

Alfa Laval Unique Mixproof CP-3

Double seat valves

Introduction

The Alfa Laval Unique Mixproof CP-3 Valve is a versatile, highly efficient and lightweight valve for the safe and efficient management of fluids at intersection points in valve-matrix and piped systems.

Based on the well proven and exceptionally versatile principle of the Unique Mixproof valves from Alfa Laval, it enables the simultaneous flow of two different products or fluids through the same valve, or the safe handling of one product while seat-lift cleaning operations are being conducted in the other portion of the valve – without any risk of cross-contamination.

The valve provides exceptional spillage-free operation and is compliant with most hygienic standards, including the 3-A Sanitary Standards, the Pasteurized Milk Ordinance and the seat lift requirements of the US Food and Drug Administration.

With its modular design and a wide variety of options, the valve can be customized to meet any process requirement and provides low total cost of ownership. The valve maximizes available floor space while significantly minimizing downtime and consumption of Cleaning-in-Place (CIP) media.

Application

The Unique Mixproof CP-3 Valve is designed for continuous flow management in hygienic processes where product safety is at the top of the agenda. It is widely used across the dairy, food, beverage and many other industries.

Benefits

- Gentle product handling, enhanced product safety
- Cost-effective, spillage-free operation
- Optimized plant efficiency and enhanced cleanability
- Leakage detection and leakage chamber cleaning
- Fully configurable to fit your exact needs

Standard design

The Unique Mixproof CP-3 Valve is comprised of a series of base components, including valve body, valve plug, actuator and cleaning options and accessories that support a wide range of applications. Leakage detection holes enable visual inspection without requiring valve disassembly and provide



advance notification of parts wear. Few straightforward moveable parts contribute to reliable operation and reduced maintenance costs.

Working principle

The Alfa Laval Mixproof CP-3 Valve is a normally closed (NC) valve that is controlled from a remote location by means of compressed air.

To separate the two liquids, the valve has two independent plug seals. The space between the two seals forms an atmospheric leakage chamber. In the rare case of accidental product leakage, the product flows into the leakage chamber and is discharged through the leakage outlet.

When the valve is open, the leakage chamber is closed. The product can then flow from one line to the other without spillage. The valve can easily be cleaned and protected against the effects of water hammer according to the specific requirements

of the process and the configuration of the valve. (There is no product spillage during valve operation).



TECHNICAL DATA

Temperature	
Temperature range:	23°F to +257°F (Depending on seal material)

Pressure	
Max. product pressure:	145 psi
Min. product pressure:	Full vacuum
Air pressure:	116 psi

PHYSICAL DATA

Materials	
Product wetted steel parts:	Acid-resistant steel AISI 316L
Other steel parts:	Stainless steel AISI 304

Surface finish choose from the following:	
Internal Bright (polished)/External semi-bright:	Ra<32 µin
Internal/external Bright (internal polished):	Ra<32 µin

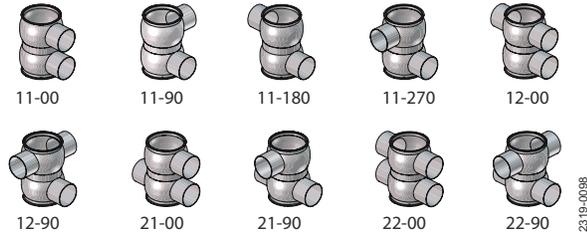


Note!
The Ra values are only for the internal surface.

Product wetted seals:	EPDM (Standard), NBR, HNBR or FPM
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Other seals:	
CIP seals:	EPDM
Actuator seals:	NBR
Guide strips:	PTFE

Valve body combination



Valve body combinations, example: type 21-00

- 2 Number of ports - lower valve body
- 1 Number of ports - upper valve body
- 00 Angle between ports

Possible configurations

The Alfa Laval Unique Mixproof CP-3 offers a wide range of options, including:

Lower flush

The Alfa Laval lower flush option ensures CIP of the lower sealing element and the OD of the lower plug during seat push. This option efficiently cleans the lower seal in the housing without the need for external CIP connections, supporting continuous processing.

Balancing flexibility

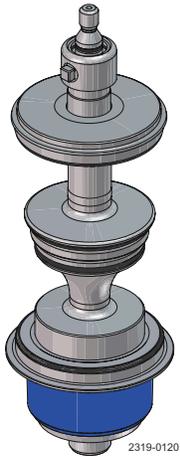
The Unique Mixproof CP-3 valve has a lower balanced plug to avoid product mix, even in the event of pressure spikes in the system. The upper plug can be configured with or without a balancer depending on the required performance.

SpiralClean

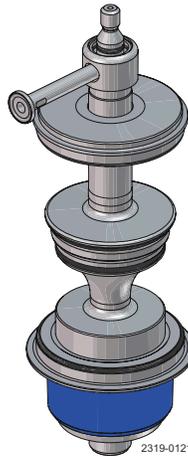
The Alfa Laval SpiralClean system makes it possible to clean the upper and lower plugs and leakage chamber by external CIP connections. The system cleans more efficiently, uses less cleaning fluid by ensuring that a directional flow of CIP fluid reaches all the surfaces in much less time than with conventional systems.

Spiral Clean of the leakage chamber is not depending on a special type of plug configuration, but can be added to any of the available plug configurations. Here shown in combination with plug configuration #11

11.



11a.

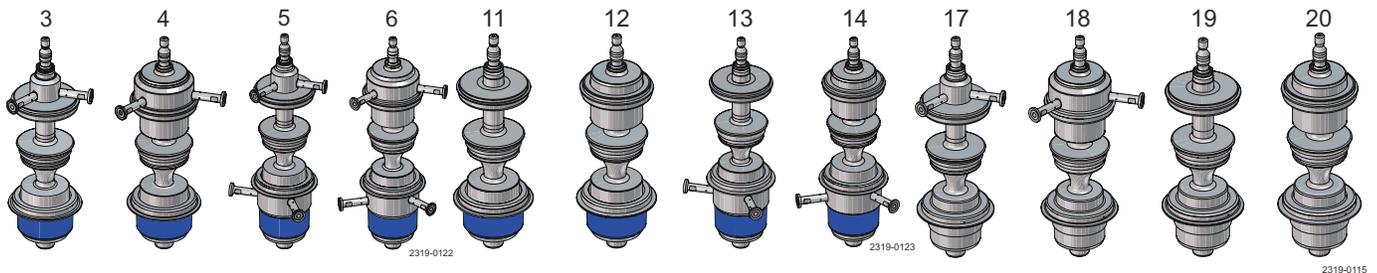


11. Upper: Unbalanced
Lower: Balanced (Blue bottom)

11a. Upper: Unbalanced
Lower: Balanced (Blue bottom) SpiralClean of leakage chamber

Selection guide (plug configurations)

The drawings below give an overview of the various plug configurations available.



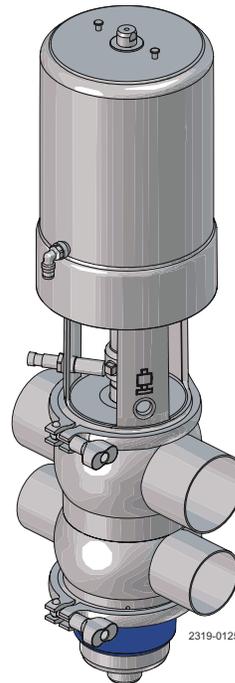
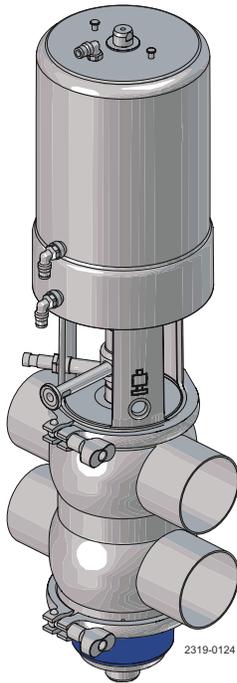
3	Upper: Unbalanced with SpiralClean OD spindle Lower: Balanced (blue bottom)	11	Upper: Unbalanced Lower: Balanced (blue bottom)	17	Upper: Unbalanced with SpiralClean OD spindle Lower: Flush OD Balancer (stainless steel bottom)
4	Upper: Balanced with SpiralClean OD balancer Lower: Balanced (blue bottom)	12	Upper: Balanced Lower: Balanced (blue bottom)	18	Upper: Balanced with SpiralClean OD balancer Lower: Flush OD Balancer (stainless steel bottom)
5	Upper: Unbalanced with SpiralClean OD spindle Lower: Balanced with SpiralClean OD balancer (blue bottom)	13	Upper: Unbalanced Lower: Balanced with SpiralClean OD balancer (blue bottom)	19	Upper: Unbalanced Lower: Flush OD Balancer (stainless steel bottom)
6	Upper: Balanced with SpiralClean OD balancer Lower: Balanced with SpiralClean OD balancer (blue bottom)	14	Upper: Balanced Lower: Balanced with SpiralClean OD balancer (blue bottom)	20	Upper: Balanced Lower: Flush OD Balancer (stainless steel bottom)

Size flexibility (mixed housing)

The valve body can be configured with mixed sizes. The body sections can be fully combined, including the full range of 1-4" sizes.

Seat lift and Seat push

Seat lift and seat push enable cleaning of the plug seals of either the upper or lower plug individually. The Unique Mixproof CP-3 range is available in a variety of configurations, including two separate actuator versions. An actuator with both upper seat lift and lower seat push or an actuator without any seat lift/push operations only one period.



1. 3"/3", 22-00, with lower balanced plug, SpiralClean leakage chamber, actuator with seat lift/push, and external proximity switch for indication of upper plug position
2. 2"/3", 22-00, with lower balanced plug, actuator without seat lift/push and external proximity switch for indication of upper plug position

The Unique Mixproof CP-3 modular range offers balanced and unbalanced plugs, seat lift/push, CIP for the plugs and leakage chambers and any combination in between.

Options

- Tri clamp connections.
- Control and Indication: IndiTop, ThinkTop or ThinkTop Basic. (ThinkTop is mandatory in a dairy application)
- External proximity switch for indication of upper plug position (This option is mandatory in dairy applications)
- Product wetted seals in HNBR, NBR or FPM
- Various external surface finishes

Pressure drop/capacity diagrams

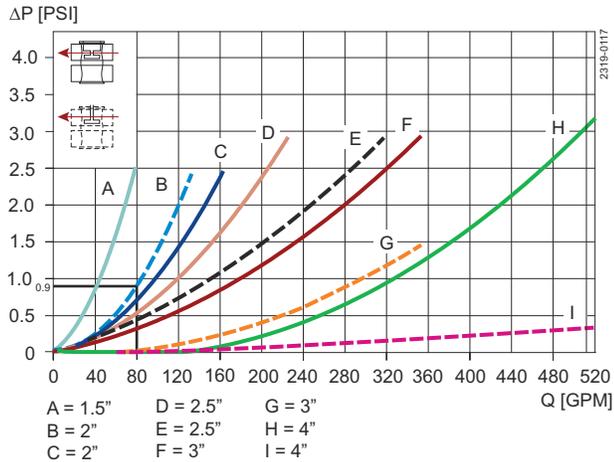


Fig. 3.
Pressure drop/capacity diagram, upper body.
Full lines: Balanced upper plug. Dotted lines: Unbalanced upper plug.

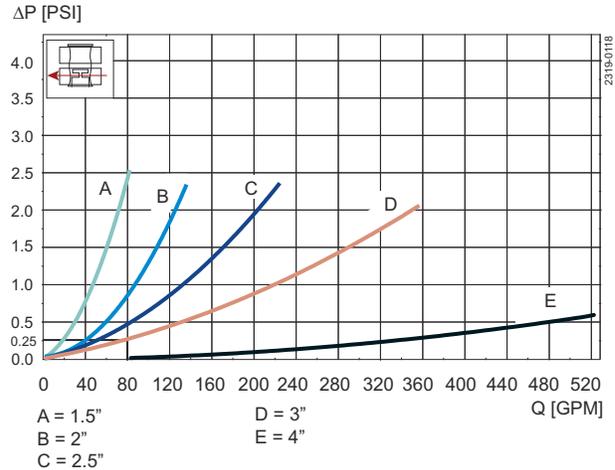


Fig. 4.
Pressure drop/capacity diagram, lower body, balanced plugs.

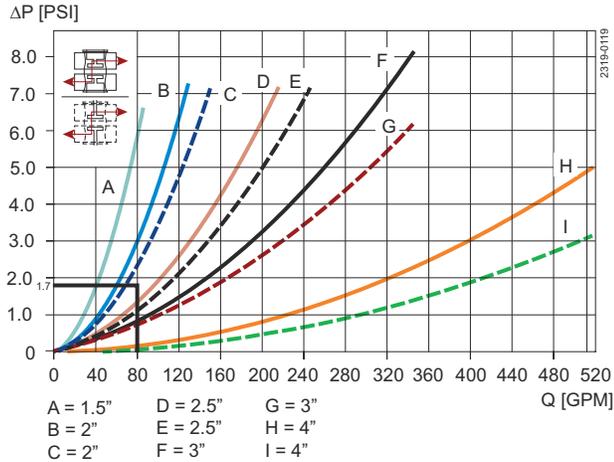


Fig. 5.
Pressure drop/capacity diagram, between bodies.
Full lines: Balanced. Dotted lines: Unbalanced upper plug only one period.



Note!

For the diagrams the following applies:

- Medium: Water (68°F).
- Measurement: In accordance with VDI 2173.

Example to determine pressure drop:

- **Upper body size: 2".** Balanced upper plug.
- Capacity: 80 gpm.
- **Lower body size: 3".** Balanced lower plug.
- Capacity: 80 gpm.
- **Between bodies:**
- Capacity: 60 gpm.

Result:

From fig. 3, $\Delta p = 0.9$ psi through upper body.

From fig. 4, $\Delta p = 0.25$ psi through lower body.

From fig. 5, $\Delta p = 1.7$ psi seeing that:

1. The smallest body determines the curve for Δp between bodies.
2. Always choose the curve for balanced plugs if upper plug is balanced. If only lower plug is balanced, always choose the curve for unbalanced.

Air and CIP consumption

Size	OD	OD	OD	OD	OD
ISO	1½"	2"	2½"	3"	4"
Cv-value					
Upper Seat-lift [gpm/psi]	1.7	1.7	2.9	2.9	3.6
Lower Seat-lift [gpm/psi]	1.0	1.0	2.2	2.2	2.9
Air consumption					
Upper Seat-lift * [cubic inches]	12	12	24	24	38
Lower Seat-lift * [cubic inches]	6.7	6.7	8	8	13
Main Movement * [cubic inches]	52	52	99	99	170
Cv-value SpiralClean					

Size	OD	OD	OD	OD	OD
ISO	1½"	2"	2½"	3"	4"
External CIP of upper and lower plug [gpm/psi]	0.14	0.14	0.14	0.14	0.14
External CIP of leakage chamber [gpm/psi]	0.29	0.29	0.34	0.34	0.34



Note!

* [cubic inches] = volume at atmospheric pressure
 Recommended min. pressure for SpiralClean: 29 psi.

Formula to estimate CIP flow during seat lift:

(for liquids with comparable viscosity and density to water):

$$Q = C_v \cdot \sqrt{\Delta p}$$

Q = CIP - flow (gpm).

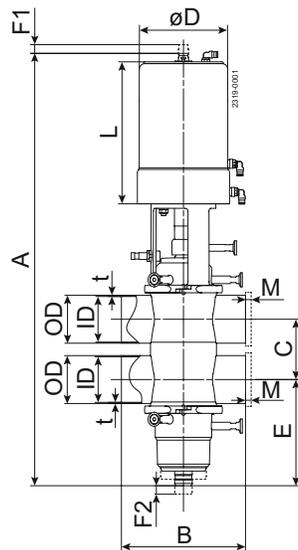
Cv = Cv value from the above table.

Δ p = CIP pressure (psi).

Actuator

Tube OD	STD Operating pressure (psi)
1½"	145
2"	145
2½"	145
3"	145
4"	145

Dimensions (inch)



Note for mixed bodies:

1. The seat always applies to the smallest valve body.
2. Dimension B is equal with the largest valve body size.

Size	1½"	2"	2½"	3"	4"
*A	24.055	25.827	29.921	29.921	36.299
B	6.693	8.661	8.661	8.661	11.811
**C	2.394	2.906	3.398	3.894	4.866
OD	1.5	2	2.5	3.0	4.0
ID	1.370	1.882	2.374	2.870	3.843
t	0.063	0.063	0.063	0.063	0.079
E	5.669	6.496	7.874	7.598	9.764
F1	1.240	1.240	1.496	1.496	2.323
F2	0.197	0.197	0.197	0.197	0.197
øD	4.724	4.724	6.181	6.181	7.323
L	9.055	9.055	9.921	9.921	11.063

Size	1½"	2"	2½"	3"	4"
M/Tri-clamp	0.827	0.827	0.827	0.827	0.827
Weight (lb)	32	35	60	60	84

Note!



*For the A-measure if different upper/lower body sizes, please refer to Configurator in Alfa Laval Anytime or contact Alfa Laval.

**The dimension C can always be calculated by the formula $C = \frac{1}{2}ID\text{-upper} + \frac{1}{2}ID\text{-lower} + 1,02''$

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