



# Alfa Laval Unique DV-ST UltraPure Diaphragm Valves

Discover Alfa Laval UltraPure



# Content

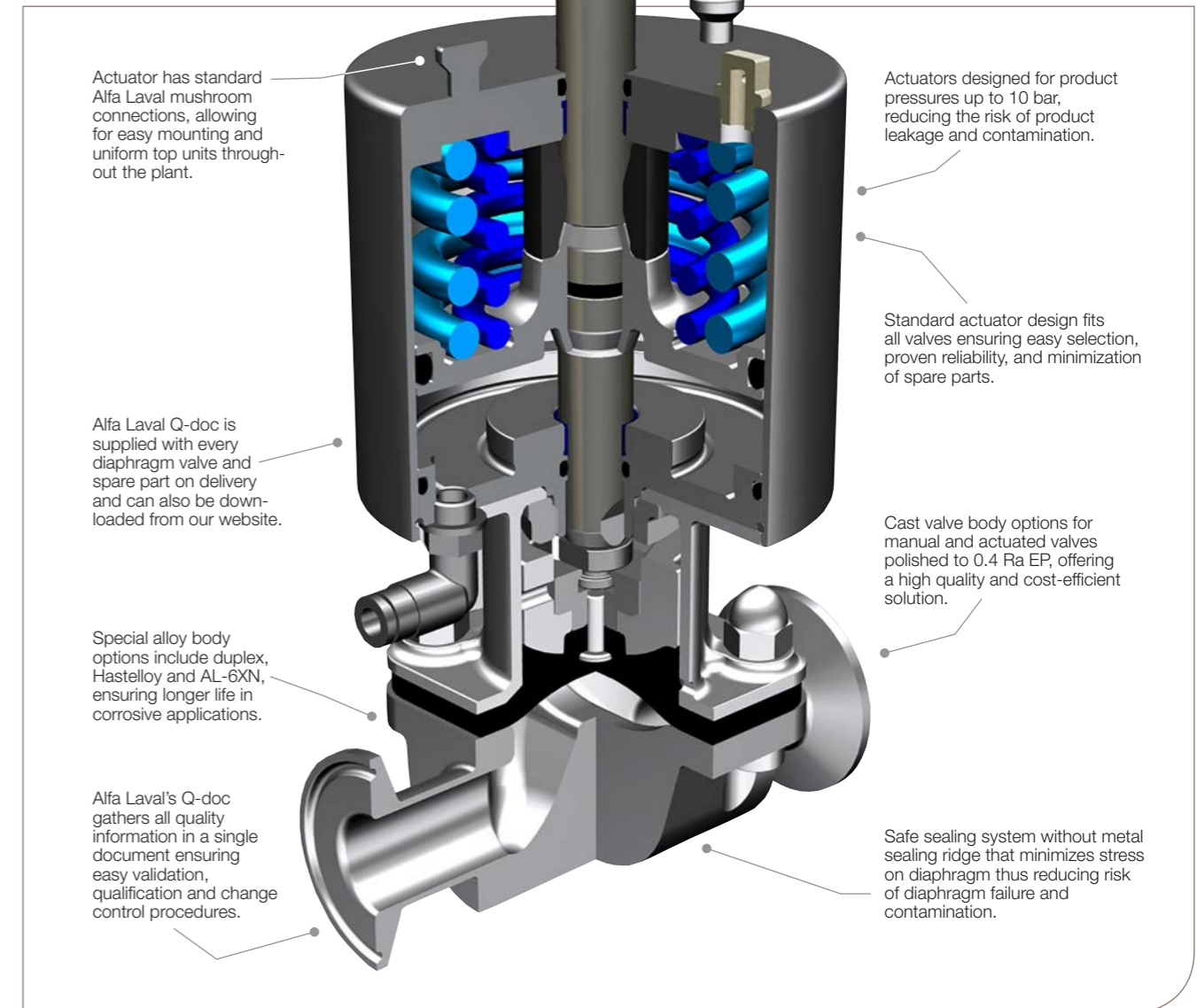
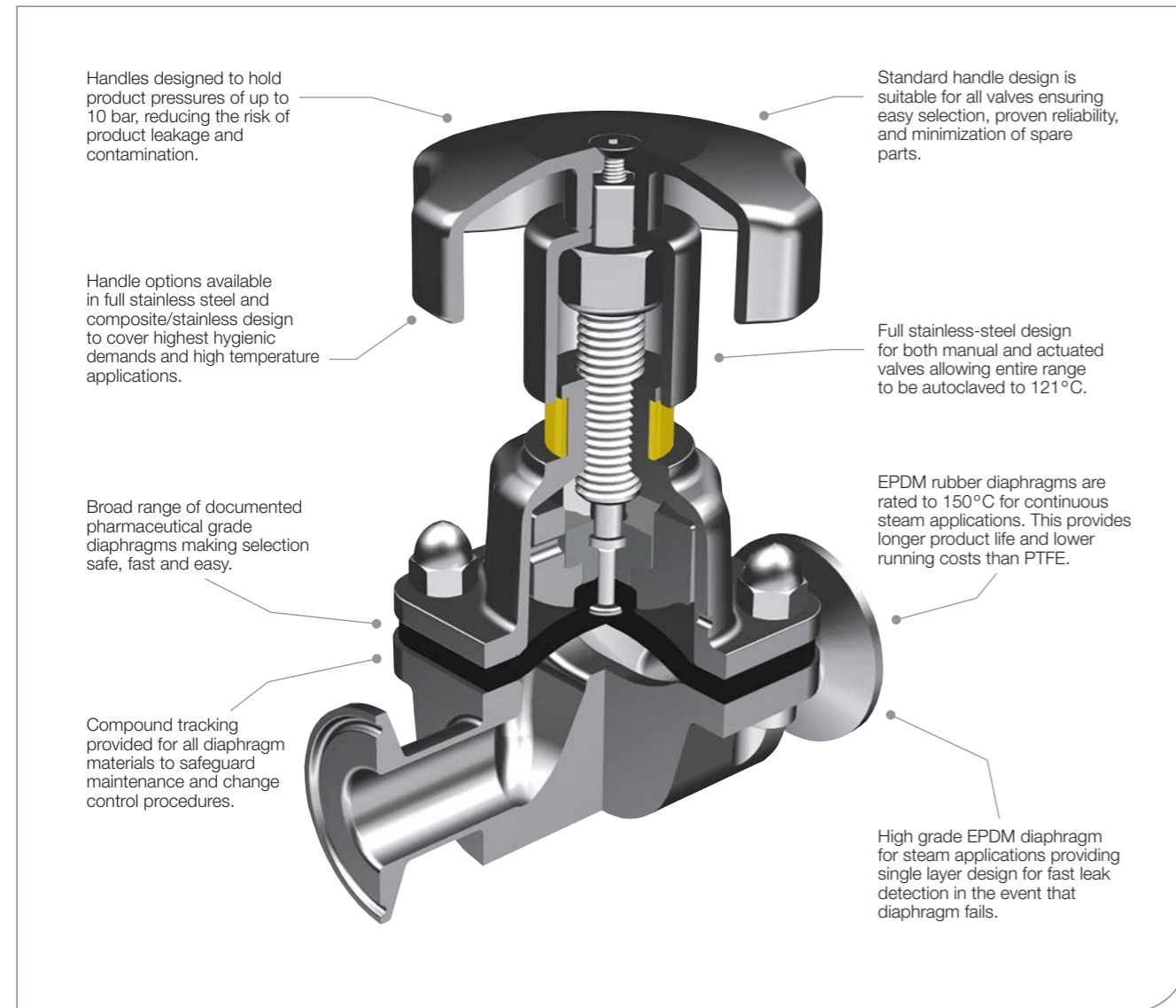
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# Alfa Laval DV-ST UltraPure Diaphragm Valves

With a fully modular design and enhanced compatibility, Alfa Laval's DV-ST UltraPure diaphragm valves offer solutions for all hygienic industries. Their customizability allow you to create a complete valve system to meet virtually any demand in the pharmaceutical and biotech industry. In fact, it's an obvious choice in any industry where reliable, documented, contaminant-free performance is required.

Throughout this brochure you will read more about the strengths of the individual components in Alfa Laval DV-ST UltraPure diaphragm valves, but don't lose sight of the value of having a complete solution delivered by Alfa Laval. Through years of innovation, improvement and refinement, Alfa Laval has consistently delivered high-performance systems backed up by thorough documentation.

## Some of the key features that distinguish Alfa Laval DV-ST UltraPure Diaphragm Valves are:





# A configuration to suit any application

Alfa Laval DV-ST UltraPure diaphragm valve has a modular design. The range includes control units, actuators, handles, diaphragms and a wide range of standardised and customised valve bodies, it can be designed to suit any application.

The table below lays out the possibilities, but since Alfa Laval's high-quality valve bodies can be engineered to meet exact specifications the selection is unlimited.



With a fully modular design and enhanced compatibility, Alfa Laval's DV-ST UltraPure diaphragm valves offer solutions for all hygienic industries.

# Valve body options

Alfa Laval DV-ST UltraPure valve bodies are available in cast, forged, and block options to suit the most demanding applications. A choice of surface finishes and connection types are also

available. For critical applications with corrosive media we offer special alloy options in block design including Hastelloy, duplex, and AL-6XN materials.

## Valve bodies



Type	Cast	Forged	Block
Size	1/4-3 Inches	1/4-3 Inches	1/4-4 Inches
Alloy	CF3M (316L)	1.4435 (316L)	1.4404 (316L)
Special Alloy	N/A	N/A	1.4435, Duplex, Hastelloy, AL6XN
Delta Ferrite	<1.0%	<0.5%	<0.5%
Sulphur	<0.04%	0.005-0.017%	0.005-0.017%
Internal Surface finish	0.51Ra Mechanical (SF1) and 0.38Ra Electropolished (SF4)	0.51Ra Mechanical (SF1) and 0.38Ra Electropolished (SF4)	0.51Ra Mechanical (SF1) and 0.38Ra Electropolished (SF4)
External Surface finish	Blasted (other finish available on request)	Blasted (other finish available on request)	Machined surface (other finish available on request)
Connections	Buttweld, Clamp	Buttweld, Clamp	Buttweld, Clamp
Dimension Standard	ASME BPE, ISO 2037	ASME BPE, ISO 2037, DIN 11850, ISO 1127	ASME BPE, ISO 2037, DIN 11850, ISO 1127

### Cast

Alfa Laval DV-ST cast bodies are manufactured from high quality investment castings. The manufacturing process starts with a wax shell which is coated in ceramic material. The shell is then heated in a kiln where the wax melts away, leaving the final mould for molten metal to be cast into. It is then cooled, machined, and polished into the DV-ST diaphragm valve body. Stringent quality checks and advanced casting procedures ensure valve bodies are free from porosities.

### Forged

Alfa Laval DV-ST forged valve bodies are manufactured from stainless steel ingots. An ingot is compressed using forging tools under high pressure and high temperature to form the diaphragm valve body shape. It is then machined and polished into the finished product. The forging process ensures a high density homogenous valve body free from porosity.

### Block

Alfa Laval DV-ST block valves are manufactured from bar stock. Different machining processes are used to create the valve body, and many different sizes and shapes can be produced. Utilizing bar stock also allows for high-performance materials such as AL-6XN and Hastelloy alloys to be used. Block valves offer a homogenous high-density material free from porosity.

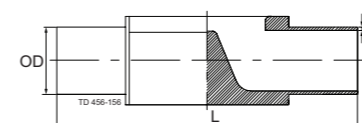




# Two-way valves

Alfa Laval DV-ST UltraPure two-way diaphragm valves are available in forged, cast or block types, and in sizes 1/4" to 4" (DN 8 to DN 100). They are all fully compatible with all other components in

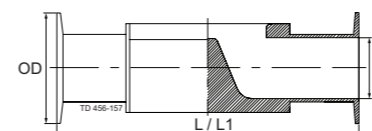
the Alfa Laval DV-ST UltraPure range. The specifications below are applicable to forged, cast and block types, unless otherwise stated.



Weld ends: (mm)

Port size		Length	ASME BPE	ISO 2037	DIN11850 <sup>1)</sup> (Series A)	ISO1127 <sup>1)</sup> (Series B)
DN	Inch	L	OD x t	OD x t	OD x t	OD x t
8	1/4"	89	6.35 x 0.89	12.00 x 1.00	10.00 x 1.0	13.50 x 1.60
10	3/8"	89	9.53 x 0.89	12.70 x 1.00	13.00 x 1.50	17.20 x 1.60
15	1/2"	89	12.70 x 1.65	-	-	-
15	1/2"	110	12.70 x 1.65	17.20 x 1.00	19.00 x 1.50	21.30 x 1.60
20	3/4"	119	19.05 x 1.65	21.30 x 1.00	23.00 x 1.50	26.90 x 1.60
25	1"	129	25.40 x 1.65	25.00 x 1.20	29.00 x 1.50	33.70 x 2.00
32	1 1/4"	129	-	-	35.00 x 1.50	-
32	1 1/4"	161	-	-	-	42.40 x 2.00
40	1 1/2"	161	38.10 x 1.65	38.00 x 1.20	41.00 x 1.50	48.30 x 2.00
50	2"	192	50.80 x 1.65	51.00 x 1.20	53.00 x 1.50	60.30 x 2.00
65	2 1/2"	218	63.50 x 1.65	63.50 x 1.60	70.00 x 2.00	76.10 x 2.00
80	3"	256	76.20 x 1.65	76.10 x 1.60	85.00 x 2.00	88.90 x 2.30
100	4"	218	101.60 x 2.11	101.60 x 2.00	104.00 x 2.00	114.30 x 2.30

<sup>1)</sup> Forged only



Clamp ends: (mm)

Port size		Length	Length	Clamp ASME BPE for ASME BPE		Clamp ISO 2852 for ISO 2037		Clamp DIN 32676 <sup>1)</sup> for Series A/DIN		Clamp DIN 32676 <sup>1)</sup> for Series B/ISO	
DN	Inch	L <sup>3)</sup>	L1 <sup>2)</sup>	OD	ID	OD	ID	OD	ID	OD	ID
8	1/4"	89	63.5	25.00	4.57	34.00	10.00	25.00	8.00	25.00	10.3
10	3/8"	89	63.5	25.00	7.75	34.00	10.70	34.00	10.00	-	-
10	3/8"	108	-	-	-	-	-	-	-	25.00	14.0
15	1/2"	-	63.5	25.00	9.40	-	-	-	-	-	-
15	1/2"	108	89	25.00	9.40	34.00	15.20	34.00	16.00	50.50	18.1
20	3/4"	118	102	25.00	15.75	34.00	19.30	34.00	20.00	50.50	23.7
25	1"	127	114	50.50	22.10	50.50	22.60	50.50	26.00	50.50	29.7
32	1 1/4"	127	-	-	-	-	-	50.50	32.00	-	-
32	1 1/4"	159	-	-	-	-	-	-	-	64.00	38.4
40	1 1/2"	159	140	50.50	34.80	50.50	35.60	50.50	38.00	64.00	44.3
50	2"	191	159	64.00	47.50	64.00	48.60	64.00	50.00	77.50	56.3 <sup>1)</sup>
65	2 1/2"	216	194	77.50	60.20	77.50	60.30	91.00	66.00	91.00	72.1
80	3"	254	222	91.00	72.90	91.00	72.90	106.00	81.00	106.00	84.3
100	4"	305	-	118.92	97.38	119.00	97.60	119.00	100.00	119.00	109.7

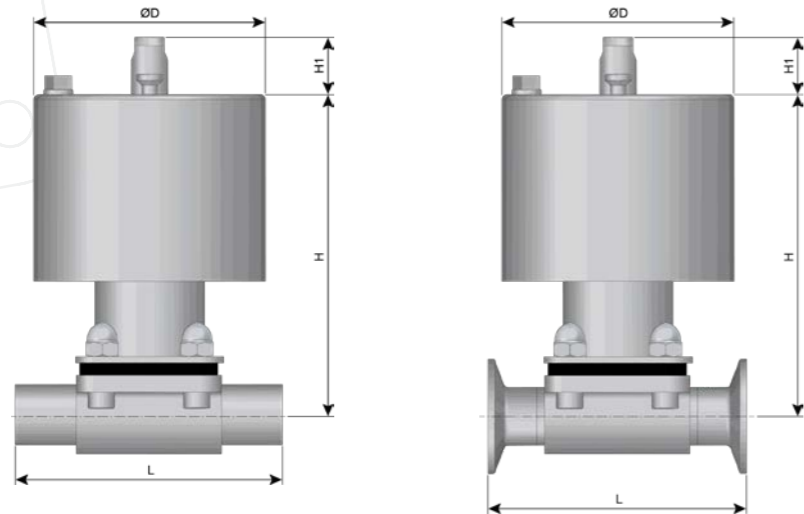
<sup>1)</sup> Forged only

<sup>2)</sup> ASME BPE forged valves only, short version acc. to ASME BPE dimension table for hygienic clamp joint: Weir style diaphragm valve

<sup>3)</sup> Standard build-in length acc. EN 558-1, Series 7

Alfa Laval UltraPure two-way diaphragm valves are available in forged, cast or block types.

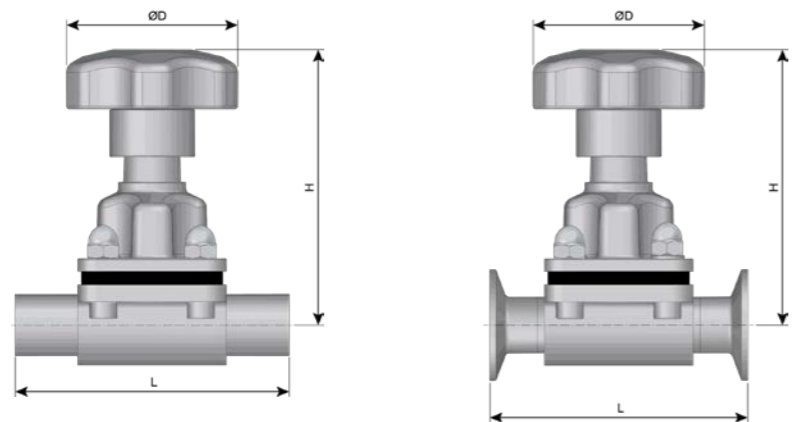
Alfa Laval Unique DV-ST dimension overview for 2-way valves. Further dimension and 3D drawing can be found in Cadenas tool on the following web-page: <http://alfalaval.partcommunity.com/3d-cad-models/>



2-way Actuator

Size		ØD mm(in)	H mm (in)	H1 mm (in)	L (Weld ends) mm (in)	L (Clamp) mm (in)
DN	Inch					
08 -10	1/4" - 3/8"	54 (2.13)	105 (4.13)	18.7 (0.74)	89 (3.50)	89 (3.50)
15	1/2"	54 (2.13)	118 (4.65)	22.2 (0.87)	110 (4.33)	108 (4.25)
20	3/4"	102 (4.00)	151 (5.94)	27.6 (1.09)	119 (4.69)	118 (4.65)
25*	1"	102 (4.00)	159 (6.26)	30.5 (1.20)	129 (5.08)	127 (5.00)
40*	1½"	156 (6.14)	231 (9.09)	48.9 (1.93)	161 (6.34)	159 (6.26)
50	2"	156 (6.14)	236 (9.29)	48.9 (1.93)	192 (7.56)	191 (7.52)
65	2½"	222 (8.74)	360 (14.17)	68.0 (2.68)	218 (8.58)	216 (8.50)
80	3"	222 (8.74)	368 (14.49)	73.9 (2.90)	256 (10.08)	254 (10.00)
100	4"	222 (8.74)	374 (14.72)	73.9 (2.90)	218 (8.58)	305 (11.96)

\*DN32 DIN use DN25. DN32 ISO 1127 use DN40  
ASME BPE clamp short length dimension - see page 11



2-way Manual

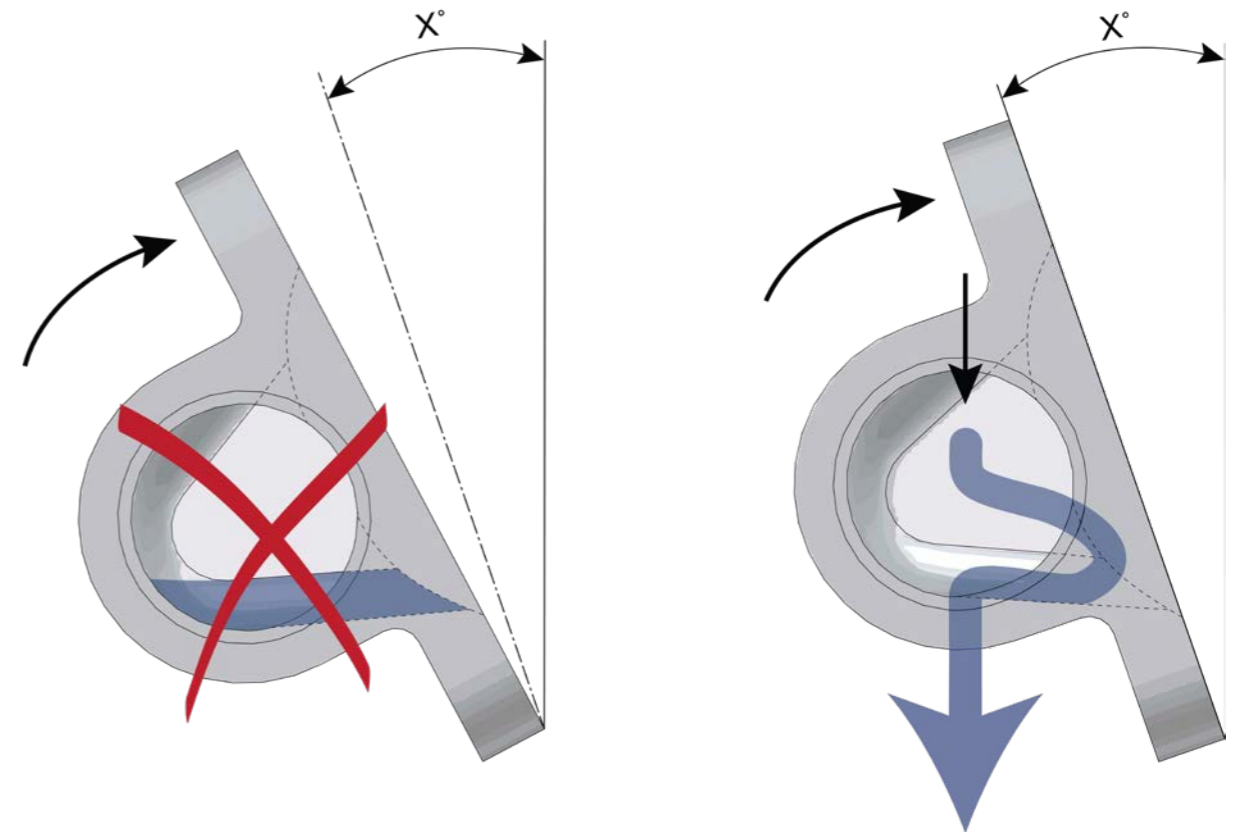
Size		ØD SS / ØD C mm(in)	H mm (in)	L (Weld ends) mm (in)	L (Clamp) mm (in)
DN	Inch				
08 -10	1/4" - 3/8"	40 (1.57)	65 (2.56)	89 (3.50)	89 (3.50)
15	1/2"	62 (2.44)	101 (3.98)	110 (4.33)	108 (4.25)
20	3/4"	62 (2.44)	116 (4.57)	119 (4.68)	118 (4.65)
25*	1"	87 (3.42)	128 (5.04)	129 (5.08)	127 (5.00)
40*	1½"	108 (4.25)	165 (6.50)	161 (6.34)	159 (6.26)
50	2"	108 (4.25)	195 (7.68)	192 (7.56)	191 (7.52)
65	2½"	172 (6.78)	255 (10.04)	218 (8.58)	216 (8.50)
80	3"	220 (8.66)	274 (10.79)	256 (10.08)	254 (10.00)
100	4"	220 (8.66)	280 (11.02)	218 (8.58)	305 (11.96)

\*DN32 DIN use DN25. DN32 ISO 1127 use DN40  
ASME BPE clamp short length dimension - see page 11  
H at fully open handle

# Two-way valve drainability

Drainability is critical in the pharmaceutical and biotech industries. Alfa Laval DV-ST UltraPure two-way diaphragm valves offer full drainability, when the valve is mounted at the correct angle.

The table below shows the angles necessary for full drainability.



Drain angle x:

Port size		ASME BPE	ISO 2037	DIN11850 (Series A)	ISO 1127 (Series B)
DN	Inch				
8	1/4"	37°	27°	27°	22°
10	3/8"	33°	28°	28°	31°
15	1/2"	32°	23°	23°	18°
20	3/4"	26°	23°	23°	15°
25	1"	22°	25°	21°	20°
32	1 ¼"	-	-	21°	18°
40	1½"	24°	24°	22°	18°
50	2"	24°	24°	23°	20°
65	2½"	20°	22°	19°	15°
80	3"	22°	25°	22°	15°
100	4"	14°	14°	13°	8°

# Kv Value

To ensure that valves of the correct size are installed in a system, it is necessary to know the rate at which fluid flows through the valves in specific conditions. Using metric measurements, this is calculated using the Kv value (also known as the flow factor or flow coefficient).

The Kv value is defined as the flow in cubic metres per hour of water, at a pressure drop (differential pressure) across the valve of 1bar, when fully open, at a temperature between 5 °C and 30 °C.

In countries that use imperial measurements, the Cv value is often used. The Cv value is defined as

the flow in US Gallons per minute, at a pressure drop (differential pressure) across the valve of 1 psi, when fully open, at a temperature of 60 °F.

The Cv value can be calculated from the Kv value using the formula:  **$Cv = 1.16 \times Kv$**

The tables below specify the Kv values for Alfa Laval DV-ST UltraPure two-way valves of different sizes.

**$KV = Q/\text{square root } \Delta p$**

Q is the flowrate (expressed in cubic metres per hour),  $\Delta P$  is the differential pressure across the device (expressed in bars).

## Kv value / Flow coefficient

Kv value (Pipe standard ISO 1127)

Lift in %	kv in l/min. $\Delta p = 1 \text{ bar}$								
	DN 8 (1/4")	DN 15 (1/2")	DN 20 (3/4")	DN 25 (1")	DN 40 (1 1/2")	DN 50 (2")	DN 65 (2 1/2")	DN 80 (3")	DN 100 (4")
100	27	70	146	218	684	1156	1571	2533	3415
90	27	68	140	210	667	1116	1480	2515	3385
80	26	67	133	201	625	1076	1445	2462	3314
70	25	64	124	194	610	994	1365	2312	3187
60	23	59	101	165	545	893	1210	2170	2973
50	20	47	87	142	457	750	1044	1925	2575
40	18	35	55	115	345	606	835	1565	2112
30	11	22	43	65	310	424	625	845	1173
20	10	17	20	25	180	222	280	401	543
10	2	5	7	14	50	64	125	195	265

Kv value (Pipe standard ASME BPE)

Lift in %	kv in l/min. $\Delta p = 1 \text{ bar}$								
	DN 8 (1/4")	DN 15 (1/2")	DN 20 (3/4")	DN 25 (1")	DN 40 (1 1/2")	DN 50 (2")	DN 65 (2 1/2")	DN 80 (3")	DN 100 (4")
100	3.4	35	99	180	426	914	1395	2066	3333
90	3.3	35	99	173	425	914	1394	2066	3250
80	3.3	34	97	155	410	913	1393	2058	3177
70	3.3	33	95	145	401	910	1311	2030	3039
60	3.3	33	94	140	388	882	1210	1950	2847
50	3.2	31	90	105	349	776	1090	1753	2464
40	3.1	28	76	95	335	665	872	1445	1983
30	3.1	19	65	66	265	525	630	940	1095
20	3.0	10	45	48	139	370	250	300	508
10	2.6	3	10	10	22	67	88	142	255

$Cv = 1.16 \times Kv$

Note!

For the diagrams the following applies:

Medium: Water (20 °C)

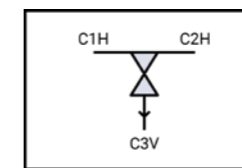
Measurement: In accordance with VDI2173

# T-valves

Alfa Laval DV-ST UltraPure Zero Deadleg T-valves are machined from a single block, thereby avoiding weld seams. Often used in water circulation systems they offer minimal deadleg, low weight, and are compact in size.

Alfa Laval can customize T-valves according to your precise needs and specifications, and they can be made to suit almost any configuration and application. The examples below show some of the most common T-valve designs in the Alfa Laval DV-ST UltraPure range.

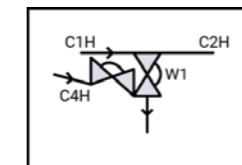
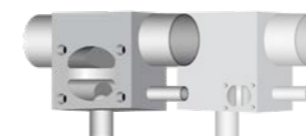
## Zero deadleg T-valve



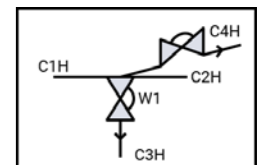
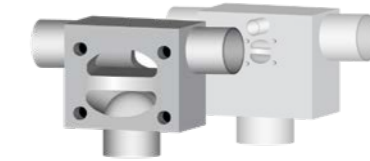
Key/legend
C = Connection
V = Vertical
H = Horizontal
W = Weir

Sampling and steam access points can also be incorporated into the design of your T-valve.

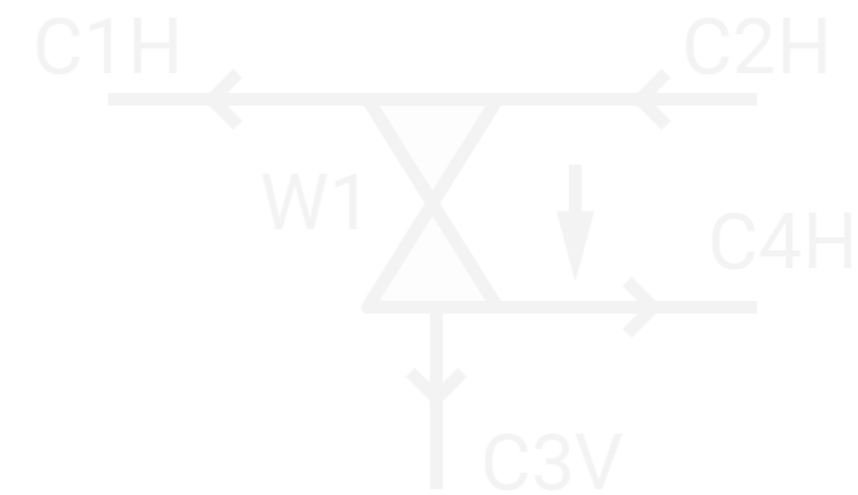
## Zero deadleg T-valve with downstream access point (suitable for steam purging)



## Zero deadleg T-valve with upstream access point on the back side (suitable for sampling)



Other designs available on request.





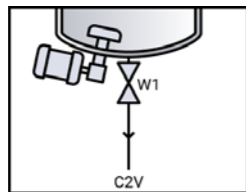
# Tank outlet valves

Alfa Laval DV-ST UltraPure tank outlet valves are machined from a single block. This makes them ideal for mixing tanks with a limited sump area, since the design minimizes mixing dead zones.

Alfa Laval can customize tank outlet valves according to your precise specifications and in

accordance with their intended application. The examples below show some of the most common tank outlet valve designs in the Alfa Laval DV-ST UltraPure range, and other designs are available on request.

## Block tank outlet valve

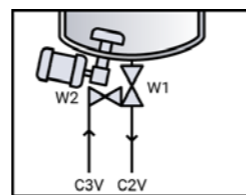
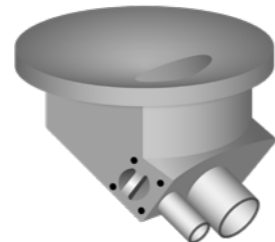
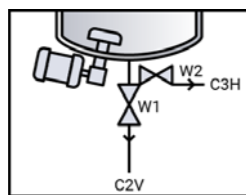
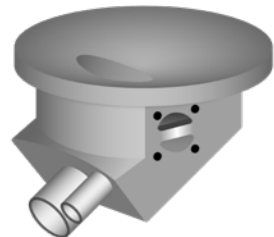


Key/legend
C = Connection
V = Vertical
H = Horizontal
W = Weir

Sampling and steam access points can also be incorporated into the design of your tank outlet valve as part of our standard multipoint tank valve range.

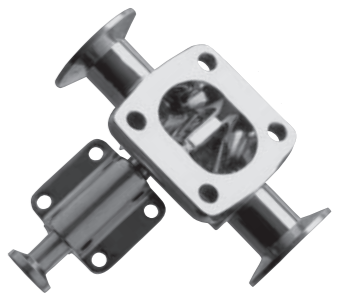
**Tank outlet valve with access point before weir, on left or right (suitable for sampling)**

**Tank outlet valve with access point after weir, on left or right (suitable for steam purging)**



Other designs available on request.

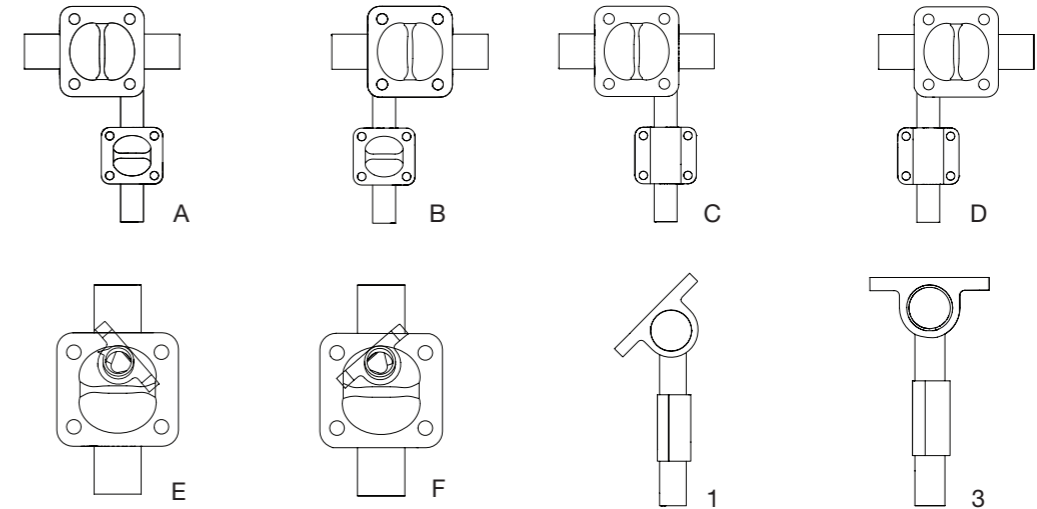
# Tandem valves



Tandem valves are a combination of two, two-way valves welded together to match various piping configurations. Alfa Laval DV-ST UltraPure fabricated tandem valves incorporate a compact design with minimal deadleg and good drainability.

Tandem valves can help simplify pipework by taking the place of conventional valve and fitting combinations. Alfa Laval can supply the standard tandem valves illustrated here or fabricate custom designs to suit your application in cast, forged, and block options.

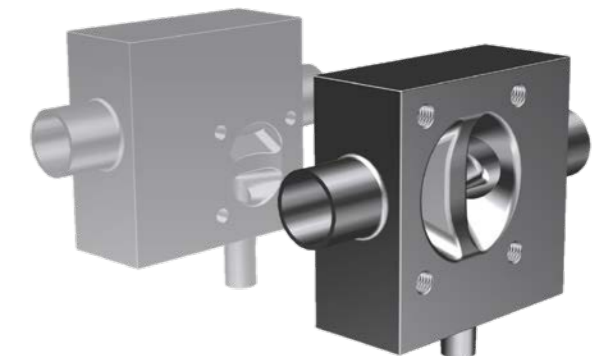
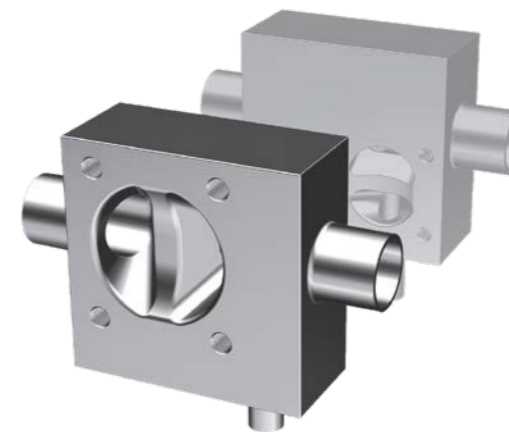
## Standard tandem valve combinations



## DV-ST Integral Access Valve (IAV)

For demanding duties where a deadleg-free system is required, Alfa Laval offers a tandem

block valve solution. The compact, weld-free design ensures full drainability and zero deadleg.



# Multi-port diaphragm valves

Alfa Laval multi-port diaphragm valves offer the ultimate in process design. By combining multiple functions in a single valve body, you can save time and space, minimize deadleg, maximize drainability, and improve system performance. These customized solutions are suitable for both simple and complex processes, and provide a more reliable and efficient alternative to valve clusters.

Our multi-port valves are customized to suit the most demanding pharmaceutical and biotech applications. Machined from solid plate or bar they

are available in 316L or 1.4435 stainless steel, as well as high alloy options like AL-6XN, Hastelloy C22, and duplex for highly corrosive and aggressive applications.

The design of multi-port valves is critical to optimizing them for your specific application and processes. Alfa Laval achieves stand-out product design by combining state of the art machining techniques with an experienced design team, and most importantly, through communication with our customers.

## Benefits of multi-port valves include:

- Reduced product holdup, maximizing yield
- Reduced deadlegs
- Optimized drainability
- Fewer welds
- Compact design
- Easy validation and conformance to international standards
- Reduced complex pipework
- Safe distribution of product

## Typical applications for the Alfa Laval multi-port valves include:

- Product distribution
- Sampling
- Mixing
- Bypass drain
- System sterilization
- Point of use
- Double block and bleed (DBB) solutions

## Examples of possible multiports configurations

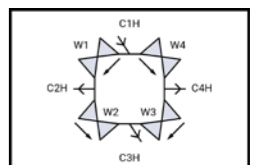
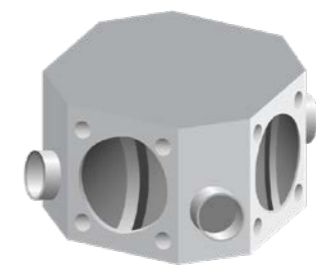
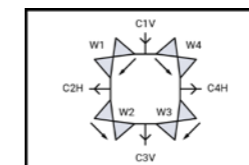
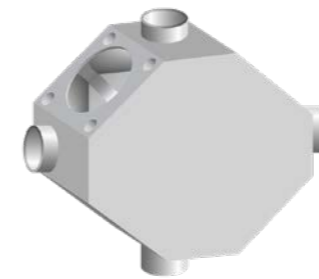


## Chromatography multi-port designs

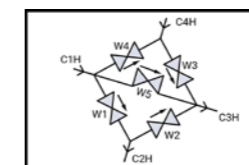
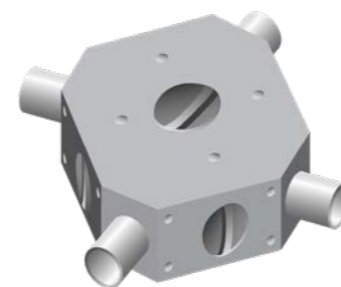
Alfa Laval can create multi-port diaphragm valves for almost any application. These examples are particularly suited for chromatography applications.

Key/legend
C = Connection
V = Vertical
H = Horizontal
W = Weir

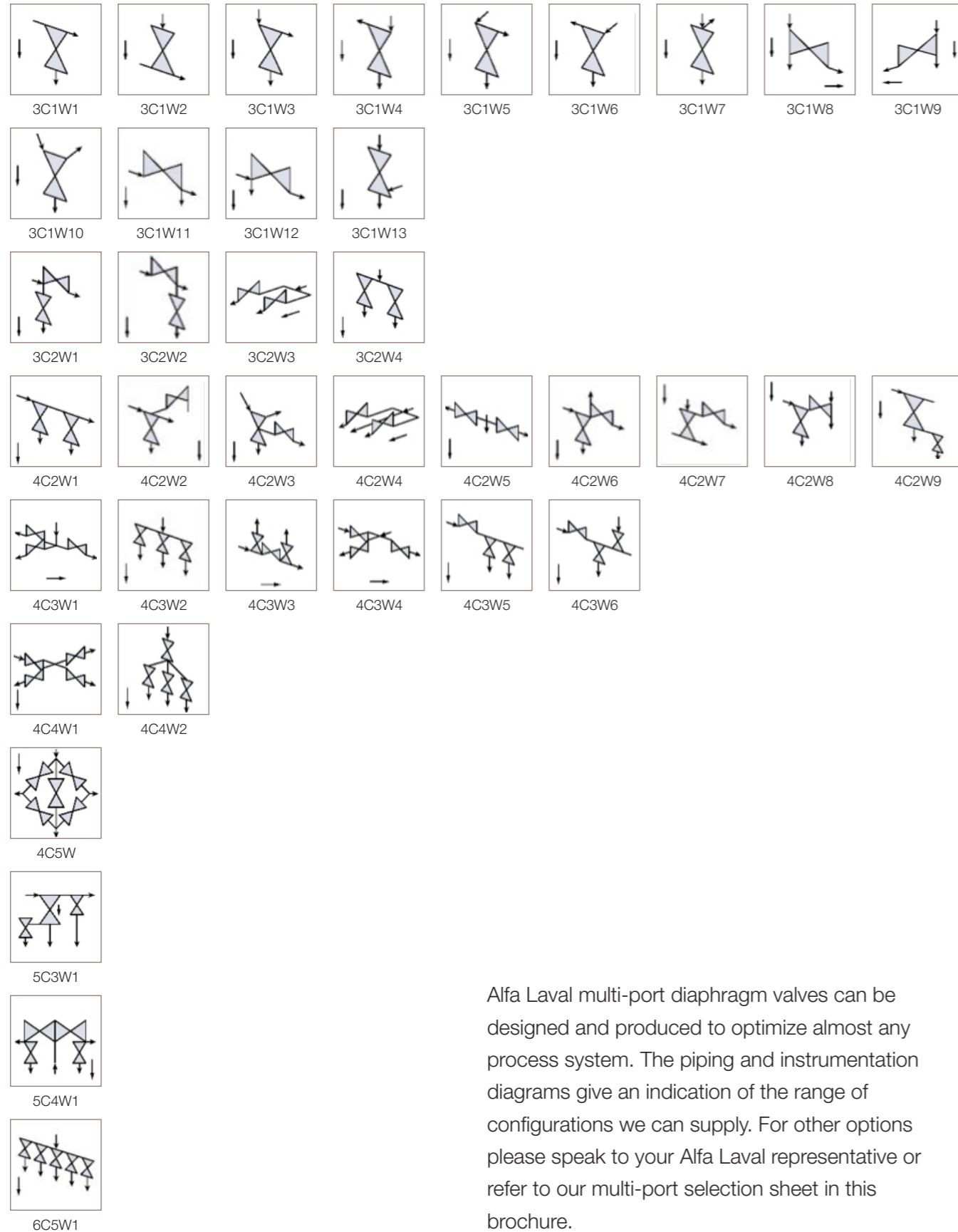
**Chromatography (without bypass): This 4-seat valve-block links any port alternatively to two adjacent points (Distribution/collection in vertical or horizontal position).**



**Chromatography (with bypass): This 5 seat valve block links ports to 2 adjacent ports, distribution/collection (vertical or horizontal installation)**



## Multi-port valves



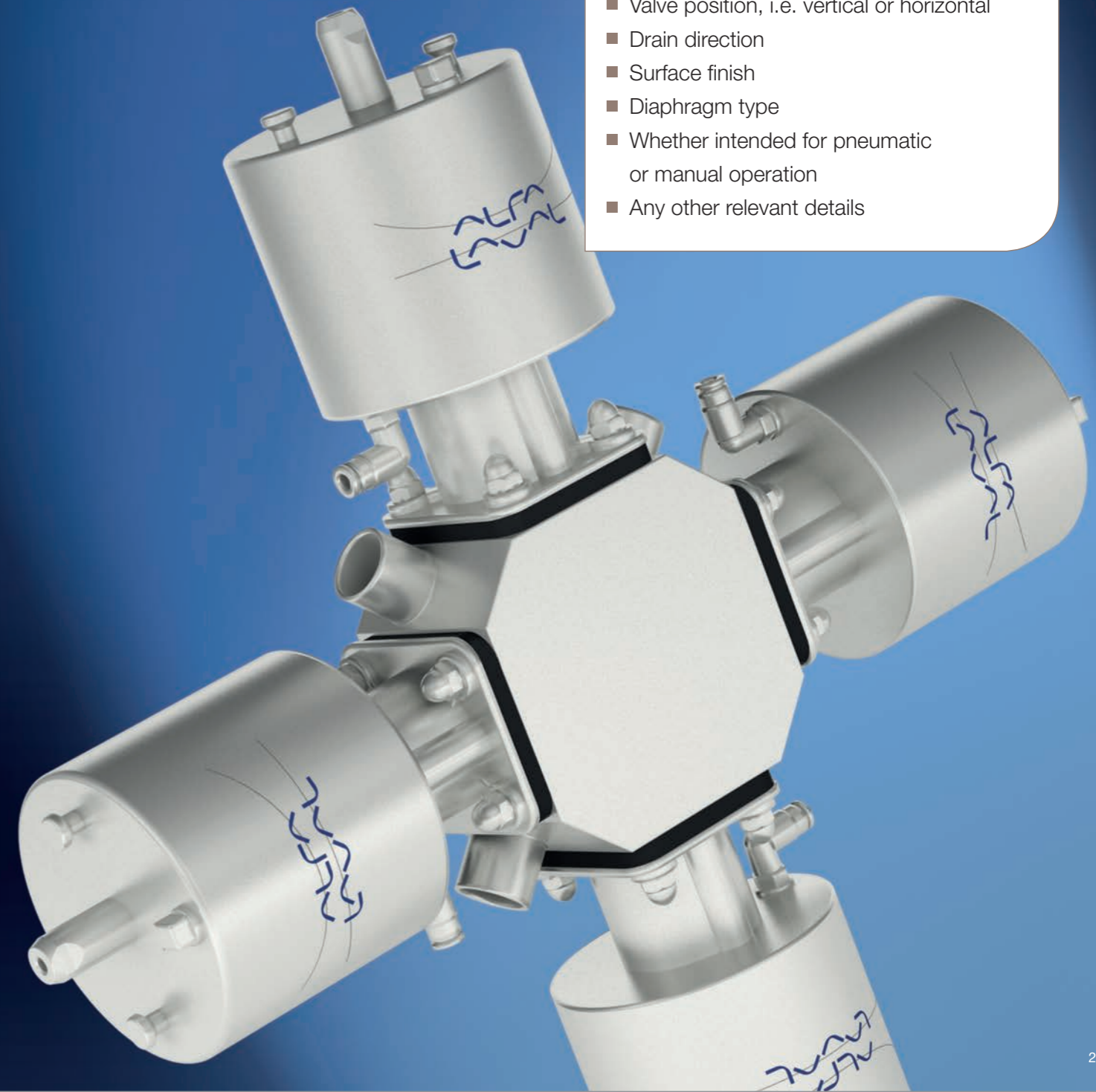
Alfa Laval multi-port diaphragm valves can be designed and produced to optimize almost any process system. The piping and instrumentation diagrams give an indication of the range of configurations we can supply. For other options please speak to your Alfa Laval representative or refer to our multi-port selection sheet in this brochure.

# How to specify and order a multi-port diaphragm valve

Getting the right multi-port valve design is crucial for maximizing system performance and flexibility. On the next page you'll find a specification sheet, to record the necessary information for each multi-port valve.

### The key information required to design your multi-port valve includes:

- Details of operating conditions
- Functions you wish the valve to perform
- Flow diagram of the system
- Connection type, size, standard etc., for every connection
- Valve position, i.e. vertical or horizontal
- Drain direction
- Surface finish
- Diaphragm type
- Whether intended for pneumatic or manual operation
- Any other relevant details



## Multi Block Configuration Quotation Form

### Multi Block Configuration Quotation Form



Commercial Data		Contact Data	
Project/Ref		Company Name	
Qty		Department	
Single Request		Contact	
Serial Request		Phone	
Other Information		Email	

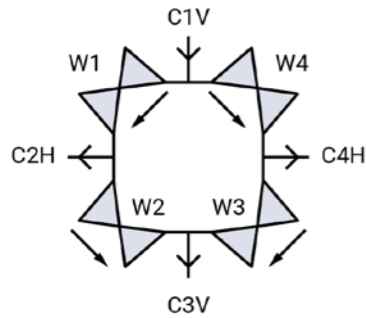
Technical Data	
Media:	
Pressure:	
Temperature (Media):	
Viscosity:	
Kv Value (Flow):	

Key/legend	
C = Connection	
V = Vertical	
H = Horizontal	
W = Weir	

Mark, X or describe the other desired option:

Block Material	1.4404 (316L)	1.4435	1.4435 (BN2)	Other
Diaphragm Material	EPDM	PTFE/EPDM	TFM/EPDM	Other
Surface Finish Internal	0.5 RA	0.4 RA Electropolished	Other	
Surface Finish External	3.2 RA	Other		

Please draw flow diagram Example



Diaphragm Valve	
Area With Min Volume	.....
Drainability	
Flow of Medium	
C1, C2 .... Connections	C1...CN
Orientation of Connections	V Vertical or H Horizontal

Page 2

C NO.	DN/Inch.	Connection STD				Connection Type		Operation		Other
		DIN/A	ISO/B	ISO 2037	ASME	Clamp	Weld Ends	Manual	Pneumatic (N/C, N/O, A/A)	
C1										
C2										
C3										
C4										
C5										
C6										
C7										
C8										
C9										
C10										



## Diaphragms

In pharmaceutical, biotech and other industries that demand ultra-hygienic conditions, the large number of variables can make it difficult to find the correct diaphragm. Depending on the application, diaphragm materials may require compatibility with high temperatures, steam, aggressive chemicals and even living organisms. They must also conform to applicable regulations to allow the system to be validated.

In order to meet these demands, the Alfa Laval DV-ST line includes a range of diaphragms suitable for countless applications and environments. They are designed to maximize uptime and minimize the chance of product contamination regardless of the industry in which they are used. For easy maintenance we provide compound tracking on all diaphragms, to ensure the correct spare parts are used and to make revalidation easier.

The diaphragms are available as soft elastomer (EPDM) as well as hard elastomers (PTFE/EPDM and TFM/EPDM). The hard elastomers are supported by a soft elastomer (EPDM). The 2-piece design allows the two elastomers to work independently of each other, thereby reducing tension caused by different thermal properties.

Stand-out features include bayonet connections to prolong diaphragm life, compatibility with steam of temperatures up to 150 °C (continuous temperature for EPDM; 40 minutes for PTFE/EPDM and TFM/EPDM), and the option of a single-layer EPDM diaphragm that ensures leakage detection in the event of diaphragm failure.



EPDM Screw Connection



EPDM Plug Connection



PTFE/EPDM Bayonet Connection

### Alfa Laval DV-ST Diaphragms

Description	Temperature Recommendations			Documentation			Available Sizes	Diaphragm Connection type		
	Min	Max Liquid	Max Steam	FDA	USP Class VI	TSE/ADI		Button	Thread	Bayonet
EPDM	-40 °C (-40 °F)	150 °C (302 °F)	150 °C*** (302 °F)	Yes	Yes	Yes	DN 8-100	DN 8-20*	DN 25-100	
PTFE/EPDM	-5 °C (23 °F)	175 °C (347 °F)	150 °C**** (302 °F)	Yes	Yes	Yes	DN 15-100			DN 15-100
TFM/EPDM	-5 °C (23 °F)	175 °C (347 °F)	150 °C**** (302 °F)	Yes	Yes	Yes	DN 8-100	DN 8-10	**	DN 15-100

\* DN 15 & 20 Optional thread available \*\* Optional thread available \*\*\* Continuous temperature \*\*\*\* 40 minute steam sterilization

FDA: Declaration of Conformity to FDA (21:177.2600 or 177.1550)

USP: Certificate of conformity. Biocompatibility complying to :

- USP directive <87>, Biological Reactivity Test in-vitro

- USP Class VI <88>, Biological Reactivity Test in-vivo

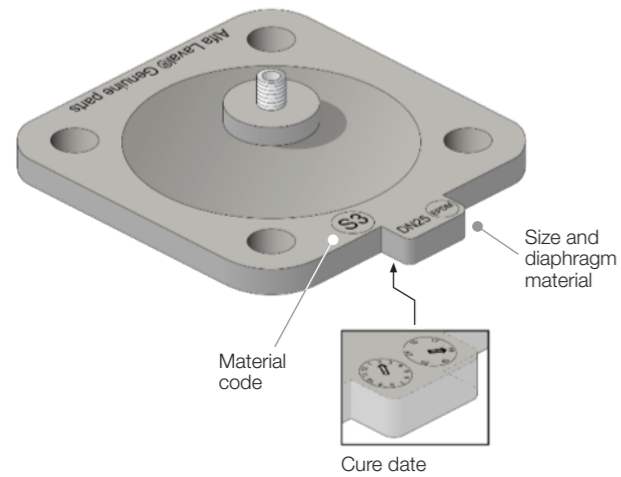
TSE/ADI Declaration: declared free from Transmissible Spongiform Encephalopathy and Animal Derived Ingredients

## Diaphragm Coding

Alfa Laval DV-ST diaphragms are clearly coded to ensure easy verification of replacement diaphragms. Key information such as size,

material grade, cure date, and supplier codes are moulded into every diaphragm.

### EPDM Diaphragm



### PTFE/EPDM Diaphragm



Clearly coded for easy verification and replacement.

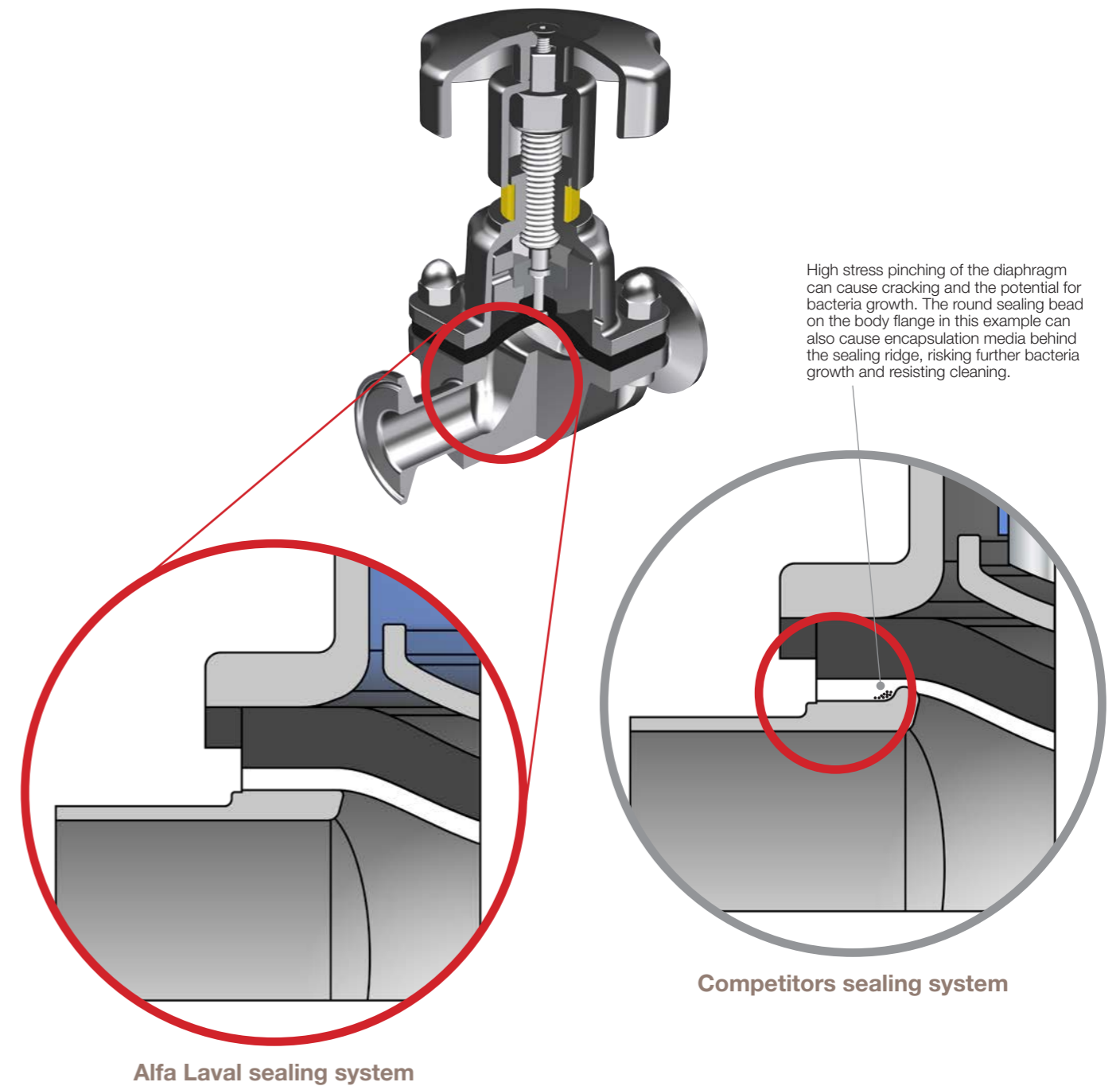


## Sealing systems

The Alfa Laval DV-ST diaphragm valve sealing system is designed to have a flat surface between the body, diaphragm and bonnet. This design ensures that the diaphragm is not pinched in a critical high stress area, and that helps to extend the life of the diaphragm. It also reduces the risk of stress fractures in the diaphragm, which can

create undetectable, non-cleanable crevices that cause contamination.

The Alfa Laval sealing system has a pressure rating of 10 bar ( $\Delta p=0\%$ ) for EPDM and PTFE/EPDM options, and 6 bar ( $\Delta p=0\%$ ) for TFM/EPDM, in all sizes.





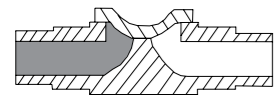
# Actuator

The Alfa Laval stainless steel actuator meets all demands from the pharmaceutical industry and keeps selections easy, simple and safe today and tomorrow.

Alfa Laval's stainless-steel actuator covers the whole range within the Unique DV-ST from DN8 / 1/4" to DN100 / 4" and can handle up to 10 bar product pressure\* without any leakages on both EPDM and PTFE/EPDM.

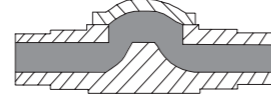
All actuators are ATEX certified and autoclavable up to 121°C as standard. Available in Normally Closed (NC), Normally Open (NO) and Air to Air (A/A) versions.

## Maximum working pressure



### 100 % pressure drop ( $\Delta p$ )

When pressure is only on one side of the diaphragm and the outlet is open to atmospheric pressure less force is required to close the valve.



### 0 % pressure drop ( $\Delta p$ )

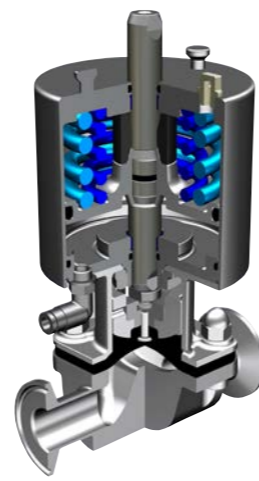
When pressure is exerted on both sides of the diaphragm, more force is required to close the valve.

Changeable diaphragm holder makes it easy to change to different diaphragm options.

A non-maintainable stainless-steel design providing high corrosion resistance and a 5-year warranty guarantees long lasting lifetime and trouble-free operation.

The actuator has standard Alfa Laval mushroom connections, allowing for easy mounting and uniform top units throughout the plant.

\* 0% Pressure drop – see schematic



## Actuator NO (Normally Open)

### Product pressures and recommended control air pressures

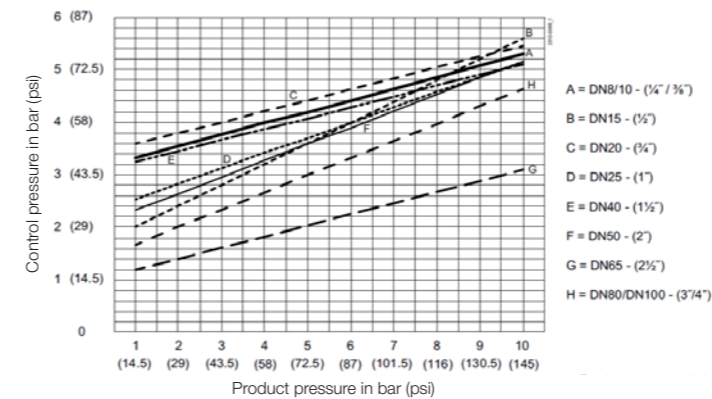
Size		Control Air pressure <sup>1)</sup> Bar (psi)	EPDM		PTFE/EPDM		TFM/EPDM	
DN	Inch		$\Delta p=100\%$ <sup>2)</sup> Bar (psi)	$\Delta p=0\%$ <sup>2)</sup> Bar (psi)	$\Delta p=100\%$ <sup>2)</sup> Bar (psi)	$\Delta p=0\%$ <sup>2)</sup> Bar (psi)	$\Delta p=100\%$ <sup>2)</sup> Bar (psi)	$\Delta p=0\%$ <sup>2)</sup> Bar (psi)
8-10	1/4"-3/8"	Max. 5.7 (83)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
15	1/2"	Max. 5.5 (80)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
20	3/4"	Max. 5.5 (80)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
25*	1"	Max. 5.2 (76)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
40*	1 1/2"	Max. 5.2 (76)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
50	2"	Max. 5.2 (76)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
65	2 1/2"	Max. 4.5 (65)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
80	3"	Max. 4.4 (64)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
100	4"	Max. 4.4 (64)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)

\* DN32 DIN use DN25. DN32 ISO 1127 use DN40

<sup>1)</sup> Maximum air pressure at product pressure 10 bar

<sup>2)</sup> See diagram below for further information

### Product pressure versus control pressure



**Description:** The diagrams state the required control pressure on the actuator at a given product pressure in the system.

**NO (Normally Open):** Control pressure is used for closing the valve. Here the required control pressure is increased when the product pressure is increased. With interruption of air supply, the actuator will open the valve.

## Actuator NC (Normally Closed)

### Product pressures and recommended control air pressures

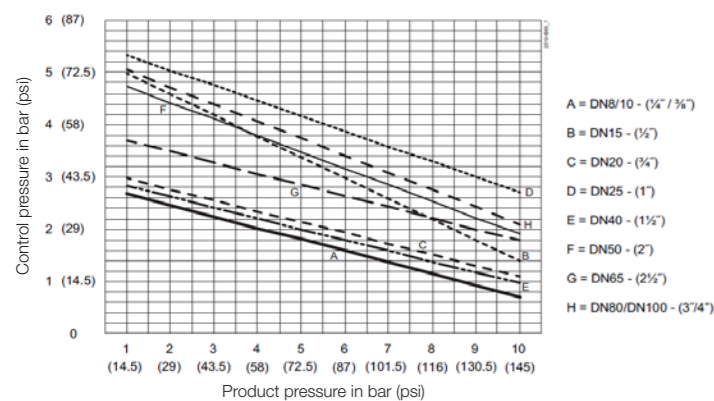
Size		Control Air pressure <sup>1)</sup> Bar (psi)	EPDM		PTFE/EPDM		TFM/EPDM	
DN	Inch		$\Delta p=100\%$ <sup>2)</sup> Bar (psi)	$\Delta p=0\%$ <sup>2)</sup> Bar (psi)	$\Delta p=100\%$ <sup>2)</sup> Bar (psi)	$\Delta p=0\%$ <sup>2)</sup> Bar (psi)	$\Delta p=100\%$ <sup>2)</sup> Bar (psi)	$\Delta p=0\%$ <sup>2)</sup> Bar (psi)
8-10	1/4"-3/8"	Min. 3.1 (45)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
15	1/2"	Min. 5.5 (80)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
20	3/4"	Min. 3.2 (47)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
25*	1"	Min. 5.7 (83)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
40*	1 1/2"	Min. 3.1 (45)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
50	2"	Min. 5.1 (74)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
65	2 1/2"	Min. 4.1 (60)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
80	3"	Min. 5.1 (60)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
100	4"	Min. 5.1 (60)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)

\* DN32 DIN use DN25. DN32 ISO 1127 use DN40

<sup>1)</sup> Minimum air pressure at product pressure 0 bar

<sup>2)</sup> See diagram below for further information

### Product pressure versus control pressure



**Description:** The diagrams state the required control pressure on the actuator at a given product pressure in the system.

**NC (Normally Closed):** Control pressure is used for opening the valve. Here the required control pressure is reduced when the product pressure is increased. At interruption of the air supply the actuator will close the valve.

## Actuator AA (Air/Air)

### Product pressures and recommended control air pressures

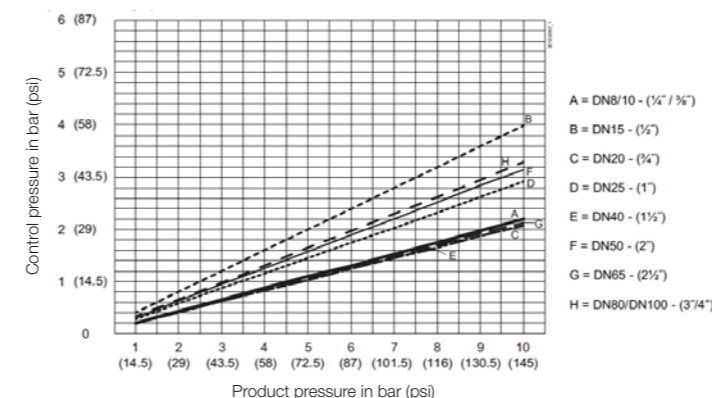
Size		Control Air pressure <sup>1)</sup> Bar (psi)	EPDM		PTFE/EPDM		TFM/EPDM	
DN	Inch		$\Delta p=100\%$ <sup>2)</sup> Bar (psi)	$\Delta p=0\%$ <sup>2)</sup> Bar (psi)	$\Delta p=100\%$ <sup>2)</sup> Bar (psi)	$\Delta p=0\%$ <sup>2)</sup> Bar (psi)	$\Delta p=100\%$ <sup>2)</sup> Bar (psi)	$\Delta p=0\%$ <sup>2)</sup> Bar (psi)
8-10	1/4"-3/8"	Max. 3.2 (46)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
15	1/2"	Max. 4.0 (59)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
20	3/4"	Max. 2.1 (31)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
25*	1"	Max. 2.9 (42)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
40*	1 1/2"	Max. 2.1 (31)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
50	2"	Max. 3.1 (45)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
65	2 1/2"	Max. 2.1 (31)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
80	3"	Max. 3.3 (48)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)
100	4"	Max. 3.3 (48)	10 (145)	10 (145)	10 (145)	10 (145)	6 (87)	6 (87)

\* DN32 DIN use DN25. DN32 ISO 1127 use DN40

<sup>1)</sup> Maximum air pressure at product pressure 10 bar

<sup>2)</sup> See diagram below for further information

### Product pressure versus control pressure



**Description:** The diagrams state the required control pressure on the actuator at a given product pressure in the system.

**A/A (Air/Air):** Control pressure is used for both opening and closing the valve. Here the required control pressure is increased when the product pressure is increased. With interruption of air supply, the valve will open at positive product pressure and close at negative product pressure.

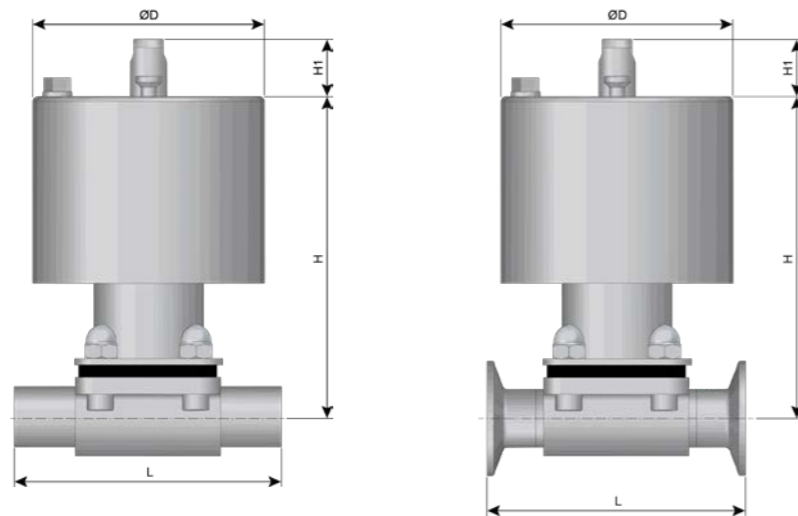


## Actuator

Temperature range	-10° C (14° F) to 80° C (176° F)
Air quality	ISO 8573-1, Class 0.2.4
Control air pressure	Max. 7 bar (102 psi) <sup>1)</sup>
Model	SS
Sizes	DN 8-100 (1/4"-4")
Housing	Stainless steel
Intermediate part	Stainless steel
Compressor, steam	Stainless steel
Max. product working pressure, EPDM and PTFE	10 bar
Max. product working pressure, TFM	6 bar
Max. air temperature	80° C
Max. air pressure	7 bar
ATEX	Yes
Autoclavable	Yes <sup>2)</sup>
Leakage Detection	Yes

<sup>1)</sup> Maximum control air pressure for actuator. For maximum control air pressure in regards to diaphragm endurance, please refer to tables on the previous pages.

<sup>2)</sup> 121° C for max. 60 min



## Dimensions

DN	Size		ØD mm(in)	H mm (in)	H1 mm (in)	L (Weld ends) mm (in)	L (Clamp) mm (in)
	Inch						
8-10	1/4" - 3/8"		54 (2.13)	105 (4.13)	18.7 (0.74)	89 (3.50)	89 (3.50)
15	1/2"		54 (2.13)	118 (4.65)	22.2 (0.87)	110 (4.33)	108 (4.25)
20	3/4"		102 (4.00)	151 (5.94)	27.6 (1.09)	119 (4.69)	118 (4.65)
25*	1"		102 (4.00)	159 (6.26)	30.5 (1.20)	129 (5.08)	127 (5.00)
40*	1 1/2"		156 (6.14)	231 (9.09)	48.9 (1.93)	161 (6.34)	159 (6.26)
50	2"		156 (6.14)	236 (9.29)	48.9 (1.93)	192 (7.56)	191 (7.52)
65	2 1/2"		222 (8.74)	360 (14.17)	68.0 (2.68)	218 (8.58)	216 (8.50)
80	3"		222 (8.74)	368 (14.49)	73.9 (2.90)	256 (10.08)	254 (10.00)
100	4"		222 (8.74)	374 (14.72)	73.9 (2.90)	218 (8.58)	305 (11.96)

\* DN32 DIN use DN25. DN32 ISO 1127 use DN40  
ASME BPE clamp short length dimension - see page 11

# Sensing and control

Alfa Laval DV-ST UltraPure diaphragm valves can be fitted with automation systems from an extensive range to meet your process requirements exactly. Options include control units that suit AS-Interface, DeviceNet and digital operating platforms. The range can suit the most basic of indication needs with simple open and closed feedback, to more sophisticated options including

control units with solenoids and 4-20 mA positioners. The Alfa Laval control top range is designed with fast and easy installation in mind and has been developed over many years drawing on our experience from the pharmaceutical industry and other industries where demanding valve control is needed.



## Automation for DV-ST UltraPure Diaphragm Valve

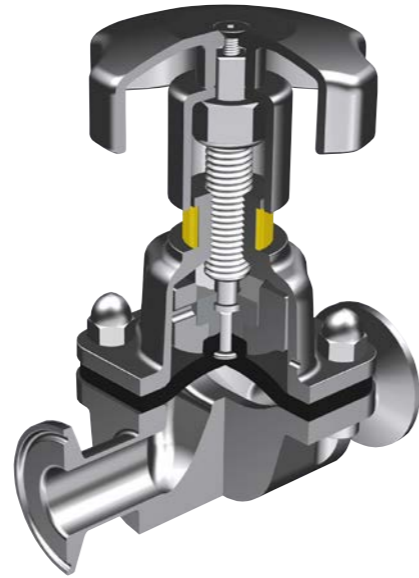


Indication Units	Position Feedback	Valve Sizes mm	Solenoids	Optical	Interface Options	Protection	Cable Connection	Air Connection	Mounting	ATEX
Indi Top	Open/Closed	15-100	No	LED	Digital	IP66/67	5mtr-6 wire, 10mtr-6 wire, 0.5mtr-M12 plug	N/A	Mushroom	No
Think Top D30	Open/Closed	8-50	Yes	LED 360	Digital	IP66/67	PG7 (2,5-6,5 mm)	6 mm	Mushroom	No
Think Top Basic	Open/Closed	15-100	Yes	LED	Digital/AS-I	IP66/67	PG11 (4-10 mm)	6 mm or 1/4"	Mushroom	Option
Think Top V50	Open/Closed	15-100	Yes	LED 360	Digital/AS-I/IO Link	IP 66/67/69K	M16 (4-10mm)	6 mm or 1/4"	Mushroom	No
Type 8691	Open/Closed	8-100	Yes	LED	Digital/AS-I	IP65/67	M16 (5-10 mm)	6 mm or 1/4"	Mushroom	No
Type 8692	Flow Control	8-100	Yes	With display	Analogue 4-20 mA	IP65/67	M16 (5-10 mm)	6 mm or 1/4"	Mushroom	No
Type 8694	Flow Control	8-100	Yes	Without display	Analogue 4-20 mA	IP65/67	M16 (5-10 mm)	6 mm or 1/4"	Mushroom	No
Type 8697	Open/Closed	8-100	Yes/No	LED	Digital	IP65/67	M16 (5-10 mm)	6 mm or 1/4"	Mushroom	Option



# Handles

In addition to automated control units, Alfa Laval DV-ST UltraPure diaphragm valves are also compatible with manual handles. There are currently two models available, and a complete range of sizes for each model.



## Handles

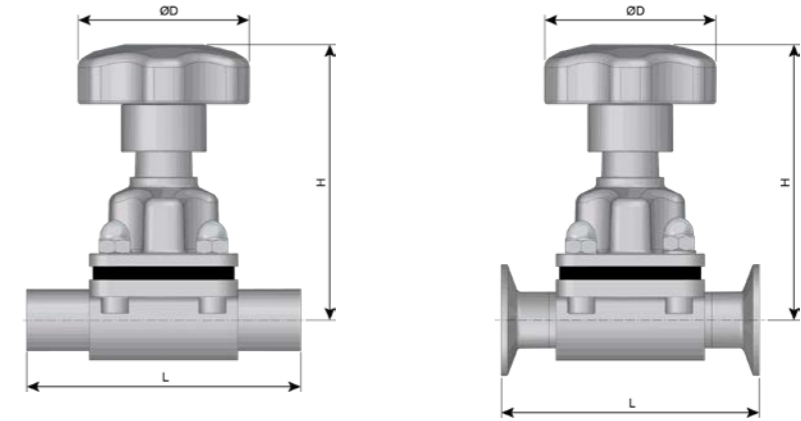
Model	SS/SS	C/SS
Sizes	DN 8-100 (1/4"-4")	DN 8-100 (1/4"-4")
Handwheel	Stainless steel	POM <sup>2)</sup>
Bonnet	Stainless steel	Stainless steel
Spindle + compressor <sup>1)</sup>	Stainless steel	Stainless steel
Max. product pressure	10 bar	10 bar
Max. temperature	150 °C	150 °C
Overclosure protection	Yes	Yes
Optical positioner	Yes	Yes
Lockable	No	No
Autoclavable	Yes <sup>3)</sup>	Yes <sup>3)</sup>
Leakage Detection	Yes	Yes

<sup>1)</sup> For DN 65 and up, the compressor is nickel cast iron

<sup>2)</sup> POM (Polyoxymethylene)

<sup>3)</sup> 121° C for max. 60 min.

## Dimensions



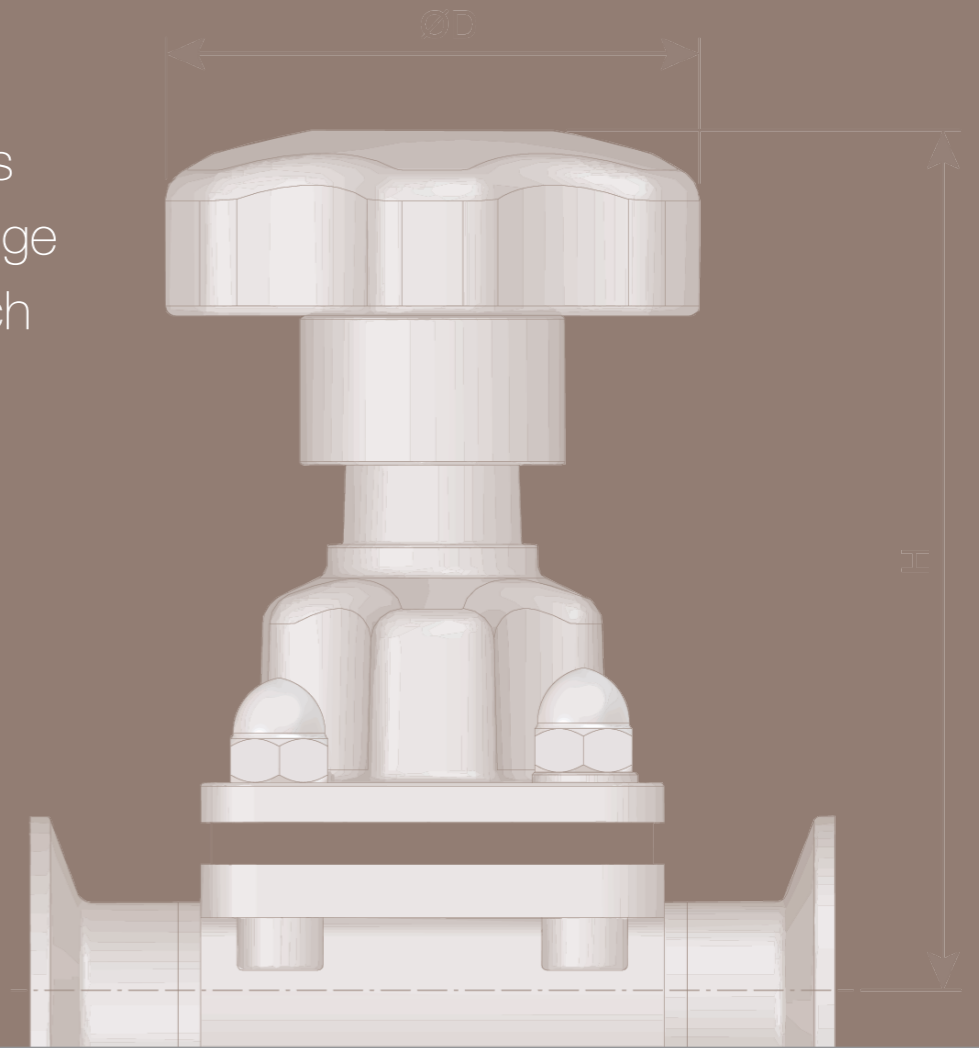
DN	Size		ØD SS / ØD C mm(in)	H mm (in)	L (Weld ends) mm (in)	L (Clamp) mm (in)
	Inch					
08 -10	1/4" - 3/8"		40 (1.57)	65 (2.56)	89 (3.50)	89 (3.50)
15	1/2"		62 (2.44)	101 (3.98)	110 (4.33)	108 (4.25)
20	3/4"		62 (2.44)	116 (4.57)	119 (4.68)	118 (4.65)
25*	1"		87 (3.42)	128 (5.04)	129 (5.08)	127 (5.00)
40*	1½"		108 (4.25)	165 (6.50)	161 (6.34)	159 (6.26)
50	2"		108 (4.25)	195 (7.68)	192 (7.56)	191 (7.52)
65	2½"		172 (6.78)	255 (10.04)	218 (8.58)	216 (8.50)
80	3"		220 (8.66)	274 (10.79)	256 (10.08)	254 (10.00)
100	4"		220 (8.66)	280 (11.02)	218 (8.58)	305 (11.96)

\* DN32 DIN use DN25. DN32 ISO 1127 use DN40

ASME BPE clamp short length dimension - see page 11

H at fully open handle

Alfa Laval offers a complete range of sizes for each model.

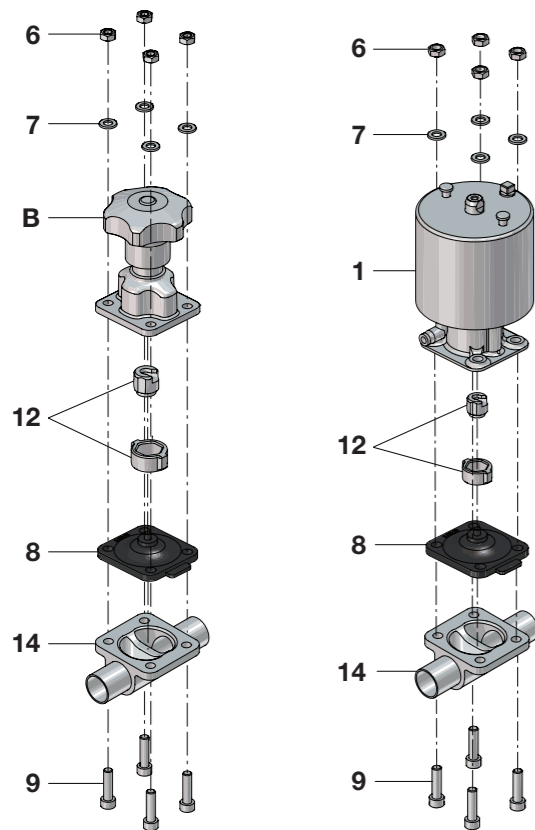


# Extending your equipment's performance

You can reach our global service partner wherever you are. We partner with you all the way – from start-up, maintenance and support, to improvements and monitoring services.

We can help optimize your equipment to meet your evolving needs and secure uptime.

Using Alfa Laval genuine spare parts with matching Alfa Laval Q-doc effectively protects the operational reliability of your plant and ensures the lowest possible total cost of ownership. We ensure guarantee performance and extended 3 years warranty.



## Spare parts and service

All valve parts are readily available and easy to find in our spare part catalogue on the web or in the instruction manual supplied together with the valve.

[www.alfalaval.com/high](http://www.alfalaval.com/high)

[www.alfalaval.com/service-and-support/service-overview](http://www.alfalaval.com/service-and-support/service-overview)

## Complete spare part documentation

To facilitate easy and safe replacement of equal-to-equal spare parts, all our product contact parts come with complete Q-Doc documentation, providing evidence that all parts are of the same specification, design, and material, and are manufactured via the same standard operating procedures.

Clearly specified article numbers for spare parts and service kits in the original valve documentation (Q-Doc), make it easy to order the correct spare

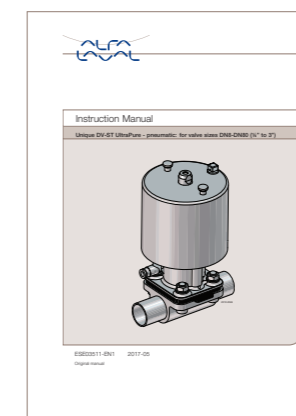
parts for each specific valve. Our Q-Doc for spare parts also clearly specifies part numbers, material quality, a Material Test Result for product wetted steel parts, Compound ID for product wetted non-metallic materials, standard fulfilment and certification.

Overall, it secures the equal-to-equal spare parts process, simplifies change control procedures and provides customers with peace of mind.

Q-Doc example for DV-ST service kit.

## Instruction manual

All valves are delivered with instruction manuals for safe and correct installation, operation and maintenance. Instruction manuals are also available on our web.



Instruction manual example.

### Instruction manuals includes:

- EC Declaration of Conformity
- General information
- Safety instruction
- Installation instruction
- Operation instruction
- Maintenance instruction
- Technical data
- Part list and service kit information

[www.alfalaval.com/dvst\\_ultrapure](http://www.alfalaval.com/dvst_ultrapure)

# Pharma & biotech equipment overview

## Pumps

### C-pumps



### Rotary lobe pumps



### Twin screw pumps



## Valves

### Diaphragm valves



Unique DV-ST UltraPure

### Double seat valves



Unique Mixproof UltraPure

### Single seat valves



Unique SSV

### Butterfly valves



LKB UltraPure

### Regulating, control, check valves and sampling valves



Unique RV-P



CPM-2



LKC UltraPure



Safety valves



Unique Sampling Valve

## Control unit and indication



## Installation material



Tri-Clover UltraPure Fittings

Tri-Clover UltraPure Tubes

## Tank Cleaning Equipment

### Rotating jet heads



TJ SaniJet 20

TJ SaniJet 25

TJ 20G

TJ 40G

### Rotating spray heads



TJ SaniMidget

TJ SaniMidget SB UltraPure

TJ SaniMidget Retractor

SSB Retractor

## Agitators and mixers



LeviMag UltraPure

ALS

ALB

ALT

Hybrid Powder Mixer

## Tank Accessories



Sight Glasses

Tank Feet

## Tank Covers

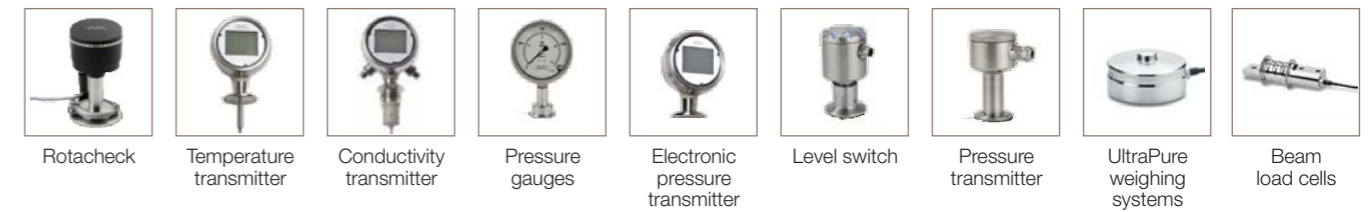


HLSD-2

LKDC

LKD

## Instrumentation



Rotacheck

Temperature transmitter

Conductivity transmitter

Pressure gauges

Electronic pressure transmitter

Level switch

Pressure transmitter

UltraPure weighing systems

Beam load cells

## Heat Exchangers

### Tubular heat exchangers



Pharma-X

Pharma-line

### Gasketed plate heat exchangers



BaseLine

### Fusion-bonded plate heat exchangers



AlfaNova

### Welded heat exchangers



Compabloc

Spiral heat exchangers

## High-speed separators

### Biotech



Culturefuge

BTPX/BTUX

MBPX/MBUX

### Pharmaceutical



AB/ABPX

CHPX

### Industrial fermentation



Bactofuge

FEUX

MBPX/MBUX

# Glossary

Term	Acronym	Definition
3A Sanitary Standards and Accepted Practice	<b>3A</b>	Determines criteria for the cleanability of dairy processing equipment. They have been adopted by many other liquid processing industries outside of dairy.
American Society of Mechanical Engineers	<b>ASME</b>	Creates consensus standards for Mechanical Engineering.
American Society for the Testing of Materials	<b>ASTM</b>	Creates consensus standards for material quality and material quality testing methods.
BioProcessing Equipment Committee	<b>BPE</b>	A sub-committee of ASME. It creates engineering standards for the design, specification, manufacture and documentation of equipment used for biopharm processes.
Clean in Place	<b>CIP</b>	The technique of cleaning process line components without the need for relocation or disassembly.
Comite Européen de Normalisation	<b>CEN</b>	Committee for European Standardization. Creates standards that reflect the best practices in each industry and is supported by DIN and ISO.
Current Good Manufacturing Practices	<b>cGMP</b>	Current design and operating practices developed by the pharmaceutical industry to meet FDA requirements as published in the Code of Federal Regulations. They reflect the least common denomination of practices in the industry at present.
Deionized Water	<b>DIW</b>	Process of the extraction of deionized water through ion exchange resins.
Deutsches Institut für Normung	<b>DIN</b>	German Institute for Standardization. Creates engineering standards for Germany and is contributing body to CEN and ISO.
Electro-Polish	<b>EP or E/P</b>	Electrochemical polishing process for metal components where metal ions are removed from the surface of the metal.
European Hygienic Equipment Design Group	<b>EHEDG</b>	The group's objective is to provide standardization organizations (CEN and ISO) with specialist views on hygienic and aseptic design by publishing requirements and test methods. Accredited bodies carry out cleaning tests which are certified if successful.
European Pharmacopoeia	<b>EP</b>	European counterpart to USP. A private, non-profit organization that sets standards for drugs, drug ingredients, medical devices and diagnostics.
Food and Drug Administration (USA)	<b>FDA</b>	Enforcement agency of the U.S. Government for food, drug and cosmetics manufacturing. Author of the U.S. cGMP's. Responsible for new product approvals, plant inspections and product recalls.
International Standards Organization	<b>ISO</b>	Creates consensus standards for engineering and quality systems.
Mill Test Report or Material Test Report	<b>MTR</b>	A document certifying the composition of a metal from a particular heat batch.
Piping and Instrumentation Diagram	<b>P&amp;ID</b>	American standard for process diagrams. Diagrams on which the process, the instruments and the flow scheme are defined.
Point of Use	<b>POU</b>	A valve outlet in a recirculation utility system (typically a water system).
Purified Water	<b>PW</b>	Ingredient water (not for injection) or rinse water for pharmaceutical products conforming to USP guidelines. Obtained by distillation, reverse osmosis, ion exchange or any other suitable process.
Steam in Place	<b>SIP</b>	Sanitization of process line components by the use of steam without the need for relocation or disassembly.
Total Oxidizable Carbon or Total Organic Carbon	<b>TOC</b>	A measure of the amount of organic compounds in a water sample. Carbon is oxidized and the level of CO <sub>2</sub> is measured. The proposed USP water standards are based on TOC analysis.
United States Pharmacopoeia	<b>USP</b>	A private, non-profit organization that sets standards for drug, drug ingredients, medical devices, and diagnostics. The FDA enforces the established standards.
Water for Injection	<b>WFI</b>	Water for use as a solvent for the preparation of parenteral products conforming to USP guidelines. Obtained most commonly by distillation.

### **Alfa Laval in brief**

Alfa Laval is a leading global provider of specialized products and engineering solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

### **How to contact Alfa Laval**

Contact details for all countries are continually updated on our web site. Please visit [www.alfalaval.com](http://www.alfalaval.com) to access the information.

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