

**Mi-209 EN**

# Service and operating instruction

## Butterfly valves



Type VSS  
Nominal pressure

Lugged design  
PN 63, 100  
ASME Class 600

Nominal size

DN 80 - 600

Material

Stainless steel





## 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:

<b>Danger!</b>	
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
<b>Warning!</b>	
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
<b>Attention!</b>	
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 machine 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  $\geq 70^\circ\text{C}$ . 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. 10 ... 3s) 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-203EN".

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

The user is responsible for knowing the impact from the media on the valve, the resulting wear rate, and establishing maintenance interval, to maintain safe operation.



### **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 butterfly valves

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

<b>Danger!</b>	
<p>Risk of injury! Observe movements of the disc. Keep hands, tools and other objects away from the area where the disc 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.</p>	
<b>Warning!</b>	
<p>Before carrying out maintenance or repair work on the butterfly valve with actuator or installation and removal of the butterfly 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.</p>	
<b>Warning!</b>	
<p>Ensure that personnel who work with, install or repair the butterfly valve are appropriately trained. This prevents unnecessary damage and accidents or injury to personnel.</p> <p>The maintenance and assembly personnel must be familiar with the process of installing and disassembling the butterfly valve in a process line, the special and possible risks of the process and the most important safety regulations.</p> <p>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.</p>	   
<b>Warning!</b>	
<p>Do not exceed the design data of the butterfly valve! Exceeding the design data marked on the butterfly 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.</p>	
<b>Warning!</b>	
<p>Do not remove the butterfly valve from the line as long as it is pressurised! Dismantling or disassembly of a pressurised butterfly valve leads to an uncontrolled loss of pressure. Always isolate the relevant butterfly valve in the pipe system; depressurise the butterfly valve and remove the medium before working on the butterfly valve.</p>	

**Warning!**

Before assembling or disassembling the pneumatic actuator of a butterfly 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 butterfly 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 valve disc.  
Keep hands, tools and other objects away from the area where the valve disc moves. The valve with valve disc mounted may work as a cutting tool. Do not leave any foreign objects in the valve body. The valve disc of the butterfly valve always works as a separate device. There is no difference whether an actuator is installed or not. The position of the disc may change during transport or handling of the butterfly valve.

**Warning!**

Protect yourself against noise - use the relevant safety equipment.  
The butterfly 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 butterfly valve may increase the noise level.

**Warning!**

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





**Warning!**

When transporting and handling the butterfly 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 butterfly valve or parts thereof may injure persons if dropped.  
Do not walk under suspended loads.





## 3 Description

### 3.1 General information

The SOMAS butterfly valve type VSS is used for control shut-off and hand operation. The valve is suitable for liquids, vapours and gases in a wide temperature range.

Due to the sophisticated triple-eccentric design and the special shape of the disc a solid stainless steel seat can be used. This combination gives a solution resistant against high flow velocity and guarantees no leakage even under severe conditions.

The seat is available in different stainless qualities and is replaceable.

The butterfly valve type VSS is designed as a wafer style valve. As alternative there is a lug type version available.

The butterfly valve is checked and ready for use at delivery and can be equipped with actuators, valve positioners as well as with other accessories.

### 3.2 Function of the valve

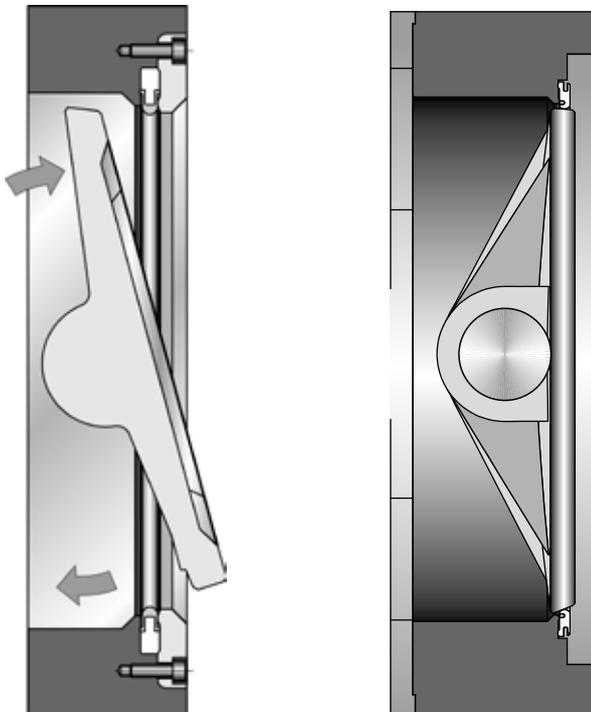


Fig.3-1 Function of the valve

The standard SOMAS VSS butterfly valve is equipped with a metal seat. Other available seat materials are PTFE, HiCo and HiNi.

**Note**

Use gaskets with the nominal size of the valve, to have a leak-proof sealing in both flow directions.



The valve is adjustable. This means, the more the valve is closed the tighter it becomes (→ Fig.3-1).

Through the sophisticated triple eccentric design, the seat is relaxed from the disc when opening the valve. This reduce wearing and extend the durability of the valve.

To close the butterfly valves for liquids need less torque than valves for vapors and gases.

The butterfly valve is tight in both flow directions. The preferred flow direction is the direction towards the flat side of the disc. This direction is marked with arrows on both sides of the valve.

When the valve is used in applications with emergency quick close functions, the valve is recommended to be installed in a way so that the flow hits the shaft side of the valve disc first. With this installation the differential pressure will help the actuator to close the valve. With this mounting position the capacity will be a little reduced due to more turbulence on the shaft side.

## 4 Technical specifications

### 4.1 Specifications

#### 4.1.1 Flange gaskets

Flat gaskets are required to ensure the right pressure on the valve cover plate. Metal reinforced graphite gaskets with a maximum thickness of 1.5 mm, or cam profile gaskets in stainless steel and graphite, are recommended. Spiral wound gaskets shall not be used.

Gasket dimensions shall be according to table 4-1 and table 4-2. Please note that the gasket inside diameter is vital and shall not be exceeded.

**Note**

To ensure pressure on the cover plate use only gaskets with right inside diameter.





For installation between pipe flanges acc. to PN 63-100, the inside diameter acc. to EN 1514-1 of the gasket should not be exceeded, see (→ Tab.4-1).

DN	PN 63		PN 100	
	Max.inside diam.(mm)	Outside diameter (mm)	Max.inside diam.(mm)	Outside diameter (mm)
80	86	148	90	154
100	110	174	115	180
125	135	210	141	217
150	163	247	169	257
200	210	309	220	324
250	264	364	274	391
300	314	424	325	458
350	360	486	368	512
400	415	543	420	-

Gasket dimensions according to EN 1514-1                      Gasket dimensions according to DIN 2697

Tab.4-1

For dimensions not included in the table contact SOMAS

To fit between pipe flanges acc. to Class 600, the dimensions acc. to ASME B16.21 RF are valid, whereas the following dimensions for gaskets are valid (→ Tab.4-2).

NPS	Class 600	
	Max. inside diam. (mm)	Outside diameter (mm)
3	89	149
4	114	194
5	141	241
6	168	267
8	219	321
10	273	400
12	324	457
14	356	492
16	406	565
18	457	615
20	510	685
22	559	733
24	610	790

Gasket dim. according to ASME B16.21

Tab.4-2

For dimensions not included in the table contact SOMAS



## 4.2 Tightening torque for bolts

### 4.2.1 Fastening torque valve body PN 100

DN	PN/Class	Bolts		Torque Nm) <sup>1</sup> Min.
		Dim.	Quantity	
DN 80	PN100 /600	3/4"	8	145
		M24	8	200
DN 100	PN100 /600	7/8"	8	250
		M27	8	260
DN 150	PN 100 / 600	1"	12	290
		M30	12	285
DN 200	PN 100 /600	1 1/8"	12	445
		M33	12	555
DN 250	PN 100 /600	1 1/4"	16	450
		M36	12	795
DN 300	PN 100 /600	1 1/4"	20	475
		M39	16	1140
DN 350	PN 100 /600	1 3/8"	20	570
		M45	16	1870
DN 400	PN 100 /600	1 1/2"	20	795
		M45	16	2510
DN 500	PN 100	M52	20	2310
DN 600	PN 100	M56	20	3460

Tab.4-3 For dimensions not included in the table contact Somas

<sup>1</sup> 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.



### 4.2.2 Tightening torque for screws in valves

Screw dim./class.	M6	M8	M10	M12	M16	M20	M24	M27
<b>Tightening torque MV 1)</b>	10 Nm	25 Nm	47 Nm	57 Nm	140 Nm	273 Nm	472 Nm	682 Nm

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

Tab.4-4

### 4.2.3 Tightening of stuffing box

The prescribed torque is valid for lubricated stud bolts and new or repacked stuffing boxes. A worn stuffing box and unlubricated stud bolts may require a higher torque.

In case of leakage tighten the stud bolts until leakage stops. This have to be done regularly.

If leakage does not stop, replace the stuffing box with a new one.

To have a leak tight stuffing box, it is vital to have the compression force of the gland distributed evenly on the gland screws, and to have the gland aligned to the stuffing box.

Table 4-5 is valid for valves with a maximum differential pressure of 50 bar.

DN	Stuff. box diameters di/dy (mm)	Stud bolt dim.	Minimum torque (Nm)
80	20/35	M10	15
100	25/40	M10	15
125			
150	30/45	M12	20
200	35/50	M12	25
250	40/55	M16	35
300	50/65	M16	40
350	60/75	M20	70
400	70/90	M20	100
450			
500	80/100	M24	130
600	90/110	M24	150

Tab.4-5

For data not included in the tables contact SOMAS



## 5 Assembly

### 5.1 Unpacking and transportation

Inspect the butterfly 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.

#### 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.

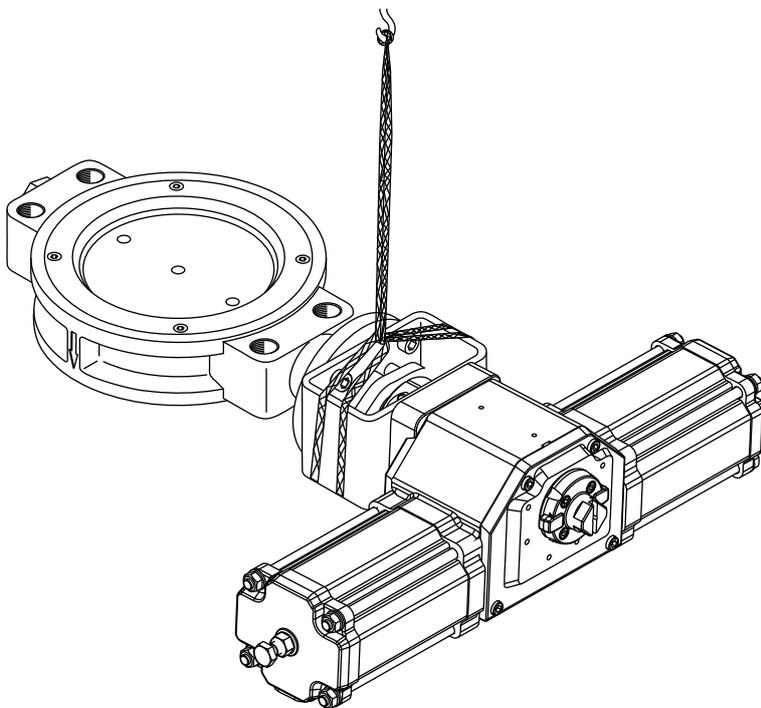


Fig.5-1 Lifting



## 5.2 Installation of the valve in the pipeline

### Attention!

The installation of the butterfly valve is usually made with full installed actuator. The assembly is made by closing spring loaded and double acting actuators with closed butterfly valve, by opening spring loaded actuators with open butterfly valve.  
At opening spring loaded actuators, a short adapter with additional flanges is to be installed in the pipeline immediately in front of and behind the valve.



### 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.

### Note

The preferred flow direction is shown with arrows on the valve body (→ Fig.5-2). The medium should impact on the flat side of the disc.

End of line-installation of the valve is only permitted after approval from SOMAS. When the valve is used in applications with emergency quick close functions, the valve is recommended to be installed in a way so that the flow hits the shaft side of the valve disc first. With this installation the differential pressure will help the actuator to close the valve. With this mounting position the capacity will be a little reduced due to more turbulence on the shaft side.





**Warning!**

Before carrying out maintenance or repair work on the valve with actuator as well as installation and disassembly of the butterfly 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.

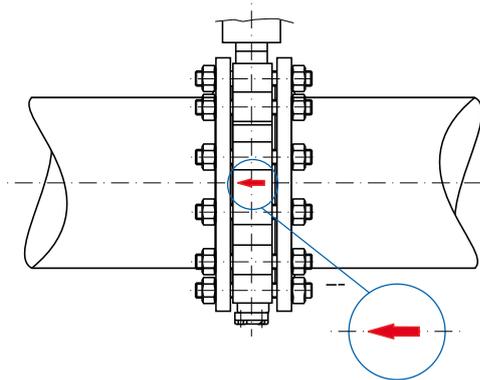


Fig.5-2 Preferred flow direction marking



### 5.2.1 Important information for installation

- The protective devices are to be removed directly before mounting the valve
- Counterflanges must be in accordance to the European or ASME standards
- Clean the whole pipeline system prior start up. Impurities damage the seat and the butterfly edge and lead to leakage
- Flush the pipeline system with fully opened valve
- Use gaskets of an appropriate quality (no spiral-wound gasket)
- Check if all flange surfaces are clean and undamaged
- Check if all screws of the cover plate are tightened.  
Do not pull the ends of the counterflange with force to the valves, to compensate wide clearances

In case of control application avoid mounting the butterfly valve direct behind or ahead of a pipe bend. If the valve must be mounted behind a pipe bend, observe that the shaft is assembled aligned to the bend to reduce dynamic, irregular forces on the butterfly (→ Fig.5-3).

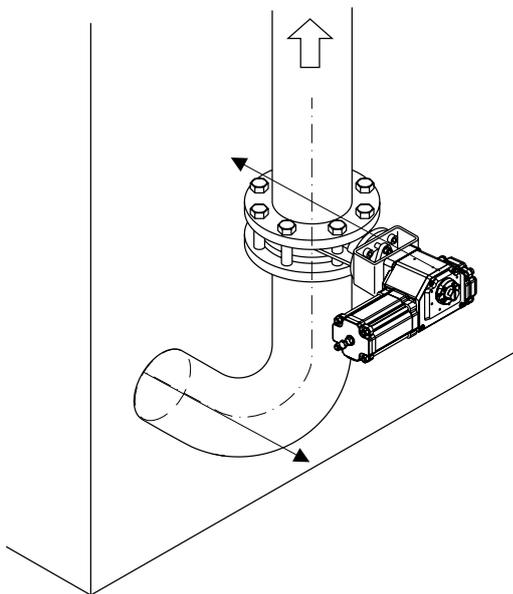


Fig.5-3 Installing near pipe bends



To install the butterfly valve on the pressure side of a centrifugal pump, you have to position the butterfly valve shaft perpendicular to the pump shaft (→ Fig.5-4).

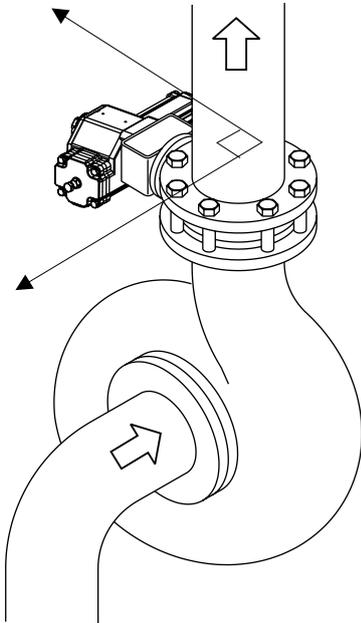


Fig.5-4 Installing the butterfly valve after a centrifugal pump

1. Make sure that the pipelines are flushed clean.
2. Open and close the valve completely before tightening the screws of the flange. Consider that the butterfly valve opens 80°. To seal the flanges tightly you have to use plain washers and tighten the screws in sequence with a torque wrench. The fastening torque depends on the size of the screw (→ Chap. 4.2).
3. If possible open the valve approx. 5° right before installing.
4. Make sure that the sealing areas of the counterflange are clean and parallel situated.
5. Make sure that the butterfly valve and the gaskets are correctly centered and that correct quality is used. By a good shut-off function the pressure of the counterflange is transmitted through the gasket to the cover plate (→ Fig.5-5).

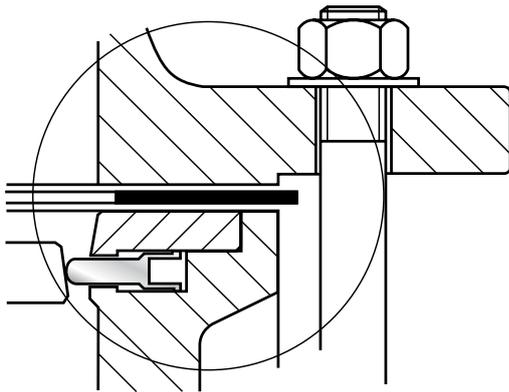


Fig.5-5 Flanges and gaskets

6. Tighten flange screws (→ Chap. 4.2).
7. Leave the butterfly valve in closed position when the installation is finished.  
The butterfly valve is now ready for operation.

### 5.3 Start up

1. Always start up the system only with closed butterfly valve.
2. Be sure that the system is clean before starting up. Impurities may damage the seat immediately and in addition cause a leakage of the butterfly valve.
3. The valve should be fully opened at the last flushing by cleaning the system.
4. Check the stuffing box and in case of leakage, tighten the nuts of the stuffing box gland (→ Tab.4-6).



## 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 butterfly 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 butterfly 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.



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

Fig.5-6 Disassembly of the actuator (schematic diagram)

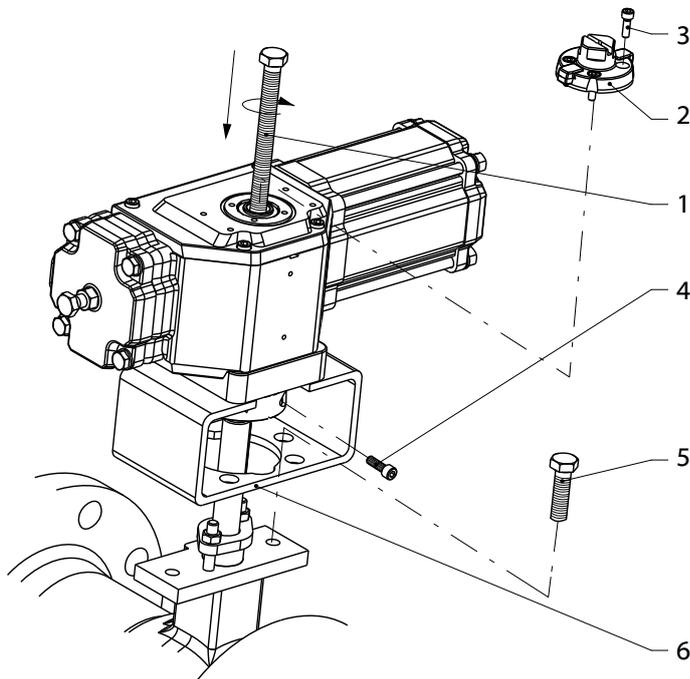


Fig.5-6 Disassembly of the actuator (schematic diagram)

Use a puller to disassemble the actuator from the butterfly valve. This prevents damage to the seat and the butterfly 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

Tab.5-1

1. Undo the clamping ring bolts (→ Fig.5-6/4).
2. Remove the accessory parts such as positioners and end position limit switches.
3. Remove the screws (→ Fig.5-6/3), to remove the driver (→ Fig.5-6/2).
4. Remove the bracket (→ Fig.5-6/6) from the butterfly valve by removing the bolts (→ Fig.5-6/5).
5. Press the actuator off the valve with the puller (→ Fig.5-6/1). 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 line at the end of the shaft, marks the position of the disc in the butterfly valve. The line must be parallel to the butterfly valve body, when the valve is closed and the key in the flow direction points to the right (→ Fig.5-7).

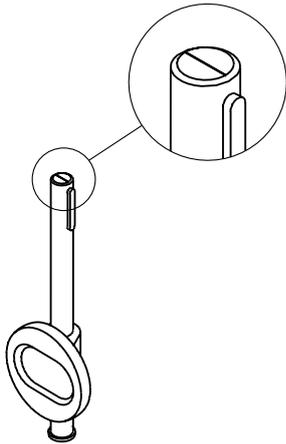


Fig.5-7 Marking (at the end of the shaft)

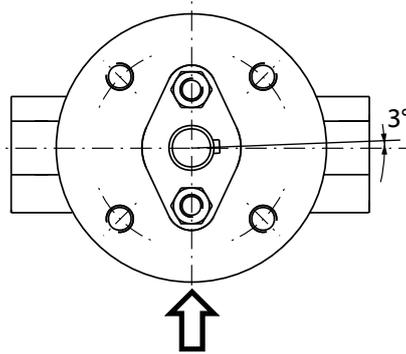


Fig.5-8 Slot angle

To ensure that the valve in combination with an actuator without over travel achieves the closing position, (→ Fig.5-8) the slot of the key as standard turned out of the center line  $3^\circ$ . Depending on type of actuator the position of the slot can vary from  $0^\circ$  to more than  $3^\circ$ . When the valve is closed the slot should point to the right when looking in the flow direction of the valve.



## 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 butterfly 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!

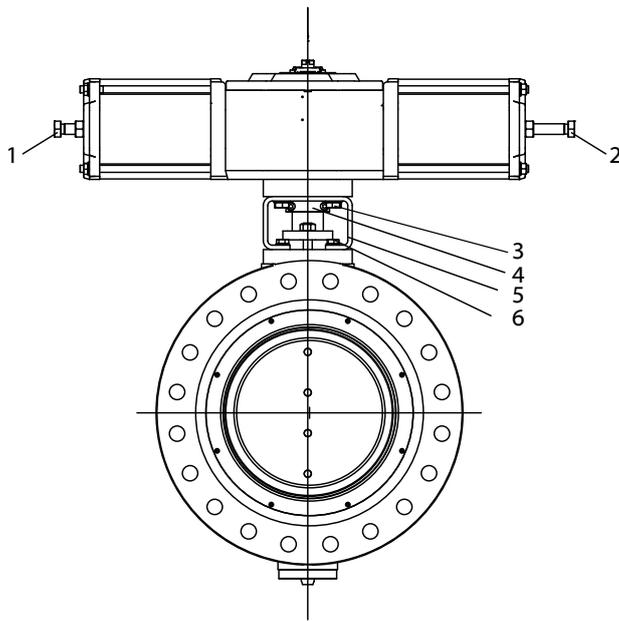
Before carrying out maintenance or repair work on the valve with actuator as well as installation and disassembly of the butterfly in the pipeline, always disconnect the compressed air supply to the actuator.  
Single action actuators may move to "open" or "closed" position without being connected to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



### Danger!

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





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

Fig.5-9 Assembly of the actuator (schematic diagram)



### 5.6.1 Actuator mounting alternatives

Following mounting positions are possible

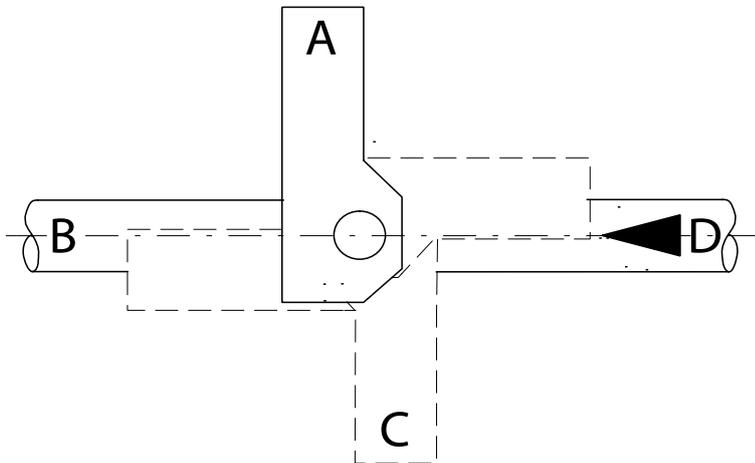


Fig.5-10 Actuator mounting position

#### Note

To prevent damage, do not fit the actuator with force.



1. Make sure that the butterfly valve is closed when using double acting and closing spring loaded actuators.
2. Make sure that the butterfly valve is open when using opening spring loaded actuators.
3. Lubricate the shaft and the key.
4. Fix the bracket (→ Fig.5-9/5) to the actuator with the aid of the bolts (→ Fig.5-9/3).
5. Assemble the actuator with the bracket on the desired position (A, B, C or D) (→ Fig.5-10) onto the shaft of the butterfly valve body. Fix the unit with the screws (→ Fig.5-9/6).
6. Connect the shaft's end of the butterfly valve to the actuator using the clamping ring (→ Fig.5-9/4). Assemble the clamping ring so that the yellow markings show the position of the butterfly. When the valve is closed, the markings must have an offset of 90° to the flow direction.
7. Tighten the bolts at the clamping ring (→ Fig.5-9/4).
8. Adjust the end positions afterwards (→ Chap. 6.6).



## 6 Maintenance

### 6.1 Disassembly of the butterfly valve from pipeline

<p><b>Attention!</b></p> <p>The disassembling of the butterfly valve is usually made with full installed actuator. The disassembly is made by closing spring loaded and double acting actuators with closed butterfly valve, by opening spring loaded actuators with open butterfly valve. At opening spring loaded actuators, a short adapter with additional flanges is to be installed in the pipeline immediately in front of and behind the valve.</p>	
<p><b>Warning!</b></p> <p>Before carrying out maintenance or repair work on the butterfly valve with actuator or installation and removal of the butterfly 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.</p>	
<p><b>Warning!</b></p> <p>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.</p>	
<p><b>Warning!</b></p> <p>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.</p>	
<p><b>Warning!</b></p> <p>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.</p>	
<p><b>Warning!</b></p> <p>In Cryogenic applications the liquefied gas can be oxygen. Oxygen is strong oxidizing agent that can make normal grease catch fire. Make sure to use grease that is approved for oxygen use.</p>	

**Warning!**

Risk of injury!

Do not unscrew bolts between extended bonnet and valve when valve is pressurized.

**Procedure**

1. Seal off the pipeline section containing the butterfly valve.
2. Depressurise the seal off pipeline section.
3. Drain the pipeline section.
4. If necessary purge the pipeline section.
5. Set butterfly valves double acting actuators in closed position.
6. Remove the compressed air supply to the actuator.
7. Control the temperature of both pipeline and butterfly valve. Let cool down the pipeline and the butterfly valve to the ambient temperature if necessary.
8. Ensure the butterfly valve against falling (→ Fig.5-1).
9. If the butterfly valve is equipped with double acting or closing spring loaded actuators dismantle the connection between valve and piping.
10. If the butterfly valve is equipped with an opening spring loaded actuator, remove the complete butterfly valve with the spacers assembled on each side (→ Chap. 5.2).



## 6.2 Maintenance

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

Check the butterfly 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 retightened 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!

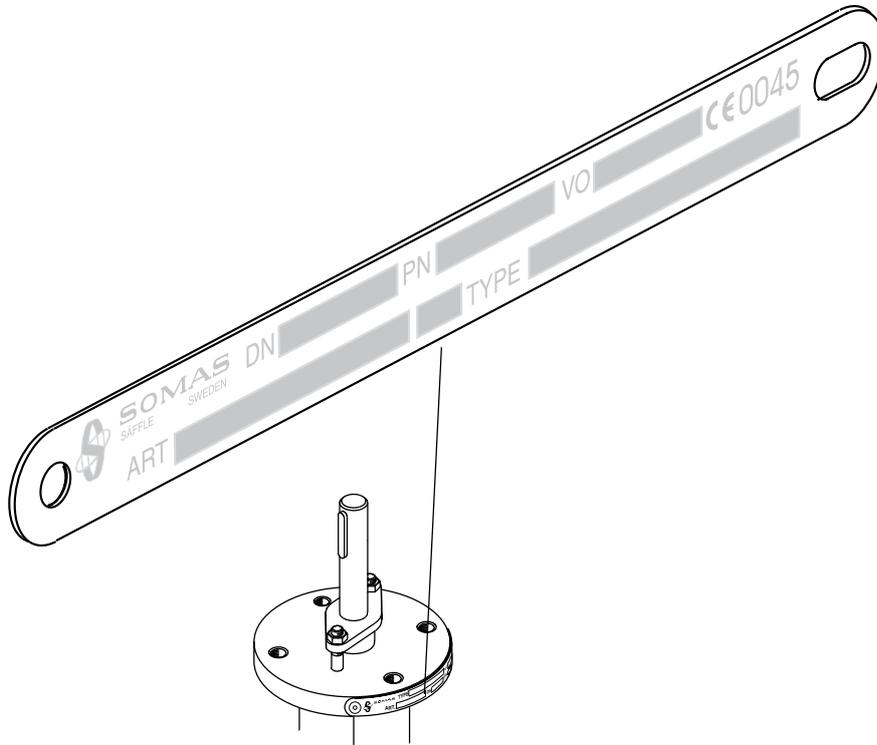
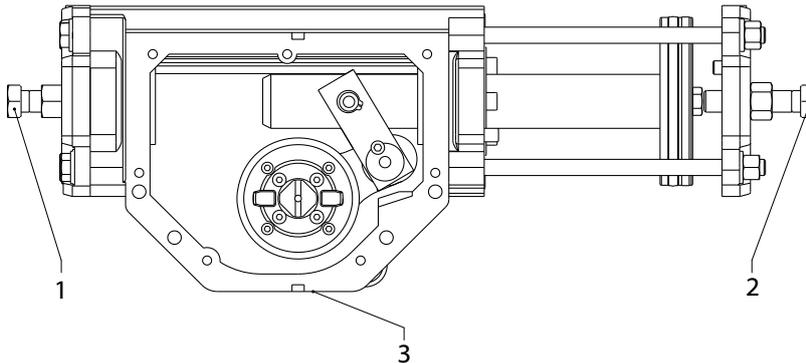


Fig.6-1 Type plate



### 6.2.1 Procedure to evaluate a leakage on a butterfly valve installed in a pipeline

1. Open the butterfly valve entirely, to flush out existing particles on the sealing areas.
2. Make sure that no impurities were clamped between the seat and the disc.
3. Close the butterfly valve.



1 End position bolt "open" position    2 End position bolt "closed" position    3 Type plate

Fig.6-2 End position bolts on pneumatic actuator

If the leakage remains furthermore, open the valve slightly:

Loosen the end position bolts "closed" (→ Fig.6-2/2) of the pneumatic actuator and turn this a fourth-turn anticlockwise. Test the valve. Repeat the procedure until the valve is tight. If the end position bolt was loosened more than three turns, and the butterfly valve remains leaking, the seat is damaged and has to be replaced.

Tighten the lock nut of the end position bolt, if the butterfly valve is tight.

### 6.3 Installation and disassembly of the stuffing box

1. Check the stuffing box after starting up and after this regularly. Retighten the nuts of the stuffing box gland if necessary (→ Fig.6-3/1).
- ⇒ 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 dismantling of the butterfly valve from pipeline (→ Chap. 6.1) and dismantling the pneumatic actuator from the ball segment valve (→ Chap. 5.4).

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

**Warning!**

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

**Warning!**

Before carrying out maintenance or repair work on the butterfly valve with actuator or installation and removal of the butterfly 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.

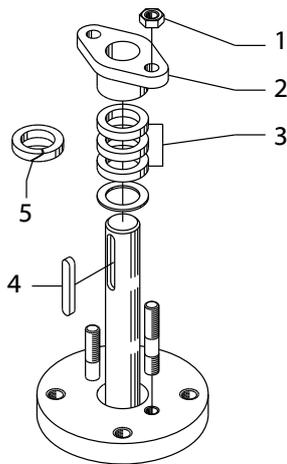




## Installation and disassembly

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.6-3/5).



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

Fig.6-3 Assembly of the stuffing box

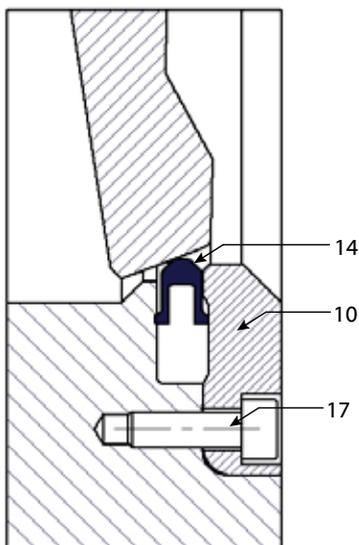
1. Remove the key (→ Fig.6-3/4) and undo the nuts (→ Fig.6-3/1).
2. Remove the stuffing box gland (→ Fig.6-3/2) and insert the graphite rings (→ Fig.6-3/5).
3. Fix the stuffing box gland again with the nuts.
4. Tighten the nuts alternately, but not too tight.
5. Insert the new key.



## 6.4 Replacing the seat (standard metal seat)

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

<b>Attention!</b>	
<p>To change the seat, the butterfly valve has to be safely fixed in a fastening device!</p>	
<b>Danger!</b>	
<p>Risk of injury!                  Observe movements of the disc.                  Keep hands, tools and other objects away from the area where the disc 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.</p>	
<b>Warning!</b>	
<p>Before carrying out maintenance or repair work on the valve with actuator as well as installation and disassembly of the butterfly 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.</p>	



- 14 Seat
- 10 Cover plate
- 17 Screw

Fig.6-4 Clean and assemble metal seat



## 6.4.1 Disassembly

### Note

The replacement of the seat should be made with installed actuator.



### Attention!

The seat disassembly is made by closing spring loaded and double acting actuators with closed valve, by opening spring loaded actuators with open valve.



### Procedure

1. Loosen the screws (→ Fig.6-4/17) and remove the cover plate (→ Fig.6-4/10).
2. Lift the seat (→ Fig.6-4/14), out of the valve.

## 6.4.2 Cleaning, lubrication and assembly

1. Clean the seat area and cover plate and make sure that the disc periphery is undamaged. Any damage can quickly destroy a new seat. Small scratches on the disc edge can be removed by lightly polishing the edge with fine emery cloth.
2. Lubricate the screws (→ Fig.6-4/17) with molybdenum disulphide paste.
3. Mount a new seat (→ Fig.6-4/14).
4. Fit a cover plate (→ Fig.6-4/10)
5. Tighten screws (→ Fig.6-4/17) in rotating order.
6. Check the “closed position” of the butterfly valve and adjust if necessary by setting the end position bolt on the actuator (→ Chap. 6.6).



## 6.5 Mounting of a new fixed seat

### Procedure

Fixed seat is used for backwards flow direction.

1. The actuator should be mounted to the valve (→ Fig.6-5/1).
2. Clean the seat area, disc edge and coverplate.
3. Lubricate the seat position in the valvebody with Molycote P37 or similar (→ Fig.6-5/2).
4. Locate the seat in it's position in the valvebody (→ Fig.6-5/3).
5. Adjust the closed position of the valve by using the adjustment screw on the actuator. The clearance between disc and seat should be zero at 3 o'clock and 9 o'clock. The seat must not move from it's original position (→ Fig.6-5/3).
6. Measure the distance "A" at 3 o'clock and note it down (→ Fig.6-5/3).
7. Reduce the distance "A" by 0.5 mm by using the adjustment screw on the actuator (→ Fig.6-5/4).
8. Lubricate the flat side of the seat and the disc edge with Molybden P37 or similar (→ Fig.6-5/5).
9. Locate the coverplate over the seat. Pls. note the guide diameter in the coverplate. The coverplate fits on the outside diameter of the seat (→ Fig.6-5/6).
10. Fit washers and screws. Tighten the screws in steps of 2 Nm crosswise. The final torque should be:

Screws dim. M5 = 6 Nm

Screws dim. M6 = 10 Nm

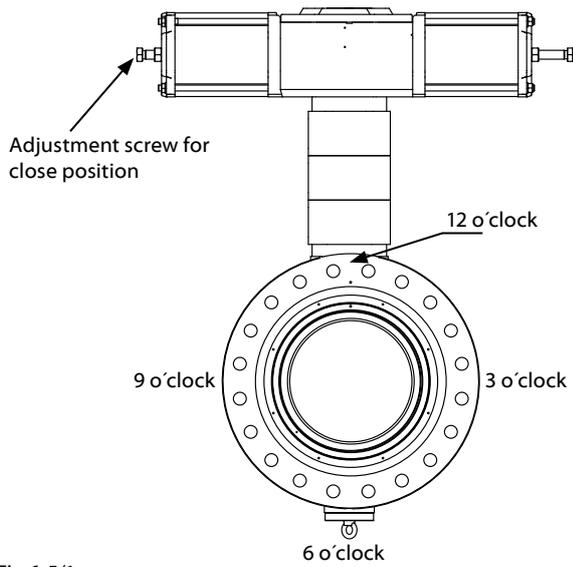


Fig.6-5/1

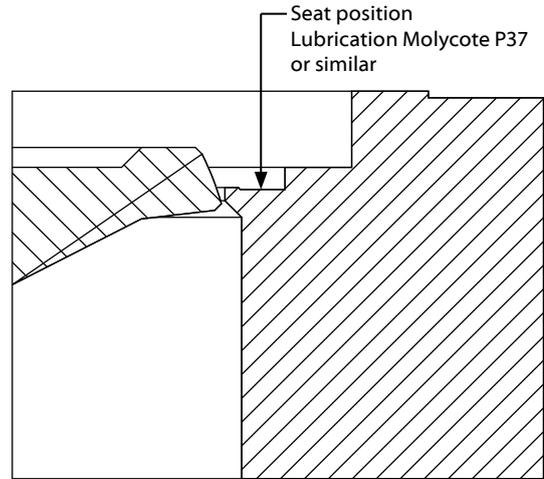


Fig.6-5/2

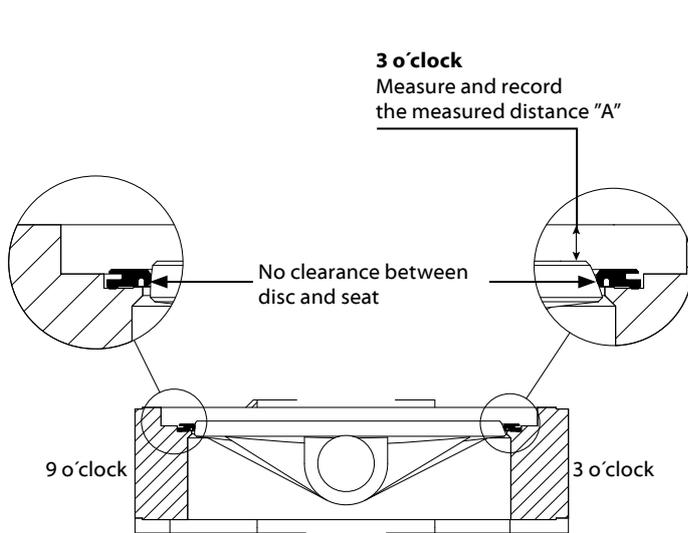


Fig.6-5/3

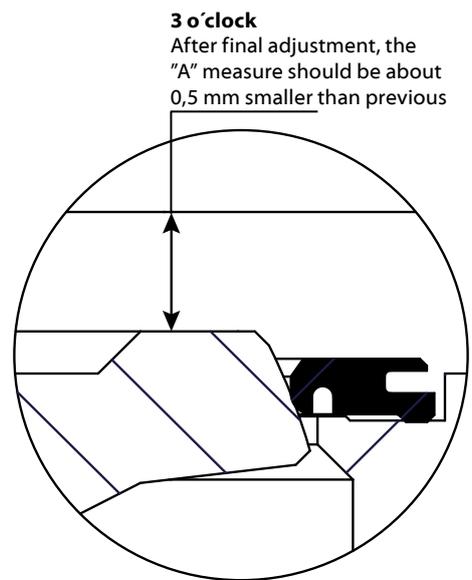


Fig.6-5/4

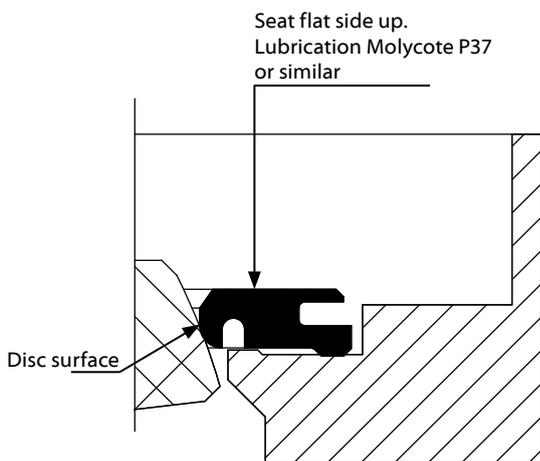


Fig.6-5/5

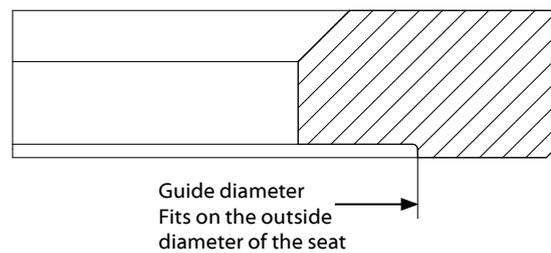


Fig.6-5/6



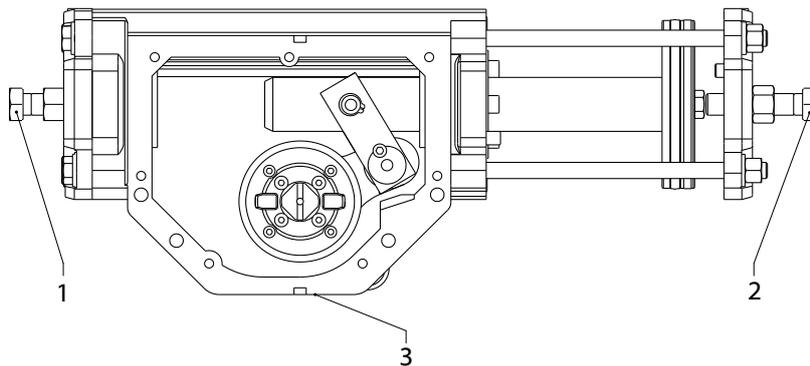
## 6.6 Adjustment of the end positions

### Danger!

Risk of injury!

Observe movements of the disc.

Keep hands, tools and other objects away from the area where the disc 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.6-6 End position bolts on pneumatic actuator



### 6.6.1 Setting of the “closed” position with type VSS

1. Connect compressed air via a pressure reduction valve. Adjust the pressure to 3 bar.
2. Operate the valve to est. Leave it in the closed position.
3. If the valve is not mounted in the pipeline, make a visual check the disc edge is in contact with the seat.
4. If the valve is mounted in the pipeline, check for leakage across closed valve.
5. The design of the valve is such that increased surface pressure between seat and disc will reduce leakage. Do not increase surface pressure more than necessary.
6. If the points 4 or 5 above require some action please see procedure below.

#### Procedure

1. Loosen the nut of end position bolt(→ Fig.6-8/2) and turn the end position bolt 0.25 turns counter clockwise.
2. Repeat point 2 above.
3. Repeat point 3 alternative 4 above.
4. When the set-up is correct, apply sealing tape and tighten the lock nut.
5. If the valve is outside the pipe line is preferable to make a leakage test (→ Chap. 6.7).



### 6.6.2 Setting of the “open” position with type VSS

1. Connect compressed air via a pressure reducing valve 4-5,5 bar depending on actuator specification.
2. Operate the valve to test.
3. Check if the valve opens to the desired position.

In control and on/off application application the opening angle is 80°.

### Procedure

1. If the butterfly does not reach the position, loosen the lock nut of the end position bolt and turn the end position bolt (→ Fig.6-8/1) 1-2 turns counterclockwise.
2. If the butterfly rides over the position, loosen the lock nut of the end position bolt and turn the end position bolt (→ Fig.6-8/1) 1-2 turns clockwise.
3. Operate the valve to test.
4. When the correct setting is reached, attach thread seal tape and tighten the locknut.



## 6.7 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 disc.

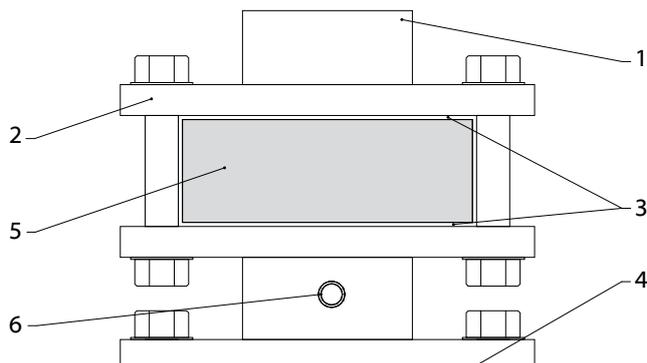
Keep hands, tools and other objects away from the area where the disc moves when the actuator is connected to compressed air system. Single action actuators may move to "open" or "closed" position without being connected to the air system.



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

1. The butterfly valve can be tested with a testing device as in (→ Fig.6-9) shown.

⇒ Please consult Pressure testing instruction Mi-901EN.



- |                  |                  |                    |
|------------------|------------------|--------------------|
| 1 Piece of pipe  | 3 Flange gaskets | 5 Butterfly valve  |
| 2 Counter flange | 4 Blind flange   | 6 Water connection |

Fig.6-7 Leak test device (schematic diagram for wafer valve types)



In case of leakage the valve must be adjusted again (→ Chap. 6.7).

Nominal size DN	Max differential pressure (closed valve)	Gaskets [mm]				Force of pressure total (tons)	Torque (Nm)
		ø inside	ø outside PN63	ø outside PN100	ø outside ASME Class600		
80	50	89	148	154	149	5	180
100	50	115	174	180	194	10	250
150	50	169	247	257	267	20	350
200	50	220	309	424	321	35	460
250	50	274	364	391	400	50	680
300	50	325	424	458	457	65	900
350	50	368	486	512	492	80	1350
400	50	420	543	—	565	100	1750
500	50	508	—	—	685	150	3000
600	50	610	—	—	790	200	5800

Tab.6-1



## 6.8 Components

### 6.8.1 VSS DN 80-600, with metal seat

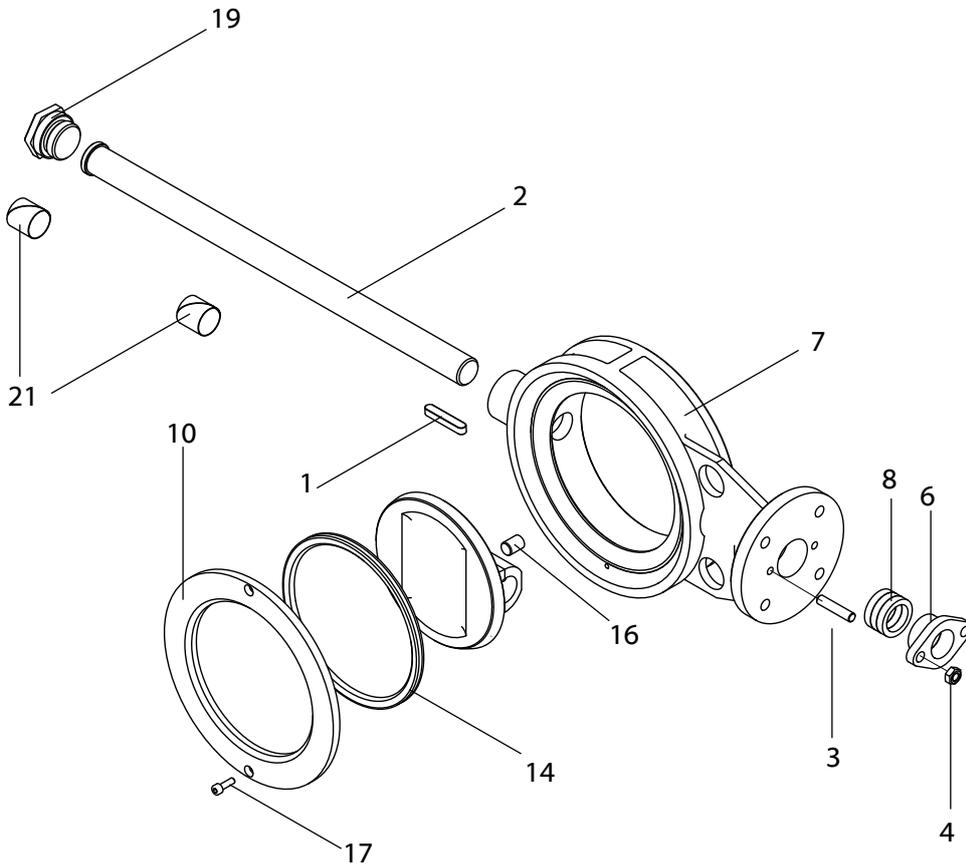


Fig.6-8 VSS DN 80-600, with metal seat



1 Key	8 Stuffing box	15 Disc
2 Shaft	9 -	16 Cylindrical pin
3 Stud	10 Cover plate	17 -
4 Nut	11 Support ring	18 -
5 -	12 -	19 Plug
6 Stuffing box gland	13 -	
7 Valve body	14 Seat complete	

Following parts are included in the sealing kit for valves with metal seat:  
DN 80-600: Pos. No. 1, 8 and 14.



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