SOMAS®

Edition: 2024-04

Mi-101 EN

Service and operating instruction
Ball segment valves



Type KVT / KVX	Wafer design
Type KVTF / KVXF	Flanged design
Nominal pressure	PN 40/Class 300
Nominal size	DN 25/2 - 65 NPS 1 - 2 $^{1/2}$

Introduction

This operating manual is intended for the operating, maintenance and supervisory personnel.

This operating manual also describes components, equipment and ancillary units which are not or only partially included in the scope of supply.

The operating personnel must have read, understood and must comply with this operating manual.

We keep the right to do any technical changes which are necessary to improve the product without prior notice.

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1 Preliminary remarks

To enable you to find information quickly and reliably in the operation manual, this chapter familiarises you with the structure of the operating manual.

This manual uses symbols and special characters which make it easier for you to find information. Please read the explanations of the symbols given in the section below.

Ensure that you read all the safety instructions in this operating manual very carefully.

You will find safety instructions in section 2, in the foreword to the sections and before any working instructions.

1.1 Explanation of warnings, symbols and signs

1.1.1 Warnings

Warnings are used in this operating manual to warn against injury and material damage. Always read and observe these warnings! Warnings are identified by the following symbols:

In this manual are used diverse types of safety and warning notices:

Danger!	
Type of danger. Advise for imminent danger. Not attention of the advices could be mortal or cause severe injuries as a consequence. Explanation of the countermeasures.	International Safety symbol

Warning!	
Type of danger. Advise for imminent danger. Not attention of the advices could cause severe injuries or property damage as a consequence. Explanation of the countermeasures.	International Safety symbol

Attention!	
Type of danger. Advise for possible danger. Not attention of the advices could cause property damage as a consequence. Explanation of the countermeasures.	International Safety symbol

Note

Advices and give tips for better understanding of the manual or a better handling of the valve.

1.1.2 Symbols and signs

Symbols and signs are used in this operating manual to provide fast access to information.

1.1.2.1 Symbols and signs in the text

Symbol	Denotation	Explanation
⇨	Operating instructions	This means there is an action to be carried out.
1. 2.	Operating instructions, multi-step	Work instructions must be carried out in the sequence shown. Deviations from the sequence shown may result in damages to the valve and accidents.
• –	Lists, two-stage	No activities are linked with lists.
➔	Cross-reference	References to images, tables, other sections or other instructions.

Tab.1-1 Symbols in the text

2 Safety

2.1 Safety instructions

2.1.1 General dangers

Sources of danger resulting in general hazards:

- Mechanical hazards
- Electrical hazards.

2.1.2 Hazards due to electrical equipment

Due to the permanent dampness, electrically-operated machine parts represent a potential source of danger.
Comply with all regulations on electrical equipment in damp areas!

2.1.3 Additional hazards

2.1.3.1 Entanglement, crushing and cut/sever hazards

- by moving valve parts left exposed, by removing covers for inspection, sampling, etc.
- by automatic operated valves.

2.1.3.2 Burning or scalding hazards

- by opening or leaving open function-check and/or sampling openings on systems operating at high temperatures (above 40°C).
- by operating temperature >= 70°C. Short contacts (approx. 1s) of the skin with the surface of the valve may cause burns (pr EN 563)
- by operating temperature = 65°C. Longer contacts (approx. 3s) of the skin with the surface of the valve may cause burns (pr EN 563)
- by operating temperature 55°C…65°C. Longer contacts (approx. 3-10s) of the skin with the surface of the valve may cause burns (pr EN 563).

2.1.3.3 Explosion hazards

A high surface temperature on a valve and actuator, constitutes (a risk for burn injuries, and) a risk of ignition of explosive atmospheres in ATEX applications.

The surface temperature of the equipment is not dependent on the equipment itself, but on the ambient conditions and the process conditions. The protection from the surface temperature is the responsibility of the end user, and must be effectuated before the equipment is put into service.

2.1.4 State of the art

This product has been built by Somas Instrument AB in accordance with state-of-the-art standards and the recognized safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the valve and to other material property, if:

- the product is not used as designated
- the product is operated or repaired by untrained personnel
- the product is modified or converted improperly and/or
- the safety instructions are not observed

Therefore, every person involved in erecting, operating, inspecting, maintaining, servicing and repairing the valve must read, understand and observe the complete operating instructions, particularly the safety instructions.

2.1.5 Preconditions for using the valve

The valve only has to be used:

- in perfect technical condition
- as designated
- according to the instructions in the operating manual, and only by safety-conscious persons who are fully aware of the risks involved in operating the valve
- if all protective devices are installed and operative

Rectify immediately any functional disorders, especially those affecting the safety of the valve!

2.2 Designated use of the valve

2.2.1 Use

The valves are appropriate to be used in pulp and paper industry, chemical industry, shipbuilding industry, energy industry and offshore industry.

Particular data to the operation and limit values are specified on the data sheet “Si-101EN”.

The operating values, limit values and setting data must not deviate from the values specified in the operating manual and correspondig information sheet without consulting the manufacturer! The manufacturer cannot be held liable for any damages resulting from non-observance of the operating manual.

2.2.2 Liability for non-designated use

Using the valve for other purposes than those mentioned previously is considered contrary to its designated use. For resulting damages of this, Somas Instrument AB is not liable! The user take the risk.

2.3 Organizational measures

2.3.1 Availability of operating manual

The operating manual has to be stored and be readily available!

2.3.2 Additional regulations

In addition to the operating manual, it have to be observed all other generally applicable legal and other mandatory regulations relevant to accident prevention and environmental protection! Direct the personnel to comply with them!

2.3.3 Checks

Periodically check that the personnel carry out the work in compliance with the operating manual and that they pay attention to risks and safety factors.

2.3.4 Protective equipment

Use when necessary protective equipment.

2.3.5 Rebuilds or modifications at the valve

Do not make any rebuilds or modifications at the valve yourself, which can affect the security of the valve.

2.3.6 Replacing damaged parts

Valve parts that are not in perfect condition must be replaced immediately with original spare parts! Use only original spare and wear parts from Somas Instrument AB.

On unauthorized parts is not guarantee that they have been designed and manufactured according to the application.

2.4 Selection and qualification of personnel

Operation, maintenance and repairing works require special knowledge and may only be carried out by trained technical specialists or qualified personnel authorized by the user.

2.5 Safety instructions for ball segment valves

- Operation of the ball segment valve is always subject to the local safety and accident prevention regulations.

Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves when the actuator is connected to compressed air system. Single action actuators may move to “open” or “closed” position without being connected to the air system.



Warning!

Before carrying out maintenance or repair work on the ball segment valve with actuator or installation and removal of the ball segment valve from the pipeline, always disconnect the compressed air supply to the actuator.
Single action actuators may move to “open” or “closed” position without being connected to the air system.



Warning!

Ensure that personnel who work with, install or repair the ball segment valve are appropriately trained. This prevents unnecessary damage and accidents or injury to personnel.

The maintenace and assembly personnel must be familiar with the process of installing and disassembling the ball segment valve in a process line, the special and possible risks of the process and the most important safety regulations.

The repair and assembly personnel must be familiar with the risks when handling pressurised equipment, hot and cold surfaces, dangerous substances and substances which represent a hazard to health.









Warning!

Do not exceed the design data of the ball segment valve!
Exceeding the design data marked on the ball segment valve may lead to damage and uncontrolled escape of the pressurised medium.
Both the damage as such and the pressurised medium may lead to injuries to personnel.



Warning!

Do not remove the ball segment valve from the line as long as it is pressurised!
Dismantling or disassembly of a pressurised ball segment valve leads to an uncontrolled loss of pressure. Always isolate the relevant ball segment valve in the pipe system; despressurise the ball segment valve and remove the medium before working on the ball segment valve.



Warning!

Before assembling or disassembling the pneumatic actuator of a ball segment valve installed in the pipeline depressurise the relevant valve in the pipeline system, isolate the valve and remove the medium before working on the valve.
The pressurised medium may lead to injuries to personnel.



Warning!

Inform yourself of the properties of the medium. Protect yourself and your environment from hazardous or poisonous substances.
Observe the safety instructions in the safety data sheets of the manufacturers. Ensure that no medium can enter the pipeline during maintenance work.



Warning!

Before replacing the stuffing box of a ball segment valve installed in the pipeline depressurise the relevant valve in the pipeline system, isolate the valve and remove the medium before working on the valve.
The pressurised medium may lead to injuries to personnel.



Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves. The valve with ball segment mounted may work as a cutting tool. Do not leave any foreign objects in the valve body. The ball segment of the ball segment valve always works as a separate device. There is no difference whether an actuator is installed or not. The position of the ball segment may change during transport or handling of the ball segment valve.



Warning!

Protect yourself against noise - use the relevant safety equipment.
The ball segment valve may cause noise in the pipeline. The noise level depends on the type of application and can be determined with the Somas software SomSize.
Additional noise sources in the vicinity of the ball segment valve may increase the noise level.



Warning!

Beware of very cold or hot surfaces!
The body of the ball segment valve may become very cold or very hot during operation. Protect yourself against frostbite and burns.





Warning!

When transporting and handling the ball segment valve, observe its weight.
Never lift the valve by its positioner, limit switch, solenoid valve or piping. Place the hoisting ropes securely according to lift instruction.
The ball segment valve or parts thereof may injure persons if dropped.
Do not walk under suspended loads.



3 Description

3.1 General information

The Somas ball segment valves were developed to meet the requirements of industrial production for control, on/off and hand operated valves with unhindered flow and at the same time a tight shut off in closed position. The valves of type KVT with centrally assembled ball segment are used for liquids, fibrous material suspensions, muddy media, chemicals etc.

The valves of type KVX are used for applications with dry and hot substances, such as vapours, gases and acids. With this valve type, the ball segment is installed eccentrically and rotates outwards from the seat when the valve is opened. This reduces wear of the seat and ball segment.

3.2 Seat design

Select the PTFE seat for particle-less substances in so far as the temperature allows.

Otherwise, we recommend an HiCo seat (seat made of a cobalt alloy).

To achieve a uniform design and to reduce the requirement for replacement parts, the design of the seat is identical for all valves with PTFE seat and HiCo seat (seat made of a cobalt alloy). Independently of the seat material, a spring washer is used to press the seat against the surface of the ball segment. A very good tightness is thus achieved even with low differential pressures.

3.3 Decommissioning and disposal

Somas valves are designed for easy maintenance and repair, ensuring an environmentally friendly and cost-efficient use.

Replaced components and valves shall be disassembled and recycled according to local rules and regulations.

The materials of the valve components can be found on the valve marking plate and in Somas valve data sheets. Material information can also be acquired from Somas Instrument AB.

4 Technical specifications

4.1 Tightening torque for bolts

4.1.1 Torques for flange boltings

DN	PN/Class	Bolt-dimension	Number of bolts	Torque (Nm)[1]
25	10, 16, 25	M12	4	32
	40	M12	4	48
	/150	1/2“	4	35
	/300	5/8“	4	60
40	10, 16, 25	M16	4	65
	40	M16	4	95
	/150	1/2”	4	65
	/300	3/4“	4	75
50	10, 16, 25	M16	4	80
	40	M16	4	120
	/150	5/8“	4	60
	/300	5/8“	8	45
65	10, 16, 25	M16	8	55
	40	M16	8	80
	Class 150	5/8“	4	75
	Class 300	3/4“	8	65

Tab.4-1 Torque for flange boltings

[1] The information in the table refers to lubricated bolts. The correction factor for new, unlubricated bolts is 1.5. Tighten the bolts alternately until the correct tightening torque is reached.

Tightening torque applies to flat gaskets corresponding to non-reinforced and reinforced graphite according to EN 12516-2: 2014 with m-factor according to ASME 2.0 to 2.5. Maximum thickness for gasket: 2.0 mm.

Tightening torque must not be exceeded, because then the functionality of the valve can be compromised. Tightening torques in Nm are designed for gaskets according to EN 1514-1, ASME B16.21 and counter flanges according to EN 1092-1, EN 1759-1, ASME B16.47.

4.1.2 Tightening torque for screws in cover

Screw dim.	M6	M8	M10	M12	M16	M20	M24
Tightening torque Nm MV 1)	10	25	47	57	140	273	472

1) Mv-recommendations refer to flat burr-free surfaces lubricated with a good quality lubricant.

Tightening torque for ball segment

Screw dim.	M5	M6	M8	M10	M12	M16	M20	M24
Tightening torque Nm	6,6	12	29	54	94	228	442	765

Tightening torque for stuffing box nuts

The table applies to expanded graphite stuffing boxes. For stuffing boxes made of other materials, a slightly lower torque must be used.

					Torque	
					1)First	2) Final
DN	di	Dy	Bolt	Qty.	Nm	Nm
25, 40, 50	15	24	M6	2	5	3
65	20	30	M8	2	9	5

1) A first compression.
The nuts must be tightened alternately repeatedly until all achieves the specified torque.

2) The final compression.
Before the final compression, loosen the nuts and thereafter tighten again at the specified final torque. The nuts must again be tightened alternately repeatedly until all achieves the specified torque.

5 Assembly

5.1 Unpacking and transportation

Inspect the ball segment valve for transport damage when unpacking. The protective caps must only be removed immediately before assembly. The valve must be stored on a suitable base and protected against dirt until installed.

The valve must be stored in a cool, dry, clean place, not in direct contact with the floor. The valve must always be protected against dirt during storage and assembly, see Technical Information sheet, Ti-935 that is available at www.somas.se

Warning!

When transporting and handling the valve, observe the weight of the valve or of the whole unit. Do not walk under suspended loads.



Transportation must be carried out with suitable hoisting equipment as shown in (➔ Fig.5-1). The picture shows a standard situation. Please note that all possible situations that can occur cannot be covered in this lift instruction.

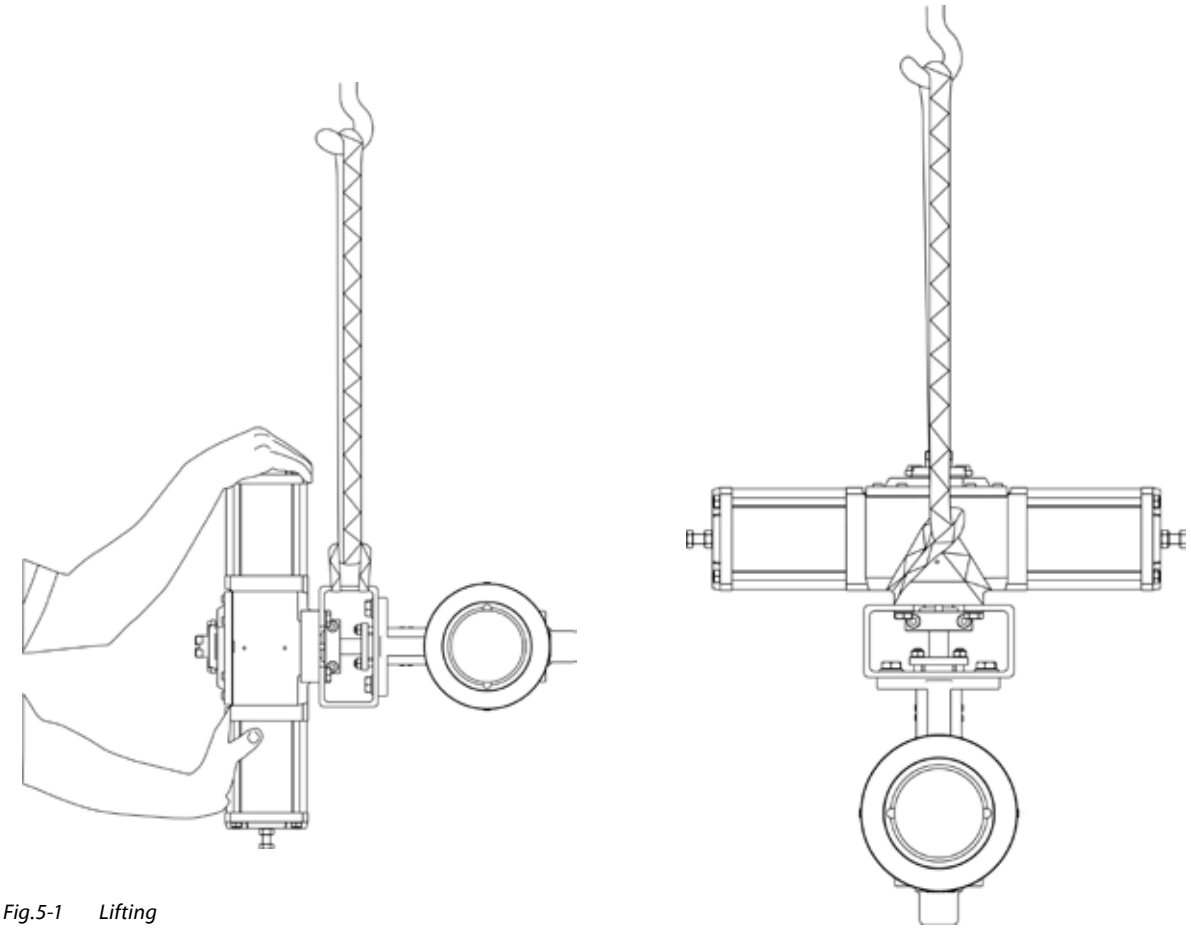


Fig.5-1 Lifting

5.2 Installation of the valve in the pipeline

Attention!

The valve is normally installed in the pipeline complete with mounted actuator.



Mounting in horizontal pipes

How Somas valves are mounted in a horizontal pipe can depend on a variety of factors like the media, the application as such and available space.

Somas valves (ball valves, segmented valves and butterfly valves) should generally be mounted:

- In the first place with the shaft horizontally.
- If it is necessary to deviate from above, the spindle should point upwards in the upper half plane.
- For media that has a thick ”bottom fraction” that can accumulate in the lower shaft bearing, avoid mounting with the shaft straight up or near straight up.
- Mounting with the shaft pointing down in the lower half plane should be avoided, and especially mounting with the shaft straight down.
- If there are strong reasons for choosing the mountings that contradict the instructions above, Somas should be contacted to evaluate the risks associated with these mountings.

The direction of flow is indicated with arrows on the valve body. Fix the pipeline correctly to prevent the exertion of external forces on the valve.

Warning!

Before carrying out maintenance or repair work on the valve with actuator as well as installation and disassembly of the ball segment valve in the pipeline, always disconnect the compressed air supply to the actuator.
Single action actuators may move to “open” or “closed” position without being connected to the air system.



5.2.1 Important information for installation

- Only remove protective devices immediately before installation of the valve.
- Counterflanges must be in accordance to the European or ASME standards.
- Ensure that the valve is not dirty and the pipeline is cleanly purged. Dirt damages the seat and the ball segment and leads to leakages.
- Ensure that the sealing surfaces of the counterflanges are clean and parallel.
- Ensure that the valve and the gaskets are correctly centred and gaskets of the correct quality are used. The sealing function of the valve depends on the gasket on the inlet side, which transmits the pressure from the connecting flange to the cover plate (➔ Fig.5-2).
- Tighten the flange bolt carefully. The tightening torque depends on the bolt size (➔ Tab.4-1). Keep the valve closed when it is not put into operation.
- **Valves can be delivered with threaded connection holes intended for TA Luft, flushing, lubrication, steam etc. Components and equipment to be connected shall fulfil the safety requirements according to the PED (2014/68/EU). Pipe threads with parallel threads and a separate sealing ring shall be used.**

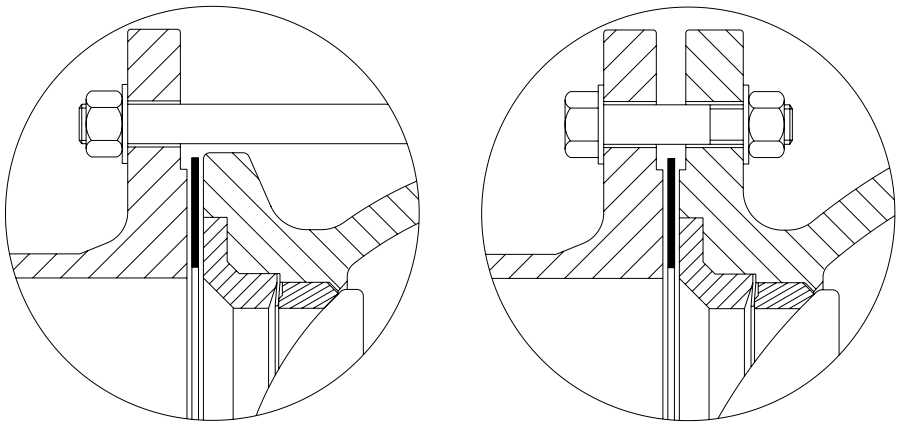


Fig.5-2 Gasket

5.3 Commissioning

1. Ensure that the valve is cleaned well before commissioning. Dirt damages the ball segment and/or seat and leads to leakages.
2. Open the valve completely.
3. Check the stuffing box when the pipe system is pressuerized and retighten the nuts of the stuffing box gland in the event of leakage.

5.4 Disassembly of the pneumatic actuator

Note

Observe also the detailed information in the operating manual of the actuator Mi-503EN.



Warning!

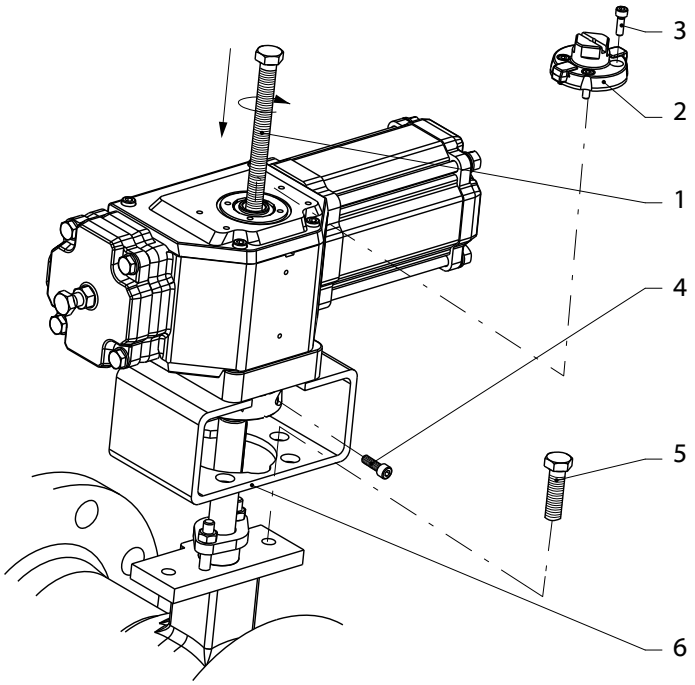
Before assembling or disassembling the pneumatic actuator of a ball segment valve installed in the pipeline depressurise the relevant valve in the pipeline system, isolate the valve and remove the medium before working on the valve.
The pressurised medium may lead to injuries to personnel.



Warning!

Before carrying out maintenance or repair work on the valve with actuator as well as installation and disassembly of the ball segment in the pipeline, always disconnect the compressed air supply to the actuator.
Single action actuators may move to “open” or “closed” position without being connected to the air system.





1	Puller	3	Screw	5	Bolt
2	Driver	4	Clamping ring bolts	6	Bracket

Fig.5-3 Disassembly of the actuator (schematic diagram)

Use a puller to remove the actuator from the valve. This prevents damage to the seat and ball segment/ball of the valve.

Pullers

Actuator size	**A11**	**A13**	**A21**	**A22**	**A23**	**A24**	**A31**	**A32**
Article no.	34786	34786	34786	34786	34786	34786	34787	34787
Actuator size	**A33**	**A34**	**A41**	**A42**	**A43**	**A44**	**A51**	**A52**
Article no.	34787	34787	34788	34788	34788	34788	34788	34788

1. Undo the clamping ring bolts (➔ Fig.5-3/4).
2. Remove the accessory parts such as positioners and end position limit switches.
3. Remove the screws (➔ Fig.5-3/3), to remove the driver (➔ Fig.5-3/2).
4. Remove the bracket (➔ Fig.5-3/6) from the valve by removing the bolts (➔ Fig.5-3/5).
5. Press the actuator off the valve with the puller (➔ Fig.5-3/1). Turn the puller in until the actuator can be removed from the valve shaft.
6. Lift the actuator off and turn the puller out again.

5.5 Positioning of the shaft with disassembled actuator

A groove or a semi-circle on the end of the shaft marks the position of the ball segment in the valve. The ball segment must be turned to the valve inlet when the valve is closed (➔ Fig.5-4).

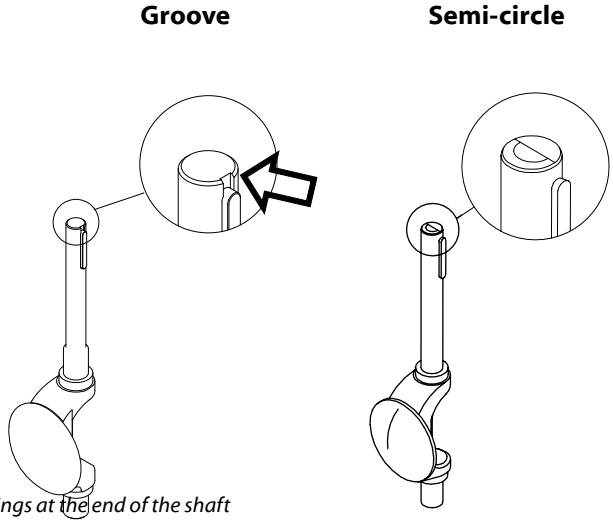


Fig.5-4 Markings at the end of the shaft

5.6 Assembly of the pneumatic actuator

Note

Observe also the detailed information in the operating manual of the actuator Mi-503EN.

Warning!

Before assembling or disassembling the pneumatic actuator of a ball segment valve installed in the pipeline depressurise the relevant valve in the pipeline system, isolate the valve and remove the medium before working on the valve.
The pressurised medium may lead to injuries to personnel.

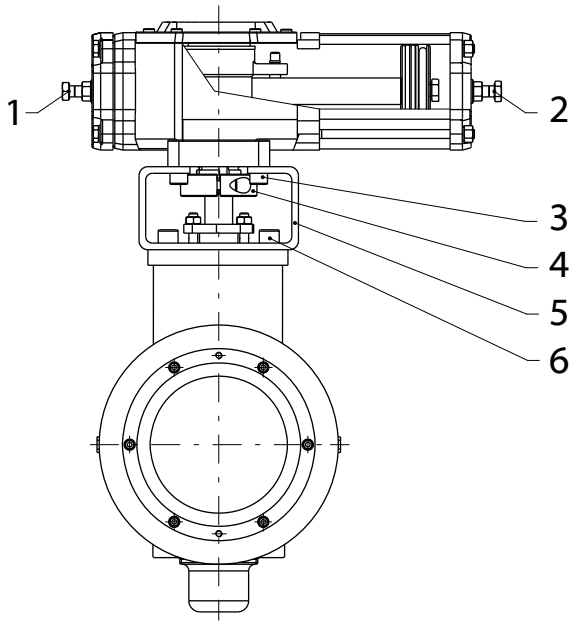
Warning!

Before carrying out maintenance or repair work on the valve with actuator as well as installation and disassembly of the ball segment in the pipeline, always disconnect the compressed air supply to the actuator.
Single action actuators may move to “open” or “closed” position without being connected to the air system.

Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves. The valve with ball segment mounted may work as a cutting tool. Do not leave any foreign objects in the valve body. The ball segment of the ball segment valve always works as a separate device. There is no difference whether an actuator is installed or not. The position of the ball segment may change during transport or handling of the ball segment valve.





1	End stop bolt	4	Clamping ring
2	End stop bolt	5	Bracket
3	Bolt	6	Bolt

Fig.5-5 Assembly of the actuator (schematic diagram)

5.6.1 Actuator mounting alternatives

Following mounting positions are possible.

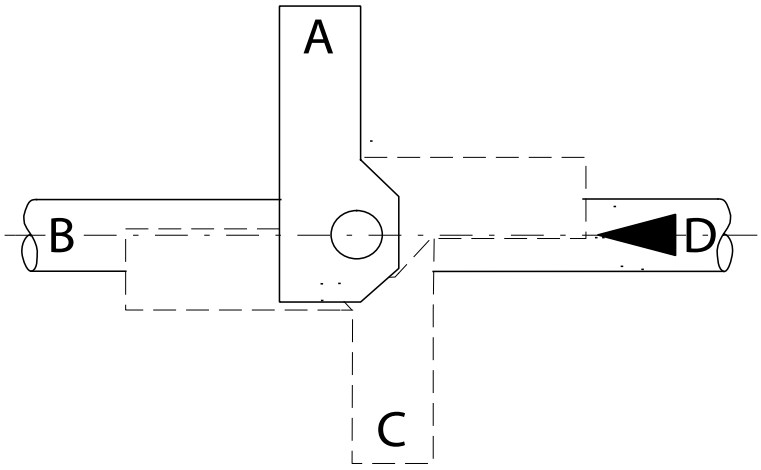


Fig.5-6 Actuator mounting position

Note

To prevent damage, do not fit the actuator with force.
When large actuators (both single - and double acting) are used in vertical pipes, install them with the cylinder in the pipe direction. This will result in less wear and easier maintenance..

1. When using double action and spring closed actuators, ensure that the valve in “closed” position.
2. When using spring opened actuators, ensure that the valve is in “open” position.
3. Lubricate the shaft and the key.
4. Fix the bracket (➔ Fig.5-5/5) to the actuator with the aid of the bolts (➔ Fig.5-5/3).
5. Place the actuator with the bracket in the required (position A, B, C or D) (➔ Fig.5-6) on the shaft of the valve body and fix the unit with the aid of the bolts (➔ Fig.5-5/3).
6. Connect the shaft end of the valve and the actuator to the clamping ring (➔ Fig.5-5/4). The clamping ring is to be installed in such a way that its yellow markings indicate the position of the ball segment. When the valve is closed, the markings must then be offset to the direction of flow by 90°.
7. Tighten the bolts on the clamping ring (➔ Fig.5-5/4).
8. Then set the end positions (➔ Chap. 6.10).

6 Maintenance

6.1 Disassembling the ball segment valve from pipeline

Attention!

The valve is normally removed from the pipeline complete with mounted actuator.



Warning!

Before carrying out maintenance or repair work on the valve with actuator or installation and removal of the ball segment from the pipeline, always disconnect the compressed air supply to the actuator.
Single action actuators may move to “open” or “closed” position without being connected to the air system.



Warning!

Inform yourself of the properties of the medium. Protect yourself and your environment from hazardous or poisonous substances.
Observe the safety instructions in the safety data sheets of the manufacturers.
Ensure that no medium can enter the pipeline during maintenance work.



Warning!

Do not remove the valve from the line as long as the valve is under pressure!
Dismantling or disassembly of a valve under pressure leads to an uncontrolled pressure drop.
Always isolate the relevant valve in the pipeline system; depressurise the valve and remove the medium before working on the valve.



Warning!

When transporting and handling the valve, observe the weight of the valve or of the whole unit.
Never lift the valve by its positioner, limit switch, solenoid valve or piping. Place the hoisting ropes securely according to lift instruction.
The valve or parts thereof may injure persons if dropped.
Do not walk under suspended loads.



Procedure

1. Seal off the pipeline section containing the ball segment valve.
2. Depressurise the sealed off pipeline section.
3. Drain the sealed off pipeline section.
4. If necessary, purge the pipeline section.
5. Check the temperature of the pipeline and of the valve. Allow the pipeline and valve to cool down to the ambient temperature if necessary.
6. Secure the valve against falling (➔ Fig.5-1).
7. Undo the boltings between the ball segment valve and the pipeline (➔ Chap. 5.2).

6.2 Maintenance

Regular maintenance is necessary to be able to operate the valve with maximum efficiency and low operating costs. Somas products enable trouble-free operation and are very low-maintenance.

Check the valve, the actuator and accessory parts regularly to ensure safe, trouble-free operation. The tightening torques of the boltings on the flanges must be checked in accordance with the specifications of the gasket manufacturer and tightened if necessary. The stuffing box must be checked regularly and re-tightened if necessary. The most important replacement parts are contained in the Somas replacement part set. The gasket set contains all necessary seals and sealing rings for basic repair of the valve. The repair kit contains a seal kit as well as bearings, ball segments etc. for a complete overhaul of the valve.

Note

Note down the details of the type plate (➔ Fig.6-1) before contacting the contact partners given in the order confirmation.
Only use original replacement and wear parts from Somas Instrument AB.

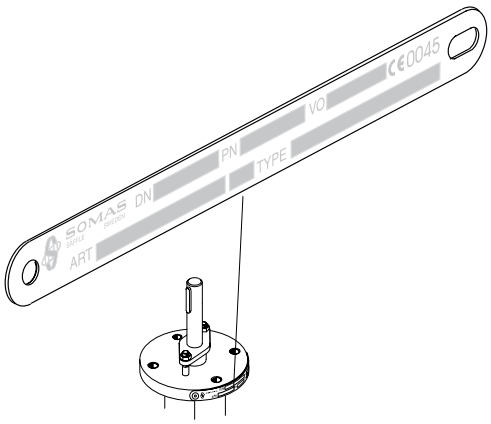


Fig.6-1 Type plate

6.3 Installation and disassembly of the stuffing box

1. Check the stuffing box after commissioning and then regularly. Retighten the nuts of the stuffing box gland (➔ Fig.6-2/1) if necessary.

⇨ The stuffing box package must be replaced if leaks can no longer be eliminated by tightening the nuts.

Changing the stuffing box is normally a part of valve overhaul. Follow applicable safety instructions concerning dismounting of the ball segment valve from pipeline (➔ Chap. 6.1) and dismounting the pneumatic actuator from the ball segment valve (➔ Chap. 5.4).

When indicated it is possible to change the stuffing box if the valve is installed in the pipeline. For this regard the following safety instructions.

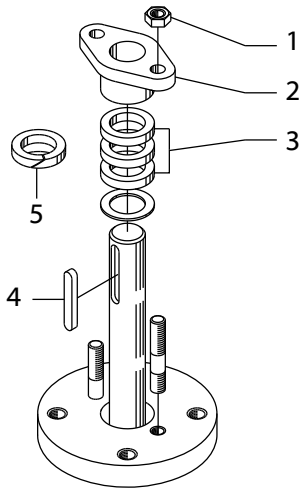
Warning!	
Before replacing the stuffing box of a ball segnent valve installed in the pipeline depressurise the relevant valve in the pipeline system, isolate the valve and remove the medium before working on the valve. The pressurised medium may lead to injuries to personnel.	

Warning!	
Before carrying out maintenance or repair work on the ball segment valve with actuator or installation and removal of the ball segment valve from the pipeline, always disconnect the compressed air supply to the actuator. Single action actuators may move to “open” or “closed” position without being connected to the air system.	

Installation and disassembly

When using PTFE stuffing boxes, the actuator is always to be disassembled (➔ Chap. 5.4).

When using graphite stuffing boxes, the actuator can remain installed. In this case you can install the graphite rings by cutting through them at an angle and then carefully pushing them over the shaft (➔ Fig.6-2/5).



1 Nut
2 Stuffing box gland
3 Graphite rings/PTFE rings
4 Key
5 Graphite ring

Fig.6-2 Assembly of the stuffing box

1. Remove the key (➔ Fig.6-2/4) and undo the nuts (➔ Fig.6-2/1).
2. Remove the stuffing box gland (➔ Fig.6-2/2) and insert the graphite rings/PTFE rings (➔ Fig.6-2/3).
3. Fix the stuffing box gland again with the nuts.
4. Tighten the nuts alternately, but not too tight.
5. Insert the new key.

6.4 Replacing the PTFE/PTFE 53 seat (KVT/KVX)

To replace the seat, the complete valve assembly is dismounted from the pipeline (➔ Chap. 6.1) and the actuator is dismounted from the valve (➔ Chap. 5.4).

Attention!

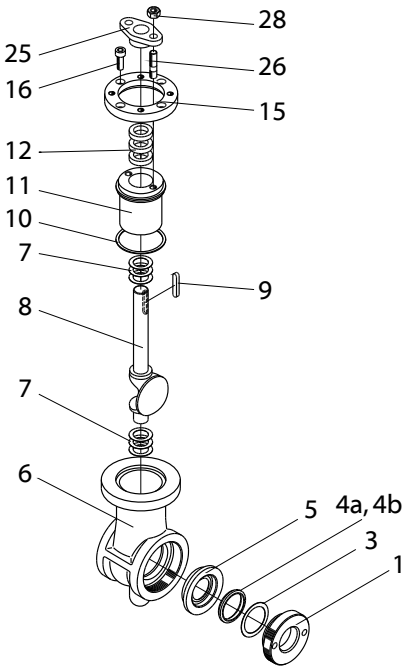
To replace the seat, the valve should when possible be securely clamped in a clamping vice with the inlet side facing upwards!



Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves. The valve with ball segment mounted may work as a cutting tool. Do not leave any foreign objects in the valve body. The ball segment of the ball segment valve always works as a separate device. There is no difference whether an actuator is installed or not. The position of the ball segment may change during transport or handling of the ball segment valve.





1	Cover plate	7	Shims	15	Cover
3	Spring washer	8	Ball segment	16	Screw
4a	PTFE/PTFE 53 seat	9	Key	25	Stuffing box gland
4b	HiCo seat	10	Gasket	26	Stud
5	Support ring	11	Stuffing box sleeve	28	Nut
6	Valve body	12	Stuffing box kit		

Fig.6-3 KVT/KVX, DN 25/2-50 PN 50

6.4.1 Disassembly

Condition

The actuator is disassembled.

Procedure

1. Remove the cover plate (➔ Fig.6-3/1) with a special tool (ring spanner).
2. Remove spring washer (➔ Fig.6-3/3), seat (➔ Fig.6-3/4a) and support ring (➔ Fig.6-3/5).

6.4.1.1 Cleaning, grinding and lubrication

1. Clean the seat recess and cover plate. Check the surface of the ball segment and replace it if necessary. Damage can very quickly destroy a new seat. If the ball segment has to be replaced, see section “Replacing ball segment” (➔ Chap. 6.9).
2. Lubricate the seat surface with molybdenum disulfide paste.

6.4.2 Assembly

1. Fit the new seat and the spring washers on the cover plate.
2. Turn the ball segment to the closed position.
3. Carefully insert the complete package into the valve.
4. Fit the pneumatic actuator (➔ Chap. 5.6) and check the end positions (➔ Chap. 6.10).

6.5 Replacing the HiCo seat (KVT/KVX)

To replace the seat, the complete valve assembly is dismounted from the pipeline (➔ Chap. 6.1) and the actuator is dismounted from the valve (➔ Chap. 5.4).

Attention!

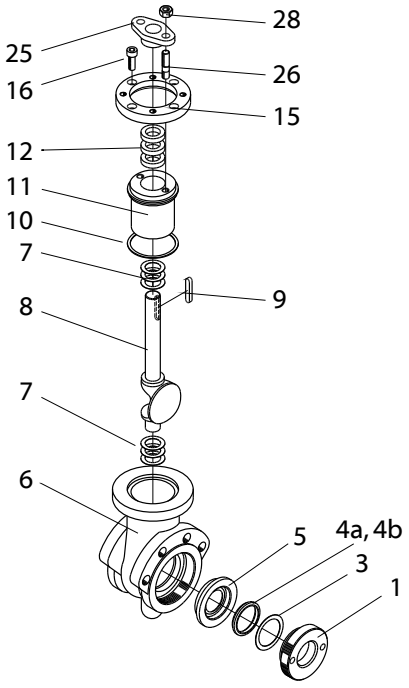
To replace the seat, the valve should when possible be securely clamped in a clamping vice with the inlet side facing upwards!



Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves. The valve with ball segment mounted may work as a cutting tool. Do not leave any foreign objects in the valve body. The ball segment of the ball segment valve always works as a separate device. There is no difference whether an actuator is installed or not. The position of the ball segment may change during transport or handling of the ball segment valve.





1	Cover plate	7	Shims	15	Cover
3	Spring washer	8	Ball segment	16	Screw
4a	PTFE seat	9	Key	25	Stuffing box gland
4b	HiCo seat	10	Gasket	26	Stud
5	Support ring	11	Stuffing box sleeve	28	Nut
6	Valve body	12	Stuffing box kit		

Fig.6-4 KVT/KVX, DN 65, PN 50

6.5.1 Disassembly

Condition

The actuator is disassembled.

Procedure

1. Remove the cover plate (➔ Fig.6-4/1) with a special tool.
2. Remove the spring washer (➔ Fig.6-4/3) and seat (➔ Fig.6-4/4b).
3. Remove the key (➔ Fig.6-4/9), nuts (➔ Fig.6-4/28), stuffing box gland (➔ Fig.6-4/25), cover (➔ Fig.6-4/15) and stuffing box sleeve (➔ Fig.6-4/11).
4. Remove the ball segment.

6.5.2 Cleaning, grinding and lubrication

1. Check the surface of the ball segment and replace it if necessary. Damage can very quickly destroy a new seat. If the ball segment has to be replaced, see section “Replacing ball segment” (➔ Chap. 6.9).
2. Clean all parts.
3. Grind the ball segment into the new seat. Use valve grinding paste and rub the seat and ball segment against each other until the surfaces of the sealing area are evenly matt (➔ Fig.6-5).
4. Lubricate the seat surface and the thread in the valve body with molybdenum disulfide paste.

6.5.3 Assembly

1. Fit the ball segment, stuffing box sleeve with new gasket, new stuffing box, cover and nuts.
2. Fit the new seat and the spring washers on the cover plate.
3. Turn the ball segment to the closed position and carefully insert the whole package into the valve.
4. Fit the pneumatic actuator (➔ Chap. 5.6) and check the end positions (➔ Chap. 6.10).

6.6 Replacing the ball segment (KVT/KVX)

To replace the ball segment, the complete valve assembly is dismounted from the pipeline (➔ Chap. 6.1) and the actuator is dismounted from the valve (➔ Chap. 5.4).

Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves. The valve with ball segment mounted may work as a cutting tool. Do not leave any foreign objects in the valve body. The ball segment of the ball segment valve always works as a separate device. There is no difference whether an actuator is installed or not. The position of the ball segment may change during transport or handling of the ball segment valve.



6.6.1 Disassembly

Condition

The actuator is disassembled.

Procedure

1. Remove the cover plate (➔ Fig.6-4/1) with a special tool.
2. Remove the spring washer (➔ Fig.6-4/3), seat (➔ Fig.6-4/4b) and support ring (➔ Fig.6-4/5).
3. Remove the key (➔ Fig.6-4/9), nuts (➔ Fig.6-4/28), stuffing box gland (➔ Fig.6-4/25), cover (➔ Fig.6-4/15) and stuffing box sleeve (➔ Fig.6-4/11).
4. Remove the ball segment.

6.6.2 Cleaning, grinding and lubrication

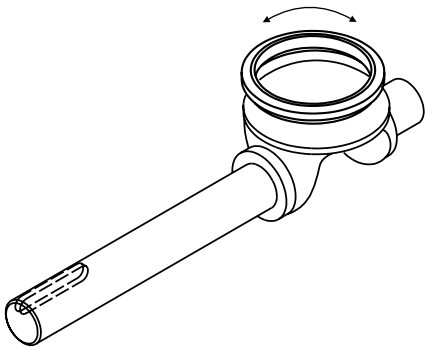


Fig.6-5 Cleaning, grinding and lubrication

1. Clean all parts.

Note

This section only refers to valves with HiCo seat.
Grind the ball segment into the new seat. Use valve grinding paste and rub the seat and ball segment against each other until the surfaces of the sealing area are evenly matt (➔ Fig.6-5).

2. Lubricate the seat surface and the thread in the valve body with molybdenum disulfide paste.

6.6.3 Centre ball segment

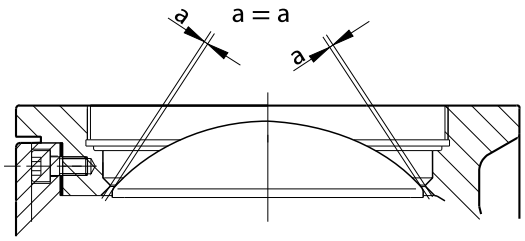


Fig.6-6 Centre ball segment

1. Fit the new ball segment, the shims and the stuffing box sleeve.
2. Fit the cover to test.
3. Ensure that the ball segment is centred with the valve body. The ball segment must not be attached with too much play or too tightly. There must be an evenly sized gap around the complete ball segment. This can be checked more precisely with a feeler gauge on the relevant shaft end (➔ Fig.6-6). Set the position of the ball segment with the aid of shims.

6.6.4 Assembly

1. Fit the stuffing box sleeve with new gasket, new stuffing box, cover and nuts.
2. Fit the new seat and the spring washers on the cover plate.
3. Turn the ball segment to the closed position and carefully insert the complete package into the valve.
4. Fit the pneumatic actuator (➔ Chap. 5.6) and check the end positions (➔ Chap. 6.10).

6.7 Replacing the PTFE/PTFE 53 seat (KVTF/KVXF)

To replace the seat, the complete valve assembly is dismounted from the pipeline (➔ Chap. 6.1) and the actuator is dismounted from the valve (➔ Chap. 5.4).

Attention!

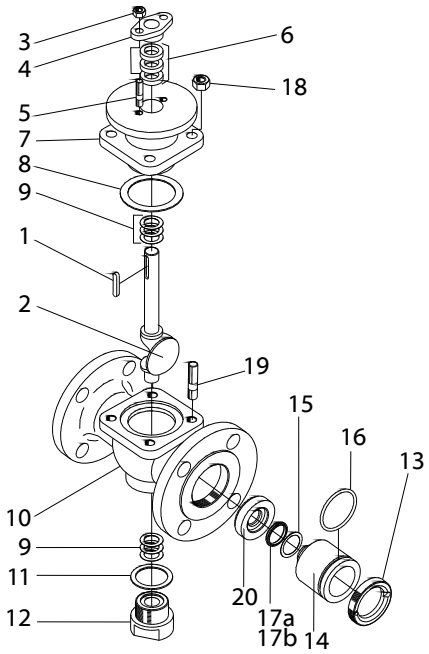
To replace the seat, the valve should when possible be securely clamped in a clamping vice with the inlet side facing upwards!



Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves. The valve with ball segment mounted may work as a cutting tool. Do not leave any foreign objects in the valve body. The ball segment of the ball segment valve always works as a separate device. There is no difference whether an actuator is installed or not. The position of the ball segment may change during transport or handling of the ball segment valve.





1	Key	8	Gasket	15	Spring washers
2	Ball segment	9	Shims	16	O-ring
3	Nut	10	Valve body	17a	PTFE/PTFE 53 seat
4	Stuffing box gland	11	Gasket	17b	HiCo seat
5	Stud	12	Plug	18	Nut
6	Stuffing box kit	13	Locking ring	19	Stud
7	Cover	14	Sleeve	20	Support ring only with DN 25/2-25/20

Fig.6-7 KVTF/KVXF, DN 25/2-25/20, PN 50

6.7.1 Disassembly

Condition

The actuator is disassembled.

Procedure

1. Remove the locking ring (➔ Fig.6-7/13) with a special tool.
2. Remove the sleeve (➔ Fig.6-7/14), spring washer (➔ Fig.6-7/15), seat (➔ Fig.6-7/17a) and support ring (➔ Fig.6-7/20) of the corresponding valves.

6.7.2 Cleaning, grinding and lubrication

1. Clean the seat recess and all other parts. Check the surface of the ball segment and replace it if necessary. Damage can very quickly destroy a new seat. If the ball segment has to be replaced, see section (➔ Chap. 6.9).
2. Lubricate the seat surface with molybdenum disulfide paste.

6.7.3 Assembly

1. Fit the new spring washer, the new seat, the new O-ring and the support ring on the sleeve.
2. Turn the ball segment to closed position.
3. Carefully insert the complete package into the valve and fit the locking ring.
4. Fit the pneumatic actuator (➔ Chap. 5.6) and check the end positions (➔ Chap. 6.10).

6.8 Replacing the HiCo seat (KVTF/KVXF)

To replace the seat, the complete valve assembly is dismounted from the pipeline (➔ Chap. 6.1) and the actuator is dismounted from the valve (➔ Chap. 5.4).

Attention!

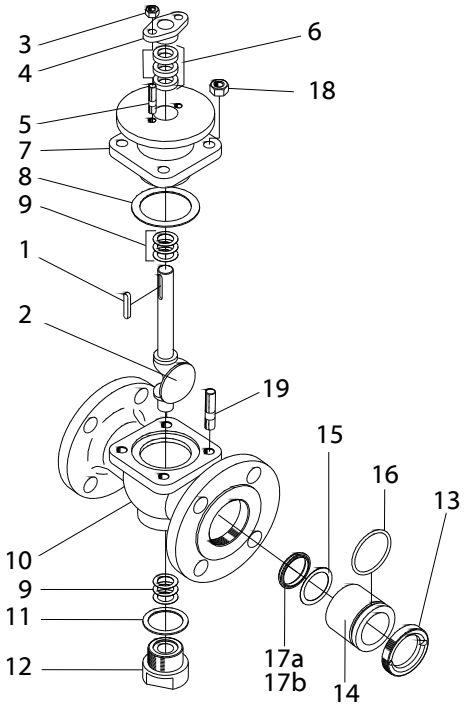
To replace the seat, the valve should when possible be securely clamped in a clamping vice with the inlet side facing upwards!



Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves. The valve with ball segment mounted may work as a cutting tool. Do not leave any foreign objects in the valve body. The ball segment of the ball segment valve always works as a separate device. There is no difference whether an actuator is installed or not. The position of the ball segment may change during transport or handling of the ball segment valve.





1	Key	8	Gasket	15	Spring washers
2	Ball segment	9	Shims	16	O-ring
3	Nut	10	Valve body	17a	PTFE/PTFE 53 seat
4	Stuffing box gland	11	Gasket	17b	HiCo seat
5	Stud	12	Plug	18	Nut
6	Stuffing box kit	13	Locking ring	19	Stud
7	Cover	14	Sleeve		

Fig.6-8 KVTF/KVXF, DN 25-50, PN 50

6.8.1 Disassembly

Condition

The actuator is disassembled.

Procedure

1. Remove the locking ring (➔ Fig.6-7/13) with a special tool.
2. Remove the sleeve (➔ Fig.6-8/14), spring washer (➔ Fig.6-8/15), seat (➔ Fig.6-8/17b) and support ring (➔ Fig.6-7/20) of the corresponding valves.
3. Remove the key (➔ Fig.6-8/1) and undo the nuts (➔ Fig.6-8/3).
4. Remove the nuts (➔ Fig.6-8/18) and the cover (➔ Fig.6-8/7).
5. Remove the ball segment (➔ Fig.6-8/2). With DN 40-50 the ball segment must be turned through 180° before disassembly.
6. Remove the plug (➔ Fig.6-8/12).

6.8.2 Cleaning, grinding and lubrication

1. Check the surface of the ball segment and replace it if necessary. Damage can very quickly destroy a new seat.
2. Clean all parts.
3. Grind the ball segment into the new seat. Use valve grinding paste and rub the seat and ball segment against each other until the surfaces of the sealing area are evenly matt (➔ Fig.6-9).
4. Lubricate the seat surface and the thread in the valve body with molybdenum disulfide paste.

6.8.3 Assembly

1. Fit a new gasket (➔ Fig.6-8/11) and insert the plug again.
2. Fit the ball segment and a new gasket.
3. Fit the cover and nuts again (➔ Fig.6-8/18).
4. Tighten the nuts (➔ Fig.6-8/3) slightly. Retighten if necessary.
5. Insert a new key.
6. Fit the new spring washer, the new seat, the new O-ring and the support ring on the sleeve.
7. Turn the ball segment to closed position.
8. Carefully insert the complete package into the valve and fit the locking ring.
9. Fit the pneumatic actuator (➔ Chap. 5.6) and check the end positions (➔ Chap. 6.10).

6.9 Replacing the ball segment (KVTF/KVXF)

To replace the ball segment, the complete valve assembly is dismounted from the pipeline (➔ Chap. 6.1) and the actuator is dismounted from the valve (➔ Chap. 5.4).

Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves. The valve with ball segment mounted may work as a cutting tool. Do not leave any foreign objects in the valve body. The ball segment of the ball segment valve always works as a separate device. There is no difference whether an actuator is installed or not. The position of the ball segment may change during transport or handling of the ball segment valve.



6.9.1 Disassembly

Condition

The actuator is disassembled.

Procedure

1. Remove the locking ring (➔ Fig.6-8/13) with a special tool.
2. Remove the sleeve (➔ Fig.6-8/14), spring washer (➔ Fig.6-8/15), seat (➔ Fig.6-8/17b) and support ring (➔ Fig.6-7/20) of the corresponding valves.
3. Remove the key (➔ Fig.6-8/1) and undo the nuts (➔ Fig.6-8/3).
4. Remove the nuts (➔ Fig.6-8/18) and the cover (➔ Fig.6-8/7).
5. Remove the ball segment (➔ Fig.6-8/2). With DN 40-50 the ball segment must be turned through 180° before disassembly.
6. Remove the plug (➔ Fig.6-8/12).

6.9.2 Cleaning, grinding and lubrication

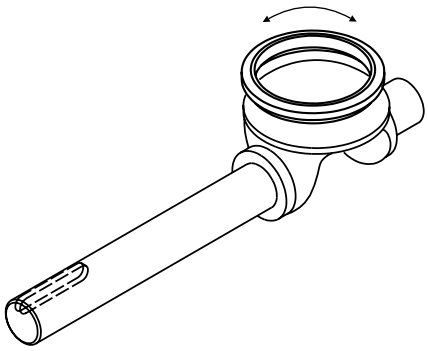


Fig.6-9 Cleaning, grinding and lubrication

1. Clean all parts.
2. Lubricate the seat surface and the thread in the valve body with molybdenum disulfide paste.

Note

This section only refers to valves with HiCo seat.
Grind the ball segment into the new seat. Use valve grinding paste and rub the seat and ball segment against each other until the surfaces of the sealing area are evenly matt (➔ Fig.6-9).

6.9.3 Centre ball segment

1. Fit the new ball segment, the plug and the new shims (➔ Fig.6-8/9).
2. Fit the cover without gasket to test.
3. Fit the seat and the support ring for valves with rated width DN 20/2-20/20.
4. Ensure that the ball segment is centred with the valve body. The ball segment must not be attached with too much play or too tightly. There must be an evenly sized gap around the complete ball segment. Set the position of the ball segment with the aid of shims (➔ Fig.6-6).

6.9.4 Assembly

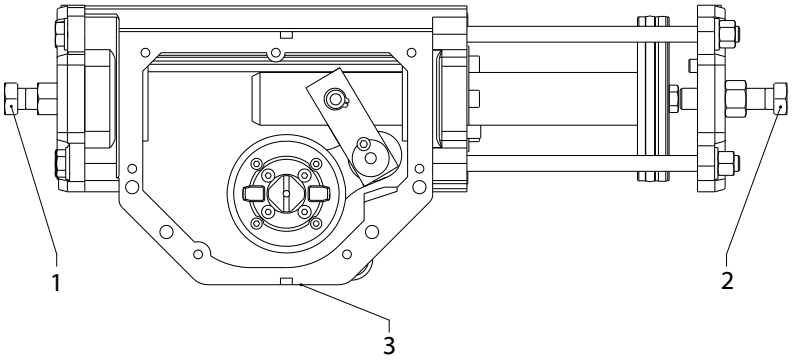
1. Fit a new gasket (➔ Fig.6-8/11) and insert the plug again.
2. Fit the ball segment with and a new gasket and nuts again (➔ Fig.6-8/18).
3. Tighten the nuts (➔ Fig.6-8/3) slightly. Retighten if necessary.
4. Insert a new key.
5. Fit the new spring washer, the new seat, the new O-ring and the support ring on the sleeve.
6. Turn the ball segment to closed position.
7. Carefully insert the complete package into the valve and fit the locking ring.
8. Fit the pneumatic actuator (➔ Chap. 5.6) and check the end positions (➔ Chap. 6.10).

6.10 Adjustment of the end positions

Danger!

Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves when the actuator is connected to compressed air system. Single action actuators may move to “open” or “closed” position without being connected to the air system.





1 End position bolt “open” position 2 End position bolt “closed” position 3 Type plate

Fig.6-10 End position bolts on pneumatic actuator

6.10.1 Setting of the “closed” position with type KVT/KVTF

1. Connect compressed air via a pressure reduction valve 4-5,5 bar depending on actuator specification.
2. Operate the valve to test.
3. Check whether the valve closes correctly. With a correct setting, the ball segment is centrally aligned with the seat. The position of the ball segment can be determined by looking into the valve through the outlet side.

Procedure

1. If the ball segment does not reach the “closed” position, undo the locknut of the end position bolt and turn the end position bolt (➔ Fig.6-10/2) 1-2 turns counterclockwise.
2. If the ball segment moves beyond the “closed” position, undo the locknut of the end position bolt and turn the end position bolt (➔ Fig.6-10/2) 1-2 turns clockwise.
3. Operate the ball segment to test.
4. When the correct setting is reached, attach thread seal tape and tighten the locknut.

6.10.2 Setting of the “open” position with type KVT/KVTF

1. Connect compressed air via a pressure reduction valve 4-5,5 bar depending on actuator specification.
2. Operate the valve to test.
3. Check whether the valve opens correctly.

With open/close applications, the max. degree of opening of the ball segment is 90°.

With control applications, the max. degree of opening of the ball segment is 75°- 90.

Procedure

1. If the required degree of opening is not reached, undo the locknut of the end position bolt and turn the end position bolt (➔ Fig.6-10/2) 1-2 turns counterclockwise.
2. If the ball segment moves beyond the required degree of opening, undo the locknut of the end position bolt and turn the end position bolt (➔ Fig.6-10/2) 1-2 turns clockwise.
3. Operate the ball segment to test.
4. When the correct setting is reached, attach thread seal tape and tighten the locknut.

6.10.3 Setting of the “closed” position with type KVX/KVXF

1. Connect compressed air via a pressure reduction valve 2-3 bar, depending on actuator specification.
2. Operate the valve to test.
3. Check whether the valve closes correctly.

Procedure

1. Loosen the locking nut and unscrew the end position bolt (➔ Fig.6-10/2) a few turns.
2. Connect compress air via a reduction valve. Adjust the pressure to 2-3 bar depending on actuator specification.
3. Close the valve with the air pressure.
4. Make sure that the ball segment will reach the seat.
5. Screw in the end position bolt until stop and then backwards ½ a turn.
6. Attach seal tape and tighten the lock nut.

⇨ Afterwards we recommend to test the ball segment valve type KVX for leakage (➔ Chap. 6.11).

6.10.4 Setting of the “open” position with type KVX/KVXF

1. Connect compressed air via a pressure reduction valve 4-5,5 bar depending on actuator specification.
2. Operate the valve to test.
3. Check whether the valve closes correctly.

With open/close applications, the max. degree of opening of the ball segment is 90°.

With control applications, the max. degree of opening of the ball segment is 75°- 90.

Procedure

1. If the required degree of opening is not reached, undo the locknut of the end position bolt and turn the end position bolt (➔ Fig.6-10/2) 1-2 turns counterclockwise.
2. If the ball segment moves beyond the required degree of opening, undo the locknut of the end position bolt and turn the end position bolt (➔ Fig.6-10/2) 1-2 turns clockwise.
3. Operate the ball segment to test.
4. When the correct setting is reached, attach thread seal tape and tighten the locknut.

6.11 Leak test of the valve

Each valve should be tested for leakage after maintenance work on the seat.

Danger!

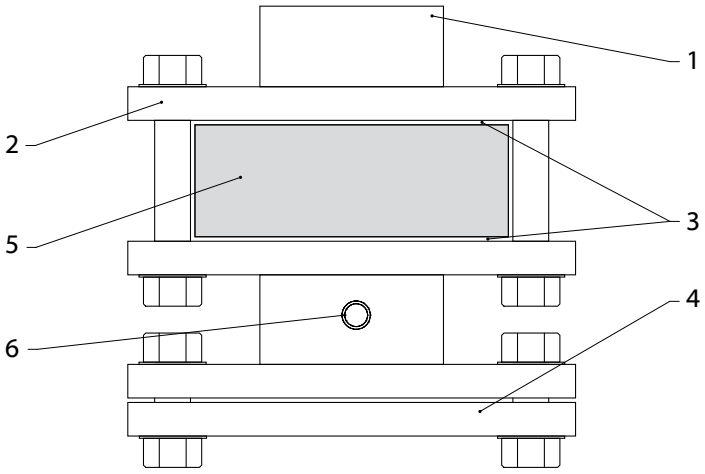
Risk of injury!
Observe movements of the ball segment.
Keep hands, tools and other objects away from the area where the ball segment moves when the actuator is connected to compressed air system. Single action actuators may move to “open” or “closed” position without being connected to the air system.



The valve has to be installed between the flanges for the test procedure with a prescribed torque (➔ Tab.6-1).

1. The ball segment valve can be tested with a testing device as in (➔ Fig.6-11) shown.

⇨ Please consult Pressure testing instruction Mi-901 EN.



1	Piece of pipe	3	Flange gaskets	5	Ball segment valve
2	Counter flange	4	Blind flange	6	Water connection

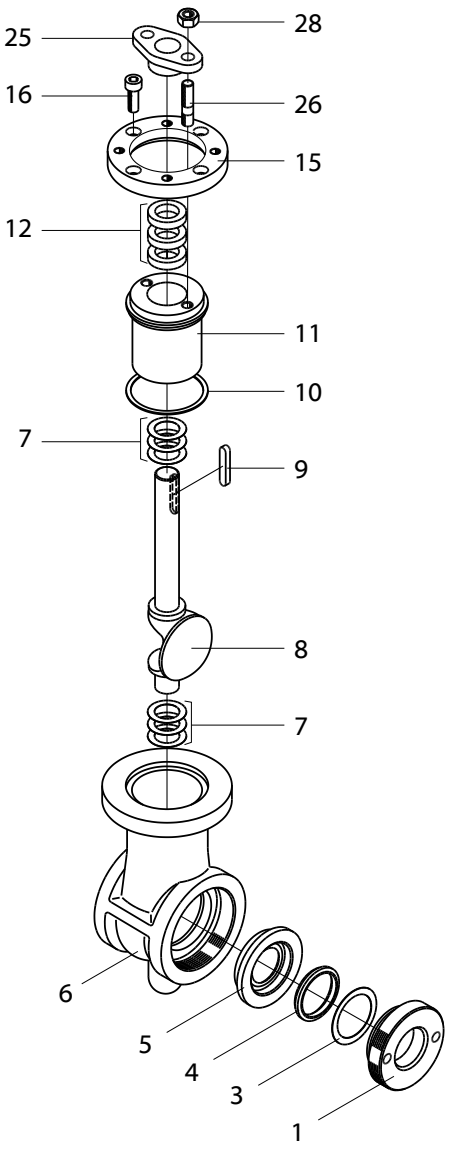
Fig.6-11 Leak test device (schematic diagram for wafer valve types)

Nominal size DN	Max. differential pressure (closed valve)	Gaskets [mm]		Torque [Nm]
		ø inside	ø outside	
25	50	34	71	25
40	50	49	92	45
50	50	61	107	55
65	50	77	127	120

Tab.6-1

6.12 Components

6.12.1 KVT DN 25/2-50, with PTFE/PTFE 53 seat

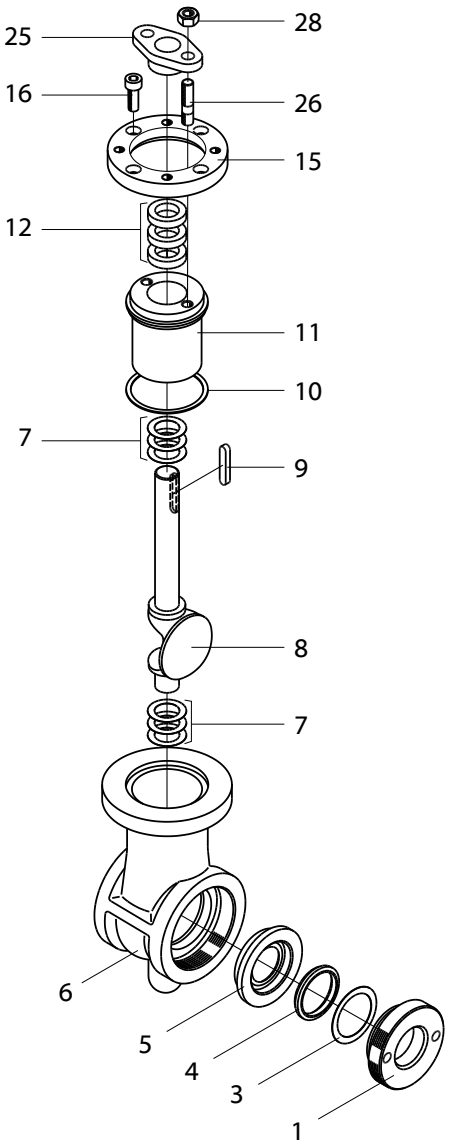


1	Cover plate	8	Ball segment	16	Screw
3	Spring washer	9	Key	25	Stuffing box gland
4	PTFE/PTFE 53 seat	10	Gasket	26	Stud
5	Support ring	11	Stuffing box sleeve	28	Nut
6	Valve body	12	Stuffing box kit		
7	Shims	15	Cover		

Fig.6-12 KVT DN 25/2-50, with PTFE seat

Pos.No. 3, 4, 9, 10 and 12 are included in the sealing kit.
Pos.No. 3, 4, 7, 8, 9, 10 and 12 are included in the repair kit.

6.12.2 KVT DN 25/2-50, with HiCo seat

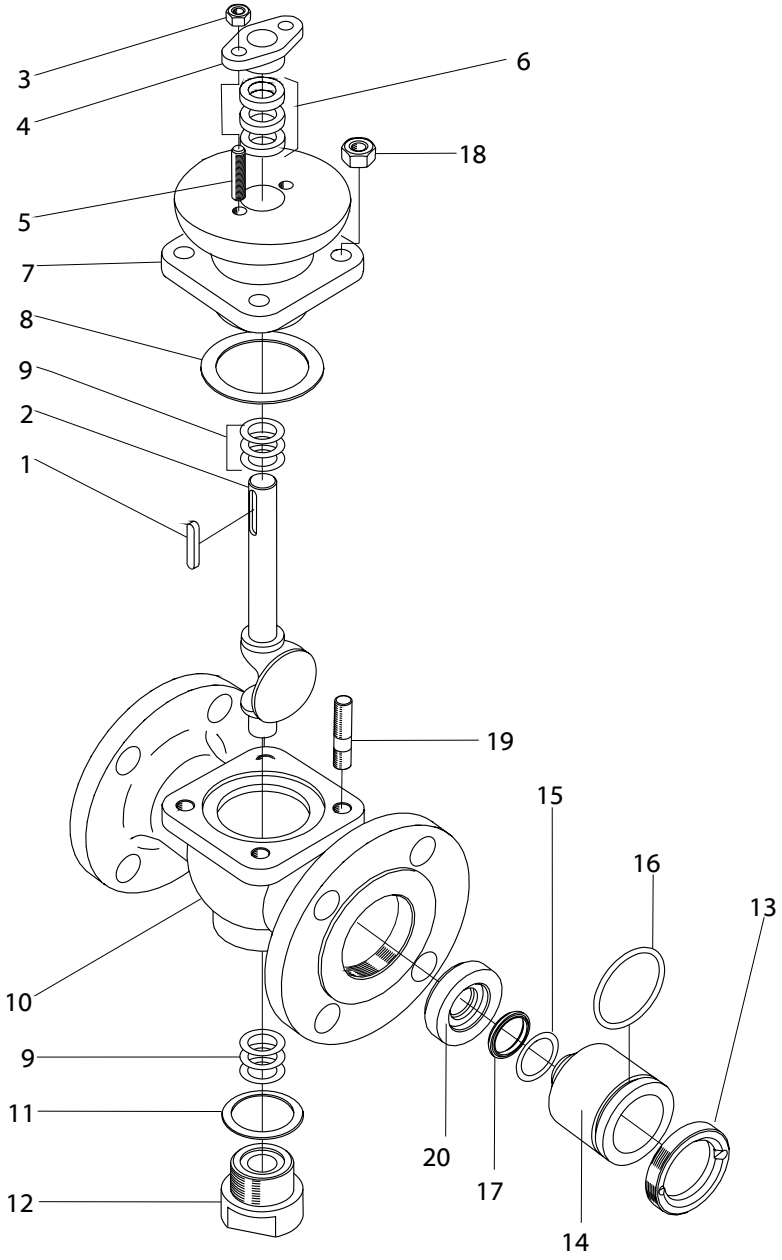


1	Cover plate	8	Ball segment	16	Screw
3	Spring washer	9	Key	25	Stuffing box gland
4	HiCo seat	10	Gasket	26	Stud
5	Support ring	11	Stuffing box sleeve	28	Nut
6	Valve body	12	Stuffing box kit		
7	Shims	15	Cover		

Fig.6-13 KVT DN 25/2-50, with HiCo seat

Pos.No. 3, 9, 10 and 12 are included in the sealing kit.
Pos.No. 3, 4, 7, 8, 9, 10 and 12 are included in the repair kit.

6.12.3 KVTF DN 25/2-50, with PTFE/PTFE 53 seat

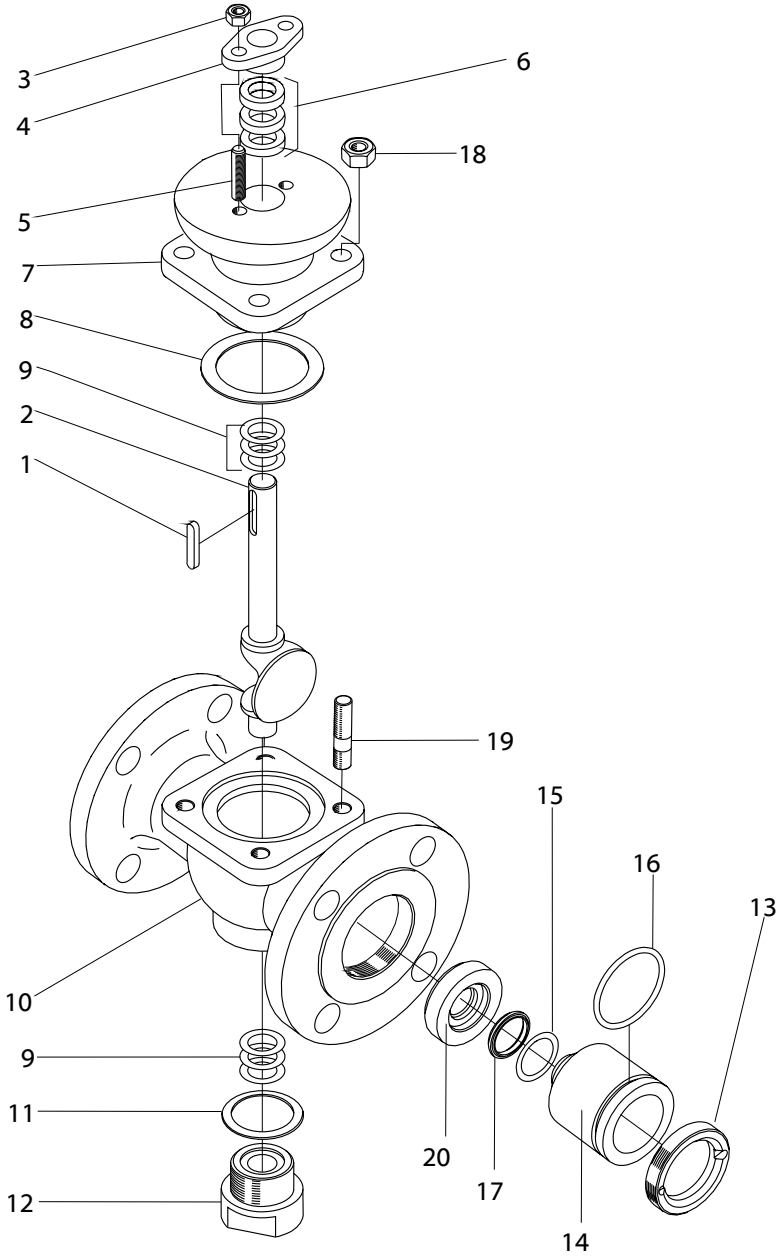


1	Key	8	Gasket	15	Spring washer
2	Ball segment	9	Shims	16	O-ring
3	Nut	10	Valve body	17	PTFE/PTFE 53 seat
4	Stuffing box gland	11	Gasket	18	Nut
5	Stud	12	Plug	19	Stud
6	Stuffing box kit	13	Locking ring	20	Support ring
7	Cover	14	Sleeve		

Fig.6-16 KVTF DN 25/2-50, with PTFE seat

Pos.No. 1, 6, 8, 11, 15, 16 and 17 are included in the sealing kit.
Pos.No. 1, 2, 6, 8, 9, 11, 15, 16 and 17 are included in the repair kit.

6.12.4 KVTF DN 25/2-50, with HiCo seat



1	Key	8	Gasket	15	Spring washer
2	Ball segment	9	Shims	16	O-ring
3	Nut	10	Valve body	17	HiCo seat
4	Stuffing box gland	11	Gasket	18	Nut
5	Stud	12	Plug	19	Stud
6	Stuffing box kit	13	Locking ring	20	Support ring
7	Cover	14	Sleeve		

Fig.6-17 KVTF DN 25/2-50, with HiCo seat

Pos.No. 1, 6, 8, 11, 15 and 16 are included in the sealing kit.
Pos.No. 1, 2, 6, 8, 9, 11, 15 and 16 are included in the repair kit.

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