

Vacuum gate valve with pneumatic actuator

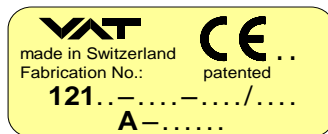
This manual is valid for the valve ordering number(s):

12144- . A14/24/34/44

12146- . A14/24/34/44

12148- . A14/24/34/44

The fabrication number is indicated on each product as per the label below (or similar):



← Fabrication number

Explanation of symbols:



Read declaration carefully before you start any other action!



Keep body parts and objects away from the valve opening!



Attention!



Hot surfaces; do not touch!



Product is in conformity with EC guidelines, if applicable!



Loaded springs and/or air cushions are potential hazards!



Disconnect electrical power and compressed air lines. Do not touch parts under voltage!



Wear gloves!



Read these «**Installation, Operating & Maintenance Instructions**» and the enclosed «**General Safety Instructions**» carefully before you start any other action!



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1 Use of product

Use product for clean and dry indoor vacuum applications under the conditions indicated in chapter «Technical data» only! Other applications are only allowed with the written permission of VAT.

1.1 Technical data

Pressure range	DN 160 – 200 : 1×10^{-7} mbar to 1.6 bar (abs)
	DN 250 : 1×10^{-7} mbar to 1.2 bar (abs)
Differential pressure on the gate	DN 160 – 200 : ≤ 1.6 bar in either direction
	DN 250 : ≤ 1.2 bar in either direction
Differential pressure at opening	≤ 30 mbar
Admissible temperature: Valve body	$\leq 120^{\circ}\text{C}$
Actuator	$\leq 80^{\circ}\text{C}$
Position indicator	$\leq 80^{\circ}\text{C}$
Solenoid	$\leq 50^{\circ}\text{C}$
Position indicator: Contact rating	5 A / 250 V AC, 3 A / 50 V DC
Solenoid	see tag on solenoid

Further data according to VAT catalogue «Vacuum Valves 2004».

2 Installation

2.1 Unpacking

Before unpacking the valve, make sure that the packaging is in impeccable condition and the valve has not suffered damage.

Note! The plastic packing material and/or protective covers may only be removed immediately before the valve is mounted into the system. Unprotected sealing surfaces must be treated with care and kept clean.

2.2 Installation into the system

The valve seat side is indicated by the symbol "∇" on the connection flange.

2.2.1 Tightening torque for flange screws

The screws of the flanges have to be tightened uniformly in crosswise order. The tightening torques indicated in the following table have to be observed.

DN		Tightening torque «Nm»			lbf · ft		
mm	inch	ISO	JIS	ASA-LP	ISO	JIS	ASA-LP
160	6	8 - 10	10 - 12	10 - 12	6 - 7.5	7.5 - 9	7.5 - 9
200	8	8 - 10	16 - 18	40 - 60	6 - 7.5	12 - 13	30 - 44
250	10	8 - 10	16 - 18	-	6 - 7.5	12 - 13	-

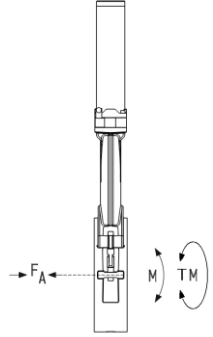
Higher tightening torques may deform the valve body. This can lead to improper function of the valve or to a leaky valve gate.

2.2.2 Admissible forces

Forces from evacuating the system and from the weight of other components 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 are admissible:

DN (nom. I.D.)		Axial tensile or compressive force «FA»		Bending moment «M»		Maximum admissible torsional moment of body «TM»	
mm	inch	N	lbf	Nm	lbf · ft	Nm	lbf · ft
160	6	3000	674	150	110	10'000	7'370
200	8	3000	674	150	110	12'000	8'850
250	10	3500	787	200	148	12'000	8'850

If a combination of forces («FA», «M» and «TM») occurs, the values mentioned above are invalid. Please contact VAT for more information.



2.3 Connections

2.3.1 Compressed air connection



- Connect compressed air only if
- valve has been installed into the vacuum system
 - moving parts cannot be touched

With solenoid: Connect compressed air to connection **IN** (internal thread R 1/8", 1/8" NPT for USA)

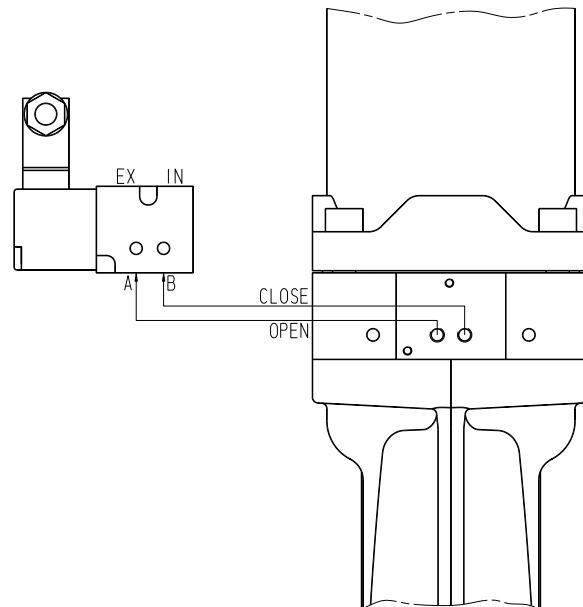
Without solenoid: Connect compressed air to connection **OPEN** and **CLOSE** (internal thread M5)

Solenoid delivered separately
(not attached to valve):

Compressed air connection at
pneumatic cylinder: internal thread M5

Compressed air connected to <A>:
valve opens

Compressed air connected to :
valve closes



Compressed air pressure (min. - max. overpressure): 4 - 7 bar / 55 - 100 psig

Use only clean, dry or slightly oiled air!

2.3.2 Electrical connection



Do not touch any electrically charged parts!

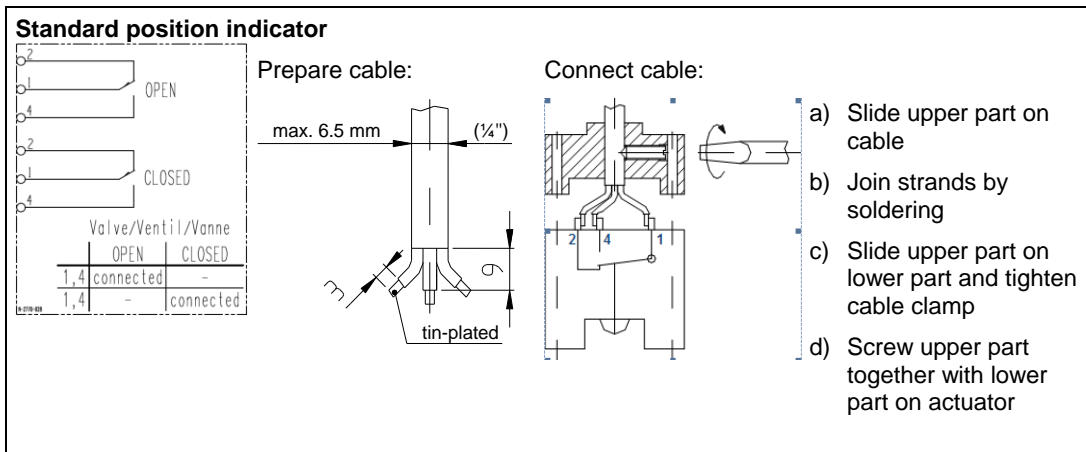
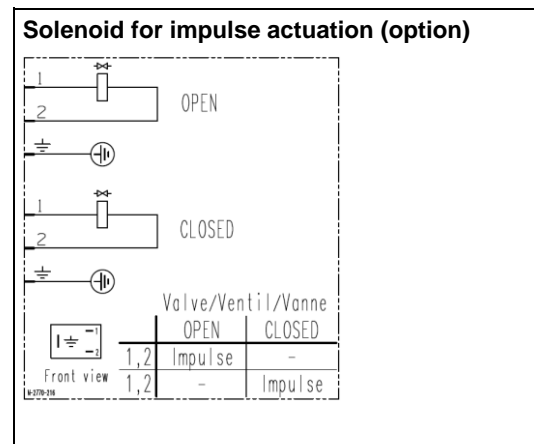
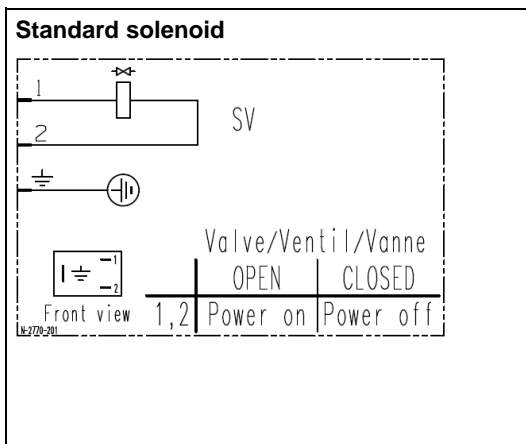


Connect electrical power only if

- valve has been installed into the vacuum system
- moving parts cannot be touched

Verify that mains voltage matches voltage stated on the solenoid! Sockets for position indicator and solenoid are supplied with the valve.

Wire solenoid and position indicator according to the following diagrams:



3 Operation

3.1 Normal operation

Valve is opened and closed by means of compressed air.

3.2 Operation under increased temperature

See «1.1 Technical data»

The maximum temperatures indicated in the technical data are only valid as long as the valve is in one of the end positions. Cycling the valve at these temperatures may reduce the cycle life of the mechanism.

3.3 Behavior in case of compressed air pressure drop

Valve closed: valve remains closed

Valve open: valve position is undefined

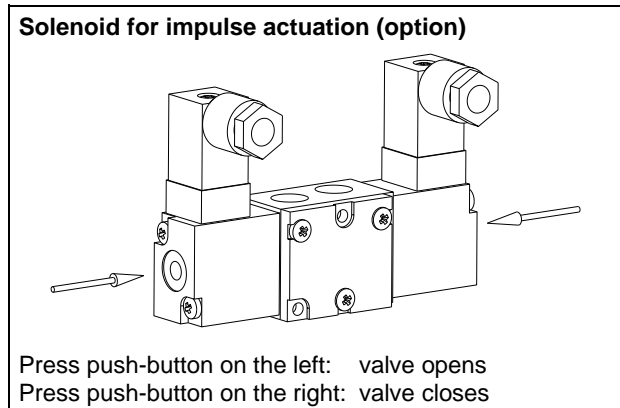
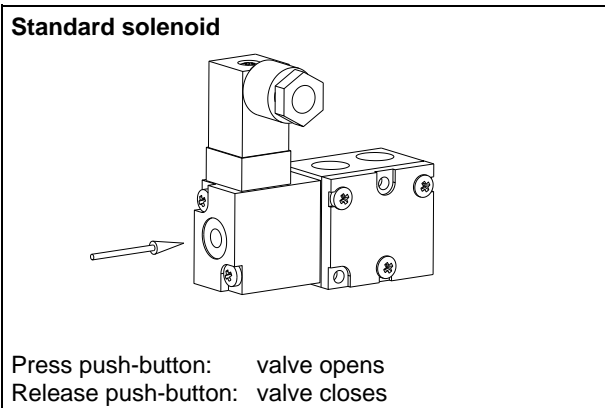
3.4 Behavior in case of power failure

Standard solenoid: valve closes

Solenoid for impulse actuation (option): valve position does not change, but a started movement will be completed

3.5 Emergency operation at power failure

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



4 Trouble shooting

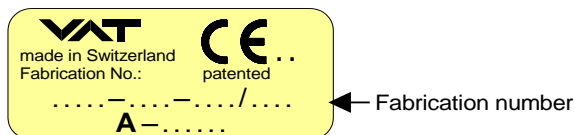
Failure	Check	Action
Valve does not close/open	Power available?	Connect correct voltage
	Compressed air available?	Connect correct air pressure
	Solenoid defective?	Replace solenoid
Leak at gate	Valve seat and gate seal clean?	Clean valve seat and gate seal, or replace gate seal
	Compressed air available?	Connect correct air pressure
Leak at body	Flanges leaktight?	Tighten flange screws correctly
	Screws at upper part of body tightened?	Tighten bonnet screws correctly
		Replace bonnet seal

If you need any further information, please contact one of our service centers. You can find the addresses on our website: <http://www.vat.ch>

5 Maintenance & repairs

Under clean operating conditions, the valve does not require any maintenance during the specified cycle life. Contamination from the process may influence the function and requires more frequent maintenance.

Before carrying out any maintenance or repairs, please contact VAT. It has to be individually decided whether the maintenance/repair can be performed by the customer or has to be carried out by VAT. The fabrication number on the valve



has always to be specified.

All supplies (e. g. compressed air, electrical power) must be disconnected for removal/installation of the valve from/into the system and for maintenance work.



Even with disconnected supply, loaded springs and/or air cushions in cylinders can be potential hazards.



Keep fingers and objects away from the valve opening!

Products returned to VAT must be free of harmful substances such as e.g. toxic, caustic or microbiological ones. If products are radioactively contaminated, fill in the VAT form «Contamination and Radiation Report» and send it with the product. The form is available at VAT. The maximum values indicated in the form must not be exceeded.

5.1 Cleaning or replacement of gate seal and/or bonnet seal

The figures in brackets refer to the drawing on page 16

The lower part of the body (flange part) need not be removed from the system for cleaning/replacing the gate seal and/or bonnet seal!

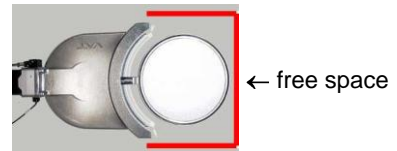
a) Separation of upper part of body (11) / actuator assembly from lower part of body (10):

1. Vent vacuum chambers on either side of valve
2. Open valve by means of compressed air
3. Switch off compressed air and power supply
4. Disconnect compressed air and power lines from valve
5. Loosen and swing out both screws (12)
Attention: Make sure to maintain upper part of body (11) / actuator assembly in its position while swinging out the screws!
6. Withdraw upper part of body (11) / actuator assembly carefully from lower part of body (10) and put it on a clean place (seat side symbol «∇» on top)

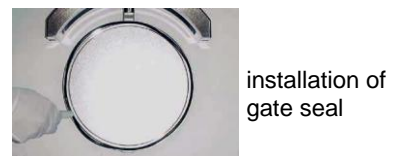
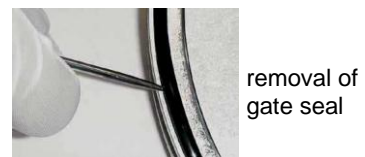
b) Cleaning or replacement of gate seal and bonnet seal:

7. Apply compressed air (air pressure approx. 1 bar) and move mechanism slowly out of upper part of body (11)

Attention: Provide sufficient free space in order to prevent the mechanism from touching any objects!



8. Disconnect compressed air from valve
9. Clean (A) or replace (B) gate seal (1):
 - (A) 1. Leave gate seal in groove and clean it by using a lint-free cloth and alcohol
 2. Slightly lubricate seal with VAT vacuum grease [see «Spare parts»]
 - (B) 1. Pull gate seal out of groove by means of a scribing tool
Attention: Be careful not to damage the bottom of the groove!
 2. Clean seal groove by using a lint-free cloth and alcohol
 3. Put new gate seal on seal groove and press it into groove uniformly and crosswise



10. Clean (A) or replace (B) bonnet seal (2):
 - (A) 1. Leave bonnet seal in groove and clean it by using a lint-free cloth and alcohol
 2. Slightly lubricate seal with VAT vacuum grease [see «Spare parts»]
 - (B) 1. Pull bonnet seal out of groove by means of a scribing tool

Attention: Be careful not to damage the bottom of the groove!

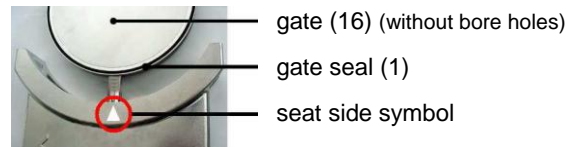
 2. Clean seal groove by using a lint-free cloth and alcohol
 3. Put new bonnet seal on seal groove and press it into groove on one short side
 4. Distribute seal uniformly over long sides to opposite short side and press it fully into groove
11. Clean sealing surface of upper part of body (11) by using a lint-free cloth and alcohol
12. Clean sealing surface of valve seat on lower part of body (10) by using a lint-free cloth and alcohol

c) Mounting of upper part of body (11) / actuator assembly on lower part of body (10):

13. Make sure to have gate (16) on seat side «▽»:

Symbol «▽» on upper part of body (11)

Note: Mechanism with actuator shaft (13) is stiffly rotatable by 360°!



14. Align mechanism with opening of upper part of body (11)




correct

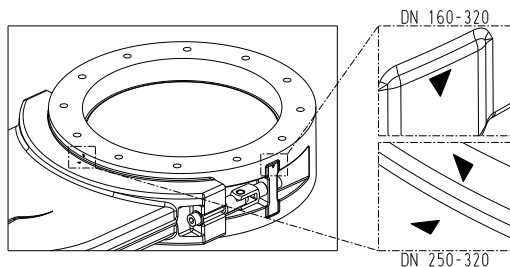


wrong

15. Apply compressed air (air pressure approx. 1 bar) and move mechanism slowly into upper part of body (11)

Attention:  Make sure to keep the space between body opening and mechanism free of any objects or body parts!

16. Disconnect compressed air from valve
 17. Set upper part of body (11) / actuator assembly carefully on lower part of body (10)
- Attention:** The tips of the triangles «▽» of both body parts must face each other!



▽ on both body parts

18. Swing back both screws (12) and tighten them alternately

Tightening torque: DN 160 - 200: 14 Nm / 10.5 lbf · ft
DN 250: 20 Nm / 15.0 lbf · ft
19. Connect electrical power and compressed air
20. Perform function and leak test

5.2 Cleaning or replacement of locking balls

The figures in brackets refer to the drawing on page 16

The lower part of the body (flange part) need not be removed from the system for cleaning/replacing the locking balls! When the locking balls are cleaned/replaced, we recommend to clean the gate seal and bonnet seal as well (see relevant chapter).

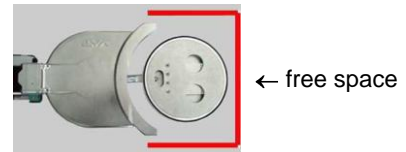
a) Separation of upper part of body (11) / actuator assembly from lower part of body (10):

1. Carry out steps 1 - 6 of chapter «Cleaning or replacement of gate seal and/or bonnet seal», however with seat side «∇» down!

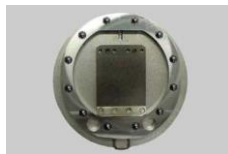
b) Cleaning or replacement of locking balls:

2. Apply compressed air (air pressure approx. 1 bar) and move mechanism slowly out of upper part of body (11)

Attention: Provide sufficient free space in order to prevent the mechanism from touching any objects!



3. Disconnect compressed air from valve
4. Remove lock nut (14) with disk (15)
5. Withdraw mechanism from actuator shaft (13) and put it on a clean place
6. Remove screws (19)
7. Lift off counter plate (17) carefully and put it on a clean place
8. Remove all visible balls (3) from ball guidance (18)
9. Lift off ball guidance (18) carefully and put it on a clean place
- Attention:** Balls can get caught in the lower ball sockets of the ball guidance (18)!
10. Remove all balls (3) from ball tracks in gate (16)
11. Clean (A) or replace (B) balls (3):
 - (A)
 1. Clean ball tracks in gate (16) and counter plate (17) by using a lint-free cloth, and check their condition with regard to wear
 2. Clean balls and ball sockets in ball guidance (18) by using a lint-free cloth and alcohol
 3. Lubricate balls with VAT vacuum grease [see «Spare parts»]
 4. Insert balls into ball tracks in gate (16)
 - (B)
 1. Clean ball tracks in gate (16) and counter plate (17) by using a lint-free cloth and alcohol, and check their condition with regard to wear
 2. Clean ball sockets in ball guidance (18) by using a lint-free cloth and alcohol
 3. Insert new, lubricated balls [see «Spare parts»] into ball tracks in gate (16)
 - (A + B)
 1. Put ball guidance (18) carefully on gate (16) so that balls (3) get into ball sockets



2. Insert remaining balls into ball sockets in ball guidance (18)

12. Put counter plate (17) on ball guidance
13. Insert and tighten screws (19)

Attention: The internal screws first, then the outside screws. **Tightening torque: 9 Nm!**
14. Move mechanism on actuator shaft (13) to its stop

Attention: Spanner width of ball guidance (18) and shaft (13) must match!
Mechanism must not rotate against the shaft!
15. Mount lock nut (14) with disk (15)
16. Clean sealing surface of upper part of body (11) by using a lint-free cloth and alcohol
17. Clean sealing surface of valve seat on lower part of body (10) by using a lint-free cloth and alcohol

c) Mounting of upper part of body (11) / actuator assembly on lower part of body (10):

18. Carry out steps 13 - 20 of chapter «Cleaning or replacement of gate seal and/or bonnet seal»

Valve is ready for operation

5.3 Cleaning or replacing of shaft feedthrough seals

The figures in brackets refer to the drawing on page 16

The lower part of the body (flange part) need not be removed from the system for cleaning/replacing the shaft feedthrough seals! When the shaft feedthrough seals are cleaned/replaced, we recommend to clean the gate seal and bonnet seal as well (see relevant chapter).

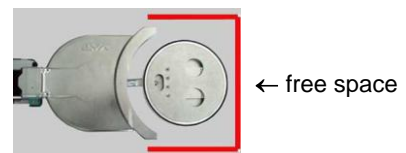
a) Separation of upper part of body (11) / actuator assembly from lower part of body (10):

1. Carry out steps 1 - 6 of chapter «Cleaning or replacement of gate seal and/or bonnet seal», however with seat side «▽» down!

b) Cleaning or replacement of shaft feedthrough seals:

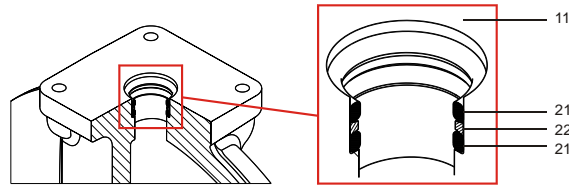
2. Apply compressed air (air pressure approx. 1 bar) and move mechanism slowly out of upper part of body (11)

Attention: Provide sufficient free space in order to prevent the mechanism from touching any objects!



3. Disconnect compressed air from valve
4. Remove lock nut (14) with disk (15)
5. Withdraw mechanism from actuator shaft (13) and put it on a clean place
6. Apply compressed air (air pressure approx. 1 bar) and move actuator shaft (13) slowly into upper part of body (11)
7. Disconnect compressed air from valve
8. Put upper part of body (11) / actuator assembly in upright position (actuator on top)
9. Take a note in which position the actuator is mounted with regard to the seat side [see symbol «▽» on upper part of body (11)], so that the actuator can be mounted in the same position after completion of the maintenance work

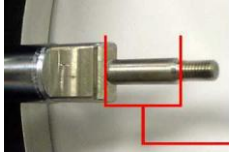
10. Remove 4 screws (20)
11. Withdraw actuator from upper part of body (11) and put it on a clean place
12. Remove both seals (21) and spacer (22) carefully from upper part of body (11)
Attention: Be careful not to damage the sealing surface!
13. Clean feedthrough opening in upper part of body (11) and spacer (22) by using a lint-free cloth and alcohol
14. Clean (A) or replace (B) seals of shaft feedthrough (21); see drawing below
 - (A)
 1. Clean seals by using a lint-free cloth and alcohol
 2. Lubricate first seal extensively with VAT vacuum grease [see «Spare parts»] and insert it in feedthrough opening in upper part of body (11)
 3. Insert spacer (22)
 4. Lubricate second seal extensively with VAT vacuum grease [see «Spare parts»] and insert it in feedthrough opening in upper part of body (11)
 - (B)
 1. Lubricate first seal extensively with VAT vacuum grease [see «Spare parts»] and insert it in feedthrough opening in upper part of body (11)
 2. Insert spacer (22)
 3. Lubricate second seal extensively with VAT vacuum grease [see «Spare parts»] and insert it in feedthrough opening in upper part of body (11)
 - (A + B)
 1. Lubricate space between both seals extensively with VAT vacuum grease [see «Spare parts»]



- 11 upper part of body
 21 first and second shaft feedthrough seal
 22 spacer = **space between both seals** → **area to be lubricated**

15. Clean actuator shaft (13):
 1. Apply compressed air and move out actuator shaft slowly in its full length (air pressure approx. 1 bar)
 2. Clean actuator shaft by using a lint-free cloth and alcohol
 3. Lubricate running surface of actuator shaft slightly with VAT vacuum grease [see «Spare parts»]
 4. Move back actuator shaft slowly with compressed air (air pressure approx. 1 bar)
 5. Remove excessive grease from shaft
 6. Disconnect compressed air from actuator
16. Put actuator on upper part of body (11)
Attention: Actuator must be mounted in the same position as it was before disassembly!
17. Mount and tighten 4 screws (20)
 Tightening torque: DN 160: 6 Nm / 4.5 lbf · ft
 DN 200 - 250: 14 Nm / 10.5 lbf · ft

18. Apply compressed air (air pressure approx. 1 bar) and move actuator shaft slowly out of upper part of body (11)
19. Disconnect compressed air from actuator
20. Remove excessive grease from shaft
21. Lubricate end piece of shaft without thread slightly with VAT vacuum grease [see «Spare parts»]

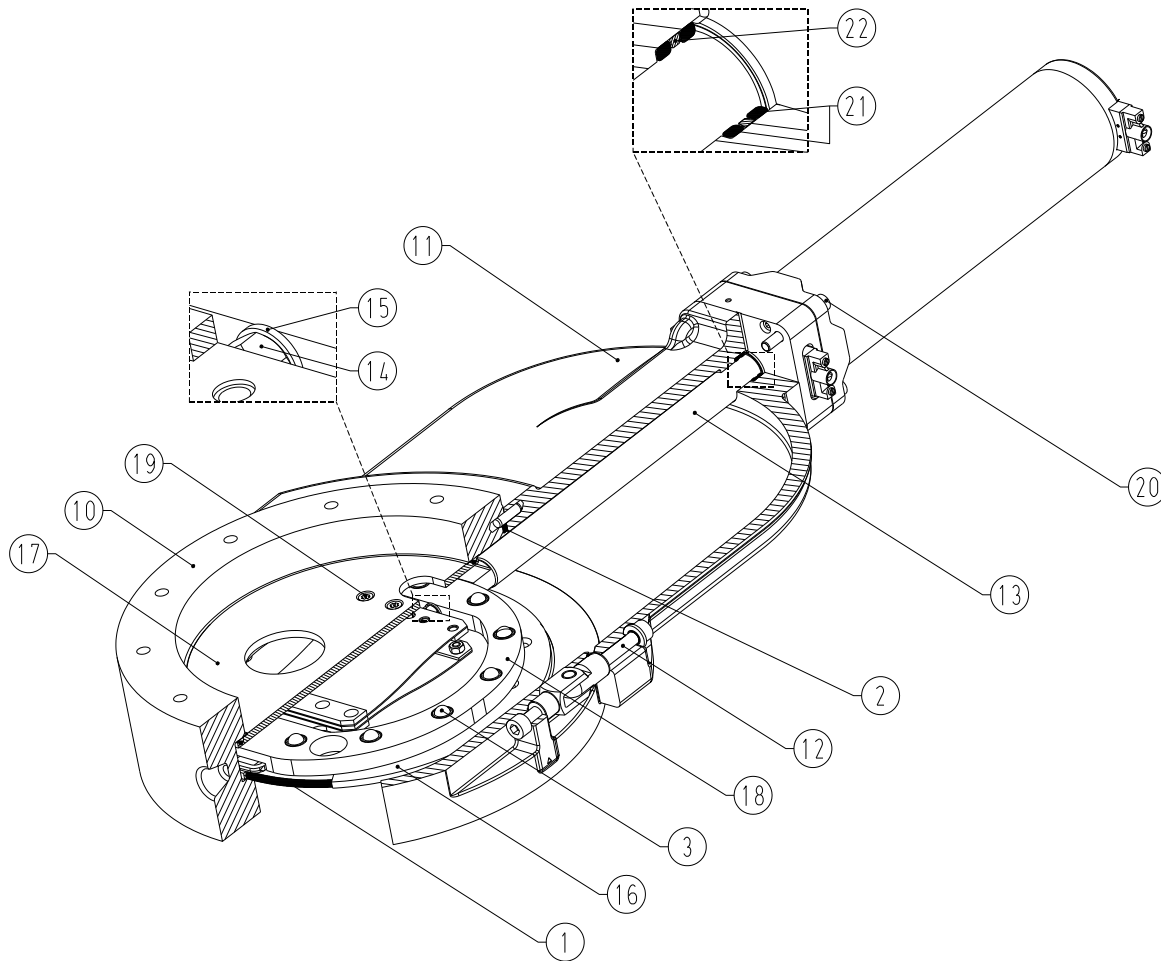


area to be lubricated

22. Move mechanism on actuator shaft (13) to its stop
Attention: Spanner width of ball guidance (18) and shaft (13) must match!
Mechanism must not rotate against the shaft!
 23. Mount lock nut (14) with disk (15)
 24. Clean sealing surface of upper part of body (11) by using a lint-free cloth and alcohol
 25. Clean sealing surface of valve seat on lower part of body (10) by using a lint-free cloth and alcohol
- c) Mounting of upper part of body (11) / actuator assembly on lower part of body (10):**
26. Carry out steps 13 - 20 of chapter «Cleaning or replacement of gate seal and/or bonnet seal»

Valve is ready for operation

6 Drawing



Item	Designation	Item	Designation	Item	Designation
1	gate seal	13	actuator shaft	19	countersunk-head screws
2	bonnet seal	14	lock nut	20	cylinder head screws
3	locking balls	15	disk	21	feedthrough seals
10	lower part of body	16	gate	22	spacer
11	upper part of body	17	counter plate		
12	swing screws	18	ball guidance		

7 Spare parts

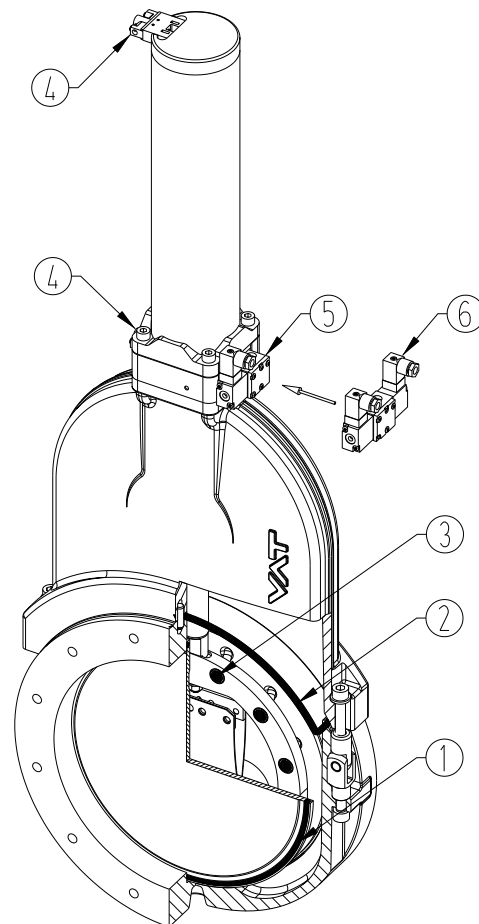


Please specify the **fabrication number of the valve** (see yellow label on valve) when ordering spare parts. This is to ensure that the appropriate spare parts are supplied.

The item numbers refer to the drawing below

Item	Designation	Ordering No.		
		160	200	250
	DN			
	Seal kit ¹⁾	216860	216859	216857
1	Gate seal	N-5100-258	N-5100-266	N-5100-378
2	Bonnet seal	N-5100-255	N-5100-264	N-5100-376
3	Spare parts kit «balls lubricated»	216865	216864	216862
4	Position indicator	78855-R1	78855-R1	78855-R1
5	Standard solenoid with coil ²⁾	94800-R1	94800-R1	94800-R1
6	Solenoid for impulse actuation with coils ²⁾	94801-R1	94801-R1	94801-R1
	VAT vacuum grease (10g)	N-6951-011	N-6951-011	N-6951-011

- ¹⁾ Seal kit includes:
gate seal, bonnet seal, shaft feedthrough seals
In most cases it is sufficient to replace the gate seal and bonnet seal only.
- ²⁾ Specify voltage!



VAT Vakuumentile AG would be pleased to carry out the maintenance work for you. Please contact the VAT representative responsible for your country. You will find the addresses on our website www.vatvalve.com.

Please specify the **fabrication number** of the valve whenever you place an order for spare parts. The fabrication number is indicated on a yellow label attached to the actuator of the valve (see **product identification label** on page 1).

Attention: Use lubricated **VAT** spare parts only!



8 Warranty

Each product sold by VAT Vakuumventile AG (VAT) is warranted to be free from the manufacturing defects that adversely affect the normal functioning thereof during the warranty period stated in VAT's «Terms of Sale» immediately following delivery thereof by VAT, provided that the same is properly operated under conditions of normal use and that regular, periodic maintenance and service is performed or replacements made, in accordance with the instructions provided by VAT. The foregoing warranty shall not apply to any product or component that has been repaired or altered by anyone other than an authorized VAT representative or that has been subject to improper installation or abuse, misuse, negligence or accident. VAT shall not be liable for any damage, loss, or expense, whether consequential, special, incidental, direct or otherwise, caused by, arising out of or connected with the manufacture, delivery (including any delay in or failure to deliver), packaging, storage or use of any product sold or delivered by VAT shall fail to conform to the foregoing warranty or to the description thereof contained herein, the purchaser thereof, as its exclusive remedy, shall upon prompt notice to VAT of any such defect or failure and upon the return of the product, part or component in question to VAT at its factory, with transportation charges prepaid, and upon VAT's inspection confirming the existence of any defect inconsistent with said warranty or any such failure, be entitled to have such defect or failure cured at VAT's factory and at no charge therefor, by replacement or repair of said product, as VAT may elect. VAT MAKES NO WARRANTY OR REPRESENTATION OF ANY KIND, EXPRESS OR IMPLIED, (INCLUDING NO WARRANTY OR MERCHANTABILITY), EXCEPT FOR THE FOREGOING WARRANTY AND THE WARRANTY THAT EACH PRODUCT SHALL CONFORM TO THE DESCRIPTION THEREOF CONTAINED HEREIN, and no warranty shall be implied by law.

Furthermore, the «Terms of sale» at the back of the price list are applicable.