Operating Instructions

VESTA® XL
Tank Bottom Valve Type H_A/T/F/M

Edition 2023-09-26
English

Product	Tank Bottom Valve Type H_A/T/F/M
Document	Operating Instructions Edition 2023-09-26 English
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Wordmarks	The designations VESTA® and T.VIS® are protected trademarks of GEA Tuchenhagen GmbH.

Table of Contents

Notes for the Reader

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

Binding Character of These Operating Instructions

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

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

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

Notes on the Illustrations

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

Symbols and Highlighting

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

DANGER

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

EXPLOSION HAZARD

Warning: Explosions.
Failure to observe the warning may result in a severe explosion.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

WARNING

Warning: Serious Injuries.
Failure to observe the warning note can result in serious damage to health.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

CAUTION

Warning: Injuries.
Failure to observe the warning note can result in minor or moderate damage to health.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

NOTE

Warning: Damage to Property.
Non-observance of the warning note can cause serious damage to the valve or the vicinity of the valve.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

Carry out the following steps: = Start of 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.

TIP
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 description, short designation according to DIN/ISO 1629: Ethylene Propylene Diene Rubber
GEA	GEA Group AG group of companies GEA stands for Global Engineering Alliance
FKM	Material description, short designation according to DIN/ISO 1629: Fluorine rubber
h	Unit of measurement of time [hour]
HNBR	Material description, 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	Material description polyamide
PTFE	Material description polytetrafluorethylene
PE-LD	Material description low-density polyethylene
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 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.

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

Qualification of Staff

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

Operating and maintenance staff must

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

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

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

The following minimum qualifications are required:

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

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

- Personal qualification for the relevant task.
- Sufficient professional qualification for the relevant task.
- Instructed with regard to the function of the valve.
- Instructed with regard to the operating sequences of the valve.
- Familiar with the safety devices and their function.
- Familiar with 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 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 after the express permission of the manufacturer.
- After completion of all work, check that the protective devices are fully functional.

Signage

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

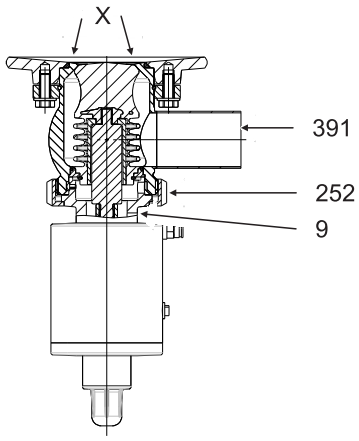
The signs and notes on the valve must always be legible. Any illegible signs must be replaced immediately.

Signs on the valve

Sign	Meaning
	General hazard warning
	Warning Crushing
	Explosive atmosphere hazard warning

Residual Risk

Hazard Areas



Please observe the following notes:

- In the event of malfunctions, shut down the valve (disconnect from the power and air supply) and secure it against being used.
- When the valve is switching, never reach into the valve housing (391), the lantern (9) or into the valve inlet X (on pneumatic actuators). Fingers can be crushed or cut off.
- When releasing the grooved cap nut (252) of the non-actuated valve (spring-to-close version) there is a risk of the bellows and the round thread of the grooved cap nut being damaged. Before releasing the grooved cap nut (252) therefore relieve the spring tension by pressurizing the actuator with compressed air. The valve is opened.
- The housing sockets have very sharp edges. When transporting and assembling the valve therefore be sure to wear suitable protective gloves.
- Before starting any service, maintenance or repair work, disconnect the valve from the power supply and secure it against inadvertently being switched back on again.
- Only allow a qualified electrician to carry out any work on the electrical power supply.
- Check the electrical equipment of the valve at regular intervals. Immediately remedy loose connections and molten cables.
- If work on live parts cannot be avoided, call in a second person, who can operate the main switch in case of an emergency.

Residual Dangers

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

Residual dangers on the valve and measures

Danger	Cause	Measure
Danger to life	Inadvertent switch-on of the valve	Effectively disconnect all components, effectively prevent switch-on.
	Electric power	Observe the following safety rules: 1 Isolate from the power supply. 2 Take appropriate measures to prevent switch on. 3 Test absence of voltage. 4 Earthing and short-circuiting. 5 Cover or safeguard any adjacent live parts.
	Spring tension in the actuator	Danger to life caused by compression spring in the actuator. Do not open actuators but return them 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.

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

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Designation: Valve with actuator

Type: VESTA® H_A, H_A/I, H_A/T

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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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Person authorised for compilation and handover of technical documentation:

GEA Tuchenhagen GmbH
CE Documentation Officer
Am Industriepark 2-10
21514 Büchen, Germany

Büchen, 19 September 2023

Tatjana Fischer
Managing Director

pp. Stephan Dirks
Head of Engineering

Transport and Storage

Scope of Supply

On receipt of the valve check whether

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

Transport

For transport, the following principles apply:

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

Storage

If, during transport or storage, the valve is going to be exposed to temperatures ≤ 0°C, it must be dried and suitable measures be taken to protect it from damage.

TIP

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

Intended Purpose

Designated Use

The Tank Bottom Valve type H_A/T/F/M is used for opening and closing tank outlets. It offers a high degree of process reliability and product quality in aseptic and sterile working processes.

Pressure hammers and excessive control air pressures can destroy the bellows. The control air pressure should therefore not be higher than max. 8 bar.

The medium should preferably flow in the opening direction of the bellows to ensure that pressure hammers are prevented when the valve is opened or closed. The valve is monitored, controlled and operated by the customer's system.

TIP

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

ATEX Directive

If the Tank Bottom Valves type H_A/T/F/M are used in areas with a potentially explosive atmosphere, you must absolutely comply with directive 94/9/EC with respect to all ignition hazards. In this case these Operating Instructions only apply in combination with the additional operating instructions for VESTA sterile valves in ATEX design.

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

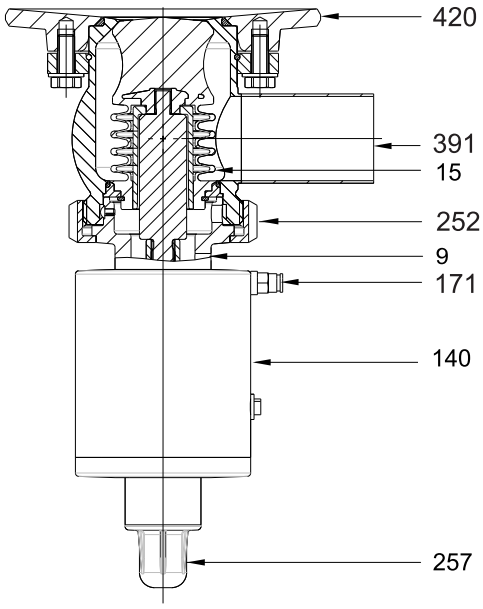
- Persons or objects are in the danger zone.
- Safety devices are not working or were removed.
- Malfunctions have been detected on the valve.
- Damage has been detected on the valve.
- Maintenance intervals have been exceeded.

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



No.	Designation
9	Lantern
15	Bellows
140	Actuator
171	Air connection
252	Grooved cap nut
257	Cap
391	Housing
420	Housing connection

Installation and Commissioning

Notes on Installation

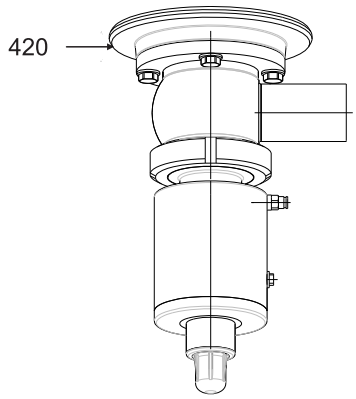
The valve is fitted underneath the tank. Care must be taken to ensure that the valve housing and the pipe system can drain properly.

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.

Welding the Housing Connection into the Tank

This section describes how the housing connection is welded into the tank.



Requirement

- When welding the housing connection (420) into the tank, the welding instructions (WPS) must be observed, see “Welding Instructions“ (Page 63).

NOTE

Damage caused by welding

The tank bottom valve can be damaged by distortion due to welding and when the position of the grooves is altered.

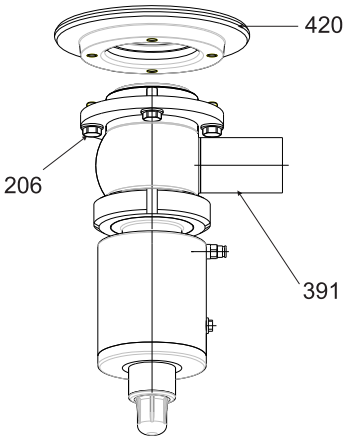
➔ Before starting any welding work, remove all built-in parts from the valve.

➔ To ensure that a proper weld is formed when the valve is welded into the pipe, make sure that the root side of the weld is protected against oxidation by forming gas.

➔ Use welding filler if necessary.

Carry out the following steps:

1. If valves with screwed-on housing connection (420) are supplied, first release the screws (206) and take off the housing connection (420).



2. Remove the valve insert, see chapter “Disassembly“ (Page 35).
3. Fit the housing connection into place and tack it.

4. Always close the housing before welding it into the pipe system and flush it with forming gas from the inside during the welding process.
5. Weld the housing in position in the pipe, ensuring that the connection is free of stress and distortion. Use the TIG welding with pulse method.

✓ Done.

Fitting the Valve with Detachable Pipe Connection Elements

⚠ CAUTION

If pipes contain liquids, these can spurt out when the pipes are opened.
Danger of injury as a result of hot or aggressive liquids.

➔ Before releasing any pipe or clamp connections, drain and, if necessary, clean or flush the pipe.

➔ 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 the tank bottom valve directly into the pipe system using suitable connection fittings.

✓ Done.

Pneumatic Connections

Air Requirement

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

Air requirement for spring-to-close actuators

Size	Actuator type	Actuator diameter (mm)	Air pressure min.	Air pressure max.	Air requirement (dm^3_n/stroke) dm^3_n at 1.01325 bar at 0°C as per DIN 1343
DN 40	ECO-DZ B3	100	5	8	0.23
DN 50	ECO-DZ B3	100	5	8	0.23
DN 65	ECO-DZ D8	160	5	8	0.54
DN 80	ECO-DZ D8	160	5	8	0.59
DN 100	ECO-DZ D8	160	5	8	0.64
ISO 42.4	ECO-DZ B3	100	5	8	0.23

Air requirement for spring-to-close actuators (continued)

Size	Actuator type	Actuator diameter (mm)	Air pressure min.	Air pressure max.	Air requirement (dm^3_n/stroke) dm^3_n at 1.01325 bar at 0°C as per DIN 1343
ISO 48.3	ECO-DZ B3	100	5	8	0.23
ISO 60.3	ECO-DZ D8	160	5	8	0.56
ISO 76.1	ECO-DZ D8	160	5	8	0.54
ISO 88.9	ECO-DZ D8	160	5	8	0.59
ISO 114.3	ECO-DZ D8	160	5	8	0.64
1 1/2"OD	ECO-DZ B3	100	5	8	0.23
2" OD	ECO-DZ B3	100	5	8	0.23
2 1/2" OD	ECO-DZ D8	160	5	8	0.54
3" OD	ECO-DZ D8	160	5	8	0.54
4" OD	ECO-DZ D8	160	5	8	0.64

Air requirement for spring-to-open actuators

Size	Actuator type	Actuator diameter (mm)	Air pressure min.	Air pressure max.	Air requirement (dm^3_n/stroke) dm^3_n at 1.01325 bar at 0°C as per DIN 1343
DN 40	ECO-DZ B3	100	5	5.5	0.23
DN 50	ECO-DZ B3	100	5	5.5	0.23
DN 65	ECO-DZ D8	160	5	5.5	0.54
DN 80	ECO-DZ D8	160	5	5.5	0.59
DN 100	ECO-DZ D8	160	5	5.5	0.64
ISO 42.4	ECO-DZ B3	100	5	5.5	0.23
ISO 48.3	ECO-DZ B3	100	5	5.5	0.23
ISO 60.3	ECO-DZ D8	160	5	5.5	0.56
ISO 76.1	ECO-DZ D8	160	5	5.5	0.54
ISO 88.9	ECO-DZ D8	160	5	5.5	0.59
ISO 114.3	ECO-DZ D8	160	5	5.5	0.64
1 1/2"OD	ECO-DZ B3	100	5	5.5	0.23
2" OD	ECO-DZ B3	100	5	5.5	0.23
2 1/2" OD	ECO-DZ B8	160	5	5.5	0.54
3" OD	ECO-DZ D8	160	5	5.5	0.54
4" OD	ECO-DZ D8	160	5	5.5	0.64

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.

✓

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 control modules T.VIS M-1, T.VIS A-7 or T-VIS P-20.

✓

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.

Malfunctions

In the event of malfunctions immediately deactivate the tank bottom 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 Compressed air pressure too low	Check the compressed air supply Check air hoses for free passage and air tightness
	Fault in the electrical system	Check actuation and routing of electrical lines
Valve does not close tight	Dirt/foreign material between valve seat and bellows	Clean valve housing and bellows
	PTFE bellows defective	Replace PTFE bellows
Valve closes too slowly	O-rings in the actuator dry (friction losses)	Grease O-rings
Leakage at the housings	PTFE bellows defective	Replace PTFE bellows
Switchpoint changed		Check for leaks

Maintenance

Inspections

Between the maintenance periods, the tank bottom valve must be checked for leakage and proper function.

Product Contact Seals

Carry out the following steps:

➔ Regularly check the bellows.

✓

Pneumatic Connections

Carry out the following steps:

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

✓

Electrical Connections

Carry out the following steps:

➔ Check that the proximity switch connections are clean.

✓

Maintenance Intervals

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

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

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

Maintenance Intervals

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

Removing the Valve

Requirement

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

Carry out the following steps:

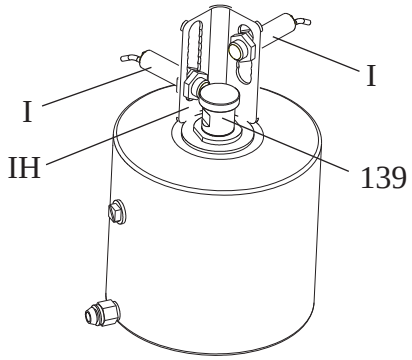
1. Drain all pipe system elements that lead to the valve and, if necessary, clean or rinse them.
2. Shut off the control air supply.
3. Disconnect the power supply.
4. Detach the pipe connection of the valve.

✓ Done.

Disassembly

This section describes disassembly of various components.

Dismantling the Proximity Switch Mounting

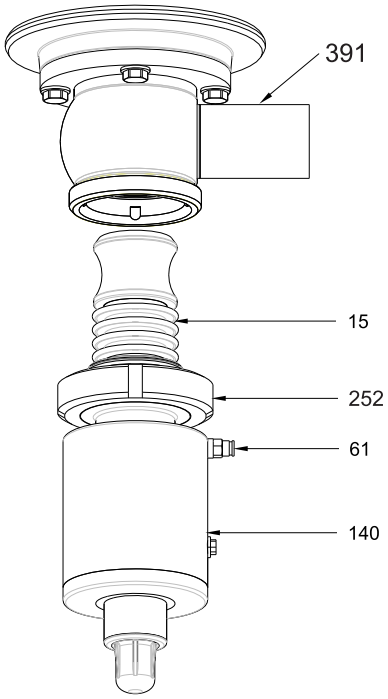


Carry out the following steps:

1. Remove the proximity switches (I).
2. Unscrew the switch bar (139).
3. Unscrew (a/f 27) the proximity switch mounting (IH).

✓ Done.

Removing the Valve Insert



Raising the bellows

NOTE

High spring tension on the non-actuated valve (spring-to-close version)
When releasing the grooved cap nut (252) there is a risk of the bellows and the round thread of the grooved cap nut being damaged.

➔ Before releasing the grooved cap nut (252) relieve the spring tension by energizing the actuator with compressed air. The valve is opened!

Carry out the following steps:

➔ Supply air to the actuator (140) via (61).

➥ The bellows (15) is raised.

Done.

Withdrawing the valve insert from the housing

NOTE

The bellows is a sensitive component.

Danger of damaging the bellows when pulling the valve insert from the housing (391).

➔ Carefully withdraw the valve insert from the housing. Do not set the valve insert down on the bellows. Always place the bellows on a clean and soft surface.

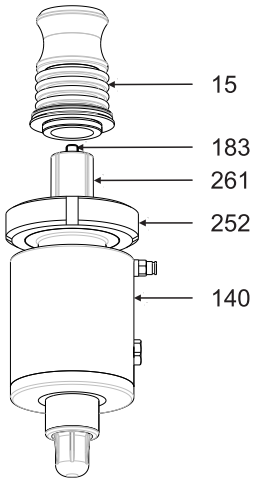
Carry out the following steps:

1. Release the grooved cap nut (252) with a hook spanner.
2. Carefully withdraw the valve insert from the housing (391).

Done.

✓ The bellows can now be dismantled.

Dismantling the Bellows

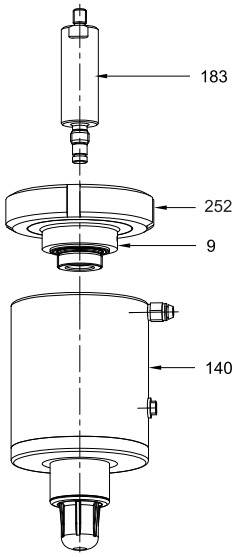


Carry out the following steps:

1. Unscrew the bellows (15) from the valve stem (183) using a paper towel or a piece of leather.
2. Take off the insert (261) from the valve stem (183).

✓ Done.

Dismantling the Lantern

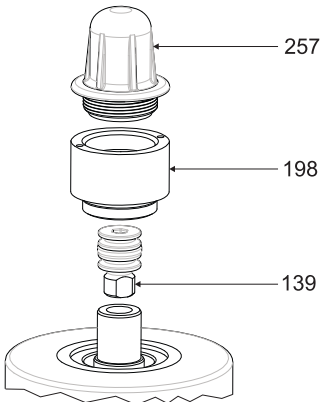


Carry out the following steps:

1. Grip the actuator (140) with a belt wrench, release the valve stem (183) and remove it (a\f 24).
2. Push up the grooved cap nut (252) and insert the round rod (8 mm in diameter) into the hole.
3. Remove the lantern (9).

✓ Done.

Dismantling the Position Indicator



Carry out the following steps:

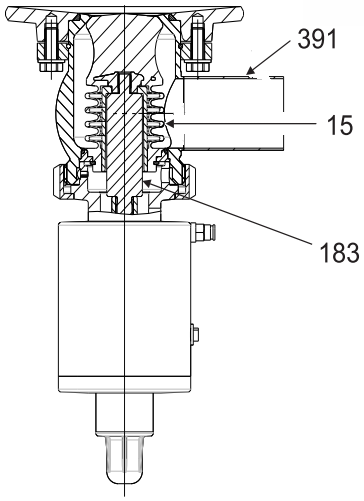
1. Unscrew the cap (257).
2. Release the mounting base (198) using a face spanner and remove it.

3. Remove the adapter (139) using an a\f 6 hex key.

✓ Done.

Maintenance

Cleaning the Valve



Precision areas of the valve

15	Bellows
391	Housing
183	Valve shaft

NOTE

Bellows (15), housing (391) and valve shaft (183) are precision areas.
Damage to the valve can result in a malfunction.

➔ Observe the safety information sheets issued by the detergent manufacturers!

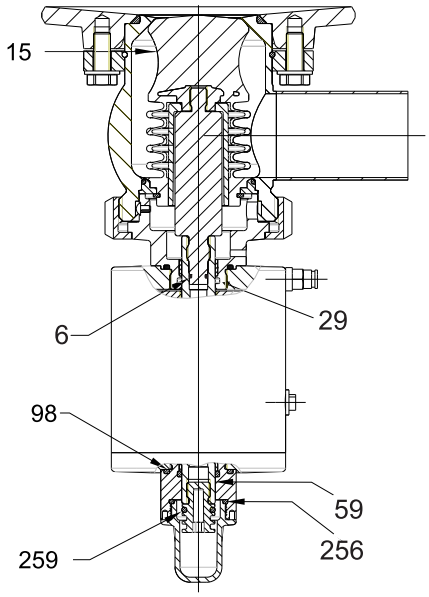
➔ Only use detergents which are not aggressive towards the materials of the valve, see “Tank Bottom Valve type H_A/T/F/M“ (Page 52), and which are non-abrasive.

Carry out the following steps:

➔ Carefully clean the individual parts.

✓ Done.

Replacing Wearing Parts



Requirement

- Always use original spare parts!
- Used seals must not be used again, since the proper function of the seal can then no longer be ensured!

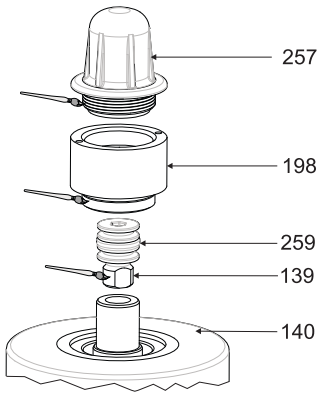
Carry out the following steps:

1. Replace the bellows (15) if it is defective.
2. Replace all seals and plain bearings identified in the diagram:
   (6) O-ring
   (29) O-ring
   (98) O-ring
   (256) O-ring
   (59) Plain bearing

✓ Done.

Assembly

Assembling the Position Indicator

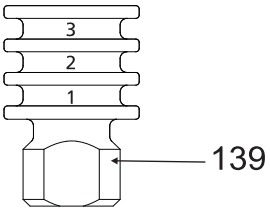


Carry out the following steps:

1. Fit the adapter (139) using an a\f 6 hex key.
2. Fit the O-ring (259) into the adapter (139) in accordance with the table “Position of the O-Ring in the Adapter“ (Page 41).
3. Secure the mounting base (198) to the actuator (140) using a face spanner.
4. Screw on the cap (257).

✓ Done.

Position of the O-Ring in the Adapter



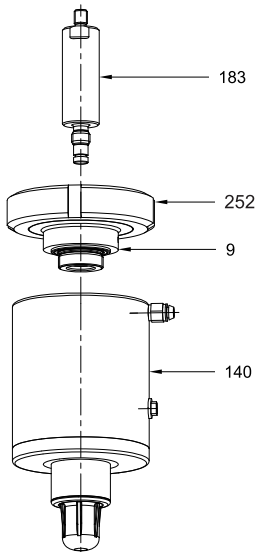
Position of the O-ring

Size	Position of the O-ring (yellow)
DN 40	1
DN 50	1
DN 65	2
DN 80	2
DN 100	3
ISO 42.4	1
ISO 48.3	1

Position of the O-ring (continued)

Size	Position of the O-ring (yellow)
ISO 60.3	1
ISO 76.1	2
ISO 88.9	2
ISO 114.3	3
1 1/2"OD	1
2" OD	1
2 1/2" OD	1
3" OD	3
4" OD	2

Assembling the Lantern

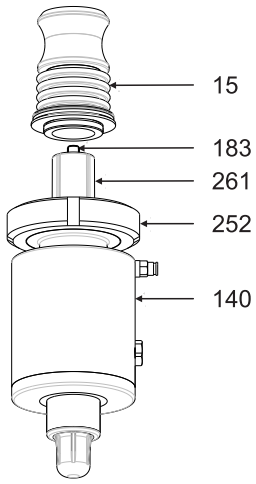


Carry out the following steps:

1. Grip the actuator (140) using a belt wrench and screw the lantern (9) into the actuator (140) by hand.
2. Push up the groove nut (252) and tighten the lantern (9) using a round rod (dia. 8 mm).
3. Insert the valve stem (183) into the actuator and tighten it (a\f 24).

✓ Done.

Fitting the Bellows



NOTE

Damage to the bellows

Damage to the bellows can result in malfunctions.

➔ Do not tension the bellows using a tool.

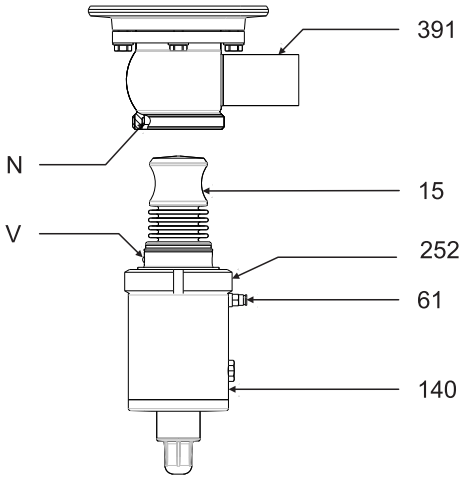
➔ When fitting, hold the bellows using a paper towel or a piece of leather.

Carry out the following steps:

1. Place the insert (261) on the valve stem (183).
2. Grip the bellows (15) using a paper towel or a piece of leather, push it over the insert (261) and screw it onto the valve stem (183).

✓ The valve insert can now be fitted.

Fitting the Valve Insert



Requirement

- In order that the valve insert can be fitted, the actuator must be in the open position.

NOTE

Sealing diaphragm is easily damaged

Damage to the sealing diaphragm can result in malfunctions.

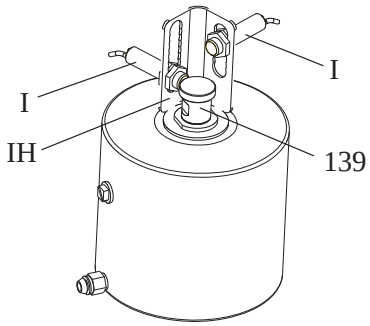
➔ Carefully introduce the bellows into the housing.

Carry out the following steps:

1. Pressurize the actuator (140) via (61).
   ➥ The bellows (15) is raised.
2. Carefully place the valve insert in the housing (391), making sure that the anti-twist device (V) is aligned with the grooves (N) in the housing (391).
3. Screw on the grooved cap nut (252) by hand and tighten using a hook spanner.
4. Depressurize the valve.

✓

Assembling the Proximity Switch Mounting



Carry out the following steps:

1. Screw (a\f 27) the proximity switch mounting (IH) on the actuator (140).
2. Fit and adjust the proximity switches (I).

Checking the Function

Setting the Valve Stroke

Carry out the following steps:

1. Actuate the valve with compressed air.
2. Adjust the proximity switches and set the stroke in accordance with the table “Valve stroke in accordance with the size“ (Page 45).

✓

Valve Stroke

Valve stroke in accordance with the size

Size	Valve stroke (mm)
DN 40	13.8
DN 50	13.8
DN 65	22
DN 80	22
DN 100	28.1
ISO 42.4	13.8
ISO 48.3	13.8
ISO 60.3	22
ISO 76.1	22
ISO 88.9	22

Valve stroke in accordance with the size (continued)

Size	Valve stroke (mm)
ISO 114.3	28.1
1 1/2"OD	13.8
2" OD	13.8
2 1/2" OD	22
3" OD	22
4" OD	28.1

Disposal

General Notes

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

The valve is made of the following materials:

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

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

Valve Actuator Disposal

DANGER

The spring forces in the actuator can be as much as 5 kN.
The pre-stressed spring can cause serious personal injury or death.
➔ Never open the actuator.
➔ GEA Tuchenhagen accepts unopened actuators and arranges for proper disposal free of charge.

Carry out the following steps:

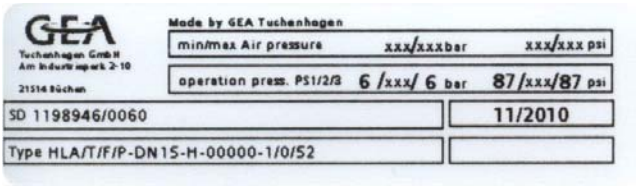
1. Remove the actuator, see “Disassembly“ (Page 35).
2. Safely pack the actuator and send it to GEA Tuchenhagen GmbH.

✓

Technical Data

Type Plate

The type plate clearly identifies the valve.



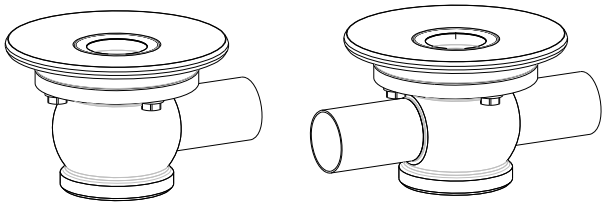
Type plate of the valve

The type plate provides the following key data:

Key data of the valve

Type	Tank Bottom Valve Type H_A/T/F/M VESTA
Control air pressure bar/psi	min. 5 (72.5); max. 8 (116)
Product pressure bar/psi	6/87

The Tank Bottom Valve type H_A/T/F/M is available in the housing types shown in the diagrams:



Housing types: 1 socket 391; 2 sockets 392

Technical Data

The “Overview of Chemical Resistance“ for the PTFE material used is available on request. The EPDM O-ring used on the valve to seal it off against the atmosphere may be used in the temperature range of -40°C to +135°C.

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

Technical data: Valve

Designation	Description
Size	DN 40 to DN 100 1.5 to 4" OD ISO 42.4 to ISO 114.3
Material of product contact parts – Housing – PTFE bellows	 Stainless steel 1.4435/AISI 316L Hostaform TFM 1705/TMOH 0017 resistant to almost all types of media
Material of all parts not in contact with the product – Seals	 Standard: EPDM – conform to FDA requirements Optional: FKM – conform to FDA requirements
Surfaces – Inside – Seals	 R_a 0.8 ≤ mm Hostaform TFM 17057TMOH 0017 resistant to almost all types of media Standard: EPDM – conform to FDA requirements Optional: FKM – conform to FDA requirements

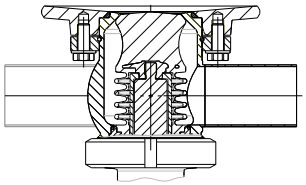
Technical data: Temperatures

Designation	Description
Ambient temperature	0 to 60 °C
Sterilization temperature	briefly max. 0.5 h 150°C (302°F) 3 bar (43 psi) saturated steam
Operating temperature for – synthetic actuators – stainless steel actuators	 -10°C to 135°C (32° to 275 °F) Period of use max. 24 months at temperatures > 80°C for valves made of synthetic materials, operated pneumatically or manually -10°C to 135°C (32° to 275 °F) Depending on the product pressure

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	max. 6 bar / 87 psi
Control air pressure NC actuator – spring-to-close NO actuator – spring-to-open	 min 5 bar/72.5 psi, max 8 bar/116 psi min 5 bar/72.5 psi, max 6 bar/87 psi
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 1 m^3 air

KV values



Nominal width	Kv value
DN 40	33.52
DN 50	41.04
DN 65	81.51
DN 80	91.06
DN 100	151.22
ISO 42.4	33.52
ISO 48.3	37.39

Nominal width	Kv value
ISO 60.3	72.48
ISO 76.1	87.09
ISO 88.9	92.16
ISO 114.3	317.97
1.5" OD	29.54
2" OD	38.62
2.5" OD	76.71
3" OD	87.09
4" OD	151.39

Pipe Ends

Dimensions for Pipes in DN

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

Dimensions for Pipes in Inch OD

Inch OD	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to BS 4825 Part 1
1 1/2“	38.1	1.65	34.8	x
2	50.8	1.65	47.5	x
2 1/2“	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 ISO

ISO	Outside diam-eter	Wall thickness	Inside diam-eter	Outside diameter acc. to DIN 11866 Series B
42.4	42.4	2	38.4	x
48.3	48.3	2	44.3	x
60.3	60.3	2	56.3	x
76.1	76.1	2	72.1	x
88.9	88.9	2.3	84.3	x
114.3	114.3	2.3	109.7	x

Tools

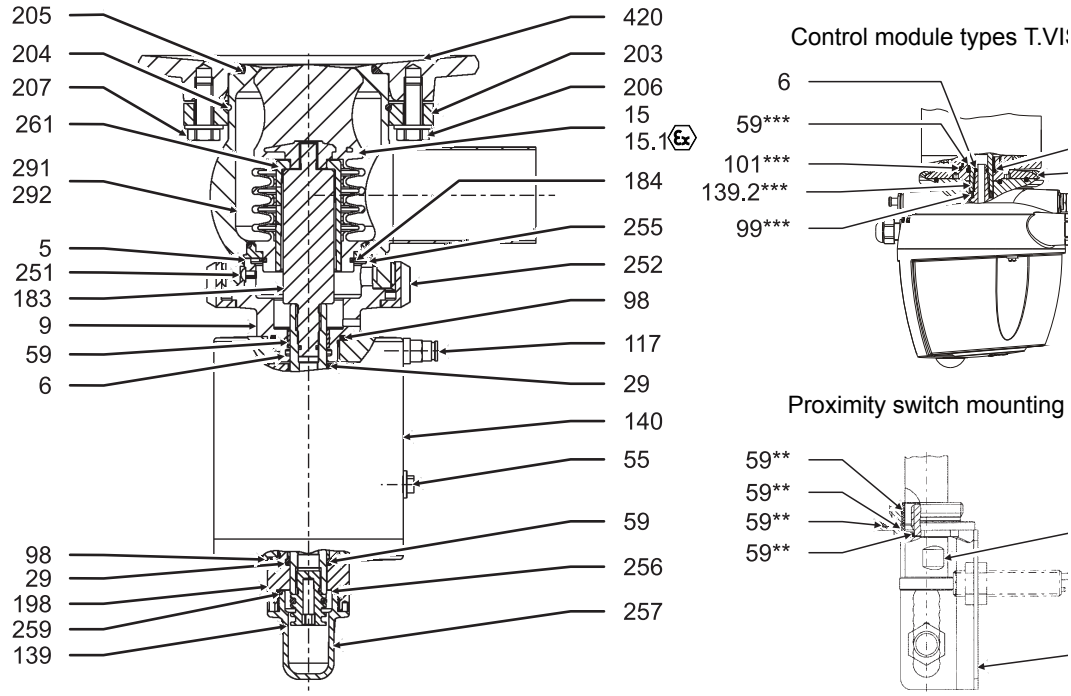
Tool	Material no.
Hose cutter	407-065
Belt wrench	408-142
Hex. screwdriver (for hex. socket-head screws) a/f 6	408-124
Screwdriver, blade width 3.5	
Ring or open-end spanner a/f 17	408-036
Ring or open-end spanner a/f 24x27	408-040
Pin punches or T-bars dia. max. 8 mm	
Outside snap ring pliers shape B – 90° offset tips, size A31	
Hook spanner 60/90	408-200
Hook spanner 110/115	
Hook spanner 135/145	
Pin-type face spanner pin diameter Ø3 mm	

Lubricants

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

Spare Parts Lists

Tank Bottom Valve type H_A/T/F/M



**	Proximity switch mounting ECO-E compl.		221-643.05
Item	Designation	Material	Material no.
C	Proximity switch mounting ECO-E	1.4301	221-643.04
6.1	O-ring	NBR	930-005
29	O-ring	NBR	930-026
59	Plain bearing	IGLIDUR-G	704-041
98	O-ring	NBR	930-046
139.1	Switch bar	1.4305	221-643.01

***	Control module types T.VIS M-1 and P-20		
Item	Designation	Material	Material no.
198.2	Mounting base compl. for T.VIS M-1 and P-20		221-589.32
29	O-ring	NBR	930-026
59	Plain bearing	IGLIDUR-G	704-041
101	O-ring	NBR	930-046
129.2	Switch bar compl. for T.VIS M-1	1.4305	221-643.07
6	O-ring	NBR	930-004
99	Ring T.VIS	Noryl/GFN2	221-002396

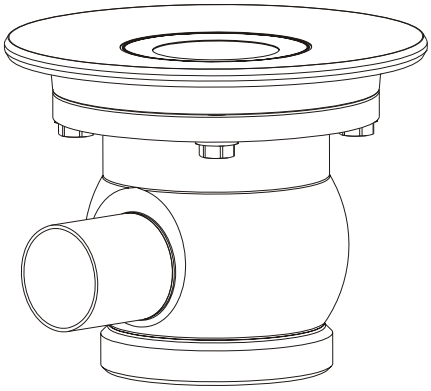
Item	Designation	Material	DN 40	DN 50	DN 65	DN 80	DN 100
* Bellows T_A/P compl.			221-559.06	221-559.06	221-559.07	221-559.07	221-559.08
* Bellows T_A/P compl. ⟨Ex⟩			221-559.11	221-559.11	221-559.12	221-559.12	--
1) Sealing set H_A/M			221-003894	221-003894	221-003894	221-003894	221-003894
*5	O-ring	EPDM	930-784	930-784	930-785	930-785	930-786
1)6	O-ring	NBR	930-004	930-004	930-004	930-004	930-004
6.1	O-ring	NBR	930-005	930-005	930-005	930-005	930-005
9	Lantern H_A/M	1.4301	221-002762	221-002762	221-002763	221-002763	221-002765
*15	Bellows T_A/P	TFM1705 1.4301	221-559.02	221-559.02	221-559.03	221-559.03	221-559.04
*15.1	Bellows T_A/P ⟨Ex⟩	TFMOF0040/ 1.4301	221-559.09	221-559.09	221-559.10	221-559.10	--
1)29	O-ring	NBR	930-026	930-026	930-026	930-026	930-026
55	Vent screw	PP/black	221-133.14	221-133.14	221-133.14	221-133.14	221-133.14
1)59	Plain bearing	IGLIDUR-G	704-041	704-041	704-041	704-041	704-041
1)98	O-ring	NBR	930-046	930-046	930-046	930-046	930-046
117	Screw-in plug connection G 1/8 - 6/4	Brass/nickel-plated	933-330	933-330	933-330	933-330	933-330
139	Adapter H_A/M	PA/black	221-002842	221-002842	221-002842	221-002842	221-002842
140	Actuator ECO-DZ	--	221-686.01	221-686.01	221-686.04	221-686.04	221-686.04
183	Stem H_A/M	1.4305	221-002766	221-002766	221-002918	221-002918	221-002774
*184	Retaining ring	1.4310	917-121	917-121	917-160	917-160	917-160
198	Mounting base H_A/M	1.4301	221-003455	221-003455	221-002835	221-002835	221-002835
203	Housing flange T_A	1.4301	221-556.02	221-556.02	221-556.03	221-556.03	221-556.04
204	Circlip	1.4310	917-164	917-164	917-165	917-165	917-166
205	O-ring	EPDM	930-1066	930-1066	930-1067	930-1067	930-1068
206	Hex screw	A2-70	901-095	901-095	901-143	901-143	901-143

Item	Designation	Material	DN 40	DN 50	DN 65	DN 80	DN 100
207	Scheibe / washer	A2	921-018	921-018	921-021	921-021	921-021
251	Round head grooved pin	A2	925-092	925-092	925-092	925-092	925-092
252	Grooved cap nut H_A	1.4301	221-003932	221-003932	221-003933	221-003933	221-003934
*255	Thrust washer N_A/P	1.4301	221-544.02	221-544.02	221-544.03	221-544.03	221-544.04
1)256	O-ring	NBR	930-041	930-041	930-041	930-041	930-041
257	Cap H_A	PSU	221-002748	221-002748	221-002748	221-002748	221-002748
259	O-ring	MVQ / yellow	930-918	930-918	930-918	930-918	930-918
261	Insert	PSU	221-002810	221-002810	221-002812	221-002812	221-002813
391	Housing HLA/T/F	1.4435	221-003319	221-003318	221-003316	221-003341	221-003343
392	Housing HTA/T/F	1.4435	221-003402	221-003399	221-003396	221-003391	221-003394
420	Housing connection T_A	1.4404	221-555.02	221-555.02	221-555.03	221-555.03	221-555.04
		1.4435	221-002943	221-002943	221-002944	221-002944	--
		1.4529	221-003299	221-003299	--	--	--
		1.4539	221-003300	221-003300	--	--	--

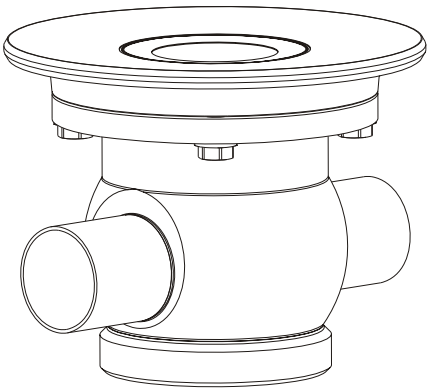
* Items 5, 15, (15.1), 184 and 255 are included in the bellows, compl.

1) Items 6, 29, 59, 98 and 256 are included in the sealing set.

Housing HLA/T/F
item 391



Housing HTA/T/F
item 392



Item	Designation	Material	1 1/2“ OD	2" OD	2 1/2“ OD	3" OD	4" OD
* Bellows T_A/P compl.			221-559.06	221-559.06	221-559.07	221-559.07	221-559.08
* Bellows T_A/P compl. Ex			221-559.11	221-559.11	221-559.12	221-559.12	--
1) Sealing set H_A/M			221-003894	221-003894	221-003894	221-003894	221-003894
*5	O-ring	EPDM	930-784	930-784	930-785	930-785	930-786
1)6	O-ring	NBR	930-004	930-004	930-004	930-004	930-004
6.1	O-ring	NBR	930-005	930-005	930-005	930-005	930-005
9	Lantern H_A/M	1.4301	221-002762	221-002762	221-002763	221-002763	221-002765
*15	Bellows T_A/P	TFM1705 1.4301	221-559.02	221-559.02	221-559.03	221-559.03	221-559.04
*15.1	Bellows T_A/P Ex	TFMOF0040/ 1.4301	221-559.09	221-559.09	221-559.10	221-559.10	--
1)29	O-ring	NBR	930-026	930-026	930-026	930-026	930-026
55	Vent screw	PP/black	221-133.14	221-133.14	221-133.14	221-133.14	221-133.14
1)59	Plain bearing	IGLIDUR-G	704-041	704-041	704-041	704-041	704-041
1)98	O-ring	NBR	930-046	930-046	930-046	930-046	930-046
117	Screw-in plug connection G 1/8 - 6/4	Brass/nickel-plated	933-330	933-330	933-330	933-330	933-330
139	Adapter H_A/M	PA/black	221-002842	221-002842	221-002842	221-002842	221-002842
140	Actuator ECO-DZ	--	221-686.01	221-686.01	221-686.04	221-686.04	221-686.04
183	Stem H_A/M	1.4305	221-002766	221-002766	221-002918	221-002918	221-002774
*184	Retaining ring	1.4310	917-121	917-121	917-160	917-160	917-160
198	Mounting base H_A/M	1.4301	221-003455	221-003455	221-002835	221-002835	221-002835
203	Housing flange T_A	1.4301	221-556.02	221-556.02	221-556.03	221-556.03	221-556.04
204	Circlip	1.4310	917-164	917-164	917-165	917-165	917-166
205	O-ring	EPDM	930-1066	930-1066	930-1067	930-1067	930-1068
206	Hex screw	A2-70	901-095	901-095	901-143	901-143	901-143
207	Disk	A2	921-018	921-018	921-021	921-021	921-021
251	Round head grooved pin	A2	925-092	925-092	925-092	925-092	925-092
252	Grooved cap nut H_A	1.4301	221-003932	221-003932	221-003933	221-003933	221-003934
*255	Thrust washer N_A/P	1.4301	221-544.02	221-544.02	221-544.03	221-544.03	221-544.04
1)256	O-ring	NBR	930-041	930-041	930-041	930-041	930-041
257	Cap H_A	PSU	221-002748	221-002748	221-002748	221-002748	221-002748
259	O-ring	MVQ / yellow	930-918	930-918	930-918	930-918	930-918
261	Insert H_A/M	PSU	221-002810	221-002810	221-002812	221-002812	221-002813
391	Housing HLA/T/F	1.4435	221-003267	221-003269	221-003323	221-003340	221-003342
392	Housing HTA/T/F	1.4435	221-003404	221-003400	221-003397	221-003295	221-003393

Item	Designation	Material	1 1/2“ OD	2" OD	2 1/2“ OD	3" OD	4" OD
420	Housing connection T_A	1.4404	221-555.02	221-555.02	221-555.03	221-555.03	221-555.04
		1.4435	221-002943	221-002943	221-002944	221-002944	--
		1.4529	221-003299	221-003299	--	--	--
		1.4539	221-003300	221-003300	--	--	--

* Items 5, 15, (15.1), 184 and 255 are included in the bellows, compl.

1) Items 6, 29, 59, 98 and 256 are included in the sealing set.

Item	Designation	Material	ISO 42.2	ISO 48.3	ISO 60.3
* Bellows T_A/P compl.			221-559.06	221-559.06	221-559.07
* Bellows T_A/P compl. ⟨Ex⟩			221-559.11	221-559.11	221-559.12
1) Sealing set H_A/M			221-003894	221-003894	221-003894
*5	O-ring	EPDM	930-784	930-784	930-785
1)6	O-ring	NBR	930-004	930-004	930-004
6.1	O-ring	NBR	930-005	930-005	930-005
9	Lantern H_A/M	1.4301	221-002762	221-002762	221-002763
*15	Bellows T_A/P	TFM1705 1.4301	221-559.02	221-559.02	221-559.03
*15.1	Bellows T_A/P ⟨Ex⟩	TFMOF0040/ 1.4301	221-559.09	221-559.09	221-559.10
1)29	O-ring	NBR	930-026	930-026	930-026
55	Vent screw	PP/black	221-133.14	221-133.14	221-133.14
1)59	Plain bearing	IGLIDUR-G	704-041	704-041	704-041
1)98	O-ring	NBR	930-046	930-046	930-046
117	Screw-in plug connection G 1/8 - 6/4	Brass/nickel-plated	933-330	933-330	933-330
139	Adapter H_A/M	PA/black	221-002842	221-002842	221-002842
140	Actuator ECO-DZ	--	221-686.01	221-686.01	221-686.04
183	Stem H_A/M	1.4305	221-002766	221-002766	221-002918
*184	Retaining ring	1.4310	917-121	917-121	917-160
198	Mounting base H_A/M	1.4301	221-003455	221-003455	221-002835
203	Housing flange T_A	1.4301	221-556.02	221-556.02	221-556.03
204	Circlip	1.4310	917-164	917-164	917-165
205	O-ring	EPDM	930-1066	930-1066	930-1067
206	Hex screw	A2-70	901-095	901-095	901-143
207	Disk	A2	921-018	921-018	921-021
251	Round head grooved pin	A2	925-092	925-092	925-092
252	Grooved cap nut H_A	1.4301	221-003932	221-003932	221-003933
*255	Thrust washer N_A/P	1.4301	221-544.02	221-544.02	221-544.03
1)256	O-ring	NBR	930-041	930-041	930-041
257	Cap H_A	PSU	221-002748	221-002748	221-002748
259	O-ring	MVQ / yellow	930-918	930-918	930-918
261	Insert H_A/M	PSU	221-002810	221-002810	221-002812
391	Housing HLA/T/F	1.4435	221-003320	221-003317	221-003321
392	Housing HTA/T/F	1.4435	221-003403	221-003401	221-003398

Item	Designation	Material	ISO 42.2	ISO 48.3	ISO 60.3
420	Housing connection T_A	1.4404	221-555.02	221-555.02	221-555.03
		1.4435	221-002943	221-002943	221-002944
		1.4529	221-003299	221-003299	--
		1.4539	221-003300	221-003300	--

* Items 5, 15, (15.1), 184 and 255 are included in the bellows, compl.

1) Items 6, 29, 59, 98 and 256 are included in the sealing set.

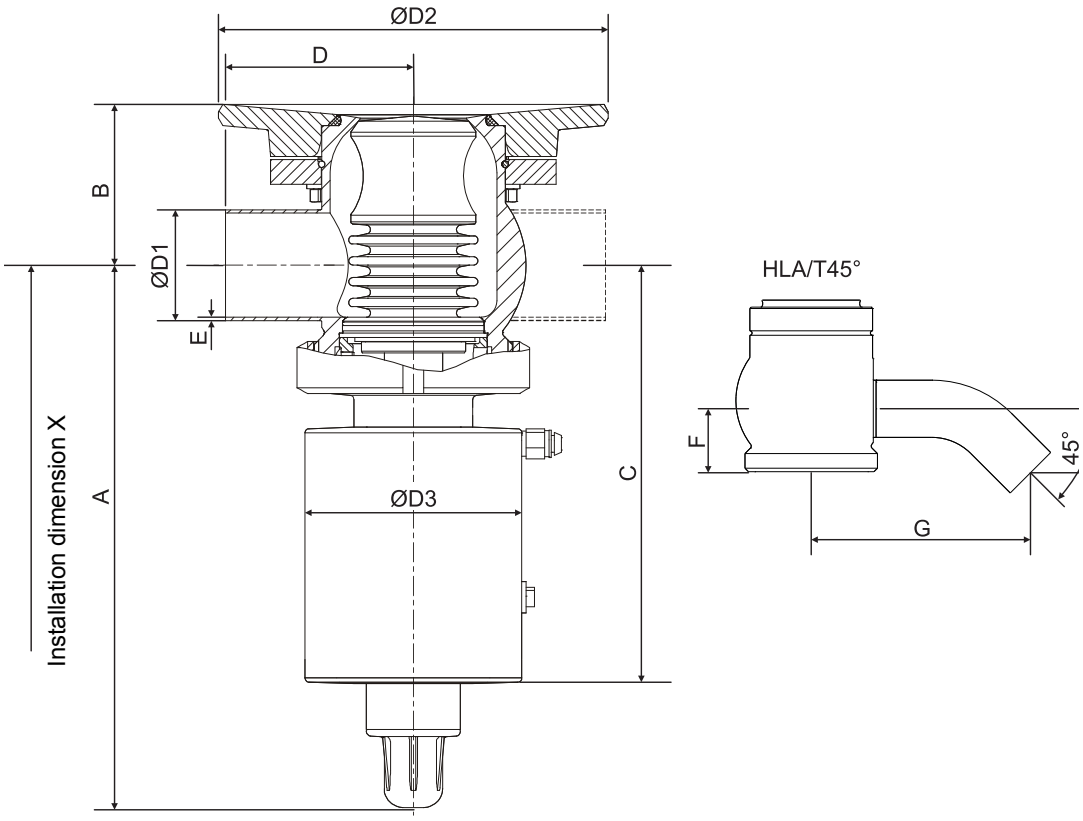
Item	Designation	Material	ISO 76.1	ISO 88.9	ISO 114.3
* Bellows T_A/P compl.			221-559.07	221-559.07	221-559.08
* Bellows T_A/P compl. ⟨Ex⟩			221-559.12	221-559.12	--
1) Sealing set H_A/M			221-003894	221-003894	221-003894
*5	O-ring	EPDM	930-785	930-785	930-786
1)6	O-ring	NBR	930-004	930-004	930-004
6.1	O-ring	NBR	930-005	930-005	930-005
9	Lantern H_A/M	1.4301	221-002763	221-002763	221-002765
*15	Bellows T_A/P	TFM1705 1.4301	221-559.03	221-559.03	221-559.04
*15.1	Bellows T_A/P ⟨Ex⟩	TFMOF0040/ 1.4301	221-559.10	221-559.10	--
1)29	O-ring	NBR	930-026	930-026	930-026
55	Vent screw	PP/black	221-133.14	221-133.14	221-133.14
1)59	Plain bearing	IGLIDUR-G	704-041	704-041	704-041
1)98	O-ring	NBR	930-046	930-046	930-046
117	Screw-in plug connection G 1/8 - 6/4 /	Brass/nickel-plated	933-330	933-330	933-330
139	Adapter H_A/M	PA/black	221-002842	221-002842	221-002842
140	Actuator ECO-DZ	--	221-686.04	221-686.04	221-686.04
183	Stem H_A/M	1.4305	221-002918	221-002918	221-002774
*184	Retaining ring	1.4310	917-160	917-160	917-160
198	Mounting base H_A/M	1.4301	221-002835	221-002835	221-002835
203	Housing flange T_A	1.4301	221-556.03	221-556.03	221-556.04
204	Circlip	1.4310	917-165	917-165	917-166
205	O-ring	EPDM	930-1067	930-1067	930-1068
206	Hex screw	A2-70	901-143	901-143	901-143
207	Disk	A2	921-021	921-021	921-021
251	Round head grooved pin	A2	925-092	925-092	925-092
252	Grooved cap nut H_A	1.4301	221-003933	221-003933	221-003934
*255	Thrust washer N_A/P	1.4301	221-544.03	221-544.03	221-544.04
1)256	O-ring	NBR	930-041	930-041	930-041
257	Cap H_A	PSU	221-002748	221-002748	221-002748
259	O-ring	MVQ / yellow	930-918	930-918	930-918
261	Insert H_A/M	PSU	221-002812	221-002812	221-002813
391	Housing HLA/T/F	1.4435	221-003322	221-003328	221-003329
392	Housing HTA/T/F	1.4435	221-003390	221-003392	221-003395

Item	Designation	Material	ISO 76.1	ISO 88.9	ISO 114.3
420	Housing connection T_A	1.4404	221-555.03	221-555.03	221-555.04
		1.4435	221-002944	221-002944	--
		1.4529	--	--	--
		1.4539	--	--	--

* Items 5, 15, (15.1), 184 and 255 are included in the bellows, compl.

[1)] Items 6, 29, 59, 98 and 256 are included in the sealing set.

Dimension Sheet – Tank Bottom Valve type H_A/T/F/M



Nominal widths	Dimensions															
	A	B	C	D	E	F	G	H	ØD1	ØD2	ØD3	X	Weight			Stroke
													HLA	HTA	HLA 45°	
DIN																
DN 40	260.5	82.9	195.2	125	1.5	45.1	157.2	45.9	41.0	187	104.0	505.0	11.4	11.4	11.5	13.8
DN 50	266.5	76.9	201.2	125	1.5	51.1	164.3	48.8	53.0	187	104.0	511.0	11.5	11.5	11.6	13.8
DN 65	279.8	117.9	220.5	125	2.0	70.1	190.9	51.7	70.0	237	169.5	643.8	25.6	25.3	25.9	22.0
DN 80	287.3	110.4	228.0	125	2.0	77.6	223.5	65.3	85.0	237	169.5	651.3	26.9	26.4	27.4	22.0
DN 100	304.8	129.9	245.5	125	2.0	90.1	246.1	68.2	104.0	267	169.5	733.8	35.5	34.2	36.2	28.1
ISO																
42.4	260.7	82.7	195.4	125	2.0	45.3	148.4	42.2	42.2	187	104.0	505.2	11.6	11.6	11.7	13.8
48.3	263.7	79.8	198.4	125	2.0	48.3	155.1	45.0	48.3	187	104.0	508.2	11.6	11.6	11.7	13.8
60.3	275.0	122.8	215.7	125	2.0	65.3	188.0	50.5	60.3	237	169.5	639.0	25.6	25.5	25.9	22.0
76.1	282.9	114.9	223.6	125	2.0	73.2	227.1	66.7	76.1	237	169.5	646.9	27.0	26.5	27.5	22.0

Nominal widths	Dimensions															
	A	B	C	D	E	F	G	H	ØD1	ØD2	ØD3	X	Weight			Stroke
													HLA	HTA	HLA 45°	
88.9	289.0	108.8	229.7	125	2.3	79.3	240.9	72.4	88.9	237	169.5	653.0	27.0	26.4	27.6	22.0
114.3	309.7	125.1	250.4	125	2.3	95.0	283.2	83.6	114.3	267	169.5	738.7	35.4	33.8	36.5	28.1
OD																
1.5"	258.9	84.5	193.6	125	1.7	43.5	154.9	44.9	38.1	187	104.0	503.4	11.4	11.5	11.5	13.8
2"	265.3	78.2	200.0	125	1.7	49.9	176.5	53.9	50.8	187	104.0	509.8	11.4	11.4	11.6	13.8
2.5"	276.9	120.8	217.6	125	1.7	67.2	213.6	61.1	63.5	237	169.5	640.9	25.6	25.4	25.9	22.0
3"	283.3	114.5	224.0	125	1.7	73.6	223.3	65.2	76.2	237	169.5	647.3	26.9	26.4	27.2	22.0
4"	303.5	131.2	244.2	125	2.1	88.8	267.7	80.8	101.6	267	169.5	732.5	35.6	34.3	36.5	28.1

Accessories: Control module T.VIS® V-20, see Spare Parts Lists for T.VIS® V-20 (221ELI005975G)

Welding Instructions

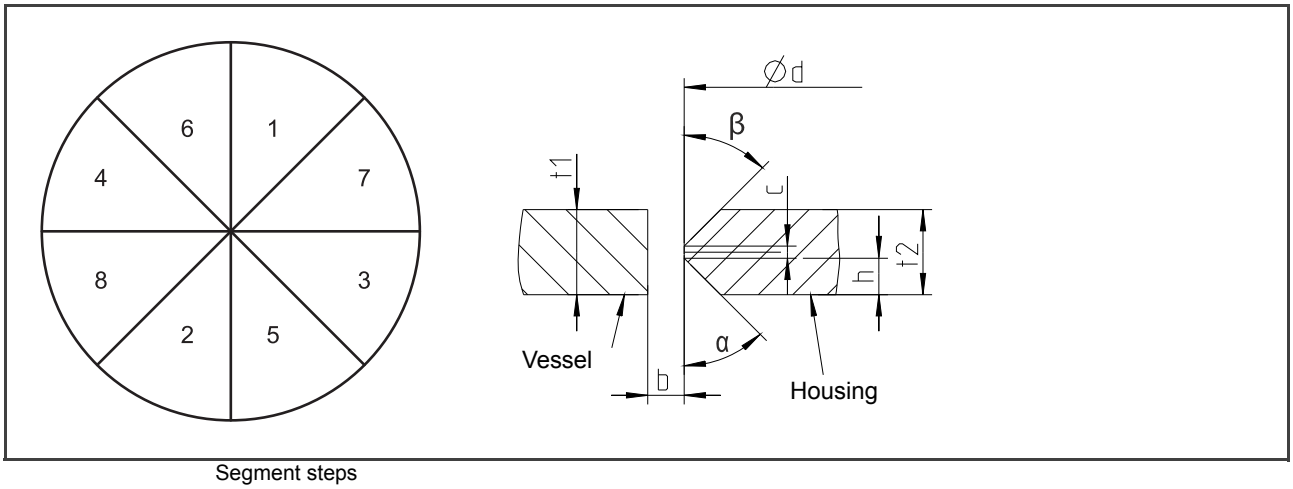
Preparatory Information

Preparatory Information

Location	Büchen
Manufacturer's welding method	TIG pulse
Document no.	-
Welder	Certified acc. to DIN EN 287-1 and AD -2000 data sheet HP3
Welding process	141 DIN EN ISO 4063
Type of preparation	Mechanical
Type of cleaning	Brushing or pickling
Seam type	DIN EN ISO 9692; K-joint, gap b = 0 mm
Workpiece thickness [mm]	t1 = 4, 5, 6, 8, 10
Specification of basic materials	1.4404, 1.4435, 1.4539, 1.4529
Outside diameter	187; 237; 267
Heat input	Root 1, 2: < 9 kJ/cm
Heat input	Layer 3, 4: < 10 kJ/cm
Preparation of groove	-
Welding position	-

Design of the Joint / Welding Sequence

Information on the Welding Sequence



Segment steps

Welding bead	Process	Filler material Ø [mm]	Amperage [A]	Voltage [V]	Type of current/polarity Electrode
Root 1, 2	141 Pulse	1.0	90 - 110	11 - 14	= -
Layer 3, 4	141 Pulse	1.2	105 - 125	11 - 14	= -

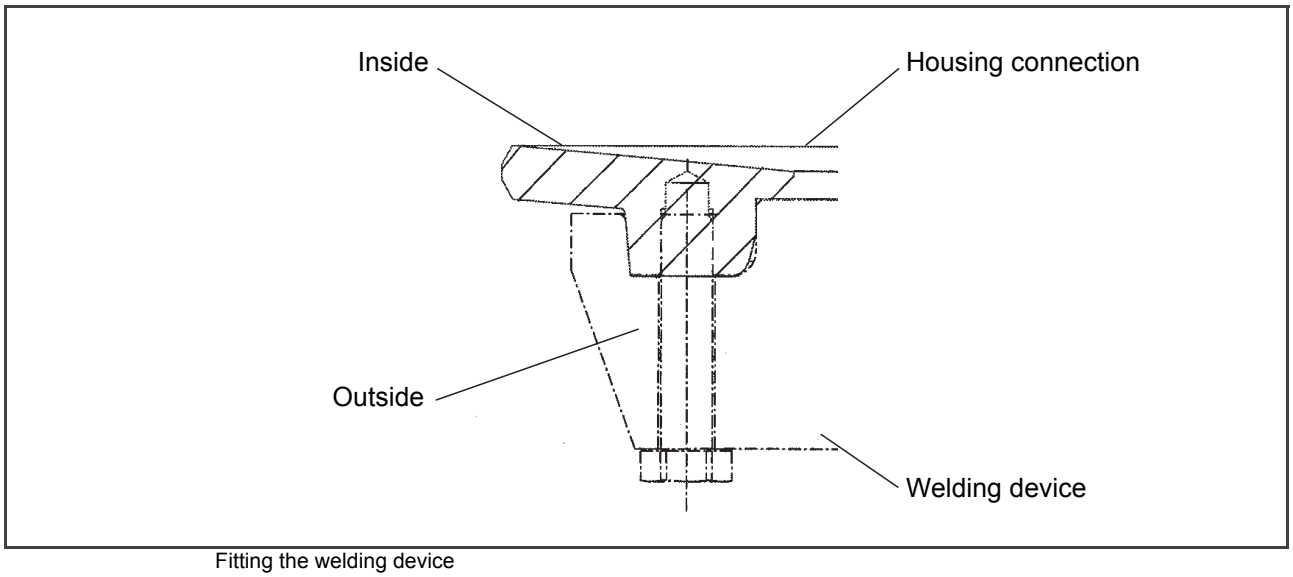
Filler materials	For the relevant basic materials in consultation with the expert
Shielding gas	DIN EN ISO 14175-I1
Root shielding / forming gas	DIN EN ISO 14175 -I1, -R1
Flow rates [l/min]	Shielding gas: 13 - 15
	Root shielding: 10 - 20
Intermediate layer temperature	T < 30 °C

Execution

t2	h	c	α	β
10	3.5	3	30°	30°

If the vessel wall thickness is t1 < 8 mm, layer 4 can be omitted. The preparation of the seam and the execution of the seam on the inside of the vessel are still required.

Fitting the Welding Device Prior to Welding



Fitting the welding device

Nominal width	Welding device
DN40 / DN50 / ISO42.4 / ISO48.3 / 1.5" OD / 2" OD	229-103.54
DN65 / DN80 / ISO60.3 / ISO76.1 / ISO88.9 / 2.5" OD / 3" OD	229-103.55
DN100 / ISO114.3 / 4" OD	229-103.56

Welding Sequence

Carry out the following steps:

1. Use filler to tack at eight opposite positions:
   ➔ first from the outer side of the connection,
   ➔ then from the inner side of the connection. Welding rod diameter: ø1 mm
2. Weld the root pass using filler (rod ø1 mm) from the outside (root 1) in segments, see section “Design of the Joint / Welding Sequence“.
   ➥ Start at position 1 of the segment steps.
   ➥ The welding device remains in place.
   ➥ Allow the workpiece to cool until the workpiece and seam area temperature is < 30 °C.
3. Weld the root pass using filler (rod ø1 mm) from the inside (root 2) in segments, see section “Design of the Joint / Welding Sequence“.
   ➥ In contrast to root 1 start at position 1 of the segment steps, turned by 45°.
   ➥ The welding device remains in place.
   ➥ Allow the workpiece to cool until the workpiece and seam area temperature is < 30 °C.

4. Weld the second layer using filler (rod ø1.2 mm) from the inside (layer 3) in segments, see section “Design of the Joint / Welding Sequence“.
   ➥ In contrast to root 2 start at position 1 of the segment steps, turned by 45°.
   ➥ The welding device remains in place.
   ➥ Allow the workpiece to cool until the workpiece and seam area temperature is < 30 °C.
5. Weld the second layer using filler (rod ø1.2 mm) from the outside (layer 4) in segments, see section “Design of the Joint / Welding Sequence“.
   ➥ In contrast to layer 3 start at position 1 of the segment steps, turned by 45°.
   ➥ Leave the welding device in place until the component has cooled down completely.

✓ Done.

Explanation

Explanation

Manufacturer/stamp	Name	Date	Signature (welding supervisor)
	Merhof	08 February 2012	

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