



Operating Instructions

VARIVENT[®]
Mixproof Shuttle Valve Y

Edition 2014-08-22
English

Product	Mixproof Shuttle Valve Y
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Notes for the Reader

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

Binding Character of These Operating Instructions

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

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

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

Notes on the Illustrations

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

Symbols and Highlighting

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



DANGER

Warning: Fatal Injuries.

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

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



EXPLOSION HAZARD

Warning: Explosions.

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

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



WARNING

Warning: Serious Injuries.

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

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



CAUTION

Warning: Injuries.

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

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

IMPORTANT NOTE

Warning: Damage to Property.

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

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

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 _g /psi _g] unless explicitly specified otherwise.
approx.	approximately
°C	Unit of measurement of temperature [degree Celsius]
dm ³ _n	Unit of measurement of volume [cubic decimetre] Volume (litre) at standard temperature and pressure
DN	DIN nominal width
DIN	German standard issued by DIN (Deutsches Institut für Normung e.V, German Institute for Standardization)
EN	European Standard
EPDM	Material designation Short designation according to DIN/ISO 1629: Ethylene Propylene Diene Rubber
°F	Unit of measurement of temperature [degree Fahrenheit]
FKM	Material designation, short designation according to DIN/ISO 1629: Fluorine rubber
h	Unit of measurement of time [hour]
HNBR	Material designation Short designation according to DIN/ISO 1629: Hydrogenated Acrylonitrile Butadiene Rubber
IP	Protection class
ISO	International standard issued by the International Organization for Standardization
kg	Unit of measurement of weight [kilogram]
kN	Unit of measurement of force [kilonewton]
l	Unit of measurement of volume [litre]
max.	maximum
mm	Unit of measurement of length [millimetre]
µm	Unit of measurement of length [micrometre]
M	metric

Abbreviation	Explanation
Nm	Unit of measurement of work [newton metre] UNIT OF TORQUE 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
PA	Polyamide
PE-LD	Low-density polyethylene
psi	Unit of measurement of pressure [psi] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [bar _g /psi _g] unless explicitly specified otherwise.
PTFE	Polytetrafluoroethylene
SET-UP	Self-learning installation During commissioning and maintenance, the SET-UP procedure carries out all the necessary settings for the generation of messages.
a/f	Indicates the size of spanners width across flats
T.VIS	Tuchenhagen Valve Information System
V AC	Volt alternating current
V DC	Volt direct current
W	Unit of measurement of power [Watt]
TIG	Welding method Tungsten inert gas welding
Inch	Unit of measurement of length in the Anglo-American language area
Inch OD	Pipe dimension acc. to British standard (BS), Outside Diameter
Inch IPS	US pipe dimension Iron Pipe Size

Safety

Safety Note

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

Nevertheless, the valve can pose dangers, especially if

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

Operator's Duties

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

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

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

- Only allow qualified staff to work on the valve.
- The operator must authorize the staff to carry out the relevant tasks.
- Working areas and the entire environment of the valve must be neat and clean.
- The staff must wear suitable work clothing and personal protective equipment. As the operator of the facility make sure that work clothing and personal protective equipment are used.
- Instruct the staff with regard to any properties of the product which might pose a health risk and the preventative measures to be taken.
- Have a qualified first-aid-er 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.

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

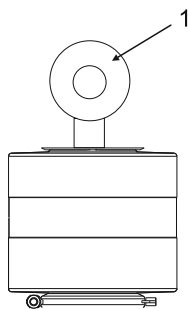
To ensure the safe operation of the valve the following principles apply:

- 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. When transporting the valve be sure to unscrew the control module and the switch bar and use the screwed-in eye bolt (1), part no. 221-104.98 to lift the valve, see "Removing the T.VIS M-1 Control Module" (Page 38) or "Removing the T.VIS A-8 Control Module" (Page 39).
- 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 valve back into operation refit all safety devices as originally provided in the factory. Then check that all safety devices are working correctly.
- Make sure lubricants are used properly.
- Check pipes are firmly secured, also check for leaks and damage.
- Check that all emergency stop devices are working correctly.

Disassembly

For disassembly, the following principles apply:

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

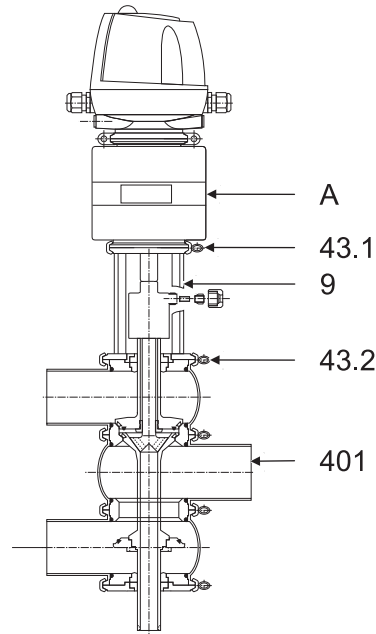
The signs and notes on the valve must always be legible. Any illegible signs must be replaced immediately.

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) when the valve is switching. Fingers can be crushed or cut off.
- On a spring-closing valve there is danger of injury when the hinged clamps (43.1/43.2) are opened as the released spring pretension will suddenly lift the actuator. Therefore, release the spring tension before detaching the hinged clamps (43.1/43.2) 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.
- When the valve switches, when the valve seat is being cleaned or if a seal is defective, cleaning medium escapes from the leakage outlet. This leakage must be collected in a suitable container, e.g. a funnel or a drip pan, and removed in a controlled manner. Observe the safety data sheets issued by the cleaning agent manufacturers.

Residual Dangers

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

Residual dangers on the valve and measures

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

Declaration of Incorporation

Declaration of Incorporation

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

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

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

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

Designation of the machine:	Mixproof Shuttle Valve Y
Machine type:	VARIVENT®
Relevant EC directives:	2006/42/EC
Applicable harmonized standards:	DIN EN ISO 12100

Büchen, 06/02/2009

Franz Bürmann
Managing Director

i.V. Peter Fahrenbach
Head of Development and Design

Transport and Storage

Scope of Supply

On receipt of the valve check whether

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

Transport

For transport, the following principles apply:

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

Storage

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

If, during transport or storage, the valve is going to be exposed to temperatures $\leq 0^{\circ}\text{C}$, it must be dried and suitable measures must 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 Mixproof Shuttle Valve type Y is used for switch-over of liquid flows in pipe systems. The medium should preferably flow in the opening direction of the valve disk to avoid pipe hammers when the valve is opened or closed.

If the valve operates in the opposite way (valve disk closes with the flow), a damping cylinder can be used to protect the valve against pipe hammers.

Do not install the valve with actuator spring-to-open action because the valve will then open in case of power or air failure and cause product intermixing.

In a closed pipe system, hydraulic pressure build-up may occur when the valve switches and result in seal damage.

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

ATEX Directive

If valves type Y are used in areas with a potentially explosive atmosphere, you must absolutely comply with directive 94/9/EC with respect to all ignition hazards. The supplementary "EX" operating instructions for VARIVENT valves must be observed.

For details regarding the marking of valves for potentially explosive areas refer to the additional "Ex" operating instructions for VARIVENT valves.

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.

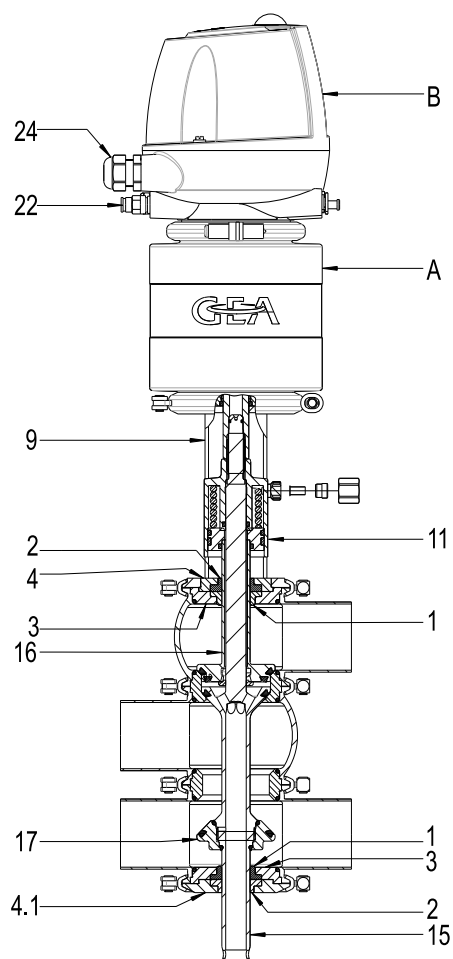
Conversion Work

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 Tuchenhausen GmbH should be fitted. This ensures the reliable and economical operation of the valve.

Design and Function

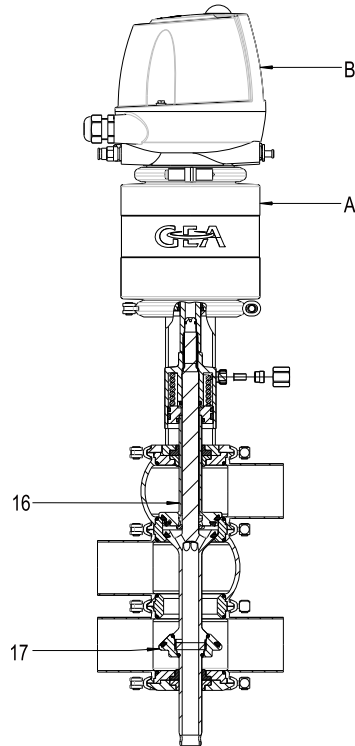
Design



No.	Designation	No.	Designation
A	Actuator	11	CIP bonnet
B	T.VIS control module	15	Valve disk
1	Sealing ring	16	Double-disk
2	Bearing	17	Additional disk
3	Sealing disk	22	Air connection
4	Bearing disk	24	Electrical connection
9	Lantern		

Function

Opening and Closing the Valve



Opening the valve

In the closed valve position, the upper and the lower valve housings are sealed by the double seat disk (16). If a sealing defect occurs, even at both seals, leakage is limited by throttling gaps. The additional disk (17) is open. The valve is pressurized with compressed air via the air connection. The piston of the actuator cylinder presses upwards against the spring. The actuated lower valve disk is raised and the cavity between the upper and the lower valve disk is sealed against the product area by the centre seal on the upper valve disk after a stroke of a few millimetres.

The valve disk combination moves upward to the end position and opens the valve. At the same time, the additional disk (17) is raised and closes off the two lower housings.

Closing the valve

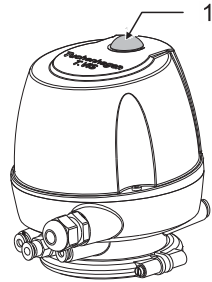
Closing is performed in the reverse order, i.e. the upper valve disk seal reaches its position first, before the lower valve disk leaves the centre seal and the lower valve disk closes. With the descending movement of the valve stem the additional disk is opened again.

Actuator Function

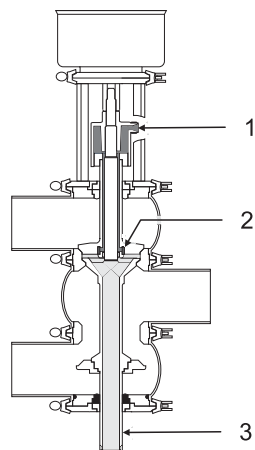
The actuator is of the spring closing type (Z). The valve is closed in the non-actuated position.

Identification:

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



Leakage-Proof Shut-Off



The upper and the lower valve housing are each fitted with a valve seat. The chamber between the two valve disks is connected to the open environment by an isolation outlet (3) integrated into the lower valve stem. In the event of seal damage, the leaking fluid can safely flow into the open. Defective seals can thus easily be detected. Liquid from one pipe is prevented from entering the other pipe.

Cleaning of the leakage outlet system takes place independently of the opening or closing position of the valve.

CIP solution is introduced into the leakage outlet system through a separate connection (1) integrated in the lantern. The CIP solution is sprayed through a ring nozzle (2) into the cavity between the two valve disks and drains into the open by gravity via the outlet pipe.

The CIP solution is supplied from a CIP supply station.

Key data of the CIP solution

- Operating pressure: min. 2 bar (29 psi) , max. 5 bar (72,5 psi)
- Operating temperature: max. 135 °C (275 °F)

Installation and Commissioning

Notes on Installation

The installation position of the valve is upright. Care must be taken to ensure that the valve housing and the pipe system can drain properly.

To prevent damage, make sure that

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

Control Module

If external valves are connected in a control module 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 hinged clamps: 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 hinged clamps 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 hinged clamps by pressurizing the actuator with compressed air at max. 10 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 the Valve" (Page 37).
3. Fit the housing without sealing rings.
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 and ensure the weld is free from stress. 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.

✓ Done

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 (dm ³ /stroke) dm ³ _n at 1.01325 bar, at 0°C acc. to DIN 1343
A...	99	0.16
B...	109	0.26
B...5	109	0.34
C...	135	0.42
C...5	135	0.54
D...	170	0.70
E...	210	1.10
E...5	210	1.40
E...6	210	2.00
S...6	261	3.20
D...6	170	1.30
R... ¹	170	1.60
S... ¹	210	2.00
T... ¹	210	3.10
T...6 ¹	210	4.00
U...6 ¹	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 module.
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.



EXPLOSION HAZARD

Explosive gases or dusts

An explosion can result in serious personal injury or death.

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

Carry out the following steps:

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



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 module.

Commissioning

Before starting commissioning observe the following:

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

Cleaning and Passivation

Cleaning

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

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

The cleaning effect must be checked regularly by the operator!

Cleaning Process Examples

Typical Cleaning Parameters in Dairy Operations

Example of a two-phase cleaning process:

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

Example of a cleaning operation in one cleaning step:

- Formic acid and combination product based on formic acid at 85°C.

Typical Cleaning Parameters in Breweries

Example of a two-phase cleaning process:

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

The cleaning effect depends on the following factors:

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

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

Cleaning the Leakage Cavity

On double-seat valves without lifting actuator, the leakage cavity is cleaned by a spraying nozzle in the double disk, which is connected to a valve seat cleaning pipe. Here, too, we can only give general recommendations with respect to the number and duration of spray-cleaning operations, since the conditions in the process line such as type of product, temperatures, cleaning media, cleaning intervals etc. affect the duration and frequency of the spray-cleaning operations required.

We recommend defining the cleaning parameters for the system during a test phase in order to save cleaning medium. To optimize seat cleaning, spot checks on the valve should be performed after cleaning to ascertain whether the valve seats are clean. All systems fitted for cleaning the valve should be used regularly to ensure best cleaning results and prevent damage to the valve.

Double-Seat Valves with Spray Cleaning

The leakage cavity is cleaned by spray cleaning while product can flow in both pipes. A spraying nozzle distributes the CIP solution in the entire leakage cavity. The sealing surfaces of the valve disk seals are not cleaned by this operation, however.

This type of cleaning the leakage cavity is often used for liquid media that do not adhere to the sealing surfaces or do not tend to crystallize so that they can easily be rinsed off.

Technical Data for Spray Cleaning

The operating pressure of the cleaning solution should be 2.5 ± 0.5 bar (35.6 ± 7 psi) and the operating temperature should be max. 135 °C (275°F).

The duration of the entire washing process depends on the type of soiling and typically ranges between 10 and 90 seconds.

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 (HNO_3) at approx. 80°C (176 °F) at a concentration in the 3% range 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
Valve closes too slowly	O-rings in actuator and control module are dry (friction losses)	Grease O-rings
Leakage in the area of the valve body	Housing O-rings defective	Disassemble the valve, change the housing O-rings
Leakage in the lantern	Sealing ring defective	Replace the sealing ring
Leakage in the leakage cavity	V-rings defective	Replace the V-rings

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 Dismantling

Requirement

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

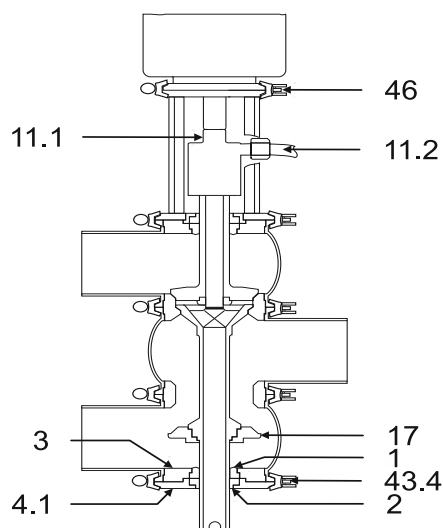
Carry out the following steps:

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

Disassembling the Valve

Removing the Additional Disk

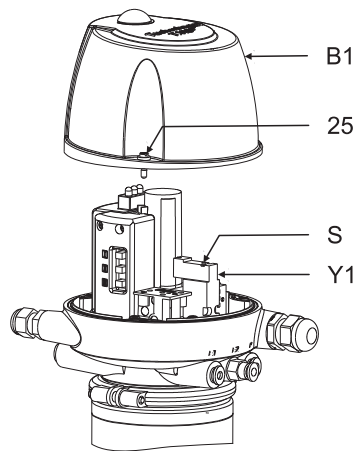


Carry out the following steps:

1. Remove the CIP connection (11.2).
2. Detach the hinged clamp (43.4) on the lower housing.
3. Take off the sealing ring (1), sealing disk (3), bearing (2) bearing disk (4.1) from the lower housing.
4. Hold the CIP bonnet (11) at the wrench flat (11.1) and unscrew the additional disk (17) using an assembly tool.

✓ Done

Removing the T.VIS M-1 Control Module



Requirement

- No solenoid valve must be actuated electrically or manually.
- The pneumatic and electrical connections on the plant side can remain on the control module.

IMPORTANT NOTE

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

→ Protect the permanent magnet against impact stress.



WARNING

Spring tension in the valve

Danger of injury when releasing the hinged clamps (43.1, 46) as the released spring pretension will suddenly lift the actuator.

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

Carry out the following steps:

1. Release three cheese head screws (25) and take off the cap (B1).
2. Pressurize the actuator by activating solenoid valve Y1 at manual operation element S.
→ The valve disks are lifted.
3. Detach the hinged clamp (43.1).
4. Depressurize the actuator by deactivating solenoid valve Y1.
5. Using a size 3 hex. key release the two screws (B11) and remove the semi-annular clamps (B12).

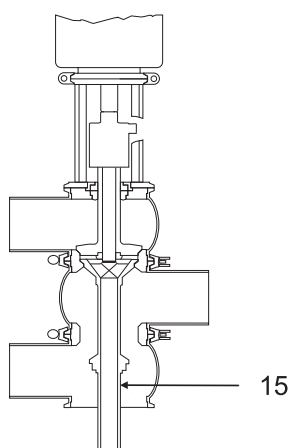
6. Pull off the control module (B1) upwards.
→ The LED A (green) goes out and LED B flashes (yellow).

✓ Done

Removing the T.VIS A-8 Control Module

For dismantling a valve with T.VIS A-8 control module refer to the operating instructions for the T.VIS A-8 control module.

Disconnecting the Valve from the Housing



IMPORTANT NOTE

The stem of the valve disk (15) is a sensitive part.

Damage to this part can result in malfunctions.

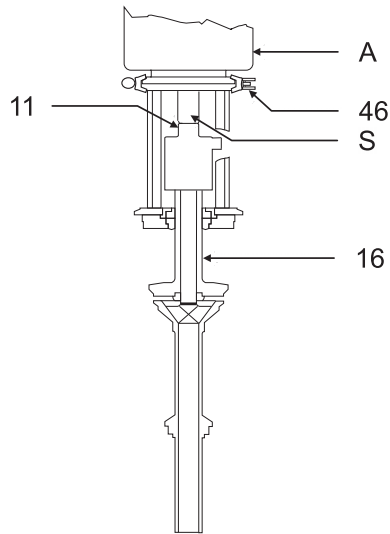
- When the valve is pulled out, the stem of the valve disk (15) must not hit the valve housing!

Carry out the following steps:

- Carefully draw the valve out of the housing.

✓ Done

Separating the Valve Insert from the Actuator



IMPORTANT NOTE

The piston rod (S) and the stem (16) of the valve disk are precision parts.

Damage to these parts can result in a malfunction.

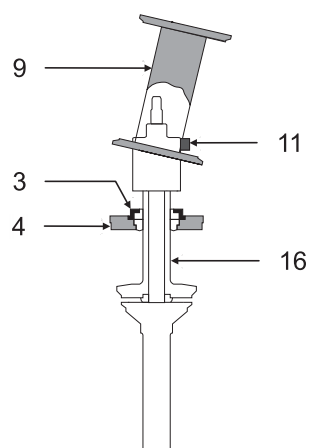
→ Hold the lantern while unscrewing the actuator.

Carry out the following steps:

1. Unscrew the hinged clamps (46) between the actuator and the lantern.
2. Hold the actuator (A) in position with a strap wrench.
3. Apply an open-end spanner to the spanner flat on the CIP bonnet (11.1) and unscrew the actuator.

✓ Done

Separating Valve Insert and Lantern



IMPORTANT NOTE

The lantern (S) and the stem (16) of the double disk are precision parts.

Damage to these parts can result in a malfunction.

- ➔ The bearing disk (4) and the sealing disk (3) must not hit the stem (16) of the double disk when the valve insert is withdrawn. Do not hit the thread of the CIP bonnet (11) against the lantern. Carefully draw the valve insert out of the lantern (9).

Carry out the following steps:

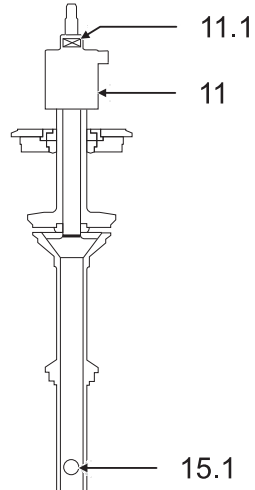
- ➔ Pull the valve insert out of the lantern (9).

✓ Done

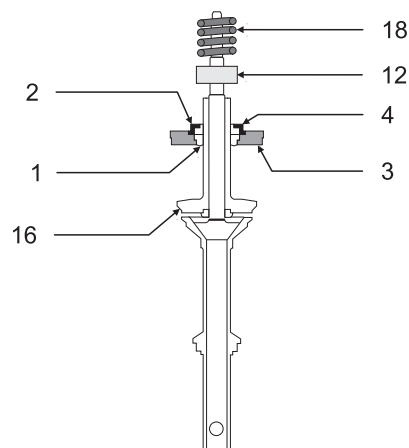
Dismantling the Valve Insert

Carry out the following steps:

1. Hold the valve disk at the hole (15.1) with a suitable tool, e.g. a Ø 5 mm pin.



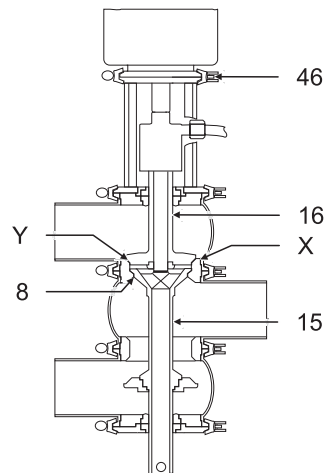
2. Apply an open-end spanner to the spanner flat on the CIP bonnet (11.1) and release the valve disk.
3. Unscrew the CIP bonnet (11) from the valve disk.
4. Pull off the spring (18), counter bearing (12), bearing disk (4), bearing (2), sealing ring (3) with sealing disk (1) and the double disk (16) from the valve disk.



✓ Done

Maintenance

Cleaning the Valve



IMPORTANT NOTE

The stem of the valve disk (15, 16), the housing seat (X), the valve seat (Y) and the V-ring groove (8) 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.

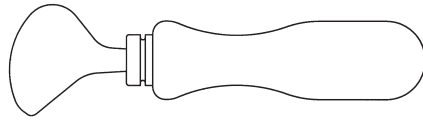
- Observe the safety information sheets issued by the detergent manufacturers!
- Only use detergents which are non-abrasive and not aggressive towards stainless steel.

Carry out the following steps:

1. Disassemble the valve, see “Disassembling the Valve” (Page 37).
2. Carefully clean the individual parts.

✓ Done

Replacing Seals



Insertion tool

Requirement

- Use the insertion tool to fit the V-ring.
- 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.



CAUTION

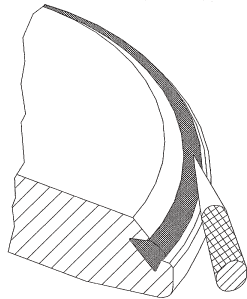
The scriber can slip off when the V-ring is removed.

Danger of injury!

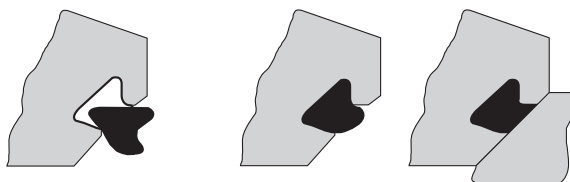
- Grip the valve disk in a vice with protected jaws.
- Unscrew the curved side of the scriber.

Carry out the following steps:

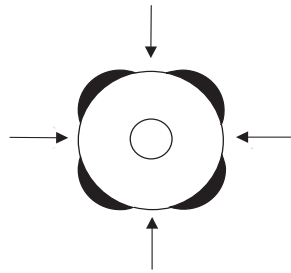
1. Put a scriber into the V-ring and take it out.



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 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 after fitting the complete valve.
- 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 Tuchenhausen recommends Rivolta F.L.G. MD-2 and PARALIQ GTE 703. These lubricants are approved for foodstuff and are resistant to beer froth. They have the NSF-H1 (USDA H1) registration. PARALIQ GTE 703 can be ordered from GEA Tuchenhausen under part no. 413-064, and Rivolta F.L.G. MD-2 can be ordered under part no. 413-071.

Using other types of grease can result in malfunctions or in premature seal failure. The warranty will also become null and void.

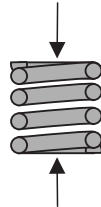
A Manufacturer's Declaration for these products can be obtained from GEA Tuchenhausen if required. A thin film of grease is required on the seals to ensure the proper function of the fittings. It reduces friction and extends the service life of the seals. This is absolutely harmless from a health and hygienic point of view.

Running dry must be avoided!.

Assembly

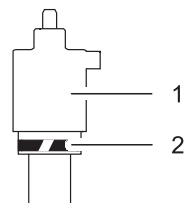
Assemble the valve in reverse order of disassembly. Observe the notes and instructions given in the following sections when doing so.

Spring



Before the spring is inserted into the CIP bonnet both faces must be greased.

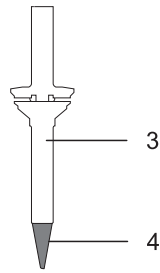
CIP bonnet



Observe the following instructions when assembling the CIP bonnet:

- a) When assembling the CIP bonnet (1) carefully introduce the rod guide ring (2) of the counter bearing into the CIP bonnet.
- b) After assembling the valve insert, counter the CIP bonnet against the piston rod.

Fitting the Valve into the Housing



IMPORTANT NOTE

Valve disk has sharp edges

When inserting the valve into the valve housing, the lower stem seal can be damaged by the valve disk (3).

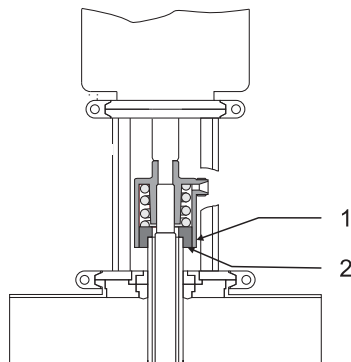
→ Therefore always use an installation mandrel (4) for assembling the valve.

Carry out the following steps:

1. Introduce the O-ring end of the installation mandrel (4) into the valve disk (3).
2. Insert the valve with the installation mandrel into the housing.
3. Pull off the installation mandrel from the valve disk.

✓ Done

Checking the Assembly



When the valve is closed, the lower edge of the CIP bonnet (1) must be flush with the lower edge of the counter bearing (2).

Connecting a New CIP Hose

Requirement

- The CIP hose is made of synthetic material. When the CIP hose is connected by means of a screw fitting there can be strong constriction of the hose near the cutting ring and the CIP hose can come loose. Therefore, a sleeve must always be inserted into the CIP hose before fitting.

CIP hose preparation



Carry out the following steps:

1. Cut the CIP hose square using a hose cutter.
2. Insert the sleeve into the hose up to the rim.
3. Grease the thread and the cone of the screw fitting, as well as the cutting ring and the thread of the cap nut.

NOTE

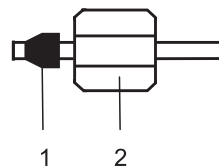
GEA Tuchenhausen recommends Rivolta F.L.G. MD-2 and PARALIQ GTE 703. These lubricants are approved for foodstuff and are resistant to beer froth. They have the NSF-H1 (USDA H1) registration. They do not affect the taste or the consistency of the products and are compatible with the seals in contact with product. PARALIQ GTE 703 can be ordered from GEA Tuchenhausen under part no. 413-064, and Rivolta F.L.G. MD-2 can be ordered under part no. 413-071.

CIP hose preassembly



Carry out the following steps:

- Slip the cap nut (2) and the cutting ring (1) over the CIP hose.



CIP hose assembly



Carry out the following steps:

1. Screw down the cap nut by hand until you feel the limit stop. Press the CIP hose against the stop in the inner cone while doing so.
2. Tighten the cap nut by about 1 1/2 turns. The CIP hose must not turn. Due to the taper the tightening forces will only increase up to a fixed limit.

NOTE

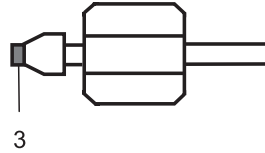
A mark on the CIP hose helps you to observe the specified number of turns.

Check



Carry out the following steps:

1. Unscrew the cap nut.
2. Check whether material (3) has bulged in front of the first cutting edge (1).



→ It does not matter if the ring on the end of the CIP hose can be turned.

Re-assembly



Carry out the following steps:

- Whenever it has been released, tighten the cap nut hand-tight, holding the socket.

✓ Done

Torques for the Clamps and Hinged Clamps

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

Tightening torques required

Torques		Nm	lbft
Clamps on the control module		1	0.7
Hinged clamps Cast clamps	M6	9	6.6
Hinged clamps Cast clamps	M8	22	16.2
Cast clamps	M10	45	33

Checking the Function

Setting the Stroke

Carry out the following steps:

1. Actuate the valve with compressed air.
2. Check the function of the proximity switches, adjust if necessary, see table "Valve stroke" (Page 51).

✓ Done

Valve Stroke

Valve stroke

Valve size	Valve stroke (mm)	Valve size	Valve stroke (mm)
metric		Inch OD	
25	20	1"	16
40	19	1.5"	18
50	27	2"	26
65	27	2.5"	27
80	27	3"	26
100	27	4"	26
125	55	Inch IPS	
150	55	2"	27
		3"	27
		4"	27
		6"	55

Disposal

General Notes

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

The valve is made of the following materials:

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

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

Valve Actuator Disposal



DANGER

The spring forces in the actuator can be as much as 24 kN.

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

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

Carry out the following steps:

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



Technical Data

Type Plate

The type plate clearly identifies the valve.

Made by GEA Tuchenhausen			
Type	YUC-OD3"-SZ-TM1.L3AAA-DD/CLB-L0-12N/52		
Serial	1261301/0290		
Mat.	1.4404 (AISI 316L)/EPDM (FDA)		
Air bar/psi	min. 6.0 / 87	max. 8.0 / 116	
PS bar/psi	1 5.0 / 72.5	2 5.0 / 72.5	3 5.0 / 72.5

Type plate of the Mixproof Shuttle Valve type Y

The type plate provides the following key data:

Key data of the valve

Type	Mixproof Shuttle Valve Y
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)

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 4" OD 2" to 6" IPS
Material of product contact parts	Stainless steel 1.4404
Installation position	Vertical

Technical data: Ambient temperatures

Designation	Description
- Valve	0 to 60 °C, standard < 0 °C: use control air with a low dew point. Protect valve stems against freezing.
- Proximity switch	-20 to +80 °C
- Control module type T.VIS M-1, A-8	-20 to +50 °C
- Control module type T.VIS P-20	0 to +50 °C
Product temperature and operating temperature	Depending on the sealing material

Technical data: Compressed air supply

Designation	Description
Air hose	
- Metric	Material PE-LD Outside dia. 6 mm Inside dia. 4 mm
- Inch	Material PA Outside dia. 6.35 mm Inside dia. 4.3 mm
Product pressure	5 bar (72.5 psi) standard max. 10 bar (116 psi)
Control air pressure	6 bar max. 8 bar
Control air	acc. to ISO 8573-1:2001
- Solid particle content:	Quality class 6 Particle size max. 5µm Particle density max. 5 mg/m ³
- Water content:	Quality class 4 max. dew point +3 °C If the unit is used at higher altitudes or at low ambient temperatures, the dew point must be adapted accordingly.
- Oil content:	Quality class 3, preferably oil free max. 1 mg oil in 1m ³ air

CIP Connection

Hose connection

1", DN 25	Ø6/4 mm
DN 40...100	Ø8/6 mm
1.5"...4" OD	Ø8/6 mm
DN 125, 150; 6" IPS	Ø10/8 mm

Operating pressure for optimum cleaning

- min. 2 bar (29 psi)
- max. 5 bar (72.5 psi)

The resistance of the material of the CIP connection (cutting ring, support sleeve, PTFE hose) depends on the type, pressure and temperature of the medium conveyed.

Resistance of the CIP connection

Medium	Pressure max. (bar)	. (psi)	Temperature (°C)	max. (°F)
Water	6	87	95	203
Nitric acid at 5%	6	87	60	140
Sulphuric acid at 3%	6	87	60	140
Sodium hydroxide at 5%	6	87	85	185
Steam	3	42	130	266

Resistance of Sealing Materials

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

Resistance:

- + = good resistance
- o = limited resistance
- – = no resistance

Table of resistance of seals

Medium	Temperature	Sealing material (general operation temperature)		
		EPDM -40...+135°C -40...275°F	FKM -10...+200 °C +14...+392°F	HNBR -25...+140 °C -13...+284°F
Caustics up to 3%	up to 80 °C (176°F)	+	o	+
Caustics up to 5%	up to 40 °C (104°F)	+	o	o
Caustics up to 5%	up to 80 °C (176°F)	+	–	–
Caustics at more than 5%		o	–	–
Inorganic acids up to 3%	up to 80 °C (176°F)	+	+	+
Inorganic acids up to 5%	up to 80 °C (176°F)	o	+	o
Inorganic acids up to 5%	up to 100 °C (212°F)	+	+	–
Water	up to 80 °C (176°F)	+	+	+
Steam	up to 135 °C (275°F)	+	o	o
Steam, approx. 30 min	up to 150 °C (302°F)	+	o	–
Fuels/hydrocarbons		–	+	+
Product with a fat content of max. 35%		+	+	+
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 Part 1
1"	25.4	1.65	60.3	x
1.5"	38.1	1.65	60.3	x
2"	50.8	1.65	47.6	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

Dimensions for Pipes in Inch IPS

Inch OD	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to BS 4825 Part 1
2"	60.3	2	56.3	x
3"	88.9	2.3	84.3	x
4"	114.3	2.3	109.7	x
6"	168.3	2.77	162.76	x

Tools

Tool	Part no.
Hose cutter	407-065
Manual emergency actuator	221-310.74
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
Assembly tool DN 40-50 DN 65-100 DN 125/162	229-109.89 229-109.90 229-109.91
Assembly tool for additional disk DN 50/40 DN 80/65 DN 100 DN 125+150 / 6" IPS	229-109.10 229-109.12 229-109.15 229-109.21

Lubricants

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

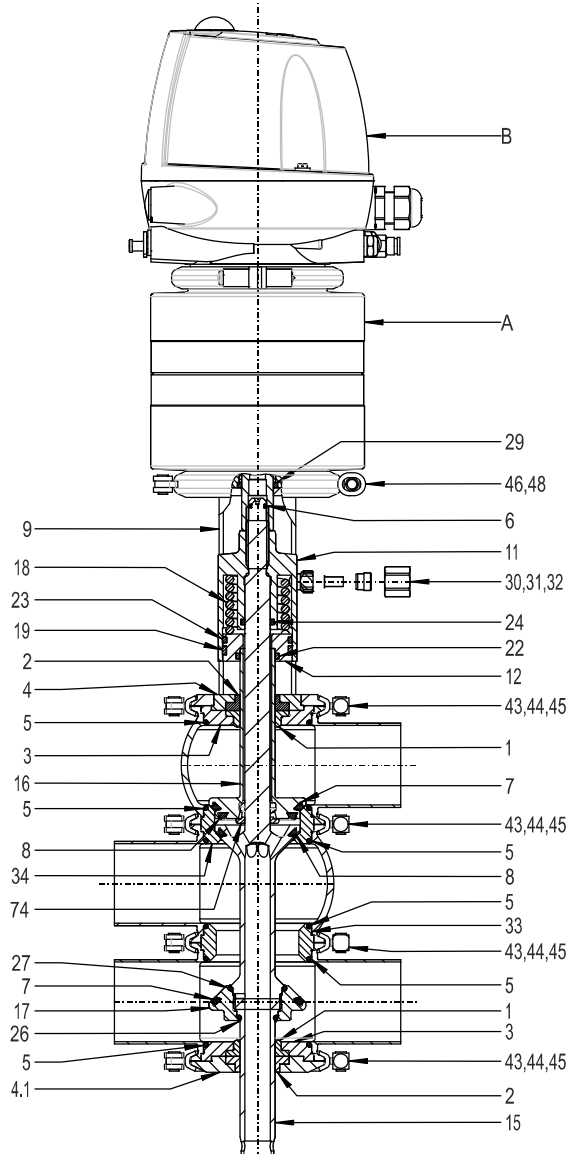
Weights

Size	Weight (kg)
DN 25, 1"	12
DN 40, 1.5"	14
DN 50, 2"	15
DN 65, 2.5"	21
DN 80, 3"	23
DN 100, 4"	33
DN 125	58
DN 150	94
6"	96

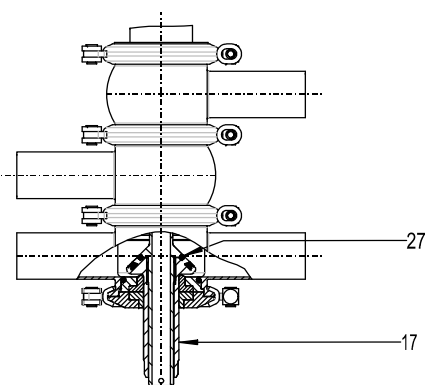
Spare Parts Lists

Mixproof Shuttle Valve Type Y

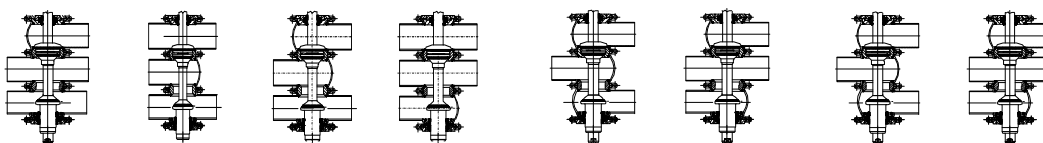
DN 40 – DN 150 and 1 ½" OD - 6" IPS



DN 25 and 1" OD



Housing combinations





Spare Parts List – Metric Sizes DN 25; DN 40; DN 50; DN 65

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65
Set of seals		EPDM	221-519.59	221-304.30	221-304.30	221-304.31
		FKM	221-519.61	221-519.39	221-519.39	221-519.40
		HNBR	221-519.78	221-519.79	221-519.79	221-519.80
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	PTFE/carbon	935-001	935-001	935-001	935-002
		SUSTA-PVDF	935-098	935-098	935-098	935-101
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
4.1	Bearing disk	1.4301	221-142.15	221-142.10	221-142.10	221-142.11
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
7	V-ring	EPDM	932-046	932-021	932-021	932-024
		FKM	932-030	932-033	932-033	932-035
		HNBR	932-087	932-088	932-088	932-090
8	V-ring	EPDM	932-017	932-019	932-019	932-023
		FKM	932-029	932-032	932-032	932-034
		HNBR	932-085	932-084	932-084	932-089
9	Lantern	1.4301	221-121.01	221-121.02	221-121.02	221-121.03
11	CIP bonnet	1.4301	221-146.04	221-146.01	221-146.01	221-146.01
12	Counter bearing	1.4301	221-148.06	221-148.02	221-148.02	221-148.01
15	Valve disk Y	1.4404	221-130.23	221-130.09	221-130.10	221-130.03
16	Double seat disk	1.4404	221-112.30	221-112.09	221-112.10	221-112.03
17	Additional disk Y	1.4404	221-123.08	221-123.01	221-123.01	221-123.02
18	Pressure spring	1.4310	931-208	931-001	931-001	931-249
19	Guide ring	Turcite	935-058	935-021	935-021	935-021
22	O-ring	EPDM	930-268	930-268	930-268	930-243
		FKM	930-164	930-164	930-164	930-244
		HNBR	930-639	930-639	930-639	930-640
23	O-ring	EPDM	930-525	930-246	930-246	930-246
		FKM	930-802	930-247	930-247	930-247
		HNBR	930-636	930-631	930-631	930-631
24	O-ring	EPDM	930-368	930-235	930-235	930-235
		FKM	930-616	930-162	930-162	930-162
		HNBR	930-635	930-638	930-638	930-638



Spare Parts List – Metric Sizes DN 25; DN 40; DN 50; DN 65 (Cont.)

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65
26	O-ring	EPDM FKM HNBR	-- -- --	930-270 930-163 930-637	930-270 930-163 930-637	930-252 930-165 930-629
27	O-ring	EPDM FKM HNBR	930-350 930-269 930-628	930-312 930-166 930-630	930-312 930-166 930-630	930-246 930-247 930-631
29	O-ring	NBR	930-026	930-026	930-026	930-026
30	Cap nut	1.4571	933-459	933-456	933-456	933-456
31	Cutting ring	1.4571	933-458	933-455	933-455	933-455
32	Support sleeve	1.4571	933-380	933-382	933-382	933-382
33	Seat ring N	1.4404	221-107.01	221-107.02	221-107.02	221-107.03
34	Seat ring D	1.4404	221-108.01	221-108.02	221-108.02	221-108.03
43	Hinged clamp Clamp	1.4401 1.4408	701-074 --	701-075 --	701-075 --	701-076 --
44	Hex screw	A2-70	--	--	--	--
45	Hex nut	1.4305	912-035	912-035	912-035	912-036
46	Hinged clamp	1.4401	701-073	701-073	701-073	701-073
48	Hex nut	1.4305	912-036	912-036	912-036	912-036
74	Cleaning nozzle	PVDF	221-334.04	221-334.01	221-334.01	221-334.02
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
A	Actuator	See spare parts list for actuator type VARIVENT®				
B	Control module type S	See spare parts list for control module type S				

The sealing set includes items 1, 5, 6, 7, 8, 22, 23, 24, 26, 27 and 29.

Spare Parts List – Metric Sizes DN 80; DN 100; DN 125; DN 150

Item	Designation	Material	DN 80	DN 100	DN 125	DN 150
Set of seals		EPDM FKM HNBR	221-304.31 221-519.40 221-519.80	221-304.32 221-519.41 --	221-304.33 221-519.42 --	221-304.34 221-519.43 --
1	Sealing ring	EPDM FKM HNBR	924-085 924-083 924-313	924-085 924-083 924-313	924-088 924-087 --	924-088 924-087 --
2	Bearing	PTFE/carbon SUSTA-PVDF	935-002 935-101	935-002 935-101	935-003 935-102	935-003 935-102
3	Sealing disk	1.4404	935-002 935-101	935-002 935-101	935-003 935-102	935-003 935-102
4	Bearing disk	1.4301	221-141.03	221-141.04	221-141.07	221-141.05



Spare Parts List – Metric Sizes DN 80; DN 100; DN 125; DN 150 (Cont.)

Item	Designation	Material	DN 80	DN 100	DN 125	DN 150
4.1	Bearing disk	1.4301	221-142.03	221-142.03	221-142.04	221-142.04
5	O-ring	EPDM FKM HNBR	930-150 930-176 930-634	930-156 930-178 930-863	930-372 930-409 --	930-260 930-259 --
6	O-ring	NBR	930-004	930-004	930-007	930-007
7	V-ring	EPDM FKM HNBR	932-024 932-035 932-090	932-028 932-039 932-100	932-060 932-062 --	932-042 932-041 --
8	V-ring	EPDM FKM HNBR	932-023 932-034 932-089	932-027 932-038 932-099	932-059 932-063 --	932-045 932-044 --
9	Lantern	1.4301	221-121.03	221-121.04	221-121.06	221-121.22
11	CIP bonnet	1.4301	221-146.01	221-146.01	221-146.02	221-146.02
12	Counter bearing	1.4301	221-148.01	221-148.01	221-148.03	221-148.03
15	Valve disk Y	1.4404	221-130.04	221-130.05	221-130.08	221-130.25
16	Double seat disk	1.4404	221-112.04	221-112.05	221-112.08	221-112.07
17	Additional disk Y	1.4404	221-123.02	221-123.03	221-123.05	221-123.04
18	Pressure spring	1.4310	931-249	931-002	931-093	931-093
19	Guide ring	Turcite	935-021	935-021	935-025	935-024
22	O-ring	EPDM FKM HNBR	930-243 930-244 930-640	930-243 930-244 930-640	930-356 930-357 --	930-356 930-357 --
23	O-ring	EPDM FKM HNBR	930-246 930-247 930-631	930-246 930-247 930-631	930-266 930-265 --	930-266 930-265 --
24	O-ring	EPDM FKM HNBR	930-235 930-162 930-638	930-235 930-162 930-638	930-268 930-164 930-639	930-268 930-164 930-639
26	O-ring	EPDM FKM HNBR	930-252 930-165 930-629	930-252 930-165 930-629	930-246 930-247 930-631	930-246 930-247 930-631
27	O-ring	EPDM FKM HNBR	930-246 930-247 930-631	930-246 930-247 930-631	930-364 930-299 --	930-364 930-299 --
29	O-ring	NBR	930-026	930-026	930-035	930-035
30	Cap nut	1.4571	933-456	933-456	933-482	933-482
31	Cutting ring	1.4571	933-455	933-455	933-481	933-481
32	Support sleeve	1.4571	933-382	933-382	933-385	933-385
33	Seat ring N	1.4404	221-107.03	221-107.04	221-107.18	221-107.06
34	Seat ring D	1.4404	221-108.03	221-108.04	221-108.12	221-108.06

Spare Parts List

Mixproof Shuttle Valve Type Y



Spare Parts List – Metric Sizes DN 80; DN 100; DN 125; DN 150 (Cont.)

Item	Designation	Material	DN 80	DN 100	DN 125	DN 150
43	Hinged clamp Clamp	1.4401 1.4408	701-076 --	701-077 --	-- 701-011	-- 701-010
44	Hex screw	A2-70	--	--	901-296	901-296
45	Hex nut	1.4305	912-036	912-036	910-025	910-025
46	Hinged clamp	1.4401	701-073	701-073	701-077	701-077
48	Hex nut	1.4305	912-036	912-036	912-036	912-036
74	Cleaning nozzle	PVDF	221-334.02	221-334.02	221-334.03	221-334.03
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
A	Actuator	See spare parts list for actuator type VARIVENT®				
B	Control module type S	See spare parts list for control module type S				

The sealing set includes items 1, 5, 6, 7, 8, 22, 23, 24, 26, 27 and 29.



Spare Parts List – OD Sizes 1.5" OD; 2" OD; 2.5" OD; 3" OD; 4" OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
Set of seals		EPDM	221-519.59	221-304.30	221-304.30	221-304.31	221-304.31	221-304.32
		FKM	221-519.61	221-519.39	221-519.39	221-519.40	221-519.40	221-519.41
		HNBR	221-519.78	221-519.79	221-519.79	221-519.80	221-519.80	--
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	PTFE/carbon	935-001	935-001	935-001	935-002	935-002	935-002
		SUSTA-PVDF	935-098	935-098	935-098	935-101	935-101	935-101
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	930-309	930-144	930-144	930-150	930-150	930-156
		FKM	930-168	930-171	930-171	930-176	930-176	930-178
		HNBR	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
7	V-ring	EPDM	932-046	932-021	932-021	932-024	932-024	932-028
		FKM	932-030	932-033	932-033	932-035	932-035	932-039
		HNBR	932-087	932-088	932-088	932-090	932-090	932-100
8	V-ring	EPDM	932-017	932-019	932-019	932-023	932-023	932-027
		FKM	932-029	932-032	932-032	932-034	932-034	932-038
		HNBR	932-085	932-084	932-084	932-089	932-089	932-099
9	Lantern	1.4301	221-121.01	221-121.07	221-121.07	221-121.08	221-121.08	221-121.09
11	CIP bonnet	1.4301	221-146.04	221-146.01	221-146.01	221-146.01	221-146.01	221-146.01
12	Counter bearing	1.4301	221-148.06	221-148.02	221-148.02	221-148.01	221-148.01	221-148.01
15	Valve disk Y	1.4404	221-130.24	221-130.11	221-130.12	221-130.13	221-130.14	221-130.15
16	Double seat disk	1.4404	221-112.30	221-112.09	221-112.10	221-112.03	221-112.04	221-112.05
17	Additional disk Y	1.4404	221-123.08	221-123.01	221-123.01	221-123.02	221-123.02	221-123.03
18	Pressure spring	1.4310	931-208	931-001	931-001	931-249	931-249	931-002
19	Guide ring	Turcite	935-058	935-021	935-021	935-021	935-021	935-021
22	O-ring	EPDM	930-268	930-268	930-268	930-243	930-243	930-243
		FKM	930-164	930-164	930-164	930-244	930-244	930-244
		HNBR	930-639	930-639	930-639	930-640	930-640	930-640
23	O-ring	EPDM	930-525	930-246	930-246	930-246	930-246	930-246
		FKM	930-802	930-247	930-247	930-247	930-247	930-247
		HNBR	930-636	930-631	930-631	930-631	930-631	930-631

Spare Parts List

Mixproof Shuttle Valve Type Y



Spare Parts List – OD Sizes 1.5" OD; 2" OD; 2.5" OD; 3" OD; 4" OD (Cont.)

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
24	O-ring	EPDM	930-368	930-235	930-235	930-235	930-235	930-235
		FKM	930-616	930-162	930-162	930-162	930-162	930-162
		HNBR	930-635	930-638	930-638	930-638	930-638	930-638
26	O-ring	EPDM	--	930-270	930-270	930-252	930-252	930-252
		FKM	--	930-163	930-163	930-165	930-165	930-165
		HNBR	--	930-637	930-637	930-629	930-629	930-629
27	O-ring	EPDM	930-350	930-312	930-312	930-246	930-246	930-246
		FKM	930-269	930-166	930-166	930-247	930-247	930-247
		HNBR	930-628	930-630	930-630	930-631	930-631	930-631
29	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026
30	Cap nut	1.4571	933-459	933-456	933-456	933-456	933-456	933-456
31	Cutting ring	1.4571	933-458	933-455	933-455	933-455	933-455	933-455
32	Support sleeve	1.4571	933-380	933-382	933-382	933-382	933-382	933-382
33	Seat ring N	1.4404	221-107.01	221-107.02	221-107.02	221-107.03	221-107.03	221-107.04
34	Seat ring D	1.4404	221-108.01	221-108.02	221-108.02	221-108.03	221-108.03	221-108.04
43	Hinged clamp	1.4401	701-074	701-075	701-075	701-076	701-076	701-077
45	Hex nut	1.4305	912-035	912-035	912-035	912-036	912-036	912-036
46	Hinged clamp	1.4401	701-073	701-073	701-073	701-073	701-073	701-073
48	Hex nut	1.4305	912-036	912-036	912-036	912-036	912-036	912-036
74	Cleaning nozzle	PVDF	221-334.04	221-334.01	221-334.01	221-334.02	221-334.02	221-334.02
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
A	Actuator	See spare parts list for actuator type VARIVENT®						
B	Control module type S	See spare parts list for control module type S						

The sealing set includes items 1, 5, 6, 7, 8, 22, 23, 24, 26, 27 and 29.

Spare Parts List

Mixproof Shuttle Valve Type Y



Spare Parts List – IPS Sizes 2" IPS; 3" IPS; 4" IPS; 6" IPS

Item	Designation	Material	2" IPS	3" IPS	4" IPS	6" IPS
Set of seals		EPDM	221-304.30	221-304.31	221-304.32	221-304.34
		FKM	221-519.39	221-519.40	221-519.41	221-519.43
		HNBR	221-519.79	221-519.80	--	--
1	Sealing ring	EPDM	924-084	924-085	924-085	924-088
		FKM	924-082	924-083	924-083	924-087
		HNBR	924-311	924-313	924-313	--
2	Bearing	PTFE/carbon	935-001	935-002	935-002	935-003
		SUSTA-PVDF	935-098	935-101	935-101	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
4.1	Bearing disk	1.4301	221-142.10	221-142.1	221-142.12	221-142.14
5	O-ring	EPDM	930-144	930-150	930-156	930-260
		FKM	930-171	930-176	930-178	930-259
		HNBR	930-633	930-634	930-863	--
6	O-ring	NBR	930-004	930-004	930-004	930-007
7	V-ring	EPDM	932-021	932-024	932-028	932-042
		FKM	932-033	932-035	932-039	932-041
		HNBR	932-088	932-090	932-100	--
8	V-ring	EPDM	932-019	932-023	932-027	932-045
		FKM	932-032	932-034	932-038	932-044
		HNBR	932-084	932-089	932-099	--
9	Lantern	1.4301	221-121.12	221-121.10	221-121.11	221-121-05
11	CIP bonnet	1.4301	221-146.01	221-146.01	221-146.01	221-146.02
12	Counter bearing	1.4301	221-148.02	221-148.01	221-148.01	221-148.03
15	Valve disk Y	1.4404	221-130.17	221-130.16	221-130.22	221-130.07
16	Double seat disk	1.4404	221-112.10	221-112.04	221-112.05	221-112.07
17	Additional disk Y	1.4404	221-123.01	221-123.02	221-123.03	221-123.04
18	Pressure spring	1.4310	931-001	931-249	931-002	931-093
19	Guide ring	Turcite	935-021	935-021	935-021	935-024
22	O-ring	EPDM	930-268	930-243	930-243	930-356
		FKM	930-164	930-244	930-244	930-357
		HNBR	930-639	930-640	930-640	--
23	O-ring	EPDM	930-246	930-246	930-246	930-266
		FKM	930-247	930-247	930-247	930-265
		HNBR	930-631	930-631	930-631	--
24	O-ring	EPDM	930-235	930-235	930-235	930-268
		FKM	930-162	930-162	930-162	930-164
		HNBR	930-638	930-638	930-638	--

Spare Parts List

Mixproof Shuttle Valve Type Y



Spare Parts List – IPS Sizes 2" IPS; 3" IPS; 4" IPS; 6" IPS (Cont.)

Item	Designation	Material	2" IPS	3" IPS	4" IPS	6" IPS
26	O-ring	EPDM FKM HNBR	930-270 930-163 930-637	930-252 930-165 930-629	930-252 930-165 930-629	930-246 930-247 --
27	O-ring	EPDM FKM HNBR	930-312 930-166 930-630	930-246 930-247 930-631	930-246 930-247 930-631	930-346 930-299 --
29	O-ring	NBR	930-026	930-026	930-026	930-035
30	Cap nut	1.4571	933-456	933-456	933-456	933-482
31	Cutting ring	1.4571	933-455	933-455	933-455	933-481
32	Support sleeve	1.4571	933-382	933-382	933-382	933-385
33	Seat ring N	1.4404	221-107.02	221-107.03	221-107.04	221-107.06
34	Seat ring D	1.4404	221-108.02	221-108.03	221-108.04	221-108.06
43	Hinged clamp Clamp	1.4401 1.4408	701-075 --	701-076 --	701-077 --	-- 701-017
44	Hex screw	A2-70	--	--	--	901-078
45	Hex nut	1.4305	912-035	912-036	912-036	910-025
46	Hinged clamp	1.4401	701-073	701-073	701-073	701-077
48	Hex nut	1.4305	912-036	912-036	912-036	912-036
74	Cleaning nozzle	PVDF	221-334.01	221-334.02	221-334.02	221-334.03
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
A	Actuator	See spare parts list for actuator type VARIVENT®				
B	Control module type S	See spare parts list for control module type S				

The sealing set includes items 1, 5, 6, 7, 8, 22, 23, 24, 26, 27 and 29.



Seals for VARIVENT® Mixproof Shuttle Valve Y

Seals for VARIVENT® Mixproof Valve Type Y

Item	Qty	Designation	Material	DN 25 1"	DN 40/50 1.5"/2"	DN 65/80 2.5"/3"	DN 100 4"	DN 125	DN 150 6"
1	2	Sealing ring	Ø	22	22	28	28	35	35
			EPDM	924-084	924-084	924-085	924-085	924-088	924-088
			FKM	924-082	924-082	924-083	924-083	924-087	924-087
			HNBR	924-311	924-311	924-313	924-313	--	--
5	6	O-ring	Ø	42x3	60x3	85x4	113x4	138x4	158x5
			EPDM	930-309	930-144	930-150	930-156	930-372	930-260
			FKM	930-168	930-171	930-176	930-178	930-409	930-259
			HNBR	930-632	930-633	930-634	930-863	--	--
6	1	O-ring	Ø	8x1.6	8x1.6	8x1.6	8x1.6	9x3	9x3
			NBR	930-004	930-004	930-004	930-004	930-007	930-007
7	2	V-ring	Ø	35-5	52-6	76-6	104-6	128-6	148-6
			EPDM	932-046	932-021	932-024	932-028	932-060	932-042
			FKM	932-030	932-033	932-035	932-039	932-062	932-041
			HNBR	932-087	932-088	932-090	932-100	--	--
8	2	V-ring	Ø	28-5	44-6	68-6	96-6	120-6	140-6
			EPDM	932-017	932-019	932-023	932-027	932-059	932-045
			FKM	932-029	932-032	932-034	932-038	932-063	932-044
			HNBR	932-085	932-084	932-089	932-099	--	--
22	1	O-ring	Ø	22x3	22x3	28x3	28x3	35x3	35x3
			EPDM	930-268	930-268	930-243	930-243	930-356	930-356
			FKM	930-164	930-164	930-244	930-244	930-357	930-357
			HNBR	930-639	930-639	930-640	930-640	--	--
23	1	O-ring	Ø	30x3	38x3	38x3	38x3	56x3	56x3
			EPDM	930-525	930-246	930-246	930-246	930-266	930-266
			FKM	930-802	930-247	930-247	930-247	930-265	930-265
			HNBR	930-636	960-631	930-631	930-631	--	--
24	1	O-ring	Ø	10x2.5	16x3	16x3	16x3	22x3	22x3
			EPDM	930-368	930-235	930-235	930-235	930-268	930-268
			FKM	930-616	930-162	930-162	930-162	930-164	930-164
			HNBR	930-635	930-638	930-638	930-638	930-639	930-639
26	1	O-ring	Ø	--	20x3	26x3	26x3	38x3	38x3
			EPDM	--	930-270	930-252	930-252	930-246	930-246
			FKM	--	930-163	930-165	930-165	930-247	930-247
			HNBR	--	930-637	930-629	930-629	930-631	930-631
27	1	O-ring	Ø	23x3	32x3	38x3	38x3	50x3	50x3
			EPDM	930-350	930-312	930-246	930-246	930-364	930-364
			FKM	930-269	930-166	930-247	930-247	930-299	930-299
			HNBR	930-628	930-630	930-631	930-631	--	--
29	1	O-ring	Ø	20x3	20x3	20x3	20x3	25x3	25x3
			NBR	930-026	930-026	930-026	930-026	930-035	930-035
Sealing set cpl.			Material	DN 25 1"	DN 40/50 11/2"/2"	DN 65/80 21/2"/3"	DN 100 4"	DN 125	DN 150 6"
			EPDM	221-519.59	221-304.30	221-304.31	221-304.32	221-304.33	221-304.34
			FKM	221-519.61	221-519.39	221-519.40	221-519.41	221-519.42	221-519.43
			HNBR	221-519.78	221-519.79	221-519.80	--	--	--

Storing instructions: Store in accordance with DIN 7716, relative humidity approx. 65%, temperature 15-25° C and protected from light

When replacing seals, observe the instructions in the Operating Instructions!

429-018

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