



## Operating Instructions

### **VARIVENT® Control Valve Type P**

Edition 2017-07-09  
English

<b>Product</b>	Control Valve Type P
<b>Document</b>	Operating Instructions Edition 2017-07-09 English
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# Table of Contents

Notes for the Reader .....	5
Binding Character of These Operating Instructions .....	5
Notes on the Illustrations .....	5
Symbols and Highlighting .....	6
Abbreviations and Terms .....	7
<b>Safety .....</b>	<b>10</b>
Safety Note .....	10
Operator's Duties .....	10
Qualification of Staff .....	11
Supplementary Regulations .....	12
Instructions for the Safe Operation .....	13
• General Principles .....	13
• Installation .....	13
• Commissioning/Setup Mode .....	14
• Setting into Operation .....	14
• Operation .....	14
• Shutting Down .....	15
• Maintenance and Repair .....	15
• Disassembly .....	16
• Environmental Protection .....	16
• Electrical Equipment .....	16
Signage .....	17
Residual Risk .....	18
• Hazard Areas .....	18
• Residual Dangers .....	19
Declaration of Conformity .....	20
<b>Transport and Storage .....</b>	<b>21</b>
Scope of Supply .....	21
Transport .....	21
Storage .....	22
<b>Intended Purpose .....</b>	<b>23</b>
Designated Use .....	23
Requirements for the Operation .....	23
Pressure Equipment Directive .....	23
ATEX Directive .....	23
Improper Operating Conditions .....	24
Conversion Work .....	24
<b>Design and Function .....</b>	<b>25</b>
Design .....	25
Function .....	26
• Control Valve Type P - P_F / P_J .....	26
• Control Valve Type P - Divert Valves W / X .....	27
<b>Installation and Commissioning .....</b>	<b>28</b>
Notes on Installation .....	28
Control Top .....	28

Valve with Detachable Pipe Connection Elements .....	28
Valve with Welding Ends .....	29
Pneumatic Connections .....	30
• Air Requirement .....	30
• Establishing Hose Connections .....	31
Electrical Connections .....	31
Setting into Operation .....	32
<b>Cleaning and Passivation .....</b>	<b>33</b>
Cleaning .....	33
• Cleaning Process Examples .....	33
• Cleaning Effect .....	34
Passivation .....	34
<b>Malfunctions .....</b>	<b>35</b>
<b>Maintenance .....</b>	<b>36</b>
Inspections .....	36
• Product Contact Seals .....	36
• Pneumatic Connections .....	36
• Electrical Connections .....	36
Maintenance Intervals .....	37
Prior to Disassembly .....	37
Disassembly .....	38
• Disassembling Control Valve Type P - P_F / P_J and 3-Stage Seat K .....	38
• Control Valve Type P - Disassembling Divert Valve W .....	44
• Control Valve Type P - Disassembling Divert Valve X .....	49
Maintenance .....	54
• Cleaning the Valve .....	54
• Replacing Seals .....	55
• Lubricating Seals and Threads .....	57
Installation .....	58
• Seat Rings .....	58
• Spacer Nut .....	59
• Torques for the Clamps and Clamp Connections .....	59
• Checking the Function .....	60
Disposal .....	61
• General Notes .....	61
• Valve Actuator Disposal .....	61
<b>Technical Data .....</b>	<b>62</b>
Type Plate .....	62
Technical Data .....	63
Resistance of Sealing Materials .....	65
Pipe Ends .....	66
Tools .....	67
Lubricants .....	67
Weights .....	67
<b>Spare Parts Lists .....</b>	<b>68</b>
<b>Dimension Sheets .....</b>	<b>123</b>

## Notes for the Reader

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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.



**DANGER**

**Warning: Fatal Injuries.**

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

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



**WARNING**

**Warning: Serious Injuries.**

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

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



**CAUTION**

**Warning: Injuries.**

Failure to observe the warning 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.

Failure to observe the warning can result in serious damage to the valve or in the vicinity of the valve.

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

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

1. First step in a sequence of operations.
  2. Second step in a sequence of operations.  
→ Result of the previous operation.
- ✓ The operation is complete, the goal has been achieved.

### NOTE

Further useful information.

## 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 [bar <sub>g</sub> /psi <sub>g</sub> ] unless explicitly specified otherwise.
approx.	approximately
°C	Unit of measurement of temperature [degree Celsius]
dm <sup>3</sup> <sub>n</sub>	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]

Abbreviation	Explanation
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]
Kv value	Flow coefficient [ $\text{m}^3/\text{s}$ ] $1 \text{ KV} = 0.86 \times \text{Cv}$
l	Unit of measurement of volume [litre]
max.	maximum
mm	Unit of measurement of length [millimetre]
$\mu\text{m}$	Unit of measurement of length [micrometre]
M	Metric
Nm	Unit of measurement of work [newton metre] UNIT OF TORQUE 1 Nm = 0.737 lbf Pound-Force (lb) + Feet (ft)
PA	Polyamide
PE-LD	Low-density polyethylene
PTFE	Polytetrafluoroethylene
psi	British and American unit of measurement [Pound force per square inch] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
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

Abbreviation	Explanation
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.

---

**NOTE**

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

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## 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	<p>Adequate instruction and sound knowledge in the following areas:</p> <ul style="list-style-type: none"> <li>• Function of the valve</li> <li>• Valve operating sequences</li> <li>• What to do in case of an emergency</li> <li>• Lines of authority and responsibilities with respect to the task</li> </ul>
Maintenance staff	<p>Adequate instruction as well as sound knowledge of the design and function of the valve.</p> <p>Sound knowledge in the following areas:</p> <ul style="list-style-type: none"> <li>• Mechanical equipment</li> <li>• Electrical equipment</li> <li>• Pneumatic system</li> </ul> <p>Authorization with regard to safety engineering standards to carry out the following tasks:</p> <ul style="list-style-type: none"> <li>• Setting devices into operation</li> <li>• Earthing of devices</li> <li>• Marking of devices</li> </ul> <p>The relevant certificates of qualification must be submitted before work can be carried out on ATEX certified machines.</p>

## Supplementary Regulations

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

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

## Instructions for the Safe Operation

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

### General Principles

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

- The Operating Instructions must be kept ready to hand at the valve's place of use. 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 22).

## 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 22).

## 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.

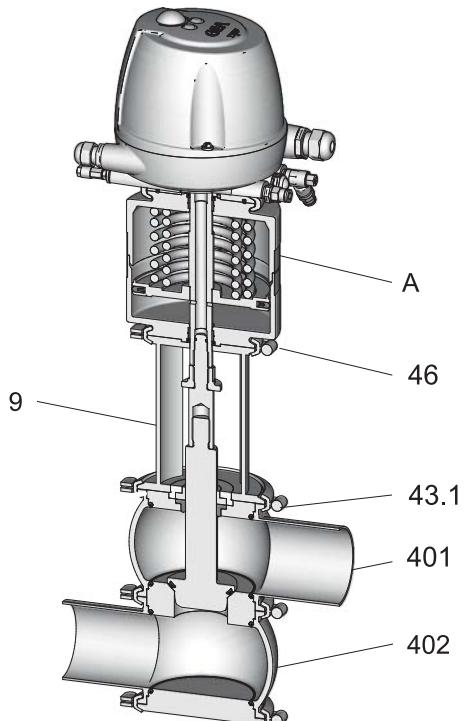
The signs and notes on the valve must always be legible. Any illegible signs must be replaced immediately.

**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.
- Never reach into the lantern (9) or the valve housing (401/402) when the valve is switching. Fingers can be crushed or cut off.
- On a spring-closing valve there is danger of injury when the clamp connections (43.1/46) are opened, as the released spring pretension will suddenly lift the actuator. Therefore, release the spring tension before detaching the clamp connection (43.1) by supplying the actuator (A) with compressed air.
- 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.
- The housing sockets have very sharp edges. When transporting and assembling the valve be sure to wear suitable protective gloves.

## Residual Dangers

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

Residual dangers on the valve and measures

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

## Declaration of Conformity

### Declaration of Conformity

in accordance with the EC Machinery Directive 2006/42/EC

We hereby declare that the machine designated below, based on its design and type as well as in the version brought to market by us, complies with the basic safety and health protection requirements of the EC Machinery Directive.

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

Designation of the machine: Valve with actuator

Machine type: VARIVENT®

Relevant EC directives: 2006/42/EC

Applicable harmonized standards: DIN EN ISO 12100

Authorized representative for the compilation of documentation

the technical documentation

Authorized representative for CE documentation

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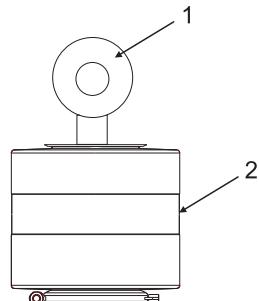
# Transport and Storage

## 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:

- When transporting the valve be sure to unscrew the control top and the switch bar from the actuator (2) and use the screwed-in eye bolt (1), material no. 221-104.98, to lift the valve.
- 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 loading and unloading. The outside synthetic materials are susceptible to breaking.
- 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 unit 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  $\leq 0^{\circ}\text{C}$ , it must be dried and suitable measures be taken to protect it from damage.

---

**NOTE**

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

---

# Intended Purpose

## Designated Use

The control valve is used to control flow rates and pressures in automated process plants.

The medium should preferably flow in the opening direction of the valve disk to avoid pipe hammers when the valve is opened or closed.

### NOTE

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

## Requirements for the Operation

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

## Pressure Equipment Directive

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

## ATEX Directive

If the control 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 ATEX operating instructions for VARIVENT valves must be observed. For details regarding the marking of valves for potentially explosive areas also refer to the additional ATEX operating instructions for VARIVENT valves.

If used in explosion-proof areas, the regulations laid down in the European standards DIN EN 60079-0 and DIN EN 60079-11 must be observed.

## 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.

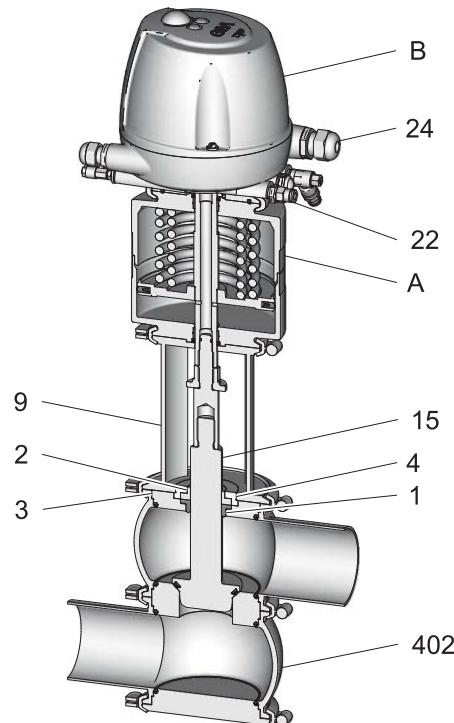
## Conversion Work

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



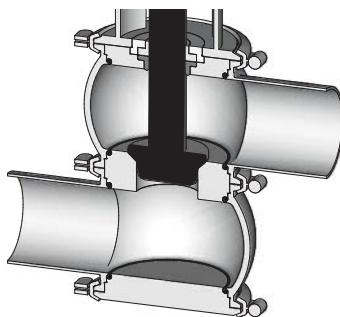
No.	Designation
A	Actuator
B	Control top type T.VIS P-15
1	Sealing ring
2	Bearing
3	Sealing disk
4	Bearing disk
9	Lantern
15	Valve disk
22	Air connection
24	Electrical connection
402	Valve housing

## Function

### Control Valve Type P - P\_F / P\_J

#### Closing Direction

Closing direction: from top to bottom  
Standard: spring-to-close

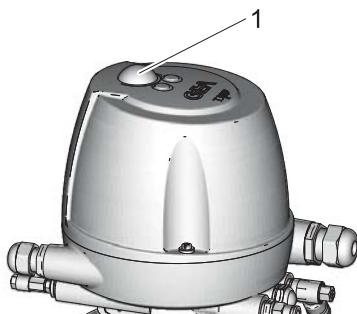


#### Distinguishing features of spring-to-close actuator (Z)

The valve is closed in the non-actuated position.

Identification:

- Green steady light (1): valve in non-actuated position
- Yellow steady light (1): valve in end position (actuated position)



#### Distinguishing feature of spring-to-open actuator (A)

The valve is open in the non-actuated position.

Identification on the T.VIS control top once the installation (SET-UP) has been completed:

- Green steady light (1): valve in non-actuated position
- Yellow steady light (1): valve in end position (actuated position)

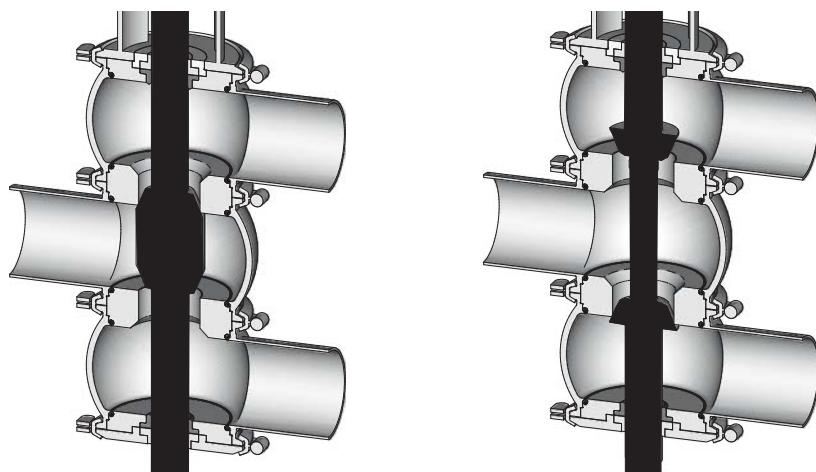
#### NOTE

For further information regarding the control top please refer to the Operating Instructions "Control Top T.VIS P-15".

## Control Valve Type P - Divert Valves W / X

### Closing Direction

Closing direction: from the bottom to the top  
Standard: spring-to-close



### Distinguishing features of spring-to-close actuator (Z)

The valve is closed in the non-actuated position.

Identification:

- Green steady light (1): valve in non-actuated position
- Yellow steady light (1): valve in end position (actuated position)



### Distinguishing feature of spring-to-open actuator (A)

The valve is open in the non-actuated position.

Identification on the T.VIS control top once the installation (SET-UP) has been completed:

- Green steady light (1): valve in non-actuated position
- Yellow steady light (1): valve in end position (actuated position)

# Installation and Commissioning

## Notes on Installation

The valve can be installed in any position. Care must be taken to ensure that the valve housing and the pipe system can drain properly. If the valve is installed in the horizontal position, pay attention that the vent hole in the actuator is aligned horizontally on one side.

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.
- If the valve is installed horizontally, the stress on the valve stem seals is higher than in the vertical installation position. Therefore, support the actuator and regularly check the valve for leakage.

## Control Top

If external valves are connected in a control top with several solenoid valves, make sure that the control air pressure in the main actuator does not fall below the operating pressure.

## Valve with Detachable Pipe Connection Elements

This section describes the procedure to fit the valve.



### CAUTION

#### Liquids in pipes

Danger of injury due to liquid spraying out

- ➔ Therefore, before releasing any pipe connections or clamp connections: drain the pipe and, if necessary, clean or rinse it.
- ➔ Separate the pipe section in which the valve is to be fitted from the rest of the piping system to prevent product entering again.

Carry out the following steps:

- ➔ Fit valves with detachable pipe connection elements – using suitable connection fittings – directly into the pipe system.

- ✓ Done

## Valve with Welding Ends

This section describes the welding procedure for the valve.



### WARNING

#### Spring tension in the valve

Danger of injury when opening the clamp connections on the actuator or on the housing as the released spring pretension will suddenly lift the actuator.

- Therefore, release the spring tension before detaching the clamp connections by pressurizing the actuator with compressed air at max. 8 bar.

### IMPORTANT NOTE

#### Seals are wearing parts

Old seals will cause malfunction of the valve

- When fitting the valve be sure to fit new housing O-rings.

Carry out the following steps:

1. Release the spring tension.
2. Remove the valve insert, see chapter "Disassembling Control Valve Type P - P\_F / P\_J and 3-Stage Seat K" (page 38).
3. Weld the housing, without sealing rings, into position, ensuring that the connection is free of stress.
4. Fit the housing into place and tack it.
5. Always close the housing before welding.
6. Flush the housing with forming gas from the inside to push the oxygen out of the system.
7. Weld the housing into the pipe system; use welding filler if necessary. Use the TIG welding with pulse method.
8. Passivate the seam after welding.
9. Fit the seals.

## 10. Assemble the valve and depressurize the actuator.

→ The valve disk is lowered.



### **NOTE**

Welding method

We recommend using the automatic orbital welding method.

Housing O-rings

When assembling the valve always replace the housing O-rings to ensure that the valve is tight.

## Pneumatic Connections

### Air Requirement

Actuator type	Actuator diameter (mm)	Air requirement ( $\text{dm}^3_n/\text{stroke}$ ) $\text{dm}^3_n$ at 1.01325 bar at 0°C as per DIN 1343	Use
A...	98	0.16	DN 25 - DN 100 1" - 4" OD, 2" - 4" IPS
B...	109	0.26	
C...	135	0.42	
D...	170	0.70	
E...	210	1.10	
R... <sup>1</sup>	169	1.60	
S... <sup>1</sup>	210	2.00	DN 125 + DN 150 6" OD, 6" IPS
T... <sup>1</sup>	210	3.10	
D...6	170	1.30	
E...6	210	2.00	
S...6	261	3.20	
T...6 <sup>1</sup>	210	4.00	
U...6 <sup>1</sup>	261	5.10	

1. Actuators with booster cylinder for increasing the pneumatic actuating force when lower control air pressures are used

## 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.
3. Push the air hose into the air connector on the control top.
4. Re-open the compressed air supply.

✓ Done

## Electrical Connections



### 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.



### EXPLORSION 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:

- ➔ Connect in accordance with the connection diagram and the instructions in the corresponding operating instructions for the control top.

✓ Done

#### NOTE

The proximity switches are factory set. During transport and installation it can happen that the settings are changed, so that readjustment may be required (see the Operating Instructions for the control top).

## Setting into Operation

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 products based on formic acid at up to 85 °C.

### Typical cleaning parameters in breweries

- 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.

## Cleaning Effect

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. Depending on the cleaning method (medium, concentration, temperature and contact times), the seals are affected to different degrees. This can impair the function and the service life.

## 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 ( $\text{HNO}_3$ ) at approx. 80°C (176 °F) at a concentration of 3% and a contact time of 6 to 8 hours.

## Malfunctions

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

Malfunction	Cause	Remedy
Valve does not work	Fault in the control system	Check the system configuration
	No compressed air or compressed air too low	Check the compressed air supply Check air hoses for free passage and air tightness
	Fault in the electrical system	Check actuation / external controller and routing of electrical lines
	Solenoid valve defective	Replace the solenoid valve
Valve does not close	Dirt/foreign material between valve seat and valve disk	Clean valve housing and valve seat
	Spring defective	Replace the actuator
Valve closes too slowly	O-rings in actuator and control top are dry (friction losses)	Grease O-rings
Leakage in the area of the valve housing	Housing O-rings defective	Disassemble the valve, change the housing O-rings
Leakage in the lantern	Sealing ring defective	Replace the sealing ring

# Maintenance

## Inspections

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

### Product Contact Seals

Carry out the following steps:

- Regularly check:  
– Stem seal between upper housing and lantern  
– V-ring in the valve disks  
– O-rings between the valve housings

✓ Done

### Pneumatic Connections

Carry out the following steps:

1. Check the operating pressure at the pressure reducing and filter station.
2. Regularly clean the air filter in the filter station.
3. Check that the air hoses sit firmly in the air connections.
4. Check the lines for kinks and leaks.
5. Check the solenoid valves for proper function.

✓ Done

### Electrical Connections

Carry out the following steps:

1. Check that the cap nut on the cable gland is tight.
2. Check that the cable connections are firmly secured.
3. Check the solenoid valves for proper function.

✓ Done

## Maintenance Intervals

To ensure the highest operational reliability of the 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 140 °F to 266 °F	approx. every 3 months
Media at temperatures of < 60 °C (< 140 °F)	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:

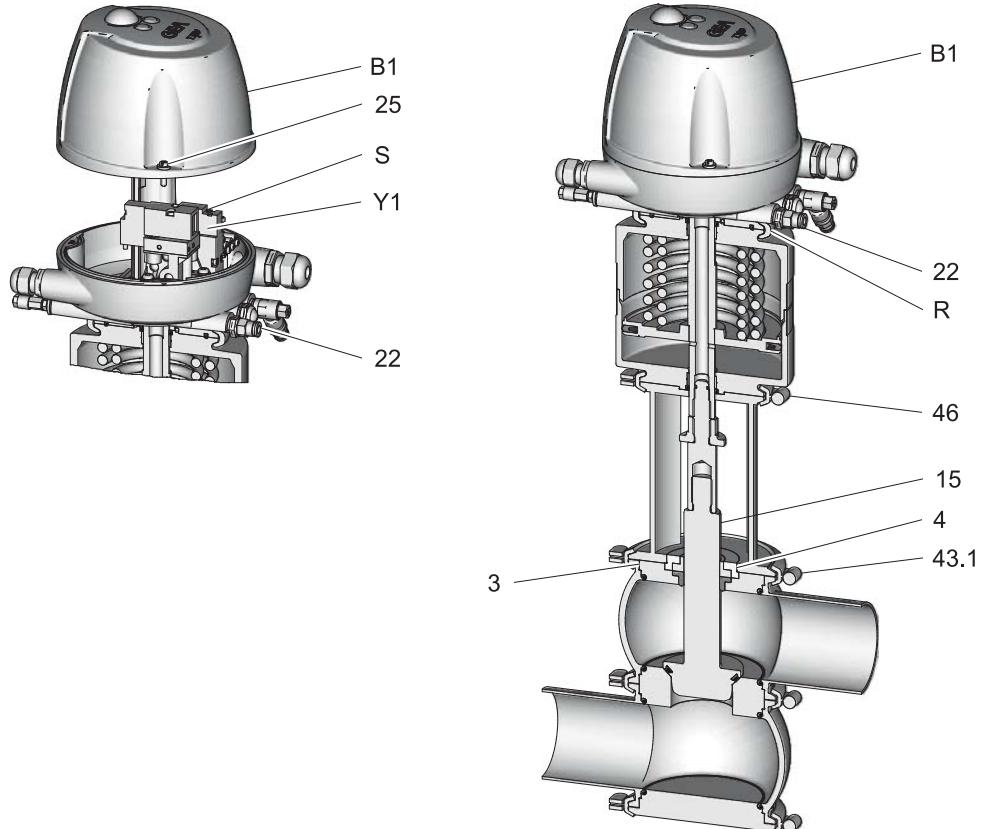
1. Drain all pipe system elements that lead to the valve and, if necessary, clean or rinse them.
2. Shut off the control air supply.
3. Disconnect the power supply.
4. Take the valve out of the pipe section, with all housings and housing connections if possible.

✓ Done

## Disassembly

### Disassembling Control Valve Type P - P\_F / P\_J and 3-Stage Seat K

#### Detaching the Clamp Connection (43.1)



Requirement:

- No solenoid valve must have been activated electrically or manually.
- The pneumatic and electrical connections on the plant side can remain on the control top.

Spring-closing valve



#### WARNING

##### Spring tension in the valve

Danger of injury when opening the clamp connections at the actuator (46) or at the housing (43.1) as the released spring pretension will suddenly lift the actuator.

→ Therefore, release the spring tension before detaching the clamp connections by pressurizing the actuator with compressed air at max. 8 bar.

**IMPORTANT NOTE**

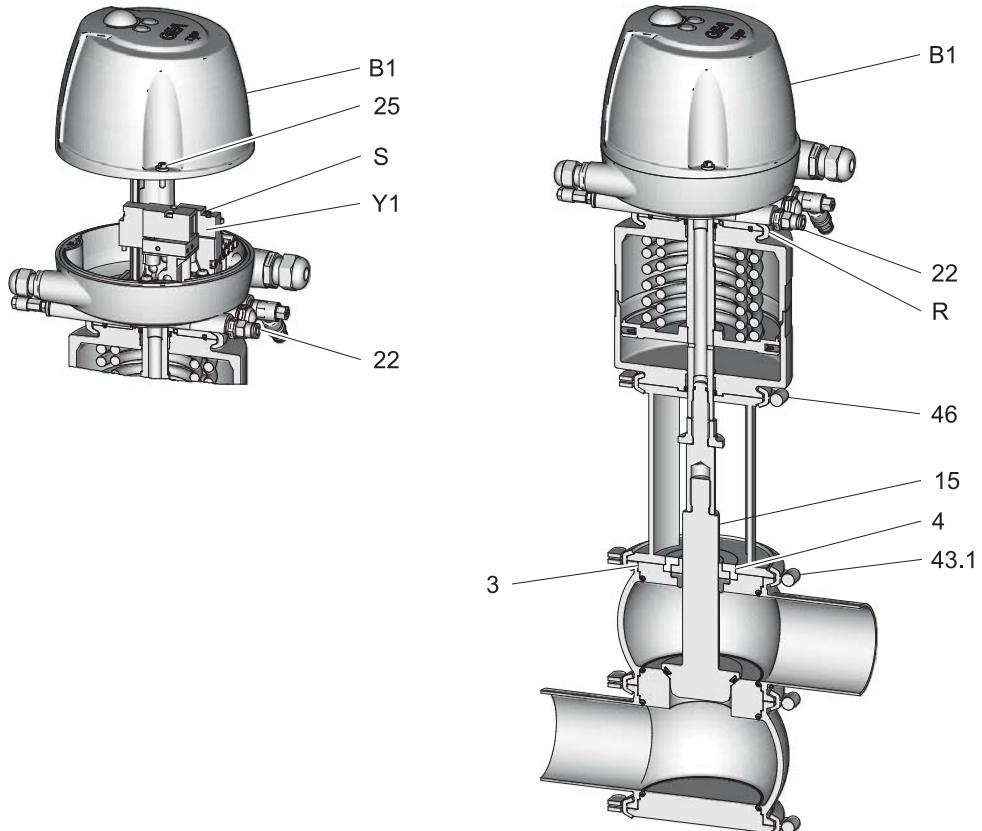
**The valve disk (15), the bearing disk (4) and the sealing disk (3) are sensitive parts.**

Damage to these parts can result in a malfunction.

- When the valve is pulled out, the stem of the valve disk (15) must not hit the valve housing!
- The bearing disk (4) and the sealing disk (3) must not hit the stem of the valve disk when the valve insert is withdrawn.
- Do not set the valve insert down on the valve disk but lay it down.

Carry out the following steps:

1. Release three cheese head screws (25) and take off the cap (B1).
2. Pressurize the actuator with compressed air, max. 8 bar, via the connection (22) by activating the solenoid valve (Y1) at the manual operation element (S).



→ The valve disk (15) is raised.

3. Remove the clamp connection (43.1).
4. Depressurize the actuator.

## Spring-opening valve

**IMPORTANT NOTE**

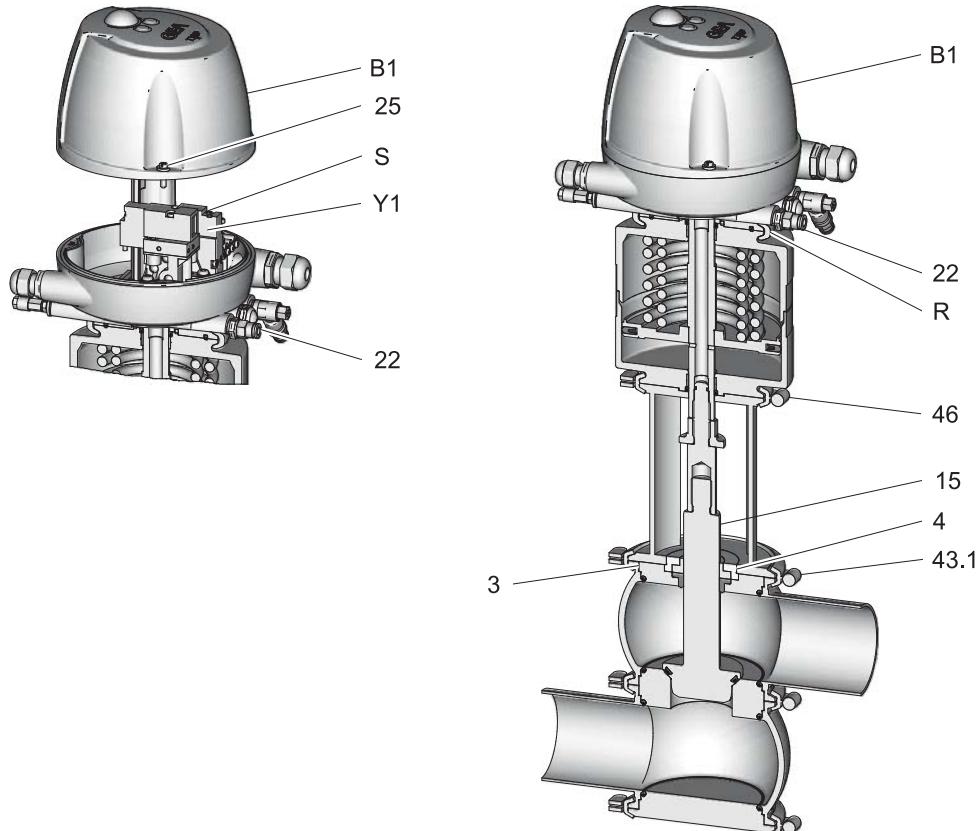
**The valve disk (15), the bearing disk (4) and the sealing disk (3) are sensitive parts.**

Damage to these parts can result in a malfunction.

- When the valve is pulled out, the stem of the valve disk (15) must not hit the valve housing!
- The bearing disk (4) and the sealing disk (3) must not hit the stem of the valve disk when the valve insert is withdrawn.
- Do not set the valve insert down on the valve disk but lay it down.

Carry out the following steps:

1. Release three cheese head screws (25) and take off the cap (B1).
2. Depressurize the actuator by deactivating the solenoid valve (Y1) at the manual operation element (S).

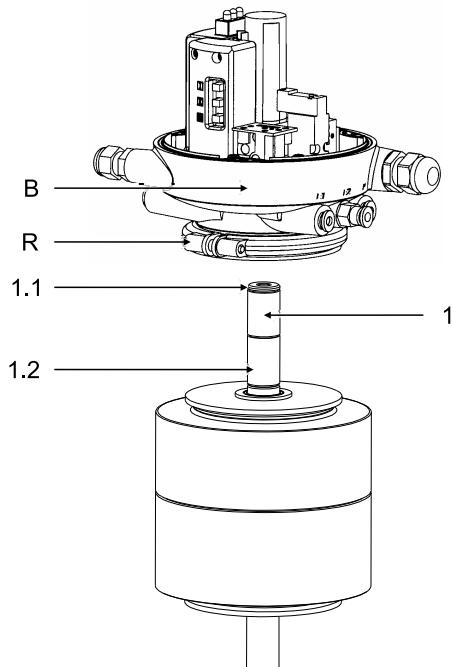


→ The valve disk (15) is raised.

3. Remove the clamp connections (43.1).



### Removing the Control Top



Requirement:

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

#### 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:

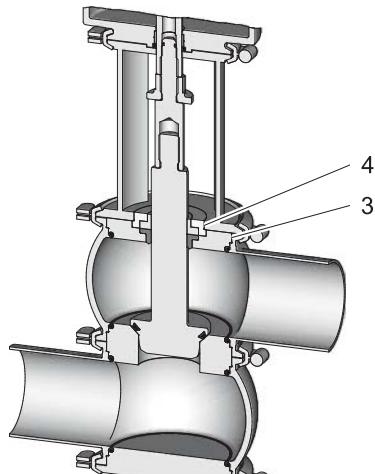
1. Remove the clamps (R) between control top and actuator.
2. Pull off the control top (B) upwards.
3. Release the T.VIS switch bar (1) by applying a hex key at (1.1) or an a/f 13 open end spanner at (1.2) and remove it.

✓ The control top has been taken off.

#### NOTE

For further information regarding the control top please refer to the Operating Instructions "Control Top T.VIS P-15".

### Disconnecting the Valve from the Housing



#### IMPORTANT NOTE

##### Sensitive valve parts

Damage to valve parts.

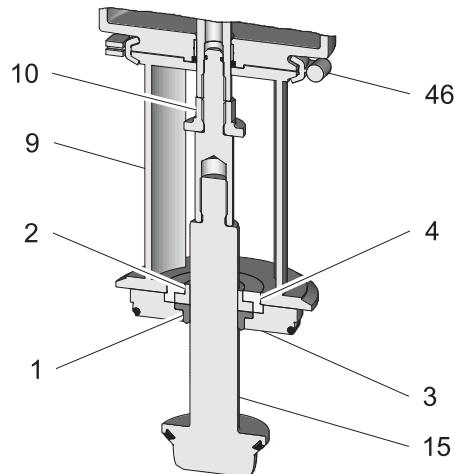
→ Protect the valve parts against impact stress.

Carry out the following steps:

→ Withdraw the valve from the housing.

**!** The bearing disk (4) and the sealing disk (3) must not hit the stem of the valve disk when the valve insert is withdrawn.

✓ The valve is separated from the housing.

**Removing the Valve Disk****IMPORTANT NOTE****Sensitive valve parts**

Damage to valve parts.

→ Protect the valve parts against impact stress.

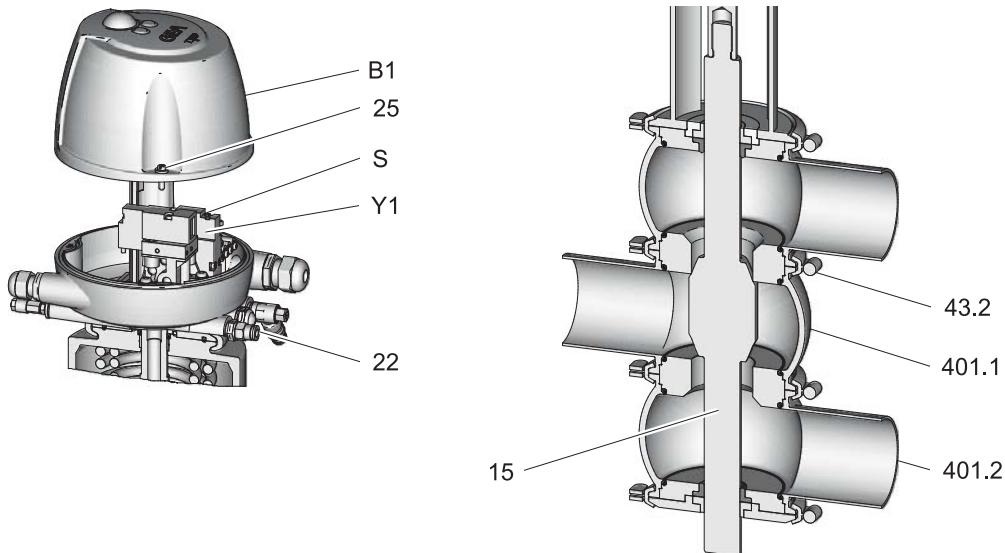
Carry out the following steps:

1. Slacken the clamp connection (46) but do not remove it.
2. Place an open end spanner on the spacer nut (10), use a strap wrench to turn the actuator and release the valve disk.
3. Unscrew the valve disk together with the bearing disk (4), the bearing (1), the sealing ring (3) and the sealing disk (2).  
**!** The bearing disk (4) and the sealing disk (3) must not hit the stem of the valve disk when the valve disk is withdrawn.
4. Unscrew the spacer nut (10) from the valve disk using 2 open end spanners.
5. Pull off the bearing disk (4) with bearing (1) and the sealing disk (2) with sealing ring (3) from the valve disk.
6. Remove the clamp connection (46) between the lantern and the actuator.
7. Remove the lantern (9).

✓ This completes removal of the valve disk.

## Control Valve Type P - Disassembling Divert Valve W

### Detaching the Clamp Connection (43.2)



Requirement:

- No solenoid valve must have been activated electrically or manually.
- The pneumatic and electrical connections on the plant side can remain on the control top.



### WARNING

#### Spring tension in the valve

Danger of injury when detaching the clamp connection (43.2) at the housing as the released spring pretension will suddenly lift the actuator.

→ Therefore, release the spring tension before detaching the clamp connections by pressurizing the actuator with compressed air at max. 8 bar.

### IMPORTANT NOTE

#### Sensitive parts.

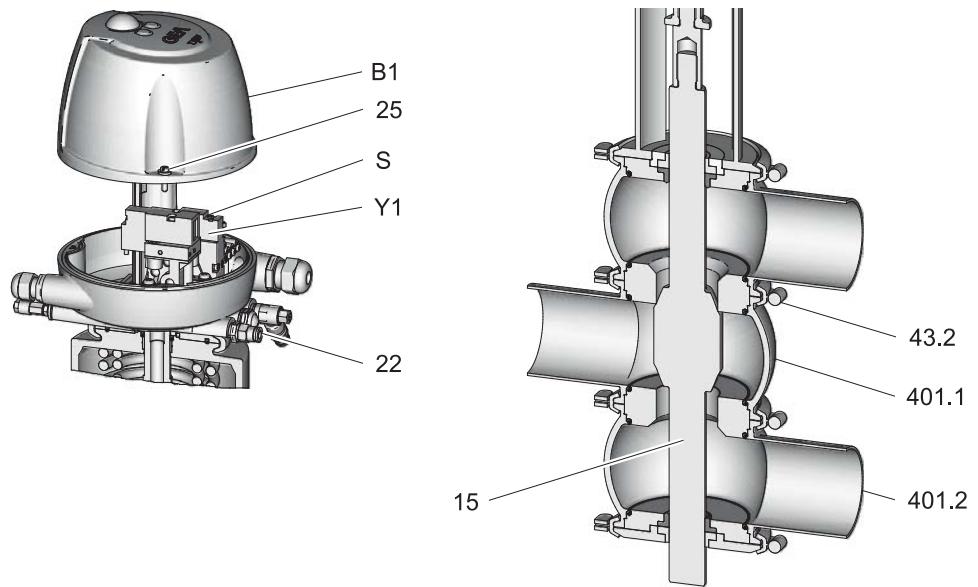
Damage to these parts can result in a malfunction.

→ When the valve is pulled out, the stem of the valve disk (15) must not hit the valve housing!  
→ Do not set the valve insert down on the valve disk but lay it down.

Carry out the following steps:

1. Release three cheese head screws (25) and take off the cap (B1).
2. Raise the valve disk (15):
  - Spring-closing valve (NC): pressurize the actuator with compressed air, max. 8 bar, via connection (22) by activating the solenoid valve (Y1) at the manual operation element (S).

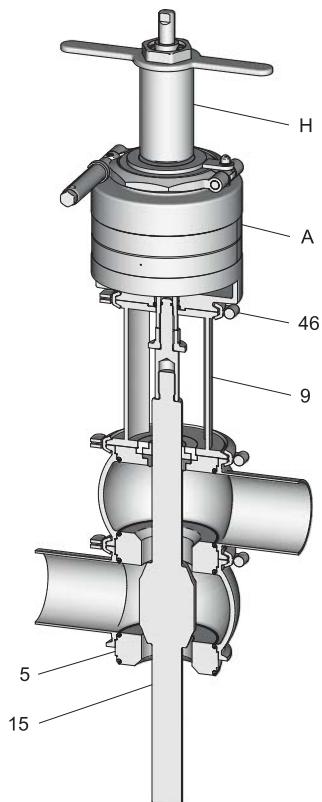
→ Spring-opening valve (NO): depressurize the actuator.



→ The valve disk (15) is raised.

3. Remove the clamp connection (43.2).
4. Withdraw the valve from the housings (401.1, 401.2).

✓ The clamp connection has been removed.

**Releasing the Valve Disk**

Tools required:

- Emergency manual actuator (H)

**WARNING****Spring tension in the valve**

Danger of injury when disassembling the spring-opening valve.

- ➔ Do not put your hand into the valve housing.
- ➔ Before unscrewing the valve disk, pretension the actuator using an emergency manual actuator (H).

**IMPORTANT NOTE****Seat ring (5) fitted freely in the housing.**

The seat ring can hit the valve disk when the valve is moved. The sealing surfaces of the seat ring and the valve disk shaft can be damaged.

- ➔ Carefully disassemble the valve

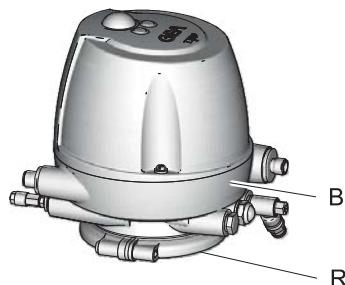
Carry out the following steps:

**1. Lower the valve disk (15):**

- ➔ Spring-closing valve (NC): depressurize the actuator.
- ➔ Spring-opening valve (NO): pretension the actuator using an emergency manual actuator (H).

- The valve disk (15) is lowered.
  - 2. Loosen the clamp connection (46) between actuator (A) and lantern (9).
  - 3. Place an open end spanner on the spanner flat on the valve disk (15) and use a strap wrench to unscrew the actuator by three turns.
  - 4. Spring-opening valve: release the actuator pretension.
- ✓ The valve disk has been released.

#### Removing the Control Top



Requirement:

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

#### IMPORTANT NOTE

**The permanent magnet on the switch bar is fragile.**

Damage to the permanent magnet.

→ Protect the permanent magnet against impact stress.

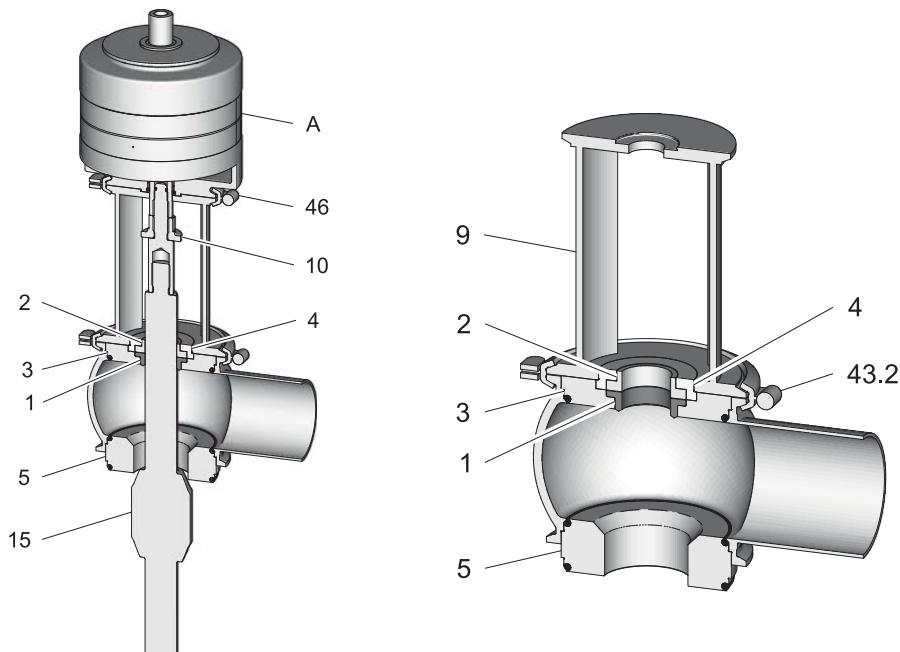
Carry out the following steps:

1. Remove the clamps (R) between control top and actuator.
2. Pull off the control top (B) upwards.

✓ The control top has been taken off.

#### NOTE

For further information regarding the control top please refer to the Operating Instructions "Control Top T.VIS P-15".

**Removing the Valve Disk****IMPORTANT NOTE****Sensitive valve parts**

Damage to valve parts.

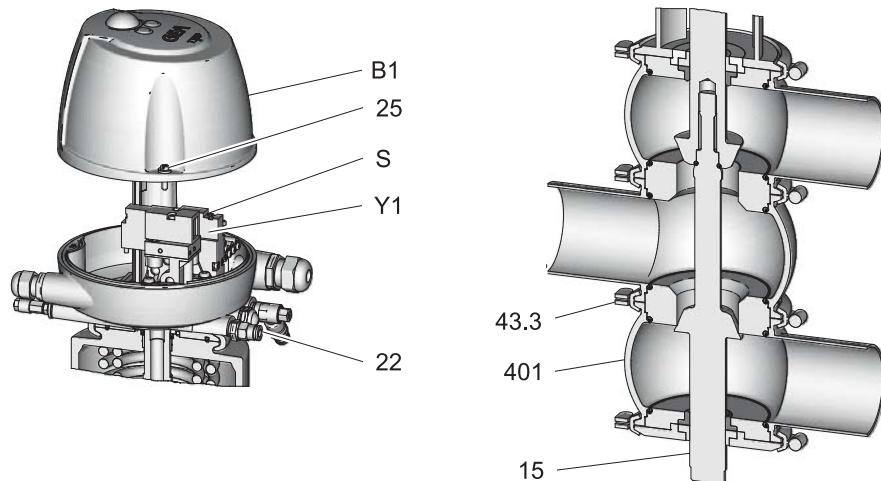
→ Protect the valve parts against impact stress.

Carry out the following steps:

1. Remove the clamp connection (46) between actuator (A) and lantern (9).
  2. Unscrew the valve disk (15) from the actuator (A) by hand.
  3. Unscrew the spacer nut (10) from the valve disk using 2 open end spanners.
  4. Pull the valve disk out of the housing.  
**!** The bearing disk (4), bearing (2), sealing disk (3), sealing ring (1) and seat ring (5) must not hit the stem of the valve disk when the valve disk is withdrawn.
  5. Take the actuator off.
  6. Remove the seat ring (5) from the housing.
  7. Remove the clamp connection (43.1) between the lantern and the housing.
  8. Remove the lantern.
  9. Take the bearing disk (4) with bearing (2) and the sealing disk (3) with sealing ring (1) out of the housing.
- Valve disk has been removed.

## Control Valve Type P - Disassembling Divert Valve X

### Exposing the Lower Valve Disk



Requirement:

- No solenoid valve must have been activated electrically or manually.
- The pneumatic and electrical connections on the plant side can remain on the control top.



### WARNING

#### Spring tension in the valve

Danger of injury when detaching the clamp connections (43.3) at the housing as the released spring pretension will suddenly lift the actuator.

- Therefore, release the spring tension before detaching the clamp connections by pressurizing the actuator with compressed air at max. 8 bar.

### IMPORTANT NOTE

#### Sensitive parts.

Damage to these parts can result in a malfunction.

- When the valve is pulled out, the stem of the valve disk (15) must not hit the valve housing (401)!  
→ Do not set the valve insert down on the valve disk but lay it down.

Carry out the following steps:

1. Release three cheese head screws (25) and take off the cap (B1).
2. Raise the valve disk (15):
  - Spring-closing valve (NC): pressurize the actuator with compressed air, max. 8 bar, by activating solenoid valve Y1 at the manual operation element S.
  - Spring-opening valve (NO): depressurize the actuator.

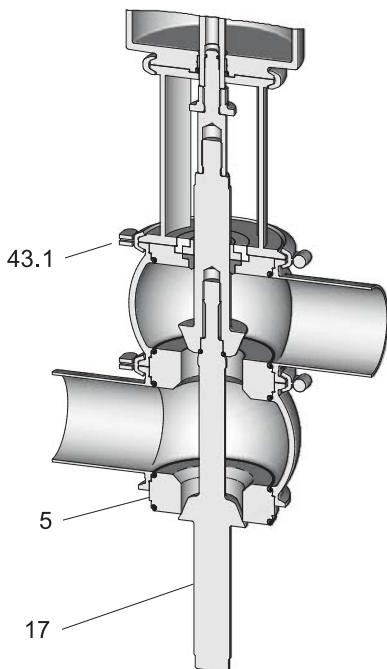
→ The valve disk (15) is raised.
3. Remove the clamp connection (43.3).

4. Withdraw the valve from the housing (401) or take the housing (401) off.

**!** Do not set the valve insert down on the valve disk but lay it down.

**✓** The lower valve disk has been exposed.

#### Removing the Lower Valve Disk



#### WARNING

##### Spring tension in the valve

Danger of injury when disassembling the spring-opening valve.

→ Do not put your hand into the valve housing.

#### IMPORTANT NOTE

##### Seat ring (5) fitted freely in the housing.

The seat ring can hit the valve disk when the valve is moved. The sealing surfaces of the seat ring and the valve disk shaft can be damaged.

→ Carefully disassemble the valve

Carry out the following steps:

1. Lower the valve disk (17):

→ Spring-closing valve (NC): depressurize the actuator.  
→ Spring-opening valve (NO): pressurize the actuator - with compressed air, max. 8 bar.

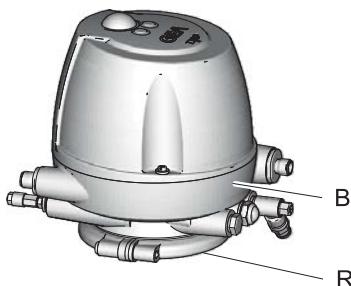
→ The valve disk (17) is lowered.

2. Unscrew the valve disk (17) with an open end spanner.

- !** When unscrewing, do not reach between valve disk (17) and seat ring (5). If the air hose is torn off, the valve disk will suddenly move upwards, and your fingers can be crushed.
3. Remove the seat ring (5) from the housing.
  4. Raise the valve disk:
    - Spring-closing valve (NC): pressurize the actuator - with compressed air, max. 8 bar.
    - Spring-opening valve (NO): depressurize the actuator.
    - Valve disk is raised.
  5. Remove the clamp connection (43.1) between the lantern and the housing.
  6. Spring-closing valve (NC): depressurize the actuator.

 The lower valve disk has been removed.

#### Removing the Control Top



Requirement:

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

#### 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:

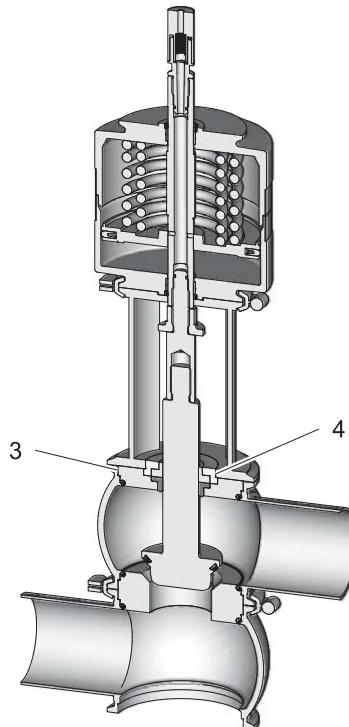
1. Remove the clamps (R) between control top and actuator.
2. Pull off the control top (B) upwards.

 Control top has been taken off.

#### NOTE

For further information regarding the control top please refer to the Operating Instructions "Control Top T.VIS P-15".

### Taking Out the Valve Insert



#### IMPORTANT NOTE

##### Sensitive valve parts

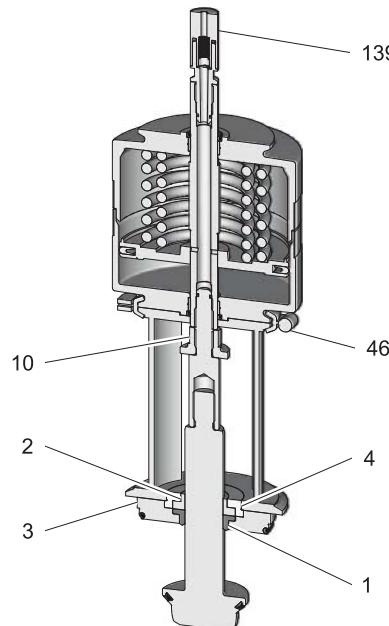
Damage to valve parts.

- Protect the valve parts against impact stress.

Carry out the following steps:

- ➔ Carefully pull the valve insert complete with actuator and lantern upwards to remove it from the valve housing.
  - ! The bearing disk (4) and the sealing disk (3) must not hit the stem of the valve disk when the valve insert is withdrawn.
- ✓ The valve insert has been removed.

### Removing the Upper Valve Disk



#### IMPORTANT NOTE

##### Sensitive valve parts

Damage to valve parts.

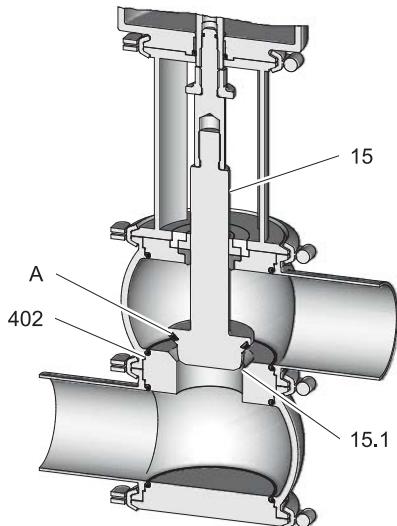
→ Protect the valve parts against impact stress.

Carry out the following steps:

1. Unscrew the switch bar (139).
  2. Release the clamp connection (46) but do not remove it.
  3. Place an open end spanner on the spacer nut (10), use a strap wrench to turn the actuator and release the valve disk.
  4. Unscrew the valve disk together with the bearing disk (4), the bearing (2), the sealing ring (1) and the sealing disk (3).
  5. Unscrew the spacer nut (10) from the valve disk using two open end spanners.
  6. Slide off the bearing disk (4) with bearing and the sealing disk (3) with sealing ring from the valve disk.  
**!** The bearing disk (4) and the sealing disk (3) must not hit the stem of the valve disk. This can cause damage to the sealing surface.
  7. Remove the clamp connection (46) between the lantern and the actuator.
  8. Remove the lantern.
- ✓ The upper valve disk has been removed.

## Maintenance

### Cleaning the Valve



#### IMPORTANT NOTE

The stem of the valve disk (15), the housing seat (402), the valve seat (15.1) and the V-ring groove (A) are precision parts.

Damage to these parts can result in a malfunction.

→ Handle the valve with care!

#### 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. Disassemble the valve, see "Disassembling Control Valve Type P - P\_F / P\_J and 3-Stage Seat K" (page 38), "Control Valve Type P - Disassembling Divert Valve W" (page 44) or "Control Valve Type P - Disassembling Divert Valve X" (page 49).
2. Carefully clean the individual parts.

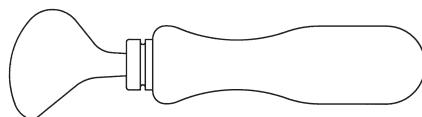
✓ Done

## Replacing Seals

### Note on Seal Replacement

Replace defective seals, but always fit new housing O-rings to ensure the tightness of the valve. Always use original spare parts.

### Replacing the V-Ring



V-ring insertion tool

Requirement:

- Insert V-rings without grease. To facilitate fitting, use water with a drop of washing-up liquid to remove the surface tension. In order that no rust is transferred, the washing-up liquid solution must be made up in a ceramic, plastic, or stainless steel container.

Tools required:

- V-ring insertion tool



### CAUTION

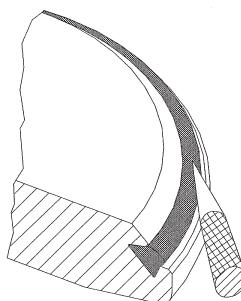
**The scribe can slip off when the V-ring is removed.**

Danger of injury!

- ➔ Grip the valve disk in a vice with protected jaws.
- ➔ Unscrew the curved side of the scribe.

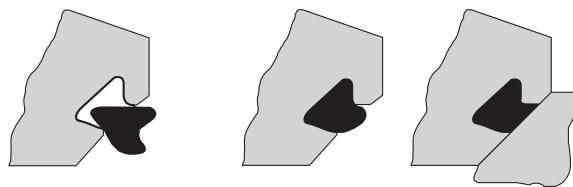
Carry out the following steps:

1. Put a scribe into the V-ring and take it out.

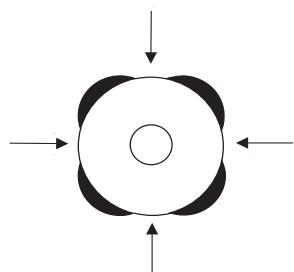


2. Before fitting, wet the V-ring on the side not in contact with product (rear side). Pay attention that water does not drip into the V-ring groove on the valve disk.

3. Put in the V-ring. Make sure the installation position of the V-ring is correct (see illustration).



4. Use the insertion tool to press in the V-ring – evenly press in at several opposite points along the circumference.



5. Insert the V-ring evenly.
6. Replace all the other seals identified in the spare parts lists.

✓ Done

**NOTE**

Used seals must not be used again, since the proper function of the seal can then no longer be ensured.

## 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. No grease residues must be visible once the valve has been assembled completely.
- 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. Lightly grease the valve disk thread.
2. Grease all seals - including the O-rings at the top and bottom of the actuator piston rod - very thinly.
  - ! Do not grease the V-ring

✓ Done

#### NOTE

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 material no. 413-064, and Rivolta F.L.G. MD-2 can be ordered under material no. 413-071. Using other types of grease can result in malfunctions or in premature seal failure. The warranty will also become null and void. 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.

Running dry must be avoided!

## Installation

Assemble the valve in reverse order of disassembly. Observe the notes and instructions given in the following sections when doing so.

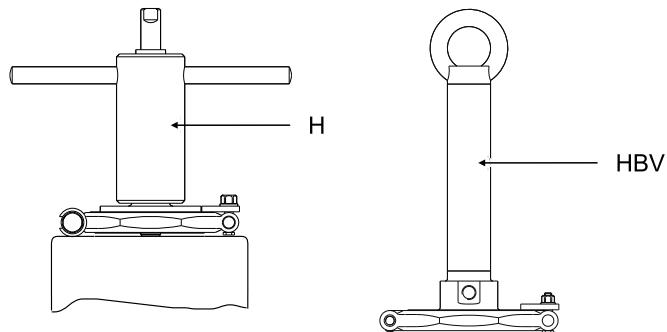


### CAUTION

**Danger of injury by spring force being released on valves with spring-closing actuator action (divert valve W / X – spring-closing)**

You can sustain injuries to your fingers when you put your hand into a valve with spring-closing action if the valve has not been opened beforehand.

- Before screwing in the valve disk, pretension the actuator using an emergency manual actuator (H) or pressurize it with compressed air using assembly tool HBV.

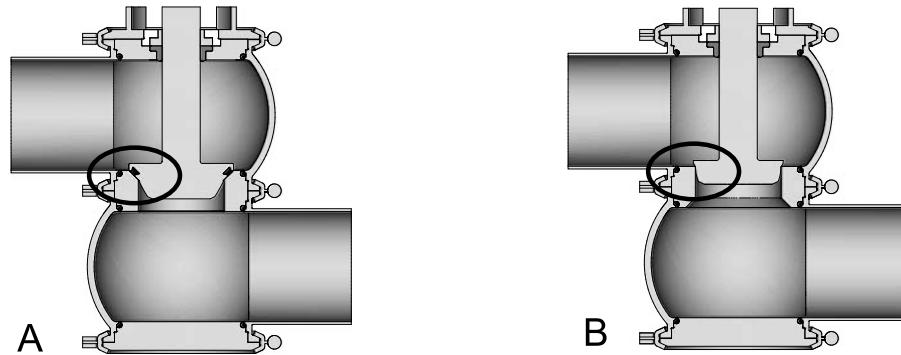


Emergency manual actuator (H) and assembly tool (HBV)

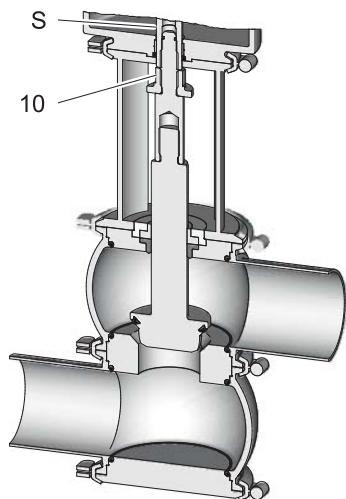
## Seat Rings

Pay attention that the seat rings are positioned correctly:

Soft sealing valve disks: inclined seating surface must face the valve disk (A).  
Metallically sealing valve disks: pointed edge must face the valve disk (B).



### Spacer Nut



Lock the spacer nut (10) against the actuator rod (S).

### Torques for the Clamps and Clamp Connections

Tighten the clamp connections and clamps on the valve to the torques specified in the table.

**Tightening torques required**

Torques		[Nm]	[lbf ft]
Clamps on the control top		1	0.7
Clamp connection Cast clamps	M6	9	6.6
Clamp connection Cast clamps	M8	22	16.2
Cast clamps	M10	45	33
Lower valve disk (divert valve X)	DN 25 - DN 50 OD 1" - OD 2"	24	17.7
	DN 65 - DN 100 OD 2.5" - OD 4"	58	42.8
	DN 150 OD 6"	70	51.6

## Checking the Function

### Setting the Stroke

Carry out the following steps:

1. Actuate the valve with compressed air.
2. Check the stroke of the valve in accordance with "Valve stroke" (page 60).



### Strokes Depending on Size

#### Valve stroke

Valve size	Valve stroke [mm]	
	N / 3-stage seat	N / W
<b>Metric</b>		
25		15
40		15
50		15
65		15
80		15
100		15/30
125		30
150		30
<b>Inch OD</b>		
1"		15
1.5"		15
2"		15
2.5"		15
3"		15
4"		15/30
6"		30
<b>Inch IPS</b>		
2"		15
3"		15
4"		15/30
6"		30

## Disposal

### General Notes

Dispose of the valve 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 high as 24 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:

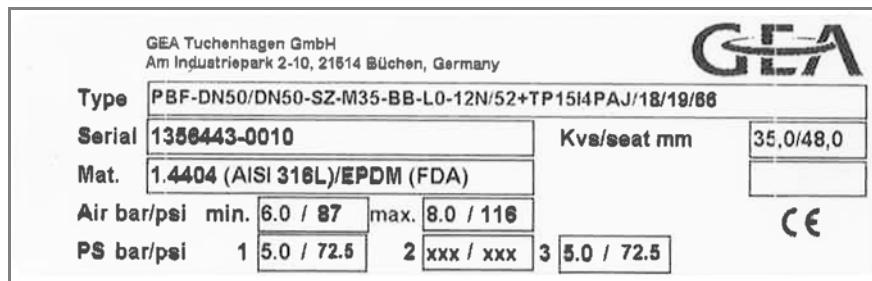
1. Remove the actuator.
2. Safely pack the actuator and send it to GEA Tuchenhagen GmbH.

 Done

# Technical Data

## Type Plate

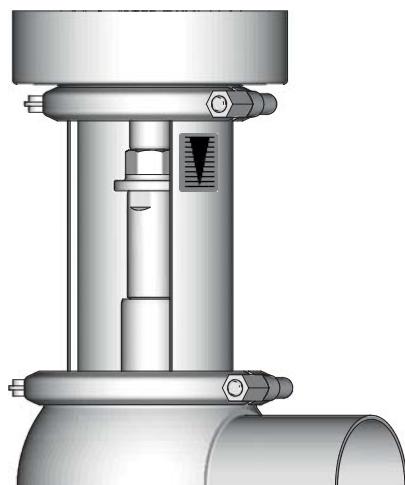
The type plate clearly identifies the valve.



The type plate provides the following key data:

### Key data of the valve

Type	Control valve P
Serial	Serial number
Material	1.4404 (AISI316L)/EPDM (FDA)
Control air pressure bar/psi	min. 6.0 / 87; max. 8.0 / 116
Product pressure bar/psi	5.0 / 72.5
K <sub>VS</sub> value / seat diameter	35.0 / 48.0



Label on lantern - closed position

## Technical Data

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

**Technical data: Valve**

Designation	Description
Size	DN 25 to DN 150 1" to 6" OD 2" to 6" IPS
Material of product contact parts	Stainless steel 1.4404
Installation position	Any position, if valve and pipe system can drain properly

**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. < -15 °C: no solenoid valves in the control top > +50 °C: no solenoid valves in the control top
- Proximity switch	-20 to +80 °C
- Control top type T.VIS P-15	-20 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
Product pressure	5 bar (72.5 psi) standard > 5 bar (72.5 psi) on request
Control air pressure	6 bar, max. 8 bar
Control air	acc. to ISO 8573-1

**Technical data: Compressed air supply (Cont.)**

Designation	Description
- Solid particle content:	Quality class 6 Particle size max. 5 µm Particle density max. 5 mg/m <sup>3</sup>
- 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 <sup>3</sup> air

## 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 operating 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%		+	+	+
Product with a fat content of more than 35%		-	+	+
Oils		-	+	+

\* depending on the installation conditions

## Pipe Ends

Dimensions for Pipes in DN

Metric DN	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to DIN 11850
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

Dimensions for Pipes in Inch OD

Inch OD	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to BS 4825
1"	25.4	1.65	22.1	x
1,5"	38.1	1.65	34.8	x
2"	50.8	1.65	47.5	x
2.5"	63.5	1.65	60.2	x
3"	76.2	1.65	72.9	x
4"	101.6	2.11	97.38	x
6"	152.4	2.77	146.86	x

Dimensions for Pipes in Inch IPS

Inch IPS	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to DIN EN ISO 1127
2"	60.3	2.00	56.3	x
3"	88.9	2.30	84.3	x
4"	114.3	2.30	109.7	x
6"	168.3	2.77	162.76	x

## Tools

Tools	Material no.
Manual emergency actuator	221.310.74
Pneumatic emergency switch bar (DN 25 to 100)	221-105.67
Pneumatic emergency switch bar (DN 125 to 162 (6" IPS))	221-105.65
Hose cutter	407-065
Belt wrench	408-142
V-ring insertion tool	229-109.88
Open end spanner, ends ground, a/f 17-19	229-119.01
Open end spanner, ends ground, a/f 21-23	229-119.05
Open end spanner, ends ground, a/f 22-24	229-119.03
Open end spanner, a/f 30-32	408-041
Open end spanner, a/f 25-28	408-268
Open end spanner a/f 13	408-035
Assembly tool HBV	221-105.99

## Lubricants

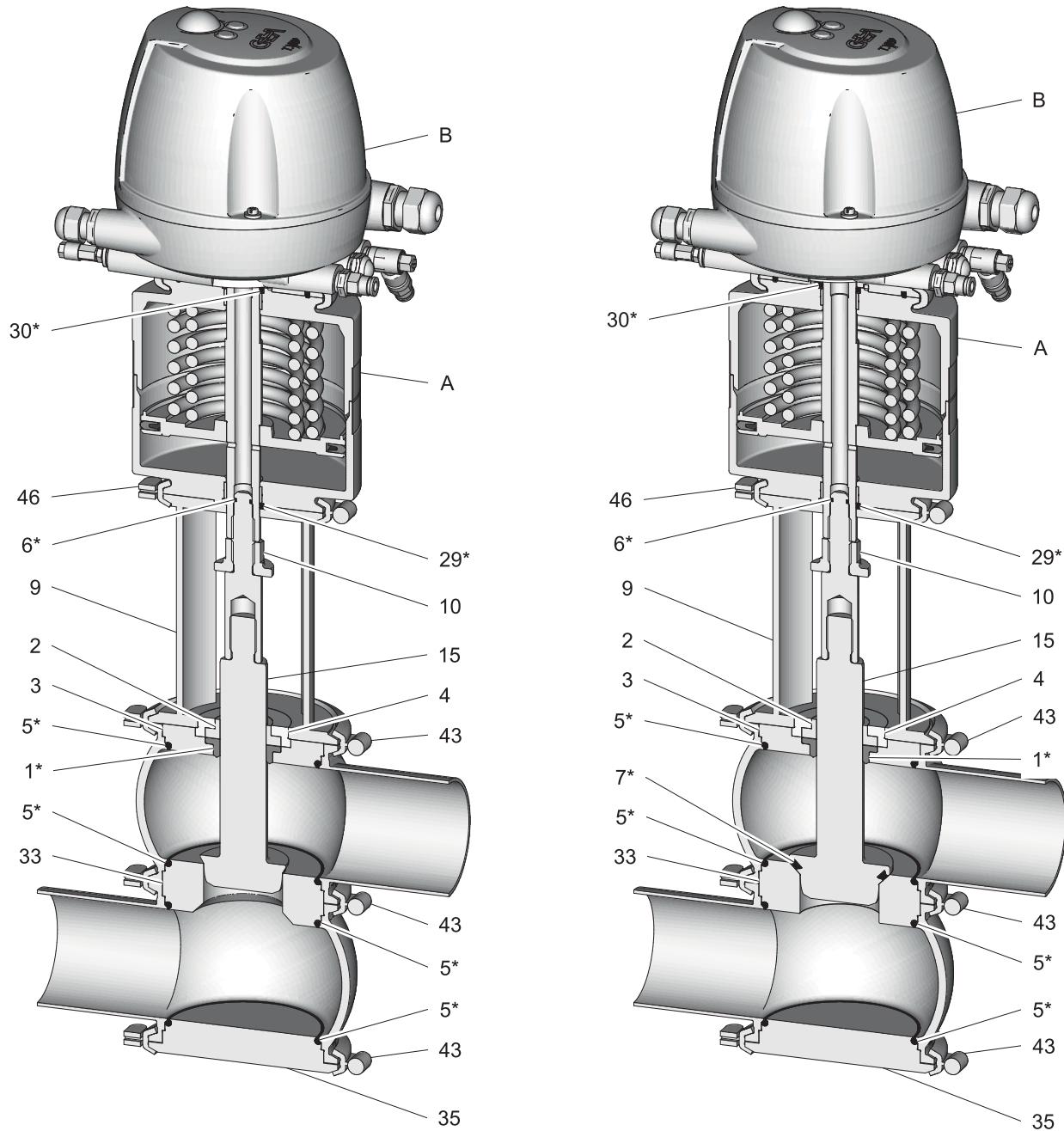
Lubricants	Material no.
Rivolta F.L.G. MD-2	413-071
PARALIQ GTE 703	413-064

## Weights

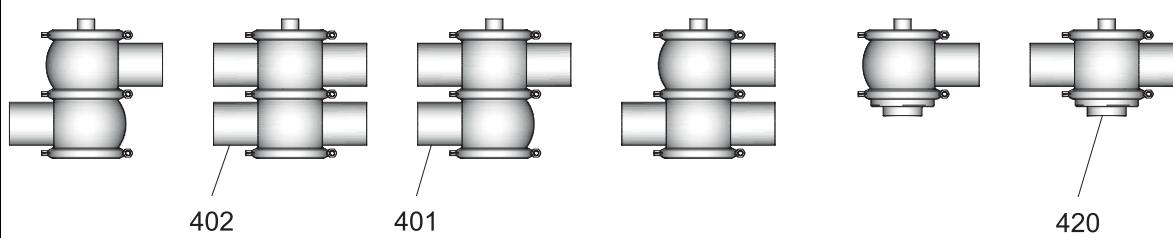
Size	Weight [kg]
DN 25, 1"	approx. 7.5
DN 40, 1.5"	approx. 10.0
DN 50, 2"	approx. 10.5
DN 65, 2.5"	approx. 17.0
DN 80, 3"	approx. 17.5
DN 100, 4"	approx. 25.0
DN 125	approx. 55.0
DN 150, 6"	approx. 63.5

## Spare Parts Lists

### VARIVENT Control Valve Type P - P\_F / P\_J



Spare parts drawing (left: metallic seal, right: soft sealing)



Housing combinations

**Spare Parts List, Items 1-5, Metric Sizes (DN 25 to DN 65)**

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65
1*	Sealing ring	EPDM	924-084	924-084	924-084	924-085
		FKM	924-082	924-082	924-082	924-083
		HNBR	924-311	924-311	924-311	924-313
2	Bearing Bearing, 3A	PTFE/carbon	935-001	935-001	935-001	935-002
		SUSTA-PVDF	935-098	935-098	935-098	935-099
3	Sealing disk	1.4404	221-141.01	221-141.02	221-141.02	221-141.03
4	Bearing disk	1.4301	221-142.01	221-142.02	221-142.02	221-142.03
5*	O-ring	EPDM	930-309	930-144	930-144	930-150
		FKM	930-168	930-171	930-171	930-176
		HNBR	930-632	930-633	930-633	930-634
6*	O-ring	NBR	930-004	930-004	930-004	930-004

Items marked with an \* are wearing parts.

**Spare Parts List, Items 1-5, Metric Sizes (DN 80 to DN 150)**

Item	Designation	Material	DN 80	DN 100	DN 125	DN 150
1*	Sealing ring	EPDM	924-085	924-085	924-088	924-088
		FKM	924-083	924-083	924-087	924-087
		HNBR	924-313	--	--	--
2	Bearing Bearing, 3A	PTFE/carbon	935-002	935-002	935-003	935-003
		SUSTA-PVDF	935-099	935-099	935-102	935-102
3	Sealing disk	1.4404	221-141.03	221-141.04	221-141.07	221-141.05
4	Bearing disk	1.4301	221-142.03	221-142.03	221-142.04	221-142.04
5*	O-ring	EPDM	930-150	930-156	930-372	930-260
		FKM	930-176	930-178	930-409	930-259
		HNBR	930-634	930-863	--	--
6*	O-ring	NBR	930-004	930-004	930-007	930-007

Items marked with an \* are wearing parts.

Spare Parts List V-Ring, Lantern, Spacer Nut, Metric Sizes (DN 25 - DN 65)

Item	Designation	K <sub>VS</sub> value	Material	DN 25	DN 40	DN 50	DN 65
7*	V-ring	0.1 0.16 0.25 0.4 0.63 1 1.6 2.5 4	EPDM FKM FFKM HNBR	932-064 932-073 932-120 932-083	-- -- -- --	-- -- -- --	-- -- -- --
		6.3	EPDM FKM FFKM HNBR	932-017 932-029 932-111 932-085	932-017 932-029 932-111 932-085	-- -- -- --	-- -- -- --
		10.0	EPDM FKM FFKM HNBR	932-017 932-029 932-111 932-085	932-017 932-029 932-111 932-085	932-017 932-029 932-111 932-085	-- -- -- --
		16.0	EPDM FKM FFKM HNBR	-- -- -- --	932-046 932-030 932-110 932-087	932-046 932-030 932-110 932-087	-- -- -- --
		25.0	EPDM FKM FFKM HNBR	-- -- -- --	932-019 932-032 932-113 932-084	932-019 932-032 932-113 932-084	932-019 932-032 932-113 932-084
		35.0	EPDM FKM FFKM HNBR	-- -- -- --	-- -- -- --	932-021 932-033 932-114 932-088	932-021 932-033 932-114 932-088
		40.0	EPDM FKM FFKM HNBR	-- -- -- --	-- -- -- --	932-021 932-033 932-114 932-088	932-021 932-033 932-114 932-088
		60.0	EPDM FKM FFKM HNBR	-- -- -- --	-- -- -- --	-- -- -- --	932-023 932-034 932-115 932-089
9	Lantern	--	1.4301	221-121.01	221-121.02	221-121.02	221-121.03
10	Spacer nut	--	1.4305	221-147.02	221-147.02	221-147.02	221-147.01

Spare Parts List V-Ring, Lantern, Spacer Nut, Metric Sizes (DN 80 - DN 150)

Item	Designation	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
7*	V-ring	35.0	EPDM	932-021	--	--	--
			FKM	932-033	--	--	--
			FFKM	932-114	--	--	--
			HNBR	932-088	--	--	--
		40.0	EPDM	932-021	--	--	--
			FKM	932-033	--	--	--
			FFKM	932-114	--	--	--
			HNBR	932-088	--	--	--
		60.0	EPDM	932-023	932-023	--	--
			FKM	932-034	932-034	--	--
			FFKM	932-115	932-115	--	--
			HNBR	932-089	932-089	--	--
		80.0	EPDM	932-024	932-025	--	--
			FKM	932-035	932-036	--	--
			FFKM	932-116	--	--	--
			HNBR	932-090	(932-101)	--	--
		100	EPDM	--	932-025	932-025	--
			FKM	--	932-036	932-036	--
			FFKM	--	--	--	--
			HNBR	--	(932-101)	(932-101)	--
		160	EPDM	--	932-028	932-028	--
			FKM	--	932-039	932-039	--
			FFKM	--	932-119	932-119	--
			HNBR	--	932-100	932-100	--
		200	EPDM	--	--	932-059	932-059
			FKM	--	--	932-063	932-063
			FFKM	--	--	--	--
			HNBR	--	--	--	--
		260	EPDM	--	--	932-060	932-045
			FKM	--	--	932-062	932-044
			FFKM	--	--	--	--
			HNBR	--	--	--	--
		360	EPDM	--	--	--	932-042
			FKM	--	--	--	932-041
			FFKM	--	--	--	932-079
			HNBR	--	--	--	--
9	Lantern	--	1.4301	221-121.03	221-121.04	221-121.06	221-121.22
10	Spacer nut	--	1.4404	221-147.01	221-147.01	221-147.06	221-147.06

Spare Parts List Valve Disk SFM, Equal Percentage, Metallic Seal, Metric Sizes (DN 25 - DN 65)

Item	K <sub>VS</sub> value	Material	DN 25	DN 40	DN 50	DN 65
15	0.1	1.4404	221-005980	--	--	--
	0.16	1.4404	221-005982	--	--	--
	0.25	1.4404	221-005984	--	--	--
	0.4	1.4404	221-005986	--	--	--
	0.63	1.4404	221-005988	--	--	--
	1	1.4404	221-005991	--	--	--
	1.6	1.4404	221-005993	--	--	--
	2.5	1.4404	221-005995	--	--	--
	4.0	1.4404	221-005997	--	--	--
	6.3	1.4404	221-005999	221-006000	--	--
	10	1.4404	221-005473	221-005479	221-005483	--
	16	1.4404	--	221-005480	221-005485	--
	25	1.4404	--	221-005481	221-005487	221-005492
	35	1.4404	--	--	221-005489	221-005493
	40	1.4404	--	--	221-005491	221-005494
	60	1.4404	--	--	--	221-005495
	80	1.4404	--	--	--	--
	100	1.4404	--	--	--	--
	160	1.4404	--	--	--	--
	200	1.4404	--	--	--	--
	260	1.4404	--	--	--	--
	360	1.4404	--	--	--	--

Spare Parts List Valve Disk SFM, Equal Percentage, Metallic Seal, Metric Sizes (DN 80 - DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	--	--	--	--
	35	1.4404	221-005496	--	--	--
	40	1.4404	221-005498	--	--	--
	60	1.4404	221-005499	221-005501	--	--
	80	1.4404	221-006002	221-006004	--	--
	100	1.4404	--	221-006006	221-006009	--
	160	1.4404	--	221-006008	221-006010	--
	200	1.4404	--	--	221-006011	221-006013
	260	1.4404	--	--	221-006012	221-006014
	360	1.4404	--	--	--	221-006015

Spare Parts List Valve Disk SFM/DF, Equal Percentage, Metallic Seal, Metric Sizes (DN 80 - DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	--	--	--	--
	35	1.4404	--	--	--	--
	40	1.4404	--	--	--	--
	60	1.4404	--	--	--	--
	80	1.4404	--	--	--	--
	100	1.4404	--	221-006202	221-006204	--
	160	1.4404	--	221-006203	221-006205	--
	200	1.4404	--	--	221-006206	221-006220
	260	1.4404	--	--	221-006207	221-006221
	360	1.4404	--	--	--	221-006222

Spare Parts List Valve Disk SJM, Linear, Metallic Seal, Metric Sizes (DN 25 - DN 65)

Item	K <sub>VS</sub> value	Material	DN 25	DN 40	DN 50	DN 65
15	0.1	1.4404	221-006074	--	--	--
	0.16	1.4404	221-006076	--	--	--
	0.25	1.4404	221-006078	--	--	--
	0.4	1.4404	221-006080	--	--	--
	0.63	1.4404	221-006082	--	--	--
	1	1.4404	221-006084	--	--	--
	1.6	1.4404	221-006086	--	--	--
	2.5	1.4404	221-006088	--	--	--
	4.0	1.4404	221-006090	--	--	--
	6.3	1.4404	221-006092	221-006093	--	--
	10	1.4404	221-005886	221-005887	221-005891	--
	16	1.4404	--	221-005888	221-005899	--
	25	1.4404	--	221-005889	221-005901	221-005912
	35	1.4404	--	--	221-005903	221-005913
	40	1.4404	--	--	221-005905	221-005914
	60	1.4404	--	--	--	221-005915
	80	1.4404	--	--	--	--
	100	1.4404	--	--	--	--
	160	1.4404	--	--	--	--
	200	1.4404	--	--	--	--
	260	1.4404	--	--	--	--
	360	1.4404	--	--	--	--

Spare Parts List Valve Disk SJM, Linear, Metallic Seal, Metric Sizes (DN 80 - DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	--	--	--	--
	35	1.4404	221-005916	--	--	--
	40	1.4404	221-005917	--	--	--
	60	1.4404	221-005918	221-005920	--	--
	80	1.4404	221-006094	221-006096	--	--
	100	1.4404	--	221-006098	221-006101	--
	160	1.4404	--	221-006100	221-006102	--
	200	1.4404	--	--	221-006103	221-006105
	260	1.4404	--	--	221-006104	221-006106
	360	1.4404	--	--	--	221-006107

Spare Parts List Valve Disk SJM/DF, Linear, Metallic Seal, Metric Sizes (DN 80 - DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	--	--	--	--
	35	1.4404	--	--	--	--
	40	1.4404	--	--	--	--
	60	1.4404	--	--	--	--
	80	1.4404	--	--	--	--
	100	1.4404	--	221-006226	221-006228	--
	160	1.4404	--	221-006227	221-006229	--
	200	1.4404	--	--	221-006230	221-006232
	260	1.4404	--	--	221-006231	221-006233
	360	1.4404	--	--	--	221-006234

Spare Parts List Valve Disk SFW, Equal Percentage, Soft Sealing, Metric Sizes (DN 25 - DN 65)

Item	K <sub>VS</sub> value	Material	DN 25	DN 40	DN 50	DN 65
15	0.1	1.4404	221-005444	--	--	--
	0.16	1.4404	221-005922	--	--	--
	0.25	1.4404	221-005924	--	--	--
	0.4	1.4404	221-005926	--	--	--
	0.63	1.4404	221-005928	--	--	--
	1	1.4404	221-005930	--	--	--
	1.6	1.4404	221-005932	--	--	--
	2.5	1.4404	221-005934	--	--	--
	4.0	1.4404	221-005936	--	--	--
	6.3	1.4404	221-005938	221-005939	--	--
	10	1.4404	221-005446	221-005447	221-005451	--
	16	1.4404	--	221-005448	221-005453	--
	25	1.4404	--	221-005449	221-005405	221-005459
	35	1.4404	--	--	221-005456	221-005460
	40	1.4404	--	--	221-005458	221-005461
	60	1.4404	--	--	--	221-005462
	80	1.4404	--	--	--	--
	100	1.4404	--	--	--	--
	160	1.4404	--	--	--	--
	200	1.4404	--	--	--	--
	260	1.4404	--	--	--	--
	360	1.4404	--	--	--	--

Spare Parts List Valve Disk SFW, Equal Percentage, Soft Sealing, Metric Sizes (DN 80 - DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	--	--	--	--
	35	1.4404	221-005463	--	--	--
	40	1.4404	221-005464	--	--	--
	60	1.4404	221-005465	221-005467	--	--
	80	1.4404	221-005940	221-005942	--	--
	100	1.4404	--	221-005944	221-005947	--
	160	1.4404	--	221-005946	221-005948	--
	200	1.4404	--	--	221-005949	221-005951
	260	1.4404	--	--	221-005950	221-005952
	360	1.4404	--	--	--	221-005953

Spare Parts List Valve Disk SFW/DF, Equal Percentage, Soft Sealing, Metric Sizes (DN 80 - DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	--	--	--	--
	35	1.4404	--	--	--	--
	40	1.4404	--	--	--	--
	60	1.4404	--	--	--	--
	80	1.4404	--	--	--	--
	100	1.4404	--	221-006190	221-006192	--
	160	1.4404	--	221-006191	221-006193	--
	200	1.4404	--	--	221-006194	221-006196
	260	1.4404	--	--	221-006195	221-006197
	360	1.4404	--	--	--	221-006198

Spare Parts List Valve Disk SJW, Linear, Soft Sealing, Metric Sizes (DN 25 - DN 65)

Item	K <sub>VS</sub> value	Material	DN 25	DN 40	DN 50	DN 65
15	0.1	1.4404	221-006035	--	--	--
	0.16	1.4404	221-006037	--	--	--
	0.25	1.4404	221-006039	--	--	--
	0.4	1.4404	221-006041	--	--	--
	0.63	1.4404	221-006043	--	--	--
	1	1.4404	221-006045	--	--	--
	1.6	1.4404	221-006047	--	--	--
	2.5	1.4404	221-006049	--	--	--
	4.0	1.4404	221-006051	--	--	--
	6.3	1.4404	221-006053	221-006054	--	--
	10	1.4404	221-005612	221-005613	221-005617	--
	16	1.4404	--	221-005614	221-005619	--
	25	1.4404	--	221-005615	221-005621	221-005640
	35	1.4404	--	--	221-005624	221-005652
	40	1.4404	--	--	221-005630	221-005653
	60	1.4404	--	--	--	221-005654
	80	1.4404	--	--	--	--
	100	1.4404	--	--	--	--
	160	1.4404	--	--	--	--
	200	1.4404	--	--	--	--
	260	1.4404	--	--	--	--
	360	1.4404	--	--	--	--

Spare Parts List Valve Disk SJW, Linear, Soft Sealing, Metric Sizes (DN 80 - DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	--	--	--	--
	35	1.4404	221-005655	--	--	--
	40	1.4404	221-005656	--	--	--
	60	1.4404	221-005657	221-005684	--	--
	80	1.4404	221-006055	221-006057	--	--
	100	1.4404	--	221-006059	221-006062	--
	160	1.4404	--	221-006061	221-006063	--
	200	1.4404	--	--	221-006064	221-006066
	260	1.4404	--	--	221-006065	221-006067
	360	1.4404	--	--	--	221-006068

**Spare Parts List Valve Disk SJW/DF, Linear, Soft Sealing, Metric Sizes (DN 80 - DN 150)**

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	--	--	--	--
	35	1.4404	--	--	--	--
	40	1.4404	--	--	--	--
	60	1.4404	--	--	--	--
	80	1.4404	--	--	--	--
	100	1.4404	--	221-006211	221-006213	--
	160	1.4404	--	221-006212	221-006214	--
	200	1.4404	--	--	221-006215	221-006217
	260	1.4404	--	--	221-006216	221-006218
	360	1.4404	--	--	--	221-006219

**Spare Parts List Items 29, 30, Metric Sizes (DN 25 to DN 65)**

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65
29*	O-ring	NBR	930-026	930-026	930-026	930-026
30*	O-ring	NBR	930-026	930-026	930-026	930-026

Items marked with an \* are wearing parts.

**Spare Parts List Items 29, 30, Metric Sizes (DN 80 to DN 150)**

Item	Designation	Material	DN 80	DN 100	DN 125	DN 150
29*	O-ring	NBR	930-026	930-026	930-035	930-035
30*	O-ring	NBR	930-026	930-026	930-026	930-026

Items marked with an \* are wearing parts.

Spare Parts List Seat Ring, Metric Sizes (DN 25 to DN 65)

Item	K <sub>VS</sub> value	Material	DN 25	DN 40	DN 50	DN 65
33	0.1	1.4404	221-107.102	--	--	--
	0.16	1.4404	221-107.102	--	--	--
	0.25	1.4404	221-107.102	--	--	--
	0.4	1.4404	221-107.81	--	--	--
	0.63	1.4404	221-107.81	--	--	--
	1	1.4404	221-107.81	--	--	--
	1.6	1.4404	221-107.24	--	--	--
	2.5	1.4404	221-107.24	--	--	--
	4	1.4404	221-107.24	--	--	--
	6.3	1.4404	221-107.25	221-107.27	--	--
	10	1.4404	221-107.25	221-107.27	221-107.27	--
	16	1.4404	--	221-107.28	221-107.28	--
	25	1.4404	--	221-107.29	221-107.29	221-107.31
	35	1.4404	--	--	221-107.30	221-107.32
	40	1.4404	--	--	221-107.30	221-107.32
	60	1.4404	--	--	--	221-107.33

Spare Parts List Seat Ring, Metric Sizes (DN 80 to DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
33	35	1.4404	221-107.32	--	--	--
	40	1.4404	221-107.32	--	--	--
	60	1.4404	221-107.33	221-107.35	--	--
	80	1.4404	221-107.34	221-107.36	--	--
	100	1.4404	--	221-107.36	221-107.103	--
	160	1.4404	--	221-107.37	221-107.104	--
	200	1.4404	--	--	221-107.89	221-107.40
	260	1.4404	--	--	221-107.39	221-107.41
	360	1.4404	--	--	--	221-107.105

Spare Parts List Items 35, 43, 46, 401, 402, Metric Sizes (DN 25 - DN 65)

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65
35	Cover	1.4404	221-144.01	221-144.02	221-144.02	221-144.03
43	Clamp connection KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09

**Spare Parts List Items 35, 43, 46, 401, 402, Metric Sizes (DN 25 - DN 65) (Cont.)**

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65
46	Clamp connection KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06
401	Housing V1	1.4404	221-101.19	221-101.21	221-101.22	221-101.05
402	Housing V2	1.4404	221-102.41	221-102.43	221-102.44	221-102.05

**Spare Parts List Items 35, 43, 46, 401, 402, Metric Sizes (DN 80 - DN 150)**

Item	Designation	Material	DN 80	DN 100	DN 125	DN 150
35	Cover	1.4404	221-144.03	221-144.04	221-144.06	221-144.05
43	Clamp connection KL	1.4401	221-507.09	221-507.11	221-507.13	221-507.14
46	Clamp connection KL	1.4301	221-507.06	221-507.06	221-507.11	221-507.11
401	Housing V1	1.4404	221-101.06	221-101.07	221-101.18	221-101.66
402	Housing V2	1.4404	221-102.06	221-102.07	221-102.29	221-102.09

**Spare Parts List Housing Connection S, Metallic Seal, Metric Sizes (DN 25 - DN 65)**

Item	K <sub>VS</sub> value	Material	DN 25	DN 40	DN 50	DN 65
420	0.1	1.4404	221-407.103	--	--	--
	0.16	1.4404	221-407.103	--	--	--
	0.25	1.4404	221-407.103	--	--	--
	0.4	1.4404	221-131.33	--	--	--
	0.63	1.4404	221-131.33	--	--	--
	1	1.4404	221-131.33	--	--	--
	1.6	1.4404	221-131.20	--	--	--
	2.5	1.4404	221-131.20	--	--	--
	4	1.4404	221-131.20	--	--	--
	6.3	1.4404	221-131.97	221-131.91	--	--
	10	1.4404	221-131.97	221-131.91	221-132.104	--
	16	1.4404	--	221-131.90	221-131.99	--
	25	1.4404	--	221-131.96	221-132.51	221-131.92
	35	1.4404	--	--	221-132.46	221-132.56
	40	1.4404	--	--	221-132.46	221-132.56
	60	1.4404	--	--	--	221-131.28

Spare Parts List Housing Connection S, Metallic Seal, Metric Sizes (DN 80 - DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
420	35	1.4404	221-132.105	--	--	--
	40	1.4404	221-132.105	--	--	--
	60	1.4404	221-132.53	221-131.09	--	--
	80	1.4404	221-131.80	221-131.83	--	--
	100	1.4404	--	221-131.83	221-132.108	--
	160	1.4404	--	221-131.81	221-132.109	--
	200	1.4404	--	--	221-407.77	221-132.107
	260	1.4404	--	--	221-004.629	221-132.110
	360	1.4404	--	--	--	221-132.111

Spare Parts List Housing Connection S for V-Ring Seal, Metric Sizes (DN 25 - DN 65)

Item	K <sub>VS</sub> value	Material	DN 25	DN 40	DN 50	DN 65
420	0.1	1.4404	221-407.115	--	--	--
	0.16	1.4404	221-407.115	--	--	--
	0.25	1.4404	221-407.115	--	--	--
	0.4	1.4404	221-131.19	--	--	--
	0.63	1.4404	221-131.19	--	--	--
	1	1.4404	221-131.19	--	--	--
	1.6	1.4404	221-131.94	--	--	--
	2.5	1.4404	221-131.94	--	--	--
	4	1.4404	221-131.94	--	--	--
	6.3	1.4404	221-407.97	221-407.99	--	--
	10	1.4404	221-407.97	221-407.99	221-407.104	--
	16	1.4404	--	221-407.60	221-407.61	--
	25	1.4404	--	221-407.63	221-407.56	221-132.16
	35	1.4404	--	--	221-131.95	221-132.92
	40	1.4404	--	--	221-131.95	221-132.92
	60	1.4404	--	--	--	221-407.58

Spare Parts List Housing Connection S for V-Ring Seal, Metric Sizes (DN 80 - DN 150)

Item	K <sub>VS</sub> value	Material	DN 80	DN 100	DN 125	DN 150
420	35	1.4404	221-407.105	--	--	--
	40	1.4404	221-407.105	--	--	--
	60	1.4404	221-407.59	221-407.81	--	--
	80	1.4404	221-407.57	221-131.02	--	--
	100	1.4404	--	221-131.02	221-407.106	--
	160	1.4404	--	221-131.21	221-407.107	--
	200	1.4404	--	--	221-132.17	221-407.109
	260	1.4404	--	--	221-407.108	221-407.87
	360	1.4404	--	--	--	221-407.111

Spare Parts List Items A, B, Metric Sizes

Item	Designation	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150
A	Actuator	See spare parts list/dimension sheet for actuator type VARIVENT®.							
B	Control top type T.VIS® P-15	See spare parts list for Control Top T.VIS P-15.							

Spare Parts List Items 1-5, Inch OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
1*	Sealing ring	EPDM	924-084	924-084	924-084	924-085	924-085	924-085
		FKM	924-082	924-082	924-082	924-083	924-083	924-083
		HNBR	924-311	924-311	924-311	924-313	924-313	924-313
2	Bearing Bearing, 3A	PTFE/carbon SUSTA-PVDF	935-001	935-001	935-001	935-002	935-002	935-002
			935-098	935-098	935-098	935-099	935-099	935-099
3	Sealing disk	1.4404	221-141.01	221-141.02	221-141.02	221-141.03	221-141.03	221-141.04
4	Bearing disk	1.4301	221-142.01	221-142.02	221-142.02	221-142.03	221-142.03	221-142.03
5*	O-ring	EPDM FKM HNBR	930-309	930-144	930-144	930-150	930-150	930-156
			930-168	930-171	930-171	930-176	930-176	930-178
			930-632	930-633	930-633	930-634	930-634	930-863
6*	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004

Items marked with an \* are wearing parts.

Spare Parts List V-Ring, Lantern, Spacer Nut, Inch OD

Item	Designa-tion	K <sub>VS</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
7*	V-ring	0.1 0.16 0.25 0.4 0.63 1 1.6 2.5 4	EPDM FKM FFKM HNBR	932-064 932-073 932-120 932-083	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --
		6.3	EPDM FKM FFKM HNBR	932-017 932-029 932-111 932-085	932-017 932-029 932-111 932-085	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --
		10	EPDM FKM FFKM HNBR	932-017 932-029 932-111 932-085	932-017 932-029 932-111 932-085	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --
		16	EPDM FKM FFKM HNBR	-- -- -- --	932-046 932-030 932-110 932-087	932-046 932-030 932-110 932-087	-- -- -- --	-- -- -- --	-- -- -- --
		25	EPDM FKM FFKM HNBR	-- -- -- --	932-019 932-032 932-113 932-084	932-019 932-032 932-113 932-084	932-019 932-032 932-113 932-084	-- -- -- --	-- -- -- --
		35	EPDM FKM FFKM HNBR	-- -- -- --	-- 932-033 932-114 932-088	932-021 932-033 932-114 932-088	932-021 932-033 932-114 932-088	932-021 932-033 932-114 932-088	-- -- -- --
		40	EPDM FKM FFKM HNBR	-- -- -- --	-- 932-033 932-114 932-088	932-021 932-033 932-114 932-088	932-021 932-033 932-114 932-088	932-021 932-033 932-114 932-088	-- -- -- --
		60	EPDM FKM FFKM HNBR	-- -- -- --	-- -- -- --	-- 932-034 932-115 932-089	932-023 932-034 932-115 932-089	932-023 932-034 932-115 932-089	932-023 932-034 932-115 932-089
		80	EPDM FKM FFKM HNBR	-- -- -- --	-- -- -- --	-- -- -- --	932-024 932-035 932-116 932-090	932-024 932-035 932-116 932-090	932-025 932-036 -- (932-101)

Spare Parts List V-Ring, Lantern, Spacer Nut, Inch OD (Cont.)

Item	Designa-tion	K <sub>VS</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
		100	EPDM	--	--	--	--	--	932-025
			FKM	--	--	--	--	--	932-036
			FFKM	--	--	--	--	--	--
			HNBR	--	--	--	--	--	(932-101)
		160	EPDM	--	--	--	--	--	932-028
			FKM	--	--	--	--	--	932-039
			FFKM	--	--	--	--	--	932-119
			HNBR	--	--	--	--	--	932-100
9	Lantern	--	1.4301	221-121.01	221-121.07	221-121.07	221-121.08	221-121.08	221-121.09
10	Spacer nut	--	1.4305	221-147.02	221-147.02	221-147.02	221-147.01	221-147.01	221-147.01

Spare Parts List Valve Disk SFM, Equal Percentage, Metallic Seal, Inch OD

Item	K <sub>VS</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
15	0.1	1.4404	221-005979	--	--	--	--	--
	0.16	1.4404	221-005981	--	--	--	--	--
	0.25	1.4404	221-005983	--	--	--	--	--
	0.4	1.4404	221-005985	--	--	--	--	--
	0.63	1.4404	221-005987	--	--	--	--	--
	1	1.4404	221-005990	--	--	--	--	--
	1.6	1.4404	221-005992	--	--	--	--	--
	2.5	1.4404	221-005994	--	--	--	--	--
	4.0	1.4404	221-005996	--	--	--	--	--
	6.3	1.4404	221-005998	221-006000	--	--	--	--
	10	1.4404	221-005472	221-005479	221-005482	--	--	--
	16	1.4404	--	221-005480	221-005484	--	--	--
	25	1.4404	--	221-005481	221-005486	221-005492	--	--
	35	1.4404	--	--	221-005488	221-005493	221-005496	--
	40	1.4404	--	--	221-005490	221-005494	221-005498	--
	60	1.4404	--	--	--	221-005495	221-005499	221-005500
	80	1.4404	--	--	--	--	221-006002	221-006005
	100	1.4404	--	--	--	--	--	221-006003
	160	1.4404	--	--	--	--	--	221-006007
	200	1.4404	--	--	--	--	--	--
	260	1.4404	--	--	--	--	--	--
	360	1.4404	--	--	--	--	--	--

Spare Parts List Valve Disk SFM/DF, Equal Percentage, Metallic Seal, Inch OD

Item	K <sub>V</sub> S value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	6" OD
15	0.1	1.4404	--	--	--	--	--	--	--
	0.16	1.4404	--	--	--	--	--	--	--
	0.25	1.4404	--	--	--	--	--	--	--
	0.4	1.4404	--	--	--	--	--	--	--
	0.63	1.4404	--	--	--	--	--	--	--
	1	1.4404	--	--	--	--	--	--	--
	1.6	1.4404	--	--	--	--	--	--	--
	2.5	1.4404	--	--	--	--	--	--	--
	4.0	1.4404	--	--	--	--	--	--	--
	6.3	1.4404	--	--	--	--	--	--	--
	10	1.4404	--	--	--	--	--	--	--
	16	1.4404	--	--	--	--	--	--	--
	25	1.4404	--	--	--	--	--	--	--
	35	1.4404	--	--	--	--	--	--	--
	40	1.4404	--	--	--	--	--	--	--
	60	1.4404	--	--	--	--	--	221-006243	--
	80	1.4404	--	--	--	--	--	221-006244	--
	100	1.4404	--	--	--	--	--	221-006245	--
	160	1.4404	--	--	--	--	--	221-006246	--
	200	1.4404	--	--	--	--	--	--	221-006247
	260	1.4404	--	--	--	--	--	--	221-006248
	360	1.4404	--	--	--	--	--	--	221-006249

Spare Parts List Valve Disk SJM, Linear, Metallic Seal, Inch OD

Item	K <sub>VS</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
15	0.1	1.4404	221-006073	--	--	--	--	--
	0.16	1.4404	221-006075	--	--	--	--	--
	0.25	1.4404	221-006077	--	--	--	--	--
	0.4	1.4404	221-006079	--	--	--	--	--
	0.63	1.4404	221-006081	--	--	--	--	--
	1	1.4404	221-006083	--	--	--	--	--
	1.6	1.4404	221-006085	--	--	--	--	--
	2.5	1.4404	221-006087	--	--	--	--	--
	4.0	1.4404	221-006089	--	--	--	--	--
	6.3	1.4404	221-006091	221-006093	--	--	--	--
	10	1.4404	221-005885	221-005887	221-005890	--	--	--
	16	1.4404	--	221-005888	221-005892	--	--	--
	25	1.4404	--	221-005889	221-005900	221-005912	--	--
	35	1.4404	--	--	221-005902	221-005913	221-005916	--
	40	1.4404	--	--	221-005904	221-005914	221-005917	--
	60	1.4404	--	--	--	221-005915	221-005918	221-005919
	80	1.4404	--	--	--	--	221-006094	221-006095
	100	1.4404	--	--	--	--	--	221-006097
	160	1.4404	--	--	--	--	--	--
	200	1.4404	--	--	--	--	--	--
	260	1.4404	--	--	--	--	--	--
	360	1.4404	--	--	--	--	--	--

Spare Parts List Valve Disk SJM/DF, Linear, Metallic Seal, Inch OD

Item	K <sub>V</sub> s value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	6" OD
15	0.1	1.4404	--	--	--	--	--	--	--
	0.16	1.4404	--	--	--	--	--	--	--
	0.25	1.4404	--	--	--	--	--	--	--
	0.4	1.4404	--	--	--	--	--	--	--
	0.63	1.4404	--	--	--	--	--	--	--
	1	1.4404	--	--	--	--	--	--	--
	1.6	1.4404	--	--	--	--	--	--	--
	2.5	1.4404	--	--	--	--	--	--	--
	4.0	1.4404	--	--	--	--	--	--	--
	6.3	1.4404	--	--	--	--	--	--	--
	10	1.4404	--	--	--	--	--	--	--
	16	1.4404	--	--	--	--	--	--	--
	25	1.4404	--	--	--	--	--	--	--
	35	1.4404	--	--	--	--	--	--	--
	40	1.4404	--	--	--	--	--	--	--
	60	1.4404	--	--	--	--	--	221-006257	--
	80	1.4404	--	--	--	--	--	221-006258	--
	100	1.4404	--	--	--	--	--	221-006259	--
	160	1.4404	--	--	--	--	--	221-006260	--
	200	1.4404	--	--	--	--	--	--	221-006261
	260	1.4404	--	--	--	--	--	--	221-006262
	360	1.4404	--	--	--	--	--	--	221-006263

Spare Parts List Valve Disk SFW, Equal Percentage, Soft Sealing, Inch OD

Item	K <sub>VS</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
15	0.1	1.4404	221-005443	--	--	--	--	--
	0.16	1.4404	221-005921	--	--	--	--	--
	0.25	1.4404	221-005923	--	--	--	--	--
	0.4	1.4404	221-005925	--	--	--	--	--
	0.63	1.4404	221-005927	--	--	--	--	--
	1	1.4404	221-005929	--	--	--	--	--
	1.6	1.4404	221-005931	--	--	--	--	--
	2.5	1.4404	221-005933	--	--	--	--	--
	4.0	1.4404	221-005935	--	--	--	--	--
	6.3	1.4404	221-005937	221-005939	--	--	--	--
	10	1.4404	221-005445	221-005447	221-005450	--	--	--
	16	1.4404	--	221-005448	221-005452	--	--	--
	25	1.4404	--	221-005449	221-005454	221-005459	--	--
	35	1.4404	--	--	221-005455	221-005460	221-005463	--
	40	1.4404	--	--	221-005457	221-005461	221-005464	--
	60	1.4404	--	--	--	221-005462	221-005465	221-005466
	80	1.4404	--	--	--	--	221-005940	221-005941
	100	1.4404	--	--	--	--	--	221-005943
	160	1.4404	--	--	--	--	--	221-005945
	200	1.4404	--	--	--	--	--	--
	260	1.4404	--	--	--	--	--	--
	360	1.4404	--	--	--	--	--	--

Spare Parts List Valve Disk SFW/DF, Equal Percentage, Soft Sealing, Inch OD

Item	K <sub>V</sub> S value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	6" OD
15	0.1	1.4404	--	--	--	--	--	--	--
	0.16	1.4404	--	--	--	--	--	--	--
	0.25	1.4404	--	--	--	--	--	--	--
	0.4	1.4404	--	--	--	--	--	--	--
	0.63	1.4404	--	--	--	--	--	--	--
	1	1.4404	--	--	--	--	--	--	--
	1.6	1.4404	--	--	--	--	--	--	--
	2.5	1.4404	--	--	--	--	--	--	--
	4.0	1.4404	--	--	--	--	--	--	--
	6.3	1.4404	--	--	--	--	--	--	--
	10	1.4404	--	--	--	--	--	--	--
	16	1.4404	--	--	--	--	--	--	--
	25	1.4404	--	--	--	--	--	--	--
	35	1.4404	--	--	--	--	--	--	--
	40	1.4404	--	--	--	--	--	--	--
	60	1.4404	--	--	--	--	--	221-006236	--
	80	1.4404	--	--	--	--	--	221-006237	--
	100	1.4404	--	--	--	--	--	221-006238	--
	160	1.4404	--	--	--	--	--	221-006239	--
	200	1.4404	--	--	--	--	--	--	221-006240
	260	1.4404	--	--	--	--	--	--	221-006241
	360	1.4404	--	--	--	--	--	--	221-006242

Spare Parts List Valve Disk SJW, Linear, Soft Sealing, Inch OD

Item	K <sub>VS</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
15	0.1	1.4404	221-006034	--	--	--	--	--
	0.16	1.4404	221-006036	--	--	--	--	--
	0.25	1.4404	221-006038	--	--	--	--	--
	0.4	1.4404	221-006040	--	--	--	--	--
	0.63	1.4404	221-006042	--	--	--	--	--
	1	1.4404	221-006044	--	--	--	--	--
	1.6	1.4404	221-006046	--	--	--	--	--
	2.5	1.4404	221-006048	--	--	--	--	--
	4.0	1.4404	221-006050	--	--	--	--	--
	6.3	1.4404	221-006052	221-006054	--	--	--	--
	10	1.4404	221-005611	221-005613	221-005616	--	--	--
	16	1.4404	--	221-005614	221-005618	--	--	--
	25	1.4404	--	221-005615	221-005620	221-005640	--	--
	35	1.4404	--	--	221-005622	221-005652	221-005655	--
	40	1.4404	--	--	221-005629	221-005653	221-005656	--
	60	1.4404	--	--	--	221-005654	221-005657	221-005659
	80	1.4404	--	--	--	--	221-006055	221-006056
	100	1.4404	--	--	--	--	--	221-006058
	160	1.4404	--	--	--	--	--	221-006060
	200	1.4404	--	--	--	--	--	--
	260	1.4404	--	--	--	--	--	--
	360	1.4404	--	--	--	--	--	--

Spare Parts List Valve Disk SJW/DF, Linear, Soft Sealing, Inch OD

Item	K <sub>Vs</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	6" OD
15	0.1	1.4404	--	--	--	--	--	--	--
	0.16	1.4404	--	--	--	--	--	--	--
	0.25	1.4404	--	--	--	--	--	--	--
	0.4	1.4404	--	--	--	--	--	--	--
	0.63	1.4404	--	--	--	--	--	--	--
	1	1.4404	--	--	--	--	--	--	--
	1.6	1.4404	--	--	--	--	--	--	--
	2.5	1.4404	--	--	--	--	--	--	--
	4.0	1.4404	--	--	--	--	--	--	--
	6.3	1.4404	--	--	--	--	--	--	--
	10	1.4404	--	--	--	--	--	--	--
	16	1.4404	--	--	--	--	--	--	--
	25	1.4404	--	--	--	--	--	--	--
	35	1.4404	--	--	--	--	--	--	--
	40	1.4404	--	--	--	--	--	--	--
	60	1.4404	--	--	--	--	--	221-006250	--
	80	1.4404	--	--	--	--	--	221-006251	--
	100	1.4404	--	--	--	--	--	221-006252	--
	160	1.4404	--	--	--	--	--	221-006253	--
	200	1.4404	--	--	--	--	--	--	221-006254
	260	1.4404	--	--	--	--	--	--	221-006255
	360	1.4404	--	--	--	--	--	--	221-006256

Spare Parts List Items 29, 30, Inch OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
29*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026
30*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026

Items marked with an \* are wearing parts.

Spare Parts List Seat Ring, Inch OD

Item	K <sub>VS</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
33	0.1	1.4404	221-107.102	--	--	--	--	--
	0.16	1.4404	221-107.102	--	--	--	--	--
	0.25	1.4404	221-107.102	--	--	--	--	--
	0.4	1.4404	221-107.81	--	--	--	--	--
	0.63	1.4404	221-107.81	--	--	--	--	--
	1	1.4404	221-107.81	--	--	--	--	--
	1.6	1.4404	221-107.24	--	--	--	--	--
	2.5	1.4404	221-107.24	--	--	--	--	--
	4	1.4404	221-107.24	--	--	--	--	--
	6.3	1.4404	221-107.25	221-107.27	--	--	--	--
	10	1.4404	221-107.25	221-107.27	221-107.27	--	--	--
	16	1.4404	--	221-107.28	221-107.28	--	--	--
	25	1.4404	--	221-107.29	221-107.29	221-107.31	--	--
	35	1.4404	--	--	221-107.30	221-107.32	221-107.32	--
	40	1.4404	--	--	221-107.30	221-107.32	221-107.32	--
	60	1.4404	--	--	--	221-107.33	221-107.33	221-107.35
	80	1.4404	--	--	--	--	221-107.34	221-107.36
	100	1.4404	--	--	--	--	--	221-107.36
	160	1.4404	--	--	--	--	--	221-107.37

Spare Parts List Items 35, 43, 46, 401, 402, Inch OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
35	Cover	1.4404	221-144.01	221-144.02	221-144.02	221-144.03	221-144.03	221-144.04
43	Clamp connection KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09	221-507.09	221-507.11
46	Clamp connection KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06
401	Housing V1	1.4404	221-101.27	221-101.28	221-101.29	221-101.30	221-101.31	221-101.32
402	Housing V2	1.4404	221-102.52	221-102.53	221-102.54	221-102.55	221-102.56	221-102.57

Spare Parts List, Housing Connection S, Inch OD

Item	K <sub>VS</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
420	0.1	1.4404	221-132.114	--	--	--	--	--
	0.16	1.4404	221-132.114	--	--	--	--	--
	0.25	1.4404	221-132.114	--	--	--	--	--
	0.4	1.4404	221-407.95	--	--	--	--	--
	0.63	1.4404	221-407.95	--	--	--	--	--
	1	1.4404	221-407.95	--	--	--	--	--
	1.6	1.4404	221-132.50	--	--	--	--	--
	2.5	1.4404	221-132.50	--	--	--	--	--
	4.0	1.4404	221-132.50	--	--	--	--	--
	6.3	1.4404	221-407.09	221-132.48	--	--	--	--
	10	1.4404	221-407.09	221-132.48	221-132.113	--	--	--
	16	1.4404	--	221-407.65	221-131.68	--	--	--
	25	1.4404	--	221-131.93	221-132.49	221-407.73	--	--
	35	1.4404	--	--	221-131.98	221-407.20	221-407.23	--
	40	1.4404	--	--	221-131.98	221-407.20	221-407.23	--
	60	1.4404	--	--	--	221-132.112	221-407.74	221-407.86
	80	1.4404	--	--	--	--	221-004.872	221-132.52
	100	1.4404	--	--	--	--	--	221-132.52
	160	1.4404	--	--	--	--	--	221-132.106

Spare Parts List, Housing Connection S for V-Ring Seal, Inch OD

Item	K <sub>VS</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
420	0.1	1.4404	221-407.114	--	--	--	--	--
	0.16	1.4404	221-407.114	--	--	--	--	--
	0.25	1.4404	221-407.114	--	--	--	--	--
	0.4	1.4404	221-407.94	--	--	--	--	--
	0.63	1.4404	221-407.94	--	--	--	--	--
	1	1.4404	221-407.94	--	--	--	--	--
	1.6	1.4404	221-131.24	--	--	--	--	--
	2	1.4404	221-131.24	--	--	--	--	--
	4	1.4404	221-131.24	--	--	--	--	--
	6.3	1.4404	221-131.85	221-131.86	--	--	--	--
	10	1.4404	221-131.85	221-131.86	221-407.113	--	--	--
	16	1.4404	--	221-407.66	221-407.79	--	--	--
	25	1.4404	--	221-131.87	221-407.70	221-131.89	--	--
	35	1.4404	--	--	221-407.72	221-132.38	221-132.36	--
	40	1.4404	--	--	221-407.72	221-132.38	221-132.36	--
	60	1.4404	--	--	--	221-131.84	221-407.64	221-407.75
	80	1.4404	--	--	--	--	221-407.110	221-131.88
	100	1.4404	--	--	--	--	--	221-131.88
	160	1.4404	--	--	--	--	--	221-407.112

Spare Parts List Items A, B, Inch OD

Item	Designation	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
A	Actuator	See spare parts list/dimension sheet for actuator type VARIVENT®.					
B	Control top type T.VIS® P-15	See spare parts list for Control Top T.VIS P-15.					

Spare Parts List, Items 1-5, Inch IPS

Item	Designation	Material	2" IPS	3" IPS	4" IPS	6" IPS
1*	Sealing ring	EPDM FKM HNBR	924-084 924-082 924-311	924-085 924-083 924-313	924-085 924-083 924-313	924-088 924-087 --
2	Bearing Bearing, 3A	PTFE/carbon SUSTA-PVDF	935-001 935-098	935-002 935-099	935-002 935-099	935-003 935-102
3	Sealing disk	1.4404	221-141.02	221-141.03	221-141.04	221-141.05
4	Bearing disk	1.4301	221-142.02	221-142.03	221-142.03	221-142.04
5*	O-ring	EPDM FKM HNBR	930-144 930-171 930-633	930-150 930-176 930-634	930-156 930-178 930-863	930-260 930-259 --
6*	O-ring	NBR	930-004	930-004	930-004	930-007

Items marked with an \* are wearing parts.

Spare Parts List V-Ring, Lantern, Spacer Nut, Inch IPS

Item	Designation	K <sub>VS</sub> value	Material	2" IPS	3" IPS	4" IPS	6" IPS
7*	V-ring	10	EPDM FKM FFKM HNBR	932-017 932-029 932-111 932-085	-- -- -- --	-- -- -- --	-- -- -- --
		16	EPDM FKM FFKM HNBR	932-046 932-030 932-110 932-087	-- -- -- --	-- -- -- --	-- -- -- --
		25	EPDM FKM FFKM HNBR	932-019 932-032 932-113 932-084	-- -- -- --	-- -- -- --	-- -- -- --
		35	EPDM FKM FFKM HNBR	932-021 932-033 932-114 932-088	932-021 932-033 932-114 932-088	-- -- -- --	-- -- -- --
		40	EPDM FKM FFKM HNBR	932-021 932-033 932-114 932-088	932-021 932-033 932-114 932-088	-- -- -- --	-- -- -- --
		60	EPDM FKM FFKM HNBR	-- -- -- --	932-023 932-034 932-115 932-089	932-023 932-034 932-115 932-089	-- -- -- --

**Spare Parts List V-Ring, Lantern, Spacer Nut, Inch IPS (Cont.)**

Item	Designation	K <sub>VS</sub> value	Material	2" IPS	3" IPS	4" IPS	6" IPS
		80	EPDM	--	932-024	932-025	--
			FKM	--	932-035	932-036	--
			FFKM	--	932-116	--	--
			HNBR	--	932-090	(932-101)	--
		100	EPDM	--	--	932-025	--
			FKM	--	--	932-036	--
			FFKM	--	--	--	--
			HNBR	--	--	(932-101)	--
		160	EPDM	--	--	932-028	--
			FKM	--	--	932-039	--
			FFKM	--	--	932-119	--
			HNBR	--	--	932-100	--
		200	EPDM	--	--	--	932-059
			FKM	--	--	--	932-063
			FFKM	--	--	--	--
			HNBR	--	--	--	--
		260	EPDM	--	--	--	932-045
			FKM	--	--	--	932-044
			FFKM	--	--	--	--
			HNBR	--	--	--	--
		360	EPDM	--	--	--	932-042
			FKM	--	--	--	932-041
			FFKM	--	--	--	932-079
			HNBR	--	--	--	--
9	Lantern	--	1.4301	221-121.12	221-121.10	221-121.11	221-121.05
10	Spacer nut	--	1.4305	221-147.02	221-147.01	221-147.01	221-147.06

Spare Parts List Valve Disk SFM, Equal Percentage, Metallic Seal, Inch IPS

Item	K <sub>VS</sub> value	Material	2" IPS	3" IPS	4" IPS	6" IPS
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	221-00	--	--	--
	16	1.4404	221-00	--	--	--
	25	1.4404	221-00	--	--	--
	35	1.4404	221-00	221-00	--	--
	40	1.4404	221-00	221-00	--	--
	60	1.4404	--	221-00	221-00	--
	80	1.4404	--	221-00	221-00	--
	100	1.4404	--	--	221-00	--
	160	1.4404	--	--	221-00	--
	200	1.4404	--	--	--	221-00
	260	1.4404	--	--	--	221-00
	360	1.4404	--	--	--	221-00

Spare Parts List Valve Disk SJM, Linear, Metallic Seal, Inch IPS

Item	K <sub>VS</sub> value	Material	2" IPS	3" IPS	4" IPS	6" IPS
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	221-00	--	--	--
	16	1.4404	221-00	--	--	--
	25	1.4404	221-00	--	--	--
	35	1.4404	221-00	221-00	--	--
	40	1.4404	221-00	221-00	--	--
	60	1.4404	--	221-00	221-00	--
	80	1.4404	--	221-00	221-00	--
	100	1.4404	--	--	221-00	--
	160	1.4404	--	--	221-00	--
	200	1.4404	--	--	--	221-00
	260	1.4404	--	--	--	221-00
	360	1.4404	--	--	--	221-00

Spare Parts List Valve Disk SFW, Equal Percentage, Soft Sealing, Inch IPS

Item	K <sub>VS</sub> value	Material	2" IPS	3" IPS	4" IPS	6" IPS
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	221-00	--	--	--
	16	1.4404	221-00	--	--	--
	25	1.4404	221-00	--	--	--
	35	1.4404	221-00	221-00	--	--
	40	1.4404	221-00	221-00	--	--
	60	1.4404	--	221-00	221-00	--
	80	1.4404	--	221-00	221-00	--
	100	1.4404	--	--	221-00	--
	160	1.4404	--	--	221-00	--
	200	1.4404	--	--	--	221-00
	260	1.4404	--	--	--	221-00
	360	1.4404	--	--	--	221-00

**Spare Parts List Valve Disk SJW, Linear, Soft Sealing, Inch IPS**

Item	K <sub>VS</sub> value	Material	2" IPS	3" IPS	4" IPS	6" IPS
15	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	221-00	--	--	--
	16	1.4404	221-00	--	--	--
	25	1.4404	221-00	--	--	--
	35	1.4404	221-00	221-00	--	--
	40	1.4404	221-00	221-00	--	--
	60	1.4404	--	221-00	221-00	--
	80	1.4404	--	221-00	221-00	--
	100	1.4404	--	--	221-00	--
	160	1.4404	--	--	221-00	--
	200	1.4404	--	--	--	221-00
	260	1.4404	--	--	--	221-00
	360	1.4404	--	--	--	221-00

**Spare Parts List Items 29, 30, Inch IPS**

Item	Designation	Material	2" IPS	3" IPS	4" IPS	6" IPS
29*	O-ring	NBR	930-026	930-026	930-026	930-035
30*	O-ring	NBR	930-026	930-026	930-026	930-026

Items marked with an \* are wearing parts.

Spare Parts List Seat Ring, Inch IPS

Item	K <sub>VS</sub> value	Material	2" IPS	3" IPS	4" IPS	6" IPS
33	10	1.4404	221-107.27	--	--	--
	16	1.4404	221-107.28	--	--	--
	25	1.4404	221-107.29	--	--	--
	35	1.4404	221-107.30	221-107.32	--	--
	40	1.4404	221-107.30	221-107.32	--	--
	60	1.4404	--	221-107.33	221-107.35	--
	80	1.4404	--	221-107.34	221-107.36	--
	100	1.4404	--	--	221-107.36	--
	160	1.4404	--	--	221-107.37	--
	200	1.4404	--	--	--	221-107.40
	260	1.4404	--	--	--	221-107.41
	360	1.4404	--	--	--	221-107.105

Spare Parts List Items 35, 43, 46, 401, 402, Inch IPS

Item	Designation	Material	2" IPS	3" IPS	4" IPS	6" IPS
35	Cover	1.4404	221-144.02	221-144.03	221-144.04	221-144.05
43	Clamp connection KL	1.4401	221-507.04	221-507.03	221-507.11	221-507.14
46	Clamp connection KL	1.4401	221-507.06	221-507.09	221-507.06	221-507.11
401	Housing V1	1.4404	221-101.37	221-101.35	221-101.36	221-101.17
402	Housing V2	1.4404	221-102.62	221-102.59	221-102.60	221-102.17

Spare Parts List, Housing Connection S, Inch IPS

Item	K <sub>VS</sub> value	Material	2" IPS	3" IPS	4" IPS	6" IPS
420	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2.5	1.4404	--	--	--	--
	4.0	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	221-407.88	--	--	--
	35	1.4404	--	--	--	--
	40	1.4404	--	--	--	--
	60	1.4404	--	--	221-407.102	--
	80	1.4404	--	--	--	--
	100	1.4404	--	--	--	--
	160	1.4404	--	--	--	--

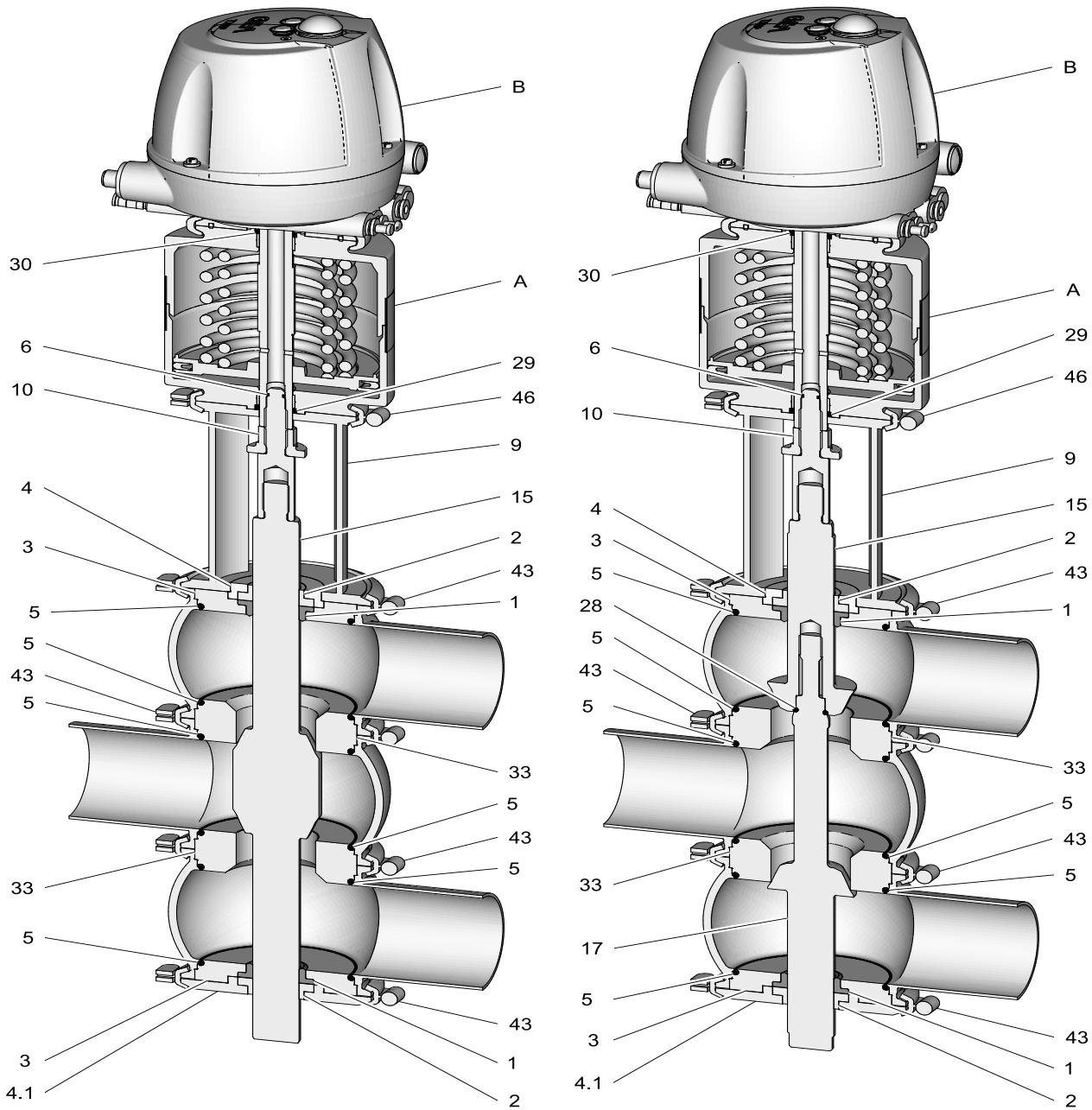
Spare Parts List, Housing Connection S for V-Ring Seal, Inch IPS

Item	K <sub>VS</sub> value	Material	2" IPS	3" IPS	4" IPS	6" IPS
420	0.1	1.4404	--	--	--	--
	0.16	1.4404	--	--	--	--
	0.25	1.4404	--	--	--	--
	0.4	1.4404	--	--	--	--
	0.63	1.4404	--	--	--	--
	1	1.4404	--	--	--	--
	1.6	1.4404	--	--	--	--
	2	1.4404	--	--	--	--
	4	1.4404	--	--	--	--
	6.3	1.4404	--	--	--	--
	10	1.4404	--	--	--	--
	16	1.4404	--	--	--	--
	25	1.4404	--	--	--	--
	35	1.4404	--	--	--	--
	40	1.4404	--	--	--	--
	60	1.4404	--	--	221-407.101	--
	80	1.4404	--	--	--	--
	100	1.4404	--	--	--	--
	160	1.4404	--	--	--	--
	200	1.4404	--	--	--	221-132.86
	260	1.4404	--	--	--	221-407.80
	360	1.4404	--	--	--	--

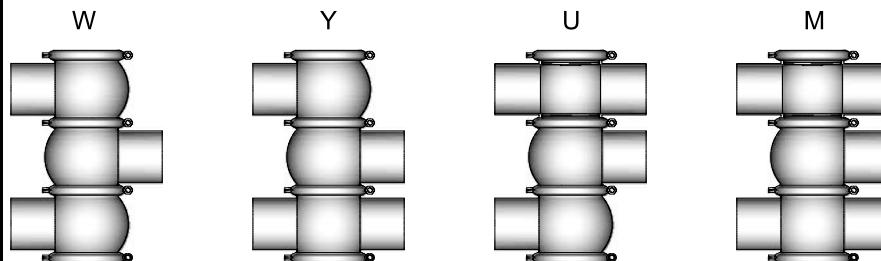
Spare Parts List Items A, B, Inch IPS

Item	Designation	2" IPS	3" IPS	4" IPS	6" IPS
A	Actuator	See spare parts list/dimension sheet for actuator type VARIVENT®.			
B	Control top type T.VIS® P-15	See spare parts list for Control Top T.VIS® P-15.			

## VARIVENT Control Valve Type P - Divert Valves W / X



Type W (SWW) and Type X (SXW)



Housing combinations

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GEA Tuchenhausen GmbH

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Spare Parts List, Items 1-10, Metric Sizes

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
1	Sealing ring	EPDM FKM HNBR	924-084 924-082 924-311	924-084 924-082 924-311	924-084 924-082 924-311	924-085 924-083 924-313	924-085 924-083 924-313	924-085 924-083 924-313
2	Bearing Bearing, 3A	PTFE/carbo n SUSTA- PVDF	935-001 935-098	935-001 935-098	935-001 935-098	935-002 935-099	935-002 935-099	935-002 935-099
3	Sealing disk	1.4404	221-141.01	221-141.02	221-141.02	221-141.03	221-141.03	221-141.04
4	Bearing disk	1.4301	221-142.01	221-142.02	221-142.02	221-142.03	221-142.03	221-142.03
4.1	Bearing disk	1.4301	221-142.15	221-142.10	221-142.10	221-142.11	221-142.11	221-142.12
5	O-ring	EPDM FKM HNBR	930-309 930-168 930-632	930-144 930-171 930-633	930-144 930-171 930-633	930-150 930-176 930-634	930-150 930-176 930-634	930-156 930-178 930-863
9	Lantern	1.4301	221-121.01	221-121.02	221-121.02	221-121.03	221-121.03	221-186.03
10	Spacer nut	1.4305	221-147.02	221-147.02	221-147.02	221-147.01	221-147.01	221-147.01

Items marked with an \* are wearing parts.

Spare Parts List Item 15 - Divert Valve W, Linear, Metallic Seal, Metric Sizes

Item	Designation	K <sub>v</sub> value	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
15	Valve disk W	6.3	1.4404	221-006109	--	--	--	--	--
		16	1.4404	--	221-006110	--	--	--	--
		25	1.4404	--	--	221-006111	--	--	--
		35	1.4404	--	--	--	221-006112	--	--
		60	1.4404	--	--	--	--	221-006113	--
		100	1.4404	--	--	--	--	--	221-006114

Spare Parts List Item 15 - Divert Valve X - Valve Disk X1, Linear, Metallic Seal, Metric Sizes

Item	Designation	K <sub>v</sub> value	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
15	Valve disk X1	6.3	1.4404	221-006121	--	--	--	--	--
		16	1.4404	--	221-006122	--	--	--	--
		25	1.4404	--	--	221-006123	--	--	--
		35	1.4404	--	--	--	221-006124	--	--
		60	1.4404	--	--	--	--	221-006125	--
		100	1.4404	--	--	--	--	--	221-006126

Spare Parts List Item 17 - Divert Valve X - Valve Disk X2, Linear, Metallic Seal, Metric Sizes

Item	Designation	K <sub>v</sub> value	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
17	Valve disk X2	6.3	1.4404	221-762.29	--	--	--	--	--
		16	1.4404	--	221-762.30	--	--	--	--
		25	1.4404	--	--	221-762.31	--	--	--
		35	1.4404	--	--	--	221-762.32	--	--
		60	1.4404	--	--	--	--	221-762.33	--
		100	1.4404	--	--	--	--	--	221-762.34

Spare Parts List Item 28 - Divert Valve X, Metric Sizes

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
28	O-ring		13x3	13x3	15x3	15x3	15x3	15x3
		EPDM	930-001	930-001	930-276	930-276	930-276	930-276
		FKM	930-009	930-009	930-277	930-277	930-277	930-277
		HNBR	930-002	930-002	930-627	930-627	930-627	930-627

Spare Parts List Item 29, 30 Metric Sizes

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
29*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026
30*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026

Items marked with an \* are wearing parts.

Spare Parts List, Item 33, Metric Sizes

Item	Designation	K <sub>v</sub> value	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
33	Seat ring	6.3	1.4404	221-107.25	--	--	--	--	--
		16	1.4404	--	221-107.28	--	--	--	--
		25	1.4404	--	--	221-107.29	--	--	--
		35	1.4404	--	--	--	221-107.32	--	--
		60	1.4404	--	--	--	--	221-107.33	--
		100	1.4404	--	--	--	--	--	221-107.36

Spare Parts List Items 43-45, 48, 401, 402, Metric Sizes

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
43	Clamp connection KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09	221-507.09	221-507.11
46	Clamp connection KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06
401	Housing V1	1.4404	221-101.19	221-101.21	221-101.22	221-101.05	221-101.06	221-101.07
402	Housing V2	1.4404	221-102.41	221-102.43	221-102.44	221-102.05	221-102.06	221-102.07

Spare Parts List Item A, B, Metric Sizes

Item	Designation	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
A	Actuator	see spare parts list/dimension sheet for Actuator VARIVENT®					
B	Control top T.VIS® P-15	see spare parts list for Control top T.VIS P-15					

Spare Parts List Items 1-10, Inch OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
1	Sealing ring	EPDM FKM HNBR	924-084 924-082 924-311	924-084 924-082 924-311	924-084 924-082 924-311	924-085 924-083 924-313	924-085 924-083 924-313	924-085 924-083 924-313
2	Bearing Bearing, 3A	PTFE/carbo n SUSTA- PVDF	935-001 935-098	935-001 935-098	935-001 935-098	935-002 935-099	935-002 935-099	935-002 935-099
3	Sealing disk	1.4404	221-141.01	221-141.02	221-141.02	221-141.03	221-141.03	221-141.04
4	Bearing disk	1.4301	221-142.01	221-142.02	221-142.02	221-142.03	221-142.03	221-142.03
4.1	Bearing disk	1.4301	221-142.15	221-142.10	221-142.10	221-142.11	221-142.11	221-142.12
5	O-ring	EPDM FKM HNBR	930-309 930-168 930-632	930-144 930-171 930-633	930-144 930-171 930-633	930-150 930-176 930-634	930-150 930-176 930-634	930-156 930-178 930-863
9	Lantern	1.4301	221-121.01	221-121.07	221-121.07	221-121.08	221-121.08	221-186.05
10	Spacer nut	1.4305	221-147.02	221-147.02	221-147.02	221-147.01	221-147.01	221-147.01

Items marked with an \* are wearing parts.

Spare Parts List Item 15 - Divert Valve W, Linear, Metallic Seal, Inch OD

Item	Designation	K <sub>v</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
15	Valve disk W	6.3	1.4404	221-006115	--	--	--	--	--
		16	1.4404	--	221-006116	--	--	--	--
		25	1.4404	--	--	221-006117	--	--	--
		35	1.4404	--	--	--	221-006118	--	--
		60	1.4404	--	--	--	--	221-006119	--
		100	1.4404	--	--	--	--	--	221-006120

Spare Parts List Item 15 - Divert Valve X - Valve Disk X1, Linear, Metallic Seal, Inch OD

Item	Designation	K <sub>v</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
15	Valve disk X1	6.3	1.4404	221-006127	--	--	--	--	--
		16	1.4404	--	221-006122	--	--	--	--
		25	1.4404	--	--	221-006123	--	--	--
		35	1.4404	--	--	--	221-006124	--	--
		60	1.4404	--	--	--	--	221-006125	--
		100	1.4404	--	--	--	--	--	221-006126

Spare Parts List Item 17, Divert Valve X - Valve Disk X2, Linear, Metallic Seal, Inch OD

Item	Designation	K <sub>v</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
17	Valve disk X2	6.3	1.4404	221-762.35	--	--	--	--	--
		16	1.4404	--	221-762.36	--	--	--	--
		25	1.4404	--	--	221-762.37	--	--	--
		35	1.4404	--	--	--	221-762.38	--	--
		60	1.4404	--	--	--	--	221-762.39	--
		100	1.4404	--	--	--	--	--	221-762.40

Spare Parts List Item 28 - Divert Valve X, Inch OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
28	O-ring		13x3	13x3	15x3	15x3	15x3	15x3
		EPDM	930-001	930-001	930-276	930-276	930-276	930-276
		FKM	930-009	930-009	930-277	930-277	930-277	930-277
		HNBR	930-002	930-002	930-627	930-627	930-627	930-627

**Spare Parts List Item 29, 30, Inch OD**

Item	Designation	Material	1" OD	1,5" OD	2" OD	2,5" OD	3" OD	4" OD
29*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026
30*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026

Items marked with an \* are wearing parts.

**Spare Parts List, Item 33, Inch OD**

Item	Designation	K <sub>v</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
33	Seat ring	6.3	1.4404	221-107.25	--	--	--	--	--
		16	1.4404	--	221-107.28	--	--	--	--
		25	1.4404	--	--	221-107.29	--	--	--
		35	1.4404	--	--	--	221-107.32	--	--
		60	1.4404	--	--	--	--	221-107.33	--
		100	1.4404	--	--	--	--	--	221-107.36

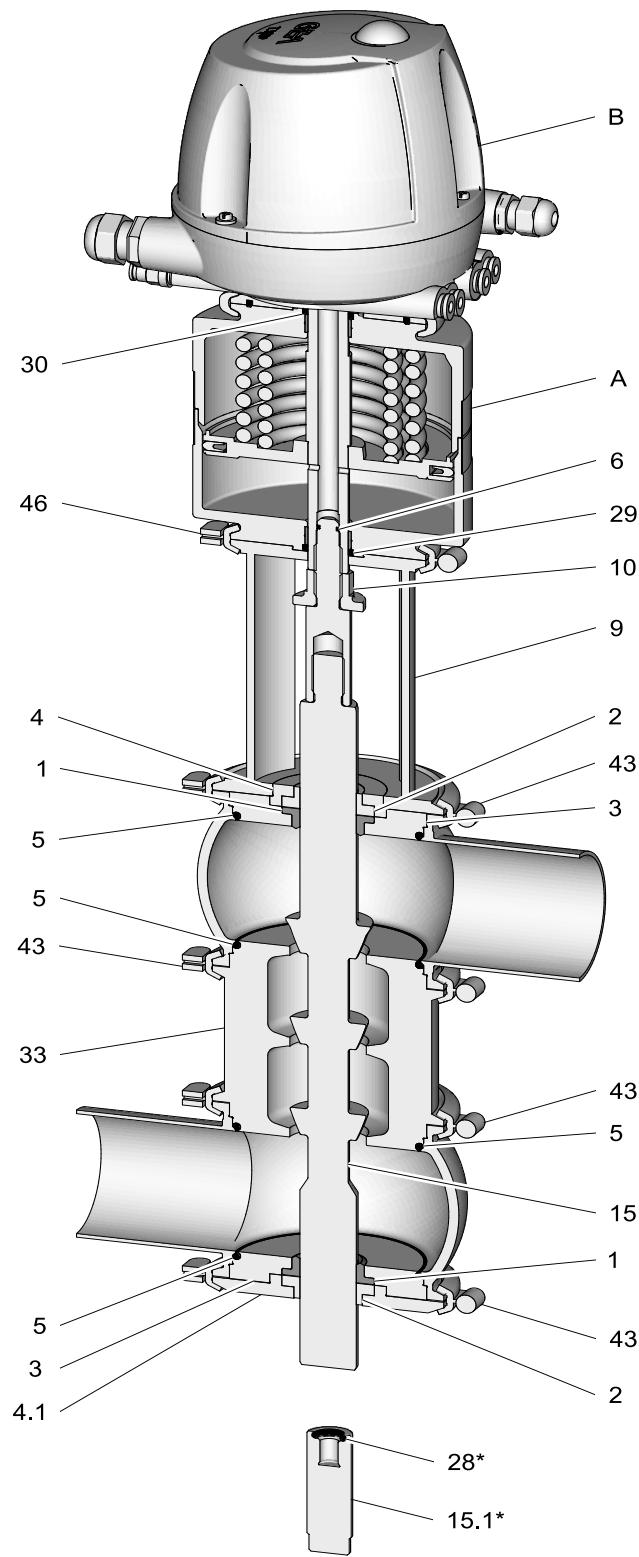
**Spare Parts List Items 43-45, 48, 401, 402, Inch OD**

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
43	Clamp connection KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09	221-507.09	221-507.11
46	Clamp connection KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06
401	Housing V1	1.4404	221-101.27	221-101.28	221-101.29	221-101.30	221-101.31	221-101.32
402	Housing V2	1.4404	221-102.52	221-102.53	221-102.54	221-102.55	221-102.56	221-102.57

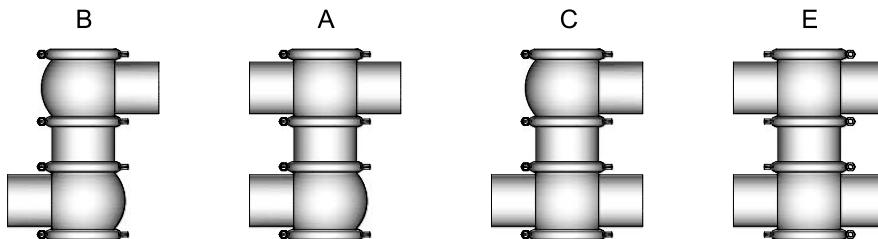
**Spare Parts List Items A, B, Inch OD**

Item	Designation	1" OD	1,5" OD	2" OD	2,5" OD	3" OD	4" OD
A	Actuator	see spare parts list/dimension sheet for Actuator VARIVENT®					
B	Control top T.VIS® P-15	see spare parts list for Control top T.VIS P-15					

## VARIVENT Control Valve Type P - 3-Stage Seat K



\* Valid only for DN 25 and 1" OD



Housing combinations

Table of Dimensions

Metric sizes	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
Inch OD	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
a	12	12	12	15	15	15
h	28	51	51	75	75	85
H	52	75	75	105	105	115

Spare Parts List, Items 1-10, Metric Sizes

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
1	Sealing ring	EPDM FKM HNBR	924-084 924-082 924-311	924-084 924-082 924-311	924-084 924-082 924-311	924-085 924-083 924-313	924-085 924-083 924-313	924-085 924-083 924-313
2	Bearing Bearing, 3A	PTFE/carbo n SUSTA- PVDF	935-001 935-098	935-001 935-098	935-001 935-098	935-002 935-099	935-002 935-099	935-002 935-099
3	Sealing disk	1.4404	221-141.01	221-141.02	221-141.02	221-141.03	221-141.03	221-141.04
4	Bearing disk	1.4301	221-142.01	221-142.02	221-142.02	221-142.03	221-142.03	221-142.03
4.1	Bearing disk	1.4301	221-142.15	221-142.10	221-142.10	221-142.11	221-142.11	221-142.12
5	O-ring	EPDM FKM HNBR	930-309 930-168 930-632	930-144 930-171 930-633	930-144 930-171 930-633	930-150 930-176 930-634	930-150 930-176 930-634	930-156 930-178 930-863
9	Lantern	1.4301	221-121.01	221-121.02	221-121.02	221-121.03	221-121.03	221-121.04
10	Spacer nut	1.4305	221-147.02	221-147.02	221-147.02	221-147.01	221-147.01	221-147.01

Items marked with an \* are wearing parts.

Spare Parts List Item 15 - 3-Stage Seat, Linear, Metallic Seal, Metric Sizes

Item	Designation	K <sub>v</sub> value	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
15	Valve disk SJM-3S	2.3 3xK <sub>v</sub> 4	1.4404	221-006144	--	--	--	--	--
		5.8 3xK <sub>v</sub> 10	1.4404	--	221-006139	--	--	--	--
		9.2 3xK <sub>v</sub> 16	1.4404	--	--	221-006140	--	--	--
		14.4 3xK <sub>v</sub> 25	1.4404	--	--	--	221-006142	--	--
		23.1 3xK <sub>v</sub> 40	1.4404	--	--	--	--	221-006141	--
		34.6 3xK <sub>v</sub> 60	1.4404	--	--	--	--	--	221-006143
15.	Valve disk SJM-3S	2.3 3xK <sub>v</sub> 4	1.4404	221-005334	--	--	--	--	--

Spare Parts List Item 28 - Divert Valve X, Metric Sizes

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
28	O-ring (11x3)	EPDM	930-311	--	--	--	--	--
		FKM	930-335	--	--	--	--	--
		HNBR	930-803	--	--	--	--	--

Spare Parts List Item 29, 30 Metric Sizes

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
29*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026
30*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026

Items marked with an \* are wearing parts.

**Spare Parts List, Item 33 - 3-Stage Seat, Metric Sizes**

Item	Designation	K <sub>v</sub> value	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
33	3-stage seat S	2.3 3xK <sub>v</sub> 4	1.4404	229-168.35	--	--	--	--	--
		5.8 3xK <sub>v</sub> 10	1.4404	--	229-168.36	--	--	--	--
		9.2 3xK <sub>v</sub> 16	1.4404	--	--	229-168.37	--	--	--
		14.4 3xK <sub>v</sub> 25	1.4404	--	--	--	229-168.38	--	--
		23.1 3xK <sub>v</sub> 40	1.4404	--	--	--	--	229-168.34	--
		34.6 3xK <sub>v</sub> 60	1.4404	--	--	--	--	--	229-168.39

**Spare Parts List Items 43-45, 48, 401, 402, Metric Sizes**

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
43	Clamp connection KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09	221-507.09	221-507.11
46	Clamp connection KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06
401	Housing V1	1.4404	221-101.19	221-101.21	221-101.22	221-101.05	221-101.06	221-101.07
402	Housing V2	1.4404	221-102.41	221-102.43	221-102.44	221-102.05	221-102.06	221-102.07

**Spare Parts List Item A, B, Metric Sizes**

Item	Designation	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100	
A	Actuator	see spare parts list/dimension sheet for Actuator VARIVENT®						
B	Control top T.VIS® P-15	see spare parts list for Control top T.VIS P-15						

Spare Parts List Items 1-10, Inch OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
1	Sealing ring	EPDM FKM HNBR	924-084 924-082 924-311	924-084 924-082 924-311	924-084 924-082 924-311	924-085 924-083 924-313	924-085 924-083 924-313	924-085 924-083 924-313
2	Bearing Bearing, 3A	PTFE/carbo n SUSTA- PVDF	935-001 935-098	935-001 935-098	935-001 935-098	935-002 935-099	935-002 935-099	935-002 935-099
3	Sealing disk	1.4404	221-141.01	221-141.02	221-141.02	221-141.03	221-141.03	221-141.04
4	Bearing disk	1.4301	221-142.01	221-142.02	221-142.02	221-142.03	221-142.03	221-142.03
4.1	Bearing disk	1.4301	221-142.15	221-142.10	221-142.10	221-142.11	221-142.11	221-142.12
5	O-ring	EPDM FKM HNBR	930-309 930-168 930-632	930-144 930-171 930-633	930-144 930-171 930-633	930-150 930-176 930-634	930-150 930-176 930-634	930-156 930-178 930-863
9	Lantern	1.4301	221-121.01	221-121.07	221-121.07	221-121.08	221-121.08	221-121.09
10	Spacer nut	1.4305	221-147.02	221-147.02	221-147.02	221-147.01	221-147.01	221-147.01

Items marked with an \* are wearing parts.

Spare Parts List Item 15 - 3-Stage Seat, Linear, Metallic Seal, Inch OD

Item	Designation	K <sub>v</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
15	Valve disk SJM-3S	2.3 3xK <sub>v</sub> 4	1.4404	221-006145	--	--	--	--	--
		5.8 3xK <sub>v</sub> 10	1.4404	--	221-006139	--	--	--	--
		9.2 3xK <sub>v</sub> 16	1.4404	--	--	221-006146	--	--	--
		14.4 3xK <sub>v</sub> 25	1.4404	--	--	--	221-006142	--	--
		23.1 3xK <sub>v</sub> 40	1.4404	--	--	--	--	221-006141	--
		34.6 3xK <sub>v</sub> 60	1.4404	--	--	--	--	--	221-006147
15.1	Valve disk SJM-3S	2.3 3xK <sub>v</sub> 4	1.4404	221-005334	--	--	--	--	--

Spare Parts List Item 28 - Divert Valve X, Inch OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
28	O-ring (11x3)	EPDM	930-311	--	--	--	--	--
		FKM	930-335	--	--	--	--	--
		HNBR	930-803	--	--	--	--	--

Spare Parts List Item 29, 30, Inch OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
29*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026
30*	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026

Items marked with an \* are wearing parts.

Spare Parts List, Item 33 - 3-Stage Seat, Inch OD

Item	Designation	K <sub>v</sub> value	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
33	3-stage seat S	2.3 3xK <sub>v</sub> 4	1.4404	229-168.35	--	--	--	--	--
		5.8 3xK <sub>v</sub> 10	1.4404	--	229-168.36	--	--	--	--
		9.2 3xK <sub>v</sub> 16	1.4404	--	--	229-168.37	--	--	--
		14.4 3xK <sub>v</sub> 25	1.4404	--	--	--	229-168.38	--	--
		23.1 3xK <sub>v</sub> 40	1.4404	--	--	--	--	229-168.34	--
		34.6 3xK <sub>v</sub> 60	1.4404	--	--	--	--	--	229-168.39

Spare Parts List Items 43-45, 48, 401, 402, Inch OD

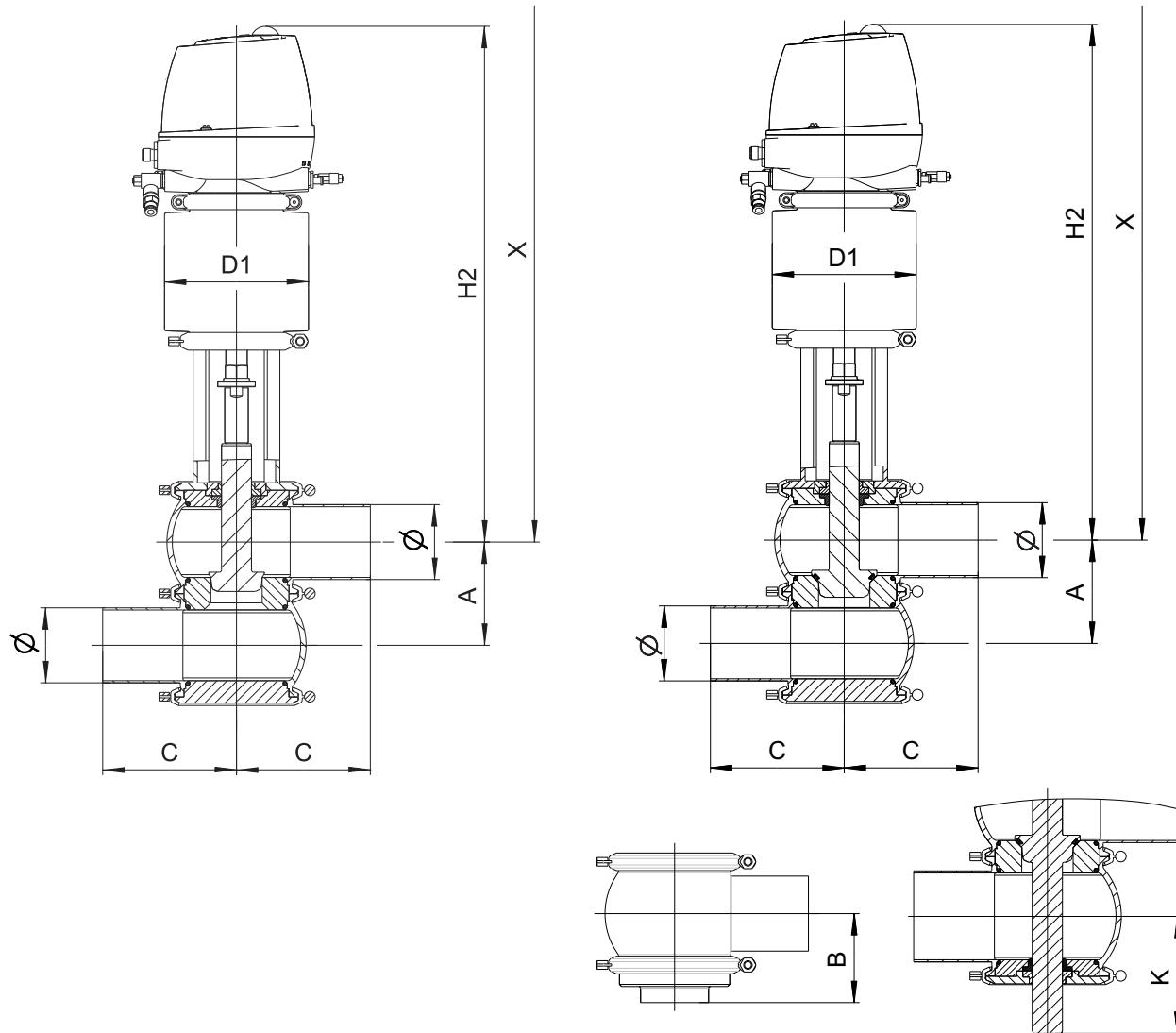
Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
43	Clamp connection KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09	221-507.09	221-507.11
46	Clamp connection KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06
401	Housing V1	1.4404	221-101.19	221-101.21	221-101.22	221-101.05	221-101.06	221-101.07
402	Housing V2	1.4404	221-102.41	221-102.43	221-102.44	221-102.05	221-102.06	221-102.07

Spare Parts List Items A, B, Inch OD

Item	Designation	1" OD	1,5" OD	2" OD	2,5" OD	3" OD	4" OD
A	Actuator	see spare parts list/dimension sheet for Actuator VARIVENT®					
B	Control top T.VIS® P-15	see spare parts list for Control top T.VIS P-15					

## Dimension Sheets

### VARIVENT Control Valve Type P - P\_F / P\_J



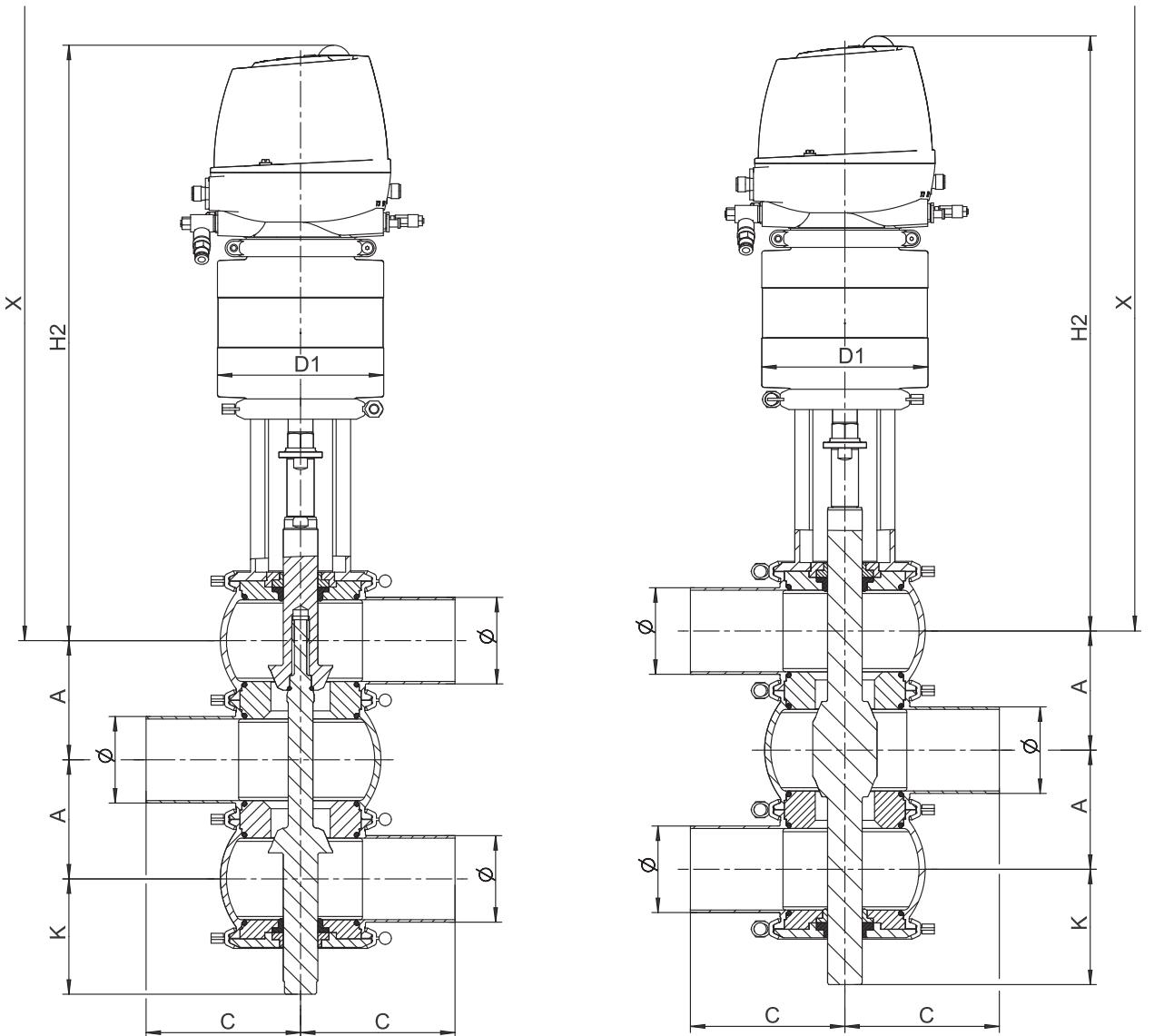
Spare parts drawing (left: metallic seal. right: soft sealing)

**Control Valve Type P - P\_F / P\_J**

	Pipe	Housing			Actuator*	Dimensions*		Valve*	
Nominal width	Diameter Ø [mm]	A [mm]	B [mm]	C [mm]	D1 [mm]	H2 [mm]	X [mm]	Stroke S [mm]	Weight [kg]
DN 25	29.0 × 1.50	50.0	58	90.0	99	423.0	508	15	6
DN 40	41.0 × 1.50	62.0	64	90.0	110	464.0	514	15	7
DN 50	53.0 × 1.50	74.0	70	90.0	110	470.0	520	15	7
DN 65	70.0 × 2.00	96.0	83	125.0	135	481.0	626	15	11
DN 80	85.0 × 2.00	111.0	90	125.0	170	519.0	634	15	11
DN 100	104.0 × 2.00	130.0	100	125.0	210	714.0	643	15	16
DN 125	129.0 × 2.00	155.0	112	150.0	260	784.0	884	30	39
DN 150	154.0 × 2.00	180.0	125	150.0	260	708.0	908	30	50
OD 1"	25.4 × 1.65	46.0	56	90.0	99	421.0	506	15	6
OD 1.5"	38.1 × 1.65	59.0	62	90.0	110	466.0	516	15	7
OD 2"	50.8 × 1.65	71.5	69	90.0	110	472.0	522	15	7
OD 2.5"	63.5 × 1.65	90.0	80	125.0	135	485.0	630	15	11
OD 3"	76.2 × 1.65	103.0	86	125.0	170	522.0	637	15	11
OD 4"	101.6 × 2.11	127.5	99	125.0	210	616.0	645	15	17
OD 6"	152.4 × 2.77	177.0	123	150.0	260	706.5	907	30	50
IPS 2"	60.3 × 2.00	81.0	73	114.3	110	467.0	517	15	7
IPS 3"	88.9 × 2.30	115.0	92	152.5	135	487.0	632	15	11
IPS 4"	114.3 × 2.30	140.0	105	152.5	135	493.0	638	15	17
IPS 6"	168.3 × 2.77	192.0	131	152.5	260	702.0	902	30	50

\* Dimension refers to the standard design the of spring-to-close actuator with a control air pressure of 5 bar and the largest possible Kvs value of the nominal width.

## VARIVENT Control Valve Type P - Divert Valves W / X



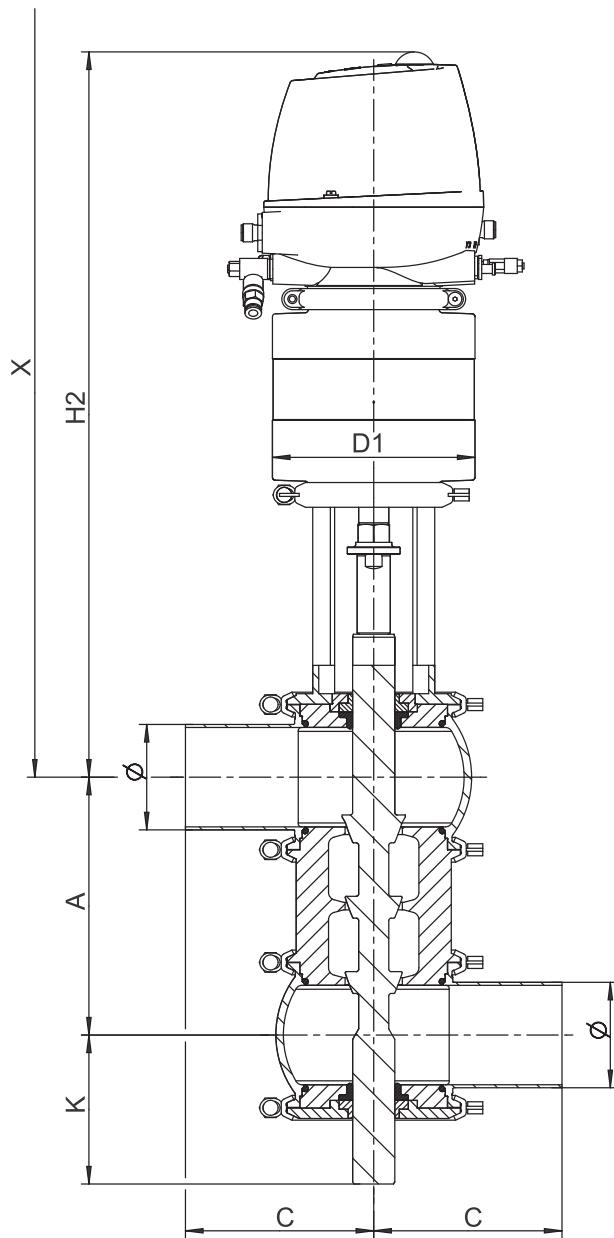
Type W (SWW) and Type X (SXW)

Control Valve Type P - Divert Valves W / X

	Pipe	Housing			Actuator*	Dimensions*		Valve*	
Nominal width	Diameter Ø [mm]	A [mm]	C [mm]	K [mm]	D1 [mm]	H2 [mm]	X [mm]	Stroke S [mm]	Weight [kg]
DN 25	29.0 × 1.50	50.0	90	73.5	110	458	692	15	9
DN 40	41.0 × 1.50	62.0	90	80.0	110	464	704	15	10
DN 50	53.0 × 1.50	74.0	90	85.5	110	470	716	15	11
DN 65	70.0 × 2.00	96.0	125	101.5	135	481	868	15	23
DN 80	85.0 × 2.00	111.0	125	110.0	170	519	914	15	22
DN 100	104.0 × 2.00	130.0	125	133.5	170	538	957	15	33
OD 1"	25.4 × 1.65	46.0	90	71.5	110	456	688	15	9
OD 1.5"	38.1 × 1.65	59.0	90	78.5	110	466	705	15	10
OD 2"	50.8 × 1.65	71.5	90	84.5	110	472	717	15	11
OD 2.5"	63.5 × 1.65	90.0	125	98.5	135	485	869	15	23
OD 3"	76.2 × 1.65	103.0	125	105.0	170	522	912	15	21
OD 4"	101.6 × 2.11	127.5	125	132.5	170	540	958	15	32

\* Dimension refers to the standard design the of spring-to-close actuator with a control air pressure of 5 bar.

## VARIVENT Control Valve Type P - 3-Stage Seat K



Type P - 3-Stage Seat K

Control Valve Type P - 3-Stage Seat K

	Pipe	Housing			Actuator*	Dimensions*		Valve	
Nominal width	Diameter Ø [mm]	A [mm]	C [mm]	K [mm]	D1 [mm]	H2 [mm]	X [mm]	Stroke S [mm]	Weight [kg]
DN 25	29.0 × 1.50	77.5	90	75	99	423	611	15	6
DN 40	41.0 × 1.50	112.5	90	81	99	429	646	15	9
DN 50	53.0 × 1.50	124.5	90	87	110	470	693	15	9
DN 65	70.0 × 2.00	170.5	125	105	110	481	806	15	15
DN 80	85.0 × 2.00	185.5	125	114	135	489	823	15	17
DN 100	104.0 × 2.00	214.5	125	120	170	528	878	15	24
OD 1"	25.4 × 1.65	73.5	90	75	99	421	609	15	6
OD 1.5"	38.1 × 1.65	109.5	90	81	99	431	648	15	9
OD 2"	50.8 × 1.65	122.0	90	87	110	472	695	15	9
OD 2.5"	63.5 × 1.65	164.5	125	105	110	485	810	15	15
OD 3"	76.2 × 1.65	177.5	125	114	135	492	826	15	17
OD 4"	101.6 × 2.11	212.0	125	120	170	530	880	15	25

\* Dimension refers to the standard design the of spring-to-close actuator with a control air pressure of 5 bar.





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