Operating Instructions

Butterfly Valve T-smart 7

Edition 24/01/2014
English

Product	Butterfly Valve T-smart 7
Document	Operating Instructions Edition 24/01/2014 English
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Wordmarks	The designation T.VIS® is a protected trademark of GEA Tuchenhagen GmbH.

Table of Contents

Notes for the Reader

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

Binding Character of These Operating Instructions

These Operating Instructions contain the manufacturer's instructions to the operator of the valve and to 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 they are accessible to the operator 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.

- Warning notes (Page 7)
- Note (Page 6)

Note

NOTICE
Further useful information.

Warning notes

DANGER

Warning: Fatal Injuries.
Failure to observe the warning will cause serious damage to health, or even death.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

WARNING

Warning: Serious 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.

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.

IMPORTANT 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.

Abbreviations and Terms

Abbreviation	Explanation
BS	British Standard
bar	Unit of measurement of pressure [bar] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
approx.	approximately
°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
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]
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

Abbreviation	Explanation
psi	Unit of measurement of pressure [psi] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
PTFE	Polytetrafluoroethylene
SET-UP	Self-learning installation During commissioning and maintenance, the SET-UP procedure carries out all the necessary settings for the generation of messages.
a/f	Indicates the size of spanners width across flats
T.VIS	Tuchenhagen Valve Information System
V AC	Volt alternating current
V DC	Volt direct current
W	Unit of measurement of power [Watt]
TIG	Welding method Tungsten inert gas welding
Inch	Unit of measurement of length in the Anglo-American language area
Inch OD	Pipe dimension acc. to British standard (BS), Outside Diameter
Inch IPS	US pipe dimension Iron Pipe Size

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.

These Operating Instructions contain 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 these 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-aider 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.

NOTICE

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 these 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	Adequate instruction and sound knowledge in the following areas: • 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 (Cont.)

Staff	Qualifications
Maintenance staff	Adequate instruction as well as sound knowledge of the design and function of the valve. Sound knowledge in the following areas: • Mechanical equipment • Electrical equipment • Pneumatic system Authorization with regard to safety engineering standards to carry out the following tasks: • Setting devices into operation • Earthing of devices • Marking of devices The relevant certificates of qualification must be submitted before work can be carried out on ATEX certified machines.

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. They 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 21).

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 unit 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 21).

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 with 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.

Residual dangers on the valve and measures (Cont.)

Danger	Cause	Measure
	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 Tuchenhagen for proper disposal.
Danger of injury	Danger presented by moving or sharp-edged parts	The operator must exercise caution and prudence. For all work: • 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: • Protective gloves • Safety shoes
Environmental damage	Operating materials with properties which are harmful to the environment	For all work: • Collect lubricants in suitable containers. • Dispose of lubricants in accordance with the pertinent regulations.

Declaration of Incorporation

Declaration of Incorporation

in accordance with the 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:	Butterfly Valve T-smart 7
Machine type:	T-smart
Relevant EC directives:	2006/42/EC
Applicable harmonized standards:	DIN EN ISO 12100

Büchen, 24/01/2014

Franz Bürmann	i.V. Peter Fahrenbach
Managing Director	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 damage 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 unit to lift or push the cleaner or to support yourself. Avoid putting the unit down with a jerk.

Storage

The valves, valve inserts 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 ≤ 0°C, it must be dried and suitable measures must be taken to protect it from damage.

NOTICE

We recommend that the valve should be stored at a temperature of ≥ 5 °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 butterfly valve is used for opening and shutting off pipe sections fully or in part. Using the valve for any other purpose is considered contrary to its designated use.

NOTICE

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.

Flow Velocity

If the flow rates are too low, solids that may be present can deposit at specific points.

If the butterfly valve is closed quickly, the resulting interruption in the flow will cause a vacuum pressure at the disk and in the butterfly valve seal area. From flow rates ≥ 3.5 m/s, the valve may only be closed at a considerably reduced speed.

Pressure Equipment Directive

The 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 Tuchenhagen GmbH will supply a special Declaration of Conformity.

ATEX Directive

If the 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 Tuchenhagen Butterfly Valves T-smart must be observed.

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

Improper Operating Conditions

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

Operating the valve 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

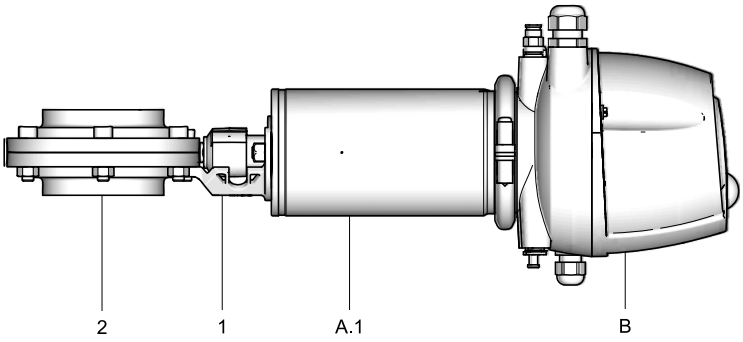
You should never make any technical modifications to the valve. Otherwise you will have to undergo a new conformity process in accordance with the EC Machinery Directive on your own.

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

Design and Function

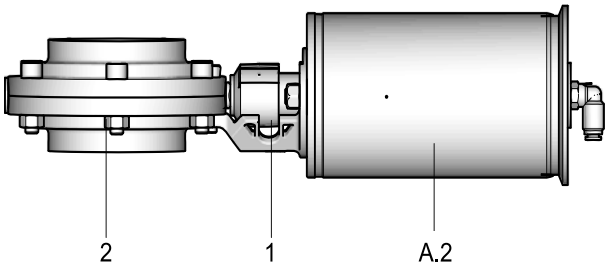
Design

Pneumatic actuator with control module



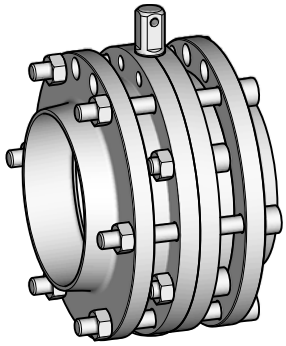
No.	Designation
A.1	Pneumatic actuator
B	T.VIS control module
1	Mounting bracket
2	Valve disk assembly

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)

Intermediate flange design – VV (788)

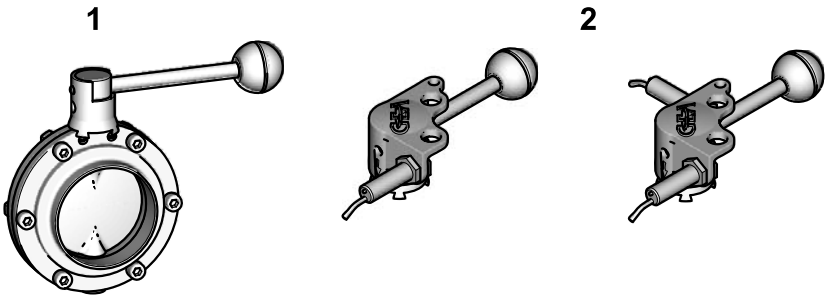


Butterfly valve design for matrix-piped systems.

Manual actuator type H

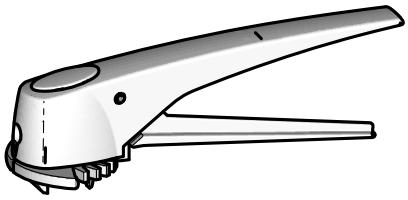
The manual actuator is available in various designs.

Standard manual actuator design



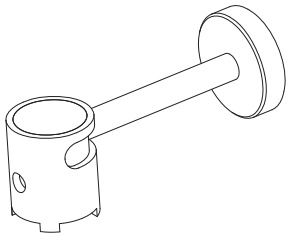
No.	Designation
1	Standard
2	Electrical feedback

Actuator with scissors handle



The actuator with scissors handle can position the valve disk at specific positions on the circumference (12x15°).

Adjustable manual actuator



The lever of the adjustable manual actuator is used to infinitely adjust the valve disk in a range between 0° and 90°.

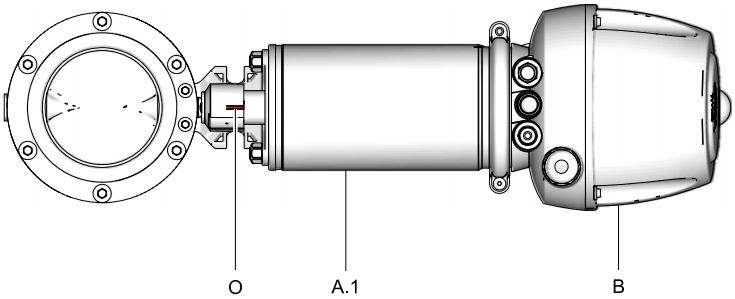
Functional Description

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 or closes, depending on the definition of the non-actuated position. When the air supply is shut off, the valve closes automatically as a result of the spring force.

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 butterfly valve.

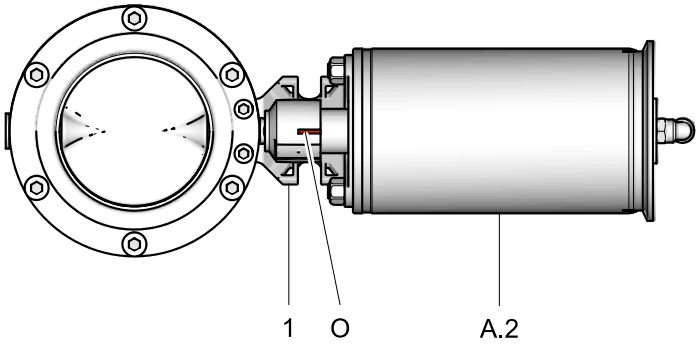
Actuator A.1



The switching state is detected and indicated by the control module (B).

The visual position indication (O) can be identified by the red marking on the switching sleeve.

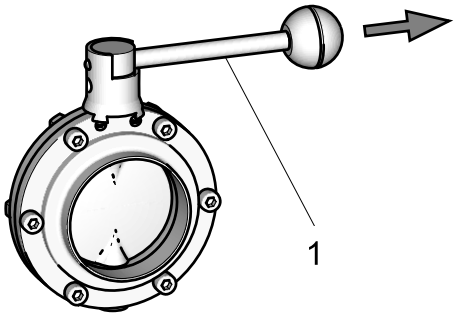
Actuator A.2



Feedback of switching states can be provided by proximity switches in the mounting bracket (1). The non-actuated position can be signalled by proximity switches fitted to the mounting bracket.

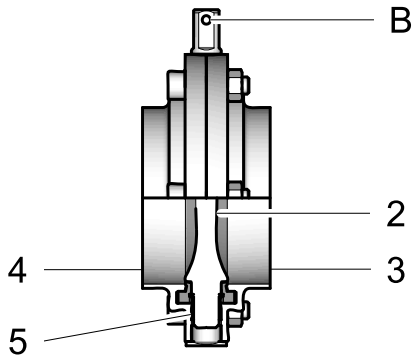
The visual position indication (O) can be identified by the red marking on the switching sleeve.

Manual actuator type H



To open or close the 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 end positions of the butterfly valve can be detected by proximity switches.

Valve disk assembly without actuator



The valve disk (2) is held between two flanges screwed together (3, 4) and is supported by a separate plain bearing (5).

The position of the disk in the pipe and hence the degree the flow path in the pipe is opened is controlled by the actuator. When the blade of the disk is parallel to the centre axis of the pipe, the butterfly valve is completely open and allows maximum flow. In the closed position, the blade of the disk shuts off the flow of the butterfly valve.

NOTICE

The hole (B) in the square and the marking on the bottom shaft indicate the position of the valve disk.

Installation and Commissioning

Notes on Installation

The butterfly valve can be installed in any position. However, care must be taken to ensure that the valve housing and the pipe system can drain properly.

To prevent damage, make sure that

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

Valve with Welding Ends

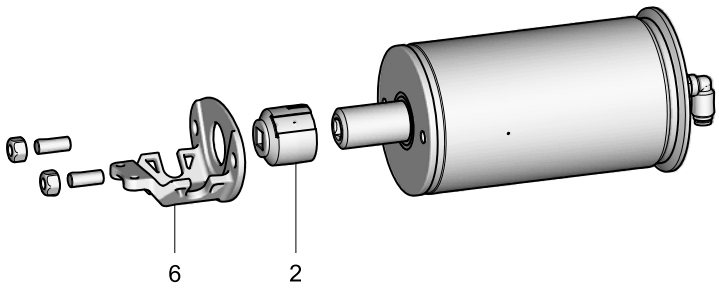
This section describes the welding procedure for the butterfly valve.

IMPORTANT NOTE

Damage caused by welding
The butterfly valve can be damaged by distortion due to welding and when the position of the grooves is altered.
➔ Only weld the butterfly valve in assembled condition without gasket and disk.
➔ To ensure that a proper weld is formed when the valve is welded into the pipe, make sure that the root side of the weld is protected against oxidation by forming gas.

Carry out the following steps:

1. Remove the actuator.
2. Cut the pipe open at the point of installation.
3. Weld the housing in position in the pipe, ensuring that the connection is free of stress and distortion. Use the TIG welding with pulse method.
4. Remove the welding beads.
5. Fit the mounting bracket (6).



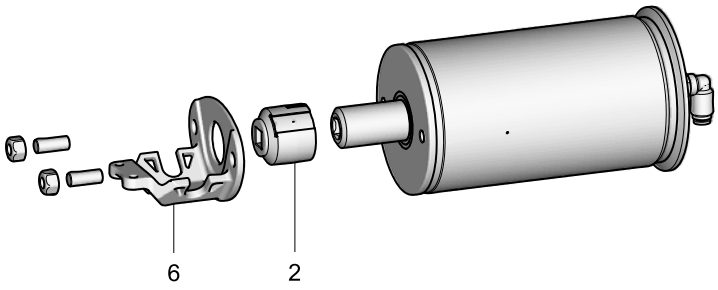
6. Fit the switching ring (2).

✓ Done.

Valve with Screw Connection

Carry out the following steps:

1. Remove the actuator.
2. Screw the body parts together with the gasket and the disk inserted.
3. Open the point of installation with connection fittings.
4. Mount the butterfly valve to the fitting welded to the pipe.
5. Fit the mounting bracket (6).



6. Fit the switching ring (2).

✓ Done.

NOTICE

Fit exhaust air/supply air flow control devices for all compressed-air operated design variants. This way you prevent pipe hammers.

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	0.325
BFV 150	114.3	0.530

Establishing Hose Connections

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.

✓ Done.

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.

✓ Done.

Actuator without control module

Carry out the following steps:

1. Remove the plug from the cylinder.
2. Screw in the air connector size G 1/8".
3. Push the air hose into the air connector.
4. Re-open the compressed air supply.

✓ Done.

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, T.VIS A-7, A-8 or T.VIS P-20.

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. Release 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.

✓ Done.

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 the inner parts of the valve. When the pipe is cleaned, the cleaning medium also flows through and cleans the valve housings.
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 operator in accordance with the relevant process.
The cleaning effect must be checked regularly by the 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 product based on formic acid at 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 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.

Rinsing Operations

The table lists the values for the duration and number of rinsing operations.

Medium	Duration (s)	Number of rinsing operations	Cleaning steps
Beer	1...2	2...3	During every cleaning phase 1. Prerinse 2. Hot caustic 3. Intermediate rinse 4. Acid 5. Rinse
Yeast	1...2	2...3	
Fruit juice	2...5	3	
Milk	2...5	3	
Yoghurt	3...5	3	

Passivation

Before commissioning a plant, passivation is commonly carried out for long pipes and tanks. Valve blocks are usually excepted from this.
Passivation is typically performed using nitric acid (HNO3) 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 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
	Switch bar loose (Caution: The switch bar may be under pressure).	Check that the switch bar is firmly in place.
	Proximity switch not connected correctly	Check and correct the wiring
	Proximity switch defective	Replace the proximity switch
Leakage at flanges	Disk seal defective	Replace the disk seal

Maintenance

Inspections

Between the maintenance periods, the 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.

✓ Done

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, A-8 or
T.VIS P-20.)

✓ Done

Mechanical Connections

Carry out the following steps:

➔ Check that all screw connections and locking devices are firmly secured.

✓ Done

Maintenance Intervals

To ensure the highest operational reliability of the 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.

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

Prior to Disassembly

Requirement

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

Carry out the following steps:

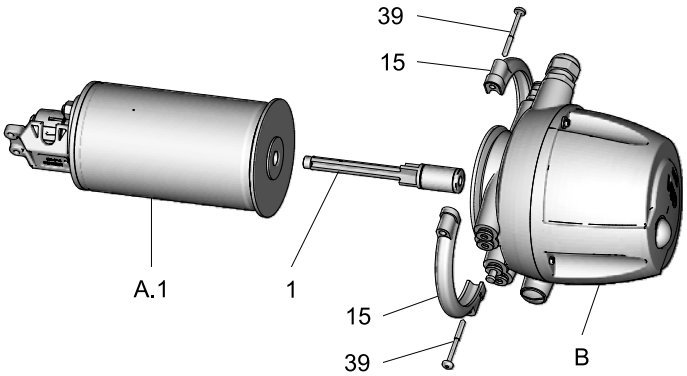
1. Drain all pipe system elements that lead to the butterfly valve and, if necessary, clean or rinse them.
2. Shut off the control air supply.
3. Disconnect the power supply.
4. Detach the pipe connection of the butterfly valve.

✓ Done

Disassembly

This section describes disassembly of various components.

Removing the T.VIS M-1 Control Module



Requirement

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

IMPORTANT NOTE

The permanent magnet on the switch bar is fragile.
Damage to the permanent magnet.
➔ Protect the permanent magnet against impact stress.

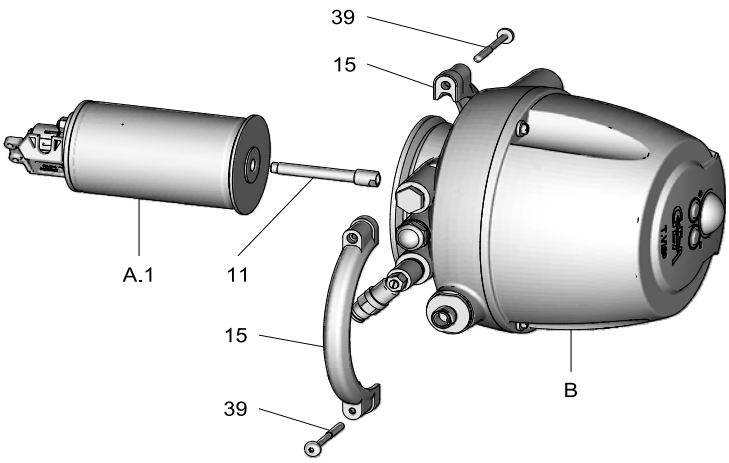
Carry out the following steps:

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 the switch bar (1).
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).

✓ Done

NOTICE
Assemble the valve in reverse order. Also refer to the operating instructions for the T.VIS M-1.

Removing the Control Module Types T.VIS P-20 and A-8



Requirement

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

IMPORTANT NOTE

The permanent magnet on the switch bar is fragile.
Damage to the permanent magnet.
➔ Protect the permanent magnet against impact stress.

IMPORTANT NOTE

The sensor is a sensitive component.
Damage of the sensor and failure of the valve.
➔ Always handle the sensor with care!

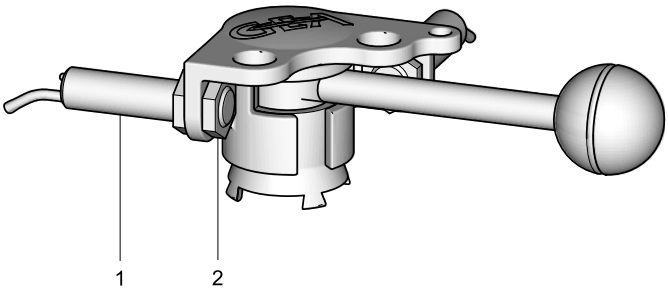
Carry out the following steps:

1. Undo the screws (39).
2. Remove the clamps (15).
3. Withdraw the control module (B) via the switch bar (1) from the actuator (A1).
4. Unscrew the switch bar (11).

✓ Done

NOTICE
Assemble in reverse order (refer to the operating instructions for T.VIS P-20).

Removing the Proximity Switch – Actuator Without T.VIS

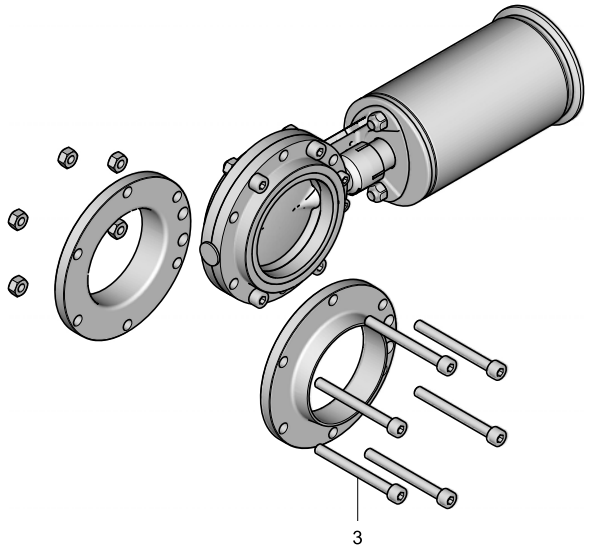


Carry out the following steps:

1. Unscrew the hex. nuts (2) on the proximity switches (1).
2. Remove the proximity switches (1).

✓ Done

Intermediate Flange Design Type VV – Removing the Valve

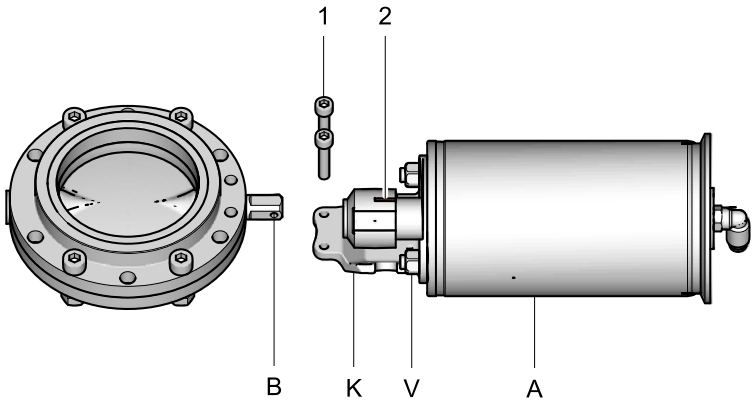


Carry out the following steps:

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

✓ Done

Detaching the Actuator



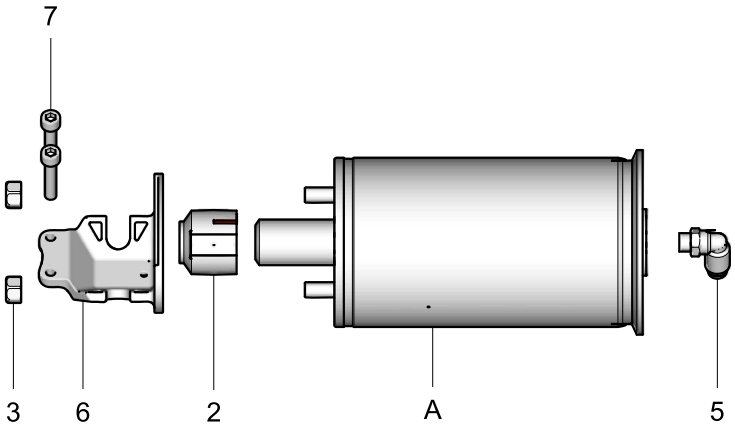
Carry out the following steps:

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

✓ Done

NOTICE
The red 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



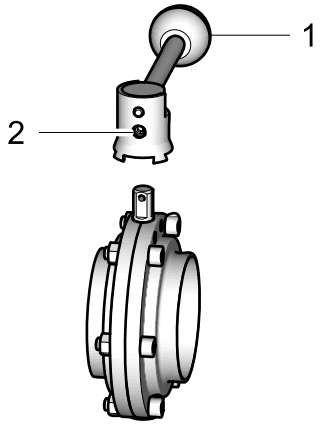
Carry out the following steps:

1. Remove the hex screws (7).
2. Take off the position indicator (2).
3. Remove the mounting bracket (6).

4. Unscrew the elbow screw-in plug connection (5).

✓ Done

Removing the Manual Actuator Type H



Carry out the following steps:

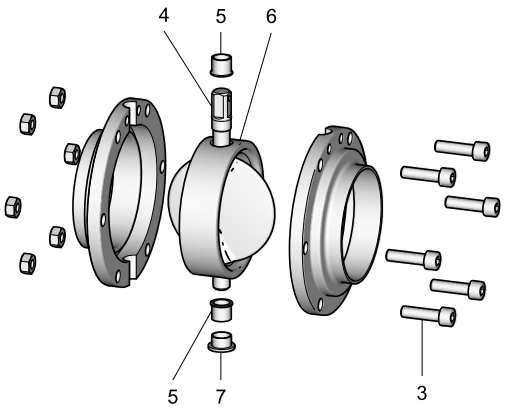
1. Use an a/f 4 hex socket screwdriver to unscrew the locking screw (2) until it is flush with the bushing.
2. Take off the hand lever (1).

✓ Done

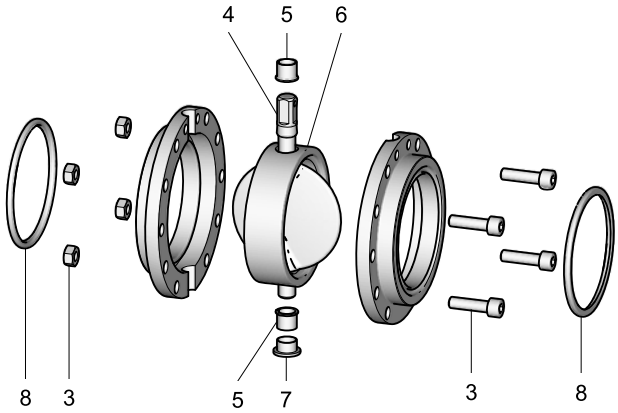
Removing the Valve Disk Gasket

The steps to be performed to remove the valve disk gasket are the same for both valve types.

Type SS



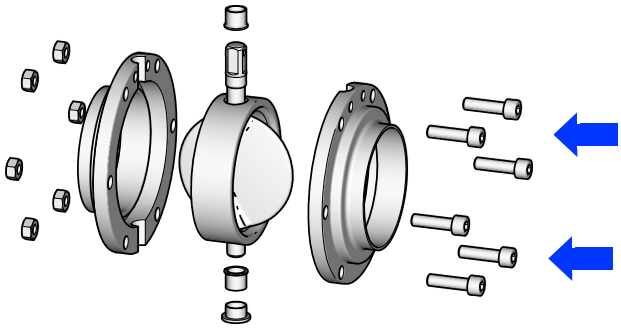
Type VV



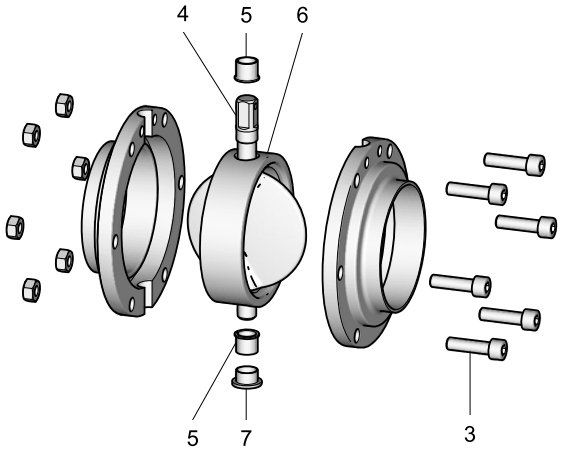
Removing the flanges

Carry out the following steps:

1. Undo the screw connections (3).



2. Pull the butterfly valve flanges apart.
3. Remove the plug (7).



➥ The plug protects the plain bearings against soiling.

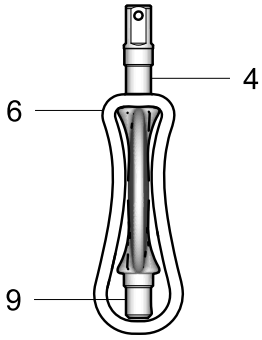
4. Take out the valve disk (4) with the gasket (6).

Done

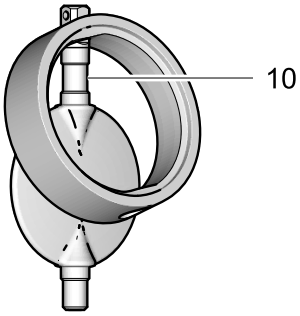
Removing the gasket

Carry out the following steps:

1. Pull off the plain bearings (5).
2. Turn the gasket (6) until it is positioned at a 90° angle to the disk (4).



3. Pull the gasket over the short end (9) of the disk.
4. Unclamp the disk.
5. Pull the gasket over the long end of the shaft (10).



6. Remove the O-ring (8).

Done

✓ This completes removal of the valve disk gasket.

Maintenance

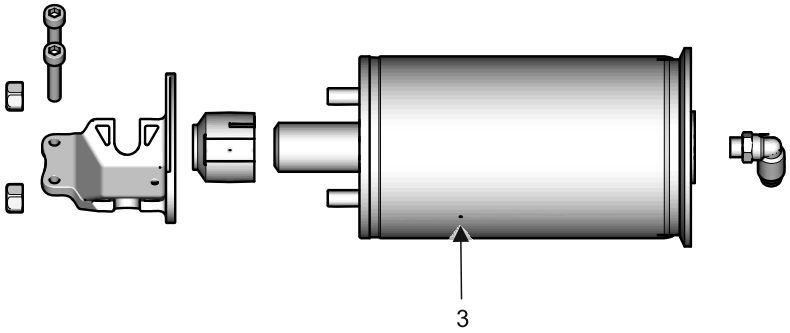
Cleaning the Butterfly Valve

IMPORTANT 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.

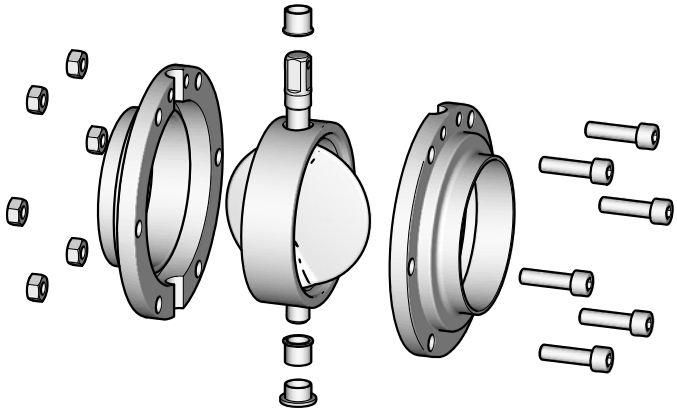
✓ Done

NOTICE

GEA Tuchenhagen 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. They do not affect the taste or the consistency of the products and are compatible with the seals in contact with product. PARALIQ GTE 703 can be ordered from GEA Tuchenhagen 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 Tuchenhagen 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 gasket.
- The plain bearings must be refitted. To fit the upper plain bearing on valves with nominal widths DN125 and DN150 put installation mandrel 229-000061 over the square end to mount the plain bearing.
- When the actuator is mounted, the disk must be in the correct position:
  For non-actuated position closed: disk closed
  For non-actuated position open: disk in 90° position.

Assembly

Carry out the following steps:

➔ Assemble the butterfly valve in reverse order.

✓ Done

Disposal

General Notes

Dispose of the machine 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 Tuchenhagen accepts unopened actuators and arranges for proper disposal free of charge.

Carry out the following steps:

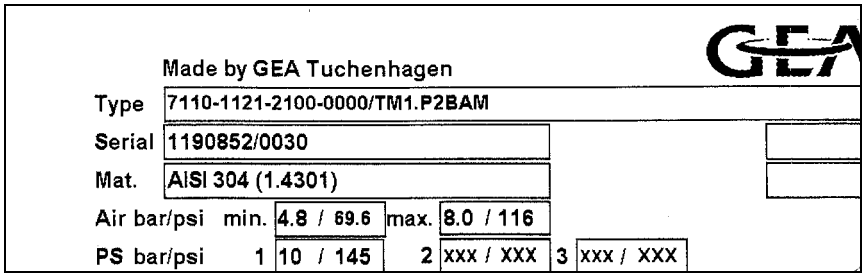
1. Remove the actuator, see “Detaching the Actuator“ (Page 43).
2. Safely pack the actuator and send it to GEA Tuchenhagen GmbH.

✓ Done

Technical Data

Type Plate

The type plate clearly identifies the valve.



Type plate of the valve

The type plate provides the following key data:

Key data of the valve

Type	Butterfly Valve T-smart 7
Serial	Serial number
Material	AISI 304/FKM
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 valve:

Technical data: Valve

Designation	Description
Size	DN 15 to DN 150 ½" to 4" OD
Material of product contact parts	Stainless steel AISI 304/316L (1.4301) 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-7	-20 to +50 °C
- Control module type T.VIS A-8, P-20	0 to +50 °C
Product temperature and operating temperature	Depending on the sealing material

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 25 to DN 125 3.5 to 6.5 l for DN 150
Product pressure	max. 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_n/stroke) dm^3_n at 1.01325 bar at 0°C as per DIN 1343
BFV 125	89.0	0.325
BFV 150	114.3	0.530

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

Pipe ends, metric

Metric DN	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to DIN 11850
15	19	1.5	16	x
20	23	1.5	20	x
25	29	1.5	26	x
40	41	1.5	38	x
50	53	1.5	50	x
65	70	2.0	66	x
80	85	2.0	81	x
100	104	2.0	100	x
125	129	2.0	125	x
150	154	2.0	150	x

Pipe ends, inch OD

Inch OD	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to BS 4825 Part 1
0.5"	12.7	1.6	9.5	x
0.75"	19.0	1.6	15.8	x
1"	25.4	1.6	22.2	x
1.5"	38.1	1.6	34.9	x
2"	50.8	1.6	47.6	x
2.5"	63.5	1.6	60.3	x
3"	76.2	1.6	73	x
4"	101.6	2	97.6	x

Tools

Tool	Part no.
Hose cutter	407-065
Open end spanner a/f 8; 9; 10; 12 to 19; 24	
Pin punch dia. 4	403-209
Belt wrench	408-142
Face pin wrench Ø 4, adjustable 80	408-197
Hex. key a/f 3; 4; 5	
Installation mandrel	229-000061

Resistance of Sealing Materials

The resistance of sealing materials depends on the type and temperature of the medium conveyed. The exposure time can adversely 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 = limited resistance
- – = no resistance

Table of resistance of seals

Medium	Temperature	Sealing material (general operation temperature)		
		EPDM -40...+135°C -40...275°F	FKM -10...+200 °C +14...+392°F	HNBR -25...+140 °C -13...+284°F
Caustics up to 3%	up to 80 °C (176°F)	+	o	+
Caustics up to 5%	up to 40 °C (104°F)	+	o	o
Caustics up to 5%	up to 80 °C (176°F)	+	–	–
Caustics at more than 5%		o	–	–
Inorganic acids up to 3%	up to 80 °C (176°F)	+	+	+
Inorganic acids up to 5%	up to 80 °C (176°F)	o	+	o
Inorganic acids up to 5%	up to 100 °C (212°F)	+	+	–
Water	up to 80 °C (176°F)	+	+	+
Steam	up to 135 °C (275°F)	+	o	o
Steam, approx. 30 min	up to 150 °C (302°F)	+	o	–
Fuels/hydrocarbons		–	+	+
Product with a fat content of max. 35%		+	+	+

Table of resistance of seals (Cont.)

Medium	Temperature	Sealing material (general operation temperature)		
		EPDM -40...+135°C -40...275°F	FKM -10...+200 °C +14...+392°F	HNBR -25...+140 °C -13...+284°F
Product with a fat content of more than 35%		–	+	+
Oils		–	+	+
* depending on the installation conditions				

Lubricants

Lubricants	Material no.
Rivolta F.L.G. MD-2	413-071
PARALIQ GTE 703	413-064

Weights

TYPE GS

Size	Butterfly valve with actuator (kg)		
	Manual actuator	Pneumatic actuator without control module	Pneumatic actuator with T.VIS control module
DN 25, 1"	1.6	5.5	6.7
DN 40, 1.5"	1.7	5.7	6.9
DN 50, 2"	2.2	6.1	7.3
DN 65, 2.5"	2.4	6.7	7.8
DN 80, 3"	3.6	7.5	8.7
DN 100, 4"	4.8	8.7	9.9
DN 125	7.4	11.4	12.5
DN 150	8.8	13.2	14.4

TYPE SS

Size	Butterfly valve with actuator (kg)		
	Manual actuator	Pneumatic actuator without control module	Pneumatic actuator with T.VIS control module
DN 15, 0.5"	1.4	5.3	6.5
DN 20, 0.75"	1.4	5.3	6.5
DN 25, 1"	1.4	5.3	6.5

TYPE SS

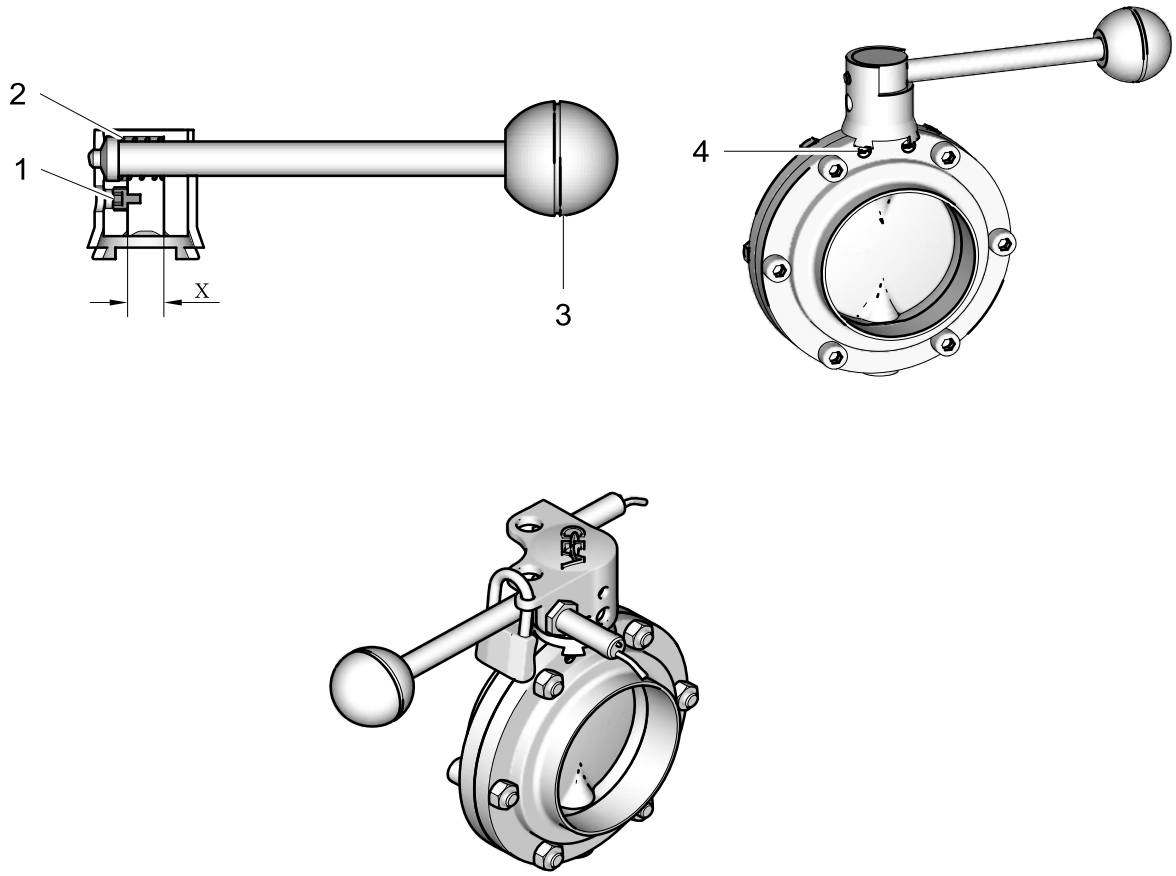
Size	Butterfly valve with actuator (kg)		
	Manual actuator	Pneumatic actuator without control module	Pneumatic actuator with T.VIS control module
DN 40, 1.5"	1.5	5.5	6.7
DN 50, 2"	1.9	5.8	7.0
DN 65, 2.5"	2.0	6.3	7.5
DN 80	3.1	7.0	8.2
3"	3.4	7.3	8.5
DN 100, 4"	4.4	8.3	9.5
DN 125	6.2	10.2	11.3
DN 150	7.0	11.4	12.6

TYPE VV

Size	Butterfly valve with actuator (kg)		
	Manual actuator	Pneumatic actuator without control module	Pneumatic actuator with T.VIS control module
DN 15, 0.5"	2.5	6.5	7.7
DN 20, 0.75"	2.5	6.5	7.7
DN 25, 1"	2.5	6.5	7.7
DN 40, 1.5"	3.0	6.9	8.1
DN 50, 2"	3.6	7.6	8.8
DN 65, 2.5"	4.6	8.6	9.7
DN 80, 3"	5.3	9.2	10.4
DN 100, 4"	7.7	11.6	12.8
DN 125	9.6	13.5	14.7
DN 150	13.0	17.0	18.2

Spare Parts Lists – Actuators

Manual Actuator for Butterfly Valve T-smart 7



Manual actuator BFV

Item	Designation	Material	Nominal width	Nominal width	Nominal width
			DN 25 - DN 65 1"OD - 2.5"OD	DN 80 / 3” OD DN 100 / 4"OD	DN 125 DN 150
			VK10	VK12	VK14
Manual actuator, complete			224-001054	224-001055	224-001056
1	Adjusting screw	1.4301	224-001052	224-000123	224-000123
2	Pressure spring	1.4310	931-324	931-304	931-304
3	Ball handle	--	941-021	941-005	941-005
4	Plug	PP	224-001220	224-001220	224-001220
X	Square end	--	10 mm	12 mm	14 mm
Proximity switch holder			224-001057	224-001058	224-001058

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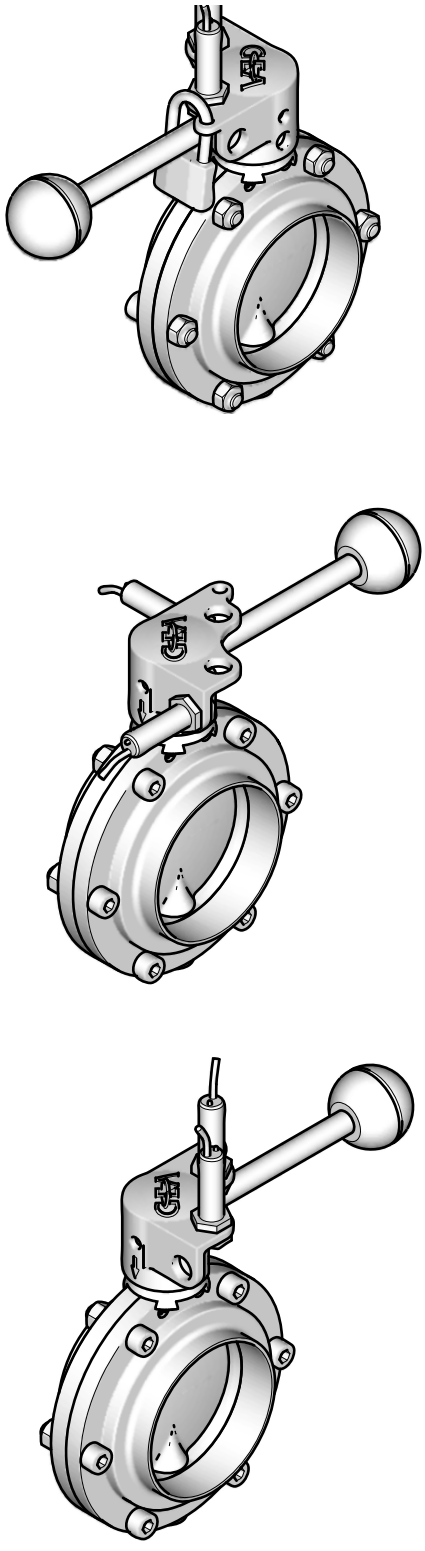
Spare Parts List

Manual Actuator for Butterfly Valve T-smart 7



Installation variants for proximity switches

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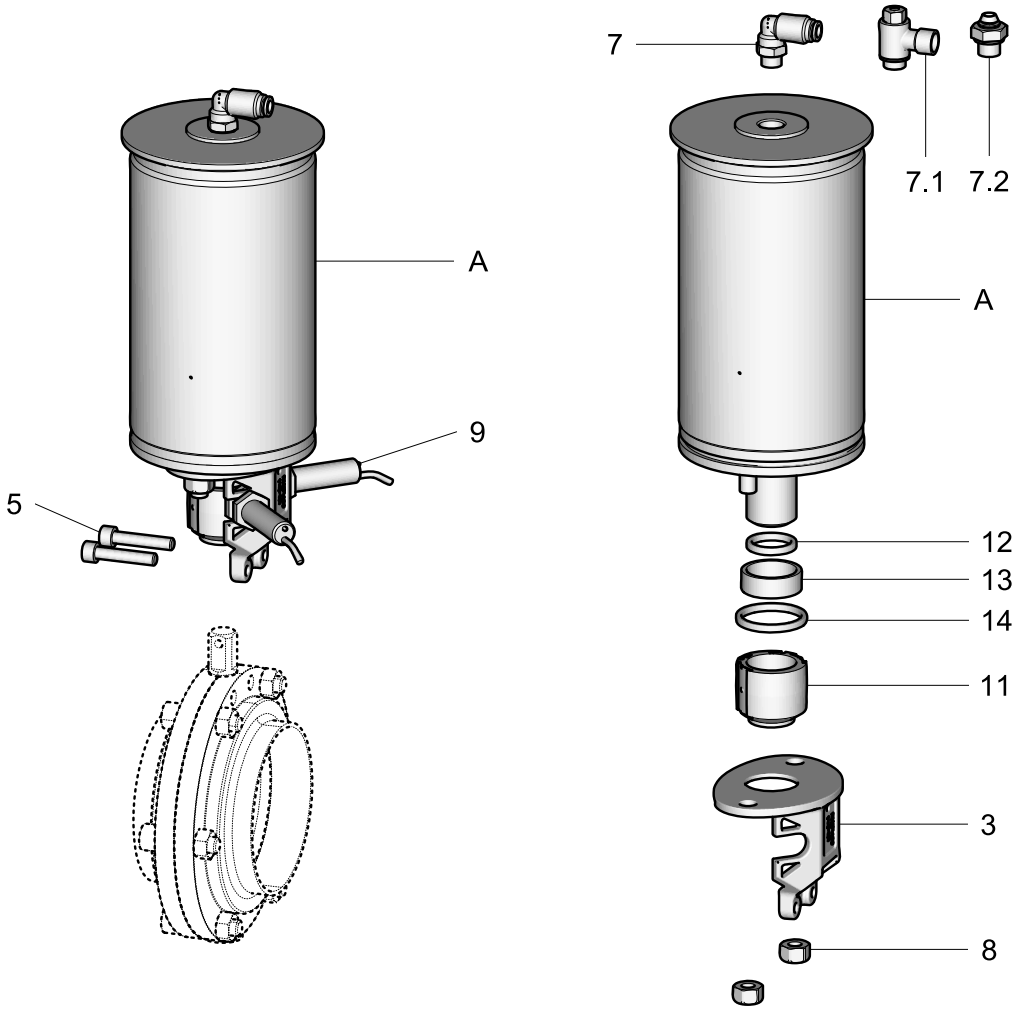
Pneumatic Actuator for Butterfly Valve T-smart 7



A contains the keys A, 10, 12 and 14
B contains the keys A, 3, 8 and 11

Item	Designation	Material	DN 25 1" OD	DN 40 1.5" OD	DN 50 2" OD	DN 65 2.5" OD
A	Actuator BFV-7 / NC/NO	--	224-000891			
A (opt.)	Actuator BFV-7 / AA	--	224-001223			
3	Mounting bracket BFV-7	1.4301	224-001042			
5	Cheese head screw	A2-70	902-099			
B	Actuator BFV-7 / NC/NO/cpl.	--	224-001503			
B	Actuator BFV-7 / AA/cpl.	--	224-001504			

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Spare Parts List

Pneumatic Actuator for Butterfly Valve T-smart 7

Item	Designation	Material	DN 25 1" OD	DN 40 1.5" OD	DN 50 2" OD	DN 65 2.5" OD
7	Elbow screw-in plug connection (1/4" - 6/4)	Brass/nickel-plated	933-034	933-034	933-034	933-034
7.2	Screw-in plug connection (1/4" - 6/4)		933-117	933-117	933-117	933-117
7	Elbow screw-in plug connection (1/4 " - 6.35/4.1)		933-972	933-972	933-972	933-972
7.2	Screw-in plug connection (1/4" - 6.35/4.1)	Brass/nickel-plated	933-118	933-118	933-118	933-118
7.1	Throttle non-return valve Exhaust air 1/4"	Brass/nickel-plated	603-048			
8	Hex nut	A2-70	910-018			
9	Proximity switch M12x1;10-65V/DC/2-wire	Synthetic	505-035 (electrical connection with terminal compartment)			
	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	Position indicator BFV-7	PP	224-001068			
12	O-ring	NBR	930-041	930-041	930-041	930-041
13	Guide ring	Turcite-T51	935-105	935-105	935-105	935-105
14	O-ring	NBR	930-903	930-903	930-903	930-903

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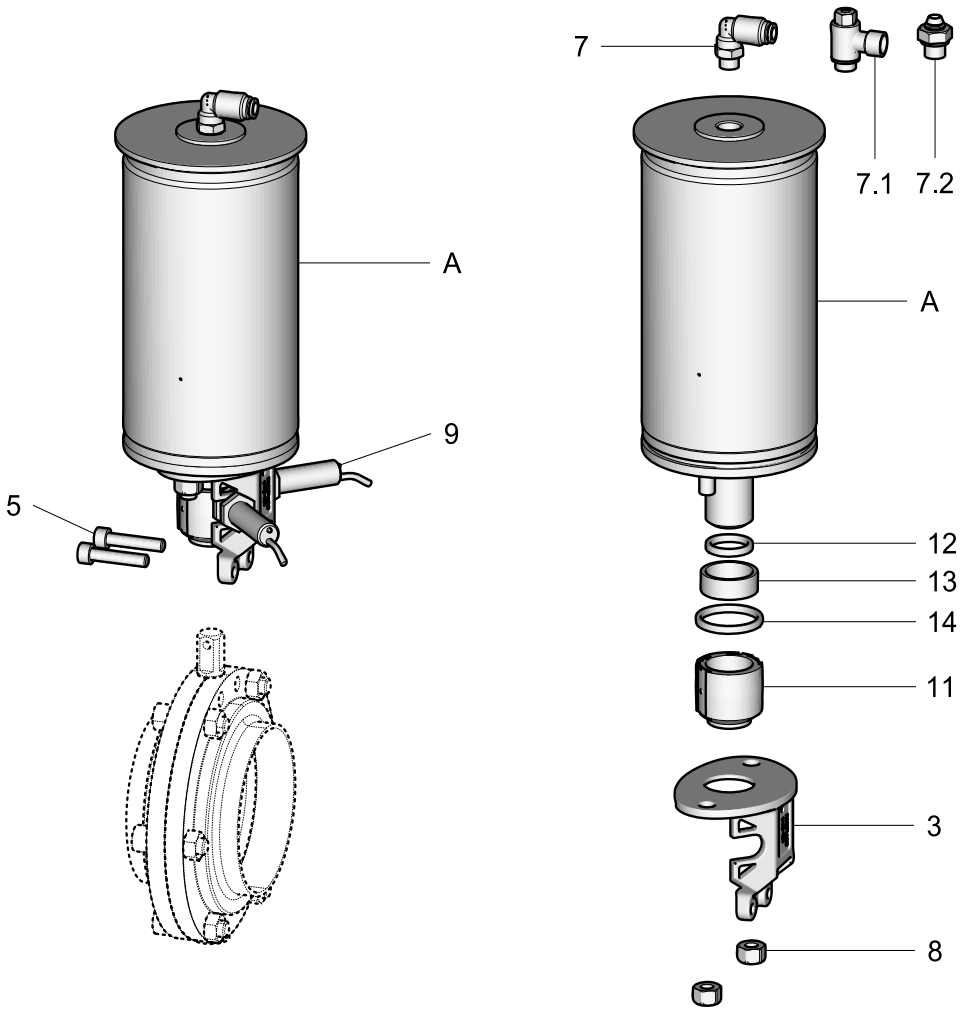
Spare Parts List

Pneumatic Actuator for Butterfly Valve T-smart 7



A contains the keys A, 10, 12 and 14
B contains the keys A, 3, 8 and 11

Item	Designation	Material	DN 80 3" OD	DN 100 4" OD	DN 125	DN 150
A	Actuator BFV-7 / NC/NO	--	224-001221		224-000895	
A (opt.)	Actuator BFV-7 / AA	--	224-001222		224-001224	
3	Mounting bracket BFV-7	1.4301	224-001042		224-001071	
5	Cheese head screw	A2-70	902-099		902-099	
B	Actuator BFV-7 / NC/NO/cpl.	--	224-001505		224-001509	
B	Actuator BFV-7 / AA/cpl.	--	224-001506		224-001508	

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Spare Parts List

Pneumatic Actuator for Butterfly Valve T-smart 7

Item	Designation	Material	DN 80 3" OD	DN 100 4" OD	DN 125	DN 150
7	Elbow screw-in plug connection (1/4" - 6/4)	Brass/nickel-plated	933-034	933-034	933-034	933-034
	Screw-in plug connection (1/4" - 6/4)		933-117	933-117	933-117	933-117
	Elbow screw-in plug connection (1/4" - 6.35/4.1)	Brass/nickel-plated	933-972	933-972	933-972	933-972
	Screw-in plug connection (1/4" - 6.35/4.1)		933-118	933-118	933-118	933-118
7.1	Throttle non-return valve Exhaust air 1/4"	Brass/nickel-plated	603-048			
8	Hex nut	A2-70	910-018			
9	Proximity switch M12x1;10-65V/DC/2-wire Proximity switch M12x1;10-30V/DC/3-wire	Synthetic 1.4301	505-035 (electrical connection with terminal compartment) 505-088 (electrical connection with terminal compartment) 505-096 (electrical connection with connector M12)			
11	Position indicator BFV-7	PP	224-001069		224-001070	
12	O-ring	NBR	930-041	930-041	930-041	930-041
13	Guide ring	Turcite-T51	935-105	935-105	935-105	935-105
14	O-ring	NBR	930-903	930-903	930-903	930-903

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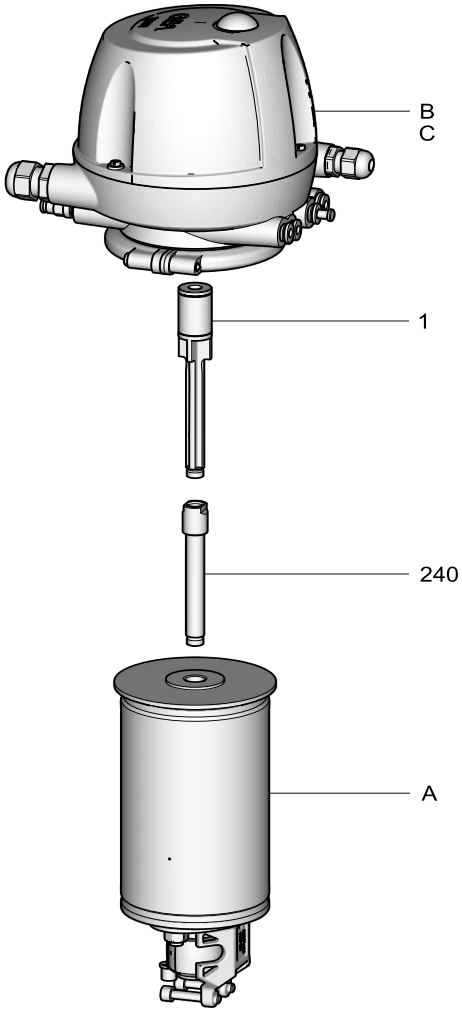
Spare Parts List

Pneumatic Actuator for Butterfly Valve T-smart 7



Pneumatic actuators for Butterfly Valves T-smart 7

		Item	Material	Designation	Part no.
			Accessories for T.VIS M-1		
B	Control module T.VIS M-1	1	1.4301	T.VIS switch bar	224-001227
			Accessories for T.VIS P-20 and A-8		
C	Control module T.VIS P-20 and A-8	240	--	Switch bar for T.VIS P-20 and A-8 incl. magnet and O-ring	224-001226
D	Control module SES				
		220		Switch bar	224-001548
				Extension	224-001549

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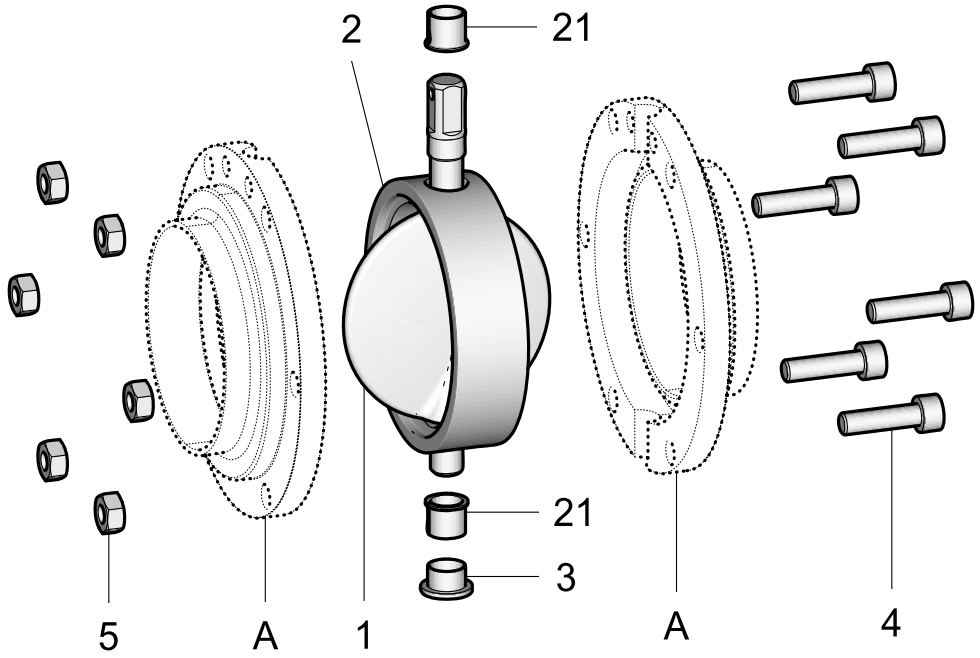
Spare Parts Lists – Butterfly Valve

Butterfly Valve T-smart 7



Butterfly Valve T-smart 7

Item	Designation	Material	DN 15	DN 20	DN 25	DN 40	DN 50
Butterfly valve T-smart SS cpl.		304 / EPDM	224-905.20	224-905.21	224-905.22	224-905.24	224-905.25
		316L / EPDM	224-905.01	224-905.02	224-905.03	224-905.05	224-905.06
Sealing set SS cpl.		EPDM	224-001332	224-001332	224-001300	224-001304	224-001308
		FKM	224-001333	224-001333	224-001301	224-001305	224-001309
		HNBR	224-001334	224-001334	224-001302	224-001306	224-001310
		VMQ	224-001335	224-001335	224-001303	224-001307	224-001311
1	Disk	304	224-001007	224-001007	224-000999	224-001000	224-001001
		316L	224-000810	224-000810	224-000802	224-000803	224-000804
2	Seal	EPDM	224-170.61	224-170.61	224-170.67	224-170.68	224-170.69
		FKM	224-170.75	224-170.75	224-170.81	224-170.82	224-170.83
		HNBR	224-170.89	224-170.89	224-170.95	224-170.96	224-170.97
		VMQ	224-173.05	224-173.05	224-173.11	224-173.12	224-173.13
3	Round plug	PE	922-338	922-338	922-338	922-338	922-338
4	Cheese head screw	A2-70	902-099	902-099	902-099	902-099	902-100

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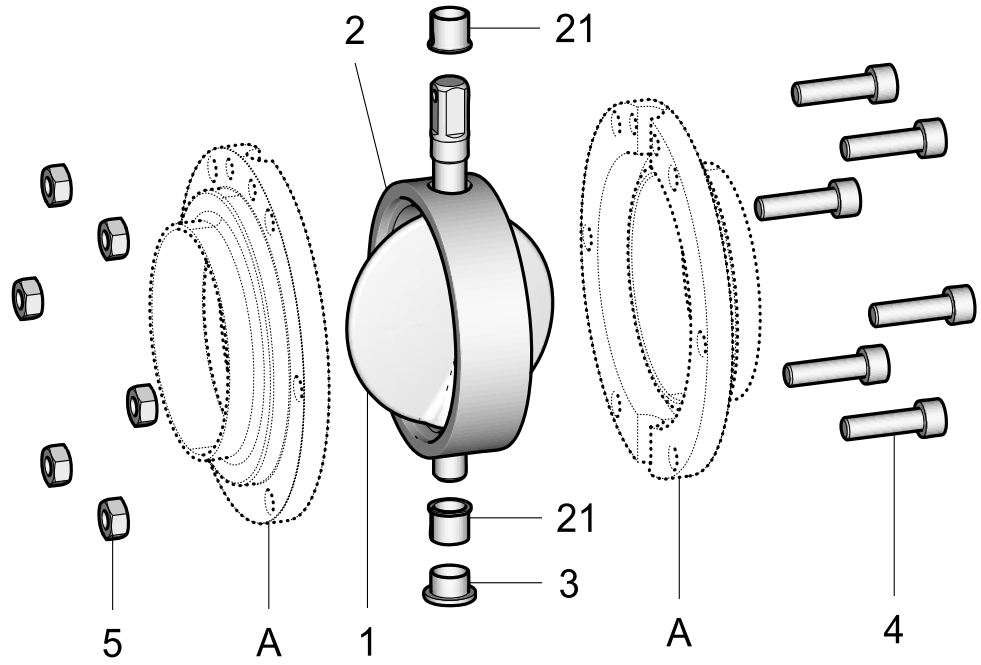
Spare Parts List

Butterfly Valve T-smart 7

Item	Designation	Material	DN 15	DN 20	DN 25	DN 40	DN 50
5	Hex nut	A2	910-013	910-013	910-013	910-013	910-018
21	Plain bearing	IGLIDUR F	704-045	704-045	704-045	704-045	704-045
A	Flange	See overview of flanges					



Butterfly Valve T-smart 7

Item	Designation	Material	DN 65	DN 80	DN 100	DN 125	DN 150
Butterfly Valve T-smart SS cpl.		304 / EPDM	224-905.26	224-905.27	224-905.28	224-905.29	224-905.30
		316L / EPDM	224-905.07	224-905.08	224-905.09	224-905.10	224-905.11
Sealing set SS cpl.		EPDM	224-001312	224-001316	224-001320	224-001324	224-001328
		FKM	224-001313	224-001317	224-001321	224-001325	224-001329
		HNBR	224-001314	224-001318	224-001322	224-001326	224-001330
		VMQ	224-001315	224-001319	224-001323	224-001327	224-001331
1	Disk	304	224-001002	224-001003	224-001004	224-001005	224-001006
		316L	224-000805	224-000806	224-000807	224-000808	224-000809
2	Seal	EPDM	224-170.70	224-170.71	224-170.72	224-170.73	224-170.74
		FKM	224-170.84	224-170.85	224-170.86	224-170.87	224-170.88
		HNBR	224-170.98	224-170.99	224-173.02	224-173.03	224-173.04
		VMQ	224-173.14	224-173.15	224-173.16	224-173.17	224-173.18
3	Round plug	PE	922-338	922-338	922-338	922-339	922-339

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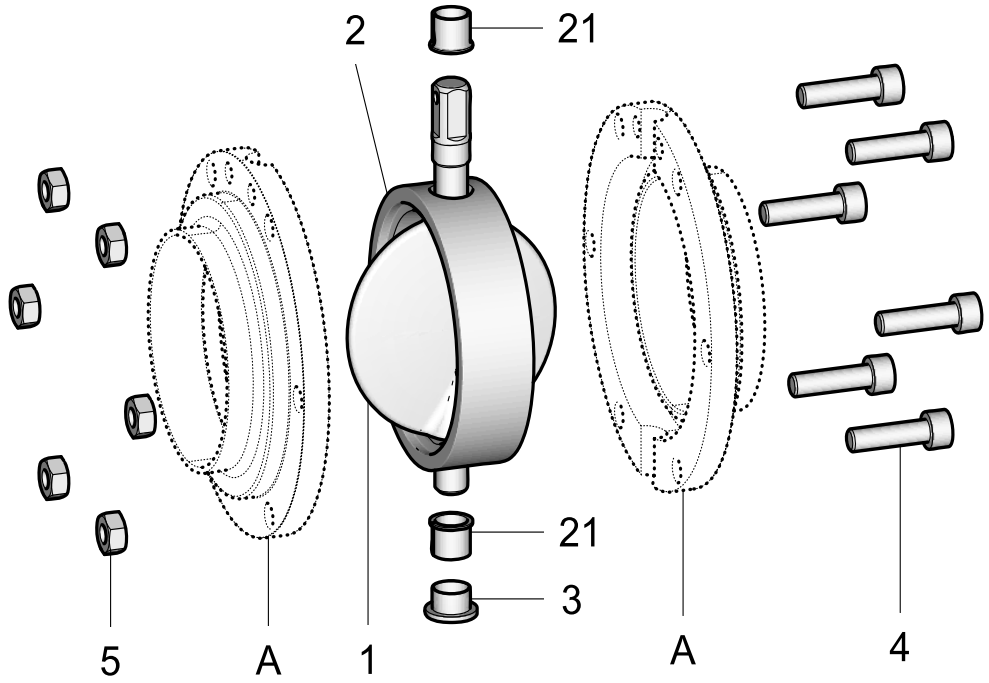
Item	Designation	Material	DN 65	DN 80	DN 100	DN 125	DN 150
4	Cheese head screw	A2-70	902-100	902-100	902-100	902-119	902-088
5	Hex nut	A2	910-018	910-018	910-018	910-026	910-029
21	Plain bearing	IGLIDUR F	704-045	704-045	704-045	704-046	704-046
A	Flange	See overview of flanges					



Butterfly Valve T-smart 7

Item	Designation	Material	0.5" OD	0.75" OD	1" OD	1.5" OD
Butterfly valve T-smart SS cpl.		304 / EPDM	224-905.31	224-905.20	224-905.33	224-905.34
		316L / EPDM	224-905.12	224-905.01	224-905.14	224-905.15
Sealing set SS cpl.		EPDM	224-001332	224-001332	224-001332	224-001336
		FKM	224-001333	224-001333	224-001333	224-001337
		HNBR	224-001334	224-001334	224-001334	224-001338
		VMQ	224-001335	224-001335	224-001335	224-001339
1	Disk	304	224-001007	224-001007	224-001007	224-001008
		316L	224-000810	224-000810	224-000810	224-000811
2	Seal	EPDM	224-170.61	224-170.61	224-170.61	224-170.62
		FKM	224-170.75	224-170.75	224-170.75	224-170.76
		HNBR	224-170.89	224-170.89	224-170.89	224-170.90
		VMQ	224-173.05	224-173.05	224-173.05	224-173.06

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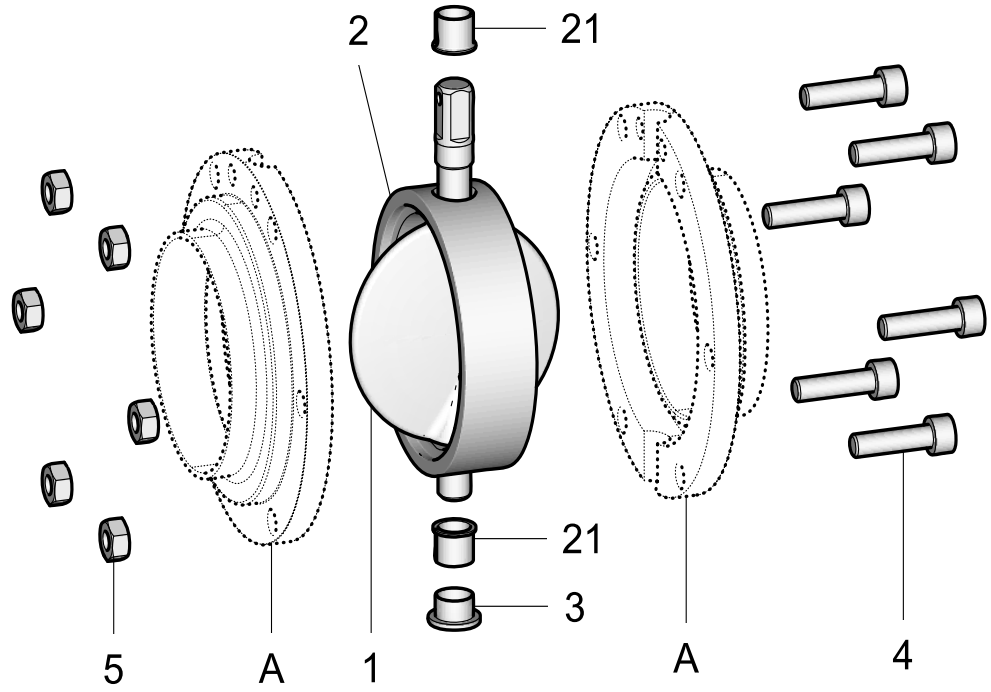
Spare Parts List

Butterfly Valve T-smart 7

Item	Designation	Material	0.5" OD	0.75" OD	1" OD	1.5" OD
3	Round plug	PE	922-338	922-338	922-338	922-338
4	Cheese head screw	A2-70	902-099	902-099	902-099	902-099
5	Hex nut	A2	910-013	910-013	910-013	910-013
21	Plain bearing	IGLIDUR F	704-045	704-045	704-045	704-045
A	Flange	See overview of flanges				



Butterfly Valve T-smart 7

Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
Butterfly valve T-smart SS cpl.		304 / EPDM	224-905.35	224-905.36	224-905.37	224-905.38
		316L / EPDM	224-905.16	224-905.17	224-905.18	224-905.19
Sealing set SS cpl.		EPDM	224-001340	224-001344	224-001348	224-001352
		FKM	224-001341	224-001345	224-001349	224-001353
		HNBR	224-001342	224-001346	224-001350	224-001354
		VMQ	224-001343	224-001347	224-001351	224-001355
1	Disk	304	224-001009	224-001010	224-001011	224-001012
		316L	224-000812	224-000813	224-000814	224-000815

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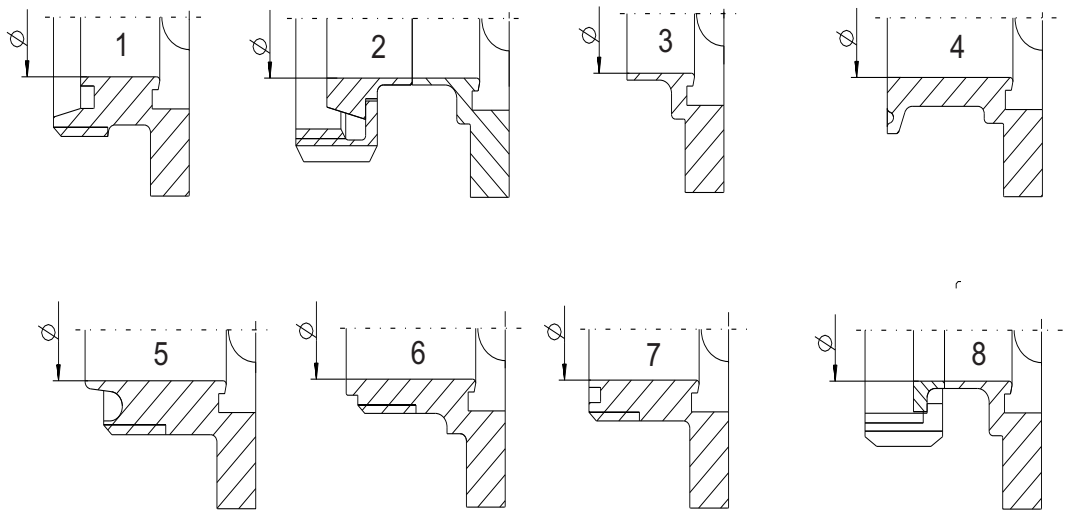
Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
2	Seal	EPDM	224-170.63	224-170.64	224-170.65	224-170.66
		FKM	224-170.77	224-170.78	224-170.79	224-170.80
		HNBR	224-170.91	224-170.92	224-170.93	224-170.94
		VMQ	224-173.07	224-173.08	224-173.09	224-173.10
3	Round plug	PE	922-338	922-338	922-338	922-338
4	Cheese head screw	A2-70	902-100	902-100	902-100	902-100
5	Hex nut	A2	910-018	910-018	910-018	910-018
21	Plain bearing	IGLIDUR F	704-045	704-045	704-045	704-045
A	Flange	See overview of flanges				



Butterfly Valve T-smart 7 – Flanges

Item	Designation	Material	DN 15	DN 20	DN 25	DN 40	DN 50
1	Threaded flange DIN	304	--	--	224-000945	224-000946	224-000947
		316L	--	--	224-000721	224-000722	224-000723
2	Cone flange DIN	304	--	--	on request		
		316L	--	--	on request		
3	Welding flange	304	224-000899	224-000900	224-000901	224-000902	224-000903
		316L	224-000705	224-000706	224-000707	224-000708	224-000709
4	Clamp flange	304	--	--	224-000933	224-000934	224-000935
		316L	--	--	224-000735	224-000736	224-000737

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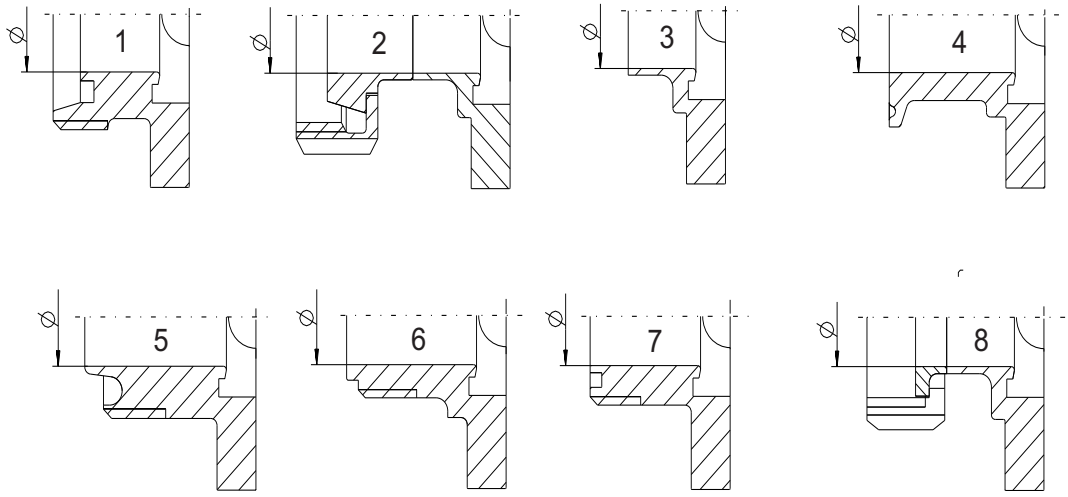
Spare Parts List

Butterfly Valve T-smart 7

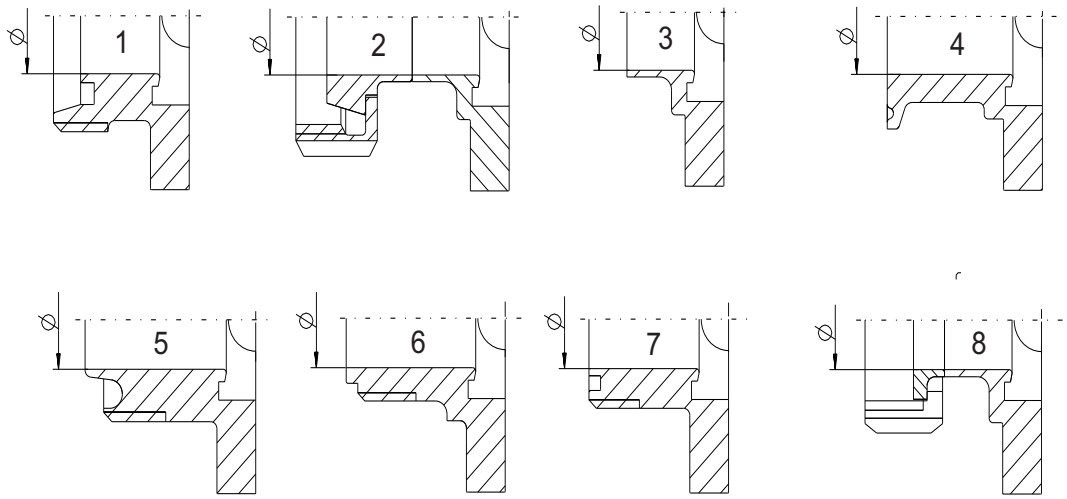
Item	Designation	Material	DN 65	DN 80	DN 100	DN 125	DN 150
1	Threaded flange DIN	304	224-000948	224-000949	224-000950	224-000951	224-000952
		316L	224-000724	224-000725	224-000726	224-000727	224-000728
2	Cone flange DIN	304	on request				
		316L	on request				
3	Welding flange	304	224-000904	224-000905	224-000906	224-000907	224-000908
		316L	224-000710	224-000711	224-000712	224-000713	224-000714
4	Clamp flange	304	224-000936	224-000937	224-000938	--	--
		316L	224-000738	224-000739	224-000740	--	--



Butterfly Valve T-smart 7 – Flanges

Item	Designation	Material	0.5" OD	0.75" OD	1" OD	1.5" OD
1	Threaded flange DIN	304	--	--	224-000978	224-000979
		316L	--	--	224-000729	224-000730
2	Cone flange DIN	304	--	--	on request	
		316L	--	--	on request	
3	Welding flange	304	224-000915	224-000899	224-000909	224-000910
		316L	224-000816	224-000705	224-000715	224-000716
4	Clamp flange	304	--	--	224-000939	224-000940
		316L	--	--	224-000741	224-000742
5	Threaded flange RJT	304	--	--	224-000965	224-000966
		316L	--	--	224-000784	224-000785
6	Threaded flange IDF	304	--	--	224-000953	224-000954
		316L	--	--	224-000790	224-000791

Item	Designation	Material	0.5" OD	0.75" OD	1" OD	1.5" OD
7.1	Threaded flange SMS	304	--	--	224-000971	224-000972
		316L	--	--	224-000777	224-000778
7.2	Threaded flange DS	304	--	--	224-000959	224-000960
		316L	--	--	224-000796	224-000797
8	Cone flange SMS	304	--	--	on request	
		316L	--	--	on request	



Butterfly Valve T-smart 7 – Flanges

Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
1	Threaded flange DIN	304	224-000980	224-000981	224-000982	224-000983
		316L	224-000731	224-000732	224-000733	224-000734
2	Cone flange DIN	304	on request			
		316L	on request			
3	Welding flange	304	224-000911	224-000912	224-000913	224-000914
		316L	224-000717	224-000718	224-000719	224-000720
4	Clamp flange	304	224-000941	224-000942	224-000943	224-000944
		316L	224-000743	224-000744	224-000745	224-000746
5	Threaded flange RJT	304	224-000967	224-000968	224-000969	224-000970
		316L	224-000786	224-000787	224-000788	224-000789
6	Threaded flange IDF	304	224-000955	224-000956	224-000957	224-000958
		316L	224-000792	224-000793	224-000794	224-000795

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Spare Parts List

Butterfly Valve T-smart 7

Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
7.1	Threaded flange SMS	304	224-000973	224-000974	224-000975	224-000976 224-000977
		316L	224-000779	224-000780	224-000781	224-000782 224-000783
7.2	Threaded flange DS	304	224-000961	224-000962	224-000963	224-000964
		316L	224-000798	224-000799	224-000800	224-000801
8	Cone flange SMS	304	on request			
		316L	on request			

Designation	Material	DN 25	DN 40	DN 50	DN 65
Butterfly Valve T-smart GS cpl.	304 / EPDM	224-907.22	224-907.24	224-907.25	224-907.26
	316L / EPDM	224-907.03	224-907.05	224-907.06	224-907.07
Butterfly Valve T-smart GG cpl.	304 / EPDM	224-909.22	224-909.24	224-909.25	224-909.26
	316L / EPDM	224-909.03	224-909.05	224-909.06	224-909.07
Butterfly Valve T-smart CC cpl.	304 / EPDM	224-911.39	224-911.40	224-911.41	224-911.42
	316L / EPDM	224-911.33	224-911.34	224-911.35	224-907.36
Butterfly Valve T-smart CS cpl.	304 / EPDM	224-911.51	224-911.52	224-911.53	224-911.54
	316L / EPDM	224-911.45	224-911.46	224-911.47	224-911.48

Designation	Material	DN 80	DN 100	DN 125	DN 150
Butterfly Valve T-smart GS cpl.	304 / EPDM	224-907.27	224-907.28	224-907.29	224-907.30
	316L / EPDM	224-907.08	224-907.09	224-907.10	224-907.11
Butterfly Valve T-smart GG cpl.	304 / EPDM	224-909.27	224-909.28	224-909.29	224-909.30
	316L / EPDM	224-909.08	224-909.09	224-909.10	224-909.11
Butterfly Valve T-smart CC cpl.	304 / EPDM	224-911.43	224-911.44	--	--
	316L / EPDM	224-911.37	224-911.38	--	--
Butterfly Valve T-smart CS cpl.	304 / EPDM	224-911.55	224-911.56	--	--
	316L / EPDM	224-911.49	224-911.50	--	--

Designation	Material	1" OD	1.5" OD	2“ OD
Butterfly Valve T-smart GS cpl.	304 / EPDM	224-907.33	224-907.34	224-907.35
	316L / EPDM	224-907.14	224-907.15	224-907.16

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Spare Parts List

Butterfly Valve T-smart 7

Designation	Material	1" OD	1.5" OD	2“ OD
Butterfly Valve T-smart GS-SMS cpl.	304 / EPDM	224-947.43	224-947.44	224-947.45
	316L / EPDM	224-947.19	224-947.20	224-947.21
Butterfly Valve T-smart GS-DS cpl.	304 / EPDM	on request		
	316L / EPDM	on request		
Butterfly Valve T-smart GG cpl.	304 / EPDM	224-909.33	224-909.34	224-909.35
	316L / EPDM	224-909.14	224-909.15	224-909.16
Butterfly Valve T-smart GG-SMS cpl.	304 / EPDM	224-949.43	224-949.44	224-949.45
	316L / EPDM	224-949.19	224-949.20	224-949.21
Butterfly Valve T-smart GG-DS cpl.	304 / EPDM	on request		
	316L / EPDM	on request		
Butterfly Valve T-smart CC cpl.	304 / EPDM	224-911.11	224-911.12	224-911.13
	316L / EPDM	224-911.03	224-911.04	224-911.05
Butterfly Valve T-smart CS cpl.	304 / EPDM	224-911.27	224-911.28	224-911.29
	316L / EPDM	224-911.19	224-911.20	224-911.21

Designation	Material	2.5" OD	3" OD	4“ OD
Butterfly Valve T-smart GS cpl.	304 / EPDM	224-907.36	224-907.37	224-907.38
	316L / EPDM	224-907.17	224-907.18	224-907.19
Butterfly Valve T-smart GS-SMS cpl.	304 / EPDM	224-947.46	224-947.47	224-947.48
	316L / EPDM	224-947.22	224-947.23	224-947.24
Butterfly Valve T-smart GS-DS cpl.	304 / EPDM	on request		
	316L / EPDM	on request		
Butterfly Valve T-smart GG cpl.	304 / EPDM	224-909.36	224-909.37	224-909.38
	316L / EPDM	224-909.17	224-909.18	224-909.19
Butterfly Valve T-smart GG-SMS cpl.	304 / EPDM	224-949.46	224-949.47	224-949.48
	316L / EPDM	224-949.22	224-949.23	224-949.24
Butterfly Valve T-smart GG-DS cpl.	304 / EPDM	on request		
	316L / EPDM	on request		
Butterfly Valve T-smart CC cpl.	304 / EPDM	224-911.14	224-911.15	224-911.16
	316L / EPDM	224-911.06	224-911.07	224-911.08
Butterfly Valve T-smart CS cpl.	304 / EPDM	224-911.30	224-911.31	224-911.32
	316L / EPDM	224-911.22	224-911.23	224-911.24

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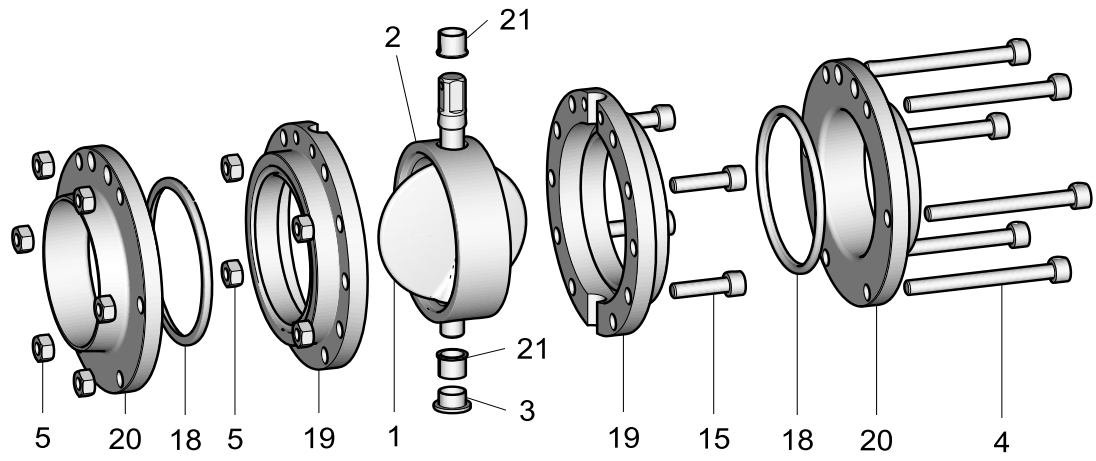
Butterfly Valve T-smart 7 / VV



Item	Designation	Material	DN 15	DN 20	DN 25	DN 40
Butterfly Valve T-smart / VV cpl.		304 / EPDM	224-906.20	224-906.21	224-906.22	224-906.24
		316L / EPDM	224-906.01	224-906.02	224-906.03	224-906.05
Sealing set VV cpl.		EPDM	224-001388	224-001388	224-001356	224-001360
		FKM	224-001389	224-001389	224-001357	224-001361
		HNBR	224-001390	224-001390	224-001358	224-001362
		VMQ	224-001391	224-001391	224-001359	224-001363
1	Butterfly valve disk	304	224-001007	224-001007	224-000999	224-001000
		316L	224-000810	224-000810	224-000802	224-000803
2	Butterfly valve seal	EPDM	224-170.61	224-170.61	224-170.67	224-170.68
		FKM	224-170.75	224-170.75	224-170.81	224-170.82
		HNBR	224-170.89	224-170.89	224-170.95	224-170.96
		VMQ	224-173.05	224-173.05	224-173.11	224-173.12
3	Round plug	PE	922-338	922-338	922-338	922-338
4	Cheese head screw	A2-70	902-127	902-127	902-127	902-127
5	Hex nut	A2	910-013	910-013	910-013	910-013
15	Cheese head screw	A2-70	902-099	902-099	902-099	902-099
18	O-ring	EPDM	930-376	930-376	930-393	930-545
		FKM	930-593	930-593	930-564	930-566
		HNBR	930-851	930-851	930-551	930-552
19	Flange V, int.	304	224-000992	224-000992	224-000984	224-000985
		316L	224-000755	224-000755	224-000747	224-000748
20	Flange V, ext.	304	224-000931	224-000932	224-000916	224-000917
		316L	224-000818	224-000819	224-000762	224-000764
21	Plain bearing	IGLIDUR F	704-045	704-045	704-045	704-045

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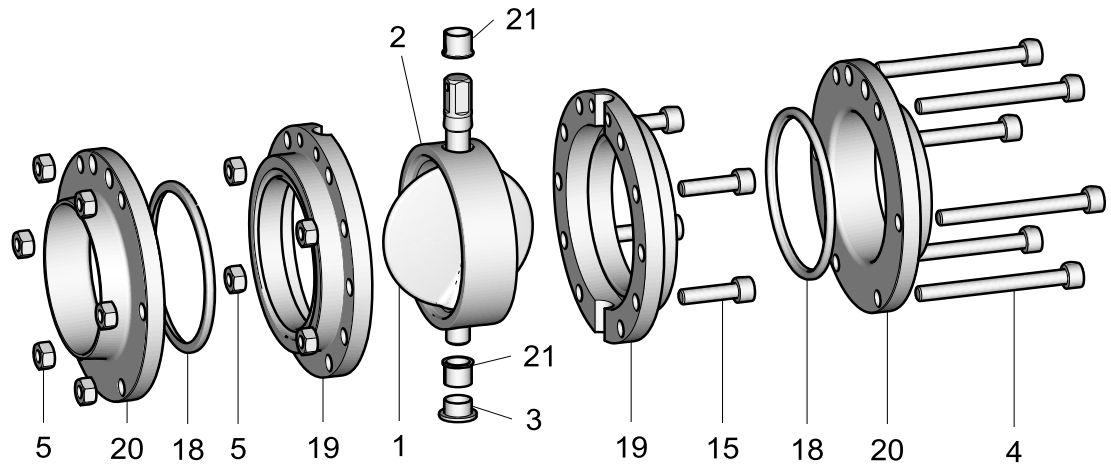
Spare Parts List

Butterfly Valve T-smart 7 / VV



Item	Designation	Material	DN 50	DN 65	DN 80
Butterfly Valve T-smart / VV cpl.		304 / EPDM	224-906.25	224-906.26	224-906.27
		316L / EPDM	224-906.06	224-906.07	224-906.08
Sealing set VV cpl.		EPDM	224-001364	224-001368	224-001372
		FKM	224-001365	224-001369	224-001373
		HNBR	224-001366	224-001370	224-001374
		VMQ	224-001367	224-001371	224-001375
1	Butterfly valve disk	304	224-001001	224-001002	224-001003
		316L	224-000804	224-000805	224-000806
2	Butterfly valve seal	EPDM	224-170.69	224-170.70	224-170.71
		FKM	224-170.83	224-170.84	224-170.85
		HNBR	224-170.97	224-170.98	224-170.99
		VMQ	224-173.13	224-173.14	224-173.15
3	Round plug	PE	922-338	922-338	922-338
4	Cheese head screw	A2-70	902-128	902-128	902-128
5	Hex nut	A2	910-018	910-018	910-018
15	Cheese head screw	A2-70	902-100	902-100	902-100
18	O-ring	EPDM	930-546	930-547	930-450
		FKM	930-567	930-526	930-527
		HNBR	930-553	930-554	930-555
19	Flange V, int.	304	224-000986	224-000987	224-000988
		316L	224-000749	224-000750	224-000751
20	Flange V, ext.	304	224-000918	224-000919	224-000920
		316L	224-000765	224-000766	224-000767
21	Plain bearing	IGLIDUR F	704-045	704-045	704-045

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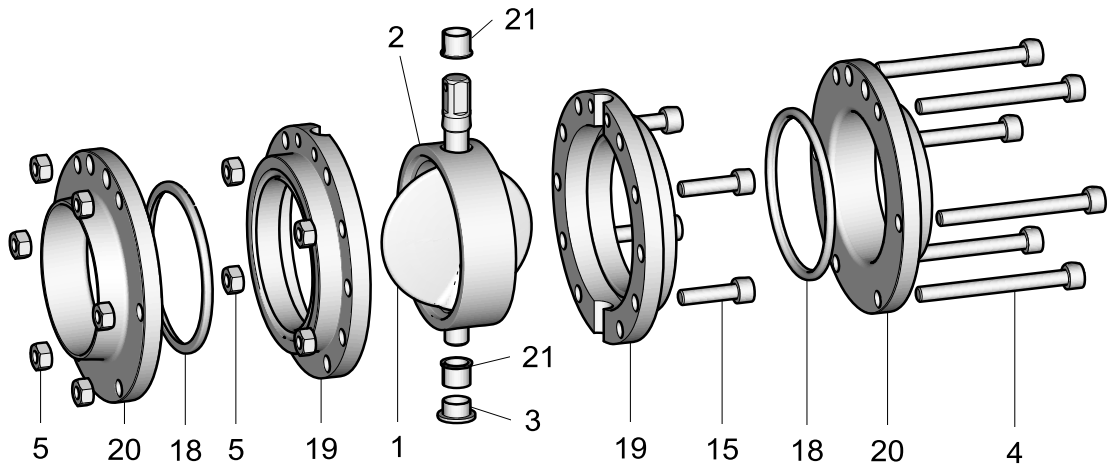
Butterfly Valve T-smart 7 / VV



Item	Designation	Material	DN 100	DN 125	DN 150
Butterfly Valve T-smart / VV cpl.		304 / EPDM	224-906.28	224-906.29	224-906.30
		316L / EPDM	224-906.09	224-906.10	224-906.11
Sealing set VV cpl.		EPDM	224-001376	224-001380	224-001384
		FKM	224-001377	224-001381	224-001385
		HNBR	224-001378	224-001382	224-001386
		VMQ	224-001379	224-001383	224-001387
1	Butterfly valve disk	304	224-001004	224-001005	224-001006
		316L	224-000807	224-000808	224-000809
2	Butterfly valve seal	EPDM	224-170.72	224-170.73	224-170.74
		FKM	224-170.86	224-170.87	224-170.88
		HNBR	224-173.02	224-173.03	224-173.04
		VMQ	224-173.16	224-173.17	224-173.18
3	Round plug	PE	922-338	922-339	922-339
4	Cheese head screw	A2-70	902-128	902-133	902-132
5	Hex nut	A2	910-018	910-026	910-029
15	Cheese head screw	A2-70	902-100	902-118	902-134
18	O-ring	EPDM	930-549	930-550	930-574
		FKM	930-568	930-559	930-575
		HNBR	930-556	930-557	930-872
19	Flange V, int.	304	224-000989	224-000990	224-000991
		316L	224-000752	224-000753	224-000754
20	Flange V, ext.	304	224-000921	224-000922	224-000923
		316L	224-000768	224-000769	224-000770
21	Plain bearing	IGLIDUR F	704-045	704-046	704-046

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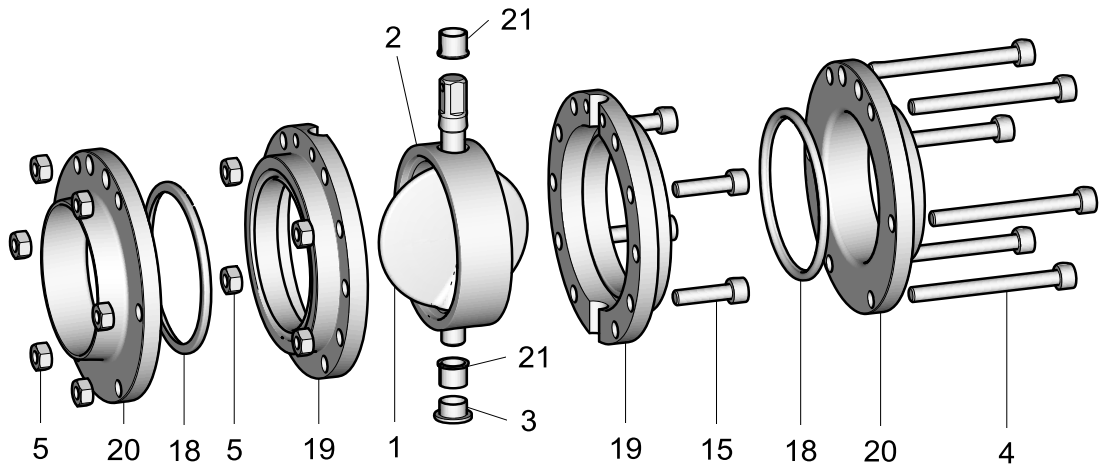
Butterfly Valve T-smart 7 / VV



Item	Designation	Material	0.5" OD	0.75" OD	1" OD	1.5" OD
Butterfly Valve T-smart / VV cpl.		304 / EPDM	224-906.31	224-906.20	224-906.33	224-906.34
		316L / EPDM	224-906.12	224-906.01	224-906.14	224-906.15
Sealing set VV cpl.		EPDM	224-001388	224-001388	224-001388	224-001392
		FKM	224-001389	224-001389	224-001389	224-001393
		HNBR	224-001390	224-001390	224-001390	224-001394
		VMQ	224-001391	224-001391	224-001391	224-001395
1	Butterfly valve disk	304	224-001007	224-001007	224-001007	224-001008
		316L	224-000810	224-000810	224-000810	224-000811
2	Butterfly valve seal	EPDM	224-170.61	224-170.61	224-170.61	224-170.62
		FKM	224-170.75	224-170.75	224-170.75	224-170.76
		HNBR	224-170.89	224-170.89	224-170.89	224-170.90
		VMQ	224-173.05	224-173.05	224-173.05	224-173.06
3	Round plug	PE	922-338	922-338	922-338	922-338
4	Cheese head screw	A2-70	902-127	902-127	902-127	902-127
5	Hex nut	A2	910-013	910-013	910-013	910-013
15	Cheese head screw	A2-70	902-099	902-099	902-099	902-099
18	O-ring	EPDM	930-376	930-376	930-376	930-497
		FKM	930-593	930-593	930-593	930-570
		HNBR	930-851	930-851	930-851	930-852
19	Flange V, int.	304	224-000992	224-000992	224-000992	224-000993
		316L	224-000755	224-000755	224-000755	224-000756
20	Flange V, ext.	304	224-000930	224-000931	224-000924	224-000925
		316L	224-000817	224-000818	224-000771	224-000772
21	Plain bearing	IGLIDUR F	704-045	704-045	704-045	704-045

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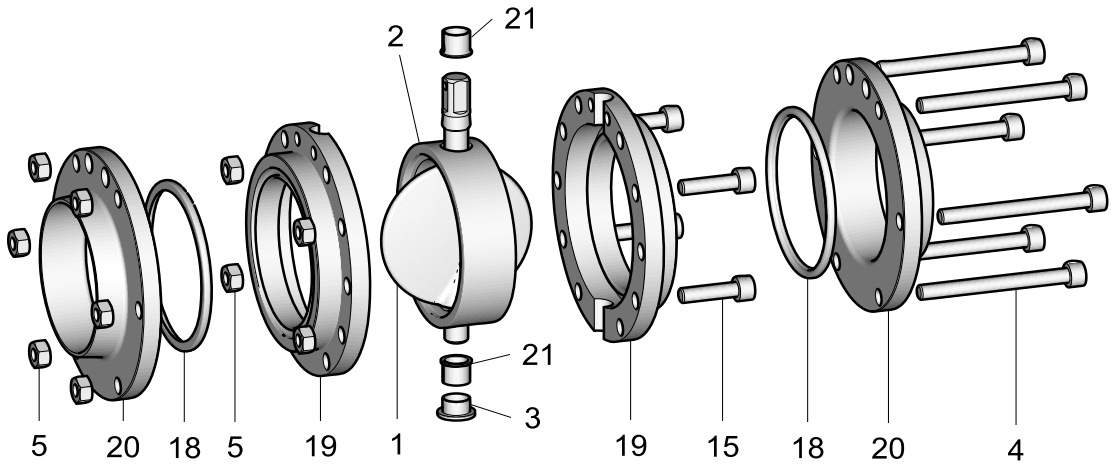
Spare Parts List

Butterfly Valve T-smart 7 / VV



Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
Butterfly Valve T-smart / VV cpl.		304 / EPDM	224-906.35	224-906.36	224-906.37	224-906.38
		316L / EPDM	224-906.16	224-906.17	224-906.18	224-906.19
Sealing set VV cpl.		EPDM	224-001396	224-001400	224-001404	224-001408
		FKM	224-001397	224-001401	224-001405	224-001409
		HNBR	224-001398	224-001402	224-001406	224-001410
		VMQ	224-001399	224-001403	224-001407	224-001411
1	Butterfly valve disk	304	224-001009	224-001010	224-001011	224-001012
		316L	224-000812	224-000813	224-000814	224-000815
2	Butterfly valve seal	EPDM	224-170.63	224-170.64	224-170.65	224-170.66
		FKM	224-170.77	224-170.78	224-170.79	224-170.80
		HNBR	224-170.91	224-170.92	224-170.93	224-170.94
		VMQ	224-173.07	224-173.08	224-173.09	224-173.10
3	Round plug	PE	922-338	922-338	922-338	922-338
4	Cheese head screw	A2-70	902-128	902-128	902-128	902-128
5	Hex nut	A2	910-018	910-018	910-018	910-018
15	Cheese head screw	A2-70	902-100	902-100	902-100	902-100
18	O-ring	EPDM	930-559	930-560	930-319	930-561
		FKM	930-571	930-572	930-666	930-573
		HNBR	930-853	930-854	930-652	930-855
19	Flange V, int.	304	224-000994	224-000995	224-000996	224-000997
		316L	224-000758	224-000759	224-000760	224-000761
20	Flange V, ext.	304	224-000926	224-000927	224-000928	224-000929
		316L	224-000773	224-000774	224-000775	224-000776
21	Plain bearing	IGLIDUR F	704-045	704-045	704-045	704-045

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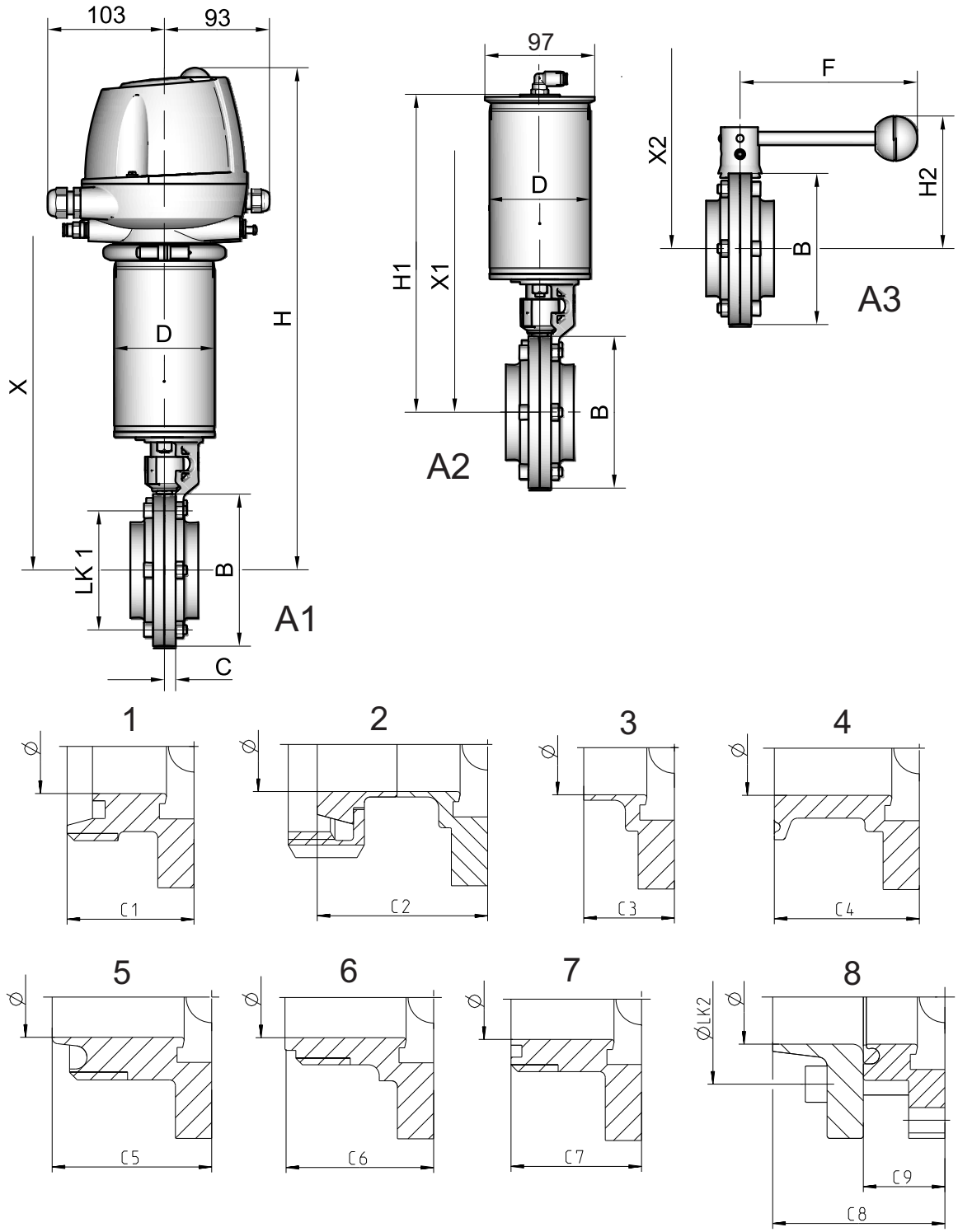
Dimension Sheets

Dimension Sheet Butterfly Valve T-smart 7



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Spare Parts List

Dimension Sheet Butterfly Valve T-smart 7

Item	Designation	Dimension	DN 15 0.5" OD	DN 20 0.75" OD	DN 25 1" OD	DN 40 1.5" OD	DN 50 2" OD
A1	Pneumatic actuator with T.VIS control module, installation dimension X	B / DN B / OD	78 78	78 78	78 78	87 94	103 101
		C	10	10	10	10	10
		D / actuator ∅	88.9	88.9	88.9	88.9	88.9
		H / DN H / OD	415 415	415 415	415 415	418.5 420	427 428
		LK 1 DN LK 1 OD Screws	68 68 4 x M6	68 68 4 x M6	68 68 4 x M6	77 74 4 x M6	90 88 4 x M8
		X / DN X / OD	435 435	435 435	435 435	438.5 440	447 448
A2	Pneumatic actuator without control module, installation dimension X1	B / DN B / OD	78 78	78 78	78 78	87 94	103 101
		D / actuator ∅	88.9	88.9	88.9	88.9	88.9
		H1 / DN H1 / OD	253 253	253 253	253 253	256.5 258	265 266
		X 1 / DN X 1 / OD	273 273	273 273	273 273	276.5 278	285 286
A3	Manual actuator, installation dimension X2	B / DN B / OD	78 78	78 78	78 78	87 94	103 101
		F	116	116	116	116	116
		H2 / DN H2 / OD	83 83	83 83	83 83	86.5 88	95 96
		X 2 / DN X 2 / OD	103 103	103 103	103 103	106.5 108	115 116
1	Threaded flange DIN 11852	C1 DIN	--	--	35	35	35
		C1 / OD	--	--	47	47	48
	Threaded flange	C1 DS / OD	--	--	38	38	40
2	Cone flange DIN 11851	C2 DIN	--	--	47	51	53
3	Welding flange	C3 DIN	25	25	25	25	25
		C3 “OD	25	25	25	25	25
4	Clamp flange	C4 DIN	--	--	40	30	30
		C4 “OD	--	--	40	30	30
5	Threaded flange RJT	C5 “OD	--	--	44	44	44
6	Threaded flange IDF	C6 “OD	--	--	41	41	41
7	Threaded flange SMS	C7 “OD	--	--	36	41	41
	Threaded flange DS	C7 “OD	--	--	38	38	40

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Item	Designation	Dimension	DN 15 0.5" OD	DN 20 0.75" OD	DN 25 1" OD	DN 40 1.5" OD	DN 50 2" OD
8	Intermediate flange design	C8 DIN	47.5	47.5	47.5	47.5	47.5
		C8 “OD	47.5	47.5	47.5	47.5	47.5
		C9 DIN	22.5	22.5	22.5	22.5	22.5
		C9 “OD	22.5	22.5	22.5	22.5	22.5
		∅ LK 2/DN	68	68	68	74	88
		∅ LK 2/OD	68	68	68	77	90
		Screws	4 x M6	4 x M6	4 x M6	4 x M	4 x M8
		Switch bar stroke	56	56	56	56	56
		Butterfly valve square end	10	10	10	10	10

Item	Designation	Dimension	DN 65 2.5" OD	DN 80 3" OD	DN 100 4" OD	DN 125	DN 150
A1	Pneumatic actuator with T.VIS control module, installation dimension X	B / DN B / OD	120 116	135 128	155 160	191 --	219 --
		C	10	10	10	13	14
		D / actuator ∅	88.9	88.9	88.9	114.3	114.3
		H / DN H / OD	434.5 436.5	440.5 444	456.5 454	472 --	486 --
		LK 1 DN	107	122	147	175	200
		LK 1 OD	103	115	142	--	--
		Screws	6 x M8	6x M8	6x M8	6x M10	8x M12
		X / DN X / OD	454.5 456.5	460.5 464	476.5 474	492 --	506 --
A2	Pneumatic actuator without control module, installation dimension X1	B / DN B / OD	120 116	135 128	155 160	191 --	219 --
		D / actuator ∅	88.9	88.9	88.9	114.3	114.3
		H1 / DN H1 / OD	272.5 274.5	278.5 282	294.5 292	310 --	324 --
		X 1 / DN X 1 / OD	292.5 294.5	298.5 302	314.5 312	330 --	344 --
A3	Manual actuator, installation dimension X2	B / DN B / OD	120 116	135 128	155 160	191 --	219 --
		F	116	160	160	220	220
		H2 / DN H2 / OD	103 105	114.5 118	128 130.5	146 --	-- --

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Spare Parts List

Dimension Sheet Butterfly Valve T-smart 7

Item	Designation	Dimension	DN 65 2.5" OD	DN 80 3" OD	DN 100 4" OD	DN 125	DN 150
		X 2 / DN X 2 / OD	123 125	134.5 138	148 150.5	166 --	180 --
1	Threaded flange DIN 11852	C1 DIN	38	43	43	55	80
		C1 / OD	50	55	60	--	--
2	Cone flange DIN 11851	C2 DIN	57	67	74	69	77
3	Welding flange	C3 DIN	25	30	30	35	40
		C3 “OD	25	30	30	--	--
4	Clamp flange	C4 DIN	30	30	30	68	68
		C4 “OD	30	30	30	--	--
5	Threaded flange RJT	C5 “OD	44	44	44	--	--
6	Threaded flange IDF	C6 “OD	41	41	41	--	--
7	Threaded flange SMS	C7 “OD	45	45	51/56	--	--
	Threaded flange DS	C7 “OD	40	41	42	--	--
8	Intermediate flange design	C8 DIN	47.5	47.5	47.5	55.0	60.0
		C8 “OD	47.5	47.5	47.5	--	--
		C9 DIN	22.5	22.5	22.5	30.0	30.0
		C9 “OD	22.5	22.5	22.5	--	--
		∅ LK 2/DN	103	115	147	175	200
		∅ LK 2/OD	107	122	142	--	--
		Screws	8 x M8	8x M8	8x M10	8x M10	8x M12
		Stroke	56	56	56	56	56
		Butterfly valve square end	10	12	12	14	14

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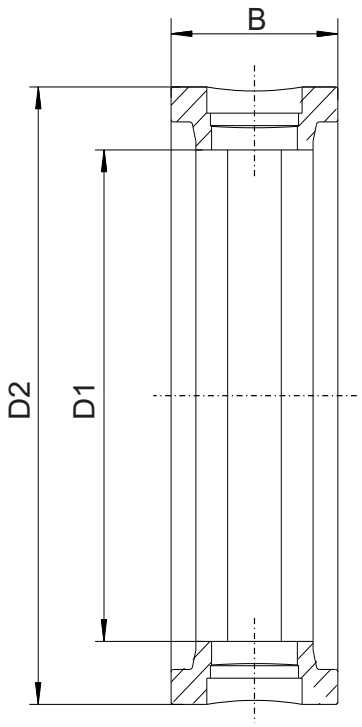
Dimension Sheet Butterfly Valve T-smart 7 – Seals



Dimensional drawing BFV-7 seals

Dimension table

Nominal width	Material	Material	D1	D2	B
DN 15	EPDM FKM HNBR VMQ	224-170.61 224-170.75 224-170.89 224-173.05	22.2	36.0	20.5
DN 20	EPDM FKM HNBR VMQ	224-170.61 224-170.75 224-170.89 224-173.05	22.2	36.0	20.5
DN 25	EPDM FKM HNBR VMQ	224-170.67 224-170.81 224-170.95 224-173.11	26.0	40.0	20.5
DN 40	EPDM FKM HNBR VMQ	224-170.68 224-170.82 224-170.96 224-173.12	38.0	53.0	21.5
DN 50	EPDM FKM HNBR VMQ	224-170.69 224-170.83 224-170.97 224-173.13	50	66	22.5

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Spare Parts List

Dimension Sheet Butterfly Valve T-smart 7 – Seals

Dimension table (Cont.)

Nominal width	Material	Material	D1	D2	B
DN 65	EPDM FKM HNBR VMQ	224-170.70 224-170.84 224-170.98 224-173.14	66.0	83.2	25.0
DN 80	EPDM FKM HNBR VMQ	224-170.71 224-170.85 224-170.99 224-173.15	81.0	99.0	28.0
DN 100	EPDM FKM HNBR VMQ	224-170.72 224-170.86 224-173.02 224-173.16	100.0	120.0	30.0
DN 125	EPDM FKM HNBR VMQ	224-170.73 224-170.87 224-173.03 224-173.17	125.0	147.0	33.0
DN 150	EPDM FKM HNBR VMQ	224-170.74 224-170.88 224-173.04 224-173.18	150.0	172.0	35.0
0.5" OD	EPDM FKM HNBR VMQ	224-170.61 224-170.75 224-170.89 224-173.05	22.2	36.0	20.5
0.75" OD	EPDM FKM HNBR VMQ	224-170.61 224-170.75 224-170.89 224-173.05	22.2	36.0	20.5
1" OD	EPDM FKM HNBR VMQ	224-170.61 224-170.75 224-170.89 224-173.05	22.2	36.0	20.5
1.5" OD	EPDM FKM HNBR VMQ	224-170.62 224-170.76 224-170.90 224-173.06	34.9	49.7	21.5
2" OD	EPDM FKM HNBR VMQ	224-170.63 224-170.77 224-170.91 224-173.07	47.6	63	22.5

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Spare Parts List

Dimension Sheet Butterfly Valve T-smart 7 – Seals

Dimension table (Cont.)

Nominal width	Material	Material	D1	D2	B
2.5" OD	EPDM FKM HNBR VMQ	224-170.64 224-170.78 224-170.92 224-173.08	60.3	77.0	25.0
3" OD	EPDM FKM HNBR VMQ	224-170.65 224-170.79 224-170.93 224-173.09	73.0	90.0	27.5
4" OD	EPDM FKM HNBR VMQ	224-170.66 224-170.80 224-170.94 224-173.10	97.6	117.6	30.0

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