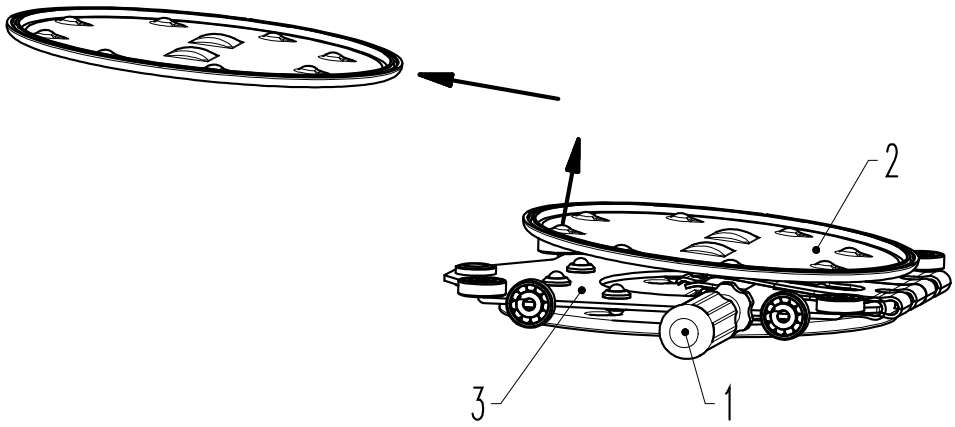


Figure 6-3

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

14. Insert new valve gate in reverse order.

The markings Δ and ∇ (2) according to «Figure 6-4» on page 18 on ball guidance and valve gate must face each other.

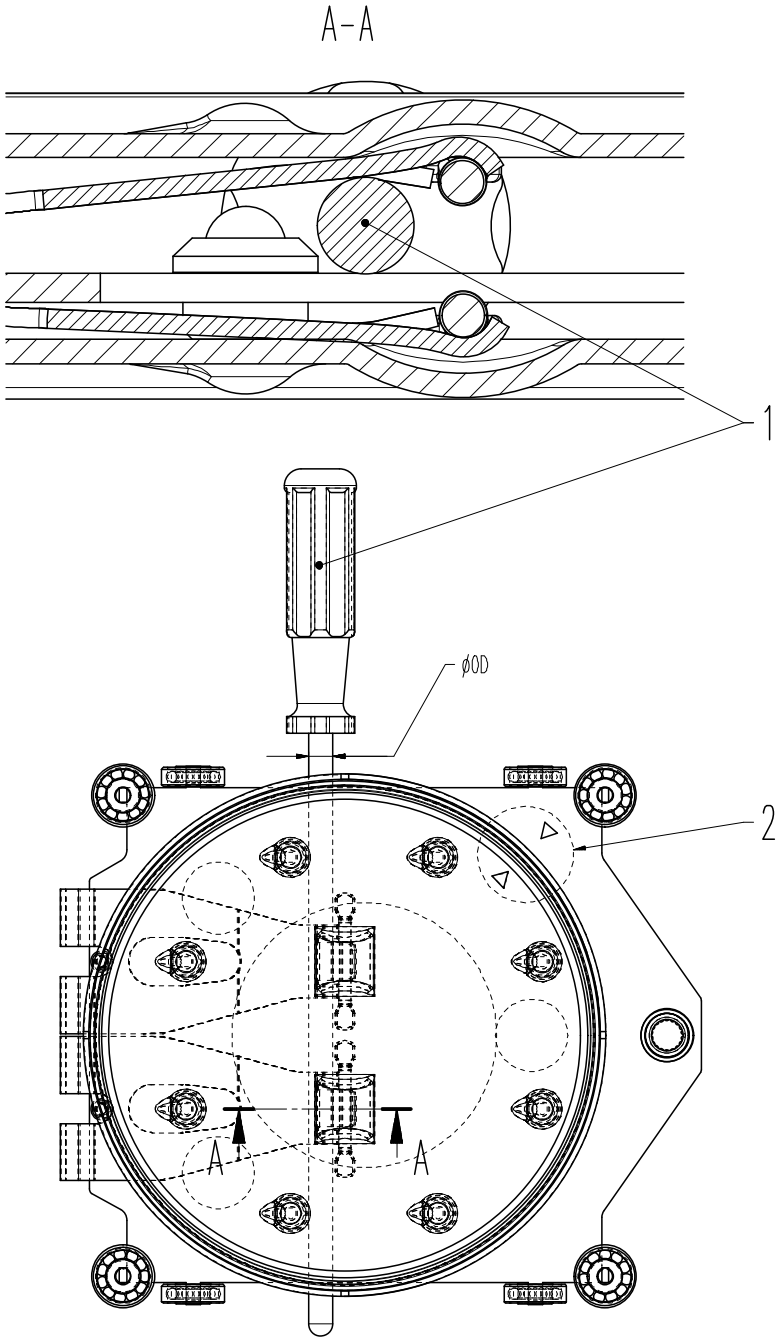


Figure 6-4

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

15. Withdraw tool according to «Figure 6-3» on page 17.
16. Mount bolt (4) according to «Figure 6-2» on page 16.
17. Mount locking ring (5) according to «Figure 6-2» on page 16.
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 6-1» on page 16.

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.

8 Dismounting and Storage

⚠ WARNING

Unqualified personnel

Inappropriate handling may cause serious injury or property damage.

Only qualified personnel are allowed to carry out the described work.

⚠ WARNING

Hazardous components

Human body parts may get jammed and severely injured.

Before dismounting the product
– disconnect compressed air supply
– disconnect electrical power supply

⚠ WARNING

Movable parts

Human body parts may get jammed and severely injured.

Keep human body parts away from movable parts.

NOTICE

Contamination

Product may get contaminated.

Always wear cleanroom gloves when handling the product.

8.1 Dismounting

NOTICE

Valve in open position

Valve mechanism may get damaged if valve is in open position.

Close valve before dismounting the valve from the system.

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

NOTICE

Wrong storage

Inappropriate temperatures and humidity may cause damage to the product.

Valve must be stored at:
– relative humidity between 10% and 70%
– temperature between +10 °C and +50 °C
– non-condensing environment

NOTICE

Inappropriate packaging

Product may get damaged if inappropriate packaging material is used.

Always use the original packaging material and handle product with care.

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

Unqualified personnel

Inappropriate handling may cause serious injury or property damage.

Only qualified personnel are allowed to carry out the described work.

⚠ WARNING

Harmful substances

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.

NOTICE

Inappropriate packaging

Product may get damaged if inappropriate packaging material is used.

Always use the original packaging material and handle product with care.

- 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.
- 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

NOTICE

Valve in open position

Valve mechanism may get damaged if valve is in open position.

Make sure that the valve is closed.

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

NOTICE

Inappropriate packaging

Product may get damaged if inappropriate packaging material is used.

Always use the original packaging material and handle product with care.

VAT disclaims any liability for damages resulting from inappropriate packaging.

10 Disposal

Observe the local regulations for disposal

WARNING

Harmful substances

Environmental pollution.

Discard products and parts according to the local regulations.

WARNING

Unqualified personnel

Inappropriate handling may cause serious injury or property damage.

Only qualified personnel are allowed to carry out the disposal.

CAUTION

Risk of damage

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury. A large number of diverse materials are used in the product. Some of them could cause human and machine damage in the case of improper handling.

- Observe local regulations in regard to waste disposal without fail.
- Commission an authorized waste disposal company for the professional disposal of your waste.

NOTICE

Improper disposal

Some built-in materials can cause damage, if improperly handled**.**

- When disposing, take into account all the different materials used

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

The following list should help you to dismantle your product without making serious errors and to properly separate out the product scrap.

Material groups	Hazard level
non-ferrous metals	high
stainless steel	low
aluminium	low
plastics	medium
lubricants	high
electronic scrap	high
batteries	very high
cables and wires	medium
motors	medium
seals and rubber parts	high

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.

Description	Part No.	Quantity per valve	Maintenance procedure see chapter
Bonnet seal (Item 2 as per «Figure 6-1», page 16	On request	1	«6.3 Replacement of valve gate (O-ring) / mechanism unit»
Gate with vulcanized seal	On request	1	«6.3 Replacement of valve gate (O-ring) / mechanism unit»
Mechanism, completely	On request	1	«6.3 Replacement of valve gate (O-ring) / mechanism unit»
Optional: O-ring	On request	1	«6.3 Replacement of valve gate (O-ring) / mechanism unit»
Tool Ø6 mm DN 63 - 100	434168	1	«6.3 Replacement of valve gate (O-ring) / mechanism unit»
Tool Ø8 mm DN 160	434164	1	«6.3 Replacement of valve gate (O-ring) / mechanism unit»
Tool Ø10 mm DN 200	419421	1	«6.3 Replacement of valve gate (O-ring) / mechanism unit»
O-ring removal tool	234859	1	«6.3 Replacement of valve gate (O-ring) / mechanism unit»

Table 11-1