Liquids to Value

VARIVENT® Valves

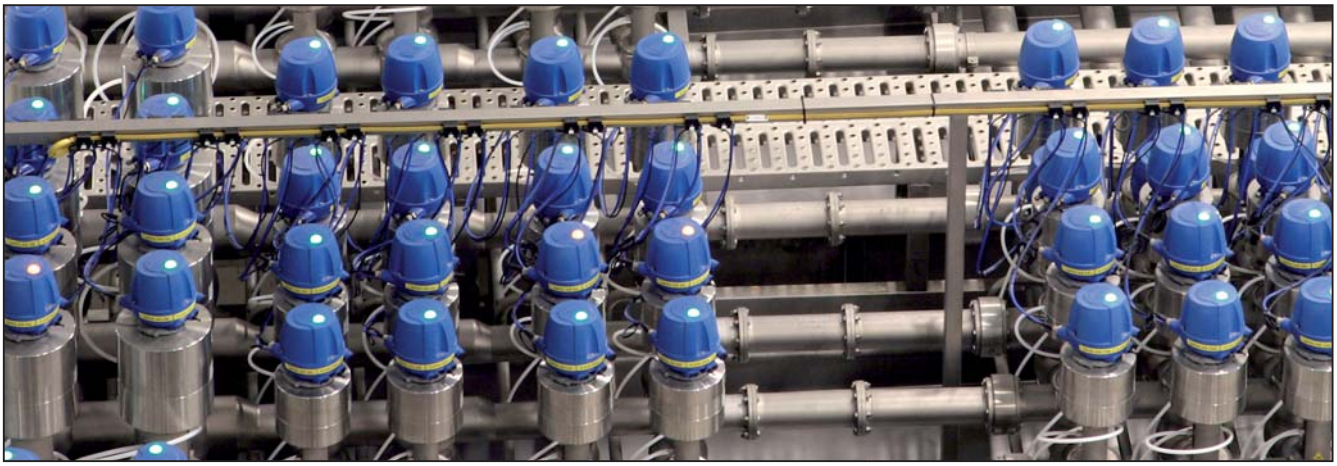
The core component for matrix-piped process plants

Made by GEA Tuchenhagen

GEA Mechanical Equipment / **GEA Tuchenhagen**

VARIVENT® Valves

VARIVENT® valves are operationally reliable, easy to maintain, CIP/SIP-capable that altogether are essential factors for continuous product quality.
Low operational maintenance and service costs ensure economical plant productivity.
The VARIVENT® system is built up in a modular structure and therefore offers high application flexibility, efficiency for the plant user, optimised stock inventory and favourably-priced spare parts and low parts diversity.
Many valve types are EHEDG certified and meet 3A standard.
VARIVENT® valves are characterised by their special sealing technique. The metallic stop of the valve disk is the core element for a defined deformation of the seal. With this technique a longer service life in the process plant is reached - leading to shorter downtimes and continuous production.



VARIVENT® single seat shut-off valves . . .

. . . are used for simple shut-off at flow path intersections within the pipe system. One seal is used on the one-part valve disk for shutting-off two pipes against each other. In case of sealing failure, controlled leakage drain is not provided.

VARIVENT® single seat shuttle valves . . .

. . . are used for converging media from two pipes into one pipe (W-Valve), or for diverting media from one pipe on to two pipes (X-Valve).
Always one seal is used on the one-part valve disk in order to shut-off the pipes from each other (upper – central or lower – central). If the seal fails, the media in the pipes may intermix.

VARIVENT® double seal valves type C . . .

. . . have a one-part valve disk with a double seal. They are used for mixproof separation of incompatible media at flow path intersections within the pipe system. Double seal valves are the economical alternative to the generally used double-seat valves. The valve`s isolation chamber is equipped with two rinsing valves which are provided for leakage detection and cleaning of the isolation chamber itself.
It is possible to clean the isolation chamber both separately and during pipe cleaning.

VARIVENT® mixproof valves type D . . .

. . . are used for mixproof separation of incompatible media at flow path intersec-tions. In the closed position of the valve (non-actuated position) always two seals are located between the two pipes. If one of the seals fails, leakage may directly drain to the open via the therefore provided leakage outlet of the valve without intermixing with the product being in the second pipe.

VARIVENT® mixproof valves type B . . .

. . .shows the same functions as the mixproof valve type D.
In addition this valve is equipped with a balancer. The balancer prevents that the valve disk is forced open in case of pressure hammers produced in the pipe system.

VARIVENT® mixproof valves type R . . .

. . . are used for mixproof separation of incompatible media at flow path intersec-tions. In the closed position of the valve (non-actuated position) always two seals are located between the two pipes.
Due to its radial arrangement of the seals, the valve is switching leakage-free. If one of the seals fails, leakage may directly drain to the open via the therefore provided leakage outlet of the valve without intermixing with the product being in the second pipe. The valve is equipped with a balancer. The balancer prevents that the valve disk is forced open in case of pressure hammers produced in the pipe system.

VARIVENT® Valves

VARIVENT® mixproof valves type K . . .

. . . are used for mixproof shut-off at flow path intersections of two pipe systems. These valve have no device for cleaning the isolation chamber. They are mainly used as cleaning and gas valves in CIP systems and gas blocks.

VARIVENT® mixproof shuttle valves type Y . . .

. . . are used for diverting liquids in a pipe system, i.e. from one pipe on to two pipes, with mixproof separation between the central and the upper pipe. In the closed position of the valve (non-actuated posi-tion) always two seals are located between the two pipes (shut-off between central housing and upper housing). If one of the seals fails, leakage may directly drain to the open via the therefore provided leakage outlet of the valve without inter-mixing with the product being in the second pipe.
For shut-off between the central and the lower valve housing, only one seal is used. The VARIVENT® mixproof shuttle valve has been tested and approved by the Dairy Institut in Kiel, Germany.

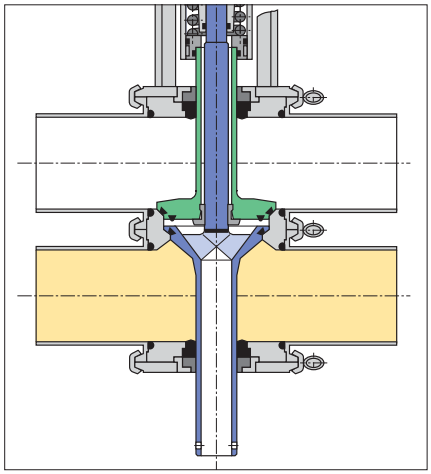
VARIVENT® mixproof tank bottom valves type T_R. . .

. . . are used for mixproof shut-off between the tank and the pipe system. The working principle is comparible to VARIVENT® valve type R (leakage free switching). The leakage outlet is optimized for an upside down installation of the valve.

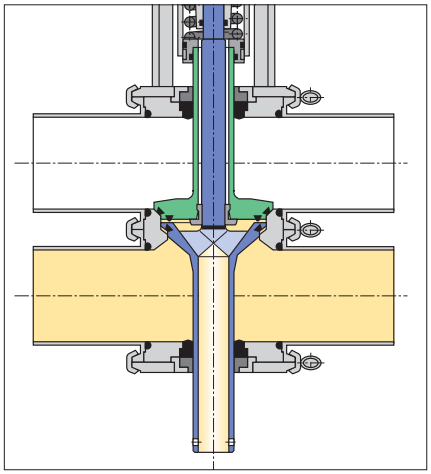
VARIVENT® mixproof valves (pig-able) type L . . .

. . . are based on the VARIVENT® valve, type T. A special feature of this valve is that one of the valve housings may be pushed out using a pig. This technique allows for the recovery of high quality products at the end of a process step and thus to minimise product residues inside the pipe.

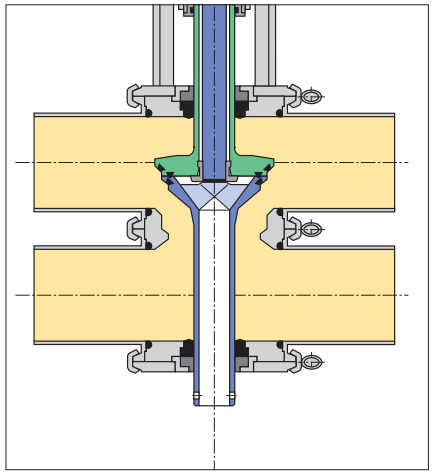
Switching positions at the example of an axial/axial sealing mixproof valve, type D, B and K



In the closed position the upper and the lower valve housings are each sealed by an independent valve disk

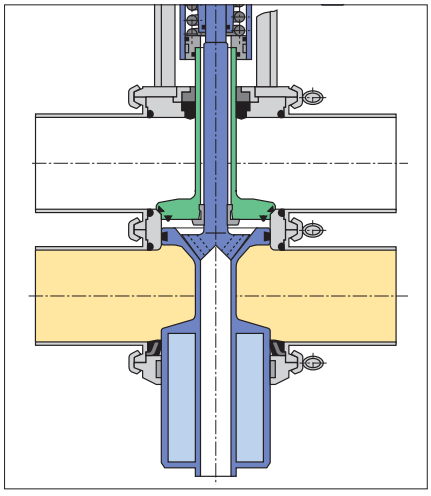


To open, the actuated lower valve disk (blue colour) is raised. The throttling gap between the lower valve disk and the seat ring minimises the switching leakage that is drained pressureless to the open through the valve stem. Afterwards, the isolation chamber between the upper double disk (green) and the lower valve disk is shut-off.

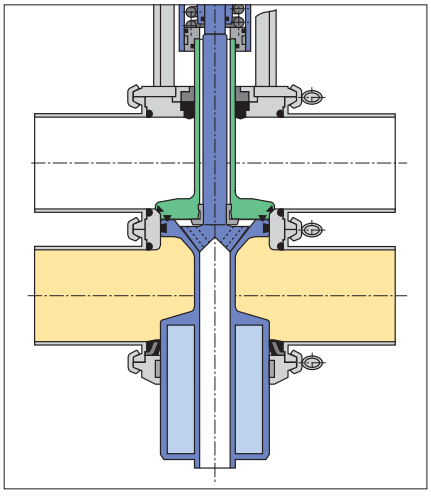


The upper double disk is entrained by the actuated lower valve disk into the valve´s open position. The valve is now opened.

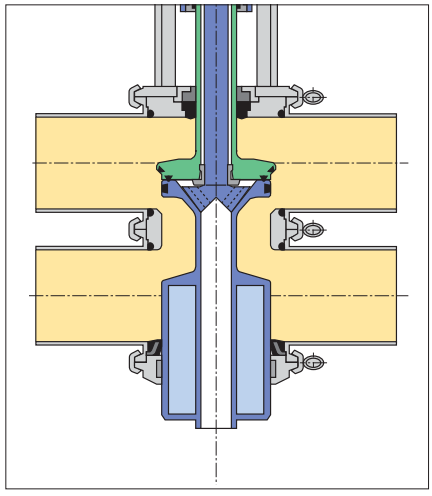
Switching positions at the example of an axial/radial sealing mixproof valve, type R, T and L



In the closed position the upper and the lower valve housings are each sealed by an independent valve disk



To open, the actuated lower valve disk (blue colour) is raised. The isolation chamber between the upper double disk (green) and the lower valve disk is shut-off, before the radial seal of the valve disk is leaving the seat ring; in this way switching leakage does not occur.

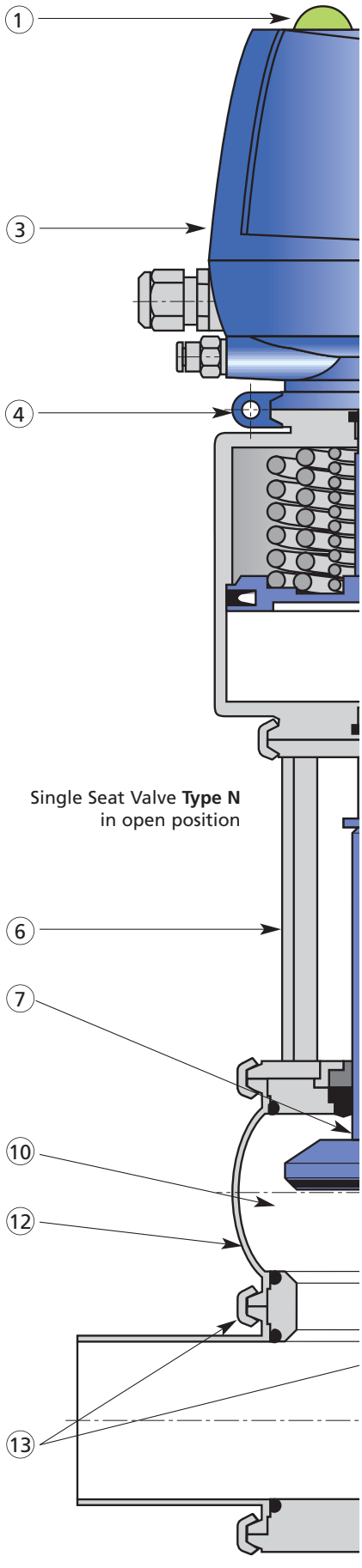


The upper double disk is entrained by the actuated lower valve disk into the valve´s open position. The valve is now opened.

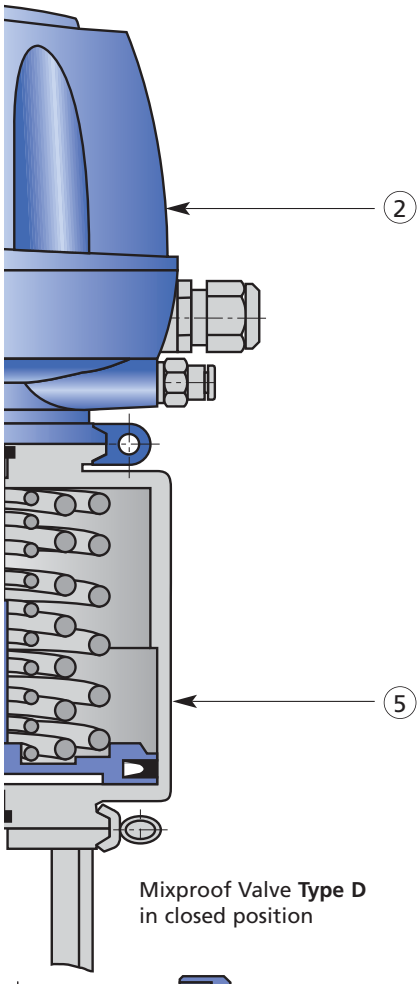
VARIVENT® Valves

The VARIVENT® valve is designed for process plants where product quality, hygiene and operational safety demand the use of high quality components. The VARIVENT® valve provides besides the below listed main design features, also unique high quality valve technology.

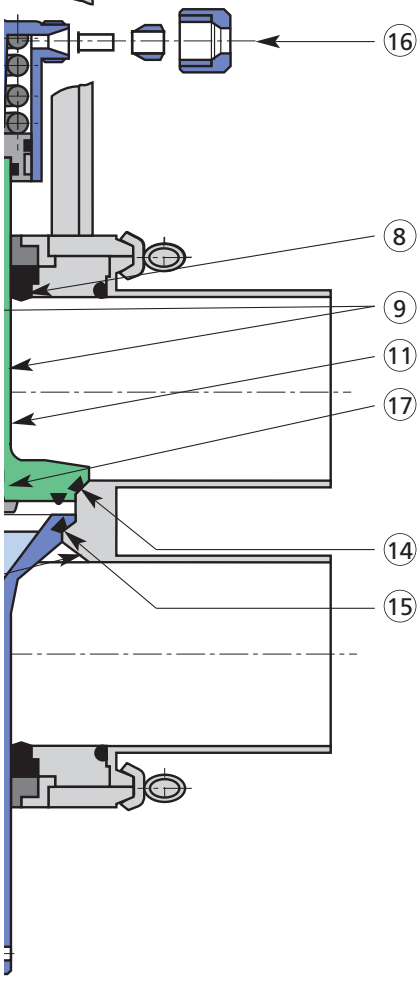
1. Amply sized multi-colour optical indication hood on the top of the T.VIS® control module clearly indicates and visible from all sides the valve's current status.
2. Splash-water proof control module, connected to the actuator with clamps is provided for the protection of electronics.
3. Interactive feedback via the integrated stroke travel measurement.
4. The whole control module can be removed for maintenance without disconnecting the control wiring or air line. In this way the allocation of the valve to the master control system remains unchanged.
5. A wide range of actuators is available to handle various process pressures and system air pressures. The actuator function can be reversed on single seat valves.
6. The open lantern separates the actuator from the product section of the valve. It permits the visual inspection of the spindle seal and prevents possible heat transfer fom the valve body to the actuator.
7. The machine rolled valve spindle finish provides for excellent wiping action as it passes through the seal and improves the service life of the stem seal.
8. A variety of sealing materials is available to satisfy food grade standards.
9. Easy removal of product contacted parts in one piece from the top of the valve.
10. The height of the pok-ket- free valve housing corres-ponds to that of the connecting pipe, so that smooth flow and freedom from any dead space are given, thus safely excluding oxidation damage and cleaning problems.
11. The valve disks are, as a matter of principle, manufactured in a single piece.
12. The ball shaped valve housing provides ideal flow and CIP characteristics.
13. The valves can be supplied with butt-weld ends or with removable connections.
14. The metallic stop of the valve disk achieves defined deformation of the seal, ensuring long seal life.
15. The special design of the seal groove in the valve disk provides that the seal holds its location against high flow velocities and viscous liquids. The shape of the seal was designed on the basis of FEM.
16. A separate connection is used to supply the isolation with cleaning media.
17. The isolation chamber is cleaned via a radially acting spraying nozzle in the upper valve disk.



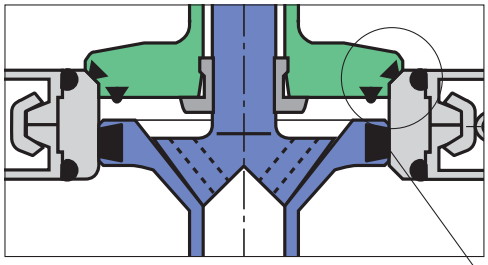
Single Seat Valve **Type N** in open position



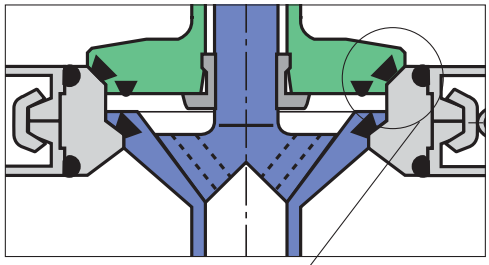
Mixproof Valve **Type D**
in closed position



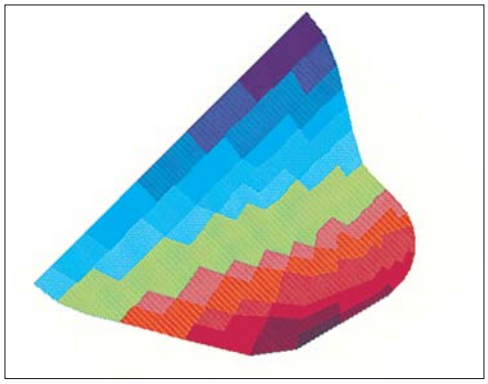
Variants of valve seat sealing on the VARIVENT® mixproof valve



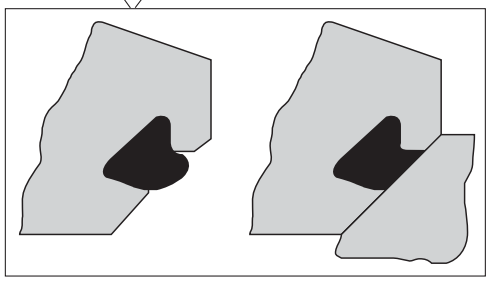
axial/radial **sealing**



axial/axial **sealing**



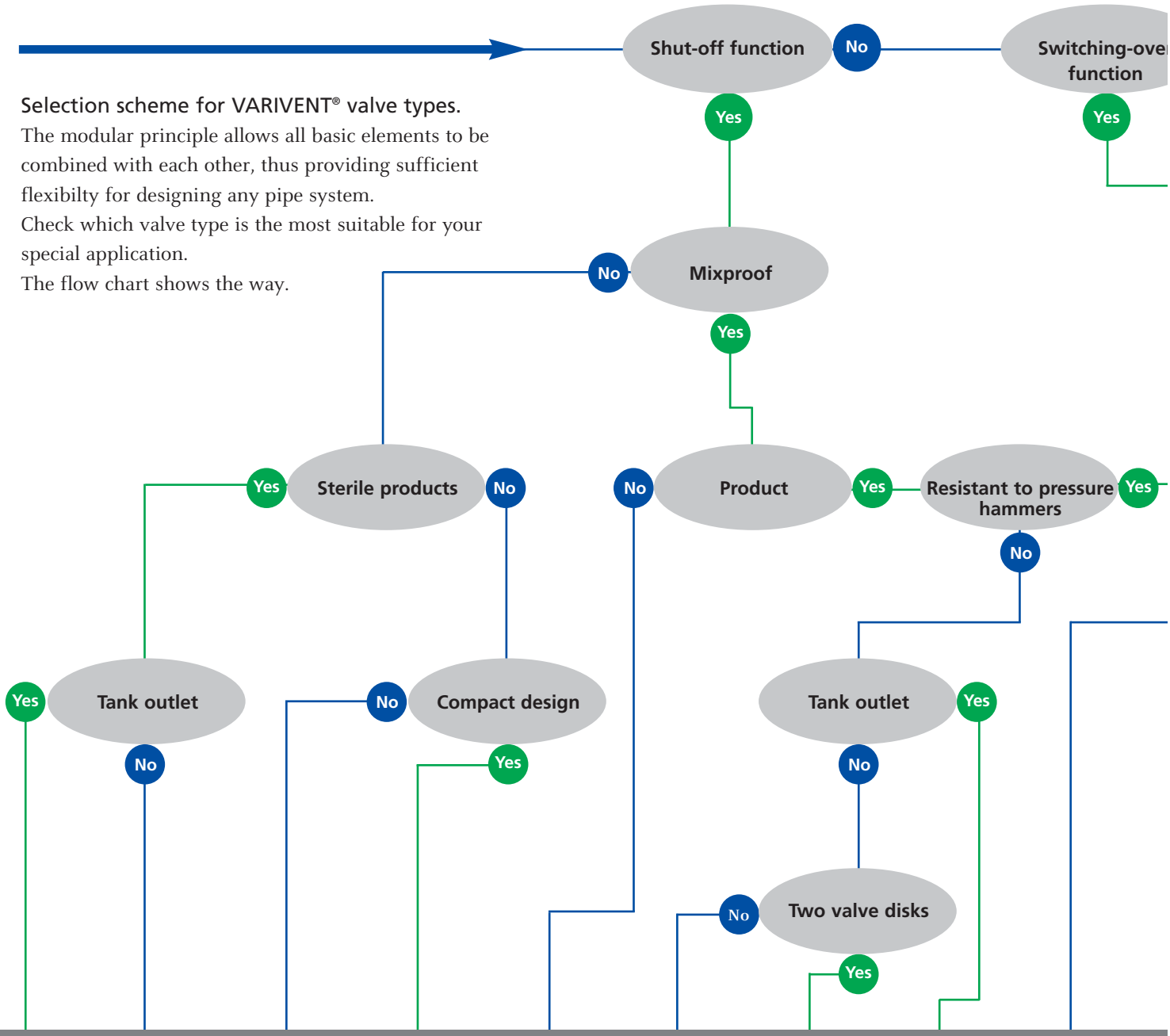
Diffusion of stress in the seal. The sealing geometry was optimised by calculations based on the FEM method.

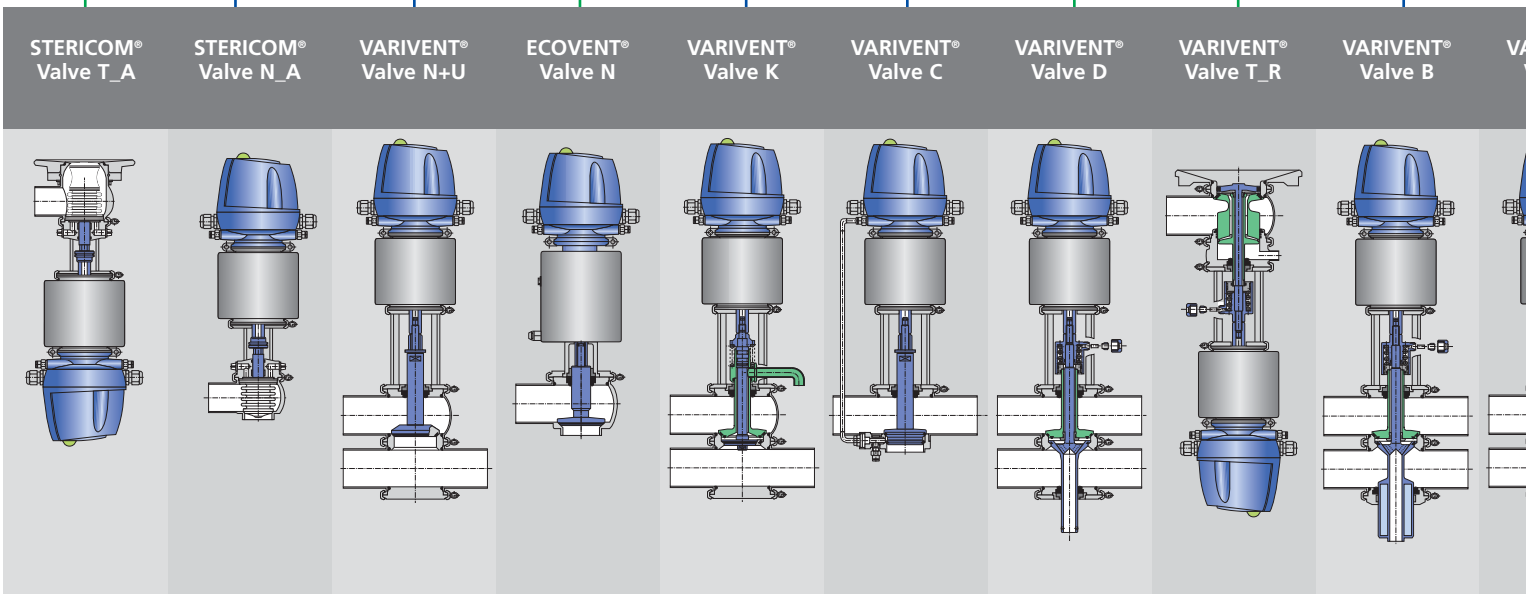


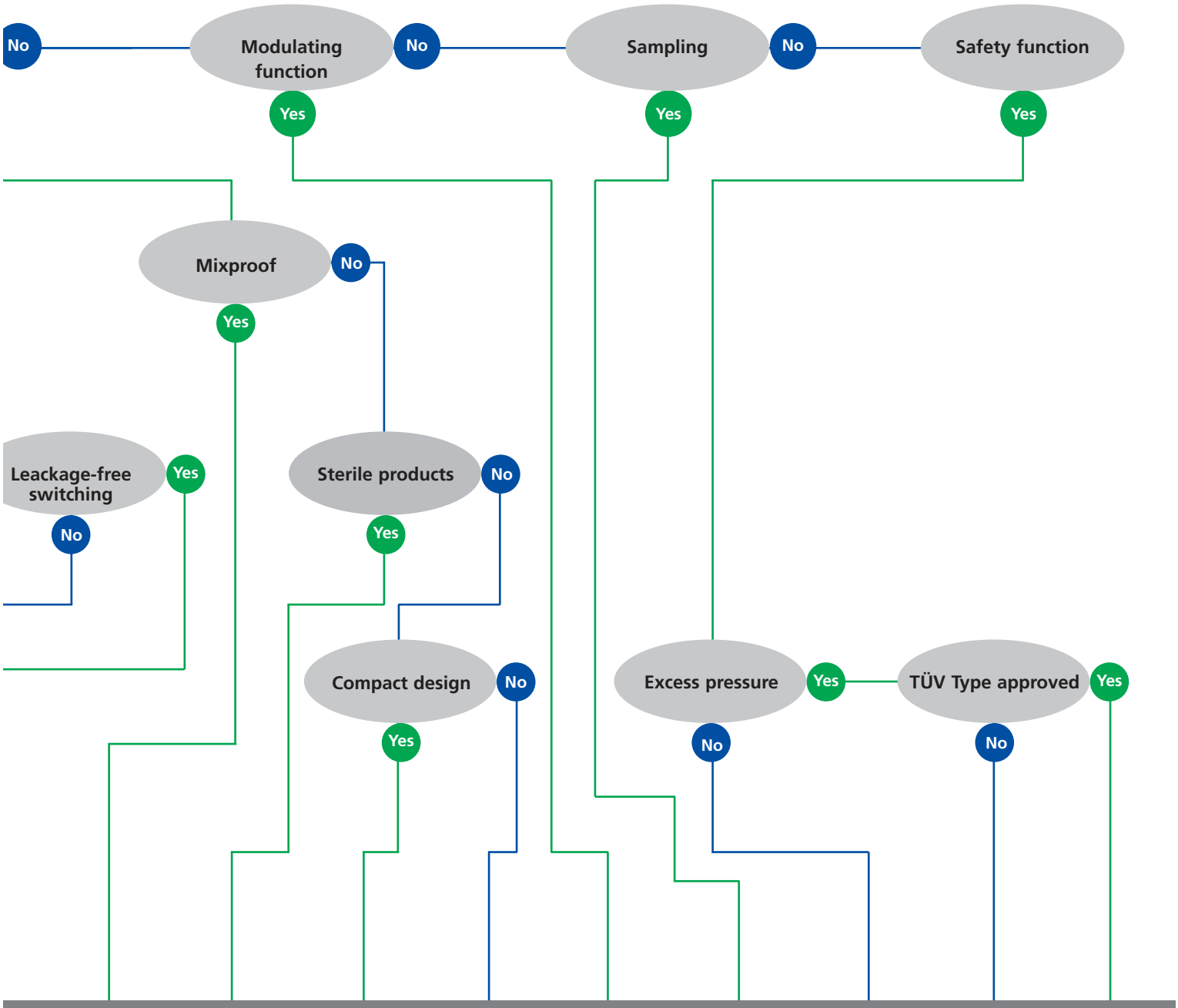
Constant compression seal, see 14.

VARIVENT® Valves

Selection scheme for VARIVENT® valve types.
The modular principle allows all basic elements to be combined with each other, thus providing sufficient flexibilty for designing any pipe system.
Check which valve type is the most suitable for your special application.
The flow chart shows the way.






No
Modulating function
No
Sampling
No
Safety function
Yes
Yes
Yes
Mixproof
No
Yes
Leackage-free switching
Yes
No
Sterile products
No
Yes
Compact design
No
Yes
Excess pressure
Yes
No
TÜV Type approved
Yes
No
VARIVENT® Shuttle Valve Y
STERICOM® Shuttle Valve X_A
ECOVENT® Shuttle Valve W
VARIVENT® Shuttle Valve W or X
VARIVENT® Control Valve A or S
VARIVENT® Sampling Valve IT
VARIVENT® Vacuum-Valve V
VARIVENT® Overflow Valve Q
VARIVENT® Safety Valve

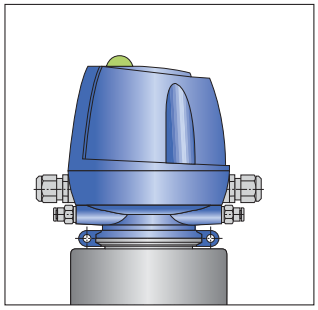
The VARIVENT® housing configuration with only four basic components allows any housing combination which is technically feasible in combination with the valve inserts.

With its variable configurations the VARIVENT® System gives you highest flexibility with regard to integrating the valves into your plant. This makes optimum piping with shortest product routes possible. Check which housing configuration is required for your application. The matrix below shows you what combination is feasible.

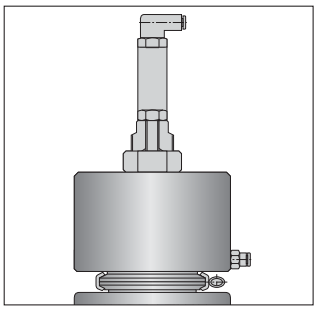
Housing combinations / Valve type	...L	...T	...L	...T	...B	...C	...A	...E
N			NL	NT	NB	NC	NA	NE
U			UF	UD	UB	UC	UA	UE
C			CL	CT				
K			KL	KT	KB	KC	KA	KE
D					DB	DC	DA	DE
B					BB	BC	BA	BE
R					RB	RC	RA	RE
T	TL	TT						
L						LC		LE

Housing combinations / Valve type	...K	...V	...P	...O	...W	...Y	...X	...U	...M
W	WK	WV	WP	WO	WW	WY	WX	WU	WM
X					XW	XY	XX	XU	XM
Y					YW	YY	YX	YU	YM

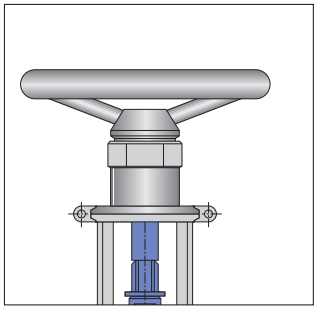
Components of the VARIVENT® modular system



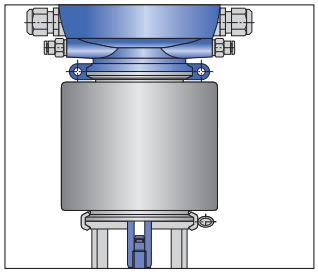
T.VIS® Control module with diverse possibilities of pneumatic and electric connections, as well as integrated stroke



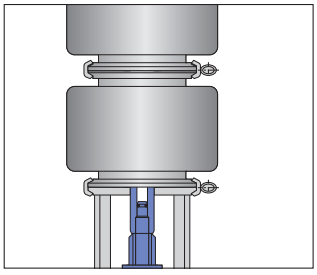
The two-position stop moves the valve into two repeatable positions.travel measurement.



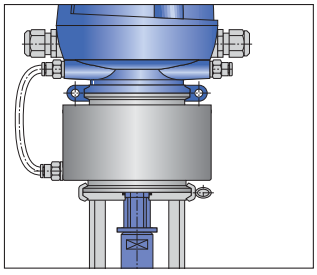
Manual actuator



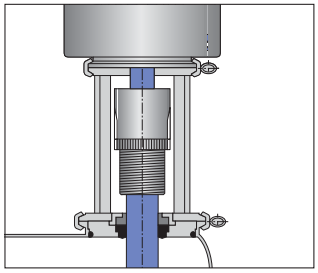
Standard actuator
air-to-open spring-to-close.



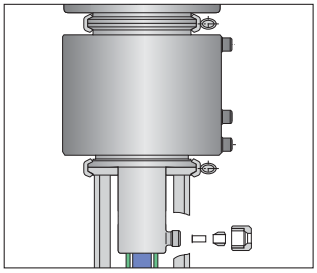
The booster cylinder is used for applications with low control air pressures.



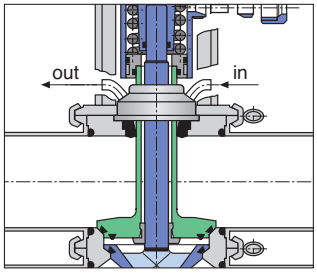
Actuator air-to-open/air-to-close.



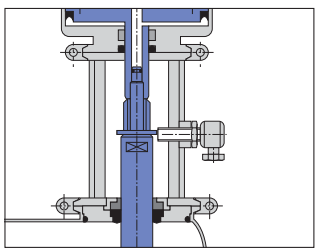
Limit stop for defined adjustment of the opening and/or closing stroke length (for single-seat valves only).



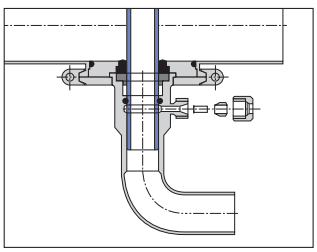
The lifting actuator is used for defined lifting of valve disks for valve seat cleaning.



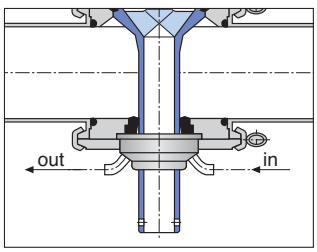
Upper sterile lock to protect the product chamber from the atmosphere.



Valve position feedback in the lantern and for monitoring the lift stroke of the double-disk, if provided.



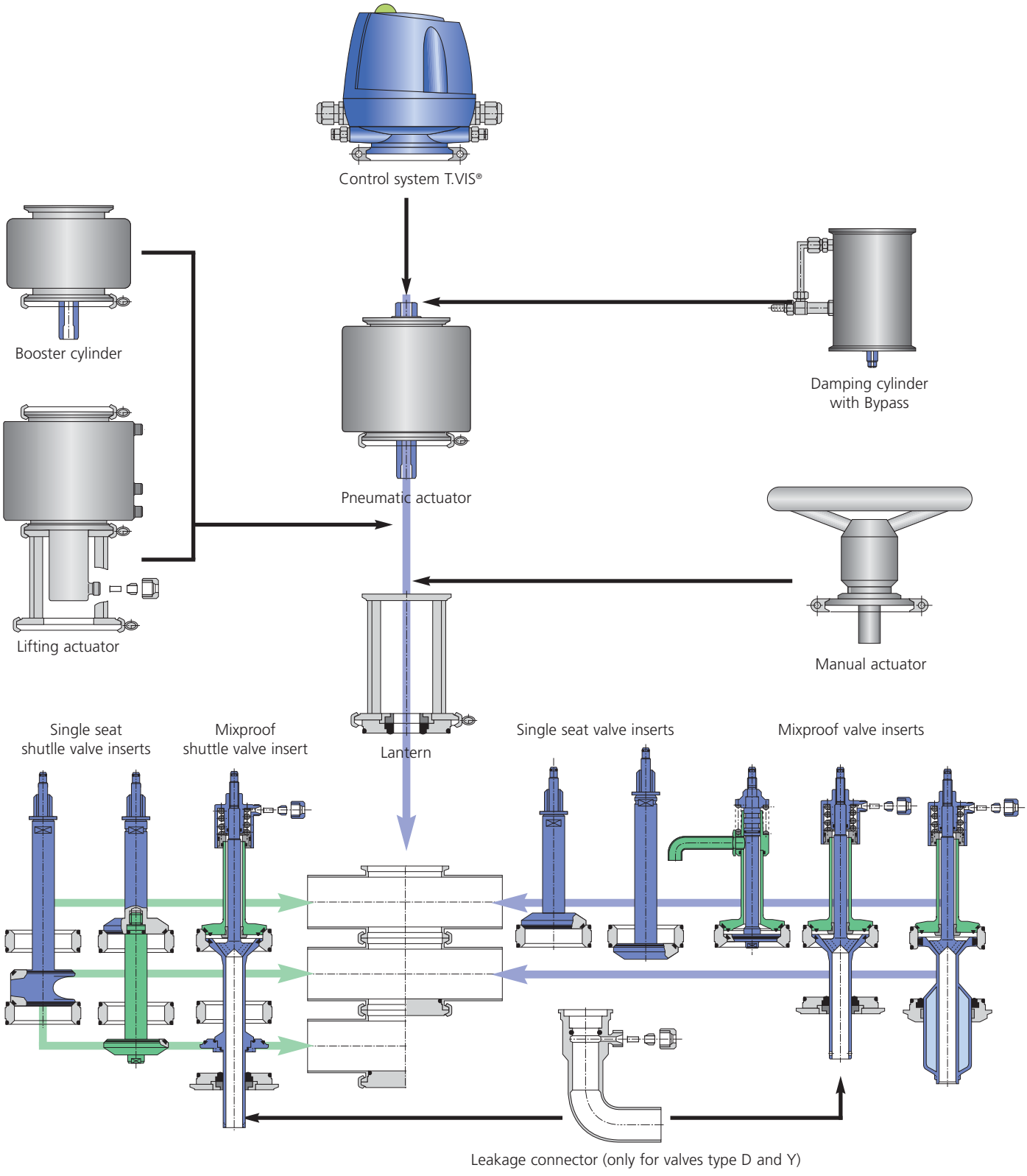
Leakage outlet connection for the defined discharge of leaking fluids and valve seat cleaning solutions.



Lower sterile lock to protect the product chamber from the atmosphere.

VARIVENT® modular system

High flexibility of the VARIVENT® system offers clear advantages: Valve systems existing in process plants may be easily modified or adapated without the need of changing the existing plant concept.



T.VIS®, the GEA Tuchenhagen Valve Information System

GEA Tuchenhagen Feedback Systems M-1 and A-8 combine modern valve design with innovative technology. They stand out by simple concepts for installation, operation and maintenance and thus facilitate operational processes. The T.VIS® series is the optimal solution for the constantly increasing demands made on control systems in modern production plants. The use of T.VIS® series helps the user reliably to lower operating costs.

T.VIS® is tailored to customers‘ requirements

Multiple requirements made on components and control systems demand flexible feedback technology that responds to individual customers‘ requirements by tailored solutions. This is an ambitious aim that T.VIS® Feedback Systems fully meet! The T.VIS® series integrates two different systems for feedback of the valve position. The **T.VIS® A-8** is a feedback system of the next generation with innovative path measurement technology. The intelligent technique of this feedback system reduces not only the expenditure for installation, operation and maintenance, but significantly lowers the operating costs by use of the LEFF® Function!

T.VIS® M-1 equipped with the proven sensor module combines all advantages of this technology with the advantages of the T.VIS® design.

In this way the T.VIS® series responds to the different customers‘ requirements and offers optimal solutions.

T.VIS® M-1 T.VIS® A-8

T.VIS® shows clearly the valve status

T.VIS® Feedback Systems (M-1 and A-8) are equipped with a large-sized optical round flashing indicator on the top of the T.VIS® control module. Multicolour light emitting diodes show the user clearly from afar the current state of the valve!

Depending on the valve type, the following states can be signalled:

- Non-actuated position (green)
- Actuated position (yellow)
- Seat lift activated (on mixproof valves) (green/yellow slow flashing)
- Request for maintenance (red flashing)
- Error (red)
- LEFF® function active (yellow/green quick flashing)

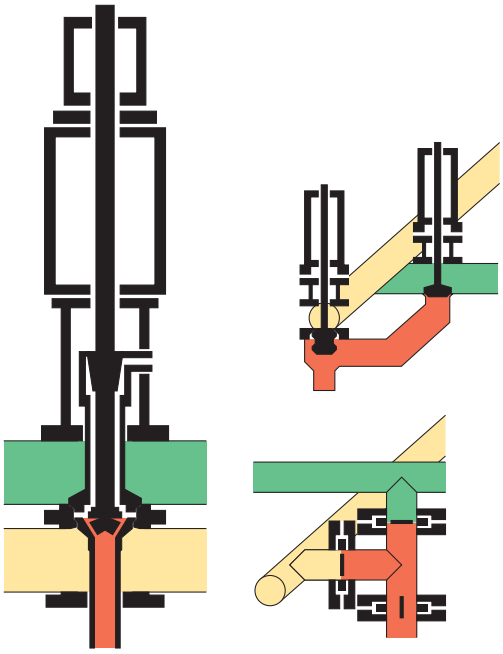
T.VIS® reacts with flexibility

The modular structure allows in addition the two system variants for flexible equipment of the feedback system in order to fulfil individual requirements (e.g. type of interface modules, number of solenoid valves etc.). Expansion and modification, e.g. the change from binary data exchange to a bus system are easily achieved by exchange of single modules without the need of exchanging the complete feedback system.

Advantages of the mixproof technology over the traditional block & bleed design:

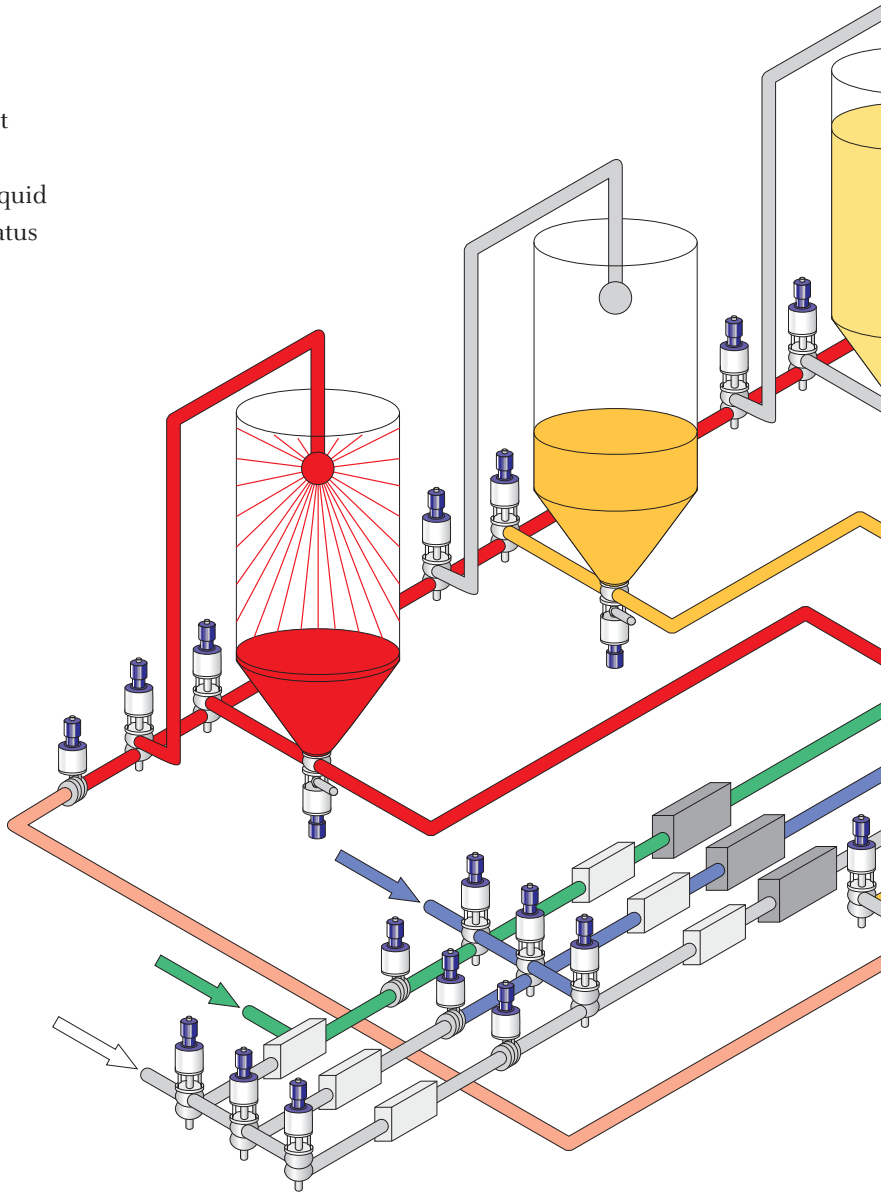
- Reduced number of components
- Low space requirement
- Easy to maintain, less labour input
- Only one electrical actuation signal
- No pockets
- The leakage outlet system never conveys product
- Reliable cleaning of the isloation chamber
- The isolation chamber can be cleaned without liquid pressure build-up, independently of the plant status and the open or closed position of the valve

Schematic diagram



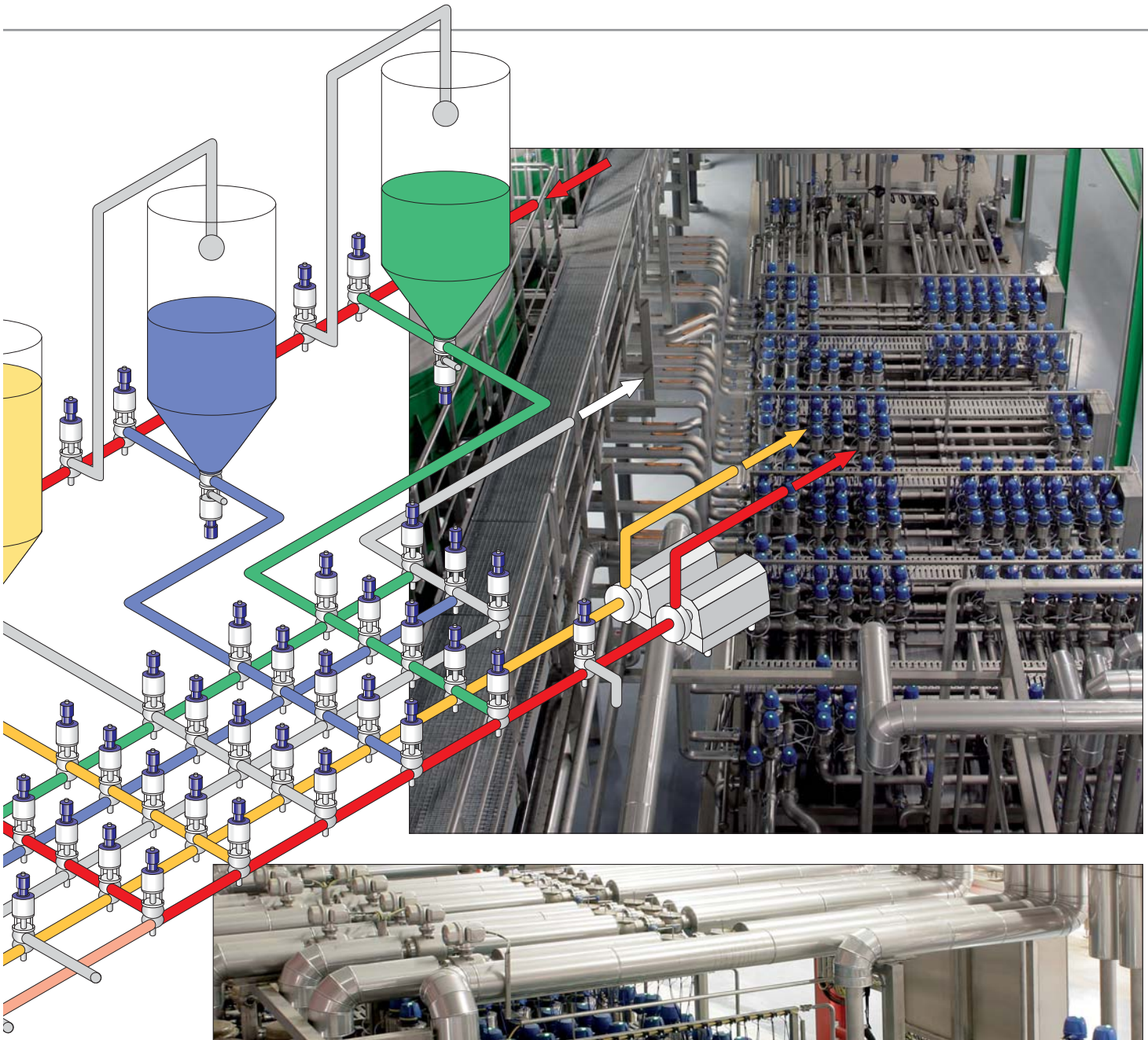
Mixproof

Block & Bleed



Function characteristic of VARIVENT® mixproof valves

- The upper and lower valve housings are each fitted with a valve seat for independent shut-off.
- Leakage of liquids from one pipe into the other is safely excluded.
- Any defects on valve disk seals are visible at the open leakage outlet.
- Should seal damage occur, the leaking fluid flows safely to the atmosphere by gravity.
- Cleaning solution is supplied to the isolation chamber via a separate CIP connection.
- The cleaning solution is sprayed inside the isolation chamber that is located between the two valve disks through a ring nozzle, which remains pressure free at all times. The used solution drains safely to the open via the outlet pipe.
- The isolation chamber can be cleaned independently of the valve position.



VARIVENT® Valves

Technical data

Material

Product contact parts (standard)

Housing	1.4404 (AISI 316 L)
Inside	$R_a \leq 0.8$ µm
Outside	matt finish
Internals	1.4404 (AISI 316 L)

Non-product contact parts

1.4301 (AISI 304)
Surface matt finish

Seals

Standard	EPDM (FDA)
Operating temp.	135° C
Sterilizing temp.	150° C (short time)

optional:
FKM (FDA)
HNBR (FDA)
other materials on request

Operating pressure

max. 10 bar, higher pressures upon request

Control air

min. 4, max. 8 bar

VARIVENT® Valves are available with the following pipe connection sizes:

Metric

as per DIN 11850

DN 10, 15, 25, 40, 50	wall thickness, class 2
DN 65, 80, 100, 125, 150	wall thickness, class 2

Inch OD

as per ISO 2037/BS 4825, Part 1

1", 11/2", 2", 21/2", 3"	wall thickness 1.6 mm
4"	wall thickness 2.0 mm

Inch IPS

as per IPS, Schedule 5

2"	wall thickness 2.0 mm
3"	wall thickness 2.3 mm
4"	wall thickness 2.3 mm
6"	wall thickness 2.7 mm

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610e-11/2010