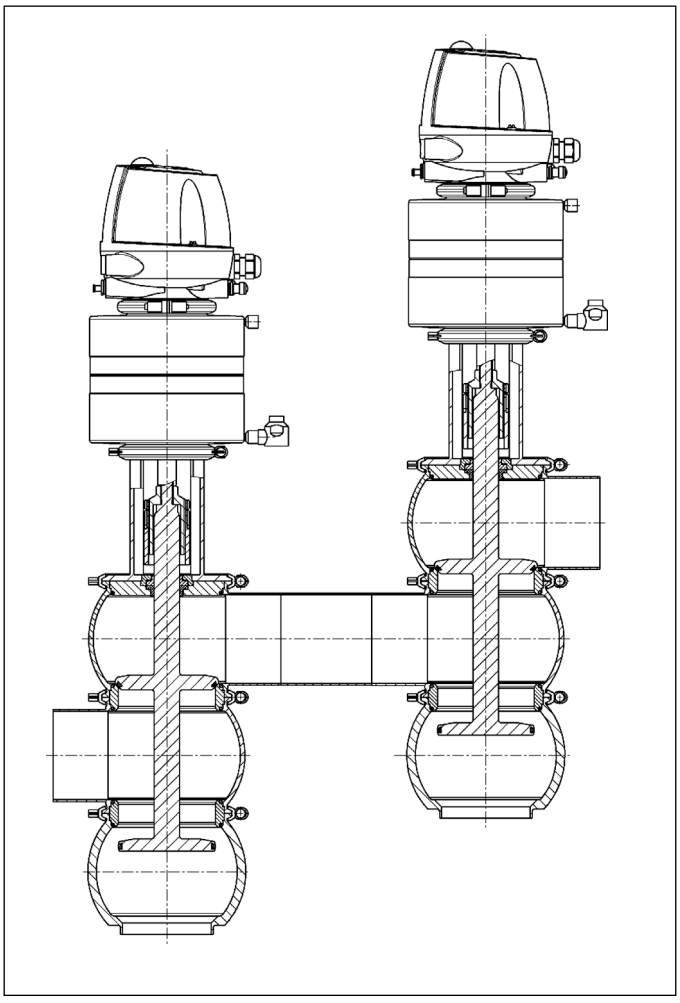
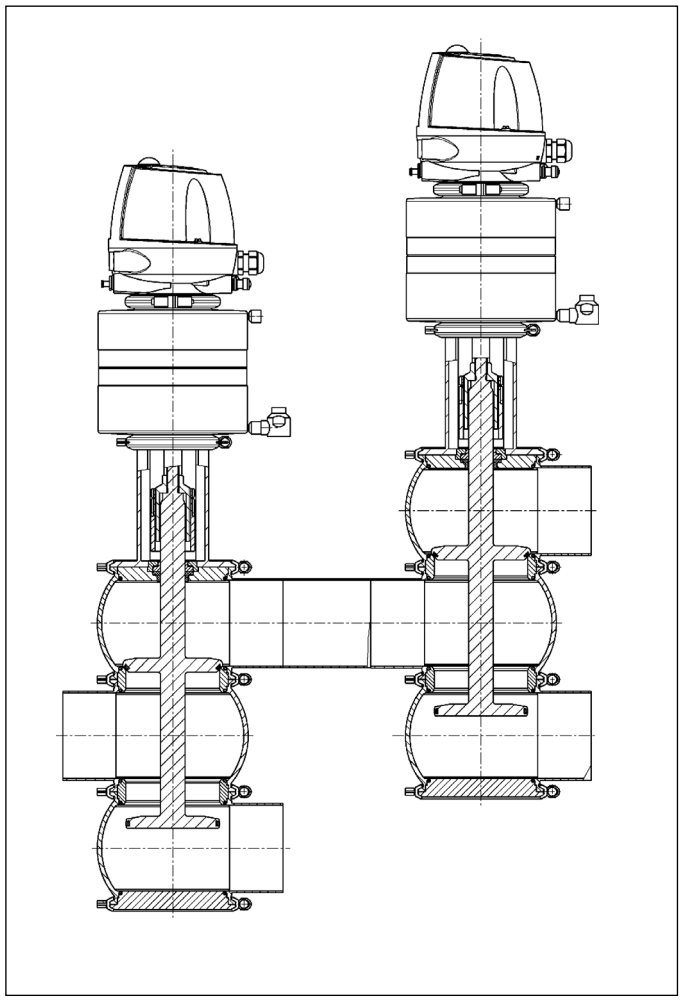
Operating Instructions

Flow Diversion Device with control module



XKR



XWR

Issue 2023-06
Part no. 430-455
English

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Important Abbreviations and terms

BS	British standard
bar	Unit of measure for pressure
app.	approximately
°C	Unit of measure for temperature degrees centigrade
dm^3_n	Unit of measure for volume cubic decimetre Volume (litre) under standard conditions
DN	DIN nominal width
DIN	Deutsche Norm (German standard) *DIN Deutsches Institut für Normung e.V.* *(German institut for Standardization)*
EN	European standard
EPDM	Material designation *Short designation acc. to DIN/ ISO 1629* *Ethylene propylene diene (monomer) rubber*
GEA	GEA AG group of companies *GEA stands for Global Engineering Alliance*
FPM	Material designation *Short designation acc. to DIN/ ISO 1629* *Fluorine rubber*
h	Unit of measure for time hour
HNBR	Material designation *Short designation acc. to DIN/ ISO 1629* *Hydrated acrylonitrile butadiene rubber*
IP	Protection class
ISO	International standard of the *International Organization for Standardization*
kg	Unit of measure for weight kilogram
kN	Unit of measure for force kilo Newton
l	Unit of measure for volume litre
max.	maximum
mm	Unit of measure for length millimetre
µm	Unit of measure for length micrometer
M	metric
Nm	Unit of measure for work Newton metre *Unit for torque* 1 Nm = 0,737 lbft Pound-Force (lb) + Feet (ft)
Size	Size of spanners
see Chapt.	see Chapter
s. ill.	see illustration
T.VIS®	Tuchenhagen Valve Information System
V DC	Volt direct current
V AC	Volt alternating current
W	Unit of measure for power Watt
Inch OD	Pipe dimension acc. to British standard (BS), Outside Diameter
Inch IPS	US pipe dimension Iron Pipe Size

Safety Instructions

Designated use

The Flow diversion device is designed exclusively for the purposes described below. Using the Flow diversion device for purposes other than those mentioned is considered contrary to its designated use. GEA Tuchenhagen cannot be held liable for any damage resulting from such use; the risk of such misuse lies entirely with the user.
The prerequisite for the reliable and safe operation of the Flow diversion device is proper transportation and storage as well as competent installation and assembly. Operating the Flow diversion device within the limits of its designated use also involves observing the operating, inspection and maintenance instructions.

Personnel

Personnel entrusted with the operation and maintenance of the Flow diversion device must have the suitable qualification to carry out their tasks. They must be informed about possible dangers and must understand and observe the safety instructions given in the relevant manual. Only allow qualified personnel to make electrical connections.

Modifications, spare parts, accessories

Unauthorized modifications, additions or conversions which affect the safety of the Flow diversion device are not permitted. Safety devices must not be bypassed, removed or made inactive.
Only use original spare parts and accessories recommended by the manufacturer.

General instructions

The user is obliged to operate the Flow diversion device only when it is in good working order.
In addition to the instructions given in the operating manual, please observe the following:
– relevant accident prevention regulations
– generally accepted safety regulations
– regulations effective in the country of installation
– working and safety instructions effective in the user's plant.

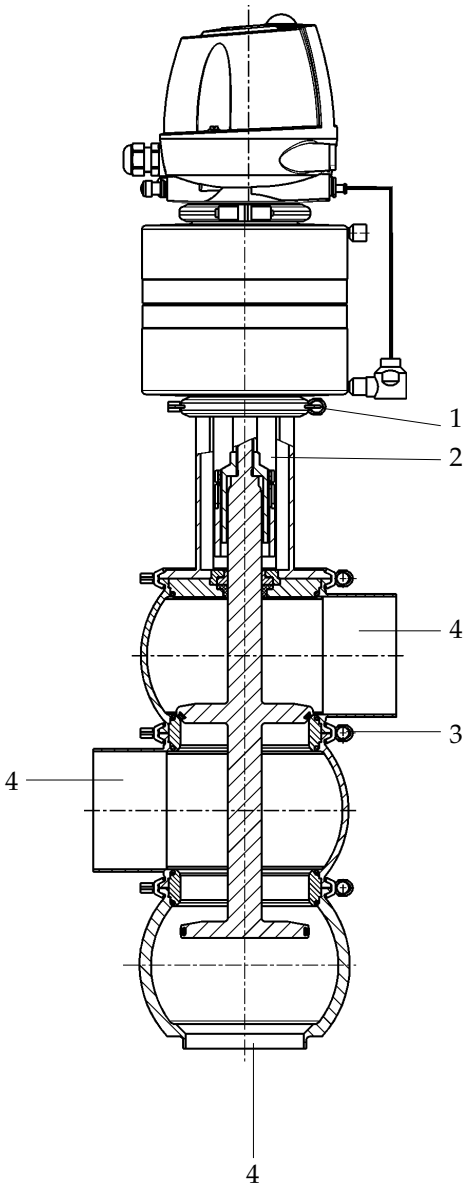
Marking of safety instructions in the operating manual

Special safety instructions are given directly before the operating instructions. They are marked by the following symbols and associated signal words.
It is essential that you read and observe the texts belonging to these symbols before you continue reading the instructions and handling the Flow diversion device.

Symbol	Signal word	Meaning
	**DANGER**	Imminent danger, which may cause severe bodily injury or death.
	**CAUTION**	Dangerous situation, which may cause slight injury or damage to material.

Further symbols

Symbol	Meaning
•	Process / operating steps which must be performed in the specified order.
✗	Information about the optimum use of the Flow diversion device.
–	General enumeration



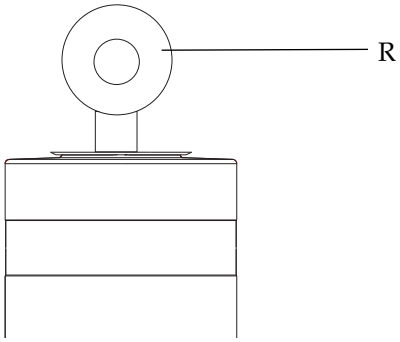
Special hazardous spots

DANGER

In the event of malfunctions set the Flow diversion device out of operation (disconnect the valve from the power and the air supply) and secure it against reactivation.
Immediately rectify the fault.

Never put your hand into the lantern (2) or into the valve housing (4).

When the hinged clamps at the actuator (1) or at the housing (3) of the non-actuated valve (spring-closing action) are detached, there is danger of injury, since the released spring pressure suddenly lifts the actuator (5). Therefore, prior to detaching the hinged clamps, release the spring tension by
– the pneumatic emergency switchbar
  or
– pressurizing the actuator with compressed air.



CAUTION

Housing sockets have very sharp edges. Therefore wear suitable protection gloves during transport or installation of the Flow diversion devices.

For transportation of the valve, it is imperative to remove the control module and the valve stem and to use the screwed-in eye bolt (R), part no. 221-104.98 for lifting the valve.

Designated Use

The Tuchenhagen Flow diversion devices consists of two Tuchenhagen non-slamming divert valves type XKR or XWR welded together to form an assembly. The assembly is used to enable the “Divert Flow”, “Leak Detect” or “Forward Flow”.
Divert valves type X are pressure retention devices (without safety function) in accordance with the pressure equipment guideline 97/23/EC. They are classified according to Appendix II in Article 3, Section 3. In case of deviations thereof, a separate Declaration of Conformity will be handed out together with the equipment.

Transport and Storage

Checking the consignment

On receipt of the Flow diversion device check whether
– the type and serial number on the type plate correspond to the data in the order and delivery documents and
– the equipment is complete and all components are in good order.

The forwarding agent must immediately be notified of any transport damage detectable from the outside and/or missing packages (confirmation on the consignment note). The consignee shall take recourse against the forwarding agent immediately in writing and inform GEA Tuchenhagen accordingly.
Transport damages which cannot be recognized immediately shall be brought to the forwarder´s notice within 6 days. Later claims on damages shall be born by the consignee.

Weights

Size	Weight (kg) per valve	per device
OD 1"	app. 10	app. 20
OD 1 1/2"	app. 18	app. 36
OD 2"	app. 18	app. 36
OD 2 1/2"	app. 25	app. 50
OD 3"	app. 25	app. 50
OD 4"	app. 26	app. 52
OD 6"	app. 82	app. 164

Transport

DANGER
For transport of the package, only use suitable lifting gear and slings. Observe the instruction symbols on the package and on the Flow diversion device.

Handle the Flow diversion device with care to avoid damage caused by shock or careless unloading.
The synthetic materials of the control modules are sensitive to breakages.

Storage

In the case that during transport or storage the Flow diversion device is exposed to temperatures ≤ 0°C, then store in a dry place against damage.
We recommend, prior to any handling (dismounting the housings / activation of actuators) an intermediate storage of 24 hours at a temperature of ≥ 5 °C so that any ice crystals formed by condensation water melts.

General Description

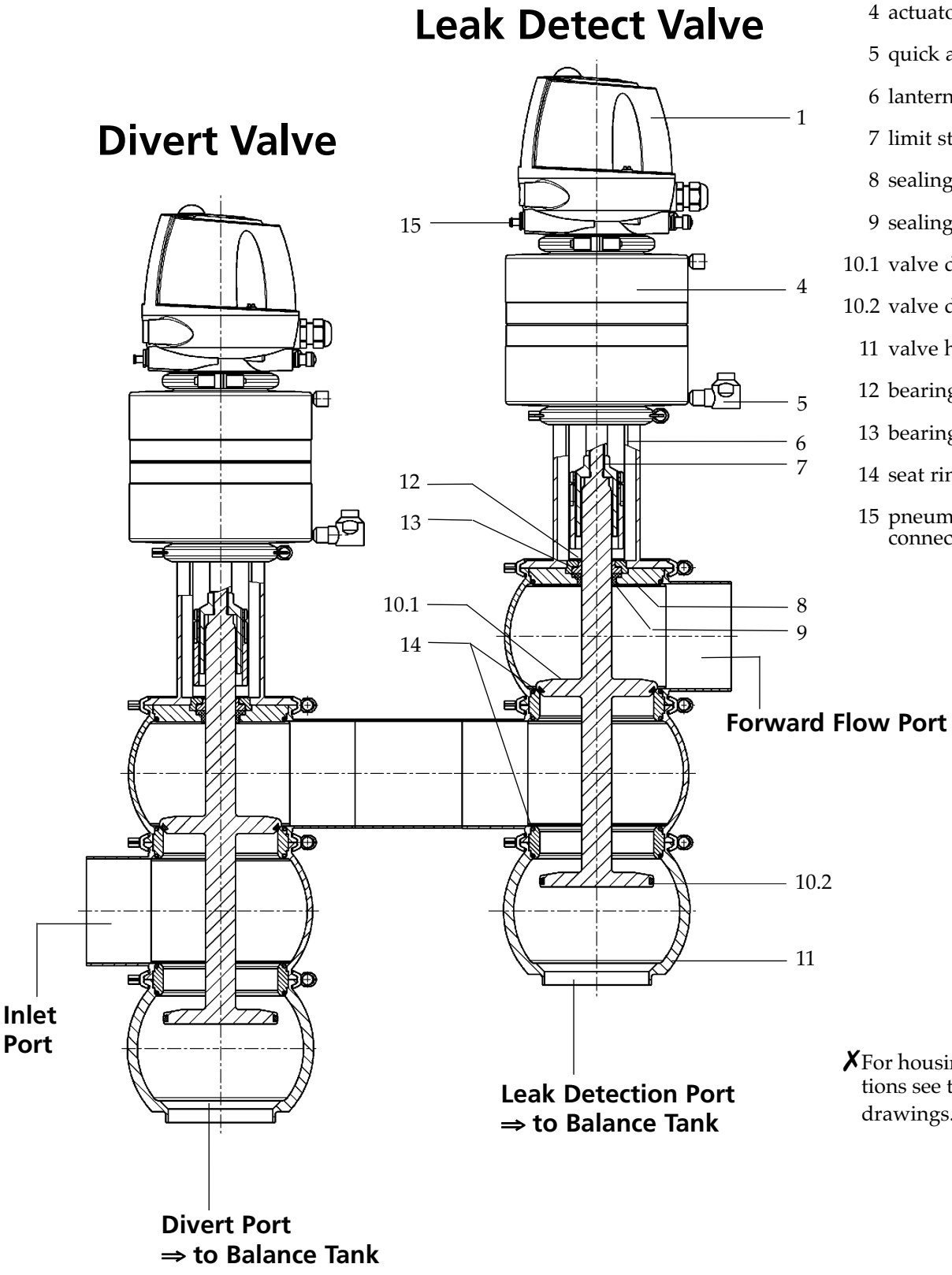
The Tuchenhagen Flow diversion devices are available with either vertical down (Type XKR) or horizontal (Type XWR) divert flow ports to suit the installation requirements. Refer to Appendix “Dimension sheets”.

The actuator is a type Z air to activate, spring to close design. It can be activated directly at the actuator by suitable air connection or through the control module with a solenoid (if required). The air connection port at the actuator is provided with a quick exhaust valve to speed activation. See chapter “Assembly and Operation, Pneumatic Connections”.
The control module is supplied as standard with two sensor to detect non-activated and the activated valve position. See Chapter “Assembly and Operation, Electrical Connections”. A solenoid valve is available.

Design and Function

Design

1 control module
4 actuator
5 quick air exhaust
6 lantern
7 limit stop
8 sealing disk
9 sealing ring
10.1 valve disk X 1
10.2 valve disk X 2
11 valve housing
12 bearing
13 bearing disk
14 seat ring
15 pneumatic connection

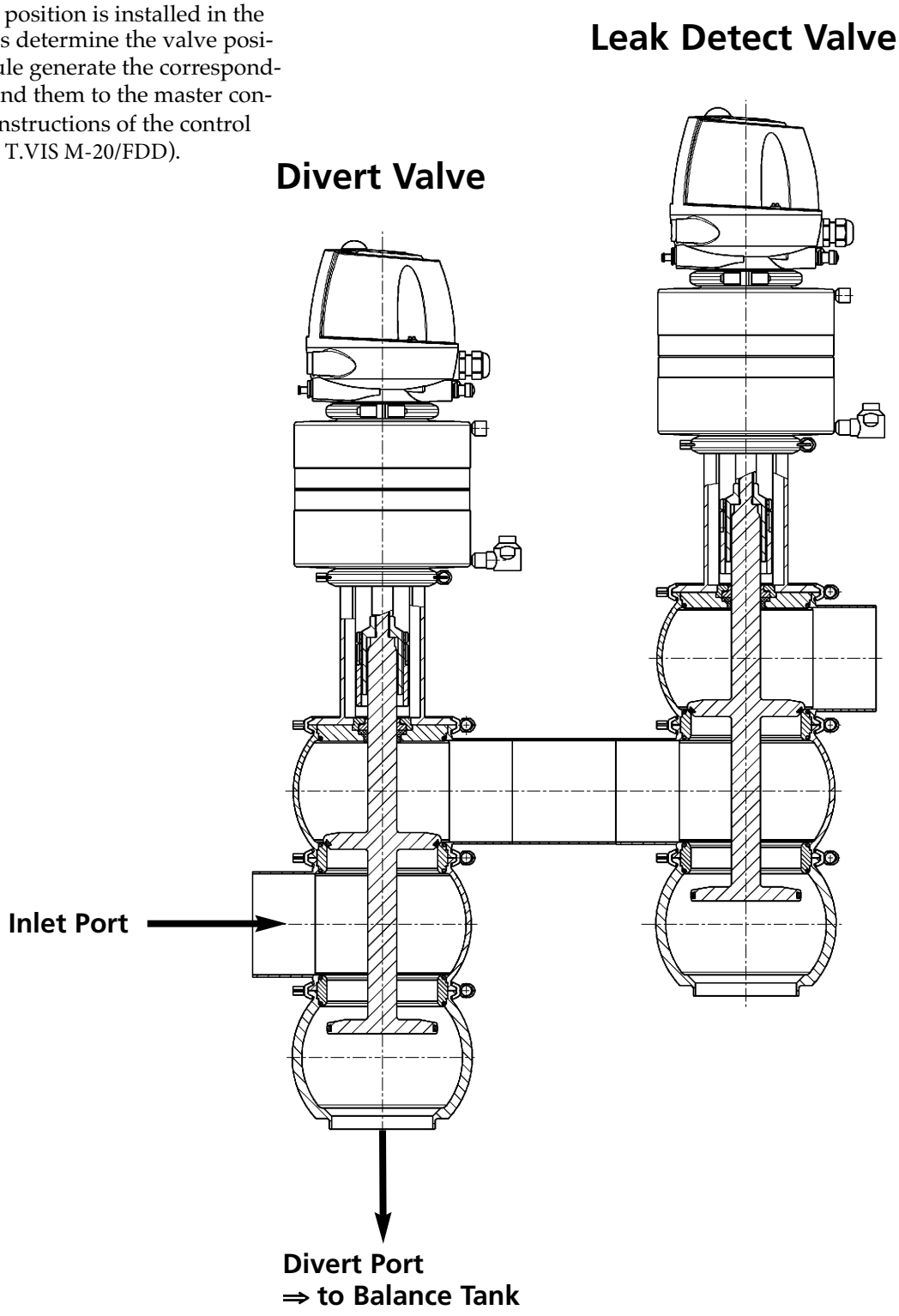


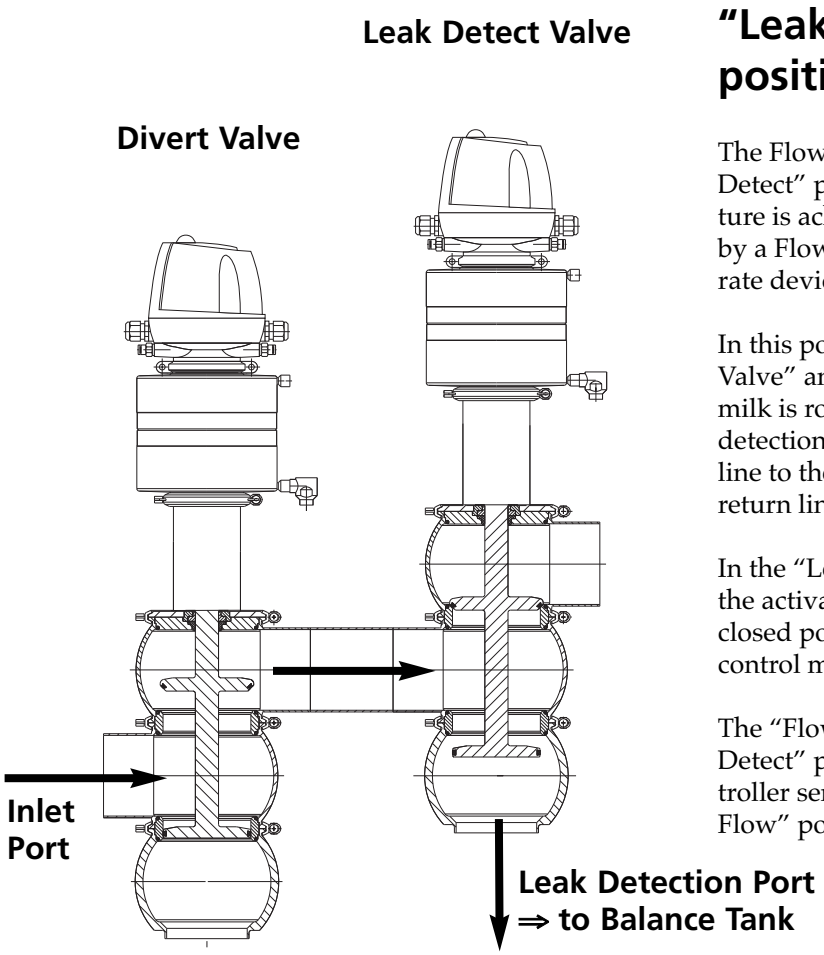
✗For housing configurations see the spare parts drawings.

Function

„Divert Flow“ position

The „Divert Flow“ position is the start position of the valve after assembling in which the divert valve routes the product back to the balance tank during periods of sub-legal pasteurization temperatures.
The valve position is detected by a sensors installed in the control module. The interface module with two sensors to determine the valve position is installed in the control module. The sensors determine the valve position and the interface module generate the corresponding feedback signals and send them to the master control system (see operating instructions of the control module T.VIS M-15/FDD or T.VIS M-20/FDD).





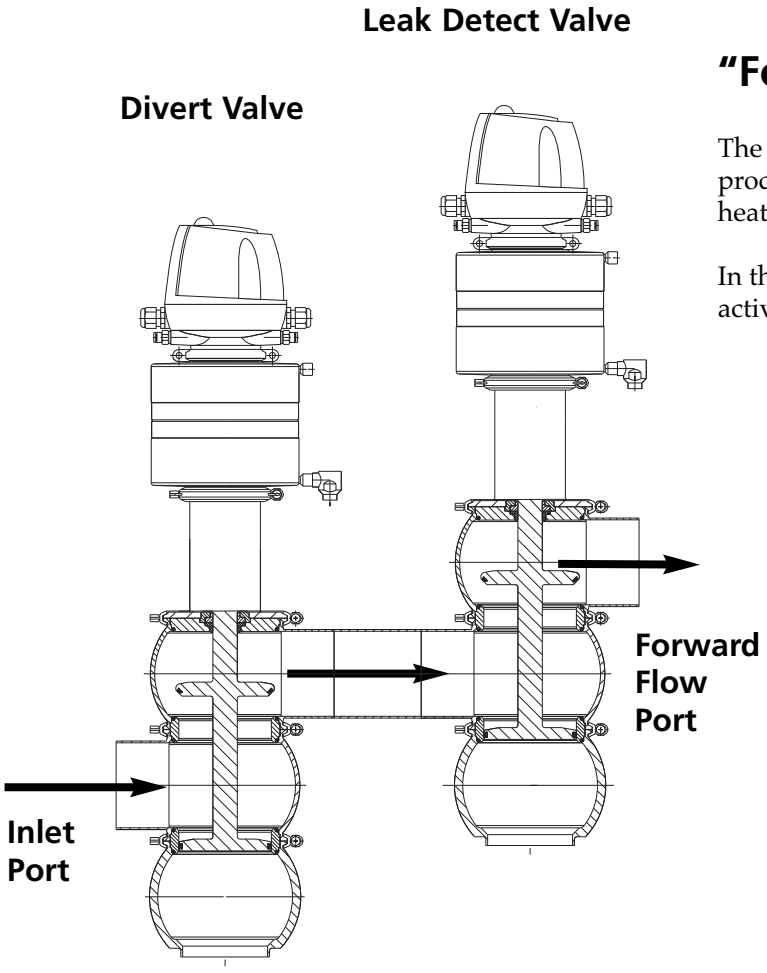
“Leak Detect Flush Time Delay” position

The Flow Diversion Device will move into the “Leak Detect” position once the legal pasteurization temperature is achieved. The time of the clearance is controlled by a Flow Diversion Device Controller which is a separate device.

In this position the common body between the “Divert Valve” and the “Leak Detect Valve” is purged and the milk is routed back to the balance tank out of the leak detection port of the “Leak Detect Valve”. This return line to the balance tank has to be separated from the return line of the “Divert Valve”.

In the “Leak Detect” position the “Divert Valve” is in the activated position. The “Leak Detect Valve” is in the closed position which is detected by the sensor in the control module.

The “Flow Diversion Device” will stay in the “Leak Detect” position until the Flow Diversion Device Controller sends out the signal to transition to the “Forward Flow” position.



“Forward Flow” position

The “Forward Flow” position enables the pasteurized product to flow through the “Leak Detect” Valve to the heat holder and subsequent sections of the pasteurizer.

In the “Forward Flow” position both valves are in the activated position.

Actuator function

The valve is closed in the non-actuated position.

Distinguishing feature with **control module T.VIS**:
– Permanent light (1) green:
  Valve in non-actuated position

– Permanent light (1) yellow:
  Actuated valve position

Assembly and Operation

Make sure that
– the Flow diversion device is installed in the pipe system free of stress and
– no foreign materials (e. g. tools, bolts, lubricants) are enclosed in the system.

Installation position

The standard installation position of the Flow Diversion device is in the vertical position. In the case of the XWR arrangement, the inner parts must be connected to the external piping in such a way as to be drainable.

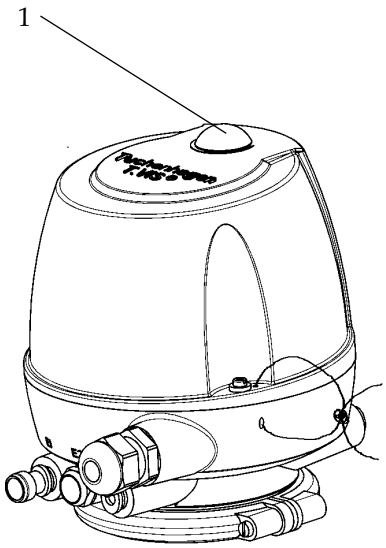
Valve with detachable housing connections

DANGER
If liquids are present in the pipe system, they can cause injury to people when the pipework is disconnected. Therefore, prior to detaching pipe connection fittings or clamp connections:
– drain and – if necessary – rinse or clean the pipe.
– isolate the pipe segment with the valve to be mounted from the rest of the pipe system to secure the pipe against incoming product.

Valves with detachable housing connections can be installed directly into the pipe system, if suitable connection fittings are used.

Valve with welded connections

CAUTION
For welding operations, all internals must be removed from the valve housing.



DANGER
When the hinged clamps at the actuator or at the housing of the non-actuated divert valve X (spring-closing action) are detached, there is danger of injury, since the released spring pressure suddenly lifts the actuator. Therefore, prior to detaching the valve housing, lift the valve disk, either
– through the pneumatic emergency switchbar or
– by actuating the valve with compressed air, max. 8 bar.
• Release the spring tension.

• Dismantle the valve (follow the instructions under “Disassembly”).

• Purge the housing on the inside with forming gas to remove oxygen from the system.

• Fit in the housing and tack it.

• Use the TIG welding method with pulsating current.

• Weld the housing into the pipe system, if necessary using a welding filler.

• After welding, passivate the seam.

• Dismount the housing.

CAUTION
When mounting the valve, make sure that the O-rings in the housing are replaced to ensure the tightness of the valve.

• Insert the seals.

• Mount the valve.

• Depressurize the actuator.
  The valve disk is lowered.

Pneumatic Connections

Air requirement

The compressed air required for switching operations of the valve is governed by the type of actuator (identification at the actuator cap).

Actuator type	Actuator dia. (mm)	Air requirement (dm^3_n/stroke)
A...	89	0.16
B...	108	0.26
C...	133	0.42
D...	168	0.70
E...	212	1.10
E...6	212	2.00
S...6	261	3.20
R...[1)]	168	1.60
S...[1)]	212	2.00
T...[1)]	212	3.10
T...6[1)]	212	4.00
U...6[1)]	261	5.10

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

Installing the air hose

✗To ensure optimum fit in the air connector, the pneumatic hoses must be cut square with a hose cutter.
- Shut off the compressed air supply.
- Push the air hose into the air connector (port P) in the control module.
- Reopen the compressed air supply.

Air connect – no solenoid in control module

Refer to chapter “Design and Function, Design” for item numbers.

- Insert air supply to port P on control module. Use 1/4" OD polytube to connect port Y1 (item 15) from control module to quick exhaust air connect (Item 5).

Air Connect – with solenoid in control module

Refer to chapter “Design and Function, Design” for item numbers.

- Insert air supply to port P on control module. Use 1/4" OD polytube to connect port Y1 (item 15) from control module to quick exhaust air connect (Item 5).

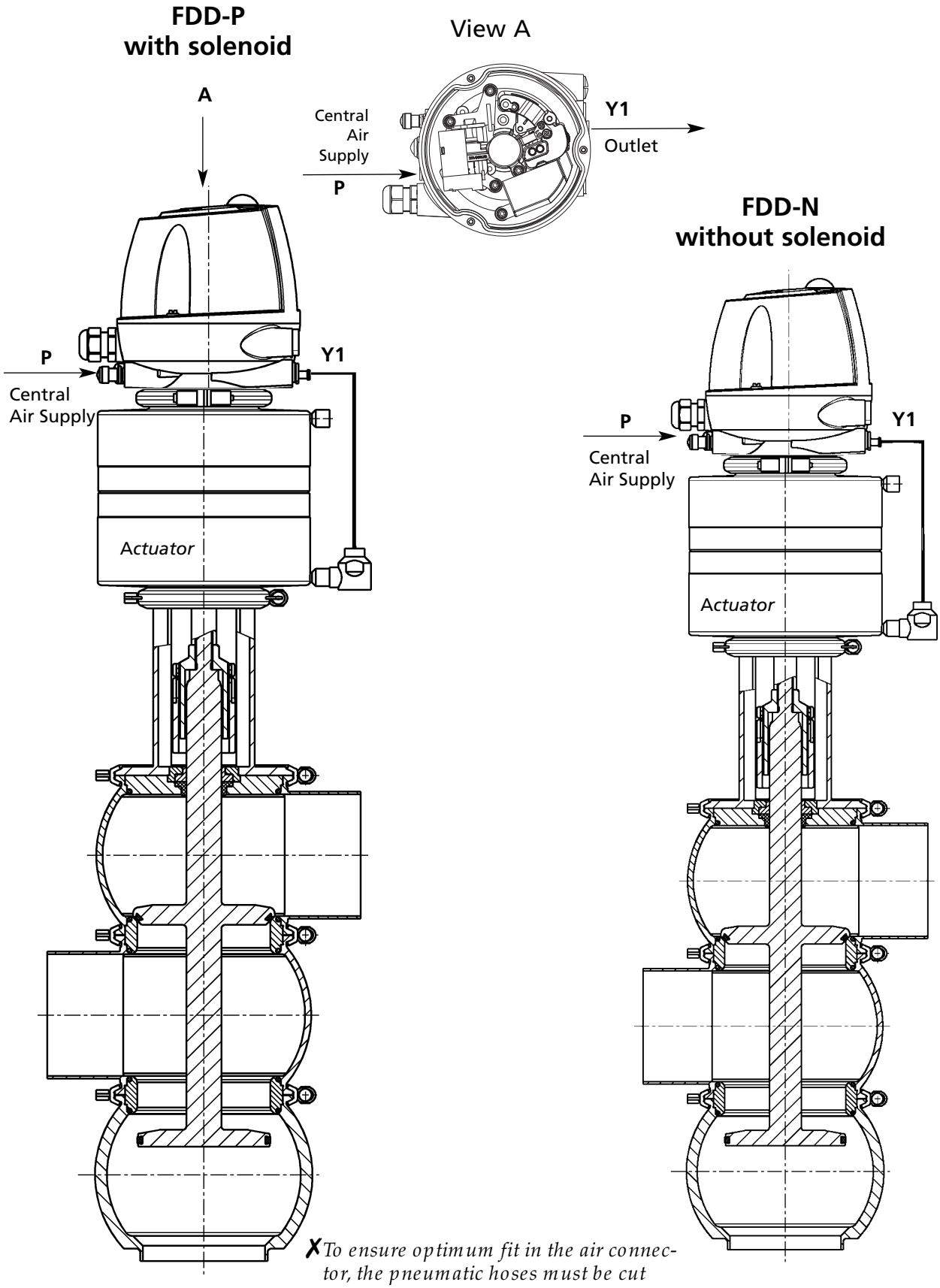
Electrical Connections

DANGER
Only allow qualified personnel to make electrical connections. Prior to making electrical connections check the maximum permissible operating voltage and amperage for each part being connected.

Connecting the electrical cable

Inserting the cable into the gland

- Pull the cable through the cable gland and connect it in the control module in accordance with the wiring diagram (see operating instructions of the control module T.VIS M-15/FDD or T.VIS M-20/FDD).



✗ *To ensure optimum fit in the air connector, the pneumatic hoses must be cut square with a hose cutter.*

Commissioning

- Clean the valve assembly prior to the first production run.

Functional test

- Actuate each valve of the Flow Diversion Device once by applying compressed air.
- Prior to the first product run clean the pipe system.

Leak test

- Visually check that all seals are free from leaks.
- Replace defective seals.

Malfunction, Cause, Remedy

CAUTION

In the event of malfunctions immediately deactivate the Flow Diversion Device and secure it against inadvertent reactivation. Defects may only be rectified by qualified personnel observing the safety instructions.
The following applies to each valve in the Flow Diversion Device.

Malfunction	Cause	Remedy
Valve does not work	Error in the control system	Check the plant configuration
	No compressed air Air pressure too low	Check the air supply Check the air hoses for free passage and leaks
	Error in the electric system	Check actuation /external controller and routing of electric lines
	Solenoid valve defective	Replace the solenoid valve
Valve does not close	Dirt/foreign materials between valve seat and valve disk	Clean the valve housing and the valve seat
Valve closes too slowly	O-rings dry in the actuator and in the control module (friction losses)	Grease the O-rings
Leakage at the valve housing	O-rings in the housing defective	Dismantle the valve housing, replace the O-rings
Leakage in the lantern	Sealing ring defective	Replace the sealing ring

Maintenance

Inspections

Between the maintenance periods, the each valve of the Flow diversion devices must be checked for leakage and proper function.

Product contact seals

- Check at regular intervals:
  – stem seal between the upper housing and the lantern
  – O-rings between the valve housings
  – V-ring in the valve disks

Pneumatic connection

- Check the operating pressure at the pressure reducing and filter station.
- Clean the air filter in the filter station at regular intervals.
- Check whether the air hose sits firmly in the air connector.
- Check the air hoses for bends and leaks.
- Check function of the solenoid valves.

Electrical connection

- Check whether the cap nut on the cable gland is tight.
- Check the cable connections at the adapter module.
- Check function of the solenoid valves.

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 plant user, since they depend on the operating conditions, for instance
– daily period of operation
– switching frequency
– type and temperature of the product
– type and temperature of the cleaning solution
– ambient conditions.

Application	Maintenance interval (recommendations)
Media at temperatures of 60 °C to 130 °C	every 3 months
Media at temperatures < 60 °C	every 12 months

Prior to disassembly the Flow diversion device

DANGER
Before detaching the pipe connection and the semi-annular clamp connections on the valve housing, always take the following preparatory measures:

- Make sure that during maintenance and repair work no process is in operation in the area concerned.
- All pipe system elements attached to the Flow diversion device must be drained and, if necessary, cleaned or rinsed.
- Shut off the control air supply, unless it is required for disassembly the Flow diversion device.
- Disconnect the power supply.
- If possible, take the valve out of the pipe system together with all housings and housing connections.

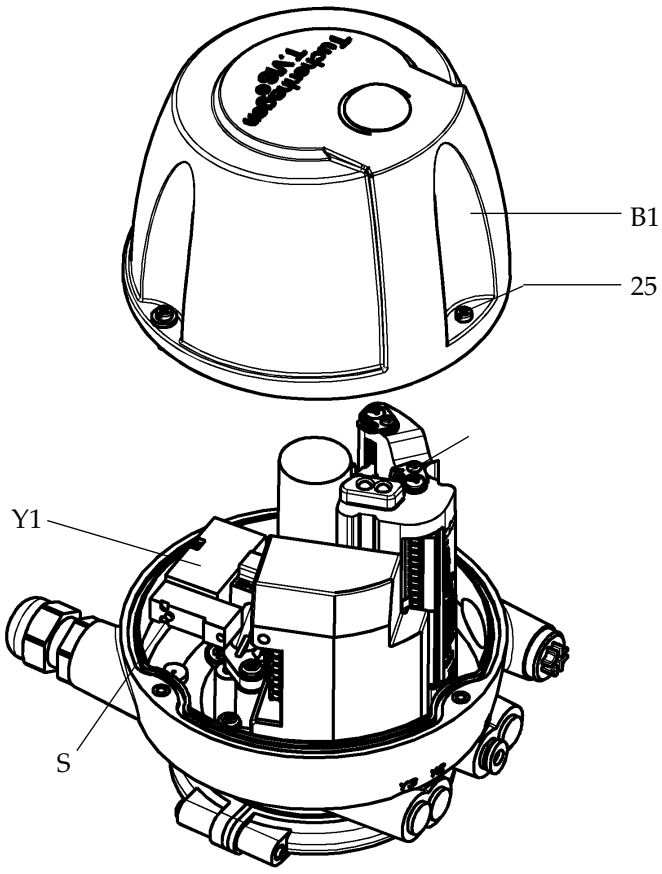
Disassembly of Flow Diversion Device

NOTE
The pneumatic and electrical connections can remain in the control module.

- Loose the cheese head screw (25) and remove cap (B1).

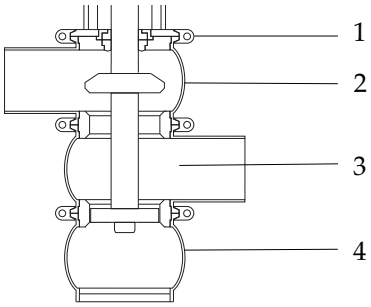
DANGER
When the hinged clamps are detached of the non-actuated valve, the released spring force suddenly lifts the actuator. There is danger of injury.
Therefore, prior to detaching the hinged clamps, release the spring tension by actuating the valve actuator with compressed air.
Lift the valve disk:
Spring-closing valve
- Pressurize the actuator with compressed air, max. 8 bar by activating solenoid valve Y1 at S.

Spring-opening valve
- Depressurize the actuator.



Disassembly the control module

• Remove the hinged clamps (1).



Lower the valve disk :
• Depressurize the actuator.

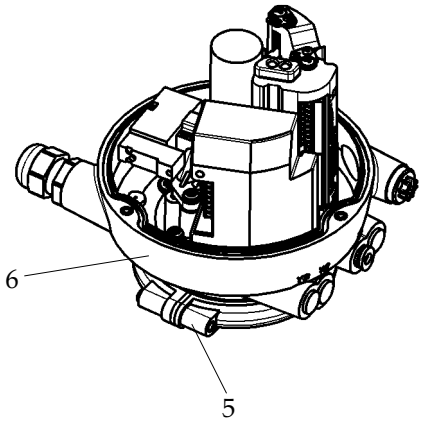
✗ The pneumatic and electrical connections can remain connected to the control module.

• Remove the hinged clamps (5) between the control module and the actuator.

• Lift the control module (6) upwards.

Disassembly the valve insert

CAUTION
When pulling out the valve do not damage the valve seat.
Do not set the valve insert down on the valve disk, as this can damage the valve disk, but lay it down carefully.

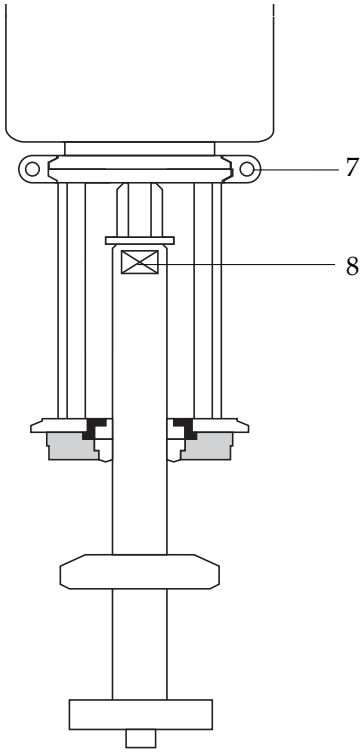


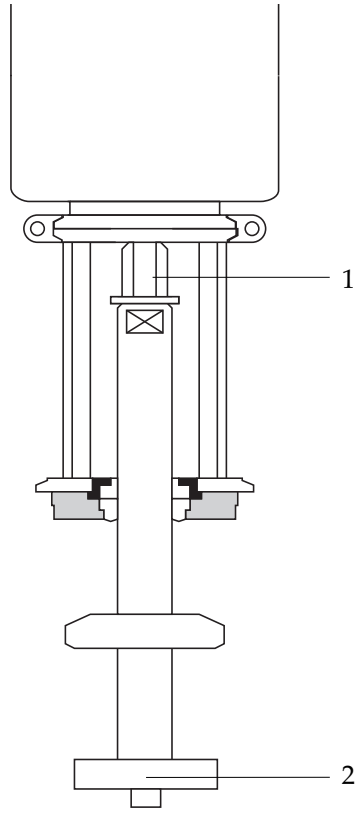
•Pull the valve out of the housing (2, 3, 4).

Loosen the valve disk

• Slacken the hinged clamps (7) between the actuator and the lantern.

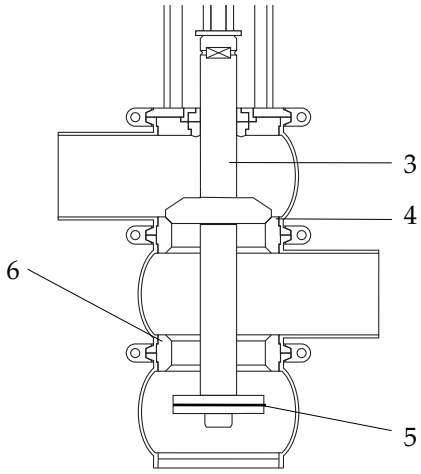
• Grip the valve disk at the key face (8) with an open-end spanner, turn the actuator 3 turns using a strap wrench. The valve disk will come loose.





Disassembly valve disk

- Unscrew the valve disk (2) from the actuator by hand.
- Unscrew the spacer nut (1) from the valve disk.
- Withdraw the valve disk from the housing.
- Withdraw the actuator.



Maintenance

CAUTION

The stem of the valve disk (3), the housing seat (4), the valve seat (6) and the V-ring groove (5) are precision parts which must not be damaged!

- Dismantle the Flow diversion device see Chapter “Disassembly”.
- Carefully clean the individual components.

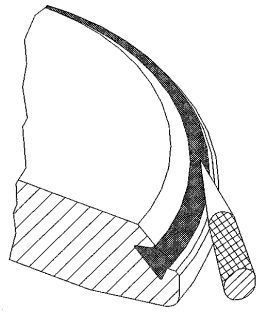
CAUTION

Observe the safety information sheets issued by the detergent manufacturers! Only use detergents which are non abrasive and non-aggressive towards stainless steel.

Replacing the seals

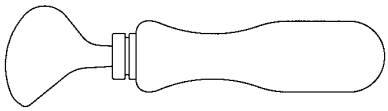
✗Replace defective seals.
Always replace the housing O-rings to ensure the tightness of the valve. Always use original spare parts.

CAUTION
When the V-Ring is removed with a scriber, the scriber can slip off. There is danger of injury. Therefore grip the valve disk in a vice fitted with protected jaws. Also unscrew the curved end of the scriber.



- Insert the scriber into the V-ring and lever it out.

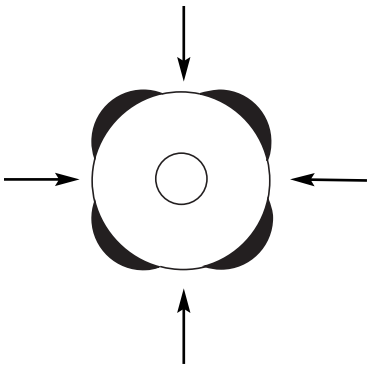
Use the insertion tool to mount the new V-ring.



✗Do not grease the V-ring before inserting it.
We recommend using water with household washing-up liquid (1 drop/1 l) as an aid to inserting V-rings. In order to prevent oxidation from infiltration prepare the liquid solution in a ceramic, plastic or stainless steel container.

Before inserting the V-ring wet it on the back (side not in contact with the product). Take care that there is no water in the V-ring groove in the valve disk.

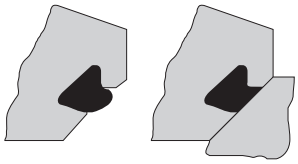
CAUTION
- Observe the required installation position of the V-ring (see ill.).



- Insert the V-ring (see ill.).

- Using the V-ring insertion tool press the V-ring into the groove at several opposite places along the circumference.

- Insert the V-ring evenly into position.



- Replace all the other seals correspondingly marked in the spare parts drawing.

✗Used seals must not be refitted, since this would adversely affect the sealing function.

Lubrication of seals and threads

CAUTION
For product contact seals do not use conventional greases and oils. Observe the safety information sheets issued by the lubricant manufacturers.

- Grease the thread of the valve disk and all screws.
- Do not grease the V-ring.
- Apply a very light film of grease to all seals – including the O-rings at the top and bottom of the piston rod for the actuator.

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

CAUTION
When mounting the control module, make sure that the air hoses do not get kinked.

Assembling

Mounting to The control module T.VIS onto FDD

CAUTION
The permanent magnet on the switch bar (1) is fragile and must therefore be protected against mechanical impact stress.

The magnetic fields can delete data carriers and affect or destroy mechanical components.

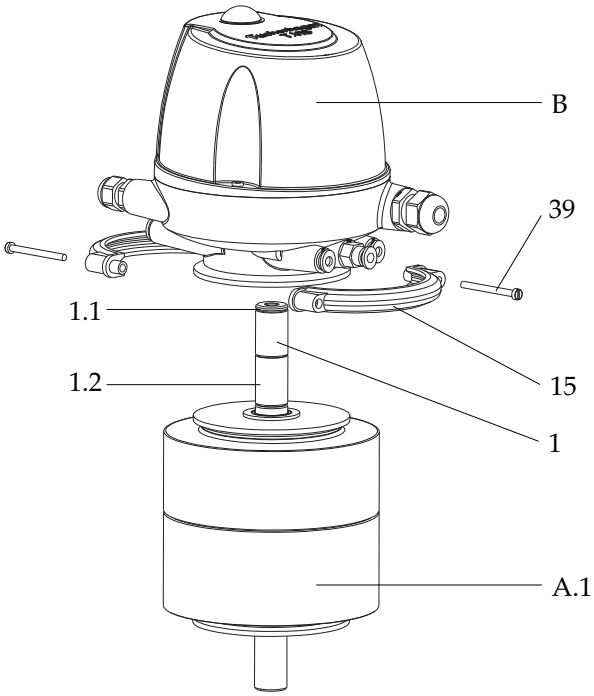
- Check that the switch bar (1) is firmly in place. If needed, tighten using an Allen key at (1.1) or an open spanner, size 13 at (1.2): tightening torque 2 Nm (1.4 lbft).

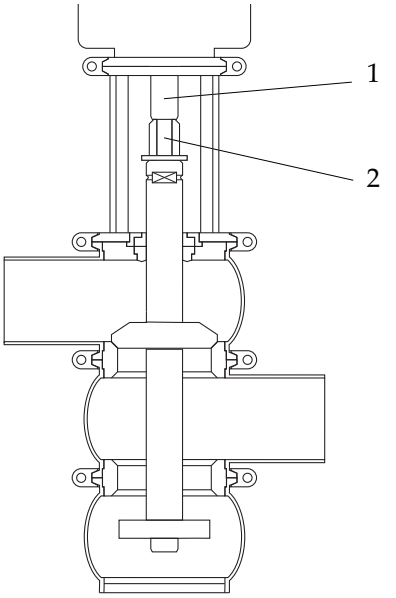
- Pass the control module (B) over the valve stem (1) and place it on to the actuator (A.1).

- Fix the clamps (15) by tightening the screws (39) at a torque of 1 Nm (0.7 lbft).

- Align the pneumatic and electrical connections according to the valve block configura-tion.

- Carry out commissioning, see operating instructions of the control module T.VIS M-15/FDD or T.VIS M-20/FDD.



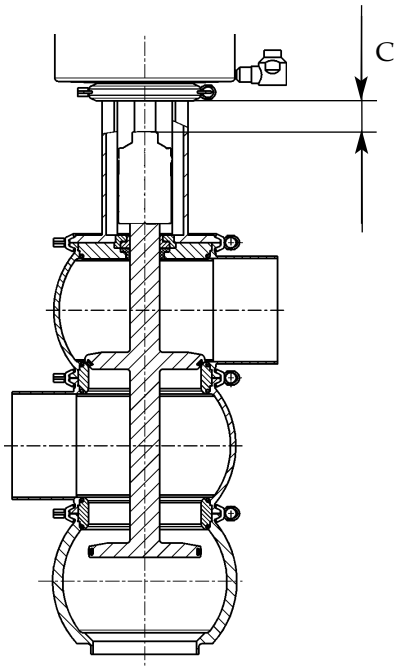


DANGER

There is a danger of injury when the spring-opening valve is assembled. Therefore, do not put your hand in the valve housing. Before unscrewing the valve disk, pretension the actuator using an emergency manual actuator (H) (part no. 221.310.74).

Assemble the valve in the reverse sequence of disassembly. During assembly, observe the following instructions:

- Lock the spacer nut (2) against the actuator rod (1).
- Tighten the nuts of the clamps at the control module with a torque of 1 Nm.
- Tighten the nuts of the hinged clamps with following torques:
  M 6 9 Nm
  M 8 22 Nm
- Tighten the nuts of the cast-semi-annular clamps with a torque of 45 Nm (33 lbft).



Checking the valve stroke

- Actuate the valve by applying compressed air.
- Check whether the valve stroke (c) is correct.

Valve size	Valve stroke c (mm)
OD 1"	15
OD 11/2"	23
OD 2"	30
OD 21/2"	30
OD 3"	30
OD 4"	30
OD 6"	60

- Check the function of the feedback or sensors and, if necessary, readjust them (see operating instructions Control Module T.VIS M-15/FDD or T.VIS M-20/FDD).

Dual Stem Device – Test Procedures

The following procedures have been developed by GEA Tuchenhagen to comply with the Pasteurized Milk Ordinance for the Dual Stem Device Assembly.

Device Assembly – Dual Stem Device

Apparatus

Limit Test Stop is supplied with valve Spacer, Part. no. 221-105.32, set to 0.059 inches.

Procedure

The Limit Test Stop is supplied as standard with the Divert Valve and the Leak Detect valve.

- Set the Divert Valve to the Divert Flow position.
- Lower the Limit Test Stop by turning Clockwise until it touches the housing plate.
- Lower the Lock Nut until it touches the Limit Test Stop – see figure A.
- Set the Divert Valve to Forward Flow Position.
- Lower the Limit Test Stop by 0.059" inches from the Lock Nut using the Spacer provided to set the gap accurately – see figure B.
- Lock the Limit Test Stop in place with the Lock Nut.
- Activate the valve to Divert Flow Position.
- The metering pump or any other flow promoting device should not start. See Corrective Action if the metering pump does not respond as indicated.

After test:

- Set the valve to Forward Flow Position.
- Slacken the lock nut and raise the Limit Test Stop by turning Anti-Clockwise to the normal position as shown in picture C. Tighten the lock nut against the Limit Test Stop.
- Repeat the above steps for the Leak Detect Valve.

Corrective Action

If the metering pump fails to respond as indicated, conduct an investigation of the Flow Diversion Valve, the sensor and wiring to correct the problem.

Figure A: Test Position 1

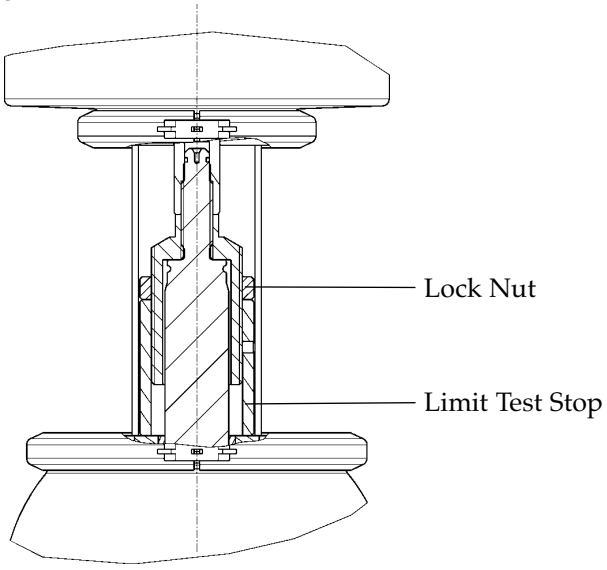


Figure B: Test Position 2

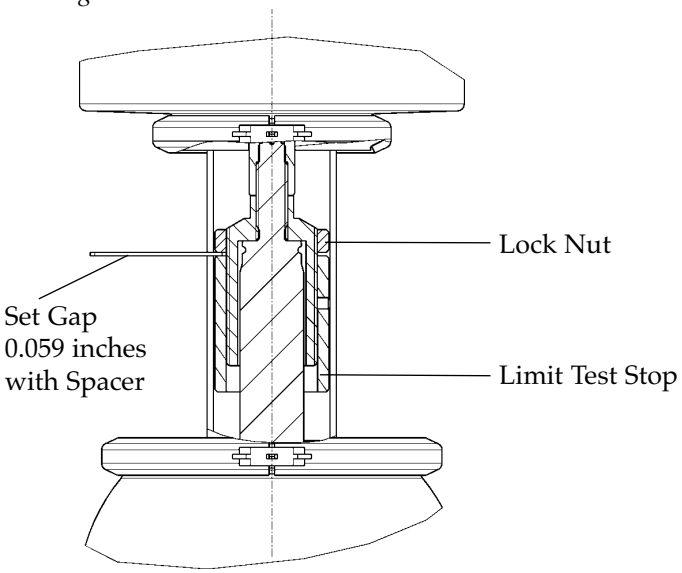
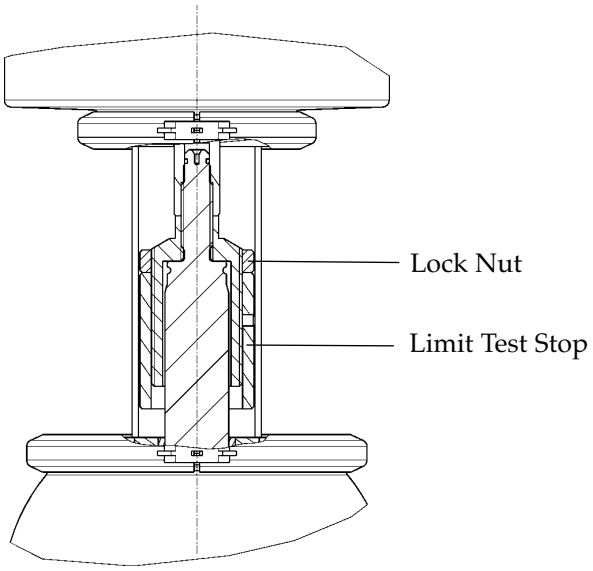


Figure C: Normal Position



Technical Data

Size	1" to 6" OD
Weight	20 to 164 kg, depending on size and equipment
Material of product contact parts	stainless steel 1.4404 Check corrosion resistance with respect to media and detergents.
Installation position	any position, if valve and pipe system can drain properly
Ambient temperature Valve	0...45 °C, standard < 0 °C: use control air with low dew point. Protect valve stems against freezing > +60 °C: no solenoid valves in the control module
Control module	–20...+55 °C
Product temperature and operating temperature	depending on the sealing material
Product pressure	5 bar, standard max. 10 bar
Control air pressure	6 bar, max. 8 bar, standard < 6 bar on request
Control air – Solid particle content: – Water content: – Oil content:	acc. to ISO 8573-1:2001 quality class 6 particle size max. 5 µm part. density max. 5 mg/m³ quality class 4 max. dew point +3 °C If the valve is used at higher altitudes or at low ambient temperatures, the dew point must be adapted accordingly. quality class 3, preferably oil free max. 5 mg oil in 1m³ air
Air hose Inch	material PA outside dia. 6,35 mm inside dia. 4,3 mm
Protection class	IP 66, IP 67 on option
Noise level via sound absorber	72 dB max

Tools / Lubricant

Tool	Part no.
Pneum. emergency switchbar DN 25...100	221-105.67
Pneum. emergency switchbar DN 125...162 (6" IPS)	221-105.65
Emergency manual actuator	221.310.74
Strap wrench	408-142
Hose cutter	407-065
V-ring insertion tool	229-109.88
Open spanner, ends ground, size 17-19	229-119.01
Open spanner, ends ground, size 21-23	229-119.05
Open spanner, ends ground, size 22-24	229-119.03
Open spanner, size 30-32	408-041
Allen key size 3 and 8	
Screw driver torx 10 IP	
Screw driver torx 20 IP	
Phillips head screw driver size 2	
Slotted screw driver A 0.4 X 2.5	
Open spanner size 13	
Spacer 0.059 inches	221-105.32

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

Disposal of valve actuators

DANGER

When actuators are opened, the prestressed spring can cause loss of life.
The spring tension can be as much as 24 kN. Therefore never try to force the actuator open. Only deactivated actuators may be scrapped.

✗GEA Tuchenhagen accepts unopened actuators and arranges for proper disposal free of charge.

Resistance of the Sealing Materials

The resistance of the sealing material depends on the type and temperature of the medium conveyed.

Medium	Sealing material EPDM (standard)	FKM (optional)	HNBR (optional)
product	–40... +135 °C	–10...+200 °C	–25...+140 °C
caustics at 2...5%	up to 80 °C	up to 40 °C	conditionally resistant
strong caustics	sufficiently resistant	not resistant	not resistance
acids at 2...5%	up to 80 °C	up to 100 °C	conditionally resistant
strong acids	not resistant	not resistant	not resistance
saturated steam up to 135 °C	resistant	conditionally resistant	resistant
fuels/hydrocarbons	not resistant	conditionally resistant	not resistance
oils/fats	not resistant	very good resistance	good resistance

Spare parts list - Flow Diversion Device with M-15/FDD or T.VIS M-20/FDD

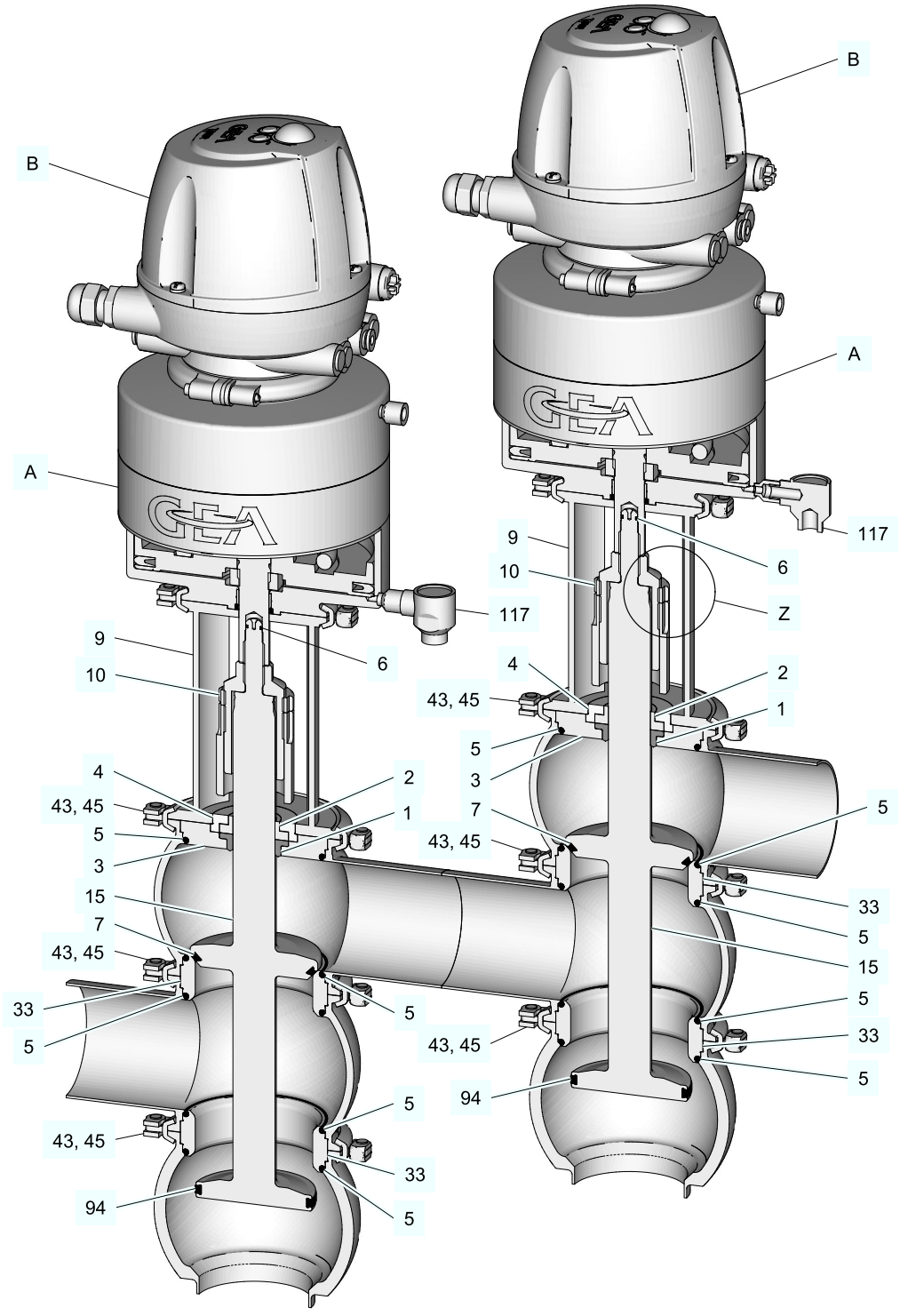


Fig.1

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
1	Seal ring	EPDM	924-084	924-084	924-084	924-085	924-085	924-085
		FKM	924-082	924-082	924-082	924-083	924-083	924-083
2	Bearing	PTFE/carbon	935-001	935-001	935-001	935-002	935-002	935-002
3	Seal disk	1.4404	221-141.01	221-141.02	221-141.02	221-141.03	221-141.03	221-141.04
4	Bearing disc	1.4301	221-142.01	221-142.02	221-142.02	221-142.03	221-142.03	221-142.03
5	O-ring	EPDM	930-309	930-144	930-144	930-150	930-150	930-156
		FKM	930-168	930-171	930-171	930-176	930-176	930-178
6	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004
7	V-ring	EPDM	932-046	932-021	932-021	932-024	932-024	932-028
		FKM	932-030	932-033	932-033	932-035	932-035	932-039
9	Lantern	1.4301	221-121.01	221-121.07	221-121.07	221-121.08	221-121.08	221-121.09
10	Limit stop N	1.4404/1.4301	221-156.13	221-156.13	221-156.13	221-156.01	221-156.01	221-156.01
15	Valve plate X_R	1.4404	221-700.06	221-700.05	221-700.04	221-700.03	221-700.01	221-700.02
33	Seat ring X_R	1.4404	221-699.04	221-699.03	221-699.03	221-699.01	221-699.01	221-699.02
35	Blanking plate N	1.4404	221-144.01	221-144.02	221-144.02	221-144.03	221-144.03	221-144.04
43	Hinged clamp	1.4401	701-074	701-075	701-075	701-076	701-076	701-077
45	Hexagon nut	1.4305	912-035	912-035	912-035	912-036	912-036	912-036
94	V-ring RA	EPDM	221-365.13	221-365.07	221-365.07	221-365.08	221-365.08	221-365.09
		FKM	221-365.21	221-365.10	221-365.10	221-365.11	221-365.11	221-365.12
117	Quick bleed valve G1/8"	Al	603-038	603-038	603-038	603-038	603-038	603-038
401	Housing V1	1.4404	221-101.27	221-101.28	221-101.29	221-101.30	221-101.31	221-101.32
403	Housing connection X	1.4404	221-672.06	221-672.03	221-672.04	221-672.01	221-672.02	221-672.05
450	Spacer	1.4301	221-105.32					
A	Actuator Z/FDD		See spare parts list for actuator Z/FDD					
B	Control top T.VIS M-15/FDD or T.VIS M-20/FDD		See spare parts list for control top T.VIS M-15/FDD or T.VIS M-20/FDD					

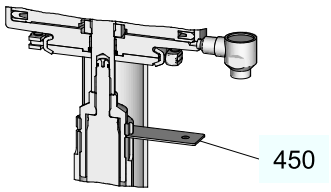


Fig.2: Detail Z

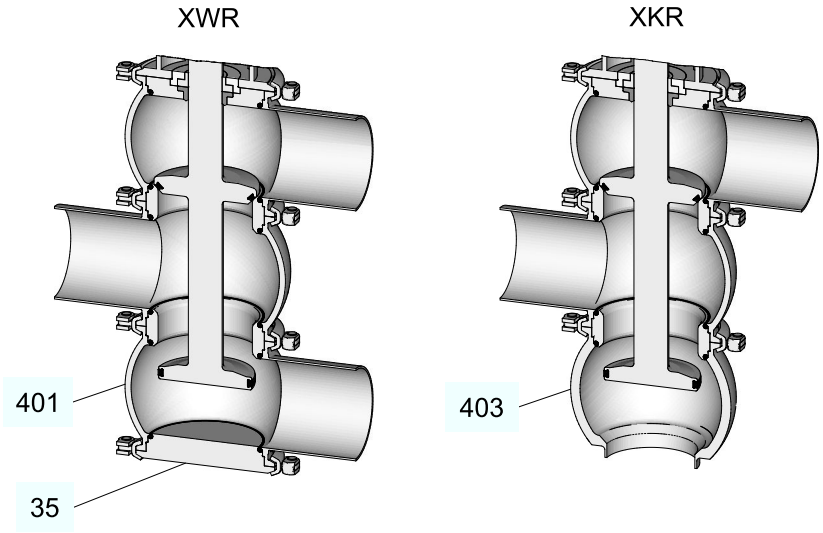


Fig.3: Housing combinations

1 Dimension sheet - Flow Diversion Device with T.VIS® M-15/FDD or T.VIS® M-20/FDD

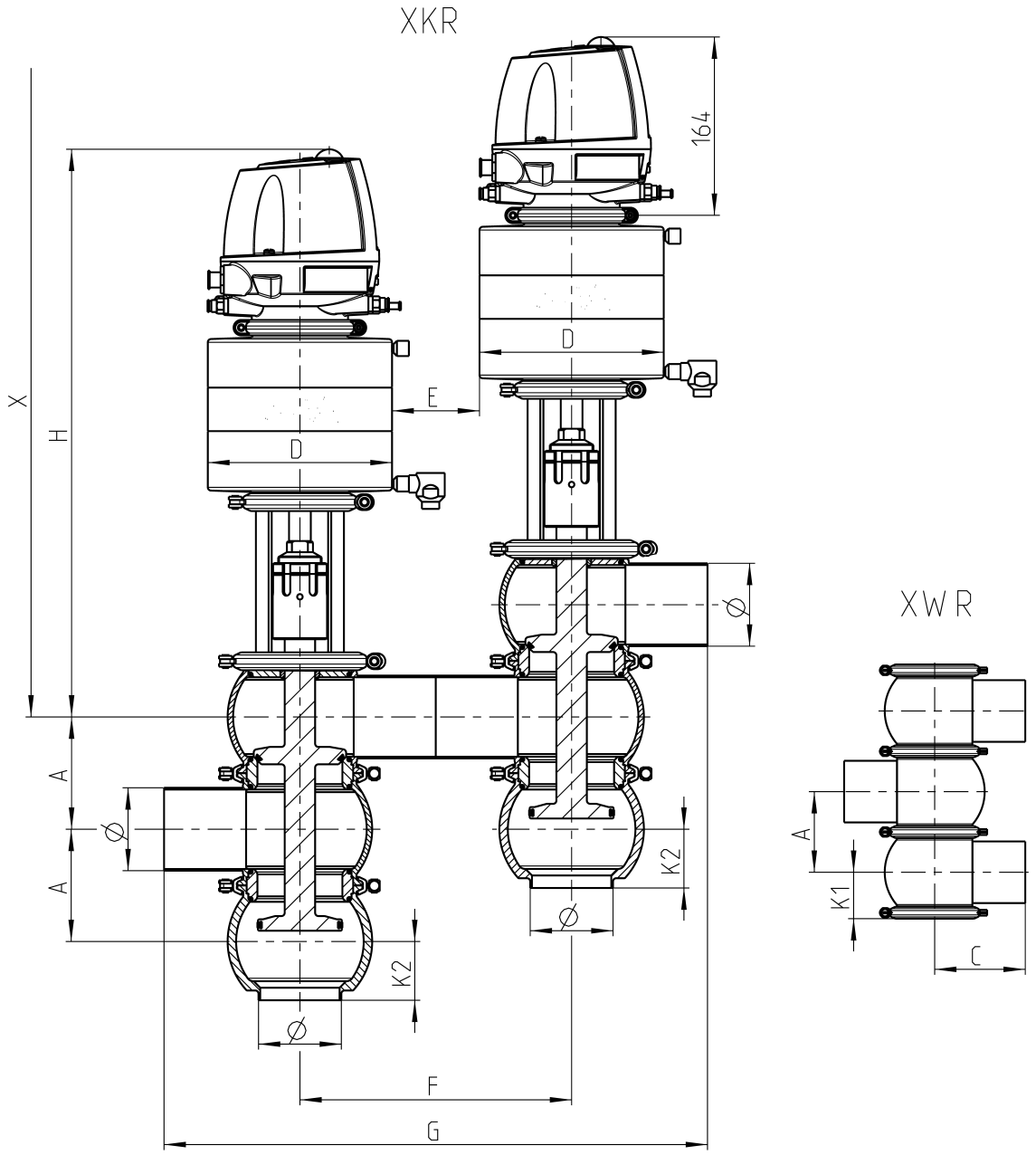
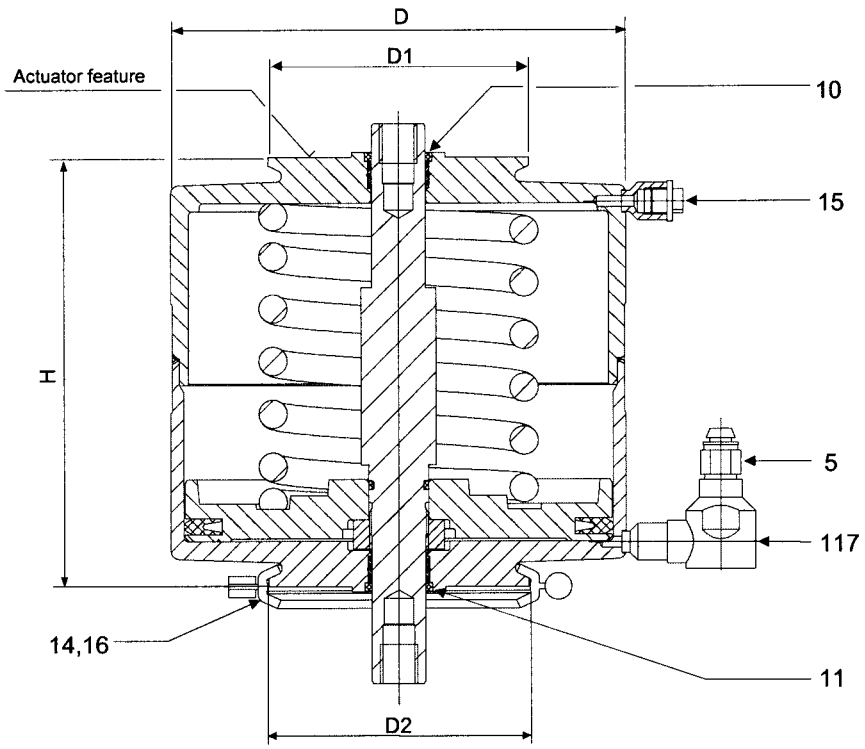


Fig.1

Nominal width	Ø [mm]	A [mm]	C [mm]	D [mm]	S [mm]	F [mm]	G [mm]	H [mm]	K1 [mm]	K2 [mm]	Expansion X [mm]	Weight [kg]
OD 1"	25.4 × 1.65	46	90	110	70	180	360	456	30	29	537	15
OD 1.5"	38.1 × 1.65	59	90	135	45	180	360	465.5	36.5	39	615	23
OD 2"	50.8 × 1.65	71.5	90	135	45	180	360	472	43	42	658	30
OD 2.5"	63.5 × 1.65	90	125	170	80	250	500	515	52	54	741	30
OD 3"	76.2 × 1.65	103	125	170	80	250	500	521.5	58.5	54	772	30
OD 4"	101.6 × 2.11	127.5	125	210	40	250	500	530	71	69	830	30

Date: 2008-07-08 221ELI006065E_0.DOC	Spare parts list and Dimension sheet **Actuator Z / FDD**	GEA



Item	Designation	Material	Part no.							
			ZCB	ZDD	ZDG	ZEF	ZEH	ZSH 6Z	ZSK 6Z	ZSN 6Z
Actuator Z cpl.			221-694.02	221-694.01	221-694.03	221-694.04	221-694.05	221-694.06	221-694.07	221-694.08
5	Screw connection	Brass/ nickeled	933-144	933-144	933-144	933-144	933-144	933-144	933-144	933-144
10	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-026	930-026	930-026
11	O-ring	NBR	930-026	930-026	930-026	930-026	930-026	930-035	930-035	930-035
14	Hinged clamp	1.4401	701-073	701-073	701-073	701-073	701-073	701-077	701-077	701-077
15	Vent screw	PP	221-133.14	221-133.14	221-133.14	221-133.14	221-133.14	221-133.14	221-133.14	221-133.14
16	Hex. nut	1.4305	912-036	912-036	912-036	912-036	912-036	912-036	912-036	912-036
117	Quick air exhaust	Al	603-038	603-038	603-038	603-038	603-038	603-038	603-038	603-038
			Dimension (mm)							
D			135	170	170	210	210	260	260	260
D1			97	97	97	97	97	97	97	97
D2			97	97	97	97	97	142	142	142
H			130	160	160	160	160	246	246	246
Stroke			35	35	35	35	35	65	65	65
Weight (Kg)			5,9	8,8	10,9	12,2	13,9	28,5	30	36

Spare parts list - control head T.VIS M-15 FDD

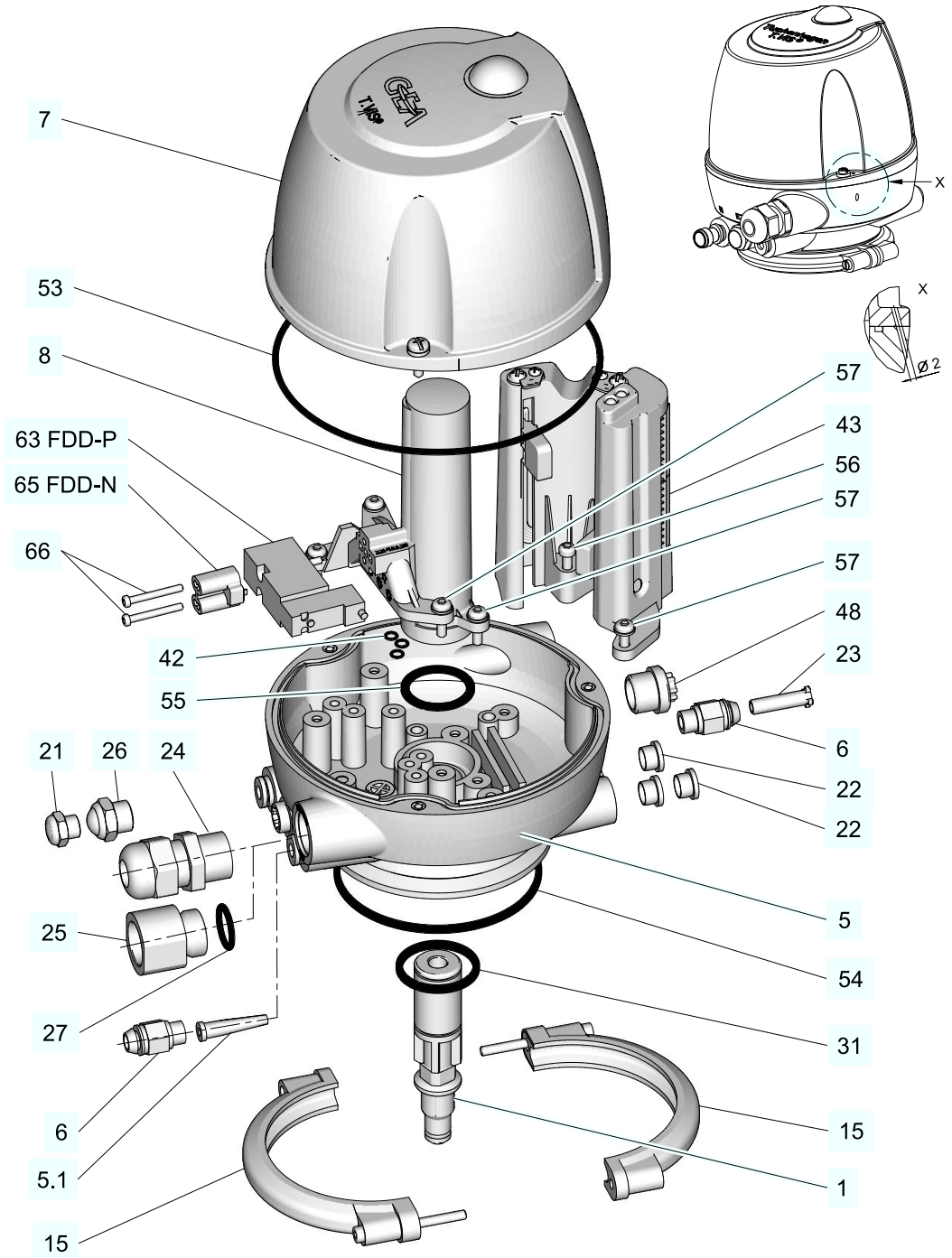


Fig.1: X = for lead sealing

Item	Designation	Material	24V DC	
			with solenoid valve	without solenoid valve
			FDD-P	FDD-N
	Control head T.VIS M-15 FDD cpl.		221-602.80	221-602.110
1	Switch bar	PA6	221-589.80	221-589.80
5	Base T.VIS Z/1PV	PA12	221-646.100	221-646.100
5.1	Filter	PE SINTERED	221-003869	221-003869
6	Screw-in plug connection G 1/8"	MS CV	933-173	933-173
7	Cap T.VIS with screws (919-008)	PA12	221-646.88	221-646.88
8	Pneumatic block with T.VIS 1PV (1 solenoid valve)	PA12	221-646.94	221-646.94
15*	Clamp connection KU	--	221-507.08	221-507.08
21	Sound absorber	MS CV	933-175	933-175
22	Locking screw	PE-HD	922-369	922-369
23	Sealing plug D1/4"	PP-GF30	922-280	922-280
24	Cable gland	PA	508-299	508-299
25	Adapter	PA	221-004094	221-004094
26	Sound absorber	MS CV	933-174	933-174
27	O-ring	NBR	930-017	930-017
31	O-ring	NBR	930-041	930-041
42	O-ring	FKM	930-169	930-169
43	Interface module 24V DC	--	221-589.53	221-589.53
48	Locking screw	PE-HD	922-370	922-370
53	O-ring	NBR	930-833	930-833
54	O-ring	NBR	930-117	930-117
55	O-ring	NBR	930-038	930-038
56	Thread-forming screw	A2	514-749	514-749
57	Thread-forming screw	A2	514-750	514-750
63	Solenoid valve 24VDC	PPS	512-151	--
65	Control plate without screws incl. seals	Noryl	--	221-589.27
66	Thread-forming screw	A2	514-761	514-761
*Item 15 is not included in control head T.VIS M-15/FDD cpl. and must be ordered separately if required.				

1 Spare parts list - control top T.VIS M-20 FDD

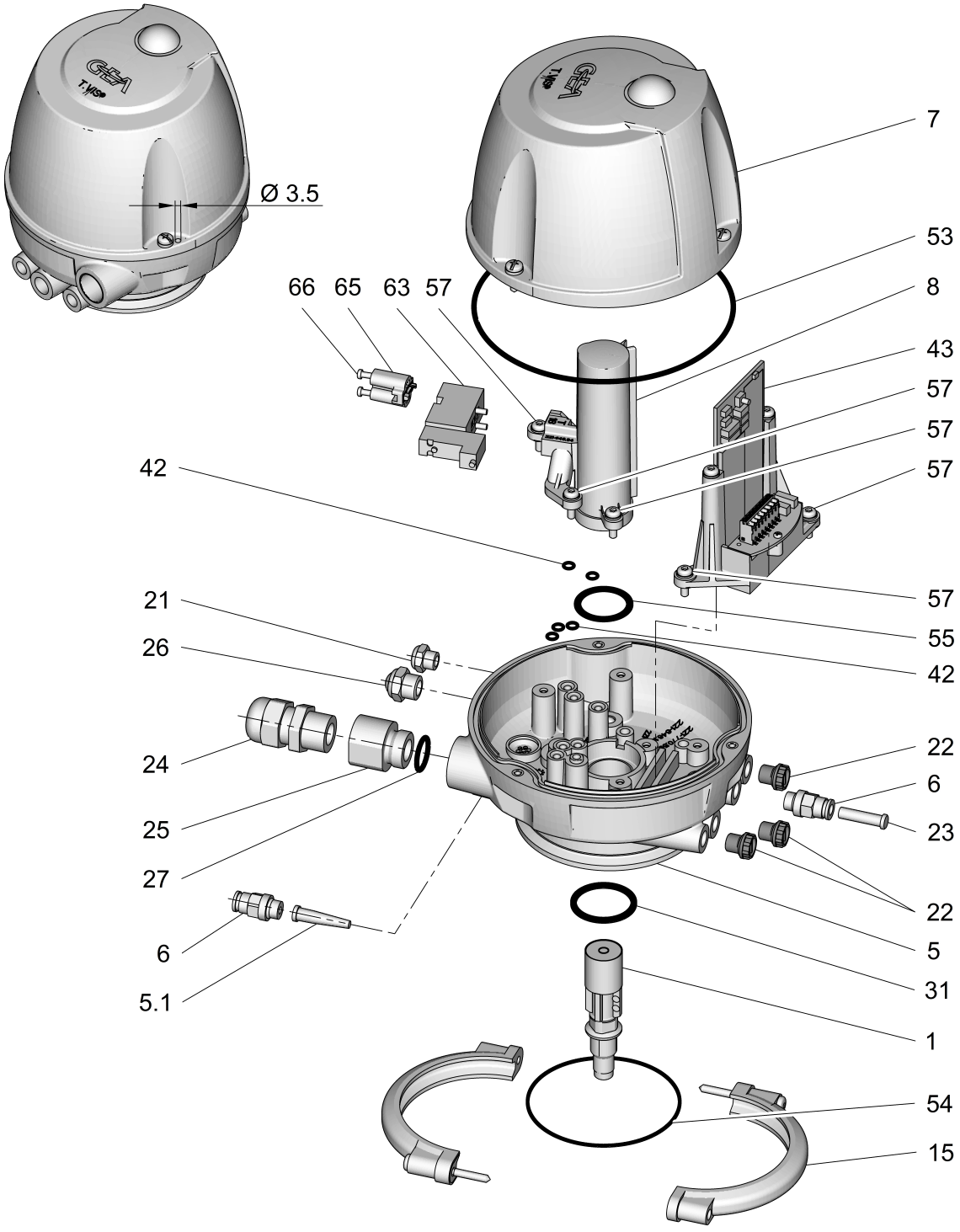


Fig.1: (Ø 3.5 mm drilled hole for seal)

Item	Designation	Material	24V DC	
			with 1 solenoid valve	without solenoid valve
			FDD-P	FDD-N
	Control top T.VIS M-20 FDD cpl.		221-664.85	221-664.86
1	Switch bar T.VIS/FLOWVENT A-15	PA6/GB30/ KONDIT.	221-589.104	221-589.104
5	Base T.VIS-T18	PA12/L	221-646.101	221-646.101
5.1	Filter	PE	221-003869	221-003869
6	Screw-in plug connection D 6.35	MS CV	933-173	933-173
7	Hood T.VIS M/A-15	PA12/L	221-646.88	221-646.88
15*	Clamp connection KU	--	221-507.08	221-507.08
21	Sound absorber G1/8"	MS CV	933-175	933-175
22	Locking screw G1/8"	PE-HD	922-369	922-369
23	Plug	PP	922-280	922-280
24	Cable gland G1/2"	PA	508-915	508-915
25	Adapter G1/2"	PA	221-004094	221-004094
26	Sound absorber G1/4"	MS CV	933-174	933-174
27	O-ring	NBR	930-017	930-017
31	O-ring	NBR	930-041	930-041
42	O-ring	FKM	930-169	930-169
43	Sensor module T.VIS 24VDC/ZUS/1PV	--	221-589.108	221-589.108
53	O-ring	NBR	930-833	930-833
54	O-ring	NBR	930-117	930-117
55	O-ring	NBR	930-038	930-038
57	Thread-forming screw	A2	514-750	514-750
63	Solenoid valve NC 24VDC	PBT	512-169	--
65	Valve plate	PPO	--	221-589.27
66	Thread-forming screw	A2	514-761	514-761
*Item 15 is not included in control top T.VIS M-20/FDD cpl. and must be ordered separately if required.				

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Excellence Passion Integrity Responsibility GEA-versity

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