



Operating Instructions

Mixproof Butterfly Valve T-smart 9

Edition 01/11/2013
English

Product	Mixproof Butterfly Valve T-smart 9
Document	Operating Instructions Edition 01/11/2013 English
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Wordmarks	The designation T.VIS [®] is a protected trademark of GEA Tuchenhausen GmbH.

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Notes for the Reader

The present Operating instructions are part of the user information for the valve. The Operating Instructions contains all the information you need to transport, install, commission, operate and carry out maintenance for the valve.

Binding Character of Theses Operating instructions

These Operating instructions contain the manufacturer's instructions for the owner of the valve and for all persons who work on or use the valve regarding the procedures to follow.

Carefully read these Operating instructions before starting any work on or using the valve. Your personal safety and the safety of the valve can only be ensured if you act as described in the Operating instructions.

Store the Operating instructions in such a way that it is accessible to the owner and the operating staff during the entire life cycle of the valve. When the location is changed or the valve is sold make sure you also provide the Operating instructions.

Notes on the Illustrations

The illustrations in these Operating instructions show the valve in a simplified form. The actual design of the valve can differ from the illustration. For detailed views and dimensions of the valve please refer to the design documents.

Symbols and Highlighting

In these Operating instructions, important information is highlighted by symbols or special formatting. The following examples illustrate the most important types of highlighting.

DANGER

Warning: Fatal injuries.

Failure to observe the warning can cause serious damage to health, or even death.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.

EXPLOSION HAZARD

Warning: Explosions.

Failure to observe the warning may result in a severe explosion.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.

WARNING

Warning: Serious Injuries.

Failure to observe the warning note can result in serious damage to health.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.

CAUTION

Warning: Injuries.

Failure to observe the warning note can result in minor or moderate damage to health.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.

NOTE

Warning: Damage to Property.

Non-observance of the warning note can cause serious damage to the valve or the vicinity of the valve.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.

Carry out the following steps: = Start of instructions for a task.

1. First step in a sequence of operations.

2. Second step in a sequence of operations.

↪ Result of the previous operation.

✓ The operation is complete, the goal has been achieved.

TIP

Further useful information.

Abbreviations and Terms

Abbreviation	Explanation
a/f	Indicates the size of spanners width across flats
approx.	approximately
BS	British Standard
bar	Unit of measurement of pressure [bar] All pressure ratings [bar/psi] stand for over pressure [bar _g /psi _g] if this is not explicitly described differently.
Cv value	flow coefficient [US gallons per minute] 1 Cv = 1,17 x Kv
°C	Unit of measurement of temperature [degree Celsius]
dm ³ _n	Unit of measurement of volume [cubic decimetre] Volume (litre) at standard temperature and pressure
DN	DIN nominal width
DIN	German standard issued by DIN (Deutsches Institut für Normung e.V, German Institute for Standardization)
EN	European Standard
EPDM	Material designation Short designation according to DIN/ISO 1629: Ethylene Propylene Diene Rubber
°F	Unit of measurement of temperature [degree Fahrenheit]
FKM	Material designation, short designation according to DIN/ISO 1629: Fluorine rubber
h	Unit of measurement of time [hour}
HNBR	Material designation Short designation according to DIN/ISO 1629: Hydrogenated Acrylonitrile Butadiene Rubber
IP	Protection class
Inch	Unit of measurement of length [inch]
Inch OD	Pipe dimension acc. to British standard (BS), Outside Diameter
Inch IPS	US pipe dimension Iron Pipe Size
ISO	International standard issued by the International Organization for Standardization
kg	Unit of measurement of weight [kilogram]
kN	Unit of measurement of force [kilonewton]
L	Unit of measurement of volume [litre]
max.	maximum
mm	Unit of measurement of length [millimetre]

Abbreviation	Explanation
μm	Unit of measurement of length [micrometre]
M	metric
Nm	Unit of measurement of work [newton metre] UNIT OF TORQUE 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
PA	Polyamide
PE-LD	Low-density polyethylene
psi	Anglo-American Unit of measurement of pressure [Pound-force per square inch] All pressure ratings [bar/psi] stand for over pressure [bar _g /psi _g] if this is not explicitly described differently.
SET-UP	Self-learning installation During commissioning and maintenance, the SET-UP procedure carries out all the necessary settings for the generation of messages.
TIG	Welding method Tungsten inert gas welding
T.VIS	Tuchenhagen Valve Information System
V AC	Volt alternating current
V DC	Volt direct current
W	Unit of measurement of power [Watt]

Safety

Safety Note

The valve is operationally reliable. It was built according to state-of-the art standards.

Nevertheless, the valve can pose dangers, especially if

- the valve is not used in accordance with its intended use,
- the valve is not used correctly,
- the valve is operated under impermissible operating conditions.

Operator's Duties

In your capacity as operator of the facility you bear a particular responsibility for the proper and safe handling of the valve in your facility. Only use the valve when it is in perfect condition to prevent danger to persons and property.

This Operating Instructions contains the information you and your staff need for the safe and reliable operation during the entire service life of the valve. Be sure to read this Operating Instructions carefully and ensure that the measures described here are observed.

The operator's duty of care includes planning the necessary safety measures and monitoring that these measures are observed. The following principles apply:

- Only allow qualified staff to work on the valve.
- The operator must authorize the staff to carry out the relevant tasks.
- Working areas and the entire environment of the valve must be neat and clean.
- The staff must wear suitable work clothing and personal protective equipment. As the operator of the facility make sure that work clothing and personal protective equipment are used.
- Instruct the staff with regard to any properties of the product which might pose a health risk and the preventative measures to be taken.
- Have a qualified first-aid on call during the operation, who can initiate the necessary first-aid measures in case of an emergency.
- Clearly define processes, lines of authority and responsibilities associated with the valve. Everybody must know what to do in case of an emergency. Instruct the staff in this respect at regular intervals.
- The signs relating to the valve must always be complete and legible. Check, clean and replace the signs as necessary at regular intervals.

TIP

Carry out regular checks. This way you can ensure that these measures are actually observed.

Qualification of Staff

This section contains information about the qualifications that staff working on the valve must have.

Operating and maintenance staff must

- have the necessary qualification to carry out their tasks,
- be instructed with regard to possible dangers,
- know and observe the safety instructions given in the documentation.

Only allow qualified electricians to carry out work on the electrical equipment or have a qualified electrician supervise the work.

Only allow specially trained staff to carry out any work on explosion-protected equipment. When working on explosion-protected equipment observe the standards DIN EN 60079-14 for gases and DIN EN 50281-1-2 for dusts.

The following minimum qualifications are required:

- Vocational training as a specialist who can work on the valve independently.
- Sufficient instruction to work on the valve under the supervision and direction of a qualified specialist.

Each member of staff must meet the following requirements to be allowed to work on the valve:

- Personal qualification for the relevant task.
- Sufficient professional qualification for the relevant task.
- Instructed with regard to the function of the valve.
- Instructed with regard to the operating sequences of the valve.
- Familiar with the safety devices and their function.
- Familiar with this Operating Instructions, especially with the safety instructions and the information which is relevant for the task on hand.
- Familiar with the basic regulations with regard to occupational health and safety and accident prevention.

For work to be carried out on the valve the following user groups are distinguished:

User groups

Staff	Qualifications
Operating staff	<p>Adequate instruction and sound knowledge in the following areas:</p> <ul style="list-style-type: none"> • Function of the valve • Valve operating sequences • What to do in case of an emergency • Lines of authority and responsibilities with respect to the task.

User groups (continued)

Staff	Qualifications
Maintenance staff	<p>Adequate instruction as well as sound knowledge of the design and function of the valve.</p> <p>Sound knowledge in the following areas:</p> <ul style="list-style-type: none"> • Mechanical equipment • Electrical equipment • Pneumatic system <p>Authorization with regard to safety engineering standards to carry out the following tasks:</p> <ul style="list-style-type: none"> • Setting devices into operation • Earthing of devices • Marking of devices <p>The relevant certificate of qualification must be submitted before work can be carried out on ATEX certified machines.</p>

Supplementary Regulations

In addition to the instructions in this documentation the following also has to be observed:

- pertinent accident prevention regulations,
- generally accepted safety rules,
- national regulations applicable in the country of use,
- work and safety instructions applicable in the facility,
- installation and operating regulations for use in potentially explosive areas.

Instructions for the Safe Operation

Dangerous situations during the operation can be avoided by safety-conscious and proactive behaviour of the staff.

General Principles

To ensure the safe operation of the valve the following principles apply:

- The Operating Instructions must be kept ready to hand at the valve's place of use. It must be complete and in clearly legible form.
- Only use the valve for its intended use.
- The valve must be functional and in good working order. Check the condition of the valve before starting work and at regular intervals.
- Wear tight-fitting work clothing for all work on the valve.
- Ensure that nobody can get hurt on the parts of the valve.
- Immediately report any faults or noticeable changes on the valve to the person responsible.
- Observe the accident prevention regulations and all local regulations.

Installation

For installation, the following principles apply:

- Only properly qualified staff is allowed to install, assemble and set the valve into operation.
- Ensure that adequate working and traffic areas are available at the place of installation.
- Observe the maximum load-bearing capacity of the installation surface.
- Observe the transport instructions and markings on the part(s) to be transported.
- Remove any nails protruding from transport crates immediately after opening the crate.
- Under no circumstances should anyone stand under a suspended load.
- During assembly, the valve safety devices might not be working effectively.
- Reliably secure machine parts which have already been connected against inadvertently being switched on.

Commissioning/Setup Mode

For commissioning, the following principles apply:

- Take protective measures against dangerous contact voltages in accordance with pertinent regulations.
- The valve must be completely assembled and correctly adjusted. All screw connections must be securely tightened. All electrical cables must be installed correctly.
- Reliably secure machine parts which have already been connected against inadvertently being switched on.
- Relubricate all lubricating points.
- Make sure lubricants are used properly.
- After conversion of the valve, residual risks must be reassessed.

Setting into Operation

For setting into operation, the following principles apply:

- Only allow properly qualified staff to set the valve into operation.
- Establish all connections correctly.
- The safety devices for the valve must be complete, fully functional and in perfect condition. Check the function before starting any work.
- When the valve is switched on, the danger zones must be free.
- Remove any liquids that have escaped without leaving residues.

Operation

For operation, the following principles apply.

- Monitor the valve during the operation.
- Safety devices must not be changed, removed or taken out of service. Check all safety devices at regular intervals.
- All guards and hoods must be fitted as intended.
- The place of installation of the valve must be adequately ventilated at all times.
- Structural alterations of the valve are not permitted. Immediately report any changes on the valve to the person responsible.
- Always keep danger zones clear. Do not leave any objects in the danger zone. Only allow persons to enter the danger zone when the machine is de-energized.
- Regularly check that all emergency stop devices are working correctly.

Shutting Down

For shutting down, the following principles apply:

- Switch off the compressed air.
- Switch off the valve via the main switch.
- Padlock the main switch (if fitted) in the off position to prevent it from being switched back on. The key to the padlock must be deposited with the person responsible until the machine is restarted.
- For longer periods of standstill, observe the storage conditions, see Storage (Page 20).

Maintenance and Repair

Before starting any maintenance and repair work on the electrical devices of the valve, carry out the following steps in accordance with the "5 safety rules":

- Isolate from the power supply
- Take appropriate measures to prevent switch on
- Test absence of voltage
- Earthing and short-circuiting
- Cover or safeguard any adjacent live parts.

For maintenance and repair, the following principles apply:

- Observe the intervals specified in the maintenance schedule.
- Only allow qualified staff to carry out maintenance or repair work on the valve.
- Before starting any maintenance or repair work, the valve must be switched off and secured against being switched back on. Work may only be started once any residual energy has been discharged.
- Block access for unauthorized persons. Put up notice signs which draw attention to the maintenance or repair work going on.
- Do not climb on the valve. Use suitable access aids and working platforms.
- Wear suitable protective clothing.
- Only use suitable and undamaged tools to carry out maintenance work.
- When replacing parts only use approved, fully functional load lifting devices and lifting accessories which are suitable for the intended purpose.
- Before setting the valve back into operation refit all safety devices as originally provided in the factory. Then check that all safety devices are working correctly.
- Make sure lubricants are used properly.
- Check pipes are firmly secured, also check for leaks and damage.
- Check that all emergency stop devices are working correctly.

Disassembly

For disassembly, the following principles apply:

- Only allow qualified staff to disassemble the valve.
- Before starting disassembly, the valve must be switched off and secured against being switched back on. Work may only be started once any residual energy has been discharged.
- Disconnect all power and utility lines.
- Markings, e.g. on lines, must not be removed.
- Do not climb on the valve. Use suitable access aids and working platforms.
- Mark the lines (if unmarked) prior to disassembly to ensure they are not confused when re-assembling.
- Protect open line ends with blind plugs against ingress of dirt.
- Pack sensitive parts separately.
- For longer periods of standstill, observe the storage conditions, see „Storage“ (Page 20).

Environmental Protection

Harm to the environment can be avoided by safety-conscious and proactive behaviour of the staff.

For environmental protection the following principles apply:

- Substances harmful to the environment must not be discharged into the ground or the sewage system.
- Always observe the pertinent regulations relating to waste avoidance, disposal and utilization.
- Substances harmful to the environment must be collected and stored in suitable containers. Clearly mark the containers.
- Dispose of lubricants as hazardous waste.

Electrical Equipment

For all work on electrical equipment, the following principles apply:




- Access to electrical equipment should only be allowed to qualified electricians. Always keep unattended switch cabinets locked.
- Modifications of the control system can affect the safe and reliable operation. Modifications are only permitted after the express permission of the manufacturer.
- After completion of all work, check that the protective devices are fully functional.

Signage

Dangerous points on the valve are indicated by warning signs, prohibition signs and mandatory signs.

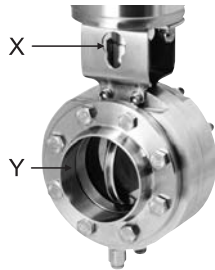
The signs and notes on the valve must always be legible. Any illegible signs must be replaced immediately.

Signs on the valve

Sign	Meaning
	General hazard warning
	Warning Crushing
	Explosive atmosphere hazard warning

Residual Risk

Hazard Areas



Please observe the following notes:

- In the event of malfunctions, shut down the valve (disconnect from the power and air supply) and secure it against being used.
- When the valve is switching, never reach into pipe Y or into bracket X (on pneumatic actuators). Fingers can be crushed or cut off.
- Before starting any service, maintenance or repair work, disconnect the valve from the power supply and secure it against inadvertently being switched back on again.
- Only allow a qualified electrician to carry out any work on the electrical power supply.
- Check the electrical equipment of the valve at regular intervals. Immediately remedy loose connections and molten cables.
- If work on live parts cannot be avoided, call in a second person, who can operate the main switch in case of an emergency.

Residual Dangers

Dangerous situations can be avoided by safety-conscious and proactive behaviour of the staff and by wearing personal protective equipment.

Residual dangers on the valve and measures

Danger	Cause	Measure
Danger to life	Inadvertent switch-on of the valve	Effectively disconnect all components, effectively prevent switch-on.
	Electric power	Observe the following safety rules: 1 Isolate from the power supply. 2 Take appropriate measures to prevent switch on. 3 Test absence of voltage. 4 Earthing and short-circuiting. 5 Cover or safeguard any adjacent live parts.
	Spring tension in the actuator	Danger to life caused by compression spring in the actuator. Do not open the actuator but return it to GEA Tuchenhausen for proper disposal.
Danger of injury	Danger presented by moving or sharp-edged parts	The operator must exercise caution and prudence. For all work: <ul style="list-style-type: none"> • Wear suitable work clothing. • Never operate the machine if the cover panels are not correctly fitted. • Never open the cover panels during the operation. • Never reach into openings. As a precautionary measure, wear personal protective equipment in the vicinity of the valve: <ul style="list-style-type: none"> • Protective gloves • Safety shoes
Environmental damage	Operating materials with properties which are harmful to the environment	For all work: <ul style="list-style-type: none"> • Collect lubricants in suitable containers. • Dispose of lubricants in accordance with the pertinent regulations.
Danger of injury	Danger due to liquid escaping from the leakage connections	Discharge the liquid in a controlled manner.

Declaration of Incorporation

in accordance with EC Machinery Directive 2006/42/EC

We herewith declare that this consignment contains the subsequently identified - but incomplete - machine and that putting into service is not permitted until it has been established that the machinery into which this machine is to be incorporated is in conformity with the provisions of the EC Machinery Directive.

We declare that the incomplete machine identified here complies with the "Essential Health and Safety Requirements" defined in Annex I, section 1 and section 2.1. The technical documentation is compiled in accordance with Annex VII, part B. In response to a reasoned request the relevant information will be transmitted to the appropriate national authorities.

This declaration will become invalid if any alterations are made to the machine which have not been agreed with us.

Designation of the machine:	Mixproof Butterfly Valve T-smart 9
Machine type:	T-smart
Relevant EC directives:	2006/42/EC
Applicable harmonized standards:	DIN EN ISO 12100

Büchen, 01/11/2013

Franz Bürmann
Managing Director

i.V. Peter Fahrenbach
Head of Development and Design

Transport and Storage

Scope of Supply

On receipt of the valve check whether

- the details on the type plate correspond to the data in the order and delivery documents,
- the equipment is complete and all components are in good order.

Transport

For transport, the following principles apply:

- Only use suitable lifting gear and slings for transporting the package units/valves.
- Observe the pictograms on the package.
- Handle valves with care to avoid damaged caused by impact or careless onloading and unloading. The outside synthetic materials are susceptible to breaking.
- The control modules must be protected from animal and vegetable fats.
- Only allow qualified staff to transport the valve.
- Movable parts must be properly secured.
- Only use approved, fully functional load lifting devices and lifting accessories which are suitable for the intended purpose. Observe the maximum load-bearing capacities.
- Secure the valve against slipping. Take the weight of the valve into account and the position of the point of gravity.
- Under no circumstances should anyone stand under a suspended load.
- Take care when transporting the valve. Do not grip sensitive parts of the valve to lift or push the valve or support yourself. Avoid putting the valve down with a jerk.

Storage

Valves or spare parts should be stored in a dry place, free of vibrations and dust. To avoid damage, leave the components in their original packaging if possible.

If, during transport or storage, the valve is going to be exposed to temperatures $\leq 0^{\circ}\text{C}$, it must be dried and suitable measures be taken to protect it from damage.

TIP

We recommend that the valve should be stored at a temperature of $\geq 5^{\circ}\text{C}$ for a period of 24 hours prior to any handling (disassembling the housings / activation of actuators) so that any ice crystals formed by condensation water can melt.

Intended Purpose

Designated Use

The Mixproof Butterfly Valve is used for the separation of media in pipe sections. Using the valve for any other purpose is considered contrary to its designated use.

TIP

The manufacturer will not accept any liability for damage resulting from such use of the valve. The risk of such misuse lies entirely with the operator of the facility.

Requirements for the Operation

The prerequisite for the reliable and safe operation of the valve is proper transportation and storage as well as professional installation and assembly. Operating the valve within the limits of its designated use also involves adhering to the operating, inspection and maintenance instructions.

Pressure Equipment Directive

The Mixproof Butterfly Valves are pressure equipment (without safety function) in the sense of the pressure equipment directive: Directive 97/23/EC. They are classified according to Annex II, article 3, section 3. In the event of any deviations, GEA Tuchenhausen GmbH will supply a special Declaration of Conformity.

ATEX Directive

If the Mixproof Butterfly Valves are used in areas with a potentially explosive atmosphere, you must absolutely comply with directive 94/9/EC with respect to all ignition hazards. The supplementary "EX" operating instructions for the T-smart Mixproof Butterfly Valves must be observed.

For details regarding the marking of valves for potentially explosive areas refer to the additional "Ex" operating instructions for the T-smart Butterfly Valves.

Improper Operating Conditions

The operational reliability of the valve cannot be ensured under improper operating conditions. Therefore avoid improper operating conditions.

Operating the valves is not permitted if

- Persons or objects are in the danger zone.
- Safety devices are not working or were removed.
- Malfunctions have been detected on the valve.
- Damage has been detected on the valve.
- Maintenance intervals have been exceeded.

Conversion Work

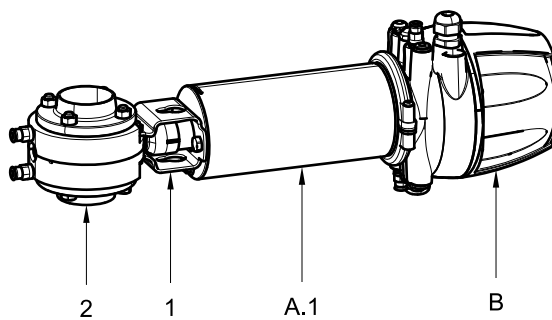
You should never make any technical modifications to the valve. Otherwise you will have to undergo a new conformity process in accordance with the EC Machinery Directive on your own.

In general, only original spare parts supplied by GEA Tuchenhausen GmbH should be fitted. This ensures the reliable and economical operation of the valve.

Design and Function

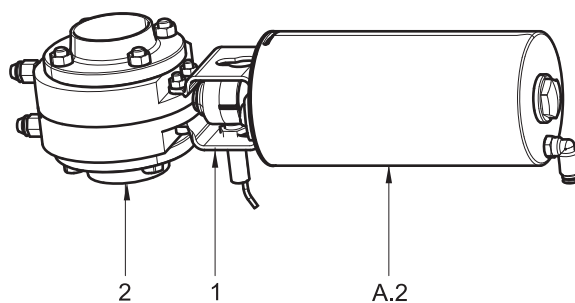
Design

Pneumatic actuator with control module



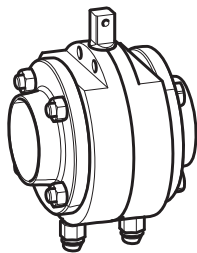
No.	Designation
A.1	Pneumatic actuator
B	T.VIS control module
1	Mounting bracket
2	Valve disk assembly

Pneumatic actuator without control module



No.	Designation
A.2	Pneumatic actuator
1	Mounting bracket
2	Valve disk assembly
Optional	Electrical feedback – proximity switch in the mounting bracket

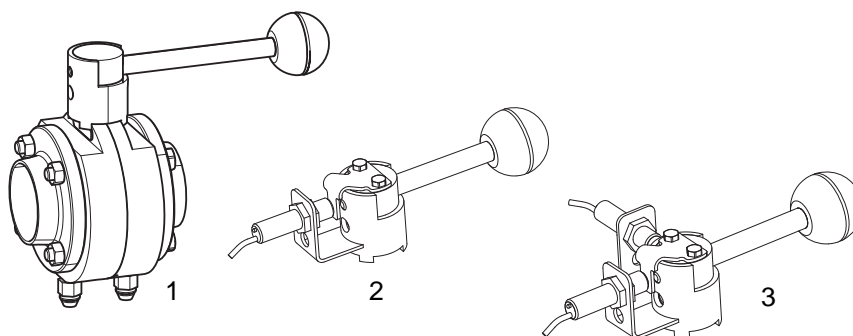
Valve disk assembly without actuator



Butterfly valve design for matrix-piped systems.

Manual actuator type H

Various manual actuator variants are available.



No.	Manual actuator variants
1	Standard
2	Optional – one electrical feedback signal
3	Optional – two electrical feedback signals

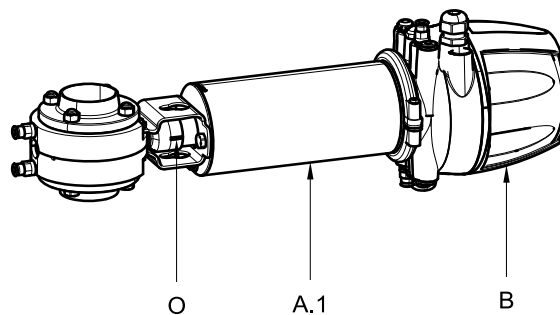
Functional Description

Pneumatic actuator

The compressed air which enters above the piston causes a downwards movement of the piston and the disk of the butterfly valve opens. When the air supply is shut off, the valve closes automatically as a result of the spring force (non-actuated position).

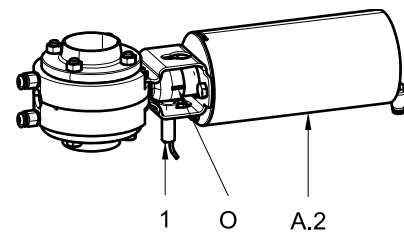
The stroke of the piston is converted into a rotary movement of the shaft. The travel of the piston is limited, so that the shaft performs a 90° rotation per stroke. This rotation exactly corresponds to the rotational angle required to open or close the disk of the mixproof butterfly valve.

Actuator (A.1)



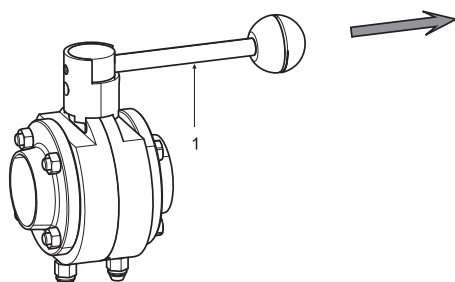
The position of the disk is detected and indicated by the control module (B). The visual position indication (O) can be recognized by the red marking on the coupling.

Actuator (A.2)



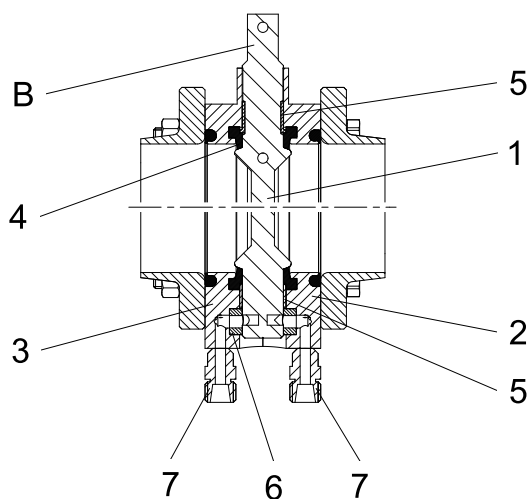
Feedback of switching states can be provided by proximity switches in the mounting bracket (1). The visual position indication (O) can be recognized by the red marking on the coupling.

Manual actuator type H



To open or close the mixproof butterfly valve, unlock the hand lever (1) by gently pulling it out of the locking device and turn it through 90°. When the lever is released, it locks into place in the holes provided. The limit positions of the mixproof butterfly valve can be detected by proximity switches.

Valve disk assembly without actuator



No.	Designation
1	Valve disk
2	Flange
3	Flange
4	Disk seal
5	Plain bearing
6	Radial seal
7	Leakage connections
B	Hole on the square end

The mixproof butterfly valve is used for separating media. The valve disk (1) as shut-off element is supported between two flanges screwed together (2, 3) and by plain bearings (4). The valve positions are OPEN / CLOSED.

In the CLOSED position, two media can be reliably separated from one another. The leakage cavity is open towards the atmosphere in this case. After switching, the medium in the valve disk leakage areas can drain by gravity (7).

In the OPEN position (maximum throughflow), the leakage paths towards the atmosphere are closed. The leakage cavity is sealed by the radial seal (6) on the short valve disk shaft.

TIP

The hole (B) in the square end is used to indicate the position of the valve disk.

Installation and Commissioning

Notes on Installation

The mixproof butterfly valve may only be installed in horizontal pipes, with the actuator in vertically upright position.

To prevent damage, make sure that

- the mixproof butterfly valve is installed in the pipe system free of tension and
- no foreign materials (e.g. tools, bolts, lubricants) are left in the system.

Pneumatic Connections

Air requirement

The air requirement for the switching operations depends on the actuator type.

Actuator type	Actuator diameter (mm)	Air requirement (dm ³ _n /stroke) dm ³ _n at 1.01325 bar; at 0°C as per DIN 1343
BFV 125	89	0.325

Establishing the hose connection

To ensure reliable operation, the compressed air hoses must be cut exactly square.

Tools required:

- A hose cutter.

Carry out the following steps:

1. Shut off the compressed air supply.
2. Use the hose cutter to cut the pneumatic hoses square.

Actuator with T.VIS control module

Carry out the following steps:

1. Push the air hose into the air connector on the control module.
2. Re-open the compressed air supply.

Actuator without control module

Carry out the following steps:

1. Remove the plug from the actuator.
2. Screw in connector G 1/8 " or an exhaust air throttle for slow closing.
3. Push the air hose into the air connector.
4. Re-open the compressed air supply.

Electrical Connections

For T.VIS control module

DANGER

Live parts

Electrical shock can result in serious personal injury or death.

- Only allow properly qualified staff to carry out work on the electrical equipment.
- Prior to establishing electrical connections check the maximum permissible operating voltage.

EXPLOSION HAZARD

Explosive gases or dusts

An explosion can result in serious personal injury or death.

- Observe the installation and operating regulations for use in potentially explosive areas.
- Connect in accordance with the connection diagram and the instructions in the corresponding operating instructions for control modules T.VIS M-1 or T.VIS A-8.

Adjusting the proximity switch – actuator without T.VIS

DANGER

Live parts

Electrical shock can result in serious personal injury or death.

- ➔ Only allow properly qualified staff to carry out work on the electrical equipment.
- ➔ Prior to establishing electrical connections check the maximum permissible operating voltage.

EXPLOSION HAZARD

Explosive gases or dusts

An explosion can result in serious personal injury or death.

- ➔ Observe the installation and operating regulations for use in potentially explosive areas.

Carry out the following steps:

1. Slacken the cap nuts on the proximity switch.
2. Hold the proximity switch and turn the cap nuts until a switching gap of max. 4 mm to the associated contact element is achieved.
3. Tighten the cap nuts.

Commissioning

Before starting commissioning observe the following:

- Make sure that there are no foreign materials in the system.
- Actuate the valve once by applying compressed air.
- Clean the pipe system prior to the first product run.
- During commissioning, regularly check all sealing points for leaks. Replace defective seals.

Cleaning and Passivation

Cleaning

All parts in contact with product must be cleaned at regular intervals. Always observe the safety data sheets issued by the cleaning agent manufacturers. Only use cleaning agents which do not cause damage to the seals and inner valve parts. During pipe cleaning, the cleaning fluid also flows through the valve housings and cleans them.

With respect to the cleaning method and parameters like detergents, temperatures, times and intervals, the component manufacturer can merely make recommendations but cannot provide any generally applicable details. Method and parameters should be determined and defined by the plant operator in accordance with the relevant process.

The cleaning effect must be checked regularly by the plant operator!

Cleaning process examples

Typical cleaning parameters in dairy operations

Example of a two-phase cleaning process:

- Sodium hydroxide and combination products based on sodium hydroxide in concentrations from 0.5% to 2.5% at 75°C to 80°C.
- Phosphoric acid or nitric acid and combination products based on these acids in concentrations from 0.3 to 1.5% at approx. 65°C.

Example of a cleaning operation in one cleaning step:

- Formic acid and combination products based on formic acid at up to 85 °C.

Typical cleaning parameters in breweries

Example of a two-phase cleaning process:

- Sodium hydroxide and combination products based on sodium hydroxide in concentrations from 1% to 4% at approx. 85°C.
- Phosphoric acid or nitric acid and combination products based on these acids in concentrations from 0.3 to 1.5% at approx. 20°C.

The cleaning effect depends on the following factors:

- Temperature
- Time
- Mechanics
- Chemicals
- Degree of soiling.

These factors can be combined in such a way as to make an optimal cleaning result probable.

Cleaning of the leakage outletsystem

On the mixproof butterfly valve, two connections for flushing are provided at the deepest point of the housing to enable cleaning of the leakage cavity.

A special sealing mechanism allows the valve to be operated without any additional shut-off valves.

- Cleaning liquid is flushed into the leakage cavity through one of the flushing connections.
- The second flushing connection is used for discharging medium and as a leakage indicator in the event of sealing damage.

The recommended admission pressure for the cleaning medium supply at the inlet valve to the leakage cavity is 2.5 bar \pm 0.5 bar. Pressure build-up between the seals on the valve disk should always be avoided. A non-pressurized outlet at the outlet valve is therefore required. Generally also ensure a positive pressure difference from the product chamber to the leakage cavity.

The duration of the complete washing process depends on the type of contamination, and is generally between 10 and 90 seconds.

Flow rates

Flow rate for cleaning isolation chamber						
Size	DN 50 2" OD	2,5" OD	DN 65	3" OD	DN 80	DN 100 4" OD
Kvs-value (l/h)	194	198	178	203	188	163

In the table values for the duration and number of rinses are listed.

Medium	Period (s)	Number of rinses	
Beer	1...2	2...3	During each cleaning phase 1. Prewash 2. Hot caustic 3. Intermediate washing 4. Acid 5. Rinse
Yeast	1...2	2...3	
Fruit juice	2...5	3	
Milk	2...5	3	
Yogurt	3...5	3	

Depending on the cleaning method (medium concentration, temperature and contact time), the seals are attacked differently. This can lead to impairments in function and durability.

Passivation

Before commissioning a plant, passivation is commonly carried out for long pipes and tanks. Valve blocks are usually excluded from this. Passivation is typically performed using nitric acid (HNO_3) at approx. 85°C at a concentration in the 4 to 6% range and a contact time of 6 to 8 hours.

Malfunctions

In the event of malfunctions immediately deactivate the mixproof butterfly valve and secure it against inadvertent reactivation. Malfunctions may only be remedied by qualified staff, who must observe the safety instructions.

Malfunction	Cause	Remedy
Actuator does not work	Air hoses clogged or leaking	Clean or replace the air hoses
	Control air pressure too low	Increase the control air pressure
	Solenoid valve defective	Replace the solenoid valve
	Valve disk is blocked	Clear the blockage
No feedback signal	Proximity switch incorrectly adjusted	Adjust the proximity switch
	Proximity switch not connected correctly	Check and correct the wiring
	Proximity switch defective	Replace the proximity switch
	Valve disk is blocked	Clear the blockage
Leakage at flanges	Disk seal defective O-ring defective	Replace the disk seal

Maintenance

Inspections

Between the maintenance periods, the mixproof butterfly valves must be checked for leakage and proper function.

Pneumatic Connections

Carry out the following steps:

1. Check the operating pressure at the pressure reducing and filter station.
2. Clean the air filter at regular intervals.
3. Check that the air hoses sit firmly in the air connections.
4. Check the lines for kinks and leaks.



Electrical Connections

Carry out the following steps:

1. Check that the cap nut on the cable gland is tight.
2. Only for T.VIS control module: check the cable connections on the adapter and interface module (see operating instructions for control module types T.VIS M-1 or T.VIS A-8).



Mechanical joints

Carry out the following steps:

- Check all screw connections and detents for firm seat.



Maintenance Intervals

To ensure the highest operational reliability of the mixproof butterfly valves, all wearing parts should be replaced at longer intervals.

The actual maintenance intervals can only be determined by the user since they depend on the operating conditions, for instance:

- daily period of use,
- switching frequency,
- type and temperature of the product,
- type and temperature of the cleaning solution,
- ambient conditions.

Guideline Values for Maintenance Intervals

Applications	Maintenance Intervals (guideline values)
Media at temperatures of 60 °C to 130 °C	approx. every 3 months
Media at temperatures of < 60 °C	approx. every 12 months

Removing the Valve

Requirement

- Make sure that during maintenance and repair work no process is in operation in the area concerned.

Carry out the following steps:

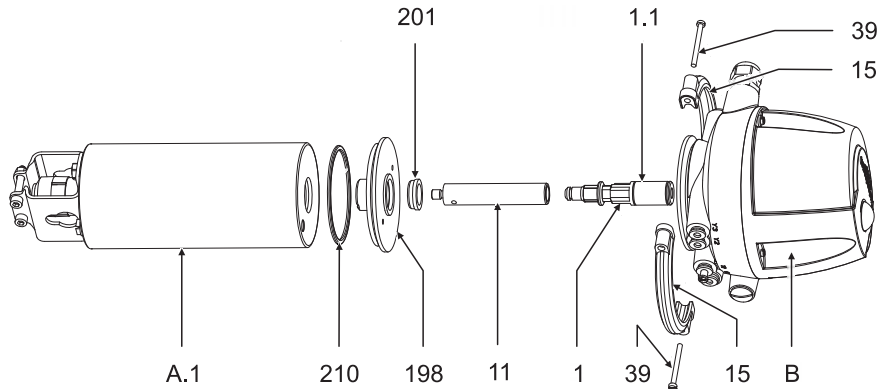
1. Drain all pipe system elements that lead to the mixproof butterfly valve and, if necessary, clean or rinse them.
2. Shut off the control air supply.
3. Disconnect the power supply.
4. Detach the pipe connection of the butterfly valve.

✓ Done.

Disassembly

This section describes disassembly of various components.

Removing the Control Module, Types T.VIS M-1 and A-8



Requirement

- The pneumatic and electrical connections on the plant side can remain on the control module.

NOTE

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

→ Protect the permanent magnet against impact stress.

Carry out the following steps:

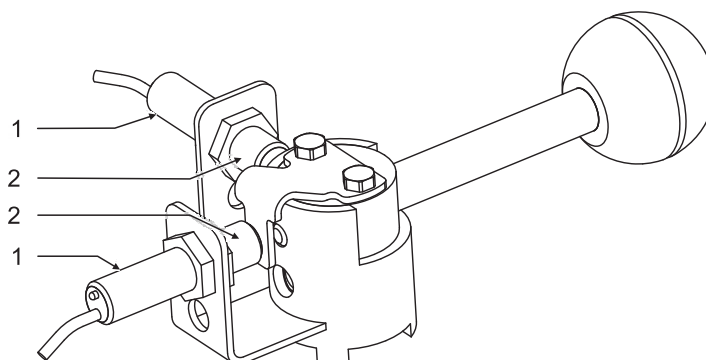
1. Undo the screws (39).
2. Remove the clamps (15).
3. Withdraw the control module (B) via the switch bar (11) from the actuator (A.1).
4. Unscrew both switch bars (1, 11).
5. Hold the actuator (A.1) using a belt wrench and use a face spanner to unscrew the mounting base (198) from the actuator (A.1).
6. Take off the O-ring (210) from the closure.
7. Remove the bearing (201) from the mounting base (198).

✓ Done.

TIP

Assemble the valve in reverse order. Refer to the operating instructions for T.VIS M-1, T.VIS A-8.

Removing the Proximity Switch – Actuator Without T.VIS

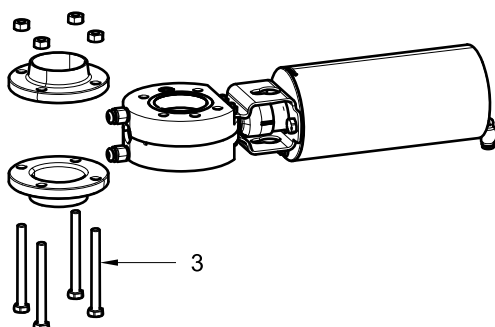


Carry out the following steps:

1. Unscrew the hex. nuts (2) on the proximity switches (1).
2. Remove the proximity switches (1).
3. Take the butterfly valve out of the pipe.

✓ Done.

Removing the Valve

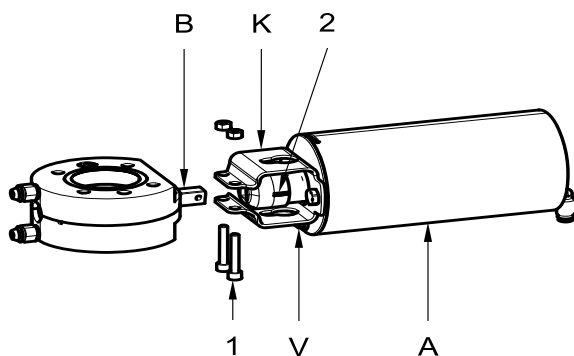


Carry out the following steps:

1. Undo the screw connections (3).
2. Remove the valve from the pipe.

✓ Done.

Taking off the Actuator



Carry out the following steps:

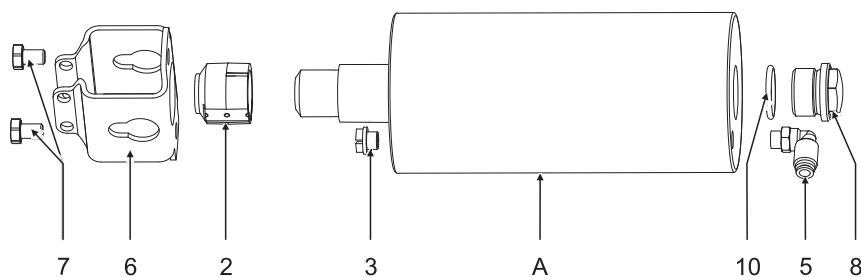
1. Undo the screw connections (1).
2. Lift off the actuator (A).

✓ Done.

TIP

The red position indication marker (2) is aligned with the hole (B) in the valve disk so that it indicates the position of the disk in the valve.

Dismantling the Actuator Parts

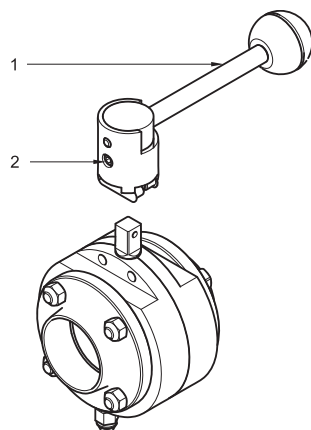


Carry out the following steps:

1. Remove the hex. screws (7) and take off the bracket (6).
2. Take off the position indicator (2).
3. Unscrew the vent screw (3).
4. Hold the actuator (A) with a belt wrench and unscrew the plug screw (8).
5. Remove the O-ring (10).
6. Unscrew the elbow screw-in plug connection (5).

✓ Done.

Removing the Manual Actuator Type H



Carry out the following steps:

1. Use an a/f 4 hex socket screwdriver to unscrew the locking screw until it is flush with the bushing.
2. Take off the hand lever (1).

✓ Done.

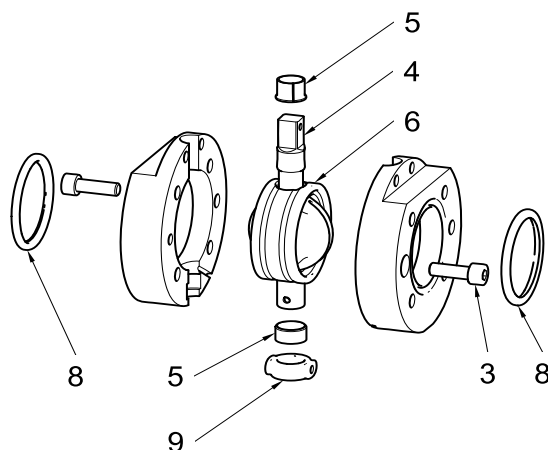
Removing the Valve Disk Seal

Removing the
flanges



Carry out the following steps:

1. Undo the screw connections (3).



2. Pull the butterfly valve flanges apart.
3. Remove the radial seal (9).
→ The radial seal protects the plain bearing against soiling.
4. Take out the valve disk (4) with the disk seal (6).

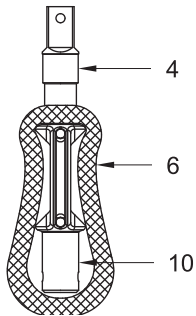
Done.

Removing the
seal

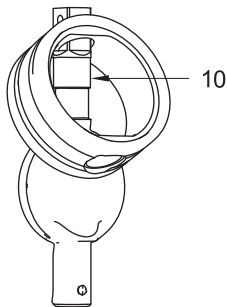


Carry out the following steps:

1. Pull off the bushes (5).
2. Turn the disk seal (6) until it is positioned at a 90° angle to the valve disk (4).



3. Pull the disk seal over the free end (10) of the valve disk.
4. Unclamp the valve disk.
5. Pull the disk seal over the long end of the shaft (10).



6. Remove the O-ring (8).

✓ This completes removal of the valve disk seal.

Maintenance

Cleaning the Mixproof Butterfly Valve

NOTE

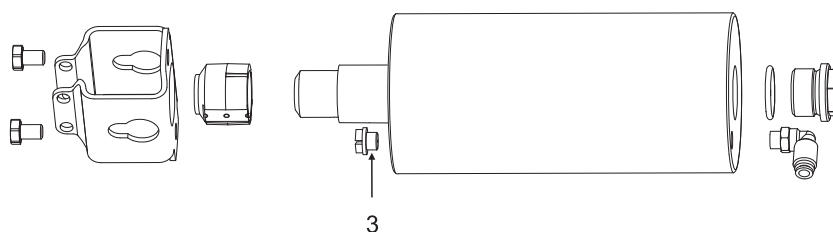
Damage to the valve

Damage to the valve can result in a malfunction.

- Observe the safety information sheets issued by the detergent manufacturers!
- Only use detergents which are non-abrasive and not aggressive towards stainless steel.

Carry out the following steps:

1. Carefully clean the individual parts.
2. Check that air can exit freely from the vent screw (3).



✓ Done.

Lubricating Seals and Threads

CAUTION

Damage to seals and threads

Damage to seals and threads can result in a malfunction.

- Ensure that an adequate film of lubricant is applied.
- For product contact seals only use suitable greases and oils.
- Observe the safety information sheets issued by the lubricant manufacturer!

Carry out the following steps:

1. Apply a light film of lubricant to all threads.
2. Apply a light film of lubricant to all seals.
3. Apply a light film of lubricant to the shaft ends.

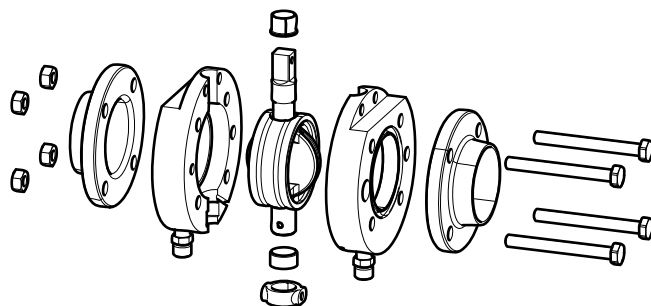
✓ Done.

TIP

GEA Tuchenhausen recommends Rivolta F.L.G. MD-2 and PARALIQ GTE 703. These lubricants are approved for foodstuff and are resistant to beer froth. They have the NSF-H1 (USDA H1) registration. PARALIQ GTE 703 can be ordered from GEA Tuchenhausen under part no. 413-064, and Rivolta F.L.G. MD-2 can be ordered under part no. 413-071. A Manufacturer's Declaration for these products can be obtained from GEA Tuchenhausen if required. A thin film of grease is required on the seals to ensure the proper function of the fittings. It reduces friction and extends the service life of the seals. This is absolutely harmless from a health and hygienic point of view.

Assembling the Valve Disk

Overview Drawing



General Notes

Observe the following points when assembling:

- Before the valve disk is inserted between the flanges it must be positioned at a 90° angle to the seal.
- The plain bearings must be refitted. To fit the upper plain bearing on valves with nominal widths DN80, DN100, 3"OD and 4"OD put installation mandrel 229-000061 over the square end to mount the plain bearing.
- When the actuator is mounted, the valve disk must be in the correct position:
For non-actuated position closed, valve disk closed.
For non-actuated position open, valve disk in 90° position.

Assembly

Carry out the following steps:

- ➔ Assemble the butterfly valve in reverse order.

Disposal

General Notes

Dispose of the valve at the end of its life cycle in an environmentally friendly manner. Observe the statutory waste disposal regulations applicable at the place of installation.

The valve is made of the following materials:

- Metals
- Synthetic materials
- Electronic parts
- Lubricants containing oil and grease

Separate the different materials and dispose of them correctly sorted. Also observe the instructions regarding disposal in the operating instructions for the individual components.

Valve Actuator Disposal



DANGER

The spring forces in the actuator can be as much as 3.5 kN.

The pre-stressed spring can cause serious personal injury or death.

- Never open the actuator.
- GEA Tuchenhausen accepts unopened actuators and arranges for proper disposal free of charge.

Carry out the following steps:

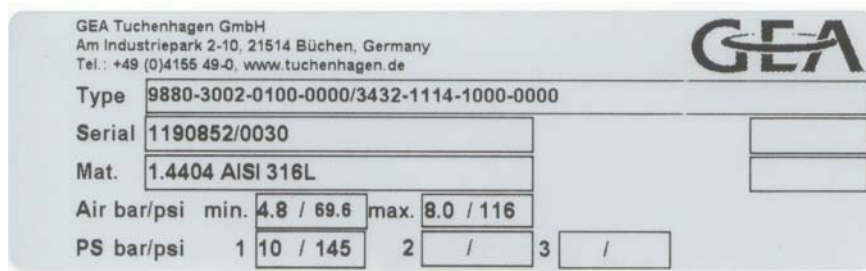
1. Remove the actuator, see „Taking off the Actuator“ (Page 39).
2. Safely pack the actuator and send it to GEA Tuchenhausen GmbH.



Technical Data

Type Plate

The type plate clearly identifies the mixproof butterfly valve.



Type plate of the mixproof butterfly valve

The type plate provides the following key data:

Key data of the mixproof butterfly valve

Type	Mixproof Butterfly Valve T-smart 9
Serial	Serial number
Material	1.4404/AISI 316L
Control air pressure bar/psi	min. 4.8/69.6 max. 8.0/116
Product pressure bar/psi	10/145

Technical Data

Refer to the following tables for the key technical data of the mixproof butterfly valve:

Technical data: mixproof butterfly valve

Designation	Description
Size	DN 50 to DN 100 2 to 4" OD
Material of product contact parts	Stainless steel 1.4404/AISI 316L Check corrosion resistance with respect to media and detergents.

Technical data: ambient temperatures

Designation	Description
- Valve	0 to 45 °C, standard < 0 °C: use control air with a low dew point. Protect valve stems against freezing.
- Proximity switch	-20 to +80 °C
- Control module type T.VIS M-1, A-8	-20 to +50 °C
Product and operating temperature	-40 to +135°C

Technical data: compressed air supply

Designation	Description
Air hose	
- Metric	Material PE-LD Outside dia. 6 mm Inside dia. 4 mm
- Inch	Material PA Outside dia. 6.35 mm Inside dia. 4.3 mm
Air consumption (depending on the operating pressure)	2 to 3.8 l for DN 50 to DN 65 3.5 to 6.5 l for DN 80 to
Product pressure	10 bar
Control air pressure	min. 4.8 bar max. 8 bar
Control air	acc. to ISO 8573-1:2001
- Solid particle content:	Quality class 6 Particle size max. 5µm Particle density max. 5 mg/m ³
- Water content:	Quality class 4 max. dew point +3 °C If the unit is used at higher altitudes or at low ambient temperatures, the dew point must be adapted accordingly.
- Oil content:	Quality class 3, preferably oil free max. 1 mg oil in 1m ³ air

Air requirement per switching operation

Actuator type	Actuator diameter (mm)	Air requirement (dm ³ /stroke) dm ³ _n at 1.01325 bar at 0°C as per DIN 1343
BFV 125	89	0.325

Equipment
Proximity switches – actuator without T.VIS

Operating voltage (V)	10...65 DC	20...25 AC
Switching distance (mm)	5	5
Max. continuous current (mA)	>3...<100	>3...<100
Ambient temperature (°C)	-25...+80	-25...+80
Protection class	IP 67	IP 67

Pipe Ends

Metric DN	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to DIN 11850
50	53	1.5	50	x
65	70	2.0	66	x
80	85	2.0	81	x
100	104	2.0	100	x

Inch OD	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to BS 4825 Part 1
2"	50.8	1.6	47.6	x
2 1/2"	63.5	1.6	60.3	x
3"	76.2	1.6	73	x
4"	101.6	2	97.6	x

Resistance of Sealing Materials

The resistance of sealing materials depends on the type and temperature of the medium conveyed. The contact time can negatively affect the service life of the seals. The sealing materials comply with the regulations of FDA 21 CFR 177.2600 or FDA 21 CFR 177.1550.

Resistance:

- + = good resistance
- o = reduced service life
- – = not resistant

Medium	Temperature	Sealing material (general operating temperature)
		EPDM -40...+135°C -40...275°F
Caustics up to 3%	up to 80 °C (176°F)	+
Caustics up to 5%	up to 40 °C (104°F)	+
Caustics up to 5%	up to 80 °C (176°F)	+
Caustics more than 5%		o
Anorganic acids up to 3%	up to 80 °C (176°F)	+
Anorganic acids up to 5%	up to 80 °C (176°F)	o
Anorganic acids up to 5%	up to 100 °C (212°F)	–
Water	up to 80 °C (176°F)	+
Steam	up to 135 °C (275°F)	+
Steam, approx. 30 min	up to 150 °C (302°F)	+
Fuels/hydrocarbons		–
Product with a fat content of max. 35%		+
Product with a fat content more than 35%		–
Oils		–
* depending on the installation position		–

Tools

Tools	Part no.
Hose cutter	407-065
Open-end spanners a/f 8; 9; 10; 12; 13; 14; 15; 16; 17; 24	
Pin punch dia. 4	403-209
Belt wrench	408-142

Tools	Part no.
Face pin spanner wrench Ø 4, adjustable 80	408-197
Hex. key a/f 3; 4; 5	
Mounting mandrel	229-000061

Lubricant

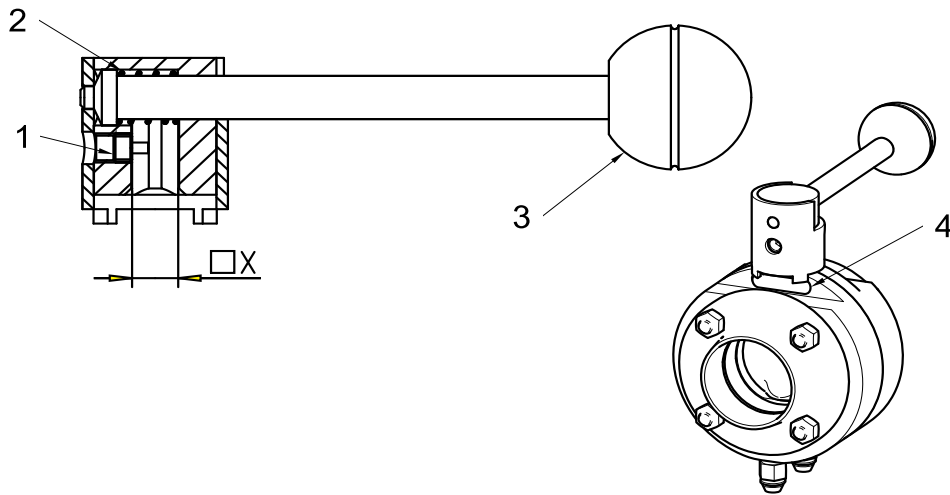
Lubricant	Part no.
Rivolta F.L.G. MD-2	413-071
PARALIQ GTE 703	413-064

Weights

Size	Mixproof butterfly valve (kg)		
	Manual actuator	Pneumatic actuator without control module	Pneumatic actuator with T.VIS control module
DN 50, 2"	4.0	7.9	9.1
2 1/2"	5.1	9.0	10.2
DN 65	5.0	8.9	10.1
3"	6.1	10.0	11.0
DN 80	5.9	9.8	11.0
DN 100, 4"	8.3	12.2	13.4

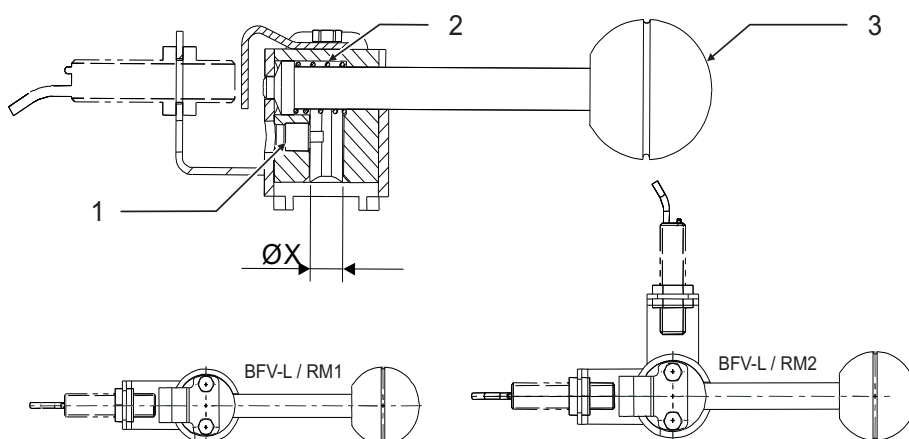
Spare Parts Lists

Mixproof Butterfly Valve T-smart 9 – Manual Actuator



Manual actuator BFV-L

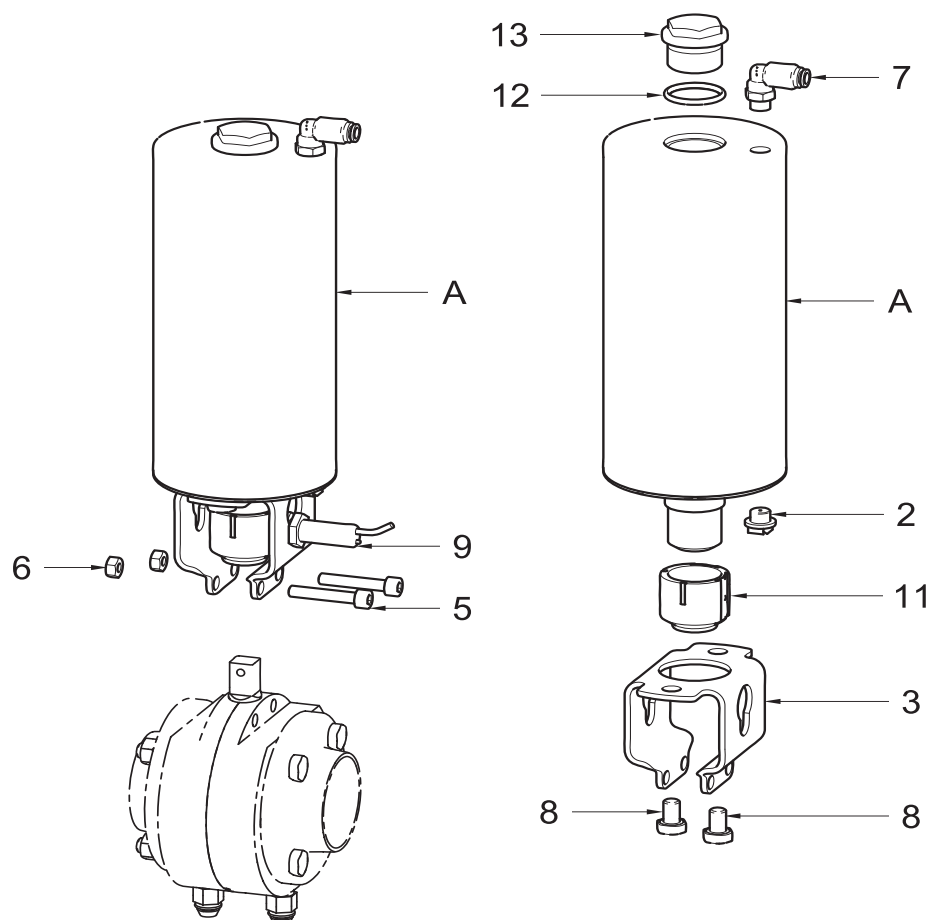
Item	Designation	Material	Type BFV-L	Type BFV-L
			DN 50 / DN 65 2" OD / 2.5" OD	DN 100 / DN 80 3" OD / 4" OD
Manual actuator, complete			224-000131	224-000132
1	Adjusting screw	1.4301	224-000123	224-000123
2	Pressure spring	1.4310	931-304	931-304
3	Ball handle	--	941-005	941-005
*4	Cap	PP	224-000159	224-000159
X	Square end	--	12 mm	14 mm



Manual actuator BFV-L / RM1 / RM2

Item	Designation	Material	Type BFV-L		Type BFV-L	
			DN 50 / DN 65 2" OD / 2.5" OD		DN 100 / DN 80 3" OD / 4" OD	
			RM 1	RM 2	RM 1	RM 2
Manual actuator, complete			224-000446	224-000449	224-000447	224-000450
1	Adjusting screw	1.4301	224-000123		224-000123	
2	Pressure spring	1.4310	931-304		931-304	
3	Ball handle	--	941-005		941-005	
*4	Cap	PP	224-000159		224-000159	
*9	Proximity switch M12x1, 10-65 V / DC	1.4301	505-088 505-096		505-088 505-096	
X	Square end	--	12 mm	12 mm	14 mm	14 mm
Items 4 and 9 are not included in the manual actuator, complete and must be ordered separately.						

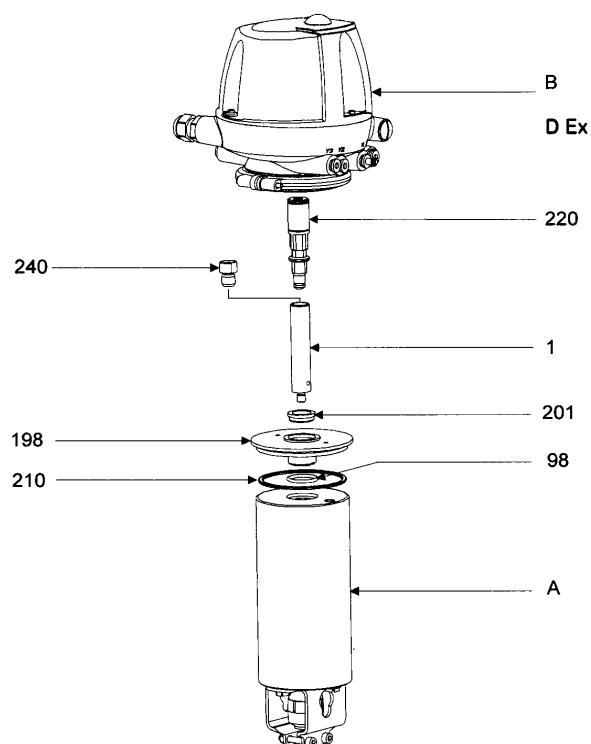
Mixproof Butterfly Valve T-smart 9 – Pneumatic Actuators



Mixproof Butterfly Valve T-smart 9 - Pneumatic Actuators

Item	Designation	Material	DN 50 2" OD	DN 65 2.5" OD	3" OD	DN 80 / DN 100 4" OD
A	Actuator BFV/NC/NO	--	224-000486	224-000486	224-000487	224-000500
A (opt.)	Actuator BFV/NC/NO EX	--	224-000492	224-000492	224-000493	224-000502
	Actuator BFV AA	--	224-000483	224-000483	224-000484	224-000499
	Actuator BFV AAEX	--	224-000489	224-000489	224-000490	224-000501
2	Vent screw	PP black	221-133.14	221-133.14	221-133.14	221-133.14
3	Mounting bracket	1.4301	224-000136	224-000136	224-000136	224-000136
5	Cheese head screw	A2-70	902-120	902-120	902-120	902-120
6	Hex nut	A2	910-013	910-013	910-013	910-013

Item	Designation	Material	DN 50 2" OD	DN 65 2.5" OD	3" OD	DN 80 / DN 100 4" OD
7	Elbow screw-in plug connection (1/8 " - 6/4)	Brass/nickel-plated	933-475	933-475	933-475	933-475
7.2	Screw-in plug connection (1/8 " - 6/4)		933-330	933-330	933-330	933-330
7	Elbow screw-in plug connection (1/8 " - 6.35/4.1)	Brass/nickel-plated	933-979	933-979	933-979	933-979
7.2	Screw-in plug connection (1/8 " - 6.35/4.1)		933-144	933-144	933-144	933-144
7.1	Throttle non-return valve exhaust air	Brass/nickel-plated	603-042	603-042	603-042	603-042
8	hex. screw	A2-70	901-040	901-040	901-040	901-040
9	Proximity switch M12x1;10-30V/DC/3-wire	1.4301	505-088 (electrical connection with terminal compartment) 505-096 (electrical connection with connector M12)			
11	Switching ring	--	224-000133	224-000133	224-000135	224-000135
12	O-ring	NBR	930-029	930-029	930-029	930-029
13	Locking screw	1.4301	224-000151	224-000151	224-000151	224-000151

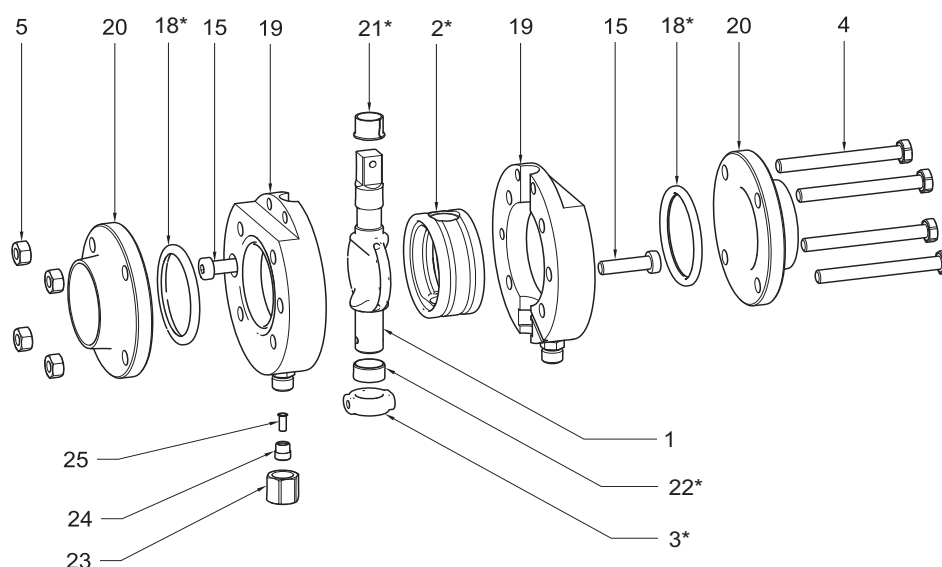


T-smart Mixproof Butterfly Valve - Pneumatic Actuators

		Item	Material	Designation	Part no.
Accessories for T.VIS A-8 and M-1					
B	Control module T.VIS A-8 and M-1	1	1.4301	T.VIS switch bar	224-000214
		98	NBR	O-ring	930-029
		198	1.4301	T.VIS mounting base	224-000213
		201	IGLIDUR-G	Plain bearing	704-047
		210	NBR	O-ring	930-093
		220	PA6/GK30	T.VIS switch bar	221-589.01

		Item	Material	Designation	Part no.
D	Control module EX	98	NBR	O-ring	930-029
		198	1.4301	T.VIS mounting base	224-000213
		201	IGLIDUR-F	Plain bearing EX	704-065
		210	NBR	O-ring	930-093
		220	1.4305/PA12	Switch bar	221-405.03

Mixproof Butterfly Valve T-smart 9 (valve disk assembly without actuator)

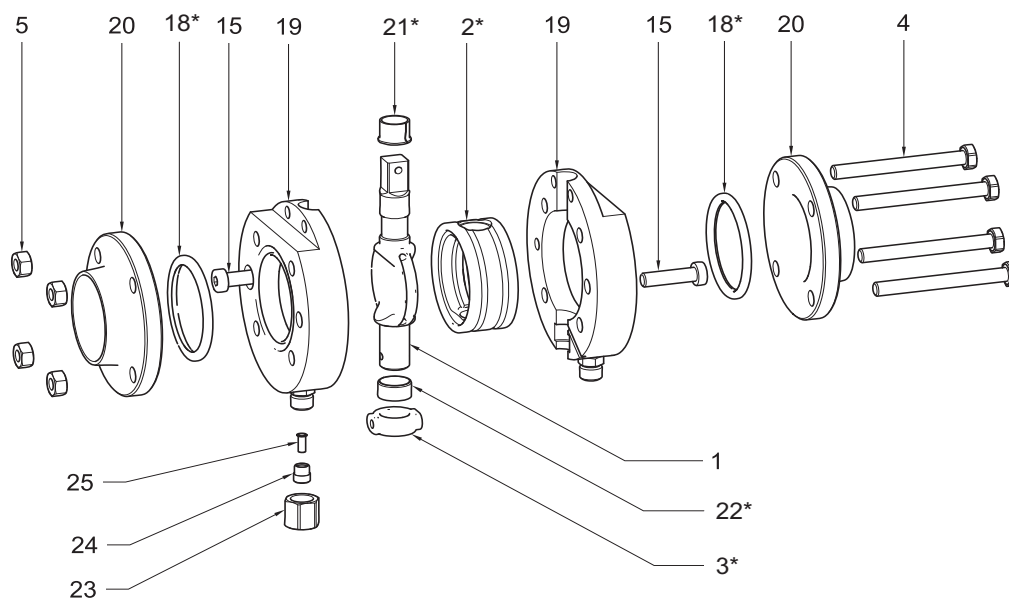


The parts marked with * are wearing parts.

Item	Designation	Material	DN 50	DN 65	DN 80	DN 100
Mixproof Butterfly Valve T-smart cpl.		1.4404/ EPDM	224-000618	224-000619	224-000620	224-000621
Sealing set		EPDM	224-000696	224-000697	224-000698	224-000699
1	Butterfly valve disk	1.4404	224-000583	224-000585	224-000540	224-000568
2**	Butterfly valve seal	EPDM	224-000570	224-000571	224-000535	224-000573
3**	Radial seal	EPDM	224-000536	224-000536	224-000536	224-000536
4	Hex screw	A2-70	901-078	901-078	901-078	901-126
5	Hex nut	A2	910-018	910-018	910-018	910-026
15	Cheese head screw	A2-70	902-126	902-126	902-126	902-126

Item	Designation	Material	DN 50	DN 65	DN 80	DN 100
18**	O-ring	EPDM	930-546	930-547	930-450	930-549
19	Base body with intermediate flange with TU groove	1.4404	224-000587	224-000589	224-000591	224-000592
20	Flange V	1.4404	752-727	752-728	752-729	752-730
21**	Plain bearing	IGLIDUR F	704-046	704-046	704-046	704-046
22**	Plain bearing	IGLIDUR F	704-069	704-069	704-069	704-069
23	Cap nut M12 x 1,5	1.4571	933-459	933-459	933-459	933-459
24	Olive 6/4	1.4571	933-458	933-458	933-458	933-458
25	Support sleeve 6/4	1.4571	933-380	933-380	933-380	933-380

** Items 2, 3, 18, 21 und 22 are completely contained in the sealing set.

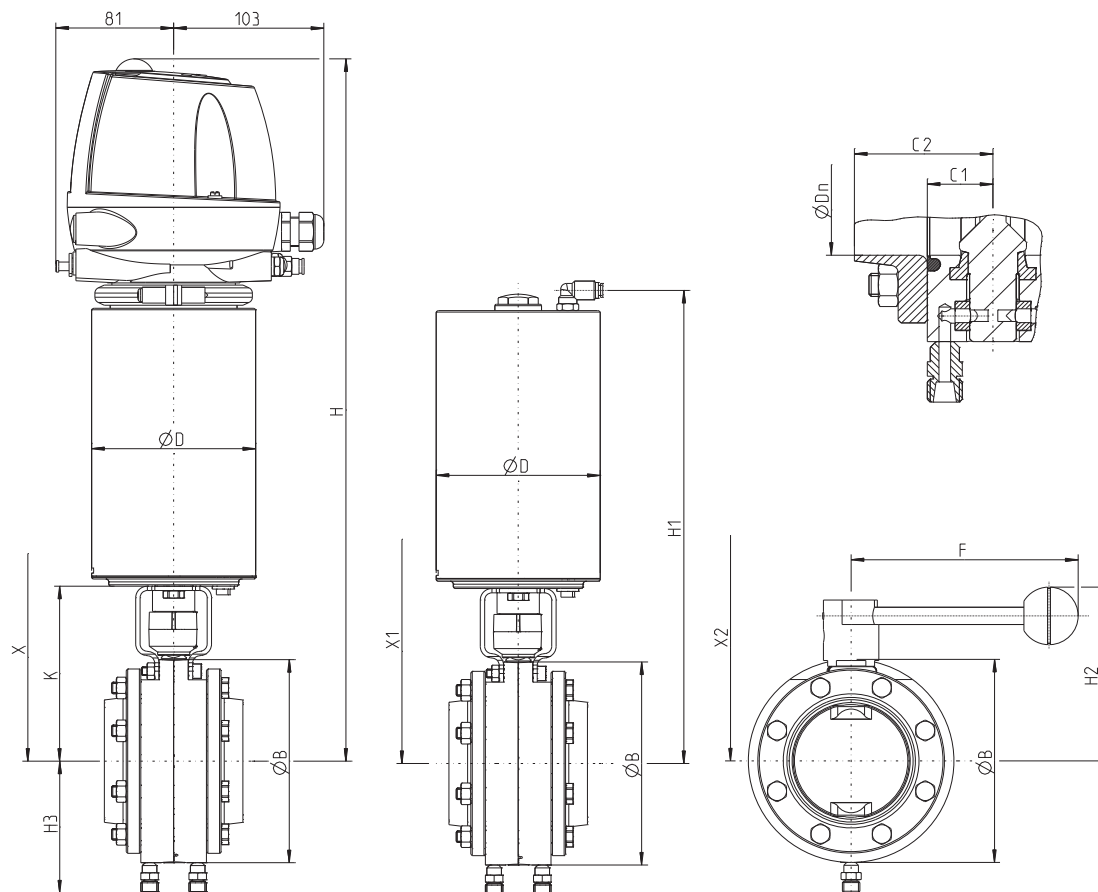


The parts marked with * are wearing parts.

Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
	Mixproof Butterfly Valve T-smart cpl.	1.4404/ EPDM	224-000622	224-000623	224-000624	224-000625
	Sealing set	EPDM	224-000700	224-000701	224-000702	224-000703
1	Butterfly valve disk	1.4404	224-000583	224-000584	224-000586	224-000568
2**	Butterfly valve seal	EPDM	224-000570	224-000574	224-000572	224-000573
3**	Radial seal	EPDM	224-000536	224-000536	224-000536	224-000536
4	Hex screw	A2-70	901-078	901-078	901-078	901-126
5	Hex nut	A2	910-018	910-018	910-018	910-026

Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
15	Cheese head screw	A2-70	902-126	902-126	902-126	902-126
18**	O-ring	EPDM	930-559	930-560	930-319	930-561
19	Base body with intermediate flange with TU groove	1.4404	224-000593	224-000588	224-000590	224-000594
20	Flange V	1.4404	752-741	752-742	752-743	752-744
21**	Plain bearing	IGLIDUR F	704-046	704-046	704-046	704-046
22**	Plain bearing	IGLIDUR F	704-069	704-069	704-069	704-069
23	Cap nut M12 x 1,5	1.4571	933-459	933-459	933-459	933-459
24	Olive 6/4	1.4571	933-458	933-458	933-458	933-458
25	Support sleeve 6/4	1.4571	933-380	933-380	933-380	933-380
<p>** Items 2, 3, 18, 21 und 22 are completely contained in the sealing set.</p>						

Mixproof Butterfly Valve T-smart 9 – Dimension Sheet



Mixproof Butterfly Valve T-smart 9 - Dimension Sheet

Dimension	2" OD	DN 50	2.5" OD	DN 65	3" OD	DN 80	4" OD	DN 100
Ø B	109	109	127	127	141	141	168	168
Ø Dn	47.6	50	60.3	66	72.9	81	97.7	100
K	105.5	105.5	114.5	114.5	121.5	121.5	135	135
C1	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
C2	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
Ø D	89	89	89	89	89	113	113	113

Dimension	2" OD	DN 50	2.5" OD	DN 65	3" OD	DN 80	4" OD	DN 100
F	156	156	156	156	156	156	156	156
H	469	469	478	478	485	488	501	501
H 1	310	310	319	319	326	329	342	342
H 2	105	105	114	114	121	121	134	134
H 3	75.5	75.5	84.5	84.5	91.5	91.5	105	105
Ø LK 2 screws	74 4 x M8	77 4 x M8	88 8 x M8	95 8 x M8	101 8 x M8	110 8 x M8	134 8 x M10	137 8 x M10
Installation dimension X	520	520	520	520	535	535	550	550
Installation dimension X 1	360	360	360	360	380	380	390	390
Installation dimension X 2	130	130	139	139	146	146	159	159
Stroke	56	56	56	56	56	56	56	56
Butterfly valve square end	12	12	12	12	14	14	14	14



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