



GEA Tuchenhagen Hygienic Valves and Components

Business Line Hygienic Valve Technology

Catalog 2015

Legal notice

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Business Unit GEA Flow Components	8
Hygienic valves and components	
Introduction hygienic valves and components	10
Overview	12
Technical data	16
Selection matrix	20
VARINLINE® housings and connection flanges	
Overview VARINLINE® housings and connection flanges	22
VARINLINE® housings	30
VARINLINE® housing connection flange, type U and U-S	32
VARINLINE® housing connection flange, type T and T-S	34
VARINLINE® tank connection flange, type P	36
VARINLINE® housing connection flange, welding jigs	38
VARINLINE® sight glass, type TXIA	40
VARINLINE® pressure gauge, type TPIA	42
VARINLINE® thermometer, type TTIA	44
Level probe, type TNS	46
Options	48
VARIVENT® pipe connections	
Overview VARIVENT® pipe connections	50
VARIVENT® flange connection	51
VARIVENT® grooved flange	52
VARIVENT® smooth flange	53
VARIVENT® blind grooved flange	54
VARIVENT® plain blind flange	55
VARICOMP® expansion compensators	
Overview VARICOMP® expansion compensators	56
VARICOMP® expansion compensator	59
VARIVENT® valves with special function	
Overview VARIVENT® valves with special function	60
Valve selection matrix	62
VARIVENT® control valves	
Overview VARIVENT® control valves	64
Valve selection matrix	70
VARIVENT® control valve type S – equal-percentage characteristic curve	72
VARIVENT® control valve type S – linear characteristic curve	74
VARIVENT® control valve type S – 3-stage seat	76
VARIVENT® control valve type S – divert valve, product-merging	78
VARIVENT® control valve type S – divert valve, product distribution	80
Options	82
Design	91
Questionnaire	94

VARIVENT® sampling valves

Overview VARIVENT® sampling valves 96

Valve selection matrix 100

VARIVENT® sampling valve, type I 102

Accessories 104

VARINLINE® sampling valve, type TSVN 106

VARINLINE® sampling valve, type TSVU 108

VARIVENT® sampling valve, type T/09 110

VARIVENT® overflow valves

Overview VARIVENT® overflow valves 112

Valve selection matrix 116

VARIVENT® overflow valve, type Q – adjustable set pressure 118

VARIVENT® overflow valve, type Q – adjustable spring with pneumatic lifting 120

VARIVENT® overflow valve, type Q – D-force actuator 122

VARIVENT® constant pressure valves

Overview constant pressure valves 124

VARIVENT® constant pressure valve, type DHV 126

VARIVENT® safety relief valves

Overview VARIVENT® safety relief valves 128

Valve selection matrix 132

Discharge capacities for air and water 134

VARIVENT® safety relief valve, type 488 136

VARIVENT® safety relief valve, type 483 138

Type HyCom 140

Options 142

Questionnaire 144

VARIVENT® vacuum valves

Overview VARIVENT® vacuum valves 146

VARIVENT® vacuum valve, type V 148

Options 150

Questionnaire 151

VARITOP® tank safety systems

Overview VARITOP® tank safety systems 152

Design 160

Options 162

Selection matrix 164

VARITOP® type TTB 11 D, type TTB 12 D 166

VARITOP® type TTB 41 D, type TTB 42 D 168

VARITOP® type TTB 11 Z, type TTB 12 Z 170

VARITOP® type TTB 41 Z, type TTB 42 Z 172

Selection scheme VARITOP® 174

Questionnaire 175

Dimensions of VARITOP® tank dome cover 177

VARICOVER® product recovery systems

Overview VARICOVER® product recovery systems	178
Pig selection matrix	182
Overview VARICOVER® pig components	184
VARIVENT® type L	191
VARICOVER® pig cleaning station	192
VARICOVER® pig catching pipe/pig catching station	194
Pig driving medium valves with VARINLINE® housing	196
VARICOVER® pig stopper	198
VARICOVER® pig T-piece	200
VARICOVER® pig type PK	202
VARICOVER® EMI/1 and EMII/1, automatic product recovery systems	204
VARICOVER® DM/1, automatic product recovery systems	206
VARICOVER® SP1/SP2, semi-automatic product recovery systems	208
VARICOVER® MP1/MP2, manual product recovery systems	209
Options	210
Questionnaire	212

Options

Available options	215
Housings and nominal widths	216
Seal materials	220
Surface qualities	221
Connection fittings	223
Additional options	228

Spare parts

Wearing parts	232
Seal kits	233

Control and feedback systems

Overview	239
Selection matrix T.VIS®	240
T.VIS® M-15	242
T.VIS® A-15	248
SES (ATEX)	252
Connection 0, INA, LAT	256
Proximity switches, magnetic sensors	258
Adaptation, IP protection classes	260
LEFF® function and semi-automatic set-up, connection screw fitting	262
Interface types	264

Appendix

Certificates	266
Abbreviations and terms	267
CAD files	271
General sales terms and conditions of delivery	272
Contact data Business Unit GEA Flow Components	278



Whether it's dairy, beer, viscous food ingredients or fine-chemical products – product quality and profitability are what matter in the end. This is precisely what the business unit GEA Flow Components stands for – a specialist with many years of experience for everything that flows.

The GEA Group

GEA Group Aktiengesellschaft is one of the largest suppliers of systems for the food processing industry. As an international technology group, the company focuses on process technology and components for sophisticated production processes in a variety of markets.

The Business Unit GEA Flow Components

As a technology leader, the business unit GEA Flow Components develops and produces well-engineered process components and services for smooth production processes in the treatment of liquid products.

The business unit is comprised of GEA Tuchenhagen in Germany, GEA Aseptomag in Switzerland and GEA Breconcherry in Great Britain as well as further sites in France, Poland, China, India, Canada and the USA.



Four business lines – for everything that flows

The product range of the business unit GEA Flow Components includes hygienic and aseptic valve technology, hygienic pumps and cleaning technology. These products are used particularly for the brewing, beverages, dairy and food industries, as well as for the pharmaceutical, health care, biotechnology and fine-chemicals industries.

Hygienic valves and components from GEA Tuchenhagen form the core component of matrix-piped process plants. For aseptic processes, which require components with the highest levels of sterility, GEA Aseptomag produces aseptic valves and systems that meet specific requirements.

The hygienic pump range from GEA Tuchenhagen also belongs to the business unit's range of solutions. This includes non-self-priming and self-priming centrifugal pumps, as well as rotary piston pumps. Rounding off this range of solutions, GEA Breconcherry offers cleaning technology especially developed for the sustainable conservation of valuable resources.

The business unit GEA Flow Components focuses on major process solutions for the food processing, pharmaceutical and biotechnology manufacturing industries with leading hygienic and aseptic valve technology, pumps and cleaning technology.



Hygienic Valve Technology

GEA Tuchenhagen



Hygienic Pump Technology

GEA Tuchenhagen



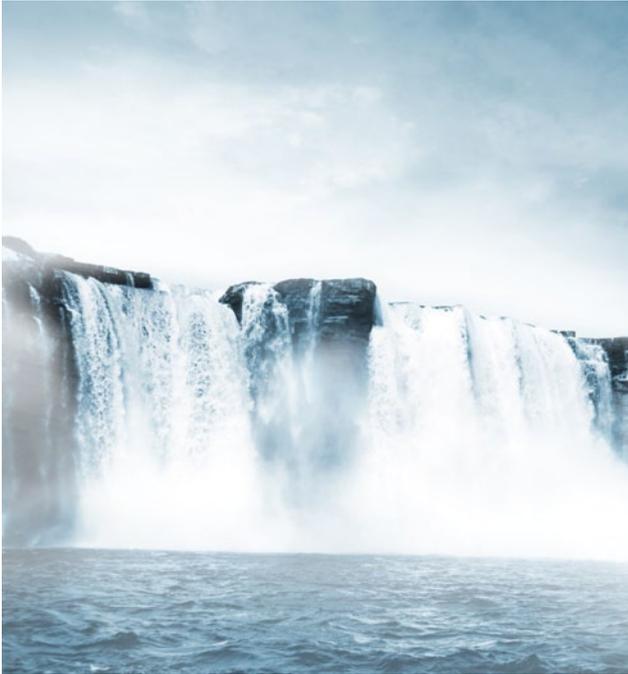
Cleaning Technology

GEA Breconcherry



Aseptic Valve Technology

GEA Aseptomag



The components of GEA Tuchenhagen are based on future-oriented company and product concept principles that include an obligation to economic viability, sustainability and service.

Your investment pays off

GEA Tuchenhagen hygienic valves and components help you to achieve considerable cost savings. The valve concepts with a variable structure and the efficient control technology provide both low purchase costs and low energy consumption.

The design of the valves and individual components without dead space satisfies the most exacting hygienic requirements and prevents unnecessary product losses. Thanks to the metallic stops, the seals used are characterized by a very long service life. This significantly cuts operating costs.

The GEA Tuchenhagen design concept reduces consumption of valuable energy and helps you to cut your water consumption, as well as the use of chemicals.

The ingenious maintenance concept additionally ensures that the personnel and time required for necessary maintenance work can be reduced to a minimum.

Thus, your investment in innovative process technology from GEA Tuchenhagen will quickly repay itself.

Economical

Higher product quality

Reduced consumption of energy, water and cleaning media

Reduced time and personnel costs for maintenance and cleaning



You score points with environmental protection

Lower consumption of energy, water and chemicals means less pollution for the environment. GEA Tuchenhagen meets these requirements by complying with binding international standards.

As a user of GEA Tuchenhagen products, you benefit from proven environmentally-friendly production processes, as well as the high standards for hygienic processing and care of your products. This makes a significant contribution to protecting the global environment and climate.

With our products, you show how important sustainable operating methods are to you and that you take responsibility for future generations!

Our support is your gain

In addition to our product range, you can also make use of the individualized engineering support from GEA Tuchenhagen. Even before you have started using our products, this support provides you with extensive digital tools – from technical drawings to 3-D models.

The individualized service concepts from GEA Tuchenhagen ensure that maintenance work is conducted with the lowest amount of production downtime possible.

We look forward to creating and customizing a maintenance plan for you.

Sustainable

Lower climate and environmental impact

Sustainable, environmentally friendly production processes

High standards for hygienic processing and care of products

Service-oriented

Individual engineering support

Shortest possible interruptions of production

Individual service concept

Hygienic valves and components

Hygienic valves and components are suitable for CIP/SIP, easy to maintain, offer reliable function and represent a significant factor in consistent product quality. Low costs with operation, maintenance and service ensure economical system productivity.

The highly flexible VARIVENT® modular system is the basis for the hygienic valves and components of GEA Tuchenhausen. The result is economic efficiency for the system operator, optimized stock keeping and low-cost spare parts production due to the reduced diversity of parts.

Modular system
Greater flexibility because of the ability to adapt rapidly to process changes
High economic efficiency
Low spare part stocks

Hygienic valves and components meet the requirements of the European Hygienic Engineering and Design Group (EHEDG) as well as those of 3-A Sanitary Standards, Inc. (3-A SSI).

Numerous valves have been demonstrated to offer trouble-free and efficient cleaning ability not only in accordance with the aforementioned guidelines, but also in independent, standardized cleaning tests (EHEDG certificate).

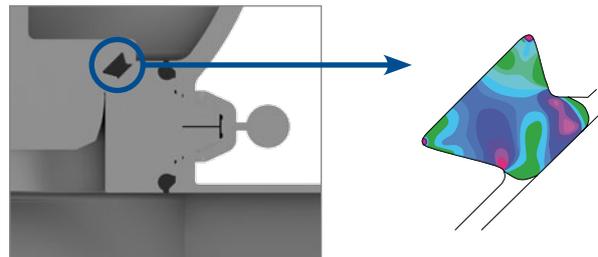
In addition to the safety-relevant aspects of the hygienic design, this valve structure also offers high savings potentials.



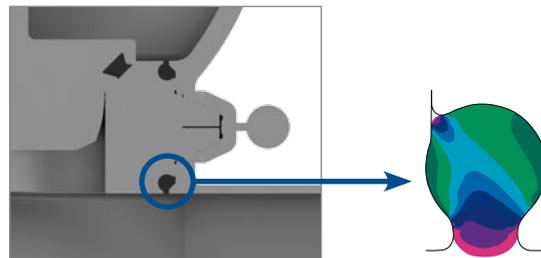
Hygienic design
Lower risk of contaminating the end product
Maximum efficiency in cleaning
Lower CIP costs

Sealing according to the VARIVENT® principle

The hygienic valves and components offered by GEA Tuchenhausen are characterized by special seal technology. A metallic stop results in defined seal deformation, ensuring long seal life. This allows for more time to pass between required maintenance services, thereby allowing for continuous production and shorter downtimes. The special grooved shape in the valve disc ensures the seal has a secure hold at all times up to a pressure differential of 10 bar during switching. The seal geometry was optimized by using FEM calculations.



Representation of the stress load on the V-ring



Representation of the stress load on the housing O-ring

Seals
Long operating time
Vacuum-proof
Selection of FDA-compliant seal materials
<ul style="list-style-type: none"> • EPDM • FKM • HNBR • PTFE

Hygienic valves and components

VARINLINE® instrumentation free of dead pockets

The trademark VARINLINE® includes control and measuring instruments that meet the requirement of being CIP/SIP-able, thus enabling cleaning and sterilization without the need for dismantling. The instruments can be cleaned and sterilized without any residue in automatic cleaning and sterilizing process cycles. The core piece of the in-line control and measurement technology is the process connection fitting, the VARINLINE® housing. It is mainly an in-line housing with double vertical ports with two process connections.



The process connections in the VARINLINE® housing allow up to two control / measuring instruments, e.g. a sight glass with opposite illumination unit or different measuring mountings. They are available for all pipe sizes, with the VARIVENT® process connection designed for the nominal width of the respective components to be installed. VARINLINE® housings are self draining – also in the vertical installation orientation – and thus permit instrumentation free of dead zones. VARINLINE® housings are 3A approved, according to the DGRL and are EHEDG-certified.



VARICOMP® expansion compensator

VARICOMP® expansion compensators compensate for expansions and tensions in pipeline systems that result from temperature differences. Due to the dead-zone free design, they are able to be used in hygienic and aseptic processes.



VARIVENT® valves with special function

The high flexibility in the VARIVENT® system offers many advantages. With the ability to combine all basic elements with one another, the system offers a broad range of possible applications. Existing valve systems in process installations can be modified or enhanced without changing the current system concept.

Housings and other components from the VARIVENT® modular kit are used e.g. in control valves, overflow valves and vacuum valves.



VARITOP® tank safety systems

The VARITOP® tank safety system consists of a modular system and thereby forms a functional unit designed individually according to the customer's requests.

The diverse applications of the VARITOP® system range from tank cleaning to protecting tanks against high and low pressures to gassing and degassing of tanks.

VARICOVER® product recovery systems

VARICOVER® product recovery systems are designed for use in fully automatic operations with maximum cleaning demands. They are used to recover valuable products from pipelines – an important consideration to optimize the economic efficiency of a process system. Pigging pushes the product from the pipes and returns it to the production cycle.

A VARICOVER® product recovery system usually comprises of a pig cleaning station, a pig catching station with propellant medium valves and a pig.



Available nominal widths for valve series

Valve type	Nominal width															
	DN	10	15	25	40	50	65	80	100	125	150	162				
	OD			1"	1 ½"	2"	2 ½"	3"	4"		6"					
	IPS												2"	3"	4"	6"
VARIVENT® pipe connections				•	•	•	•	•	•	•	•		•	•	•	•
VARICOMP® expansion compensator							•	•	•	•				•	•	•
VARIVENT® control valve type S				•	•	•	•	•	•	•	•		•	•	•	•
VARIVENT® sampling valve type I		•	•	•	•	•	•	•	•	•	•		•	•	•	•
VARIVENT® sampling valve type TSVN and TSVU					•											
VARIVENT® double-seat sampling valve type T/09					•											
VARIVENT® overflow valve type Q				•	•	•	•	•	•				•	•	•	
VARIVENT® constant pressure valve type DHV				•	•	•	•									
VARIVENT® safety relief valve type 488				•	•	•	•	•	•							
VARIVENT® safety relief valve type 483				•	•											
Spring-loaded safety relief valve type HyCom				•	•	•	•	•								
VARIVENT® vacuum valve type V							•	•	•		•					•
VARITOP® tank safety system									•	•		•				
VARICOVER® product recovery system				•	•	•	•	•	•							

Pipe classes

Standard VARIVENT® valve housings and VARINLINE® housings are supplied with welding ends, although the components can be delivered with various connection fittings as an option (see section 7).

The dimensions of the welding ends comply with the following standards:

Metric		Inch			ISO	
DN	Outside diameter according to DIN 11850 series II; DIN 11866, series A	OD IPS	Outside diameter based on ASME-BPE-a-2004, DIN 11866, series C	Outside diameter according to IPS schedule 5	ISO	Outside diameter according to DIN EN ISO 1127
10	13.0 × 1.50				13.5	13.5 × 1.6
15	19.0 × 1.50				17.2	17.2 × 1.6
25	29.0 × 1.50	1"	25.4 × 1.65		21.3	21.3 × 1.6
40	41.0 × 1.50	1 ½"	38.1 × 1.65		33.7	33.7 × 2.0
50	53.0 × 1.50	2"	50.8 × 1.65	60.3 × 2.00	42.4	42.4 × 2.0
65	70.0 × 2.00	2 ½"	63.5 × 1.65		48.3	48.3 × 2.0
80	85.0 × 2.00	3"	76.2 × 1.65	88.9 × 2.30	60.3	60.3 × 2.0
100	104.0 × 2.00	4"	101.6 × 2.11	114.3 × 2.30	76.1	76.1 × 2.0
125	129.0 × 2.00				88.9	88.9 × 2.3
150	154.0 × 2.00	6"	152.4 × 2.77	168.2 × 2.70	114.3	114.3 × 2.3

Surfaces

The standard for surfaces in contact with the product depends on the particular nominal width standard:

- **Metric, inch OD, ISO:** $Ra \leq 0.8 \mu\text{m}$
- **Inch IPS:** $Ra \leq 1.2 \mu\text{m}$

Higher-quality surfaces are an available option (see section 7).

Surfaces not in contact with the product (housing) are matte blasted or metal ground as standard. Detailed information on surface designs can be taken from the respective sections.

Materials

Components in contact with the product are produced from 1.4404/AISI 316 L, while those not in contact with the product use 1.4301/AISI 304. Other materials, e.g. for use when handling aggressive fluids, are available on request.

For detailed information about the properties of the materials, refer to the **material properties** table.

Test report and inspection certificate

Optionally, the valve housings and product wetted parts can be supplied with a test report 2.2 or an inspection certificate 3.1 according to EN 10204.

If 3.1 inspection certificates are required, please notify us of this when you place the order.

Seal materials

Seals in contact with the product are EPDM (standard), HNBR, FKM and FFKM (on request; not available for all components). NBR material is used for seals not in contact with the product.

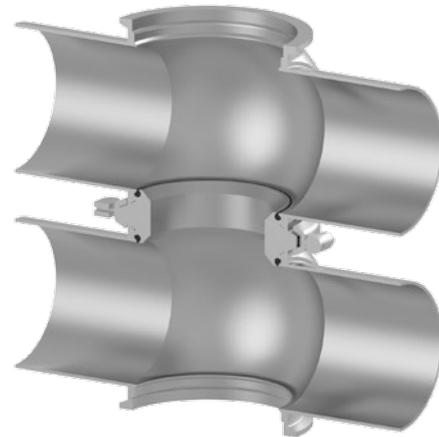
The mixing component of the above sealing materials are according to the USP Class VI and are contained in the FDA "**White List**". The seals meet the requirements of the "**FOOD and DRUG**" (FDA) directives 21 CFR Part 177.2600 or 21 CFR 177.1550: "Rubber articles intended for repeated use".

The resistance of the seal material depends on the type and temperature of the product being transported. The contact time with certain products can negatively affect the service life of seals. The seal material PTFE is available for individual valve types and components as well.

For detailed information about the seal material properties, refer to the **seal material properties** table.

Housing connections

For valves with the option of combining housings, such as overflow and control valves, the clamped housing connection forms a flexible selection of the port orientation.



Clamped housing connection:
Seat ring clamped by clamping connection

Ambient conditions

Ambient temperatures	
Hygienic valves and components (with connection 0)	0 °C to 45 °C
	32 °F to 113 °F
Proximity switches	-20 °C to 80 °C
	-4 °F to 176 °F

The valves can also be used outdoors. However, in these application areas they must be protected against icing, or else de-iced before switching or lifting. In addition, the particular requirements on the control and feedback system must be taken into account in this case.

The product or operating temperature depends on the seal material and can be seen in the **seal material properties** table.

Installation

Hygienic valves and components must be installed without stresses. Lateral forces such as expansion of the pipelines due to heat cannot be compensated in the valve, as a result valve damages are possible. In such cases, we recommend taking measures to compensate for the expansion, such as by using the VARICOMP® expansion compensator.

The required clearance for installing and removing a component is specified in the particular technical data and dimensional sheet.

Air supply

The valve actuators are configured for operation with min. 4 bar and max. 8 bar air pressure. The standard actuator sizes are configured for an air supply pressure of min. 6 bar (with a product pressure of 5 bar). The quality of the air supply must meet the requirements of ISO 8573-1:2010.

ISO 8573-1:2010	
Solid content	Quality class 6
	Particle size max. 5 µm
	Particle density max. 5 mg/m³
Water content	Quality class 4
	Max. dew point 3 °C
	A correspondingly different dew point is required for applications at high altitude or with low ambient temperatures.
Oil content	Quality class 3
	Max. 1 mg oil per 1 m³ air, preferably oil-free

Feedback

In the control top

See section 9: Control and feedback systems

In the lantern (LAT)

Proximity switches of size M12x1 can indicate the positions “open” and/or “closed”. In double-seat valves with lifting actuator, it is also possible to detect the upper valve disc stroke in the lantern by means of a proximity switch (see section 9: Control and feedback systems).

For detecting the end positions by proximity switches in these valves, it is recommended to use the proximity switch holder (INA) on the actuator (see section 9: Control and feedback systems).

Recommended flow direction

If possible, the valves should close against the flow direction so to avoid water hammer. Exception: Constant pressure valve type DHV, sampling valve type I and vacuum valve type V.

Material properties

Material number	Short name	Similar materials			WS***	Main alloy elements in % by mass			
						Cr (Chrome)	Ni (Nickel)	Mo (Molybdenum)	C max. (Carbon)
1.4301*	X5CrNi18-10	AISI 304	BS 304S15	SS2332	18	17.5–19.5	8.0–10.5	–	0.07
1.4404**	X2 CrNiMo 17-12-2	AISI 316L	BS 316S11	SS2348	25	16.5–18.5	10.0–13.0	2.0–2.5	0.03
1.4435	X2 CrNiMo 18-14-3	AISI 316L	BS 316S11	SS2353	27	17.0–19.0	12.5–15.0	2.5–3.0	0.03
1.4462	X2 CrNiMoN 22-5-3	2205	BS 318S13	SS2377	37	21.0–23.0	4.5–6.5	2.5–3.5	0.03
1.4410	X2 CrNiMoN 22-5-3	SAF 2507®	–	SS2328	39	24.0–26.0	6.0–8.0	3.0–4.5	0.03
1.4529	X1 NiCrMoCuN 25-20-7	AISI 926	–	–	42	19.0–21.0	24.0–26.0	6.0–7.0	0.02
AL-6XN®	–	–	–	–	42	20.0–22.0	23.5–25.5	6.0–7.0	0.03
1.4539	X1 NiCrMoCu 25-20-5	AISI 904L	BS 904S13	SS2562	35	19.0–21.0	24.0–26.0	4.0–5.0	0.02
2.4602	NiCr21Mo14W HASTELLOY C-22	–	–	–	69	20.0–22.0	–	12.5–14.5	0.01
2.4819	NiMo16Cr15W HASTELLOY C-276	N 10276	–	–	75	14.5–16.5	–	15.0–17.0	0.01

* Standard material for components not in contact with the product

** Standard material for components in contact with the product (other materials available on request)

*** Effective sum of stainless steels = % Cr + 3.3 × (% Mo + 0.5 W) + 20 N

Seal material properties

Seal material			EPDM	FKM	HNBR	FFKM	PTFE	VMQ (pig)
General application temperature*			–40 to 135 °C –40 to 275 °F	–10 to 200 °C 14 to 392 °F	–25 to 140 °C –13 to 284 °F	–10 to 230 °C 14 to 446 °F	–200 to 260 °C	–50 to 200 °C
Medium	Concentration	At permitted operating temperature						
Alkali	≤ 3 %	up to 80 °C	+	○	+	+	+	○
	≤ 5 %	up to 40 °C	+	○	○	+	+	○
	≤ 5 %	up to 80 °C	+	–	–	+	+	○
	> 5 %		○	–	–	+	+	○
Inorganic acid**	≤ 3 %	up to 80 °C	+	+	+	+	+	○
	≤ 5 %	up to 80 °C	○	+	○	+	+	○
	> 5 %	up to 100 °C	–	+	–	+	+	○
Water		up to 80 °C	+	+	+	+	+	+
Steam		up to 135 °C	+	○	○	+	+	○
Steam, approx. 30 min		up to 150 °C	+	○	–	+	+	○
Hydrocarbons/fuels			–	+	○	+	+	–
Products containing grease	≤ 35 %		+	+	+	+	+	○
	> 35 %		–	+	+	+	+	○
Oils			–	+	+	+	+	○

+ = Good resistance

○ = Reduced service life

– = Not resistant

Other applications on request

* Depending on the installation situation

** Inorganic acids include hydrochloric acid, nitric acid, sulphuric acid

Catalogs
Hygienic Valve Technology

 Hygienic valves
VARIVENT® and ECOVENT®

 Butterfly valves T-smart

 Seat valves T-smart

 Hygienic valves and
components

Catalogs
Hygienic Pump Technology

 Hygienic centrifugal pumps

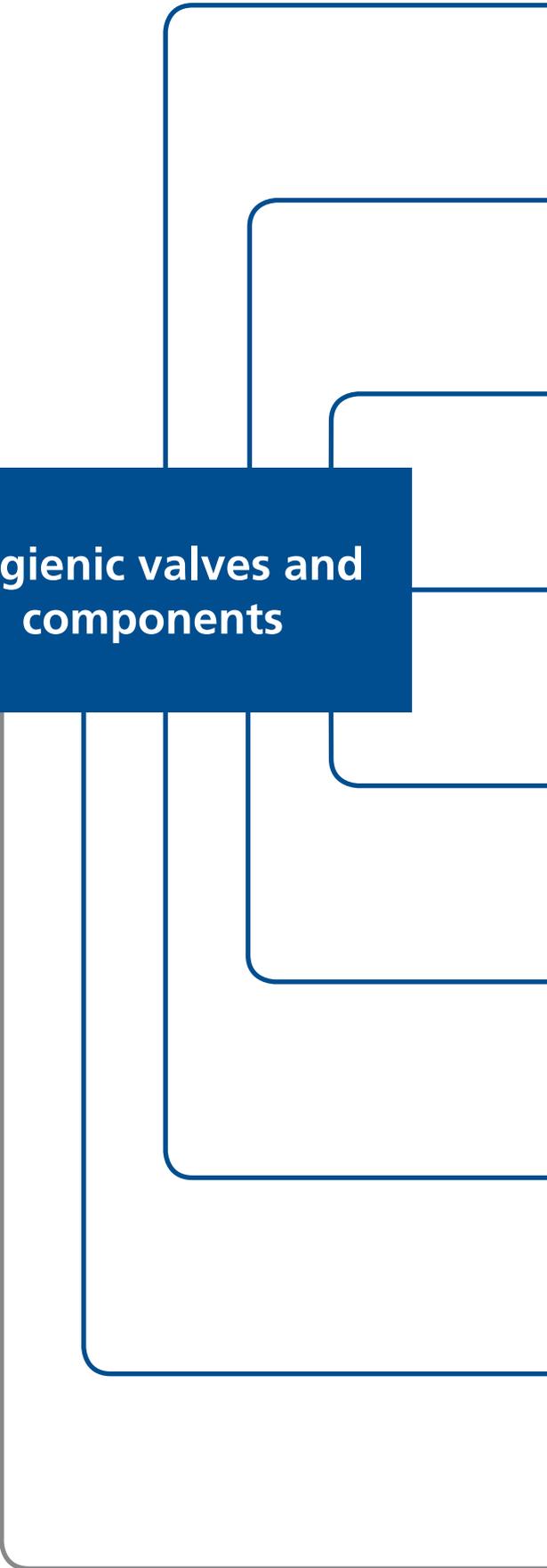
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Catalogs
Cleaning Technology

 Cleaning technology

**Hygienic valves and
components**



	VARINLINE® housings and connection flanges	1
	VARIVENT® pipe connections	2
	VARICOMP® expansion compensators	3
	VARIVENT® valves with special function	4
	VARITOP® tank safety systems	5
	VARICOVER® product recovery systems	6
	Options	7
	Spare parts	8
	Control and feedback systems	9



VARINLINE® instrumentation free of dead pockets

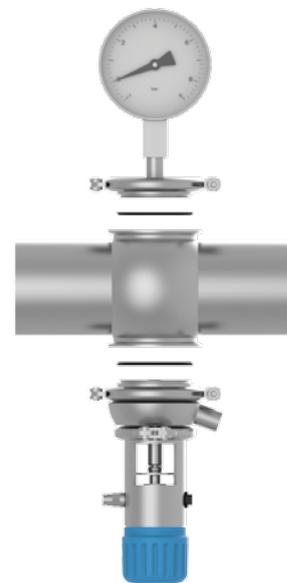
The matrix piping found in process technology makes it difficult for the operator to directly view his product. The installation of VARINLINE® housings into the pipeline system permits integration of measurement and control instruments in the process system and thus, structuring the production process transparently.

Cleaning and sterilization capacities in the CIP/SIP procedures have the highest priority, as well as to ensure hygienic production in the brewery and beverage industries, dairy processing operations and the chemical, pharmaceuticals and cosmetic industries.

General benefits
No domes, no sumps
Gap-free sealing according to the VARIVENT® principle
Rapid, accurate instrument installation with clamp connection
Connections for instrumentation independent of nominal widths and process variables
Detection of the respective measuring values directly in the product flow
Perfect flow properties and cleaning ability

Function of the VARINLINE® components

The adaptation of the meters in the VARINLINE® housings takes place via VARINLINE® process connections. Many manufacturers have assumed this established process connection type and offer meters for installation in VARINLINE® fittings as standard. This ensures hygienic and quick integration of different devices into the process system.



The process connections offer the option of holding up to two VARINLINE® components in one housing



Application examples

The VARINLINE® concept has proven its worth in hygienic processes. VARINLINE® housings permit installation of transmitters free of dead zones and thus, permit use of sensors in systems with high hygienic requirements.

The VARINLINE® system comprises of components for process monitoring, such as pressure, temperature and flow measurement.

Optimized process circuits reduce product loss, e.g. by measurement of the color, clouding or conductivity of the product to divert the ejections.

The GEA Tuchenhagen level probe is used as media recognition to protect the pumps or control filling of tanks.

Special features

Four different process connection sizes

Combination options of up to two devices in one VARINLINE® housing

Different adaptation options in tanks

VARINLINE® housing according to four different pipe standards

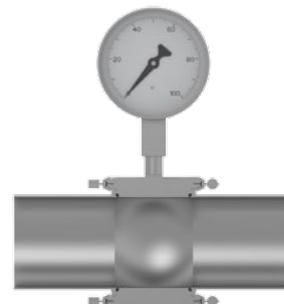
EHDG certification of the housing

The GEA Breconcherry In-Line Sprayer type IS 25 can also be utilized in the respective process fittings for container and pipe cleaning.

For adapting measurement and control instruments in tanks, VARINLINE® housing connections and tank connection flanges for welding into wall, cone or dished bottoms are available.



Formation of a dome by conventional adaptation at the T-piece



Holder in the VARINLINE® housing free of dead zones

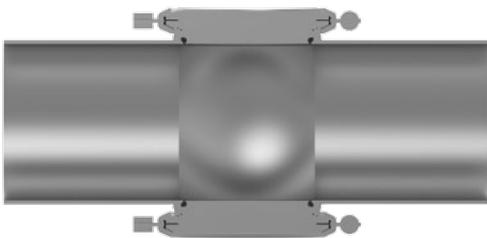


VARINLINE® housings

The VARINLINE® housing is the process connection that is the core element to the control and measurement technology. It is free of dead zones in pipeline systems.

Depending on the housing rated width and the installation depth of the instrumentation, up to two control or measuring instruments can be adapted into the double vertical port in-line housing. Only the nominal widths DN 10 and 15 as well as ISO 13.5 to 21.3 are an exception with only one process connection.

To meet the nominal width of the pipeline, housings with four different process connection sizes are available.



The pipe inside diameter corresponds to the inner height of the housing.

VARINLINE® housing connection flange type T and T-S

The housing connection flanges type T and T-S serve to adapt measurement and control instruments free of dead zones, e.g. for installation of VARINLINE® pressure gauges and sight glasses. This connection flange may be welded into the tank or vessel wall flush from the inside, in the cone or dished bottom.

The housing connection flange type T is designed for installation into vessels of a wall thickness up to 8 mm.

Due to its cylindrical shape, the housing connection flange of type T-S allows adjustment to the inclination or curve of the vessel bottom or vessel wall and is thus suitable for installation in tanks with smaller diameters (≤ 1.6 m).

For stress-free installation, a welding device is available (available for rent as well), which facilitates the reliable and simple installation. When welding in, the regulations of the weld must be complied with.



The conical inner contour permits a flat installation orientation



Cylindrical shape for adaptability to eccentric positions

Process connection sizes

The process connections are available in four sizes.

	Process connection			
	B	F	N	G
VARINLINE® housings	•	•	•	•
VARINLINE® housing connection flange type T	•	•	•	•
VARINLINE® housing connection flange type T-S			•	
VARINLINE® housing connection flange type U		•	•	•
VARINLINE® housing connection flange type U-S			•	
VARINLINE® tank connection flange type P		•	•	
VARINLINE® sight glass type TXIA		•	•	•
VARINLINE® pressure gauge type TPIA	•	•	•	
VARINLINE® thermometer type TTIA		•	•	
VARINLINE® sampling valve type TSVN*		•	•	
VARINLINE® sampling valve type TSVU*		•	•	
VARIVENT® double-seat sampling valve type T/09*			•	
GEA Tuchenhagen level probe type TNS		•	•	
GEA Breconcherry in-line sprayer type IS 25**			•	

* See section 4.2, sampling valves
 ** See catalog cleaning technology (GEA Breconcherry)

VARINLINE® housing connection flanges type U and U-S

The housing connection flange type U is used to adapt a measurement and control instrument free of dead zones, e.g. a VARINLINE® thermometer or a level probe. The flange may be welded into the tank or vessel wall front-flush, in the cone or dished bottom. The housing connection flanges type U and U-S are particularly suitable for installation of measuring technology at jacketed tanks due to their cylindrical form.

The housing connection flange type U-S is used for vertical holding of a measurement and control instrument free of dead zones. Its cylindrical shape allows the adjustment to the inclination of the cone or dished bottom and therefore allows for vertical installation of sight glasses and measuring instruments outside the vessel bottom.

For stress-free installation, the housing connections should be welded in with an inserted plug. Apart from this, the regulations of the weld must be complied with.



Conical inner contour permits flat installation orientations



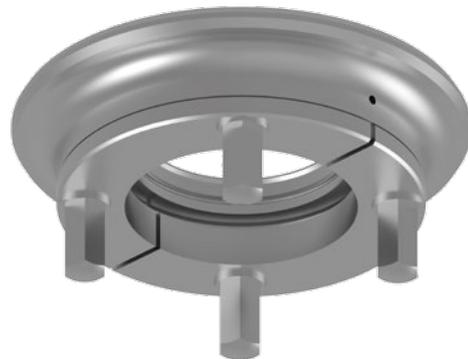
Cylindrical shape permits adjustment to the inner tank contours

VARINLINE® tank connection flange type P

The tank connection flange type P is used for front-flush installation with no dead zones of a measurement and control instrument. This flange type is suitable for installation into vessels of a wall thickness up to 20 mm.

The flange is equipped with pressure relief half-rings and a pressure relief bore for controlled discharge of the inner tank pressure for maintenance work.

For stress-free installation, a welding device is available (available for rent as well) which facilitates the reliable and simple installation. When welding in, the regulations of the weld must be complied with.



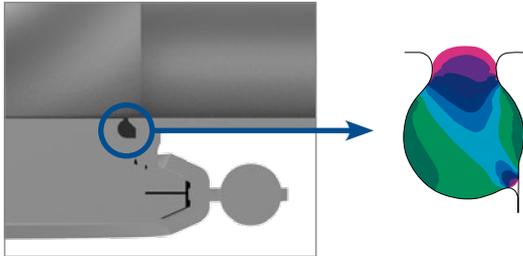
Possibility of pressure relief in the tank



Sealing according to the VARIVENT® principle

A defined seal deformation allows for more time to pass between required maintenance services, thereby allowing for continuous production and shorter downtimes.

The seal geometry was optimized by using FEM calculations.



Representation of the stress load on the housing O-ring

Seals
Long operating time
Vacuum-proof
Selection of FDA-compliant seal materials
<ul style="list-style-type: none"> • EPDM
<ul style="list-style-type: none"> • FKM
<ul style="list-style-type: none"> • HNBR
<ul style="list-style-type: none"> • FFKM
<ul style="list-style-type: none"> • PTFE

VARINLINE® pressure gauge

The Bourdon tube pressure gauge is equipped with a sealing diaphragm. A diaphragm provides separation from the measuring material and transmits the process pressure to the meter via a transmission medium. If pressure is applied from the measuring medium now, it is transmitted via the elastic diaphragm to the liquid and thus, to the meter.

The specifically constructed setup of this pressure gauge achieves a low temperature influence and permits use of the device for over- or under-pressure measurements.

According to the requirements of the FDA, the indicator is filled with certified glycerin (or insulation oil at equip with proximity switches) to permit dampening of the indicator under strong vibrations and to avoid formation of precipitation if the temperatures fluctuate strongly.

Thus, the pressure gauge is outstanding for use in the food industry. It is available for process connection sizes B, F and N. Depending on the installation position of the pressure gauge, different orientations are available for best reading of the display.



Pressure gauge with process connection B



Pressure gauge for vertical installation



VARINLINE® sight glass

The VARINLINE® sight glass can be inserted into the VARINLINE® housing or the housing connection flanges and serves visual product inspection. The glass closure of borosilicate glass can be used, depending on nominal width, for a pressure range of -1 bar to 25 bar; however, the pressure level of the installed fittings must be considered as well.

For good visual inspection even in cloudy media, an additional lighting facility is recommended. The LED lighting with 20 LEDs has either a 2 or 20 m connection cable. The 2W luminaire is operated via a button. An ATEX lighting without buttons can be delivered for use in potentially explosive atmospheres.



VARINLINE® sight glass without illumination



VARINLINE® sight glass with illumination



VARINLINE® sight glass with ATEX illumination

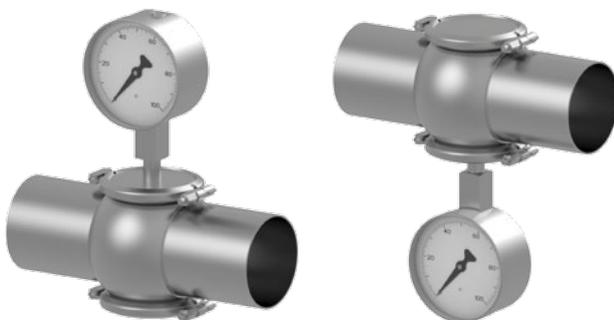


VARINLINE® thermometer

The precision gas system thermometer has a sturdy design and is characterized by its optimal and completely welded installation into the VARINLINE® process connection. It ideally meets the high requirements to hygienic process technology.

According to the requirements of the FDA, the indicator is filled with certified glycerin (or insulation oil at equip with proximity switches) to permit dampening of the indicator under strong vibrations and to avoid formation of precipitation if the temperatures fluctuate strongly.

The VARINLINE® thermometer is ideal for use in the food industry. It is available for process connection sizes F and N. Depending on the installation position of the thermometer, different orientations are available for best reading of the display.



Thermometer with connection down

Thermometer with connection up

Pipe classes

Standard VARINLINE® housings are supplied with welding ends, although the housings can be delivered with various connection fittings as an option.

The dimensions of the welding ends comply with the following standards:

- **Metric:** Outside diameter according to DIN 11850, series II, DIN 11866, series A
- **Inch OD:** Outside diameter based on ASME-BPE-a-2004, DIN 11866, series C
- **Inch IPS:** Outside diameter according to IPS sched. 5
- **ISO:** Outside diameter according to DIN EN ISO 1127

Surfaces

The standard for surfaces in contact with the product depends on the particular nominal width standard:

- **Metric, inch OD, ISO:** Ra ≤ 0.8 μm
- **Inch IPS:** Ra ≤ 1.2 μm

Higher-quality surfaces are an available option.

Surfaces not in contact with the product (housing) are matte blasted as standard. Alternatively, a ground outer surface is available.

Materials

Components in contact with the product are produced from 1.4404/AISI 316 L, while those not in contact with the product use 1.4301/AISI 304. Alternatively (standard for nominal width standard ISO and DN 10/15), VARINLINE® housings and housing connection flanges are also available in 1.4435/AISI 316 L. Other materials, e.g. for use when handling corrosive fluids, are available on request.

For detailed information about the properties of the materials, refer to the **material properties** table.

Test report and inspection certificate

Optionally, the valve housings and product wetted parts can be supplied with a test report 2.2 or an inspection certificate 3.1 according to EN 10204.

If 3.1 inspection certificates are required, please notify us of this when you place the order.

Seal materials

Seals in contact with the product are made of EPDM (standard), HNBR, FKM, FFKM and PTFE. EPDM will be supplied if no seal material is specified in the orders.

The mixing constituents of our seal materials are contained in the FDA **White List** and are in accordance with **FOOD and DRUG** (FDA) guidelines 21 CFR Part 177.2600 or 21 CFR 177.1550: "Rubber articles intended for repeated use".

The resistance of the seal material depends on the type and temperature of the product being transported. The contact time with certain products can negatively affect the service life of seals.

For detailed information about the seal material properties, refer to the seal material properties table.

Operating pressure

VARINLINE® housings	
Nominal width	Nominal pressure
DN 10–65 OD 1"–2 ½" IPS 2" ISO 13.5–60.3	16 bar
DN 80–150 OD 3"–6" IPS 3"–6" ISO 76.1–114.3	10 bar

Optionally, VARINLINE® housings are available for use at higher options.

VARINLINE® housings	
Nominal width	Maximum permitted operating pressure
DN 25–100 OD 1"–3"	PS 20 bar

VARINLINE® housing connections

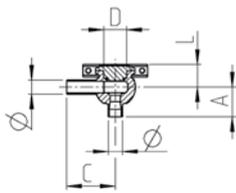
The VARINLINE® housing connections of types T and U as well as the VARINLINE® tank connection flange type P can be used for an operating pressure of 10 bar.



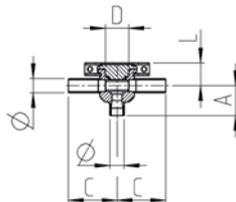


The in-line housing, usually with double vertical ports, permits hygienic holding of up to two in-line measurement and control instruments free of dead zones via process connections

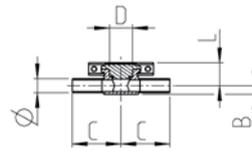
Technical data of the standard version		
Material in contact with the product	DN 10–15, ISO	1.4435/AISI 316 L
	From DN 25, OD, IPS	1.4404/AISI 316 L
Seal material in contact with the product	EPDM, FKM, HNBR	
Product pressure	DN 10–65, OD 1"–2 ½", IPS 2", ISO 13.5–60.3	16 bar
	DN 80–150, OD 3"–6", IPS 3"–6", ISO 76.1–114.3	10 bar
Surface in contact with the product	DN, OD, ISO	Ra ≤ 0.8 µm
	IPS	Ra ≤ 1.2 µm
External housing surface	Matte blasted	
Connection fittings	Welding end	
Certificates		



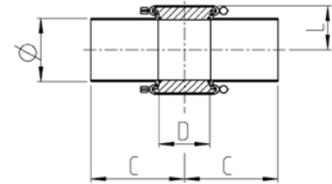
Housing design L



Housing design T



Housing design G



-

Nominal width	Process connection	Housing design	Pipe		Dimension				
			Ø [mm]	A [mm]	B [mm]	C [mm]	D [mm]	L [mm]	
DN 10	B	L, T, G	13.00 × 1.50	40	8.50	65.0	31	26.0	
DN 15	B	L, T, G	19.00 × 1.50	40	11.50	65.0	31	29.0	
DN 25	F	-	29.00 × 1.50	-	-	90.0	50	30.0	
DN 40	N	-	41.00 × 1.50	-	-	90.0	68	36.0	
DN 50	N	-	53.00 × 1.50	-	-	90.0	68	42.0	
DN 65	N	-	70.00 × 2.00	-	-	125.0	68	50.0	
DN 80	N	-	85.00 × 2.00	-	-	125.0	68	57.5	
DN 100	N, G*	-	104.00 × 2.00	-	-	125.0	68*	67.0	
DN 125	N, G*	-	129.00 × 2.00	-	-	125.0	68*	79.5	
DN 150	N, G*	-	154.00 × 2.00	-	-	150.0	68*	92.0	
OD 1"	F	-	25.40 × 1.60	-	-	90.0	50	28.0	
OD 1 ½"	N	-	38.10 × 1.60	-	-	90.0	68	34.5	
OD 2"	N	-	50.80 × 1.60	-	-	90.0	68	40.8	
OD 2 ½"	N	-	63.50 × 1.60	-	-	125.0	68	47.0	
OD 3"	N	-	76.20 × 1.60	-	-	125.0	68	53.5	
OD 4"	N, G*	-	101.60 × 2.00	-	-	125.0	68*	65.8	
OD 6"	N, G*	-	152.40 × 2.77	-	-	150.0	68*	92.0	
IPS 2"	N	-	60.30 × 2.00	-	-	114.3	68	45.5	
IPS 3"	N	-	88.90 × 2.30	-	-	152.4	68	59.5	
IPS 4"	N, G*	-	114.30 × 2.30	-	-	152.4	68*	72.0	
IPS 6"	N, G*	-	168.30 × 2.70	-	-	152.4	68*	98.0	
ISO 13.5	B	L, T, G	13.50 × 1.60	40	8.35	65.0	31	25.5	
ISO 17.2	B	L, T, G	17.20 × 1.60	40	11.50	65.0	31	27.5	
ISO 21.3	B	L, T, G	21.30 × 1.60	40	13.50	65.0	31	29.5	
ISO 33.7	F	-	33.70 × 2.00	-	-	114.3	50	32.0	
ISO 42.4	N	-	42.40 × 2.00	-	-	114.3	68	36.3	
ISO 48.3	N	-	48.30 × 2.00	-	-	114.3	68	39.3	
ISO 60.3	N	-	60.30 × 2.00	-	-	114.3	68	45.5	
ISO 76.1	N	-	76.10 × 2.00	-	-	152.4	68	53.5	
ISO 88.9	N	-	88.90 × 2.30	-	-	152.4	68	59.5	
ISO 114.3	N	-	114.30 × 2.30	-	-	152.4	68	72.0	

* Process connection G only available with a sight glass. The dimension D is 123 mm.

Position	Description of the order code																																								
1	VARINLINE® system T VARINLINE® housings																																								
2	Nominal width <table border="1"> <tr><td>DN 10</td><td></td><td></td><td>ISO 13.5</td></tr> <tr><td>DN 15</td><td></td><td></td><td>ISO 17.2</td></tr> <tr><td>DN 25</td><td>OD 1"</td><td></td><td>ISO 21.3</td></tr> <tr><td>DN 40</td><td>OD 1 ½"</td><td></td><td>ISO 33.7</td></tr> <tr><td>DN 50</td><td>OD 2"</td><td>IPS 2"</td><td>ISO 42.4</td></tr> <tr><td>DN 65</td><td>OD 2 ½"</td><td></td><td>ISO 48.3</td></tr> <tr><td>DN 80</td><td>OD 3"</td><td>IPS 3"</td><td>ISO 60.3</td></tr> <tr><td>DN 100</td><td>OD 4"</td><td>IPS 4"</td><td>ISO 76.1</td></tr> <tr><td>DN 125</td><td></td><td></td><td>ISO 88.9</td></tr> <tr><td>DN 150</td><td>OD 6"</td><td>IPS 6"</td><td>ISO 114.3</td></tr> </table>	DN 10			ISO 13.5	DN 15			ISO 17.2	DN 25	OD 1"		ISO 21.3	DN 40	OD 1 ½"		ISO 33.7	DN 50	OD 2"	IPS 2"	ISO 42.4	DN 65	OD 2 ½"		ISO 48.3	DN 80	OD 3"	IPS 3"	ISO 60.3	DN 100	OD 4"	IPS 4"	ISO 76.1	DN 125			ISO 88.9	DN 150	OD 6"	IPS 6"	ISO 114.3
DN 10			ISO 13.5																																						
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DN 25	OD 1"		ISO 21.3																																						
DN 40	OD 1 ½"		ISO 33.7																																						
DN 50	OD 2"	IPS 2"	ISO 42.4																																						
DN 65	OD 2 ½"		ISO 48.3																																						
DN 80	OD 3"	IPS 3"	ISO 60.3																																						
DN 100	OD 4"	IPS 4"	ISO 76.1																																						
DN 125			ISO 88.9																																						
DN 150	OD 6"	IPS 6"	ISO 114.3																																						
3	Housing design (only available for DN 10, DN 15, ISO 13.5, ISO 17.2 and ISO 21.3) L T G																																								
4	Blanking plates 0 Without blanking plate 1 With one blanking plate 1.4404/316 L 2 With two blanking plates 1.4404/316 L 3 With one blanking plate 1.4435 cert. 3.1 4 With two blanking plates 1.4435 cert. 3.1																																								
5	Seal material 1 EPDM (FDA) 2 FKM (FDA) 3 HNBR (FDA) 4 FFKM (FDA) 5 PTFE (FDA)																																								
6	Surface quality of the housing 1 Inside Ra ≤ 1.2 µm, outside matte blasted (IPS) 2 Inside Ra ≤ 0.8 µm, outside matte blasted (DN, ISO, OD)																																								
7	Certificates K Without A Inspection certificate 3.1/AD2000W2 according to EN10204 M EN 10204 test report 2.2 and inspection certificate 3.1 W EN 10204 test report 2.2 Z EN 10204 inspection certificate 3.1																																								
8	Language of the documentation D German E English																																								
9	Number of documentation 1 Single documentation ... The number of documentations corresponds to their entered number																																								
10	Connection fittings N Welding end																																								
11	Material of the housing 1.4404 1.4404/AISI 316 L 1.4435* 1.4435/AISI 316 L																																								
12	Options See section options																																								

* Standard material in the housings of the nominal width DN 10, DN 15 and ISO. Optionally also available in the metric housings up to DN 125 and OD 4".

The code is composed as follows, depending on the chosen configuration:

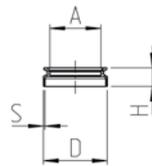
Position	1	2	3	4	5	6	7	8	9	10	11	12
Code	T									N		

For order codes differing from the standard version, please refer to section 7 (options).

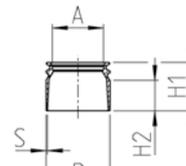


Housing connection flanges are used to connect measuring instruments without dead zones and are welded into the vessel wall or the vessel bottom. Type U-S is suitable for installation in the tank bottom, since it can be adjusted in inclination.

Technical data of the standard version		
Material in contact with the product	type U	1.4404/AISI 316 L
	type U-S	1.4435/AISI 316 L
Material blanking plate	1.4404/AISI 316 L	
	1.4435/AISI 316 L	
Seal material	EPDM, FKM, HNBR	
Operating temperature	135 °C, short-time 150 °C	
Product pressure	Process connection F	16 bar
	Process connection N	16 bar
	Process connection G	10 bar
Surface in contact with the product	Ra ≤ 0.8 µm	
Outside surface	Matte blasted	
Wall thickness t	2; 2.5; 3; 4 mm	



type U



type U-S

type U

Nominal width	Process connection	Dimension			
		A [mm]	D [mm]	H [mm]	S [mm]
DN 32/25	F	50	70	25	2
DN 50/40	N	68	85	25	2
DN 125/100	G	123	154	30	2

type U-S

Nominal width	Process connection	Dimension				
		A [mm]	D [mm]	H [mm]	H2* [mm]	S [mm]
DN 50/40	N	68	85	65	max. 40	2

* Possibility of the adjustment to the vessel

Position	Description of the order code
1	VARINLINE® system
	TU VARINLINE® housing connection flange type U
	TU-S VARINLINE® housing connection flange type U-S
2	Nominal width (process connection)
	32/25 F
	50/40 N
	100 G
3	Blanking plate
	0 Without blanking plate
	1 With blanking plate
4	Seal material
	1 EPDM (FDA)
	2 FKM (FDA)
	3 HNBR (FDA)
	4 FFKM (FDA)
	5 PTFE (FDA)
5	Welding instructions
	K Without
	D German
	E English
6	Welding device
	K Without
7	Certificates
	K Without
	A Inspection certificate 3.1/AD2000W2 according to EN10204
	M Inspection certificate 3.1 and test report 2.2 according to EN10204
	W Test report 2.2 according to EN10204
	Z Inspection certificate 3.1 according to EN10204
8	Material
	1.4404 (type U)
	1.4435 (type U-S)

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8
Code						K		

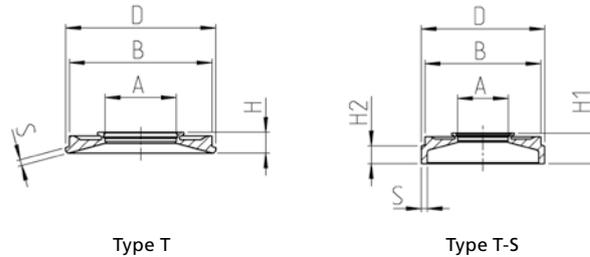
For order codes differing from the standard version, please refer to section 7 (options).



Housing connection flanges are used to connect measurement and control instruments front-flush and are welded into the vessel wall or the vessel bottom. Type T-S can be adjusted to the inclination or rounding of the vessel.

Technical data of the standard version		
Material in contact with the product	type T	1.4404/AISI 316 L or 1.4435/AISI 316 L*
	type T-S	1.4435/AISI 316 L
Material blanking plate	1.4404/AISI 316 L	
	1.4435/AISI 316 L	
Seal material	EPDM, FKM, HNBR	
Operating temperature	135 °C, short-time 150 °C	
Product pressure	10 bar	
Surface in contact with the product	Ra ≤ 0.8 µm	
Outside surface	Matte blasted	

* Process connection N or G



Type T

Nominal width	Process connection	Dimension				
		A [mm]	B [mm]	D [mm]	H [mm]	S [mm]
DN 15	B	31	-	105	22.0	Max. 8
DN 32/25	F	50	135	145	24.0	Max. 8
DN 50/40	N	68	155	165	24.5	Max. 8
DN 125/100	G	123	215	225	27.5	Max. 8

Type T-S

Nominal width	Process connection	Dimension					
		A [mm]	B [mm]	D [mm]	H1 [mm]	H2 [mm]	S [mm]
DN 50/40	N	68	155	165	41	25	max. 8

Position	Description of the order code
1	VARINLINE® system
	TT VARINLINE® housing connection flange type T
	TTS VARINLINE® housing connection flange type T-S
2	Nominal width (process connection)
	15 B
	32/25 F
	50/40 N
	100 G
3	Blanking plate
	0 Without blanking plate
	1 With blanking plate
4	Seal material
	1 EPDM (FDA)
	2 FKM (FDA)
	3 HNBR (FDA)
	4 FFKM (FDA)
5 PTFE (FDA)	
5	Welding instructions
	K Without
	D German
E English	
6	Welding device
K Without	
7	Certificates
	K Without
	A Inspection certificate 3.1/AD2000W2 according to EN10204
	M Inspection certificate 3.1 and test report 2.2 according to EN10204
	W Test report 2.2 according to EN10204
Z Inspection certificate 3.1 according to EN10204	
8	Material
	1.4404 (type T)
	1.4435 (type T-S)

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8
Code						K		

For order codes differing from the standard version, please refer to section 7 (options).

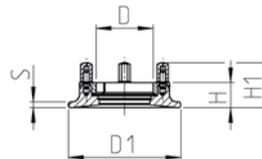
VARINLINE® Tank Connection Flange, Type P



The tank connection flange is welded into vessels with a wall thickness up to 20 mm and takes a measurement or control instrument free of dead zones. Pressure relief half-rings can be used for controlled relief of the inner tank pressure.

Technical data of the standard version	
Material in contact with the product	1.4435/AISI 316 L 1.4539*
Material blanking plate	1.4404/AISI 316 L 1.4435/AISI 316 L
Seal material	EPDM, FKM, HNBR
Operating temperature	135 °C, short-time 150 °C
Product pressure	10 bar
Surface in contact with the product	Ra ≤ 0.8 µm
Outside surface	Matte blasted

* Only process connection N to 15 mm wall thickness



Nominal width	Process connection	Tank connection				
		D1 [mm]	D [mm]	H [mm]	H1 [mm]	S [mm]
DN 25-15	F	130	58	34	61	15
DN 50-5	N	150	76	34	61	5
DN 50-6	N	150	76	34	61	6
DN 50-8	N	150	76	34	61	8
DN 50-10	N	150	76	34	61	10
DN 50-12	N	150	76	34	61	12
DN 50-15	N	150	76	34	61	15
DN 50-20	N	150	76	39	66	20

Position	Description of the order code
1	VARINLINE® system
	TP VARINLINE® tank connection flange type P
2	Nominal width (process connection)
	25 F
	50/40 N
3	Blanking plate
	0 Without blanking plate
	1 With blanking plate
4	Seal material
	1 EPDM (FDA)
	2 FKM (FDA)
	3 HNBR (FDA)
	4 FFKM (FDA)
	5 PTFE (FDA)
5	Welding instructions
	K Without
	D German
	E English
6	Welding device
	K Without
7	Certificates
	K Without
	A Inspection certificate 3.1/AD2000W2 according to EN10204
	M Inspection certificate 3.1 and test report 2.2 according to EN10204
	W Test report 2.2 according to EN10204
	Z Inspection certificate 3.1 according to EN10204
8	Material
	1.4435
	1.4539*

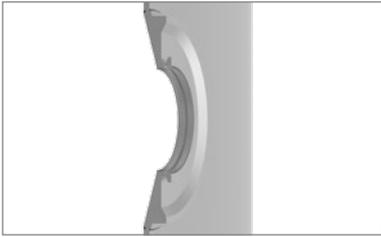
* Only process connection N to 15 mm wall thickness

The code is composed as follows, depending on the chosen configuration:

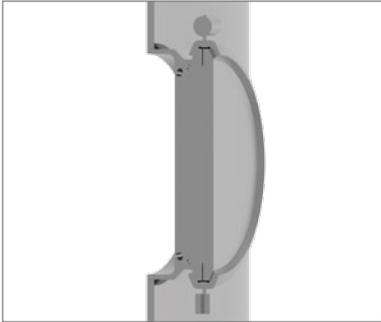
Position	1	2		3	4	5	6	7		8
Code	TP		-				K		-	

For order codes differing from the standard version, please refer to section 7 (options).

VARINLINE® Housing Connection Flange, Welding Jigs



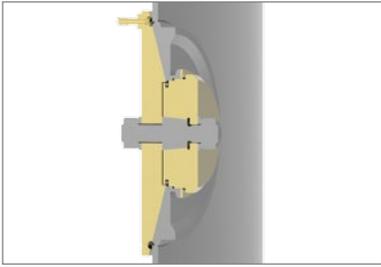
The VARINLINE® housing connection flanges and VARINLINE® tank connection flanges are welded into the vessel wall or the vessel bottom with a welding jig to protect against distortion. Since the different heat introduction when welding may cause deformation of the flanges and thereby leaks, the flange with the installed welding jig must be allowed to cool off to 30 °C. All conditions required for welding (such as insert gas, cooling, welding additive) can be taken from the respective welding instructions.



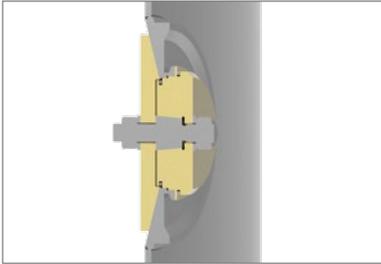
VARINLINE® housing connection U and U-S

Process connection	Lock (welding device)
F	221-144.01
N	221-144.02
N for type U-S	221-144.02
G	221-144.04
Required welding instructions 221RLI002533D	

The required welding jig corresponds to a plug with half-ring connections.



Outer weld with insert gas connection inside

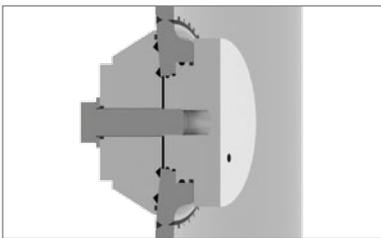


Inner weld

VARINLINE® housing connection T and T-S

Process connection	Lock (welding device)
B	–
F	229-104.01
N	229-104.07
N for type T-S	229-104.07
G	229-104.19
Required welding instructions 221RLI002244D	

The welding jig for stress-free installation is also available for rent.



VARINLINE® tank connection flange type P

Process connection	Lock (welding device)
F	229-103.48
N	229-103.45
Required welding instructions 222RLI005452D	

The welding jig for stress-free installation is also available for rent.

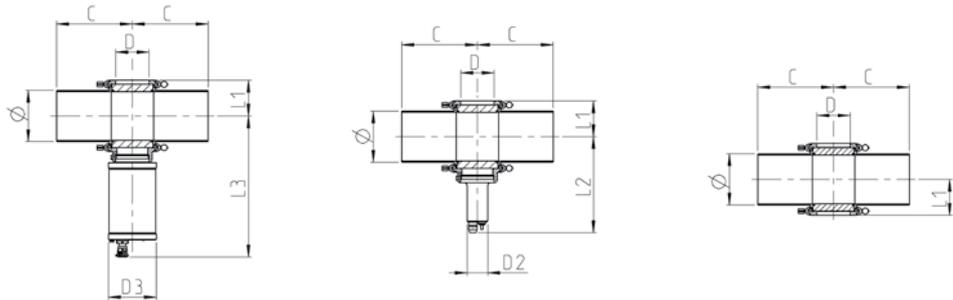


VARINLINE® Sight Glass, Type TXIA



Sight glasses inserted into the VARINLINE® housings or into the housing connection flange are used for visual monitoring of the product. In case of optically dense products in pipelines, an illumination device is recommended to be used with the sight glass.

Technical data		
Material in contact with the product	Borosilicate glass, thermally hardened	
Material not in contact with the product	1.4301/AISI 304	
Seal material in contact with the product	EPDM, FKM, HNBR	
Temperature resistance	-5 to 180 °C	
Shock-resistant	Up to Δt approximately 140° C	
Product pressure	25 bar (362.6 psi)	
Surface in contact with the product	DN, OD, ISO	Ra ≤ 0.8 μm
	IPS	Ra ≤ 1.2 μm
External housing surface	Matte blasted	
Connection fittings	Welding end	
Technical data of the LED sight glass illumination		
Connection voltage	24 V AC/DC	
Burning output nominal	2 W	
Luminaire	LED-use with 20 LEDs	
Protection class	IP65, ATEX variant IP67	
Installation space	Insertion flange for VARINLINE® process connection	
ATEX	Ex II 2 g + D Explosion groups IIC / IIIC Temperature class G / D - T6 / T80 °C Ignition protection type Ex d IIC Gb, Ex t IIIC Db IP67	



		Pipe	Housing	Sight glass		Illumination		Illumination ATEX	
Nominal width	Process connection	Ø [mm]	C [mm]	D [mm]	L1 [mm]	D2 [mm]	L2 [mm]	D3 [mm]	L3 [mm]
DN 25	F	29.0 × 1.5	90.0	38	30.00	34	130	77	203
DN 40	N	41.0 × 1.5	90.0	55	36.00	34	136	77	209
DN 50	N	53.0 × 1.5	90.0	55	42.00	34	142	77	215
DN 65	N	70.0 × 2.0	125.0	55	50.00	34	153	77	226
DN 80	N	85.0 × 2.0	125.0	55	57.50	34	160	77	233
DN 100	N	104.0 × 2.0	125.0	55	67.00	34	165	77	243
DN 125	N	129.0 × 2.0	125.0	55	79.50	34	180	77	255
DN 150	N	154.0 × 2.0	150.0	55	92.00	34	195	77	268
OD 1"	F	25.4 × 1.6	90.0	38	28.00	34	128	77	201
OD 1 ½"	N	38.1 × 1.6	90.0	55	34.50	34	135	77	207
OD 2"	N	50.8 × 1.6	90.0	55	40.75	34	141	77	214
OD 2 ½"	N	63.8 × 1.6	125.0	55	47.00	34	150	77	223
OD 3"	N	76.2 × 1.6	125.0	55	53.50	34	157	77	229
OD 4"	N	101.6 × 2.0	125.0	55	65.75	34	169	77	242
IPS 2"	N	60.3 × 2.0	114.3	55	45.50	34	146	77	218
IPS 3"	N	88.9 × 2.3	152.4	55	59.50	34	163	77	235
IPS 4"	N	114.3 × 2.3	152.4	55	72.00	34	175	77	248
IPS 6"	N	168.3 × 2.7	152.4	55	98.00	34	201	77	274
ISO 33.7	F	33.7 × 2.0	114.3	38	32.00	34	132	77	205
ISO 42.4	N	42.4 × 2.0	114.3	55	36.25	34	136	77	209
ISO 48.3	N	48.3 × 2.0	114.3	55	39.25	34	141	77	212
ISO 60.3	N	60.3 × 2.0	114.3	55	45.50	34	146	77	218
ISO 76.1	N	76.1 × 2.0	114.3	55	53.50	34	157	77	229
ISO 88.9	N	88.9 × 2.3	152.4	55	59.50	34	163	77	235
ISO 114.3	N	114.3 × 2.3	152.4	55	72.00	34	175	77	248

Position	Description of the order code																																
1	VARINLINE® system TXIA VARINLINE® sight glass																																
2	Process connection F N G																																
3	Installation in VARINLINE® component - Without VARINLINE® housing or flange T VARINLINE® housings TT VARINLINE® housing connection type T TT-5 VARINLINE® housing connection type T-5 TU VARINLINE® housing connection type U TU-5 VARINLINE® housing connection type U-5																																
4	Nominal width <table border="1"> <tr> <td>DN 25</td> <td>OD 1"</td> <td></td> <td></td> </tr> <tr> <td>DN 40</td> <td>OD 1 ½"</td> <td></td> <td>ISO 33.7</td> </tr> <tr> <td>DN 50</td> <td>OD 2"</td> <td>IPS 2"</td> <td>ISO 42.4</td> </tr> <tr> <td>DN 65</td> <td>OD 2 ½"</td> <td></td> <td>ISO 48.3</td> </tr> <tr> <td>DN 80</td> <td>OD 3"</td> <td>IPS 3"</td> <td>ISO 60.3</td> </tr> <tr> <td>DN 100</td> <td>OD 4"</td> <td>IPS 4"</td> <td>ISO 76.1</td> </tr> <tr> <td>DN 125</td> <td></td> <td></td> <td>ISO 88.9</td> </tr> <tr> <td>DN 150</td> <td></td> <td>IPS 6"</td> <td>ISO 114.3</td> </tr> </table>	DN 25	OD 1"			DN 40	OD 1 ½"		ISO 33.7	DN 50	OD 2"	IPS 2"	ISO 42.4	DN 65	OD 2 ½"		ISO 48.3	DN 80	OD 3"	IPS 3"	ISO 60.3	DN 100	OD 4"	IPS 4"	ISO 76.1	DN 125			ISO 88.9	DN 150		IPS 6"	ISO 114.3
DN 25	OD 1"																																
DN 40	OD 1 ½"		ISO 33.7																														
DN 50	OD 2"	IPS 2"	ISO 42.4																														
DN 65	OD 2 ½"		ISO 48.3																														
DN 80	OD 3"	IPS 3"	ISO 60.3																														
DN 100	OD 4"	IPS 4"	ISO 76.1																														
DN 125			ISO 88.9																														
DN 150		IPS 6"	ISO 114.3																														
5	Seal material 1 EPDM (FDA) 2 FKM (FDA) 3 HNBR (FDA) 4 FFKM (FDA) 5 PTFE (FDA)																																
6	Surface quality of the housing 1 Inside Ra ≤ 1.2 µm, outside matte blasted (IPS) 2 Inside Ra ≤ 0.8 µm, outside matte blasted (DN, ISO, OD)																																
7	Illumination K Without illumination L LED illumination, 24 V, 2 W, 2 m cable M LED illumination, 24 V, 2 W, 20 m cable X ATEX illumination LED, 24 V, 2 W																																
8	Certificates K Without certificate M Test report and inspection certificate EN 10204 – 2.2 and 3.1 W Test report EN 10204 – 2.2 Z Inspection certificate EN 10204 – 3.1																																
9	Language of the documentation D German E English																																
10	Number of documentation 1 Single documentation ... The number of documentations corresponds to their entered number																																
11	Connection fittings N Welding end																																
12	Options See section options																																

The code is composed as follows, depending on the chosen configuration:

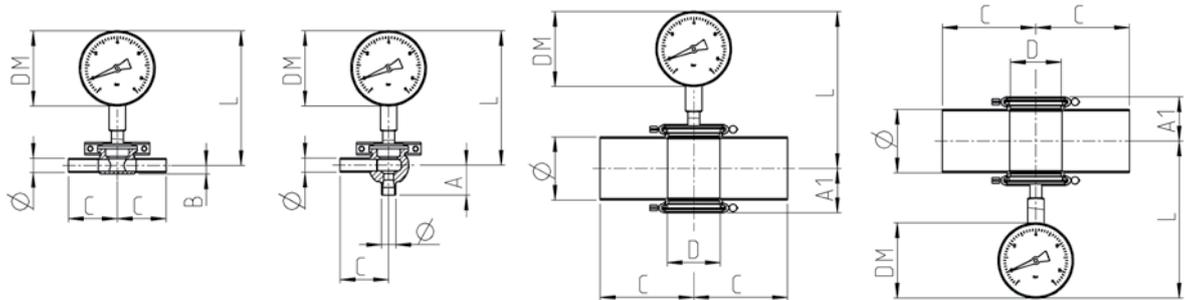
Position	1	2	3	4	5	6	7	8	9	10	11	12
Code	TXIA										N	

For order codes differing from the standard version, please refer to section 7 (options).



The Bourdon tube pressure gauge is equipped with a sealing diaphragm. A diaphragm separates it from the measured material and therefore is suitable for use in the food industry.

Technical data	
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Diaphragm material	1.4435/AISI 316 L
Seal material in contact with the product	EPDM, FKM, HNBR
Damping liquid	Glycerin (FDA)
Operating temperature	-20 to 100 °C
Ambient temperature	-20 to 60 °C
Measuring ranges	Min. -1 bar (-14.5 psi), max. 25 bar (362.6 psi) Pressure resistant up to 1.3 times the measured value
Deviation at 20 °C	Max. ± 0.4%/10 K from the scale end value
Surface in contact with the product	DN, OD, ISO Ra ≤ 0.8 µm IPS Ra ≤ 1.2 µm
External housing surface	Matte blasted
Protection class	IP65



Nominal width	Process connection	Pipe		Dimension				
		Ø [mm]	C [mm]	D [mm]	DM [mm]	L [mm]	A1 [mm]	A [mm]
DN 10	B	13.0 × 1.5	65.0	31	63	100.0	-	34.5
DN 15	B	19.0 × 1.5	65.0	31	63	103.0	-	40.5
DN 25	F	29.0 × 1.5	90.0	50	100	165.0	30.00	-
DN 40	N	41.0 × 1.5	90.0	68	100	171.0	36.00	-
DN 50	N	53.0 × 1.5	90.0	68	100	177.0	42.00	-
DN 65	N	70.0 × 2.0	125.0	68	100	185.0	50.00	-
DN 80	N	85.0 × 2.0	125.0	68	100	192.7	57.50	-
DN 100	N	104.0 × 2.0	125.0	68	100	202.0	67.00	-
DN 125	N	129.0 × 2.0	125.0	68	100	214.5	79.50	-
DN 150	N	154.0 × 2.0	150.0	68	100	227.0	92.00	-
OD 1"	F	25.4 × 1.6	90.0	50	100	163.0	28.00	-
OD 1 ½"	N	38.1 × 1.6	90.0	68	100	169.5	34.50	-
OD 2"	N	50.8 × 1.6	90.0	68	100	175.8	40.75	-
OD 2 ½"	N	63.8 × 1.6	125.0	68	100	182.0	47.00	-
OD 3"	N	76.2 × 1.6	125.0	68	100	188.5	53.5	-
OD 4"	N	101.6 × 2.0	125.0	68	100	200.8	65.75	-
IPS 2"	N	60.3 × 2.0	114.3	68	100	180.5	45.50	-
IPS 3"	N	88.9 × 2.3	152.4	68	100	194.5	59.50	-
IPS 4"	N	114.3 × 2.3	152.4	68	100	207.0	72.00	-
IPS 6"	N	168.3 × 2.7	152.4	68	100	233.0	98.00	-
ISO 17.2	B	17.2 × 1.6	65.0	31	63	102.0	-	40.0
ISO 21.3	B	21.3 × 1.6	65.0	31	63	107.0	-	40.0
ISO 33.7	F	33.7 × 2.0	114.3	50	100	167.0	32.00	-
ISO 42.4	N	42.4 × 2.0	114.3	68	100	171.3	36.25	-
ISO 48.3	N	48.3 × 2.0	114.3	68	100	174.3	39.25	-
ISO 60.3	N	60.3 × 2.0	114.3	68	100	180.5	45.50	-
ISO 76.1	N	76.1 × 2.0	152.4	68	100	188.5	53.50	-
ISO 88.9	N	88.9 × 2.3	152.4	68	100	194.5	59.50	-
ISO 114.3	N	114.3 × 2.3	152.4	68	100	207.0	72.00	-

Position	Description of the order code
1	VARINLINE® system TPIA VARINLINE® pressure gauge
2	Process connection B F N
3	Measuring range I -1 to 5 bar K -1 to 9 bar D 0 to 4 bar E 0 to 6 bar F 0 to 10 bar G 0 to 16 bar L 0 to 25 bar*
4	Nominal width (at delivery with VARINLINE® housing) DN 10 DN 15 DN 25 OD 1" ISO 21.3 DN 40 OD 1 ½" ISO 33.7 DN 50 OD 2" IPS 2" ISO 42.4 DN 65 OD 2 ½" ISO 48.3 DN 80 OD 3" IPS 3" ISO 60.3 DN 100 OD 4" IPS 4" ISO 76.1 DN 125 ISO 88.9 DN 150 IPS 6" ISO 114.3
5	Connection direction U Down H Back Z Up
6	Proximity switches K Without proximity switches M Magnetic spring contacts, 250 V AC/DC, 20 W, 1 A I Inductive limit switches, 250 V AC/DC, 20 W, 1 A (ATEX)
7	Contact type – magnetic spring contacts L Type .01, one contact, normally open H Type .02, one contact, normally closed Z Type .12, two contacts, 1. Normally open contact, 2. Normally closed contact M Type .11, two contacts, both normally open S Type .22, two contacts, both normally closed
8	Certificates K Without W EN 10204 test report 2.2 M EN 10204 test report 2.2 and inspection certificate 3.1 Z EN 10204 inspection certificate 3.1 E Calibration certificate B Calibration certificate and EN 10204 test report 2.2
9	Language of the documentation D German E English
10	Number of documentation 1 Single documentation ... The number of documentations corresponds to their entered number
11	Options See section options

* Option PS 20 bar (/37) required

The code is composed as follows, depending on the chosen configuration:

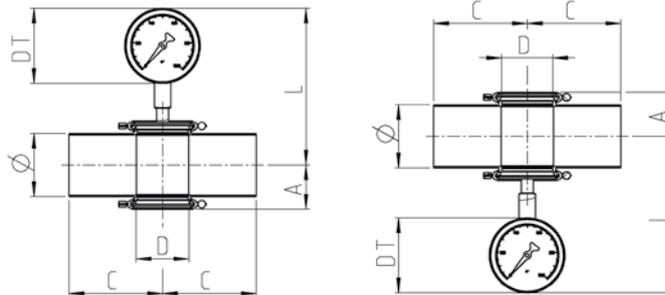
Position	1	2	3	4	5	6	7	8	9	10	11
Code	TPIA		-								

For order codes differing from the standard version, please refer to section 7 (options).



The robust gas system thermometer is characterized specifically by its optimal and complete welded installation in the VARINLINE® process connection and ideally meets the high requirements for hygienic processing technology.

Technical data		
Material in contact with the product	1.4404/AISI 316 L	
Material not in contact with the product	1.4301/AISI 304	
Material Bourdon tube pressure gauge	1.4571/AISI 316 Ti	
Seal material in contact with the product	EPDM, FKM, HNBR	
Damping liquid	Glycerin (FDA)	
Ambient temperature	0 to 40 °C	
Measuring ranges	-30 to 160 °C	
Accuracy class	± 1 °C within the measuring range	
Surface in contact with the product	DN, OD, ISO	Ra ≤ 0.8 µm
	IPS	Ra ≤ 1.2 µm
External housing surface	Matte blasted	
Protection class	IP66	



Nominal width	Process connection	Pipe		Dimension			
		Ø [mm]	C [mm]	D [mm]	DT [mm]	L [mm]	A [mm]
DN 25	F	29.0 × 1.5	90.0	50	100	162.0	30.00
DN 40	N	41.0 × 1.5	90.0	68	100	168.0	36.00
DN 50	N	53.0 × 1.5	90.0	68	100	174.0	42.00
DN 65	N	70.0 × 2.0	125.0	68	100	182.0	50.00
DN 80	N	85.0 × 2.0	125.0	68	100	189.5	57.50
DN 100	N	104.0 × 2.0	125.0	68	100	199.0	67.00
DN 125	N	129.0 × 2.0	125.0	68	100	211.5	79.50
DN 150	N	154.0 × 2.0	150.0	68	100	224.0	92.00
OD 1"	F	25.4 × 1.6	90.0	50	100	160.0	28.00
OD 1 ½"	N	38.1 × 1.6	90.0	68	100	166.5	34.50
OD 2"	N	50.8 × 1.6	90.0	68	100	172.8	40.75
OD 2 ½"	N	63.8 × 1.6	125.0	68	100	179.0	47.00
OD 3"	N	76.2 × 1.6	125.0	68	100	185.5	53.50
OD 4"	N	101.6 × 2.0	125.0	68	100	197.8	65.75
IPS 2"	N	60.3 × 2.0	114.3	68	100	177.5	45.50
IPS 3"	N	88.9 × 2.3	152.4	68	100	191.5	59.50
IPS 4"	N	114.3 × 2.3	152.4	68	100	204.0	72.00
IPS 6"	N	168.3 × 2.7	152.4	68	100	130.0	98.00
ISO 33.7	F	33.7 × 2.0	114.3	50	100	164.0	32.00
ISO 42.4	N	42.4 × 2.0	114.3	68	100	168.3	36.25
ISO 48.3	N	48.3 × 2.0	114.3	68	100	171.3	39.25
ISO 60.3	N	60.3 × 2.0	114.3	68	100	177.3	45.50
ISO 76.1	N	76.1 × 2.0	152.4	68	100	185.5	53.50
ISO 88.9	N	88.9 × 2.3	152.4	68	100	191.5	59.50
ISO 114.3	N	114.3 × 2.3	152.4	68	100	204.0	72.00

Position	Description of the order code																																
1	VARINLINE® system TTIA VARINLINE® thermometer																																
2	Process connection F N																																
3	Measuring range D -30 to 50 °C U 0 to 120 °C H 0 to 160 °C																																
4	Nominal width (at delivery with VARINLINE® housing) <table border="1"> <tr> <td>DN 25</td> <td>OD 1"</td> <td></td> <td></td> </tr> <tr> <td>DN 40</td> <td>OD 1 ½"</td> <td></td> <td>ISO 33.7</td> </tr> <tr> <td>DN 50</td> <td>OD 2"</td> <td>IPS 2"</td> <td>ISO 42.4</td> </tr> <tr> <td>DN 65</td> <td>OD 2 ½"</td> <td></td> <td>ISO 48.3</td> </tr> <tr> <td>DN 80</td> <td>OD 3"</td> <td>IPS 3"</td> <td>ISO 60.3</td> </tr> <tr> <td>DN 100</td> <td>OD 4"</td> <td>IPS 4"</td> <td>ISO 76.1</td> </tr> <tr> <td>DN 125</td> <td></td> <td></td> <td>ISO 88.9</td> </tr> <tr> <td>DN 150</td> <td></td> <td>IPS 6"</td> <td>ISO 114.3</td> </tr> </table>	DN 25	OD 1"			DN 40	OD 1 ½"		ISO 33.7	DN 50	OD 2"	IPS 2"	ISO 42.4	DN 65	OD 2 ½"		ISO 48.3	DN 80	OD 3"	IPS 3"	ISO 60.3	DN 100	OD 4"	IPS 4"	ISO 76.1	DN 125			ISO 88.9	DN 150		IPS 6"	ISO 114.3
DN 25	OD 1"																																
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DN 50	OD 2"	IPS 2"	ISO 42.4																														
DN 65	OD 2 ½"		ISO 48.3																														
DN 80	OD 3"	IPS 3"	ISO 60.3																														
DN 100	OD 4"	IPS 4"	ISO 76.1																														
DN 125			ISO 88.9																														
DN 150		IPS 6"	ISO 114.3																														
5	Connection direction U Down H Back Z Up																																
6	Proximity switches K Without proximity switches M Magnetic spring contacts, 250 V AC/DC, 20 W, 1 A I Inductive limit switches, 250 V AC/DC, 20 W, 1 A (ATEX)																																
7	Contact type – magnetic spring contacts L Type .01, one contact, normally open H Type .02, one contact, normally closed Z Type .12, two contacts, 1. Normally open contact, 2. Normally closed contact M Type .11, two contacts, both normally open S Type .22, two contacts, both normally closed																																
8	Certificates K Without W EN 10204 test report 2.2 M EN 10204 test report 2.2 and inspection certificate 3.1 Z EN 10204 inspection certificate 3.1 E Calibration certificate B Calibration certificate and EN 10204 test report 2.2																																
9	Language of the documentation D German E English																																
10	Number of documentation 1 Single documentation ... The number of documentations corresponds to their entered number																																
11	Options See section options																																

The code is composed as follows, depending on the chosen configuration:

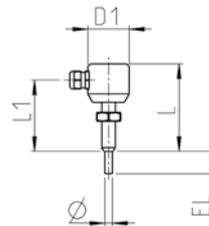
Position	1	2	3	4	5	6	7	8	9	10	11
Code	TTIA		-								

For order codes differing from the standard version, please refer to section 7 (options).



The level probe works conductively in connection with conventional evaluation electronics. The electrodes are mainly used in tanks for level control during vessel filling or emptying. The coated electrode rod (Ø 10 mm) can be shortened as required and also serves to collect media in pipelines, e.g. as pump protection.

Technical data	
Material in contact with the product	1.4404, PEEK
Material not in contact with the product	1.4301/AISI 304
Material electrode rod	ETFE coating
Seal material in contact with the product	EPDM, FKM, HNBR
Operating temperature	0 to 100 °C, short-time (30 min.) up to 140 °C
Ambient temperature	-10 to 60 °C
Product pressure	Max. 10 bar
Protection class	IP68

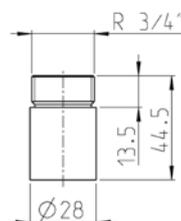


Length of the electrode EL [mm]	Dimension			
	Ø [mm]	L [mm]	L1 [mm]	D1 [mm]
30	10	110	80	55
150	10	110	80	55
500	10	110	80	55
1,000	10	110	80	55
1,800	10	110	80	55

Electrode holder N

To hold the level probe in vessels or tanks, the electrode holder N is available.

Technical data	
Material	1.4404/316 L
Certificate	Optional inspection certificate EN 10204 – 3.1



Position	Description of the order code
1	Type
	TNS Level probe
2	Process connection
	WA Without electrode holder
	ZA Electrode holder N
	NA VARINLINE® process connection size N with electrode holder N
3	Cable gland
	M M16×1.5
	U 4-pin M12/M16×1,5 plug
4	Level module
	0 Without
	1 With
5	Rod length in the product chamber
	30 30 mm
	31...149 31 bis 149 mm
	150 150 mm
	151...499 151 bis 499 mm
	500 500 mm
	501...999 501 bis 999 mm
	1000 1,000 mm
	1001...1799 1,001 bis 1,799 mm
1800 1,800 mm	
6	Certificates
	K Without
	W EN 10204 test report 2.2
	M EN 10204 test report 2.2 and inspection certificate 3.1
	Z EN 10204 inspection certificate 3.1
7	Accessories
	/52 Adhesive ID tag

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7
Code	TNS	-	-	-	-	-	/52

For order codes differing from the standard version, please refer to section 7 (options).



VARINLINE® plugs

The VARINLINE® plugs are needed to close the VARINLINE® housings or housing connections when no measuring or control instrument is used. Clamping connections are available to attach the closures in the fittings.

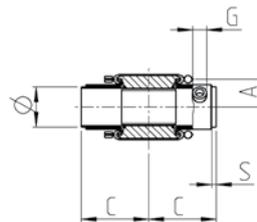


Process connection	Material		Dimension D [mm]	O-ring			Clamping connection complete Article number
	1.4404	1.4435		Material			
				EPDM	FKM	HNBR	
B	221-144.14	221-144.15	31	930-270	930-163	930-637	606-001
F	221-144.01	221-144.12	50	930-309	930-168	930-632	221-507.02
N	221-144.02	221-144.13	68	930-144	930-171	930-633	221-507.04
G	221-144.04	221-144.22	123	930-156	930-178	930-863	221-507.11



Jacketed VARINLINE® housings

For keeping chocolate or margarine fluid or for cooling ice cream, jacketed VARINLINE® housings are available. For heating or cooling products, a hot or cooling medium is passed through the housing jacket in the opposite flow direction.

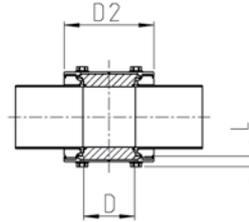


Nominal width	Process connection	Pipe Ø [mm]	Dimension				G	Weight [kg]	Article number
			D [mm]	C [mm]	A [mm]	S [mm]			
DN 25	F	29 × 1.5	50	90	25.0	5	¼"	0.7	221-631.01
DN 40	N	41 × 1.5	68	90	31.0	5	¼"	1.1	221-631.02
DN 50	N	53 × 1.5	68	90	37.0	5	¼"	1.1	221-631.03
DN 80	N	85 × 2.0	68	125	55.5	5	½"	2.3	221-631.08
DN 100	G	104 × 2.0	123	125	65.0	5	½"	4.4	221-631.06
OD 1"	F	25.4 × 1.6	50	90	43.0	5	¼"	0.6	221-631.09
OD 1 ½"	N	38.1 × 1.6	68	90	29.5	5	¼"	0.9	221-631.10
OD 2"	N	50.8 × 1.6	68	90	36.0	5	¼"	1.1	221-631.11
OD 4"	G	101.6 × 2.0	123	125	64.0	5	½"	4.0	221-631.14



VARINLINE® pressure relief half rings

The VARINLINE® pressure relief half-rings are used for controlled channeling of the inner pipe pressure at maintenance or mounting work. The respective VARINLINE® process connection can also be used for taking up a measuring or control instrument*.



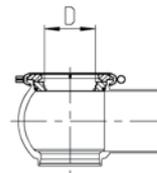
Process connection	Pipe	Dimension		Article number
	Ø [mm]	D [mm]	L [mm]	
F	102	50	14	222-156.02
N	120	68	14	222-156.01

* Not suitable for installation of a VARINLINE® sampling valve type TSVN or TSVU.



VARINLINE® adapters

The flexibility in the VARIVENT® system offers many advantages. Often, adjustments or modifications are required in existing valve systems of a process system. Use of a VARINLINE® adapter permits inserting a VARINLINE® process connection into a VARIVENT® housing, thereby integrating in-line control and measurement* free of dead zones in a valve housing.



Nominal width	Process connection	Dimension	O-ring			Seal disc INL	Locking ring INL	Clamping connection complete
		D [mm]	Material					
			EPDM	FKM	HNBR			
DN 65	N	68	930-150	930-176	930-634	222-108.03	222-108.01	221-507.09
DN 80	N	68	930-150	930-176	930-634	222-108.03	222-108.01	221-507.09
DN 100	N	68	930-156	930-178	930-863	222-108.04	222-108.02	221-507.11
DN 125	N	68	930-372	930-409	-	222-108.06	222-108.05	221-507.13
OD 2 1/2"	N	68	930-150	930-176	930-634	222-108.03	222-108.01	221-507.09
OD 3"	N	68	930-150	930-176	930-634	222-108.03	222-108.01	221-507.09
OD 4"	N	68	930-156	930-178	930-863	222-108.04	222-108.02	221-507.11
IPS 3"	N	68	930-150	930-176	930-634	222-108.03	222-108.01	221-507.09
IPS 4"	N	68	930-156	930-178	930-863	222-108.04	222-108.02	221-507.11

* Not suitable for installation of a VARINLINE® sampling valve type TSVN or TSVU.



Use and function

An O-ring is used for sealing the VARIVENT® flange connection, and is given a defined range of compression by a metal stop. The O-ring is also protected by the special geometry of the recess from being pulled out at high flow rates.

The VARIVENT® flange connection is available as a complete connection including O-rings, screws and nuts, as well as in components (grooved and plain flanges).

The range also contains VARIVENT® blind flanges that are also available as grooved and plain flanges. They are used for shutting off pipelines, e.g. when expansion of the system is only planned for a later time.



Complete connection including bolts and nuts



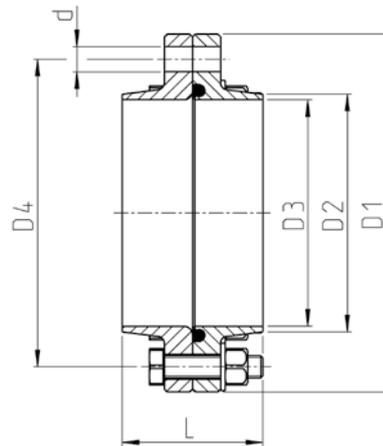
Grooved flange including connecting elements and O-ring



Smooth flange



Technical data	
Material	1.4404
Surface in contact with the product	Ra ≤ 0.8 µm
Certificates	3.1/AD2000W2
Seal materials	EPDM (FDA), FKM (FDA), HNBR (FDA)

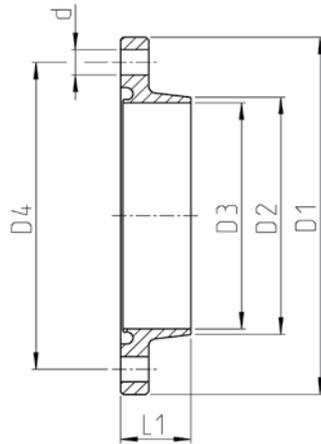


Nominal width	Dimension							O-ring	PS	Weight [kg]	Article number		
	D1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	d [mm]	L [mm]	[mm]				Material		
	EPDM	FKM	HNBR										
DN 25	70	30.0	26.0	53	4 × Ø 9	50	25.0 × 5.0	16	0.6	752-828	752-838	752-848	
DN 40	82	42.0	38.0	65	4 × Ø 9	50	36.0 × 5.0	16	0.7	752-830	752-840	752-849	
DN 50	94	54.0	50.0	77	4 × Ø 9	50	47.0 × 5.0	16	0.9	752-831	752-841	752-850	
DN 65	113	70.0	66.0	95	8 × Ø 9	50	62.0 × 5.0	16	1.2	752-832	752-842	752-851	
DN 80	128	85.0	81.0	110	8 × Ø 9	50	75.0 × 5.0	10	1.5	752-833	752-843	752-852	
DN 100	159	104.0	100.0	137	8 × Ø 11	50	95.0 × 5.0	10	2.3	752-834	752-844	752-853	
DN 125	183	129.0	125.0	161	8 × Ø 11	50	115.0 × 5.0	10	2.7	752-835	752-845	752-854	
DN 150	213	154.0	150.0	188	8 × Ø 14	60	134.2 × 5.7	10	4.8	752-836	752-846	752-878	
OD 1"	66	25.5	22.0	49	4 × Ø 9	50	25 × 5.0	16	0.6	752-858	752-864	752-872	
OD 1 ½"	79	38.5	35.0	62	4 × Ø 9	50	36 × 5.0	16	0.7	752-859	752-865	752-873	
OD 2"	91	51.0	47.5	74	4 × Ø 9	50	47 × 5.0	16	0.9	752-860	752-866	752-874	
OD 2 ½"	106	63.5	60.0	88	8 × Ø 9	50	62 × 5.0	16	1.0	752-861	752-867	752-875	
OD 3"	119	76.5	73.0	101	8 × Ø 9	50	75 × 5.0	10	1.3	752-862	752-868	752-876	
OD 4"	156	102.0	97.5	134	8 × Ø 11	50	95 × 5.0	10	2.3	752-863	752-869	752-877	
OD 6"	211	152.4	146.5	186	8 × Ø 14	50	115 × 5.0	10	5.2	752-691	752-692	752-693	
IPS 2"	101	60.5	57.0	84	8 × Ø 9	50	25 × 5.0	16	1.0	752-855	-	-	
IPS 3"	132	89.0	85.0	114	8 × Ø 9	50	36 × 5.0	10	1.5	752-856	-	-	
IPS 4"	169	114.0	110.0	147	8 × Ø 9	50	47 × 5.0	10	2.5	752-857	-	-	
IPS 6"	227	168.0	162.0	202	8 × Ø 14	60	62 × 5.0	10	5.4	752-837	752-847	-	

VARIVENT® Grooved Flange



Technical data	
Material	1.4404
Surface in contact with the product	Ra ≤ 0.8 µm
Certificates	3.1/AD2000W2
Seal materials	EPDM (FDA), FKM (FDA), HNBR (FDA)



Grooved flange

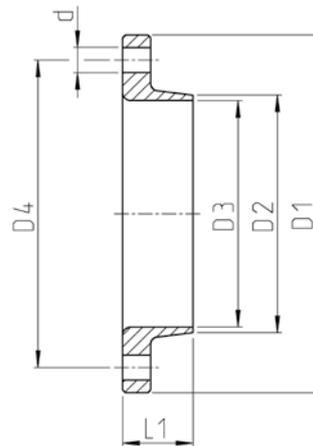


O-Ring

Grooved flange										O-ring			
Nominal width	Dimensions						PS	Weight [kg]	Article number	Dimensions	Article number		
	D1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	d [mm]	L1 [mm]					Material		
									D1 [mm]	EPDM	FKM	HNBR	
DN 25	70	30.0	26.0	53	4 × Ø 9	25	16	0.3	752-703	25.0 × 5.0	930-393	930-564	930-551
DN 40	82	42.0	38.0	65	4 × Ø 9	25	16	0.3	752-705	36.0 × 5.0	930-545	930-566	930-552
DN 50	94	54.0	50.0	77	4 × Ø 9	25	16	0.4	752-706	47.0 × 5.0	930-546	930-567	930-553
DN 65	113	70.0	66.0	95	8 × Ø 9	25	16	0.5	752-707	62.0 × 5.0	930-547	930-526	930-554
DN 80	128	85.0	81.0	110	8 × Ø 9	25	10	0.6	752-708	75.0 × 5.0	930-450	930-527	930-555
DN 100	159	104.0	100.0	137	8 × Ø 11	25	10	1.0	752-709	92.0 × 5.0	930-549	930-568	930-556
DN 125	183	129.0	125.0	161	8 × Ø 11	25	10	1.2	752-710	115.0 × 5.0	930-550	930-569	930-557
DN 150	213	154.0	150.0	188	8 × Ø 14	30	10	2.0	752-711	134.2 × 5.7	930-574	930-575	930-872
OD 1"	66	25.5	22.0	49	4 × Ø 9	25	16	0.3	752-718	22.0 × 5.0	930-376	930-593	930-851
OD 1 ½"	79	38.5	35.0	62	4 × Ø 9	25	16	0.3	752-719	33.5 × 5.0	930-497	930-570	930-852
OD 2"	91	51.0	47.5	74	4 × Ø 9	25	16	0.4	752-720	45.0 × 5.0	930-559	930-571	930-853
OD 2 ½"	106	63.5	60.0	88	8 × Ø 9	25	16	0.5	752-721	56.0 × 5.0	930-560	930-572	930-854
OD 3"	119	76.5	73.0	101	8 × Ø 9	25	10	0.6	752-722	68.0 × 5.0	930-319	930-666	930-652
OD 4"	156	102.0	97.5	134	8 × Ø 11	25	10	1.0	752-723	90.0 × 5.0	930-561	930-573	930-855
OD 6"	211	152.4	146.5	186	8 × Ø 14	30	10	2.0	752-694	134.2 × 5.7	930-574	930-575	930-872
IPS 2"	101	60.5	57.0	84	8 × Ø 9	25	16	0.4	752-715	53.0 × 5.0	930-562	-	-
IPS 3"	132	89.0	85.0	114	8 × Ø 9	25	10	0.6	752-716	78.0 × 5.0	930-563	-	-
IPS 4"	169	114.0	110.0	147	8 × Ø 9	25	10	1.0	752-717	102.0 × 5.0	930-154	930-667	930-654
IPS 6"	227	168.0	162.0	202	8 × Ø 14	30	10	2.3	752-712	149.0 × 5.7	930-403	930-404	-



Technical data	
Material	1.4404
Surface in contact with the product	Ra ≤ 0.8 μm
Certificates	3.1/AD2000W2

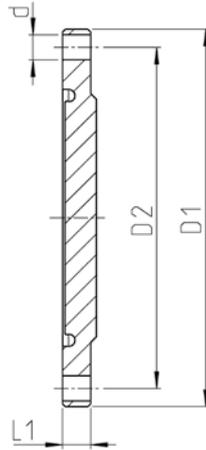


Smooth flange									
Nominal width	Dimensions						PS	Weight [kg]	Article number
	D1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	d [mm]	L1 [mm]			
DN 25	70	30.0	26.0	53	4 × Ø 9	25	16	0.3	752-724
DN 40	82	42.0	38.0	65	4 × Ø 9	25	16	0.3	752-726
DN 50	94	54.0	50.0	77	4 × Ø 9	25	16	0.4	752-727
DN 65	113	70.0	66.0	95	8 × Ø 9	25	16	0.6	752-728
DN 80	128	85.0	81.0	110	8 × Ø 9	25	10	0.7	752-729
DN 100	159	104.0	100.0	137	8 × Ø 11	25	10	1.1	752-730
DN 125	183	129.0	125.0	161	8 × Ø 11	25	10	1.2	752-731
DN 150	213	154.0	150.0	188	8 × Ø 14	30	10	2.1	752-733
OD 1"	66	25.5	22.0	49	4 × Ø 9	25	16	0.2	752-739
OD 1 ½"	79	38.5	35.0	62	4 × Ø 9	25	16	0.3	752-740
OD 2"	91	51.0	47.5	74	4 × Ø 9	25	16	0.4	752-741
OD 2 ½"	106	63.5	60.0	88	8 × Ø 9	25	16	0.5	752-742
OD 3"	119	76.5	73.0	101	8 × Ø 9	25	10	0.6	752-743
OD 4"	156	102.0	97.5	134	8 × Ø 11	25	10	1.0	752-744
OD 6"	211	152.4	146.5	186	8 × Ø 14	30	10	2.4	752-695
IPS 2"	101	60.5	57.0	84	8 × Ø 9	25	16	0.4	752-736
IPS 3"	132	89.0	85.0	114	8 × Ø 9	25	10	0.7	752-737
IPS 4"	169	114.0	110.0	147	8 × Ø 9	25	10	1.1	752-738
IPS 6"	227	168.0	162.0	202	8 × Ø 14	30	10	2.4	752-734

VARIVENT® Blind Grooved Flange



Technical data	
Material	1.4404
Surface in contact with the product	Ra ≤ 0.8 µm
Certificates	3.1/AD2000W2
Seal materials	EPDM (FDA), FKM (FDA), HNBR (FDA)



Blind grooved flange



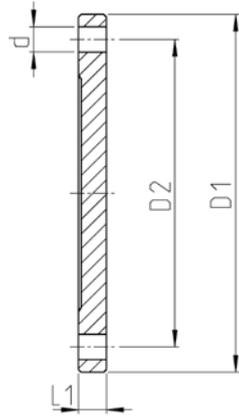
O-Ring

Blind grooved flange								O-ring				
Nominal width	Dimensions				PS	Weight [kg]	Article number	Dimensions	Article number			
	D1 [mm]	D2 [mm]	d [mm]	L1 [mm]					D1 [mm]	Material		
								EPDM	FKM	HNBR		
DN 25	70	53	4 × Ø 9	10	16	0.3	752-763	25.0 × 5.0	930-393	930-564	930-551	
DN 40	82	65	4 × Ø 9	10	16	0.4	752-766	36.0 × 5.0	930-545	930-566	930-552	
DN 50	94	77	4 × Ø 9	10	16	0.5	752-792	47.0 × 5.0	930-546	930-567	930-553	
DN 65	113	95	8 × Ø 9	10	16	0.7	752-790	62.0 × 5.0	930-547	930-526	930-554	
DN 80	128	110	8 × Ø 9	10	10	0.9	752-770	75.0 × 5.0	930-450	930-527	930-555	
DN 100	159	137	8 × Ø 11	10	10	1.4	752-772	92.0 × 5.0	930-549	930-568	930-556	
DN 125	183	161	8 × Ø 11	10	10	2.0	752-773	115.0 × 5.0	930-550	930-569	930-557	
DN 150	213	188	8 × Ø 14	15	10	4.1	752-638	134.2 × 5.7	930-574	930-575	930-872	
OD 1"	66	49	4 × Ø 9	25	16	0.2	752-762	22.0 × 5.0	930-376	930-593	930-851	
OD 1 ½"	79	62	4 × Ø 9	25	16	0.4	752-765	33.5 × 5.0	930-497	930-570	930-852	
OD 2"	91	74	4 × Ø 9	25	16	0.5	752-767	45.0 × 5.0	930-559	930-571	930-853	
OD 2 ½"	106	88	8 × Ø 9	25	16	0.6	752-768	56.0 × 5.0	930-560	930-572	930-854	
OD 3"	119	101	8 × Ø 9	25	10	0.8	752-769	68.0 × 5.0	930-319	930-666	930-652	
OD 4"	156	134	8 × Ø 11	25	10	1.5	752-771	90.0 × 5.0	930-561	930-573	930-855	
OD 6"	211	186	8 × Ø 14	30	10	4.2	752-070	134.2 × 5.7	930-574	930-575	930-872	
IPS 6"	227	202	8 × Ø 14	30	10	4.9	752-004	149.0 × 5.7	930-403	930-404	-	

VARIVENT® Plain Blind Flange



Technical data	
Material	1.4404
Surface in contact with the product	Ra ≤ 0.8 µm
Certificates	3.1/AD2000W2



Plain flange							
Nominal width	Dimensions				PS	Weight [kg]	Article number
	D1 [mm]	D2 [mm]	d [mm]	L1 [mm]			
DN 25	70	53	4 × Ø 9	10	16	0.3	752-774
DN 40	82	65	4 × Ø 9	10	16	0.4	752-777
DN 50	94	77	4 × Ø 9	10	16	0.5	752-779
DN 65	113	95	8 × Ø 9	10	16	0.7	752-782
DN 80	128	110	8 × Ø 9	10	10	0.9	752-784
DN 100	159	137	8 × Ø 11	10	10	1.4	752-787
DN 125	183	161	8 × Ø 11	10	10	2.0	752-788
DN 150	213	188	8 × Ø 14	15	10	4.1	752-791
OD 1"	66	49	4 × Ø 9	25	16	0.2	752-825
OD 1 ½"	79	62	4 × Ø 9	25	16	0.4	752-776
OD 2"	91	74	4 × Ø 9	25	16	0.5	752-778
OD 2 ½"	106	88	8 × Ø 9	25	16	0.6	752-781
OD 3"	119	101	8 × Ø 9	25	10	0.8	752-783
OD 4"	156	134	8 × Ø 11	25	10	1.5	752-786
OD 6"	211	186	8 × Ø 14	30	10	4.2	752-071
IPS 2"	101	84	8 × Ø 9	25	16	0.6	752-780
IPS 3"	132	114	8 × Ø 9	25	10	1.0	752-785
IPS 4"	169	147	8 × Ø 9	25	10	1.6	752-789
IPS 6"	227	202	8 × Ø 14	30	10	4.4	752-212



Function method of the expansion compensator

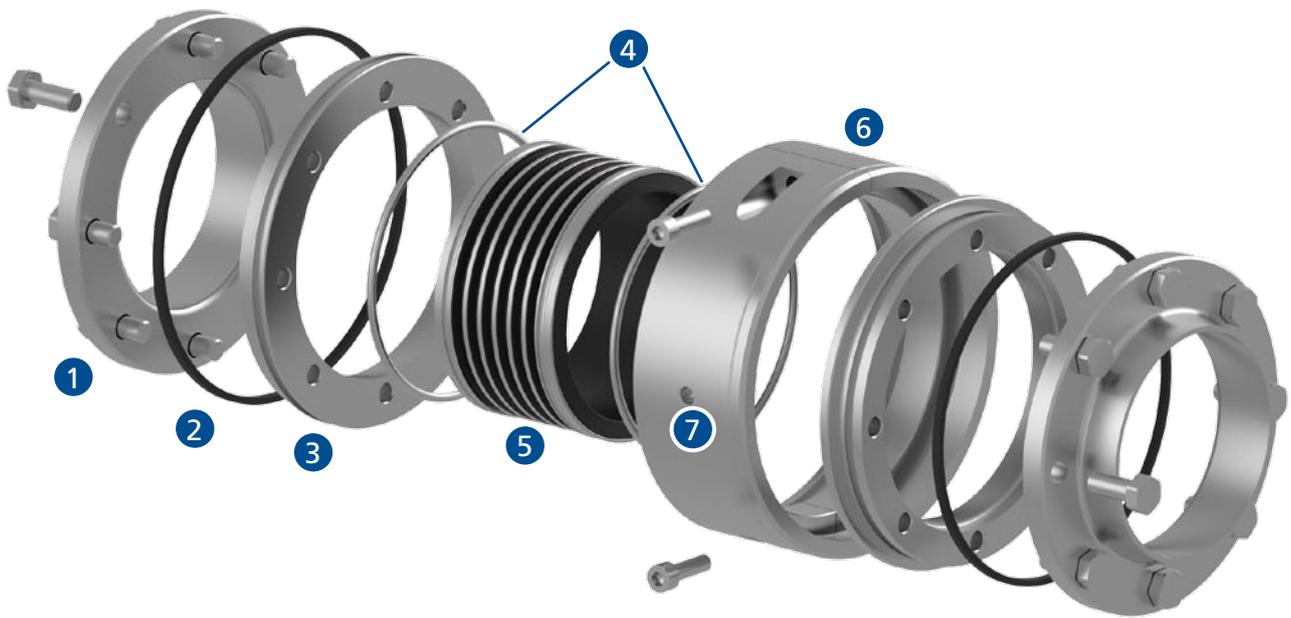
The innovative VARICOMP® expansion compressor compensates for expansions and tensions that result from temperature differences in the pipeline system. Its special design principles allow for use in aseptic processes as well.

A decisive benefit of the VARICOMP® expansion compensator is its dead-zone free design with drain characteristics. This design meets the prerequisites for best cleaning in CIP/SIP-processes.

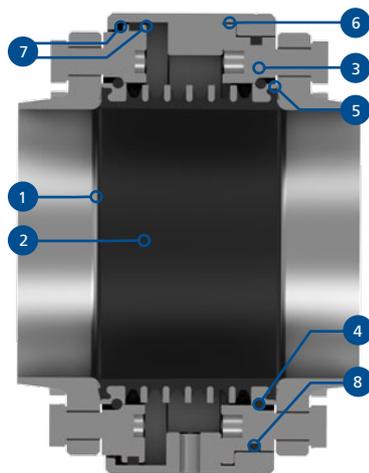


Special features

- Suitable for hygienic and aseptic applications
- EHDG-certified
- Design with no dead zones
- CIP/SIP-able
- Short, compact design
- Compensation element available in EPDM and FKM
- Compensation distances (tension/compression) limited by metallic stop
- Maximum compensation distance 8 mm
- Compensation element with integral vulcanized support rings for high pressure loads



- 1 VARIVENT® smooth flange
- 2 O-Ring
- 3 Internal flange
- 4 Snap ring
- 5 Compensation element
- 6 Half ring
- 7 Leakage display

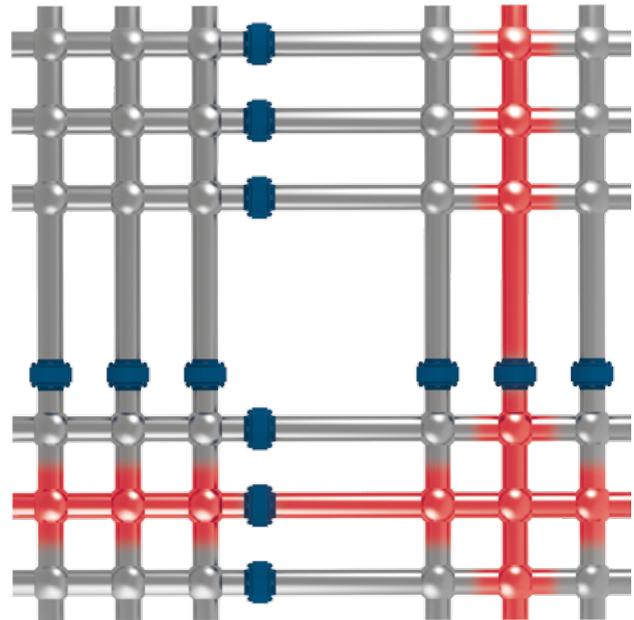


Technical features	
1	Gap-free sealing
2	Pipe-flush, even passage
3	Flange used to fix the compensation element
4	Snap ring for the transmission of force (sealing)
5	Metallic stop (defined sealing pressure, no excessive strain on the compensation element)
6	Fixing of the compensation element at the external ring
7	Defined compensation distance due to metallic stop (tensile/compressive stress) at the external ring, no excessive strain on the compensation element
8	Additional sealing to the outside provided by O-rings



Application ranges

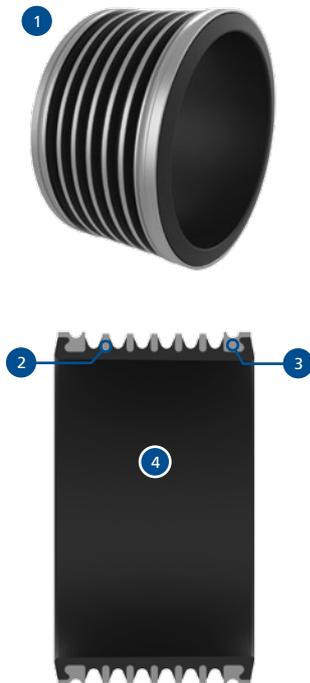
VARICOMP® expansion compensators are used especially in valve blocks and matrix piped systems to compensate for thermal stress in pipeline systems resulting from thermal expansion. They are designed for hygienic and aseptic applications in the dairy, beverage and food industries, as well as in the pharmaceutical, fine chemical, biotechnological and cosmetic industries. The expansion compensators can be used as an alternative for Ω -bends.



Valve block with VARICOMP® compensators

The compensation element

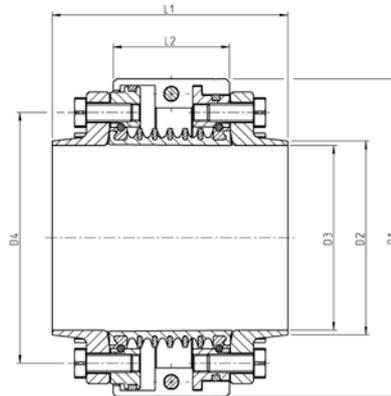
The elastomer compensation element takes up tensions as the core piece of the compensator and compensates for them.



Technical features	
1	Sprayed compensation element of elastomer (EPDM and FKM available)
2	Vulcanized-in support rings of stainless steel for support at pressure load (excess pressure and negative pressure)
3	Vulcanized-in carrying rings for fastening the compensation element
4	Smooth inner faces



Technical data of the standard version	
Material in contact with the product	1.4404
Material not in contact with the product	1.4301
Seal material in contact with the product	EPDM (FDA), FKM (FDA), HNBR (FDA)
Max. product pressure	16 bar (232 psi) from DN 80/OD 3" 10 bar (145 psi)
Surface in contact with the product	Ra ≤ 0.8 µm
Connection fittings	VARINLINE® smooth flange
Certificates	



Nominal width	Dimension						Article number	
	L1 [mm]	L2 [mm]	D1 [mm]	D4 [mm]	D3 [mm]	D2 [mm]	Material	
							EPDM	FKM
DN 50	102.6	52.6	109.5	77.0	50.0	54.0	228-000126	228-000127
DN 65	102.6	52.6	124.5	95.0	66.0	70.0	228-000091	228-000136
DN 80	102.6	52.6	139.5	110.0	81.0	85.0	228-000132	228-000133
DN 100	102.6	52.6	171.3	137.0	100.0	105.0	228-000092	228-000137
DN 125	102.6	52.6	203.3	161.0	125.0	129.0	228-000115	228-000143
OD 2"	102.6	52.6	109.5	77.0	47.5	51.0	228-000128	228-000129
OD 2 ½"	102.6	52.6	109.5	88.0	60.0	63.5	228-000134	228-000135
OD 3"	102.6	52.6	124.5	101.0	73.0	76.5	228-000130	228-000131
OD 4"	102.6	52.6	171.3	137.0	97.5	102.0	228-000138	228-000139
IPS 3"	102.6	52.6	147.5	114.0	84.7	88.9	228-000140	-
IPS 4"	102.6	52.6	186.3	147.0	110.1	114.3	228-000141	-
IPS 6"	102.6	52.6	246.3	202.0	162.7	168.3	228-000142	-

VARIVENT® control valves

VARIVENT® control valves are used for control of applications where constant parameters are required. With gases, vapors or liquids, the valve series is characterized by reliable control of the process.

With many configuration options available, these control valves offer the best economical solutions for individual process requirements. Based on the proven VARIVENT® sealing and housing technology, maximum hygiene is ensured.



VARIVENT® sampling valves

VARIVENT® sampling valves are designed for many different tasks. Both manual sampling of very small amounts and the incorporation into fully automatic, mix-proof sampling and dosage systems are possible. Thanks to the VARIVENT® modular principle, the sampling valves can be easily integrated into process lines and vessels, while fully complying with hygiene requirements.



VARIVENT® overflow valves

Critical pressures in pipeline system can be secured cost-effectively by overflow valves. They are mostly applied in combination with displacement pumps.



VARIVENT® constant pressure valves

A compact design and high function characterize the VARIVENT® constant pressure valve. It is designed for compensating for process-related pressure fluctuations and to keep production-relevant pressures at a constant level at all times.



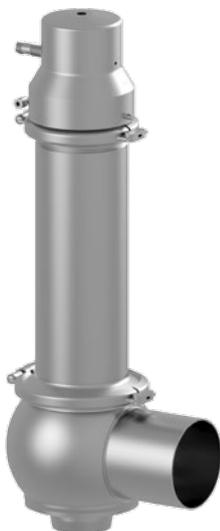
VARIVENT® vacuum valves

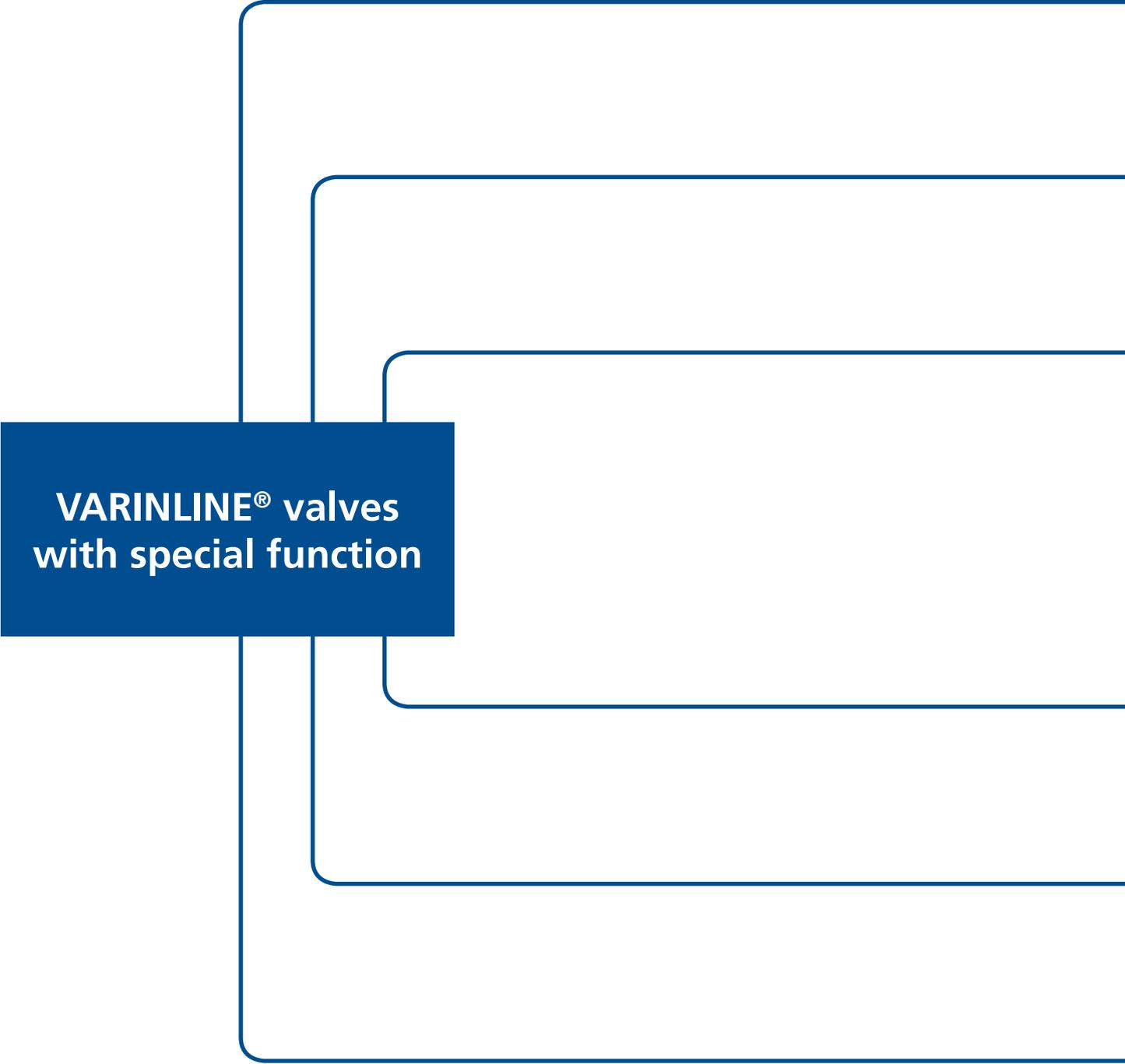
VARIVENT® vacuum valves offer reliable protection from negative pressures. Small differential pressures and a fail-safe construction mark this valve series. The upside down design of the valve disc prevents sucking in of dirt particles into the vessel and thus into the product.



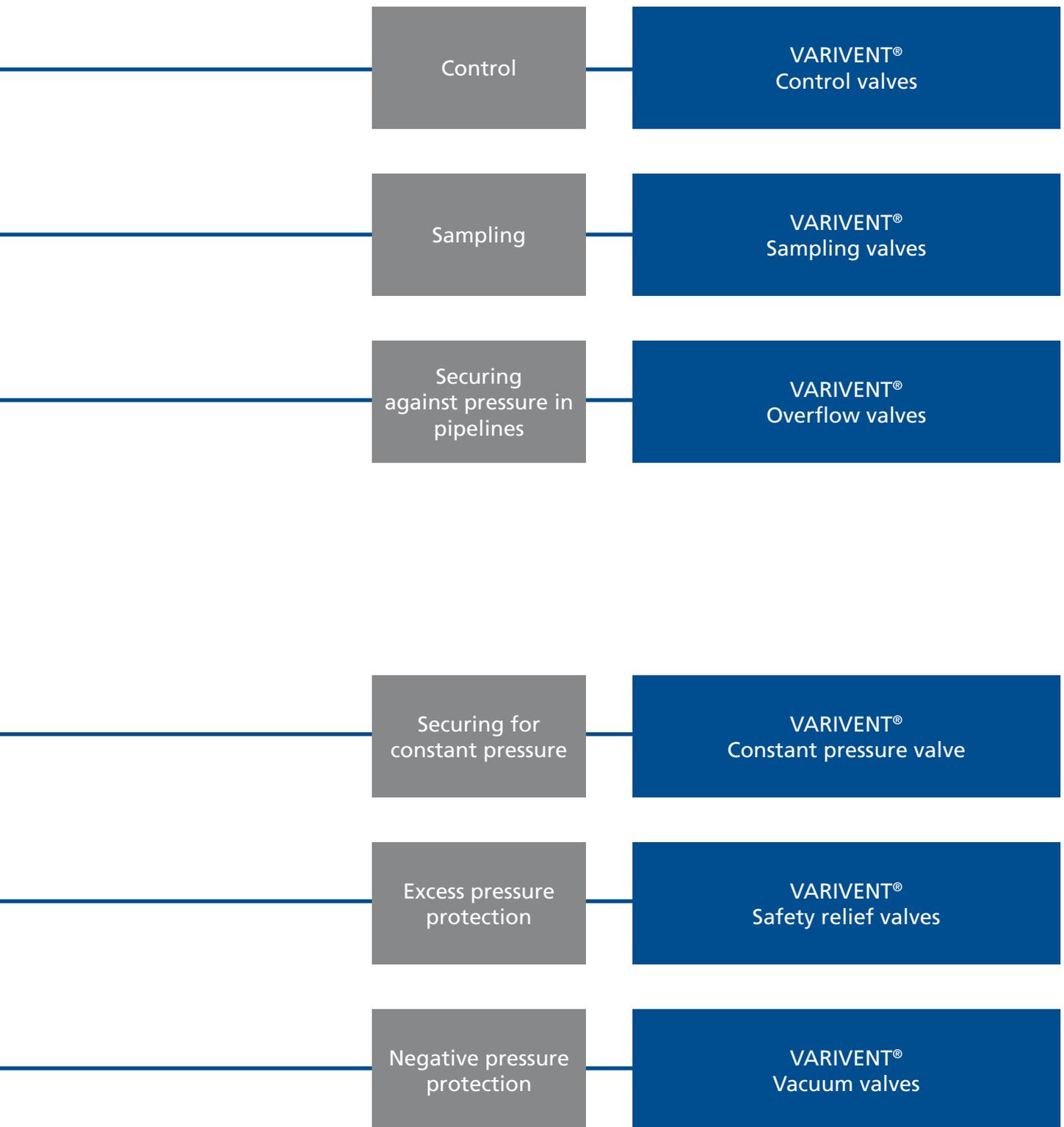
VARIVENT® safety relief valves

VARIVENT® safety relief valves work purely mechanically and offer reliable protection against critical process pressures. The often proven valve contributes to protection from pressure-bearing vessels in various applications. The hygienic design ensures full cleaning capability.





**VARINLINE® valves
with special function**





VARIVENT® control valves

Industry regulations are continually updated to stricter and higher standards. While equipment and components are required to meet these high standards, the expectation from industry buyers is to have state-of-the-art quality technology with minimal costs – operation, maintenance and service.

The modular design of the VARIVENT® valve system allows individual customization for specific tasks. These adjustments create better efficiency for system operators. The VARIVENT® systems don't require many parts, thereby reducing the need for large spare parts inventories.

Integration of control valves in the process control system directly influences the quality of control and the product. This is a prerequisite for preventive maintenance as well as better efficiency of the process system.

General benefits

- Proven seal geometry
- Dead-zone-free VARIVENT® housing
- Maximum efficiency in cleaning
- Low spare part stocks

Function of the valve

Control valves serve as actuator elements in the control circuits. The respective actuator valve acts as a throttle device that sets a desired flow rate in a pipe.

Technical configuration

The linear- or equal-percentage control cone as well as the corresponding valve seat is placed in the fully cleanable, dead-zone-free VARIVENT® housing. Uncomplicated adjustments to changing operating conditions are possible due to the replaceable seat ring with control cone. Visual inspections of the control valve are simplified by the open lantern, which also indicates any leakages.

Clamp connections between the individual modules permit quick installation and maintenance of the control valve. Type S control valves are wet-room compatible. The options spring-to-close (NC)/spring-to-open (NO) of the valve can be selected freely due to reversibility of the actuators.

Special positioners specify the stroke with very high accuracy. Several Kvs values, per nominal width, are possible due to the suitable combinations of seat ring and control cone. Thus, the valve can be optimally adjusted to the process. Soft and metallic sealing valve discs are available.



Application examples

The necessity to adhere to the strict standards in food production requires that control valves be customized for the highest hygienic demands in the food industry.

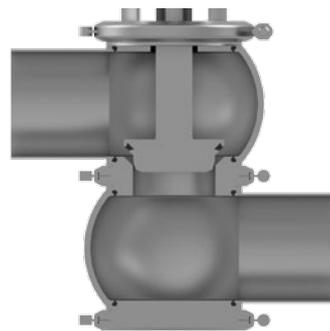
Any contamination would endanger the product also in the production of medical products in the pharmaceuticals industry, in chemical process plants, as well as in the technical use of enzymes, cells and micro-organisms. Therefore, it is necessary to use hygienic control valves with no dead zones, that can be cleaned efficiently and without residual residue.

VARIVENT® valves permit low-germ processes. The actuator valves meet highly hygienic demands and make it possible to conduct pipe cleaning through efficient CIP or SIP processes.

S-series control valves are used for pressure control, flow control or to mix liquids. Typical applications are: pressure modulation, yeast control or filling. There are different control valves for diverse control tasks (e.g. for recipe management, batch log and dosing) available.

Special features

- Low maintenance and installation effort by clamped connections
- Linear- and equal-percentage control cones
- Stainless steel actuator
- Modular design for flexible optimization for application conditions
- Soft- or metal-sealing valve discs
- Positioners for many different applications



Closed position of a control valve with a seal

VARIVENT® type S

The VARIVENT® modular system has many versions available for optimizing the valves in the process system. Divert valves are also available for mixing or distribution of products. Different cone valve seat combinations permit user-specific optimization for each particular plant process.

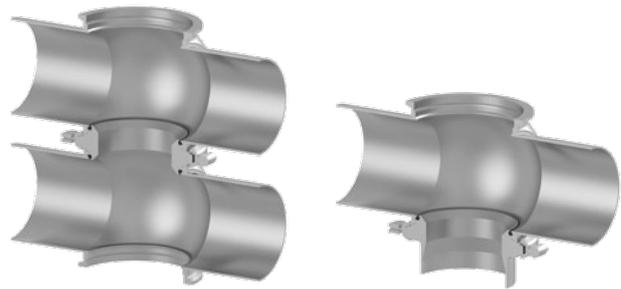


Housing combinations

VARIVENT® type S control valves are available with different housing combinations.

Valve seat version

The clamped housing connection is characterized by a high level of flexibility when it comes to installing the valve. The port orientation of the valve can be adapted to the pipeline system in question.



Clamped housing connection:
Seat ring clamped by clamping connection

L0-housing

The ease of replacing the seat ring with the associated valve disc allows for adjustment of the desired Kvs value.

For the housing combinations L and T, the vertical port is connected to the valve housing with a clamping connection.

Nominal width	Kvs values																						
	0.1*	0.16*	0.25*	0.4*	0.63*	1*	1.6	2.5	4	6.3	10	16	25	35	40	60	80	100	160	200	260	360	
DN 25	•	•	•	•	•	•	•	•	•	•	•	•	•										
DN 40										•	•	•	•										
DN 50										•	•	•	•	•	•								
DN 65													•	•	•	•							
DN 80														•	•	•	•						
DN 100																•	•	•	•				
DN 125																		•	•	•	•		
DN 150																				•	•	•	•
OD 1"	•	•	•	•	•	•	•	•	•	•	•	•	•										
OD 1 1/2"										•	•	•	•										
OD 2"											•	•	•	•	•								
OD 2 1/2"													•	•	•	•							
OD 3"														•	•	•	•						
OD 4"																•	•	•	•				
OD 6"																				•	•	•	•
IPS 2"												•	•	•	•	•							
IPS 3"													•	•	•	•	•						
IPS 4"																•	•	•	•				
IPS 6"																				•	•	•	•

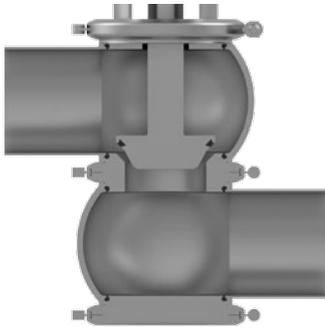
* Only for use in the gas area, e.g. in gas blocks (brewery)

Control characteristics

The characteristic curve of a control valve is defined as the dependence of the K_v value from the stroke, specified by the shape of the control cone. Linear- or equal-percentage control cones are available.

For a valve with a linear characteristic curve, the K_v value changes continually at a ratio to the stroke, while the equal-percentage characteristic curve shows a percentage change of the particular K_v value that is identical to the stroke change.

A linear characteristic curve of the valve is wanted for controls where the control valve causes more than 30 % of the total pressure drop, e.g. in level control. In all other applications, use of an equal-percentage control cone is recommended. This is the case in approx. 90 % of all applications.



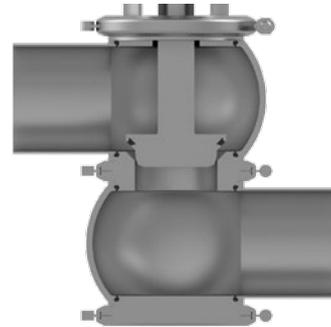
Control valve with linear control cone

The K_{vs} value is defined as the flow in m^3/h of water at 5–30 °C, which flows through the valve at full opening at a pressure drop of 1 bar.

Usually, the K_{vs} value of the valve is chosen approx. 30 % larger than the maximum K_v value calculated for the respective operating conditions. This compensates the tolerance of the K_{vs} value. Therefore, it is also possible to adjust the maximum flow.

The control valves with a 3-stage seat (type S_K) have linear control characteristics. They are used to reduce cavitation and noise and are mostly used for large differential pressures.

The divert valves are available as flow mixer (type S_W) or flow divider (type S_X). They are only available with linear control cones in the metallic-sealing design.

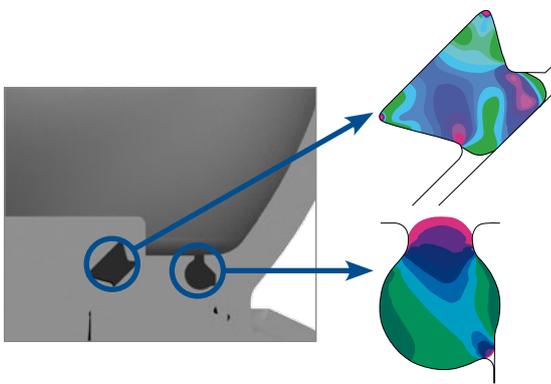


Control valve with equal-percentage control cone

Sealing acc. to the VARIVENT® principle

The hygienic control valves are characterized by special seal technology. The metallic stop design prolongs the life of the seal because of its symmetrical wear with every stroke. This allows for extended time between required maintenance services with the process system, thereby allowing for continuous production and shorter downtimes.

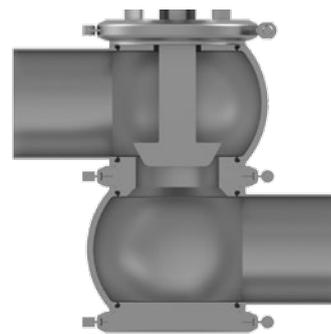
The special groove shape in the valve disc ensures the seal has a secure hold at all times up to a pressure differential of 10 bar during switching. To minimize the danger of cavitation, the pressure loss between the upper and the lower housing should be kept as low as possible. The seal geometry was optimized using FEM calculations.



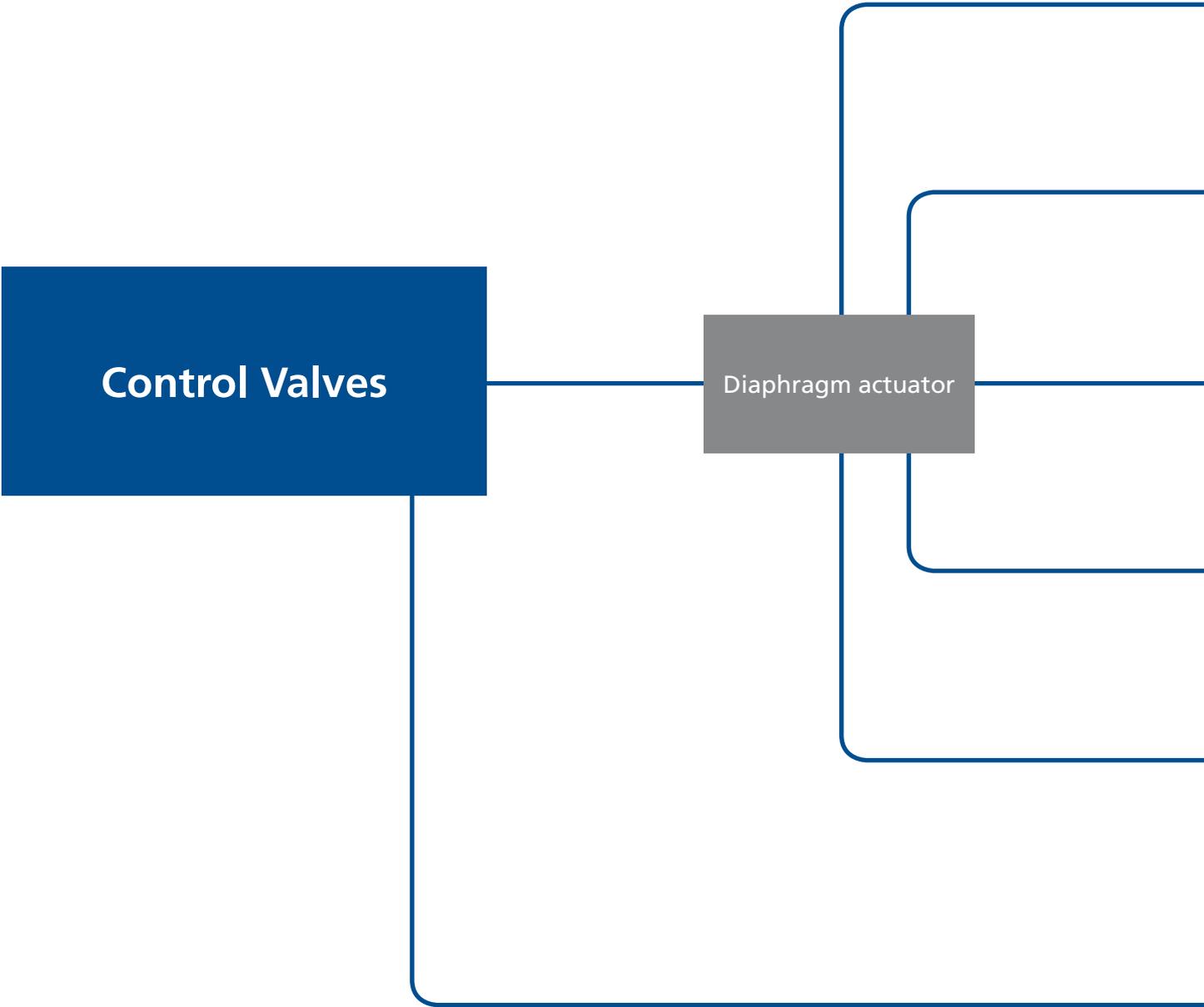
Representation of the stress load of the housing O-ring and the V-ring

Seals
Long operating time
Vacuum-proof
Selection of FDA-compliant seal materials
<ul style="list-style-type: none"> • EPDM
<ul style="list-style-type: none"> • FKM
<ul style="list-style-type: none"> • HNBR
<ul style="list-style-type: none"> • FFKM

If additional shut-off functions do not have to be performed, or if a higher leakage rate of the seat seal can be tolerated, then the control valves with a metal seat design can be used. These valves offer the benefit of lower maintenance requirements.



Metal seat design



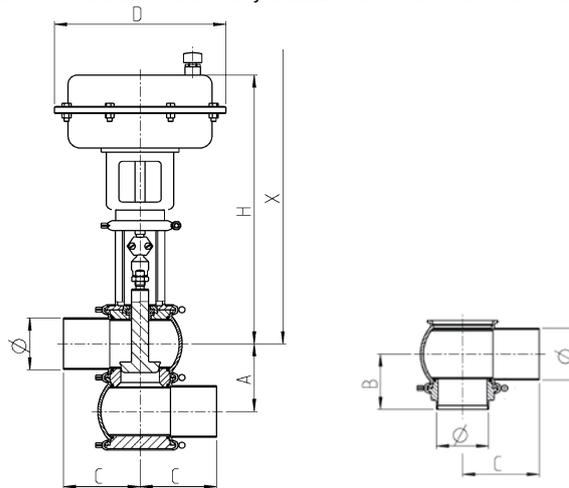
Equal-percentage characteristic curve	VARIVENT® control valve type S
Linear characteristic curve	VARIVENT® control valve type S
3-stage seat, reduction of high differential pressures	VARIVENT® control valve type S
Divert valve, product-merging	VARIVENT® control valve type S
Divert valve, product distribution	VARIVENT® control valve type S
Analog or digital SAMSON positioner	

4.1



Technical data of the standard version	
Control characteristics	Equal-percentage
Recommended flow direction	From bottom to top
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Ambient temperature	0 to 45 °C
Air supply pressure	Max. 6 bar (max. 87 psi) Certificates
Product pressure	DN 25–65, OD 1"–2 ½", IPS 2" 16 bar*
	DN 80–150, OD 3"–6", IPS 3"–6" 10 bar
Surface in contact with the product	DN, OD Ra ≤ 0.8 µm IPS Ra ≤ 1.2 µm
External housing surface	Matte blasted
Positioner	I/P positioner; type 3725
Actuator type	Diaphragm actuator air/spring
Connection fittings	Welding end
Identification	Adhesive ID tag
Valve seat version	Clamped seat ring
Certificates	CE 

* A product pressure of more than 10 bar is only available for control valves with metallic control cone seal.



Nominal width	Pipe	Housing			Diaphragm surface 175 cm ²		Diaphragm surface 350 cm ²		Diaphragm surface 750 cm ²		Valve
	Ø [mm]	C [mm]	A [mm]	B [mm]	D [mm]	H [mm]	D [mm]	H [mm]	D [mm]	H [mm]	X [mm]
DN 25	29.0 × 1.50	90.0	50.0	58.0	215	370	–	–	–	–	393
DN 40	41.0 × 1.50	90.0	62.0	64.0	215	376	280	380	–	–	415
DN 50	53.0 × 1.50	90.0	74.0	70.0	215	382	280	386	–	–	433
DN 65	70.0 × 2.00	125.0	96.0	83.0	215	393	280	397	–	–	466
DN 80	85.0 × 2.00	125.0	111.0	90.5	215	401	280	405	–	–	489
DN 100	104.0 × 2.00	125.0	130.0	100.0	–	–	280	414	390	471	574
DN 125	129.0 × 2.00	150.0	155.0	112.5	–	–	–	–	390	479	612
DN 150	154.0 × 2.00	150.0	180.0	125.0	–	–	–	–	390	560	718
OD 1"	25.4 × 1.60	90.0	46.0	56.0	215	368	–	–	–	–	391
OD 1 ½"	38.1 × 1.60	90.0	59.0	62.5	215	378	280	382	–	–	414
OD 2"	50.8 × 1.60	90.0	71.5	69.0	215	381	280	385	–	–	432
OD 2 ½"	63.5 × 1.60	125.0	90.0	80.0	215	397	280	401	–	–	464
OD 3"	76.2 × 1.60	125.0	103.0	86.5	215	–	280	408	–	–	541
OD 4"	101.6 × 2.00	125.0	127.5	99.0	–	–	280	416	390	537	573
OD 6"	152.4 × 2.77	150.0	177.0	123.0	–	–	–	–	390	559	714
IPS 2"	60.3 × 2.00	114.3	81.0	73.5	215	379	280	383	–	–	437
IPS 3"	88.9 × 2.30	152.5	115.0	92.5	215	399	280	403	–	–	491
IPS 4"	114.3 × 2.30	152.5	140.0	105.0	–	–	280	409	390	439	579
IPS 6"	168.2 × 2.00	152.5	192.0	131.0	–	–	–	–	390	555	724

Position	Description of the order code					
1	Valve type					
	S VARIVENT® control valve					
2	Housing combinations					
3	Supplement to the valve type					
	F Equal-percentage characteristic curve					
4/5	Nominal width (upper housing/lower housing)					
	DN 25	OD 1"				
	DN 40	OD 1 ½"				
	DN 50	OD 2"			IPS 2"	
	DN 65	OD 2 ½"				
	DN 80	OD 3"			IPS 3"	
	DN 100	OD 4"			IPS 4"	
	DN 125					
	DN 150	OD 6"			IPS 6"	
6	Non-actuated position					
	Z Spring-to-close (NC)					
	A Spring-to-open (NO)					
7	Control cone seal					
	M Metallic, no V-ring					
	W Soft-sealing, with V-ring					
8	Kvs value					
	0.1	DN 25, OD 1"	4	DN 25, OD 1"	80	DN 80–100, OD 3"–4", IPS 3"–4"
	0.16	DN 25, OD 1"	6.3	DN 25–40, OD 1"–1 ½"	100	DN 100–125, OD 4", IPS 4"
	0.25	DN 25, OD 1"	10	DN 25–50, OD 1"–2", IPS 2"	160	DN 100–125, OD 4", IPS 4"
	0.4	DN 25, OD 1"	16	DN 40–50, OD 1 ½"–2", IPS 2"	200	DN 125–150, OD 6", IPS 6"
	0.63	DN 25, OD 1"	25	DN 40–65, OD 1 ½"–2 ½", IPS 2"	260	DN 125–150, OD 6", IPS 6"
	1	DN 25, OD 1"	35	DN 50–80, OD 2"–3", IPS 2"–3"	360	DN 150, OD 6", IPS 6"
	1.6	DN 25, OD 1"	40	DN 50–80, OD 2"–3", IPS 2"–3"		
	2.5	DN 25, OD 1"	60	DN 65–100, OD 2 ½"–4", IPS 2"–4"		
9	Actuator					
	175 Diaphragm surface 175 cm²					
	350 Diaphragm surface 350 cm²					
	750 Diaphragm surface 750 cm²					
10	Actuation pressure					
	1	0.4–0.2 bar	4	1.65–2.65 bar	7	2.3–4.2 bar
	2	0.8–2.4 bar	5	2.1–3.3 bar		
	3	1.0–3.0 bar	6	2.2–3.4 bar		
11	Actuator material					
	S Stainless Steel					
	P Steel sheet, powder-coated					
12	Seal material in contact with the product					
	1	EPDM (FDA)	2	FKM (FDA)	3	HNBR (FDA; to DN 100, OD 4")
13	Surface quality of the housing					
	1 Inside Ra ≤ 1.2 µm, outside matte blasted (IPS)					
	2 Inside Ra ≤ 0.8 µm, outside matte blasted (DN, OD)					
14	Connection fittings					
	N Welding end					
15	Options (See acc. to valve types)					
+						
16	Positioner					
	0----- Order code for positioners, see at the end of the Section Control Valves index					

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14	15	16
Code	S		F	/									N		0-----

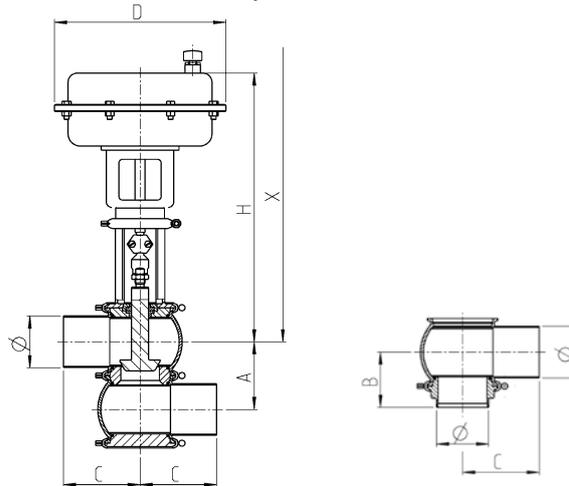
For order codes differing from the standard version, please refer to section 7 (options).



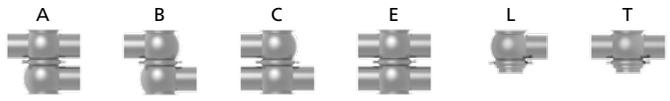


Technical data of the standard version	
Control characteristics	Linear
Recommended flow direction	From bottom to top
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Ambient temperature	0 to 45 °C
Air supply pressure	Max. 6 bar (max. 87 psi) Certificates
Product pressure	DN 25–65, OD 1"–2 ½", IPS 2" 16 bar*
	DN 80–150, OD 3"–6", IPS 3" 10 bar
Surface in contact with the product	DN, OD Ra ≤ 0.8 µm IPS Ra ≤ 1.2 µm
External housing surface	Matte blasted
Positioner	I/P positioner; type 3725
Actuator type	Diaphragm actuator air/spring
Connection fittings	Welding end
Identification	Adhesive ID tag
Valve seat version	Clamped seat ring
Certificates	CE 

* A product pressure of more than 10 bar is only available for control valves with metallic control cone seal.



Nominal width	Pipe	Housing			Diaphragm surface 175 cm ²		Diaphragm surface 350 cm ²		Diaphragm surface 750 cm ²		Valve
	Ø [mm]	C [mm]	A [mm]	B [mm]	D [mm]	H [mm]	D [mm]	H [mm]	D [mm]	H [mm]	X [mm]
DN 25	29.0 × 1.50	90.0	50.0	58.0	215	370	-	-	-	-	393
DN 40	41.0 × 1.50	90.0	62.0	64.0	215	376	280	380	-	-	415
DN 50	53.0 × 1.50	90.0	74.0	70.0	215	382	280	386	-	-	433
DN 65	70.0 × 2.00	125.0	96.0	83.0	215	393	280	397	-	-	466
DN 80	85.0 × 2.00	125.0	111.0	90.5	215	401	280	405	-	-	489
DN 100	104.0 × 2.00	125.0	130.0	100.0	-	-	280	414	390	471	574
DN 125	129.0 × 2.00	150.0	155.0	112.5	-	-	-	-	390	479	612
DN 150	154.0 × 2.00	150.0	180.0	125.0	-	-	-	-	390	560	718
OD 1"	25.4 × 1.60	90.0	46.0	56.0	215	368	-	-	-	-	391
OD 1 ½"	38.1 × 1.60	90.0	59.0	62.5	215	378	280	382	-	-	414
OD 2"	50.8 × 1.60	90.0	71.5	69.0	215	381	280	385	-	-	432
OD 2 ½"	63.5 × 1.60	125.0	90.0	80.0	215	397	280	401	-	-	464
OD 3"	76.2 × 1.60	125.0	103.0	86.5	215	-	280	408	-	-	541
OD 4"	101.6 × 2.00	125.0	127.5	99.0	-	-	280	416	390	537	573
OD 6"	152.4 × 2.77	150.0	177.0	123.0	-	-	-	-	390	559	714
IPS 2"	60.3 × 2.00	114.3	81.0	73.5	215	379	280	383	-	-	437
IPS 3"	88.9 × 2.30	152.5	115.0	92.5	215	399	280	403	-	-	491
IPS 4"	114.3 × 2.30	152.5	140.0	105.0	-	-	280	409	390	439	579
IPS 6"	168.2 × 2.00	152.5	192.0	131.0	-	-	-	-	390	555	724

Position	Description of the order code																																																
1	Valve type S VARIVENT® control valve																																																
2	Housing combinations 																																																
3	Supplement to the valve type J Linear characteristic curve																																																
4/5	Nominal width (upper housing/lower housing) <table border="1"> <tr> <td>DN 25</td> <td>OD 1"</td> <td></td> </tr> <tr> <td>DN 40</td> <td>OD 1 ½"</td> <td></td> </tr> <tr> <td>DN 50</td> <td>OD 2"</td> <td>IPS 2"</td> </tr> <tr> <td>DN 65</td> <td>OD 2 ½"</td> <td></td> </tr> <tr> <td>DN 80</td> <td>OD 3"</td> <td>IPS 3"</td> </tr> <tr> <td>DN 100</td> <td>OD 4"</td> <td>IPS 4"</td> </tr> <tr> <td>DN 125</td> <td></td> <td></td> </tr> <tr> <td>DN 150</td> <td>OD 6"</td> <td>IPS 6"</td> </tr> </table>	DN 25	OD 1"		DN 40	OD 1 ½"		DN 50	OD 2"	IPS 2"	DN 65	OD 2 ½"		DN 80	OD 3"	IPS 3"	DN 100	OD 4"	IPS 4"	DN 125			DN 150	OD 6"	IPS 6"																								
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6	Non-actuated position Z Spring-to-close (NC) A Spring-to-open (NO)																																																
7	Control cone seal M Metallic, no V-ring W Soft-sealing, with V-ring																																																
8	Kvs value <table border="1"> <tr> <td>0.1</td> <td>DN 25, OD 1"</td> <td>4</td> <td>DN 25, OD 1"</td> <td>80</td> <td>DN 80–100, OD 3"–4", IPS 3"–4"</td> </tr> <tr> <td>0.16</td> <td>DN 25, OD 1"</td> <td>6,3</td> <td>DN 25–40, OD 1"–1 ½"</td> <td>100</td> <td>DN 100–125, OD 4", IPS 4"</td> </tr> <tr> <td>0.25</td> <td>DN 25, OD 1"</td> <td>10</td> <td>DN 25–50, OD 1"–2", IPS 2"</td> <td>160</td> <td>DN 100–125, OD 4", IPS 4"</td> </tr> <tr> <td>0.4</td> <td>DN 25, OD 1"</td> <td>16</td> <td>DN 40–50, OD 1 ½"–2", IPS 2"</td> <td>200</td> <td>DN 125–150, OD 6", IPS 6"</td> </tr> <tr> <td>0.63</td> <td>DN 25, OD 1"</td> <td>25</td> <td>DN 40–65, OD 1 ½"–2 ½", IPS 2"</td> <td>260</td> <td>DN 125–150, OD 6", IPS 6"</td> </tr> <tr> <td>1</td> <td>DN 25, OD 1"</td> <td>35</td> <td>DN 50–80, OD 2"–3", IPS 2"–3"</td> <td>360</td> <td>DN 150, OD 6", IPS 6"</td> </tr> <tr> <td>1.6</td> <td>DN 25, OD 1"</td> <td>40</td> <td>DN 50–80, OD 2"–3", IPS 2"–3"</td> <td></td> <td></td> </tr> <tr> <td>2.5</td> <td>DN 25, OD 1"</td> <td>60</td> <td>DN 65–100, OD 2 ½"–4", IPS 2"–4"</td> <td></td> <td></td> </tr> </table>	0.1	DN 25, OD 1"	4	DN 25, OD 1"	80	DN 80–100, OD 3"–4", IPS 3"–4"	0.16	DN 25, OD 1"	6,3	DN 25–40, OD 1"–1 ½"	100	DN 100–125, OD 4", IPS 4"	0.25	DN 25, OD 1"	10	DN 25–50, OD 1"–2", IPS 2"	160	DN 100–125, OD 4", IPS 4"	0.4	DN 25, OD 1"	16	DN 40–50, OD 1 ½"–2", IPS 2"	200	DN 125–150, OD 6", IPS 6"	0.63	DN 25, OD 1"	25	DN 40–65, OD 1 ½"–2 ½", IPS 2"	260	DN 125–150, OD 6", IPS 6"	1	DN 25, OD 1"	35	DN 50–80, OD 2"–3", IPS 2"–3"	360	DN 150, OD 6", IPS 6"	1.6	DN 25, OD 1"	40	DN 50–80, OD 2"–3", IPS 2"–3"			2.5	DN 25, OD 1"	60	DN 65–100, OD 2 ½"–4", IPS 2"–4"		
0.1	DN 25, OD 1"	4	DN 25, OD 1"	80	DN 80–100, OD 3"–4", IPS 3"–4"																																												
0.16	DN 25, OD 1"	6,3	DN 25–40, OD 1"–1 ½"	100	DN 100–125, OD 4", IPS 4"																																												
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1	DN 25, OD 1"	35	DN 50–80, OD 2"–3", IPS 2"–3"	360	DN 150, OD 6", IPS 6"																																												
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9	Actuator 175 Diaphragm surface 175 cm² 350 Diaphragm surface 350 cm² 750 Diaphragm surface 750 cm²																																																
10	Actuation pressure <table border="1"> <tr> <td>1</td> <td>0.4–0.2 bar</td> <td>4</td> <td>1.65–2.65 bar</td> <td>7</td> <td>2.3–4.2 bar</td> </tr> <tr> <td>2</td> <td>0.8–2.4 bar</td> <td>5</td> <td>2.1–3.3 bar</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>1.0–3.0 bar</td> <td>6</td> <td>2.2–3.4 bar</td> <td></td> <td></td> </tr> </table>	1	0.4–0.2 bar	4	1.65–2.65 bar	7	2.3–4.2 bar	2	0.8–2.4 bar	5	2.1–3.3 bar			3	1.0–3.0 bar	6	2.2–3.4 bar																																
1	0.4–0.2 bar	4	1.65–2.65 bar	7	2.3–4.2 bar																																												
2	0.8–2.4 bar	5	2.1–3.3 bar																																														
3	1.0–3.0 bar	6	2.2–3.4 bar																																														
11	Actuator material S Stainless Steel P Steel sheet, powder-coated																																																
12	Seal material in contact with the product <table border="1"> <tr> <td>1</td> <td>EPDM (FDA)</td> <td>2</td> <td>FKM (FDA)</td> <td>3</td> <td>HNBR (FDA; to DN 100, OD 4")</td> </tr> </table>	1	EPDM (FDA)	2	FKM (FDA)	3	HNBR (FDA; to DN 100, OD 4")																																										
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13	Surface quality of the housing 1 Inside Ra ≤ 1.2 µm, outside matte blasted (IPS) 2 Inside Ra ≤ 0.8 µm, outside matte blasted (DN, OD)																																																
14	Connection fittings N Welding end																																																
15	Options (See acc. to valve types)																																																
+																																																	
16	Positioner 0----- Order code for positioners, see at the end of the Section Control Valves index																																																

The code is composed as follows, depending on the chosen configuration:

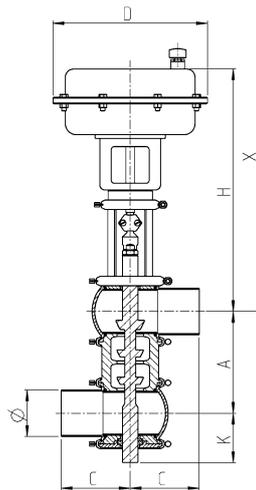
Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14	15	16
Code	S		J	/									N		0-----

For order codes differing from the standard version, please refer to section 7 (options).

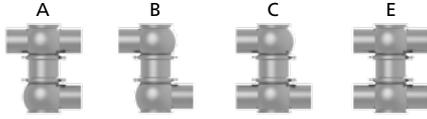




Technical data of the standard version	
Control characteristics	Linear
Recommended flow direction	From bottom to top
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Ambient temperature	0 to 45 °C
Air supply pressure	Max. 6 bar (max. 87 psi) Certificates
Product pressure	DN 25–65, OD 1"–2 ½", IPS 2" 16 bar
	DN 80–100, OD 3"–4", IPS 3"–4" 10 bar
Surface in contact with the product	DN, OD Ra ≤ 0.8 µm IPS Ra ≤ 1.2 µm
External housing surface	Matte blasted
Positioner	I/P positioner; type 3725
Actuator type	Diaphragm actuator air/spring
Connection fittings	Welding end
Identification	Adhesive ID tag
Valve seat version	Clamped seat ring
Certificates	 



Nominal width	Pipe		Housing			Diaphragm surface 175 cm ²		Diaphragm surface 350 cm ²		Diaphragm surface 750 cm ²		Valve
	Ø [mm]	C [mm]	A [mm]	K [mm]	D [mm]	H [mm]	D [mm]	H [mm]	D [mm]	H [mm]	X [mm]	
DN 25	29.0 × 1.50	90.0	On request	On request	–	–	–	–	–	–	393	
DN 40	41.0 × 1.50	90.0	On request	On request	–	–	280	380	–	–	415	
DN 50	53.0 × 1.50	90.0	On request	On request	–	–	280	386	–	–	433	
DN 65	70.0 × 2.00	125.0	On request	On request	–	–	–	–	390	454	466	
DN 80	85.0 × 2.00	125.0	On request	On request	–	–	–	–	390	462	489	
DN 100	104.0 × 2.00	125.0	On request	On request	–	–	–	–	390	471	574	
OD 1"	25.4 × 1.60	90.0	On request	On request	–	–	–	372	–	–	391	
OD 1 ½"	38.1 × 1.60	90.0	On request	On request	–	–	280	382	–	–	414	
OD 2"	50.8 × 1.60	90.0	On request	On request	–	–	280	388	–	–	432	
OD 2 ½"	63.5 × 1.60	125.0	On request	On request	–	–	280	401	390	451	464	
OD 3"	76.2 × 1.60	125.0	On request	On request	–	–	–	–	390	465	541	
OD 4"	101.6 × 2.00	125.0	On request	On request	–	–	–	–	390	473	573	
IPS 2"	60.3 × 2.00	114.3	On request	On request	–	–	280	383	–	–	437	
IPS 3"	88.9 × 2.30	152.5	On request	On request	–	–	–	–	390	460	491	
IPS 4"	114.3 × 2.30	152.5	On request	On request	–	–	280	–	390	466	579	

Position	Description of the order code																								
1	Valve type S VARIVENT® control valve																								
2	Housing combinations 																								
3	Supplement to the valve type K 3-stage seat, linear characteristic curve																								
4/5	Nominal width (upper housing/lower housing) <table border="1"> <tr> <td>DN 25</td> <td>OD 1"</td> <td></td> </tr> <tr> <td>DN 40</td> <td>OD 1 ½"</td> <td></td> </tr> <tr> <td>DN 50</td> <td>OD 2"</td> <td>IPS 2"</td> </tr> <tr> <td>DN 65</td> <td>OD 2 ½"</td> <td></td> </tr> <tr> <td>DN 80</td> <td>OD 3"</td> <td>IPS 3"</td> </tr> <tr> <td>DN 100</td> <td>OD 4"</td> <td>IPS 4"</td> </tr> <tr> <td>DN 125</td> <td></td> <td></td> </tr> <tr> <td>DN 150</td> <td>OD 6"</td> <td>IPS 6"</td> </tr> </table>	DN 25	OD 1"		DN 40	OD 1 ½"		DN 50	OD 2"	IPS 2"	DN 65	OD 2 ½"		DN 80	OD 3"	IPS 3"	DN 100	OD 4"	IPS 4"	DN 125			DN 150	OD 6"	IPS 6"
DN 25	OD 1"																								
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DN 80	OD 3"	IPS 3"																							
DN 100	OD 4"	IPS 4"																							
DN 125																									
DN 150	OD 6"	IPS 6"																							
6	Non-actuated position Z Spring-to-close (NC) A Spring-to-open (NO)																								
7	Control cone seal M Metallic, no V-ring																								
8	Kvs value 2.3 DN 25, OD 1" 5.8 DN 40, OD 1 ½" 9.2 DN 50, OD 2", IPS 2" 14.4 DN 65, OD 2 ½" 23.1 DN 80, OD 3", IPS 3" 34.6 DN 100, OD 4", IPS 4" 115.5 DN 125, DN 150, OD 6", IPS 6"																								
9	Actuator 350 Diaphragm surface 350 cm² 750 Diaphragm surface 750 cm²																								
10	Actuation pressure 1 0.4–0.2 bar 2 0.6–1.8 bar 3 0.8–2.4 bar 4 2.4–3.6 bar																								
11	Actuator material S Stainless Steel P Steel sheet, powder-coated																								
12	Seal material in contact with the product 1 EPDM (FDA) 2 FKM (FDA) 3 HNBR (FDA; to DN 100, OD 4")																								
13	Surface quality of the housing 1 Inside Ra ≤ 1.2 µm, outside matte blasted (IPS) 2 Inside Ra ≤ 0.8 µm, outside matte blasted (DN, OD)																								
14	Connection fittings N Welding end																								
15	Options (See acc. to valve types)																								
+																									
16	Positioner 0----- Order code for positioners, see at the end of the Section Control Valves index																								



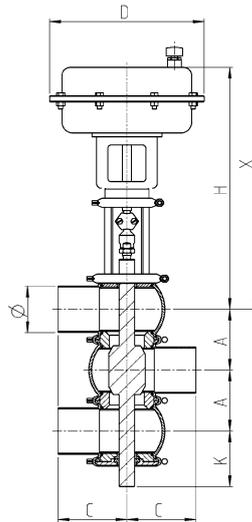
The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14	15	16
Code	S		K	/		M							N	/ZF	+ 0-----

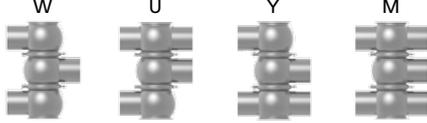
For order codes differing from the standard version, please refer to section 7 (options).



Technical data of the standard version	
Control characteristics	Linear
Recommended flow direction	From bottom to top
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Ambient temperature	0 to 45 °C
Air supply pressure	Max. 6 bar (max. 87 psi) Certificates
Product pressure	DN 25–65, OD 1"–2 ½", IPS 2" 16 bar
	DN 80–100, OD 3"–4", IPS 3"–4" 10 bar
Surface in contact with the product	DN, OD Ra ≤ 0.8 µm IPS Ra ≤ 1.2 µm
External housing surface	Matte blasted
Positioner	I/P positioner; type 3725
Actuator type	Diaphragm actuator air/spring
Connection fittings	Welding end
Identification	Adhesive ID tag
Valve seat version	Clamped seat ring
Certificates	CE 



Nominal width	Pipe	Housing			Diaphragm surface 175 cm²		Diaphragm surface 350 cm²		Diaphragm surface 750 cm²		Valve
	Ø [mm]	C [mm]	A [mm]	K [mm]	D [mm]	H [mm]	D [mm]	H [mm]	D [mm]	H [mm]	X [mm]
DN 25	29.0 × 1.50	90.0	50.0	On request	215	370	280	347	–	–	393
DN 40	41.0 × 1.50	90.0	62.0	On request	215	376	280	380	–	–	415
DN 50	53.0 × 1.50	90.0	74.0	On request	–	382	280	386	–	–	433
DN 65	70.0 × 2.00	125.0	96.0	On request	–	393	280	397	–	–	466
DN 80	85.0 × 2.00	125.0	111.0	On request	–	401	280	405	–	–	489
DN 100	104.0 × 2.00	125.0	130.0	On request	–	–	280	414	390	471	574
OD 1"	25.4 × 1.60	90.0	46.0	On request	215	368	–	–	–	–	391
OD 1 ½"	38.1 × 1.60	90.0	59.0	On request	215	378	280	382	–	–	414
OD 2"	50.8 × 1.60	90.0	71.5	On request	–	381	280	385	–	–	432
OD 2 ½"	63.5 × 1.60	125.0	90.0	On request	–	397	280	401	–	–	464
OD 3"	76.2 × 1.60	125.0	103.0	On request	–	–	280	408	–	465	541
OD 4"	101.6 × 2.00	125.0	127.5	On request	–	–	280	416	390	473	573
IPS 2"	60.3 × 2.00	114.3	81.0	On request	–	379	280	383	–	–	437
IPS 3"	88.9 × 2.30	152.5	115.0	On request	–	399	280	403	–	–	491
IPS 4"	114.3 × 2.30	152.5	140.0	On request	–	–	280	409	390	466	579

Position	Description of the order code																								
1	Valve type S VARIVENT® control valve																								
2	Housing combinations 																								
3	Supplement to the valve type W Divert valve, product-merging, linear characteristic curve																								
4/5	Nominal width (upper housing/lower housing) <table border="1"> <tr> <td>DN 25</td> <td>OD 1"</td> <td></td> </tr> <tr> <td>DN 40</td> <td>OD 1 ½"</td> <td></td> </tr> <tr> <td>DN 50</td> <td>OD 2"</td> <td>IPS 2"</td> </tr> <tr> <td>DN 65</td> <td>OD 2 ½"</td> <td></td> </tr> <tr> <td>DN 80</td> <td>OD 3"</td> <td>IPS 3"</td> </tr> <tr> <td>DN 100</td> <td>OD 4"</td> <td>IPS 4"</td> </tr> <tr> <td>DN 125</td> <td></td> <td></td> </tr> <tr> <td>DN 150</td> <td>OD 6"</td> <td>IPS 6"</td> </tr> </table>	DN 25	OD 1"		DN 40	OD 1 ½"		DN 50	OD 2"	IPS 2"	DN 65	OD 2 ½"		DN 80	OD 3"	IPS 3"	DN 100	OD 4"	IPS 4"	DN 125			DN 150	OD 6"	IPS 6"
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8	Kvs value 6.3 DN 25, OD 1" 16 DN 40, OD 1 ½" 25 DN 50, OD 2", IPS 2" 35 DN 65, OD 2 ½" 60 DN 80, OD 3", IPS 3" 100 DN 100, OD 4", IPS 4" 260 DN 125 360 DN 150, OD 6", IPS 6"																								
9	Actuator 175 Diaphragm surface 175 cm² 350 Diaphragm surface 350 cm² 750 Diaphragm surface 750 cm²																								
10	Actuation pressure 1 0.4–0.2 bar 2 1.4–2.3 bar 3 1.4–2.4 bar																								
11	Actuator material S Stainless Steel P Steel sheet, powder-coated																								
12	Seal material in contact with the product 1 EPDM (FDA) 2 FKM (FDA) 3 HNBR (FDA; to DN 100, OD 4")																								
13	Surface quality of the housing 1 Inside Ra ≤ 1.2 µm, outside matte blasted (IPS) 2 Inside Ra ≤ 0.8 µm, outside matte blasted (DN, OD)																								
14	Connection fittings N Welding end																								
15	Options (See acc. to valve types)																								
+																									
16	Positioner 0----- Order code for positioners, see at the end of the Section Control Valves index																								

The code is composed as follows, depending on the chosen configuration:

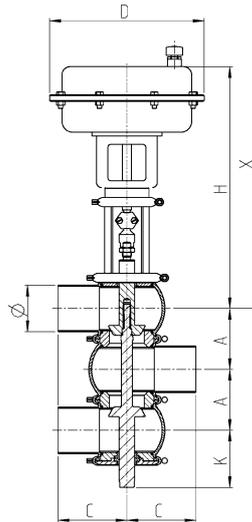
Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14	15	16
Code	S		W	/		M							N	/ZF	+ 0-----

For order codes differing from the standard version, please refer to section 7 (options).

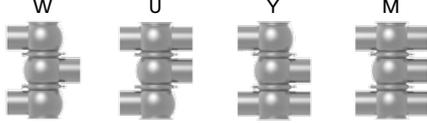




Technical data of the standard version	
Control characteristics	Linear
Recommended flow direction	From bottom to top
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Ambient temperature	0 to 45 °C
Air supply pressure	Max. 6 bar (max. 87 psi) Certificates
Product pressure	DN 25–65, OD 1"–2 ½", IPS 2" 16 bar
	DN 80–100, OD 3"–4", IPS 3"–4" 10 bar
Surface in contact with the product	DN, OD Ra ≤ 0.8 µm IPS Ra ≤ 1.2 µm
External housing surface	Matte blasted
Positioner	I/P positioner; type 3725
Actuator type	Diaphragm actuator air/spring
Connection fittings	Welding end
Identification	Adhesive ID tag
Valve seat version	Clamped seat ring
Certificates	CE 



Nominal width	Pipe	Housing			Diaphragm surface 175 cm ²		Diaphragm surface 350 cm ²		Diaphragm surface 750 cm ²		Valve
	Ø [mm]	C [mm]	A [mm]	K [mm]	D [mm]	H [mm]	D [mm]	H [mm]	D [mm]	H [mm]	X [mm]
DN 25	29.0 × 1.50	90.0	50.0	On request	215	370	280	347	–	–	393
DN 40	41.0 × 1.50	90.0	62.0	On request	215	376	280	380	–	–	415
DN 50	53.0 × 1.50	90.0	74.0	On request	–	382	280	386	–	–	433
DN 65	70.0 × 2.00	125.0	96.0	On request	–	393	280	397	–	–	466
DN 80	85.0 × 2.00	125.0	111.0	On request	–	401	280	405	–	–	489
DN 100	104.0 × 2.00	125.0	130.0	On request	–	–	280	414	390	471	574
OD 1"	25.4 × 1.60	90.0	46.0	On request	215	368	–	–	–	–	391
OD 1 ½"	38.1 × 1.60	90.0	59.0	On request	215	378	280	382	–	–	414
OD 2"	50.8 × 1.60	90.0	71.5	On request	–	381	280	385	–	–	432
OD 2 ½"	63.5 × 1.60	125.0	90.0	On request	–	397	280	401	–	–	464
OD 3"	76.2 × 1.60	125.0	103.0	On request	–	–	280	408	–	465	541
OD 4"	101.6 × 2.00	125.0	127.5	On request	–	–	280	416	390	473	573
IPS 2"	60.3 × 2.00	114.3	81.0	On request	–	379	280	383	–	–	437
IPS 3"	88.9 × 2.30	152.5	115.0	On request	–	399	280	403	–	–	491
IPS 4"	114.3 × 2.30	152.5	140.0	On request	–	–	280	409	390	466	579

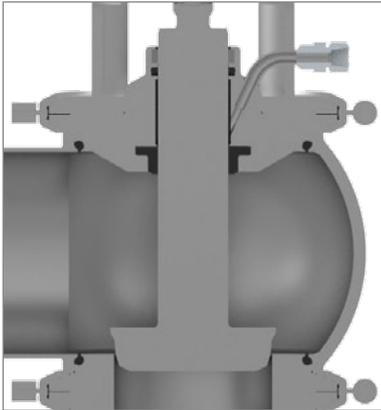
Position	Description of the order code																								
1	Valve type S VARIVENT® control valve																								
2	Housing combinations 																								
3	Supplement to the valve type X Divert valve, product distribution, linear characteristic curve																								
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9	Actuator 175 Diaphragm surface 175 cm² 350 Diaphragm surface 350 cm² 750 Diaphragm surface 750 cm²																								
10	Actuation pressure 1 0.4–0.2 bar 2 1.4–2.3 bar 3 1.4–2.4 bar																								
11	Actuator material S Stainless Steel P Steel sheet, powder-coated																								
12	Seal material in contact with the product 1 EPDM (FDA) 2 FKM (FDA) 3 HNBR (FDA; to DN 100, OD 4")																								
13	Surface quality of the housing 1 Inside Ra ≤ 1.2 µm, outside matte blasted (IPS) 2 Inside Ra ≤ 0.8 µm, outside matte blasted (DN, OD)																								
14	Connection fittings N Welding end																								
15	Options (See acc. to valve types)																								
+																									
16	Positioner 0----- Order code for positioners, see at the end of the Section Control Valves index																								



The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14	15	16
Code	S		X	/		M							N	/ZF	+ 0-----

For order codes differing from the standard version, please refer to section 7 (options).

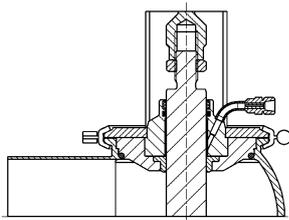


Typical application and description

The sterile lock is used for reliable separation between the surface of the valve disc in contact with the product and the atmosphere.

Applying sterilizing media to the sterile lock prevents contamination of the product from atmosphere due to the switching movement of the valve stem ("elevator effect").

If the media has a tendency towards crystallization, this effect can be avoided by pressurizing the sterile lock with a liquid and securing the shaft seal against damage.



Available nominal widths		
Metric	DN	25–150
Inch OD	OD	1"–6"
Inch IPS	IPS	2"–6"

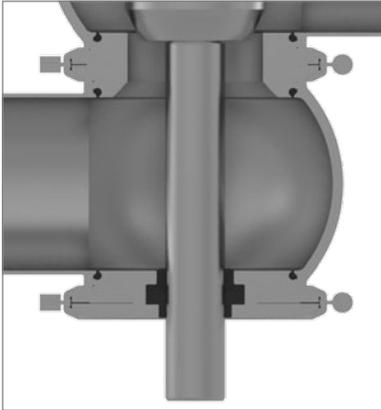
Technical data	
Material	1.4301
Barrier fluid	e.g. sterile water, condensate, steam
IMPORTANT: The sterile lock is not suitable for permanent vapor application. Brief actuation is recommended after or before the switching procedure.	

Nominal width			Dimensions	
			Connection [mm]	Weight [kg]
DN 25	OD 1"		6/4	0.4
DN 40	OD 1 ½"		6/4	0.8
DN 50	OD 2"	IPS 2"	6/4	0.8
DN 65	OD 2 ½"		6/4	1.5
DN 80	OD 3"	IPS 3"	6/4	1.5
DN 100	OD 4"	IPS 4"	6/4	2.6
DN 125			6/4	5.9
DN 150	OD 6"	IPS 6"	6/4	7.2

Incorporation of the option in the order code and example

Position	Description of the order code for options														
15	Accessories														
	/24 Sterile lock complete														

Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14	15	16
Code	S	B	F	- DN80/DN80 -	Z	M	80	- 350	8 -	S -	1	2	N	/24	+ 0-----



Typical application and description

The double guidance of the valve stem is recommended to avoid vibrations that may result from the flow dynamics within the valve body. The additional bearing of the stem in the lower housing is available from a nominal width of DN 80, OD 3", IPS 3" onwards. Modulating control valves with 3-stage seat and divert valves are equipped as standard with double stem guide.

	Diaphragm surface 175 cm ²	Diaphragm surface 350 cm ²	Diaphragm surface 750 cm ²
Nominal width	H1 [mm]	H1 [mm]	H1 [mm]
DN 25	577	-	-
DN 40	583	590	-
DN 50	589	596	-
DN 65	600	607	-
DN 80	608	615	-
DN 100	-	624	799
DN 125	-	-	812
DN 150	-	-	893
OD 1"	575	582	-
OD 1 ½"	585	592	-
OD 2"	591	598	-
OD 2 ½"	604	611	-
OD 3"	-	618	793
OD 4"	-	626	801
OD 6"	-	-	892
IPS 2"	586	593	-
IPS 3"	606	613	-
IPS 4"	-	619	794
IPS 6"	-	-	887

4.1

Incorporation of the option in the order code and example

Position	Description of the order code for options															
15	Accessories															
	/2F Double stem guidance															

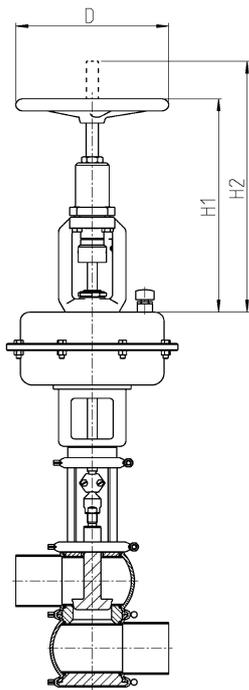
Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14	15	16				
Code	S	B	F	- DN80/DN80 -	Z	M	80	-	350	8	-	S	-	1	2	N	/2F	+	0-----



Typical application and description

Optionally, the diaphragm actuators can be equipped with an additional manual adjustment. This is attached on the upper actuator lid. The handwheel can be used to manually adjust the stroke of the valve disc against the spring force of the actuator.

Changing the nominal signal range and reversing the operating direction of the diaphragm actuator without special tools is possible in the manually adjusted design as well.



Diaphragm surface [cm²]	D [mm]	H1 [mm]	H2 [mm]	Weight [kg]
175	180	234	279	4
350	250	237	282	5
750	315	355	403	5

Incorporation of the option in the order code and example

Position	Description of the order code for options														
15	Accessories														
	/5 Additional handwheel														

Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14	15	16				
Code	S	B	F	- DN80/DN80 -	Z	M	80	-	350	8	-	S	-	1	2	N	/5	+	0-----



Description

Positioners compare the set value from a superordinate controller (PLC) to the stroke of the control valve and convert it into a pneumatic actuator pressure that is sent to the diaphragm actuator. A mechanical return of the current position of the actuator stroke can balance out changes regarding operating pressure and actuation energy automatically. This improves the accuracy and reduces the actuation time. Interferences such as friction or flow influences are balanced out by the positioner itself. The positioners can be used in the normal and split range operation.

The positioners are directly assembled to the diaphragm actuator of the control valve, which means the pneumatic connections are realized without additional tubes or hoses.

Function of the positioner

Positioners convert an electrical or pneumatic input signal into a corresponding output signal (set position).

Differentiation acc. to type of signal

Pneumatic/electropneumatic positioner

A difference is made acc. to the input signal between pneumatic (p/p-) and electropneumatic (i/p-) positioners.

Pneumatic (p/p) positioners

For pneumatic devices, the input value is a mechanical signal with a pressure of 0.2 to 1 bar (3 to 15 psi) and the output value is an actuator pressure up to 6 bar (90 psi) at most.



Type 3766

Electropneumatic (i/p) positioners

For the electropneumatic positioners, the input is an analog direct current signal of 4 to 20 mA or a digital signal (PROFIBUS®, FOUNDATION™ Fieldbus). The input signal is converted into the corresponding required pressure with an integrated circuit. The output signal is an actuation pressure with up to 6 bar (90 psi).



Type 3725



Type 3730



Type 3767

Special features of digital positioners

Simple operation

Display with switchable reading direction

Automatical setup of the neutral point and the range during the initialization process (except type 3730-0)

Independent recognition of errors in the actuator

Movement direction independent of the installation orientation

Continuous monitoring of the zero point

Minimized air consumption

Fail-safe storage of all parameters

The respective positioners can be equipped with further accessories. The positioners of type 3730-3 additionally permit HART®-communication between field and process control level. The positioner type 3730-4 and the positioners

type 3730-5 integrate control valves into fieldbus systems via PROFIBUS® PA or FOUNDATION™ fieldbus.

Type	3725	3730-0	3730-1
Input/output signal	i/p	i/p	i/p
Communication			
Diagnosis			
Guide size	4 to 20 mA	4 to 20 mA	4 to 20 mA
Split range	•	•	•
Supply air pressure	4 to 6 bar	4 to 6 bar	4 to 6 bar
Options			
Position indicator, 4–20 mA			
With 3/2 directional solenoid valve			
Pressure gage component	•	•	•
AS-Interface module type 6150	•	•	•
Open/close position feedback			
2 proximity switches (software)			•
1 inductive+ 1 software proximity switch			
2 proximity switches			
Approval acc. to ATEX			
II 2G Ex ia IIC T4	•		
EEx ia		•	•
II 2G Ex ia IIC T6 / II 2D Ex tb IIIC T80°C			
II 2G Ex ia IIC T6			
IECEx			•
Operating elements			
Display	•		•
Volume throttle	•	•	•
Buttons	3		
Dial switch/push button			•
Slider			
Potentiometer		•	
DIP switch		•	
Setting screws			
Ambient temperature	–20 to 80 °C	–20 to 80 °C	–20 to 80 °C
Index of protection class	IP66	IP66	IP66
Option in the order code	1	2	3

The optionally available 3/2 way solenoid valve for the positioner type 3720-2, 3720-3, 3730-4 and 3767 converts binary control signals into pneumatic control signals, which opens or closes the associated diaphragm actuator.

3730-2	3730-3	3730-4	3730-5	3766	3767
i/p	i/p	i/p	i/p	p/p can be converted to i/p	i/p can be converted to p/p
	HART	PROFIBUS®	FOUNDATION™		
EXPERTplus	EXPERTplus	EXPERTplus	EXPERTplus		
4 to 20 mA	4 to 20 mA	–	–	0.2 to 1 bar (4 to 20 mA)	0 to 20 mA (0.2 to 1 bar)
•	•	•	•	•	•
4 to 6 bar	4 to 6 bar	4 to 6 bar	4 to 6 bar	4 to 6 bar	4 to 6 bar
Options					
•					
•					•
•	•	•	•	•	•
•					•
Open/close position feedback					
•	•				
•	•	•			
				•	•
Approval acc. to ATEX					
•	•	•			
					•
•	•	•		•	•
Operating elements					
•	•	•	•		
•	•	•	•	•	•
1	1	1	1		
•	•	•	•		
•	•	•	•		
				•	•
–20 to 80 °C	–20 to 80 °C	–45 to 80 °C	–45 to 80 °C	–20 to 80 °C	–20 to 80 °C
IP66	IP66	IP66	IP66	IP54	IP54
4	5	6	7	8	9



Position	Description of the order code
1	Positioner type
	0 Without positioner
	1 Type 3725 i/p
	2 Type 3730-1 i/p
	3 Type 3730-0 i/p
	4 Type 3730-2 i/p
	5 Type 3730-3 i/p HART
	6 Type 3730-5 i/p (FOUNDATION™ fieldbus)
	7 Type 3730-4 i/p PROFIBUS®
	8 Type 3766 p/p
9 Type 3767 i/p	
2	Solenoid valve
	- Without 1 With 3/2 directional solenoid valve 24 V DC
3	Open/close position feedback
	- Without information
	S 2 proximity switches (software)
	I 1 proximity switch
F 2 proximity switches	
4	Position feedback
	- Without position feedback 2 With position feedback 4–20 mA
5	Ex-design
	- Without Ex-protection certificate E With Ex-protection certificate*
6	Pressure gage component
	- Without pressure gage assembly 1 With pressure gage assembly
7	Air connection
	M Metric for air hose Ø 6/4 mm Z Inch for air hose Ø OD ¼" (6.35/4.35 mm)
8	ASI module
	- Without ASI module A With ASI module

* For the available ATEX approvals please see table "further options".

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8
Code								

The code to describe the positioner is attached to the order code of the control valve.

Formula symbols used:

Q	= Flow rate (liquid)	[m ³ /h]
Q _N	= Flow rate (gas) at the standard condition	[m ³ /h]
p ₁	= Pressure upstream of the valve	[bar abs.]
p ₂	= Pressure downstream of the valve	[bar abs.]
Δp	= Differential pressure	[bar]
ρ	= Density (liquid)	[kg/m ³]
ρ _N	= Density (gas) at the standard condition	[kg/m ³]
η	= Dynamic viscosity	[mPas]
T ₁	= 273+t ₁ = Operating temperature	[Kelvin]
	= Operating temperature	[°C]

1. Kv value calculation:

Kv- value = Valve-stroke-dependent flow volume Q in m³/h referring to water at t = 5 to 30 °C at a differential pressure of Δp = p₁ - p₂ = 1 bar in the control valve.

For low-viscous liquids:

$$Kv = \frac{Q}{31.6 \sqrt{\Delta p}} \left[\frac{\rho}{h} \right]$$

For gases:

- Subcritical pressure reduction at Δp < 0.5 p₁ or p₂ > 0.5 p₁

$$Kv = \frac{Q_N}{514 \sqrt{\Delta p \times p_2}} \left[\frac{\rho_N \times T_1}{h} \right]$$

- Over-critical pressure reduction at Δp < 0.5 p₁ or p₂ < 0.5 p₁

$$Kv = \frac{Q_N}{257 \times p_1} \sqrt{\rho_N \times T_1} \left[\frac{m^3}{h} \right]$$

Over-critical pressure reduction = strong noise development

Example 1: low-viscous liquid

Q = 30 m³/h, ρ = 1000 kg/m³, Δp = 0.5 bar, p₁ = 7 bar

$$Kv = \frac{30}{31.6 \sqrt{0.5}} \approx 42.46 \left[\frac{m^3}{h} \right]$$

At different operating conditions:
Highest throughput and lowest differential pressure.

For high-viscous liquids:

$$Kv_T = \frac{Q}{31.6 \sqrt{\Delta p}} \left[\frac{\rho}{h} \right]$$

$$Kv_L = \frac{1}{1.05} \left(\frac{Q \times \eta}{216 \times \Delta p} \right)^{\frac{2}{3}} \left[\frac{m^3}{h} \right]$$

$$\frac{Kv_T}{Kv_L} < 0.46 \Rightarrow Kv_L = Kv \quad \frac{Kv_T}{Kv_L} > 20 \Rightarrow Kv_T = Kv$$

$$0.46 < \frac{Kv_T}{Kv_L} < 20 \Rightarrow \text{Calculation as below}$$

$\frac{Kv_T}{Kv_L}$	0.46	0.52	0.59	0.68	0.8	1.00	1.35	1.9	3.0	4.9	9.5	20
F _R	0.46	0.50	0.54	0.58	0.62	0.68	0.74	0.80	0.86	0.90	0.94	0.98

$$Kv = \frac{Q}{F_R \times 31.6 \sqrt{\Delta p}} \left[\frac{\rho}{h} \right]$$



2. Determination of the Kvs value and the valve size

The chosen Kvs value must be above the calculated Kv value. This ensures that the control valve works even at deviating operating data (Reserve).

There are two cases for this:

Linear control cone

$$Kv_{req.} = \frac{Kv \text{ value calculated}}{\approx 0.7}$$

Equal-percentage control cones

$$Kv_{req.} = \frac{Kv \text{ value calculated}}{\approx 0.6}$$

3. Determination of the control cone

The characteristic curve of the control valve is defined as the dependence of the Kv value from the stroke. Control valves are performed either with an equal-percentage or a linear characteristic curve. The equal-percentage characteristic curve is characterized by stroke changes leading to same percentage changes of the particular Kv value. For a linear characteristic curve, same stroke changes cause changes to the Kv value.

The selection of the control cone depends on the ratio of the pressure reduction $\Delta p = p_1 - p_2$ in the control valve at maximum flow to the pressure reduction Δp_{ges} in the entire system.

- Linear control cones are used if more than 30% of the total pressure drop is caused in the line system of the control valve. Level control is a typical example for this.
- Equal-percentage control cones are used if less than 30% of the total pressure drop is caused in the line system of the control valve; these are approx. 90 % of the applications of the control valves.

Example:

$Kv = 42.5 \text{ m}^3/\text{h}$, equal-percentage control characteristics

$$Kv_{req.} = \frac{42.5}{0.6} = 70.8$$

According to the data sheet, a Kvs value of $80 \text{ m}^3/\text{h}$ must be chosen, i.e. management of the control task set requires a valve of DN 80.

4. Determination of the nominal width and actuator size of the valve

Calculation of the actuator forces is the basis for the actuator selection scheme. The diaphragm actuator to be chosen acc. to the required closing force is determined depending on the selected Kvs value of the valve and the maximum product pressure. This information must be specified in the order.

Example:

Chosen Kvs = 80, $p_1 = 7 \text{ bar}$, ($Q = 30 \text{ m}^3/\text{h}$)

A valve nominal width of DN 80 is chosen from the data sheet. An actuator of size 350 results. Based on the flow volume, a flow speed of 1.6 m/s through the valve results.

Valve design, VARIVENT® control valve type S

Nominal width	Kvs	Seat bore Ø [mm]	Maximum product pressure [bar]	Diaphragm surface of the actuator [cm²]	Actuation pressure [bar]	Stroke [mm]
DN 25, OD 1"	0.1	3	16	175	1.00–3.00	
	0.16	3				
	0.25	3				
	0.63	6				
	1	6				
	1.6	12				
	2.5	12				
	4	12				
DN 40, OD 1 ½"	6.3	24	16	175	1.00–3.00	15
	10	24	16	175	1.00–3.00	
	16	31	13.5	175	1.00–3.00	
			16	350	0.80–2.40	
	25	38	9.3	175	1.00–3.00	
			16	350	0.80–2.40	
DN 50, OD 2", IPS 2"	10	24	13.5	175	1.00–3.00	15
	16	31	9	175	1.00–3.00	
			16	350	0.80–2.40	
	25	38	9	175	1.00–3.00	
			16	350	0.80–2.40	
	35	48	9.3	175	1.00–3.00	
			16	350	2.10–3.30	
	40	48	9.3	175	1.00–3.00	
			16	350	2.10–3.30	
	DN 65, OD 2 ½"	25	38	8	175	
15.5				350	0.80–2.40	
35		48	5	175	1.00–3.00	
			16	350	2.10–3.30	
40		48	5	175	1.00–3.00	
			16	350	2.10–3.30	
60	63	16	350	2.10–3.30		
DN 80, OD 3", IPS 3"	35	48	5	175	1.00–3.00	15
			10	350	2.10–3.30	
	40	48	5	175	1.00–3.00	
			10	350	2.10–3.30	
	60	63	10	350	2.10–3.30	
	80	80	10	350	2.10–3.30	
DN 100, OD 4", IPS 4"	60	63	10	350	2.10–3.30	15
	80	80	10	350	2.10–3.30	
	100	80	10	750	1.65–2.65	
	160	100	10	750	2.20–3.40	
DN 125	100	80	10	750	2.20–3.40	30
	160	100	10	750	1.65–2.65	
	200	110	10	750	1.65–2.65	
	260	130	10	750	2.20–3.40	
DN 150, OD 6", IPS 6"	200	110	10	750	1.65–2.65	30
	260	130	10	750	2.20–3.40	
	360	150	7.5	750	2.20–3.40	



The data apply at flow against the fail-safe position of the cone without V-ring. The maximum permitted product pressures must not be exceeded.

The actuator pressure range for the actuator function is 0.4 to 2 bar, the minimum required air supply pressure is 4 bar.

Customer			
Company/Customer Number	_____		
Project	_____		
Contact	_____		
Phone	_____		
E-Mail	_____		
Product			
	Case I (e.g. product at full load)	Case II (e.g. product at partial load)	Case III (e.g. CIP)
Type of medium	<input type="checkbox"/> Liquid <input type="checkbox"/> Gas / gaseous <input type="checkbox"/> Saturated steam	<input type="checkbox"/> Liquid <input type="checkbox"/> Gas / gaseous <input type="checkbox"/> Saturated steam	<input type="checkbox"/> Liquid <input type="checkbox"/> Gas / gaseous <input type="checkbox"/> Saturated steam
Name of medium	_____	_____	_____
Density ρ	_____ <input type="checkbox"/> kg/m ³ <input type="checkbox"/> lb/gal [US] <input type="checkbox"/> lb/gal [UK]	_____ <input type="checkbox"/> kg/m ³ <input type="checkbox"/> lb/gal [US] <input type="checkbox"/> lb/gal [UK]	_____ <input type="checkbox"/> kg/m ³ <input type="checkbox"/> lb/gal [US] <input type="checkbox"/> lb/gal [UK]
Viscosity η (for liquids only)	_____ mPas/cP	_____ mPas/cP	_____ mPas/cP
Compressibility factor Z (for gas)	_____	_____	_____
Isentropic exponent γ (gases and steams)	_____	_____	_____
Process			
Unit for pressure	<input type="checkbox"/> bar-g <input type="checkbox"/> lb/ft ² -g <input type="checkbox"/> mbar-g <input type="checkbox"/> psi-g <input type="checkbox"/> MPa-g	<input type="checkbox"/> bar-g <input type="checkbox"/> lb/ft ² -g <input type="checkbox"/> mbar-g <input type="checkbox"/> psi-g <input type="checkbox"/> MPa-g	<input type="checkbox"/> bar-g <input type="checkbox"/> lb/ft ² -g <input type="checkbox"/> mbar-g <input type="checkbox"/> psi-g <input type="checkbox"/> MPa-g
Input pressure p_1	_____	_____	_____
Output pressure p_2	_____	_____	_____
Differential pressure (optional)	_____	_____	_____
Application temperature	_____ <input type="checkbox"/> K <input type="checkbox"/> °F <input type="checkbox"/> °C	_____ <input type="checkbox"/> K <input type="checkbox"/> °F <input type="checkbox"/> °C	_____ <input type="checkbox"/> K <input type="checkbox"/> °F <input type="checkbox"/> °C
Flow	_____ <input type="checkbox"/> l/h <input type="checkbox"/> m ³ /h <input type="checkbox"/> mn ³ /h <input type="checkbox"/> gpm <input type="checkbox"/> kg/h <input type="checkbox"/> lb/h <input type="checkbox"/> scfm	_____ <input type="checkbox"/> l/h <input type="checkbox"/> m ³ /h <input type="checkbox"/> mn ³ /h <input type="checkbox"/> gpm <input type="checkbox"/> kg/h <input type="checkbox"/> lb/h <input type="checkbox"/> scfm	_____ <input type="checkbox"/> l/h <input type="checkbox"/> m ³ /h <input type="checkbox"/> mn ³ /h <input type="checkbox"/> gpm <input type="checkbox"/> kg/h <input type="checkbox"/> lb/h <input type="checkbox"/> scfm

Basic data	
Housing combination	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> E <input type="checkbox"/> L <input type="checkbox"/> T <input type="checkbox"/> W <input type="checkbox"/> U <input type="checkbox"/> Y <input type="checkbox"/> M
Nominal size standard	<input type="checkbox"/> DN <input type="checkbox"/> OD <input type="checkbox"/> IPS
Control characteristics	<input type="checkbox"/> Equal-percentage <input type="checkbox"/> Linear
Options for the control valve	<input type="checkbox"/> 3-stage seat <input type="checkbox"/> Divert valve type W <input type="checkbox"/> Divert valve type X
Seat seal	<input type="checkbox"/> Metallic <input type="checkbox"/> Soft-sealing
Seal material	<input type="checkbox"/> EPDM <input type="checkbox"/> FKM <input type="checkbox"/> HNBR <input type="checkbox"/> FFKM (on request)
Positioner basic type S	<input type="checkbox"/> 3730-0 <input type="checkbox"/> 3730-1 <input type="checkbox"/> 3730-2 <input type="checkbox"/> 3730-3 HART <input type="checkbox"/> 3730-4 PROFIBUS® <input type="checkbox"/> 3730-5 FOUNDATION™ Fieldbus <input type="checkbox"/> 3767 i/p <input type="checkbox"/> 3766 p/p <input type="checkbox"/> 3725
Feedback (optional)	<input type="checkbox"/> Inductive threshold contact <input type="checkbox"/> Analogue position indicator (4...20 mA)
Options for the positioner	<input type="checkbox"/> Double stem guide <input type="checkbox"/> Pressure gage component <input type="checkbox"/> Sterile lock <input type="checkbox"/> Additional manual adjustment
Certificates	<input type="checkbox"/> 3A <input type="checkbox"/> ATEX <input type="checkbox"/> FDA
Certificates	<input type="checkbox"/> 3.1 Certificate
Comments / Miscellaneous	_____ _____ _____ _____



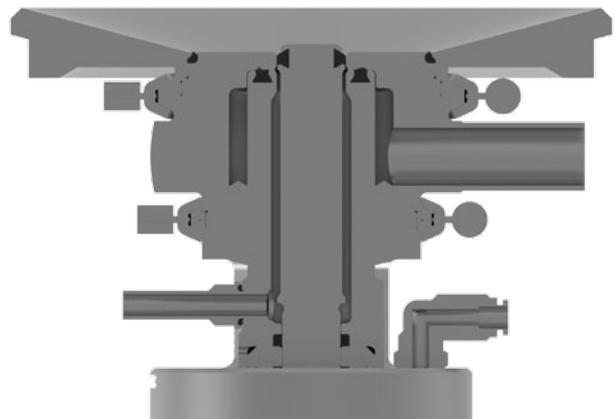


VARIVENT®/VARINLINE®

VARIVENT®/VARINLINE® valves are characterized by their ease of operation and flexibility. The modular design of the VARIVENT® modular system offers the user a wide range of options. The variable system of VARIVENT®/VARINLINE® products permits adjustable use of the valves.

Function of the valve

The sampling valves can be installed either by the process connection options of the VARINLINE® housing or through direct connection in the process. The valve is manually or pneumatically opened for sampling. The valve position can be reported to the PLC via proximity switches. An integrated metallic stop in the actuator prevents excess pressure on the seals.





Application examples

Sampling valves can be employed in a variety of situations. In practice, these valves are often integrated into the processes of the dairy, brewing or beverage industries. An example of a typical application is in the fermentation tanks of breweries.

Special features

Certified hygienic design

Flexibility because of the modular principle

Simple connection options

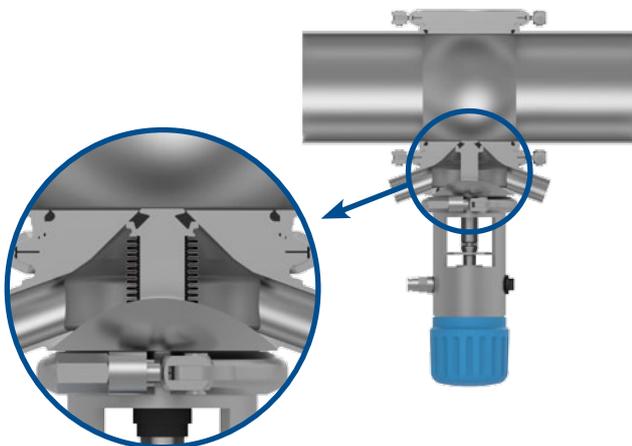
Sampling valve VARIVENT® type I

The sampling valve VARIVENT® type I is installed into the process system upright. The actuator is dually configured so that the valve can be actuated pneumatically or manually. Due to the conical contour of the valve disc, smaller sample volumes can be tapped as well. The VARIVENT® type I valve can be expanded with various individual components. Using up to two proximity switches permits detection of the closed and/or open valve positions.



Sampling valve VARINLINE® type TSVN and TSVU

The sampling valve VARINLINE® type TSV in the versions N and U can be installed into the process system vertically or horizontally. The VARIVENT® modular system makes the valve compatible with the VARINLINE® product family. The connection sockets of the sampling housing permit integration of the valve into a sampling system or alternatively connecting the second port to the CIP supply. The illustrated model shows version N. In version U, the valve disc closes for the product side and therefore additionally protects against product loss in water hammers. The valve type TSV is also available as an aseptic sampling valve with stainless steel bellows.



Sampling valve VARIVENT® type T/09

The mixproof sampling valve type T/09 of series VARIVENT® is used as a fully automatic sampling and dosing valve. The sampling line can be cleaned or sterilized immediately after sampling via connected CIP-/SIP-loop. The design as a mixproof double-seat valve ensures that the process can be executed safely in the connected tank during cleaning or sterilization.



Fully automated sampling

The double-seat valve can be fitted on the tank simply with the connection through a tank flange. The VARIVENT® interface permits installation of all common TVIS® control tops so that the valve can be used for fully automated sampling. The mixproof design as double-seat valve offers the option of cleaning and sterilizing the sampling line independently of the tank.

Simple dosage

The compact double-seat valve is very suitable for the dosage of smaller liquid volumes into larger process lines. The inline connection provided as standard permits easy insertion of the valve into the common VARINLINE® housings (process connection N) and seals flush with the pipe – free of dead zones.

Sampling

The sampling valve is available with single or double horizontal ports in the sampling line. The sampling line is always size DN 15. The process connection N as standard connects the valve directly to the tank via tank flanges.



For tank or pipe cleaning, the valve disc is lifted and the cleaning media flow into the leakage chamber. This cleans the seal of the valve disc and discharges the cleaning media through the periphery. The V-ring of the double disc seals off the cleaning medium against percolation into the sampling chamber.



Cleaning the leakage chamber

Cleaning the leakage chamber takes place via the lift functions of the two valve discs during the pipeline or tank cleaning phases. This function ensures an individual lifting of the individual valve discs independently of each other.

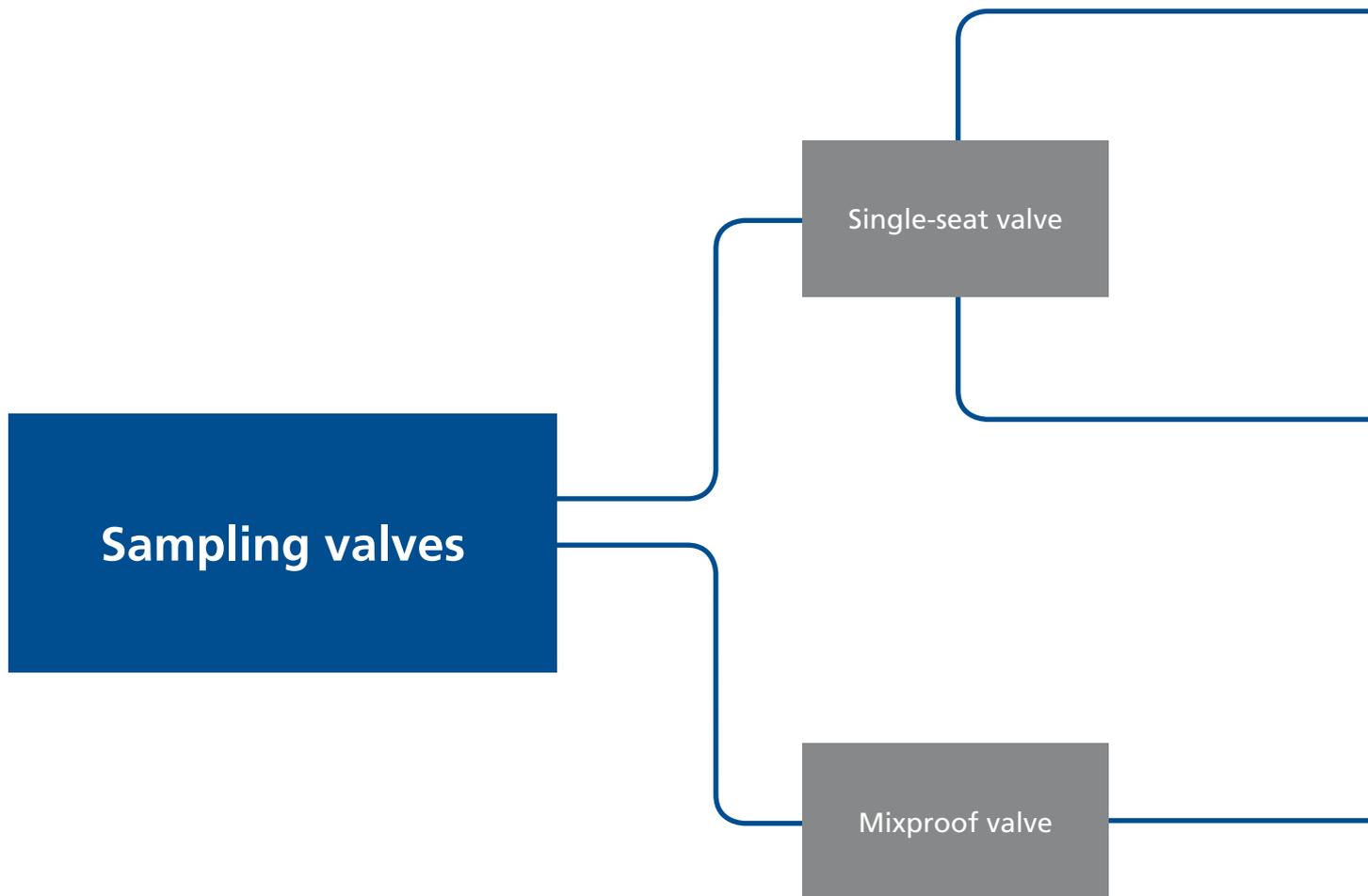


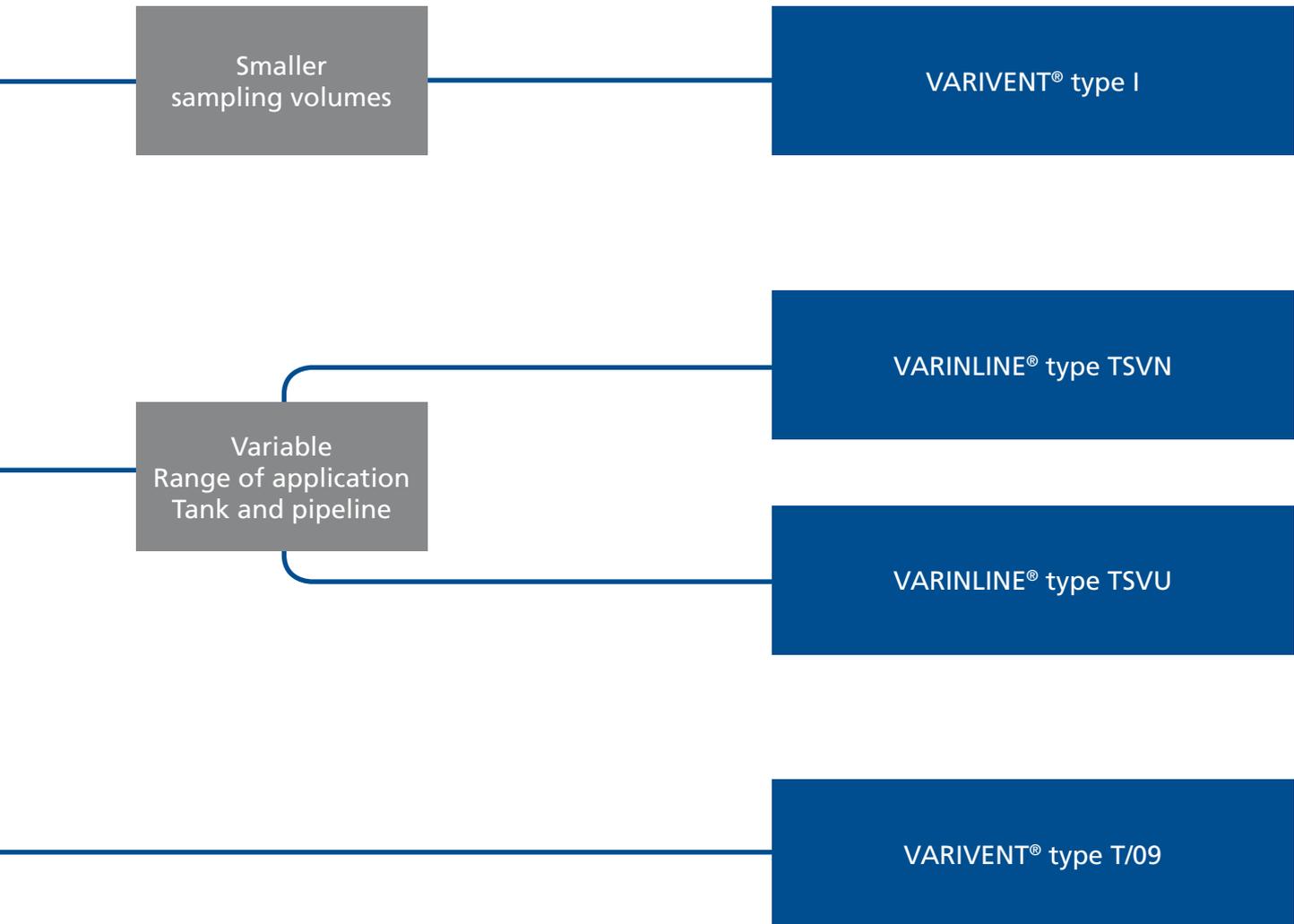
The advantages

- Permits fully automated sampling
- Completely drainable even in the horizontal installation
- Small, compact and light-weight
- Level shut-off free of dead zones

Special features

- Mixproof
- VARIVENT® sealing principle
- Both valve discs can be cleaned via lifting function
- VARINLINE® connection flange
- Equipment with common feedback systems possible

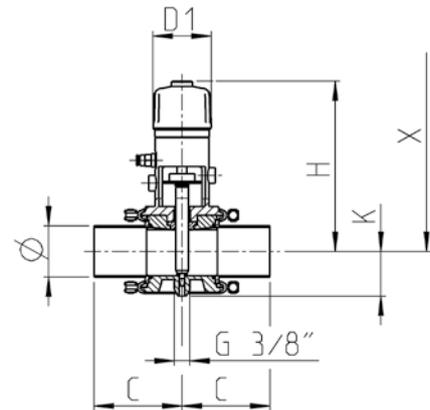
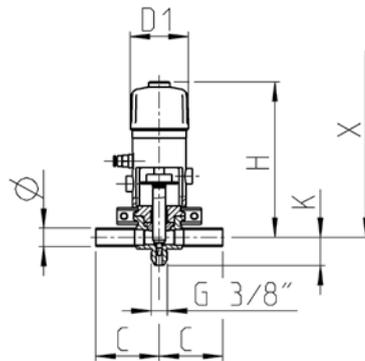




4.2



Technical data of the standard version		
Material in contact with the product	1.4404/AISI 316 L, 1.4460	
Material not in contact with the product	1.4301/AISI 304	
Seal material in contact with the product	EPDM, FKM, HNBR	
Ambient temperature	0 to 60 °C	
Air supply pressure	Min. 4 bar (87 psi)	
Product pressure	Max. 10 bar (145 psi)	
Surface in contact with the product	DN, OD	Ra ≤ 0.8 µm
	IPS	Ra ≤ 1.2 µm
External housing surface	Matte blasted	
Control and feedback system	Connection 0 (without control top)	
Actuator type	Pneumatic actuator air/spring	
Connection fittings	Welding end with additional connection fittings	
Identification	Adhesive ID tag	
Certificates		



Nominal width	Pipe	Housing		Dimension		Actuator	Valve	
	Ø [mm]	C [mm]	K [mm]	H [mm]	X [mm]	D1 [mm]	Stroke [mm]	Weight [kg]
DN 10	13.0 × 1.50	65.0	26.0	156.0	193	60	5.5	1.5
DN 15	19.0 × 1.50	65.0	29.0	159.0	202	60	8.0	1.6
DN 25	29.0 × 1.50	90.0	34.0	162.0	210	60	8.0	2.2
DN 40	41.0 × 1.50	90.0	40.0	168.0	222	60	8.0	3.0
DN 50	53.0 × 1.50	90.0	46.0	174.0	234	60	8.0	3.2
DN 65	70.0 × 2.00	125.0	54.0	182.0	250	60	8.0	3.8
DN 80	85.0 × 2.00	125.0	61.5	189.5	265	60	8.0	4.0
DN 100	104.0 × 2.00	125.0	71.0	199.0	284	60	8.0	4.4
DN 125	129.0 × 2.00	125.0	83.5	211.5	310	60	8.0	4.7
DN 150	159.0 × 2.00	150.0	96.0	224.0	323	60	8.0	9.1
OD 1"	25.4 × 1.60	90.0	32.0	160.0	206	60	8.0	2.1
OD 1 ½"	38.1 × 1.60	90.0	38.5	166.5	219	60	8.0	3.0
OD 2"	50.8 × 1.60	90.0	44.7	173.0	232	60	8.0	3.1
OD 2 ½"	63.5 × 1.60	125.0	51.0	179.0	244	60	8.0	3.6
OD 3"	76.2 × 1.60	125.0	57.5	185.5	257	60	8.0	3.8
OD 4"	101.6 × 2.00	125.0	69.7	198.0	282	60	8.0	4.3
OD 6"	152.4 × 2.77	150.0	92.7	221.0	346	60	8.0	9.5
IPS 2"	60.3 × 2.00	114.3	49.5	177.5	241	60	8.0	3.6
IPS 3"	88.9 × 2.30	152.5	63.4	191.5	269	60	8.0	4.2
IPS 4"	114.3 × 2.30	152.5	76.0	204.0	294	60	8.0	5.2
IPS 6"	168.2 × 2.00	152.5	102.0	230.0	346	60	8.0	10.3

Position	Description of the order code												
1	Valve type I VARIVENT® sampling valve												
2	Gehäusekombinationen L T 												
3	Nominal width (housing) DN 10 DN 15 DN 25 OD 1" DN 40 OD 1 ½" DN 50 OD 2" IPS 2" DN 65 OD 2 ½" DN 80 OD 3" IPS 3" DN 100 OD 4" IPS 4" DN 125 DN 150 OD 6" IPS 6"												
4	Seal material in contact with the product 1 EPDM (FDA) 2 FKM (FDA) 3 HNBR (FDA)												
5	Surface quality of the housing 1 Inside Ra ≤ 1.2 µm, outside matte (standard with IPS) 2 Inside Ra ≤ 0.8 µm, outside matte (standard with DN and OD)												
6	Connection fittings N Welding end												
7	<table border="1"> <thead> <tr> <th>Type of outlet</th> <th>Connection sleeve (optionally for outlet type threaded connection)</th> </tr> </thead> <tbody> <tr> <td>/O Threaded connection (standard)</td> <td>- Without connection sleeve</td> </tr> <tr> <td>/S Schütt connection</td> <td>/A Hose nozzle</td> </tr> <tr> <td>/L LUER connection</td> <td>/B Flammable nozzle straight</td> </tr> <tr> <td>/M LUER connection 90°</td> <td>/C Flammable nozzles 90°</td> </tr> <tr> <td>/K KEOFITT connection</td> <td>/D Spiral-type flammable nozzle</td> </tr> </tbody> </table>	Type of outlet	Connection sleeve (optionally for outlet type threaded connection)	/O Threaded connection (standard)	- Without connection sleeve	/S Schütt connection	/A Hose nozzle	/L LUER connection	/B Flammable nozzle straight	/M LUER connection 90°	/C Flammable nozzles 90°	/K KEOFITT connection	/D Spiral-type flammable nozzle
Type of outlet	Connection sleeve (optionally for outlet type threaded connection)												
/O Threaded connection (standard)	- Without connection sleeve												
/S Schütt connection	/A Hose nozzle												
/L LUER connection	/B Flammable nozzle straight												
/M LUER connection 90°	/C Flammable nozzles 90°												
/K KEOFITT connection	/D Spiral-type flammable nozzle												
8	Accessories /52 Adhesive ID tag												
+													
9-14	Air connection/control and feedback system LAT.0000M Metric for air hose Ø 6/4 mm LAT.0000Z Inch for air hose Ø OD ¼" (6.35/4.35 mm) XXXXX Order code for different control and feedback systems see section 9												

4.2

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8	9 to 14								
Code	I		-			N		/52	+								

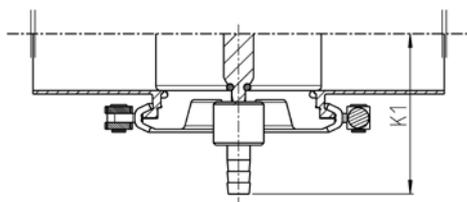
For order codes differing from the standard version, please refer to section 7 (options).

Typical application and description

Various types of connection flanges are available for a reliable and no-loss discharge of the sample volume. The threaded connection as a basis permits easy installation of the connection sleeves. The following sleeves are present for the sampling valve type I.

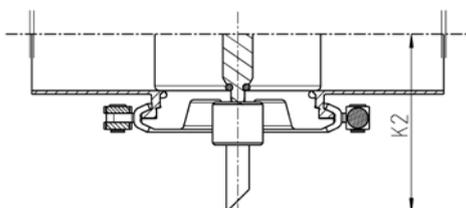
Hose nozzle

The connection type “Hose sleeve” offers the option of targeted discharge of the sample through a hose.



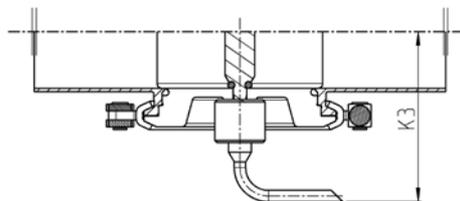
Flammable nozzle straight

The connection type “Flammable nozzle straight” has been constructed for the vertical installation orientation. The burner can be used to sterilize the flammable nozzle.



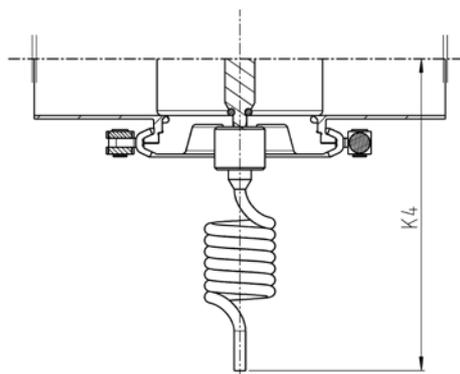
Flammable nozzles 90°

The connection type “Flammable nozzle 90°” has been constructed for horizontal sampling or installation orientation. A burner is recommended to sterilize the nozzle.



Spiral-type flammable nozzle

The connection type “Spiral-type flammable nozzle” is used in CO₂-containing and foaming liquids. The flammable nozzle can be sterilized with a burner.



		Dimension				
Nominal width		K1 [mm]	K2 [mm]	K3 [mm]	K4 [mm]	D [mm]
DN 10		48	61	51	115	10
DN 15		51	64	54	118	10
DN 25		56	69	59	123	10
DN 40		62	75	65	129	10
DN 50		68	81	71	135	10
DN 65		76	89	79	143	10
DN 80		83	97	87	150	10
DN 100		93	106	96	160	10
DN 125		10	119	109	172	10
OD 1"		54	67	57	121	10
OD 1 ½"		60	74	64	127	10
OD 2"		66	80	70	134	10
OD 2 ½"		73	86	77	140	10
OD 3"		79	93	83	146	10
OD 4"		92	105	95	159	10
IPS 2"		71	85	75	138	10
IPS 3"		85	99	89	152	10
IPS 4"		98	111	101	165	10
IPS 6"		123	138	128	191	10

Outlets deviating from the standard

The threaded connection in G3/8" presents the standard connection of the outlets. Deactivating from the standard connection, alternative outlets are available for the flammable nozzle.



Outlet KEOFITT

The outlet KEOFITT is used for aseptic sampling systems with quick couplings.



Outlet LUER

The LUER outlet connection is designed for cannulas or hoses with an inner diameter of 4 mm. It is sealed via the conical design of the outlet, the LUER cone.



Outlet SCHÜTT

The outlet SCHÜTT can be connected with a clamping connection to a sampling vessel.



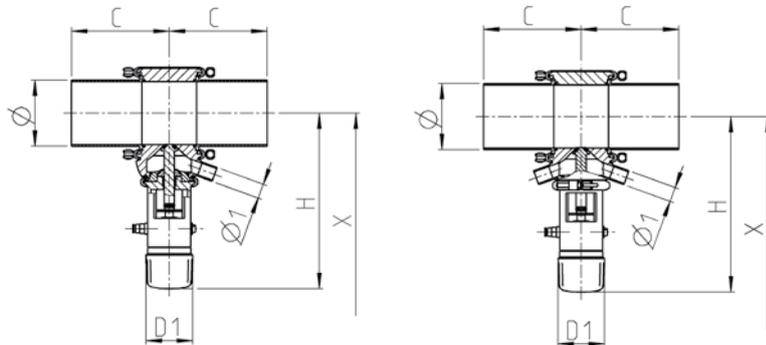
Outlet LUER 90°

In the LUER 90° connection, the sampling process takes place in accordance with the outlet type of LUER. The outlet LUER 90° is used for vertical pipeline routing. The sampling valve is installed horizontally.





Technical data of the standard version	
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Ambient temperature	0 to 60 °C
Air supply pressure	Min. 6 bar (87 psi)
Product pressure	Max. 10 bar (145 psi) With stainless steel bellows max. 5 bar (73 psi)
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted
Actuator type	Pneumatic actuator air/spring
Connection fittings	Welding end
Identification	Adhesive ID tag
Certificates	



Nominal width	Process connection	Pipe	Housing		Dimension		Actuator	Valve	
		Ø [mm]	Ø1 [mm]	C [mm]	H [mm]	X [mm]	D1 [mm]	Stroke [mm]	Weight [kg]
DN 25	F	29.0 × 1.50	10	90.0	193.0	205.0	60	8	3.0
DN 40	N	41.0 × 1.50	16	90.0	199.0	212.0	60	8	3.9
DN 50	N	53.0 × 1.50	16	90.0	205.0	218.0	60	8	4.0
DN 65	N	70.0 × 2.00	16	125.0	213.0	226.0	60	8	4.6
DN 80	N	85.0 × 2.00	16	125.0	220.5	233.5	60	8	4.8
DN 100	N	104.0 × 2.00	16	125.0	230.0	243.0	60	8	5.2
DN 125	N	129.0 × 2.00	16	125.0	242.5	255.5	60	8	5.5
DN 150	N	154.0 × 2.00	16	150.0	255.0	268.0	60	8	9.9
OD 1"	F	25.4 × 1.60	10	90.0	191.0	204.0	60	8	2.9
OD 1 ½"	N	38.1 × 1.60	16	90.0	197.5	210.5	60	8	3.8
OD 2"	N	50.8 × 1.60	16	90.0	203.8	216.8	60	8	4.0
OD 2 ½"	N	63.5 × 1.60	16	125.0	210.0	223.0	60	8	4.4
OD 3"	N	76.2 × 1.60	16	125.0	216.5	229.5	60	8	4.6
OD 4"	N	101.6 × 2.00	16	125.0	228.8	241.8	60	8	5.1
OD 6"	N	152.4 × 2.77	16	150.0	258.0	272.0	60	8	10.5
IPS 2"	N	60.3 × 2.00	16	114.3	208.5	221.5	60	8	4.4
IPS 3"	N	88.9 × 2.30	16	152.4	222.5	235.5	60	8	5.0
IPS 4"	N	114.3 × 2.30	16	152.4	235.0	248.0	60	8	6.0
IPS 6"	N	168.3 × 2.70	16	152.4	261.0	274.0	60	8	11.0
ISO 33.7	F	33.7 × 2.00	10	114.3	194.9	207.9	60	8	3.1
ISO 42.4	N	42.4 × 2.00	16	114.3	199.2	212.2	60	8	4.0
ISO 48.3	N	48.3 × 2.00	16	114.3	202.2	215.2	60	8	4.1
ISO 60.3	N	60.3 × 2.00	16	114.3	208.1	221.1	60	8	4.5
ISO 76.1	N	76.1 × 2.00	16	152.4	216.5	229.5	60	8	4.8
ISO 88.9	N	88.9 × 2.30	16	152.4	222.5	235.5	60	8	5.3
ISO 114.3	N	114.3 × 2.30	16	152.4	235.0	248.0	60	8	6.1

Position	Description of the order code
1	Valve type
	TSV VARINLINE® sampling valve
2	Type
	N Fail-safe position against the flow direction
3	Process connection
	N Housing DN 40–125, OD 1 ½"–6", IPS 2"–6", ISO 42.4–114.3
	F Housing DN 25, OD 1", ISO 33.7
4	Sampling housing
	
5	Seal material in contact with the product
	1 EPDM (FDA)
	2 FKM (FDA)
	3 HNBR (FDA)
6	Aseptic
	K Without metal bellows
	M With metal bellows
7	Installation type VARINLINE® fitting*
	/- Without in-line housing
	/T With housing
	/TT With housing connection T
	/TU With housing connection U
	/TT-S With housing connection T-S
	/TU-S With housing connection U-S
8	Installation fittings (optional for the VARINLINE® fitting)
	N Welding end
9	Accessories
	/52 Adhesive ID tag
+	
10–15	Air connection/control and feedback system
	LAT.0000M Metric for air hose Ø 6/4 mm
	LAT.0000Z Inch for air hose Ø OD ¼" (6.35/4.35 mm)
	XXXXX Order code for different control and feedback systems see section 9

* Detailed information on VARINLINE® can be found in section 1



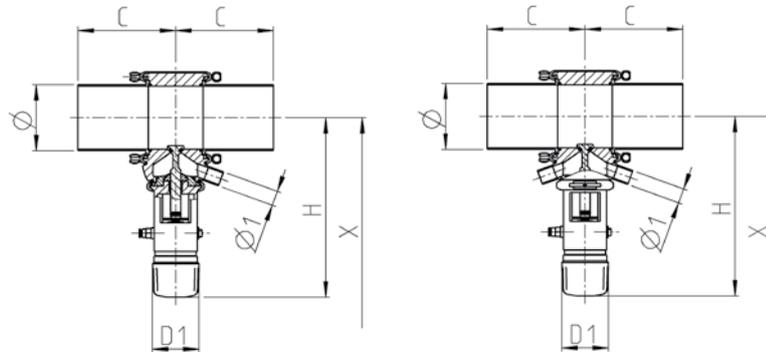
The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8	9	10 to 15							
Code	TSV	N	-		-				N	/52	+						

For order codes differing from the standard version, please refer to section 7 (options).



Technical data of the standard version	
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Ambient temperature	0 to 60 °C
Air supply pressure	Min. 6 bar (87 psi)
Product pressure	Max. 10 bar (145 psi) With stainless steel bellows max. 5 bar (73 psi)
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted
Actuator type	Pneumatic actuator air/spring
Connection fittings	Welding end
Identification	Adhesive ID tag
Certificates	



Nominal width	Process connection	Pipe	Housing		Dimension		Actuator	Valve	
		Ø [mm]	Ø1 [mm]	C [mm]	H [mm]	X [mm]	D1 [mm]	Stroke [mm]	Weight [kg]
DN 25	F	29.0 × 1.50	10	90.0	193.0	209.0	60	8	3.0
DN 40	N	41.0 × 1.50	16	90.0	199.0	216.0	60	8	3.9
DN 50	N	53.0 × 1.50	16	90.0	205.0	222.0	60	8	4.0
DN 65	N	70.0 × 2.00	16	125.0	213.0	230.0	60	8	4.6
DN 80	N	85.0 × 2.00	16	125.0	220.5	237.5	60	8	4.8
DN 100	N	104.0 × 2.00	16	125.0	230.0	247.0	60	8	5.2
DN 125	N	129.0 × 2.00	16	125.0	242.5	259.5	60	8	5.5
DN 150	N	154.0 × 2.00	16	150.0	255.0	272.0	60	8	9.9
OD 1"	F	25.4 × 1.60	10	90.0	191.0	208.0	60	8	2.9
OD 1 ½"	N	38.1 × 1.60	16	90.0	197.5	214.5	60	8	3.8
OD 2"	N	50.8 × 1.60	16	90.0	203.8	220.8	60	8	4.0
OD 2 ½"	N	63.5 × 1.60	16	125.0	210.0	227.0	60	8	4.4
OD 3"	N	76.2 × 1.60	16	125.0	216.5	223.5	60	8	4.6
OD 4"	N	101.6 × 2.00	16	125.0	228.8	245.8	60	8	5.1
OD 6"	N	152.4 × 2.77	16	150.0	258.0	272.0	60	8	10.5
IPS 2"	N	60.3 × 2.00	16	114.3	208.5	225.5	60	8	4.4
IPS 3"	N	88.9 × 2.30	16	152.4	222.5	239.5	60	8	5.0
IPS 4"	N	114.3 × 2.30	16	152.4	235.0	252.0	60	8	6.0
IPS 6"	N	168.3 × 2.70	16	152.4	261.0	279.0	60	8	11.0
ISO 33.7	F	33.7 × 2.00	10	114.3	194.9	211.9	60	8	3.1
ISO 42.4	N	42.4 × 2.00	16	114.3	199.2	216.2	60	8	4.0
ISO 48.3	N	48.3 × 2.00	16	114.3	202.2	219.2	60	8	4.1
ISO 60.3	N	60.3 × 2.00	16	114.3	208.1	225.1	60	8	4.5
ISO 76.1	N	76.1 × 2.00	16	152.4	216.5	233.5	60	8	4.8
ISO 88.9	N	88.9 × 2.30	16	152.4	222.5	239.5	60	8	5.3
ISO 114.3	N	114.3 × 2.30	16	152.4	235.0	252.0	60	8	6.1

Position	Description of the order code
1	Valve type
	TSV VARINLINE® sampling valve
2	Type
	U Fail-safe position with the flow direction
3	Process connection
	N Housing DN 40–125, OD 1 ½"–6", IPS 2"–6", ISO 42.4–114.3
	F Housing DN 25, OD 1", ISO 33.7
4	Sampling housing
	
5	Seal material in contact with the product
	1 EPDM (FDA)
	2 FKM (FDA)
	3 HNBR (FDA)
6	Aseptic
	K Without metal bellows
	M With metal bellows
7	Installation type VARINLINE® fitting*
	/- Without in-line housing
	/T With housing
	/TT With housing connection T
	/TU With housing connection U
	/TT-S With housing connection T-S
	/TU-S With housing connection U-S
8	Installation fittings (optional for the VARINLINE® fitting)
	N Welding end
9	Accessories
	/52 Adhesive ID tag
+	
10–15	Air connection/control and feedback system
	LAT.0000M Metric for air hose Ø 6/4 mm
	LAT.0000Z Inch for air hose Ø OD ¼" (6.35/4.35 mm)
	XXXXX Order code for different control and feedback systems see section 9

* detailed information on VARINLINE® can be found in section 1

4.2

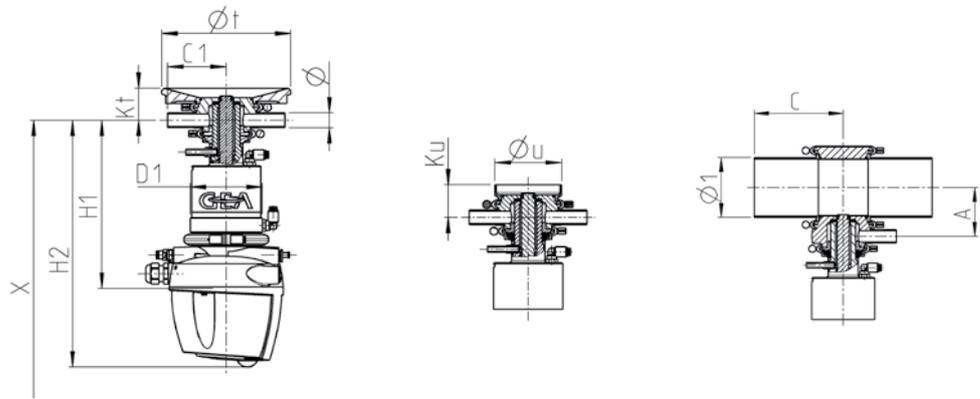
The code is composed as follows, depending on the chosen configuration:

Position	1	2	-	3	4	-	5	6	7	8	9	+	10 to 15						
Code	TSV	U	-			-				N	/52	+							

For order codes differing from the standard version, please refer to section 7 (options).



Technical data of the standard version	
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM
Ambient temperature	0 to 45 °C
Air supply pressure	6 to 8 bar (87 to 116 psi)
Product pressure	Max. 8 bar (116 psi)
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted
Control and feedback system	Connection 0 (without control top)
Actuator type	Pneumatic actuator air/spring
Connection fittings	Welding end
Certificates	



With housing connection

		Pipe			Dimension				Actuator	Valve
Nominal width	Ø [mm]	Øt [mm]	Øu [mm]	C1 [mm]	H2 [mm]	Kt [mm]	Ku [mm]	D1 [mm]	Stroke [mm]	
DN 15	19.0 × 1.5	165	85 × 2	75	317.5	41	41.5	93	15	

With in-line housing

		Pipe		Dimension					Actuator	Valve	
Nominal width	Process connection	Ø [mm]	Ø1 [mm]	A [mm]	C [mm]	H1 [mm]	H2 [mm]	X [mm]	D1 [mm]	Stroke [mm]	Weight [kg]
DN 15/DN 40	N	19 × 1.5	41.0 × 1.50	47.5	90.0	204	317.5	368	93	15	7.9
DN 15/DN 50	N	19 × 1.5	53.0 × 1.50	53.5	90.0	204	317.5	368	93	15	8.1
DN 15/DN 65	N	19 × 1.5	70.0 × 2.00	61.5	125.0	204	317.5	368	93	15	8.7
DN 15/DN 80	N	19 × 1.5	85.0 × 2.00	69.0	125.0	204	317.5	368	93	15	8.9
DN 15/DN 100	N	19 × 1.5	104.0 × 2.00	78.5	125.0	204	317.5	368	93	15	9.2
DN 15/DN 125	N	19 × 1.5	129.0 × 2.00	91.0	125.0	204	317.5	368	93	15	9.6
DN 15/DN 150	N	19 × 1.5	154.0 × 2.00	103.5	150.0	204	317.5	368	93	15	14.0
DN 15/OD 1 ½"	N	19 × 1.5	38.1 × 1.60	46.0	90.0	204	317.5	368	93	15	7.9
DN 15/OD 2"	N	19 × 1.5	50.8 × 1.60	52.0	90.0	204	317.5	368	93	15	8.0
DN 15/OD 2 ½"	N	19 × 1.5	63.5 × 1.60	58.5	125.0	204	317.5	368	93	15	8.5
DN 15/OD 3"	N	19 × 1.5	76.2 × 1.60	65.0	125.0	204	317.5	368	93	15	8.6
DN 15/OD 4"	N	19 × 1.5	101.6 × 2.00	77.0	125.0	204	317.5	368	93	15	9.2
DN 15/OD 6"	N	19 × 1.5	152.4 × 2.77	92.7	150.0	204	317.5	368	93	15	9.2
DN 15/IPS 2"	N	19 × 1.5	60.3 × 2.00	57.0	114.3	204	317.5	368	93	15	8.5
DN 15/IPS 3"	N	19 × 1.5	88.9 × 2.30	71.0	152.4	204	317.5	368	93	15	9.1
DN 15/IPS 4"	N	19 × 1.5	114.3 × 2.30	83.0	152.4	204	317.5	368	93	15	10.0
DN 15/IPS 6"	N	19 × 1.5	168.3 × 2.70	110.0	152.4	204	317.5	368	93	15	15.1

Position	Description of the order code																					
1	Valve type T Mixproof sampling valve																					
2	Housing combinations L T F D C (VARINLINE®) E (VARINLINE®) 																					
3	Supplement to the valve type RC Lifting actuator without spray cleaning																					
4	Nominal width top DN 15																					
5	Nominal width bottom (optional for the VARINLINE® housing combination) <table border="1"> <tr> <td>DN 40</td> <td>OD 1 ½"</td> <td></td> </tr> <tr> <td>DN 50</td> <td>OD 2"</td> <td>IPS 2"</td> </tr> <tr> <td>DN 65</td> <td>OD 2 ½"</td> <td></td> </tr> <tr> <td>DN 80</td> <td>OD 3"</td> <td>IPS 3"</td> </tr> <tr> <td>DN 100</td> <td>OD 4"</td> <td>IPS 4"</td> </tr> <tr> <td>DN 125</td> <td></td> <td></td> </tr> <tr> <td>DN 150</td> <td>OD 6"</td> <td>IPS 6"</td> </tr> </table>	DN 40	OD 1 ½"		DN 50	OD 2"	IPS 2"	DN 65	OD 2 ½"		DN 80	OD 3"	IPS 3"	DN 100	OD 4"	IPS 4"	DN 125			DN 150	OD 6"	IPS 6"
DN 40	OD 1 ½"																					
DN 50	OD 2"	IPS 2"																				
DN 65	OD 2 ½"																					
DN 80	OD 3"	IPS 3"																				
DN 100	OD 4"	IPS 4"																				
DN 125																						
DN 150	OD 6"	IPS 6"																				
6	Actuator type S Air/spring																					
7	Non-actuated position Z Spring-to-close (NC)																					
8	Actuator T/09																					
9	Valve seat version L0 Clamped seat ring/clamp connection																					
10	Seal material in contact with the product 1 EPDM (FDA) 2 FKM (FDA)																					
11/12	Surface quality of the sampling housing / Surface quality of the sampling housings <table border="1"> <tr> <td>3 Inside Ra ≤ 0.8 µm, outside ground</td> <td>2 Inside Ra ≤ 0.8 µm, outside matte</td> </tr> <tr> <td></td> <td>3 Inside Ra ≤ 0.8 µm, outside ground</td> </tr> </table>	3 Inside Ra ≤ 0.8 µm, outside ground	2 Inside Ra ≤ 0.8 µm, outside matte		3 Inside Ra ≤ 0.8 µm, outside ground																	
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	3 Inside Ra ≤ 0.8 µm, outside ground																					
13	Connection fittings N Welding end																					
14	Accessories /52 Adhesive ID tag																					
+																						
15–20	Air connection/control and feedback system 00000M Metric for air hose Ø 6/4 mm 00000Z Inch for air hose Ø OD ¼" (6.35/4.35 mm) XXXXX Order code for different control and feedback systems see section 9																					



The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8	9	10	11/12	13	14	15 to 20
Code	T		RC	- DN 15 /		- S	Z	- T/09	- L0	-	3/	N	/52	+ [] [] [] [] [] [] [] [] [] []

For order codes differing from the standard version, please refer to section 7 (options).



VARIVENT® overflow valves

VARIVENT® overflow valves are used to reduce excess pressure or pressure spikes and are used to protect the pipeline system and the components installed in it.

Sizes		
Type F	Type M	Type F-CJ
Opening pressure adjustable via a spring	Opening pressure adjustable via a spring and with pneumatic lifting	Opening pressure adjustable via a spring with pneumatic actuator (D-Force)
DN 25 – DN 100		
OD 1" –OD 4"		
IPS 2" –IPS 4"		

Function of the valve

The VARIVENT® overflow valve regulates the respective opening pressure of the valve with a manually adjustable actuator. When the set pressure is exceeded, the valve will open. The special contour of the valve disc and the seat ring effect a controlled diversion of the product flow so that the valve continues to remain open in spite of the pressure relief starting. This way, flutter of the valve is avoided.

The overflow valves can be equipped additionally with up to two proximity switches in the lantern. This permits feedback of the valve disc position.

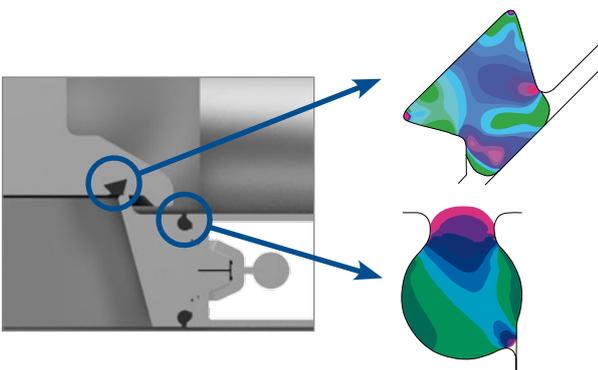
Special features
Hygienic design
Metallic stop
Flexibility because of the VARIVENT® modular principle
Proven VARIVENT® seal geometry
Availability of the three different actuator types
Low investment and maintenance costs
Mismatched housing combinations available



Application examples

VARIVENT® overflow valves are mainly used for overpressure protection downstream of displacement pumps. The valves are installed so that the respective pump will convey the medium in a circle and the pressure cannot increase further.

Overflow valves equipped with the D-Force actuator are used in filling and filter lines and in flash pasteurization systems to push out carbonated drinks with water. Therefore, it is necessary that that overflow valves are partially kept shut against a higher product pressure during the production process.



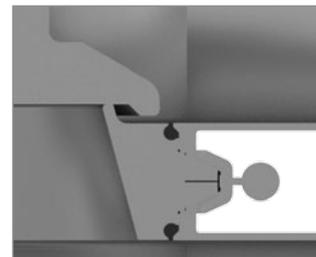
Representation of the stress load of the housing O-ring and the V-ring

Sealing according to the VARIVENT® principle

The VARIVENT® overflow valve are characterized by special seal technology. A metallic stop results in defined seal deformation, ensuring long seal life. This allows for more time to pass between required maintenance services, thereby allowing for continuous production and shorter downtimes.

The special grooved shape in the valve disc ensures the seal has a secure hold at all times up to a pressure differential of 10 bar during switching. The seal geometry was optimized by using FEM calculations.

Overflow valves with metallic seat design can be used to secure a pressure difference above 10 bar. When selecting the valve, the permitted maximum pressures of the housings and the possible setting pressures of the actuators must be considered. These valves offer the benefit of lower maintenance requirements.



Metal seat design

Actuator types of the overflow valves

The spring-to-close actuators available for the overflow valve (F) are to be set to the desired set pressure with a setting screw. Different spring packages are available to permit different pressure ranges. Take them from the table **Adjustable set pressures**.

The overflow valves are optionally available with an additionally integrated pneumatic actuator (M). This permits individual lifting of the valve disc during pipe cleaning.

The cleaning media flows past the seal of the lifted valve disc, cleans the seal surfaces and the seat area and then drains through the upper housing. This ensures hygienic cleaning of all areas in contact with the product.

The D-Force actuator permits holding shut of the valve against a higher pressure during specific production steps. This is a combination of two actuators: the overflow valve actuator with set screw (F) and an air/air actuator (CJ).

The D-Force actuator combination by air pressure allows deliberate keeping shut of the valve against higher pressures than the mechanically set pressure. This properly is required specifically for the production of carbonated beverages, since a pressure increase may result in nearly any process step here. There will be gasification of the product and foam formation in the pipeline. This actuator also permits lifting of the valve disc during cleaning.

Adjustable set pressures [bar]							
Nominal width		Actuator type					
		F11 M11	F21 M21	F1 M1	F2 M2	F3 M3	F4 M4
DN 25	OD 1"	1-4.5	3.0-9.0	8.0-16.0	-	-	-
DN 40	OD 1 1/2"	-	0.5-2.0	1.5-5.0	4.0-15.0	14.0-16.0	-
DN 50	OD 2"	-	-	0.5-4.0	3.0-11.0	10.0-16.0	-
DN 65	OD 2 1/2"	-	-	0.5-1.0	0.5-4.0	3.0-10.0	9.0-15.0
DN 80	OD 3"	-	-	0.5-1.0	0.5-4.0	3.0-10.0	9.0-10.0
DN 100	OD 4"	-	-	-	0.5-1.5	0.5-4.0	3.0-7.0
Required air supply pressure for opening [type M]		3	3	3	4	3	5
Nominal width		Actuator type					
				D-Force F1-CJ	D-Force F2-CJ	D-Force F3-CJ	D-Force F4-CJ
DN 25	OD 1"	-	-	8.0-16.0	-	-	-
DN 40	OD 1 1/2"	-	-	1.5-5.0	4.0-15.0	14.0-16.0	-
DN 50	OD 2"	-	-	0.5-4.0	3.0-11.0	10.0-16.0	-
DN 65	OD 2 1/2"	-	-	0.5-1.0	0.5-4.0	3.0-10.0	9.0-15.0
DN 80	OD 3"	-	-	0.5-1.0	0.5-4.0	3.0-10.0	9.0-10.0
DN 100	OD 4"	-	-	-	0.5-1.5	0.5-4.0	3.0-7.0
Required air supply pressure [type F-CJ]		-	-	3	3	4	6.5

Higher pressures on request.



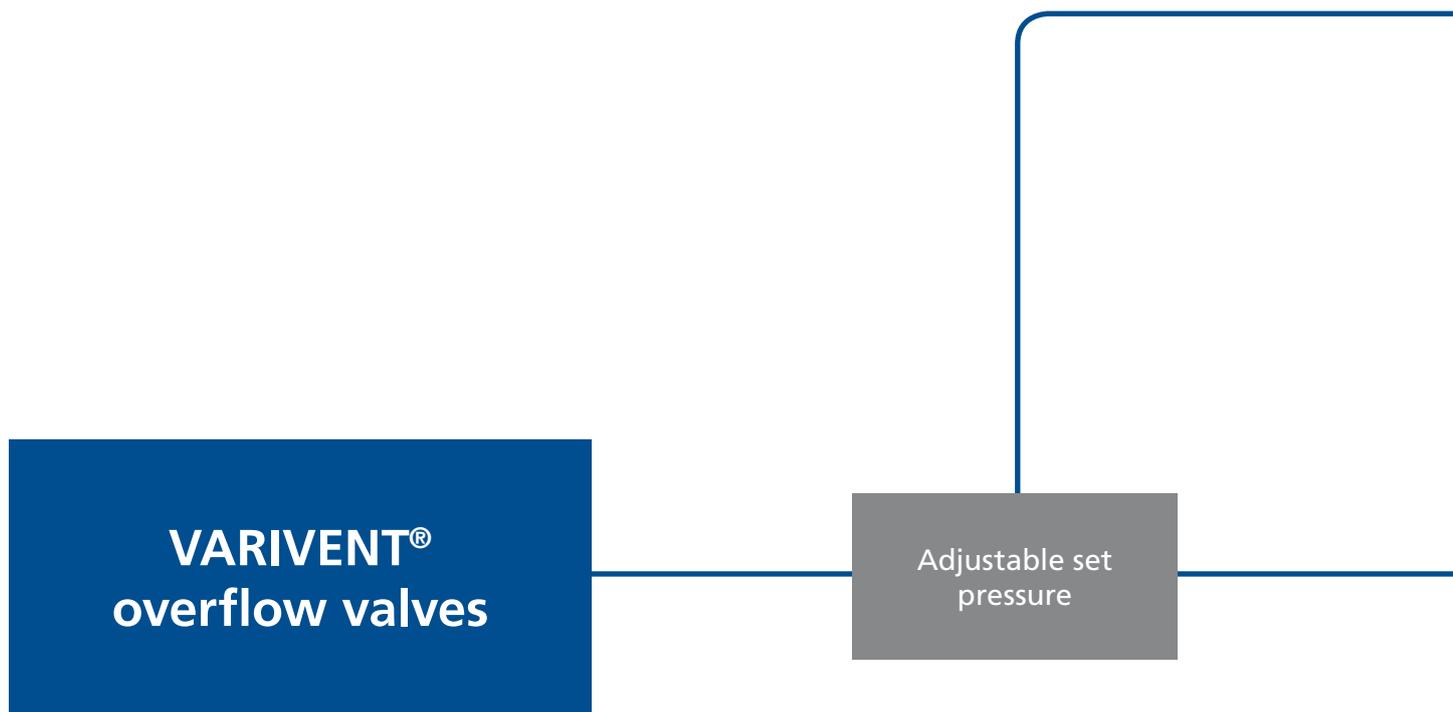
Actuator type F
with set screw for the set
pressure

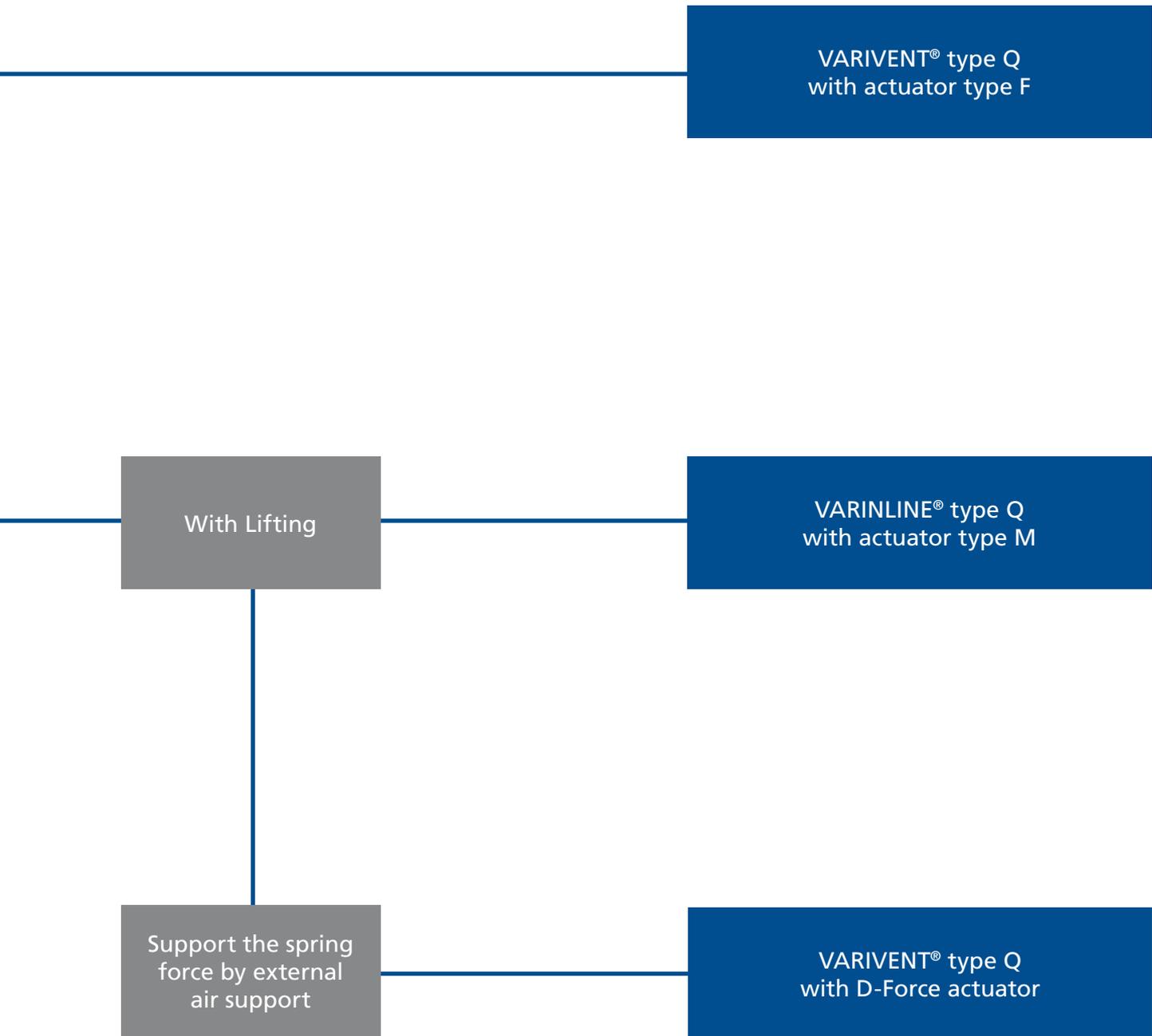


Actuator type M
with set screw and
pneumatic lifting



D-Force actuator
with set screw and air/air
actuator

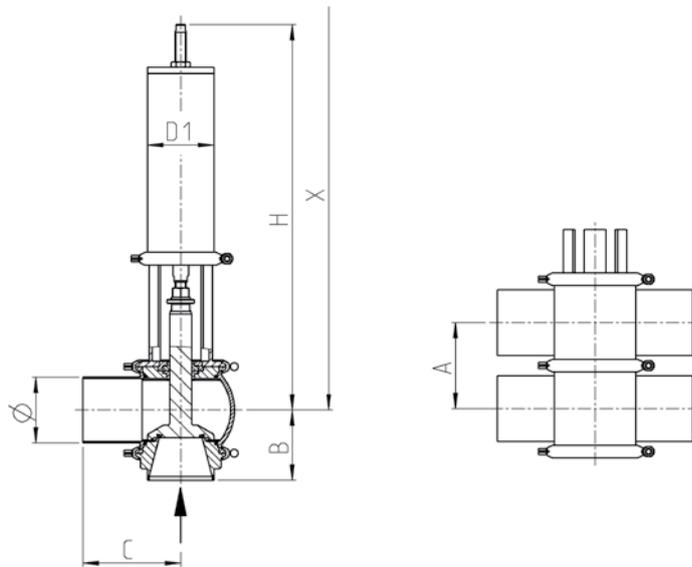




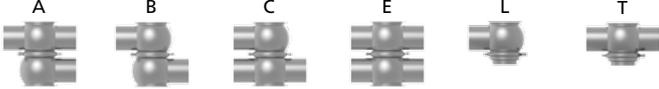
4.3



Technical data of the standard version	
Recommended flow direction	From bottom to top
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Valve disc sealing	Soft-sealing with V-ring
Ambient temperature	0 to 45 °C
Product pressure	See separate table set pressures
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted
Actuator type	Adjustable spring
Connection fittings	Welding end
Identification	Adhesive ID tag
Valve seat version	Clamped seat ring
Certificates	 



Nominal width	Pipe	Housing			Actuator	Dimension		Valve	
	Ø [mm]	A [mm]	B [mm]	C [mm]	D1 [mm]	H [mm]	X [mm]	Stroke [mm]	Weight [kg]
DN 25	29.0 × 1.5	50.0	58.0	90.0	85	394.0	644.0	10.0	4.6
DN 40	41.0 × 1.5	62.0	64.0	90.0	85	490.0	740.0	15.0	6.6
DN 50	53.0 × 1.5	74.0	70.0	90.0	85	496.0	746.0	27.0	6.8
DN 65	70.0 × 2.0	96.0	83.0	125.0	85	517.0	767.0	30.0	10.8
DN 80	85.0 × 2.0	111.0	90.5	125.0	85	524.5	774.5	30.0	11.0
DN 100	104.0 × 2.0	130.0	100.0	125.0	85	534.0	784.0	30.0	13.9
OD 1"	25.4 × 1.6	46.0	56.0	90.0	85	392.0	642.0	6.0	4.5
OD 1 ½"	38.1 × 1.6	59.0	62.5	90.0	85	491.5	741.5	15.0	6.5
OD 2"	50.8 × 1.6	71.5	69.0	90.0	85	498.0	748.0	27.5	6.7
OD 2 ½"	63.5 × 1.6	90.0	80.0	125.0	85	521.0	771.0	31.0	10.7
OD 3"	76.2 × 1.6	103.0	86.5	125.0	85	527.5	777.5	29.0	10.9
OD 4"	101.6 × 2.0	127.5	99.0	125.0	85	536.0	786.0	30.5	13.6
IPS 2"	60.3 × 2.0	81.0	73.5	114.3	85	492.5	742.5	27.0	7.0
IPS 3"	88.9 × 2.3	115.0	92.5	152.4	85	522.5	772.5	30.0	11.1
IPS 4"	114.3 × 2.3	140.0	105.0	152.4	85	529.0	779.0	30.0	14.1

Position	Description of the order code																		
1	Valve type Q Overflow valve																		
2	Housing combinations 																		
3	Valve disc sealing W Soft-sealing (with V-ring) M Metallic (no V-ring)																		
4/5	Nominal width (upper housing/lower housing) <table border="1"> <tr> <td>DN 25</td> <td>OD 1"</td> <td></td> </tr> <tr> <td>DN 40</td> <td>OD 1 ½"</td> <td></td> </tr> <tr> <td>DN 50</td> <td>OD 2"</td> <td>IPS 2"</td> </tr> <tr> <td>DN 65</td> <td>OD 2 ½"</td> <td></td> </tr> <tr> <td>DN 80</td> <td>OD 3"</td> <td>IPS 3"</td> </tr> <tr> <td>DN 100</td> <td>OD 4"</td> <td>IPS 4"</td> </tr> </table>	DN 25	OD 1"		DN 40	OD 1 ½"		DN 50	OD 2"	IPS 2"	DN 65	OD 2 ½"		DN 80	OD 3"	IPS 3"	DN 100	OD 4"	IPS 4"
DN 25	OD 1"																		
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DN 65	OD 2 ½"																		
DN 80	OD 3"	IPS 3"																	
DN 100	OD 4"	IPS 4"																	
6	Actuator type F F-actuator without lifting																		
7	Actuator type F11 F21 F1 F2 F3 F4																		
8	Valve seat version L0 Clamped seat ring/clamp connection																		
9	Seal material in contact with the product 1 EPDM (FDA) 2 FKM (FDA) 3 HNBR (FDA)																		
10	Surface quality of the housing 2 Inside Ra ≤0.8 µm, outside matte blasted																		
11	Connection fittings N Welding end																		
12	Accessories /52 Adhesive ID tag																		
+																			
13-18	Air connection/control and feedback system 00000M Metric for air hose Ø 6/4 mm 00000Z Inch for air hose Ø OD ¼" (6.35/4.35 mm) XXXXX Order code for different control and feedback systems see section 9																		

4.3

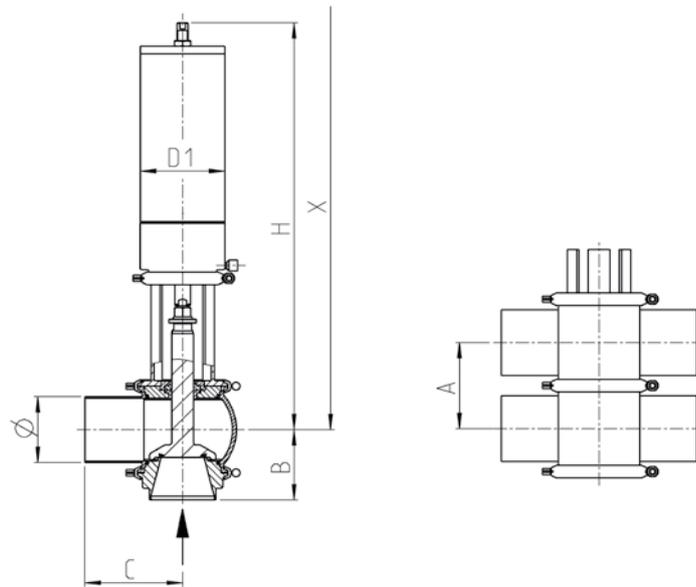
The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18
Code	Q			/	F		L0		2	N	/52	+ [] [] [] [] [] [] [] [] [] []

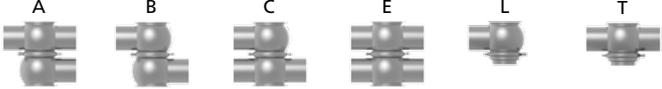
For order codes differing from the standard version, please refer to section 7 (options).



Technical data of the standard version	
Recommended flow direction	From bottom to top
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Valve disc sealing	Soft-sealing with V-ring
Ambient temperature	0 to 45 °C
Air supply pressure	Max. 8 bar (116 psi)
Product pressure	See separate table set pressures
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted
Actuator type	Adjustable spring with pneumatic lifting
Connection fittings	Welding end
Identification	Adhesive ID tag
Valve seat version	Clamped seat ring
Certificates	 



Nominal width	Pipe	Housing			Actuator	Dimension		Valve	
	Ø [mm]	A [mm]	B [mm]	C [mm]	D1 [mm]	H [mm]	X [mm]	Stroke [mm]	Weight [kg]
DN 25	29.0 × 1.5	50.0	58.0	90.0	108	439.0	689.0	10.0	9.5
DN 40	41.0 × 1.5	62.0	64.0	90.0	108	545.0	795.0	15.0	10.3
DN 50	53.0 × 1.5	74.0	70.0	90.0	108	551.0	801.0	27.0	10.5
DN 65	70.0 × 2.0	96.0	83.0	125.0	168	562.0	812.0	30.0	16.8
DN 80	85.0 × 2.0	111.0	90.5	125.0	168	569.5	819.5	30.0	17.0
DN 100	104.0 × 2.0	130.0	100.0	125.0	168	579.0	829.0	30.0	19.9
OD 1"	25.4 × 1.6	46.0	56.0	90.0	108	437.0	687.0	6.0	9.5
OD 1 ½"	38.1 × 1.6	59.0	62.5	90.0	108	546.5	796.5	15.0	10.2
OD 2"	50.8 × 1.6	71.5	69.0	90.0	108	553.0	803.0	27.5	10.5
OD 2 ½"	63.5 × 1.6	90.0	80.0	125.0	168	566.0	816.0	31.0	16.7
OD 3"	76.2 × 1.6	103.0	86.5	125.0	168	572.5	822.5	29.0	16.9
OD 4"	101.6 × 2.0	127.5	99.0	125.0	168	581.0	831.0	30.5	19.6
IPS 2"	60.3 × 2.0	81.0	73.5	114.3	108	547.5	797.5	27.0	10.8
IPS 3"	88.9 × 2.3	115.0	92.5	152.4	168	567.5	817.5	30.0	17.2
IPS 4"	114.3 × 2.3	140.0	105.0	152.4	168	574.0	824.0	30.0	20.1

Position	Description of the order code																		
1	Valve type Q Overflow valve																		
2	Housing combinations 																		
3	Valve disc sealing W Soft-sealing (with V-ring) M Metallic (no V-ring)																		
4/5	Nominal width (upper housing/lower housing) <table border="1"> <tr> <td>DN 25</td> <td>OD 1"</td> <td></td> </tr> <tr> <td>DN 40</td> <td>OD 1 ½"</td> <td></td> </tr> <tr> <td>DN 50</td> <td>OD 2"</td> <td>IPS 2"</td> </tr> <tr> <td>DN 65</td> <td>OD 2 ½"</td> <td></td> </tr> <tr> <td>DN 80</td> <td>OD 3"</td> <td>IPS 3"</td> </tr> <tr> <td>DN 100</td> <td>OD 4"</td> <td>IPS 4"</td> </tr> </table>	DN 25	OD 1"		DN 40	OD 1 ½"		DN 50	OD 2"	IPS 2"	DN 65	OD 2 ½"		DN 80	OD 3"	IPS 3"	DN 100	OD 4"	IPS 4"
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DN 40	OD 1 ½"																		
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DN 65	OD 2 ½"																		
DN 80	OD 3"	IPS 3"																	
DN 100	OD 4"	IPS 4"																	
6	Actuator type M M-actuator with lifting																		
7	Actuator type M11 M21 M1 M2 M3 M4																		
8	Valve seat version L0 Clamped seat ring/clamp connection																		
9	Seal material in contact with the product 1 EPDM (FDA) 2 FKM (FDA) 3 HNBR (FDA)																		
10	Surface quality of the housing 2 Inside Ra ≤0.8 µm, outside matte blasted																		
11	Connection fittings N Welding end																		
12	Accessories /52 Adhesive ID tag																		
+																			
13-18	Air connection/control and feedback system 00000M Metric for air hose Ø 6/4 mm 00000Z Inch for air hose Ø OD ¼" (6.35/4.35 mm) XXXXX Order code for different control and feedback systems see section 9																		

4.3

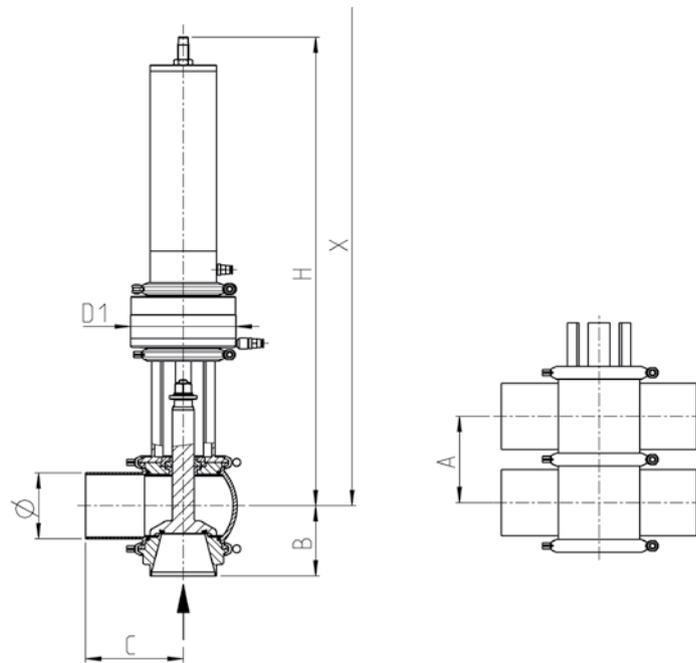
The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18
Code	Q			/	M		L0		2	N	/52	+

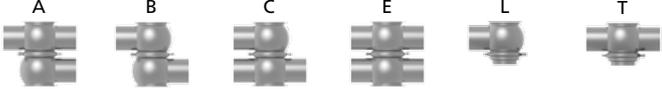
For order codes differing from the standard version, please refer to section 7 (options).



Technical data of the standard version	
Recommended flow direction	From bottom to top
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Valve disc sealing	Soft-sealing with V-ring
Ambient temperature	0 to 45 °C
Air supply pressure	Max. 8 bar (116 psi)
Product pressure	See separate table set pressures
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted
Actuator type	Adjustable spring with pneumatic guard against higher pressures and lifting
Connection fittings	Welding end
Identification	Adhesive ID tag
Valve seat version	Clamped seat ring
Certificates	



Nominal width	Pipe	Housing			Actuator	Dimension		Valve	
	Ø [mm]	A [mm]	B [mm]	C [mm]	D1 [mm]	H1 [mm]	X [mm]	Stroke [mm]	Weight [kg]
DN 25	29.0 × 1.5	50.0	58.0	90.0	135	524.0	774.0	10.0	12.6
DN 40	41.0 × 1.5	62.0	64.0	90.0	135	630.0	880.0	15.0	13.6
DN 50	53.0 × 1.5	74.0	70.0	90.0	135	636.0	886.0	27.0	13.8
DN 65	70.0 × 2.0	96.0	83.0	125.0	135	647.0	897.0	30.0	17.5
DN 80	85.0 × 2.0	111.0	90.5	125.0	135	654.5	904.5	30.0	17.7
DN 100	104.0 × 2.0	130.0	100.0	125.0	135	664.0	914.0	30.0	20.9
OD 1"	25.4 × 1.6	46.0	56.0	90.0	135	522.0	772.0	6.0	12.6
OD 1 ½"	38.1 × 1.6	59.0	62.5	90.0	135	631.5	881.5	15.0	13.5
OD 2"	50.8 × 1.6	71.5	69.0	90.0	135	638.0	888.0	27.5	13.7
OD 2 ½"	63.5 × 1.6	90.0	80.0	125.0	135	651.0	901.0	31.0	17.4
OD 3"	76.2 × 1.6	103.0	86.5	125.0	135	657.5	907.5	29.0	17.6
OD 4"	101.6 × 2.0	127.5	99.0	125.0	135	666.0	916.0	30.5	20.7
IPS 2"	60.3 × 2.0	81.0	73.5	114.3	135	632.5	882.5	27.0	14.0
IPS 3"	88.9 × 2.3	115.0	92.5	152.4	135	652.5	902.5	30.0	17.8
IPS 4"	114.3 × 2.3	140.0	105.0	152.4	135	659.0	909.0	30.0	21.1

Position	Description of the order code																		
1	Valve type Q Overflow valve																		
2	Housing combinations 																		
3	Valve disc sealing W Soft-sealing (with V-ring) M Metallic (no V-ring)																		
4/5	Nominal width (upper housing/lower housing) <table border="1"> <tr> <td>DN 25</td> <td>OD 1"</td> <td></td> </tr> <tr> <td>DN 40</td> <td>OD 1 ½"</td> <td></td> </tr> <tr> <td>DN 50</td> <td>OD 2"</td> <td>IPS 2"</td> </tr> <tr> <td>DN 65</td> <td>OD 2 ½"</td> <td></td> </tr> <tr> <td>DN 80</td> <td>OD 3"</td> <td>IPS 3"</td> </tr> <tr> <td>DN 100</td> <td>OD 4"</td> <td>IPS 4"</td> </tr> </table>	DN 25	OD 1"		DN 40	OD 1 ½"		DN 50	OD 2"	IPS 2"	DN 65	OD 2 ½"		DN 80	OD 3"	IPS 3"	DN 100	OD 4"	IPS 4"
DN 25	OD 1"																		
DN 40	OD 1 ½"																		
DN 50	OD 2"	IPS 2"																	
DN 65	OD 2 ½"																		
DN 80	OD 3"	IPS 3"																	
DN 100	OD 4"	IPS 4"																	
6	Actuator type D D-Force																		
7	Actuator type F1-CJ F2-CJ F3-CJ F4-CJ																		
8	Valve seat version L0 Clamped seat ring/clamp connection																		
9	Seal material in contact with the product 1 EPDM (FDA) 2 FKM (FDA) 3 HNBR (FDA)																		
10	Surface quality of the housing 2 Inside Ra ≤0.8 µm, outside matte blasted																		
11	Connection fittings N Welding end																		
12	Accessories /52 Adhesive ID tag																		
+																			
13-18	Air connection/control and feedback system 00000M Metric for air hose Ø 6/4 mm 00000Z Inch for air hose Ø OD ¼" (6.35/4.35 mm) XXXXX Order code for different control and feedback systems see section 9																		

4.3

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18
Code	Q			/	D		L0		2	N	/52	+

For order codes differing from the standard version, please refer to section 7 (options).



VARIVENT® constant pressure valve

The VARIVENT® constant pressure valve is used to set a constant pressure at the input side of the valve. When process-related pressure fluctuations occur, the piston will open or close automatically so to compensate for them. The product pressure to be maintained in the housing is set by the air supply pressure in the actuator. Due to this, a constant air supply pressure is required.

Special features

Mechanically limited open/close position of the valve disc

PTFE-valve disc with low friction

Simple maintenance, only two seals

Good control properties

Kvs values depending on requested flow

Hygienic design

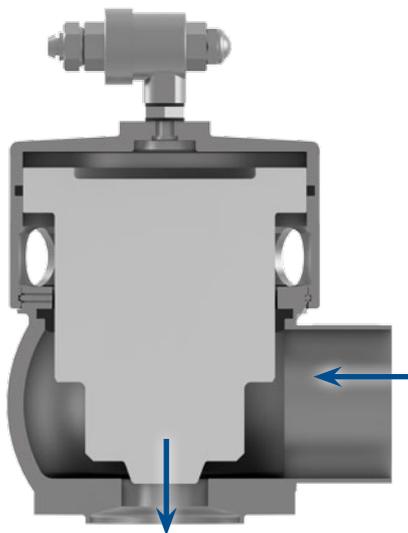
Approval according to 3-A

Function of the valve

In the VARIVENT® constant pressure valve, the exit opening opens when the pressure acting on the ring face of the valve disc is larger than the holding force of the piston set via the air pressure. If the product pressure drops, the valve will close automatically in order to maintain a constant pressure in the inlet socket.

Additionally, the lower part of the valve disc is equipped with a control cone to optimize the function method of the valve.

The valve disc of the constant pressure valve is made of PTFE with very good resilience against corrosive fluids and only low friction during the lifting movement.



The PTFE valve disc is lifted by the product flow

Application examples

VARIVENT® constant pressure valves are used to keep the pressure constant at the output of a separator. The self-adjusting VARIVENT® constant pressure valve offers a cost-efficient alternative to a control valve. No additional pressure transmitter is required since the valve will work independently after setting the product pressure.

Furthermore, the VARIVENT® constant pressure valve is used to maintain the required pressure at heat exchangers.

Nominal width			Kvs
DN 40/25	OD 1½"/1"		4
DN 40/40	OD 1½"/1½"		4
DN 40/40	OD 1½"/1½"		10
DN 65/50	OD 2½"/2"		16
DN 65/65	OD 2½"/2½"		25
DN 65/65	OD 2½"/2½"		35
DN 65/65	OD 2½"/2½"		60

Additional equipment

Optionally, the valve can be equipped with a quick vent or a fine pressure controller. The supply and exhaust quantity permits precise setting of the air supply pressure above the piston surface so that the desired content product pressure can be regulated on the input side of the valve.

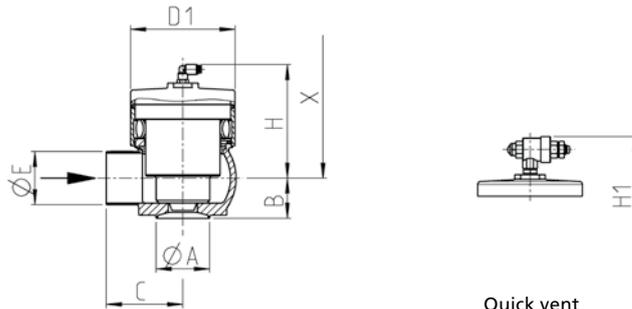


Quick venting valve with muffler

VARIVENT® Constant Pressure Valve, Type DHV



Technical data of the standard version	
Recommended flow direction	From top to bottom
Material housing	1.4404/AISI 316 L
Material valve disc	PTFE (FDA)
Seal material in contact with the product	EPDM, FKM, HNBR
Ambient temperature	0 to 45 °C
Air supply pressure	Max. 8 bar (116 psi)
Product pressure	Max. 10 bar (145 psi)
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted
Connection fittings	Welding end
Identification	Adhesive ID tag



Nominal width (inlet/outlet)	Housing				Actuator	Dimension				Valve		
	ØE [mm]	ØA [mm]	B [mm]	C [mm]		D1 [mm]	H [mm]	H1 [mm]	X [mm]	Stroke [mm]	Kvs [m³/h]	Weight [kg]
DN 40/25	41.0	29.0	39	70	76.5	141	161	169	15	4	2.0	
DN 40/40	41.0	41.0	39	70	76.5	141	161	169	15	4	2.0	
DN 40/40	41.0	41.0	39	70	76.5	141	161	169	15	10	2.0	
DN 65/50	70.0	53.0	53	100	137.0	155	175	203	15	16	7.0	
DN 65/65	70.0	70.0	53	100	137.0	155	175	200	15	25	6.9	
DN 65/65	70.0	70.0	53	100	137.0	155	175	200	15	35	6.9	
DN 65/65	70.0	70.0	53	100	137.0	155	175	203	15	60	6.7	
OD 1 ½"/1"	38.1	25.4	39	70	76.5	141	161	169	15	4	2.0	
OD 1 ½"/1 ½"	38.1	38.1	39	70	76.5	141	161	169	15	4	2.0	
OD 1 ½"/1 ½"	38.1	38.1	39	70	137.0	141	161	169	15	10	2.0	
OD 2 ½"/2"	63.5	50.8	53	100	137.0	155	175	203	15	16	7.0	
OD 2 ½"/2 ½"	63.5	63.5	53	100	137.0	155	175	200	15	25	6.9	
OD 2 ½"/2 ½"	63.5	63.5	53	100	137.0	155	175	200	15	35	6.9	
OD 2 ½"/2 ½"	63.5	63.5	53	100	137.0	155	175	203	15	60	6.7	

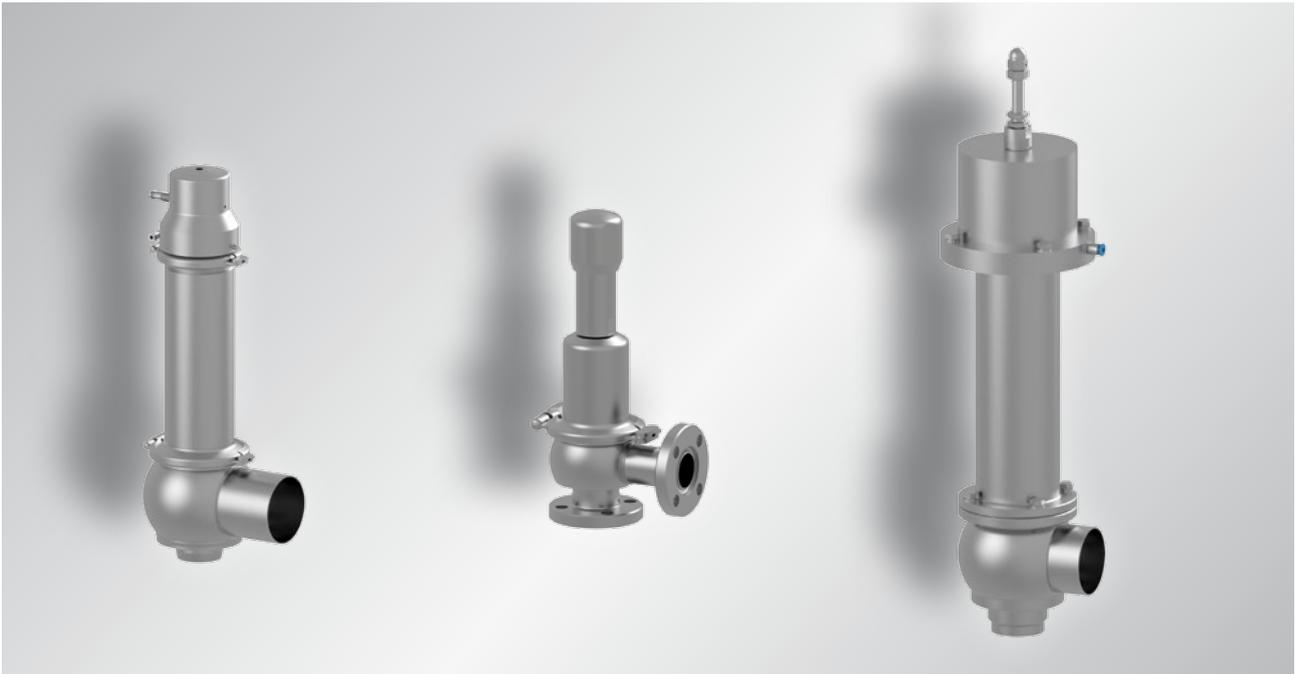
Position	Description of the order code
1	Valve type
	DHV VARIVENT® constant pressure valve
2	Nominal width inlet
	40 DN 40 1.5 OD 1 ½"
	65 DN 65 2.5 OD 2 ½"
3	Connection fitting inlet
	00 Welding end
4	Nominal width outlet
	25 DN 25 1 OD 1"
	40 DN 40 1.5 OD 1 ½"
	50 DN 50 2 OD 2"
	65 DN 65 2.5 OD 2 ½"
5	Connection fitting outlet
	00 Welding end
6	Kvs value
	4
	10
	16
	25
	35
7	Air connection
	0 Without
	M Metric Ø 6/4 mm
	Z Ø G ½"/Ø OD ¼" (standard-US)
	U Metric/inch Ø 8/6 (Ø 5/16")
8	Pressure control
	0 Without
	1 With quick vent
2 With pressure control valve, G ½"*	
9	Seal material in contact with the product
	1 EPDM (FDA)
	2 FKM (FDA)
	3 HNBR (FDA)

* Only available with air connection Z.



The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8	9								
Code	DHV	-		-	00	/		-	00	-		-		-		-	



Safety relief valves

VARIVENT® safety relief valves have been specifically developed for the requirements of the food, beverage and pharmaceuticals industries and meet the requirements of the relevant rules, such as DIN 11866 or ASME BPE. Due to the inlet area free from dead zones, the unique elastomer bellows and the optional pneumatic lifting, the valves are characterized by very good cleaning ability (CIP/SIP). Many connections permit best adjustment of the valves to different tasks.

Function of the valve

Full stroke safety relief valves are used in areas where surge flows or very fast pressure increases occur, due to their quick opening response. The main application is in pressure relief of steams and gases. Since the full stroke safety relief valve performs a full stroke after opening – no matter the pending flow rate – the full flow rate can be discharged even at a slight pressure increase.

Normal safety relief valves are ideal pressure relief valves. Their large proportional range leads to a continuous operating method and relief of pressure spikes specifically in liquids. The valves have a full stroke charge after an expanded proportional phase and thus reach a higher flow rate. They are also used as overflow valves and are used when the smallest design of the full stroke safety relief valve is too large already.

To ensure hygienic cleaning (CIP) or sterilization (SIP) of all surfaces in the system, the safety relief valves are available with a pneumatic lifting mechanism.

Special features

High-quality materials and surface finish

Manual or pneumatic lifting

Insensitive to temperature

Welded housing in CIP-able design

Self-draining housing shape free of dead zones ensures free drain

Application examples

Safety relief valves protect from excess pressure, e.g. for vessels within a sterilization process or during filling. They secure fermentation tanks in case of unexpected faults.

Safety relief valves are also used for inner pressure relief of vessels and other process equipment for curing media such as chocolate.

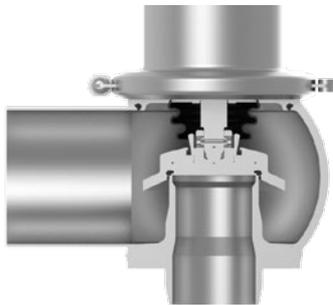
HyTight Assembly

Ease of cleaning – this is a requirement for the design of the VARIVENT® safety relief valves type 488. They are equipped with HyTight Assembly and therefore offer the best cleaning opportunities.

HyTight means Hygienic and Tight.

Benefits of the elastomer bellows
Increased tightness by O-ring seal
Elastomer bellows to protect difficult-to-clean components in the guide and spring cap
Fixing elements are placed within the bellows
Gap-free installation parts, exposed, flooded O-rings

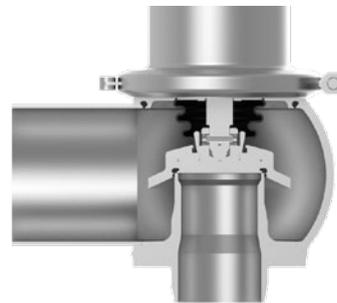
Difficult-to-clean components are protected from contact with the product by use of an elastomer bellows. Please observe that an elastomer bellows is not counterpressure-compensating like a stainless steel bellows.



Full stroke safety relief valve type 488

The safety relief valves in the series 488 has been developed in close cooperation with system operators and manufacturers. They reliably protect process systems from excess pressure without putting hygienic requirements at risk. The whole series has been configured and officially approved according to international standards (DGR 97/23/CG, ASME, GOST et al.). A version for steam, gases and liquids of each valve has been type-tested by TÜV in accordance with German regulations. They comply with the EU directive for pressure equipment and bear the CE symbol.

The VARIVENT® safety relief valve type 488 more than meets the special hygienic and performance requirements of the food, brewery and beverage industries. The valves have been developed for a great performance range and are mostly used in large plants, breweries and the beverage industry.



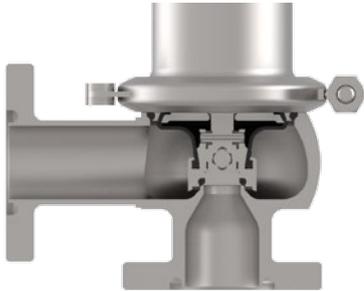
Safety relief valve type 488

4.5

Special features
Low contamination by bacteria and other contaminations
Minimized dead space in the inlet and flush installation possibility
Gap-free design of the internal assembly
Medium-contacting surface requirements according to DIN 11866 and ASME BPE
Use of FDA compliant elastomers
One-part spindle for higher setting accuracy and less friction
Valve stem and guide protected by EPDM bellows
Approvals worldwide

Normal safety relief valve type 483

The safety relief valves of series 483 have been developed for small to medium outputs. This type meets the properties of VARIVENT® safety relief valves type 488 and can be used in all areas of the food and beverage industries. The valves are used in applications such as bottling systems.



Normal safety relief valve type HyCom

HyCom normal safety relief valves have proven to be a cost-effective option for the VARIVENT® safety relief valves series 488. The HyCom series meets the requirements according to European PED 97/23/EC and AD2000 regulations. The valves are type-test approved by TÜV for non-toxic gases, steams and non-sticky liquids (fluid group 2). The HyCom safety relief valve is available with nominal widths DN 25 to DN 80.

Special features

Standardized design

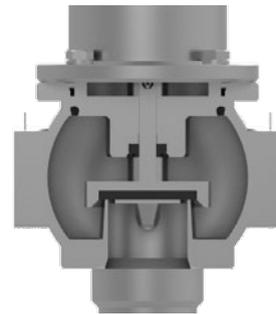
Manual and pneumatic lifting actuators available

CIP/SIP-able

Design with no dead zones

Seat heating (option)

Set pressure 0.5 to 10 bar



Liftings

The safety relief valves of the series VARIVENT® are equipped with a gas-tight lifting of the valve disc. This design characteristic permits cleaning media (steam or cleaning liquid) to flow through the valve during the cleaning process.

Manual lifting H4

The manual lifting H4 is a unique construction that clearly differs from the conventional lifting. The valves of nominal width DN 25 are equipped with a rotating lifting mechanism in which the safety relief valve opens when the cap turns. The valve remains opened until it is closed again by another turn of the cap. In larger valves, the valve disc can be lifted with a lever lift.



Turning lifting



Lever lifting

Pneumatic lifting H8

The pneumatic lifting H8 permits cleaning (CIP) or sterilizing (SIP) in the system. By pressurization of the lifting with air, the valve disc in the spindle is lifted from its seat and the flushing medium (steam or cleaning media) flows through the safety relief valve.

Depending on the setting and lifting pressure (compressed air supply), a double piston version (in exceptions also a triple piston lifting mechanism) can be required instead of the single piston design.



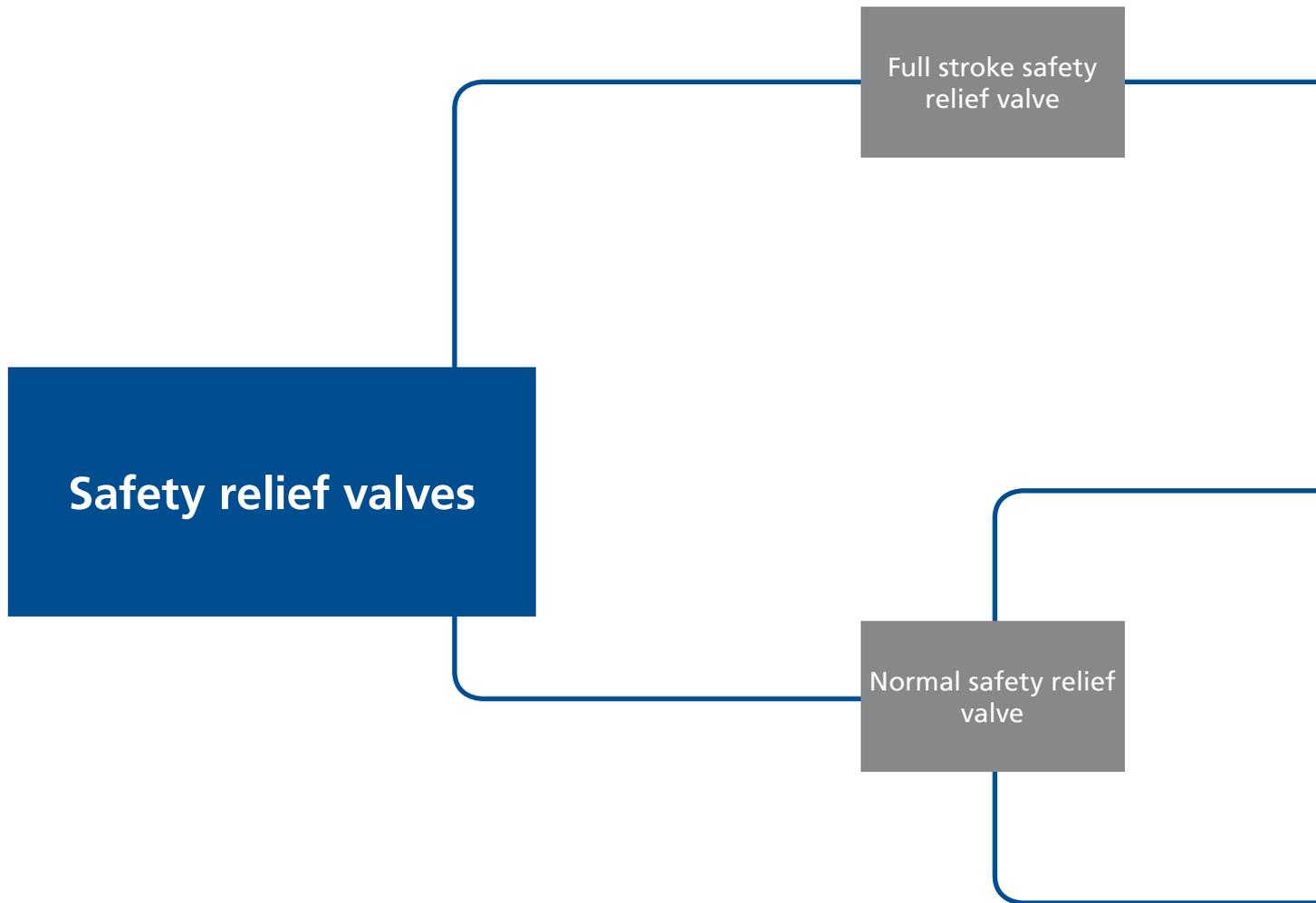
Single piston lifting in the VARIVENT® safety valve types 488 and 483



Double piston lifting in the VARIVENT® safety valve types 488 and 483



Pneumatic lifting at the spring-loaded safety relief valve type HyCom



VARIVENT®
spring safety relief valve
type 488

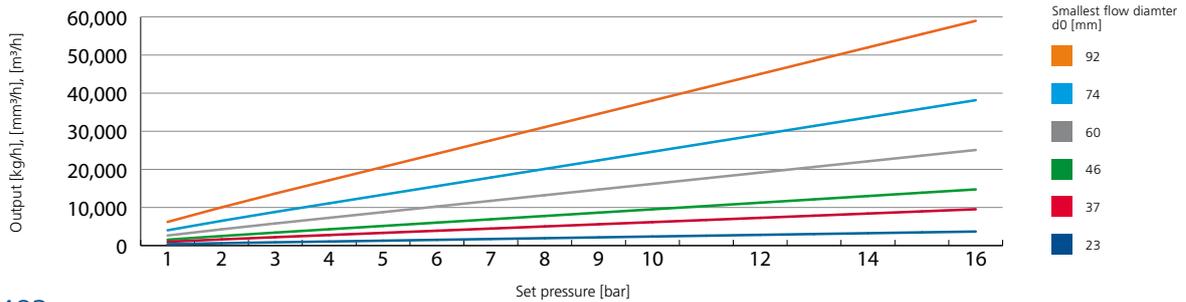
VARIVENT®
spring safety relief valve
type 483

Spring-loaded safety relief valve
type HyCom

4.5

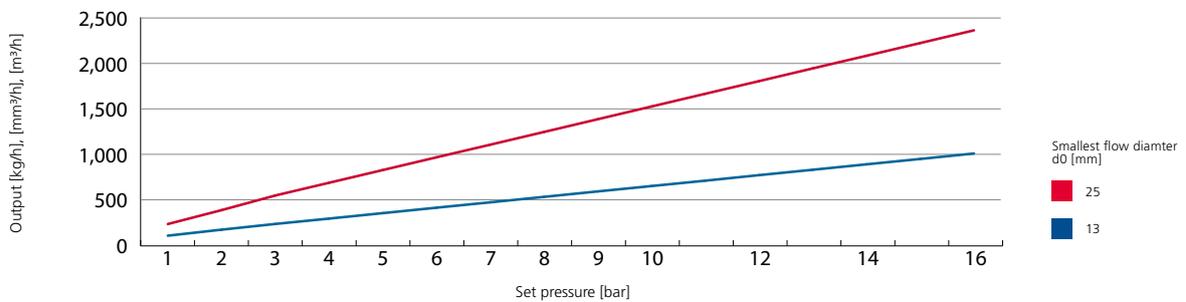
Type 488

Nominal width			Set pressure													
DN	OD	Flow diameter d ₀ [mm]	1	2	3	4	5	6	7	8	9	10	12	14	16	
			[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]
			14,5	29,0	43,5	58,0	72,5	87,0	101,5	116,0	130,5	145,0	174,0	203,0	232,0	
			[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	
25	1"	23	388	627	854	1,071	1,289	1,507	1,725	1,943	2,161	2,379	2,814	3,250	3,686	
40	1 ½"	37	1,004	1,622	2,209	2,773	3,337	3,900	4,464	5,028	5,592	6,155	7,283	8,411	9,538	
50	2"	46	1,552	2,507	3,414	4,286	5,157	6,029	6,900	7,771	8,643	9,514	11,257	13,000	14,743	
65	2 ½"	60	2,641	4,265	5,809	7,291	8,774	10,257	11,739	13,222	14,704	16,187	19,152	22,117	25,082	
80	3"	74	4,017	6,487	8,836	11,091	13,346	15,601	17,857	20,112	22,367	24,622	29,132	33,642	38,153	
100	4"	92	6,209	10,026	13,657	17,143	20,629	24,114	27,600	31,086	34,571	38,057	45,028	52,000	58,971	



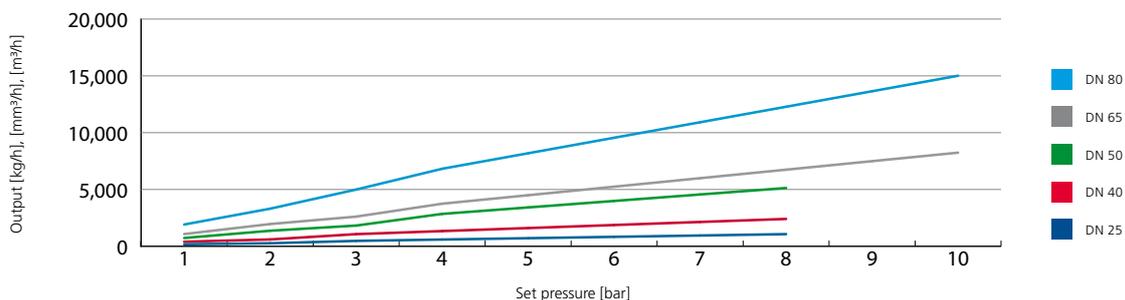
Type 483

Nominal width			Set pressure													
DN	OD	Flow diameter d ₀ [mm]	1	2	3	4	5	6	7	8	9	10	12	14	16	
			[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]
			14,5	29,0	43,5	58,0	72,5	87,0	101,5	116,0	130,5	145,0	174,0	203,0	232,0	
			[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	
25	1"	13	105	171	234	293	353	413	472	532	592	651	771	890	1,009	
40	1 ½"	25	233	386	547	687	827	967	1,106	1,246	1,386	1,526	1,805	2,084	2,364	



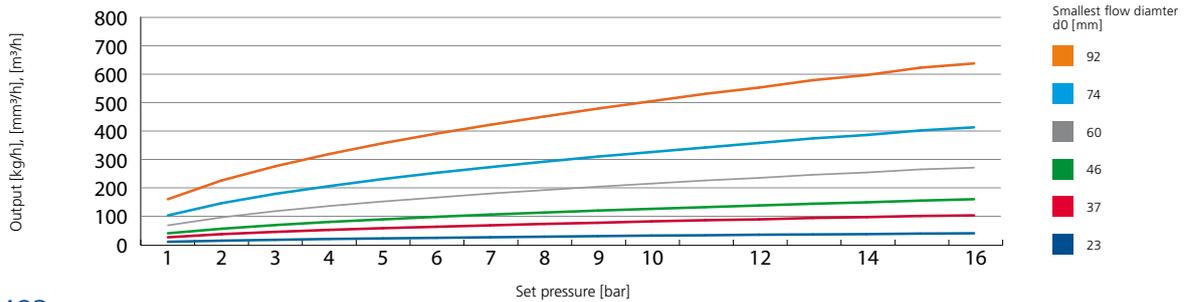
Type HyCom

Nominal width	Set pressure									
DN	1	2	3	4	5	6	7	8	9	10
	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]
25	178	267	475	594	713	832	950	1,069	-	-
40	401	602	1,070	1,338	1,605	1,873	2,141	2,408	-	-
50	730	1,368	1,824	2,850	3,420	3,990	4,560	5,130	-	-
65	1,076	1,959	2,612	3,746	4,495	5,244	5,993	6,742	7,491	8,240
80	1,916	3,310	4,993	6,822	8,187	9,551	10,916	12,280	13,645	15,009



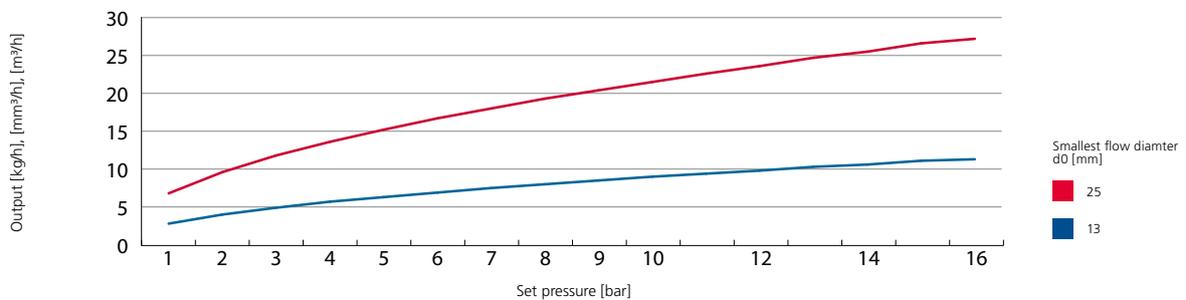
Type 488

Nominal width			Set pressure													
DN	OD	Flow diameter d ₀ [mm]	1	2	3	4	5	6	7	8	9	10	12	14	16	
			[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]
			14,5	29,0	43,5	58,0	72,5	87,0	101,5	116,0	130,5	145,0	174,0	203,0	232,0	
			[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	
25	1"	23	10	14	17	20	22	24	26	28	30	32	35	37	40	
40	1 ½"	37	26	37	45	52	58	63	68	73	77	82	89	97	103	
50	2"	46	40	56	69	80	89	98	106	113	120	126	138	149	160	
65	2 ½"	60	68	96	118	136	152	166	180	192	204	215	235	254	271	
80	3"	74	103	146	179	206	231	253	273	292	310	326	358	386	413	
100	4"	92	160	226	276	319	357	391	422	451	479	505	553	597	638	



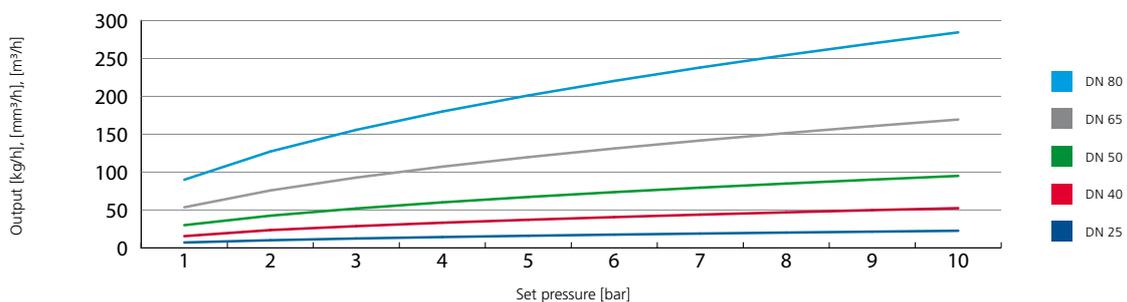
Type 483

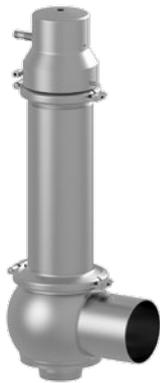
Nominal width			Set pressure													
DN	OD	Flow diameter d ₀ [mm]	1	2	3	4	5	6	7	8	9	10	12	14	16	
			[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]
			14,5	29,0	43,5	58,0	72,5	87,0	101,5	116,0	130,5	145,0	174,0	203,0	232,0	
			[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	[psi]	
25	1"	13	2.8	4.0	4.9	5.7	6.3	6.9	7.5	8.0	8.5	9.0	9.8	10.6	11.3	
40	1 ½"	25	6.8	9.6	11.8	13.6	15.2	16.7	18.0	19.3	20.4	21.5	23.6	25.5	27.2	



Type HyCom

Nominal width	Set pressure									
DN	1	2	3	4	5	6	7	8	9	10
	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]
25	7.1	10.1	12.4	14.3	16.0	17.5	18.9	20.2	21.4	22.6
40	15.5	23.5	28.7	33.2	37.1	40.6	43.9	46.9	49.8	52.4
50	30.0	42.5	52.0	60.1	67.2	73.6	79.5	84.9	90.1	95.0
65	53.6	75.8	92.8	107.2	119.8	131.2	141.7	151.5	160.7	169.4
80	90.0	127.2	155.8	180.0	201.2	220.4	238.1	254.5	269.9	284.5

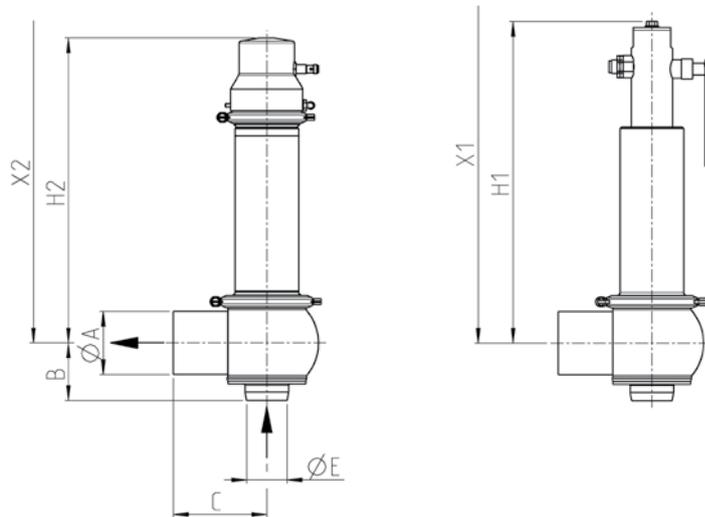




Technical data of the standard version

Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4310, 1.4401
Seal material in contact with the product	EPDM
Ambient temperature	2 to 60 °C
Air supply pressure	3.5 to 10 bar
Set pressure	0.2 to 16 bar
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted
Connection fittings	VARINLINE® grooved flange
Lifting	Manual lifting

Certificates



ØE	Pipe		Housing				Lifting		Valve		Weight* [kg]
	Ø [mm]	ØA	Flow diameter d ₀ [mm]	Flow cross section A ₀ [mm ²]	B [mm]	C [mm]	H (H4) [mm]	H (H8) [mm]	Actuation pressure min. [bar]	Actuation pressure max. [bar]	
DN 25	29.0 × 1.5	DN 40	23	416	53.0	90.0	257	265	0.20	16.00	8
DN 40	41.0 × 1.5	DN 65	37	1,075	70.0	125.0	417	444	0.20	16.00	14
DN 50	53.0 × 1.5	DN 80	46	1,662	77.5	125.0	424	451	0.25	15.00	16
DN 65	70.0 × 2.0	DN 100	60	2,827	87.0	125.0	434	461	0.23	10.34	24
DN 80	85.0 × 2.0	DN 125	74	4,301	102.5	150.0	522	584	0.26	10.34	39
DN 100	104.0 × 2.0	DN 150	92	6,648	121.0	152.5	541	603	0.20	8.20	39
OD 1 ½***	29.0 × 1.5	OD 2"	23	416	53.0	90.0	257	265	0.20	16.00	8
OD 2"***	41.0 × 1.5	OD 3"	37	1,075	70.0	125.0	417	444	0.20	16.00	14
OD 2 ½***	53.0 × 1.5	OD 3 ½"	46	1,662	77.5	125.0	424	451	0.25	15.00	16
OD 3"***	70.0 × 2.0	OD 4"	60	2,827	87.0	125.0	434	461	0.23	10.34	24
OD 3 ½***	85.0 × 2.0	OD 5"	74	4,301	102.5	150.0	522	584	0.26	10.34	39
OD 4"***	104.0 × 2.0	OD 6"	92	6,648	121.0	152.5	541	603	0.20	8.20	39

* Weights refer to the valve without connection fitting

** The nominal widths in inch are only available with the connection type clamping flange ISO 2852 (CO)!

Position	Description of the order code																		
1	Valve type 488 VARIVENT® full stroke safety relief valve																		
2	Nominal width inlet <table border="1"> <tr><td>DN 25</td><td>OD 1 ½"</td></tr> <tr><td>DN 40</td><td>OD 2"</td></tr> <tr><td>DN 50</td><td>OD 2 ½"</td></tr> <tr><td>DN 65</td><td>OD 3"</td></tr> <tr><td>DN 80</td><td>OD 3 ½"</td></tr> <tr><td>DN 100</td><td>OD 4"</td></tr> </table>	DN 25	OD 1 ½"	DN 40	OD 2"	DN 50	OD 2 ½"	DN 65	OD 3"	DN 80	OD 3 ½"	DN 100	OD 4"						
DN 25	OD 1 ½"																		
DN 40	OD 2"																		
DN 50	OD 2 ½"																		
DN 65	OD 3"																		
DN 80	OD 3 ½"																		
DN 100	OD 4"																		
3	Connection type inlet <table border="1"> <tr><td>00</td><td>Welding end</td></tr> <tr><td>TN</td><td>VARIVENT® grooved flange incl. O-ring and connecting parts</td></tr> <tr><td>CO</td><td>Clamp connection/TRI-clamp*</td></tr> <tr><td>SO</td><td>Clamp connection DIN 32676</td></tr> <tr><td>GO</td><td>Male end SC, DIN 11851, incl. sealing ring G</td></tr> <tr><td>KO</td><td>Liner SD, DIN 11851, incl. grooved nut</td></tr> <tr><td>VG</td><td>VARIVENT® process connection F</td></tr> <tr><td>VH</td><td>VARIVENT® process connection N</td></tr> <tr><td>VE</td><td>VARIVENT® process connection G</td></tr> </table>	00	Welding end	TN	VARIVENT® grooved flange incl. O-ring and connecting parts	CO	Clamp connection/TRI-clamp*	SO	Clamp connection DIN 32676	GO	Male end SC, DIN 11851, incl. sealing ring G	KO	Liner SD, DIN 11851, incl. grooved nut	VG	VARIVENT® process connection F	VH	VARIVENT® process connection N	VE	VARIVENT® process connection G
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VH	VARIVENT® process connection N																		
VE	VARIVENT® process connection G																		
4	Connection type outlet <table border="1"> <tr><td>00</td><td>Welding end</td></tr> <tr><td>TN</td><td>VARIVENT® grooved flange incl. O-ring and connecting parts</td></tr> <tr><td>CO</td><td>Clamp connection/TRI-clamp*</td></tr> <tr><td>SO</td><td>Clamp connection DIN 32676</td></tr> <tr><td>GO</td><td>Male end SC, DIN 11851, incl. sealing ring G</td></tr> <tr><td>KO</td><td>Liner SD, DIN 11851, incl. grooved nut</td></tr> </table>	00	Welding end	TN	VARIVENT® grooved flange incl. O-ring and connecting parts	CO	Clamp connection/TRI-clamp*	SO	Clamp connection DIN 32676	GO	Male end SC, DIN 11851, incl. sealing ring G	KO	Liner SD, DIN 11851, incl. grooved nut						
00	Welding end																		
TN	VARIVENT® grooved flange incl. O-ring and connecting parts																		
CO	Clamp connection/TRI-clamp*																		
SO	Clamp connection DIN 32676																		
GO	Male end SC, DIN 11851, incl. sealing ring G																		
KO	Liner SD, DIN 11851, incl. grooved nut																		
5	Lifting <table border="1"> <tr><td>H4</td><td>Manual lifting</td></tr> <tr><td>H8</td><td>Pneumatic lifting</td></tr> </table>	H4	Manual lifting	H8	Pneumatic lifting														
H4	Manual lifting																		
H8	Pneumatic lifting																		
6	Certificates <table border="1"> <tr><td>-</td><td>No approvals</td></tr> <tr><td>ASME</td><td>ASME VII – US</td></tr> <tr><td>A</td><td>ASME VIII AD2000 – US</td></tr> <tr><td>R</td><td>EAC (TR) – Russia</td></tr> <tr><td>C</td><td>AQSIQ – China</td></tr> <tr><td>K</td><td>CRN – Canada</td></tr> </table>	-	No approvals	ASME	ASME VII – US	A	ASME VIII AD2000 – US	R	EAC (TR) – Russia	C	AQSIQ – China	K	CRN – Canada						
-	No approvals																		
ASME	ASME VII – US																		
A	ASME VIII AD2000 – US																		
R	EAC (TR) – Russia																		
C	AQSIQ – China																		
K	CRN – Canada																		
7	Accessories /52 Adhesive ID tag																		
+																			
8	Feedback <table border="1"> <tr><td>0</td><td>Without feedback</td></tr> <tr><td>1</td><td>One feedback</td></tr> </table>	0	Without feedback	1	One feedback														
0	Without feedback																		
1	One feedback																		
9	Type of switch <table border="1"> <tr><td>-</td><td>Without switch</td></tr> <tr><td>B</td><td>NI 24 V DC 3-wire PNP M12x1</td></tr> <tr><td>F</td><td>NI 24 V DC 2-wire M12x1</td></tr> <tr><td>E</td><td>NI 8.2 V DC NAMUR, ATEX M12x1</td></tr> <tr><td>X</td><td>NI 24 V DC 3-wire NPN M12x1, opener</td></tr> <tr><td>I</td><td>(J38) with proximity switch holder M12x1 (for DN 25, lifting H4+H8)</td></tr> <tr><td>J</td><td>(J39) with proximity switch holder M12x1 (for DN 40–100, lifting H4)</td></tr> <tr><td>K</td><td>(J40) with proximity switch holder M12x1 (for DN 40–100, lifting H8)</td></tr> </table>	-	Without switch	B	NI 24 V DC 3-wire PNP M12x1	F	NI 24 V DC 2-wire M12x1	E	NI 8.2 V DC NAMUR, ATEX M12x1	X	NI 24 V DC 3-wire NPN M12x1, opener	I	(J38) with proximity switch holder M12x1 (for DN 25, lifting H4+H8)	J	(J39) with proximity switch holder M12x1 (for DN 40–100, lifting H4)	K	(J40) with proximity switch holder M12x1 (for DN 40–100, lifting H8)		
-	Without switch																		
B	NI 24 V DC 3-wire PNP M12x1																		
F	NI 24 V DC 2-wire M12x1																		
E	NI 8.2 V DC NAMUR, ATEX M12x1																		
X	NI 24 V DC 3-wire NPN M12x1, opener																		
I	(J38) with proximity switch holder M12x1 (for DN 25, lifting H4+H8)																		
J	(J39) with proximity switch holder M12x1 (for DN 40–100, lifting H4)																		
K	(J40) with proximity switch holder M12x1 (for DN 40–100, lifting H8)																		

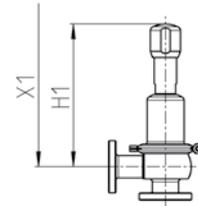
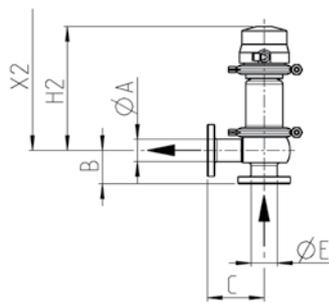
* Connections in OD-nominal widths

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8	9			
Code	488	-		/		-		-	/52	+		



Technical data of the standard version	
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4310, 1.4401
Seal material in contact with the product	EPDM
Ambient temperature	2 to 60 °C
Air supply pressure	3.5 to 10 bar
Set pressure	0.2 to 16 bar
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted
Connection fittings	VARINLINE® grooved flange
Lifting	Manual lifting
Certificates	    



ØE	Pipe		Housing					Lifting		Valve		Weight* [kg]
	Ø [mm]	ØA	Flow diameter d ₀ [mm]	Flow diameter d ₀ [mm]	B [mm]	C [mm]	H (H4) [mm]	H (H8) [mm]	Actuation pressure min. [bar]	Actuation pressure max. [bar]		
DN 25	29.0 × 1.5	DN 40	13	133	20	51	177	197	0.3	16	1.6	
DN 40	41.0 × 1.5	DN 65	25	491	26	57	264	264	0.1	16	3.7	
OD 1"***	29.0 × 1.5	OD 1 1/2"***	13	133	20	51	177	197	0.3	16	1.6	
OD 1 1/2"***	41.0 × 1.5	OD 2"	25	491	26	57	264	264	0.1	16	3.7	

* Weights refer to the valve without connection fitting

** The nominal widths in inch are only available with the connection type clamping flange ISO 2852 (CO)!

Position	Description of the order code
1	Valve type 483 VARIVENT® normal safety relief valve
2	Nominal width inlet DN 25 OD 1" DN 40 OD 1 ½"
3	Connection type inlet 00 Welding end TN VARIVENT® grooved flange incl. O-ring and connecting parts CO Clamp connection/TRI-clamp* SO Clamp connection DIN 32676 GO Male end SC, DIN 11851, incl. sealing ring G KO Liner SD, DIN 11851, incl. grooved nut VG VARIVENT® process connection F VH VARIVENT® process connection N BO Clamping connection ASME-BPE
4	Connection type outlet 00 Welding end TN VARIVENT® grooved flange incl. O-ring and connecting parts CO Clamp connection/TRI-clamp* SO Clamp connection DIN 32676 GO Male end SC, DIN 11851, incl. sealing ring G KO Liner SD, DIN 11851, incl. grooved nut BO Clamping connection ASME-BPE
5	Lifting H4 Manual lifting H8 Pneumatic lifting
6	Certificates - No approvals A ASME VII – US AA ASME VIII AD2000 – US R EAC (TR) – Russia C AQSIQ – China K CRN – Canada
7	Accessories /52 Adhesive ID tag
+	
8	Feedback 0 Without feedback 1 One feedback
9	Type of switch - Without switch B NI 24 V DC 3-wire PNP M12x1 F NI 24 V DC 2-wire M12x1 E NI 8.2 V DC NAMUR, ATEX M12x1 X NI 24 V DC 3-wire NPN M12x1, opener I (J38) with proximity switch holder M12x1 (for DN 25, lifting H4+H8) J (J39) with proximity switch holder M12x1 (for DN 40–100, lifting H4) K (J40) with proximity switch holder M12x1 (for DN 40–100, lifting H8)

* Connections in OD-nominal widths

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8	9	
Code	483	-		/		-		/52	+	

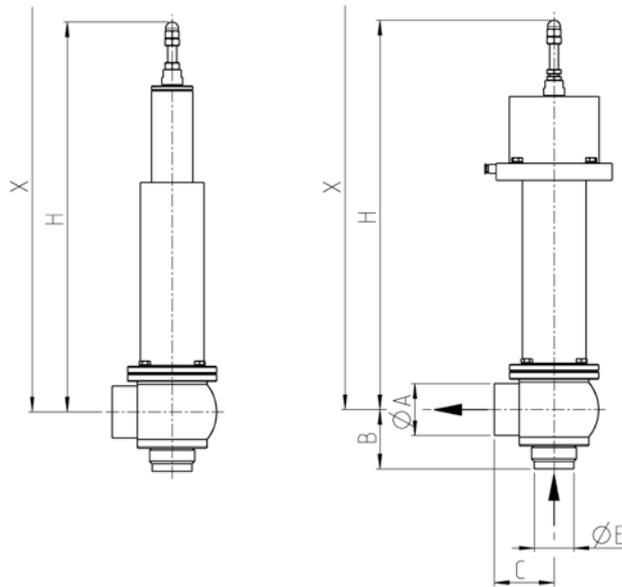




Technical data of the standard version

Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4310/AISI 304
Seal material in contact with the product	EPDM
Ambient temperature	-10 to 130 °C
Air supply pressure	6 bar
Set pressure	0.5 to 10 bar
Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Electro-polished
Connection fittings	VARINLINE® grooved flange

Certificates



DN	Pipe		Housing				Lifting		Valve			
	ØE	Ø [mm]	ØA	Flow diameter d ₀ [mm]	Flow diameter d ₀ [mm]	B [mm]	C [mm]	H [mm] without lifting H	H [mm] with pneumatic lifting P	Actuation pressure min. [bar]	Actuation pressure max. [bar]	Weight without lifting [kg]
DN 25	29.0 × 1.5	DN 40	24	452	43.5	59.5	365	365	0.5	10	4.4	9.9
DN 40	41.0 × 1.5	DN 50	36	1,018	48.5	59.5	480	480	0.5	10	7.2	12.7
DN 50	53.0 × 1.5	DN 65	47	1,735	58.5	79.5	525	525	0.6	10	9.1	16.5
DN 65	70.0 × 2.0	DN 80	61	2,922	59.5	89.5	635	635	0.5	10	12.1	20.6
DN 80	85.0 × 2.0	DN 100	75	4,418	72.5	104.5	698	698	0.5	10	20.8	31.3

Position	Description of the order code
1	Valve type FHCSV02 Spring-loaded safety relief valve
2	Nominal width inlet 25 DN 25 40 DN 40 50 DN 50 65 DN 65 80 DN 80
3	Connection type inlet TN VARIVENT® grooved flange incl. O-ring and connecting parts KO Liner SD, DIN 11851, incl. grooved nut
4	Connection type outlet TN VARIVENT® grooved flange incl. O-ring and connecting parts GO Male end SC, DIN 11851, incl. sealing ring G
5	Lifting H Manual lifting P Pneumatic lifting
6	Options See following pages
+	
7	Feedback 0 Without feedback 1 One feedback
8	Type of switch - Without switch B NI 24 V DC 3-wire PNP M12x1 F NI 24 V DC 2-wire M12x1 E NI 8.2 V DC NAMUR, ATEX M12x1



The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8
Code	FHCSV02	-		/		-		+

Surface quality

Deviating from the quality of the standard surface quality ($Ra \leq 0.8 \mu\text{m}$) a surface quality is available up to a medium roughness for surfaces in contact with the product of $Ra \leq 0.4 \mu\text{m}$. The outer surface of the housings is matte blasted as standard.

One process for improving the surface quality is electrochemical polishing, in which peaks on the surfaces of material are abraded by a galvanic process, resulting in an evened-out elevation profile.

This surface treatment makes it much less likely for contaminating substances and micro-organisms to stick to the surface. In addition, the smooth surface improves corrosion resistance by formation of an inert oxide layer.

Available valve types
Type 488
Type 483

Surface quality of the housing inlet in contact with the product	
$Ra \leq 0.8 \mu\text{m}$	Electro-polished
$Ra \leq 0.4 \mu\text{m}$	Electro-polished

Limit stop

The limit stop permits adjustment of the safety relief valve to the required outlet mass flow to avoid an unstable function behavior of the safety relief valve. This additional equipment limits the stroke of the valve and is therefore suitable for best adjustment of the respective valve size to the required capacity to be discharged.

Available valve types
Type 488



Heating facility

The heating facility is used as a freeze protection of the valve seat so that the safety function of the valve is still ensured even at temperatures below 0°C . The valve housing is equipped with up to two heating rods. Compensation for a temperature differences of up to 30°C is possible. Overheating of the valve seat must be avoided!

Available valve types
Type HyCom

Technical data	
Voltage	24 V
Power	30 W per heating rod

Nominal width	Number of heating rods
DN 25	1
DN 40	2
DN 50	2
DN 65	2
DN 80	2

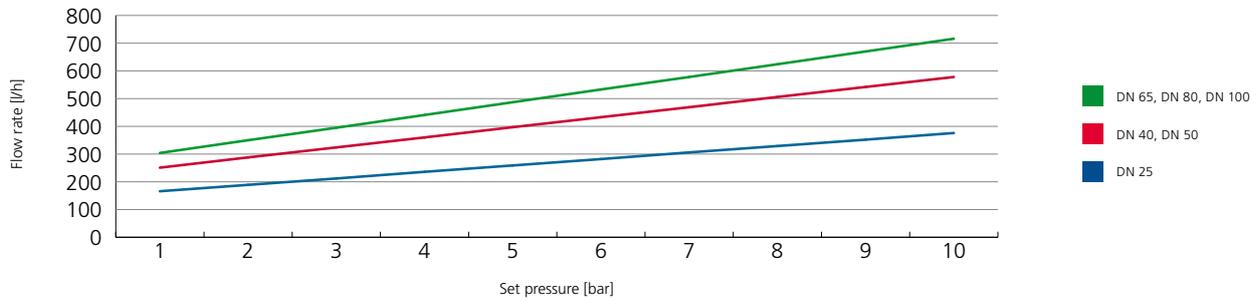


Cleaning module

The cleaning module serves the hygienic cleaning of the entrance side of an upright safety relief valve. A cleaning connection module is used to spray cleaning media into the seat area of the valve. To use the cleaning module, the safety relief valve must be equipped with the connection fitting VARIVENT® grooved flange.

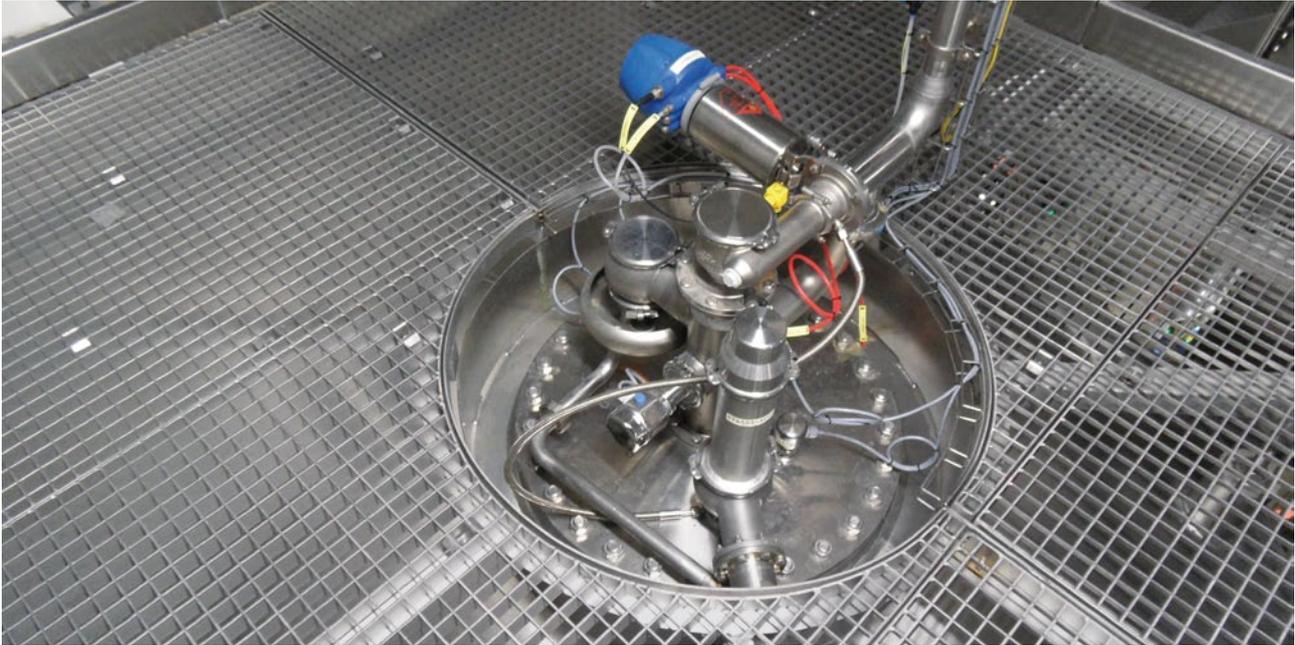
Available valve types
Type 488
Type 483
Type HyCom

Technical data	
Material in contact with the product	1.4404/316L
Connection CIP hose	6/8 mm
Cleaning nozzles	2-4



Nominal width	Number of nozzles	Flange		Tank cover	
		Material		Material	
		EPDM	FKM	EPDM	FKM
DN 25	2	223-159.13	223-159.19	223-159.01	223-159.07
DN 40	3	223-159.14	223-159.20	223-159.02	223-159.08
DN 50	3	223-159.15	223-159.21	223-159.03	223-159.09
DN 65	4	223-159.16	223-159.22	223-159.04	223-159.10
DN 80	4	223-159.17	223-159.23	223-159.05	223-159.11
DN 100	4	223-159.18	223-159.24	223-159.06	223-159.12

Customer	
Company name/customer number	_____
Project	_____
Contact	_____
Phone	_____
Email	_____
Product	
Type of medium	<input type="checkbox"/> Liquid <input type="checkbox"/> Gas / gaseous <input type="checkbox"/> Saturated steam
Name of medium	_____
Density ρ	_____ <input type="checkbox"/> kg/m ³ <input type="checkbox"/> lb/gal [US] <input type="checkbox"/> lb/gal [UK]
Viscosity η (for liquids only)	_____ mPas/cP
Compressibility factor Z (for gas)	_____
Isentropic exponent γ (gases and steams)	_____
Process	
Set pressure p_1	_____ <input type="checkbox"/> bar-g <input type="checkbox"/> mbar-g <input type="checkbox"/> psi-g
Back-pressure p_2	_____ <input type="checkbox"/> lb/ft ² -g <input type="checkbox"/> MPa-g
Application temperature	_____ <input type="checkbox"/> K <input type="checkbox"/> °F <input type="checkbox"/> °C
Dischargeable flow	_____ <input type="checkbox"/> l/h <input type="checkbox"/> m ³ /h <input type="checkbox"/> mn ³ /h <input type="checkbox"/> gpm _____ <input type="checkbox"/> kg/h <input type="checkbox"/> lb/h <input type="checkbox"/> scfm
Basic data	
Valve type	<input type="checkbox"/> Type 488 <input type="checkbox"/> Type 483 <input type="checkbox"/> Type HyCom
Nominal width standard	<input type="checkbox"/> DN <input type="checkbox"/> OD
Accessories	<input type="checkbox"/> INI holder <input type="checkbox"/> Manual lifting <input type="checkbox"/> Heating <input type="checkbox"/> Pneumatic lifting <input type="checkbox"/> Limit stop
Certificates	<input type="checkbox"/> 3.1 Certificate for the housing material <input type="checkbox"/> 3.2 Certificate for the setting pressure <input type="checkbox"/> ASME certificate (Canada) <input type="checkbox"/> ASME certificate (USA)
Surface quality	<input type="checkbox"/> > 0.8 μ m <input type="checkbox"/> > 0.4 μ m <input type="checkbox"/> Inlet electro-polished
Connection flanges	<input type="checkbox"/> TN – VARIVENT® grooved flange <input type="checkbox"/> GO – male end SC, DIN 11851 <input type="checkbox"/> CO – clamp connection <input type="checkbox"/> 00 – welding end
Comments / Miscellaneous	_____ _____ _____



VARIVENT® vacuum valves

VARIVENT® vacuum valves are used for hygienic protection of tanks against negative pressure. Protection takes place from -2.5 mbar_g . To minimize cleaning and for protection from sticking of the valve disc, the seat ring of the valves has an anti-adhesive coating. The elastomer seals used are FDA-compliant.

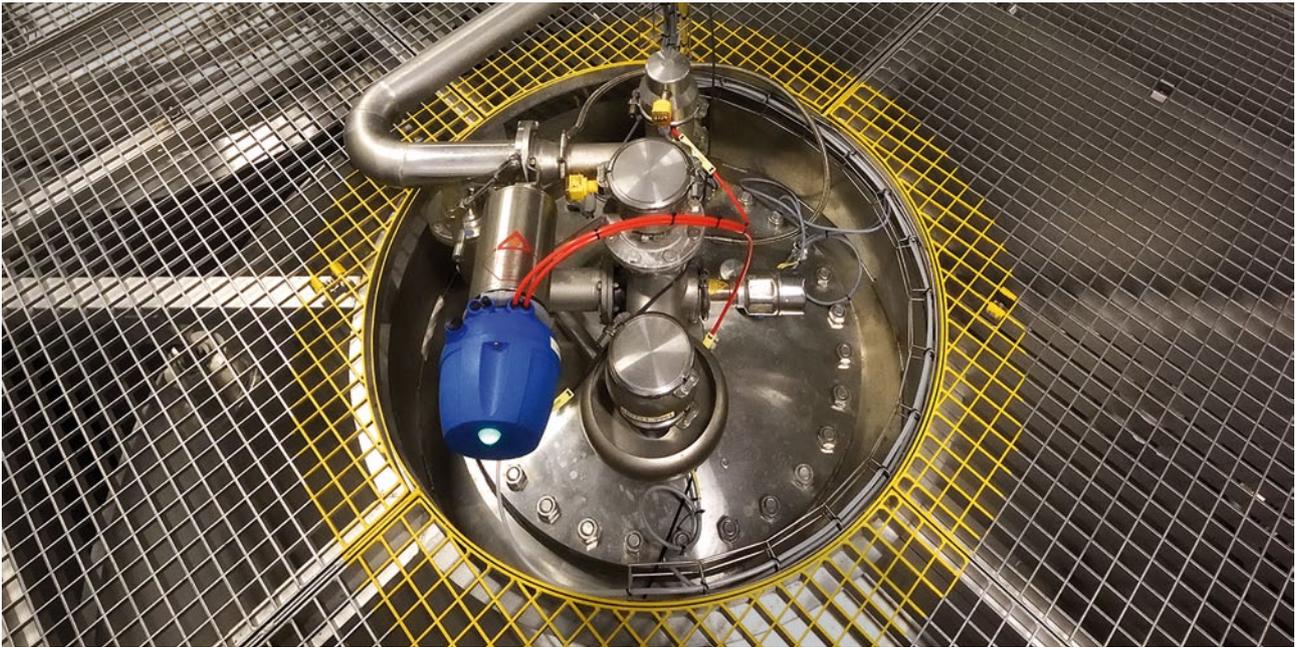
VARIVENT® vacuum valves have quick reaction times when vacuum occurs, as well as safe closing functions at excess pressure.

Function of the valve

Hydraulic configuration of GEA Tuchenhagen vacuum valves is always based on prevention of vacuum caused by free emptying of a tank. Prevention of vacuum caused by hot/cold cleaning is not taken into consideration.

If a vacuum occurs in the tank system, the valve disc is lifted by the negative pressure. The inflowing air flows up through the valve from below. This arrangement offers best protection against the percolation of dirt particles into the tank and thus into the product. The valve runs empty.

The functions of the VARIVENT® vacuum valve can be optionally expanded with a proximity switch feedback, a pneumatic lifting mechanism and a heating element.



Application examples

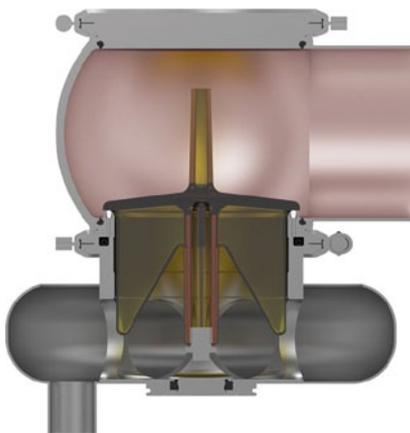
The VARIVENT® vacuum valves are mostly used in combination with the VARITOP® tank safety system. Accordingly, the main application is the beer brewing industry.

The optional installation of a heating element ensures full function even at temperatures below freezing. VARIVENT® vacuum valves therefore can also be operated outdoors. Only protection from weather must be provided.

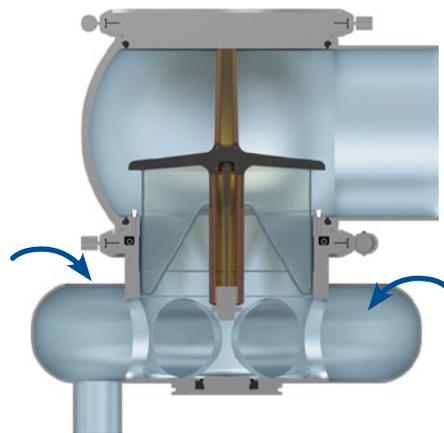
Special features

- Best protection from dirt particles being sucked in
- Ideal combination with the VARITOP® tank safety system
- Quick reaction times
- Additional equipment

4.6



The valve is connected to the housing at the tank system. The valve disc is closed. The coloration in the housing represents the vacuum.

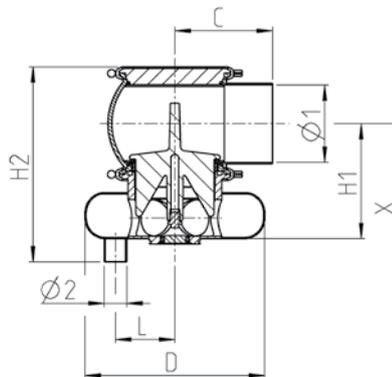


The valve disc is opened by the vacuum; air flows into the system without dirt particles being pulled along.

VARIVENT® Vacuum Valve, Type V



Technical data of the standard version	
Material in contact with the product	1.4404/AISI 316 L
Material not in contact with the product	1.4301/AISI 304
Seal material in contact with the product	EPDM, FKM, HNBR
Ambient temperature	0 to 45 °C
Air supply pressure	Min. 4 bar (58 psi) Max. 8 bar (116 psi)
Product pressure	Max. 6 bar (87 psi)
Surface in contact with the product	DN, OD Ra ≤ 0.8 µm IPS Ra ≤ 1.2 µm
External housing surface	Matte blasted
Actuator type	Pneumatic actuator air/spring
Connection fittings	Welding end
Identification	Adhesive ID tag



Nominal width	Pipe		Housing			Dimension			Valve
	Ø1 [mm]	Ø2 [mm]	C [mm]	L [mm]	D [mm]	H1 [mm]	H2 [mm]	X [mm]	Weight [kg]
DN 65	70.0 × 2.0	29	125.0	68	230	126	210	260	6
DN 80	85.0 × 2.0	29	125.0	68	230	133	225	268	6
DN 100	104.0 × 2.0	29	125.0	76	230	152	252	295	8
OD 2 ½"	63.5 × 2.0	29	125.0	68	230	123	204	260	6
OD 3"	76.2 × 1.6	29	125.0	68	230	129	217	268	6
OD 4"	101.6 × 2.0	29	125.0	76	230	150	249	295	8
IPS 6"	168.2 × 2.7	29	152.5	102	285	231	364	417	21

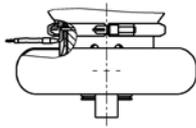
Position	Description of the order code		
1	Valve type		
	V	VARIVENT® vacuum valve	
2	Housing combinations		
	L		
3	Supplement to the valve type (further information can be found under options on the reserve)		
	-	Without	
	A	With lifting	
	E	With feedback	
	R	With lifting and feedback	
4	Nominal width		
	DN 65	OD 2 ½"	
	DN 80	OD 3"	
	DN 100	OD 4"	
			IPS 6"
5	Valve seat version		
	L0	Clamped seat ring/clamp connection	
6	Seal material in contact with the product		
	1	EPDM (FDA)	
	2	FKM (FDA)	
	3	HNBR (FDA)	
7	Surface quality of the housing		
	1	Inside Ra ≤ 1.2 µm, outside matte blasted (IPS)	
	2	Inside Ra ≤ 0.8 µm, outside matte blasted (DN, OD)	
8	Connection fittings		
	N	Welding end	
9	Options		
	/52	Adhesive ID tag	
+			
10	Type of the switch (further information can be found under options on the reverse)		
	0	Without feedback	
	B	NI 24 V DC 3-wire M18×1	
	F	NI 24 V DC 2-wire M18×1	
11	Air connection (further information can be found under options on the reverse)		
	0	Without	
	M	Metric for air hose Ø 6/4 mm	
	Z	Inch for air hose Ø OD ¼" (6.35/4.35 mm)	



The code is composed as follows, depending on the chosen configuration:

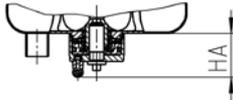
Position	1	2	3	4	5	6	7	8	9	10	11
Code	V	L		-	L0	-		N	/52	+	

For order codes differing from the standard version, please refer to section 7 (options).



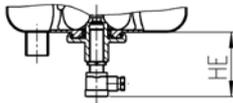
Heating

Heating of the vacuum valve is recommended when ambient temperatures could fall below the freezing point. This ensures that the valve disc does not freeze to the seat. Voltage: 24 V AC, power: 20 W



Pneumatic lifting type A

The pneumatic lifting serves control of the valve disc for valve seat cleaning during tank cleaning. This way, the seat and seal surfaces are cleaned in addition to the valve housing. The lifting mechanism can be retrofitted.

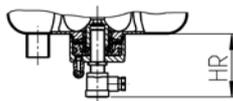


Feedback type E

The proximity switch detects the closed valve position. As soon as the valve disc leaves the non-actuated position the switching contact is interrupted.

Two types of proximity switches are available:

Proximity switch 24 V DC M18x1 for type E	Article number
2-wire (terminal chamber)	505-036
3-wire (terminal chamber)	505-083



Pneumatic lifting actuator and feedback type R

Type R is a combination of the pneumatic lifting actuator type A and the proximity switch type E. The function method is comparable to type A and E.

Nominal width	Dimension		
	HA [mm]	HE [mm]	HR [kg]
DN 65	45	77	77
DN 80	45	77	77
DN 100	45	77	77
OD 2 1/2"	45	77	77
OD 3"	45	77	77
OD 4"	45	77	77
IPS 6"	42	71	73

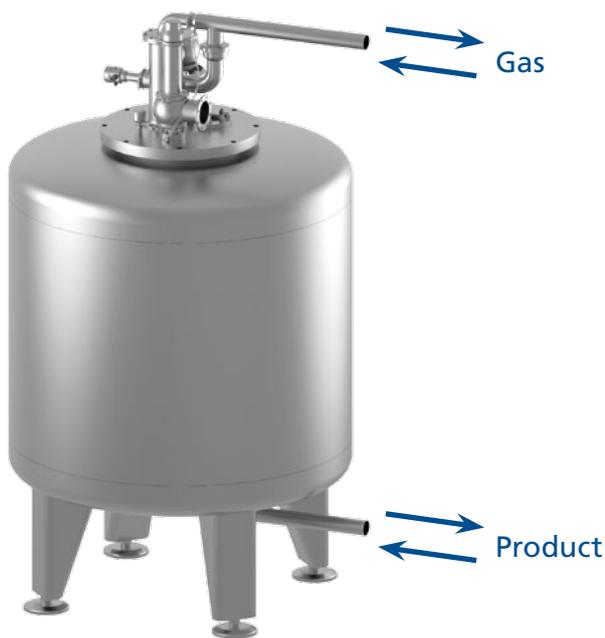
Customer																																											
Company name/ customer number	_____																																										
Project	_____																																										
Contact	_____																																										
Phone	_____																																										
Email	_____																																										
Process																																											
Max. fill level of the tank	_____ m																																										
Max. emptying volume flow	_____ m ³ /h																																										
Max. diameter of the outlet opening	_____ mm																																										
Vacuum-proofness of the tank	_____ mbar-a																																										
Nominal width standard	<input type="checkbox"/> DN <input type="checkbox"/> OD <input type="checkbox"/> IPS																																										
Accessories																																											
	<input type="checkbox"/> INI-holder <input type="checkbox"/> Pneumatic lifting <input type="checkbox"/> Heating																																										
Surface quality																																											
	<input type="checkbox"/> > 0.8 µm <input type="checkbox"/> > 0.4 µm																																										
Seal material																																											
	<input type="checkbox"/> EPDM <input type="checkbox"/> FKM <input type="checkbox"/> HNBR																																										
Comments / Miscellaneous _____ _____ _____ _____ _____ _____ _____																																											
		<table border="1"> <caption>Approximate data from the performance graph</caption> <thead> <tr> <th>Pe [mbar]</th> <th>V_v [m³/h] (DN 162/6*)</th> <th>V_v [m³/h] (DN 100)</th> <th>V_v [m³/h] (DN 80)</th> <th>V_v [m³/h] (DN 65)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>-5</td> <td>~500</td> <td>~250</td> <td>~150</td> <td>~100</td> </tr> <tr> <td>-10</td> <td>~800</td> <td>~400</td> <td>~250</td> <td>~180</td> </tr> <tr> <td>-15</td> <td>~1050</td> <td>~500</td> <td>~300</td> <td>~220</td> </tr> <tr> <td>-20</td> <td>~1250</td> <td>~600</td> <td>~350</td> <td>~260</td> </tr> <tr> <td>-25</td> <td>~1400</td> <td>~680</td> <td>~380</td> <td>~300</td> </tr> <tr> <td>-30</td> <td>~1500</td> <td>~750</td> <td>~400</td> <td>~330</td> </tr> </tbody> </table>		Pe [mbar]	V _v [m ³ /h] (DN 162/6*)	V _v [m ³ /h] (DN 100)	V _v [m ³ /h] (DN 80)	V _v [m ³ /h] (DN 65)	0	0	0	0	0	-5	~500	~250	~150	~100	-10	~800	~400	~250	~180	-15	~1050	~500	~300	~220	-20	~1250	~600	~350	~260	-25	~1400	~680	~380	~300	-30	~1500	~750	~400	~330
		Pe [mbar]	V _v [m ³ /h] (DN 162/6*)	V _v [m ³ /h] (DN 100)	V _v [m ³ /h] (DN 80)	V _v [m ³ /h] (DN 65)																																					
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		-5	~500	~250	~150	~100																																					
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		-20	~1250	~600	~350	~260																																					
-25	~1400	~680	~380	~300																																							
-30	~1500	~750	~400	~330																																							



VARITOP®

The tank safety system VARITOP® is a modular system on the basis of standardized basic components. VARITOP® is used for tank cleaning, to secure against inadmissible excessive and negative pressure and for gassing and degassing of tanks. Each customer may select the respective desired function units. Apart from this, the setup can be structured individually. The result is a functional unit adapted to customer desires.

Filling and emptying



Function of the system

The tank is secured against excess pressure with spring-loaded safety relief valves. VARIVENT® vacuum valves secure against negative pressure. For more detailed information about and the configuration of these valves please see section 4.

A central connection is used to switch gas and CIP paths. The CIP/gas management takes place either via an automatic switch-over module (no power supply required) or via a butterfly valve combination. The cleaning media enters the tank through the CIP line in the module. If no cleaning process takes place, gassing and degassing is ensured by a gas bypass at the cross piece and via the switch-over module.

The tank safety system VARITOP® can be placed on a central connection or a tank dome cover. The interface is always the proven VARIVENT® flange connection on the cross piece.

Application example

In practice, VARITOP® tank safety systems are often used in the brewery industry. A typical application is in the securing of tanks in the fermentation and storage cellar areas. During fermentation and storage, VARITOP® can be used to adjust the pressure in the head space of the tank. At the same time, the VARITOP® system protects the tanks from over- or under-pressure when filling or emptying.

The option of heating the vacuum valve and the safety relief valve permits using the VARITOP® tank safety system outdoors. However, there is the prerequisite that protective measures must be taken, e.g. for adequate protection from weather influences (enclosure).

Special features

- Flexibility because of modular principle
- Reliability in fully automated processes
- Reproducible cleaning result
- Securing against excess pressure
- Securing against negative pressure

Tank dome cover connection



Central connection



Advantages of the tank dome cover

- More compact design
- Additionally expandable
- Sight glass with and without illumination
- GEA Tuchenhagen level probe type TNS
- VARIVENT® flange connection

Advantages of the central connection

- Reduced to one connection to the tank
- Identical function ensured
- More cost-effective version
- VARIVENT® flange connection



Design of the central connection

1 Cross piece

The cross piece is the central connection point of the containers. All essential components are installed at the cross piece. The special construction ensures complete cleaning of all connected components.

2 Cleaning lance or rotating jet cleaner

The cleaning lance or the rotating jet cleaner is connected to the CIP/gas management and leads to the tank through the cross piece. Special nozzles additionally clean the cross piece from the inside and the connected components.

3 Safety relief valve

The safety relief valve of type 488 or HyCom secures the tanks reliably against excess pressures. For more detailed information and notes on design, see section 4.5.



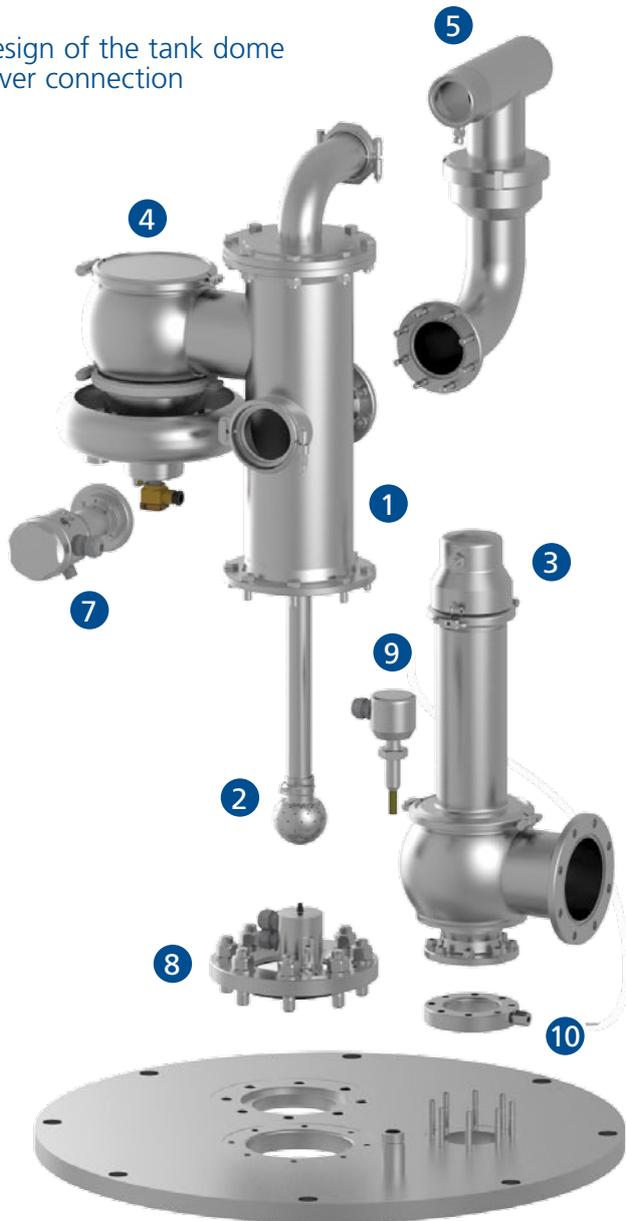
4 Vacuum valve

VARIVENT® vacuum valves secure the tank against a minimum negative pressure of -2.5 mbar_g . The construction of the valve ensures fast reaction times when a vacuum occurs. For more detailed information and notes on design, see section 4.6.

5 Switch-over module of the CIP/Gas management

For more detailed information, see the next pages.

Design of the tank dome cover connection



10 Cleaning module

The cleaning module serves the hygienic cleaning of the entrance side of an upright safety relief valve. A cleaning connection at the switch-over module is used to spray cleaning media into the seat area of the valve.

9 GEA Tuchenhagen level probe type TNS

The GEA Tuchenhagen level probe is used as overfill protection at vessel filling. It is fitted right on the tank dome cover.

8 Sight glass valve (with illumination)

The sight glass is available as a selection option for the tank dome cover. Additionally, the sight glass can be equipped with illumination. This is attached on the sight glass.

6 Central connection

For the central connection, the connection to the container takes place via the tried and tested VARIVENT® flange connection. The grooved flange is always provided for at the cross piece.

7 Pressure transmitter

The optional pressure transmitter records the pressure in the head space of the tank above the product. The process connection type VARINLINE® N 50/40 is always present even if no pressure transmitter is provided.

Automatic switch-over module

Way I: Open
Way II: Open

In the idle position, the switch-over module keeps the path for gassing and degassing of the tank open (path II). The path to the cleaning device is always opened (path I).

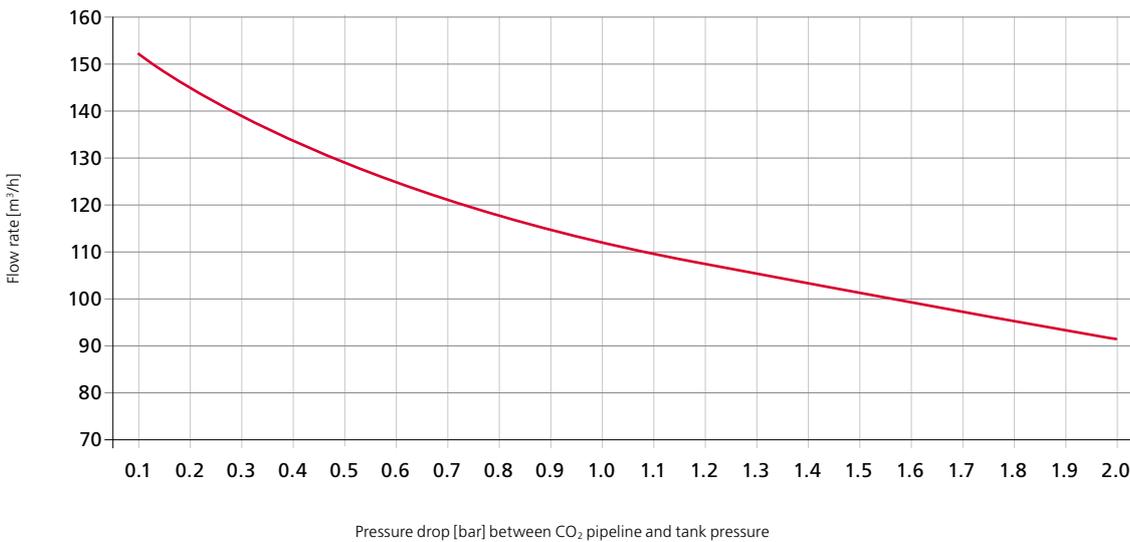
During the supply of cleaning media to the cleaning lance, the switch-over module automatically switches at a flow rate of 10 m³/h um and closes path II. The exception is with the use of a rotating jet cleaner where the switch-over module closes at 8 m³/h. The path to gassing and degassing is closed after switching.

Please note the following with the design of the VARITOP®!
The gas capacity is pressure dependent and the maximum is 92 m³/h CO₂ at an operating pressure of 2 bar_g. This can also be converted to other process parameters.

The switch-over module is self-cleaning.



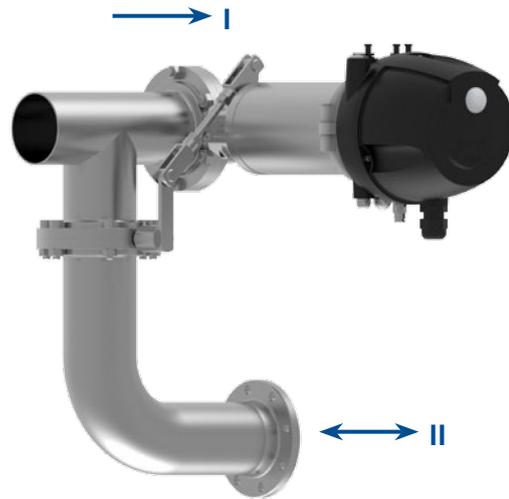
Flow capacity of CO₂ (4 °C) during tank emptying at type TTB 11 and TTB 12



Butterfly valve (with power supply)

Way I: Closed
 Way II: Open

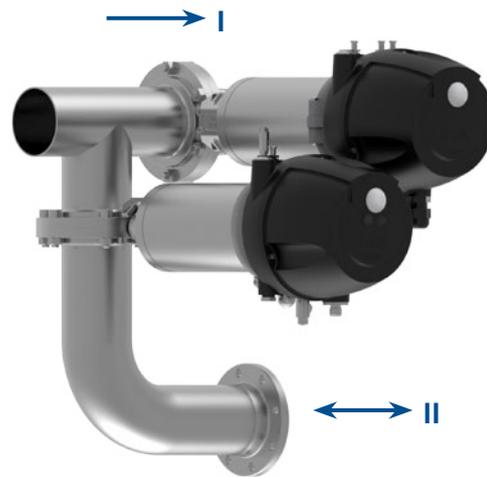
In the idle position the switch-over module keeps the path for gassing and degassing open. The path to the cleaning device is closed. Pneumatic path switching is provided. After activation the path to the cleaning device is then opened and the gassing and degassing path closed. The switch-over module is designed for higher gas rates.



Butterfly valve with T.VIS® P-15 (with power supply)

Way I: Closed
 Way II: Open

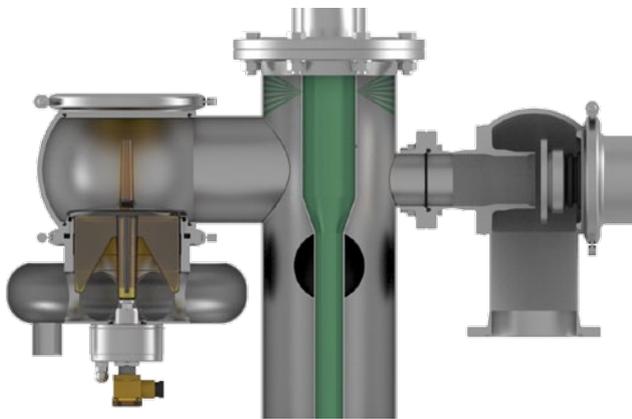
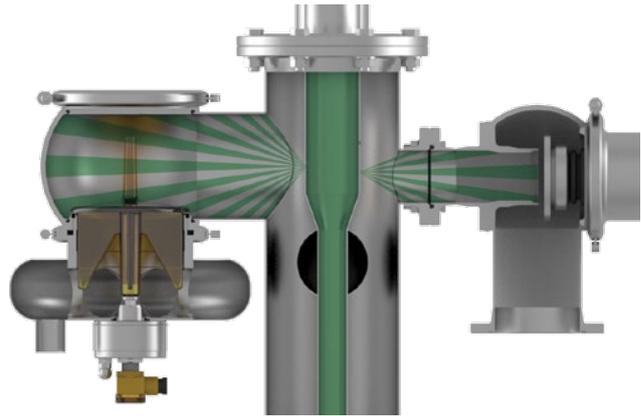
The diversion valve controls the gassing and degassing or the container inner pressure depending on the process parameters. Thus, the pressure can be compactly and reliably controlled e.g. during fermentation. The control valve, designed as a butterfly valve T-smart 7 in combination with a T.VIS® P-15, is provided in path II. Path I is locked with a butterfly valve T-smart 7 in combination with a T.VIS® M-15.



Cleaning of the valves

For the central connection, the safety relief valve and the vacuum valve are cleaned by the cleaning lance or the rotating jet cleaner. The cleaning media is sprayed onto the valve seats through the bores in the lance pipe. To ensure that the valve seats as well as the housings are cleaned, the valve discs can be lifted (optional).

The tank dome cover version has the safety relief valve fitted vertically on the tank dome cover. The valve can be cleaned via a separate cleaning module that is fitted between the tank dome cover and the safety relief valve. For further information refer to the section 4.5.



Internal cleaning

The tank can be cleaned with a cleaning lance or a rotating jet cleaner. For the cleaning lance, spray balls, orbital cleaners and rotating cleaners are available cleaning devices.

The cleaning lance or the rotating jet cleaner is fitted on the top of the cross piece and protrudes into the tank through the cross piece. Nozzles in the lance pipe ensure cleaning of the cross piece during tank cleaning.

The automatic switch-over module closes only starting at a corresponding flow rate (see following pages). This volume flow must be reached or exceeded and may be higher than the necessary flow rate for tank cleaning. The divert valve has cleaning openings that ensure cleaning of the connection pipeline to the cross piece when closed.

Cleaning lance and accessories

Many cleaners from the GEA Breconcherry cleaning technology range can be used with the tank safety system VARITOP®. Technical differences from single use can result. Be aware that the maximum permitted working pressure for all installed cleaners is 10 bar_g.

The cleaning lance is used to adapt the cleaners in the VARITOP®.



Rotating jet cleaner

The rotating jet cleaner has a proven cleaning concept of slow rotation, combined with powerful and targeted blasting to achieve the best cleaning result.



The following cleaners can be used:

Rotating cleaners	Orbital cleaners	Static cleaners
Clipdisc	Tempest	Spray ball
Sanitor	Tornado	Recommended operating pressure is between 1.0 and 2.5 bar _g
Torus	Tornado 4	
Turbo SSB	Typhoon	
Turbodisc	Torrent	

The following nozzle arrangements are available.

Nozzle placement		
A	C4	E1
B	D1	F2
B1	D2	F3
C1	D3	F5
C2	E	

For more information on the individual cleaners, see the GEA Breconcherry Cleaning Technology catalog.

When using the rotating jet cleaner, we recommend a CIP/Gas management in the form of a butterfly valve combination.



Determination of the cleaning volume flow for the overall system

The required flow rate of cleaning media is composed of three different parts. First, the flow rate for the cleaner is determined. Second, the flow rate for the internal cleaning of the systems is determined. If required, a share from using the automatic switch-over module is added. To give an illustrative example, we will present the calculation based on a spray ball type A2 and a cross piece DN 162.

1. Cleaner

Read the flow rate for the cleaner at the desired working pressure; see catalog Cleaning Technology.

Example: Spray ball A2 (1 bar_g): $\dot{V}_{\text{cleaner}} : 21.9 \text{ m}^3/\text{h}$

Important: If the spray balls are used at a higher pressure than 1 bar_g, the flow rate changes (see catalog Cleaning Technology)

2. Determination of the flow rate for the internal cleaning in the VARITOP®

Example: Cross piece DN162

$$\dot{V}_{\text{cleaning lance}} = K_{vs \text{ -value}} \cdot \sqrt{\frac{P}{1} \frac{\text{bar}_g}{\text{bar}_g}}$$

$$\dot{V}_{\text{cleaning lance}} = 2.3 \cdot \sqrt{\frac{1.0}{1} \frac{\text{bar}_g}{\text{bar}_g}} = 2.3 \frac{\text{m}^3}{\text{h}}$$

Cleaning flow rate of the internal cleaning			
Nominal width of the cross piece	DN 100	DN 125	DN 162
Kvs values [m ³ /h]	0.93	1.88	2.30

3. Determination of the overall volume flow

a) For the disc switchover:

For all cleaners:

$$\dot{V}_{total} = \dot{V}_{cleaner} + \dot{V}_{cleaning\ lance}$$

Example: For the spray ball A2 at 1.0 bar_g in a cross piece DN 162 with disc valve switchover:

$$\dot{V}_{total} = 21.9 \frac{m^3}{h} + 2.3 \frac{m^3}{h} = 24.2 \frac{m^3}{h}$$

b) Exception for automatic switch-over module

The automatic switch-over module consumes the flow rate for self-cleaning: $\dot{V}_{Auto. Switch-over\ module}$
This is determined based on the following chart and results from the pressure at the cleaner.

Thus, the overall volume flow is composed as follows:

$$\dot{V}_{total} = \dot{V}_{cleaner} + \dot{V}_{cleaning\ lance} + \dot{V}_{switch\ module}$$

Additionally, the automatic switch-over module requires a **minimum volume flow of 10 m³/h** for the divert function independently of the cleaner.

Exception: Rotating jet cleaners always close at 8 m³/h.

Case 1:

- ≤ 8 m³/h for rotating jet cleaners
- ≤ 10 m³/h for all other cleaners

The calculated flow rate is not enough to close the automatic switch-over module.

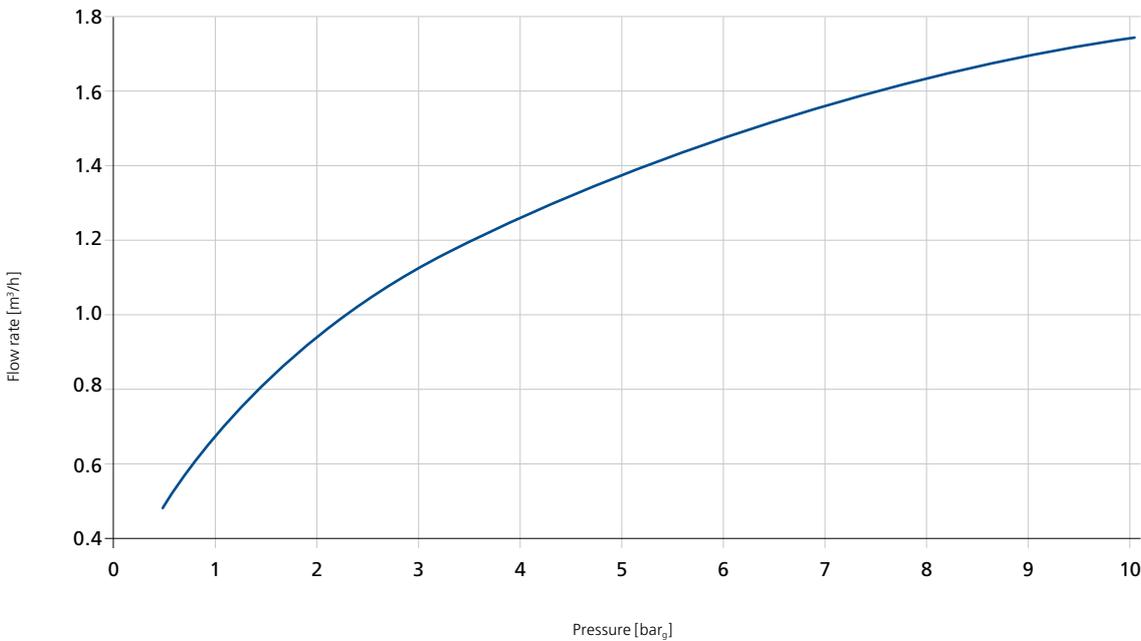
Case 2:

- > 8 m³/h for rotating jet cleaners
- > 10 m³/h for all other cleaners

The calculated flow rate is enough to close the switch-over module.

Example: For the spray ball A2 at 1.0 bar_g in a cross piece DN 162 with automatic switch-over module:

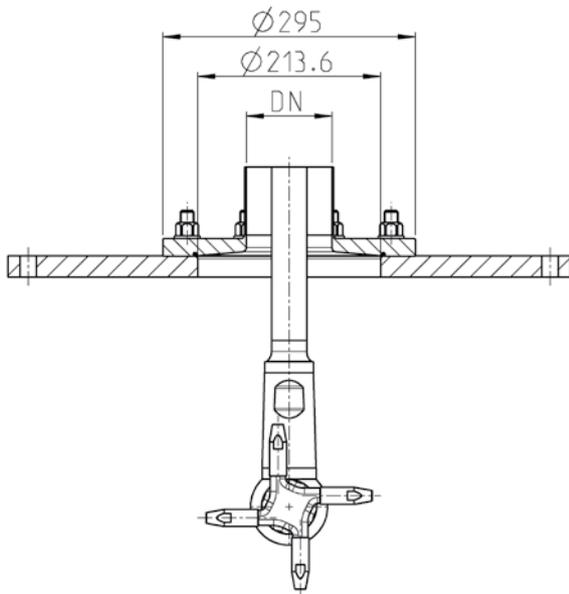
$$\dot{V}_{total} = 21.9 \frac{m^3}{h} + 2.3 \frac{m^3}{h} + 0.65 \frac{m^3}{h} = 24.85 \frac{m^3}{h}$$



Special flange for cleaners with larger installation openings

The special flange is used for cleaners that require an access opening larger than the nominal width of the cross piece. To permit installation of such cleaners from the outside, an enlarged flange is attached to the cross piece. The cleaner is first fitted to the cross piece and then installed at the tank as one unit. For overproportional cleaners, the special flange is selected automatically.

This version is only possible in combination with the tank dome cover (D).



The special flange is fitted on the tank dome cover. The mounting opening and the outer diameter of the special flange always have the same sizes, as you can see from the dimensional drawing on the left. The connection diameter to the cross piece varies according to the cross piece nominal width.

Nominal width	Diameter of the installation opening
DN 100	213.6 mm
DN 125	213.6 mm
DN 162/IPS 6"	213.6 mm

Pressure transmitter

The pressure transmitter is installed at the cross piece. Gas pressures of 0–4 bar_g or 0–10 bar_g can be measured in the head space of the tank. The process connection type is VARINLINE® N 50/40.



GEA Tuchenhagen level probe type TNS

Evaluation of the GEA Tuchenhagen level probe takes place conductively and can be used for different media. It can be chosen optionally and is fitted into a weld-in adapter on the tank dome cover. For further information refer to the section 1.



Sight glass

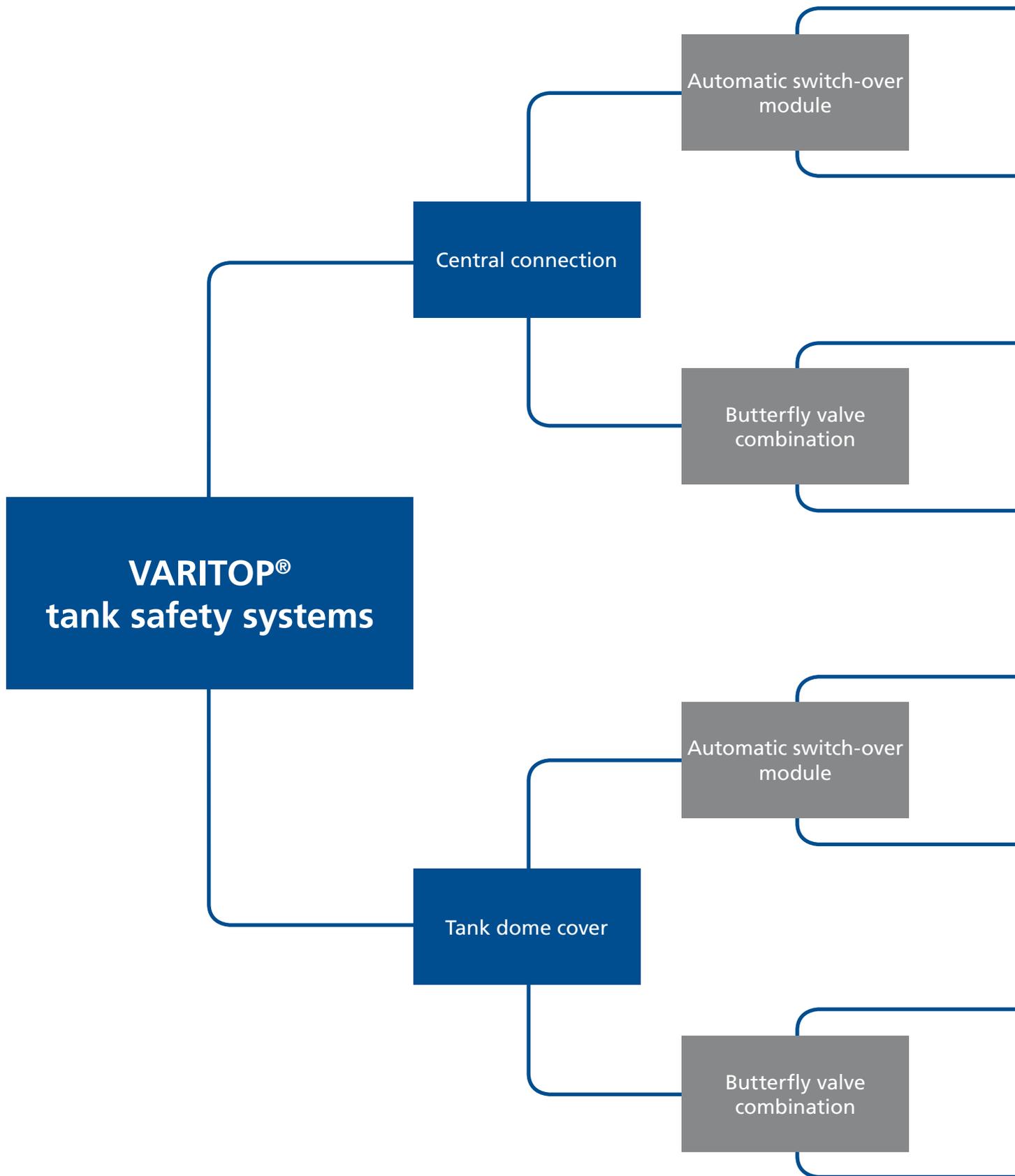
The sight glass is available as a selection option for the tank dome cover. Additionally, the sight glass can be equipped with illumination.

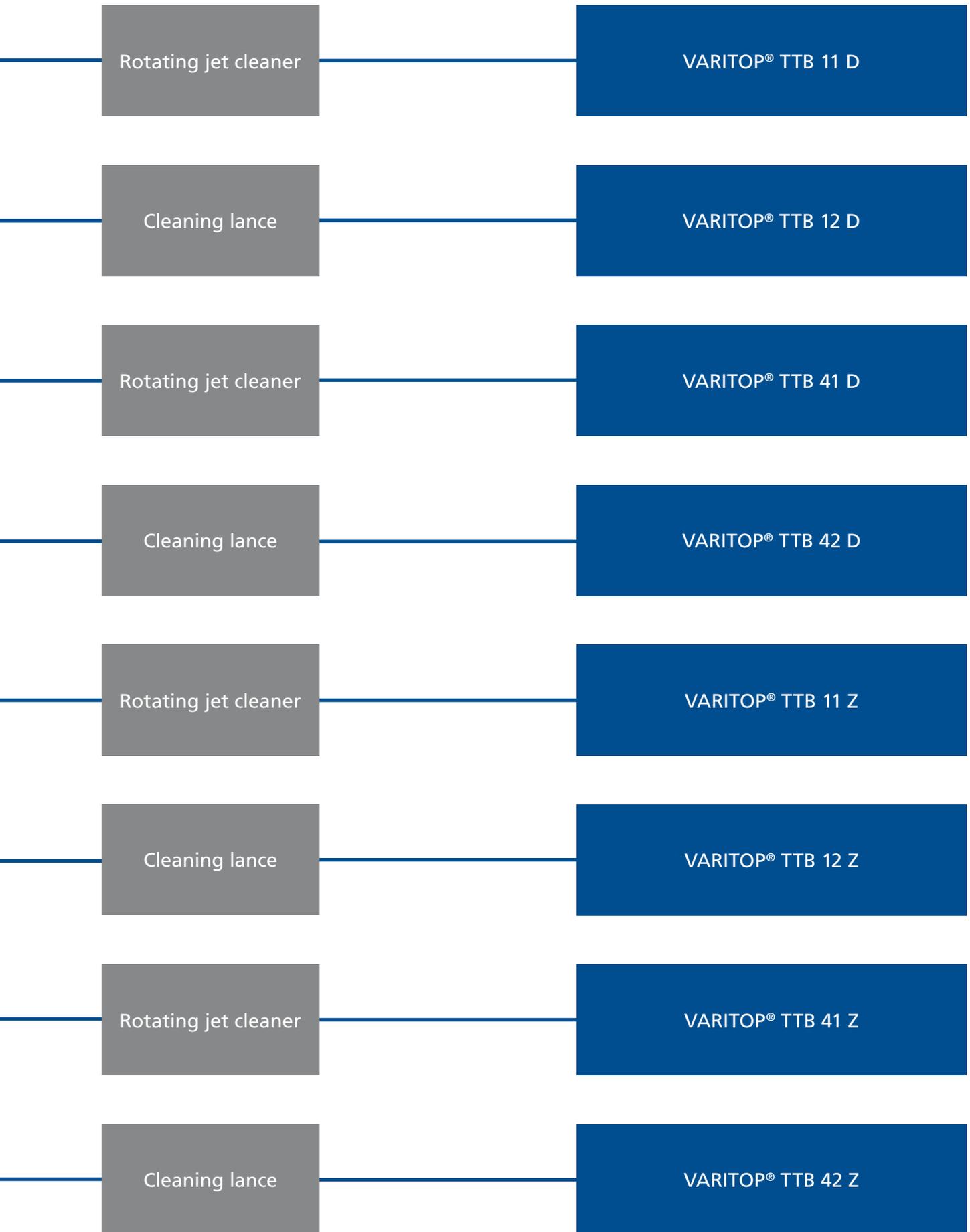


Cleaning module

The cleaning module performs the hygienic cleaning of the entrance side of an upright safety relief valve. It is installed between the tank dome cover and the safety relief valve. A cleaning connection at the switch-over module is used to spray cleaning media into the seat area of the valve.

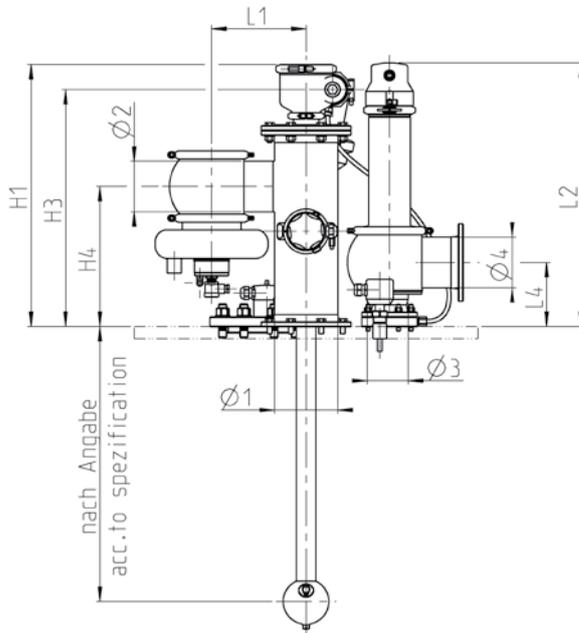




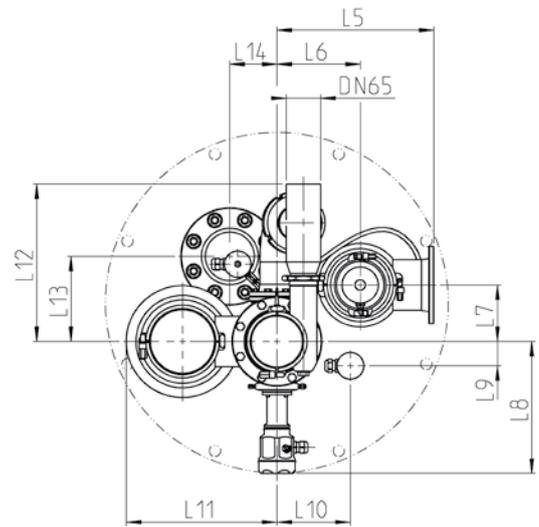




Technical data of the standard version	
Material in contact with the product	1.4404
Seal material	EPDM
Ambient temperature	0 to 45 °C
Operating temperature	< 60 °C
Air supply pressure	6 bar (87 psi), max. 8 bar (116 psi)
Product pressure	10 bar (145 psi)
Surface in contact with the product	Ra ≤ 1.6 µm
CIP/GAS management	Automatic switch-over module
Cleaner	Rotating jet cleaner
Connection fittings	VARIVENT® grooved flange on the tank side, CIP/ GAS connection of the welding end
Identification	Adhesive ID tag



Front view



Top view

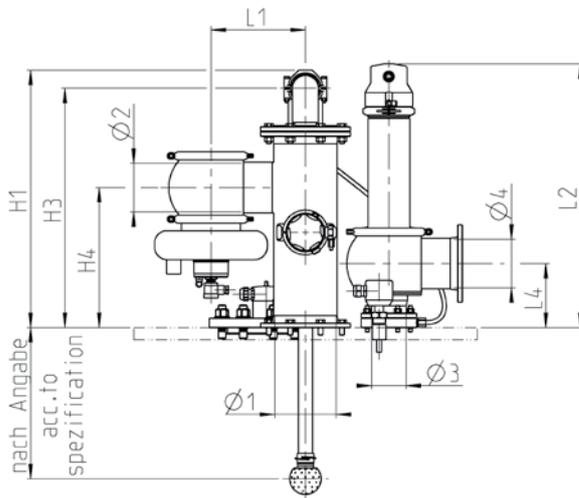
		Dimension												
Nominal width Ø1	Ø2 [mm]	H1 [mm]	H3 [mm]	H4 [mm]	L1 [mm]	L6 [mm]	L7 [mm]	L8 [mm]	L9 [mm]	L10 [mm]	L11 [mm]	L12 [mm]	L13 [mm]	L14 [mm]
DN 100	80	514	457	271	180	170	116	288	50	150	295	324	160	96
DN 125	100	545	488	288	193	170	116	301	50	150	308	324	175	96
DN 162	162	649	592	361	243	170	116	323	50	180	386	324	200	96

Maximum values for safety relief valve								
		Safety relief valve type 488			Safety relief valve type HyCom			
Ø3 [mm]	Ø4 [mm]	L2 [mm]	L4 [mm]	L5 [mm]	L2 [mm]	L4 [mm]	L5 [mm]	
25	40	363	98	260	454	89	255	
40	65	559	115	295	574	94	255	
50	80	574	123	295	629	104	275	
65	100	593	132	295	740	105	285	
80	125	732	148	320	816	118	300	

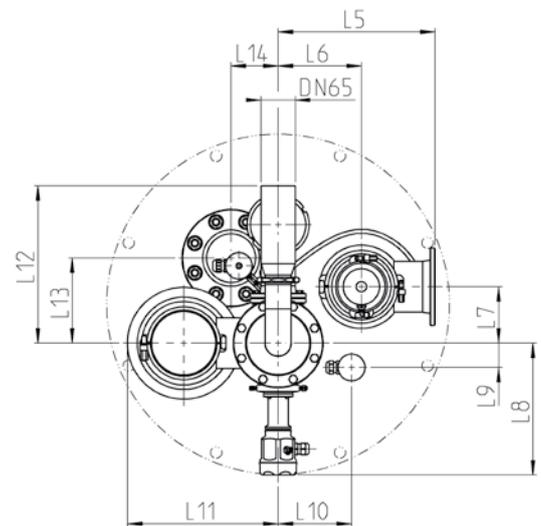
The description of the options – as well as the configuration of the system designation – can be found at the end of this section.



Technical data of the standard version	
Material in contact with the product	1.4404
Seal material	EPDM
Ambient temperature	0 to 45 °C
Operating temperature	< 60 °C
Air supply pressure	6 bar (87 psi), max. 8 bar (116 psi)
Product pressure	10 bar (145 psi)
Surface in contact with the product	Ra ≤ 1.6 µm
CIP/GAS management	Automatic switch-over module
Cleaner	Cleaning lance
Connection fittings	VARIVENT® grooved flange on the tank side, CIP/ GAS connection of the welding end
Identification	Adhesive ID tag



Front view



Top view

		Dimension												
Nominal width Ø1	Ø2 [mm]	H1 [mm]	H3 [mm]	H4 [mm]	L1 [mm]	L6 [mm]	L7 [mm]	L8 [mm]	L9 [mm]	L10 [mm]	L11 [mm]	L12 [mm]	L13 [mm]	L14 [mm]
DN 100	80	502	465	271	180	170	116	288	50	150	295	324	160	96
DN 125	100	529	492	288	193	170	116	301	50	150	308	324	175	96
DN 162	162	637	600	361	243	170	116	323	50	180	386	317	200	96

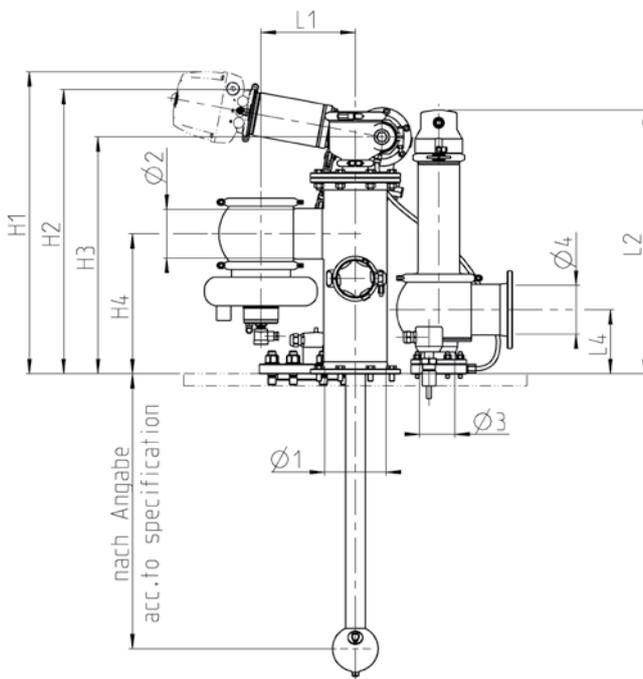
Maximum values for safety relief valve								
		Safety relief valve type 488			Safety relief valve type HyCom			
Ø3 [mm]	Ø4 [mm]	L2 [mm]	L4 [mm]	L5 [mm]	L2 [mm]	L4 [mm]	L5 [mm]	
25	40	363	98	260	454	89	255	
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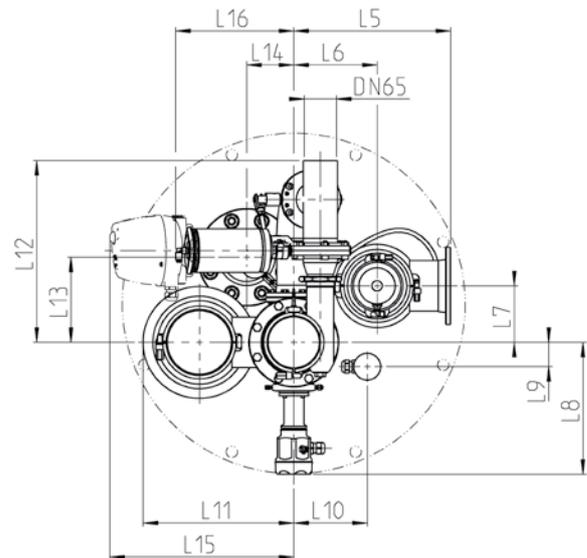




Technical data of the standard version	
Material in contact with the product	1.4404
Seal material	EPDM
Ambient temperature	0 to 45 °C
Operating temperature	< 80 °C
Air supply pressure	6 bar (87 psi), max. 8 bar (116 psi)
Product pressure	10 bar (145 psi)
Surface in contact with the product	Ra ≤ 1.6 µm
CIP/GAS management	Butterfly valve combination
Cleaner	Rotating jet cleaner
Connection fittings	VARIVENT® grooved flange on the tank side, CIP/ GAS connection of the welding end
Identification	Adhesive ID tag



Front view



Top view

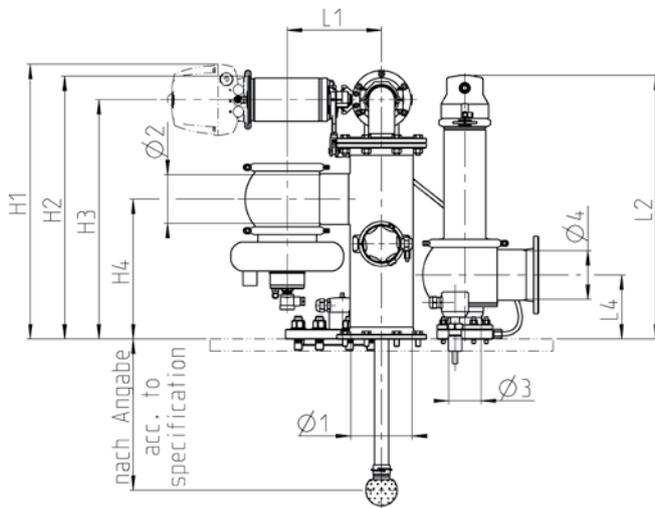
		Dimension																
Nominal width	Ø1	Ø2	H1	H2	H3	H4	L1	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
DN 100	80	640	575	457	271	180	170	116	288	50	150	295	374	160	96	428	319	
DN 125	100	671	606	488	288	193	170	116	301	50	150	308	374	175	96	428	319	
DN 162	162	775	710	592	361	243	170	116	323	50	180	386	375	200	96	428	319	

Maximum values for safety relief valve								
		Safety relief valve type 488			Safety relief valve type HyCom			
Ø3	Ø4	L2	L4	L5	L2	L4	L5	
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
25	40	363	98	260	454	89	255	
40	65	559	115	295	574	94	255	
50	80	574	123	295	629	104	275	
65	100	593	132	295	740	105	285	
80	125	732	148	320	816	118	300	

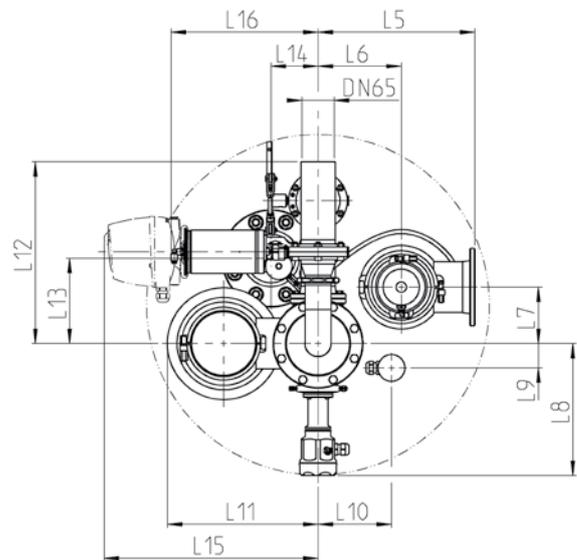
The description of the options – as well as the configuration of the system designation – can be found at the end of this section.



Technical data of the standard version	
Material in contact with the product	1.4404
Seal material	EPDM
Ambient temperature	0 to 45 °C
Operating temperature	< 80 °C
Air supply pressure	6 bar (87 psi), max. 8 bar (116 psi)
Product pressure	10 bar (145 psi)
Surface in contact with the product	Ra ≤ 1.6 µm
CIP/GAS management	Butterfly valve combination
Cleaner	Cleaning lance
Connection fittings	VARIVENT® grooved flange on the tank side, CIP/ GAS connection of the welding end
Identification	Adhesive ID tag



Front view



Top view

		Dimension																
Nominal width	Ø1 [mm]	Ø2 [mm]	H1 [mm]	H2 [mm]	H3 [mm]	H4 [mm]	L1 [mm]	L6 [mm]	L7 [mm]	L8 [mm]	L9 [mm]	L10 [mm]	L11 [mm]	L12 [mm]	L13 [mm]	L14 [mm]	L15 [mm]	L16 [mm]
DN 100	80	568	526	465	271	180	170	116	288	50	150	295	374	160	96	435	326	
DN 125	100	595	553	492	288	193	170	116	301	50	150	308	374	175	96	435	326	
DN 162	162	700	658	597	361	243	170	116	323	50	180	386	375	200	96	435	326	

Maximum values for safety relief valve								
		Safety relief valve type 488			Safety relief valve type HyCom			
Ø3 [mm]	Ø4 [mm]	L2 [mm]	L4 [mm]	L5 [mm]	L2 [mm]	L4 [mm]	L5 [mm]	
25	40	363	98	260	454	89	255	
40	65	559	115	295	574	94	255	
50	80	574	123	295	629	104	275	
65	100	593	132	295	740	105	285	
80	125	732	148	320	816	118	300	

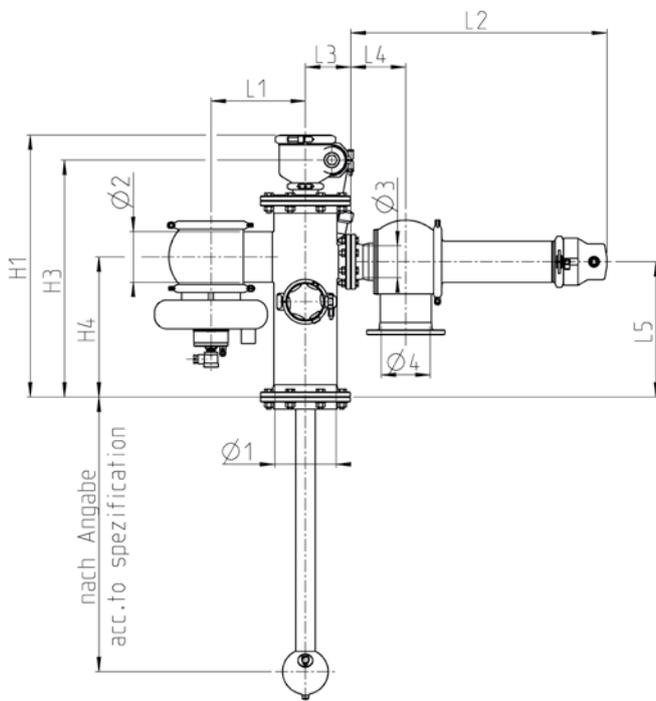
The description of the options – as well as the configuration of the system designation – can be found at the end of this section.



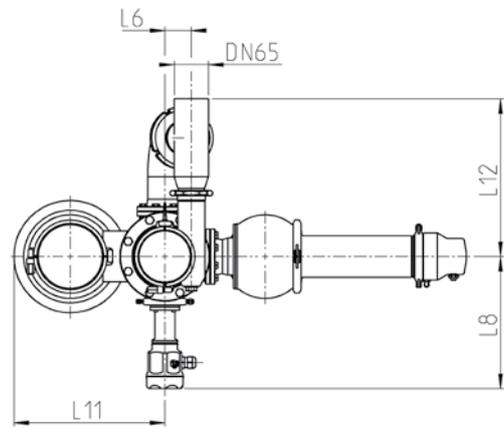
VARITOP® Type TTB 11 Z



Technical data of the standard version	
Material in contact with the product	1.4404
Seal material	EPDM
Ambient temperature	0 to 45 °C
Operating temperature	< 60 °C
Air supply pressure	6 bar (87 psi), max. 8 bar (116 psi)
Product pressure	10 bar (145 psi)
Surface in contact with the product	Ra ≤ 1.6 µm
CIP/GAS management	Automatic switch-over module
Cleaner	Rotating jet cleaner
Connection fittings	VARIVENT® grooved flange on the tank side, CIP/ GAS connection of the welding end
Identification	Adhesive ID tag



Front view



Top view

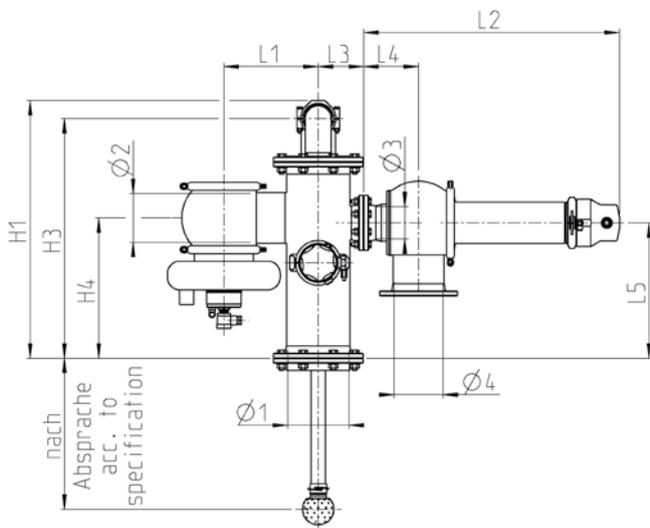
Dimension										
Nominal width Ø1	Ø2 [mm]	H1 [mm]	H3 [mm]	H4 [mm]	L1 [mm]	L5 [mm]	L6 [mm]	L8 [mm]	L11 [mm]	L12 [mm]
DN 100	80	514	457	271	180	276	54	288	295	324
DN 125	100	545	488	288	193	283	54	301	308	324
DN 162	162	649	592	361	243	376	54	323	386	324

Maximum values for safety relief valve					
		Safety relief valve type 488		Safety relief valve type HyCom	
Ø3 [mm]	Ø4 [mm]	L2 [mm]	L4 [mm]	L2 [mm]	L4 [mm]
25	40	343	78	434	69
40	65	539	95	554	74
50	80	554	103	609	84
65	100	573	112	720	85
80	125	712	128	796	98

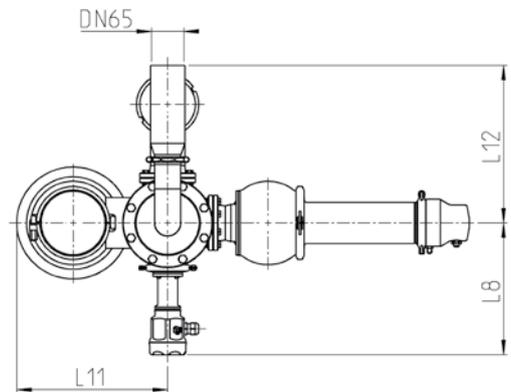
The description of the options – as well as the configuration of the system designation – can be found at the end of this section.



Technical data of the standard version	
Material in contact with the product	1.4404
Seal material	EPDM
Ambient temperature	0 to 45 °C
Operating temperature	< 60 °C
Air supply pressure	6 bar (87 psi), max. 8 bar (116 psi)
Product pressure	10 bar (145 psi)
Surface in contact with the product	Ra ≤ 1.6 µm
CIP/GAS management	Automatic switch-over module
Cleaner	Cleaning lance
Connection fittings	VARIVENT® grooved flange on the tank side, CIP/ GAS connection of the welding end
Identification	Adhesive ID tag



Front view



Top view

Dimension									
Nominal width Ø1	Ø2 [mm]	H1 [mm]	H3 [mm]	H4 [mm]	L1 [mm]	L5 [mm]	L8 [mm]	L11 [mm]	L12 [mm]
DN 100	80	502	465	271	180	276	288	301	323
DN 125	100	529	492	288	193	283	295	308	386
DN 162	162	637	600	361	243	376	324	324	317

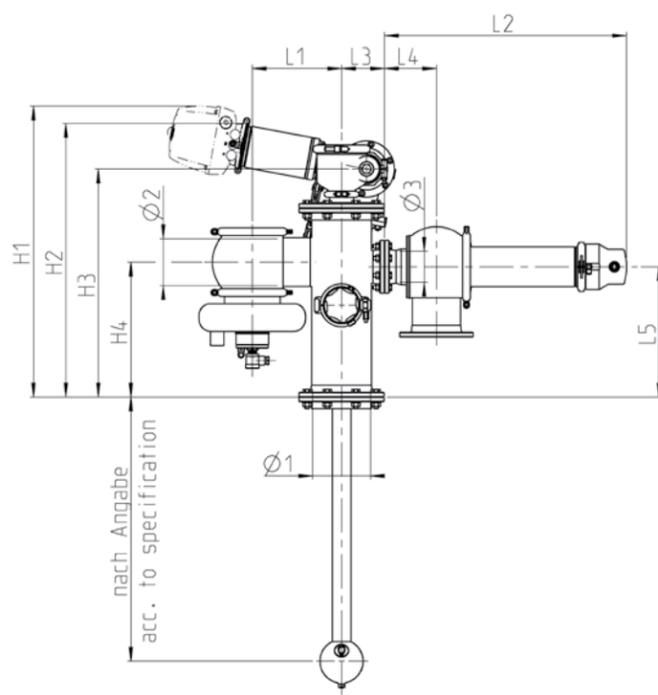
Maximum values for safety relief valve					
		Safety relief valve type 488		Safety relief valve type HyCom	
Ø3 [mm]	Ø4 [mm]	L2 [mm]	L4 [mm]	L2 [mm]	L4 [mm]
25	40	343	78	434	69
40	65	539	95	554	74
50	80	554	103	609	84
65	100	573	112	720	85
80	125	712	128	796	98

The description of the options – as well as the configuration of the system designation – can be found at the end of this section.

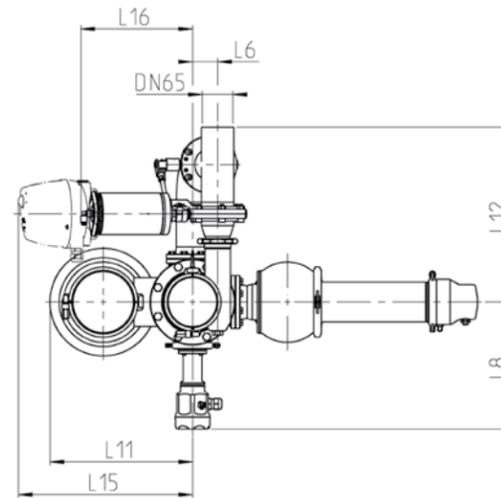




Technical data of the standard version	
Material in contact with the product	1.4404
Seal material	EPDM
Ambient temperature	0 to 45 °C
Operating temperature	< 80 °C
Air supply pressure	6 bar (87 psi), max. 8 bar (116 psi)
Product pressure	10 bar (145 psi)
Surface in contact with the product	Ra ≤ 1.6 µm
CIP/GAS management	Butterfly valve combination
Cleaner	Rotating jet cleaner
Connection fittings	VARIVENT® grooved flange on the tank side, CIP/ GAS connection of the welding end
Identification	Adhesive ID tag



Front view



Top view

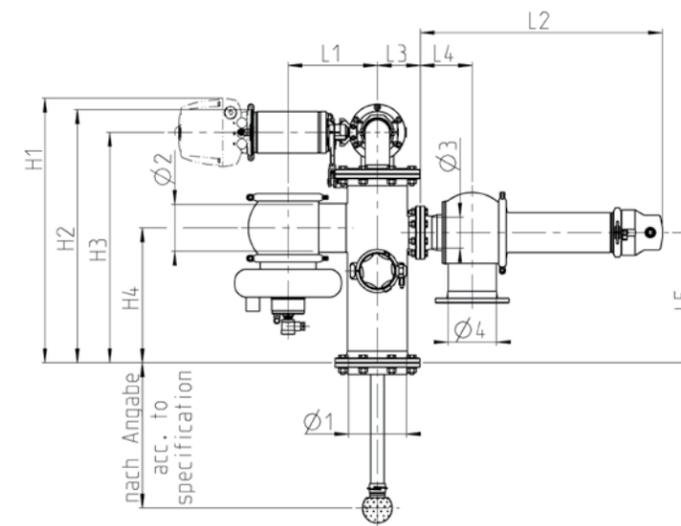
Nominal width Ø1	Dimension											
	Ø2 [mm]	H1 [mm]	H2 [mm]	H3 [mm]	H4 [mm]	L1 [mm]	L5 [mm]	L6 [mm]	L8 [mm]	L12 [mm]	L15 [mm]	L16 [mm]
DN 100	80	640	575	457	271	180	276	54	288	374	428	326
DN 125	100	671	606	488	288	193	283	54	301	374	428	326
DN 162	162	775	710	592	361	243	376	54	323	375	428	326

Maximum values for safety relief valve					
		Safety relief valve type 488		Safety relief valve type HyCom	
Ø3 [mm]	Ø4 [mm]	L2 [mm]	L4 [mm]	L2 [mm]	L4 [mm]
25	40	343	78	434	69
40	65	539	95	554	74
50	80	554	103	609	84
65	100	573	112	720	85
80	125	712	128	796	98

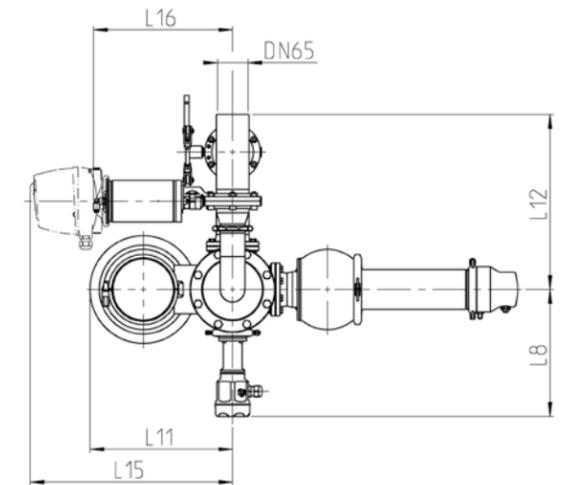
The description of the options – as well as the configuration of the system designation – can be found at the end of this section.



Technical data of the standard version	
Material in contact with the product	1.4404
Seal material	EPDM
Ambient temperature	0 to 45 °C
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Surface in contact with the product	Ra ≤ 1.6 µm
CIP/GAS management	Butterfly valve combination
Cleaner	Cleaning lance
Connection fittings	VARIVENT® grooved flange on the tank side, CIP/ GAS connection of the welding end
Identification	Adhesive ID tag



Front view



Top view

Nominal width Ø1	Dimension										
	Ø2 [mm]	H1 [mm]	H2 [mm]	H3 [mm]	H4 [mm]	L1 [mm]	L5 [mm]	L8 [mm]	L12 [mm]	L15 [mm]	L16 [mm]
DN 100	80	568	526	465	271	180	276	288	374	435	326
DN 125	100	595	553	492	288	193	283	301	374	435	326
DN 162	162	700	658	597	361	243	376	323	375	435	326

Maximum values for safety relief valve					
		Safety relief valve type 488		Safety relief valve type HyCom	
Ø3 [mm]	Ø4 [mm]	L2 [mm]	L4 [mm]	L2 [mm]	L4 [mm]
25	40	343	78	434	69
40	65	539	95	554	74
50	80	554	103	609	84
65	100	573	112	720	85
80	125	712	128	796	98

The description of the options – as well as the configuration of the system designation – can be found at the end of this section.

Selection Scheme VARITOP®

Position	Description of the selection scheme
1	CIP/GAS management
	1 Automatic switch-over module
	4 Butterfly valve combination
	Selection actuator type butterfly valve combination Pneumatic (standard) Pneumatic with control top Regular combination 
2	Cleaning device
	1 Rotating jet cleaner 2 Cleaning lance
3	Tank connection
	D Tank dome cover Z Central connection DZ Tank dome cover
	4
L Horizontal S Upright	
5	Safety relief valve type
	L Safety relief valve type 488 M Safety relief valve type HyCom
6	Connection type cross piece
	TN VARINLINE® grooved flange X Special connection tank side (for cleaner > Ø 162 mm)
7	CIP/GAS connection
	N Welding end DN 65 GK Pipe fitting S complete DN 65 DIN 11851 TK VARIVENT® flange connection DN 65
	8
- Without; housing connection N + blanking plate VP D1 Pressure transmitter 0–4 bar D2 Pressure transmitter 0–10 bar	
9	
	- Without N GEA Tuchenhagen level probe, type TNS
10	Sight glass (optional for tank connection D and DZ)
	- Without G Sight glass GB Sight glass illuminated 50 W 24 V
	11
- Without TF VARINLINE® smooth flange	

The code is composed as follows, depending on the chosen configuration:

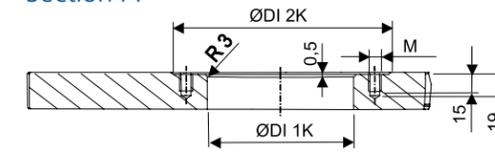
Position		1	2	3	4	5	6	7	8	9	10	11
Code	TTB			-		-		-		-		-

For order codes differing from the standard version, please refer to section 7 (options).

Product			
Medium*	_____		<input type="checkbox"/> Configuration for water
Viscosity*	_____		
Density*	_____		
Min. temperature*	_____		
Cleaner			
Type of contamination	<input type="checkbox"/> Water-soluble	<input type="checkbox"/> Solvent-soluble	<input type="checkbox"/> Crusted
Rotating cleaners	Orbital cleaners	Rotating jet cleaner with nozzle placement	Static cleaners
<input type="checkbox"/> Clipdisc <input type="checkbox"/> Sanitor <input type="checkbox"/> Torus <input type="checkbox"/> Turbo SSB <input type="checkbox"/> Turbodisc	<input type="checkbox"/> Tempest <input type="checkbox"/> Tornado <input type="checkbox"/> Tornado 4 <input type="checkbox"/> Typhoon <input type="checkbox"/> Torrent <input type="checkbox"/> Twister	<input type="checkbox"/> A <input type="checkbox"/> C4 <input type="checkbox"/> E1 <input type="checkbox"/> B <input type="checkbox"/> D1 <input type="checkbox"/> F2 <input type="checkbox"/> B1 <input type="checkbox"/> D2 <input type="checkbox"/> F3 <input type="checkbox"/> C1 <input type="checkbox"/> D3 <input type="checkbox"/> F5 <input type="checkbox"/> C2 <input type="checkbox"/> E <input type="checkbox"/> F6	<input type="checkbox"/> Spray ball
<input type="checkbox"/> With monitoring			
Comments			

* If any information is missing, the safety relief valve is designed for water.

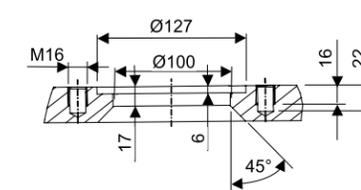
Section A



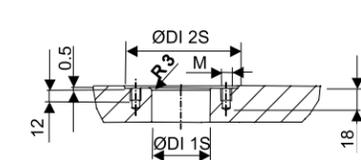
Surface finish of the sealing surfaces Ra ≤ 1,6 µm
Tolerances according to ISO 2768-mk

! No screws must be on the marked diameter ØK for tank lid attachment, since the proximity switch of the vacuum valve otherwise cannot be removed.

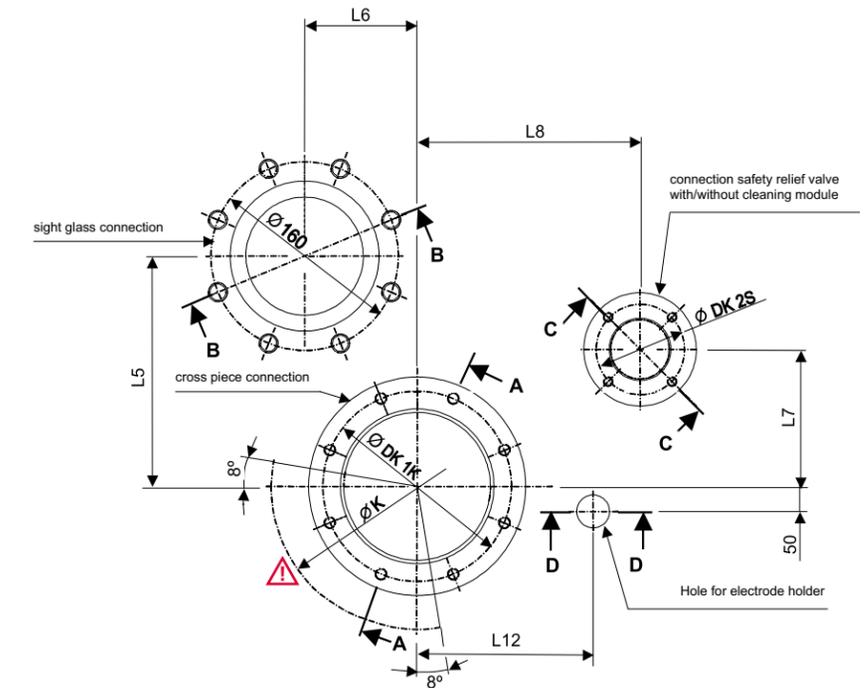
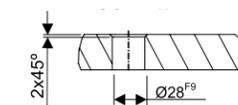
Section B



Section C



Section D



Note: The following dimensions are minimum distances. The sight glass and electrode holder are available as options for the respective design.

	Coordinates		
	L5 [mm]	L6 [mm]	L12 [mm]
	for sight glass		for electrode holder
VARITOP® TTB DN 100 with vacuum valve DN 80	160	96	150
VARITOP® TTB DN 125 with vacuum valve DN 100	175	96	150
VARITOP® TTB DN 162 with vacuum valve DN 162	200	96	150

Dimensions for cross piece connection (see section A)					
Nominal width	Number of threaded bores × M [mm]	ØDK 1K [mm]	ØDI 1K [mm]	ØDI 2K [mm]	ØK [mm]
DN 100	8 × M10	137	100	161	360
DN 125	8 × M10	161	125	185	384
DN 162	8 × M12	202	162	230	485

Dimensions for safety valve connection (see section C)						
Nominal width	Number of threaded bores × M [mm]	ØDK 2S [mm]	ØDI 1S [mm]	ØDI 2S [mm]	L7 [mm]	L8 [mm]
DN 25	4 × M8	53	26	72	116	170
DN 40	4 × M8	65	38	84	116	170
DN 50	4 × M8	77	50	96	116	170
DN 65	8 × M8	95	66	115	116	170
DN 80	8 × M8	110	81	130	116	170
DN 100	8 × M10	137	100	161	130	220



VARICOVER® product recovery systems

Product recovery systems optimize the economic efficiency of a process system by recovering the valuable products from pipelines.

Pigging pushes the remaining product from the pipe and returns it to the production cycle. The thin product film is easy to remove by subsequent cleaning, so that the pre-flushing time can be reduced.

Recover the value, reduce the waste!



Special features

Design with no dead zones

CIP/SIP-able

Reduced product loss

Reduced cleaning media and water consumption

Reduced waste water load

Reduced production downtimes

Simple maintenance

Application ranges

Product push-out

Product recovery systems are used for the ejection of viscous / flowing products from pipelines without mixing with any other media. This is especially required for high quality products in the food and beverages industries, as well as, pharmaceutical and personal and health care industries.

Product control

In addition to pushing out of products from the pipelines, product recovery systems are also used for gentle filling of pipelines with sensitive and foaming products. Even vertical pipelines can be easily filled by letting the product push the pig downwards in the pipe.



Applications

Personal and health care industry

- body care
- shampoo, lotion, cream
- toothpaste
- cleaning media, washing agents, softeners

Food industry

- yogurt, quark, cheese
- fruit juice
- dough, vegetable oil
- sauce, ice cream

Beverage industry

- concentrate
- syrup

Types of product recovery systems

The pigging process can be implemented with different degrees of automation. That is why the portfolio of GEA Tuchenhagen offers three different product recovery systems:

1. Automatic product recovery systems

Due to the complete automation of the process, the pig can push out and be cleaned without manual action. The entire process takes place solely in the pipeline.

Special features

Safe operation by closed pipe systems

No pig removal required in operation

Automatic function mode and thus fully verifiable processes

Components certified to 3A (101-00)

2. Semi-automatic product recovery systems

In contrast to the automatic product recovery systems, with the semi-automatic product recovery systems the pig is inserted and removed manually. Pushing out of product and returning of the pig then takes place automatically.

3. Manual product recovery systems

In the manual product recovery system, the pig is manually inserted into the pipeline and at the end removed manually. The pig runs in only one direction.

Design of a product recovery system

A VARICOVER® product recovery system usually comprises of a pig cleaning station, a pig catching station with propellant medium valves, and a pig. The pig is placed in the pig cleaning station during production and cleaning. In the pig catching station, the pig is stopped mechanically after successful product push-out and the propellant medium valves are used for propellant medium supply (air/water).

The pig components can be installed either in new systems or integrated into already present process systems.



Arrangement of the components in the product recovery system EMI/1

Features of VARICOVER® product recovery systems

VARICOVER® product recovery systems are characterized by use in fully automatic operations at maximum cleaning demands. Safe operation is secured by a firmly installed and closed pipe system so that no dismantling of the pig cleaning station is required for operation and cleaning. That is why the automatic function mode corresponds to a process that can be validated.

Detection of the pig position via magnetically inductive proximity switch – from the outside of the pipeline – permits automatic control and cleaning (CIP) of the product recovery system.

The pig driving medium can be water, air, CO₂ or N₂.



Cross-section of the housing of the pig cleaning station

Applications in process systems

Product recovery systems are used in different applications to meet the various requirements in numerous industries and processes:

- From product acceptance to pre-phase tanks
- From pre-phase tanks to mixers/process tanks
- From mixers/process tanks to storage tanks
- From storage tanks to filling machines



Pig stopper with pig

Prerequisites for operating of product recovery systems

- Fluid products suitable for pumping
- Non-sedimenting products
- No installations protruding into the pipe in the section to be pigged, such as measuring mountings
- Only piggable valves matching the geometry of the GEA Tuchenhagen double ball pig can be used
- Same interior diameter throughout the pipe system
- No sharp-edged and strongly sagging welds
- Connection fittings with transfers rounded on the inside can be used
- No seals protruding into the pipe permitted
- Standard pipe bends with small middle radius can be used – minimize number of pipe bends
- Use pipe bends with low ovality – Tolerances up to $\pm 1.5\%$ referring to the outside diameter across the entire bend length



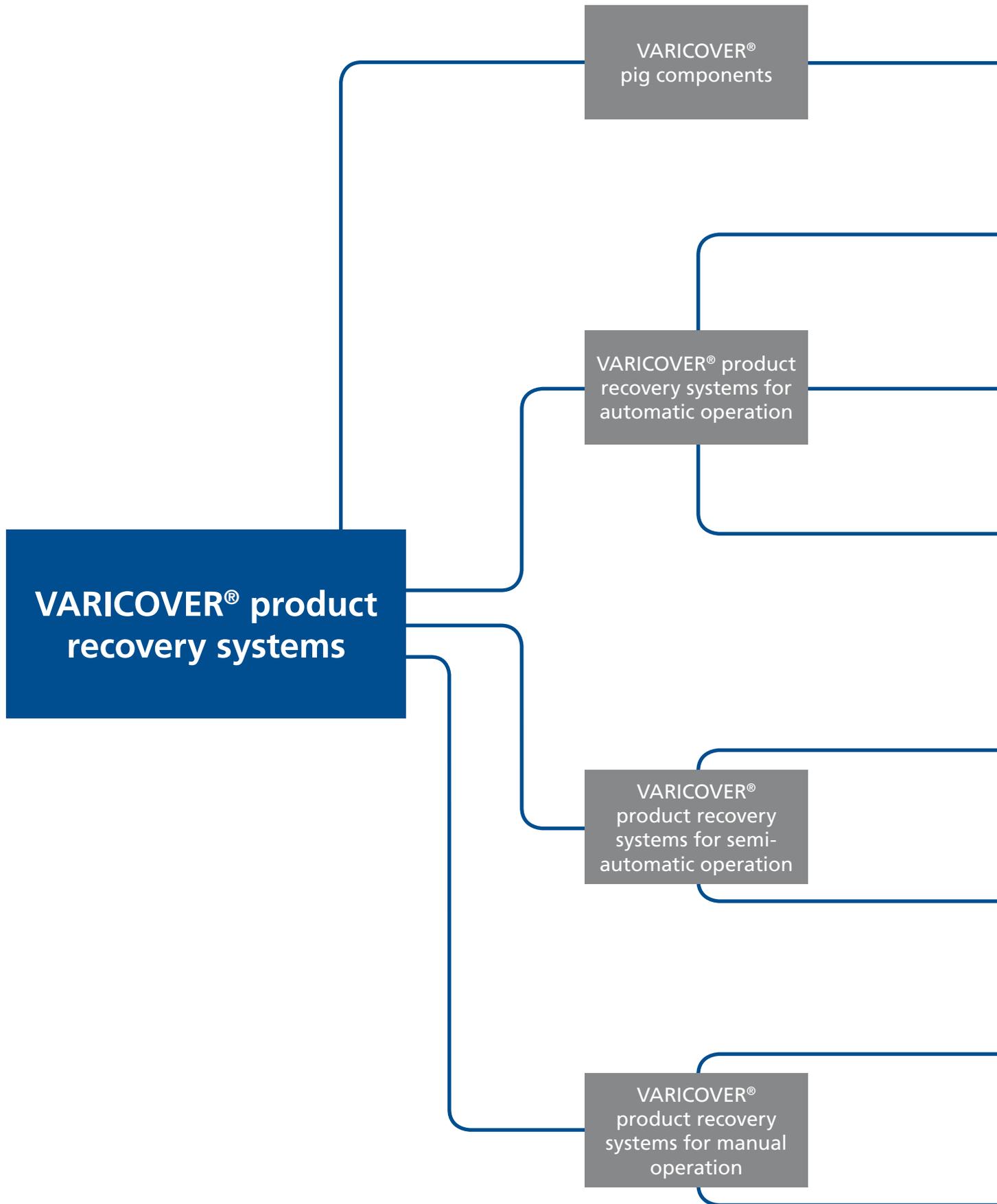
Process system recommendations

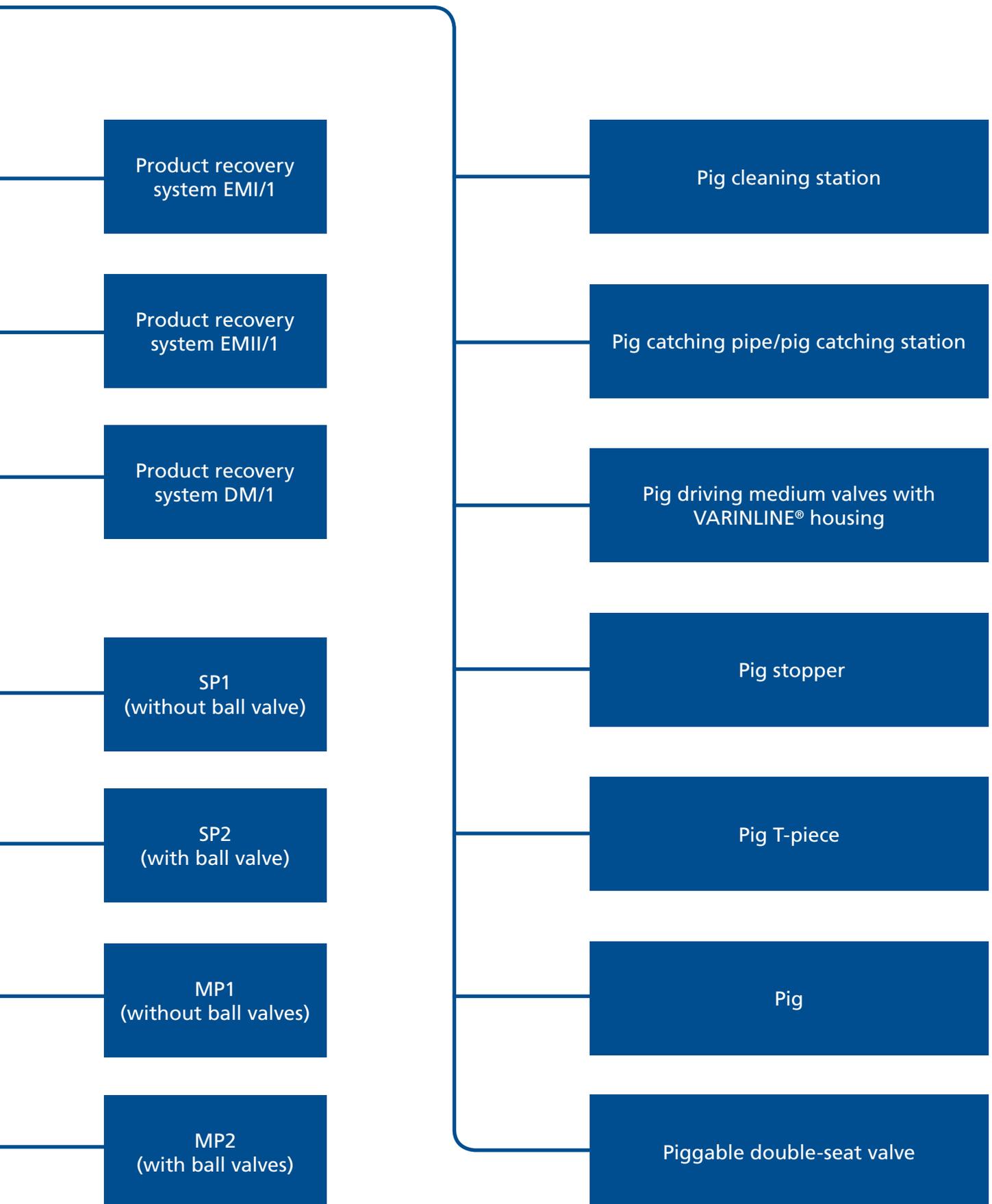
The pig speed control is important for the for successful operation of a product recovery system. It must not exceed 0.5 m/s when reaching the pig station. If the arrival speed is too high, there is the danger of damage to the pig.

When using compressible media, such as air, before and behind the pig, the following applications must be avoided:

- running the pig in a dry pipeline
- returning the pig after pushing out water

If these applications are not observed, there is the danger of a “stick-slip effect”. Here, the pig moves jerkily through the pipeline and may reach too high of speeds. An exception of this effect are with very slippery products such as shampoo and vegetable oils that form a sufficient lubricating film between the pig and the pipe wall.





Function method of the pig cleaning station

The pig cleaning station, free of dead zones and completely CIP-/SIP-able, is integrated into the product path and is flexible for use as the launching or receiving station. The pig holders and guidance keep the pig firmly in position in the station during flooding with product or cleaning media. The flow direction through the station is irrelevant.

When receiving or launching the pig, the pig gripper is pushed forward. The pig is half gripped by the gripper rods, so that it securely reaches the retracted position for production or cleaning.

When the pig is flooded with product, there is a continuous product exchange in the pig station housing. The product is gently transported through the housing. This is possible since the flow area around the pig corresponds to that of the pipeline. Since the housing is free of dead zones without domes and sumps, this ensures the best cleaning with complete residual emptying.



Cleaning the pig in the pig cleaning station

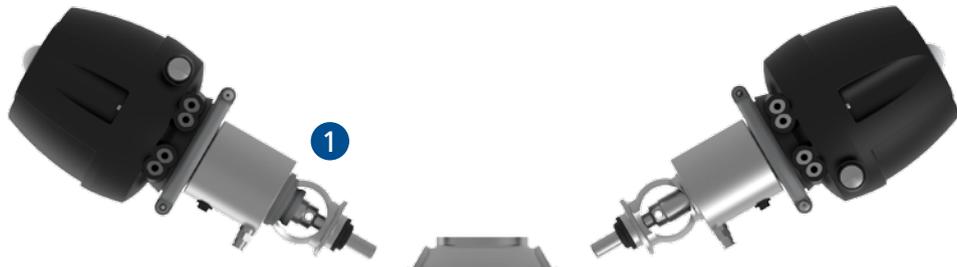
During cleaning, the pig remains in the pig cleaning station. Only there can it be flooded completely. This is possible because the pig gripper moves forward and backward several times by the control of the actuator so that a gap results between the pig front and the metallic stop.



Complete cleaning of the pig in the pig cleaning station

Furthermore, the pig can move between the gripper and the guidance rods, so that the pig contact points to the rods are completely cleaned.

Design of the pig cleaning station



1 Pig holder

The pig holders fasten the pig in the pig cleaning station in their spring-to-close position and release the pig after pneumatic activation. They are controlled via the T.VIS® feedback system.

2 Pig station housing

Product and cleaning media flood the pig firmly held in position in the pig station housing. Continuous monitoring of the pig position from outside of the housing is possible via the two magnetic sensors. Different connection fittings are available optionally.

3 Pig gripper

The pig gripper takes the pig on one side so that it will reach different positions safely.

4 Pig guidance

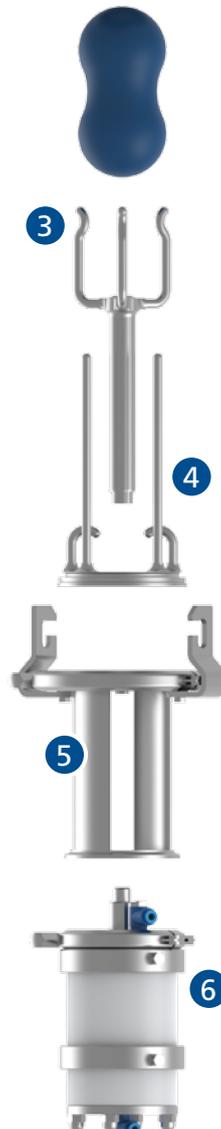
The pig is guided by straight rods within the pig station housing and thus cannot take an inclined position in the pig station housing which has a larger diameter than the pig.

5 Lantern

The open design of the lantern separates the actuator and product parts from one another. It permits visual inspection of the stem seal, and is also used for indicating any leakages. Furthermore, a heat transfer between the pig station housing and the pig actuator is prevented.

6 Pig actuator

The pig actuator consists of an air/air controlled actuator used for moving the pig into the production/cleaning position respectively into the launching/receiving position.



Pig catching pipe/pig catching station

In the catching pipe, the pig is stopped mechanically. It cannot be flooded with cleaning media there and leaves the station right after arriving in most applications. The mechanical pig stop which is integrated in the catching pipe is thoroughly cleaned during the pipe cleaning.

The catching pipe is used with and without the welded-on pig driving medium valve. The standard valve unit consists of two combined ECOVENT® valves of types NL and WK. The NL valve is used for shut-off from the product pipe and the WK valve serves as a divert valve between the inlet of the pig driving medium at the upper housing and the connection to the vent at the lower housing.

This arrangement ensures a complete cleaning of the NL shut-off valve. Furthermore, mixing between the product and the pig driving medium – in case of possible leaks – is prevented by the open venting socket at the WK divert valve.

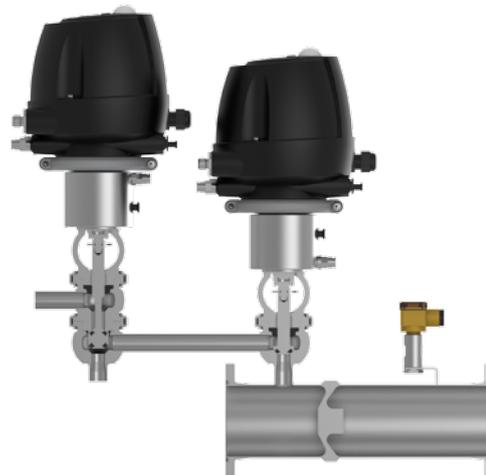
When air is used as the pig driving medium, an air throttle valve is always installed at the inlet socket of the WK divert valve. It sets the average pig speed by a hand-actuated adjustment of the flow area.



Pig catching pipe



Pig catching station



Cross section pig catching station

Pig driving medium valves with VARINLINE® housing

The VARINLINE® housing permits, aside from the connection of the pig driving medium valves, the adaptation of a pressure gauge, or a pressure transmitter, to record the driving medium pressure during commissioning.

The standard valve unit also consists of two combined ECOVENT® valves of types NL and WK. The NL valve is used for shut-off from the product pipe and the WK valve serves as a divert valve between the inlet of the pig driving medium at the upper housing and the connection to the vent at the lower housing. This arrangement ensures a complete cleaning of the NL shut-off valve. Furthermore, mixing between the product

and the pig driving medium – in case of possible leaks – is prevented by the open venting socket at the WK divert valve.

When air is used as the pig driving medium, an air throttle valve is always installed at the inlet socket of the WK divert valve. It sets the average pig speed by a hand-actuated adjustment of the flow area.



VARINLINE® housings



VARINLINE® housings with pig driving medium valves

Design pig stopper

In the spring-to-close position of the pig stopper, a rod travels over the entire pipe cross section. In it, the pig is stopped mechanically. Product or cleaning media can flow through the free cross-section around the rod.

In contrast to the closed position, the stopper rod is retracted in the air-to-open condition, so that the pig can pass the stopper.

The housing of the pig stopper is screwed to a VARIVENT® grooved flange on both sides and the complete pig stopper is welded into the pipeline.

Both the closed and the opened positions are monitored by proximity switches.

Function method pig stopper

The pig stopper is automatically operated and mostly used for two applications.

Filling and emptying of tanks is often performed by tee-outlets into pipelines. Pig stoppers can be placed before or behind tee-outlets and serve as precise positioning of the pigs. When a pig reaches a stopper rod, it works as a shut-off element and prevents further filling of the line.

In the product recovery system EMII/1, the product is supplied through the lateral socket of the T-piece and the pig stopper prevents the pig from leaving the launching station if any vacuum occurs.



Pig stopper



Cross section pig stopper with pig



Cross section pig stopper with opened stopper rod



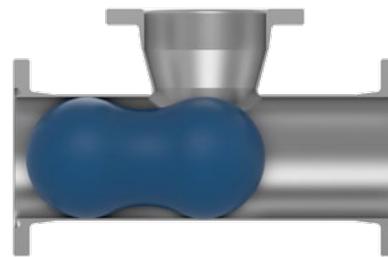
Cross section pig stopper with closed stopper rod

Pig T-piece

Special T-pieces in pigging lines are used as product inlet and outlet.

For the pig to be guided well in the T-piece, the pull out of the lateral socket is one nominal width smaller than the main line. This prevents canting of the pig.

The pig T-piece is used to feed product and cleaning media into the product recovery system EMII/1.



Pig in T-piece



Arrangement of the components in the product recovery system EMII/1

Pig

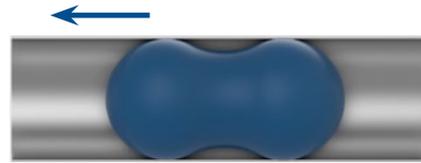
The pig is an inherently stable body made from wear- and temperature-resistant, product compatible material. Its contours allow reliable cleaning of the entire surface. The double ball shape of the pig ensures an optimal passage through small and large pipe bends as well as T-pieces with a reduced lateral pull out. Either running direction is possible.

Inside the pig, there are two stainless steel-encapsulated permanent magnets that permit detection of the pig with a magnetic sensor.

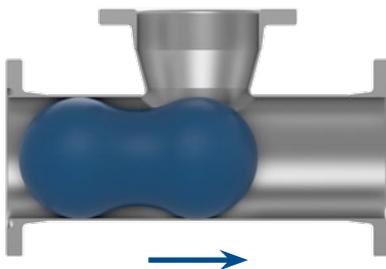
Available pig materials are Silicone and FKM (both FDA, 3A (18-03) and EU VO 1935/2004 compliant).



Separation of two different media



Both running directions possible



Passage of piggable T-pieces



Pigging pipe bends

VARIVENT® double-seat valve type L

The piggable double-seat valve type L is used when different products must be separate from each other and fully mixproof at pipeline junctions and the valve should at the same time be piggable.

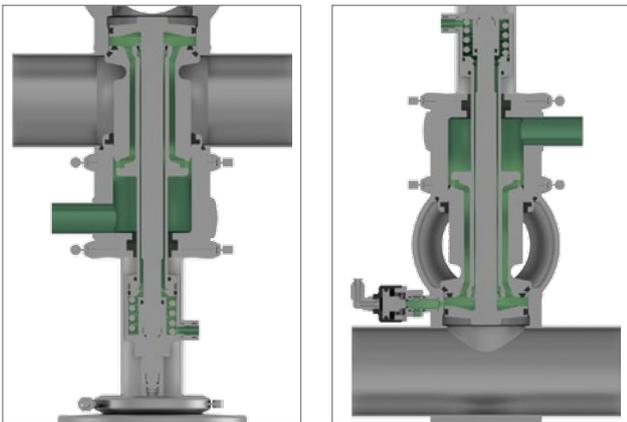
Only the lower valve housing with double horizontal ports is piggable, while the upper housing can have one or two horizontal ports. The upper and lower housings are always welded to each other.

Similar to the double-seat valve type R, type L also has the upper valve disc with an axial and the lower one with a radial seal. The double-seat valve type L cannot be equipped with a balancer in the lower housing to protect against pressure hammers.

The double-seat valve type L can be installed in the standing or suspended position. When suspended, the valve opens nearly without any switching leakage, while switching leakage occurs in the standing position. The switching leakage escapes from the additional emptying valve that is between the housings.

The emptying valve pneumatically connected to the actuator is opened while the valve is closed and closes when activating the actuator.

In the standing installation orientation of the valve type L, the cleaning media drains from two ports at the same time – through the port above the housings and through the emptying valve.



For more detailed information on the VARIVENT® valve type L, see the catalog Hygienic Valves VARIVENT® and ECOVENT®.

Application ranges

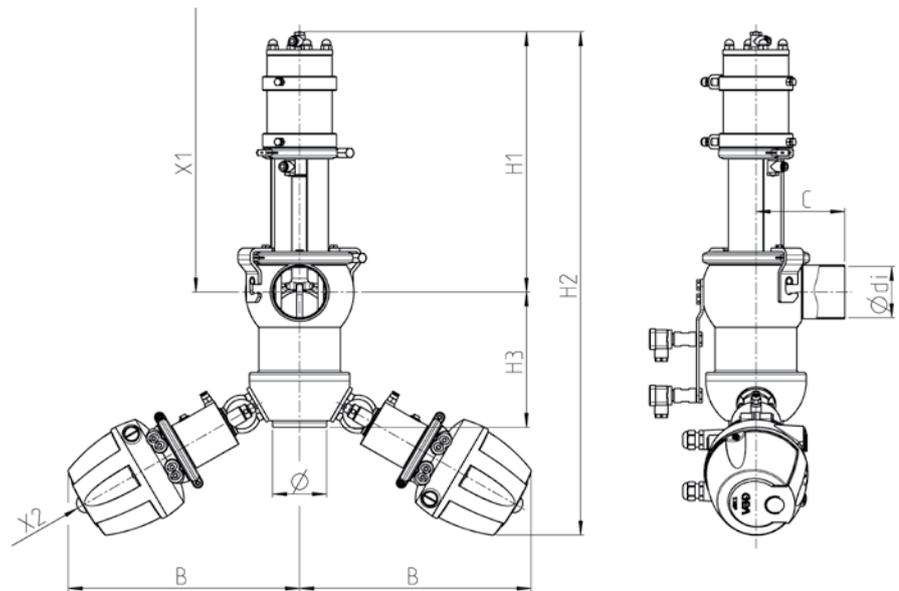
Piggable valve blocks

Piggable filling and emptying valves at product tanks





Technical data of the standard version		
Material in contact with the product	1.4404	
Seal material in contact with the product	EPDM (FDA)	
Ambient temperature	0 to 45 °C	
Air supply pressure	4.8 bar (69.6 psi) to 8 bar (116 psi)	
Max. product pressure	DN 25 – DN 65 OD 1" – OD 2 ½"	16 bar (232 psi)
	DN 80 – DN 100 OD 3" – OD 4"	10 bar (145 psi)
Surface in contact with the product	Ra ≤ 0.8 µm	
External housing surface	Matte blasted	
Actuator type	Pneumatic actuator air/air	
Actuator type of the pig holders	Pneumatic actuator air/spring	
Connection fittings	Welding end	
Identification	Adhesive ID tag	
Certificates	 	



Nominal width	Pipe		Housing		Dimension					General
	Ø [mm]	Ødi [mm]	B [mm]	C [mm]	H1 [mm]	H2 [mm]	H3 [mm]	X1 [mm]	X2 [mm]	Weight [kg]
DN 25	29.0 × 1.50	26.00	On request							
DN 40	41.0 × 1.50	38.00	339	90	353.0	521.0	135.0	503.0	100	On request
DN 50	53.0 × 1.50	50.00	313	90	359.0	650.0	158.0	559.0	100	16.0
DN 65	70.0 × 2.00	66.00	323	90	367.0	692.0	170.0	597.0	100	17.0
DN 80	85.0 × 2.00	81.00	331	125	378.0	730.5	194.5	648.0	100	24.0
DN 100	104.0 × 2.00	100.00	340	125	462.0	829.0	215.0	762.0	100	37.0
OD 1"	25.4 × 1.65	22.10	On request							
OD 1 ½"	38.1 × 1.65	34.80	337	90	351.5	510.0	125.5	501.5	100	On request
OD 2"	50.8 × 1.65	47.50	313	90	358.0	647.0	156.0	558.0	100	16.0
OD 2 ½"	63.5 × 1.65	60.20	320	90	364.0	689.0	170.0	594.0	100	18.0
OD 3"	76.2 × 1.65	72.90	326	125	374.0	721.0	192.0	634.0	100	22.5
OD 4"	101.6 × 2.11	97.38	340	125	461.0	829.0	216.0	761.0	100	36.0

Position	Description of the order code	
1	Pig cleaning station	
	PIG/PCS	Pig cleaning station MST 3A
2	Design	
	G	Pig cleaning station complete
	A	Only actuator of the pig cleaning station
	M	Only pig holder for the pig cleaning station
3	Nominal width	
	DN 25	OD 1"
	DN 40	OD 1 ½"
	DN 50	OD 2"
	DN 65	OD 2 ½"
	DN 80	OD 3"
	DN 100	OD 4"
4	Seal material	
	1	EPDM (FDA)
	2	FKM (FDA)
	3	HNBR (FDA)
5	Surface quality	
	2	Inside Ra ≤ 0.8 µm, outside matte blasted
	3	Inside Ra ≤ 0.8 µm, outside ground
6	Pig holder	
	0	Without pig holder
	2	With pig holder
7	Proximity switches at the pig actuator (for technical specifications, see section control and feedback systems)	
	0	Without proximity switches
	2	With proximity switches
8	Magnetic sensors at the pig station housing (for technical specifications, see section control and feedback systems)	
	0	Without magnetic sensors
	2	With magnetic sensors
9	Connection fittings	Connection fitting on port 1 / connection fitting on port 7 
	N Without connection fittings	TK VARIVENT® flange connection complete, grooved flange on housing
	J With connection fittings	TN VARIVENT® grooved flange complete, incl. O-ring and connecting parts
		TF VARINLINE® smooth flange
		CO Clamp connection
10	Accessories	
	/52	Adhesive ID tag
	+	
11–16	Air connection/control and feedback system	
	00000M	Metric for air hose Ø 6/4 mm
	00000Z	Inch for air hose Ø OD ¼" (6.35/4.35 mm)
	XXXXX	Order code for different control and feedback systems see section 9.

The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6	7	8	9	10	11 to 16	
Code	PIG/PCS	-		-					-	/ / /52	+	

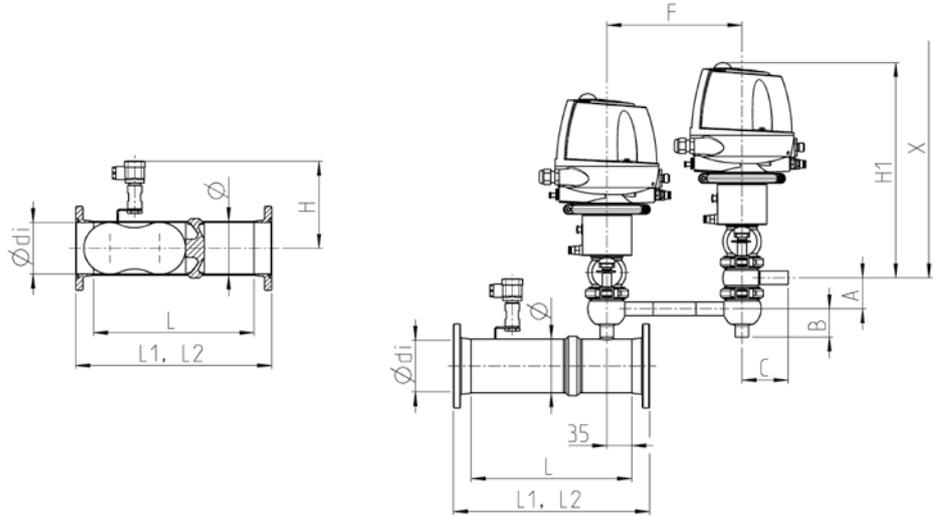
For order codes differing from the standard version, please refer to section 7 (options).



VARICOVER® Pig Catching Pipe/Pig Catching Station



Technical data of the standard version		
Material in contact with the product	1.4404	
Seal material in contact with the product	EPDM (FDA)	
Ambient temperature	0 to 45 °C	
Max. product pressure	DN 25 – DN 65	16 bar (232 psi)
	OD 1" – OD 2 ½"	
	DN 80 – DN 100	10 bar (145 psi)
OD 3" – OD 4"		
Surface in contact with the product	Ra ≤ 0.8 µm	
External housing surface	Matte blasted	
Connection fittings	Welding end	
Identification	Adhesive ID tag	
Certificates		



Pig catching pipe

Nominal width	Pipe					Dimension
	Ø [mm]	Ødi [mm]	L [mm]	L1 with VARIVENT® grooved flange [mm]	L2 with clamp connection [mm]	H [mm]
DN 25	29.0 × 1.50	26.00	On request	On request	On request	On request
DN 40	41.0 × 1.50	38.00	176	226	219	101
DN 50	53.0 × 1.50	50.00	181	231	224	107
DN 65	70.0 × 2.00	66.00	206	256	262	115
DN 80	85.0 × 2.00	81.00	246	296	302	123
DN 100	104.0 × 2.00	100.00	271	321	327	132
OD 1"	25.4 × 1.65	22.10	On request	On request	On request	On request
OD 1 ½"	38.1 × 1.65	34.80	166	216	209	99
OD 2"	50.8 × 1.65	47.50	176	226	219	105
OD 2 ½"	63.5 × 1.65	60.20	196	246	252	112
OD 3"	76.2 × 1.65	72.90	226	276	282	118
OD 4"	101.6 × 2.11	97.38	261	311	317	131

Pig catching station

Nominal width	Housing		Valve		Dimension	
	A [mm]	B [mm]	C [mm]	F [mm]	H1 [mm]	X [mm]
DN 15	47.0	40	65	180	298	348
DN 25	50.0	31	90	230	338	498
DN 40	62.0	39	90	230	372	532
DN 50	74.0	41	90	230	378	538
OD 1"	46.0	29	90	230	336	496
OD 1 ½"	59.0	39	90	230	370	530
OD 2"	71.5	42	90	230	377	537

VARICOVER® Pig Catching Pipe/Pig Catching Station

Position	Description of the order code													
1	Pig catching pipe PIG/PCP Pig catching pipe													
2	Nominal width of the pigging line <table border="1"> <tr><td>DN 25</td><td>OD 1"</td></tr> <tr><td>DN 40</td><td>OD 1 ½"</td></tr> <tr><td>DN 50</td><td>OD 2"</td></tr> <tr><td>DN 65</td><td>OD 2 ½"</td></tr> <tr><td>DN 80</td><td>OD 3"</td></tr> <tr><td>DN 100</td><td>OD 4"</td></tr> </table>		DN 25	OD 1"	DN 40	OD 1 ½"	DN 50	OD 2"	DN 65	OD 2 ½"	DN 80	OD 3"	DN 100	OD 4"
DN 25	OD 1"													
DN 40	OD 1 ½"													
DN 50	OD 2"													
DN 65	OD 2 ½"													
DN 80	OD 3"													
DN 100	OD 4"													
3	Nominal width of the driving medium valves* <table border="1"> <tr><td>0</td><td>Without driving medium valves</td></tr> <tr><td>DN 15</td><td></td></tr> <tr><td>DN 25</td><td>OD 1"</td></tr> <tr><td>DN 40</td><td>OD 1 ½"</td></tr> <tr><td>DN 50</td><td>OD 2"</td></tr> </table>		0	Without driving medium valves	DN 15		DN 25	OD 1"	DN 40	OD 1 ½"	DN 50	OD 2"		
0	Without driving medium valves													
DN 15														
DN 25	OD 1"													
DN 40	OD 1 ½"													
DN 50	OD 2"													
4	Magnetic sensors (for technical specifications, see section control and feedback systems) <table border="1"> <tr><td>0</td><td>Without magnetic sensor</td></tr> <tr><td>1</td><td>With magnetic sensor</td></tr> </table>		0	Without magnetic sensor	1	With magnetic sensor								
0	Without magnetic sensor													
1	With magnetic sensor													
5	Seal material <table border="1"> <tr><td>1</td><td>EPDM (FDA)</td></tr> <tr><td>2</td><td>FKM (FDA)</td></tr> <tr><td>3</td><td>HNBR (FDA)</td></tr> </table>		1	EPDM (FDA)	2	FKM (FDA)	3	HNBR (FDA)						
1	EPDM (FDA)													
2	FKM (FDA)													
3	HNBR (FDA)													
6	Surface quality <table border="1"> <tr><td>2</td><td>Inside Ra ≤ 0.8 µm, outside matte blasted</td></tr> <tr><td>3</td><td>Inside Ra ≤ 0.8 µm, outside ground</td></tr> </table>		2	Inside Ra ≤ 0.8 µm, outside matte blasted	3	Inside Ra ≤ 0.8 µm, outside ground								
2	Inside Ra ≤ 0.8 µm, outside matte blasted													
3	Inside Ra ≤ 0.8 µm, outside ground													
7	Connection fittings <table border="1"> <tr><td>N</td><td>Without connection fittings</td></tr> <tr><td>J</td><td>With connection fittings</td></tr> </table>	N	Without connection fittings	J	With connection fittings	Connection fitting on port 1 / connection fitting on port 2  <table border="1"> <tr><td>TK</td><td>VARIVENT® flange connection complete, grooved flange on housing</td></tr> <tr><td>TN</td><td>VARIVENT® grooved flange complete, incl. O-ring and connecting parts</td></tr> <tr><td>TF</td><td>VARINLINE® smooth flange</td></tr> <tr><td>CO</td><td>Clamp connection</td></tr> </table>	TK	VARIVENT® flange connection complete, grooved flange on housing	TN	VARIVENT® grooved flange complete, incl. O-ring and connecting parts	TF	VARINLINE® smooth flange	CO	Clamp connection
N	Without connection fittings													
J	With connection fittings													
TK	VARIVENT® flange connection complete, grooved flange on housing													
TN	VARIVENT® grooved flange complete, incl. O-ring and connecting parts													
TF	VARINLINE® smooth flange													
CO	Clamp connection													
8	Accessories /52 Adhesive ID tag													

* The order codes of the driving medium valves can be taken from the catalog Hygienic Valves VARIVENT® and ECOVENT®, section shut-off valves and divert valves. Please indicate in your request that you need valves for product recovery systems.

The code is composed as follows, depending on the chosen configuration:

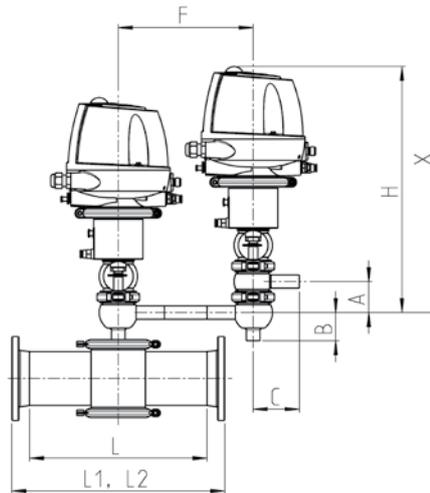
Position	1	2	3	4	5	6	7	8
Code	PIG/PCP	-		-		-	/ /	/52

For order codes differing from the standard version, please refer to section 7 (options).

Pig Driving Medium Valves with VARINLINE® Housing



Technical data of the standard version		
Seal material	EPDM (FDA)	
Product pressure	DN 25 – DN 65	16 bar (232 psi)
	OD 1" – OD 2 ½"	
	DN 80 – DN 100	10 bar (145 psi)
	OD 3" – OD 4"	
Surface in contact with the product	Ra ≤ 0.8 µm	
External housing surface	Matte blasted	
Connection fittings	Welding end	
Certificates		



VARINLINE® housings

Nominal width	Pipe				
	Ø [mm]	Ødi [mm]	L [mm]	L1 with VARIVENT® grooved flange [mm]	L2 with clamp connection [mm]
DN 25	29.0 × 1.50	26.00	180	230	223
DN 40	41.0 × 1.50	38.00	180	230	223
DN 50	53.0 × 1.50	50.00	180	230	223
DN 65	70.0 × 2.00	66.00	250	300	306
DN 80	85.0 × 2.00	81.00	250	300	306
DN 100	104.0 × 2.00	100.00	250	300	306
OD 1"	25.4 × 1.65	22.10	180	230	223
OD 1 ½"	38.1 × 1.65	34.80	180	230	223
OD 2"	50.8 × 1.65	47.50	180	230	223
OD 2 ½"	63.5 × 1.65	60.20	250	300	306
OD 3"	76.2 × 1.65	72.90	250	300	306
OD 4"	101.6 × 2.11	97.38	250	300	306

Pig driving medium valves

Nominal width	Housing		Valve		Dimension	
	A [mm]	B [mm]	C [mm]	F [mm]	H [mm]	X [mm]
DN 15	47.0	40	65	180	298	348
DN 25	50.0	31	90	230	338	498
DN 40	62.0	39	90	230	372	532
DN 50	74.0	41	90	230	378	538
OD 1"	46.0	29	90	230	336	496
OD 1 ½"	59.0	39	90	230	370	530
OD 2"	71.5	42	90	230	377	537

Position	Description of the order code	
1	Inline housings	
	PIG/T	Inline housings
2	Nominal width	
	DN 25	OD 1"
	DN 40	OD 1 ½"
	DN 50	OD 2"
	DN 65	OD 2 ½"
	DN 80	OD 3"
	DN 100	OD 4"
3	Nominal width of the driving medium valves*	
	0	Without driving medium valves
	DN 15	
	DN 25	OD 1"
	DN 40	OD 1 ½"
	DN 50	OD 2"
4	Seal material	
	1	EPDM (FDA)
	2	FKM (FDA)
	3	HNBR (FDA)
5	Surface quality	
	3	Inside Ra ≤ 0.8 µm, outside ground
6	Certificates	
	K	Without
	W	Test report 2.2
	Z	Inspection certificate 3.1
	A	Inspection certificate 3.1 and 2.2
7	Connection fittings	Connection fitting on port 1 / connection fitting on port 2 
	N Without connection fittings	TK VARIVENT® flange connection complete, grooved flange on housing
	J With connection fittings	TN VARIVENT® grooved flange complete, incl. O-ring and connecting parts
		TF VARINLINE® smooth flange
		CO Clamp connection
8	Material in contact with the product	
	1.4404	1.4404/AISI 316 L

* The order codes of the driving medium valves can be taken from the catalog Hygienic valves VARIVENT® and ECOVENT®, section shut-off valves and divert valves. Please indicate in your request that you need valves for product recovery systems.

The code is composed as follows, depending on the chosen configuration:

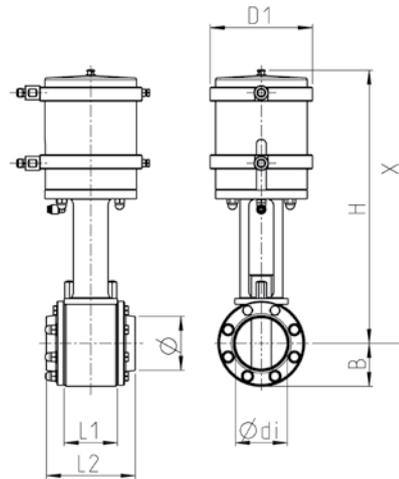
Position	1	2	3	4	5	6	7	8
Code	PIG/T	-		-		-	/ /	1.4404

For order codes differing from the standard version, please refer to section 7 (options).

VARICOVER® Pig Stopper



Technical data of the standard version		
Material in contact with the product	1.4404	
Seal material in contact with the product	EPDM (FDA)	
Ambient temperature	0 to 45 °C	
Air supply pressure	4.2 bar (61 psi) to 8 bar (116 psi)	
Max. product pressure	DN 25 – DN 65	16 bar (232 psi)
	OD 1" – OD 2 ½"	
	DN 80 – DN 100	10 bar (145 psi)
OD 3" – OD 4"		
Surface in contact with the product	Ra ≤ 0.8 µm	
External housing surface	Outside ground	
Actuator type	Pneumatic actuator air/spring	
Connection fittings	Welding end	
Identification	Adhesive ID tag	
Certificates		



Nominal width	Pipe		Housing			Actuator	Dimension		General	
	Ø [mm]	Ødi [mm]	B [mm]	L1 [mm]	L2 [mm]	D1 [mm]	H [mm]	X [mm]	Weight [kg]	Stroke [mm]
DN 25	29.0 × 1.50	26.00	On request	On request						
DN 40	41.0 × 1.50	38.00	On request	On request						
DN 50	53.0 × 1.50	50.00	51.0	75	125	139	377.0	407.0	11.0	59.0
DN 65	70.0 × 2.00	66.00	58.0	75	125	139	384.5	414.5	12.0	75.0
DN 80	85.0 × 2.00	81.00	65.0	75	125	139	392.0	422.0	12.5	90.0
DN 100	104.0 × 2.00	100.00	79.5	75	125	139	402.0	432.0	14.5	109.0
OD 1"	25.4 × 1.65	22.10	On request	On request						
OD 1 ½"	38.1 × 1.65	34.80	On request	On request						
OD 2"	50.8 × 1.65	47.50	49.5	75	125	139	375.5	405.5	11.0	56.5
OD 2 ½"	63.5 × 1.65	60.20	55.0	75	125	139	381.5	411.5	11.5	69.0
OD 3"	76.2 × 1.65	72.90	61.0	75	125	139	388.0	418.0	12.0	82.0
OD 4"	101.6 × 2.11	97.38	78.0	75	125	139	400.5	430.5	14.0	106.5

Position	Description of the order code	
1	Pig stopper	
	PIG/PS Pig stopper	
2	Nominal width	
	DN 25	OD 1"
	DN 40	OD 1 ½"
	DN 50	OD 2"
	DN 65	OD 2 ½"
	DN 80	OD 3"
	DN 100	OD 4"
3	Proximity switches at the actuator (for technical specifications, see section control and feedback systems)	
	0	Without proximity switches
	2	With proximity switches
4	Design	
	S	Pig stopper (complete)
	A	Actuator as spare part
5	Seal material	
	1	EPDM (FDA)
	2	FKM (FDA)
	3	HNBR (FDA)
6	Surface quality	
	3	Inside Ra ≤ 0.8 µm, outside ground
7	Connection fittings	Connection fitting on port 1 / connection fitting on port 2 
	N Without connection fittings	TN VARIVENT® grooved flange complete, incl. O-ring and connecting parts
	J With connection fittings	
8	Accessories	
	/52	Adhesive ID tag
+		
9-14	Air connection/control and feedback system	
	00000M	Metric for air hose Ø 6/4 mm
	00000Z	Inch for air hose Ø OD ¼" (6.35/4.35 mm)
	XXXXX	Order code for different control and feedback systems see section 9.

The code is composed as follows, depending on the chosen configuration:

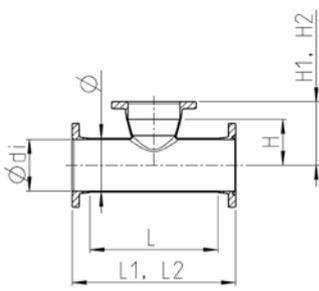
Position	1	2	3	4	5	6	7	8	9 to 14						
Code	PIG/PS	-		-		-	/	/	/52	+					

For order codes differing from the standard version, please refer to section 7 (options).

VARICOVER® Pig T-piece



Technical data of the standard version		
Material in contact with the product	1.4404	
Seal material in contact with the product	EPDM (FDA)	
Ambient temperature	0 to 45 °C	
Max. product pressure	DN 25 – DN 65	16 bar (232 psi)
	OD 1" – OD 2 ½"	
	DN 80 – DN 100	10 bar (145 psi)
Max. product pressure	OD 3" – OD 4"	
	Surface in contact with the product	Ra ≤ 0.8 µm
External housing surface	Matte blasted	
Connection fittings	Welding end	
Identification	Adhesive ID tag	
Certificates		



Nominal width	Pipe					Dimension		
	Ø [mm]	Ødi [mm]	L [mm]	L1 with VARIVENT® grooved flange [mm]	L2 with clamp connection [mm]	H [mm]	H1 with VARIVENT® grooved flange [mm]	H2 with clamp connection [mm]
DN 25	29.0 × 1.50	26.00	On request	On request	On request	On request	On request	On request
DN 40	41.0 × 1.50	38.00	120	170	163	42.5	66.50	63.00
DN 50	53.0 × 1.50	50.00	140	190	183	52.5	76.50	73.00
DN 65	70.0 × 2.00	66.00	160	210	216	62.5	86.00	89.00
DN 80	85.0 × 2.00	81.00	180	230	236	68.5	92.00	95.00
DN 100	104.0 × 2.00	100.00	200	250	256	90.0	113.50	116.50
OD 1"	25.4 × 1.65	22.10	On request	On request	On request	On request	On request	On request
OD 1 ½"	38.1 × 1.65	34.80	120	170	163	60.1	83.90	80.40
OD 2"	50.8 × 1.65	47.50	140	190	183	66.4	90.25	86.75
OD 2 ½"	63.5 × 1.65	60.20	160	210	216	59.8	83.60	86.60
OD 3"	76.2 × 1.65	72.90	180	230	236	65.1	88.95	91.95
OD 4"	101.6 × 2.11	97.38	200	250	256	90.3	113.69	116.69

VARICOVER® Pig T-piece

Position	Description of the order code	
1	Pig T-piece	
	PIG/TEE	Pig T-piece
2	Nominal width	
	DN 25	OD 1"
	DN 40	OD 1 ½"
	DN 50	OD 2"
	DN 65	OD 2 ½"
	DN 80	OD 3"
	DN 100	OD 4"
3	Seal material	
	1	EPDM (FDA)
	2	FKM (FDA)
	3	HNBR (FDA)
4	Surface quality	
	2	Inside Ra ≤0.8 µm, outside matte blasted
	3	Inside Ra ≤0.8 µm, outside ground
5	Connection fittings	Connection fitting on port 1 / Connection fitting on port 2 / connection fitting on port 7 
	N Without connection fittings	TK VARIVENT® flange connection complete, grooved flange on housing
	J With connection fittings	TN VARIVENT® grooved flange complete, incl. O-ring and connecting parts
		TF VARINLINE® smooth flange
		CO Clamp connection
6	Accessories	
	/52	Adhesive ID tag



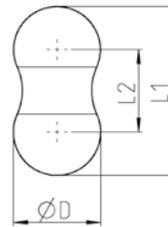
The code is composed as follows, depending on the chosen configuration:

Position	1	2	3	4	5	6
Code	PIG/TEE	-	-	-	/ /	/52

For order codes differing from the standard version, please refer to section 7 (options).

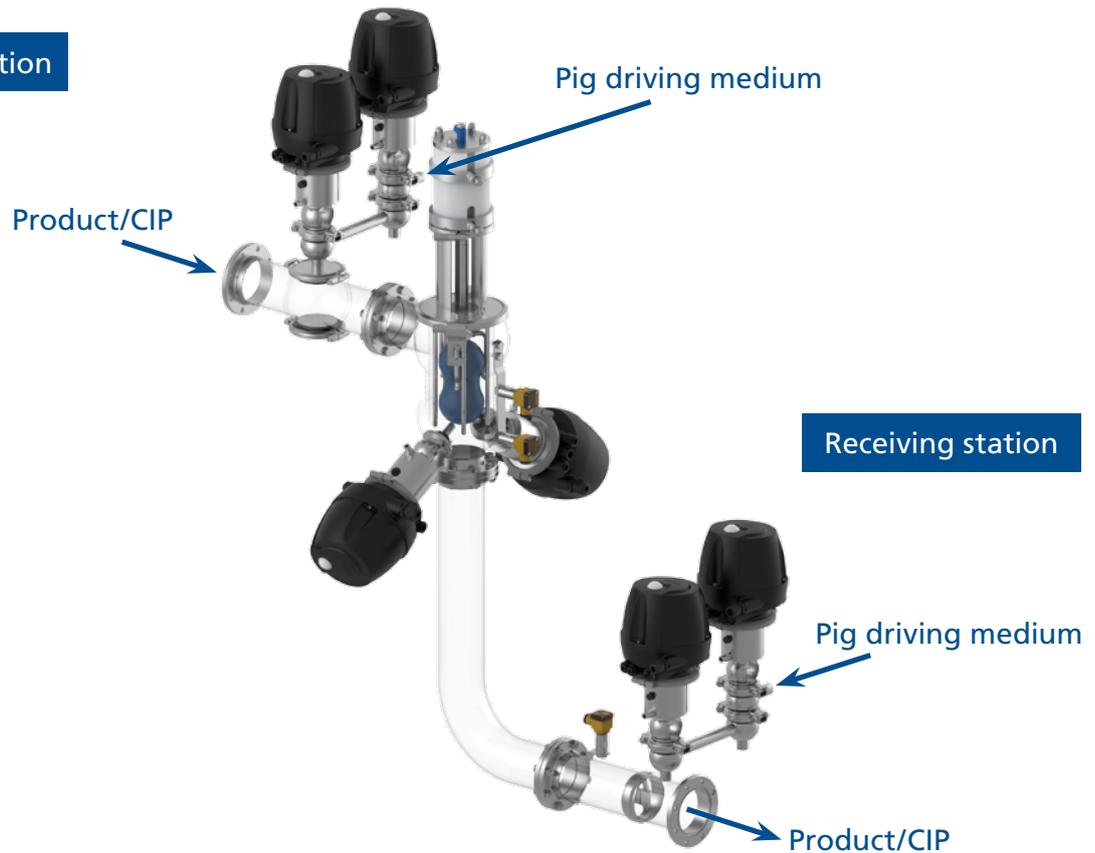


Technical data of the standard version	
Material in contact with the product	VMQ (Silicone), FKM
Ambient temperature	-5 to 130 °C
Certificates	



Nominal width	Dimensions			Article number	
	L1 [mm]	L2 [mm]	ØD [mm]	Material	
				VMQ	FKM
DN 25	On request	On request	On request	On request	On request
DN 40	80	42	> 38.00	228-163.24	228-163.23
DN 50	99	48	> 50.00	228-163.27	228-163.26
DN 65	127	60	> 66.00	228-163.30	228-163.29
DN 80	158	76	> 81.00	228-163.33	228-163.32
DN 100	192	91	> 100.00	228-163.36	228-163.35
OD 1"	On request	On request	On request	On request	On request
OD 1 ½"	67	32	> 34.80	On request	On request
OD 2"	93	45	> 47.50	228-263.03	228-263.02
OD 2 ½"	119	58	> 60.20	228-263.15	228-263.14
OD 3"	144	70	> 72.90	228-263.18	228-263.17
OD 4"	181	83	> 97.38	228-263.06	228-263.05

Launching Station



Functional description

Production

The pig is firmly held in position in the launching station and flooded with product.

Product push-out

The pig is pushed through the pipeline by means of the driving medium and pushes the residual product towards the receiving station.

Pig return

When reaching the receiving station, the pig is immediately returned to the launching station.

Cleaning

The pig stations are cleaned during the pipe cleaning. The pig is fully flooded in the launching station and cleaned.

Selection criteria for the product recovery system EMI/1

The product recovery system is automatically operated and the pig is cleaned in the launching station. The pig is removed from the pipeline for inspection.

Preferred combination of the pig driving media

Launching station: Water

Receiving station: Air

At least one liquid medium is before or behind the pig in each pig run.

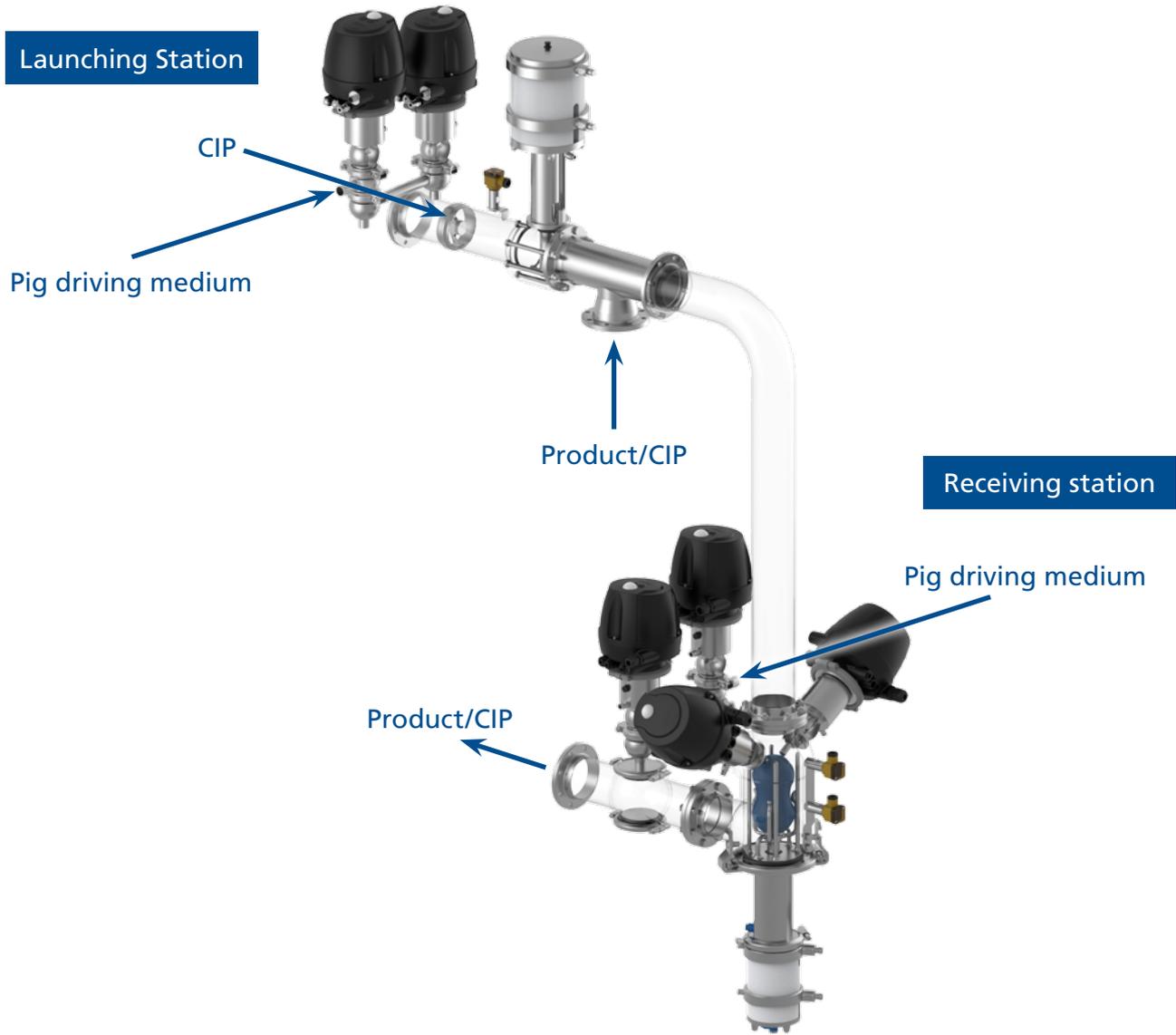
Combination of the pig driving media

Launching station: Air

Receiving station: Air

This is only possible with very slippery products such as shampoo and vegetable oils that form a sufficient lubricating film between the pig and the pipe wall. Not applicable for products that do not lubricate, so to avoid the "Stick-slip effect".

The pipeline can be fully self-drained after cleaning.



Functional description

Production

The pig is firmly held in position in the pig catching pipe of the launching station and the product enters the system via the lateral socket of the special T-piece. The pig stopper prevents the pig from exiting the system if a vacuum occurs.

Product push-out

The pig is pushed through the pipeline by means of the driving medium and pushes the residual product towards the receiving station. For subsequent cleaning, the pig remains in the receiving station.

Cleaning

The pig stations are cleaned during the pipe cleaning. The pig is fully flooded in the receiving station and cleaned. The system must not be sterilized with steam, because the pig cannot be driven back along a dry line.

Pig return

At the end of the cleaning, the pig is driven back to the launching station by a gaseous driving medium. On its way back, the pig is pushing out the final rinsing water from the pipeline.

Selection criteria for the product recovery system EMII/1

The product recovery system is automatically operated and the pig is cleaned in its specific receiving station. The pig is removed from the pipeline for inspection.

Preferred combination of the pig driving media

Launching station: Air

Receiving station: Air

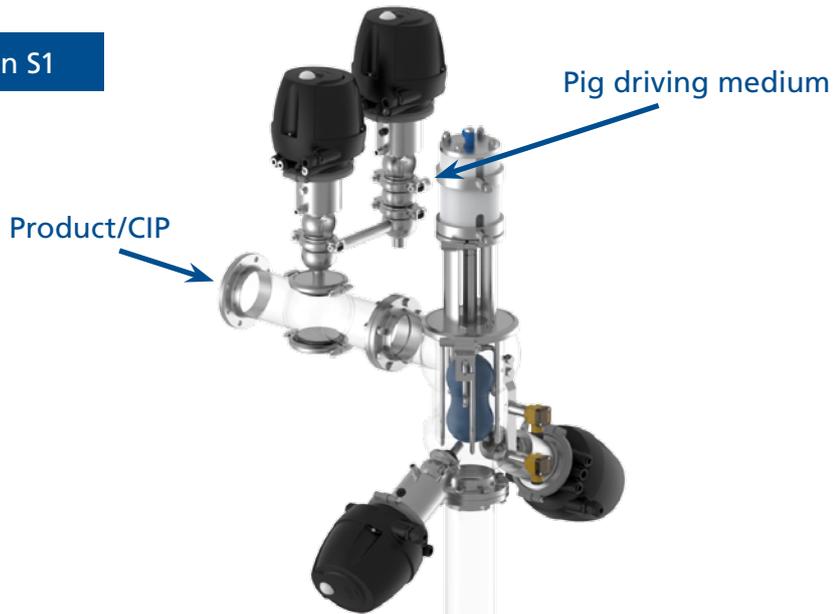
One liquid medium is located before the pig in each pig run.

Applicable for products with low lubrication properties

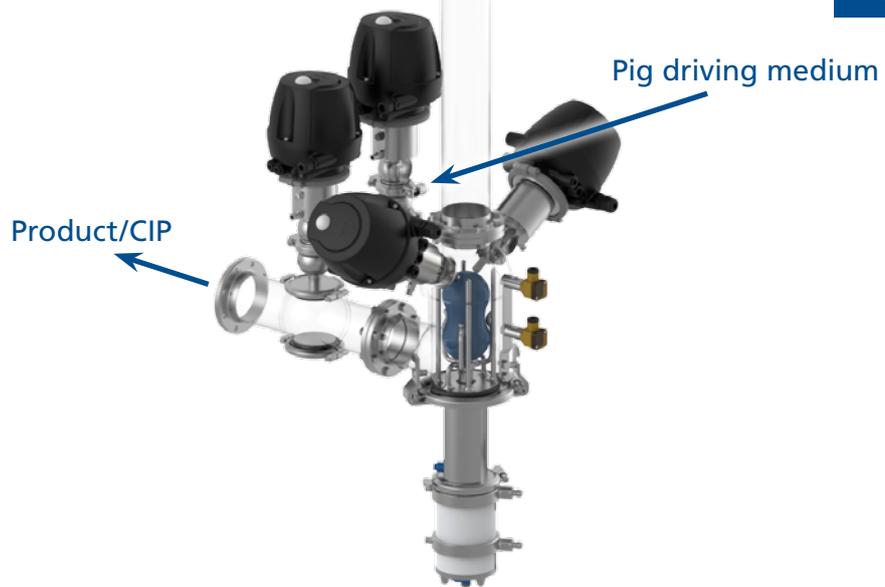
Applicable for pipelines that do not self-drain. The pig pushes the water from the last cleaning step out towards the launching station.

The pipeline is not sterilized with steam.

Pig station S1



Pig station S2



Functional description

1. Product push-out optionally in two directions

Production

The pig stations have one pig firmly held in position each. Both are flooded with product in their stations.

Product push-out

After the production end, the residual product may be pushed out in the desired direction using the driving medium. The pig moves to the opposite pig of the receiving station for this.

Pig return

When reaching the receiving station, the pig is immediately returned to the launching station.

Cleaning

The pig stations are cleaned during the pipe cleaning. The pigs are fully flooded in their specific stations and cleaned.

2. Product filling with slope

If the product is filled into empty and descending pipelines, product and air may mix and produce foam.

This incident can be avoided using the product recovery system DM/1. For this purpose, pig S2 is driven against pig S1 prior to production start. Afterwards pig S2 is pushed back with product into its station and serves as a separator between product and air. All further process steps are the same as described before under section 1.

3. Operation with the pig

Only one pig is used in the system. The function method is the same as for the product recovery system EMII/1. In contrast to the EMII/1, no T-piece is used for product infeed. The product enters directly via the launching station and floods the pig firmly held in position.

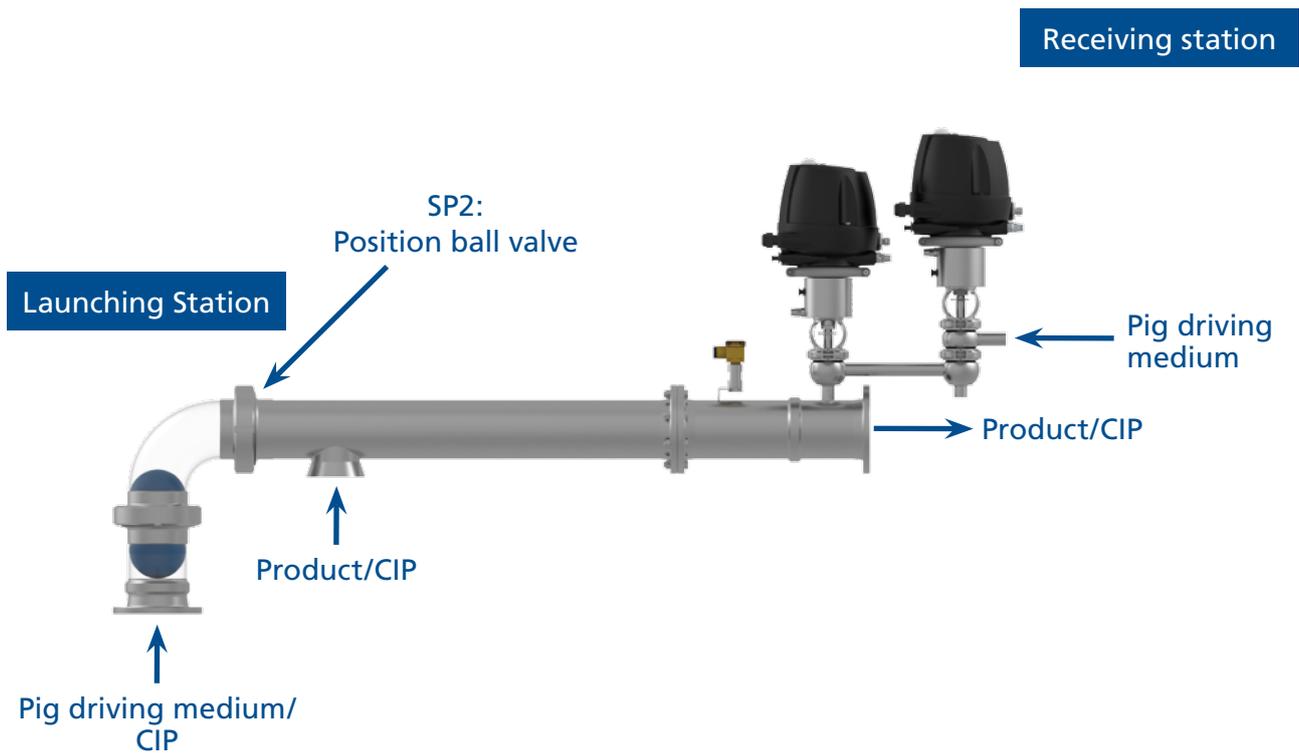
Selection criteria for the product recovery system DM/1

The product recovery system is automatically operated and the pigs are cleaned in the pig station. The pigs are removed from the pipeline for inspection.

Three possible applications:

- Product push-out optionally in two directions
- Product filling with slope
 - particularly when having foaming products
- Operation with one pig
 - benefit as compared to EMII/1: Product infeed without T-piece

All combinations of driving media can be used if at least one liquid medium is located before or behind the pig in each pig run.



Functional description

Production

Before starting production, the pig is manually inserted in the launching station. The pipe bend is removed for this and then installed again. Product infeed takes place via the lateral socket of the T-piece.

Product push-out

The pig is pushed through the pipeline by means of the driving medium and pushes the residual product towards the receiving station.

Pig return

When reaching the receiving station, the pig is immediately returned to the launching station.

Cleaning

The pig is removed manually before the start of cleaning at the launching station and manually cleaned outside of the system.

Selection criteria for the product recovery system SP1/SP2

The product recovery system is semi-automatically operated, since the pig runs automatically and cleaning of the pig takes place manually.

SP1: without ball valve

SP2: with ball valve

The ball valve increases operational safety when inserting and removing the pig.

Preferred combination of the pig driving media

Launching station: Water

Receiving station: Air

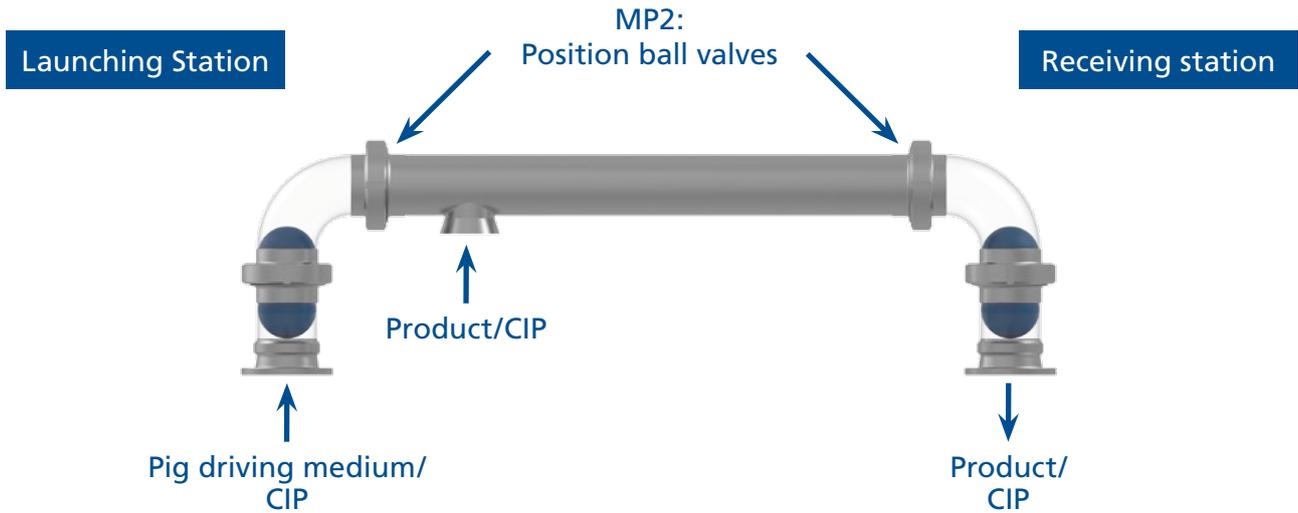
At least one liquid medium is located before or behind the pig in each pig run.

Combination of the pig driving media

Launching station: Air

Receiving station: Air

This is only possible with very slippery products such as shampoo and vegetable oils that form a sufficient lubricating film between the pig and the pipe wall.



Functional description

Production

Before starting production, the pig is manually inserted in the launching station. The pipe bend is removed for this and then installed again. Product infeed takes place via the lateral socket of the T-piece.

Product push-out

The pig is pushed through the pipeline by means of the driving medium and pushes the residual product towards the receiving station. It is removed for subsequent cleaning there and not pushed back to the launching station.

Cleaning

The pig is manually cleaned outside of the system.

Selection criteria for the product recovery system MP1/MP2

The product recovery system is manually operated, since both the pig runs and the cleaning of the pig take place manually.

MP1: without ball valves

MP2: with ball valves

The ball valves increase operational safety when inserting and removing the pig.

Preferred pig driving medium at system MP1

Launching station: Air

When using water, there is the danger of water escaping when opening the pipe bend at the receiving station.

Preferred pig driving medium at system MP2

Launching station: Water

Using water permits better adjustment of the pig speed than with the compressible medium of air. There is no risk of water escaping since the ball valve before the receiving station is closed when opening the pipe bend.

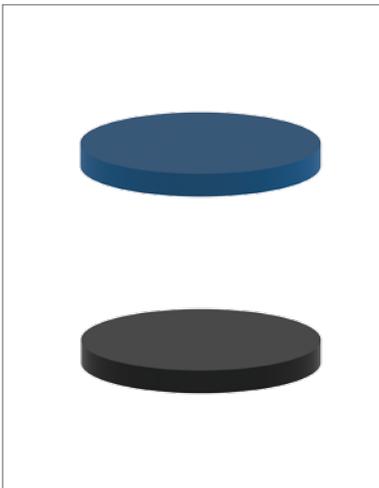
Alternatively, the MP1 and MP2 systems can also be operated semi-automatically. For this, the valves are equipped with pneumatic actuators. The pig run takes place automatically and the pig is cleaned manually. As for the manual application, the pig is taken out at the receiving station.



Pig detector

The pig detector serves to find an unmoving pig along the pipeline or in a pig station. For this, the detector is manually routed to the pipeline from the outside. Once it has entered the area of the pig's magnetic field, an indicator light comes on. The design of the pig detector is comparable to that of a pen. The detector is also approved for use in potentially explosive atmospheres (ATEX and FM).

Article number
228-000358

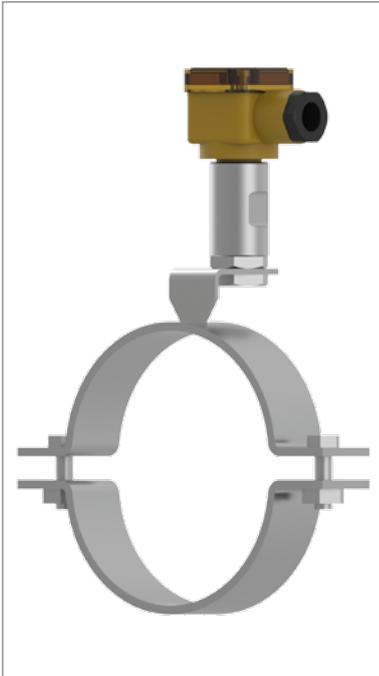


Pig test material

Using pig test materials helps to determine the chemical resistance of the pig material against products and/or cleaning media in the planning stages.

This procedure is particularly recommended when the resistance of the pig material is unknown. The test bodies have a diameter of approx. 40 mm and a thickness of approx. 4 mm. During resistance tests, deviations from the surface properties, dimensions and weights can be found. Available materials: Silicone and FKM.

Material	Article number
FKM	228-000259
Silicone	228-000260



Magnetic sensor with pipe bracket

Pigs are often detected along pipelines in the running state to initiate measures to reduce the pig speed. For this, magnetic sensors are attached to pipe brackets. They can be fitted anywhere at the pipeline.

Pipe bracket for magnetic sensors*	
Nominal width	Article number
DN 25	228-168.02
DN 40	228-168.04
DN 50	228-168.06
DN 65	228-168.08
DN 80	228-168.10
DN 100	228-168.12
OD 1"	228-168.01
OD 1 ½"	228-168.03
OD 2"	228-168.05
OD 2 ½"	228-168.07
OD 3"	228-168.09
OD 4"	228-168.11

* The magnetic sensors can be taken from the section control and feedback systems.

Customer	
Company name/ customer number	_____
Project	_____
Contact	_____
Phone	_____
Email	_____

Basic data (these parameters refer to the pipeline)

Prerequisites	The same pipe interior diameter across the entire pigging route. • No sharp-edged and strongly sagging welds. • No installations such as measuring mountings in the piggable area. • Standard pipe bends with small middle radius can be used. Recommendation: Minimize the number of pipe bends! • Use pipe bends with low ovality. Tolerance maximum $\pm 1.5\%$ referring to the outside diameter.	
Pipeline	<input type="checkbox"/> Existing <input type="checkbox"/> Planned	
Nominal width	_____	
Pipe diameter	Inside _____ mm	Outside _____ mm
Material	<input type="checkbox"/> 1.4404 <input type="checkbox"/> Others: _____	
Seal material	<input type="checkbox"/> EPDM <input type="checkbox"/> FKM <input type="checkbox"/> HNBR	
Piggable pipe lengths	_____ m	
Height difference between launching and receiving stations	_____ m <input type="checkbox"/> Dropping <input type="checkbox"/> Rising	
Outlets between launching and receiving stations	<input type="checkbox"/> T-pieces <input type="checkbox"/> Quantity _____	

Products

Designation	Viscosity mPas	Operating temperature °C	Operating pressure bar _g	Flow rate m ³ /h
1 _____	_____	_____	_____	_____
2 _____	_____	_____	_____	_____
3 _____	_____	_____	_____	_____
Properties product 1	<input type="checkbox"/> Foaming	<input type="checkbox"/> Lubricating	<input type="checkbox"/> Others: _____	
Properties product 2	<input type="checkbox"/> Foaming	<input type="checkbox"/> Lubricating	<input type="checkbox"/> Others: _____	
Properties product 3	<input type="checkbox"/> Foaming	<input type="checkbox"/> Lubricating	<input type="checkbox"/> Others: _____	

Note: Please send us viscosity charts, viscosity [mPas] depending on the shear rate [s⁻¹].

Pig driving medium

Compressed air (according to ISO 8573-1:2001)	Air pressure min. _____ bar _g Air pressure max. _____ bar _g
Water	Pressure _____ bar _g
Other	_____ Pressure _____ bar _g

- Water can be used at the launching and air at the receiving station (preferred).
- Water can be used at the launching and receiving stations.
- Air can be used at the launching and water at the receiving station.
- Air must be used at the launching and the receiving stations.

Process		
<input type="checkbox"/> Pipeline is cleaned after each product push-out. <input type="checkbox"/> Pipeline must be emptied after each cleaning. If so, <input type="checkbox"/> the system is self draining. If so, <input type="checkbox"/> the pig must push out the water. <input type="checkbox"/> The pipeline is sterilized with steam after cleaning. Temperature: _____ °C		
How often is the product pushed out?	_____ x per day	_____ x per week _____ x per month
Cleaning		
Cleaning media	Concentration %	Temperature °C
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
Design		
Explosion protected design	<input type="checkbox"/> No <input type="checkbox"/> Yes	
Control top	<input type="checkbox"/> With control top <input type="checkbox"/> AS-interface-bus <input type="checkbox"/> 24 V DC, 3-wire <input type="checkbox"/> With solenoid valve <input type="checkbox"/> Without solenoid valve <input type="checkbox"/> Others: _____	
	<input type="checkbox"/> Without control top <input type="checkbox"/> With holding plate "INA" for proximity switches <input type="checkbox"/> With proximity switches <input type="checkbox"/> Without proximity switches <input type="checkbox"/> Without holding plate "INA" for proximity switches	
	<input type="checkbox"/> With control top <input type="checkbox"/> With solenoid valve <input type="checkbox"/> Without solenoid valve	
	<input type="checkbox"/> Without control top <input type="checkbox"/> With holding plate "INA" for proximity switches <input type="checkbox"/> With proximity switches <input type="checkbox"/> Without proximity switches <input type="checkbox"/> Without holding plate "INA" for proximity switches	
Note: Please send us a sketch of the planned installation position or a flow chart of the plant section into which the VARICOVER® product recovery system is to be integrated.		
Air supply pressure (according to ISO 8573-1:2001)	Air pressure min. _____ bar _g Air pressure max. _____ bar _g	
Use of ball valves possible from a hygienic point of view?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3-A certified	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Comments		
_____ _____ _____ _____ _____ _____ _____		



Available Options

Pages

Housing and nominal widths

VARIVENT® jacketed valve housings	216
VARIVENT® housing with increased pressure level	217
Nominal widths combination	218

Seal materials

FFKM (FDA)	220
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Surface Qualities

Inner and outer surface of the housings	221
Electro-polishing	222

Connection fittings

Overview	223
VARIVENT® flange connection	224
Pipe fitting according to DIN 11851	225
Hygienic flange connection according to DIN 11853-2	226
Clamp connections	227

Additional Options

Test report and inspection certificate	228
ID Plates, TAG Numbers	229
3-A standard	230



Typical application and description

For keeping chocolate or margarine fluid and for cooling ice cream.

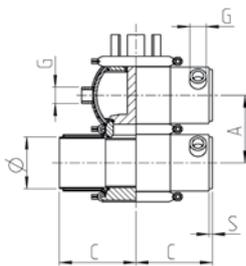
For heating or cooling products, a hot or cold medium is passed through the housing jacket in the opposite flow direction.

The product range includes jacketed valve housings with both one and two vertical ports. However, the housings cannot be supplied for valves with mix-matched nominal widths or a welded seat ring.

Available nominal widths		
Metric	DN	25–100
Inch OD	OD	1"–4"

Available valve types	
VARIVENT® control valve	S
VARIVENT® overflow valve	Q
VARINLINE® housings*	

* Only available for nominal widths DN 25 to DN 50 as well as DN 80 and OD 1" to OD 2"



Technical data	
Material	1.4404/AISI 316 L
Max. product pressure	10 bar DN 25–50, OD 1"–2" 6 bar DN 65–100, OD 2 ½"–4"
Jacket pressure resistance	3.5 bar
Surface in contact with the product	Ra ≤ 0.8 µm
Outside surface	Matte blasted
Valve seat version	Clamped connection

Nominal width	Dimensions						Weight [kg] single vertical ports	Weight [kg] double vertical ports
	Ø [mm]	C [mm]	A [mm]	S [mm]	G [mm]			
DN 25	29 × 1.5	90	50	5	1/4"	0.5	0.7	
DN 40	41 × 1.5	90	62	5	1/4"	0.8	1.1	
DN 50	53 × 1.5	90	74	5	1/4"	1.0	1.1	
DN 65	70 × 2.0	125	96	5	1/2"	2.5	2.7	
DN 80	85 × 2.0	125	111	5	1/2"	3.0	3.2	
DN 100	104 × 2.0	125	130	5	1/2"	4.1	4.4	
OD 1"	25.4 × 1.65	90	46.0	5	1/4"	0.5	0.6	
OD 1 ½"	38.1 × 1.65	90	59.0	5	1/4"	0.8	0.9	
OD 2"	50.8 × 1.65	90	71.5	5	1/4"	1.0	1.1	
OD 2 ½"	63.5 × 1.65	125	90.0	5	1/2"	2.3	2.5	
OD 3"	76.2 × 1.65	125	103.0	5	1/2"	2.7	2.8	
OD 4"	101.6 × 2.11	125	127.5	5	1/2"	4.1	4.0	

Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Accessories
	<u>/25</u> Jacketed valve housings

Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14 to 19	
Code	D	E		- DN 80/DN 80 -	S	Z	- CD -	LO	-	1	2	N	<u>/25</u> /52	+ 0 0 0 0 0 M

* According to valve type

Typical application and description

For static use of valves with increased product pressure. For increasing the strength, the half rings on the valve housings are made of cast material and the housings with nominal widths DN 100/OD 4" are made of a higher-quality material.

IMPORTANT: The differential pressure between the product chambers on both sides of the valve disc is not allowed to exceed 10 bar during switching of the valve. The actuator size of the valve must be selected based on the product data.

Available nominal widths		
Metric	DN	25–100
Inch OD	OD	1"–4"

Available valve types	
VARIVENT® control valve	S
VARIVENT® overflow valve	Q

Technical data		
Material	1.4404/AISI 316 L 1.4462	DN 25–80, OD 1"–3" DN 100, OD 4"
Pressure level	PS 20 bar	
Pressure level jacketed housing	PS 16 bar	DN 25–80, OD 1"–3"

Nominal width	Dimensions		
	Ø [mm]	C [mm]	A [mm]
DN 25	29 × 1.5	90	50
DN 40	41 × 1.5	90	62
DN 50	53 × 1.5	90	74
DN 65	70 × 2.0	125	96
DN 80	85 × 2.0	125	111
DN 100	104 × 2.0	125	130
OD 1"	25.4 × 1.65	90	46.0
OD 1 ½"	38.1 × 1.65	90	59.0
OD 2"	50.8 × 1.65	90	71.5
OD 2 ½"	63.5 × 1.65	125	90.0
OD 3"	76.2 × 1.65	125	103.0
OD 4"	101.6 × 2.11	125	127.5

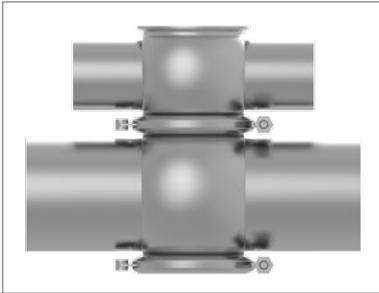
Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Accessories
	/37 PS 20 bar
	/38 PS 16 bar (jacketed valve housing)

Position	1	2	3	4/5	6	7	8	9	10	11	12	13	14 to 19	
Code	N	E		- DN 80/DN 80 -	S	Z	- CD -	LO	-	1	2	N	/37 /52 +	0 0 0 0 0 M

* According to valve type





Typical application and description

Many mix-matched housings are already available.

For technical reasons, however, a mix-matched combination is not possible for all valve types! If required, please contact GEA Tuchenhagen to ask about the feasibility.

The first mentioned nominal width indicates the upper valve housing, the second one is the nominal width of the lower valve housing. In divert valves, both upper housings are configured with the same nominal width. The larger housing in the mix-matched combination must always be configured as a housing with two vertical ports.

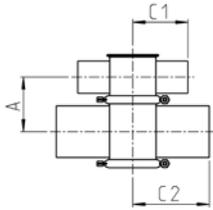
Available nominal widths		
Metric	DN	25–150
Inch OD	OD	1"–6"
Inch IPS	IPS	2"–6"

Available valve types	
VARIVENT® control valve	S
VARIVENT® overflow valve	Q

lower housing \ upper housing	DN 25			DN 40			DN 50			DN 65		
	A	C1	C2	A	C1	C2	A	C1	C2	A	C1	C2
DN 25	50	90	90	56	90	90	62	90	90	70	125	90
DN 40	56	90	90	62	90	90	68	90	90	76	125	90
DN 50	62	90	90	68	90	90	74	90	90	82	125	90
DN 65	70	90	125	76	90	125	82	90	125	96	125	125
DN 80	77.5	90	125	83.5	90	125	89.5	90	125	103.5	125	125
DN 100	87	90	125	93	90	125	99	90	125	113	125	125
DN 125	–	–	–	105.5	90	125	111.5	90	125	125.5	125	125
DN 150	–	–	–	118	90	150	124	90	150	138	125	150

lower housing \ upper housing	OD 1"			OD 1 ½"			OD 2"			OD 2 ½"		
	A	C1	C2	A	C1	C2	A	C1	C2	A	C1	C2
OD 1"	46	90	90	52.5	90	90	58.75	90	90	65	125	90
OD 1 ½"	52.5	90	90	59	90	90	65.25	90	90	71.5	125	90
OD 2"	58.75	90	90	65.25	90	90	71.5	90	90	77.75	125	90
OD 2 ½"	65	90	125	71.5	90	125	77.75	90	125	90	125	125
OD 3"	71.5	90	125	78	90	125	84.25	90	125	96.5	125	125
OD 4"	83.75	90	125	90.25	90	125	96.5	90	125	108.75	125	125
OD 6"	–	–	–	116.5	90	150	122.75	90	150	133.5	125	150

lower housing \ upper housing	IPS 2"		
	A	C1	C2
IPS 2"	58.75	90	90
IPS 3"	65.25	90	90
IPS 4"	71.5	90	90
IPS 6"	77.75	90	125



Technical data	
Material	1.4404/AISI 316 L
Product pressure	10 bar
Valve seat version	Clamped or welded housing connection

DN 80			DN 100			DN 125			DN 150			upper housing	lower housing
A	C1	C2	A	C1	C2	A	C1	C2	A	C1	C2		
77.5	125	90	87	125	90	-	-	-	-	-	-		DN 25
83.5	125	90	93	125	90	105.5	125	90	118	150	90		DN 40
89.5	125	90	99	125	90	111.5	125	90	124	150	90		DN 50
103.5	125	125	113	125	125	125.5	125	125	138	150	125		DN 65
111	125	125	120.5	125	125	133	125	125	145.5	150	125		DN 80
120.5	125	125	130	125	125	142.5	125	125	155	150	125		DN 100
133	125	125	142.5	125	125	155	125	125	167.5	150	125		DN 125
145.5	125	150	155	125	150	167.5	125	150	180	150	150		DN 150

OD 3"			OD 4"			OD 6"			upper housing	lower housing
A	C1	C2	A	C1	C2	A	C1	C2		
71.5	125	90	83.75	125	90	-	-	-		OD 1"
78	125	90	90.25	125	90	116.5	150	90		OD 1 1/2"
84.25	125	90	102.5	125	90	122.75	150	90		OD 2"
96.5	125	125	115.25	125	125	133.5	150	125		OD 2 1/2"
103	125	125	115.25	125	125	140	150	125		OD 3"
115.25	125	125	127.5	125	125	152.25	150	125		OD 4"
140	125	150	152.25	125	150	177	150	150		OD 6"

IPS 3"			IPS 4"			IPS 6"			upper housing	lower housing
A	C1	C2	A	C1	C2	A	C1	C2		
95	152.5	114.5	107.5	152.5	114.5	133.5	152.5	114.5		IPS 2"
115	152.5	152.5	121.5	152.5	152.5	153.5	152.5	152.5		IPS 3"
127.5	152.5	152.5	140	152.5	152.5	166	152.5	152.5		IPS 4"
153.5	152.5	152.5	166	152.5	152.5	192	152.5	152.5		IPS 6"

Incorporation of the option in the order code and example

Position	Description of the order code for options
4/5	Nominal width (upper housing/lower housing)

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18
Code	Q	E	W	DN 40/DN 50	M	M3	L0	1	2	N	/52	0 0 0 0 0 M



Typical application and description

Perfluorinated rubber (FFKM) is an elastomer that is used in areas where particularly high thermal and/or chemical resistance properties are required.

FFKM seal material combines the chemical properties of PTFE and the mechanical properties of Viton, and is characterized by a wide range of application temperatures, very good resistance to fluids, low-pressure deformation and minimum swelling.

Available nominal widths		
Metric	DN	10–100
Inch OD	OD	1"–4"
Inch IPS	IPS	2"–4"

Available valve types	
VARIVENT® control valve	S
VARIVENT® overflow valve	Q
VARIVENT® sampling valve	I, N, U
VARINLINE® components	

Technical data	
Operating temperature	–10 °C to 230 °C (14 °F to 446 °F)
Properties	See table of seal material properties

Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Seal material in contact with the product
4	FFKM (FDA)

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18
Code	Q	E	W	- DN 80/DN 80 -	M	M3	- L0 -	4	- 2	N	/52	+ 0 0 0 0 0 M

* According to valve type



Typical application and description

Deviating from the quality of the standard surface quality (* DN/OD corresponding to Ra ≤ 0.8 µm; ** IPS corresponding to Ra ≤ 1.2 µm), different surface qualities are available up to a medium roughness for surfaces in contact with the product of Ra ≤ 0.4 µm. The outer surface of the housings is matte blasted as standard. Optionally, it can also be supplied ground.

Housings that should comply with the 3-A standard are produced as standard with an inner surface of Ra ≤ 0.8 µm with ground welds and a blasted outer surface. If a configuration with a ground outer surface is required, it is necessary to select not only option /3-A (position 13) but also the corresponding surface quality 3 (position 11).



Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Surface quality of the housing
	1** Inside Ra ≤ 1.2 µm, outside matte blasted
	2* Inside Ra ≤ 0.8 µm, outside matte blasted
	3 Inside Ra ≤ 0.8 µm, outside ground
	4 Inside Ra ≤ 0.4 µm, outside matte blasted
	6 Inside Ra ≤ 0.5 µm, outside matte blasted
	7 Inside Ra ≤ 0.5 µm, outside ground
	8 Inside Ra ≤ 0.4 µm, outside ground

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18
Code	Q	E	W	- DN 80/DN 80 -	M	M3	- L0 -	1	- 2	N	/52	+ 0 0 0 0 0 M

* According to valve type



Typical application and description

One process for improving the surface quality is electrochemical polishing, in which peaks on the surfaces of material are abraded by a galvanic process, resulting in an evened-out elevation profile.

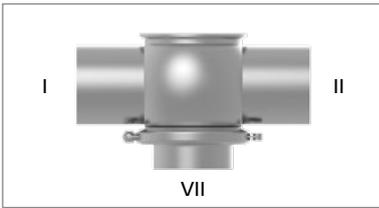
This surface treatment makes it much less likely for contaminating substances and micro-organisms to stick to the surface. In addition, the smooth surface improves corrosion resistance by formation of an inert oxide layer.

Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Accessories
	/E Surface finish electrolytically polished

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18						
Code	Q	E	W	DN 80/DN 80	M	M3	L0	1	2	N	/E /52	+	0	0	0	0	0	M

* According to valve type



Valves with one housing and vertical port

Typical application and description

The valve housings can be specified with a welded-on connection fitting. To find which connection fittings are available, please refer to the list on the following pages.

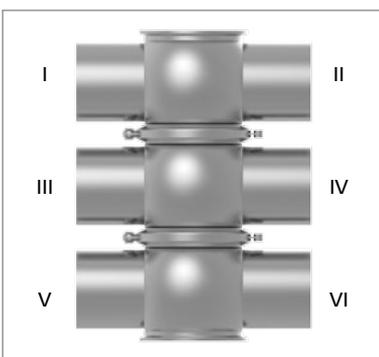
If the vertical ports within a valve do have different configurations, please inform us of the designation for the particular housing port including the required connection fitting (as in the example below). The seal which may be included corresponds to the sealing material of the valve.



Valves with two housings

Connection fittings	
TK	VARIVENT® flange connection, groove flange on housing
TN	VARIVENT® groove flange incl. O-ring and connecting parts
TF	VARIVENT® smooth flange
GK	Pipe fitting, DIN 11851, male end on housing
GO	Male end SC, DIN 11851, incl. sealing ring G
KO	Liner SD, DIN 11851, incl. groove nut
ASK	Hygienic flange connection, DIN 11853-2
NFK	Hygienic groove flange, DIN 11853-2
BFK	Hygienic flange, DIN 11853-2
CO	Clamp connection/TRI-Clamp, DIN 32676 (DN)/ISO 2852 (OD)

Example



Valves with three housings

Housing port	Connection fitting
I	TN
II	TF
III	TK
IV	
V	
VI	
VII	

Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Connection fittings
J	Valve with connection fittings (required connection fitting according to list above, please state separately)

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18	
Code	Q	E	W	- DN 80/DN 80 -	M	M3	- L0 -	1	-	2	J	/52	+ 0 0 0 0 0 M

* According to valve type



Typical application and description

An O-ring is used for sealing the VARIVENT® flange connection, and is given a defined compression by a metal stop. The O-ring is also protected by the special geometry of the recess from being pulled out at high flow rates.

The VARIVENT® flange connection (TK) can be ordered either as a complete connection including bolts and nuts (TK) or a groove flange (TN)/smooth flange (TF) as a connection fitting on a vertical port. If a complete connection is ordered as the connection fitting, the groove flange is welded onto the housing. The groove flange (TN) contains not only the O-ring but also the required connecting elements.



Complete connection including bolts and nuts (TK)



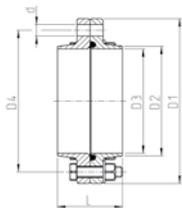
Groove flange (TN), including connecting elements and sealing ring



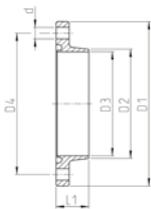
Smooth flange (TF)

Available nominal widths		
Metric	DN	25–150
Inch OD	OD	1"–6"
Inch IPS	IPS	2"–6"

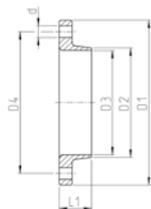
Technical data	
Material	1.4404
Surface in contact with the product	Ra ≤ 0.8 µm
Certificates	3.1/AD2000W2
Seal materials	EPDM (FDA), FKM (FDA), HNBR (FDA)



TK = VARIVENT® flange connection



TN = VARIVENT® groove flange



TF = VARIVENT® smooth flange

Nominal width	Dimensions							O-ring	
	D1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	d [mm]	L [mm]	L1 [mm]	[mm]	PS
DN 25	70	30.0	26.0	53	4 × Ø 9	50	25	25.0 × 5.0	16
DN 40	82	42.0	38.0	65	4 × Ø 9	50	25	36.0 × 5.0	16
DN 50	94	54.0	50.0	77	4 × Ø 9	50	25	47.0 × 5.0	16
DN 65	113	70.0	66.0	95	8 × Ø 9	50	25	62.0 × 5.0	16
DN 80	128	85.0	81.0	110	8 × Ø 9	50	25	75.0 × 5.0	10
DN 100	159	104.0	100.0	137	8 × Ø 11	50	25	95.0 × 5.0	10
DN 125	183	129.0	125.0	161	8 × Ø 11	50	25	115.0 × 5.0	10
DN 150	213	154.0	150.0	188	8 × Ø 14	60	30	134.2 × 5.7	10
OD 1"	66	25.5	22.0	49	4 × Ø 9	50	25	25 × 5.0	16
OD 1 ½"	79	38.5	35.0	62	4 × Ø 9	50	25	36 × 5.0	16
OD 2"	91	51.0	47.5	74	4 × Ø 9	50	25	47 × 5.0	16
OD 2 ½"	106	63.5	60.0	88	8 × Ø 9	50	25	62 × 5.0	16
OD 3"	119	76.5	73.0	101	8 × Ø 9	50	25	75 × 5.0	10
OD 4"	156	102.0	97.5	134	8 × Ø 11	50	25	95 × 5.0	10
OD 6"	211	152.4	146.5	186	8 × Ø 11	50	25	115 × 5.0	10
IPS 2"	101	60.5	57.0	84	4 × Ø 9	50	25	25 × 5.0	16
IPS 3"	132	89.0	85.0	114	4 × Ø 9	50	25	36 × 5.0	10
IPS 4"	169	114.0	110.0	147	4 × Ø 9	50	25	47 × 5.0	10
IPS 6"	227	168.0	162.0	202	8 × Ø 9	50	25	62 × 5.0	10

Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Connection fittings
J	Valve with connection fittings (please state option TK, TN or TF separately with reference to the connection)

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18									
Code	Q	E	W	- DN 80/DN 80 -	M	M3	-	L0	-	1	-	2	J	/52	+	0	0	0	0	0	M

* According to valve type

Typical application and description

A sealing ring G is used for sealing the pipe fitting acc. to DIN 11851. The pipe fitting acc. to DIN 11851 can be ordered either as a complete connection (GK) or male end SC (GO)/liner SD (KO) as a connection fitting on a vertical port. If a

complete connection is ordered on a housing port, the male end is welded onto the housing. The groove flange contains the sealing ring G. The liner (KO) contains the groove nut.



Complete connection (GK)



Male end SC (GO), including sealing ring G



Liner SD (KO), including groove nut

GK – Complete connection, male end on housing

Available nominal widths		
Metric	DN	10–150
Inch OD	OD	1"–4"

Technical data	
Material	1.4404 / AISI 316L
Standard	DIN 11851

GO – Male end SC, including sealing ring G

Available nominal widths		
Metric	DN	10–150
Inch OD	OD	1"–4"

Technical data	
Material	1.4404 / AISI 316L
Standard	DIN 11851

KO – Liner SD, including groove nut

Available nominal widths		
Metric	DN	10–150
Inch OD	OD	1"–4"

Technical data	
Material	1.4404 / AISI 316L
Standard	DIN 11851

Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Connection fittings
J	Valve with connection fittings (required connection fitting, please state separately)

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18
Code	Q	E	W	- DN 80/DN 80 -	M	M3	- L0 -	1	-	2	J /52	+ 0 0 0 0 0 M

* According to valve type



Typical application and description

An O-ring is used for sealing the hygienic flange connection acc. to DIN 11853-2, and is given a defined compression by a metal stop. The O-ring is also protected by the special geometry of the recess from being pulled out at high flow rates. Furthermore, the flange connection is centered by the design shape. The sealing geometry of the hygienic flange connection corresponds to the aseptic flange connection acc. to DIN 11864-2.

The hygienic flange connection (ASK) can be ordered either as a complete connection including bolts and nuts (ASK) or a hygienic groove flange (NFK)/hygienic flange (BFK) as a connection fitting on a vertical port. If a complete connection is ordered on a housing port, the groove flange is welded onto the housing. The groove flange (NFK) contains not only the O-Ring but also the required connecting elements.



Complete hygienic flange connection (ASK)



Hygienic-groove flange (NFK), including connecting elements and sealing ring



Hygienic flange (BFK)

ASK – Complete hygienic flange connection

Available nominal widths		
Metric	DN	10–150
Inch OD	OD	1"–4"

Technical data	
Material	1.4404 / AISI 316L
Seal material	EPDM (FDA), FKM (FDA), HNBR (FDA)
Standard	DIN 11853-2

NFK – Hygienic groove flange, including connecting elements and seal

Available nominal widths		
Metric	DN	10–150
Inch OD	OD	1"–4"

Technical data	
Material	1.4404 / AISI 316L
Seal material	EPDM (FDA), FKM (FDA), HNBR (FDA)
Standard	DIN 11853-2

BFK – Hygienic flange

Available nominal widths		
Metric	DN	10–150
Inch OD	OD	1"–4"

Technical data	
Material	1.4404 / AISI 316L
Standard	DIN 11853-2

Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Connection fittings
J	Valve with connection fittings (required connection fitting, please state separately)

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18	
Code	Q	E	W	- DN 80/DN 80 -	M	M3	- L0 -	1	-	2	J	/52 +	0 0 0 0 0 M

* According to valve type

Typical application and description

The clamp connection acc. to DIN 32676 is a widely used connection fitting, especially in North America. The connection uses a symmetrically structured clamp connection with a seal located in between it, and is secured by a clamp. The second clamp connection, the seal and the clamp are not supplied.



Clamp connection (CO)

CO – Clamp connection

Available nominal widths		
Metric	DN	25–150
Inch OD	OD	1"–4"

Technical data		
Material	DN	1.4404 / AISI 316L
	OD	AISI 316L
Standard	DN	DIN 32676
	OD	ISO 2852
Certificates		3.1

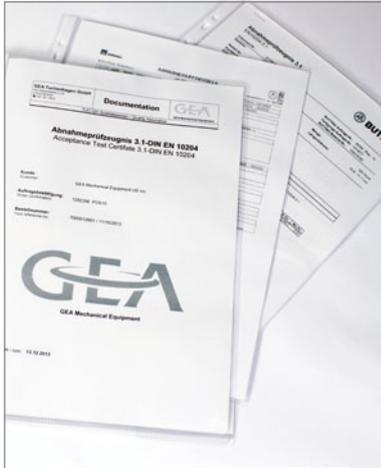
Incorporation of the option in the order code and example

Position	Description of the order code for options										
*	Connection fittings										
	J Valve with connection fittings (required connection fitting, please state separately)										

Position	1	2	3	4/5		6	7	8	9	10	11	12	13 to 18						
Code	Q	E	W	DN 80/DN 80		M	M3	L0	1	2	J	/52	+	0	0	0	0	0	M

* According to valve type





Typical application and description

Optionally, the housings or all parts in contact with the product can be supplied with a test report 2.2 and/or an inspection certificate 3.1 acc. to EN 10204.

IMPORTANT: An inspection certificate for all components in contact with the product can only be produced if notification of this requirement is provided with the order. The inspection certificate 3.1 acc. to EN 10204 can only be issued subsequently for the housings. Unless special requirements are stated, the order code referred to below only covers issuing the inspection certificate 3.1 acc. to EN 10204 for the housings.

European standard EN 10204 in its 2004 edition defines the various types of test certificate that can be issued to the ordering party in accordance with the agreements in the order for delivery of metallic products.

Number	Type of test certificate	Content of the certificate	Confirmation of the certificate by
2.2	Test report	Confirmation of compliance with the order, specifying results of a non-specific test	The manufacturer
3.1	Inspection certificate 3.1*	Confirmation of compliance with the order, specifying results of a specific test	The manufacturer's acceptance officer independent of the production department

* Inspection certificates 3.1 can be selected either for the housing or for product wetted parts connection fittings, incl. connection fittings or ADW2 (please specify when ordering).

Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Accessories
	/41 Test report 2.2
	/42 Inspection certificate 3.1 according to EN 10204

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18	
Code	Q	E	W	- DN 80/DN 80 -	M	M3	- L0 -	1	-	2	N	/41 /52 +	0 0 0 0 0 M

* According to valve type



Typical application and description

If no alternative identification option is selected, the valves are always provided with a nameplate for clear identification (option /52). All key information required for clear allocation of the valve, as well as technical data, is specified on the nameplate. The plate is glued onto the actuator. If the required identification number is specified, this is allocated to the valve by means of a separate sticker on the actuator or control and feedback system.

Key data contained	
Valve type	
Serial number	
Materials in contact with the product	Metallic material / seal material
Air supply pressure	Min./Max. [bar/psi]
Product pressure	Housing 1/2/3 [bar/psi]



Option /50 – engraved labeling plate cpl. for system identification number

In addition to the nameplate, the option /50 consists of an engraved labeling plate attached between the actuator and lantern using a key ring on the clamp connection.



Option /51 – metal labeling plate US version cpl.

The engraved labeling plate is attached between the actuator and lantern using a key ring on the clamp connection. Additional information can be recorded as well as the TAG number, customer designation and the valve type. In addition, the valve is identified with a nameplate.



Option /55 – valve identification with TAG number (yellow)

Option /55 consists of a carrier for up to 10 characters made of plastic which is attached to the actuator with cable carriers. For clear identification, the valve is additionally provided with a nameplate.



Option /56 – valve identification with TAG number (yellow)

Option /56 consists of two carriers for up to 10 characters each made of plastic which are attached to the actuator with cable carriers. For clear identification, the valve is additionally provided with a nameplate.

Incorporation of the option in the order code and example

Position	Description of the order code for options	
*	Accessories	
	/50	Engraved metal plate
	/51	Metal plate (US version)
	/52	Adhesive ID tag
	/55	Valve identification 10 numbers on carrier
	/56	Valve identification 20 numbers on carrier

Position	1	2	3	4/5		6	7	8	9	10	11	12	13 to 18						
Code	Q	E	W	DN 80/DN 80		M	M3	L0	1	2	N	/50	+	0	0	0	0	0	M

* According to valve type





Typical application and description

3-A Sanitary Standards, Inc. is an independent, non-profit corporation dedicated to advancing hygienic equipment design for the food, beverage, and pharmaceutical industries. In particular, it represents the interests of three stakeholder groups in the US dairy industry with a common commitment to promoting food safety and the public health – regulatory sanitarians, equipment fabricators and processors. To achieve this purpose, it has produced guidelines which define various design requirements on components. In the area of seat valves, it is above all the standards 53-06 (compression type valves) and 85-02 (double-seat mixproof valves) that are relevant. Compliance with these design specifications is examined by an independent expert and confirmed by issuing a certificate. Almost the entire VARIVENT® and ECOVENT® valve series complies with these design specification in the standard design acc. to section 1.

If the 3-A option is selected, compliance of the valve with the requirements of the standard is confirmed by means of a sticker on the component. Consequently, if this option is selected, it is necessary to comply with the standard in terms of identification as well.

Furthermore, when this option is selected, the welds of the port connections are ground smooth. The standard does not specify that this is mandatory, but it is in line with customers’ preferences in this market.

IMPORTANT: The standard surface when this option is selected is “inside surface Ra ≤ 0.8 µm, outside matte”. Many customers in this market ask for the alternative surface quality “inside surface Ra ≤ 0.8 µm, outside ground”. If this is required, it must be selected separately at position 11 in the order code as a non-standard surface.

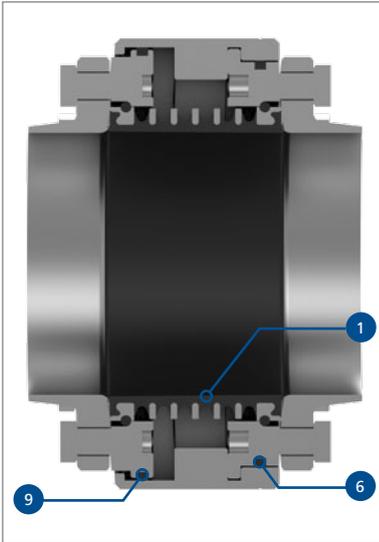
Incorporation of the option in the order code and example

Position	Description of the order code for options
*	Accessories
	/3A Adhesive ID tag, configuration of the valve according to 3-A standard

Position	1	2	3	4/5	6	7	8	9	10	11	12	13 to 18						
Code	Q	E	W	- DN 80/DN 80 -	M	M3	- L0 -	1	-	2	N	/3A /52 +	0	0	0	0	0	M

* According to valve type





The illustration of a VARICOMP® expansion compensator VC/8 shown here represents the wearing parts comprising the compensator (1) and the O-rings (6), (9).

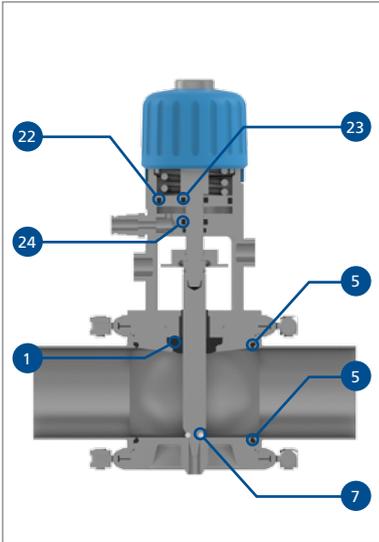
Information about maintenance can be found in the associated operating instructions.

Wearing parts of an expansion compensator VC/8		
Position	Quantity	Designation
1	1	Expansion compensator VC/8
6	1	O-ring
9	1	O-ring

VARICOMP® expansion compensator VC/8					
Nominal width			1.4301/EPDM	1.4301/FKM	
DN	OD	IPS	Article number	Article number	
50	2"	-	228-000124	228-000125	
-	2 ½"	-	228-000005	228-000010	
65	-	-	228-000006	228-000011	
-	3"	-	228-000007	228-000012	
80	-	-	228-000008	228-000013	
-	-	3"	228-000047	-	
100	4"	-	228-000009	228-000014	
-	-	4"	228-000048	-	
125	-	-	228-000053	228-000055	
-	-	6"	228-000049	-	

O-ring (position 6)				
Nominal width			NBR	
DN	OD	IPS	Article number	
50	2"	-	930-107	
65	2 ½"	-	930-115	
80	3"	-	930-120	
-	-	3"	930-238	
100	4"	-	930-124	
-	-	4"	930-125	
125	-	-	930-626	
-	-	6"	930-643	

O-ring (position 9)				
Nominal width			NBR	
DN	OD	IPS	Article number	
50	2"	-	930-111	
65	2 ½"	-	930-119	
80	3"	3"	930-238	
100	4"	4"	930-125	
125	-	-	930-963	
-	-	6"	930-717	

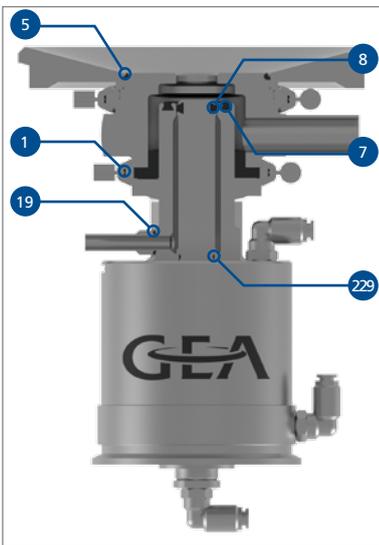


The illustration of a VARIVENT® sampling valve type I shown here represents an example of the configuration of a seal kit for sampling valves.

Chiefly, a seal kit consists of all seals of the valve in question that come in contact with the product. The precise components of all seal kits and information about maintenance can be found in the associated operating instructions.

Components of a seal kit at the example of the VARIVENT® type I		
Position	Quantity	Designation
1	1	Sealing ring
5	2	O-ring
7	1	O-ring
22	1	O-ring
23	1	O-ring
24	1	Quad ring

VARIVENT® sampling valve type I			EPDM	FKM	HNBR
Nominal width			Article number	Article number	Article number
DN	OD	IPS			
10/15	-	-	221-004744	221-004745	221-004746
25	1"	-	221-004747	221-004748	221-004749
40-150	1 ½"-6"	2"-6"	221-004750	221-004751	221-004752

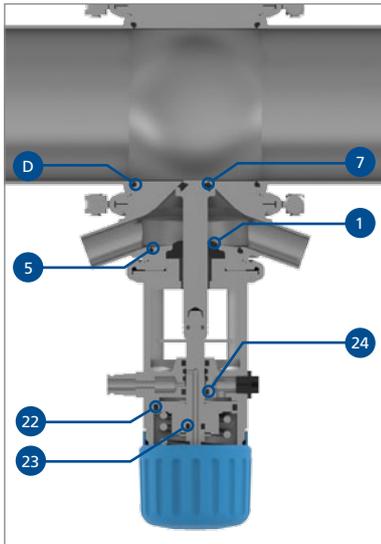


The illustration of a mixproof sampling valve VARIVENT® type T/09 shown here represents an example of the configuration of a seal kit for sampling valves.

Chiefly, a seal kit consists of all seals of the valve in question that come in contact with the product. The precise components of all seal kits and information about maintenance can be found in the associated operating instructions.

Components of a seal kit at the example of the VARIVENT® type T/09		
Position	Quantity	Designation
1	1	Sealing ring
5	1	O-ring
7	2	V-ring
8	1	V-ring
19	1	O-ring
229	1	O-ring

VARIVENT® mixproof sampling valve type T/09		
Nominal width		
DN	EPDM	FKM
	Article number	Article number
15	221-004411	221-004413



The illustration of a VARINLINE® sampling valve type TSVN shown here represents an example of the configuration of a seal kit for sampling valves. The content can differ slightly between the individual valve types.

Chiefly, a seal kit consists of all seals of the valve in question that come in contact with the product. The precise components of all seal kits and information about maintenance can be found in the associated operating instructions.

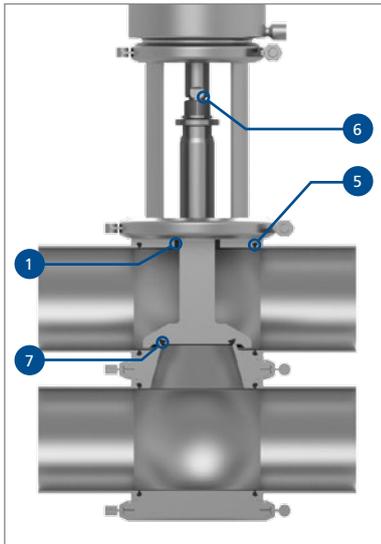
Components of a seal kit at the example of the VARINLINE® type TSVN		
Position	Quantity	Designation
1	1	Sealing ring
5	1	O-ring
7	1	V-ring
22	1	O-ring
23	1	O-ring
24	2	Quad ring
D	1	O-ring

VARINLINE® sampling valves type TSVN					
Nominal width			EPDM	FKM	
DN	OD	IPS	Article number	Article number	
25	1"	–	221-004411	221-004413	
40-150	1 ½"-6"	2"-6"	221-004412	221-004414	

VARIVENT® sampling valve type TSVN with metal bellows					
Nominal width			EPDM	FKM	
DN	OD	IPS	Article number	Article number	
25	1"	–	221-004415	221-004417	
40-150	1 ½"-6"	2"-6"	221-004416	221-004418	

VARINLINE® sampling valve type TSVU					
Nominal width			EPDM	FKM	
DN	OD	IPS	Article number	Article number	
25	1"	–	221-004419	221-004421	
40/150	1 ½"-6"	2"-6"	221-004420	221-004422	

VARIVENT® sampling valve type TSVU with metal bellows					
Nominal width			EPDM	FKM	
DN	OD	IPS	Article number	Article number	
25	1"	–	221-004423	221-004424	
40/150	1 ½"-6"	2"-6"	221-004425	221-004426	

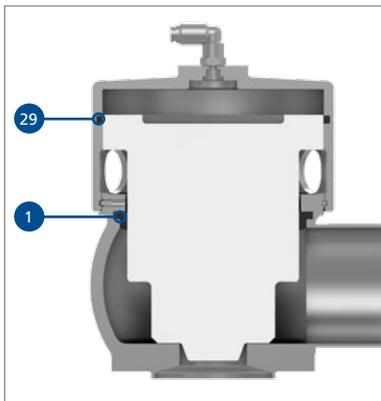


The illustration of a VARIVENT® overflow valve type Q shown here represents an example of the configuration of a seal kit for overflow valves.

Chiefly, a seal kit consists of all seals of the valve in question that come in contact with the product. The precise components of all seal kits and information about maintenance can be found in the associated operating instructions.

Components of a seal kit at the example of the VARIVENT® type Q		
Position	Quantity	Designation
1	1	Sealing ring
5	1	O-ring
6	4	O-ring
7	1	V-ring

VARIVENT® overflow valve type Q				
Nominal width		EPDM	FKM	HNBR
DN	OD	Article number	Article number	Article number
25	1"	221-304.39	221-519.49	221-519.62
40/50	1 ½"/2"	221-304.40	221-519.50	221-519.63
65/80	2 ½"/3"	221-304.41	221-519.51	221-519.64
100	4"	221-304.42	221-519.52	221-001019

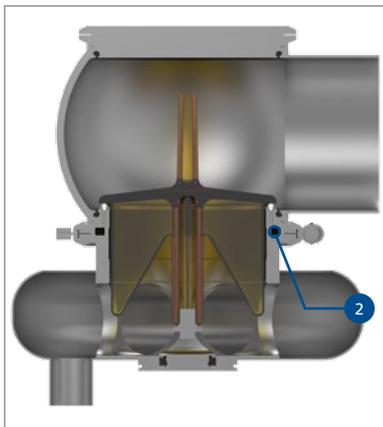


The illustration of a VARIVENT® constant pressure valve type DHV shown here represents an example of the configuration of a seal kit for constant pressure valves.

Chiefly, a seal kit consists of all seals of the valve in question that come in contact with the product. The precise components of all seal kits and information about maintenance can be found in the associated operating instructions.

Components of a seal kit at the example of the VARIVENT® type DHV		
Position	Quantity	Designation
1	1	Sealing ring
29	1	O-ring

VARIVENT® constant pressure valve type DHV		
Nominal width	NBR/EPDM	NBR/FKM
DN	Article number	Article number
40	221-004447	221-004446
65	221-004156	221-004157

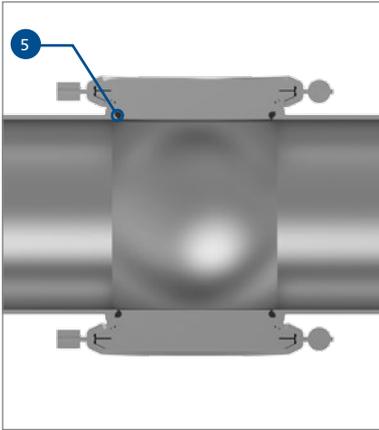


The illustration of a VARIVENT® vacuum valve type V shown here represents the wearing parts comprising the seat ring including compressed O-ring.

Information about maintenance can be found in the associated operating instructions.

Components of a seal kit at the example of the VARIVENT® type V		
Position	Quantity	Designation
2	1	Seat ring including O-ring

VARIVENT® vacuum valve type V			
Nominal width			1.4301/VMQ
DN	OD	IPS	Article number
65/80	2 ½"/3"	3"	221-468.04
100	4"	4"	221-468.05
150	–	6"	221-468.06



The adjacent figure of a VARINLINE® housing shows examples for the wear parts comprising an O-ring.

Information about maintenance can be found in the associated operating instructions.

Components of a seal kit at the example of the VARINLINE® housing	
Position	Designation
5	O-ring

O-ring for VARINLINE® housing							
Nominal width			Process connection	EPDM	FKM	HNBR	PTFE
DN	OD	ISO		Article number	Article number	Article number	Article number
10/15	–	13.5–21.3	B	930-270	930-163	930-637	930-181
25	1"	33.7	F	930-309	930-168	930-632	930-188
40–150	1 ½"–6"	42.4–114.3	N	930-144	930-171	930-633	930-190
100–150	4"–6"	–	G	930-156	930-178	930-863	–

T.VIS® control top

The T.VIS® control top is an optimal system for controlling and monitoring GEA Tuchenhagen valves.

This is available in several variants depending on the valve type, tasks and user convenience.

Common features of all T.VIS® variants are:

- Flexible modular system for optimum variant configuration for the particular task (e.g. type of interface module, number of solenoid valves, etc.)
- Internal air supply for high security against failure of the main valve functions because no external air hose is required
- Characteristic design
- High Protection class (min. IP66, optional IP67 or IP69k)
- Ease of cleaning without dead zones, whatever the installation orientation
- Clear visualization of the valve status via a light dome visible 360°, which is illuminated by colored LEDs
- Low energy consumption
- Ease of handling
- Maintenance-free electronic modules
- Many special options, e.g.:
 - Air throttles
 - Cable connections, etc.

For maintenance work on the valve, the control tops can be removed from the valve actuator by loosening two bolts on the clamp, without electrical or pneumatic connections having to be disconnected.

T.VIS® concept – for valves with pneumatic actuator



T.VIS® M-15 – control top with manual sensor setting

- For open/close position feedback and actuator control
- Proven sensor technology
- Modules and solenoid valves can be retrofitted



T.VIS® A-15 – control top with automatic set-up

- For open/close position feedback and actuator control
- Automatic set-up
- Semi-automatic setup



SES – control top for potentially explosive areas

- For open/close position feedback and actuator control
- Intrinsically safe sensors and solenoid valves



INA – proximity switch holder on the actuator

- For 2 proximity switches M12x1



LAT – proximity switch holder in the lantern

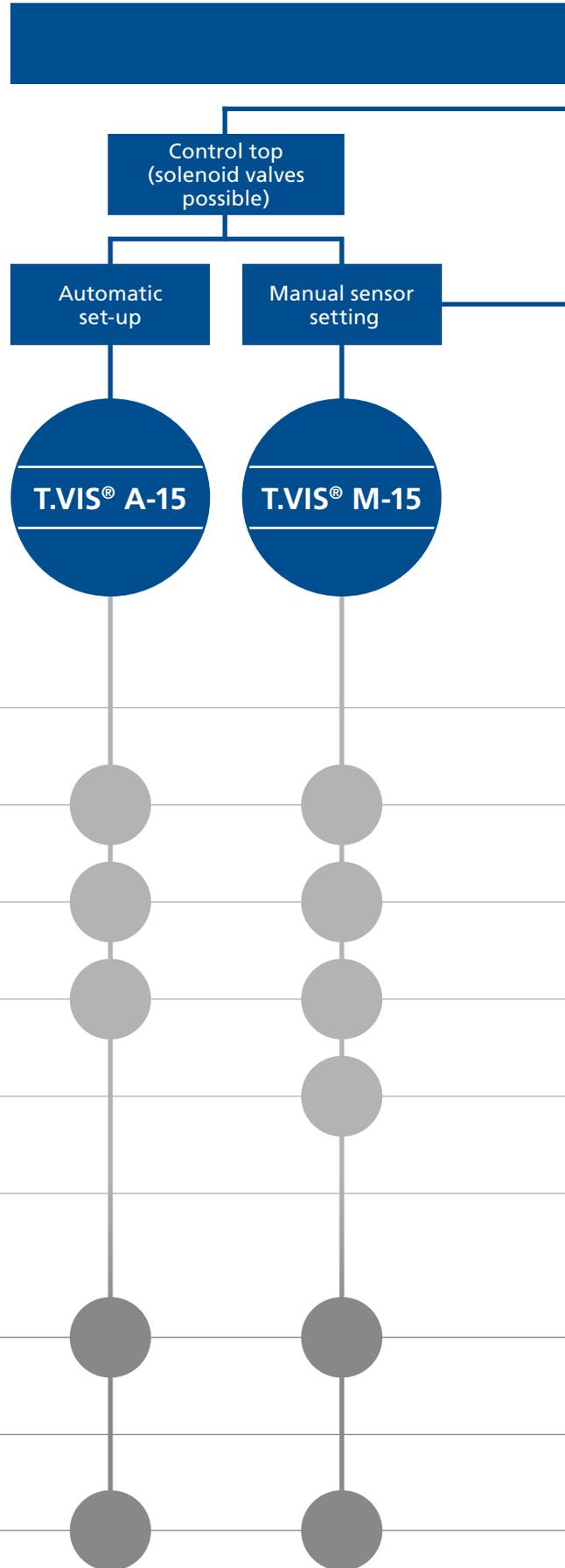
- For 2 proximity switches M12x1

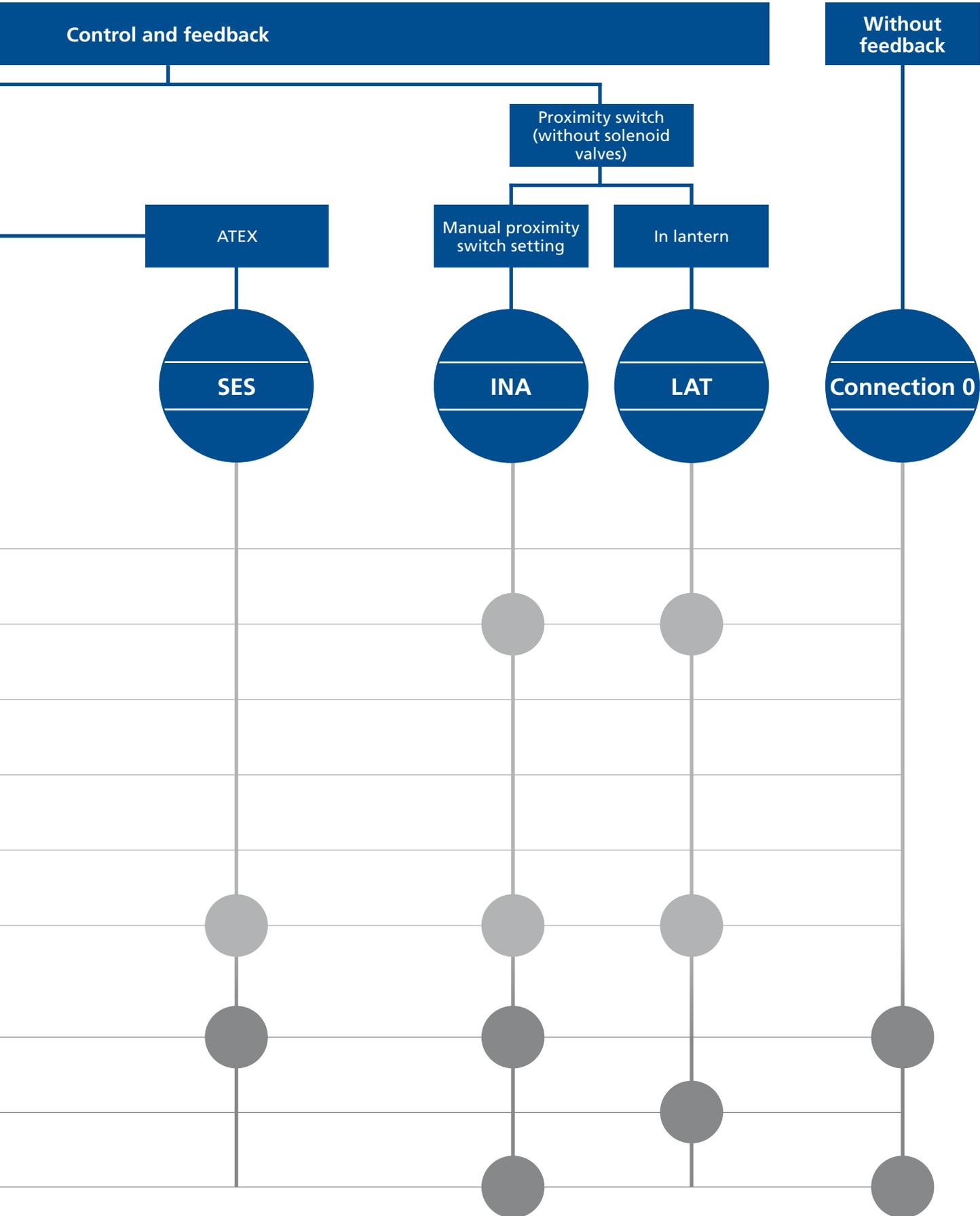
Function

Product

Available interface

Available for





Concept

The T.VIS® M-15 is equipped with manually adjustable sensors and a modular system of options, all of which form the basics of the T.VIS® feedback technology. This means it is optimally adapted to the basic requirements of the process system.

With proven sensor technology, it offers the advantages of the modern T.VIS® series in an inexpensive manner.

Standard variant



- 1 Pneumatic block
- 2 24 V DC interface module
- 3 Sensors
- 4 Solenoid valves
- 5 LED lighting
- 6 Central compressed air connection with replaceable filter
- 7 Cable gland

Features

- Flexible modular system
- Use of proven sensor technology
- Quick and easy adjustment of the sensors
- Valve status indication by LED
- Various communication standards available
- Components can be upgraded/converted subsequently
- Filter protects solenoid valves
- High-quality pneumatic fittings
- Exchangeable compressed air connection
- Supply and exhaust air throttles can be fitted
- Standard protection class IP66

Structure

The T.VIS® M-15 is characterized by proven sensor technology. The basic equipment of the control top comprises of the 24 V DC interface module with two sensors for feedback of the valve position and three solenoid valves which can be installed subsequently, if necessary.

In the interface types with AC (alternating current), DeviceNet and AS-Interface, an adapter module is connected ahead of the standard interface module, and can also be retrofitted or converted.

A replaceable filter in the supply air connection protects the solenoid valves.

Position detection

Inductive sensor system – The valve positions are detected using two manually adjustable sensors.

Setting

Mechanical – the sensors are calibrated mechanically using the positioning spindles, which are subsequently secured to prevent self-adjustment.

Visualization

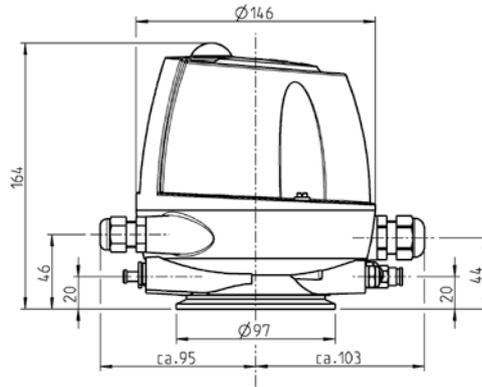
LED display:

- green
- yellow





Technical data of the standard version		
Position detection	Sensors	
Housing material	PA 12/L	
Ambient temperature	-20 to 60 °C	
Air supply	Pressure range	2 to 8 bar
	Standard	acc. to ISO 8573-1:2010
	Solid content	Quality class 6
	Water content	Quality class 4
	Oil content	Quality class 3
Dimensions of air connections	Metric 6/4 mm, inch 6.35/4.31 mm (¼")	
Protection class	IP66 (powerful water jet)	
Sound pressure level via exhaust air throttle	Max. 72 dB	
Visualization	LED (green, yellow)	
Certificates (optional)		• CSA C22.2
		• UL 429



Type of interface	24 V DC, 3-wire, PNP 24 V DC, 3-wire, NPN	48 – 130 V AC
Supply		
Operating voltage	24 V DC (+20 %, -12.5 %)	48 – 130 V AC
No-load current	≤ 40 mA	≤ 51 mA
Maximum current consumption	285 mA	185 mA
Polarity reversal protection	Yes	Yes
Certificate	cCSAus	cULus
Inputs		
Activation voltage	21 – 28.8 V = high; < 16 V = low	48 – 130 V = high*; < 30 V = low > 1.5 mA = high*; < 0.4 mA = low
Current consumption per input	≤ 35 mA	≤ 3 mA
Activation "PV Y1"	Direct PV activation	Electronic input
Activation "PV Y2"	Direct PV activation	Electronic input
Activation "PV Y3"	Direct PV activation	Electronic input
Outputs		
Connection type	24 V DC (PNP/NPN with changeover function)	
Maximum current carrying capacity per feedback output	50 mA	≤ 100 mA
Voltage drop on the outputs	≤ 3 V	≤ 5 V
Feedback "start position"	Electronic outputs	Electronic outputs
Feedback "end position"	Electronic outputs	Electronic outputs
Feedback "seat lift position"	Electronic outputs	Electronic outputs

* Leakage currents can arise if PLC modules with electronic outputs are used. If the leakage currents are more than 1.5 mA, it is essential to use a load resistor in parallel with the interface module. Recommendation: 15 kΩ/2 W

Position	Description of the order code
*	Feedback location
	TM15 Control top T.VIS® M-15
	Control top type
	N Without solenoid valve
	P 1 solenoid valve Y1
	R 1 solenoid valve Y1 (retrofittable: Y2, Y3)
	I 2 solenoid valves Y1, Y2 (retrofittable: Y3)
	J 2 solenoid valves Y1, Y3 (retrofittable: Y2)
	Feedback
	2 2 feedbacks
	3 2 feedbacks with external proximity switch
	Type of interface
	B 24 V DC, 3-wire, PNP
	N 24 V DC, 3-wire, NPN
	Solenoid valve
	A 24 V DC, 0.85 W
	0 Without
	Screw connection
	M Metric air connection, M20x1.5 cable gland
	Z Inch air connection, 0.5" NPT cable gland
	J Metric air connection, 5-pin M12 plug (1 solenoid valve, 2 feedbacks)
	P Inch air connection, 5-pin M12 plug (1 solenoid valve, 2 feedbacks)
	H Metric air connection, 8-pin M12 plug (> 1 solenoid valve, > 2 feedbacks)
	I Inch air connection, 8-pin M12 plug (> 1 solenoid valve, > 2 feedbacks)
B Inch air connection, Brad Harrison 0.5" NPT 5-pin plug (US)	
	Options (multiple selection possible)
	/18 Supply air throttle: regulates the opening speed of the valve
	/19 Exhaust air throttle: regulates the closing speed of the valve
	/22 5-pin M12 connection socket for screw fitting J, P (article no. 508-963) 8-pin M12 connection socket for screw fitting H, I (article no. 508-061)
	/67 Protection class IP67 (temporary immersion)
	/69k Protection class IP69k (high-pressure spray down)
/UC Certification UL/CSA	

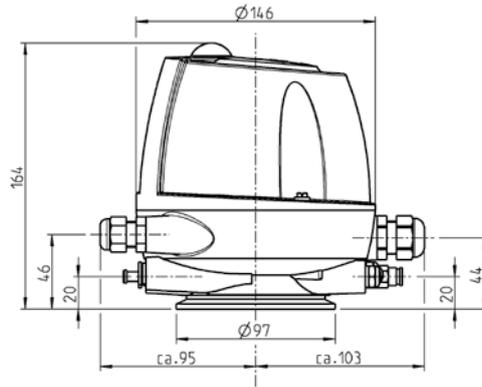
* The positions for the indication of the order code correspond to the consecutive numbering of the components for which the control and feedback systems can be selected (see selection matrix at the beginning of this section).

The code is composed as following, depending on the chosen configuration:

Position							Options								
Code	TM15														



Technical data of the standard version		
Position detection	Sensors	
Housing material	PA 12/L	
Ambient temperature	-20 to 60 °C	
Air supply	Pressure range	2 to 8 bar
	Standard	acc. to ISO 8573-1:2010
	Solid content	Quality class 6
	Water content	Quality class 4
	Oil content	Quality class 3
Dimensions of air connections	Metric 6/4 mm, inch 6.35/4.31 mm (1/4")	
Protection class	IP66 (powerful water jet)	
Sound pressure level via exhaust air throttle	Max. 72 dB	
Visualization	LED (green, yellow)	
Certificates (optional)		• CSA C22.2
		• UL 429



Type of interface	AS-Interface bus	DeviceNet
Supply		
Operating voltage	25.0–31.6 V DC	21–26 V DC
No-load current	≤ 62 mA	≤ 58 mA (at 24 V DC)
Maximum current consumption	225 mA	235 mA
Polarity reversal protection	Yes	Yes
Specification	AS-i V3.0 (max. 62 slaves with master V3.0)	ODVA-compliant
Additional information	IO.ID.ID2-code: 7.A.E	EDS file: F1022_R4.eds
Certificate	AS-i association/ cCSAus	ODVA
Inputs		
Feedback "start position"	Data bit DI 0	Data bit I-0
Feedback "end position"	Data bit DI 1	Data bit I-1
Feedback "seat lift position" (ext. NI)	Data bit DI 2	Data bit I-2
Collective fault		Data bit I-7
Outputs		
Activation "PV Y1"	Data bit DO 0	Data bit O-0
Activation "PV Y2"	Data bit DO 1	Data bit O-1
Activation "PV Y3"	Data bit DO 2	Data bit O-2

Position	Description of the order code
*	Feedback location
	TM15 Control top T.VIS® M-15
	Control top type
	N Without solenoid valve
	P 1 solenoid valve Y1
	M 1 solenoid valve Y1 (retrofitable: Y2, Y3)
	I 2 solenoid valves Y1, Y2 (retrofitable: Y3)
	J 2 solenoid valves Y1, Y3 (retrofitable: Y2)
L 3 solenoid valves Y1, Y2, Y3	
	Feedback
	2 2 feedbacks
	3 2 feedbacks with external proximity switch
	Type of interface
	A AS-Interface bus D DeviceNet
	Solenoid valve
	A 24 V DC, 0.85 W 0 Without
	Screw connection
	A Metric air connection M20×1.5 cable gland with connection box on cable 1 m (AS-i)
	S Inch air connection M20×1.5 cable gland with connection box on cable 1 m (AS-i)
	L Metric air connection, 2-pin M12 plug (AS-i)
	U Inch air connection, 2-pin M12 plug (AS-i)
	D Metric air connection, 5-pin M12 plug (DeviceNet)
	K Inch air connection, 5-pin M12 plug (DeviceNet)
	Options (multiple selection possible)
	/18 Supply air throttle: regulates the opening speed of the valve
	/19 Exhaust air throttle: regulates the closing speed of the valve
	/22 5-pin M12 connection socket for screw fitting L, U, D, K (A-coded, article no. 508-963)
	/67 Protection class IP67 (temporary immersion)
	/69k Protection class IP69k (high-pressure spray down)
	/81 AS-i connection box on cable 1 m with M12 connection socket (article no. 508-027) for screw fitting L, U
	/82 AS-i connection box on cable 2 m with M12 connection socket (article no. 508-028) for screw fitting L, U
	/UC Certification UL/CSA

* The positions for the indication of the order code correspond to the consecutive numbering of the components for which the control and feedback systems can be selected (see selection matrix at the beginning of this section).

The code is composed as following, depending on the chosen configuration:

Position							Options								
Code	TM15														

Concept

The T.VIS® A-15 is equipped with a high-precision path measuring system. This automatic open/close position recognition is available on any valve from GEA Tuchenhagen, along with a T.VIS® feedback system.

Development has focussed on the requirements and necessities of our customers from the fluid-processing industry. In addition to safe control and monitoring of all functions of the process valves in breweries, dairies, plants for manufacturing fruit juices as well as pharmaceuticals, the T.VIS® A-15 offers significant advantages that are directly reflected in lower total cost of ownership.

Standard variant



- 1 Pneumatic block
- 2 Control unit
- 3 Path measuring system
- 4 Solenoid valves
- 5 LED lighting
- 6 2 push buttons
- 7 Central compressed air connection with replaceable filter
- 8 M12 plug connection
- 9 Logic NOT-element

Features
Quick, automatic initialization
Tamper-proof setting of tolerances
Reduced energy consumption
Reduction in operating costs
Valve status display by LED
Basic LED colors can be selected specifically for the customer
Filter protects solenoid valves
High-quality pneumatic fittings
Exchangeable compressed air connection
Supply and exhaust air throttles can be fitted
LEFF® function
Semi-automatic setup
Standard protection class IP66

Structure

The T.VIS® A-15 is equipped with a precise path measuring system for detecting its position.

The necessary wiring for control and feedback is performed, depending on the requirements, via the M12 plug connections accessible from the outside or through direct wiring and cable glands.

The control top can be opened for this.

Operation and configuration of the T.VIS® A-15 takes place either by the two push buttons on the cap or, with the cap removed, via the buttons below. The push buttons are secured electronically against inadvertent or incorrect operation, while in operating mode.

A replaceable filter, in the supply air connection, protects the solenoid valves.

Position detection

Path measuring system – the valve position is registered by means of a highly modern path measuring system.

Setting

Automatic – following unlocking, simply pressing the two buttons on the cap of the T.VIS® A-15 starts the initialization process which runs fully automatically. There is no need to open the control top for this purpose, resulting in particularly quick, easy and safe commissioning of the control top (on average < 1 minute).

Immediately following the set-up, it is possible to set the open/close position tolerances and signal attenuation in the parameter menu.

LEFF® function

LEFF® (Low Emission Flip Flop) is available in double-seat valves for each lifted and monitored valve disc. The function describes modulation of the valve disc during the lifting process to reduce the consumption of cleaning agent.

For more information about the LEFF® function, refer to the end of this section.

Semi-automatic setup

As a new feature, our control top T.VIS® A-15 has the option of semi-automatic setup that permits uncomplicated exchange in the current process.

For more information about the semi-automatic setup, refer to the end of this section.

Visualization

LED display:

- Green
- Yellow
- Red



Protection class IP66

The programmable color change allows the display of colors yellow and green to be swapped over.

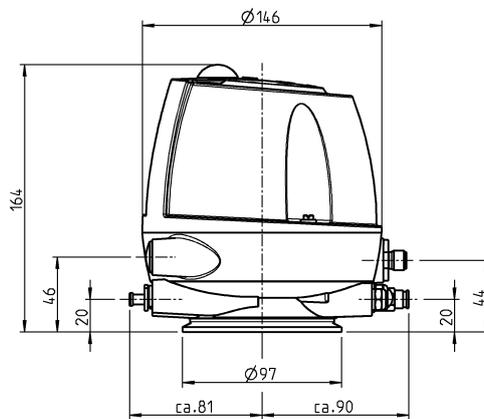
Service mode

Activation of the main stroke which may be required in VARIVENT® and ECOVENT® valves with open non-actuated position for valve maintenance is performed using the service mode which can be activated by the buttons. At the same time, all feedbacks are stopped (warning to the system control). Furthermore, input signals from the control room are not implemented by the T.VIS®, in order to protect the employee.



Technical data of the standard version		
Position detection	Path measuring system	
Housing material	PA 12/L	
Ambient temperature	-20 to 60 °C	
Air supply	Pressure range	2 to 8 bar
	Standard	acc. to ISO 8573-1:2010
	Solid content	Quality class 6*
	Water content	Quality class 4
	Oil content	Quality class 3
Dimensions of air connections	Metric 6/4 mm, inch 6.35/4.31 mm (¼")	
Protection class	IP66 (powerful water jet)	
Sound pressure level via exhaust air throttle	Max. 72 dB	
Visualization	LED (green, yellow, red)	
Certificates (optional)		• CSA C22.2
		• UL 61010-1

* Recommended



Type of interface	24 V DC, 3-wire, PNP	AS-Interface bus	DeviceNet
Supply			
Operating voltage	24 V DC (+20 %, -12.5 %)	26.5–31.0 V DC	11**–26 V DC
No-load current	≤ 25 mA	≤ 25 mA	≤ 35 mA
Maximum current consumption	265 mA	65 mA*	75 mA
Polarity reversal protection	Yes	Yes	Yes
Specification		AS-i V3.0 (max. 62 slaves)	
Additional information		IO.ID.ID2-code: 7.A.E.	
Certificate		AS-i association	ODVA

Inputs			
Connection type	24 V DC (PNP)		
Short circuit-proof	Yes		
Overload-proof	Yes		
Maximum current carrying capacity per feedback output	100 mA		
Voltage drop on the outputs	≤ 1 V		
Feedback "start position"	Electronic output	Data bit DI 0	Data bit I-0
Feedback "end position"	Electronic output	Data bit DI 1	Data bit I-1
Feedback "seat lift position"	Electronic output	Data bit DI 2	Data bit I-2

Outputs			
Activation voltage	> 13 V = high; < 6 V = low		
Current consumption per input	< 10 mA		
Activation "PV Y1"	Electronic input	Data bit DO 0	Data bit O-0
Activation "PV Y2"	Electronic input	Data bit DO 1	Data bit O-1
Activation "PV Y3"	Electronic input	Data bit DO 2	Data bit O-2

* This value is valid only with an activated solenoid valve. ** This value is valid for a control top without solenoid valve.

Position	Description of the order code
*	Feedback location
	TA15 Control top T.VIS® A-15
	Control top type
	N Without solenoid valve
	P 1 solenoid valve Y1
	I 2 solenoid valves Y1, Y2 (Y2 for lower seat lift)
	J 2 solenoid valves Y1, Y3 (Y3 for upper seat lift, air/air actuator or external process valve)
L 3 solenoid valves Y1, Y2, Y3	
	Feedback
	8 2 digital feedbacks
	9 2 digital feedbacks with external proximity switch
	Type of interface
	A AS-Interface BUS
	B 24 V DC PNP
	D DeviceNet
	Solenoid valve
	A 24 V DC, 0.85 W
	0 Without
	Screw connection
	J Metric air connection, 5-pin M12 plug for 24 V DC (1 PV, 2 feedbacks), AS-i, DeviceNet
	P Inch air connection, 5-pin M12 plug for 24 V DC (1 PV, 2 feedbacks), AS-i, DeviceNet
	H Metric air connection, 8-pin M12 plug for 24 V DC (> 1 solenoid valve, > 2 feedbacks)
	I Inch air connection, 8-pin M12 plug for 24 V DC (> 1 solenoid valve, > 2 feedbacks)
	M Metric air connection, M20x1,5 cable gland with integrated terminal strip
	Z Inch air connection, 0.5" NPT cable gland with integrated terminal strip
	Options (multiple selection possible)
	/18 Supply air throttle: regulates the opening speed of the valve
	/19 Exhaust air throttle: regulates the closing speed of the valve
	/22 24 V DC/AS-i/DeviceNet: 5-pin connection socket for screw connection J, P (article no. 508-963) 24 V DC: 8-pin connection socket for screw fitting H, I (article no. 508-061)
	/67 Protection class IP67 (temporary immersion)
	/69k Protection class IP69k (high-pressure spray down)
	/81 AS-i connection box on cable 1 m with 5-pin M12 connection socket (article no. 508-027)
	/82 AS-i connection box on cable 2 m with 5-pin M12 connection socket (article no. 508-028)
	/UC Certification UL/CSA

* The positions for the indication of the order code correspond to the consecutive numbering of the components for which the control and feedback systems can be selected (see selection matrix at the beginning of this section).

The code is composed as following, depending on the chosen configuration:

Position							Options								
Code	TA15														

Concept

The SES is characterized by proven sensor technology. The control top consists of an interface module, up to 2 sensors for valve position feedback and up to 3 solenoid valves which can also be installed subsequently.

The SES is only available in PA 12/L material, because conductivity of the material is required for use in ATEX/Ex areas.



- 2 Interface module
- 3 Proximity switches
- 4 Solenoid valves
- 8 Cable gland

Features
Proven NAMUR sensors
Simple and quick adjustment of sensors
Flexible modular system
Selection of various solenoid valves
Retro-fittable

Position detection

Proximity switches – the valve positions are recorded using two manually adjustable proximity switches for the non-actuated and actuated position.

Setting

Mechanical – the sensors are calibrated mechanically using the positioning spindles, which are subsequently secured to prevent adjustment.

Field of application

Use in potentially explosive atmospheres is permitted:*

- **With proximity switch** up to zone 1 and 20**
 - For connection to approved intrinsically safe equipment
 - ATEX identification:
 - II 2G Ex ia IIC T6
 - II 1D Ex iaD 20 T97 °C
- **With solenoid valve up to zone 0 and 20**
 - For connection to approved intrinsically safe equipment
 - ATEX identification:
 - II 2G Ex ia IIC T6
- **With interface module**
 - Not subject to Ex approval because it is a purely passive component

Please note

- *) There is no ATEX certification for the complete control top. Certifications can only be issued for the individual components of the control top. Please note that the permitted Ex-zone/ATEX category of the complete control top depends on the approval of the component with the lowest protection level. The entire control top with all components is optionally certified according to:
- CSA C22.2
 - ANSI/ISA 82.02.01-1999
 - UL 1203, 4th Ed.
 - UL 429, 6th Ed.
 - ISA/ANSI 12.12.01-2011
- ***) The intrinsically safe components are only allowed to be individually connected to an approved safety barrier. This arrangement permits use in a risk area.

Visualization

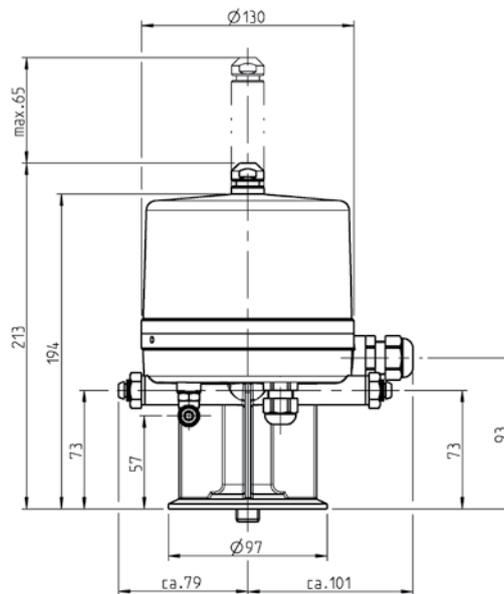
The position of the switch bar projecting from the control top makes it possible to detect what the position of the valve is.





Technical data of the standard version		
Position detection	Inductive proximity switches	
Housing material	PA 12/L	
Ambient temperature	0 to 45 °C	
Air supply	Pressure range	1.5 to 7 bar
	Standard	acc. to ISO 8573-1:2010
	Solid content	Quality class 6
	Water content	Quality class 4
	Oil content	Quality class 3
Dimensions of air connections	Metric 6/4 mm, inch 6.35/4.31 mm (¼")	
Protection class	IP65*	
Sound pressure level via exhaust air throttle	Max. 72 dB	
Visualization	Position of switch rod	
Certificates	 • II 2G EEx ia IIC T6**	

* Not for overhead installation ** Standard for SES



Type of interface	EEx / ATEX (12 V DC)	EEx / ATEX (24 V DC)
Sensor		
Communication	NAMUR 8.2 VDC (operating voltage 6–30 V DC)	NAMUR 8.2 VDC (operating voltage 6–30 V DC)
Equipment category	II 2G Eex ia IIC T6 and Ex iaD 20 T97 °C	II 2G Eex ia IIC T6 and Ex iaD 20 T97 °C
Article no.	505-093	505-093
Solenoid valve		
Rated voltage	12 V DC –10 % / +25 %	24 V DC –10 % / +15 %
Rated power	0.5 W	0.5 W
Equipment category	II 1GD Eex ia IIC T6	II 1GD Eex ia IIC T6
Article no.	512-124	512-155
Certificates (optional)	 <ul style="list-style-type: none"> • CSA C22.2 • ANSI/ISA 82.02.01-1999 • UL 1203, 4th Ed. • UL 429, 6th Ed. • ISA/ANSI 12.12.01-2011 	

Position	Description of the order code
*	Feedback location
	SES. Control top sensor technology
	Control top type
	N Without solenoid valve
	P 1 solenoid valve Y1
	I 2 solenoid valves Y1, Y2
	L 3 solenoid valves Y1, Y2, Y3
	Feedback
	0 Without
	1 1 feedback
	2 2 feedbacks
	3 2 feedbacks with external proximity switch
	Type of interface
	E EEx/ATEX
	Solenoid valve
	0 Without
	E 12 V DC, ATEX
	X 24 V DC, ATEX
	Screw connection
	E Metric air connection, Pg 13.5 cable gland
	N Inch air connection, Pg 13.5 cable gland
	Options (multiple selection possible)
	/43 Material PA 12/L: UV, oil and grease resistant (standard in control top SES)
	/UC Certification UL/CSA

* The positions for the indication of the order code correspond to the consecutive numbering of the components for which the control and feedback systems can be selected (see selection matrix at the beginning of this section).

The code is composed as following, depending on the chosen configuration:

Position							Options				
Code	SES.			E			/43				



Connection 0

Connection 0 can be used as an alternative to feedback systems if no feedback sensors are wanted above the actuator. Connection 0 is available in a metric and inch variant.

Technical data	
Material	AISI 304
Surface	Metal blank



INA – proximity switch holder on the actuator

The proximity switch holder M12x1 (INA) makes it possible to use feedback sensors above the actuator. The proximity switch holder has prepared M12x1 holes which allow the sensors to be set optimally. A direct connection to the controller provides the feedback on the valve position.

Technical data	
Material	AISI 304
Surface	Metal blank



LAT – lantern for 2 proximity switches M12x1

Feedback in the lantern is preferably used wherever control and feedback systems cannot be employed (e.g. in valves with manual actuator or two-position-stop cylinder).

Position	Description of the order code
*	Feedback location
	000 Connection 0 (without feedback)
	INA. Proximity switch holder for connection 0 for max. 2 proximity switches M12x1
	LAT. Lantern for max. 2 proximity switches M12x1
	Control top type
	0 Connection 0
	Feedback
	0 Without (INA, 000)
	1 1 feedback (INA, LAT)
	2 2 feedbacks (INA, LAT)
	3 3 feedbacks in the lantern (LAT)
	7 Without, prepared for 2 feedbacks in the lantern (LAT)
	Type of switch
	0 Without (INA, LAT, 000)
	B NI 24 V DC 3-wire PNP M12x1 with terminal chamber (INA, LAT)
	F NI 24 V DC 2-wire M12x1 with terminal chamber (INA, LAT)
	E NI NAMUR M12x1 with terminal chamber (INA, LAT)
	X NI 24 V DC 3-wire NPN M12x1 with terminal chamber (INA, LAT)
	S NI 24 V DC 3-wire PNP M12x1 with plug connector (INA, LAT)
	Cable connection
	0 Without
	Air connection
	0 Without
	M Metric (article no. 221-140.02)
	Z Inch (article no. 2214-140.04)

* The positions for the indication of the order code correspond to the consecutive numbering of the components for which the control and feedback systems can be selected (see selection matrix at the beginning of this section).

The code is composed as following, depending on the chosen configuration:

Position						
Code		0			0	

Proximity Switches

External proximity switches M12x1 for installation on the actuator or in the lantern.



Technical data	
Nominal switching distance	2 to 4 mm
Protection class	IP67
Operating voltage	10–30 V DC/NAMUR
Material	PA 12/L GF 30/VA
Permitted ambient temperature	–30 to 85 °C

Proximity switch M12x1 for INA, LAT	Article number
2-wire (terminal chamber)	505-104
3-wire PNP (M12 plug)	505-088
4-wire NPN (change with terminal chamber)	505-105

Technical data	
Nominal switching distance	4 mm
Operating voltage	7.5–30 V DC
Permitted ambient temperature	–20 to 70 °C

Proximity switch M12x1 for T.VIS®	Article number
NAMUR (M12 plug)	505-098

Technical data	
Nominal switching distance	2 mm
Operating voltage	8.2 V DC norm.
Permitted ambient temperature	–25 to 70 °C

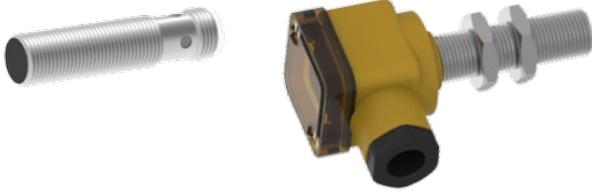
Proximity switch M12x1 for SES	Article number
NAMUR (terminal chamber)	505-085

Technical data	
Nominal switching distance	10 mm
Protection class	IP68
Operating voltage	10–30 V DC
Material	LCP / 1.4301
Permitted ambient temperature	–30 to 85 °C

Proximity switch M12x1 for pig cleaning station – normally open function	Article number
3-wire PNP (plug connector)	505-103

Magnetic Sensors

Magnetic-inductive proximity sensors monitor the position of the permanent magnets in the pig from outside of the pig station housing or the pipeline.



Technical data	
Nominal switching distance	90 mm
Protection class	IP67
Operating voltage	10–65 V DC
Material	GD-Zn, chrome-plated
Permitted ambient temperature	–25 to 70 °C

Magnetic sensor M12x1 for pig recognition – normally open function	Article number
3-wire PNP (terminal chamber)	505-081

Technical data	
Nominal switching distance	90 mm
Protection class	IP67
Operating voltage	8.2 VDC
Material	CuZn, chrome-plated / PA12-GF30
Permitted ambient temperature	–25 to 70 °C

Magnetic sensor M12x1 for pig recognition – ATEX category II 2 G, Ex zone 1	Article number
NAMUR (plug connector 514-161)	505-078

Switch bars and adapters

The following components are required for subsequent installation of a control and feedback system on a VARIVENT® valve or VARICOVER® pig holder.

If a complete control and feedback system is ordered, switch bar 221-589.80, 221-589.75 or 221-405.03 is already included. If an alternative switch bar is required, please state the corresponding article number or the component provided.

Valve type	Control top			
	T.VIS® M-15	T.VIS® A-15	SES	
VARIVENT®	Switch bar			
Mixproof sampling valve type T/09	221-589.80	221-589.75	221-405.03	
VARICOVER®	Switch bar/add-on parts			
Pig holder	Switch bar	221-589.80	221-589.75	-
	Adapter	221-624.03	221-624.03	-
	Mounting socket	221-589.32	221-589.32	-



Switch bar 221-589.80 for T.VIS® M-15



Switch bar 221-589.75 for T.VIS® A-15

IP Protection Classes

The IP protection classes inform about the scope at which the housing of an electrical device is protected against percolation of foreign bodies (first number) and moisture (second number).

The protected systems are assigned IP-codes. The index figures represent common error options against which the system is protected. The code starts with the letters IP for "International Protection".

Meaning of the index numbers

1. Index*	Protection from foreign bodies
6	Dust-tight
2. Index*	Protection from moisture
6	Protection from powerful water jet
7	Protection from temporary immersion
9k	Protection from water at high-pressure spray down/ high pressure steam jet cleaning

* Further indices and more precise explanations can be found in the corresponding standard.

If an index number is not stated, it is replaced by the letter x (e.g. IPx6)

For the 2nd index figure (protection from moisture), the following applies:

- The protection class IPx6 includes all indices of protection class below.
- **This does not apply to the higher protection class IPx7.** If this protection class is to include a lower protection class, this is indicated by a combination of index figures (e.g. IP67/69k).

The TVIS® control top designs of the M-15 and A-15 comply with the requirements of protection class IP66 (DIN EN 60529) as standard. Designs in the stronger protection classes IP67 or IP69k (both DIN EN 60529) are also available.

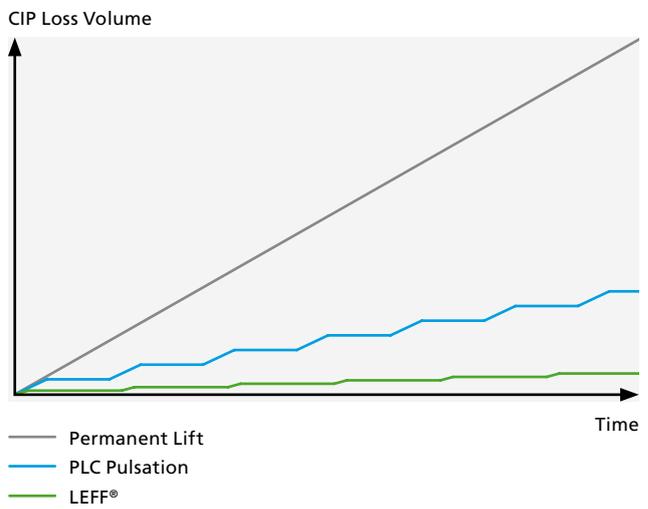
LEFF® function

LEFF® stands for Low Emission Flip Flop. The function describes modulation of the valve disc during the lifting procedure which is monitored by the path measuring system and the electronics of the TVIS® A-15, and works independently from the process run times and product pressures.

The LEFF® function is automatically integrated in the TVIS® A-15 and in double-seat valves it only uses the feedback units provided as standard, without needing any special components. The straightforward configuration using two push buttons on the TVIS® cap allows the LEFF® function to be activated separately at any time during set-up for the valve or double disc. To allow the LEFF® function to be used with the double disc, it is necessary to have the optional external proximity switch.

Modulation of the valve disc during lifting makes it possible to reduce cleaning agent consumption and/or discharge into the drains by more than 90 % compared to the conventional lifting method, thereby drastically reducing operating costs. Even compared to modulation controlled in the PLC, the TVIS® A-15 offers markedly lower CIP losses per cycle because of the significantly shorter data pathways, as well as the ability to register disc movement sooner internally because of the measuring system. Savings in the range from 30 % to 80 % are possible. However, these values are highly dependent on the process parameters, the level of contamination as well as the cleaning pressure and flow rate, as a result of which each CIP situation must be considered on a case-by-case basis.

Features
No complicated programming required in the PLC
No additional system technology required
Independent from process run times and product pressures
Automatic monitoring of the lift functions
Significant cost reduction (CIP medium losses, waste water costs, etc.)



Semi-automatic setup

By means of the semi-automatic setup, a control top can be replaced without interrupting the current process.

For this, an employee only needs to perform the simple configuration once on site: in the version in protection class IP66 with two push buttons on the TVIS® cap, and for the optional protection classes IP67 and IP69k with the cap removed right with the two buttons below.

For the semi-automatic set-up, the control top initially only learns the position of the valve disc on the non-actuated position and then remains until the valve is actuated in the scope of a running process. Only then will the end position of the valve be stored. The process thus does not need to be stopped!

The semi-automatic set-up is integrated into the TVIS® A-15 as standard and does not require any additional hardware.

Connection Screw Fitting

	Order code for air connection		In conjunction with screw fitting or plug	Use	Matching connection socket		
	Metric	Inch			Option	Item no.	Designation
	M		M20x1,5 cable gland	T.VIS® M-15 T.VIS® A-15	-	-	-
	E		Pg 13.5 cable gland	SES	-	-	-
		Z	0.5" NPT cable gland	T.VIS® M-15 T.VIS® A-15	-	-	-
		N	Pg 13.5 cable gland	SES	-	-	-
	A	S	M20x1.5 cable gland with connection box on cable 1 m	T.VIS® M-15 (AS-i)	-	-	-
	L	U	2-pin M12 plug (A-coded)	T.VIS® M-15 (AS-i)	/22	508-963	5-pin M12-connection socket (A-coded)
					/81	508-027	AS-i connection box on cable 1 m with 5-pin M12 connection socket (A-coded)
					/82	508-028	AS-i connection box on cable 2 m with 5-pin M12 connection socket (A-coded)
	D	K	5-pin M12 plug (A-coded)	T.VIS® M-15 (DeviceNet)	/22	508-963	5-pin M12-connection socket (A-coded)
			5-pin M12 plug (B-coded)	T.VIS® M-15 (DeviceNet)			508-964
	J	P	5-pin M12 plug (A-coded)	T.VIS® M-15 (24 V DC) T.VIS® M-15 (48–130 V AC) T.VIS® A-15 (24 V DC) T.VIS® A-15 (AS-i) T.VIS® A-15 (DeviceNet)	/22	508-963	5-pin M12-connection socket (A-coded)
	H	I	8-pin M12 plug (A-coded)	T.VIS® M-15 (24 V DC) T.VIS® M-15 (48–130 V AC)	/22	508-061	8-pin M12-connection socket (A-coded)
				T.VIS® A-15 (24 V DC)			
		B	Brad Harrison 0.5" NPT 5-pin plug	T.VIS® M-15 (24 V DC) T.VIS® M-15 (48–130 V AC)	-	-	-

24 V (PNP/NPN)

In 24 V parallel wiring digital signals are exchanged between a terminal unit and generally the corresponding input and output modules of a PLC. In this case, it is necessary to have a separate wire for each signal, usually in the form of a multi-core cable.

PNP (current-supplying) indicates signal transfer against reference potential L₋.

NPN (current-drawing) indicates signal transfer against reference potential L₊.

BUS AS-Interface



AS-Interface (Actuator-Sensor Interface) is a standard in fieldbus communication that was developed for connecting actuators and sensors. This is to replace parallel wiring used in the past. The AS-Interface has been an international standard acc. to EN 50295 and IEC 62026-2 since 1999. AS-i products are certified by the AS International Association, thereby, ensuring that equipment from different manufacturers will work together in the same system. The transmission medium is an unshielded, two-core yellow cable which also carries the electrical power supply (24–30 V direct current voltage) for the communication electronics and the slaves. A maximum of 62 slaves can be used per AS-i master. The slaves are addressed manually using a manual addressing unit or automatically by the master. The maximum length of the AS-i cable is 100 m, although by using repeaters it is possible to extend the entire length up to 400 m.

DeviceNet bus

DeviceNet is a CAN-based fieldbus that is chiefly used in automation engineering. DeviceNet was developed by Allen-Bradley (part of Rockwell Automation) and later transferred to the ODVA (Open DeviceNet Vendor Association) as an open standard. DeviceNet is chiefly used in the USA and, to a certain extent, Asia. A maximum of 64 network nodes can be used per fieldbus segment. The nodes address is set either using dial or DIP switches on the device, or can be configured using the bus on the basis of software. The maximum length of the DeviceNet cable depends on the selected cable type and baud rate, although it cannot exceed 500 m.

48–130 V AC

This is also parallel wiring but with alternating current voltage signals that are processed in the control top using a wide-band I/O module. This communication technology is chiefly used in the United States and Canada with 110 V, although it can also be encountered in southern Europe with 48 V.

NAMUR

The 2-wire NAMUR sensors and solenoid valves used here can be operated in the Ex area because of their “intrinsically safe” ignition protection type. Using external isolating switching amplifiers, it is possible to operate control tops with this communication technology up to zone 1 or 21.

4–20 mA (3-wire)

In industrial automation engineering, the 4–20 mA current signal is the one most frequently used for analog measured value transmission. The enormously widespread use of this type of signal is explained by its ease of handling and, above all, its resistance to interference.

Using 4 mA as the initial value instead of 0 mA makes it very easy to detect and evaluate a wire break. As a rule, 4–20 mA corresponds to 0–100% of the physical measuring range of an analog sensor or the working range of an actuator set in the parameters; the nominal value is supplied or the actual value is returned via an interface of this kind.

3-A		3-A Sanitary Standards, Inc. (3-A SSI) is an independent, non-profit corporation dedicated to advancing hygienic equipment design for the food, beverage, and pharmaceutical industries.
AS-i		Actuator Sensor interface. BUS system for the lowest field level.
ATEX		Atmosphères Explosibles. ATEX comprises the directives of the European Union in the area of explosion protection. For one thing, this is the ATEX equipment directive 94/9/EC, for another, the ATEX workplace directive 1999/92/EC.
cCSAus		Test of a product by CSA according to applicable safety standards in Canada and the USA.
CE		Conformité Européenne. By affixing the CE mark, the manufacturer confirms that the product complies with the European directives applicable to the specific product.
CSA		Canadian Standards Association. A non-governmental Canadian organization which issues standards as well as checking and certifying the safety of products. It is now globally active.
cULus		Test of a product by UL according to applicable safety standards in Canada and the USA.
DeviceNet		BUS system of the ODVA organization for complex communication on various field levels.
EG 1935/2004		Materials in contact with the product used in valves from GEA Tuchenhagen GmbH are in accordance with EC regulation 1935/2004. This defines a general framework for materials and objects intended to come into contact with foodstuffs.
EHEDG		European Hygienic Engineering & Design Group. European supervisory authority for foodstuffs and pharmaceuticals. This authority issues approvals and certificates for products and materials that are used in the foodstuffs and pharmaceuticals industries.
FDA		Food and Drug Administration. US supervisory authority for foodstuffs and pharmaceuticals. This authority issues approvals and certificates for products and materials that are used in the foodstuffs and pharmaceuticals industries.
ODVA		ODVA is a worldwide association comprising leading automation companies. It develops network protocols and standards in the joint interests of its members, which are used for the international interoperability of production systems.
TÜV		Technischer Überwachungs-Verein. The German TÜV is a private company which carries out technical safety checks as prescribed in national legislation or regulations.
UL		Underwriters Laboratories. An organization founded in the USA for checking and certifying products and their safety.

Abbreviation	Explanation
°C	Degrees Celsius, unit of measurement for temperature
°F	Degrees Fahrenheit, unit of measurement for temperature
3-A	Standard of 3-A Sanitary Standards, Incorporated
3D	Three-dimensional
A	Ampere, unit of measurement of current intensity or Output, term used in automation
AC	Alternating Current
AISI	American Iron and Steel Institute, association of the American steel industry
ANSI	American National Standards Institute, American body for standardizing industrial processes
approx.	approximately
AS-i	Actuator Sensor interface, standard for fieldbus communication
ASME	American Society of Mechanical Engineers, professional association of mechanical engineers in the USA
ASME-BPE	Standard of the ASME's bioprocessing equipment association
ATEX	Atmosphères Explosibles, synonymous with the directives of the European Union for potentially explosive areas
bar	Unit of measurement for pressure. All pressure values [bar/psi] refer to positive pressure [bar _g /psi _g], unless specifically stated otherwise.
bar _g	Unit of measurement for pressure relative to atmospheric pressure
CAN	Controller Area Network; asynchronous serial bus system
CE	Conformité Européenne, administrative symbol for the free movement of industrial products
CIP	Cleaning In Place, designates a process for cleaning technical process systems
CSA	Canadian Standards Association, a non-governmental Canadian Standardization organization
Cv	The Cv value corresponds to the water flow rate through a valve (in US.liq.gal. / min) at a pressure differential of 1 PSI and a water temperature of 5 °C to 30 °C. kv = 14,28 Cv (USA)
Cvs	The Cv values of a valve at nominal stroke (100 % opening) is designated the Cvs value.
dB	Decibel, one tenth of a bel, named after Alexander Graham Bell and used for identifying levels and dimensions
DC	Direct Current
DIN	Deutsches Institut für Normung e. V. Standardization organization in the Federal Republic of Germany, DIN = synonym for standards issued by the organization

Abbreviation	Explanation
DIP	Dual Inline Package, design of a switch
DN	Diameter Nominal, DIN nominal width
E	Input, term used in automation
EHEDG	European Hygienic Engineering and Design Group. Consortium of equipment manufacturers, food industries, research institutes as well as public health authorities
EN	European standard, rules of the European Committee for Standardization
EPDM	Ethylene propylene diene rubber, acronym acc. to DIN/ISO 1629
Ex	Synonym for ATEX
FDA	Food and Drug Administration, official foodstuffs monitoring in the United States
FEM calculation	Finite Element Method; calculation process for simulating solids
FKM	Fluorinated rubber, acronym acc. to DIN/ISO 1629
H	Henry, unit of measurement for inductance
HNBR	Hydrated acrylonitrile butadiene rubber, acronym acc. to DIN/ISO 1629
Hz	Hertz, unit of frequency named after Heinrich Hertz
I	Formula symbol for electrical current
IEC	International Electrotechnical Commission, international standardization organization for electrical and electronic engineering
IP	Ingress Protection/International Protection, index of protection class acc. to IEC 60529
IPS	Iron Pipe Size, American pipe dimension
ISA	International Society of Automation, international US organization of the automation industry
ISO	International Organization for Standardization, international organization that produced international standards, ISO = synonym for standards from the organization
kg	Kilogram, unit of measurement for weight
Kv	The Kv value corresponds to the water flow rate through a valve (in m ³ /h) at a pressure differential of 0.98 bar and a water temperature of 5 °C to 30 °C.
Kvs	The Kv values of a valve at nominal stroke (100 % opening) is designated the Kvs value
L	Conductive
LED	Light-Emitting Diode

Abbreviation	Explanation
LEFF®	Function of the T.VIS® valve informations system for cyclical pulsing during the lifting process; Low-Emission Flip Flop
mm	Millimeter, unit of measurement for length
M	Metric, system of units based on the meter or Mega, one million times a unit
m³/h	Cubic meters per hour, unit of measurement for volumetric flow
max.	Maximum
NAMUR	Standardization working association for measuring and control technology in the chemical industry, synonym for the interface type of the organization, especially for potentially explosive atmospheres
NC	Normally Closed; valve or solenoid valve control which is closed in idle status
NO	Normally Open; valve or solenoid valve control which is open in idle status
NOT-element	Logic element, NOT gate
NPN	Signal transmission against reference potential, current-consuming
NPT	National Pipe Thread, US thread standard for self-sealing pipe fittings
OD	Outside Diameter, pipe dimension
ODVA	Open DeviceNet Vendor Association, global association for network standards
PA 12/L	Polyamide
Pg	Armoured thread
PLC	Programmable Logic Controller, device for controlling a machine or system on a digital basis
PMO	Pasteurized Milk Ordinance
PN	Nominal pressure for pipeline systems according to EN 1333, rated pressure in bar at room temperature (20 °C)
PNP	Signal transmission against reference potential, current-supplying
PPO	Polyphenylene oxide, thermoplastic material
PS	Maximum permitted operating pressure at which the components can operate safely at maximum allowable temperature (TS)
psi	Unit of measurement for pressure, pound-force per square inch, 1 psi = 6894.75 Pa. All pressure values [bar/psi] refer to positive pressure [bar _g /psi _g], unless specifically stated otherwise
psi _g	Unit of measurement for pressure relative to atmospheric pressure
PV	Solenoid valve

Abbreviation	Explanation
Ra in μm	Average roughness value, describes the roughness of a technical surface
RM	Feedback
SES	GEA Tuchenhagen control head for Ex areas, control top system of GEA Tuchenhagen
SET-UP	Self-learning installation, the SET-UP procedure carries out all necessary settings for generating messages during commissioning and maintenance
SIP	Sterilization in Place, refers to a process for cleaning technical process systems
SMS	Svensk Mjök Standard, Scandinavian pipe dimension
SW	Indicates the size of a tool spanner, "Schlüsselweite"
T.VIS®	GEA Tuchenhagen valve information system, control top system from GEA Tuchenhagen
TS	Maximum permitted operating temperature
T-smart	Valve series from GEA Tuchenhagen
UL	Underwriters Laboratories, a certification organization established in the USA
UV	Ultraviolet, ultraviolet radiation is a wavelength of light
V	Volt, unit of measurement for voltage
VARICOMP®	Pipe expansion compensator from GEA Tuchenhagen
VMQ	High-polymer vinyl methyl polysiloxane, silicone rubber, MVQ = synonym
W	Watt, unit of measurement for power
Y	Control air connection for the working cylinder, designation from pneumatic systems
μ	Micro, one millionth of a unit
Ω	Ohm, the unit of electrical resistance named after Georg Simon Ohm

Typical application and description

You can receive two-dimensional and/or three-dimensional drawing files of our components for making your piping planning. For this purpose, please send us your specific request, stating the particular order code and the required drawing format. The required files will then be individually prepared for you.

Available drawing formats:

	Format	Name
2D formats	drw	Native Pro/E
	igs (2D)	IGS file
	dxg	AutoCAD drawing exchange
	pdf (2D)	Adobe Acrobat document
	tif	TIFF (plot)
3D formats	asm	Native Pro/E
	igs (3D)	IGS file
	pdf (3D)	Adobe Acrobat document
	stp	STP file
	bmp (3D)	Bitmap image
	jpg (3D)	JPEG image
	tif (3D)	TIFF image
	sat	Standard ACIS

Any contract placed with us (hereinafter referred to as “the Seller”) by any private-law corporation, company or other business or any public-law legal person or other entity (hereinafter referred to as “the Buyer”) shall exclusively be subject to these Standard Sales Terms and these Standard Sales Terms shall be applicable to any transaction agreed between the Seller and the Buyer thereafter even if no express reference to these Standard Sales Terms is made in connection with any such further transaction. The Seller hereby expressly refuses to accept any standard terms of the Buyer referred to in any correspondence or other document placing any such order. Notwithstanding any reference of the Buyer to any standard terms of the Buyer, the Buyer shall, upon the acceptance of any delivery by the Seller to the Buyer, be deemed to have accepted these Standard Sales Terms. No standard terms of the Buyer shall be applicable to any contract or order placed by the Buyer with the Seller unless such terms have been accepted expressly by the Seller in writing and the performance of any such contract or order by the Seller shall not be deemed to be an acceptance of any terms of the Buyer by the Seller.

Unless otherwise provided for in these Standard Sales Terms, the relationship between the Seller and the Buyer shall be governed by the provisions of applicable law.

If these Standard Sales Terms are otherwise inapplicable or ineffective for any reason whatsoever, the sale of any goods delivered by the Seller to the Buyer (“the Goods”) shall be subject to the reservations of Clause 6 in Article V hereinbelow.

I. General Terms

1. Any bid or offer submitted by the Seller to the Buyer shall not be binding upon the Seller and unless otherwise expressly agreed upon by the Seller and the Buyer, no contract placed by the Buyer shall be effective unless expressly accepted by the Seller in writing.
2. The title to any sample, drawing or other document or information, whether reduced to writing or in electronic form, including but not limited to any copyrights or other rights associated therewith, which may be provided by the Seller to the Buyer shall remain vested in the Seller and no such sample, drawing or other document or information may be made accessible by the Buyer to any third party.
3. Any performance or other data or description of any Goods by the Seller in any brochure, price list, bid, proposal, offer or any other document which may form part of any such bid, proposal or offer shall be deemed to be approximate in accordance with standard industry practices and shall not be binding upon the Seller unless expressly accepted as binding by the Seller and the Seller does not make any warranties whatsoever with respect to any properties of any of the Goods.
4. Commercial terms agreed between the Seller and the Buyer shall be interpreted in accordance with Incoterms 2000.

II. Price and Payment

1. Unless expressly otherwise agreed upon, any price agreed between the Seller and the Buyer shall be exclusive of any packaging. Each such price shall be exclusive of any sales tax which shall be billed by the Seller in addition to said price at the rate which may be applicable at any time and from time to time.
2. Unless otherwise agreed upon, the price of any of the Goods shall be paid without any deduction for any reason whatsoever as follows:
 - One third upon the receipt of the Seller’s acceptance of the contract placed by the Buyer
 - One third upon the receipt by the Buyer of the Seller’s notice that all main components of the Goods are ready for shipment
 - The remaining sum upon the transfer of the risks of the Goods to the Buyer and upon the issuance of the Seller’s final invoice for the Goods
3. The Buyer shall not have the right to retain any payment due to the Seller for any reason whatsoever and shall not deduct from any moneys due to the Seller any money owed or allegedly owed by the Seller to the Buyer unless any such counterclaim is undisputed by the Seller or has been awarded to the Buyer by a judgment from which no appeal can be taken.
4. If, during the period between the date on which any contract was awarded by the Buyer to or any order was placed by the Buyer with the Seller and the date on which production for the performance of said contract or order commences, any labor, material and/or production costs associated with said contract or order increase for any reason for which the Seller is not liable and the cost of any of the Goods (as defined in Section 255 of the German Commercial Code) as determined in accordance with generally accepted German accounting principles is shown by the Seller to have risen by more than twenty percent (20 %) since the date of contract award or order placement, then the Seller shall have the right to redetermine the price of any such Goods payable by the Buyer under said contract or order provided however that the Seller shall not be entitled to increase said price by more than the increase in said cost.
5. The Buyer shall pay any amount owing to the Seller within seven (7) calendar days from the due date for the payment of said amount.

III. Delivery Time and Late Delivery

1. The time available to the Seller for the delivery of the Goods (“Delivery Time”) shall be as agreed between the Parties in the contract placed. The Seller shall not be obligated to deliver within said Delivery Time unless all technical and commercial details have been agreed upon order placement and the Buyer performs all of its obligations under said contract or order such as, without limitation, any obligation to obtain necessary certificates, approvals or permits from agencies or authorities and the obligation to make any advance payment provided that

any non-satisfaction of any of the preceding conditions shall operate to increase the Delivery Time reasonably and further provided that no delay for which the Seller may be liable shall operate to increase the Delivery Time.

2. The Seller shall not be obligated to deliver any Goods within the Delivery Time unless the Seller receives deliveries from its suppliers as and when ordered by the Seller provided that the Seller shall notify the Buyer as soon as reasonably possible of any delay in delivery it may become aware of.
3. The Seller shall be deemed to have delivered within the Delivery Time if the Goods have left the Seller's works prior to the expiry of the Delivery Time or the Seller has notified the Buyer prior to the expiry of the Delivery Time that the Goods are ready for Delivery.
4. If the Buyer fails to make any payment to the Seller under any contract or order whatsoever when said payment is due, the Seller shall, upon notice to the Buyer, have the right to discontinue performance under the contract awarded or the order placed for the Goods until the payment the Buyer has failed to make when due has been received provided however that the Seller shall not have said right if the payment so due but not made is immaterial.
5. If the Seller is unable to deliver any Goods within the Delivery Time for reasons of force majeure, due to any labor dispute or due to any circumstances beyond the reasonable control of the Seller then the Delivery Time shall be extended reasonably. The Seller shall notify the Buyer of the commencement and the end of any such circumstances as soon as may be reasonably possible.

IV. Transfer of Risk and Acceptance

1. Unless expressly otherwise agreed upon between the Seller and the Buyer, the Goods shall be delivered ex works.
2. If the Goods to be delivered by Seller to the Buyer are divisible, then the Seller shall have the right to deliver and to invoice to the Buyer said Goods in reasonable parts and the Buyer shall not have the right to retain payment for any such reasonable part on the grounds of the non-delivery of any other parts of the Goods.
3. If any delivery by the Seller to the Buyer requires acceptance by the Buyer under any express provision of the order placed by the Buyer or at law, then any delivery by the Seller to the Buyer shall be deemed to have been accepted by the Buyer if and in as far as
 - any Goods manufactured or processed by the Seller are, after delivery, sold to or allowed to be used by any third party or
 - any Goods manufactured or processed by the Seller are, after delivery, processed or mixed or combined with any other things with the agreement of the Buyer or

- any Goods manufactured or processed by the Seller are, beyond trials or tests, used by the Buyer or by any third party with the agreement of the Buyer or
- the Goods are accepted by any purchaser from the Buyer.

Whatever may be earlier provided that any prior acceptance under the contract awarded or the order placed by the Buyer or at law shall take precedence over any acceptance under this Clause.

V. Retention of Title

1. The title to all Goods delivered by the Seller to the Buyer shall remain vested in the Seller until the full payment of all accounts receivable by the Seller from the Buyer for any reason whatsoever provided that under current account arrangements the title so retained shall be deemed to be security for any balance owed to the Seller.

The Buyer shall not dispose of any of the Goods the title to which is so vested in the Seller ("Title Reservation Goods") other than in the Buyer's ordinary course of business provided that the Buyer shall no longer have the right so to dispose of any Title Reservation Goods if and as soon as the Buyer fails to make payments when payments are due. The Buyer shall not have the right to pledge or to transfer by way of security the title to any Title Reservation Goods. The Buyer shall be obligated to maintain the rights of the Seller if the Title Reservation Goods are sold by the Buyer to any third party under credit arrangements. The Buyer shall promptly notify the Seller of any lien of attachment, execution or garnishment or any seizure or the like relating to any Title Reservation Goods.

The Buyer hereby assigns to the Seller and the Seller hereby accepts the Buyer's assignment of any title to payment for any of the Goods resold by the Buyer to any purchaser and any security received by the Buyer from any such purchaser for any such payment provided however that the Buyer shall, subject to any notice to the contrary given by the Seller, have the right to collect any such payment and to enforce any such security at its cost. Upon the request of the Seller, the Buyer shall notify the Seller of the debtors against which titles to payment so assigned are held, the securities provided therefor, the type and the amount of the debt of each such debtor and the type and the amount of each such security and deliver to the Seller all documents which may be necessary to collect any amount so owed by any such debtor. Upon notice to the Buyer, the Seller shall have the right to notify any such debtor of the assignment of the title to payment by the Buyer to the Seller hereunder.

2. If the Goods are sold by the Buyer to any purchaser together with any other goods the title to which is not vested in the Seller, then a share of the full title to payment of the Buyer under said sale to said purchaser equal to the price of said Goods agreed between the Buyer and the Seller shall be deemed to have been assigned by the Buyer to the Seller.

3. Upon the request of the Buyer, the Seller shall waive any title to Goods delivered by the Seller to the Buyer in as far as the value of all Goods the title to which has been retained by the Seller hereunder exceeds one hundred ten percent (110 %) of the value of all titles to payment the Seller holds against the Buyer.
4. The Buyer shall, as of the transfer of risks associated with Title Reservation Goods, insure all Title Reservation Goods against any damage or loss or destruction as a result of any fire, inundation, flooding or theft or any destruction or loss or damage in transit provided that the Buyer shall notify the Seller promptly of any such destruction or loss or damage and shall, upon the request of the Seller, provide to the Seller any documentation of any such loss or damage such as, without limitation, any expert report on said destruction or loss or damage, the names of the insurers of said Goods and, as requested by the Seller, the insurance policy or policies relating to the Title Reservation Goods or insurance certificates issued by the insurer or the insurers for the Title Reservation Goods. The Buyer hereby assigns to the Seller, conditionally as of the time of any such destruction or loss of or damage to any Goods, any title against any insurer or any party liable for any such destruction or loss or damage to a maximum amount equal to the price agreed for any such Goods affected by any such destruction or loss or damage by way of security for all moneys owed by the Buyer to the Seller.
5. Any processing of any Title Reservation Goods by the Buyer shall be for the Seller and the Seller shall be deemed to be the processor for the purposes of Section 950 of the German Civil Code. If Title Reservation Goods are processed, combined or mixed with other goods the title to which is not vested in the Seller, then a fraction of the title to the new product equal to the ratio between the price invoiced to the Buyer for the Goods so processed, combined or mixed and the sum of the price invoiced to the Buyer for the Goods so processed, combined or mixed and the price or prices invoiced to the Buyer for the other goods so processed, combined or mixed shall be vested in the Seller. The Buyer shall be the custodian of any such new product the title to which is vested in the Seller in total or in part for the Seller. If any such Title Reservation Goods are processed, combined or mixed with goods of the Buyer and the goods of the Buyer are the main constituents of the new product thereby created, then the Buyer shall be deemed to have transferred to the Seller a fraction of the title to any such new product computed in accordance with the principles of the preceding sentence and shall be the custodian of said new product for the Seller.

The provisions of Clauses 1 through 4 hereinabove applicable to Title Reservation Goods shall apply mutatis mutandis to any new product obtained by processing, combination or mixing in which the Seller acquires in total or in part a title through the operation of this Clause.
6. If these Standard Sales Terms have not been agreed effectively, any transfer of title to any of the Goods shall be subject to the Seller receiving the full price agreed between the Seller and the Buyer therefor.

VI. Defects

1. General
 - 1.1 If Section 377 or Sections 377 and 381 of the German Commercial Code (sales and contract manufacture agreements between business organizations as defined in Section 1 et seq, of the German Commercial Code) are applicable to the order placed, the Buyer shall notify the Seller promptly of any patent defect in any of the Goods provided that said notice shall be given no later than on the fourth (4th) working day following the delivery of said Goods. Any latent defect in any of said Goods shall be notified promptly by the Buyer to the Seller provided that said notice shall be given no later than on the fourth (4th) working day following the discovery of said defect. Each such notice of any defect in any of the Goods shall be in writing. The conditions applicable to any such notice and the effects of a late notice of any defect in any of the Goods shall furthermore be governed by the conditions of law (Sections 377, respectively 377 and 381 of the German Commercial Code).
 - 1.2 If the Buyer is not a business organization, notice of any patent defect in any of the Goods delivered by the Seller to the Buyer shall be given by the Buyer to the Seller within two (2) weeks following the delivery of said Goods in the case of sales and contract manufacture agreements and within two (2) weeks following acceptance in the case of service agreements. The term provided for hereinbefore shall be deemed to have been complied with if said notice is forwarded by the Buyer within said term and received by the Seller within four (4) weeks from such delivery or acceptance as the case may be. The Buyer shall not be entitled to any remedy for any patent defect in any of the Goods if the Buyer fails to give notice as aforesaid unless and in as far as
 - the Seller is liable for said defect due to willful act, neglect or omission, any act of bad faith or any gross negligence,
 - said defect is covered by a warranty of the Seller in accordance with Section 443 of the German Civil Code or
 - said defect is claimed in connection with loss of human life, injury, impairment of health or loss of freedom.
 Provided that any liability of the Seller for any such defect shall be excluded in accordance with the provisions of law such as but not limited to the provisions of Section 640, paragraph 2, or Section 442 of the German Civil Code if the Buyer had known said defect or did not know said defect due to its own gross negligence.
2. Product Defects
 - 2.1 If any of the Goods delivered by the Seller to the Buyer is defective, the Seller shall remedy said defect by repair or replacement. If said remedial action fails, then, subject to the provisions on damages in Article VII hereinbelow, the Buyer shall be entitled to any of the remedies provided for by law.

- 2.2 If any remedial action is taken by the Seller, then the Seller shall bear all costs and expenses occasioned by the removal of said defect such as, without limitation, any transportation or traveling expenses or any labor or material costs provided however that any extra costs occasioned by the Buyer moving the Goods after delivery to a place other than the registered premises of the Buyer shall be carried by the Buyer unless the removal of said Goods is a use for which the Goods are intended.
- 2.3 The Buyer shall give the Seller the time and the opportunity which may be needed to remove any defect in any of the Goods provided that the Seller shall not be held liable for any consequences of not being given such time and opportunity.
- 2.4 Any repair or replacement by the Seller with respect to any Goods shall irrespective of the scope of any such repair or replacement not be deemed to be an acceptance of any liability for any defect in any of the Goods claimed by the Buyer provided that no persons other than legal representatives or procurators under Sect. 49 German Commercial Code ("Prokuristen") of the Seller shall have the right to accept any liability for any defect on behalf of the Seller.
- 2.5 If any defect in any of the Goods claimed by the Buyer shows not to be a defect for which the Seller is liable, then the Buyer shall reimburse to the Seller all costs reasonably incurred by the Seller to remove said alleged defect in good faith provided that material and labor costs so incurred by the Seller shall be reimbursed at the Seller's standard rates applicable at the time when the alleged defect was so removed.
- 2.6 The Buyer shall not be entitled to the removal by the Seller of any defect due to any of the following:
- Improper use of any Goods or use of any Goods for a purpose for which the Goods are not fit or defective installation or commissioning of the Goods by the Buyer or any third party
 - Natural wear and tear, improper or negligent handling, improper maintenance or use of any unfit consumables or utilities
 - Defective construction work, unsuitable foundations or chemical, electrochemical or electrical interference unless caused by the Seller
- 2.7 The Seller shall not be held liable for the consequences of any improper or inappropriate removal of any defect in any of the Goods by the Buyer or any third party or any modification to any of the Goods made without the Seller's prior consent.

3. Legal Defects

- 3.1 The liability of the Seller for the Goods not to be in breach of any third-party industrial property rights or copyrights shall be limited to the Federal Republic of Germany and the country in which the Buyer is registered. The Seller shall have no such liability for any other country, such as any country to which the Goods may be moved by the Buyer, unless such other country has been notified by the Buyer to the Seller prior to awarding the contract or placing the order for the Goods.

- 3.2 If the use of the Goods delivered by the Seller to the Buyer is in breach of any third-party industrial property rights or copyrights and the Seller is liable for said breach according to Clause 3.1 hereinabove, the Seller shall, at its cost, obtain for the Buyer the right to continue the use of said Goods or modify said Goods in a manner reasonably acceptable to the Buyer so that said Goods will no longer be in breach of any such industrial property rights or copyrights. If such rights cannot be obtained at reasonable commercial terms or within a reasonable period of time and if the Goods cannot be so modified, then the Buyer shall have the right, at its discretion, to rescind the contract awarded by the Buyer to the Seller or the order placed by the Buyer with the Seller or to obtain from the Seller a reasonable reduction in the price of said Goods.

The Seller shall in any such event further indemnify the Buyer against any undisputed claims or any claims determined by non-appealable court decision of the owners of such industrial property rights or copyrights.

- 3.3 Subject to Clause 3.4 hereinbelow, the Buyer shall not have the rights under Clause 3.2 hereinabove, unless
- the Buyer notifies the Seller promptly of any breach of industrial property rights or copyrights claimed by any third party,
 - the Buyer reasonably supports the defense of any such claims by the Seller and allows the Seller to make modifications as referred to in Clause 3.2 hereinabove,
 - the Buyer allows the Seller to defend at its own cost any such claim or to make any out-of-court settlement with respect to any such claim as the Seller may think fit,
 - the legal defect is not due to any instructions given by the Buyer to the Seller and
 - the legal defect is not due to any modification of the Goods by the Buyer or any use of the Goods not in conformity with the intended use.
- 3.4 Notwithstanding the limitations in Clauses 3.2 and 3.3 hereinabove, the provisions laid down by law shall apply, if and in as far as
- the title of the Buyer against the Seller is held under Section 478 or under Sections 651 and 478 of the German Civil Code,
 - the Seller is liable for the breach of the industrial property rights or the copyrights due to any willful act, neglect or omission or any gross negligence on the part of the Seller,
 - the Seller warranted (as provided for in Section 443 of the German Civil Code) that the Goods will not violate any industrial property rights or copyrights or
 - any damages claimed as a result of any breach of any industrial property rights or copyrights are on the grounds of any loss of life, injury, loss of health or loss of freedom.

4. Warranties Under Section 443 of the German Civil Code

No person other than a legal representative or a procurator under Sect. 49 German Commercial Code ("Prokuristen") of the Seller will have the right to agree any warranties according to Section 443 of the German Civil Code.

VII. Liability and Damages

1. The Seller shall be liable for any willful acts, neglects and omissions and any gross negligence of its legal representatives and/or any other persons authorized by the Seller to perform any of the obligations of the Seller under any contract awarded to the Seller or order placed with the Seller ("Agent or Employee").
2. In the event of any ordinary negligence of any legal representative, Agent or Employee of the Seller, the liability of the Seller shall be limited to liability for any loss or damage the Seller foresaw when the contract was awarded or the order was placed by the Buyer or should have foreseen when the contract was awarded or the order was placed by the Buyer considering the circumstances the Seller knew or should have known when the contract was awarded or the order was placed by the Buyer.

If and in as far as any loss or damage suffered by the Buyer due to the ordinary negligence of any legal representative, Agent or Employee of the Seller is compensated by any final payment by any insurer under any insurance contract against loss or indemnity concluded by the Buyer or for the Buyer such as, but not limited to any liability, all-risks, transportation, fire or business interruption insurance, the liability of the Seller shall be limited to any losses incurred by the Buyer as a result of any such insurance claim such as, without limitation, any increase in insurance premium. Any liability of the Seller for any loss or damage caused by the ordinary negligence of any of the legal representatives, Agents or Employees of the Seller and covered by a final insurance payment to the Buyer shall be excluded.

Subject to the limitations provided for hereinbefore, any liability of the Seller for any loss or damage caused by the ordinary negligence of any legal representative, Agent or Employee of the Seller shall for each incident be limited to an amount of two hundred fifty thousand Euros (250,000 €).

3. The exclusions and limitations of liability provided for hereinabove shall not apply,
 - if and in as far as the Seller is held liable for any human loss of life, injury or loss of health,
 - if and in as far as the Seller is held liable under the German Product Liability Act or
 - if and in as far as the Seller is held liable under any warranty in accordance with Section 443 of the German Civil Code agreed by the Seller to provide security to the Buyer with respect to the loss or damage incurred by the Buyer.
4. The provisions of Clauses 1 through 3 hereinabove shall not operate to alter any of the provisions of law regarding the onus probandi.

VIII. Limitation

1. The period of limitation with respect to any defect shall be a period of one (1) year provided that said period shall be five (5) years for any defect in any Goods serving as civil engineering structure or structures or any defect in any civil engineering structure caused by any Goods ordinarily used in civil engineering structures.
2. The period of limitation with respect to any other cause under the contract awarded or the order placed by the Buyer or any other cause outside said contract or order shall be a period of eighteen (18) months.
3. Notwithstanding the provisions of Clauses 1 and 2 herein-above, the periods of limitation allowed by law shall apply, if and in as far as
 - the title held by the Buyer against the Seller is under Section 478 or Sections 651 and 478 of the German Civil Code,
 - the title of the Buyer is held on the grounds of any willful act, neglect or omission, any act of bad faith or any gross negligence on the part of any of the legal representatives, Agents or Employees of the Seller,
 - the title held by the Buyer against the Seller is on the grounds of any loss of life, injury, loss of health or loss of freedom of any person,
 - the title held by the Buyer against the Seller is under the German Product Liability Act,
 - the title held is on the grounds of a third party title in rem which grants any such third party a title to the surrender of the Goods (Sect. 438 para.1 subsubpara. a German Civil Code) or
 - the title held is on the grounds of any title recorded in any register of deeds (Sect. 438 para.1 subpara. b German Civil Code).

The provisions in Clauses 1 and 2 shall further not apply if the title is held by the Buyer under a warranty of the Seller in accordance with Section 443 of the German Civil Code provided that any such title shall exclusively be subject to the provisions of Clause 4 hereinbelow.

4. The period of limitation applicable to any warranty of the Seller in accordance with Section 443 of the German Civil Code shall commence upon the delivery of the Goods to the Buyer or, if acceptance by the Buyer is required by law, upon the acceptance of the Goods by the Buyer provided that, in the event of bad faith, said period shall commence as provided for in Section 438, paragraph 3, of the German Civil Code. Said period shall terminate as provided for in Section 438 of the German Civil Code unless a shorter period has been agreed according to the terms of the warranty under Section 443 of the German Civil Code.
5. Clauses 1 through 4 hereinabove shall not operate to alter any of the provisions of Sections 196, 197 and 479 of the German Civil Code or any of the provisions of law applicable to the onus probandi.

IX. Software Use

If the contract awarded by the Buyer to the Seller or the order placed by the Buyer with the Seller provides for the supply of software, the Buyer will be granted a non-exclusive right to use said software and any documentation of said software. Said software will be supplied by the Seller to the Buyer for use with the Goods delivered by the Seller to the Buyer provided that the Buyer shall not have the right to use said software on more than one system.

Any copying, modification or translation of said software or any conversion of the object code of said software into source code shall be limited as provided for in Section 69 et seq. of the German Copyright Act. The Buyer agrees not to remove from said software any reference to the developer of said software such as, without limitation, any copyright reference and not to modify any such reference unless the prior express content of the Seller has been obtained.

Any other rights associated with such software and any documentation of said software and any copies thereof shall remain vested in the Seller or the supplier of said software as the case may be. The Buyer shall not grant any sub-license.

X. Applicable Law and Jurisdiction

1. The relationship between the Seller and the Buyer shall exclusively be governed by the law of the Federal Republic of Germany as the same may be applicable to the relationship between two German parties provided however that the application of the United Nations Convention on Contracts for the International Sale of Goods of 11 April 1980 shall be excluded.
2. If the Buyer is a business or any public-law legal person or other entity, any dispute between the Seller and the Buyer shall be settled by the courts having jurisdiction at the registered offices of the Seller provided however that the Seller shall have the right to bring action against the Buyer in the courts having jurisdiction at the registered offices of the Buyer.
3. If any of the terms and conditions of the Contract or these Standard Sales Terms is or become ineffective, the remaining provisions of the Contract and these Standard Sales Terms shall remain in full force and effect. Any such ineffective provision shall be deemed to have been replaced by the Seller and the Buyer by an effective provision which shall have commercial, financial and economic implications which shall be as close to those of said ineffective provision as may be reasonably.

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