OPERATING INSTRUCTIONS

Translation from the original language

Hygienic valves

GEAVARIVENT® valve type W_R

GEA Tuchenhagen GmbH
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Product	Shuttle Valve Type W_R
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	These Operating Instructions are the English translation of the original operating instructions in the sense of the EU Machinery Directive.
Wordmarks	The designations VARIVENT® and T.VIS® are protected trademarks of GEA Tuchenhagen GmbH.

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Notes for the Reader

The present Operating Instructions are part of the user information for the valve. The Operating Instructions 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_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]

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 [m³/s] 1 KV = 0.86 x Cv
l	Unit of measurement of volume [litre]
max.	maximum
mm	Unit of measurement of length [millimetre]
µm	Unit of measurement of length [micrometre]
M	Metric
Nm	Unit of measurement of work [newton metre] UNIT OF TORQUE 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
PA	Polyamide
PE-LD	Low-density polyethylene
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
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.

Qualification of Staff

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

Operating and maintenance staff must

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

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

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

The following minimum qualifications are required:

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

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

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

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

User groups

Staff	Qualifications
Operating staff	Adequate instruction and sound knowledge in the following areas: • Function of the valve • Valve operating sequences • What to do in case of an emergency • Lines of authority and responsibilities with respect to the task
Maintenance staff	Adequate instruction as well as sound knowledge of the design and function of the valve. Sound knowledge in the following areas: • Mechanical equipment • Electrical equipment • Pneumatic system Authorization with regard to safety engineering standards to carry out the following tasks: • Setting devices into operation • Earthing of devices • Marking of devices The relevant certificates of qualification must be submitted before work can be carried out on ATEX certified machines.

Supplementary Regulations

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

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

Instructions for the Safe Operation

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

General Principles

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

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

Installation

For installation, the following principles apply:

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

Commissioning/Setup Mode

For commissioning, the following principles apply:

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

Setting into Operation

For setting into operation, the following principles apply:

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

Operation

For operation, the following principles apply:

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

Shutting Down

For shutting down, the following principles apply:

- Switch off the compressed air.
- Switch off the valve via the main switch.
- Padlock the main switch (if fitted) in the off position to prevent it from being switched back on. The key to the padlock must be deposited with the person responsible until the machine is restarted.
- For longer periods of standstill, observe the storage conditions, see Storage (page 21).

Maintenance and Repair

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

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

For maintenance and repair, the following principles apply:

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

Disassembly

For disassembly, the following principles apply:

- Only allow qualified staff to disassemble the valve.
- Before starting disassembly, the valve must be switched off and secured against being switched back on. Work may only be started once any residual energy has been discharged.
- Disconnect all power and utility lines.
- Markings, e.g. on lines, must not be removed.
- Do not climb on the valve. Use suitable access aids and working platforms.
- Mark the lines (if unmarked) prior to disassembly to ensure they are not confused when re-assembling.
- Protect open line ends with blind plugs against ingress of dirt.
- Pack sensitive parts separately.
- For longer periods of standstill, observe the storage conditions, see “Storage“ (page 21).

Environmental Protection

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

For environmental protection the following principles apply:

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

Electrical Equipment

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

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

Signage

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

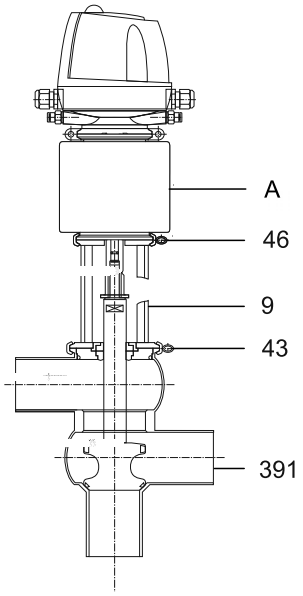
The signs and notes on the valve must always be legible. Any illegible signs must be replaced immediately.

Signs on the valve

Sign	Meaning
	General hazard warning
	Warning Crushing
	Explosive atmosphere hazard warning

Residual Risk

Hazard Areas



Please observe the following notes:

- In the event of malfunctions, shut down the valve (disconnect from the power and air supply) and secure it against being used.
- Never reach into the lantern (9) or the valve housing (391) 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, 46) are opened, as the released spring pretension will suddenly lift the actuator. Therefore, release the spring tension before detaching the clamp connections (43, 46) 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: • Wear suitable work clothing. • Never operate the machine if the cover panels are not correctly fitted. • Never open the cover panels during the operation. • Never reach into openings. As a precautionary measure, wear personal protective equipment in the vicinity of the valve: • Protective gloves • Safety shoes
Environmental damage	Operating materials with properties which are harmful to the environment	For all work: • Collect lubricants in suitable containers. • Dispose of lubricants in accordance with the pertinent regulations.

Engineering for a better world.

EU Declaration of conformity within the meaning of the EC machine directive 2006/42/EC

Manufacturer: **GEA Tuchenhagen GmbH**
Am Industriepark 2-10
21514 Büchen, Germany

Hereby, we declare that the machine designated in the following

---

Designation:	Valve with acutator
Type:	VARIVENT® / ECOVENT®

---

by virtue of its design and construction and in the versions placed on the market by us, complies with the essential health and safety requirements of the following directive:

Relevant EC directives:	2006/42/EC	EC Machinery Directive
Applicable harmonized standards, in particular:	EN ISO 12100: 2010	

Remarks:

- In the event of a modification to the machine that was not agreed with us, this declaration loses its validity
- Furthermore, we declare that the specific technical documentation for this machine has been drawn up in accordance with Annex VII, Part A, and undertake to forward this documentation by means of data medium upon justified request by the national authorities

---

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Büchen, 18 July 2025

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Engineering for a better world.

UK- Declaration of conformity by Supply of Machinery (Safety) Regulations 2008

Manufacturer: **GEA Tuchenhagen GmbH**
Am Industriepark 2-10
21514 Büchen, Germany

Hereby, we declare that the machine designated in the following

Designation:	Valve with actuator
Type:	VARIVENT® / ECOVENT®

by virtue of its design and construction and in the versions placed on the market by us, complies with the essential health and safety requirements of the following directive:

Relevant UK legislation:	Supply of Machinery (Safety) Regulations 2008
Applicable harmonized standards, in particular:	EN ISO 12100: 2010

Remarks:

- In the event of a modification to the machine that was not agreed with us, this declaration loses its validity
- Furthermore, we declare that the specific technical documentation for this machine has been drawn up in accordance with Annex VII, Part A, and undertake to forward this documentation by means of data medium upon justified request by the national authorities

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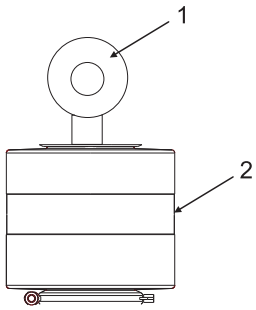
Transport and Storage

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.
- Control tops 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 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 ≤ 0°C, it must be dried beforehand and suitable measures must be taken to protect it from damage.

NOTE

We recommend that the valve should be stored at a temperature of ≥ 5°C for a period of 24 hours prior to any handling (disassembling the housings / activation of actuators) so that any ice crystals formed by condensation water can melt.

Intended Purpose

Designated Use

Shuttle Valve Type W_R is used for change-over of streams of liquid within a section of a pipe.

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

Shuttle Valve Type W_R is a piece of pressure equipment (without safety function) in the sense of the pressure equipment directive: Directive 97/23/EC. It is classified according to Annex II, article 3, section 3. In the event of any deviations, GEA Tuchenhagen GmbH will supply a special Declaration of Conformity.

ATEX Directive

In areas with an explosive atmosphere, only valves suitable for use in such areas may be used.

Refer to and observe the additional ATEX operating instructions for VARIVENT valves. For details regarding the marking of valves for potentially explosive areas also refer to the additional ATEX operating instructions for VARIVENT valves.

If these 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.

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.

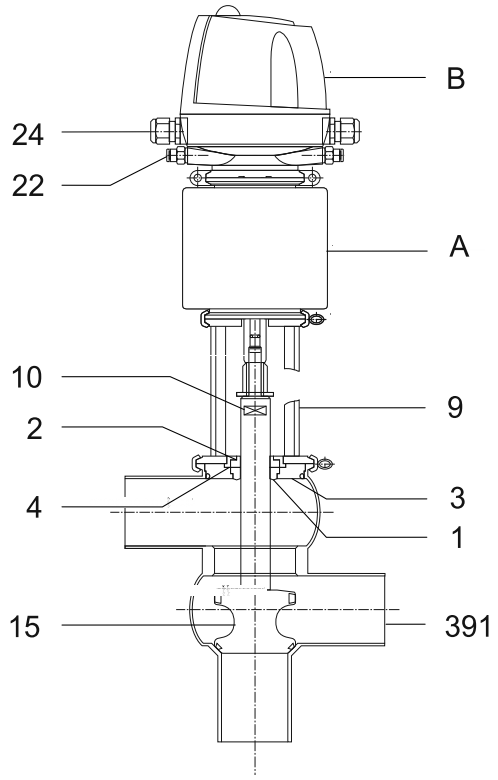
Conversion Work

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

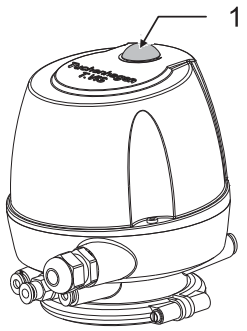


No.	Designation	No.	Designation
A	Actuator	9	Lantern
B	Control top	15	Valve disk
1	Sealing ring	22	Air connection
2	Bearing	24	Electrical connection
3	Sealing disk	391	Valve housing
4	Bearing disk		

Function

Distinguishing Feature 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.

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 the Valve“ (page 35).
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.

✓ 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 Ø (mm)	Air requirement (dm^3_n/stroke) 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...[1]	170	1.60	
S...[1]	210	2.00	
T...[1]	210	2.20	
D...6	170	1.30	DN 125 + DN 150 6" OD, 6" IPS
E...6	210	2.00	
S...6	261	3.20	
T...6[1]	210	4.00	
U...6[1]	261	5.20	
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.

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 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).

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 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 (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
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	Disassembling the Valve Replace 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 Disassembly

Requirement:

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

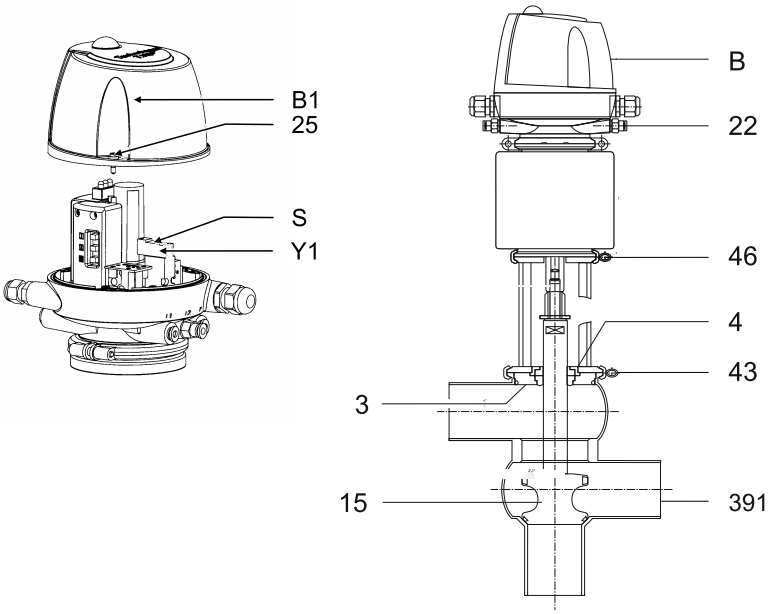
Carry out the following steps:

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

Disassembling the Valve

Detaching the Clamp Connection (43)



Requirement:

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

Spring-closing valve

WARNING

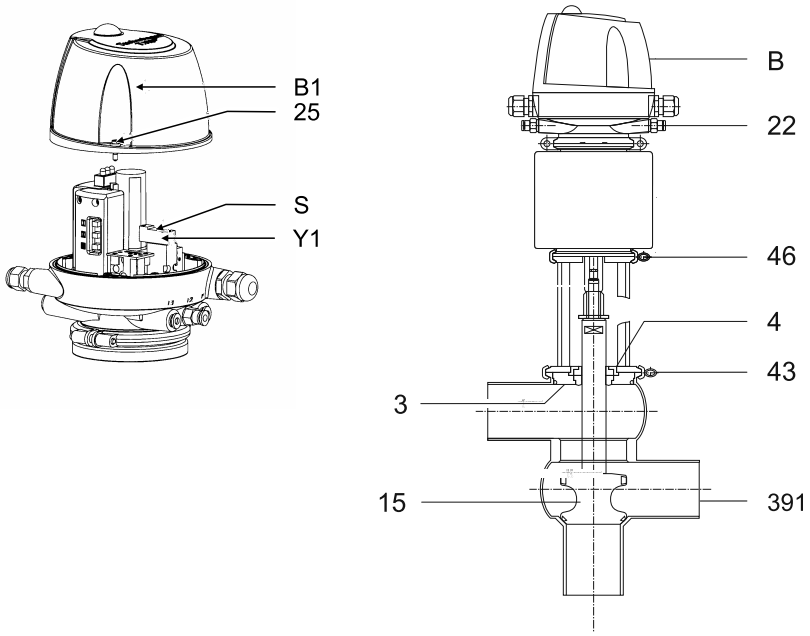
Spring tension in the valve

Danger of injury when opening the clamp connections at the actuator (46) or at the housing (43) 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.

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.

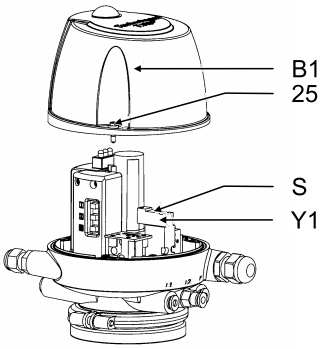
3. Remove the clamp connection (43).
4. Depressurize the actuator.
5. Remove the clamp connections (43).
6. Place an open end spanner on the spanner flat on the valve disk (15) and use a strap wrench to unscrew the actuator by 3 turns.

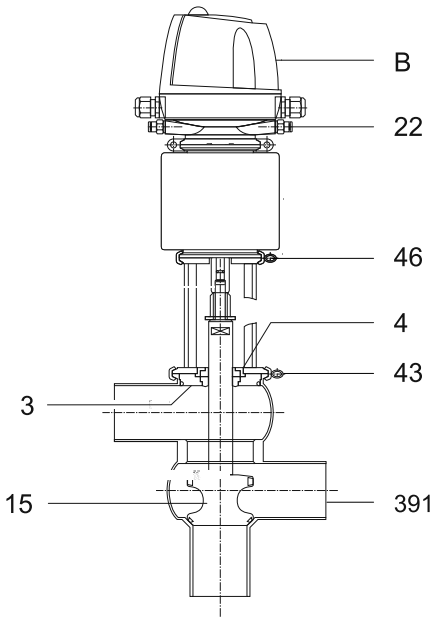
   ! The valve disk is released.

Spring-opening valve

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).





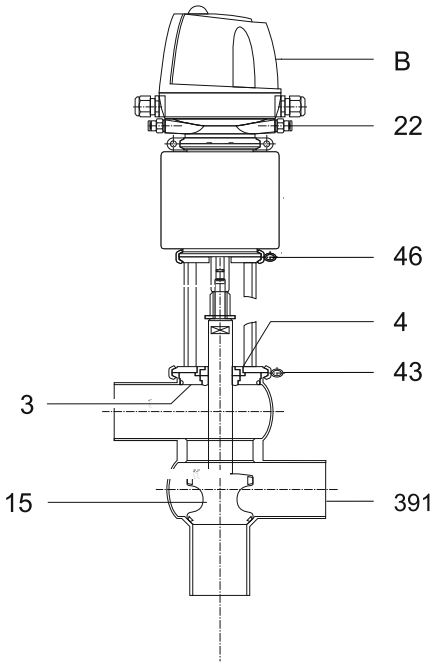
➥ The valve disk (15) is raised.

3. Remove the clamp connections (43).
4. Place an open end spanner on the spanner flat on the valve disk (15) and use a strap wrench to unscrew the actuator by 3 turns.

   ! The valve disk is released.

✓ Done

Removing the Valve Insert



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.

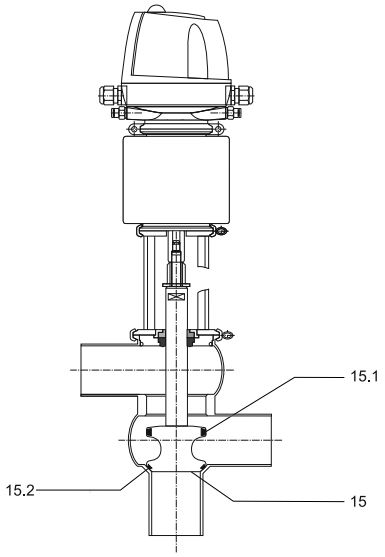
Carry out the following steps:

1. Remove the clamps between control top and actuator.
2. Unscrew the control top (B).
3. Remove the clamp connection (46) between housing and lantern.
4. Unscrew the valve disk (15) from the actuator by hand.
5. Withdraw the valve from the housing.
6. Take the actuator off.

✓ Done

Maintenance

Cleaning the Valve



IMPORTANT NOTE

The stem of the valve disk (15), the valve seat (15.2) and the V-ring groove (15.1) 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 35).
2. Carefully clean the individual parts.

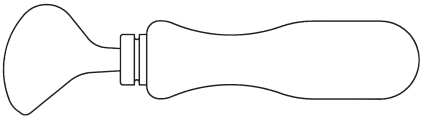
✓ Done

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



Insertion tool

Requirement:

- Insert V-rings / VR-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

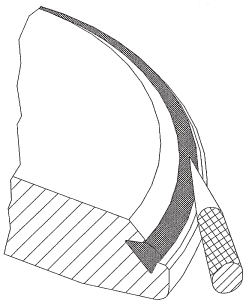
Replacing the V-Ring

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.

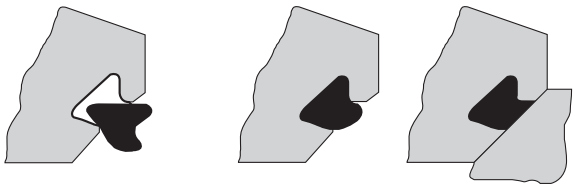
Carry out the following steps:

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

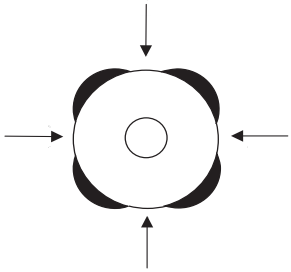


2. Before fitting, wet the V-ring on the side not in contact with product (rear side). Pay attention that water does not drip into the V-ring groove on the valve disk.

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.

Replacing V-Ring RA

CAUTION

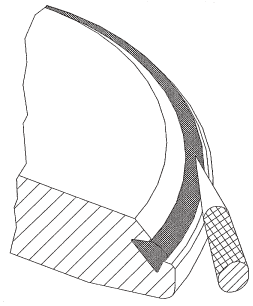
The scriber can slip off when the V-ring is removed.
Danger of injury!

➔ Grip the valve disk in a vice with protected jaws.

➔ Unscrew the curved side of the scriber.

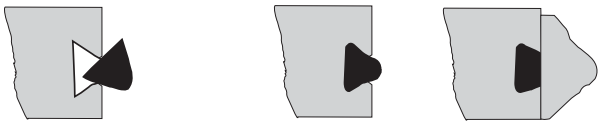
Carry out the following steps:

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

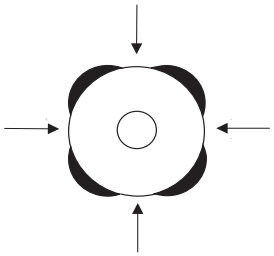


2. Before fitting, wet V-ring RA on the side not in contact with product (rear side). Pay attention that water does not drip into the V-ring groove on the valve disk.

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



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



5. Insert V-ring RA 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.

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	lbft
Clamps on the control top		1	0.7
Clamp connections Cast clamps	M6	9	6.6
Clamp connections 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 stroke of the valve in accordance with “Valve Stroke“ (page 44).

✓ Done

Strokes Depending on Size

Valve Stroke

Valve size	Valve stroke (mm)	Valve size	Valve stroke (mm)
Metric		**Inch OD**	
25	20	1"	20
40	30	1.5"	27
50	30	2"	28
65	30	2.5"	25
80	30	3"	39
100	30	4"	28

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 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:

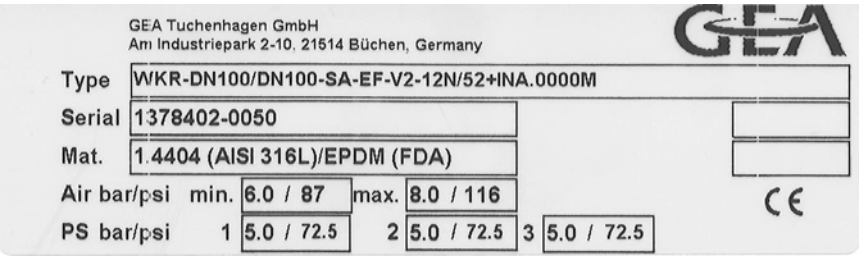
1. Remove the actuator.
2. Safely pack the actuator and send it to GEA Tuchenhagen GmbH.

✓ 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	Shuttle Valve Type W_R
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	any position

Technical data: Ambient temperatures

Designation	Description
- Valve	0 ... 45 °C (32 ... 113 °F), standard < 0 °C (32 °F): use control air with a low dew point. Protect valve stems against freezing.
- Proximity switch	-20 ... +80 °C (-4 ... +176 °F)
- Control top type T.VIS M-15, A-15	-20 ... +50 °C (-4 ... +122 °F)
- Control top type T.VIS P-15	-20 ... +50 °C (32 ... 122 °F)
Product temperature and operating temperature	Depending on the sealing material

Technical data: Compressed air supply

Designation	Description
Air hose	
- Metric	Material PE-LD Outside Ø 6 mm Inside Ø 4 mm
- Inch	Material PA Outside Ø 6.35 mm Inside Ø 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
- 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

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	47.6	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 IPS	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to DIN EN ISO 1127
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

Tools	Material no.
Hose cutter	407-065
Belt wrench	408-142
V-ring insertion tool	229-109.88
Hex key, 3 mm DN 25/40/50	408-121
Open end spanner, 10 mm	408-033
Open end spanner, 13mm	408-034
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
Installation mandrel DN 25 ... 50	229-109.95
Installation mandrel DN 65 ... 100	229-109.96
Mounting device	

Lubricants

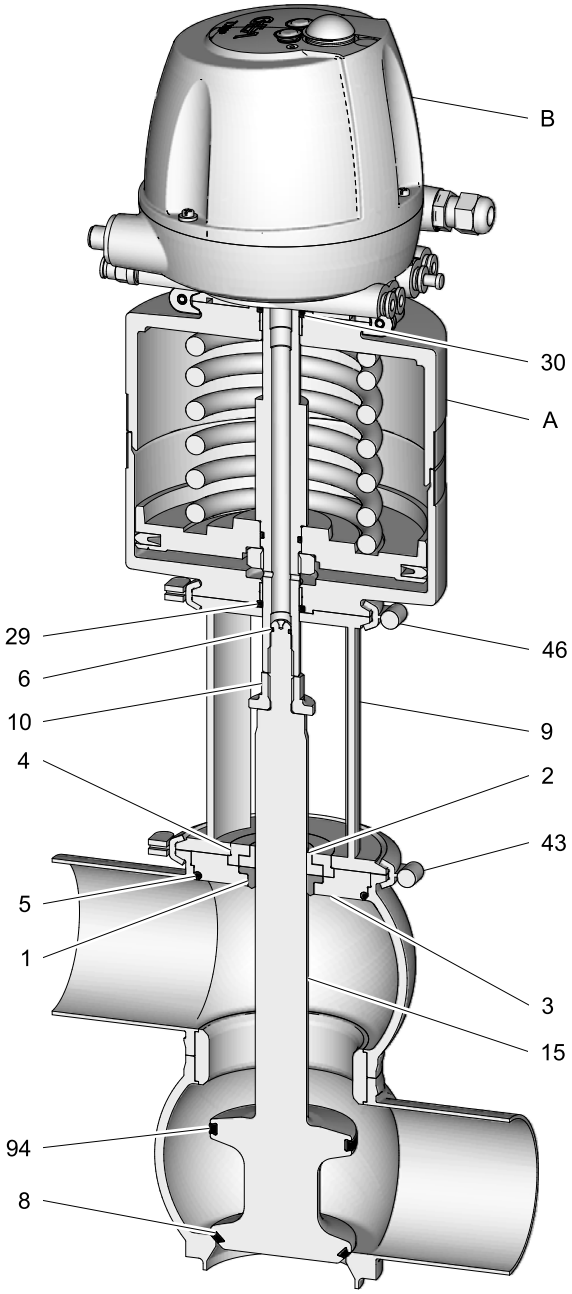
Lubricants	Material no.
Rivolta F.L.G. MD-2	413-071
PARALIQ GTE 703	413-064

Weights

Size	Weight [kg]
DN 25, 1"	10
DN 40, 50, 1.5", 2"	11
DN 65, 2.5"	16
DN 80, 3"	23
DN 100, 4"	24
DN 125	60
DN 150, 6"	90

Spare Parts Lists

Shuttle Valve Type W_R



Spare Parts Drawing

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Spare Parts List – Metric Sizes DN 25 to DN 65

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
Sealing set		EPDM FKM HNBR	221-519.91 221-001805 --	221-519.92 221-519.97 221-000756	221-519.92 221-519.97 221-000756	221-519.93 221-519.98 221-000757	221-519.93 221-519.98 221-000757	221-519.94 221-519.99 --
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/ carbon 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
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
6*	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004
**8*	V-ring AX	EPDM FKM HNBR	932-017 932-029 932-085	932-019 932-032 932-084	932-019 932-032 932-084	932-023 932-034 932-089	932-023 932-034 932-089	932-027 932-038 932-099
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	1.4301	221-147.02	221-147.02	221-147.02	221-147.01	221-147.01	221-147.01
15	Valve disk W_R	1.4404	221-524.06	221-524.01	221-524.02	221-524.03	221-524.04	221-524.05
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
43	Clamp connection KL	1.4401	221-507.02	7221-507.04	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
**94	V-ring RA	EPDM FKM HNBR	221-365.13 221-365.21 221-365.24	221-365.07 221-365.10 221-365.18	221-365.07 221-365.10 221-365.18	221-365.08 221-365.11 221-365.20	221-365.08 221-365.11 221-365.20	221-365.09 221-365.12 221-365.19
A	Actuator		See spare parts list/dimension sheet for actuator type VARIVENT					
B	T.VIS control top		See spare parts list for T.VIS control top					
Grease RIVOLTA F.L.G. MD-2 100g tube not included in the sealing set.						413-036		

* Items 1, 5, 6, 8, 29 and 30 are included in the sealing set.

** Do not grease items 8 and 94.

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Spare Parts List

Shuttle Valve Type W_R

Spare Parts List – Inch Sizes 1" OD to 4" OD

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
Sealing set		EPDM FKM HNBR	221-519.91 221-001805 --	221-519.92 221-519.97 221-000756	221-519.92 221-519.97 221-000756	221-519.93 221-519.98 221-000757	221-519.93 221-519.98 221-000757	221-519.94 221-519.99 --
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/carbon 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
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
6*	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004
**8*	V-ring AX	EPDM FKM HNBR	932-017 932-029 932-085	932-019 932-032 932-084	932-019 932-032 932-084	932-023 932-034 932-089	932-023 932-034 932-089	932-027 932-038 932-099
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	1.4301	221-147.02	221-147.02	221-147.02	221-147.01	221-147.01	221-147.01
15	Valve disk W_R	1.4404	221-524.08	221-524.01	221-524.02	221-524.03	221-524.07	221-524.05
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
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
**94	V-ring RA	EPDM FKM HNBR	221-365.13 221-365.21 221-365.24	221-365.07 221-365.10 221-365.18	221-365.07 221-365.10 221-365.18	221-365.08 221-365.11 221-365.20	221-365.08 221-365.11 221-365.20	221-365.09 221-365.12 221-365.19
A	Actuator		See spare parts list/dimension sheet for actuator type VARIVENT					
B	T.VIS control top		See spare parts list for T.VIS control top					
Grease RIVOLTA F.L.G. MD-2 100g tube not included in the sealing set.						413-036		

* Items 1, 5, 6, 8, 29 and 30 are included in the sealing set.

** Do not grease items 8 and 94.

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Sealing Sets for VARIVENT® Shuttle Valve Type W_R

Item	Qty	Designation	Material	DN 25 1" OD	DN 40/50 1.5"/2" OD	DN 65/80 2.5"/3" OD	DN 100 4" OD
1	2	Sealing ring	Ø EPDM FKM HNBR	22 924-084 924-082 924-311	22 924-084 924-082 924-311	28 924-085 924-083 924-313	28 924-085 924-083 924-313
5	4	O-ring	Ø EPDM FKM HNBR	42x3 930-309 930-168 930-632	60x3 930-144 930-171 930-633	85x4 930-150 930-176 930-634	113x4 930-156 930-178 930-863
6	1	O-ring	Ø NBR	8x1.6 930-004	8x1.6 930-004	8x1.6 930-004	8x1.6 930-004
**8	1	V-ring	Ø EPDM FKM HNBR	28-5 932-017 932-029 932-085	44-6 932-019 932-032 932-084	68-6 932-023 932-034 932-089	96-6 932-027 932-038 932-099
29	1	O-ring	Ø NBR	20x3 930-026	20x3 930-026	20x3 930-026	20x3 930-026
30	1	O-ring	Ø NBR	20x3 930-026	20x3 930-026	20x3 930-026	20x3 930-026
**94	1	V-ring RA	Ø EPDM FKM HNBR	36-7 221-365.13 221-365.21 221-365.24	54-7 221-365.07 221-365.10 221-365.18	78-7 221-365.08 221-365.11 221-365.20	106-7 221-365.09 221-365.12 221-365.19
Sealing set cpl.			EPDM FKM HNBR	221-519.91 221-001805 --	221-519.92 221-519.97 221-000756	221-519.93 221-519.98 221-000757	221-519.94 221-519.99 --
Grease RIVOLTA F.L.G. MD-2 100g tube not included in the sealing set.						413-036	

**** Do not grease items 8 and 94.**

Storing instructions: storage 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!

429-007

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