



QVF
PROCESS PLANT COMPONENTS



Introduction

QVF valves can be relied upon to require minimum maintenance and to provide maximum reliability in service. They are widely used in the chemical, pharmaceutical and allied industries together with other applications such as food and drink production, dye works and electroplating. This is because of the special properties of borosilicate glass 3.3, PTFE, PFA, ceramic and tantalum plus the fact that borosilicate glass 3.3 is an approved and proven material of construction for pressure vessels.

Reference should also be made in this context to the extreme reliability of the improved, strong and high-duty coupling system used for all components. This is achieved throughout the whole range of nominal sizes by the use of the safety buttress end which has been designed specifically by taking into account the properties of the material combined with a reliable flange system.

The complete range of standard valves is described on the following pages. Non-standard versions can also be supplied to special order where indicated in the product description.

A detailed listing of all valves by »Description« and »Catalogue Reference« can be found in the »Index«.



Detailed information on a number of the topics referred to in the following pages can be found in Section 1 »Technical Information«.

Metric grid modular system

The valves described in this section comply with EN 12585 "Pipeline and Fittings, Compatibility and Interchangeability" and are conceived as a modular system. The only exceptions to this are »RKP.« non-return valves and »FVT.« butterfly valves. The basic unit of measurement is 25 mm and all component dimensions are a multiple of this basic length. The resultant metric grid system facilitates trouble-free design and installation of systems with these components.

In addition valves and fittings (please see Section 2 »Pipeline Components«) in the same nominal size always have the same limb length, therefore the valves can be interchanged with bends, tee pieces etc. This means that any modifications which may be required to existing pipelines can be carried out quickly and easily.

Sealing in Accordance with TA Luft

The former German regulation "Technical Manual for Clean Air" (TA-Luft) was amended, and the updated version came into force on 2004-07-24. It contains maximum permissible limits for dust, steam, or gas emissions during the processing, conveying, or re-filling of dust, fluid, or gas materials.

TA Luft requires high-grade sealed metal bellows with a subsequent safety gland or equivalent sealing system for closing or control devices for the sealing of spindle feed-throughs. Equivalent sealing systems are deemed necessary if temperature-specific leakage rates are complied with during the proof procedure in accordance with VDI 2440.

As metal bellows for QVF fittings are ruled out due to corrosion reasons, the equivalence test was put to proof by TÜV Rhineland / Berlin-Brandenburg during the course of design inspections.

All hand operated borosilicate glass 3.3/PTFE valves are, therefore, fitted with a secondary seal in addition to the basic bellows seal. Pneumatically actuated on/off valves and control valves alone are available in two alternative versions. Butterfly valves and ball valves are fitted with a secondary seal.

GMP compliant installations

The use of valves and the layout of interconnecting pipeline incorporating valves when designing plant and equipment complying with GMP regulations, calls for special care in both the planning and selection of the components, together with the materials of construction used for them. Borosilicate glass 3.3 has a number of special properties that are highly valued in the pharmaceutical industry, and these, in conjunction with PTFE materials (bellows, linings) approved in accordance with the FDA catalogue, ensure that any build-up of unwanted deposits is avoided in areas which come in contact with the product. A design without any dead space, which ensures that components drain fully and can be cleaned easily and effectively, is achieved in many valves by their shape and the way they are installed. Where the external surfaces of these components have to comply with clean room requirements, appropriate stainless steel coupling and support material can be supplied (please see Section 9 »Couplings« and Section 10 »Structures and Supports«).

We would be happy to advise you on the basis of the regulatory requirements applicable to a particular case, and the guidelines drawn up by us, for the design of GMP compliant plant.

Coated valves

Damage to borosilicate glass 3.3 valves resulting from accidental external causes cannot be entirely excluded, especially in the smaller nominal sizes. This is primarily due to the relatively rigorous conditions prevalent in production plants and applies especially where no additional protection is provided in the form of insulation.

Our answer to this problem is to provide borosilicate glass 3.3 valve bodies with a Sctrans transparent coating. This can be applied irrespective of the shape of the component and it provides additional protection without having any adverse effect on visual monitoring of the process.

A glass fibre reinforced polyester coating providing a higher level of protection can also be supplied on request. This does have a slightly adverse effect on the transparency of the glass, making it translucent and not transparent.

Permissible operating conditions

While the maximum permissible operating temperature for borosilicate glass 3.3 valve bodies is generally 200 °C ($\geq \Theta$ 180 K) and their maximum permissible operating pressure is the same as for pipeline components of the same nominal size, the incorporation of bellows imposes certain restrictions and the maximum permissible operating pressure for the complete valve is somewhat lower. When the valves are used in plant applications this is unlikely to be a problem since the maximum permissible operating pressure of the plant as a whole is governed by the components with the largest nominal size. Detailed information on this and the operation of jacketed valves can be found in Section 1 »Technical Information«.




Valves with PTFE bellows suitable for higher permissible operating pressures can also be supplied on request.

Where different operating conditions apply to individual valves, the relevant details are provided in the respective product description.

ON/OFF VALVES WITH REGULATING PLUG

The design (bellows plug and seat shape) of the manually operated valves described below is such that they can be used both as on/off valves and for the coarse regulation of liquid flow, for example in pump delivery lines. If required, on/off valves can also be supplied in the DN100 and DN150 nominal sizes but without regulating cone.

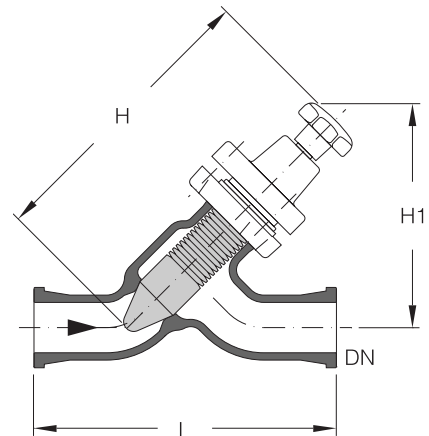
Manually operated control valves can be found on page 3.13 and on/off and control valves with pneumatic actuators are described from page 3.10 and 3.14.

 These valves only act as regulating valves when the direction of flow is towards the cone.

ON/OFF VALVES WITH REGULATING PLUG

Straight Through Valves

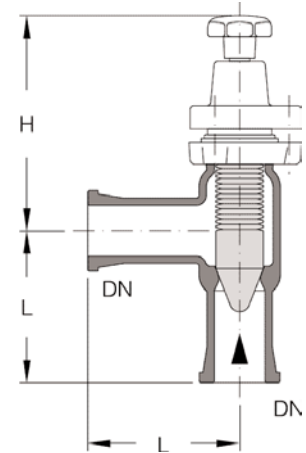
DN	L	H	H1	Reference
15	125	120	90	PVD15
25	175	220	170	PVD25
40	225	285	215	PVD40
50	300	295	225	PVD50
80	375	430	320	PVD80



ON/OFF VALVES WITH REGULATING PLUG

Angle Valves

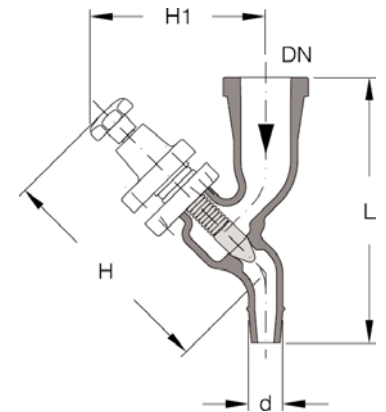
DN	L	H	Reference
15	50	85	PED15
25	100	170	PED25
40	150	215	PED40
50	150	210	PED50
80	200	290	PED80



DRAIN VALVES

These valves have a hose connector at the outlet so that a hose can be connected to them easily and securely. The internal diameter of the hoses should be as indicated in the table below to avoid fixing and leakage problems.

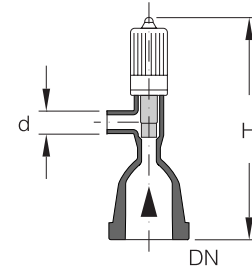
DN	hose Ø d	L	H	H1	Reference
25	16	140	120	92	PVA25/16
40	16	150	120	92	PVA40/16
40	26	200	223	170	PVA40/26



VENT VALVES

These valves are ideal for venting plant operating under vacuum, at atmospheric pressure or at low positive pressure (up to 0.5 bar g). In all other cases we recommend the use of the drain valves as described on page 3.5.

DN	d	H	Reference
15	10	132	PVL15
25	10	140	PVL25
40	10	145	PVL40



JACKETED ON/OFF VALVES

In addition to pipe sections and pipeline fittings (see Section 2 »Pipeline Components«) jacketed valves with regulating plug can also be supplied for pipeline systems involving temperature control. Further versions of the valves described here are also available on request.

These jackets are one-piece and sealed at both ends. They are designed to ensure that the critical area in particular, i.e. the valve seat, can be maintained at a given temperature. The less critical pipe ends can be heated separately by a suitable method.



Details of the permissible operating conditions for the inner and outer area can be found in Section 1 »Technical Information«.

The branches on the jacket are of the safety buttress end type. If they are aligned horizontally and if long hoses or heavy hoses are connected to them, we recommend 90° hose connectors to reduce the bending moment on the branches.

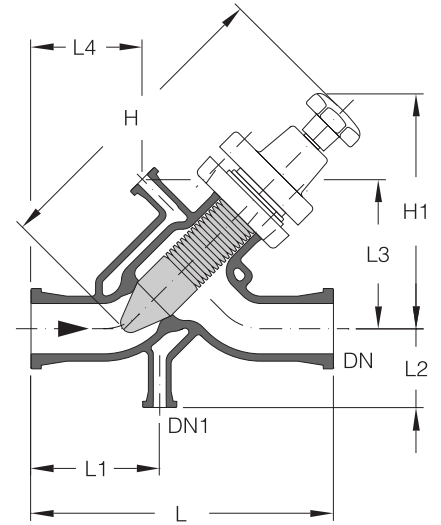
In the case of the DN 15 angle valves the branches on the jacket are positioned turned through 90° to the front (DN 1) and back (DN 3) respectively.

Borosilicate glass 3.3 and metal hose connectors can be found in Section 2 »Pipeline Components« and hoses in Section 9 »Couplings«.

JACKETED ON/OFF VALVES

Straight Through Valves

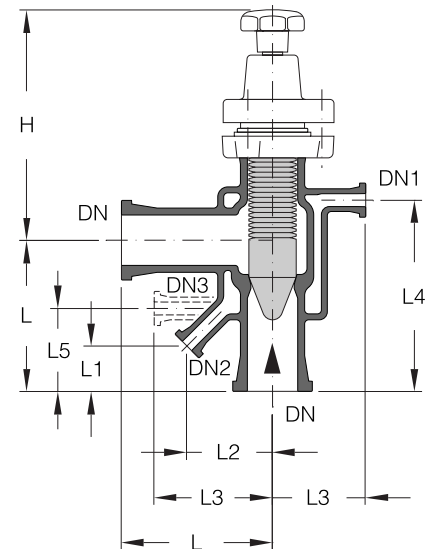
DN	DN1	L	L1	L2	L3	L4	H	H1	Reference
15	15	125	65	45	71	22	128	98	DPVD15
25	15	175	90	60	95	49	235	179	DPVD25
40	15	225	115	65	129	64	285	217	DPVD40
50	15	300	150	75	145	107	310	231	DPVD50



JACKETED ON/OFF VALVES

Angle Valves

DN	DN1	DN2	DN3	L	L1	L2	L3	L4	L5	H	Reference
15	15	-	15	50	-	-	65	57	37	97	DPED15
25	15	15	-	100	20	85	70	118	-	185	DPED25
40	15	15	-	150	25	85	90	177	-	215	DPED40
50	15	15	-	150	55	85	95	185	-	226	DPED50



LOADING VALVES

These valves are used to maintain a constant pressure and are recommended for use after dosing pumps. They may, however, also be used on occasions with centrifugal pumps (in this application it is more usual to use an orifice plate).

They can thus be used to deliver liquids safely, into or out of a vacuum, for example. Their use as by-pass valves in conjunction with dosing pumps prevents the build-up of an unacceptably high pressure in the event of the pressure-side pipeline being inadvertently closed off.

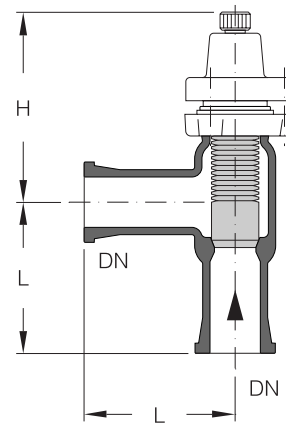
Unlike manually operated types, this valve has a spring the tension of which can be adjusted by a screwdriver. Thus, all intermediate values between 0.5 bars and the permissible operating over-pressure may be set a tolerance range of ± 0.3 bar.



Please specify pressure setting on the order.

Care should be taken when operating these valves to ensure that the sum of the setting pressure and the pressure drop in the valve does not exceed the maximum permissible operating pressure of the pipeline.

Loading valves should not be used as pressure relief valves as they do not have the necessary approval for such applications.



DN	L	H	Reference
15	50	161	PVF15A
25	100	155	PVF25A
40	150	190	PVF40A
50	150	190	PVF50A

BALL-TYPE NON-RETURN VALVES

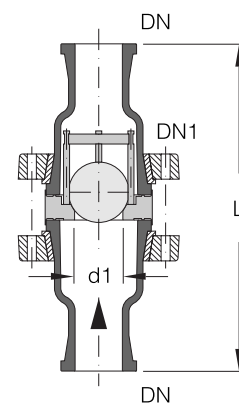
The function of these valves is to ensure that flow in vertical pipelines can only be in one direction. The PTFE seat, ball and retaining plate provide excellent corrosion resistance.

Where there is an increased requirement for freedom from leakage these valves can be supplied on request with an O-ring gasket.



Ball-type non-return valves are not suitable for use as a long-term shut-off function.

DN	DN1	d1	L	Reference
15	50	23	225	NRV15
25	50	23	225	NRV25
40	80	48	325	NRV40
50	80	48	325	NRV50
80	80	48	325	NRV80



TYPE RK NON-RETURN VALVES

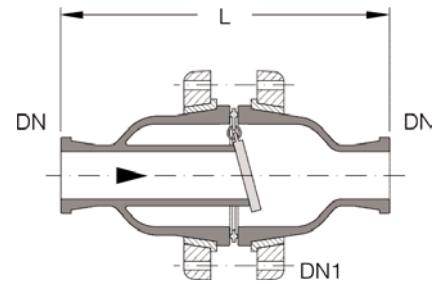
Unlike PTFE flap type non-return valves (please see below), this version provides a large free cross-section even in small nominal sizes and consequently ensures low pressure drop. It is suitable for liquids and installation in horizontal and vertical pipelines.

The PTFE flaps are mounted on tantalum hinges which must be located at the top when installed in horizontal lines.

If required we can supply a version with drain branch and an eccentric design which is used with a »PRE..« (please see Section 2 »Pipeline Components«).



Flap-type non-return valves are not suitable for use to provide a long-term shut-off function.



DN	DN1	L	Reference
25	50	225	RK25
40	80	275	RK40
50	100	325	RK50

TYPE RKP NON-RETURN VALVES

These PTFE flap-type non-return valves are only available in larger nominal sizes (please see also type »RK..« non-return valves above). They can be fitted in horizontal or vertical pipelines using longer coupling bolts. No additional gaskets are required.

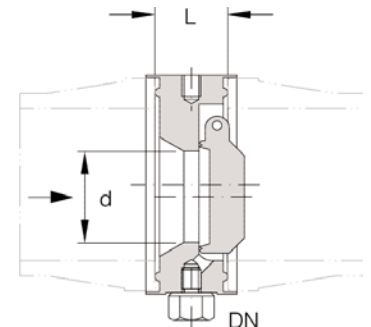
The PTFE flaps are mounted on tantalum hinges which must be located at the top when installed in horizontal lines.



The maximum permissible operating temperature for these flap-type non-return valves is 130 °C. The permissible operating pressure is the same as for pipeline components of the same nominal size.

The valve body is manufactured from carbon filled PTFE.

Flap-type non-return valves are not suitable for use to provide a long-term shut-off function.



DN	d	L	Reference
50	30	24	RKP50
80	55	24	RKP80
100	82	24	RKP100
150	125	25	RKP150

PNEUMATICALLY ACTUATED ON/OFF VALVES

These valves consist of the valve body and bellows plug used in our manually operated straight through and angle valves combined with either a Kämmer or Samson pneumatic diaphragm actuator.

All the types specified below are available in two versions, the only difference being the type of seal to atmosphere provided. Thus catalogue reference »PVS25 /..« for example describes a valve with single seal (between the valve body and the diaphragm actuator), while catalogue reference »PVS25S /..« applies to a valve with a double seal in accordance with TA-Luft (an additional spindle seal in the intermediate flange below the yoke rods as a precaution in case the bellows ruptures. Please see also page 3.2). In this case the Kämmer actuator must also be fitted with intermediate flange and yoke rods.

To provide a means of supporting the valves a »KK50-5« structure fitting (please see Section 10 »Structures & Supports«) is provided on one of the yoke rods to facilitate attachment to the support structure. In the case of valves without yoke rods (Kämmer actuator with single seal) a special support is part of the supply.



The required supply pressure is 2.5 bar g for all actuators and this should not be exceeded by more than 10%.

When ordering please add »1« to the catalogue reference for »spring to open« and »2« for »spring to close«.

If required Samson actuators can be supplied with the following additional built-on features:

- Limit switch with built-in inductive proximity switch, manufactured to protection type II 2 G EEx ia IIC T6, in order to signal its opening / closing position.
- 3/2 way solenoid valve manufactured to protection type II 2 G EEx ia IIC T6 (24 VDC).

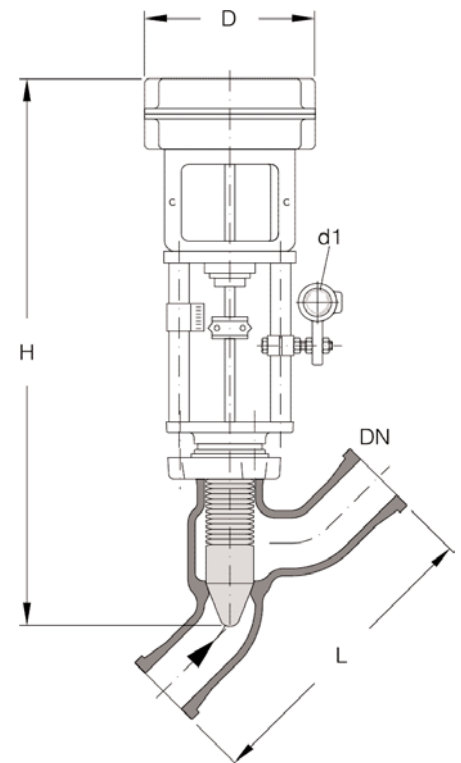
Kämmer actuators can be supplied with the following additional built-on features on request:

- Built-in inductive proximity switch, manufactured to protection type II 2 G EEx ia IIC T6, in order to signal its opening / closing position.
- Built-in analog-signal position feedback manufactured to protection type II 2 G EEx ia IIC T6 (4...20 mA). This component can only be deployed as a substitute to the previously mentioned proximity switch.

PNEUMATICALLY ACTUATED ON/OFF VALVES

Straight Through Valves with Samson Actuator

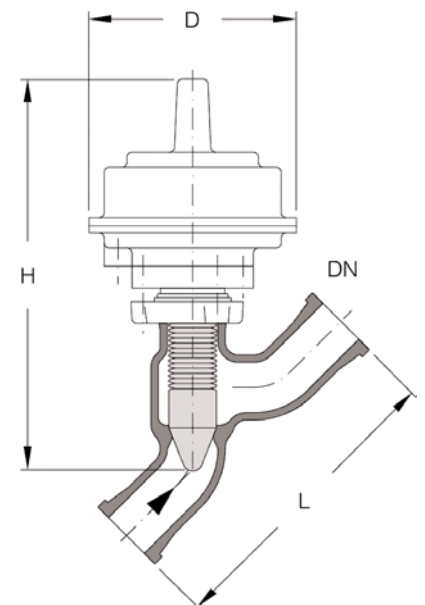
DN	D	d1	L	H	Reference
25	168	27	175	419	PVS25/...
25	168	27	175	465	PVS25S/...
40	168	27	225	481	PVS40/...
40	168	27	225	518	PVS40S/...
50	168	27	300	489	PVS50/...
50	168	27	300	525	PVS50S/...
80	280	27	375	629	PVS80/...
80	280	27	375	710	PVS80S/...



PNEUMATICALLY ACTUATED ON/OFF VALVES

Straight Through Valves with Kämmer Actuator

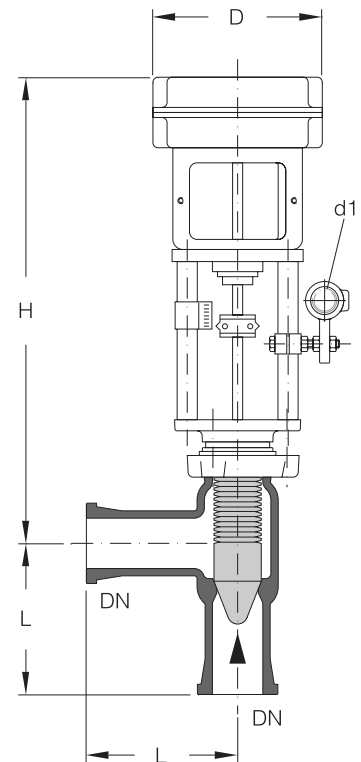
DN	D	L	H	Reference
25	150	175	265	PVM25/...
25	150	175	380	PVM25S/...
40	205	225	398	PVM40/...
40	205	225	563	PVM40S/...
50	205	300	387	PVM50/...
50	205	300	570	PVM50S/...
80	300	375	526	PVM80/...
80	300	375	707	PVM80S/...



PNEUMATICALLY ACTUATED ON/OFF VALVES

Angle Valves with Samson Actuator

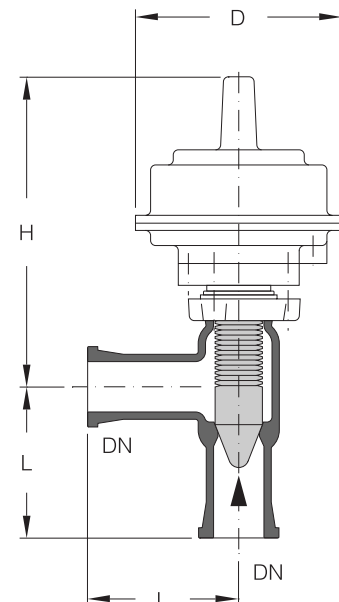
DN	D	d1	L	H	Reference
25	168	27	100	368	PES25/...
25	168	27	100	415	PES25S/...
40	168	27	150	411	PES40/...
40	168	27	150	448	PES40S/...
50	168	27	150	409	PES50/...
50	168	27	150	442	PES50S/...
80	280	27	200	512	PES80/...
80	280	27	200	593	PES80S/...



PNEUMATICALLY ACTUATED ON/OFF VALVES

Angle Valves with Kämmer Actuator

DN	D	L	H	Reference
25	150	100	215	PEM25/...
25	150	100	330	PEM25S/...
40	205	150	328	PEM40/...
40	205	150	493	PEM40S/...
50	205	150	308	PEM50/...
50	205	150	491	PEM50S/...
80	300	200	409	PEM80/...
80	300	200	590	PEM80S/...



CONTROL VALVES

Like the pneumatically actuated control valves specified on pages 3.14 and 3.15, the manually operated control valves listed below are supplied exclusively as angle type. They can be retrofitted for pneumatic operation.

All the k_{VS} values indicated for valves of a given nominal size (please see table) can be achieved by changing the PTFE plug/seat combination. A choice of linear or equal percentage characteristic curves are available.

The control ratio to VDI / VDE 2173 is 25 : 1 in all cases. The valve stroke is 10 mm for DN 25 nominal size valves and 15 mm for all other sizes.



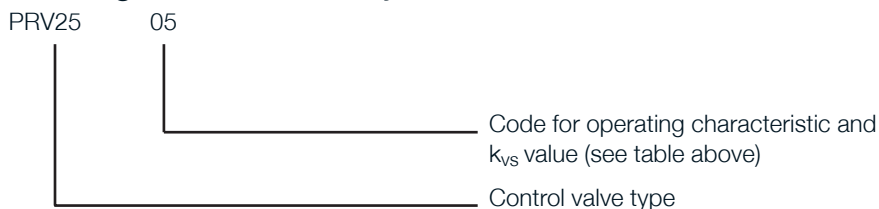
When ordering please add the code number for the required k_{VS} value and the type of the characteristic curve required, (please see table below) to the catalogue reference.

Available k_{VS} -values

The » k_{VS} value« is a typical figure indicating the flow of water in m^3/h at 20 °C with a pressure drop of $\Delta p=1$ bar through the fully opened valve.

DN	Operating characteristic	k_{VS} value m^3/h															
		0,1	0,16	0,25	0,4	0,63	1	1,6	2,5	4	6,3	10	16	25	40		
25	Code for operating characteristic and k_{VS} value																
	Equal Percent.	01	03	05	07	09	11	13	15	17	19						
40	Equal Percent.										01	03	05				
	Linear										02	04	06				
50	Equal Percent.												01	03	05		
	Linear												02	04	06		

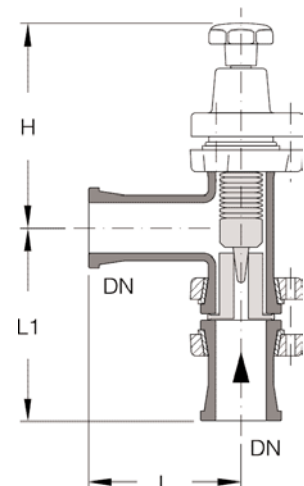
Catalogue reference key



CONTROL VALVES

Hand Control Valves

DN	L	L1	H	Reference
25	100	167	170	PRV25/...
40	150	182	195	PRV40/...
50	150	192	205	PRV50/...



PNEUMATICALLY ACTUATED CONTROL VALVES

These valves consist of the valve body and bellows plug used in our manually operated control valves combined with either a Kämmer or Samson diaphragm actuator. Both are fitted as standard with an attached electro-pneumatic I/P positioner of hazardous area type II 2 G EEx ia IIC T6.

To provide a means of supporting the valves a »KK50-5« structure fitting (please see Section 10 »Structures & Supports«) is provided on one of the yoke rods to facilitate attachment to the support structure.

Samson diaphragm actuators can also be supplied with HART or PROFIBUS positioners.



The required supply pressure is 2.5 bar g for all actuators and this should not be exceeded by more than 10 %.

When ordering please add the suffixes to the catalogue reference as indicated in the catalogue reference key. Suffixes for the required kVS value and the type of characteristic curve required can be found on page 3.13.

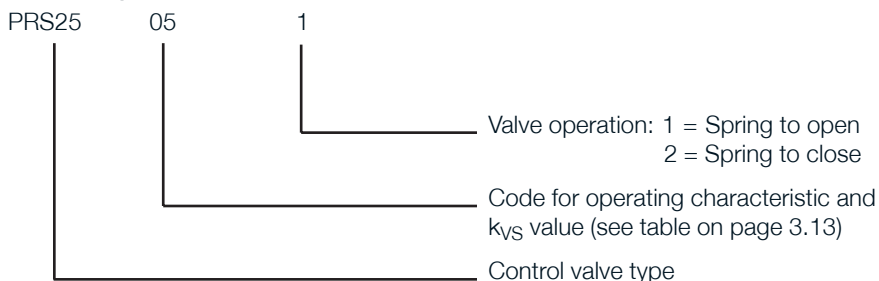
If required the positioners fitted to Samson actuators can be supplied with the following additional features:

- Built-in 3/2 way magnetic valve manufactured to protection type II 2 G EEx me II T4 (24 VDC).
- Built-in inductive proximity switch, manufactured to protection type II 2 G EEx ia IIC T6, in order to signal its opening / closing position.
- Built-in analog-signal position feedback manufactured to protection type II 2 G EEx ia IIC T6 (4...20 mA). This component can only be deployed as a substitute to the previously mentioned proximity switch.
- Built-on pressure regulator.

Kämmer actuators can be supplied with the following additional built-on features on request:

- Casing with built-in inductive proximity switch, manufactured to protection type II 2 G EEx ia IIC T6, in order to signal its opening / closing position. Built onto the drive (dimension H extends by 80mm).
- Built-in 3/2 way solenoid valve manufactured to protection type II 2 G EEx me II T4 (24 VDC).

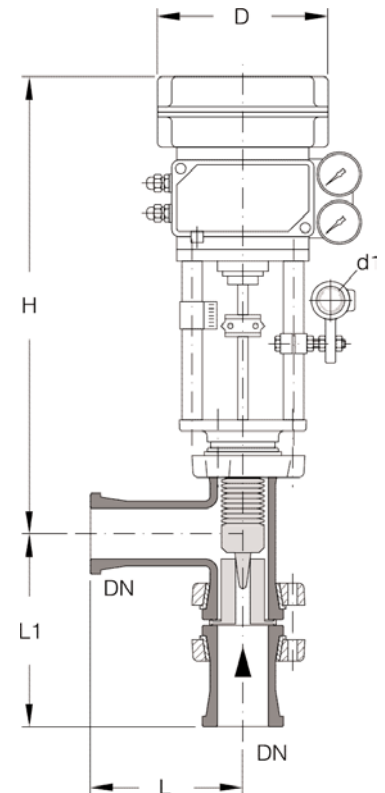
Catalogue Reference Key



PNEUMATICALLY ACTUATED CONTROL VALVES

Control Valves with Samson Actuator

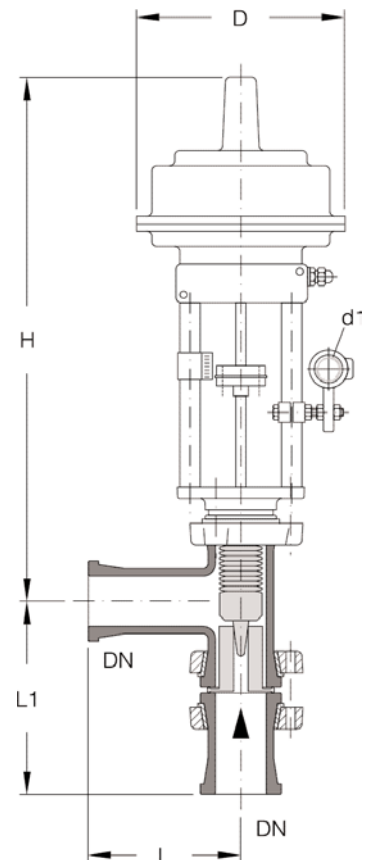
DN	D	d1	L	L1	H	Reference
25	168	27	100	164	394	PRS25/...
25	168	27	100	164	394	PRS25S/...
40	168	27	150	180	534	PRS40/...
40	168	27	150	180	536	PRS40S/...
50	168	27	150	190	544	PRS50/...
50	168	27	150	190	546	PRS50S/...



PNEUMATICALLY ACTUATED CONTROL VALVES

Control Valves with Kämmer Actuator

DN	D	d1	L	L1	H	Reference
25	150	27	100	164	445	PRM25/...
25	150	27	100	164	445	PRM25S/...
40	205	27	150	180	584	PRM40/...
40	205	27	150	180	586	PRM40S/...
50	205	27	150	190	594	PRM50/...
50	205	27	150	190	596	PRM50S/...



PRESSURE RELIEF VALVES

These valves are officially tested and approved for gases and vapours. They are direct operating and spring-loaded proportional (normal) pressure relief valves with a proven glass/PTFE seat/plug combination and are used to protect plant and equipment against exceeding the stated and/or approved operating pressure in accordance with the actual guidelines for pressure equipment. They can, however, also be used with pipeline and plant not subject to these regulations (where lower operating pressures or vacuum apply).

Before delivery, each valve is durably marked with the component reference »TÜV·SV...-590·do·D/G· α_w ·p« issued by the TÜV test institute. In this reference: ...indicates the year of the applicable test report, 590 the test number, do the smallest flow diameter in mm, D/G the approval for gases and vapours, α_w the discharge coefficient and p the setting pressure in bar.g.

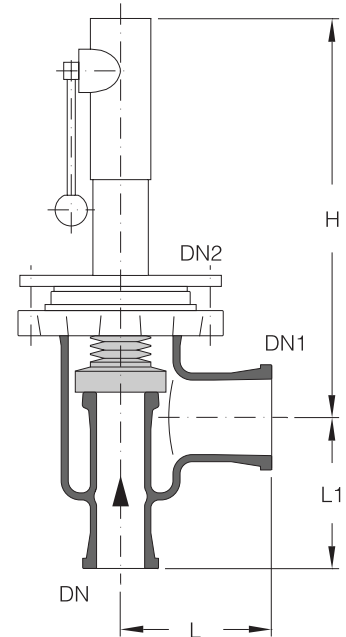
For lower duties, we can also supply a DN 50 ball valve for a blow-off pressure of 20 mbar.



When ordering, please indicate the catalogue reference and the required blow-off pressure in bar g.

The setting pressure can only be changed by specialist personnel (e.g. by QVF). The valve must then be resealed and the model label altered.

To ensure that they function properly, pressure relief valves must always be installed vertically. Support fittings are available for this purpose.



DN	DN1	DN2	L	L1	H	Reference
25	50	80	150	125	325	SVF25/50
50	80	100	150	150	395	SVF50/80
100	150	150	200	225	480	SVF100/150

Technical Data

DN	Minimum flow diameter d_o	Minimum flow cross section A_o (mm ²)	Discharge coefficient α_w	Set pressure range (bar g)
25	25	490	0,44	0,26-1,51
50	50	1960	0,10	0,11-0,25
50	50	1960	0,19	0,18-1,39
100	100	7850	0,17	0,07-1,18

ADJUSTABLE OVERFLOW VALVES

These valves are recommended for adjusting the interface in separators (e.g. in liquid-liquid extraction) azeotropic column heads or similar units. Level adjustment is infinitely variable and is by means of a PTFE tube fitted with sealing lips that can be moved up and down inside a precision bore glass tube.

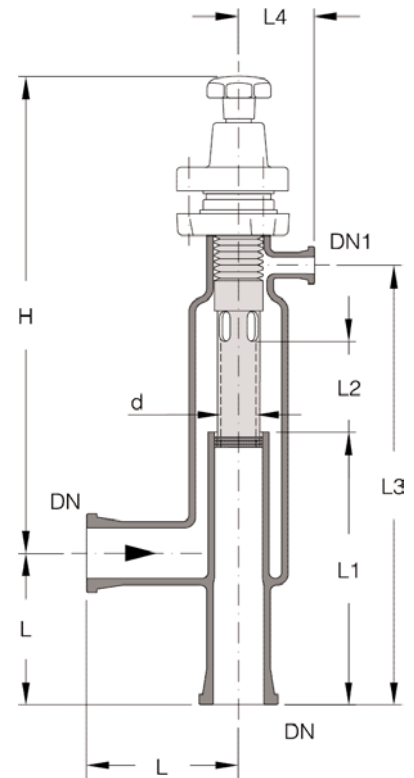
Maximum possible throughputs (based on water and measured without any head in the input) are indicated in the table below.

Horizontal separators with sealed-in adjustable overflow valve can be found in Section 4 »Vessels & Stirrers«.

DN	DN1	d	L	L1	L2	L3	L4	H	Reference
25	15	25	100	165	50	255	78	340	OF25
40	15	25	150	265	90	435	78	470	OF40
50	15	35	150	270	90	435	75	470	OF50
80	15	60	200	330	120	555	100	580	OF80

Technical Data


DN	Maximum flow rate (l/h)
25	600
40	900
50	1600
80	3200



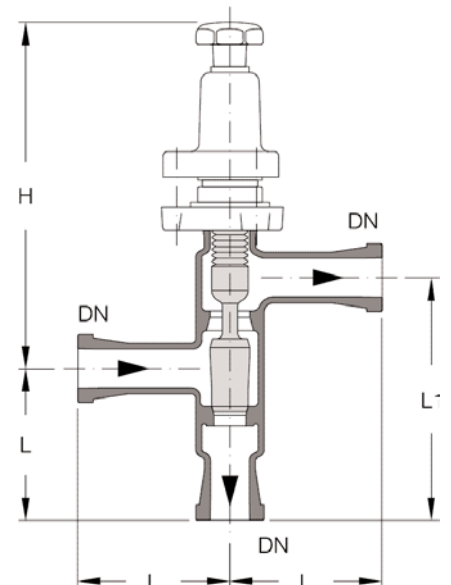
THREE WAY FLOW CHANGE VALVES

With normal three way valves it is possible to close both outlets at the same time by mistake which can result in the build-up of excess pressure in the line and also in the plant itself. The valve described here provides a safe solution to this problem since the design ensures that free flow through the valve is never impeded.

The use of a three way flow change valve is recommended when a plant is operated batchwise, under vacuum, and needs to be vented at regular intervals. In such circumstances one outlet is connected to the vacuum pump and the other (in reverse direction of flow) is used for venting purposes.

 As in the case of on-off and control valves (please see page 3.10 and 3.14) three way flow change valves can be supplied with pneumatic actuators.

DN	L	L1	H	Reference
25	100	160	232	PVW25
40	150	220	270	PVW40



BOTTOM OUTLET VALVES

Valve with Drainage Nozzle

These fittings seal at the bottom side of the internal glass seat. The glass seat may be incorporated in spherical and cylindrical type vessels (see Chapter 4 »Vessels/Stirrers«).

For pneumatically actuated bottom outlet valves, please see page 3.19.

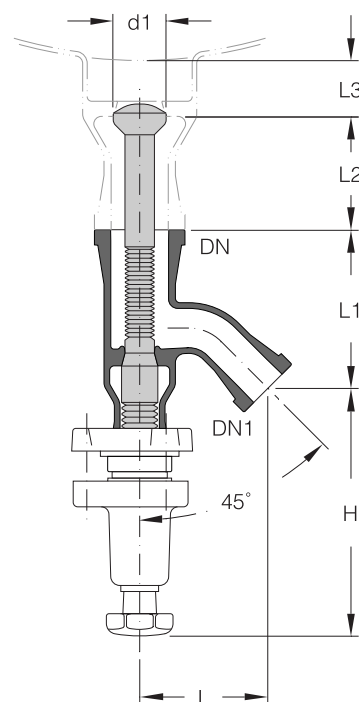
Versions which seal from above can also be supplied on request i.e. rising stem. With these valves a special inverted valve seat is required which must be specified when ordering the vessel. The plug is fitted from inside the vessel after the valve is attached to the bottom outlet.



The »BAS40« is a short form valve, designed for use in spherical and cylindrical vessels which have short bottom outlets.

In the case of spherical and cylindrical vessels which have longer bottom outlets, because they are jacketed or are for use in oil baths, the »BAL40« long version should be used.

DN	DN1	d1	L	L1	L2	L3	H	Reference
40	25	35	85	105	75	35	165	BAS40
40	25	35	85	105	155	35	165	BAL40



BOTTOM OUTLET VALVES

Valve for Integrated Drainage Nozzle

This fitting fully seals the bottom side of the melted glass joint dead space free. The convolutions of the bellow that experience product contact are manufactured to be round so that they also run empty if in an open state, and deliver good cleaning capability.

The glass joint may be provided upon demand for spherical and cylinder type vessels. The joint with drainage nozzle is melted into the bottom of the vessel.

As PTFE tends to flow at high temperatures, QVF equips high-grade connections with spring elements. Two seals are performed in this drainage valve; the seal of the valve casing, and the seal of the vessel floor. High sealing capability is ensured even for great temperature deviations by employing this design principle.



The necessary valve length "H" is contingent to the deployed vessel (see Chapter 4, page 4-5).

This valve cannot be deployed for vessels of the type BAL/BAS.

In order to perform temperature measurements at the bottom nozzle of the vessel, valves with an integrated resistance thermometer of the type "PT100-, 4-cable, class A - resistance thermometer with ATEX approval II 2G EEx e II" are on stock for delivery. In this case, the order number is supplemented by the letters "TH" in front of the nominal diameter (e.g. BASDTH25).

The valves are also available with a bonnet that includes an integrated stop against overturning (2 Nm).

DN	DN1	d1	H	Reference
25	40	27	260	BASD25
25	40	27	310	BAMD25
24	40	27	360	BALD25


PNEUMATICALLY ACTUATED BOTTOM OUTLET VALVE

This valve combines the valve body and bellows plug of the »BAS 40« manually operated bottom-outlet valve with a Samson pneumatic diaphragm actuator. The length of travel of the sealing plug below the seat is 15 mm and this therefore leaves the entire flow cross-section free. The valve can be set to close or to open as required in the event of a breakdown of the compressed air supply (please see below).

These valves are designed specifically for use with spherical or cylindrical vessels (see Section 4 »Vessels & Stirrers«) or immersion heat exchangers (see Section 5 »Heat Exchangers«) which have an integral glass-seat sealed into the bottom outlet. In the case of spherical and cylindrical vessels this feature can be incorporated on request.

To provide a means of supporting the valves a »KK50-5« structure fitting (please see Section 10 »Structures & Supports«) is provided on one of the yoke rods to facilitate attachment to the support structure.

Pneumatic actuators from other manufacturers, a long version based on the »BAL 40« and versions sealing from above can also be supplied on request. In the latter case the bellows plug has to be fitted from inside the vessel.

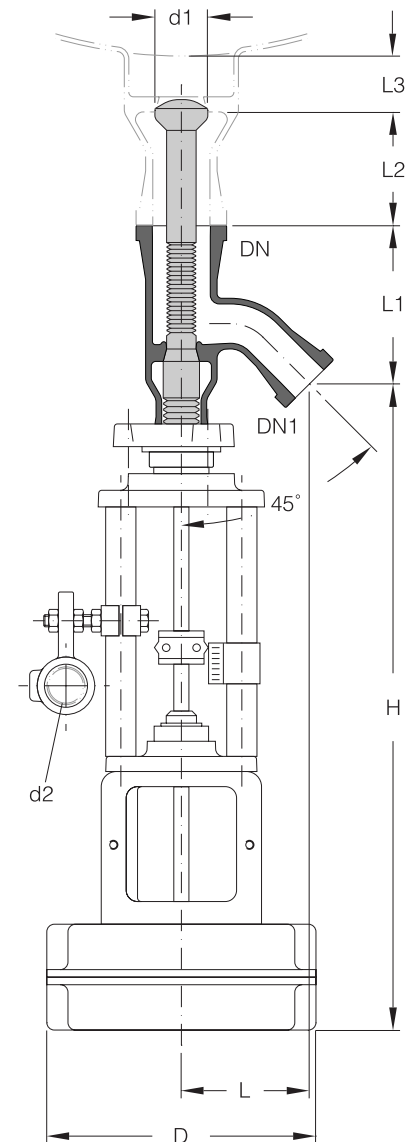
 The supply pressure required is 2.5 bar g and this should not be exceeded by more than 10 %.

When ordering please add a »1« to the catalogue reference if the »spring-to-open« fail-safe version is required or a »2« for »spring-to-close«.

If required the actuators can be supplied with the following additional built-on features:

- Limit switch with built-in inductive proximity switches in accordance with EN 50227/IEC 61934, hazardous area type EEx ia IIC T6, to indicate if the valve is open or closed.
- 3/2 way solenoid valve, hazardous area type EEx ia IIC T6 (24 V DC)..

DN	DN1	D	d1	d2	L	L1	L2	L3	H	Reference
40	25	168	35	27	85	105	75	35	378	BASP40/...
40	25	168	35	27	85	105	155	35	378	BALP40/...



GAS MIXING VALVES

These valves are used to feed gas into bubble columns without internals and reaction vessels. The gas enters through holes drilled radially at the narrowest cross-section of the PTFE jet and the flow of liquid causes it to shear off into very fine bubbles. This also ensures uniform distribution in the liquid even when used with large reaction vessels or similar equipment.

The liquid and gas throughput ratio can be selected within wide limits with the valve fully opened. This is achieved by appropriate adjustment of the gas feed pressure, selection of an appropriate diameter for the gas inlet holes or changing the liquid flow rate. It is also possible to vary the ratio of the two flow rates to each other by adjusting the setting of the control cone.

A wide range of measurements have been carried out for the water/air system and graphs recording the results of these are available on request. A summary of these curves can be seen in the diagram below.

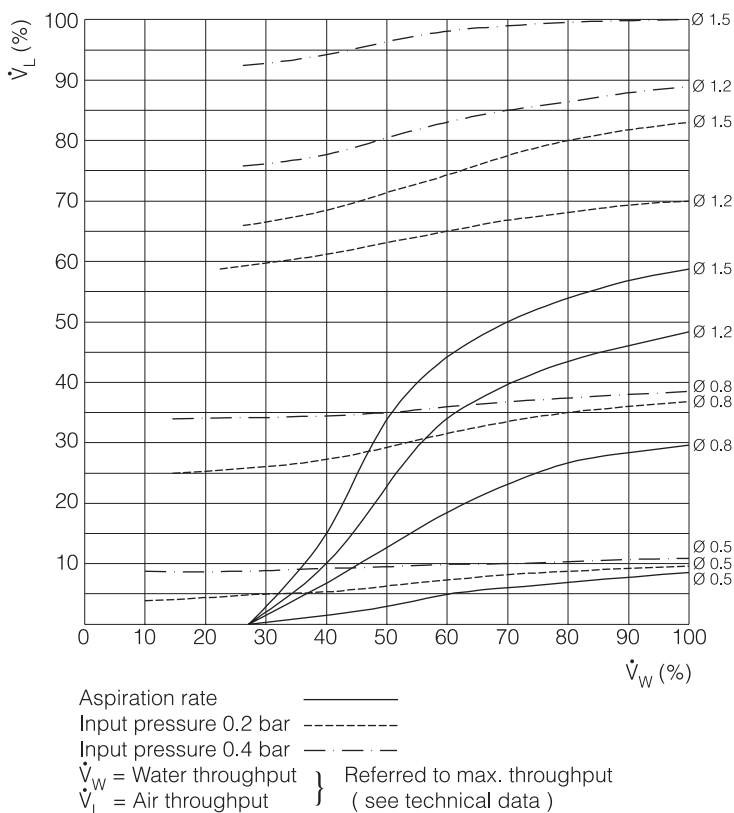


The diameter of the gas inlet holes can be freely selected between 0.5 and 1.5 mm in 1/10 mm increments.

When ordering, the required gas inlet hole diameter (please see below) should be added to the catalogue reference.

The specification of the centrifugal pump is determined by the liquid throughput on the one hand and the pressure drop in the valve and back pressure resulting from the column of liquid behind the valve on the other hand.

These valves should not be used as cut-off valves due to the risk of distortion of the gas inlet holes.



Gas throughput (air, 20 °C) versus liquid throughput (water, 20 °C)

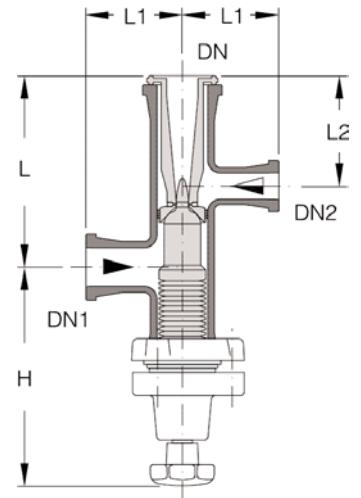
GAS MIXING VALVES

Technical Data

The throughputs for water and gas refer to a pressure drop of 2 bar in the valve and were measured with an input pressure (air) of 0.4 bar g and a hole diameter of 1.5 mm.

Valve size	DN	25	40	50	
Permissible operating pressure at 120 °C	bar.g	3,5	3,5	3,0	
Throughput	Water	l/h	1000	2000	4000
	Air	Nm ³ /h	2,3	8,0	13,0


DN	DN1 Liquid	DN2 Gas	L	L1	L2	H	Reference
25	15	15	120	50	80	186	RM25/...
40	25	25	155	75	95	207	RM40/...
50	40	25	190	95	110	220	RM50/...



SAMPLING VALVES

These valves are void of dead space and are designed for installation in horizontal pipelines. They are used to take samples from plant and other equipment. There are two different versions (please see below and page 3.23) which should be selected according to whether they are to operate under positive or atmospheric pressure or alternatively, under vacuum.

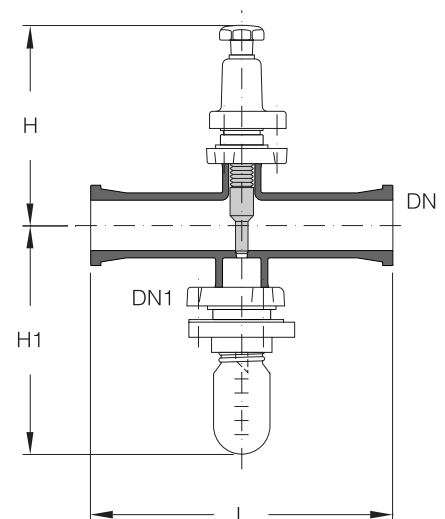
The two-part sampling flange below the outlet neck has a PPH feed pipe fitted inside it and has a GL 45 screw thread (usual with laboratory glass ware). It will, therefore, accept a laboratory bottle (which is included in the supply), for example. It can also be vented via a hole provided in the flange. To evacuate the bottle when taking samples from a vacuum, this hole is fitted with a three-way valve (G 1/4 connection).

 When taking samples from a vacuum, the vessels used (e.g. laboratory bottles) must be suitable for use under vacuum.

SAMPLING VALVES

Sampling Valves for Atmospheric and Positive Pressure

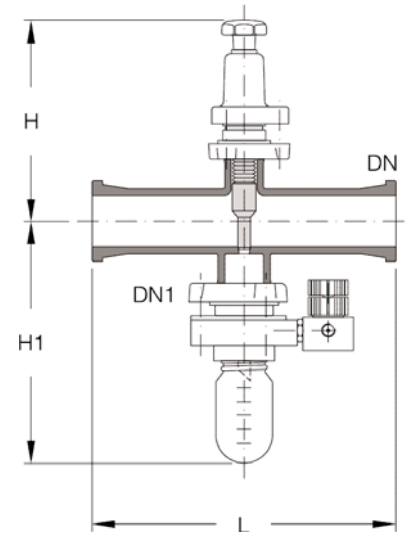
DN	DN1	L	H	H1	Reference
25	40	200	202	207	PEV25
40	40	300	202	215	PEV40
50	40	300	202	220	PEV50



SAMPLING VALVES

Sampling Valves for Vacuum

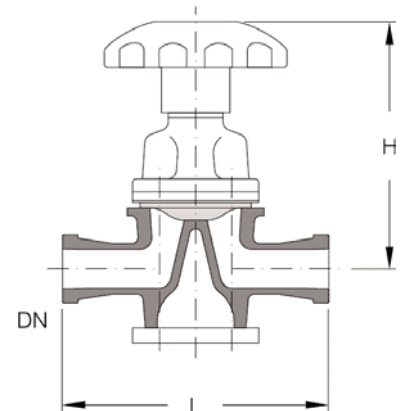
DN	DN1	L	H	H1	Reference
25	40	200	202	215	PEVV25
40	40	300	202	223	PEVV40
50	40	300	202	228	PEVV50



DIAPHRAGM VALVES

The design of these valves differs from that of our normal valves and provides great benefits where GMP requirements have to be met. The PTFE diaphragm seals on a fire-polished glass weir and, when installed vertically, the valve can be emptied fully via the pipeline it is connected to.

DN	L	H	Reference
25	175	170	MV25
40	200	175	MV40



BALL VALVES

As a result of the careful selection of materials which ensures that they meet the corrosion resistance standards expected of our products, these ball valves, which close with a gas-tight seal, represent an excellent complement to the rest of our range of glass valves. They are used in every type of application where full bore flow, i.e. low pressure drop, is an important requirement. In addition, they offer the benefit of short operating travel.

All the various versions have the common features of a PFA-sheathed ball, PFA-sheathed stainless steel operating spindle and PTFE sealing ring (various designs). Body materials, mating ends (with or without coupling components) and the sealing arrangements for the operating spindle vary.

All bodies (except »KH...«), coupling flanges and hand levers are epoxy resin coated.

Support fittings are available which consider the installation options for these components..



The maximum permissible operating temperature for all versions is 180 °C. The maximum permissible operating pressure is the same in each case as for the corresponding size borosilicate glass 3.3 pipeline.

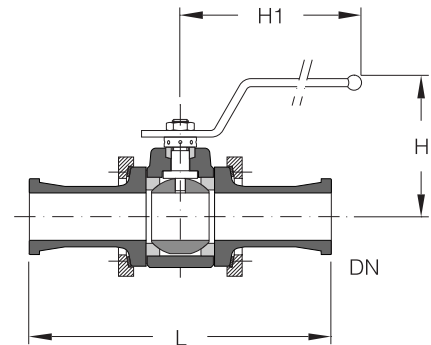
BALL VALVES

Ball Valves with Borosilicate Glass 3.3 Body

This version has a borosilicate glass 3.3 body and connecting ends (please see above for data on materials of construction applicable to all versions). This design is particularly suitable for liquids containing solids.

The operating spindle is sealed by means of a PTFE-sheathed O-ring and requires no maintenance.

DN	L	H	H1	Reference
25	175	115	150	KH25
40	225	155	225	KH40
50	300	160	225	KH50

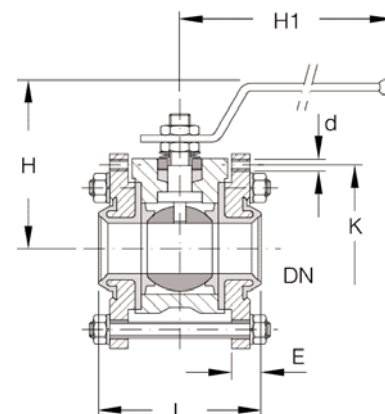


BALL VALVES

Compact Ball Valves with Spheroidal Graphite Cast Iron/PFA Body

A feature of these compact ball valves with body and connecting flanges made of spheroidal graphite cast iron/PFA (please see on page 3.24 for data on materials of construction applicable to all versions) is their short overall length. They are ideal for direct installation in borosilicate glass 3.3 between components with safety buttress ends. Appropriately drilled type »CRSSE..« adaptor flanges (please see section 9 »Couplings«, inserts, bolts etc. should be ordered separately.

The operating spindle is sealed by means of a self-adjusting, maintenance-free stuffing box.



DN	L	H	H1	E	K x n x d	Reference
25	80	115	150	15	85 x 4 x M8	KHK25
40	100	155	225	16	110 x 4 x M8	KHK40
50	125	160	225	23	125 x 4 x M8	KHK50

PNEUMATICALLY ACTUATED BALL VALVES

All the manually operated ball valves described above can be supplied with NORBRO single-action actuators. Their spring return action can be set at will as a safety feature to either »spring to open« or »spring to close«.

Technical data and installation dimensions of these ball valves are the same as for the manually operated version.

The actuators themselves and the fitting kits used conform to ISO standards. Support fittings are available which consider the installation options for these components.

If required, we can also supply actuators with a lower number of springs for lower air supply pressures, double-action NORBRO actuators or actuators by other manufacturers.



Compressed air is required at 5.5 bar g for single-action actuators with the full number of springs.

To avoid the sudden build-up of high surface pressure between the ball and operating spindle at the start of the opening or shutting action, we recommend the incorporation of air flow controls in the supply line to the actuator.

When ordering please add a »1« to the catalogue reference if the »spring-to-open« fail-safe version is required or a »2« for »spring-to-close«.

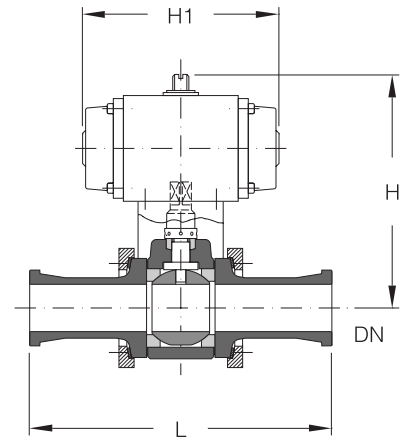
The »spring to open« setting can be changed to »spring to close« and vice-versa by changing the position of the operating spindle in the actuator by 90°.

If required, two inductive proximity detectors of hazardous area type EEx ia IIC T6 to indicate on/off can be supplied for the actuators.

PNEUMATICALLY ACTUATED BALL VALVES

Ball Valves with Borosilicate Glass 3.3 Body

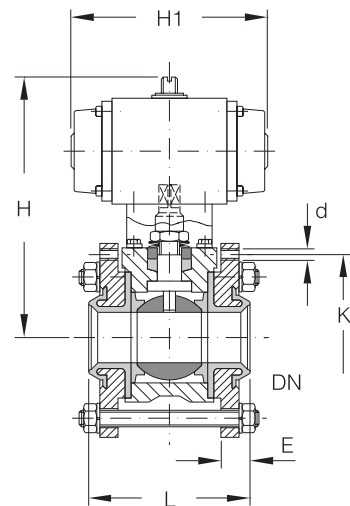
DN	L	H	H1	Reference
25	175	182	155	KHP25/...
40	225	240	195	KHP40/...
50	300	244	195	KHP50/...



PNEUMATICALLY ACTUATED BALL VALVES

Compact Ball Valves with Spheroidal Graphite Cast Iron/PFA Body

DN	L	H	H1	E	K x n x d	Reference
25	80	208	155	15	85 x 4 x M8	KHKP25/...
40	100	255	195	16	110 x 4 x M8	KHKP40/...
50	125	259	195	23	125 x 4 x M8	KHKP50/...



BUTTERFLY VALVES

These valves, which close with a gas-tight seal, complement our ball valve range (please see pages 3.24 to 3.26) in the larger bores. The combination of materials of construction selected ensures that they also meet the corrosion resistance standards expected of our products. They are used not only where there is a requirement for full bore flow, i.e. low pressure drop, and short operating travel, but also absence of dead space and short overall length.

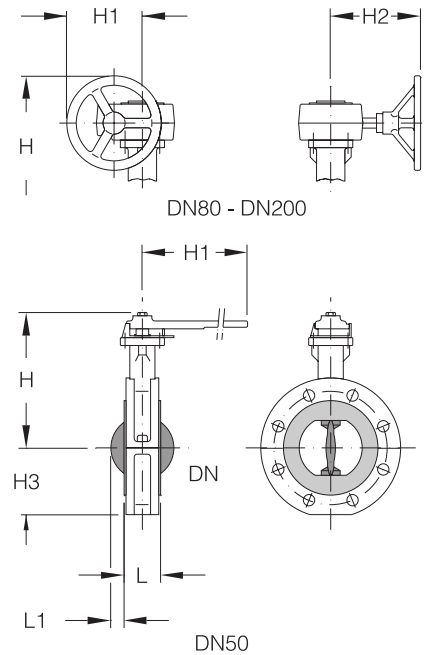
In reaction units they can be used to separate the distillation overhead gear and reaction vessel when it is intended to operate the latter for periods at higher pressure.


These butterfly valves comprise essentially a PFA-sheathed stainless steel disk/operating spindle unit, a two-part PFA / spheroidal graphite cast iron body, a maintenance-free, self-adjusting operating spindle seal together with a hand lever and an integral earthing strap for static electricity discharge purposes. The body and hand lever are epoxy resin coated.

As a result of their virtually equal percentage characteristic curve in the 20° to 80° opening angle range, flap valves can also be used as control valves. The seal between the disk and body lining is concentric and it makes a soft seal.

Support fittings are available which consider the installation options for these components.

Butterfly valves nominal size DN 50 are supplied as standard with a hand lever with fixed intermediate settings. Larger valves are supplied with a geared handwheel. All sizes can, however, be supplied with pneumatic actuators if required.



 These butterfly valves can also be used for connections to glassed steel branches. The corresponding sets of adaptors have to be ordered separately (see Section 9 »Couplings«).

The maximum permissible operating temperature is 190 °C at -0,5/+4 bar g and 120 °C at -1/+4 bar g.

If required, butterfly valves can be supplied with an additional secondary seal (stuffing box), alarm connection and proximity switch (»valve closed« indicator).

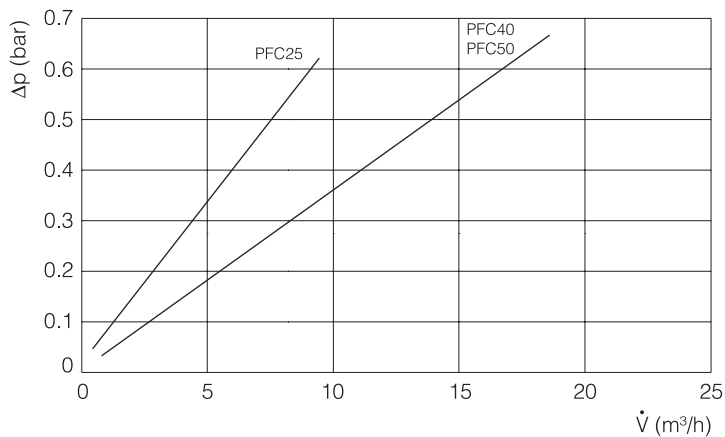
DN	L	L1	H	H1	H2	H3	Reference
50	43	4	175	300	-	66	FVT50
80	46	18	262	120	181	93	FVT80
100	52	25	277	120	181	106	FVT100
150	56	48	314	120	181	135	FVT150
200	60	71	334	120	181	165	FVT200

PIPELINE FILTERS

Our proven pipeline filters with ceramic elements (please see also »Dirt Traps« on page 3.29) are recommended for the removal of very fine impurities from liquid or gas streams in glass pipeline systems. They are supplied in grain size 30 with an average pore diameter of 40 µm.

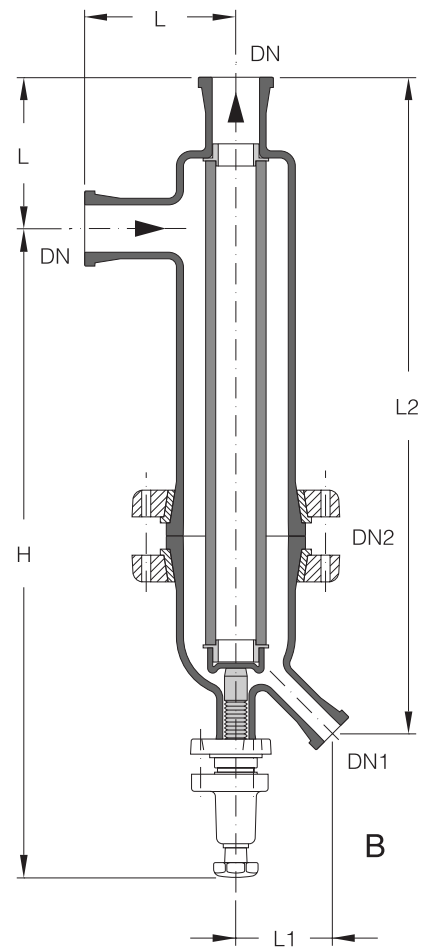
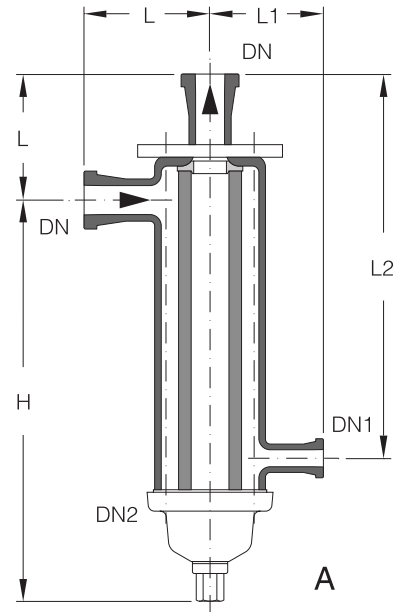
The degree of contamination can be observed clearly at all times through the borosilicate glass 3.3 body provided the product permits it. The assembly is designed for ease of cleaning or replacement of the filter element.

The graphs below provide pressure drop data (based on water) for the various sizes. They refer to clean filter elements.



Pressure drop versus throughput (water, 20 °C) with grain size 30

DN	DN1	DN2	L	L1	L2	H	Type	Reference
25	15	80	100	90	305	320	A	PFC25
40	25	100	150	96	654	650	B	PFC40
50	25	100	150	96	654	650	B	PFC50



DIRT TRAPS

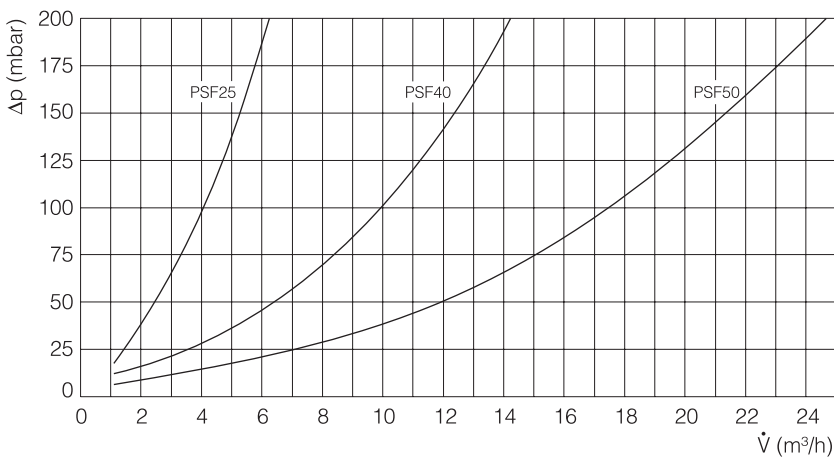
These angled seat filters with PTFE insert are designed for use in pipeline systems. They are used to protect equipment, e.g. pumps with magnetic coupling, against damage by abrasive contents or other impurities (please see also »Pipeline Filters« on page 3.28).

Dirt traps can be supplied as coarse filters, i.e. with 2 mm diameter holes in the PTFE cylinder, or as fine filters. In the latter case a ETFE filter sleeve with a mesh size of 100, 300 or 500 µm is fitted over the support cylinder. The graphs below provide pressure drop data (based on water) for the various sizes. They refer to clean filter inserts.

The degree of contamination can be observed clearly through the borosilicate glass 3.3 body provided the product permits it.



When ordering fine filters, the mesh size (please see above) should be added to the catalogue reference. The mentioned pressure drop is related to a maximum temperature of 150 °C.



Pressure drop versus throughput (water, 20 °C)

DIRT TRAPS

Coarse filters

DN	DN1	L	H	H1	Pmax. (bar)	Reference
25	40	175	180	163	3	PSF25
40	50	225	190	173	3	PSF40
50	80	300	280	252	2	PSF50

Fine filters

DN	DN1	L	H	H1	Pmax. (bar)	Reference
25	40	175	180	163	3	PSF25/...
40	50	225	190	173	3	PSF40/...
50	80	300	280	252	2	PSF50/...

