



Installation, Operating & Maintenance Instructions

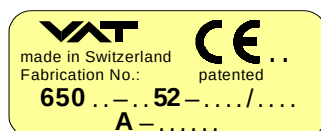
Series 650, DN 320-400 (I.D. 12-16")

Pendulum Control & Isolation Valve with stepper drive actuator

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

	ISO-F Flange	JIS Flange	ASA-LP Flange
DN320	65050 - P. 52 -	65050 - J. 52 -	65050 - T. 52 -
DN350	-	65051 - J. 52 -	-
DN400	65052 - P. 52 -	65052 - J. 52 -	65052 - T. 52 -

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



← Fabrication number



Sample photo

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!



Installation, Operating & Maintenance Instructions Series 650, DN 320-400 (I.D. 12-16")

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Series 650, DN 320-400 (I.D. 12-16")

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1 Use of product

This product is a throttling pendulum valve with isolation functionality. It is intended to use for downstream pressure control applications.

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 at 20°C			
- blank (650 A52 -)	1 x 10 ⁻⁸ mbar to 1.2 bar (abs)		
- hard anodized (650 H52 -)	1 x 10 ⁻⁶ mbar to 1.2 bar (abs)		
Leak rate to outside at 20°C			
- blank (650 A52 -)	1 x 10 ⁻⁹ mbar ls ⁻¹		
- hard anodized (650 H52 -)	1 x 10 ⁻⁵ mbar ls ⁻¹		
Leak rate valve seat at 20°C			
- blank (650 A52 -)	1 x 10 ⁻⁹ mbar ls ⁻¹		
- hard anodized (650 H52 -)	1 x 10 ⁻⁴ mbar ls ⁻¹		
Cycles until first service			
- isolation cycles (open - closed - open)	200'000	(unheated and under clean conditions)	
- throttling cycles (open - max. throttle - open)	1 Mio.	(unheated and under clean conditions)	
Admissible operating temperature			
- actuator ambient	35 °C max.		
- valve body	10 ... 150 °C		
Mounting position			
- DN320	Any (valve seat on chamber side is recommended)		
- DN350, 400	Horizontal only (parallel to level ground)		
Wetted materials	Valve body, pendulum plate	Aluminum 3.2315 (AA6082)	
	Sealing ring	Aluminum 3.2315 (AA6082), 1.4306 (304L)	
	Other parts	1.4435 (316L), 1.4404 (316L), 1.4122, 1.4310 (301), 1.4303 (304), 1.4571	
	Seals	Viton® (standard) Other materials available (seal materials are declared on dimensional drawing of specific valve ordering number)	
Max. differential pressure on plate during isolation	1200 mbar in either direction		
	DN320 / 12" (65050 - . . . 52 -)	DN350 / 14" (65051 - . . . 52 -)	DN400 / 16" (65052 - . . . 52 -)
Max. differential pressure on plate during opening and throttling	5 mbar	5 mbar	5 mbar
Min. controllable conductance (N ₂ molecular flow)	22 ls ⁻¹	25 ls ⁻¹	30 ls ⁻¹
Closing time throttling only	2.1 s typ.	2.1 s typ.	2.1 s typ.
Opening time throttling only	2.1 s typ.	2.1 s typ.	2.1 s typ.
Closing time throttling & isolation	5 s typ.	5 s typ.	5 s typ.
Opening time throttling & isolation	6 s typ.	6 s typ.	6 s typ.
Operation	Only with VAT Controller (VM-6, PM-6, PM-7 or PM-7E) and VAT connection cable		
Dimensions	Refer to dimensional drawing of specific valve ordering number (available on request)		

2 Installation

2.1 Unpacking

As this valve is a heavy component you should lift it with adequate equipment to prevent any injury to humans.



The valve is equipped with attachment points (tapped holes). Add eyebolts to these attachment points for lifting. The attachment points are indicated on the dimensional drawing of the specific valve part number (available on request).

Never lay the valve down with actuator downwards as the actuator may be damaged.

2.2 Installation procedure

2.2.1 Install valve into system

- Valve seat side should face process chamber. The valve seat side is indicated by the symbol "∇" on the valve flange.

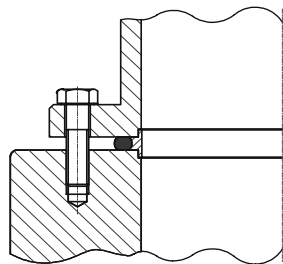
Note: Make sure that enough space is kept free to do preventive maintenance work. The required space is indicated on the dimensional drawing.



Do not tighten flange screws stronger than indicated in the tables below. The max. tightening torque depends on the type of installation.

a) Mounting with centering ring

Tighten mounting screws of the flanges uniformly in crosswise order. Observe the maximum torque levels in the following table. Higher tightening torques deforms the valve body and may lead to malfunction of the valve.

Valve size	ISO-F	ISO-F	
	max. tightening torque (Nm)	max. tightening torque (lbs . ft)	
DN320 / 12" (65050 - . . 52 -)	17 – 20	13 - 15	
DN350 / 14" (65051 - . . 52 -)	-	-	
DN400 / 16" (65052 - . . 52 -)	17 – 20	13 - 15	
	hole depth (mm)	hole depth (inch)	
DN320 / 12" (65050 - . . 52 -)	18	0.71	
DN350 / 14" (65051 - . . 52 -)	-	-	
DN400 / 16" (65052 - . . 52 -)	20	0.79	

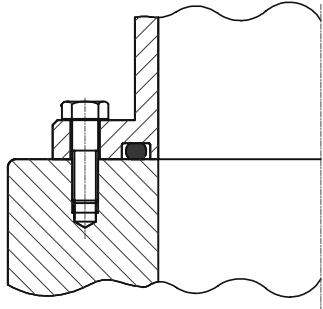
Note: Use slightly lubricated screws and make sure that screws are not too long otherwise the valve body may be damaged.

Refer to chapter «Spare parts» for centering ring ordering numbers.

b) Mounting with O-ring in groove

Tighten mounting screws of the flanges uniformly in crosswise order. Observe the maximum torque levels in the following table. Higher tightening torques may damage the threads in the valve body and lead to malfunction of the valve.

Valve size	ISO-F	JIS	ASA-LP	ISO-F	JIS	ASA-LP
	max. tightening torque (Nm)			max. tightening torque (lbs . ft)		
DN320 / 12" (65050 - . . 52 -)	65-70	65-70	80-90	48-52	48-52	59-67
DN350 / 14" (65051 - . . 52 -)	-	65-70	-	-	48-52	-
DN400 / 16" (65052 - . . 52 -)	65-70	115-120	230-240	48-52	85-89	170-178
	hole depth (mm)			hole depth (inch)		
DN320 / 12" (65050 - . . 52 -)	18	18	18	0.71	0.71	0.71
DN350 / 14" (65051 - . . 52 -)	-	18	-	-	0.71	-
DN400 / 16" (65052 - . . 52 -)	20	25	25	0.79	0.98	1.0



Note: These torques are valid if depth of the mounting screws is min. 1 x thread diameter. Make sure that screws in use are capable to withstand applied torques. Also use slightly lubricated screws and make sure that screws are not too long otherwise the valve body may be damaged.



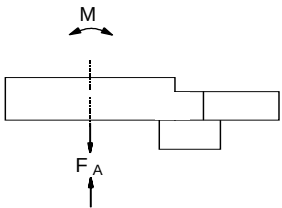
Do not admit higher forces to the valve than indicated in the table below.

c) Admissible forces

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

Valve size	Axial tensile or compressive force «F _A »		Bending moment «M»	
	N	lb.	Nm	lbf.
DN320 / 12" (65050 - . . 52 -)	3000	660	120	90
DN350 / 14" (65051 - . . 52 -)	3500	770	140	105
DN400 / 16" (65052 - . . 52 -)	4000	880	160	120

For a combination of both forces (F_A and M) the values are invalid.
Verify that the depth of the mounting screws is min. 1 x thread diameter.
Please contact VAT for more information.





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2.2.2 Connect compressed air



Compressed air pressure (above ATM) must be in the range of: 4 - 7 bar / 55 - 100 psi. Use only clean, dry or slightly oiled air.

- Connect compressed air **supply** to actuator connection labeled 'P'
- Connect compressed air **return line** to actuator connection labeled 'R'
- IN / OUT connections are 1/8" ISO/NPT internal threads. Refer to Figure 1.

2.2.3 Connect VAT controller

- The VAT controller has to be turned off for at least 60 seconds before connecting/disconnecting it to/from the valve.
- Connect valve to VAT controller (650PM - or 650VM -) by using the VAT connection cable (650CV-99L . .). Refer to Figure 2.
- Install VAT Controller according to the manual of the controller.

2.2.4 Connect intermediate pumping port

- This valve has a double sealed rotary feedthrough with intermediate pumping port for the actuator. Refer to drawing on page 16.
- Optional: Connect vacuum line to this intermediate pumping port (1/8" ISO/NPT). Refer to drawing on page 16.

2.2.5 Connect heating device

This valve may be optionally equipped with a heating device. Connect VAT heating device according to manual of the heating device.

P: compressed air supply
R: return line



Figure 1

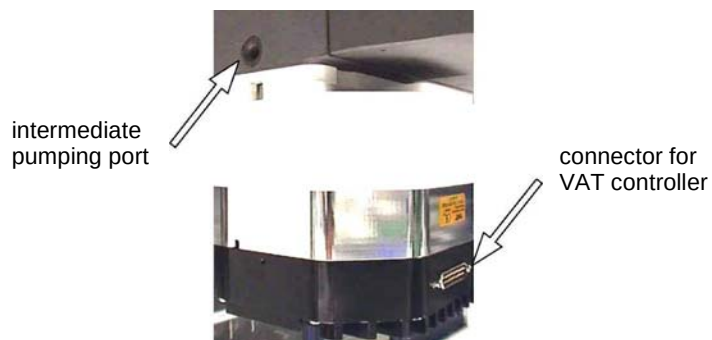


Figure 2



3 Operation



Operation is allowed after completion of the installation procedure only.

3.1 Normal operation

This valve may be operated only with a VAT controller and a VAT cable. For operation details other than those mentioned below refer to the manual of the VAT controller.

Do not operate the valve if the differential pressure between both valve sides is higher than the value specified in chapter «Technical data». Otherwise the valve may be damaged and malfunction is caused.

3.2 Operation under increased temperature

Refer to chapter «Technical data»

3.3 Behavior in case of compressed air pressure drop

Valve position before compressed air pressure drop:	Reaction of valve:
Valve closed	Valve remains closed.
Valve open or in any intermediate position	Sealing ring moves down and blocks the pendulum plate at the current position. VAT controller with display indicates ‚COMPRESSED AIR FAILURE‘. Refer to the manual of the VAT controller for details.

3.4 Behavior in case of power failure

Valve position before power failure:	Reaction of valve:	
	When operated by a VAT Controller with Power Failure Option	When operated by a VAT Controller without Power Failure Option
Valve closed	Valve remains closed. VAT controller with display indicates ‚POWER FAILURE‘. Refer to the manual of the VAT controller for details.	Valve remains closed.
Valve open or in any intermediate position	Valve will close *) VAT controller with display indicates ‚POWER FAILURE‘. Refer to the manual of the VAT controller for details.	Sealing ring moves down and blocks the pendulum plate at the current position.

*) Provided that the battery pack of the VAT controller is charged, refer to the manual of the VAT controller for details.



4 Trouble shooting

Failure	Check	Action
Valve does not close/open/control	VAT connection cable (controller to valve) connected correctly?	Connect cable to controller and valve
	Power for VAT controller supplied?	Connect VAT controller to power supply or mains respectively. Check if mains switch is on if present. For details refer to manual of VAT controller.
	Compressed air pressure supplied for valve?	Connect compressed air to valve. Refer to «2.2 Installation procedure» for details.
Pressure / position control does not work	Setup of VAT controller done correctly?	Refer to manual of VAT controller for details.
	Correct operation mode selected?	Refer to manual of VAT controller for details.
	Pressure gauge installed, setup correct and connected to VAT controller?	Refer to manual of pressure gauge and VAT controller for details.
Leak at gate	Sealing area contaminated?	Clean pendulum plate and sealing ring.
	Sealing surfaces of pendulum plate or/and sealing ring damaged?	Replace damaged part. Refer to «5.1 Preventive maintenance procedures».
	Sealing surfaces on valve body damaged?	Please contact your VAT service center for repair.
	O-rings on sealing ring damaged or not installed correctly?	Install o-ring correctly. Replace it if necessary. Refer to «5.1 Preventive maintenance procedures».
Leak to outside	Flanges leaktight? Sealing surface or flange seal damaged?	Verify if valve is installed correctly according to «2.2.1 Install valve into system» and admissible forces are not exceeded. Replace o-ring if necessary. Please contact a VAT service center for repair if flange sealing surface of valve is damaged.
	Valve bonnet leaktight?	Verify if bonnet screws are tightened with correct torque (see page 15). Replace bonnet seal if necessary.
	Actuator feedthroughs leaktight?	Perform He leak check at intermediate pumping port of actuator (see Figure 2 on page 7). Replace seals according to «5.1 Preventive maintenance procedures» if necessary.
	Leak at shaft feedthrough of sealing ring retaining pins.	Please contact a VAT service center for repair.

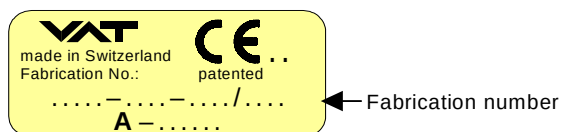
If you need any further information, please contact one of our service centers. You can find the addresses on our website: <http://www.vat.ch>



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. toxical, 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 Preventive maintenance procedures



Keep fingers out of the valve body during preventive maintenance work. The sealing ring or its retaining pins will lower in case of electrical power failure or loss of compressed air.



Take precautions to protect yourself from harmful substances that may have contaminated the valve during use.

Two preventive maintenance procedures are defined for this valve. These are:

- **Replacement of isolation seals** (gate and body seal of sealing ring) **and valve cleaning**
- **Replacement of actuator feedthrough seals**



Required frequency of cleaning and replacement of seals is depending on process conditions.

A critical factor influencing the maintenance period is the lifetime of the vacuum grease, being limited under increased temperature. In this case grease will separate to PTFE and oil. The oil may flow and contaminate the valve parts.

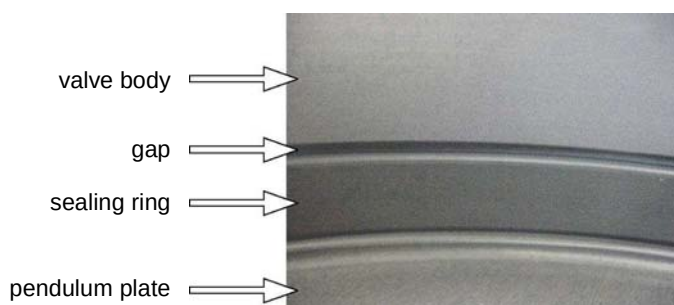
VAT can give the following **recommendations for preventive maintenance**:

	unheated *)	heated $\leq 80^{\circ}\text{C}$ *)	heated $> 80^{\circ}\text{C}$ *)
isolation seals (gate and body seal of sealing ring)	200'000 cycles	6 months	3 months
actuator feedthrough seals	1 Mio. cycles	6 months	3 months

*) These figures are reference values for clean conditions under various temperatures. These values do not include any impact of the process. Therefore preventive maintenance schedule has finally to be checked for the actual process conditions.

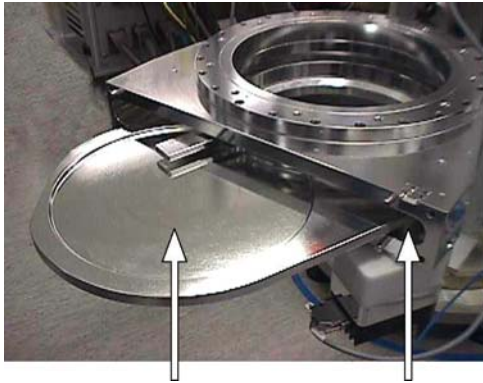
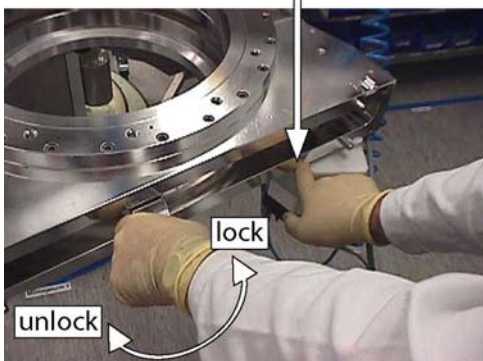


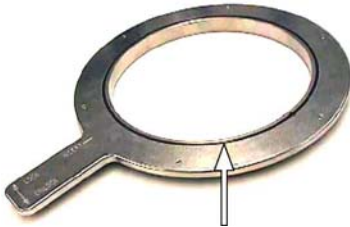
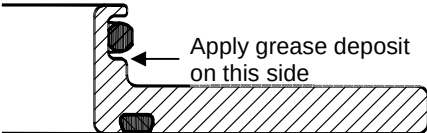
Prevent gap between body and sealing ring from air gun cleaning. Otherwise vacuum grease may be distributed and contaminate the valve.

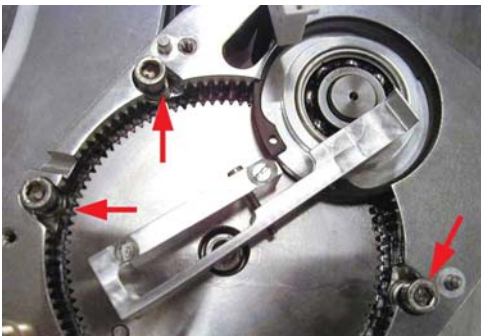


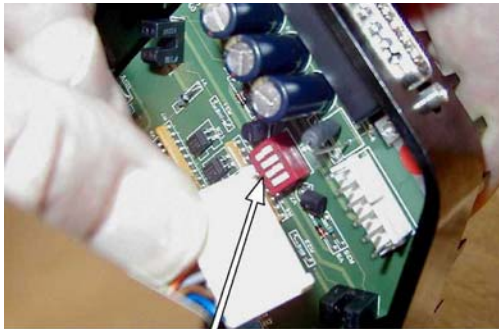
Replacement of isolation seals (gate and body seal of sealing ring) and valve cleaning

Replacement of actuator feedthrough seals

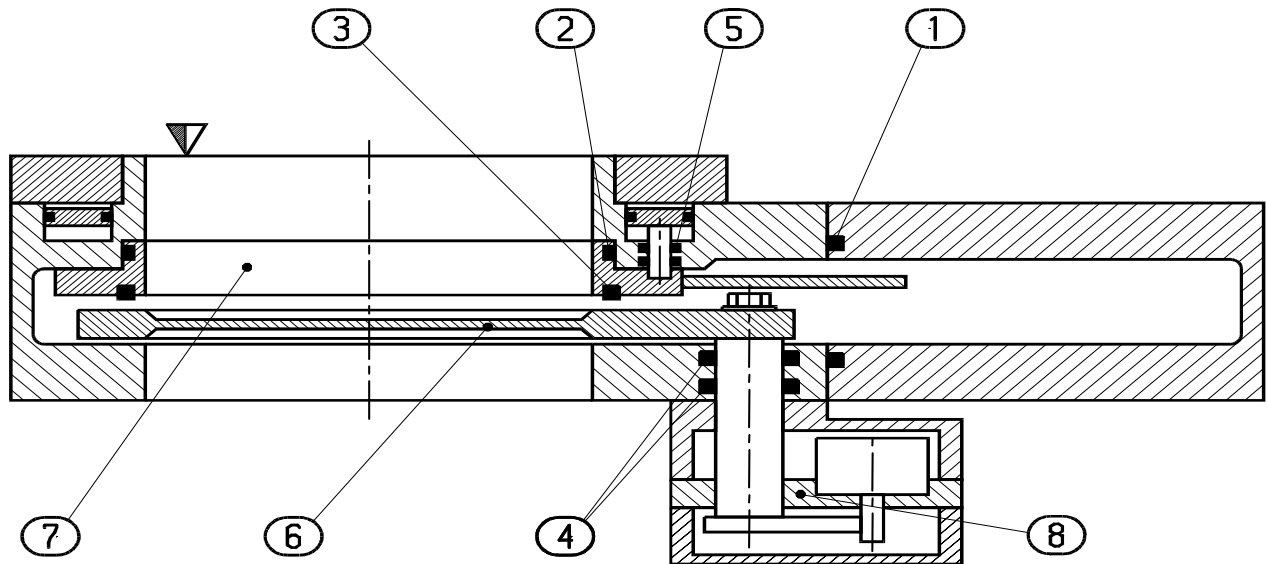
Description		Required tool								
1. Vent both valve chambers. 2. Open bonnet screws. Press snap in fixation on one side and pull bonnet a little bit on that side. Then press snap in fixation on other side and remove valve bonnet. Caution: Weight of valve bonnet is approx. <table><tr><td>DN320 / 12" (65050 - . . . 52 -)</td><td>13 kg (29 lbs.)</td></tr><tr><td>DN350 / 14" (65051 - . . . 52 -)</td><td>15 kg (33 lbs.)</td></tr><tr><td>DN400 / 16" (65052 - . . . 52 -)</td><td>18 kg (40 lbs.)</td></tr></table>	DN320 / 12" (65050 - . . . 52 -)	13 kg (29 lbs.)	DN350 / 14" (65051 - . . . 52 -)	15 kg (33 lbs.)	DN400 / 16" (65052 - . . . 52 -)	18 kg (40 lbs.)	snap in fixation 	Allen wrench 8mm		
DN320 / 12" (65050 - . . . 52 -)	13 kg (29 lbs.)									
DN350 / 14" (65051 - . . . 52 -)	15 kg (33 lbs.)									
DN400 / 16" (65052 - . . . 52 -)	18 kg (40 lbs.)									
3. Give 'OPEN' command on VAT controller to bring pendulum plate to OPEN position. Caution: Stand away from valve – pendulum plate moves out of the valve body. 4. To prevent the pendulum plate from moving during work, switch the VAT controller to maintenance mode. Refer to the manual of the VAT controller for details. 5. Unfasten mounting screw for pendulum plate. 6. Remove pendulum plate.	 pendulum plate mounting screw for pendulum plate	open end wrench 13mm								
7. Press the MAINTENANCE BUTTON to lower the sealing ring. Note: MAINTENANCE BUTTON is latched. 8. Unlock the sealing ring by pressing the handle. 9. Unlatch MAINTENANCE BUTTON. 10. Remove sealing ring.	maintenance button  lock unlock									

Description		Required tool																
11. Remove gate and body o-ring from sealing ring carefully with a soft tool. 12. Remove grease residues at sealing ring with alcohol. Clean sealing ring and pendulum plate with alcohol or in an ultrasonic bath. 13. Clean out valve body with alcohol. Use an appropriate non metal tool with a cloth to enter valve body. Do not enter valve body with hands! Then blow out valve body with clean air. Do not directly expose seals (actuator and retaining pin feedthroughs) to air stream! 14. Clean or replace gate seal if necessary. Install gate o-ring to sealing ring without grease. 15. Clean or replace body seal if necessary. Lubricate body o-ring with the quantity of vacuum grease listed in the table to the right. 16. Install body o-ring into sealing ring. 17. Deposit vacuum grease on the bottom side of the body seal according to drawing below. Pay attention that the quantity of vacuum grease listed in the table to the right is distributed constantly over the whole circumference.	 gate seal  body seal <table><tr><th>Valve size</th><th>Quantity of grease [ml]</th></tr><tr><td>DN320 / 12" (65050 - . . . 52 -)</td><td>0.3</td></tr><tr><td>DN350 / 14" (65051 - . . . 52 -)</td><td>0.4</td></tr><tr><td>DN400 / 16" (65052 - . . . 52 -)</td><td>0.4</td></tr></table> <table><tr><th>Valve size</th><th>Quantity of grease [ml]</th></tr><tr><td>DN320 / 12" (65050 - . . . 52 -)</td><td>0.5</td></tr><tr><td>DN350 / 14" (65051 - . . . 52 -)</td><td>0.7</td></tr><tr><td>DN400 / 16" (65052 - . . . 52 -)</td><td>1.1</td></tr></table>	Valve size	Quantity of grease [ml]	DN320 / 12" (65050 - . . . 52 -)	0.3	DN350 / 14" (65051 - . . . 52 -)	0.4	DN400 / 16" (65052 - . . . 52 -)	0.4	Valve size	Quantity of grease [ml]	DN320 / 12" (65050 - . . . 52 -)	0.5	DN350 / 14" (65051 - . . . 52 -)	0.7	DN400 / 16" (65052 - . . . 52 -)	1.1	
	Valve size	Quantity of grease [ml]																
	DN320 / 12" (65050 - . . . 52 -)	0.3																
	DN350 / 14" (65051 - . . . 52 -)	0.4																
	DN400 / 16" (65052 - . . . 52 -)	0.4																
	Valve size	Quantity of grease [ml]																
	DN320 / 12" (65050 - . . . 52 -)	0.5																
	DN350 / 14" (65051 - . . . 52 -)	0.7																
	DN400 / 16" (65052 - . . . 52 -)	1.1																
	 																	

Description		Required tool		
18. Turn off the VAT controller. Wait for 60s, then disconnect cable and compressed air from valve actuator.		Allen Wrench 3 mm		
19. Unfasten all 4 motor driver screws and lift motor driver carefully from actuator. Then separate actuator from motor driver by disconnecting the cable carefully.				
20. Unfasten all actuator screws (4 pcs. for B1 actuator version / 3 pcs. for B2 actuator version) and remove actuator.		Allen Wrench 5 mm		
21. Remove seals from actuator feedthrough carefully with a soft tool.				
22. Clean actuator feedthrough with alcohol.				
23. Lubricate each o-ring groove with 0.1 ml vacuum grease. Pay attention that grease is distributed constantly over the whole circumference.				

Description			Required tool				
24. Clean or replace seals if necessary. Lubricate each o-ring with 0.05 ml vacuum grease.							
25. Install o-rings.							
26. Deposit 0.1 ml vacuum grease on each o-ring. Pay attention that grease is distributed constantly over the whole circumference.							
27. Clean actuator shaft and lubricate it with 0.1 ml vacuum grease.							
28. Remove fixation kit and mounting screw for pendulum plate.							
29. Clean screw and slightly lubricate thread. Then reinstall fixation kit.							
30. Clean actuator shaft and lubricate it with 0.1 ml vacuum grease.							
31. Install actuator and motor driver in reverse order as they had been disassembled (steps 20 to 18). • Tighten actuator screws with 6 Nm. • Remove vacuum grease from actuator shaft face after installation. • Check micro switch configuration of motor driver (refer to Appendix A – Micro switch configuration of motor driver) and make sure that cable between actuator and motor driver is connected correctly. • Tighten motor driver screws with 3 Nm.	 micro switch	Allen Wrench 3 mm and Allen Wrench 5mm					
32. Install sealing ring and pendulum plate in reverse order as they had been disassembled (steps 10 to 5).	<table><tr><th>Valve size</th><th>Max. torque [Nm]</th></tr><tr><td>DN320 / 12" (65050 - . . 52 -)</td><td>16</td></tr></table>	Valve size	Max. torque [Nm]	DN320 / 12" (65050 - . . 52 -)	16	Allen wrench 8mm	
Valve size	Max. torque [Nm]						
DN320 / 12" (65050 - . . 52 -)	16						
33. Mount valve bonnet. • Tightening torques for bonnet screws are listed in the table to the right.	<table><tr><td>DN350 / 14" (65051 - . . 52 -)</td><td>16</td></tr><tr><td>DN400 / 16" (65052 - . . 52 -)</td><td>16</td></tr></table>	DN350 / 14" (65051 - . . 52 -)	16	DN400 / 16" (65052 - . . 52 -)	16	and open end wrench 13mm	
DN350 / 14" (65051 - . . 52 -)	16						
DN400 / 16" (65052 - . . 52 -)	16						

6 Drawing





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.

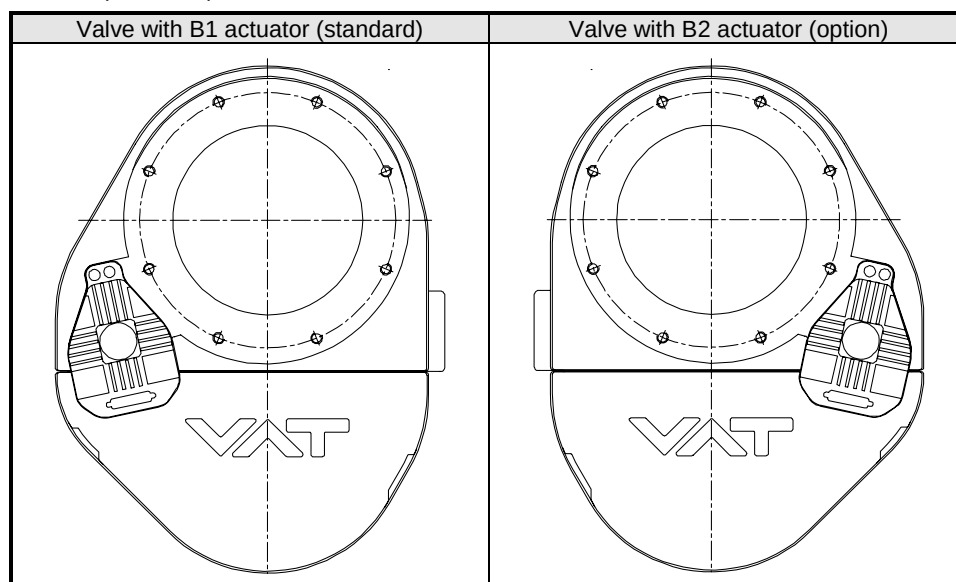
The item numbers refer to the drawing on page 16

Item	Description			
	Valve size	DN320	DN350	DN400
	Valve part number	65050 - . . 52 -	65051- . . 52 -	65052- . . 52 -
1	Bonnet Viton seal other materials	N-5100-280 on request	N-5100-281 on request	N-5100-282 on request
2	Body seal (Viton) This includes a 2ml syringe of vacuum grease	206529	230885	244435
3	Gate Viton seal other materials	N-5100-279 on request	N-5100-280 on request	N-5100-282 on request
	Seal kit vacuum (Viton). This consists of item 2 and 3.	206528	230884	244437
	Syringe of vacuum grease 2ml	206792		
	5ml	206793		
4	Actuator feedthrough seals (Viton)	N-5111-329 (2 pcs required per valve)		
5	Seals for sealing ring shaft feedthroughs (Viton)	N-7121-112 (24 pcs required per valve)		
6	Pendulum plate			
	- Blank B1 *)	211275	217681	239455
	- Blank B2 *)	211276	on request	on request
	- Hardanodized B1 *)	96603-01	222787	235219
	- Hardanodized B2 *)	98378-01	on request	on request
	- Nickel coated B1 *)	on request	on request	on request
	- Nickel coated B2 *)	on request	on request	on request
7	Sealing ring			
	- Blank	230236	217677	239438
	- Hardanodized	229310	222784	235224
8	- Nickel coated	on request	on request	on request
	Actuator complete B1 *) (incl. motor driver) B2 *)	379854 231803		
	ISO-F centering ring with Viton o-ring for installation Aluminum	32050-QAZV	-	32052-QAZV

Note: Use only spare parts manufactured by VAT to assure safe and reliable operation!

*) Refer to figures on next page to check for actuator position options.

Actuator position options:

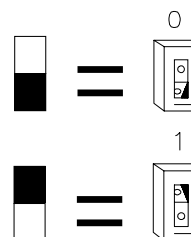
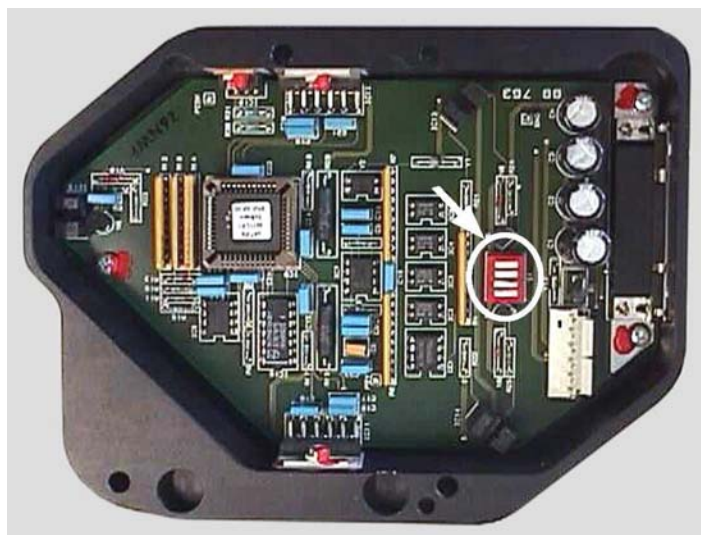


8 Warranty

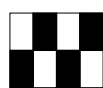
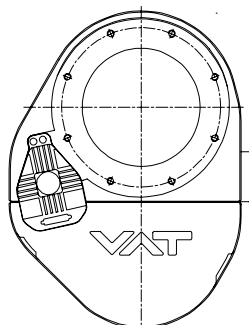
Each product sold by VAT Vakuumventile AG (VAT) is warranted to be free from the manufacturing defects that adversely affect the normal functioning thereof during the warranty period stated in VAT's «Terms of Sale» immediately following delivery thereof by VAT, provided that the same is properly operated 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.

Appendix A – Micro switch configuration of motor driver

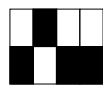
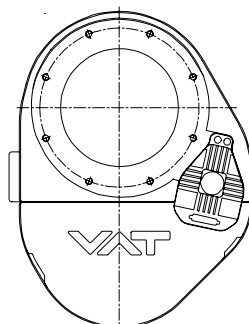


For valves with actuator position B1:



DN320 (12")
DN350 (14")
DN400 (16")

For valves with actuator position B2:



DN320 (12")
DN350 (14")
DN400 (16")