

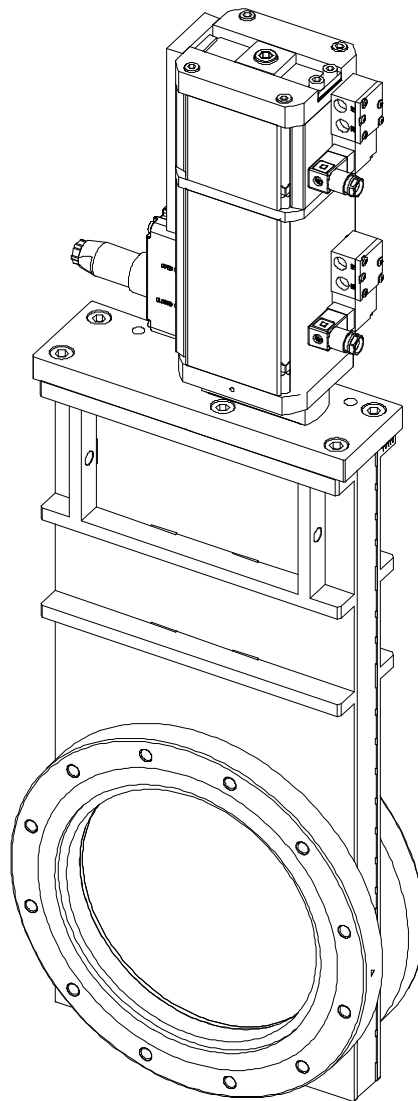
Translation of Installation- Operating- and Maintenance instruction



HV-Gate valve

Solenoid and position indicator, 11146-PE48

250 mm / 10"



Publication details

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1 General information

This document contains the original Assembly and Operating Instructions (AOI).

1.1 Scope of delivery

The scope of delivery corresponds to your order with VAT Vakuumventile AG. When you receive your order, check it against your order list. If you find discrepancies between what was ordered and delivered, contact VAT Vakuumventile AG. Publication details [▶ 2]

The scope of delivery of your order always includes the ordered product, the assembly and operating instructions and the safety data sheet.

1.2 Other applicable documents

The following documents belong to the product and must be observed:

- Product data sheet
- Product drawings





1.3 Typographical conventions

1.3.1 Important information

 This icon indicates important and useful information.

1.3.2 Danger levels

To avoid injury and equipment damage, you must observe the warning and safety information in the instructions. The warnings describe the following danger levels:

	⚠ DANGER
	Situations which, if not avoided, will lead directly to death or serious injury.
	⚠ WARNING
	Situations which, if not avoided, could lead to death or serious injury.
	⚠ CAUTION
	Situations which, if not avoided, could lead to moderately serious or slight injury.
	NOTICE
	Situations which, if not avoided, could lead to equipment damage.

1.4 Forwarding

This document is part of the product and if the product is forwarded, the document must also be forwarded to the product recipient.

If the product becomes part of a machine as a result of installation on or combination with other parts, or by another method, this document must also be forwarded when the machine is sold. The only circumstance in which forwarding is not required is if all relevant parts of this document are included in the documentation accompanying the new machine. In the two latter cases, the machine manufacturer, not the manufacturer of this product, is legally responsible for the safety and for the content and scope of the instructions accompanying the machine.

1.5 Document number and index

The cover sheet includes the document number and indexing as well as the product definition and document type. The document number consists of at least 6 and at most 7 numbers. The index consists of 2 letters.

Example:

1234567DA

The document number allows the documentation to be assigned to the product. The index indicates the language and version.

Version Language	A	B	C	D	E	F	G	...
German	DA	DB	DC	DD	DE	DF	DG	D...
English	EA	EB	EC	ED	EE	EF	EG	E...

Table 1: Index explanation

2 Safety

2.1 Intended use and purpose

This gate valve is a plate-sealed, pneumatically operated gate valve for UHV applications. The gate separates different vacuum areas from each other.


The gate valve has position indicators for the positions Open and Close. It is particularly suitable for pumping down and venting high vacuum applications. For the gate valve to achieve its maximum lifetime, the gate valve should be used for clean and dry vacuum applications in a commercial environment.

- The product is intended solely as a component for further use in a commercial context.
- The product may only be operated under the technical conditions described in this documentation.
- The product may only be operated under the environmental conditions described in this documentation. Technical data [▶ 10]
- Examine the product prior to use and never operate if visibly damaged.
- Never technically modify the product.
- Never operate the product if it has not been completely installed.
- Only connect and disconnect plug-in connections when the power is off.

2.2 Predictable misuse and improper use

Any use of the product that does not comply with the intended use, be this intentional or negligent, is forbidden by the manufacturer.

2.3 Personal protective equipment

 Personal protective equipment is not included in the scope of delivery.

To ensure the product is not contaminated or damaged, VAT recommends that the operator provides at least the following personal protective equipment for work with and on the product. If further protective clothing is required as a result of a special use of the product, the operator is responsible for making this known.





	Wear antistatic shoes
	Wear protective clothing
	Use gloves
	Use a hairnet

Table 2: Personal protective equipment

2.4 Operator's obligations

The operator of the plant is responsible for observing the safety regulations. Unqualified staff working on the product or located in danger zones can cause risks that could lead to serious injury.

- Have all activities carried out by qualified staff.
 - Qualified staff are those people authorized to operate devices, systems and electrical circuits in accordance with safety standards.
- Keep unqualified staff away from danger zones.
- Make sure that everybody who works on or with the product has read and understood the document.
- Make sure that safety information is observed.
- File this document together with the documentation of the entire plant and ensure that it can be accessed at all times.
- This document is part of the product and must be forwarded together with the product.
- Note the relevant accident protection regulations and the recognized local safety rules.
- Provide the necessary personal protective equipment.
- Provide possibilities for ESD measures.

2.5 Staff obligations

To avoid equipment damage and injury when handling the product, staff are obliged to:

- ▶ Read the operating instructions and in particular follow the safety information.
- ▶ Note the relevant accident protection regulations and the other generally recognized safety rules.
- ▶ Wear the necessary personal protective equipment.

2.6 Standards and directives

This product meets the requirements of the following standards and directives.

- The product meets the protection requirements of 2014/35/EU: Low-Voltage Directive.
- Commissioning or proper operation of a machine containing the product is forbidden until it can be demonstrated that the machine meets the requirements of EC Directive 2006/42/EC: Machinery Directive; note EN 60204-1.
- Commissioning or proper operation of a machine containing the product is only permitted if the EMC Directive 2014/30/EU is complied with in conjunction with EN 61000-6-4: 2007 Electromagnetic Compatibility (EMC) Emission standard for industrial environments and EN 61000-6-2: 2005 Electromagnetic Compatibility (EMC) Immunity for industrial environments (IEC 77/488/CDV: 2015).
- The product meets the requirements of Directive 2011/65/EU RoHS 3: Restriction of Hazardous Substances.

2.7 Damage to the product

2.7.1 Electrostatic discharge

Electrostatic discharge can cause injury and can damage electronic parts of the product.

- ▶ Provide a suitable possibility for electrostatic discharge.
- ▶ Carry out all work on the control and actuation unit under ESD-protected conditions.

2.7.2 Connections

Incorrectly connected cables can cause damage to the product and disrupt the voltage supply.

- ▶ Follow the instructions in the document when connecting the cables.

- ▶ Note the wiring diagrams.


2.7.3 Sparks

If plug connectors are connected and disconnected when the power is on, connector pins and electronic parts can be damaged by sparks.

- ▶ Do not plug in or remove connectors when the power is on.

2.7.4 Product contamination

To ensure correct operation of the product, the product must be protected from contamination.

 Personal protective equipment is not included in the scope of delivery.

- ▶ When working on and with the product, wear clean-room gloves.

2.7.5 Hazardous materials

Improper handling of hazardous materials can cause injury and harm the environment.

- ▶ Remove, for example, any toxic, corrosive or microbiological hazardous materials before you send the product to VAT.
- ▶ Dispose of the product correctly; see section Disposal [▶ 26].

2.7.6 Sealant sticking

Raised temperatures in the range from room temperature to the maximum permissible temperature may cause the plate seal to stick on the seat. This may cause damage to the seal or it may cause the valve to fail. It is advisable to bake out in an open position or to open the valve after it has heated up, even when hot.

If FFKM seals are used, the valve must be opened after heating up, even when hot.

2.8 Product handling

2.8.1 Moving parts

Moving parts of the product can cause serious injury.

- ▶ Make sure that moving parts cannot be touched.
- ▶ Make sure that the opening is free as soon as the product is connected to a supply line.
- ▶ Do not connect the product to the supply line until it has been completely installed.

2.8.2 Unsuitable packaging

Unsuitable packaging material can cause product contamination.

- ▶ Keep the original packaging material.
- ▶ Use the original packaging material during transport and storage.
- ▶ Handle the product with care.

3 Technical data

3.1 Valve

Drive	pneumatic, double acting, with 3-position actuator
Feedthrough	Bellows
Flange type	ISO-F
Nominal diameter (DN)	200 mm
Valve body leak rate [20 °C]	$< 1 \cdot 10^{-9}$ mbar ls-1
Valve seat leak rate [20 °C]	$< 1 \cdot 10^{-9}$ mbar ls-1
Pressure range (abs.)	1 · 10 ⁻⁸ mbar to 1.6 bar (abs)
Differential pressure on the plate in closing direction	≤ 1.6 bar
Differential pressure while opening	≤ 30 mbar
Conductance (molecular flow)	12 200 l/s
Cycles until maintenance interval	200 000
Operating temperature of housing	≤ 150 °C
Operating temperature of drive	≤ 120 °C
Operating temperature of position indicator	≤ 80 °C
Operating temperature of control valve	≤ 50 °C
Heating and cooling rate	≤ 50 °C h ⁻¹
Valve housing	AISI 316L (1.4404), AISI 304 (1.4301)
Plate	AISI 316L (1.4404), AISI 304 (1.4301)
Bellows	AISI 316L (1.4404, 1.4435)
Socket for drive rod	Hydrocarbonate
Housing seal	FKM
Seat seal	FKM
Drive flange seal	FKM, NBR
Assembly position	Any
Operating pressure	4 – 7 bar / 58 – 102 psi
Compressed air connection	G $\frac{1}{8}$ " ($\frac{1}{8}$ " NPT for USA)
Plate movement closing time	2 s
Weight	36 kg / 79.5 lbs

Response in the event of loss of compressed air

Valve open	Undefined
Valve closed	Valve remains closed
Valve in center position	Undefined

Response in the event of loss of voltage

Valve open	Valve closes
Valve closed	Valve remains closed
Valve in center position	Valve closes

3.2 Control valve

Type	4/2
Max. voltage	Defined by order

3.3 Position indicator

Max. current	1.2 A
Type	Micro switch
Max. voltage	≤ 50 V AC / DC

4 Design and function

4.1 Type label

The article and serial number and the order number are indicated on the product or on a type label.

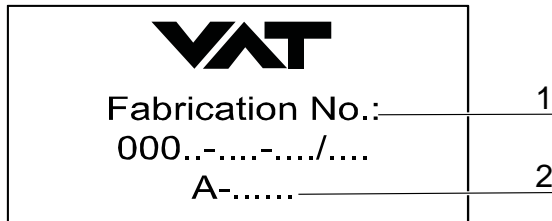
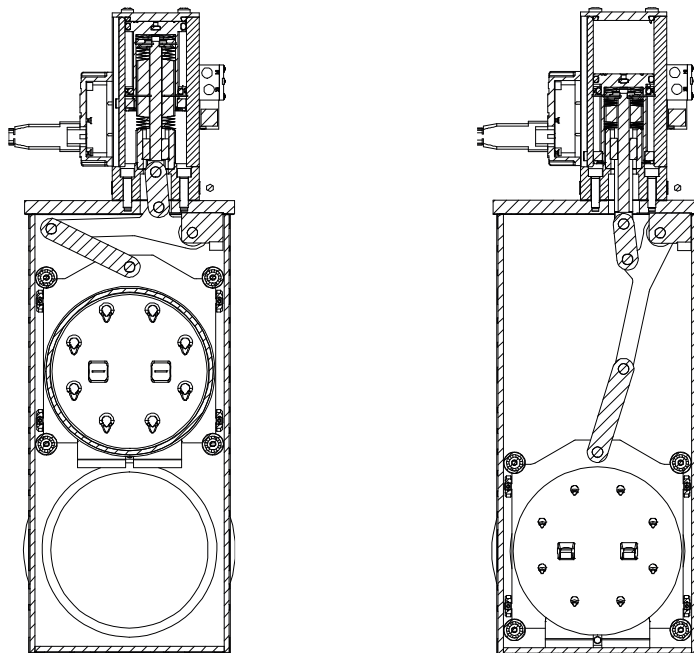


Illustration 1: Type label

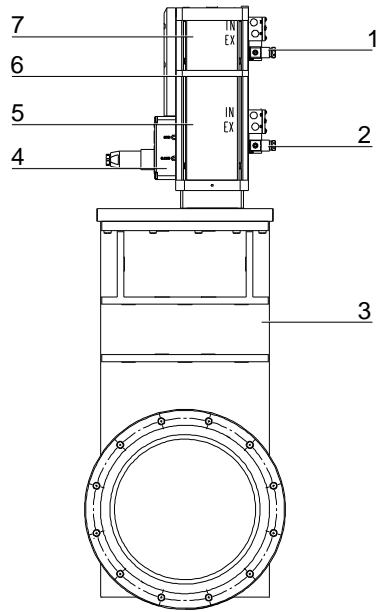
- 1 Article and serial number
- 2 Order number

4.2 Principle of operation

The drive moves the plate into the Open, into the Close position or into the freely definable position. It is not possible to regulate the gas flow..



4.3 Valve structure



- 1 Compressed air connection
- 2 Compressed air connection
- 3 Housing
- 4 Position indicator

- 5 Drive
- 6 Flange
- 7 Control valve


5 Electrical installation and assembly

5.1 Unpacking

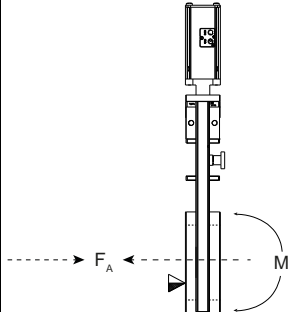
i If the product or packaging shows damage, then photograph the damage and the type plate and report the damage to the VAT Service Center.

1. Check whether the packaging is damaged. If it is, report this to VAT.
2. Make sure that the protective sleeves are not damaged.
3. Remove the packaging material.
4. Check whether the delivered product and its components match the purchase order.
5. Check whether the product is damaged. If it is, report this to VAT.
6. Fasten the lifting device to the anchor points. See scale drawing.
7. Lift the product out of the packaging.

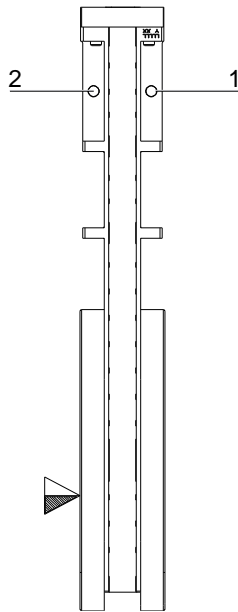
5.2 Mounting valve

	⚠ CAUTION
	<p>Risk of injury caused by heavy load! Lifting heavy loads may lead to injury.</p> <p>► Use suitable hoisting gear.</p>

Mount the valve in the vacuum system in such a way that the valve seat side faces the process chamber. The valve seat side is indicated with the symbol Δ on the flange.

DN		Tensile and compressive force F_A		Torque M		
mm	Inch	N	lbf	Nm	Lbs. ft	
200	8	3000	672	150	110	

Use ring bolts as lifting eyes to position the product.



5.3 Connecting compressed air supply

With control valve

An exhaust line is not required.

1. Connect compressed air at the IN connection.

Without control valve

1. Connect compressed air at the Open and Close connections.

Control valve delivered separately

Compressed air connection on the pneumatic cylinder:

✓ Control valve mounted.

1. Remove the two sealing plugs at «A» and «B».
- ⇒ Compressed air at connection <A>: Valve opens.
 - ⇒ Compressed air at connection : Valve closes.

See also

Moving parts [► 9]

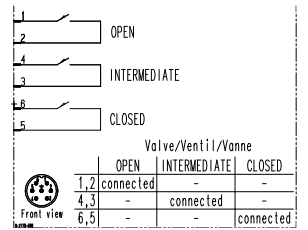
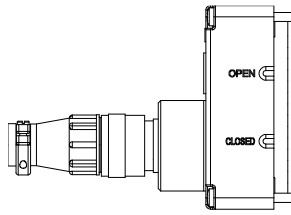
5.4 Electrical installation

	NOTICE
	<p>Damage to electronic components as a result of insufficient ESD measures</p> <p>The electronic components no longer work.</p> <ul style="list-style-type: none"> ▶ Ensure potential equalization before working on the product.

Position indicator

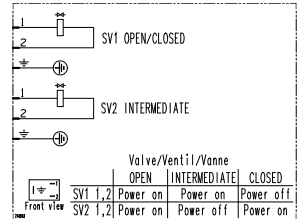
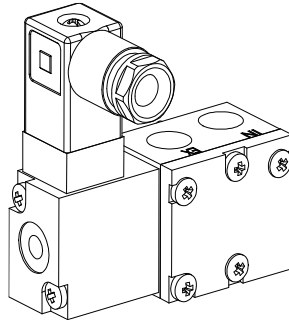
The product has a position indicator to display the Open, Close and Intermediate positions.

1. Connect the cable to the position indicator.



Control valve

The product has two control valves to move to the Open, Close and Intermediate positions.



See section Moving parts [► 9].

5.5 Installation clearances

During installation, ensure there is sufficient clearance. This ensures there is enough space for connections and air circulation.

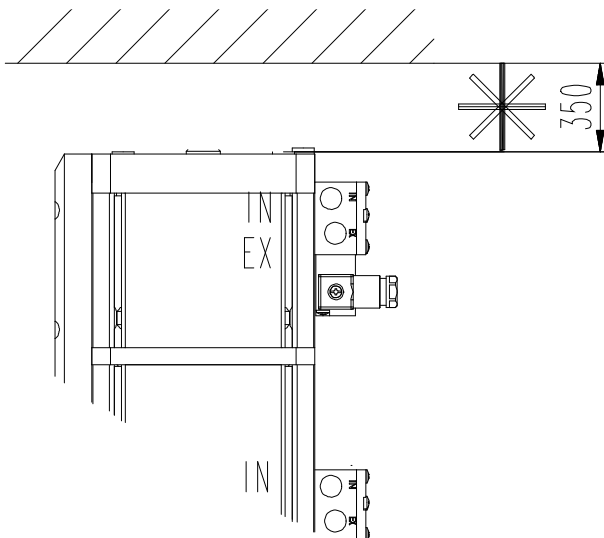


Illustration 2: Installation clearances

6 Operation

6.1 Response in operation

The drive regulates the opening and closing of the valve during operation.

6.2 Response in the event of loss of compressed air

The response in the event of loss of compressed air depends on the position of the plate.

If the plate is closed and the supply of compressed air is interrupted, then the plate remains closed.

If the plate is open and the supply of compressed air is interrupted, then the next position of the plate depends on gravity and the installation position. The valve is not interlocked.

6.3 Response in the event of loss of voltage

For a control valve, the valve closes irrespective of whether the plate is in the Open or Close position.

Emergency actuation

If there is sufficient compressed air in the system, the valve can be moved by hand if the voltage supply fails.

1. Press the pushbutton on the control valve.

7 Troubleshooting

7.1 Error table

Error	Source	Error elimination	Section
Leak at plate	Contamination in the plate seat and on the plate	Clean plate and seals.	Cleaning seals [▶ 20]
Valve does not open/close	Voltage supply interrupted	Check voltage supply	
Valve does not open/close	Compressed air supply interrupted	Check compressed air supply	Connecting compressed air supply [▶ 15]
Valve does not open/close	Mechanism damaged	Replace mechanism	Change drive and mechanism [▶ 19]
Valve does not open/close	Control valve defective	Replace control valve	Connecting compressed air supply [▶ 15]
Leak at plate	Compressed air supply does not correspond to the valve requirements	Check compressed air supply	Technical data
Leak at housing	Housing seal damaged	Replace housing seal	Repair & Service [▶ 24]
Leak at housing	Seal damaged	Replace the seal	Change drive and mechanism [▶ 19]
Leak at housing	Seal damaged	Replace the seal	
Leak at plate	Seal damaged	Replace seal or plate	Repair & Service [▶ 24]
Leak at the bellows	Bellows damaged	Replace bellows	Repair & Service [▶ 24]

8 Maintenance

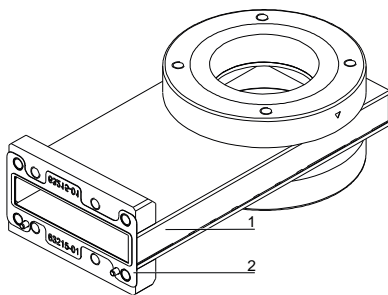
The maintenance intervals should be observed to ensure that the product works reliably throughout its lifetime. The type of application may make it necessary to shorten the maintenance intervals. In this case, the maintenance schedule must be adjusted accordingly.

In addition to the maintenance interval, the VAT Service Center also offers other services.

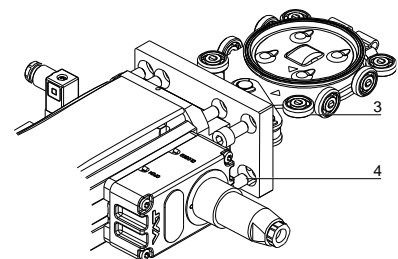
If you require further information about the maintenance intervals or services, please contact VAT.

8.1 Change drive and mechanism

	⚠ CAUTION
	<p>Risk of injury by tensioned spring and damper!</p> <p>Injuries caused by ejected parts.</p> <ul style="list-style-type: none"> ▶ Open the valve slowly. ▶ Place hand on lid to keep it in position. ▶ Ensure your face is not directly over the valve opening.



1 Housing
2 Seal



3 Mechanism
4 Screw

Dismounting drive and mechanism

1. Vent the chamber.
 2. Open the valve.
 3. Disconnect all supply lines.
 4. Slacken off the four screws [4] on the head flange working in diagonal sequence. While doing this, hold the drive with one hand.
 5. Pull the mechanism [3] in a straight line out of the housing [1].
 6. Clean the contact surfaces of the seal [2].
 7. Check the sealing surfaces for damage.
- ⇒ Drive and mechanism are dismantled.

Mounting drive and mechanism

1. Insert a new seal [2].
2. Guide the mechanism [3] in a straight line into the housing.
3. Tighten the screws [4] on the housing [1] working in diagonal sequence. Tightening torque 40 Nm.
4. Connect the supply lines.

⇒ Drive and mechanism are mounted.

8.2 Cleaning seals

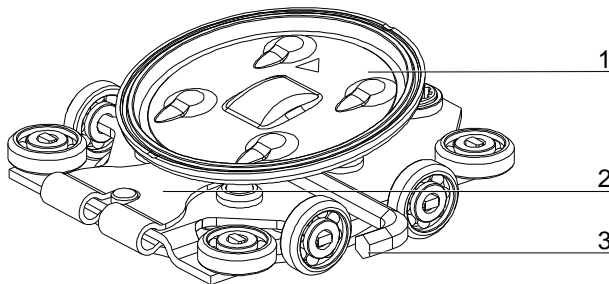
1. Clean the sealing surfaces using a lint-free and dust-free cloth and a little isopropanol.
2. Clean the O-ring using a lint-free and dust-free cloth.

8.3 Changing the plate

See also

- ▣ Change drive and mechanism [▶ 19]

8.3.1 Dismounting plate



1 Plate

3 Tool

2 Spring

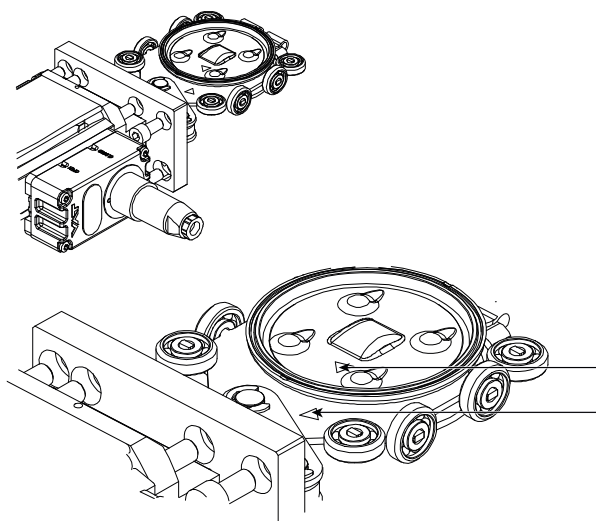
✓ Drive and mechanism dismantled. See section Change drive and mechanism [▶ 19]

1. Lift the plate [1] and push the tool [3] between the spring [2] and the ball guide. Leave the tool inserted there.

2. Remove the plate [1].

⇒ The plate is removed.

8.3.2 Mounting plate



1. Position the new plate on the mechanism so that the Δ markings on the ball guide and the plate face each other.

2. Remove the tool [3].

⇒ The plate is changed.

See also

- 📄 [Change drive and mechanism \[▶ 19\]](#)

9 Consumable and spare parts

If you wish to order spare or consumable parts, have the article and serial numbers of the product on hand. This ensures you receive the right spare parts. The article and serial number are found on the Type label [▶ 12].

NOTICE	
	<p>Non-original spare parts and wear-sensitive parts!</p> <p>If you use non-original spare parts and wear-sensitive parts, you may damage the product.</p> <p>▶ Only use original spare parts and wear-sensitive parts from VAT.</p>

9.1 Overview of consumable parts

Consumable part kit

Position	Description	Part number
without	O-ring treated seamlessly	N-7100-259
	VAT vacuum grease	206792

9.2 Overview of spare parts

The spare parts and consumable parts are only available as a set or kit.

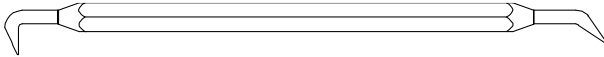
Seal kit

Position	Description	Part number
Without	Spare part kit for mechanism	1010522
	Mechanism	412294
without	O-ring treated seamlessly	N-5100-259
without	VAT vacuum grease	206792

See also

Type label [▶ 12]

9.3 Overview of auxiliary devices



Description	Part number
O-ring removal tool	234859

10 Repair & Service

1. Have repairs carried out by VAT service personnel.
2. Only carry out repairs yourself if you have first consulted VAT.
3. Contact a VAT service center, see www.vatvalve.com.

10.1 FPR service

The VAT customer service can refurbish the product or individual components for you. Wear-sensitive parts are replaced, and the guarantee on the replaced parts is extended.

1. Select the desired Fixed Price Refurbishment service from our comprehensive service program for the refurbishment.
2. Contact your assigned sales person or the nearest VAT service center to learn about the options for the product in question. [VAT Service Center](#).

11 Transport packaging and shipping

11.1 Pack and transport the valve

1. Close the valve.
2. Cover all valve openings with a protective cap.
3. Pack the valve in the original packaging material.
4. Transport the valve in the original packaging only.

11.2 Sending returns

The operator is responsible for decontaminating the products and may only send decontaminated products back to VAT. When products are sent back to VAT, the declaration regarding chemical contamination must be completed and sent to VAT beforehand.

If contaminated products are sent to VAT, VAT will perform a decontamination process at the cost of the customer. The party sending the products is responsible for ensuring that the valve is sent in corresponding packaging.

- You can download the declaration form regarding chemical contamination of vacuum valves and valve components from the following website: <http://www.vatvalve.com>.
- Fill out the form and send it in advance to VAT or the relevant sales company.
- If the product is radioactively contaminated, ask VAT for the following form: Notification of contamination and radiation.

If you have any questions regarding the issue of decontamination and shipping, consult your VAT service center or the relevant sales company.

12 Disposal

12.1 Disposal

The product and its components are made of various materials, which must be disposed of correctly.

1. Note the regulations on waste disposal.
2. Dispose of the product and its components in accordance with local regulations.
3. Hire an authorized contractor to dispose of your waste in the proper manner and in accordance with environmental requirements.

12.2 Hazardous materials

You can use the list below to identify the materials and dispose of them correctly:

- Non-ferrous metals
- Stainless steel
- Aluminum
- Plastic
- Lubricating agents
- Electronic waste
- Batteries
- Cables and lines
- Motors
- Seals and rubber parts

Find out more and connect to your
local VAT contact on

WWW.VATVALVE.COM

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(Headquarters)
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9469 Haag

