

## GENERAL INFORMATION

Various fittings can be used for glass pipelines and apparatus and, on the product side; they are designed with the sealing and installation materials borosilicate glass 3.3 and PTFE or similar highly corrosion-resistant materials. Examples are the straight through valve and bottom outlet valve, shown in the images below.



VS... straight through valve



VOB... bottom outlet valve

In addition, there is a range of options, such as flexible operating extensions for fittings in difficult-to-reach places – see the following photo – position initiators for manual and controlled valves, valves designed without non-ferrous metals or also pneumatically-controlled valves.



VE...-H...angle valve with flexible operating extension



VS...-O3 straight through valve with position initiator OFF

The valves made of borosilicate glass 3.3 as well as the connection flange couplings are permitted according to the Technical Guidelines on Air Quality Control (TA-Luft). The operating conditions given in chapter 10 should be observed for valves in the PF system.

Please contact our specialists for any requirements for your application not covered in this catalogue.

An overview of the various valves is shown in the following:

Valves for Pipings, On/Off:

- Angled seat valve, type VS ...
- Angle valve, type VE ...
- Drain valve, type VD ...
- Vent valve, type VA ...
- Three way valve, type VT ...
- Double valve, type VED...
- High pressure valve, lined, type VEP...



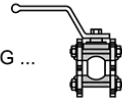
Check valves:

- Ball check valves, vertical, type VNV ...
- Ball check valve, vertical, flange insert, type VNV ...-O8
- Ccheck valve, horizontal, type VNH ...



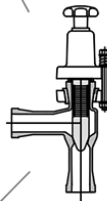
Ball valves:

- Ball valve, PTFE-lined, type VBP ...
- Ball valve, Glass-connection, type VBG ...
- Flap, type VFP ...



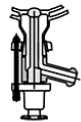
Options:

- Flexible operating extension
- Pneumatic actuation
- Free of non-ferrous materials
- Stainless steel



Apparatus- and special valves:

- Bottom outlet valve, type VOB ...
- Rupture disc, type VBD ...
- Membrane valves, type VM ...
- Gas mixing valves, type VG ...
- Dirt trap, type VFD...
- Pipeline filter, type VFF...



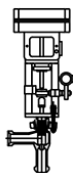
Sampling valves:

- Sampling-system, liquid, horizontal pipeline, type VSL ...
- Sampling-system, gaseous, condensable, type VSG ...
- Sampling-system in reactors, liquid, type VSR ...



Valve with controlling function:

- Pressure relief valves (bypass-valve), manual, type VP ...
- Pressure reducing valve, manual, type VR ...
- Control valve, manual (needle-valve), type VCM ...
- Control valve, el./pneumatic, type VCE ...
- Three way valve, clocked (e.g. Reflux divider ) (see "Apparatuses", chap. 7)



## VALVES, ON/OFF

Valves are designed highly corrosion-resistant with a valve housing made of borosilicate glass 3.3 and a valve plunger made of PTFE. The valve plunger is designed in the form of bellows and is operated using a spindle without a packing gland. Aside from opening / closing, the flow rate can be controlled and set using the head of the valve plunger.

The ON/OFF valves are available as straight through valves and angle valves. The options given at the end of this chapter can be selected for the valves. Examples are:

<b>Description of OPTIONAL MANUAL ON/OFF VALVES:</b>	<b>Item number</b>	<b>Example</b>
Straight through valve, KF system:	VS....-K	VS 025-K
Angle valve, KF system:	VE....-K	VE 025-K
Angle valve, KF system, former design:	VE....-K-O10	VE 025-K-O10
Angle valve, KF system, with a TAG number provided by the customer:	VE....-K-TAG	VE 025-K-TAG
Straight through valve, KF system, flexible operating extension 1 m:	VS....-K-H22	VS 025-K-H22
Straight through valve, KF system, manual, positioning feedback OFF:	VS....-K-O3	VS 025-K-O3
Straight through valve, KF system, conductive PTFE with earthing:	VS....-K-M2	VS 025-K-M2
Straight through valve, KF system, with PTFE round bellow folds:	VS....-K-M3	VS 025-K-M3
Straight through valve, KF system, conductive coating and PTFE:	VS....-K-C3-M2	VS 025-K-C3-M2
Straight through valve, KF system, with FDA material certificates:	VE....-K-Z1	VE 025-K-Z1

By entering the option "SP..." replacement parts can also be ordered for the valves.

<b>Description of SPARE PARTS FOR MANUAL ON/OFF VALVES:</b>	<b>Item number</b>	<b>Example</b>
Glass valve body for angle valve, KF system:	VS....-K-SP01	VS 025-K-SP01
PTFE plug for on/off valves, PF and KF system:	VS....-SP02	VS 025-SP02
PTFE plug for on/off valves, KF system, former design:	VS....-K-O10-SP02	VS025-K-O10-SP02
Valve top, manual, PF and KF system:	VS....-SP03	VS 025-SP03
Valve top together with PTFE plug, PF and KF system:	VS....-SP04	VS 025-SP04

The on/off valves can optionally be designed with a pneumatic actuator manufactured by SAMSON. In order to mount the pneumatic valves each of the yoke rods is fitted with a 3/4"-connection structure fitting. The valve air pressure only measures 2.5 bar for actuators and this value is not allowed to be exceeded by more than 10 %. An air supply pressure controller can additionally be attached on request.

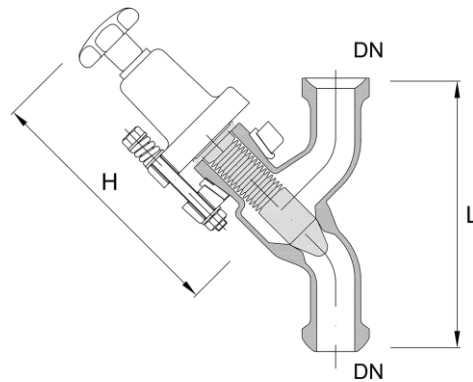
The – RP ... options given at the end of this chapter can be selected for the pneumatic valves with the following basic definitions.

- Explosion-proof design (ATEX)
- Safety position OPEN/CLOSED
- Position indicator for valve position OPEN/CLOSED
- Design with/without solenoid valve

Examples of item descriptions corresponding to pneumatic valves are:

<b>Description of extra PNEUMATIC OPTIONS:</b>	<b>Item number</b>	<b>Example</b>
Angle valve, KF system, pneumatic, not EX proof, safety position CLOSED, without position indicator, without solenoid valve	VE....-K-RP0100	VE 025-K-RP0100
Angle valve, KF system, pneumatic, EX proof, safety position OPEN with position indicator, with solenoid valve	VE....-K-RP1231	VE 025-K-RP1231

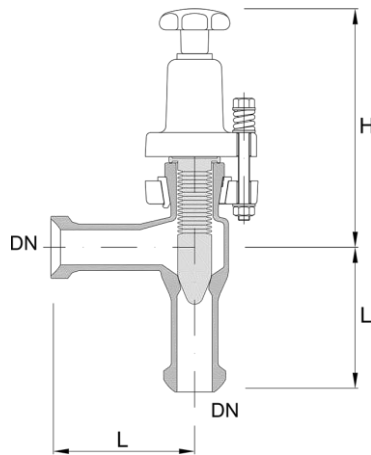
**STRAIGHT THROUGH VALVE, ON/OFF**



VS...-K straight through valve

DN	H* [mm]	L [mm]	Item no.
15	85	150	VS 015-K
25	175	200	VS 025-K
40	220	300	VS 040-K
50	230	300	VS 050-K
80	315	400	VS 080-K
100	275	500	VS 100-K

**ANGLE VALVE, ON/OFF**

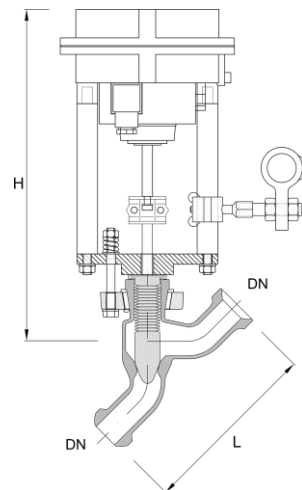


VE...-K angle valve

DN	H* [mm]	L [mm]	Item no.
15	85	50	VE 015-K
25	175	100	VE 025-K
40	220	150	VE 040-K
50	230	150	VE 050-K
80	315	200	VE 080-K
100	275	250	VE 100-K

\* For valves with position initiator the structural length H is increased by approx. 45 mm

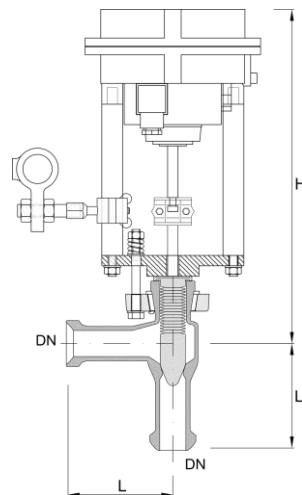
**STRAIGHT THROUGH VALVE, ON/OFF, PNEUMATIC**



VS...-K-RP...straight through valve, pneumatic

DN	H [mm]	L [mm]	Item no.
25	265	200	VS 025-K-RP...
40	305	300	VS 040-K-RP...
50	305	300	VS 050-K-RP...
80	350	400	VS 080-K-RP...
100	360	500	VS 100-K-RP...

**ANGLE VALVE, ON/OFF, PNEUMATIC**



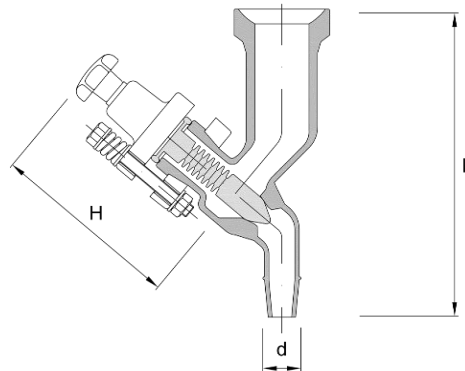
VE...-K-RP...angle valve, pneumatic

DN	H [mm]	L [mm]	Item no.
25	265	100	VE 025-K-RP...
40	305	150	VE 040-K-RP...
50	305	150	VE 050-K-RP...
80	350	200	VE 080-K-RP...
100	360	250	VE 100-K-RP...

## DRAIN VALVE, ON/OFF

Drain valves are designed as straight through valves with a reduced valve seat cross-section and outlet diameter as well as a tubing olive connection.

A range of options are available for the drain valves, for example valves with a customised tube connection or valves with a threaded outlet and sealing cap instead of a tubing olive. In addition to this the TAG numbers specified by the customer for the valves can be attached and certificates can be included in the delivery.



VD...-K Drain valve

### Description of OPTIONS:

Drain valve, PF system:

### Item number

VD....-K

### Example

VD 025-K

Drain valve, PF system, TAG number specified by customer:

VD....-K-TAG

VD 025-K-TAG

Drain valve, PF-system, with larger 26 mm tubing olive:

VD....-K-F6

VD 025-K-F6

Drain valve, PF system, with GL25 thread, without screw cap:

VD....-K-F8

VD 025-K-F8

Drain valve, PF system, with GL25 thread and screw cap:

VD....-K-F8-O11

VD 025-K-F8-O11

Drain valve, PF system, operational extension 1 m:

VD....-K-H22

VD 025-K-H22

Drain valve, PF system, conductive PTFE with earthing:

VD....-K-M2

VD 025-K-M2

Drain valve, PF system, with FDA material certificates:

VD....-K-Z1

VD 025-K-Z1

### Description of REPLACEMENT PARTS:

PTFE plunger for Drain valve:

### Item number

VD....-SP02

### Example

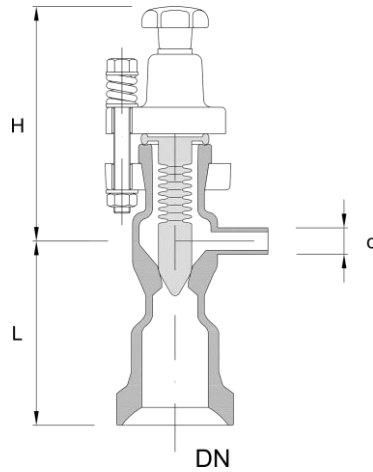
VD 025-SP02

DN	H [mm]	d [mm]	L [mm]	Item no.
15	85	Ø16	140	<b>VD015-K</b>
25	85	Ø16	140	<b>VD025-K</b>
40	170	Ø26	200	<b>VD040-K</b>
50	170	Ø26	200	<b>VD050-K</b>

**VENT VALVE**

Drain valves are usually used as vent valves.

Alternatively the following vent valves can be used as space-saving and finely adjustable variants for ventilating apparatus and pipelines.



VA...-K Vent valve

**Description of OPTIONS:**

Vent valve, KF system:

Vent valve, KF system, TAG number specified by customer:

Vent valve, KF system, conductive PTFE:

Vent valve, KF system, with FDA material certificates:

**Item number**

VA...-K

VA...-K-TAG

VA...-K-M2

VA...-K-Z1

**Example**

VA 025-K

VA 025-K-TAG

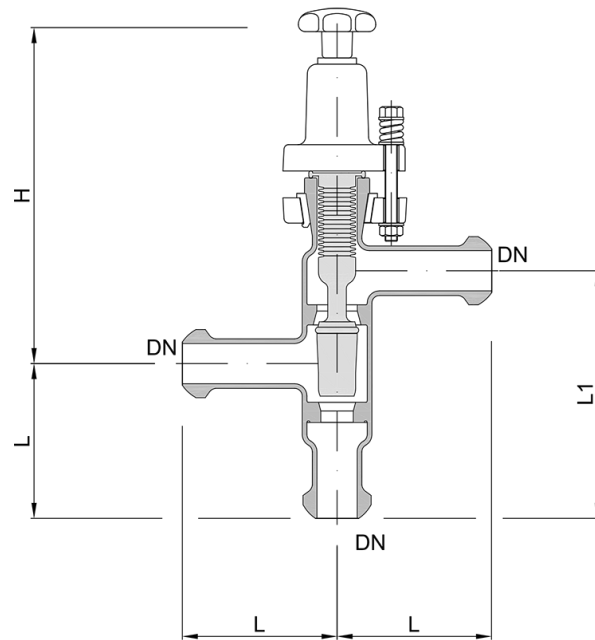
VA 025-K-M2

VA 025-K-Z1

DN	L [mm]	d [mm]	H [mm]	Item no.
15	60	Ø10	87	<b>VA 015-K</b>
25	70	Ø10	87	<b>VA 025-K</b>
40	70	Ø10	87	<b>VA 040-K</b>

**THREE WAY VALVE**

Three way valves are designed with a double valve seat so that one passage is always open. Therefore three way valves are always used in situations when it needs to be ensured that both outlets are not shut at the same time, which would lead to unpermitted high pressures building up in the supply pipe.



VT...-K three way valve

**Description of OPTIONS:**

Three way valve, KF system:

Three way valve, KF system, TAG-number specified by customer:

Three way valve, KF system, conductive PTFE:

Three way valve, KF system, with FDA material certificates:

**Item number**

VT....-K

VT....-K-TAG

VT....-K-M2

VT....-K-Z1

**Example**

VT 025-K

VT 025-K-TAG

VT 025-K-M2

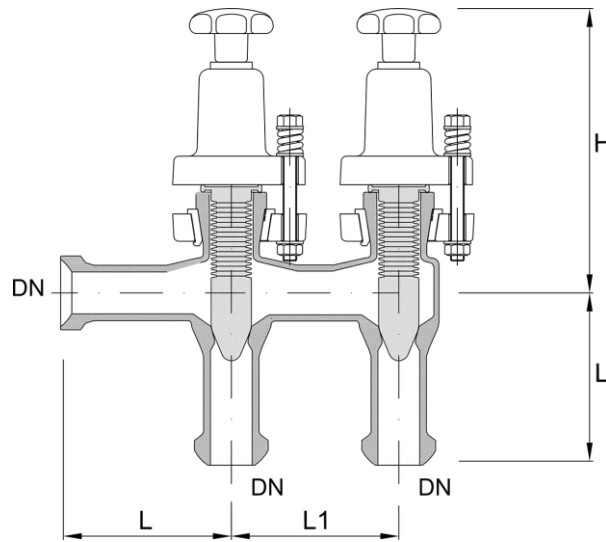
VT 025-K-Z1

DN	L [mm]	L1 [mm]	H [mm]	Item no.
25	100	160	232	<b>VT 025-K</b>
40	150	220	270	<b>VT 040-K</b>



**DOUBLE VALVE**

Double valves or multiport valves are used to distribute liquids in a way which saves space and reduces dead space. This means a distillate can be distributed into several separate distillate collection vessels with these advantages.



VED...-K double valve

**Description of OPTIONS:**

Double valve, KF system:

Double valve, KF system, TAG number specified by customer:

Double valve, KF system, conductive PTFE:

Multi-port valve, KF system, for example design with 3 valves:

**Item number**

VED...-K

VED...-K-TAG...

VED...-K-M2

VED...-K-O53

**Example**

VED 025-K

VED 025-K-TAG1234

VED 025-K-M2

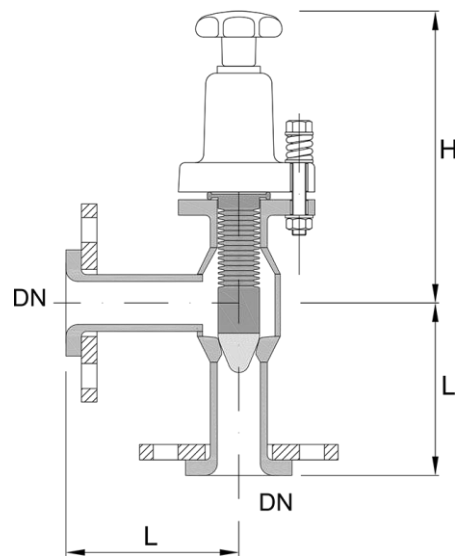
VED 025-K-O53

DN	L [mm]	L1 [mm]	H [mm]	Item no.
15	50	75	85	<b>VED 015-K</b>
25	100	100	175	<b>VED 025-K</b>
40	150	150	220	<b>VED 040-K</b>

## HIGH PRESSURE VALVE

High pressure valves are intended especially to form transitions with apparatus that work under high pressures and for glass pipelines with the permitted operating conditions according chapter 10. A typical area of usage is the connection of angle valves for dispensing into enamelled vessel so that, on the one hand, a dosed flow-in or reflux into the vessel is possible, and on the other hand the reactor can be operated under increased pressure before or after a dosage.

The flange connections of the high pressure valves are generally designed in accordance with EN 1092-1, PN 10. The permitted operating pressure is  $1/+10$  barg. The permitted operating temperature is  $0/+150$  °C but it can be adapted according to the project requirements.



VEP...high pressure valve

### Description of OPTIONS:

High pressure valve:

High pressure valve, conductive PTFE / ETFE:

### Item number

VEP....

VEP....-M2

### Example

VEP 025

VEP 025-M2

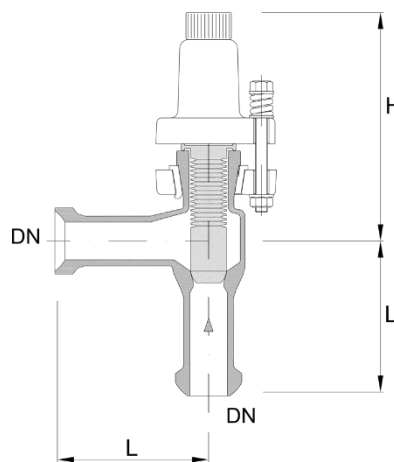
DN	H [mm]	L [mm]	Permitted operating pressure [barg]	Item no.
25	170	100	-1/+10	<b>VEP 025</b>
40	215	150	-1/+10	<b>VEP 040</b>
50	210	150	-1/+10	<b>VEP 050</b>

**PRESSURE RELIEF VALVE**

Pressure relief valves are used to set a constant inlet pressure. A typical area of application is the maintenance of pressure after pumps.

In order to set the desired inlet pressure the spring inside the valve bonnet can be intentionally put under tension. A standard inlet pressure of 0.5 bar above atmospheric pressure is normally set at the valve outlet. The initial tension can be set by the customer with up to a 1.5 bar difference in pressure between the valve inlet and outlet, whilst making sure permitted operating conditions are observed.

Pressure relief valves can be optionally delivered with a lifting lever device, for example for emptying pump lines. Pressure relief valves may not be used as safety valves as they have not received the necessary approval for such applications.



VP...-K pressure relief valve with lifting lever

**Description of OPTIONS:**

Pressure relief valve, PF system:

Pressure relief valve, PF system, with lifting lever:

Pressure relief valve, PF system, conductive PTFE with earthing:

Pressure relief valve, PF system, with FDA material certificates:

**Item number**

VP....-K

VP....-K-O4

VP....-K-M2

VP....-K-Z1

**Example**

VP 025-K

VP 025-K-O4

VP 025-K-M2

VP 025-K-Z1

**Description of REPLACEMENT PARTS:**

PTFE plunger for pressure relief valve:

**Item number**

VP....-SP02

**Example**

VP 025-SP02

DN	H [mm]	L [mm]	Item no.
15	85	50	<b>VP 015-K</b>
25	175	100	<b>VP 025-K</b>
40	220	150	<b>VP 040-K</b>
50	230	150	<b>VP 050-K</b>

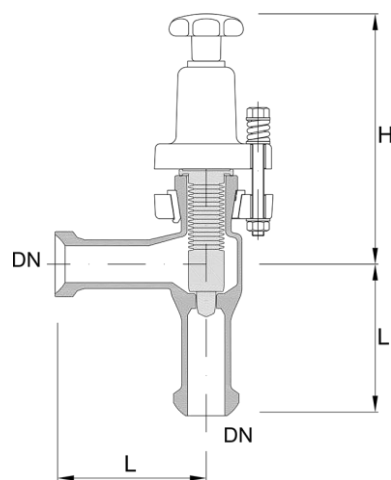
**CONTROL VALVES**

In order to intentionally control the flow in pipelines control valves are manufactured that have a defined control flow range. This flow range is defined using the so-called »Kvs value«, which gives the flow in m<sup>3</sup>/h of water at 20 °C for a pressure loss of p=1 bar through the fully open valve. The possible Kvs values range from 0.1 – 40 and are in linear design.

In general the control valves are delivered in angled design.

**CONTROL VALVE, MANUAL**

Manual control valves are designed from borosilicate glass 3.3 and PTFE on the product side as needle valves. For manual control valves the following options are available.



VCE...-K-RC...manual control valve

**Description of MANUAL OPTIONS:**

Control valve, manual, Kvs value 6.3:

Control valve, manual, TAG no. specified by customer:

Control valve, manual, Kvs value 16.0:

Control valve, manual, Kvs value 6.3, conductive PTFE:

**Item number**

VCE....-K-RC063

VCE....-K-RC063-TAG

VCE....-K-RC160

VCE....-K-RC063

**Example**

VCE 025-K-RC063

VCE 025-K-RC063-TAG

VCE 040-K-RC160

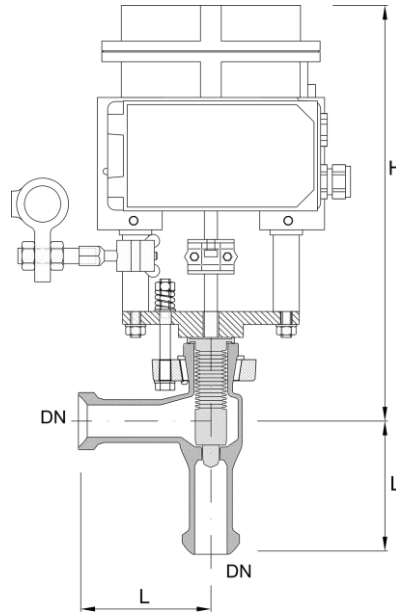
VCE 025-K-RC063

DN	L [mm]	H [mm]	Kvs value	Item no.
15	50	85	0,1 – 1,6	<b>VCE 015-K-RC...</b>
25	100	175	0,1 – 6,3	<b>VCE 025-K-RC...</b>
40	150	220	6,3 - 16	<b>VCE 040-K-RC...</b>
50	150	230	16 - 40	<b>VCE 050-K-RC...</b>

**CONTROL VALVE WITH PNEUMATIC ACTUATOR**

Control valves can also be provided with a pneumatic actuator manufactured by SAMSON instead of a manual controller. In order to mount the valves one of the yoke rods must always be fitted with a 3/4"-connection structure fitting. The valve air pressure measures 2.5 bar for all actuators and this value is not allowed to be exceeded by more than 10 %. An air supply pressure controller can additionally be attached on request.

The standard design of control valves are fitted with an electropneumatic positioning controller (I/P-design, control signal 4...20 mA).



VCE...-K-RC...-RP...control valve, pneumatic

The following RP ...options are possible for pneumatic control valves:

- ATEX design
- Fail-safe position
- Limit switch with built-in inductive proximity switches or built-in analogue positioning feedback (4...20 mA)
- With / without 3/2 way solenoid valve

The membrane actuators are can also be delivered with HART or PROFIBUS positioning controllers. If needed please contact our specialist department to make requests about options in addition to the standard designs.

**Description of PNEUMATIC OPTIONS:**

Angle valve, pneumatic, non-Ex-proof, safety position CLOSED without position initiators, without solenoid valve: **Item no.** VCE....-K-RC063-RP0100 **Example** VCE 025-K-RC063-RP0100

Angle valve, pneumatic, ATEX, safety position ON, with analogue positioner, with solenoid valve: **Item no.** VCE....-K-RC063-RP1241 **Example** VCE 025-K-RC063-RP1241

DN	L [mm]	H [mm]	Kvs value	Item no.
15	50	245	0,1 – 1,6	<a href="#">VCE 015-K-RC...-RP...</a>
25	100	265	0,1 – 6,3	<a href="#">VCE 025-K-RC...-RP...</a>
40	150	305	6,3 - 16	<a href="#">VCE 040-K-RC...-RP...</a>
50	150	305	16 - 40	<a href="#">VCE 050-K-RC...-RP...</a>

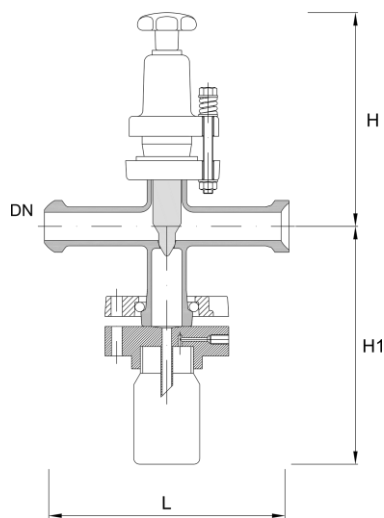
**SAMPLING VALVES**

Sampling valves are needed in the construction of glass apparatus for apparatus and for pipelines. The samples are mainly taken as liquids but sometimes also as condensable vapours. The corresponding standard solutions are described in the following.

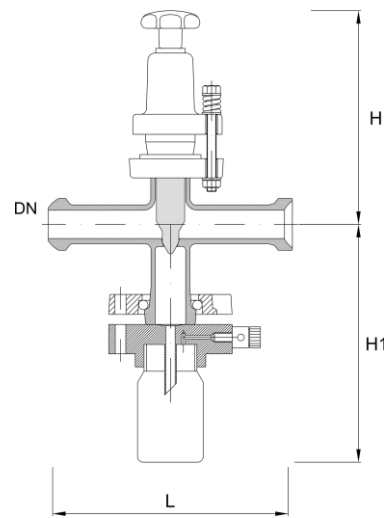
**SAMPLING VALVE LIQUIDS FROM PIPELINES**

Type VSL sampling valves are used to minimise dead space while taking samples of liquids from horizontal pipelines. The standard sampling valves are used for normal pressure and slight excess pressure conditions. When operating in a vacuum samples taken with type VSL valves are carried out with option V.

The liquid sample flows into a vacuum-tight, screw-on 100 ml laboratory flask with a GL 45 thread from which it can be extracted. To equalise the pressure or to draw a vacuum over a G1/4" three way valve a side bore is drilled into the sampling flange.



VSL...-K sampling valve



VSL...-K-V sampling valve for vacuum

**Description of OPTIONS:**

Sampling valve for pipelines:

Sampling valve for pipelines, for vacuum:

Sampling valve for pipelines, conductive PTFE:

**Item number**

VSL...-K

VSL...-K-V

VSL...-K-M2

**Example**

VSL 025-K

VSL 025-K-V

VSL 025-K-M2

**Description of REPLACEMENT PARTS:**

PTFE plunger for sampling valve:

Sampling flask, 100 ml:

**Item number**

VSL...-SP02

VSL...-SP04

**Example**

VSL 025-SP02

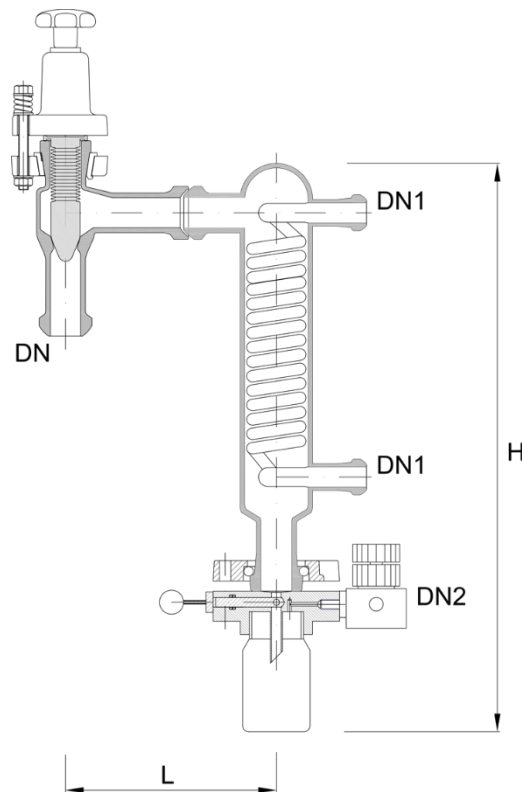
VSL 025-SP04

DN	L [mm]	H [mm]	H1 [mm]	Item no.
15	150	140	210	<b>VSL 015-K</b>
25	200	200	215	<b>VSL 025-K</b>
40	300	200	223	<b>VSL 040-K</b>
50	300	200	228	<b>VSL 050-K</b>

**SAMPLING FOR CONDENSABLE VAPOURS AND COLLECTING FLASKS**

Sampling valves, or better sampling systems for condensable vapours, can be flanged to apparatus or apparatus supply pipes, for example to side branches of distillation or rectification columns.

The gases are condensed in a 0.1 m<sup>2</sup> heat exchanger and collected in a screw-on 100 ml sampling flask. The PPh connection flange is used to ventilate and a 3/2 way valve is used for drawing a vacuum or for inerting / equalising pressure.



VSG...-K-V sampling for condensable vapors,

**Description of OPTIONS:**

Sampling of condensable vapors:

Sampling of condensable vapors, for vacuum:

Sampling of condensable vapors, conductive PTFE:

**Item number**

VSG....-K

VSG....-K-V

VSG....-K-M2

**Example**

VSG 025-K

VSG 025-K-V

VSG 025-K-M2

**Description of REPLACEMENT PARTS:**

PTFE plunger for sampling:

**Item number**

VSG....-SP02

**Example**

VSG 025-SP02

DN	DN 1	DN2	L [mm]	H [mm]	Item no.
15	15	G 1/4"	200	475	<b>VSG 015-K</b>
25	15	G 1/4"	200	475	<b>VSG 025-K</b>

CHECK VALVES

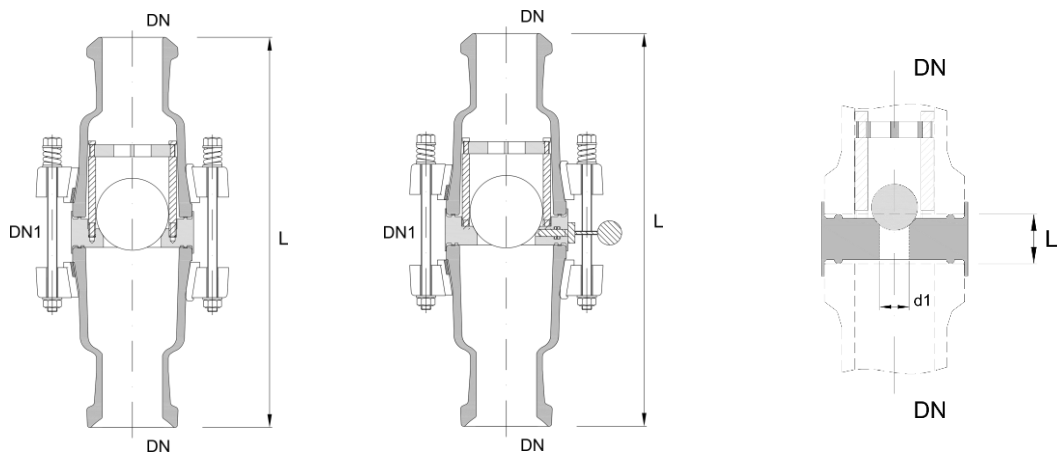
Check valves determine the direction of flow, i.e. they allow flow in one direction and prevent back-flow. For the construction of glass apparatus the following solutions for horizontal and vertical pipelines are available.

Check valves cannot generally adopt a constant shut-off function.

BALL CHECK VALVES, VERTICAL, TYPE VNV

Ball check valves can be installed in vertical piping with an upward direction of flow. The balls are made of solid ptfе (for densities up to 1,000 kg/m<sup>3</sup>), hollow balls can also optionally be used (for densities up to 10 kg/m<sup>3</sup>) for lower resistances, and tantalum balls for high fluid densities.

In addition to the standard variant with type vnv... glass connection flanges, the variant for flanging in between 2 glass flanges, type vnv ...-k-o8, can be used with glass or ptfе balls (for densities up to 1,000 kg/m<sup>3</sup>) for low construction heights.



VNV...-K check valve

VNV...-K-O7 check valve

VNV...-K-O8 flange insert check valve

Description of options:

Ball check valve, vertical pipelines:

Ball check valve, vertical pipelines, hollow ball:

Ball check valve, vertical pipelines, lifting lever:

Flange insert check valve, vertical pipelines:

Flange insert check valve, vertical pipelines, conductive ptfе

item number

example

vnv...-k	vnv 025-k
vnv...-k-o6	vnv 025-k-o6
vnv...-k-o7	vnv 025-k-o7
vnv...-k-m1	vnv 025-k-m1
vnv...-k-m2	vnv 025-k-m2

Description of replacement parts:

Solid ball ptfе for check valve:

Hollow ball ptfе for check valve:

item number

example

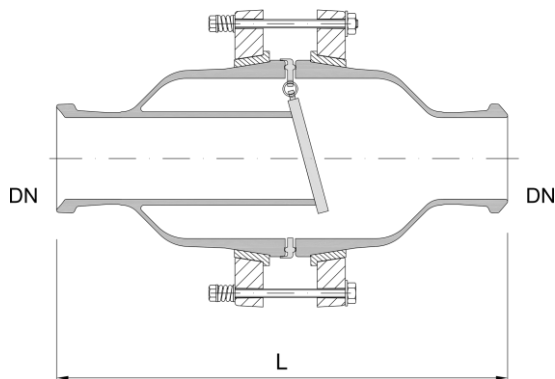
vnv...-sp05	vnv 025-sp05
vnv...-sp06	vnv 025-sp06

Dn	dn1	d1 [mm]	l [mm]	item no. with glass flanges	D1 [mm]	l [mm]	item no. flange insert
15	50	Ø23	225	<b>vnv 015-k</b>	Ø5	15	<b>vnv 015-k-o8</b>
25	50	Ø23	225	<b>vnv 025-k</b>	Ø9	15	<b>vnv 025-k-o8</b>
40	80	Ø48	325	<b>vnv 040-k</b>	Ø20	25	<b>vnv 040-k-o8</b>
50	80	Ø48	325	<b>vnv 050-k</b>	Ø24	25	<b>vnv 050-k-o8</b>
80	80	Ø48	325	<b>vnv 080-k</b>	Ø40	25	<b>vnv 080-k-o8</b>

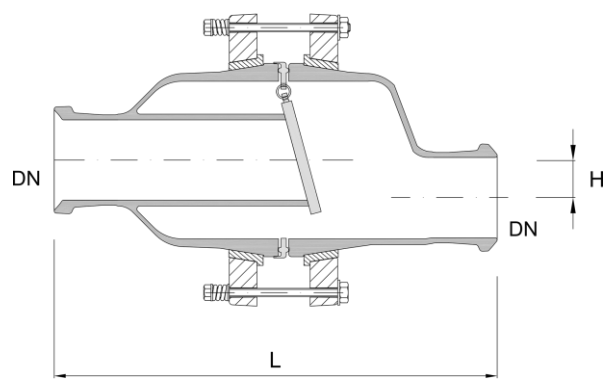


CHECK VALVES, HORIZONTAL/VERTICAL, TYPE VNH AND VNEH

Type VNH and VNEH PTFE check valves are suitable for liquids and for installation in horizontal and vertical pipelines. Check valves with small diameters also have a large free cross-section and therefore a low pressure loss. The PTFE type VNH valves are fixed with tantalum hinges, which must be placed at the top for horizontal installation. Type VNEH eccentric valves are used in horizontal pipelines and in pipelines with reduced dead space as an alternative to the VNH valve.



VNH...-K check valves, straight,



VNEH...-K check valves, eccentric,

Description of OPTIONS:

Check valve, straight:

Check valve, eccentric:

Check valve, straight, conductive PTFE

Item number

VNH...-K

VNEH...-K

VNH...-K-M2

Example

VNH 025-K

VNEH 025-K

VNH 025-K-M2

Description of REPLACEMENT PARTS:

PTFE flap:

Item number

VNH...-SP05

Example

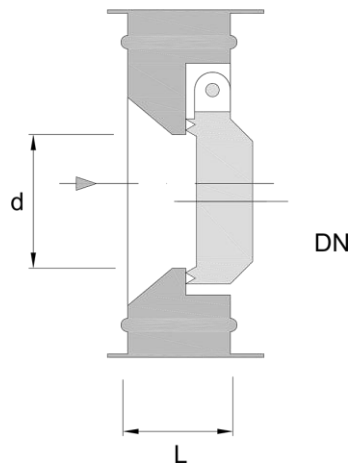
VNH 025-SP05

DN	DN1	L [mm]	H [mm]	Item no. straight	Item no. eccentric
25	50	225	12	VNH 025-K	VNEH 025-K
40	80	275	18	VNH 040-K	VNEH 040-K
50	100	325	27	VNH 050-K	VNEH 050-K
80	150	425	40	VNH 080-K	VNEH 080-K

**CHECK VALVE, FLANGE INSERT DESIGN**

Type VNP ...-K solid PTFE check valves can be delivered for larger nominal diameters and especially as space-saving flange insert variants, and can be directly built in to a horizontal or a vertical pipeline. No further sealing gaskets are necessary.

The maximum permitted operating temperature of these valves is 130 °C. The permitted excess operating pressure corresponds to the values of the nominal diameter of the pipeline components.



VNP...-K check valves, flange insert design,

**Description of OPTIONS:**

Check valve, straight:

**Item number**

VNP...-K

**Example**

VNP 025-K

Check valve, straight, conductive PTFE

VNP...-K-M2

VNP 025-K-M2

**Description of REPLACEMENT PARTS:**

PTFE valve:

**Item number**

VNP...-SP05

**Example**

VNP 025-SP05

DN	D [mm]	L [mm]	Item no.
50	Ø30	25	<b>VNP 050-K</b>
80	Ø55	25	<b>VNP 080-K</b>
100	Ø82	25	<b>VNP 100-K</b>
150	Ø125	25	<b>VNP 150-K</b>

**BALL VALVES**

Ball valves are preferably used when the entire cross-section of the pipeline should be free when the fitting is open. The ball valves used are lined with PFA including the ball itself and run especially smoothly in glass pipelines. The ball valves are optionally available with ceramic balls (Al<sub>2</sub>O<sub>3</sub>). The permitted standard operating conditions correspond to the glass pipelines.

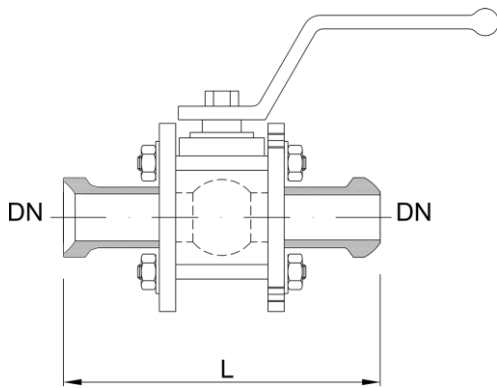
Mounting parts are available for various installation possibilities.

The following ball valves are offered for installation with a glass flange connection as well as completely lined ball valves with a connection in accordance with EN 12585.

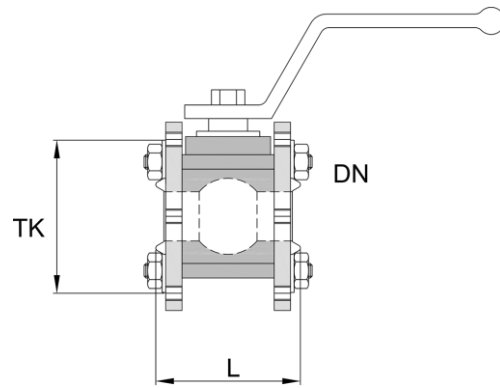
**BALL VALVES WITH HAND LEVER**

The VBG... construction form is fitted with connector pieces made of borosilicate glass 3.3. The installation length corresponds to the metric unit system, standard couplings and gaskets can be used to form joints.

The compact VBP... ball valves are on the other hand completely lined with PFA and are characterised by a short design. They are equally suited for direct installation in pipeline made of borosilicate glass 3.3 between glass structural components with a grooved flange. The flange adaptor couplings of the compact ball valves are generally designed in accordance with EN 1092-1, PN 10 and flange ends as grooved flanges. Corresponding connection flange rings with DIN bolt circles, inserts, bolts etc. must be ordered separately as per chapter 3.



VBG...-K ball valve, with glass connection,

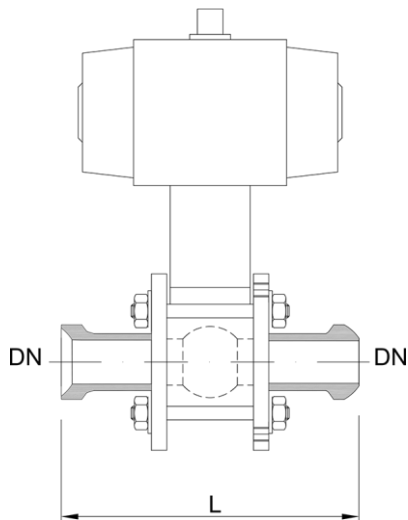


VBP... ball valve, lined with PFA,

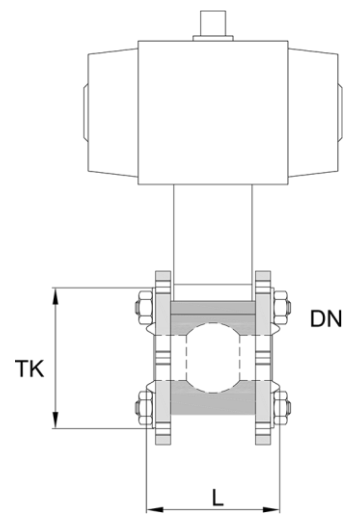
DN	H1 [mm]	H2 [mm]	L [mm]	Item no. Glass connection	L [mm]	PCD [mm]	Item no. PFA-lined
25	115	150	175	<b>VBG 025-K</b>	80	Ø85, 4 x M8	<b>VBP 025</b>
40	155	225	225	<b>VBG 040-K</b>	100	Ø110, 4 x M8	<b>VBP 040</b>
50	160	225	300	<b>VBG 050-K</b>	125	Ø125, 4 x M8	<b>VBP 050</b>

**BALL VALVES WITH PNEUMATIC ACTUATOR**

The ball valves can optionally be designed with a pneumatic actuator. The standard valve air pressure measures 6 bar for all actuators and this value is not allowed to be exceeded by more than 10 %. It is recommended to install a pressure regulator for air supply as well as additional air flow controls to prevent too quick opening and closing procedures.



VBG...-K-RP... ball valve, pneumatic, glass connection,



VBP...-RP... ball valve, pneumatic, PFA-lined,

The – RP ... options given at the end of this chapter can be selected for the pneumatic valves with the following basic definitions.

- Explosion-proof design
- Fail-safe position OPEN/CLOSED
- Position indicator for valve position OPEN/CLOSED

Examples of item descriptions corresponding to pneumatic valves are:

**Description of extra PNEUMATIC OPTIONS:**

Ball valve, glass connection, pneumatic, no explosion protection, safety position CLOSED, without positioning feedback, without solenoid valve

**Item no.**                      **Example**  
 VBG....-K-RP0100    VBG 025-K-RP0100

Ball valve, PFA lining, pneumatic, ATEX, safety position OPEN, with OPEN/CLOSED positioning feedback, with solenoid valve:

VBP....-RP1231    VBP 025-RP1231

DN	L [mm]	Item no. Glass connection	L [mm]	PCD	Item no. PFA-lined
25	175	<b>VBG 025-K-RP...</b>	80	Ø85, 4 x M8	<b>VBP 025-RP...</b>
40	225	<b>VBG 040-K-RP...</b>	100	Ø110, 4 x M8	<b>VBP 040-RP...</b>
50	300	<b>VBG 050-K-RP...</b>	125	Ø125, 4 x M8	<b>VBP 050-RP...</b>

## FLAPS

For larger nominal diameters between DN 80 and DN 300 flaps are available in addition to the ball valves. The flaps are completely PFA-lined, gas-tight and suitable as flow regulator. The flaps are designed with a hand lever (DN 80) or a worm drive with a hand wheel (DN 100 – DN 300), however on request they can also be designed with a pneumatic drive.

The permitted operating conditions for the flaps should be adjusted individually for the glass equipment or preceding apparatus such as enamel reactors.

Mounting parts are available for various installation possibilities.

It is possible to form a joint with branches of glass piping or enamelled steel tubes. The necessary adaptor couplings, see chap. 3 »couplings«, are to be ordered separately.

## APPARATUS AND SPECIAL VALVES

### BOTTOM OUTLET VALVES

Bottom outlet valves are suitable as outlet valves which reduce dead space and are used in spherical and cylindrical vessels whose glass joint Bottom is made of borosilicate glass 3.3. The angled outlet valves and the radial sealing of the plunger in the glass joint ensure a residue-free outflow. In addition to the sealing on the valve housing, a safety seal is attached up to the valve bonnet, which also guarantees high seal tightness during large temperature fluctuations.

Optionally a GMP optimized version with a bellow with round folds is available. Riboflavin tests showed a residue-free draining of this design.

Standard designs of Bottom outlet valves are made for a Bottom connecting piece with a length H of 95-115 mm. For lengths H which differ from this the desired length should be entered using option "L" as in the following example. In addition to the length of the connection piece there are also numerous further options for Bottom outlet valves such as temperature measurement in the vessel's Bottom connector piece. To do this, a PT100-, 4-wire, class A resistance thermometer with ATEX certification II 2G Ex e II, is integrated.

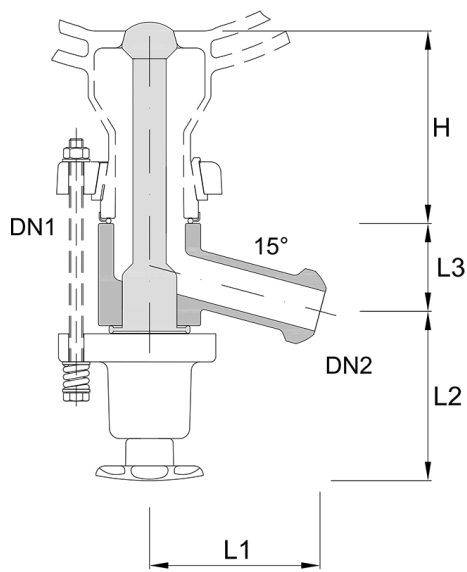
To connect the Bottom outlet valves to the connector pieces of the spherical or cylindrical vessel a standard type CGG sealing gasket is used and a type CAPG ...-K adaptor coupling in accordance with chapter 3 with an additional length of 50 mm (e.g. CGG040-K and CAPG040-K-L0050).

<b>Description of OPTIONS:</b>	<b>Item number</b>	<b>Example</b>
Bottom outlet valve, manual:	VOB....-K	VOB 40/25-K
Bottom outlet valve, manual, with a height H = 70 mm*:	VOB....-K-L0070	VOB 40/25-K-L0070
Bottom outlet valve, manual, conductive PTFE with earthing:	VOB....-K-M2	VOB 40/25-K-M2
Bottom outlet valve, manual, conductive PTFE & coating.	VOB....-K-C3-M2	VOB 40/25-K-C3-M2
Bottom outlet valve, manual, conductive PTFE & temp.sensor:	VOB....-K-M2-T2	VOB 40/25-K-M2-T2
Bottom outlet valve, manual, with round bellows:	VOB....-K-M3	VOB 40/25-K-M3
Bottom outlet valve, pneum., not EX-proof, safety pos. OFF**:	VOB....-K-RP0100	VOB 40/25-K-RP0100

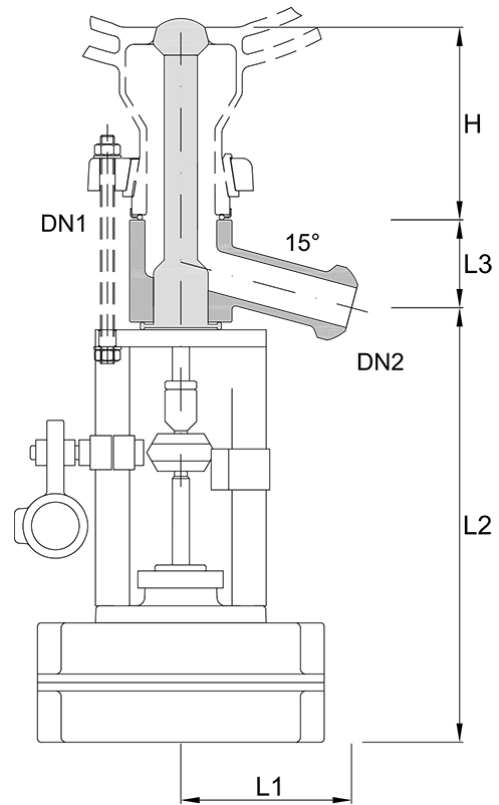
<b>Description of REPLACEMENT PARTS:</b>	<b>Item number</b>	<b>Example</b>
Conical valve seal, PF system:	VOB....-K-SP05	VOB 25-K-SP05

\* Special lengths H differing from the standard length H = 100 mm are possible. Typical cases are Bottom outlet connectors with H= 0 mm (connection to a block flange e.g. in an enamelled or stainless steel vessel), H = 70 mm (single-walled vessel), H = 100 mm (jacketed vessel) und H = 125 mm (triple-walled vessel).

\*\* RP ... can be specified for pneumatic Bottom outlet valves according to the option list whereas for Bottom outlet valves only the ATEX option and fail-safe position can be selected. The necessary air supply pressure measures 2.5 bar and may only be exceeded by 10 %.



Bottom outlet valve, manual  
VOB ...-K



Bottom outlet valve, pneumatic  
VOB ...-K-RP...

DN1	DN2	H	L1	L2	L3	Item no.
		[mm]	[mm]	[mm]	[mm]	
40	25	110	100	133	52	<b>VOB 40/25-K</b>
50	25	110	100	147	52	<b>VOB 50/25-K</b>
50	40	110	100	155	60	<b>VOB 50/40-K</b>
40	25	110	100	210	52	<b>VOB 40/25-K-RP...</b>
50	25	110	100	210	52	<b>VOB 50/25-K-RP...</b>
50	40	110	100	220	60	<b>VOB 50/40-K-RP...</b>

Further apparatus and special fittings are:

### **ADJUSTABLE OVERFLOW VALVES**

Adjustable overflow valves are used to regulate the separation levels in liquid-liquid separators, azeotrope columns or similar apparatus. The height adjustment is carried out with a hand wheel and a PTFE overflow pipe with bellows. Details on the adjustable overflow valves can be found in chapter »apparatus« for horizontal separators and mixer settlers.

### **GAS MIXING VALVES**

Gas mixing valves are used to insert and dissolve gas into liquids, mostly in bubble columns or reaction vessels. Here, the gas is fed through radial holes at the smallest cross-section of the PTFE nozzle and carried away by the liquid current flowing past and distributed into the smallest of bubbles. The bubbles therefore distribute themselves evenly in the liquid so that a very good solubility and reaction rate are ensured.

For detailed questions, e.g. on the possible relationship between liquid and gas flow-rate and on the necessary inlet pressures, as well as for a specific quote, please contact our specialist department.

### **MEMBRANE VALVES**

Membrane valves are rarely used in the construction of glass apparatus. Membrane valves generally consist of a glass base body and a sealing PTFE membrane on a glass saddle. This enables the valve to be completely emptied through connected pipelines when it is installed vertically and it this means it is also suitable for GMP applications. Standard designs of membrane valves are available with a hand wheel and a pneumatic actuator is optionally available.



## OPTIONS VALVES

For valves the following options can be chosen in addition to the standard structural components. Each option chosen must be entered at the end of the item number. Several options can be chosen and they are presented as far as possible in alphabetical order. In the following table you will find examples of item numbering for additional options.

Product name:	Item number	Examples
KF angle valve:	VE DN-K	VE 025-K
KF angle valve, with conductive coating:	VE DN-K-C3	VE 025-K-C3
KF angle valve,, with material certificate:	VE DN-K-Z2	VE 025-K-Z2
KF angle valve, with conductive coating and material certificate:	VE DN-K-C3-Z2	VE 025-K-C3-Z2
KF angle valve, with conductive coating, conductive PTFE, earthing, flexible operating extension 1 m, FDA material certificate:	VE DN-K-C3-H21-Z1	VE 025-K-C3-H21-Z1

You can choose from the following options:

### OPTION C – COATING / GLASS TYPE

The standard components used are those made of borosilicate glass 3.3 without coating. The following alternative options are possible:

- C1 = coating, non-conductive
- C2 = coating, non-conductive, for higher temperatures and chemical resistance
- C3 = coating, conductive
- C4 = amber glass
- C5 = quartz glass

### OPTION F – FLANGE TYPE

The standard components used are made of borosilicate glass 3.3 with the flange type F4 (PF system).

The following flange connectors for glass structural components are also generally available:

- F1 = KF flanges, type KF../1
- F2 = KF flanges, type KF../2
- F3 = KF flanges, type KF../3
- F4 = PF flanges, type PF
- F5 = Tube connection 16 mm
- F6 = Tube connection 26 mm
- F7 = GL-thread GL 18
- F8 = GL-thread GL 25
- F9 = NS 29/32
- F10 = NS 45/40

All other combinations of the flange types F1 to F4 can be selected as options, we will be happy to check whether the other types of flange can be used with your desired structural component.

**OPTION H – FLEXIBLE OPERATIONAL EXTENSION**

Standard = without shaft extension

H10 = 0.5 m flexible shaft extension, G3/4" stainless steel connector

H20 = 1.0 m flexible shaft extension, G3/4" stainless steel connector

H30 = 1.5 m flexible shaft extension, G3/4" stainless steel connector

H40 = 2.0 m flexible shaft extension, G3/4" stainless steel connector

H11 = 0.5 m flexible shaft extension, G1" stainless steel connector

H21 = 1.0 m flexible shaft extension, G1" stainless steel connector

H31 = 1.5 m flexible shaft extension, G1" stainless steel connector

H41 = 2.0 m flexible shaft extension, G1" stainless steel connector

H12 = 0.5 m flexible shaft extension, G1 1/4" stainless steel connector

H22 = 1.0 m flexible shaft extension, G1 1/4" stainless steel connector

H32 = 1.5 m flexible shaft extension, G1 1/4" stainless steel connector

H42 = 2.0 m flexible shaft extension, G1 1/4" stainless steel connector

**OPTION M – MATERIAL / PTFE-DESIGN**

The standard design is in white PTFE, non-conductive and with no material certificate.

M1 = PTFE conductive

M2 = PTFE conductive with earthing

M3 = PTFE-valve plunger with round bellows, white PTFE, FDA material certificate

The option M choice selection only applies for valves.

**OPTION O – SPECIAL OPTIONS**

The following special options are offered for certain structural components.

O1 = plastic valve bonnet, free of non-ferrous metals

O2 = stainless steel valve bonnet

O3 = manual valve design with positioning feedback OFF,

ATEX conform positioning feedback, protection class II 2G Ex ia IIC T6, 3 m long

O4 = valve lifting lever (only for type VP pressure relief valves)

O5 = number of valves on multiple distributors, for example the multiple distributor with three valves is option O53, and with four valves option O54, etc..

O6 = hollow ball in vertical ball check valves

O7 = manual type VNV lifting lever device in vertical ball check valves

O8 = flange insert version for type VNV check valves

O9 = flange insert version for type VNV check valves and manual lifting lever device.

O10 = KF-valve in former design (without reduced diameter valve seat and connection)

O11 = plastic screw cap and chain (for valves with GL threaded outlet)

**OPTION R – CONTROL VALVES AND PNEUMATIC ACTUATORS**

Enter option RC ... for the control function as Kvs value for a linear control characteristic

RC = Kvs value of the fitting to one decimal place, e.g. "-RC160" for Kvs value 16.0

The pneumatic actuator can be delivered with the following RP ...options:

RP w \_ \_ \_ = ATEX-design:

w=0: no explosion-proof design

w=1: ATEX design, all relevant components of the actuator in protection class II 2G EEx ia IIC T6.

According to EX-zone (in / out) of the valve additional requirements can be necessary

or recommendable (conductive PTFE with earthing (option –M2), electrically conductive glass coating (option –C3)).

If you have questions you are welcome to contact our specialist department.

RP \_ x \_ \_ = Fail-safe position:

x=0: without safety position / double acting pneumatic

x=1: safety position "spring closed"

x=2: safety position "spring open"

RP \_ \_ y \_ = Limit switch with built-in inductive proximity switches:

y=0: without signalling of ON or OFF position

y=1: Signalling of ON

y=2: Signalling of OFF

y=3: Signalling of ON and OFF

y=4\*: Built-in analogue positioning feedback (4...20 mA)

RP \_ \_ \_ z = design

z=0: without solenoid valve in the pneumatic valve actuator

z=1: with solenoid valve in the pneumatic valve actuator,

3/2-way solenoid valve design

\* only for control valves and possible instead of proximity switches

**OPTION SP – REPLACEMENT PARTS**

The replacement parts for the individual fittings are entered for each individual valve.

**OPTION TAG – LABELLING**

Standard labelling of glass structural components is carried out using the standard item number or special identification number, however without an individual TAG number.

TAG numbering is available to individually number the valves. To do this enter the option TAG and provide us separately with the desired TAG numbering for the particular valve types.

TAG = with TAG numbering

**OPTION T – TEMPERATURE PROBE**

The standard design comes without a temperature probe.

Temperature probes can also optionally be integrated for Bottom outlet valves.

The individual options for this are:

T1 = with temperature probe

T2 = with temperature probe, ATEX conform with protection class II 2G Ex ia IIB T6

**OPTION V – VACUUM RESISTANCE / - OPERATION**

With this option components that are explicitly only suitable for atmospheric or excess operational pressure are also suitable for operation in vacuum conditions. This affects the type VSL sampling valve for pipelines from this chapter.

V = vacuum resistance or suitable for vacuum operation

**OPTION Z – CERTIFICATES**

Standard deliveries do not come with certificates.

The following certificates can optionally be delivered with your order.

Z1 = FDA material certificate<sup>1)</sup>

Z2 = material certificate 2.2

Z3 = Certificate for Technical Guidelines on Air Quality Control (TA-Luft)

Z4 = calibration certificate for control valves

1) FDA material certificates can be delivered for product-side structural components containing PTFE.