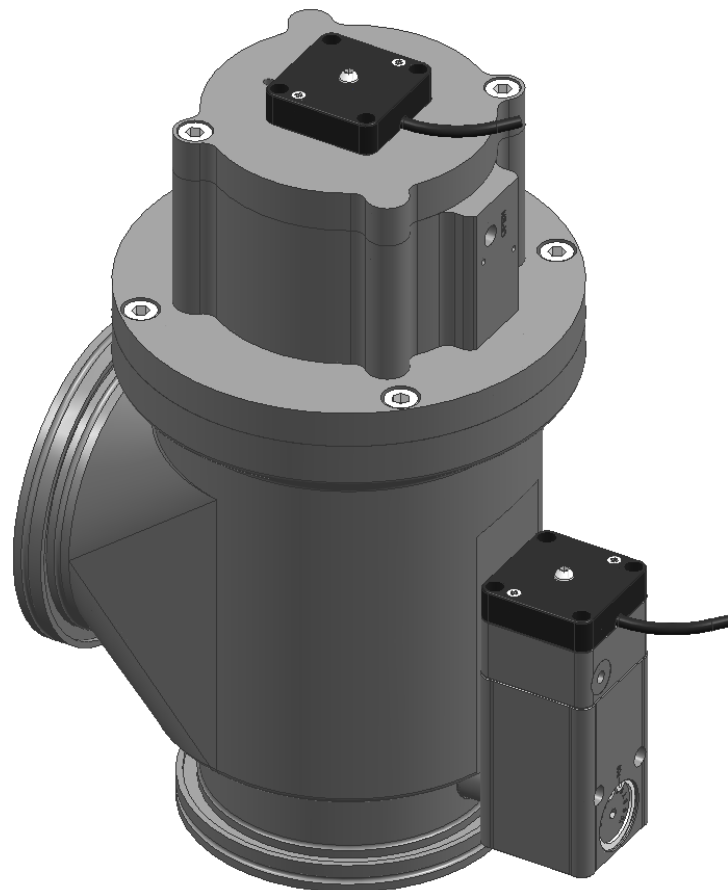


## Angle valve with soft-pump function with single acting pneumatic actuator and closing spring (NC)

**Series 292**  
**DN 100–160 mm (I. D. 4” – 6”)**

This manual is valid for the following product ordering numbers:  
**292 .. - ..... - .....**



Sample picture

## Imprint

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# 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
	DN 100: T-9001-155 DN 160: T-9001-156	On protective foil covering the valve opening
	253198	On valve body or actuators

Table 2-1

### 3 Design and Function

#### 3.1 Design

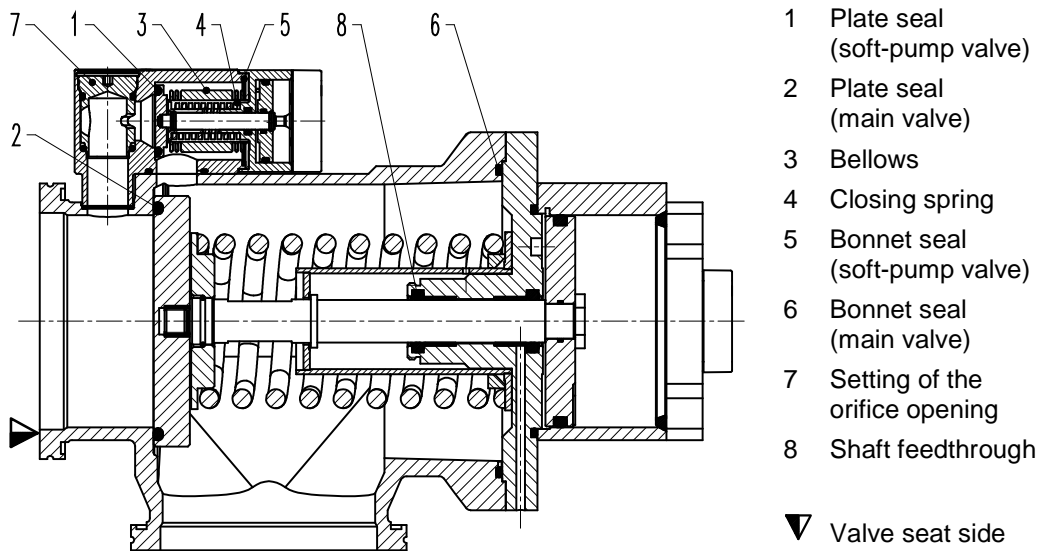



Figure 3-1

#### 3.2 Function

Main and bypass valve are closing by a spring (NC) and opening pneumatically.



## 4 Installation

	<b>⚠ WARNING</b>
	<b>Unqualified personnel</b> 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.



The protective covers may only be removed immediately before the valve is mounted into the system. Unprotected sealing surfaces must be treated with care and keep clean.

## 4.2 Installation into the system

	<b>WARNING</b> <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.
	<b>CAUTION</b> <b>Hot surfaces</b> Risk of burning when touching hot surfaces. Take safety measures in order that the valve cannot be touched during operation. Ensure air circulation of coil.
	<b>NOTICE</b> <b>Contamination</b> Product may get contaminated. Always wear cleanroom gloves when handling the product.
	<b>NOTICE</b> <b>Inappropriate tools</b> Sealing surfaces may get damaged. Do not use sharp-edged tools.

1. Check and carefully clean sealing surfaces of valve flanges and counter flanges.
2. Install valve with connection components appropriate for ISO-K flanges according the specification of «Table 4-1» on page 11 into account.

#### 4.2.1 Admissible forces and bending moments

DN (nom. I. D.)		Axial tensile or compressive force « $F_A$ »		Bending moment « $M$ »	
mm	inch	N	lbf	Nm	lbf · ft
100	4	250	56	27	20
160	6	300	68	42	31

A combination of both forces « $F_A$ » and « $M$ » is not allowed. Please contact VAT.

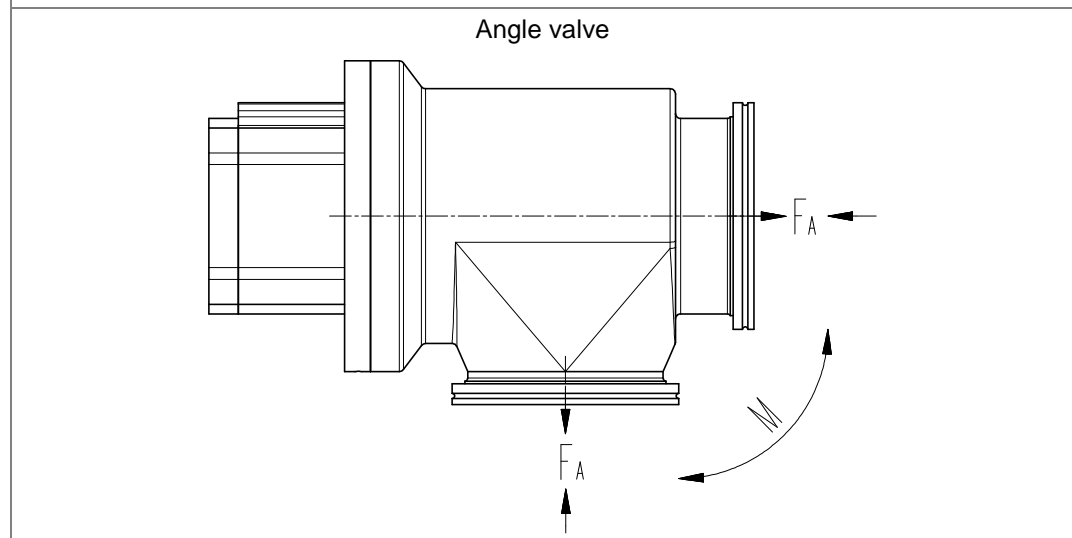


Table 4-1

### 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 wiring diagram in the product data sheet and dimensional drawing.

## 5 Operation

	<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>Movable parts</b> Human body parts may get jammed and severely injured. Do not operate before product is installed completely into the vacuum system.</p>
	<p style="text-align: center;"><b>⚠ CAUTION</b></p> <p><b>Hot surfaces</b> Risk of burning at valve with heater. Do not touch hot surfaces.</p>

### 5.1 Normal operation

Main and bypass valve are closing by a spring (NC) and opening pneumatically.

### 5.2 Operation under increased temperature

Maximum allowed temperature, see product data sheet.

### 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.





## 5.5 Trouble shooting

Failure	Check	Action	See
Valve does not close / open	Compressed air connected correctly?	Check air pressure	Product data sheet
	Solenoid valve connected correctly?	Check electrical power supply and wiring	Product data sheet
No or wrong position indicator signal	Position indicator connected correctly?	Check electrical power supply and wiring	Product data sheet
Leak at plate or body	Contamination?	Clean or replace seals	Chapter «6.3 Replacement of vacuum seals»

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>CAUTION</b></p> <p><b>Hot surfaces</b> Risk of burning at valve with heater. Touch hot surfaces only if the valve has cooled down.</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 and valve plate may get damaged. Do not use sharp-edged tools.</p>

## 6.1 Maintenance intervals

Under clean operating conditions the valve does not require any maintenance during the specified cycles.

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).



Contamination resulting from the process may impair the function of the valve and require more frequent maintenance.

## 6.2 Required tools

- Allen wrench depending on valve size
- Torque wrench 1 Nm / 20 Nm / 35 Nm
- Cross screwdriver
- Slotted screwdriver
- Open-end wrench 19 / 22
- Cleanroom wiper soaked with alcohol (2% methyl ethyl ketone)
- O-Ring removal tool; see «Table 11-1» on page 31

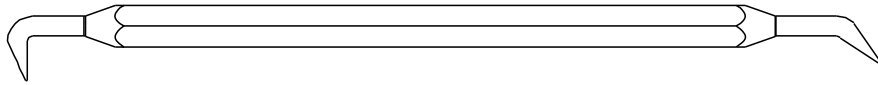


Figure 6-1



### 6.3 Replacement of vacuum seals

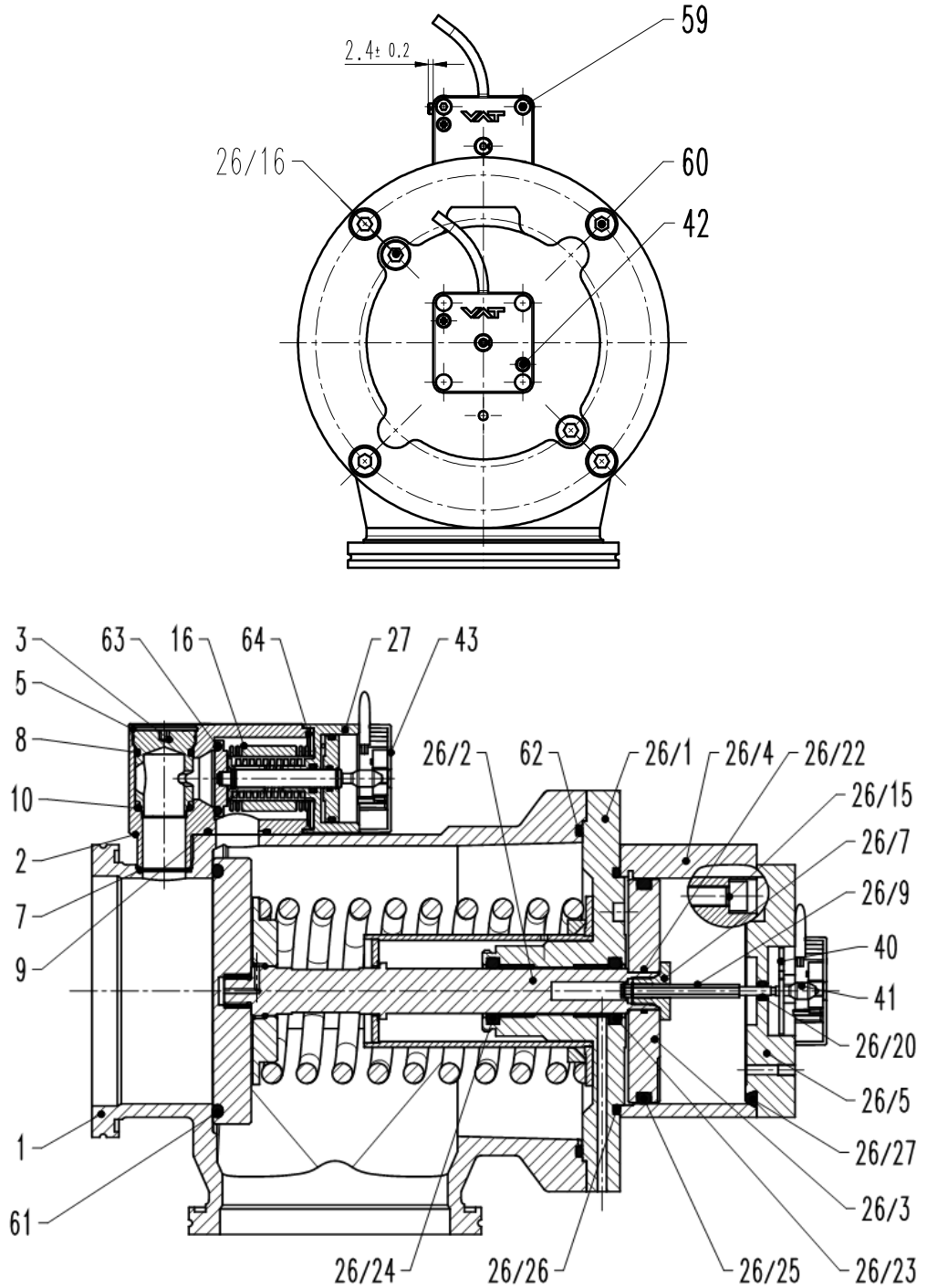


Figure 6-2

### 6.3.1 Preparatory steps

1. Detach the soft-pump valve from the main valve by removing the 2 screws (6).
2. Remove O-rings (7) and (9) and discard them. The item number in brackets refers to «Figure 6-3».

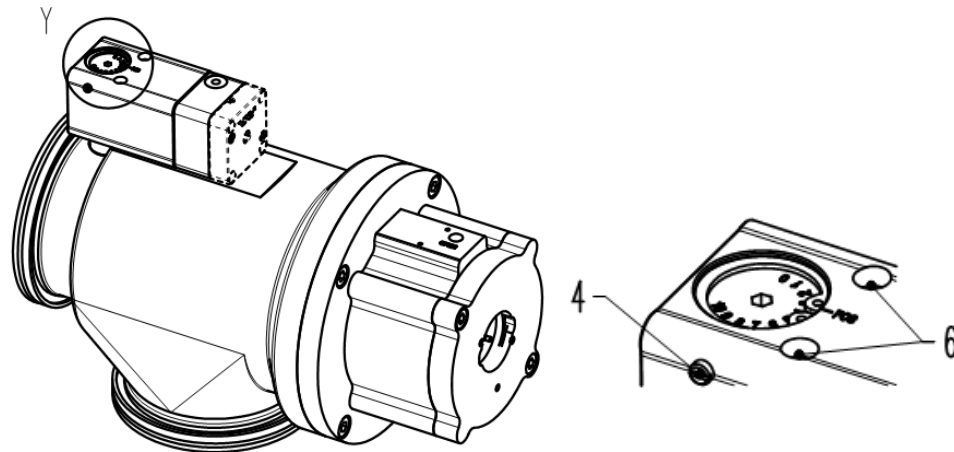


Figure 6-3

### 6.3.2 Replacement of vacuum seals – soft-pump valve

The following item numbers in brackets refer to «Figure 6-2» on page 17.

1. Remove 4 screws (59) uniformly and crosswise.



Attention: Loaded spring!

2. Withdraw "actuator/plate assembly" carefully from valve body.
3. Remove bonnet seal (O-ring, 64) from groove and discard it.
4. Pull plate seal (O-ring, 63) out of groove by picking it with a needle and discard it.



Do not damage the sealing surface!

5. Remove setscrew (4) and clean it with alcohol.
6. Remove circlip (5) and take out the setting piece (3) by pushing it from the vacuum side.
7. Remove O-rings (8, 10) and discard them.
8. Make sure that all sealing surfaces are undamaged and clean them with alcohol.

9. Lubricate new O-rings (8, 10) slightly with VAT high vacuum grease.

10. Mount lubricated O-rings (8, 10) to the setting piece (3).

11. Insert setting piece (3) and circlip (5).



Do not damage O-rings while inserting setting piece (3).

12. Mount setscrew (4) by using Loctite 222.



The dimension of  $2.40 \pm 0.2$  must be met!

13. Put new plate seal (O-ring, 63) on groove and press it crosswise into groove at 4 points.

14. Press entire plate seal (O-ring, 63) uniformly into groove.

15. Mount new bonnet seal (O-ring, 64) into groove.

16. Insert "actuator/plate" assembly carefully into the valve body.



Do not cant!

17. Mount 4 screws (59) uniformly and crosswise in 2 to 3 steps. Torque screws with 2.3Nm.

18. Mount new O-Rings (7) and (9)

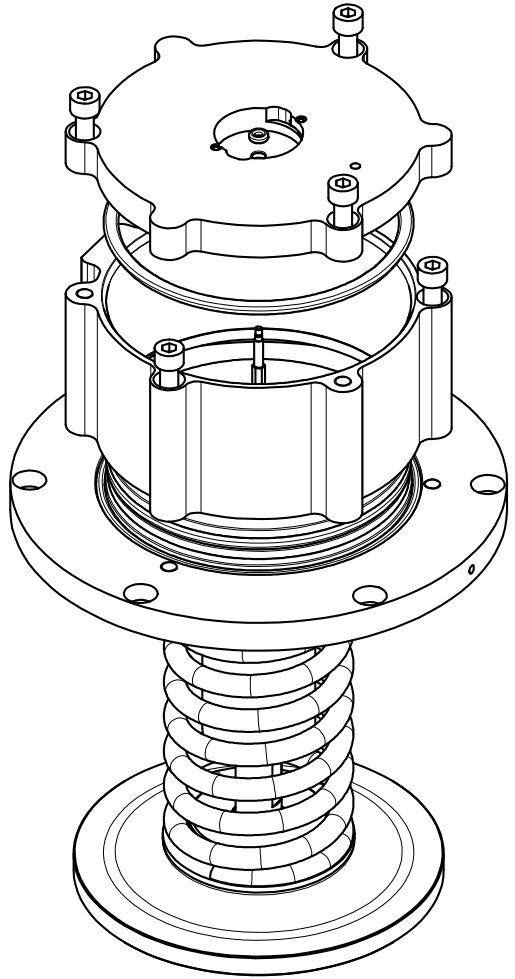
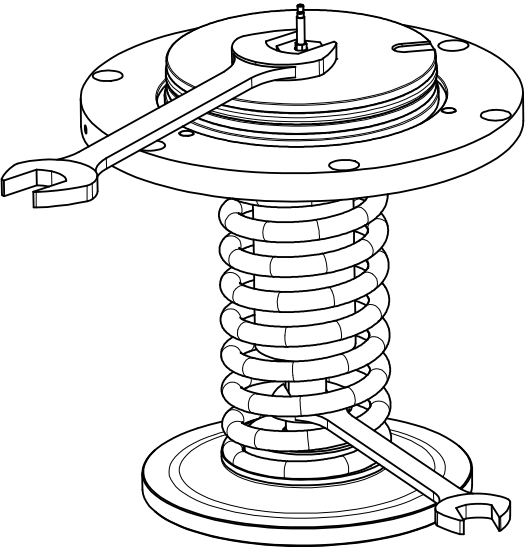
19. Attach the soft-pump valve to the main valve by mounting the 2 screws (6) and torque the screws with 2.3 Nm

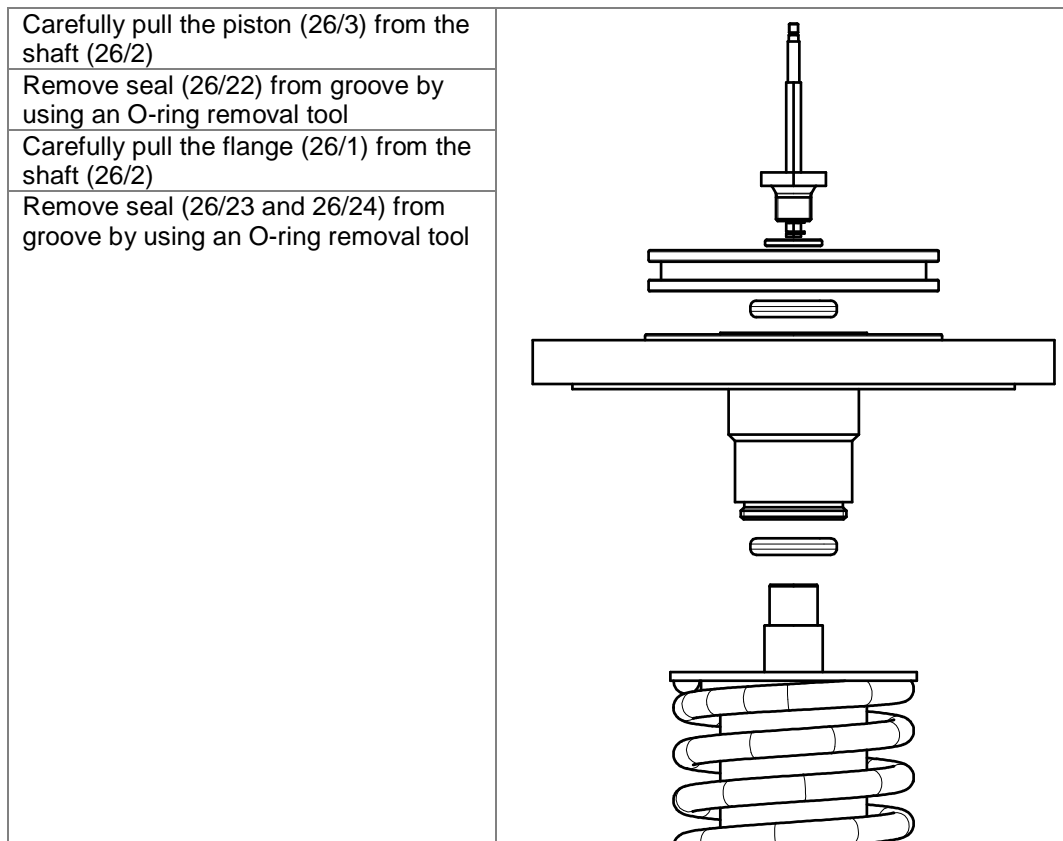
**6.3.3 Dismount actuator / plate assembly – main valve**

	<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>

The follow item numbers in brackets refer to «Figure 6-2» on page 17.

<p>Open the valve by means of compressed air and hold the position with a nonreturn valve.                  If a solenoid valves is assembled to the actuator you may use the emergency operation knob on the solenoid valve to remain the valve opened</p> <p>Loosen and remove screws (60) uniformly and in crosswise order</p> <p>Withdraw actuator / plate assembly carefully from body and vent the compressed air</p> <p>Remove bonnet seal (62) from groove by using an O-ring removal tool</p> <p>Remove the plate seal (61) from groove by using O-ring removal tool</p>	
<p>Loosen screws (42) and remove position indicator</p> <p>Loosen and remove switching cam (41)</p> <p>Turn coil spring (40) with a screwdriver approx. 20° counter-clockwise and pull it out of the groove</p> <p>Remove solenoid valve (in case it's available)</p>	

<p>Loosen and remove screws (26/16) uniformly and in crosswise order</p> <p>Remove cylinder cover (26/5) carefully</p> <p>Remove seal (26/20) from groove by using an O-ring removal tool</p> <p>Remove seal (26/27)</p> <p>Loosen and remove screws (26/15) uniformly and in crosswise order</p> <p>Remove cylinder tube (26/4) carefully</p> <p>Remove seal (26/25) from groove by using an O-ring removal tool</p> <p>Remove seal (26/26) from groove by using an O-ring removal tool</p>	
<p>Loosen screw with an open-end wrench (26/7 - counter with open-end wrench) and remove screw and position indicator shaft (26/9)</p>	

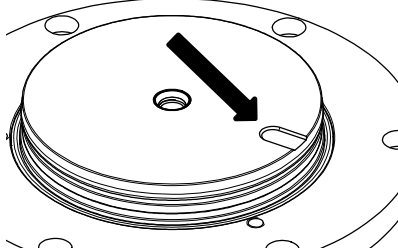


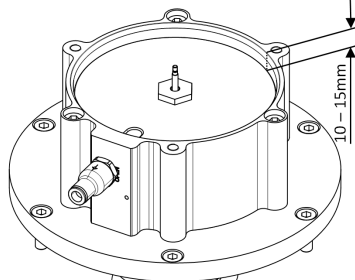
Clean all parts.

### 6.3.4 Mount actuator / plate assembly

The item numbers in brackets refer to «Figure 6-2» on page 17.

Check sealing surfaces / valve seat and clean them with cleanroom wipers.

Pos.	Lubricant	Lubricant Quantity [gram]		Description
		DN 100	DN 160	
26/1	N-6951-011	Each 0.8	Each 0.8	Create a lubricant depot in groove of flange (26/1) for O-rings (26/3) and (26/4) and disperse lubricant uniformly
26/23 26/24	N-6951-011	Each 0.2	Each 0.2	Lubricate O-Rings (26/3) and (26/4) and put them into groove of flange (26/1)
26/2	N-6951-011	0.3	0.4	Lubricate shaft (26/2) uniformly and insert shaft carefully in flange (26/1) to avoid O-ring damage
26/26				Insert O-ring (26/26) in flange (26/1)
26/25	N-6951-403	1	1.4	Create a lubricant depot in groove of piston (26/3) for O-ring (26/25) and disperse lubricant uniformly
26/25	N-6951-403	0.2	0.4	Lubricate O-ring (26/25) and put it into the piston groove
26/22	N-6951-403	0.1	0.1	Lubricate O-ring (26/22) and put it into the piston groove
26/3				Put piston (26/3) on the actuator shaft (26/2) - groove has to face atop 
26/9	N-6951-403	0.2	0.2	Lubricate the position indicator shaft (26/9) uniformly and put it into screw (26/7)
26/7				Fasten screw (26/7) with a torque of 35 Nm
26/4	N-6951-403	1.4	2	Disperse lubricant on cylinder tube sliding surface (26/4) uniformly and put cylinder tube carefully on piston (26/3) (don't damage the seal)

26/15				Fasten screw (26/15) with a torque of 20 Nm
26/27				Assemble O-ring to cylinder cap (26/5)
26/20	N-6951-403	0.1	0.1	Create lubricant depot for O-ring (26/5) and disperse lubricant in cylinder cap (26/20)
26/20	N-6951-403	0.1	0.1	Lubricate O-ring (26/20) and assemble it in cylinder cap (26/5)
				<p>Pressurize actuator with 3.5 to 4 bars. Afterwards reduce pressure inside cylinder to reach position that is between 10 – 15 mm measured from top surface</p> 
26/5				Assemble cylinder cover (26/5) and insert the position indicator shaft (26/9) carefully to prevent O-ring (26/20) damage
26/16				Fasten screw (26/16) with a torque of 20 Nm
40				Put coil spring (40) into groove of cylinder cover (26/5) and rotate coil spring with a screwdriver approx. 20° clockwise until end position (stop) is reached
41	N-6951-403	0.05	0.05	Disperse Loctite 243 on thread of switching cam (41) and tighten it with a torque of 1 Nm. Lubricate the switching cam uniformly
				Dismount the nonreturn valve; valve closes
42				Mount the position indicator (42) – if it's part of the valve
				Mount the solenoid valve – if it's part of the valve
61				Put plate O-ring (61) on groove and press it afterwards crosswise into the groove. After that press O-ring uniformly into plate groove
62				Put bonnet seal (62) into body (1)
26				Insert actuator assembly (26) carefully
60				Fasten screws uniformly and in crosswise order with a torque of 20 Nm

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


	<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 dismounting the product:                  – 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>
	<p style="text-align: center;"><b>⚠ CAUTION</b></p> <p><b>Hot surfaces</b>                  Risk of burning at valve with heater.                  Touch hot surfaces only if the valve has cooled down.</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>


## 8.1 Dismounting

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

1. Disconnect compressed air supply.
2. Disconnect electrical power supply.
3. Dismount valve from system.

## 8.2 Storage

	<b>NOTICE</b>
	<p><b>Wrong storage</b> 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</p>

	<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>

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

	<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>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>
	<p style="text-align: center;"><b>NOTICE</b></p> <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 body and plate may get damaged if valve is in open position. Make sure that the valve is closed.</p>

1. Cover all valve openings with protective covers or foils.
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

	<b>⚠ WARNING</b>	
	<b>Harmful substances</b>	

Environmental pollution.  
Discard products and parts according to the local regulations.

## 11 Spare parts

<b>NOTICE</b>	
	<p><b>Non-original spare parts</b> Non-original spare parts may cause damage to the product. Use original spare parts from VAT only.</p>



- 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
Seal kit	on request	1	«6.3 Replacement of vacuum seals»
Pneumatic grease	N-6951-403	1 (12 g)	
Vacuum grease	N-6951-011	1 (10 g)	
Nonreturn valve	N-7520-110	1	
O-ring removal tool	234859	1	

Table 11-1