



**Valves manufacturer since 1987**





The company was founded in 1987 by transforming the former CSA, which was a trading company dealing with pipes and valves for water networks, into a manufacturing company, through the research and realization of pillar fire hydrants. Since then many other products have been added.

The history of our company is characterised by years of technical and commercial research, which have enabled us to offer a complete range of valves designed for controlling, regulating and protecting the pipelines under pressure in both waterworks and sewage lines as well as fire hydrants.

Our many industrial patents and innovative technical solutions, together with modern and attractive style of design, have made it possible to differentiate our products from those offered by competitors and have allowed us to become a point of reference in our sector.

Flexibility and reliability have been the key points of the rapid growth of CSA over the last few years. We are perfectly aware that we are managing the world's most precious resource and, motivated by this responsibility and the commitment towards our customers, we have dedicated ourselves to constantly improving our products, placing them at the highest levels of quality.

## Quality

In the manufacturing business today, quality is the fundamental requirement for achieving and maintaining a growing market share.

For this reason we have always aimed at developing a synergy between the various sectors of the company and thus ensuring:

- quick and precise answers;
- evaluation of data received and immediate response;
- rigorous control of incoming and outgoing products.

Since 1998 CSA is certified according to regulation ISO 9001 by Rina (Italian Naval Registry) recently converted into ISO 9001/2008.





During the research and realisation of new products, CSA has always focused his efforts on:

- listening to the customer's needs and finding the best solution at the design and operational phases,
- guiding our R&D department to develop ranges of modern, reliable and complementary products,
- adopting production techniques that, even while complying with the severest quality standards, would allow us to reduce delivery times,
- guaranteeing complete technical support for our customers and prompt after-sales assistance.

This philosophy characterizes us not only as a valve manufacturer but also as a reliable partner whom you can always depend on for consulting and solutions.

The production cycle, aimed at the constant improvement of our products and complete customer satisfaction, ensures predetermined margins of tolerance by establishing production standards, which guarantee that the semi-finished products reach the next production stage with the required specifications. All our valves are made of ductile cast iron GJS 450-10 or 500-7 in absolute compliance with European standards, and are suitable for PN 25-40 bar.

The manufacturing process is carried out exclusively by means of numerically controlled lathes, mills, and horizontal machining units. Subsequent step-by-step controls are based on strict quality procedures.

Painting, pretreated by sand blasting grade SA 2.5, is carried out inside a fluidized bed containing epoxy powder, which guarantees maximum surface protection. All our products are tested under water pressure and certified.





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## Water air valves



### FOX series

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■ Anti-surge combination air valve Mod. FOX 3F - RFP	16
■ FOX air valves range conveyance system bias kit Mod. SUB	20



### LYNX series

■ Combination air valve Mod. LYNX 3F	22
■ Anti-shock combination air valve Mod. LYNX 3F - AS	26
■ Anti-surge combination air valve Mod. LYNX 3F - RFP	30
■ LYNX air valves range conveyance system bias kit Mod. SUB	34



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## Combination air valve Mod. FOX 3F

The CSA combination, triple function, automatic air valve Mod. FOX 3F will ensure the proper operation of the pipeline network allowing the release of air pockets during working conditions, the evacuation and entrance of large volumes of air during filling and draining operations.



### Technical features and benefits

- Single chamber full bore body in ductile cast iron, PN 40 bar rated, provided with internal ribs for accurate guiding of the floats.
- Aerodynamic deflector in stainless steel to avoid premature closures of the mobile block.
- Drainage valve, produced by CSA, for chamber control and pressure relief during maintenance.
- Mobile block composed of a cylindrical float and upper disk in solid polypropylene, joined together by the CSA air release system in AISI 316 (patent pending). The solid cylindrical floats, obtained by CNC machining, avoid deformations and ensure a great sliding precision inside the body processed ribs and a perfectly vertical thrust.
- Nozzle and gasket holder, part of CSA air release system, entirely made in stainless steel AISI 316 and designed with gasket compression control to prevent aging process and consequent leakage during working conditions.
- Maintenance can be easily performed from the top, without removing the air valve from the pipe.
- Cover in ductile and screen in stainless steel as a standard execution to prevent the entrance of insects, with three optional outlets (for submerged applications, air inlet only, air outlet only).

### Applications

- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used on changes in slope and at the high points of the pipeline.



## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The FOX 3F, thanks to the aerodynamic full port body and deflector, will make sure to avoid premature closures of the mobile block during this phase.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

## Optional



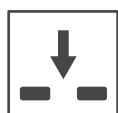
■ **Vacuum breaker version Mod. FOX 2F**, to allow the entrance and discharge of large volumes of air only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the air release won't be required.



■ **Version for submerged applications, SUB series**, available both for FOX 3F and 2F Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is the possibility of conveying spurts coming from the rapid closure of the air valve.



■ **Version for air discharge only EO series**, available both for FOX 3F and 2F models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided, such as in pump suction lines or siphons pipelines.

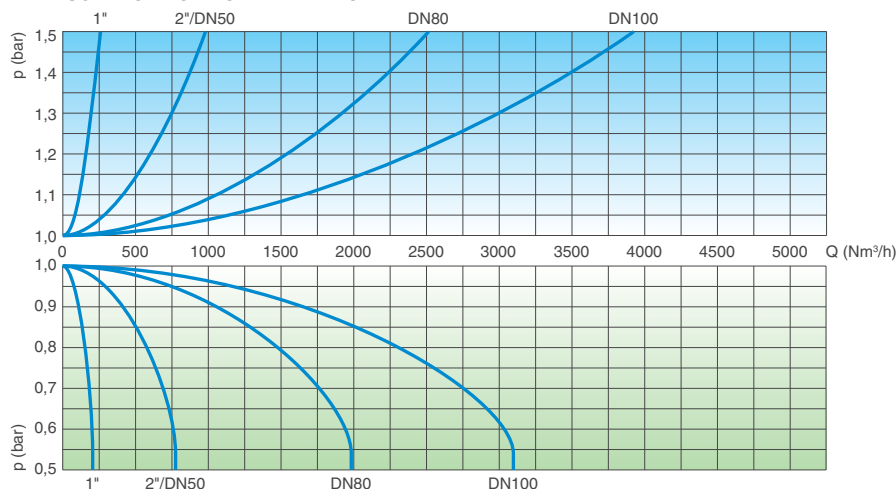


■ **Version for air entrance only IO series**, available for FOX 2F model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

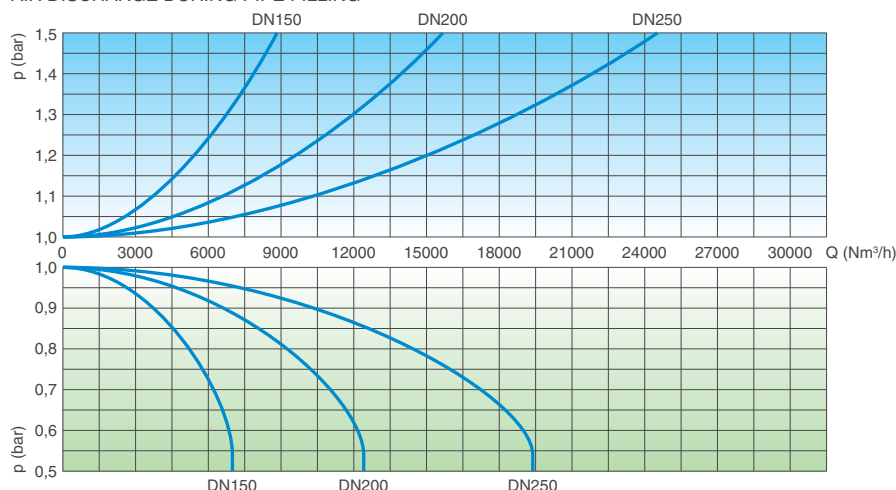
### Air flow performance charts

#### AIR DISCHARGE DURING PIPE FILLING

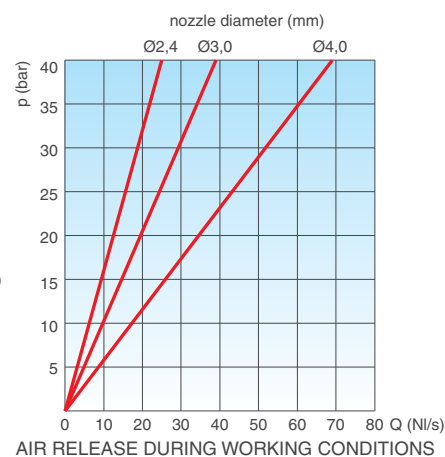
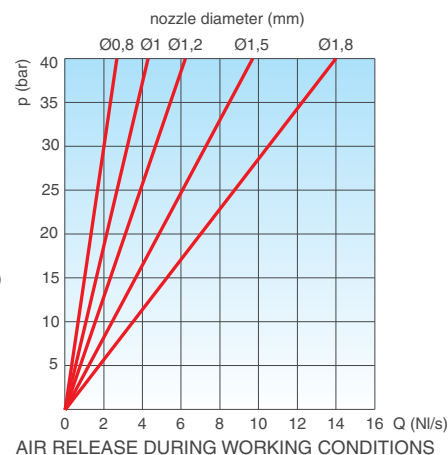


#### AIR ENTRANCE DURING PIPE DRAINING

#### AIR DISCHARGE DURING PIPE FILLING



#### AIR ENTRANCE DURING PIPE DRAINING



The air flow charts were created in Kg/s from laboratory tests and numerical analysis, without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60°C.

Max. pressure 40 bar.

Min. pressure 0,2 bar. Lower on request.

### Standard

Designed in compliance with EN-1074/4 and AWWA C-512. Flanges according to EN 1092/2 or ANSI 150. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

### Weights and dimensions

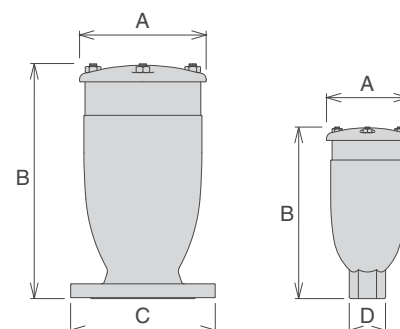
CONNECTION inch/mm	A mm	B mm	C mm		D mm	Weight Kg
Threaded 1"	117	240	-	-	CH 45	4,0
Threaded 2"	141	295	-	-	CH 70	7,5
Flanged 50	141	305	165	-	-	9,5
Flanged 80	172	322	210	205	-	13,8
Flanged 100	206	370	235	220	-	21,7
Flanged 150	285	555	305	285	-	44,5
Flanged 200	365	635	375	340	-	85,0
Flanged 250	450	785	450	405	-	134,0

All values are approximate, consult CSA service for more details.

### Nozzle choice

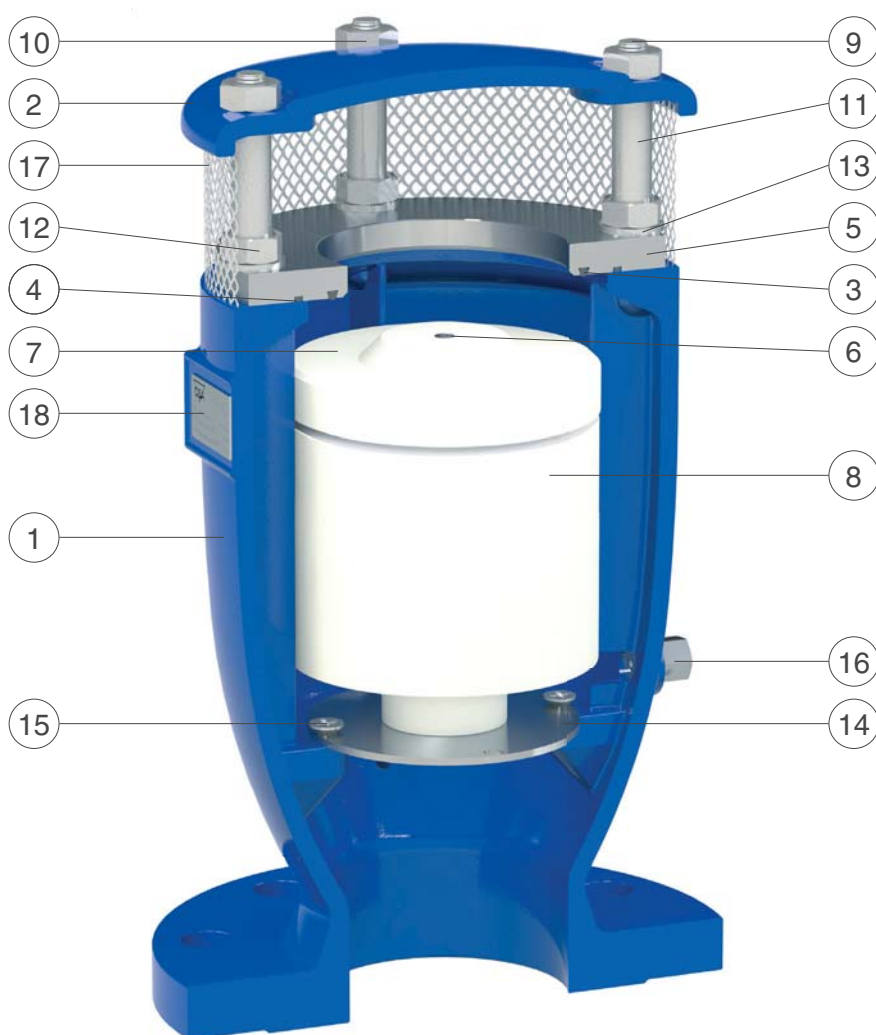
Nozzle diameter in mm according to the size of the air valve and the PN.

	PN 10	PN 16	PN 25	PN 40
1"	1,2	1,2	1	0,8
2"/DN 50	1,5	1,2	1	0,8
DN 80	1,8	1,5	1,2	1
DN 100	2,4	1,8	1,8	1,2
DN 150	4	3	2,4	1,8
DN 200	4	4	4	3
DN 250	4	4	4	4





## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 304	stainless steel AISI 316
6	Nozzle Subset	stainless steel AISI 316	
7	Upper flat	polypropylene	
8	Float	polypropylene	
9	Studs	stainless steel AISI 304	stainless steel AISI 316
10	Nuts	stainless steel AISI 304	stainless steel AISI 316
11	Spacers	stainless steel AISI 304	stainless steel AISI 316
12	Nuts	stainless steel AISI 304	stainless steel AISI 316
13	Washers	stainless steel AISI 304	stainless steel AISI 316
14	Deflector	stainless steel AISI 304	stainless steel AISI 316
15	Screws	stainless steel AISI 304	stainless steel AISI 316
16	Drain valve	stainless steel AISI 303	stainless steel AISI 316
17	Screen	stainless steel AISI 304	
18	Tag	stainless steel AISI 304	

The list of materials and components is subject to changes without notice.



## Anti-shock combination air valve Mod. FOX 3F - AS

The CSA surge alleviation, non slam combination automatic air valve Mod. FOX 3F AS will ensure the proper operation of the pipeline network allowing the release of air pockets during working conditions, the entrance of large volumes of air during draining operations and pipeline bursts and the controlled air outflow, to prevent water hammer.



### Technical features and benefits

- Single chamber full bore body in ductile cast iron, PN 40 bar rated, provided with internal ribs for accurate guiding of the mobile block.
- Drainage valve produced by CSA, for chamber control and pressure relief during maintenance.
- Mobile block composed of a cylindrical float and upper disk in solid polypropylene, joined together by the CSA air release system in AISI 316 (patent pending). The solid cylindrical floats, obtained by CNC machining only, avoid deformations and ensure a great sliding precision inside the body processed ribs and a perfectly vertical thrust.
- Nozzle and gasket holder, part of CSA air release system, entirely made in AISI 316.
- Maintenance can be easily performed from the top, without removing the air valve from the pipe.
- Anti water hammer system (also called AS function), never in contact with water, obtained by a spring and shaft in stainless steel, disk with adjustable nozzles for air outflow control.
- Cover in ductile and screen in stainless steel as a standard execution, to prevent the entrance of insects, with optional outlet for submerged applications.

### Applications

- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used at the pumps, on changes in slope ascending, and at the critical points of the pipeline subjected to water hammer and column separation.



## Operating principle



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.



### Controlled air discharge

During the air discharge it is necessary to avoid rapid closures of the float, responsible of water hammer effects. The FOX 3F AS, thanks to the anti-shock feature, will control the air outflow thus reducing the velocity of the approaching water column and minimizing the risk of overpressure.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.

## Optional



■ **Vacuum breaker version Mod. FOX 2F AS**, to allow the entrance of large volumes of air and the controlled outflow only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems.



■ **Version for submerged applications, SUB series**, available both for FOX 3F AS and 2F AS Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is the possibility of conveying spurts coming from the closure away from the air valve.



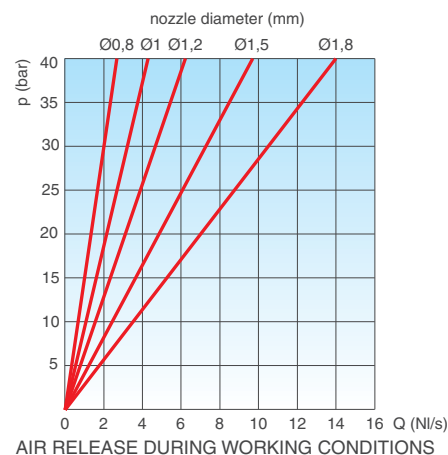
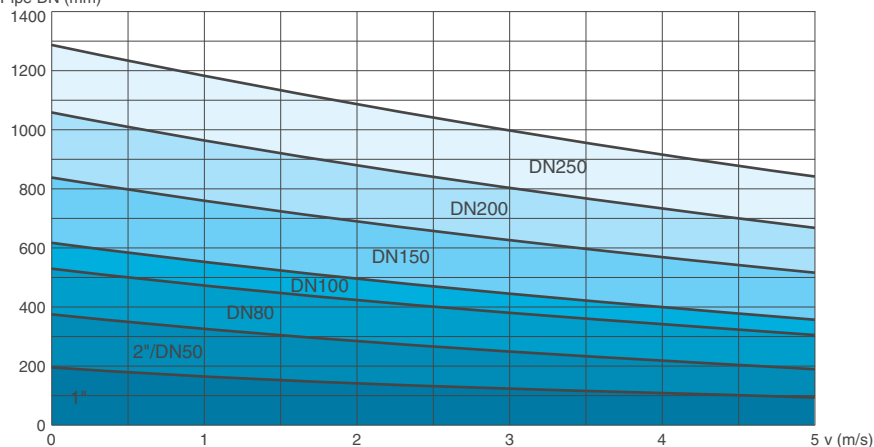
■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be modified on request according to the project conditions and the results of the transient analysis.

## Technical data

### Air valve selection chart

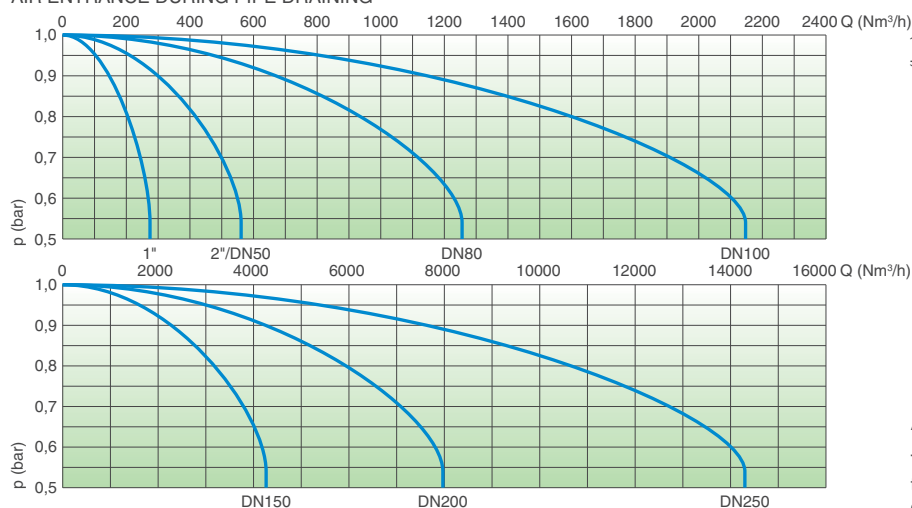
Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity in m/s.

Pipe DN (mm)

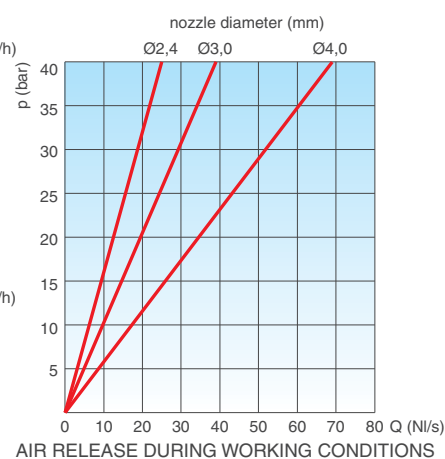


### Air flow performance charts

AIR ENTRANCE DURING PIPE DRAINING



AIR ENTRANCE DURING PIPE DRAINING



AIR RELEASE DURING WORKING CONDITIONS

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60°C.

Max. pressure 40 bar.

Min. pressure 0,2 bar. Lower on request.

### Standard

Designed in compliance with EN-1074/4 and AWWA C-512. Flanges according to EN 1092/2 or ANSI 150. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

### Weights and dimensions

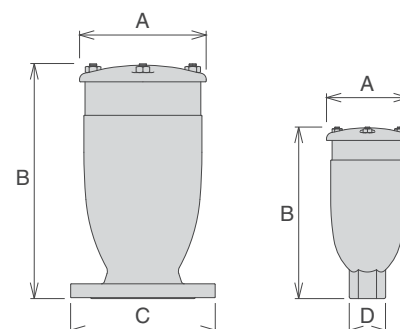
CONNECTION inch/mm	A mm	B mm	C mm		D mm	Weight Kg
Threaded 1"	117	240	-	-	CH 45	4,0
Threaded 2"	141	295	-	-	CH 70	7,5
Flanged 50	141	305	165	-	-	9,5
Flanged 80	172	322	210	205	-	13,8
Flanged 100	206	370	235	220	-	21,7
Flanged 150	285	555	305	285	-	44,5
Flanged 200	365	635	375	340	-	85,0
Flanged 250	450	785	450	405	-	134,0

All values are approximate, consult CSA service for more details.

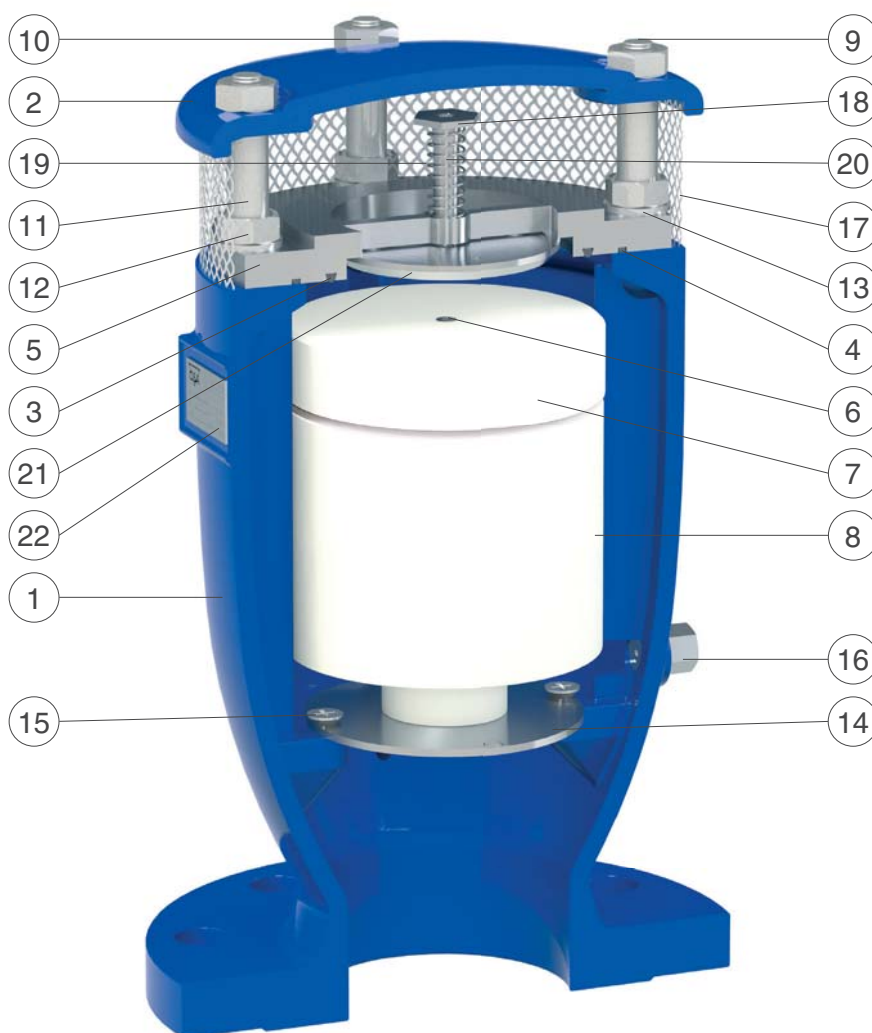
### Nozzle choice

Nozzle diameter in mm according to the size of the air valve and the PN.

	PN 10	PN 16	PN 25	PN 40
1"	1,2	1,2	1	0,8
2"/DN 50	1,5	1,2	1	0,8
DN 80	1,8	1,5	1,2	1
DN 100	2,4	1,8	1,8	1,2
DN 150	4	3	2,4	1,8
DN 200	4	4	4	3
DN 250	4	4	4	4



## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 304	stainless steel AISI 316
6	Nozzle subset	stainless steel AISI 316	
7	Upper flat	polypropylene	
8	Float	polypropylene	
9	Studs	stainless steel AISI 304	stainless steel AISI 316
10	Nuts	stainless steel AISI 304	stainless steel AISI 316
11	Spacers	stainless steel AISI 304	stainless steel AISI 316
12	Nuts	stainless steel AISI 304	stainless steel AISI 316
13	Washers	stainless steel AISI 304	stainless steel AISI 316
14	Deflector	stainless steel AISI 304	stainless steel AISI 316
15	Screws	stainless steel AISI 304	stainless steel AISI 316
16	Drain valve	stainless steel AISI 303	stainless steel AISI 316
17	Screen	stainless steel AISI 304	
18	Spring guide nut (from DN 100)	stainless steel AISI 303	stainless steel AISI 316
19	Spring	stainless steel AISI 302	stainless steel AISI 316
20	AS shaft	stainless steel AISI 303	stainless steel AISI 316
21	AS flat	stainless steel AISI 304	stainless steel AISI 316
22	Tag	stainless steel AISI 304	

The list of materials and components is subject to changes without notice.





## Anti-surge combination air valve Mod. FOX 3F - RFP

The CSA surge dampening, anti-slam automatic air valve Mod. FOX 3F RFP has been designed to allow the release of air pockets accumulated in working conditions, the entrance of large volumes of air in case of pipe draining or bursts and to prevent pipeline damages coming from pressure transients, associated with high air outflow velocities.



### Technical features and benefits

- Uncontrolled pipeline filling operations and transient events will inevitably generate the rapid closure of the air valves installed along the system, with consequent damages. The CSA air valve FOX 3F RFP will automatically adjust the outflow capacity, thus reducing the velocity of the incoming water column minimizing the risk of water hammer.
- The spray effect during closing and the risk of drowning, compared to standard combination air valves, are reduced.
- Single chamber full bore body in ductile cast iron, PN 40 bar rated, provided with internal ribs for accurate guiding of the mobile block.
- Mobile block composed of the main float and upper disk, joined together by the CSA air release system in AISI 316 (patent pending), and an additional anti surge obturator.
- Nozzle and gasket holder, part of CSA air release system, entirely made in AISI 316.
- Cover in ductile and screen in stainless steel as a standard execution, to prevent the entrance of insects, with optional outlet for submerged applications and air conveyance.

### Applications

- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used, in combination with CSA AS technology, on changes in slope and high points of the profile to provide the best air management and control with effective surge protection.

## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The FOX 3F RFP, thanks to an aerodynamic full port body and deflector, will make sure to avoid premature closures of the mobile block during this phase.



### Controlled outflow

If the differential pressure of air, during pipe filling, increases above a certain value without control there is the risk of water hammer and damages to the system. Should that happen the RFP upper float will rise automatically, reducing the outflow and consequently the velocity of the approaching water column.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

## Optional



■ **Vacuum breaker version Mod. FOX 2F RFP**, to allow the entrance of large volumes of air and the controlled outflow only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the water hammer effect has to be reduced without the necessity of air release.



■ **Version for submerged applications, SUB series**, available both for FOX 3F RFP and 2F RFP Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is the possibility of conveying spurts coming from the closure away from the air valve.

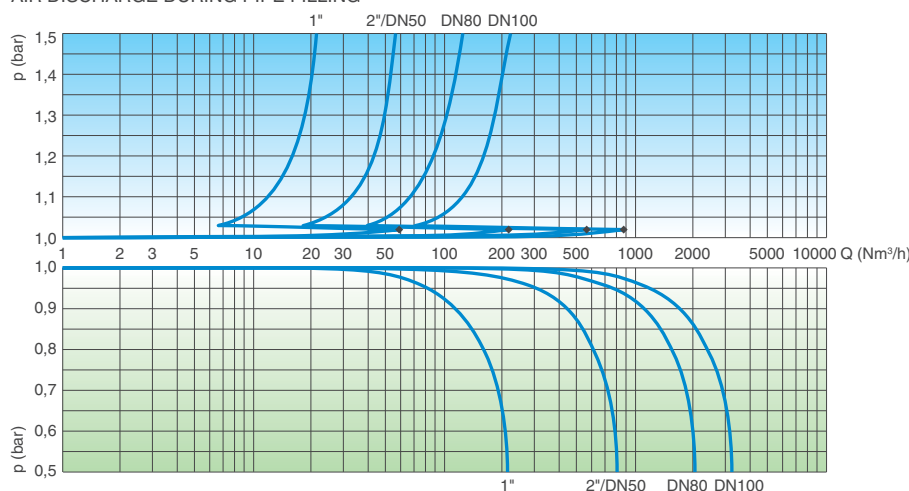


■ **Version for air discharge only EO series**, available both for FOX 3F RFP and 2F RFP models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided, such as in pump suction lines or siphons pipelines.

## Technical data

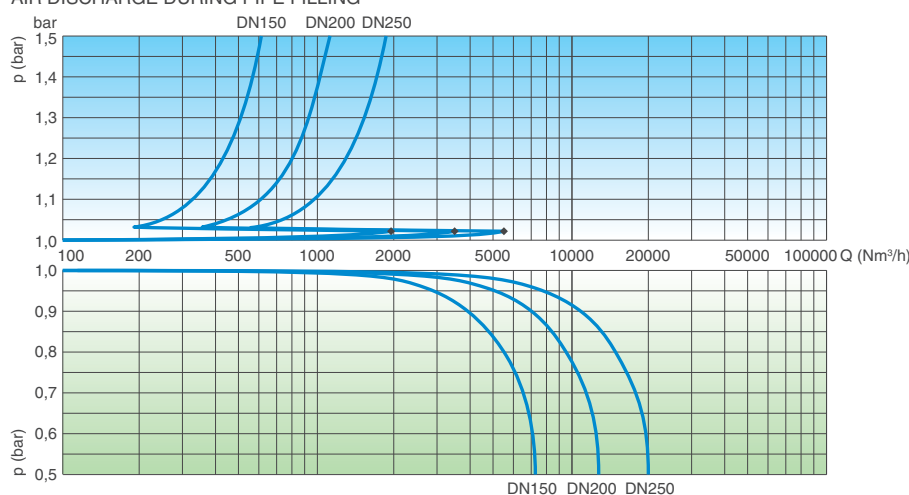
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

### Working conditions

Treated water max. 60°C.

Max. pressure 40 bar.

Min. pressure 0,2 bar. Lower on request.

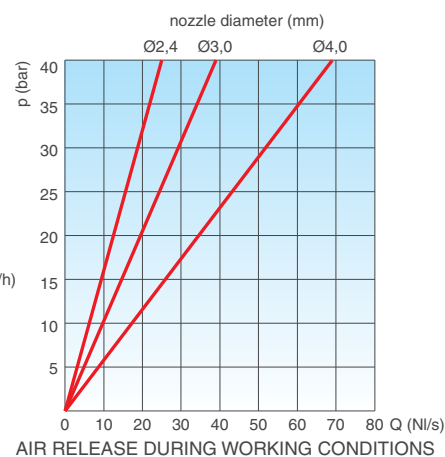
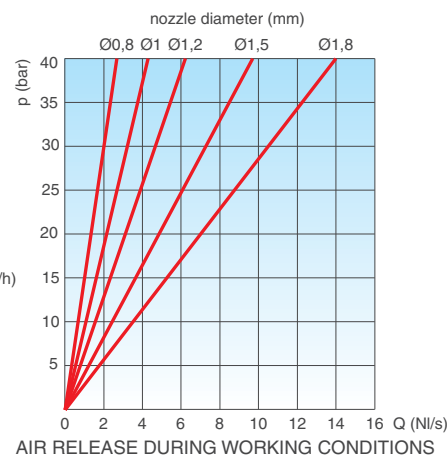
### Standard

Designed in compliance with EN-1074/4 and AWWA C-512. Flanges according to EN 1092/2 or ANSI 150. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm		D mm	Weight Kg
Threaded 1"	117	240	-	-	CH 45	4,0
Threaded 2"	141	295	-	-	CH 70	7,5
Flanged 50	141	305	165	-	-	9,5
Flanged 80	172	322	210	205	-	13,8
Flanged 100	206	370	235	220	-	21,7
Flanged 150	285	555	305	285	-	44,5
Flanged 200	365	635	375	340	-	85,0
Flanged 250	450	785	450	405	-	134,0

All values are approximate, consult CSA service for more details.

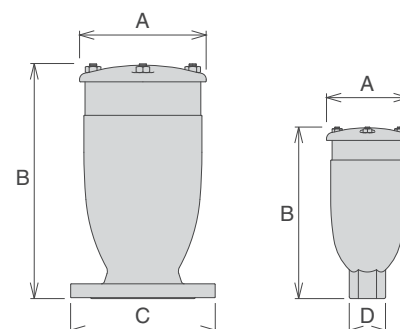


The air flow charts were created in Kg/s from laboratory tests and numerical analysis, without the screen, then converted in Nm³/h using a safety factor.

### Nozzle choice

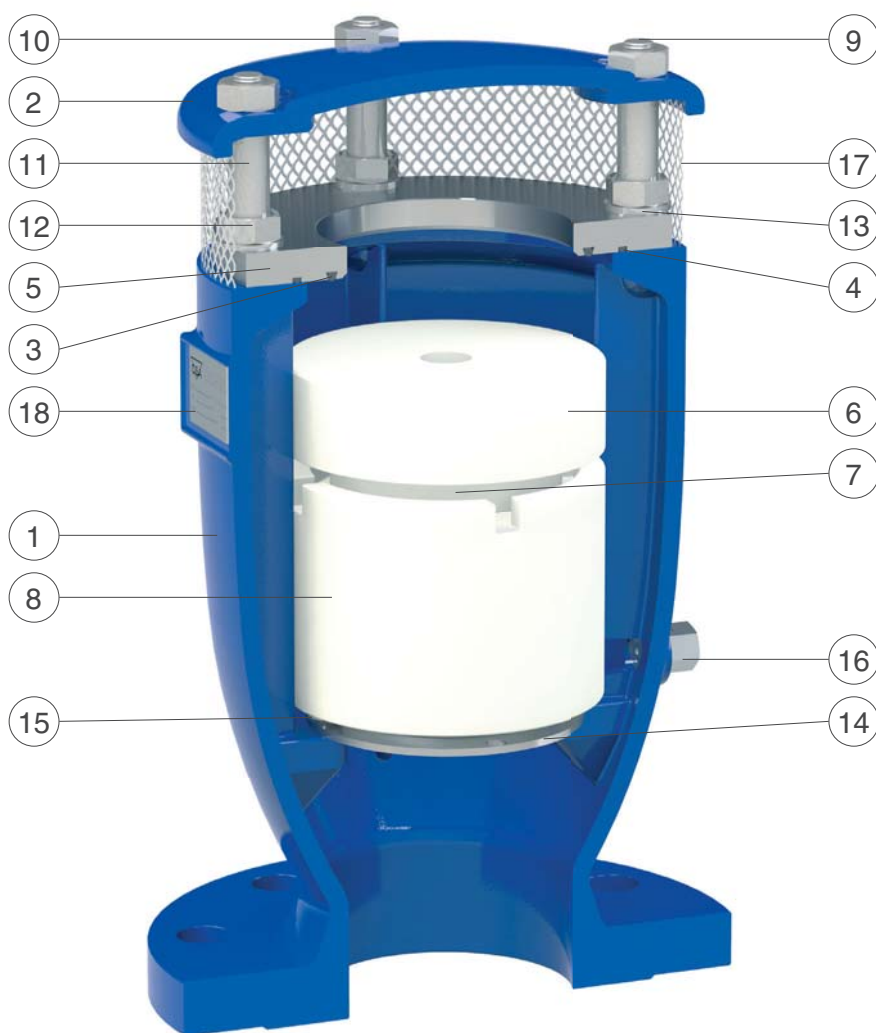
Nozzle diameter in mm according to the size of the air valve and the PN.

	PN 10	PN 16	PN 25	PN 40
1"	1,5	1,2	1	0,8
2"/DN 50	1,8	1,5	1,2	1
DN 80	1,8	1,5	1,2	1
DN 100	3	2,4	1,8	1,2
DN 150	4	3	2,4	1,8
DN 200	4	4	4	3
DN 250	4	4	4	4





## Technical details



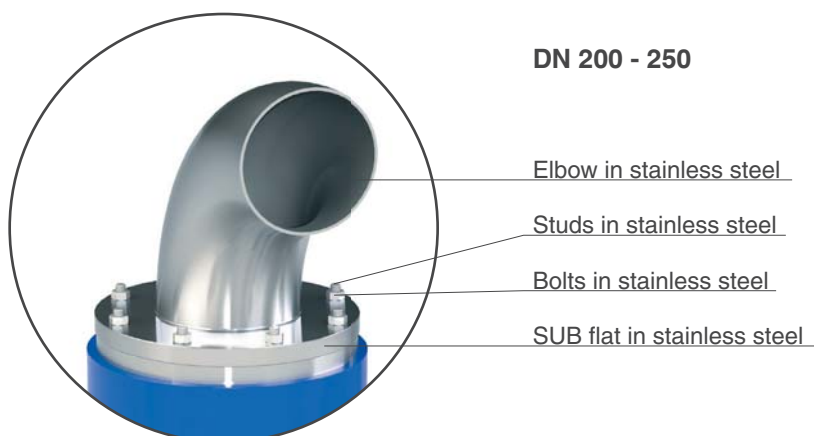
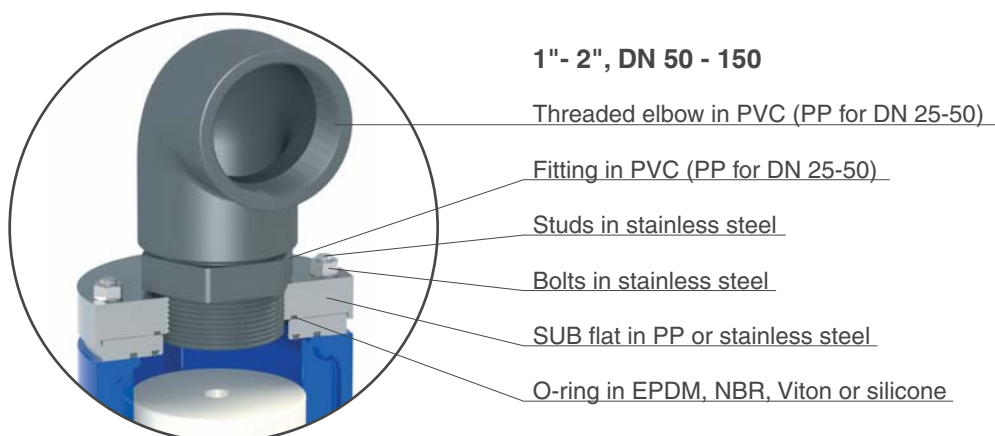
N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 304	stainless steel AISI 316
6	RFP flat with O-ring	polypropylene and NBR	EPDM/Viton/silicone
7	Upper flat with nozzle subset	polypropylene and stainless steel AISI 316	
8	Float	polypropylene	
9	Studs	stainless steel AISI 304	stainless steel AISI 316
10	Nuts	stainless steel AISI 304	stainless steel AISI 316
11	Spacers	stainless steel AISI 304	stainless steel AISI 316
12	Nuts	stainless steel AISI 304	stainless steel AISI 316
13	Washers	stainless steel AISI 304	stainless steel AISI 316
14	Deflector	stainless steel AISI 304	stainless steel AISI 316
15	Screws	stainless steel AISI 304	stainless steel AISI 316
16	Drain valve	stainless steel AISI 303	stainless steel AISI 316
17	Screen	stainless steel AISI 304	
18	Tag	stainless steel AISI 304	

The list of materials and components is subject to changes without notice.



## FOX air valves range conveyance system bias kit - Mod. SUB

The air conveyance system SUB, provided with watertight threaded elbow for submerged applications, has been created to be retrofitted on existing CSA FOX air valves or as a standalone version. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is the possibility of conveying spurts coming from the rapid closure of the air valve.



### Technical data

#### Working conditions

Treated water max. 60°C.  
Max. pressure 40 bar.  
Min. pressure 0,2 bar.  
Lower on request.

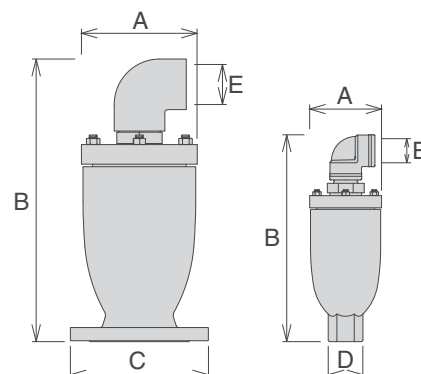
#### Standard

Designed in compliance with EN-1074/4 and AWWA C-512.  
Flanges according to EN 1092/2 or ANSI 150.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes on flanges and painting on request.

#### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm		D mm	E inch	Weight Kg
Threaded 1"	105	302	-	-	CH 45	1"	4,0
Threaded 2"	128	385	-	-	CH 70	2"	7,5
Flanged 50	128	395	165	-	-	2"	9,5
Flanged 80	158	439	210	205	-	2" 1/2	13,8
Flanged 100	192	507	235	220	-	3"	21,7
Flanged 150	272	648	305	285	-	4"	44,5
Flanged 200	359	828	375	340	-	6"	92,5
Flanged 250	430	1060	450	405	-	8"	147,0

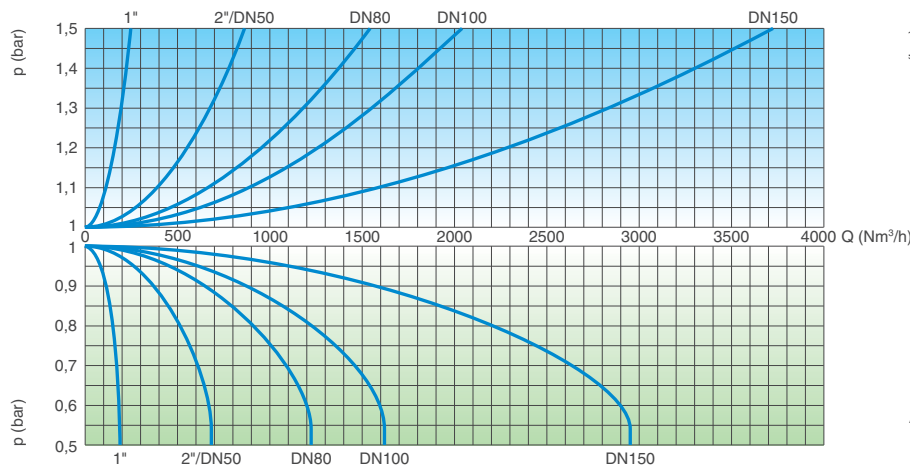
Approximate values. - Mod. SUB is stock available up to DN 150 mm, for larger sizes consult with CSA.



## Technical data

### FOX SUB - Air flow performance charts

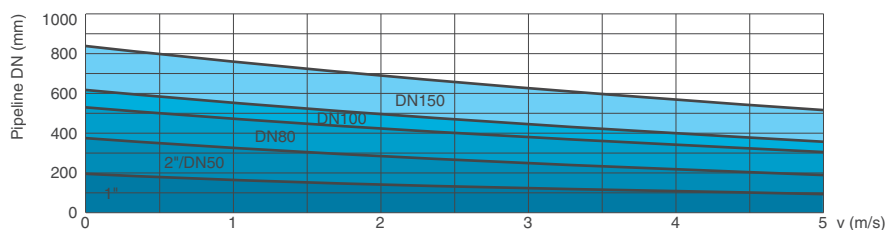
AIR DISCHARGE DURING PIPE FILLING



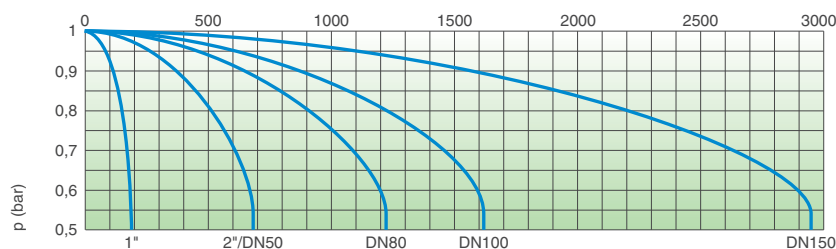
AIR ENTRANCE DURING PIPE DRAINING

### FOX AS SUB - Air valve selection chart

Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity in m/s.



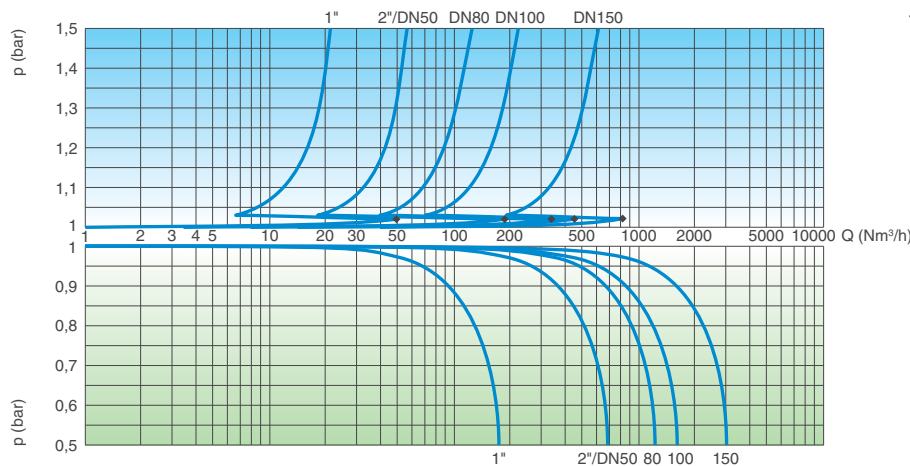
### FOX AS SUB - Air flow performance chart



AIR ENTRANCE DURING PIPE DRAINING

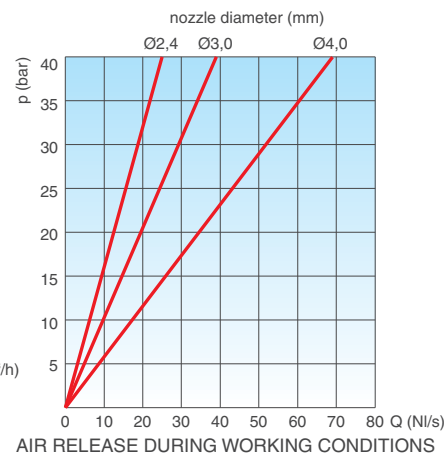
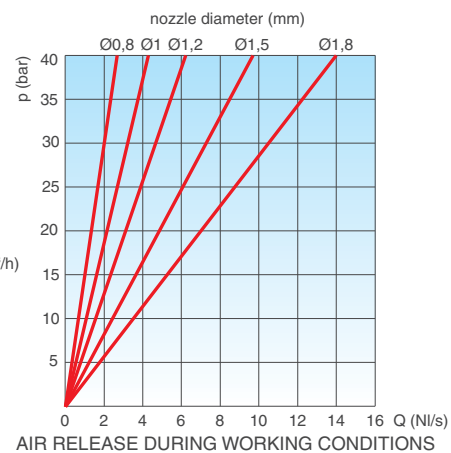
### FOX RFP SUB - Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm³/h using a safety factor.



### Nozzle choice

For the nozzle choice make reference to the available technical data sheets of the relative FOX models.





## Combination air valve Mod. LYNX 3F

The CSA combination, triple function, automatic air valve Mod. LYNX 3F will ensure the proper operation of the pipeline network allowing the release of air pockets during working conditions, the evacuation and entrance of large volumes of air during filling and draining operations.



### Technical features and benefits

- Single chamber body in ductile cast iron, PN 40 bar rated, provided with internal ribs for accurate guiding of the floats.
- Aerodynamic deflector in stainless steel to avoid premature closures of the mobile block.
- Drainage valve, produced by CSA, for chamber control and pressure relief during maintenance.
- Mobile block composed of a cylindrical float and upper disk in solid polypropylene, joined together by the CSA air release system in AISI 316 (patent pending). The solid cylindrical floats, obtained by CNC machining, avoid deformations and ensure a great sliding precision inside the body processed ribs and a perfectly vertical thrust.
- Nozzle and gasket holder, part of CSA air release system, entirely made in AISI 316 and designed with gasket compression control to prevent aging process and consequent leakage during working conditions.
- Maintenance can be easily performed from the top, without removing the air valve from the pipe.
- Cover in ductile and screen in stainless steel as a standard execution to prevent the entrance of insects, with three optional outlets (for submerged applications, air inlet only, air outlet only).

### Applications

- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used on changes in slope and at the high points of the pipeline.

## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The LYNX 3F, thanks to the aerodynamic body and the deflector, will make sure to avoid premature closures of the mobile block during this phase.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

## Optional



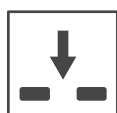
■ **Vacuum breaker version Mod. LYNX 2F**, to allow the entrance and discharge of large volumes of air only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the air release won't be required.



■ **Version for submerged applications, SUB series**, available both for LYNX 3F and 2F Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is the possibility of conveying spurts coming from the rapid closure of the air valve.



■ **Version for air discharge only EO series**, available both for LYNX 3F and 2F models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided, such as in pump suction lines or siphons pipelines.

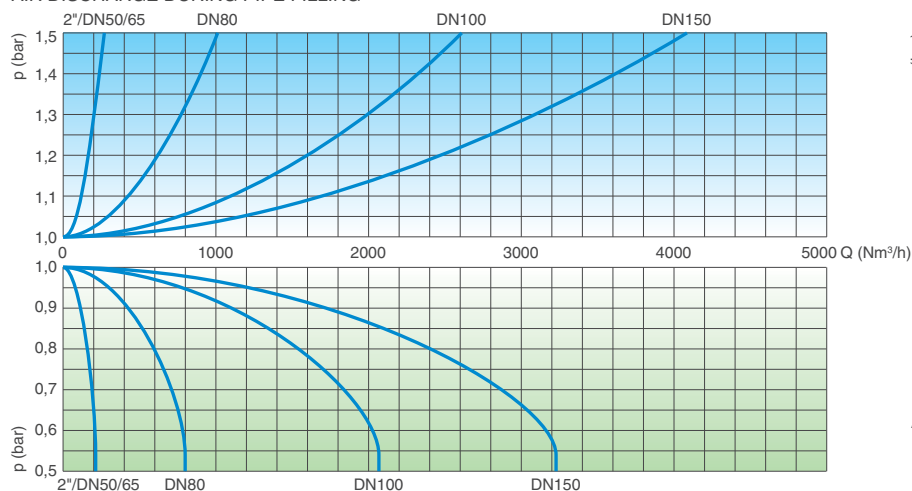


■ **Version for air entrance only IO series**, available for LYNX 2F model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

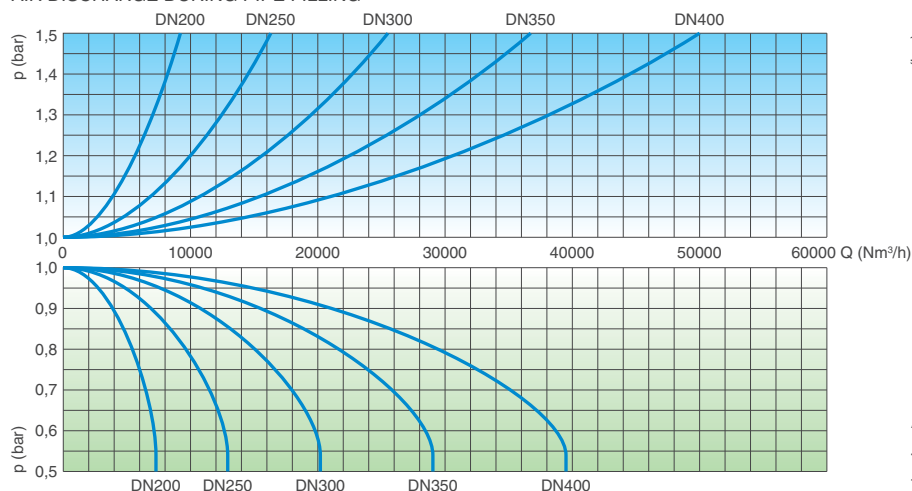
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING

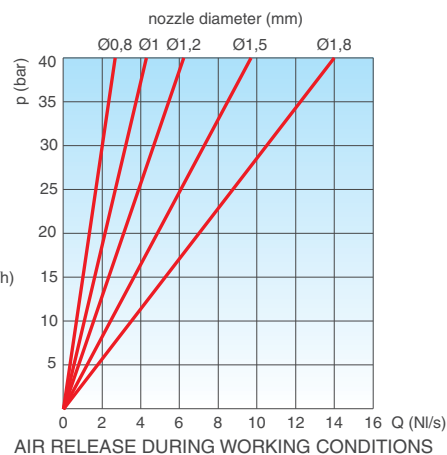


AIR ENTRANCE DURING PIPE DRAINING

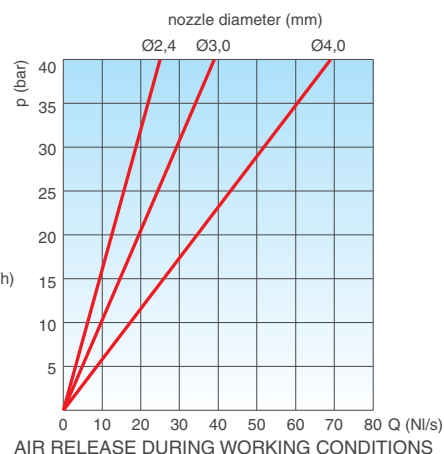
AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING



AIR RELEASE DURING WORKING CONDITIONS



AIR RELEASE DURING WORKING CONDITIONS

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60°C.  
Max. pressure 40 bar.  
Min. pressure 0,2 bar. Lower on request.

### Nozzle choice

Nozzle diameter in mm according to the air valve size and the PN.

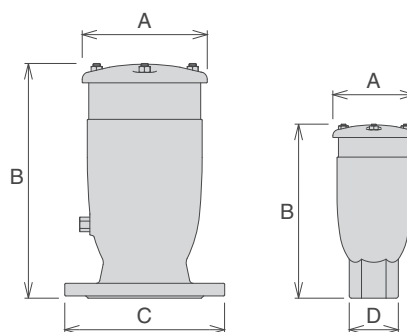
	PN 10	PN 16	PN 25	PN 40
2"-DN 65	1,2	1,2	1	0,8
DN 80	1,8	1,5	1,2	0,8
DN 100	1,8	1,5	1,2	1
DN 150	2,4	1,8	1,8	1,2
DN 200	4	3	2,4	1,8
DN 250	4	4	3	2,4
DN 300	4	4	4	4
DN 350	4	4	4	4
DN 400	4	4	4	4

### Standard

Designed in compliance with EN-1074/4 and AWWA C-512. Flanges according to EN 1092/2 or ANSI 150. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

### Weights and dimensions

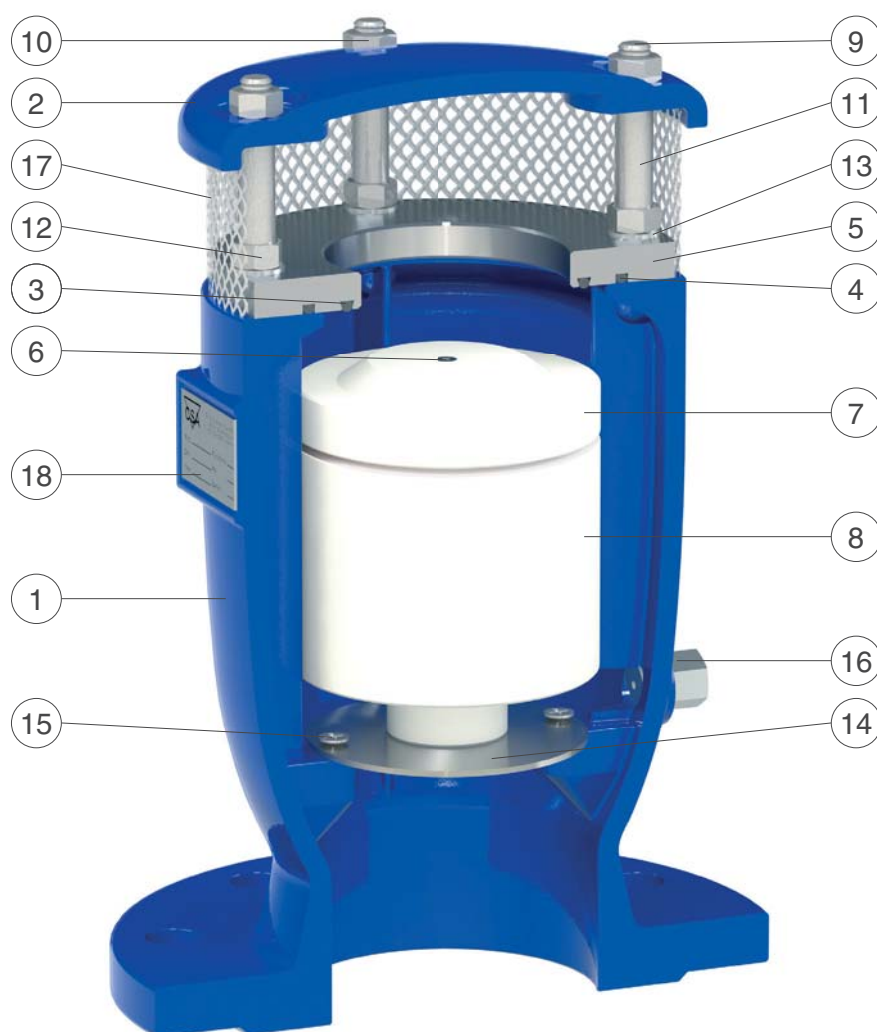
CONNECTION inch/mm	A mm	B mm	C mm		D mm	Weight Kg
Threaded 2"	117	240	-	-	CH 70	4,8
Flanged 50	117	250	165	-	-	6,8
Flanged 65	117	250	185	-	-	7,6
Flanged 80	141	305	210	205	-	10,8
Flanged 100	172	303	235	220	-	13,8
Flanged 150	206	337	305	285	-	23,0
Flanged 200	285	555	375	340	-	55,0
Flanged 250	365	635	450	405	-	101,0
Flanged 300	420	785	515	455	-	127,0
Flanged 350	515	940	580	520	-	250,5
Flanged 400	600	1075	620	580	-	304,0



Values are approximate, consult CSA service for more details.



## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 304	stainless steel AISI 316
6	Nozzle Subset	stainless steel AISI 316	
7	Upper flat	polypropylene	
8	Float	polypropylene	
9	Studs	stainless steel AISI 304	stainless steel AISI 316
10	Nuts	stainless steel AISI 304	stainless steel AISI 316
11	Spacers	stainless steel AISI 304	stainless steel AISI 316
12	Nuts	stainless steel AISI 304	stainless steel AISI 316
13	Washers	stainless steel AISI 304	stainless steel AISI 316
14	Deflector	stainless steel AISI 304	stainless steel AISI 316
15	Screws	stainless steel AISI 304	stainless steel AISI 316
16	Drain valve	stainless steel AISI 303	stainless steel AISI 316
17	Screen	stainless steel AISI 304	
18	Tag	stainless steel AISI 304	

The list of materials and components is subject to changes without notice.



## Anti-shock combination air valve Mod. LYNX 3F - AS

The CSA surge alleviation, non slam combination automatic air valve Mod. LYNX 3F AS will ensure the proper operation of the pipeline network allowing the release of air pockets during working conditions, the entrance of large volumes of air during draining operations and pipeline bursts and the air discharge with controlled speed, to prevent water hammer.



### Technical features and benefits

- Single chamber body in ductile cast iron, PN 40 bar rated, provided with internal ribs for accurate guiding of the mobile block.
- Drainage valve produced by CSA, for chamber control and pressure relief during maintenance.
- Mobile block composed of a cylindrical float and upper disk in solid polypropylene, joined together by the CSA air release system in AISI 316 (patent pending). The solid cylindrical floats, obtained by CNC machining only, avoid deformations and ensure a great sliding precision inside the body processed ribs and a perfectly vertical thrust.
- Nozzle and gasket holder, part of CSA air release system, entirely made in AISI 316.
- Maintenance can be easily performed from the top, without removing the air valve from the pipe.
- Anti water hammer system (also called AS function), never in contact with water, obtained by a spring and shaft in stainless steel, and a disk with adjustable nozzles for air outflow control.
- Cover in ductile and screen in stainless steel as a standard execution, to prevent the entrance of insects, with optional outlet for submerged applications.

### Applications

- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used at the pumps, on changes in slope ascending, and at the critical points of the pipeline subjected to water hammer and column separation.

## Operating principle



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.



### Controlled air discharge

During the air discharge it is necessary to avoid rapid closures of the float, responsible of water hammer effects. The LYNX 3F AS, thanks to the anti-shock feature, will control the air outflow thus reducing the velocity of the approaching water column and minimizing the risk of overpressure.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.

## Optional



■ **Vacuum breaker version Mod. LYNX 2F AS**, to allow the entrance of large volumes of air and the controlled outflow only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems.



■ **Version for submerged applications, SUB series**, available both for LYNX 3F AS and 2F AS Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is the possibility of conveying spurts coming from the closure away from the air valve.



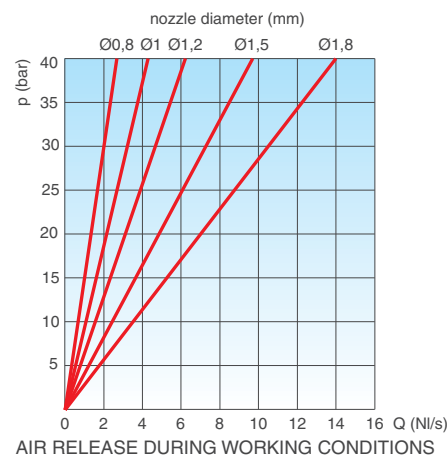
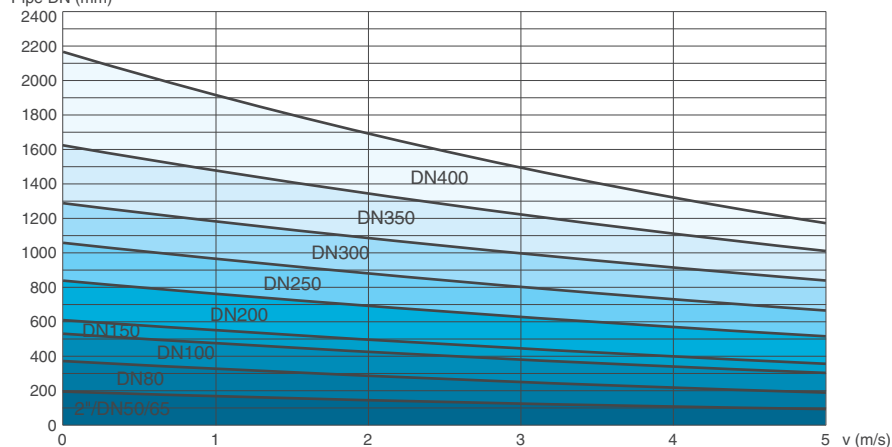
■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be modified on request according to the project conditions and the results of the transient analysis.

## Technical data

### Air valve selection chart

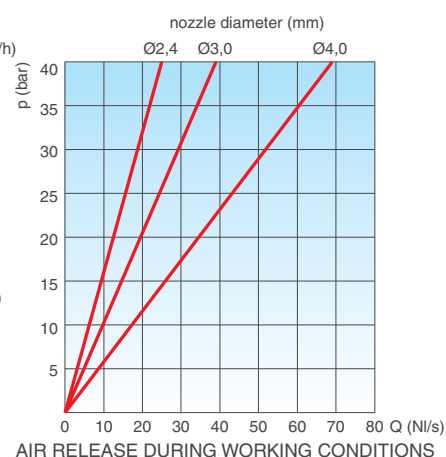
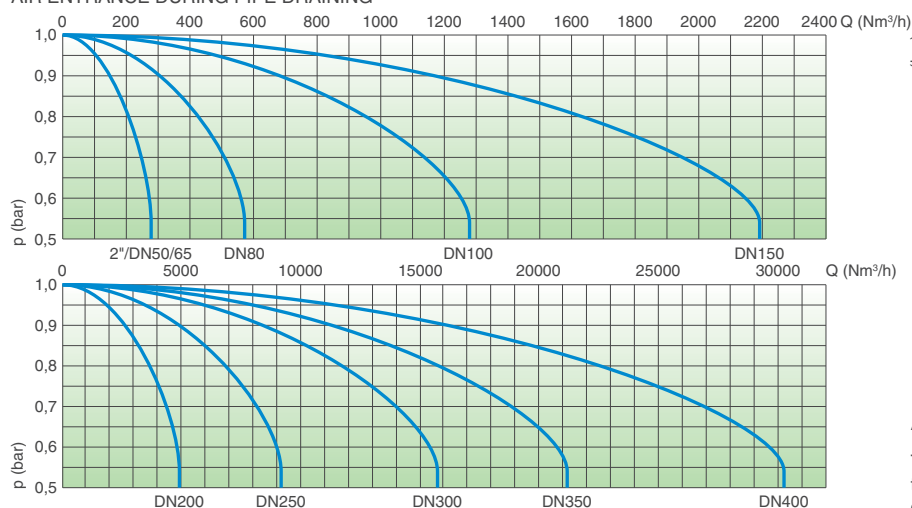
Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity in m/s.

Pipe DN (mm)



### Air flow performance charts

AIR ENTRANCE DURING PIPE DRAINING



AIR RELEASE DURING WORKING CONDITIONS

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60°C.

Max. pressure 40 bar.

Min. pressure 0,2 bar. Lower on request.

### Nozzle choice

Nozzle diameter in mm according to the air valve size and the PN.

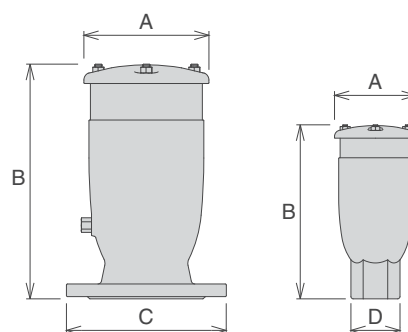
	PN 10	PN 16	PN 25	PN 40
2"-DN 65	1,2	1,2	1	0,8
DN 80	1,8	1,5	1,2	0,8
DN 100	1,8	1,5	1,2	1
DN 150	2,4	1,8	1,8	1,2
DN 200	4	3	2,4	1,8
DN 250	4	4	3	2,4
DN 300	4	4	4	4
DN 350	4	4	4	4
DN 400	4	4	4	4

### Standard

Designed in compliance with EN-1074/4 and AWWA C-512. Flanges according to EN 1092/2 or ANSI 150. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

### Weights and dimensions

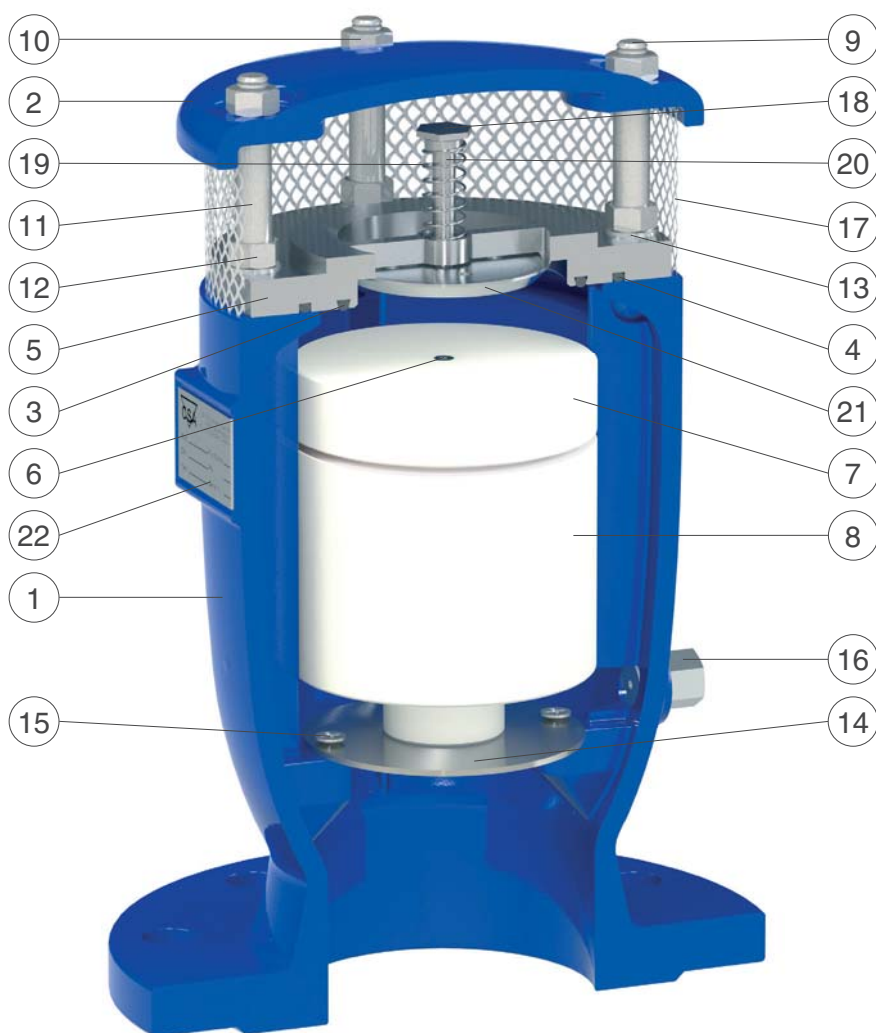
CONNECTION inch/mm	A mm	B mm	C mm	D mm	Weight Kg
Threaded 2"	117	240	-	-	CH 70 4,8
Flanged 50	117	250	165	-	6,8
Flanged 65	117	250	185	-	7,6
Flanged 80	141	305	210	205	10,8
Flanged 100	172	303	235	220	13,8
Flanged 150	206	337	305	285	23,0
Flanged 200	285	555	375	340	55,0
Flanged 250	365	635	450	405	101,0
Flanged 300	420	785	515	455	127,0
Flanged 350	515	940	580	520	250,5
Flanged 400	600	1075	620	580	304,0



Values are approximate, consult CSA service for more details.



## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 304	stainless steel AISI 316
6	Nozzle subset	stainless steel AISI 316	
7	Upper flat	polypropylene	
8	Float	polypropylene	
9	Studs	stainless steel AISI 304	stainless steel AISI 316
10	Nuts	stainless steel AISI 304	stainless steel AISI 316
11	Spacers	stainless steel AISI 304	stainless steel AISI 316
12	Nuts	stainless steel AISI 304	stainless steel AISI 316
13	Washers	stainless steel AISI 304	stainless steel AISI 316
14	Deflector	stainless steel AISI 304	stainless steel AISI 316
15	Screws	stainless steel AISI 304	stainless steel AISI 316
16	Drain valve	stainless steel AISI 303	stainless steel AISI 316
17	Screen	stainless steel AISI 304	
18	Spring guide nut (from DN 150)	stainless steel AISI 303	stainless steel AISI 316
19	Spring	stainless steel AISI 302	stainless steel AISI 316
20	AS shaft	stainless steel AISI 303	stainless steel AISI 316
21	AS flat	stainless steel AISI 304	stainless steel AISI 316
22	Tag	stainless steel AISI 304	

The list of materials and components is subject to changes without notice.



## Anti-surge combination air valve Mod. LYNX 3F - RFP

The CSA surge dampening, anti-slam automatic air valve Mod. LYNX 3F RFP has been designed to allow the release of air pockets accumulated in working conditions, the entrance of large volumes of air in case of pipe draining or bursts and to prevent pipeline damages coming from pressure transients, associated with high air outflow velocities.



### Technical features and benefits

- Uncontrolled pipeline filling operations and transient events will inevitably generate the rapid closure of the air valves installed along the system, with consequent damages. The CSA air valve LYNX 3F RFP will automatically adjust the outflow capacity, thus reducing the velocity of the incoming water column minimizing the risk of water hammer.
- The spray effect during closing and the risk of drowning, compared to standard combination air valves, are reduced.
- Single chamber body in ductile cast iron, PN 40 bar rated, provided with internal ribs accurate guiding of the mobile block.
- Mobile block composed of the main float and upper disk, joined together by the CSA air release system in AISI 316 (patent pending), and an additional anti-surge obturator.
- Nozzle and gasket holder, part of CSA air release system, entirely made in AISI 316.
- Cover in ductile and scree in stainless steel as a standard execution, to prevent the entrance of insects, with optional outlet for submerged applications and air conveyance.

### Applications

- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used, in combination with CSA AS technology, on changes in slope and high points of the profile to provide the best air management and control with effective surge protection.

## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The LYNX 3F RFP, thanks to the aerodynamic body and deflector, will make sure to avoid premature closures of the mobile block during this phase.



### Controlled outflow

If the differential pressure of air, during pipe filling, increases above a certain value without control there is the risk of water hammer and damages to the system. Should that happen the RFP upper float will rise automatically, reducing the outflow and consequently the velocity of the approaching water column.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

## Optional



■ **Vacuum breaker version Mod. LYNX 2F RFP**, to allow the entrance of large volumes of air and the controlled outflow only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the water hammer effect has to be reduced without the necessity of air release.



■ **Version for submerged applications, SUB series**, available both for LYNX 3F RFP and 2F RFP Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is the possibility of conveying spurts coming from the closure away from the air valve.

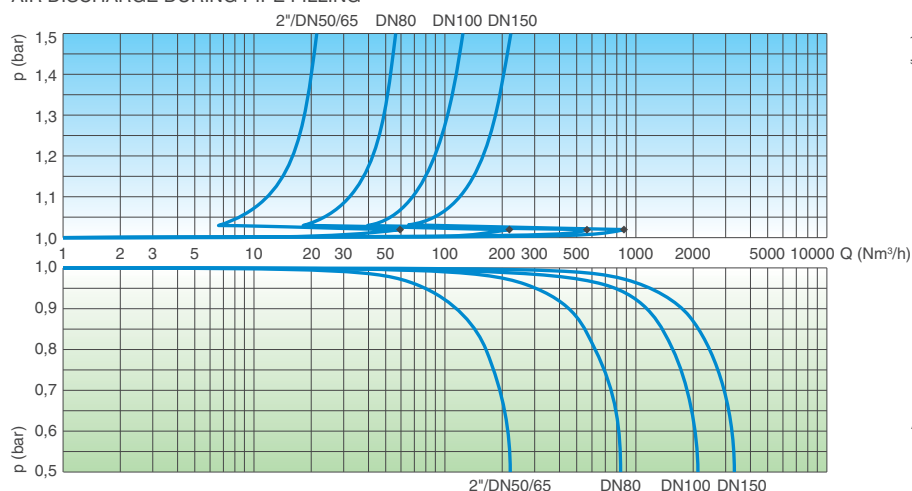


■ **Version for air discharge only EO series**, available both for LYNX 3F RFP and 2F RFP models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided, such as in pump suction lines or siphons pipelines.

## Technical data

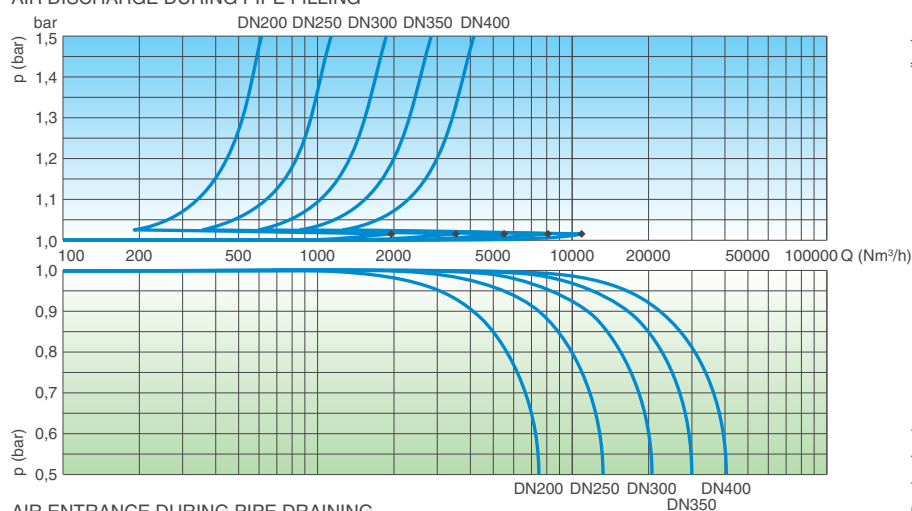
### Air flow performance charts

#### AIR DISCHARGE DURING PIPE FILLING

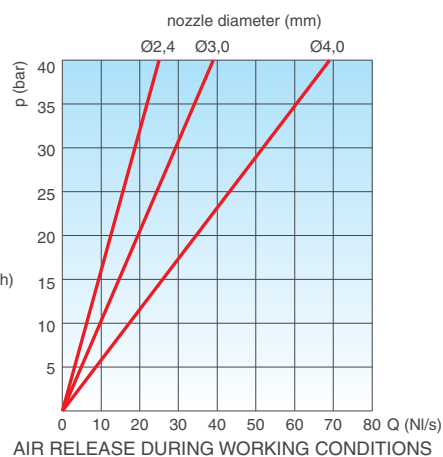
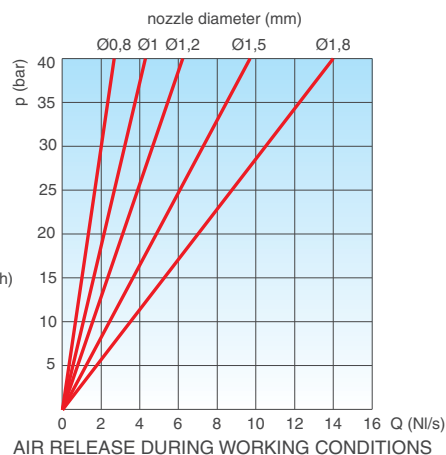


#### AIR ENTRANCE DURING PIPE DRAINING

#### AIR DISCHARGE DURING PIPE FILLING



#### AIR ENTRANCE DURING PIPE DRAINING



The air flow charts were created in Kg/s from laboratory tests and numerical analysis, without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60°C.  
Max. pressure 40 bar.  
Min. pressure 0,2 bar. Lower on request.

### Nozzle choice

Nozzle diameter in mm according to the air valve size and the PN.

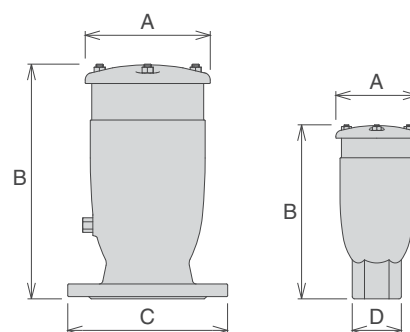
	PN 10	PN 16	PN 25	PN 40
2"-DN 65	1,5	1,2	1	0,8
DN 80	1,8	1,5	1,2	1
DN 100	1,8	1,5	1,2	1
DN 150	3	2,4	1,8	1,2
DN 200	4	3	2,4	1,8
DN 250	4	4	4	3
DN 300	4	4	4	4
DN 350	4	4	4	4
DN 400	4	4	4	4

### Standard

Designed in compliance with EN-1074/4 and AWWA C-512. Flanges according to EN 1092/2 or ANSI 150. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

### Weights and dimensions

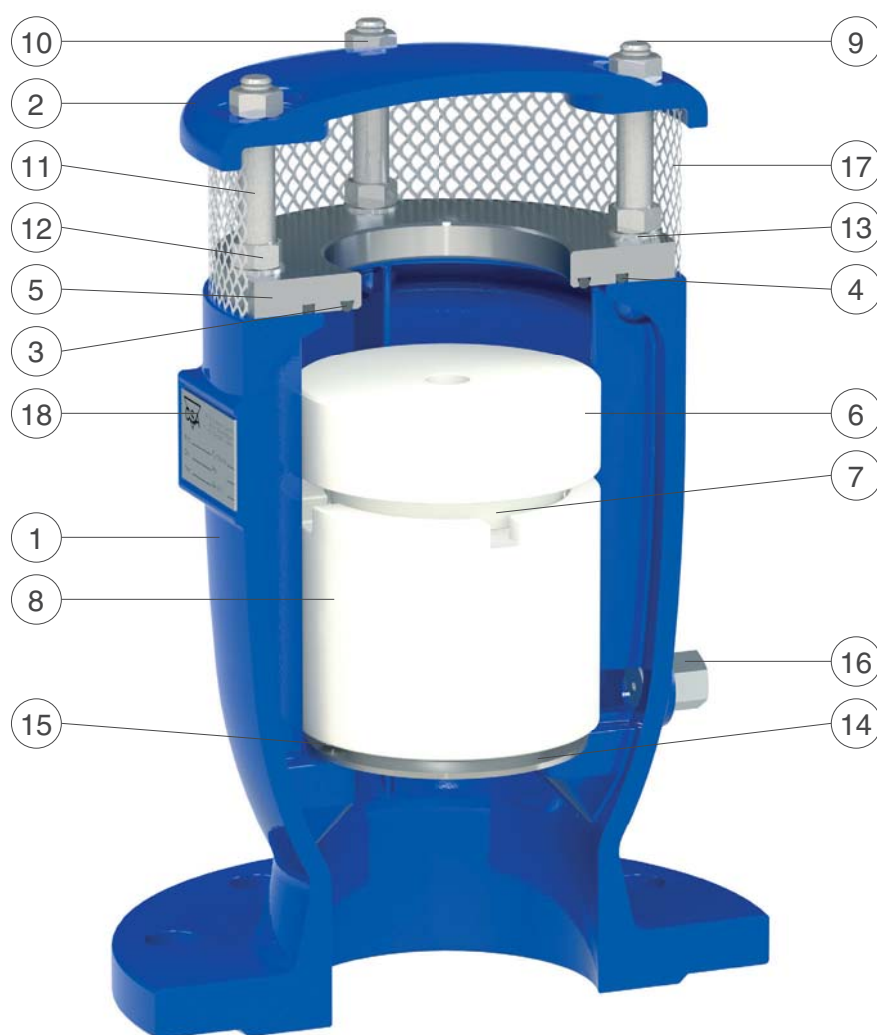
CONNECTION inch/mm	A mm	B mm	C mm		D mm	Weight Kg
Threaded 2"	117	240	-	-	CH 70	4,8
Flanged 50	117	250	165	-	-	6,8
Flanged 65	117	250	185	-	-	7,6
Flanged 80	141	305	210	205	-	10,8
Flanged 100	172	303	235	220	-	13,8
Flanged 150	206	337	305	285	-	23,0
Flanged 200	285	555	375	340	-	55,0
Flanged 250	365	635	450	405	-	101,0
Flanged 300	420	785	515	455	-	127,0
Flanged 350	515	940	580	520	-	250,5
Flanged 400	600	1075	620	580	-	304,0



Values are approximate, consult CSA service for more details.



## Technical details



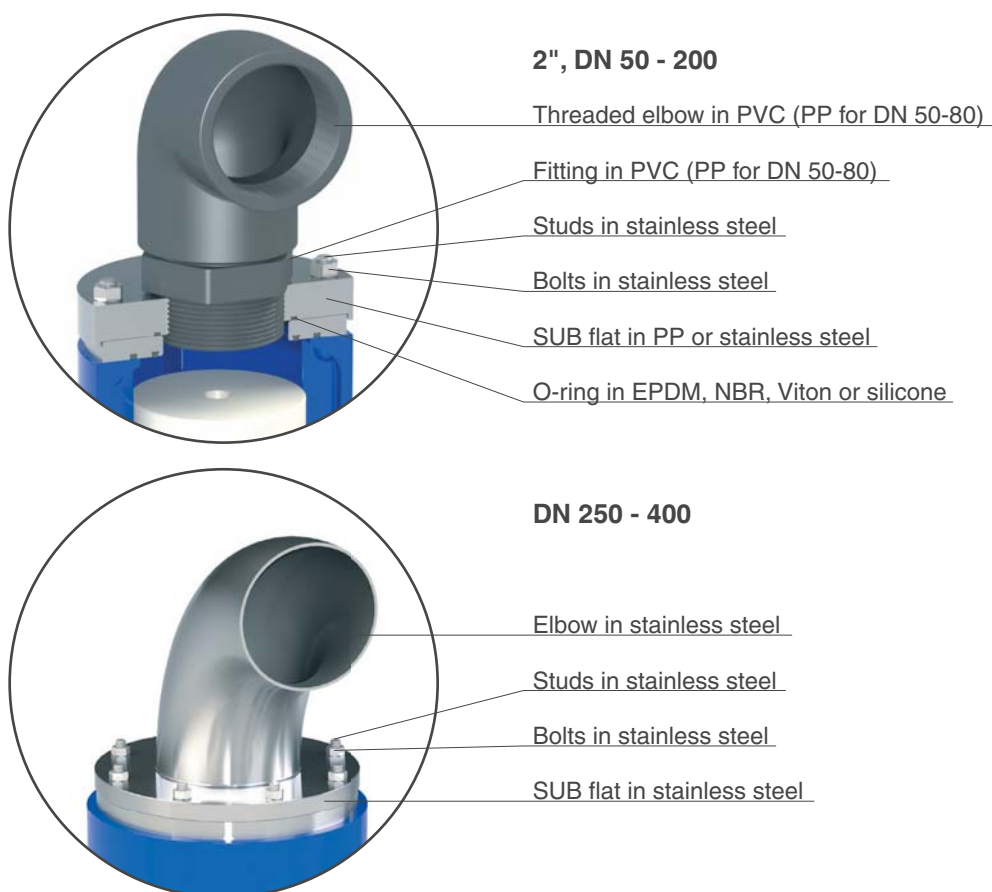
N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 304	stainless steel AISI 316
6	RFP flat with O-ring	polypropylene and NBR	EPDM/Viton/silicone
7	Upper flat with nozzle subset	polypropylene and stainless steel AISI 316	
8	Float	polypropylene	
9	Studs	stainless steel AISI 304	stainless steel AISI 316
10	Nuts	stainless steel AISI 304	stainless steel AISI 316
11	Spacers	stainless steel AISI 304	stainless steel AISI 316
12	Nuts	stainless steel AISI 304	stainless steel AISI 316
13	Washers	stainless steel AISI 304	stainless steel AISI 316
14	Deflector	stainless steel AISI 304	stainless steel AISI 316
15	Screws	stainless steel AISI 304	stainless steel AISI 316
16	Drain valve	stainless steel AISI 303	stainless steel AISI 316
17	Screen	stainless steel AISI 304	
18	Tag	stainless steel AISI 304	

The list of materials and components is subject to changes without notice.



## LYNX air valves range conveyance system bias kit - Mod. SUB

The air conveyance system SUB, provided with watertight threaded elbow for submerged applications, has been created to be retrofitted on existing CSA LYNX air valves or as a standalone version. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is the possibility of conveying spurts coming from the rapid closure of the air valve.



### Technical data

#### Working conditions

Treated water max. 60°C.  
Max. pressure 40 bar.  
Min. pressure 0,2 bar.  
Lower on request.

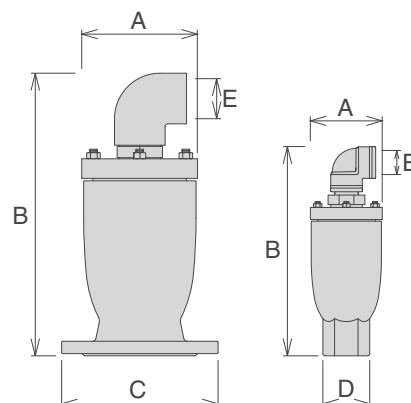
#### Standard

Designed in compliance with EN-1074/4 and AWWA C-512.  
Flanges according to EN 1092/2 or ANSI 150.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes on flanges and painting on request.

#### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm		D mm	E inch	Weight Kg
Threaded 2"	105	293	-	-	CH 70	1"	4,8
Flanged 50	105	298	165	-	-	1"	6,8
Flanged 65	105	298	185	-	-	1"	7,6
Flanged 80	128	395	210	205	-	2"	10,8
Flanged 100	158	420	235	220	-	2" 1/2	13,8
Flanged 150	192	474	305	285	-	3"	23,0
Flanged 200	272	648	375	340	-	4"	55,0
Flanged 250	359	828	450	405	-	6"	108,5
Flanged 300	414	1047	515	455	-	8"	140,0
Flanged 350	492	1310	580	520	-	10"	270,5
Flanged 400	578	1510	620	580	-	12"	332,5

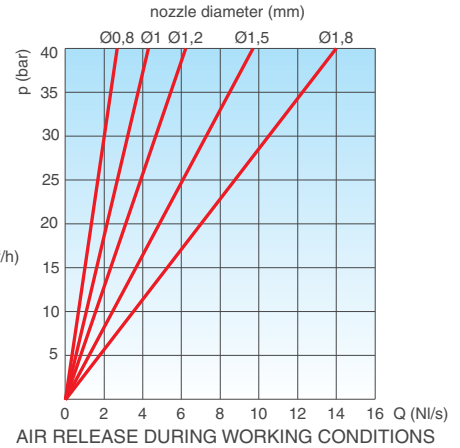
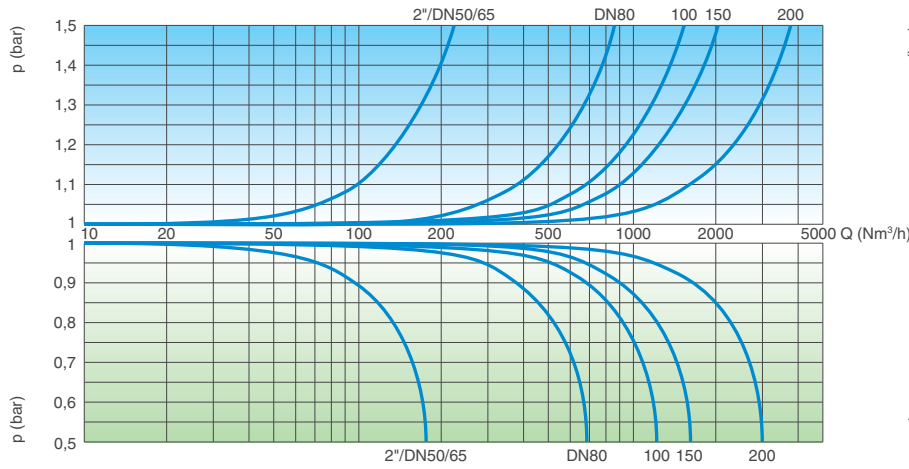
Approximate values. - Mod. SUB is stock available up to DN 200 mm, for larger sizes consult with CSA.



## Technical data

### LYNX SUB - Air flow performance charts

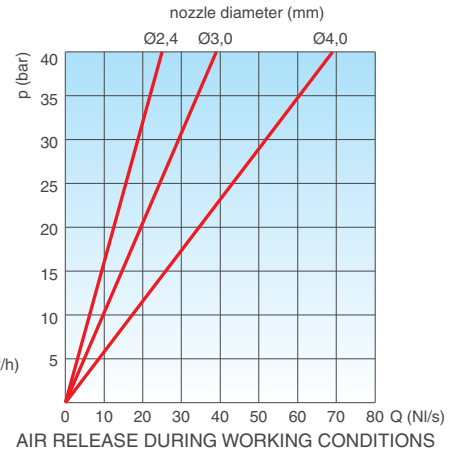
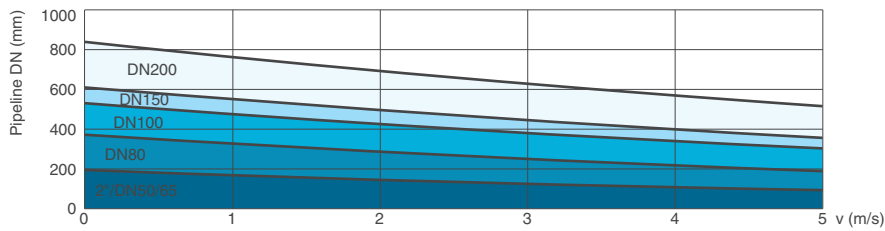
AIR DISCHARGE DURING PIPE FILLING



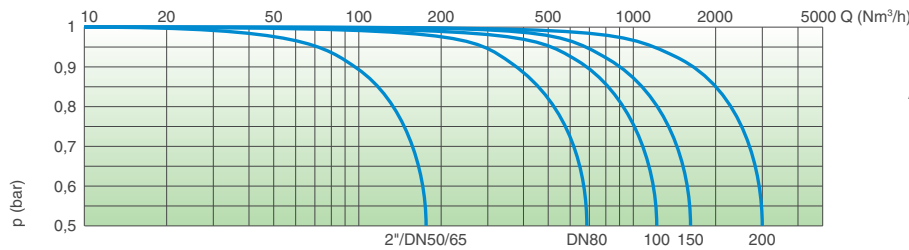
AIR ENTRANCE DURING PIPE DRAINING

### LYNX AS SUB - Air valve selection chart

Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity in m/s.



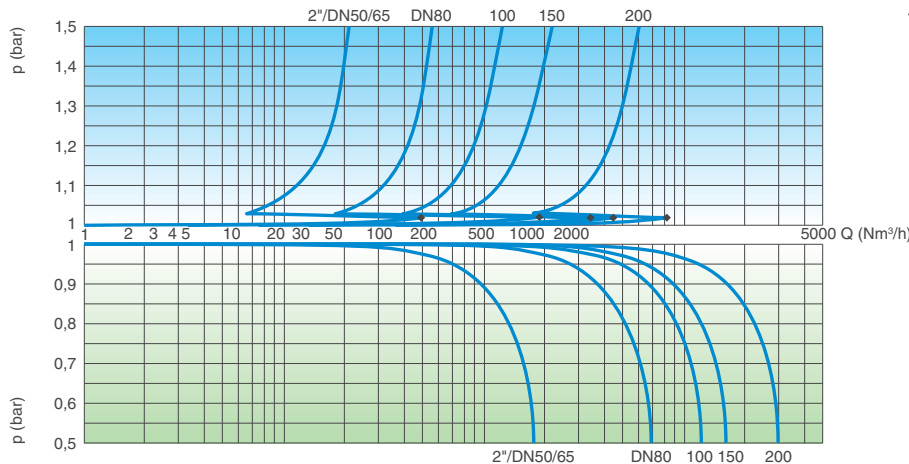
### LYNX AS SUB - Air flow performance chart



AIR ENTRANCE DURING PIPE DRAINING

### LYNX RFP SUB - Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm³/h using a safety factor.

### Nozzle choice

For the nozzle choice make reference to the available technical data sheets of the relative LYNX models.



## Combination air valve for high pressure Mod. FOX 3F - HP

The CSA automatic air release valve Mod. FOX 3F HP will ensure the proper operation of the pipeline network allowing the release of air pockets during working conditions, the evacuation and entrance of large volumes of air during filling and draining operations.



### Technical features and benefits

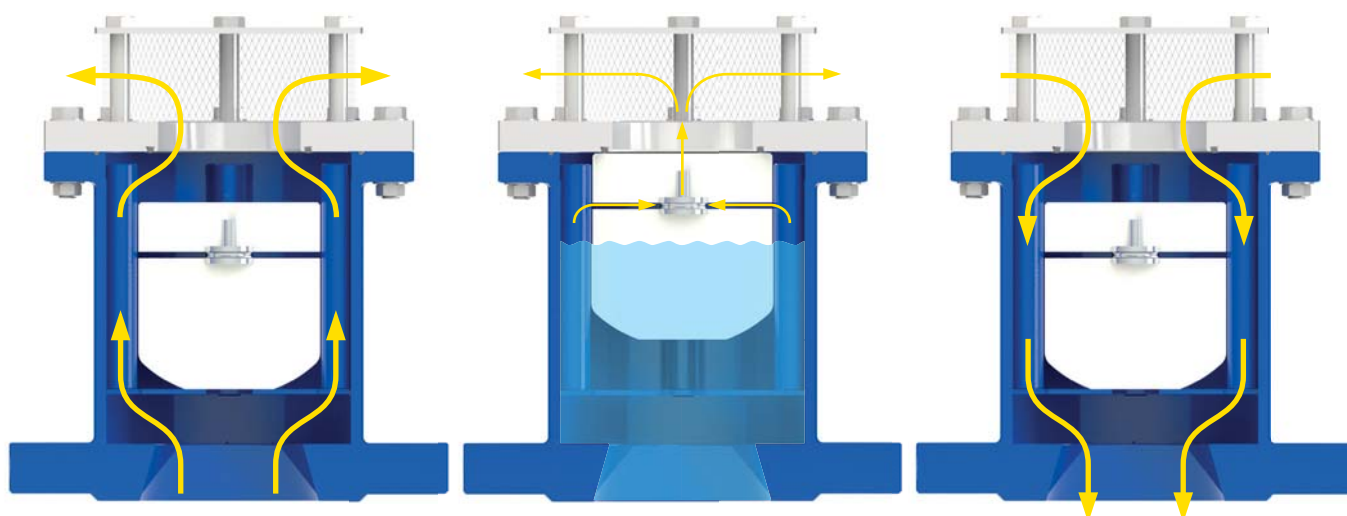
- Body in carbon welded steel, PN 64 bar rated, provided with internal spacers for consistent and accurate guiding of the mobile block.
- In general supplied with fixed flanges according to EN 1092/2 or different standards on request.
- Mobile block composed of a cylindrical float and upper disk in solid polypropylene, joined together by the CSA air release system in AISI 316 (patent pending). The solid cylindrical floats, obtained by CNC machining, avoid deformations and ensure a great sliding precision inside the body processed ribs and a perfectly vertical thrust.
- The nozzle and the gasket holder, part of CSA air release system, are entirely made in AISI 316 and designed with gasket compression control to prevent aging process and consequent leakage during working conditions.
- Maintenance can be easily performed from the top, without removing the air valve from the pipe.
- Mesh and cap in stainless steel.

### Applications

- Main transmission lines.
- Mining.
- Dams and high pressure systems.
- In general this model is used on changes in slope descending and at the high points of the pipeline for those locations exposed to high pressure conditions.



## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The FOX 3F HP, thanks to an aerodynamic deflector, will make sure to avoid premature closures of the mobile block during this phase.

### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.

### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

## Optional



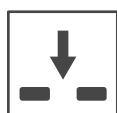
■ **Vacuum breaker version Mod. FOX 2F HP** to allow the entrance and discharge of large volumes of air only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the air release won't be required.



■ **Version for submerged applications, SUB series**, available both for FOX 3F HP and 2F HP Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying spurts coming from the rapid closure of the air valve.



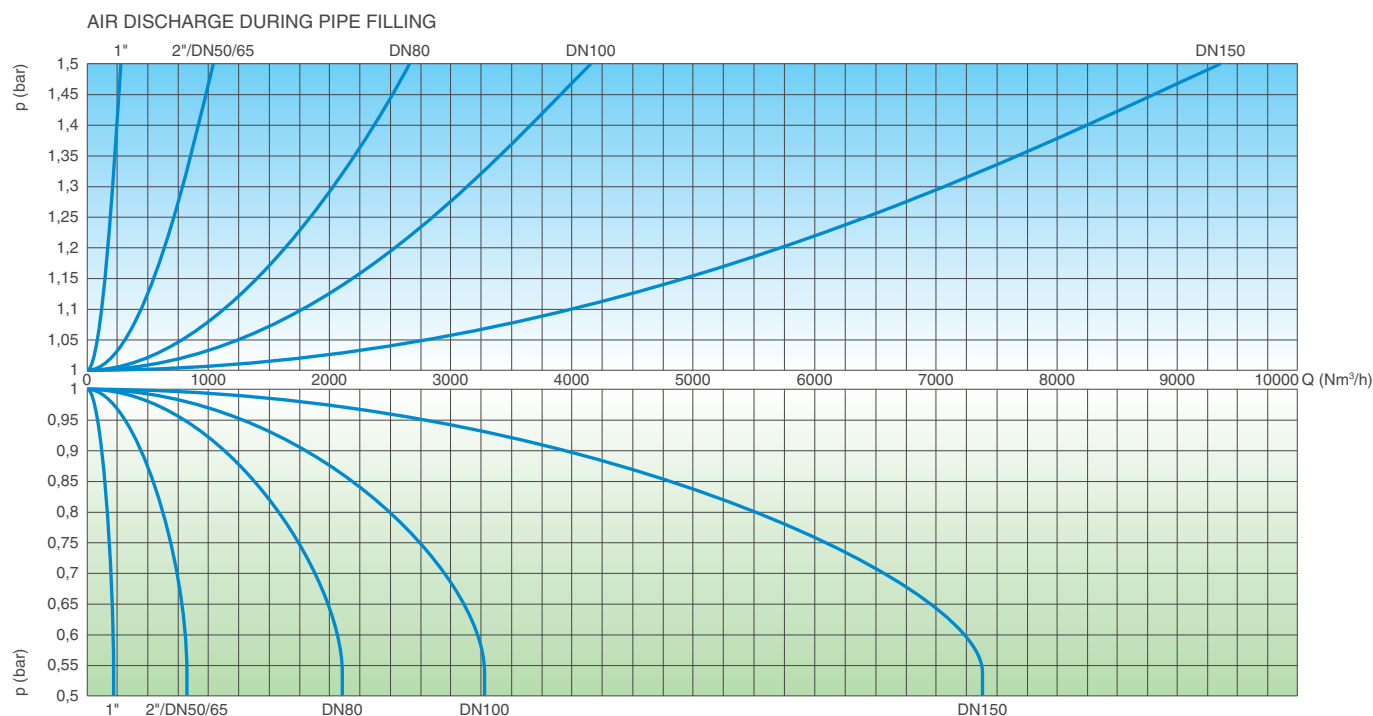
■ **Version for air discharge only EO series**, available both for FOX 3F HP and 2F HP models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided.



■ **Version for air entrance only IO series**, available for FOX 2F HP model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

### Air flow performance charts



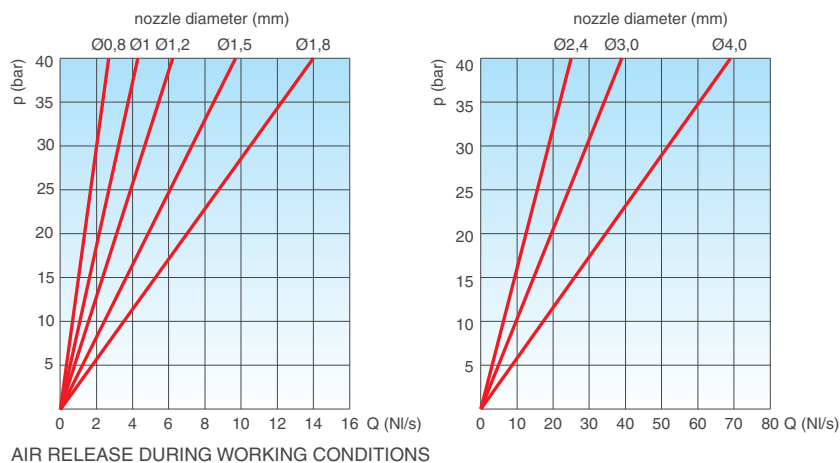
The air flow charts were created in Kg/s from laboratory tests and numerical analysis without the screen, then converted in Nm<sup>3</sup>/h using a safety factor.

### Working conditions

Treated water max. 60° C. Version for high temperature available on request.  
Maximum pressure 64 bar.  
Minimum press. 0,2 bar. Lower on request.

### Standard

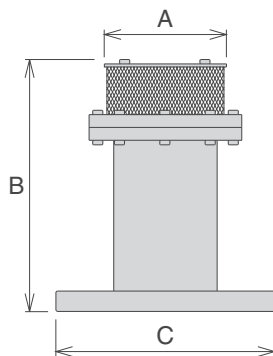
Designed in compliance with EN-1074/4.  
Flanges according to EN 1092/2, ANSI.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Other flanges or painting on request.



### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm	Weight Kg
Threaded 1"	165	240	180	4,2
Threaded 2"	165	240	180	5,0
Flanged 50	165	240	180	6,0
Flanged 65	185	240	180	6,0
Flanged 80	200	265	205	9,2
Flanged 100	235	334	205	13,0
Flanged 150	300	380	250	35,0

All values are approximate, consult CSA service for more details.

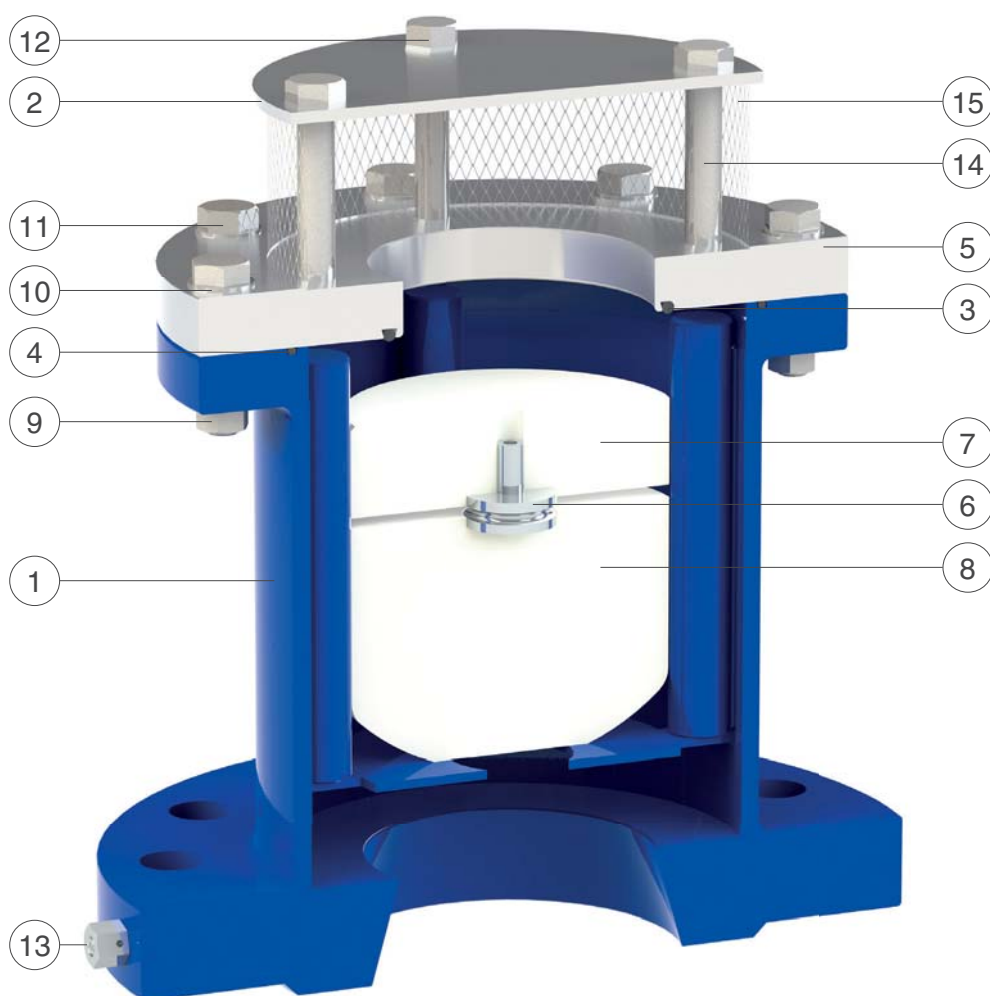


### Nozzle choice

	PN 10	PN 16	PN 25	PN 40	PN 64
1"	1,2	1,2	1	0,8	0,8
2"/DN 50/65	1,5	1,2	1	0,8	0,8
DN 80	1,8	1,5	1,2	1	0,8
DN 100	2,4	1,8	1,8	1,2	1
DN 150	4	3	2,4	1,8	1,2

Nozzle diameter in mm according to the size of the air valve and the PN.

## Technical details



N.	Component	Standard material	Optional
1	Body	painted steel	
2	Cap	stainless steel AISI 304	stainless steel AISI 316
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 304	stainless steel AISI 316
6	Nozzle Subset	stainless steel AISI 316	
7	Upper flat	polypropylene	
8	Float	polypropylene	
9	Nut	stainless steel AISI 304	stainless steel AISI 316
10	Washers	stainless steel AISI 304	stainless steel AISI 316
11	Screws	stainless steel AISI 304	stainless steel AISI 316
12	Screws	stainless steel AISI 304	stainless steel AISI 316
13	Drain valve	stainless steel AISI 303	stainless steel AISI 316
14	Spacers	stainless steel AISI 304	stainless steel AISI 316
15	Screen	stainless steel AISI 304	

The list of materials and components is subject to changes without notice.



## Anti-shock combination air valve for high pressure - Mod. FOX 3F - AS - HP

The CSA surge prevention automatic air release valve Mod. FOX 3F AS HP will allow the release of air pockets during working conditions, the entrance of large volumes of air during draining operations and pipeline bursts and the air discharge with controlled speed, to prevent water hammer.



### Technical features and benefits

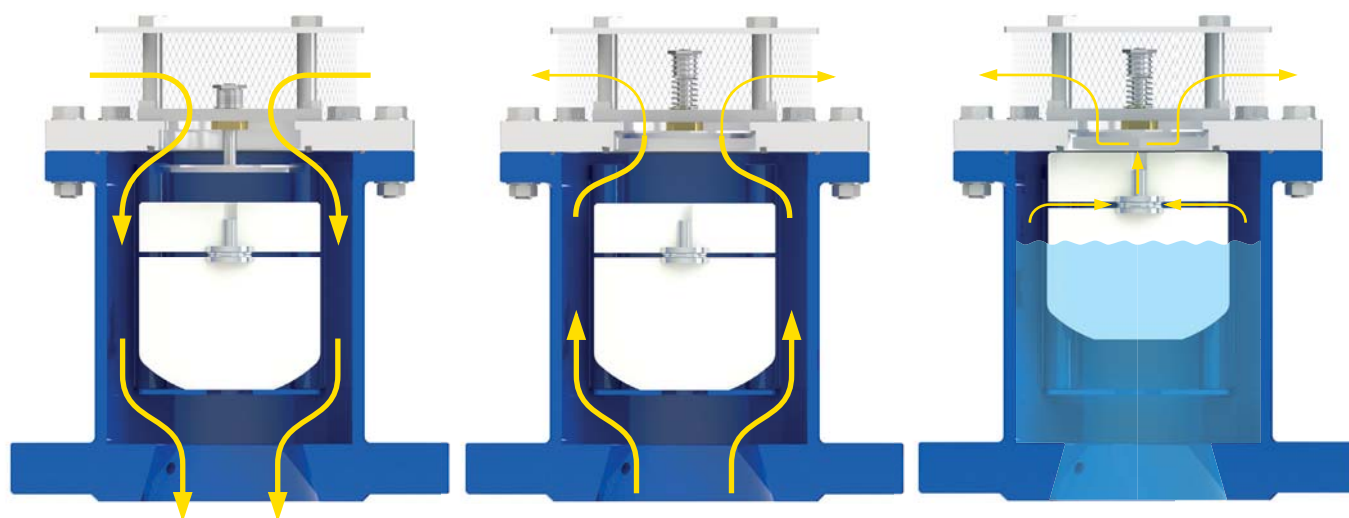
- Body in carbon welded steel, PN 64 bar rated, provided with internal spacers for consistent and accurate guiding of the mobile block.
- In general supplied with fixed flanges according to EN 1092/2 or different standards on request.
- Mobile block composed of a cylindrical float and upper disk in solid polypropylene, joined together by the CSA air release system in AISI 316 (patent pending). The solid cylindrical floats, obtained by CNC machining only, avoid deformations and ensure a great sliding precision inside the body processed ribs and a perfectly vertical thrust.
- Nozzle and gasket holder, part of CSA air release system, entirely made in AISI 316 and designed with gasket compression control to prevent aging process and consequent leakage during working conditions.
- Maintenance can be easily performed from the top, without removing the air valve from the pipe.
- Anti water hammer system (also called AS function), never in contact with water, obtained by a spring and shaft in stainless steel, disk with adjustable sonic nozzles for air flow control.

### Applications

- Main transmission lines.
- Mining.
- Dams and high pressure systems.
- In general this model is used on pumping stations, changes in slope ascending, and at the critical points of the pipeline subjected to water hammer and column separation.



## Operating principle



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

### Controlled air discharge

During the air discharge it is necessary to avoid rapid closures of the float, responsible of water hammer effects. The FOX 3F AS HP, thanks to the anti-shock feature, will control the air outflow thus reducing the velocity of the approaching water column. The risk of overpressure will therefore be minimized.

### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.

## Optional



■ **Vacuum breaker version Mod. FOX 2F AS HP**, to allow the entrance of large volumes of air and the controlled outflow only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems.



■ **Version for submerged applications, SUB series**, available both for FOX 3F AS HP and 2F AS HP Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying spurts coming from the closure away from the air valve.

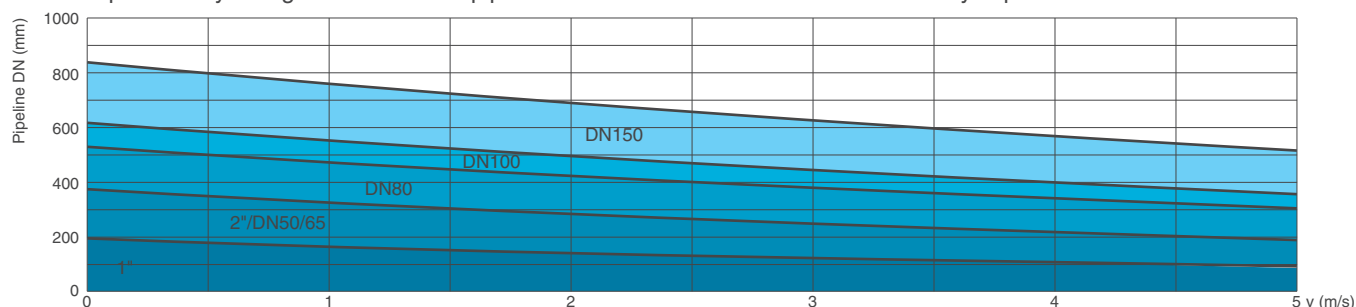


■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be modified on request according to the project conditions and the transient analysis.

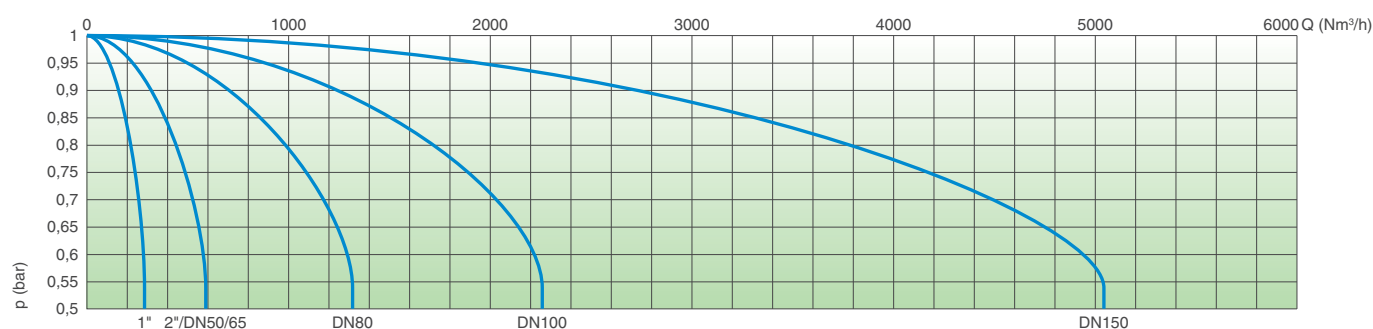
## Technical data

### Air valve selection chart

Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity expressed in m/s.



### Air flow performance chart



AIR ENTRANCE DURING PIPE DRAINING

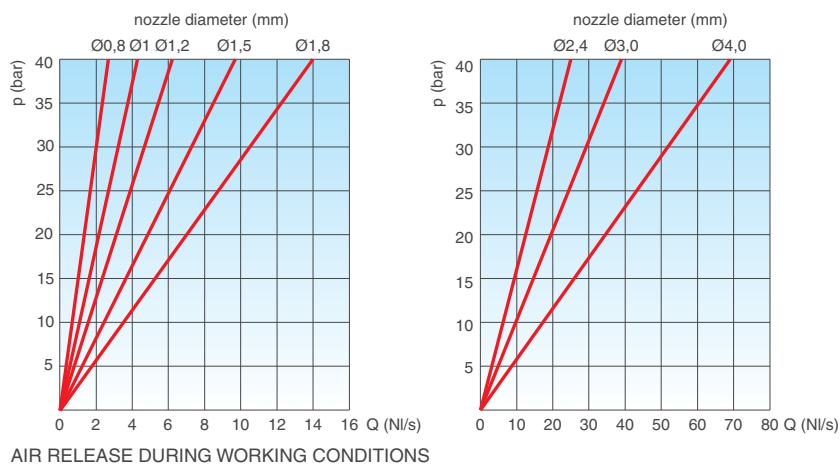
The air flow charts were created in Kg/s from laboratory tests and numerical analysis without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60° C. Version for high temperature available on request.  
Maximum pressure 64 bar.  
Minimum press. 0,2 bar. Lower on request.

### Standard

Designed in compliance with EN-1074/4.  
Flanges according to EN 1092/2, ANSI.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Other flanges or painting on request.

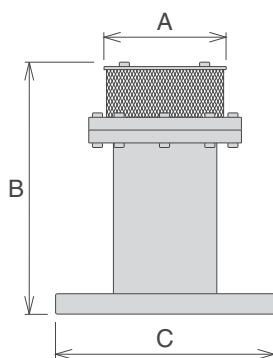


AIR RELEASE DURING WORKING CONDITIONS

### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm	Weight Kg
Threaded 1"	165	240	180	4,2
Threaded 2"	165	240	180	5,0
Flanged 50	165	240	180	6,0
Flanged 65	185	240	180	6,0
Flanged 80	200	265	205	9,2
Flanged 100	235	334	205	13,0
Flanged 150	300	380	250	35,0

All values are approximate, consult CSA service for more details.

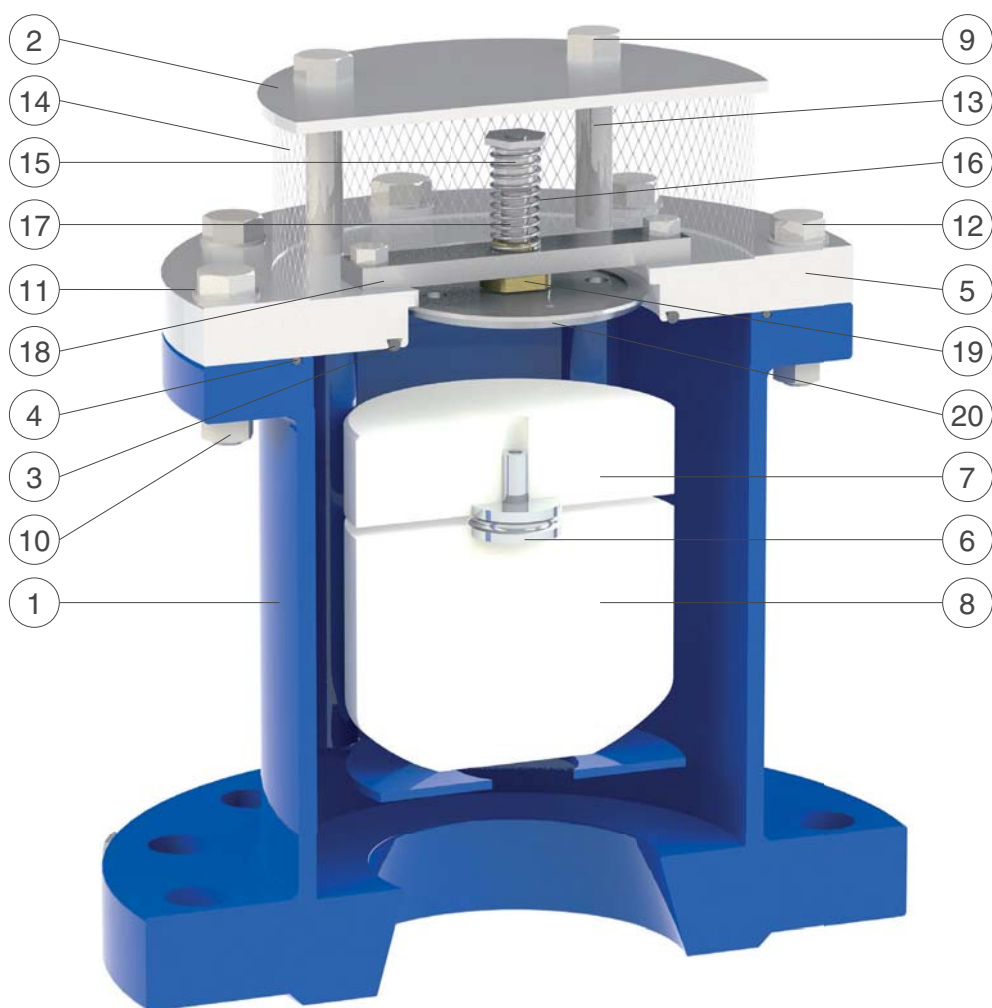


### Nozzle choice

	PN 10	PN 16	PN 25	PN 40	PN 64
1"	1,2	1,2	1	0,8	0,8
2"/DN 50/65	1,5	1,2	1	0,8	0,8
DN 80	1,8	1,5	1,2	1	0,8
DN 100	2,4	1,8	1,8	1,2	1
DN 150	4	3	2,4	1,8	1,2

Nozzle diameter in mm according to the size of the air valve and the PN.

## Technical details



N.	Component	Standard material	Optional
1	Body	painted steel	
2	Cap	stainless steel AISI 304	stainless steel AISI 316
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 304	stainless steel AISI 316
6	Nozzle subset	stainless steel AISI 316	
7	Upper flat	polypropylene	
8	Float	polypropylene	
9	Screws	stainless steel AISI 304	stainless steel AISI 316
10	Nuts	stainless steel AISI 304	stainless steel AISI 316
11	Washer	stainless steel AISI 304	stainless steel AISI 316
12	Screws	stainless steel AISI 304	stainless steel AISI 316
13	Spacers	stainless steel AISI 304	stainless steel AISI 316
14	Screen	stainless steel AISI 304	
15	Spring guide nut	stainless steel AISI 303	stainless steel AISI 316
16	Spring	stainless steel AISI 302	stainless steel AISI 316
17	AS shaft	stainless steel AISI 303	stainless steel AISI 316
18	Support with screws (in DN 150)	stainless steel AISI 304	stainless steel AISI 316
19	Guiding nut (in DN 150)	Delrin (polyoxymethylene)	
20	AS flat	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.



## Air release valve Mod. VENTOLO

The CSA single function, automatic air release valve Ventolo will ensure the proper operation of the system allowing the release of air pockets accumulated during working conditions.



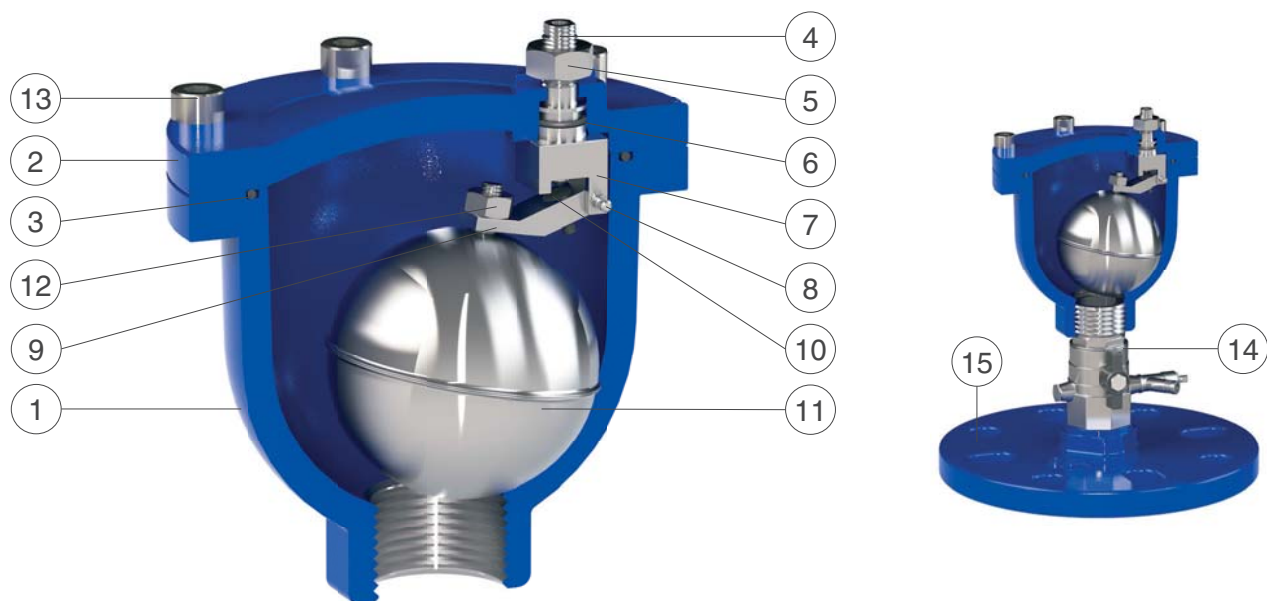
### Technical features and benefits

- Body and cover in ductile cast iron, PN 40 bar rated.
- Float in stainless steel AISI 304 or 316.
- Lever and pivots in AISI 303 or 316.
- Nozzle in stainless steel AISI 303 or 316.
- Compass lever technology to allow large air release capacity through the nozzle.
- Double O-ring to guarantee the perfect water tightness during working conditions.
- Gasket compression control thanks to the adjustable nozzle.
- Nuts and bolts in stainless steel AISI 304 or 316.
- Minimum working pressure 0,1 bar.

### Applications

- Water distribution systems, irrigation, buildings.
- Pumps, control valves and modulating devices.
- In general when the simple air release function is required, it can be combined with CSA kinetic air valves series for large air inflow and outflow requirements.

## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	O-ring	NBR	EPDM/Viton/silicone
4	Nozzle	stainless steel AISI 303	stainless steel AISI 316
5	Nut	stainless steel AISI 304	stainless steel AISI 316
6	O-ring	NBR	EPDM/Viton/silicone
7	Upper lever	stainless steel AISI 303	stainless steel AISI 316
8	Pivot	stainless steel AISI 303	stainless steel AISI 316
9	Lower lever	stainless steel AISI 303	stainless steel AISI 316
10	Nozzle gasket	silicone	
11	Float	stainless steel AISI 304	stainless steel AISI 316
12	Nut	stainless steel AISI 304	stainless steel AISI 316
13	Screw	stainless steel AISI 304	stainless steel AISI 316
14	Ball valve	nickel-plated brass	stainless steel AISI 316
15	Flange	ductile cast iron GJS 500-7 or GJS 450-10	painted steel/AISI304/316

The list of materials and components is subject to changes without notice.

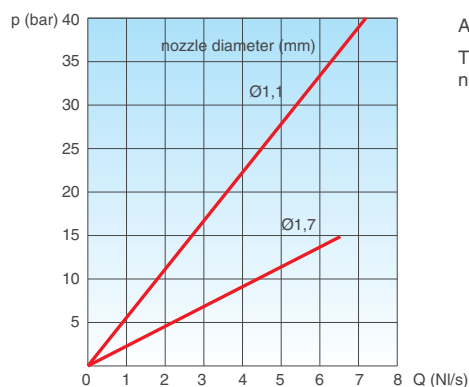
## Working conditions

Treated water max. 60°C.  
Higher temperature on request.  
Max. pressure 40 bar;  
Min. pressure 0,1 bar.

## Standard

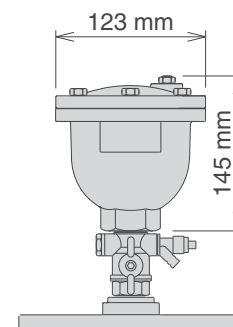
Designed in compliance with EN-1074/4.  
Standard connection 1", flanged on request. Flanges according to EN 1092/2.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes and variations on the flanges and painting details available on request.

## Air flow performance chart



### AIR RELEASE DURING WORKING CONDITIONS

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in NI/s using a safety factor.







## Water combination underground air valve Mod. SATURNO 3F

The SATURNO underground air valve has been designed to provide the proper solution for those locations requiring cost saving, frost protection, installation under roads, pavements, buildings. The air valve will ensure the operation of the pipeline networks allowing the release of air pockets during working conditions, the evacuation and the entrance of large volumes of air during filling and draining operations.



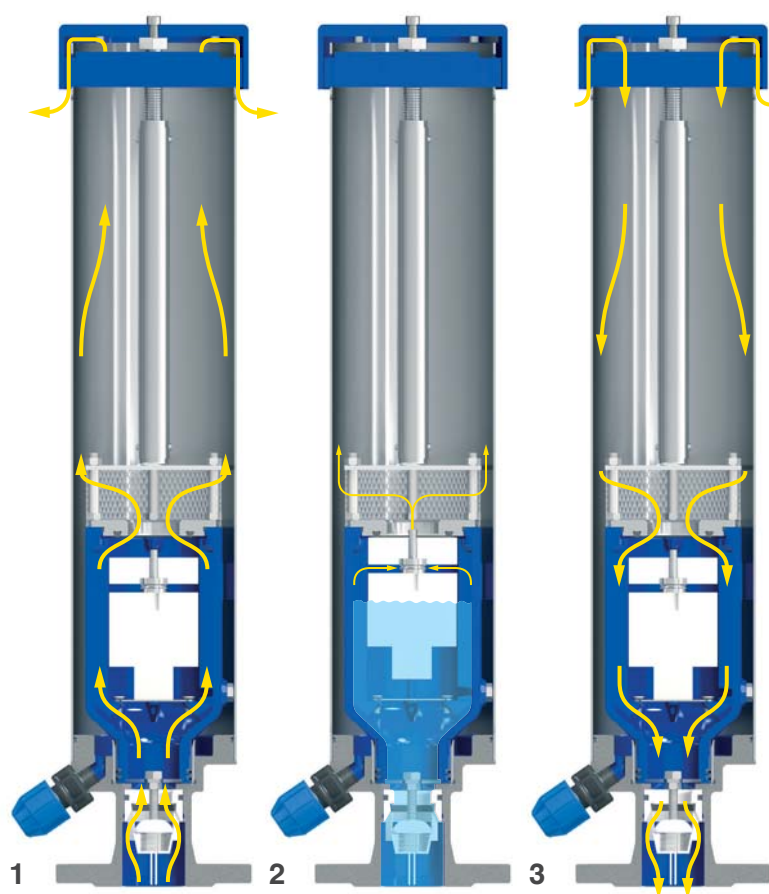
### Technical features and benefits

- SATURNO is designed to provide an alternative solution to conventional air valves installations avoiding chambers, structures, pits and sectioning devices between the air valve and the pipeline.
- Built in check valve for integral shut-off system when removing the air valve for maintenance purposes.
- Stand pipe in stainless steel for the maximum resistance against corrosion and to support the upper maneuvering system.
- Flanged basement to house the check valve and the drain port needed to avoid the accumulation of water inside the standpipe.
- Combination air valve FOX 3F automatically operated by the flow medium, and moving through the upper maneuvering system into a guidance bush with two O-rings for the perfect water tightness.
- Maintenance can be carried out from the top extracting the air valve from the standpipe.

### Applications

- At high points and changes in slope of water distribution networks.
- Pressurized system with treated water.
- In areas exposed to frost, under the roads, buildings.

## Operating principle



### 1. Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The SATURNO, thanks to an aerodynamic body and internal deflector, will make sure to avoid premature closures of the mobile block during this phase.

### 2. Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.

### 3. Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

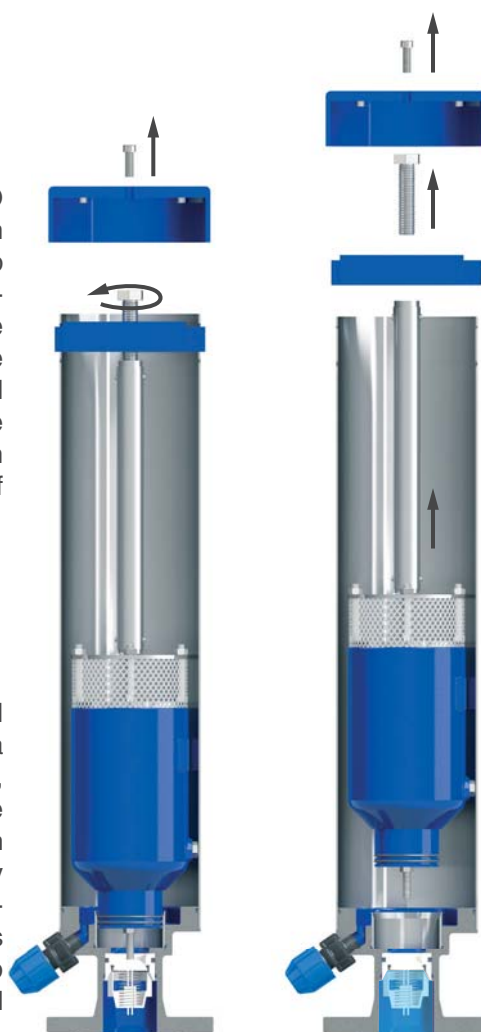


## Installation

The installation of SATURNO simply requires a derivation from the main pipe, a manhole on top to allow for maintenance operations. The picture depicts the proper installation where the drain port plays a fundamental role, allowing for water discharge from the stand pipe. The drain should be located on a layer of gravel or crushed rock.

## Air valve removal

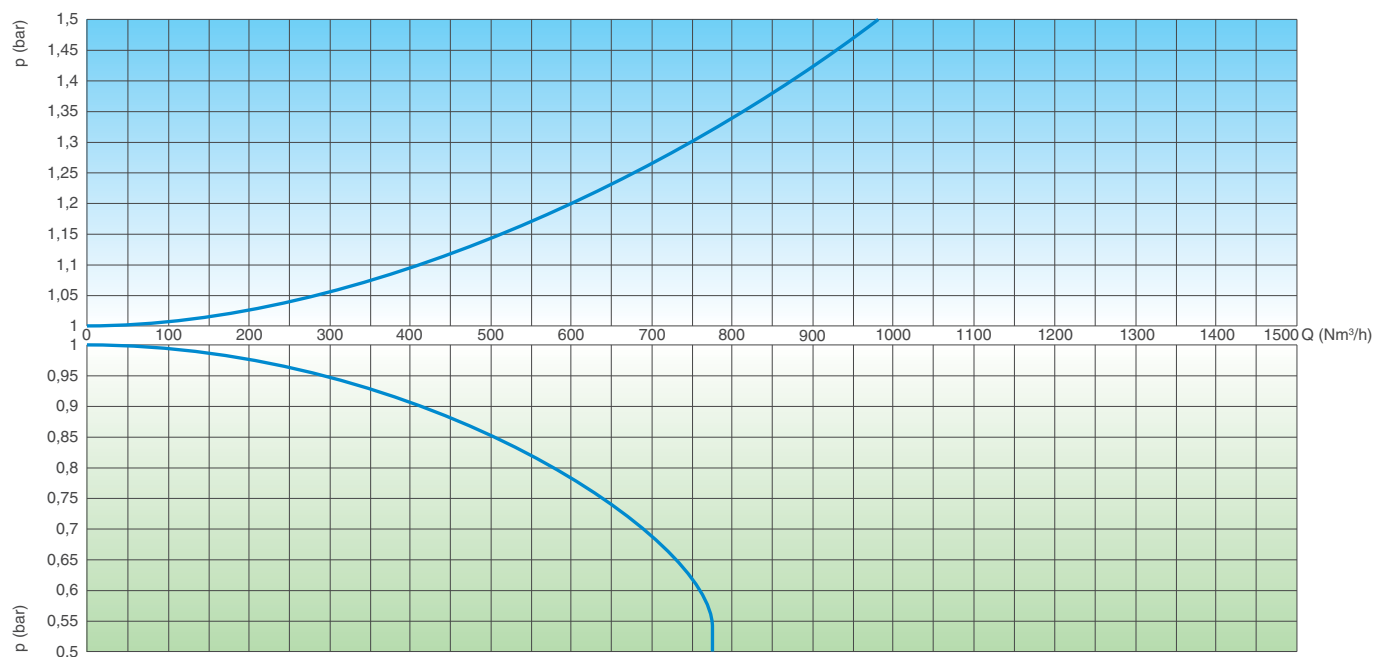
The design of the underground air valve SATURNO allows for a maintenance and replacement, without removing the air valve from the pipe, simply by acting on the cap and maneuvering key from above as shown on the picture on the right. All components will be pulled out from the top without the need of digging, and additional costs.



## Technical data

### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

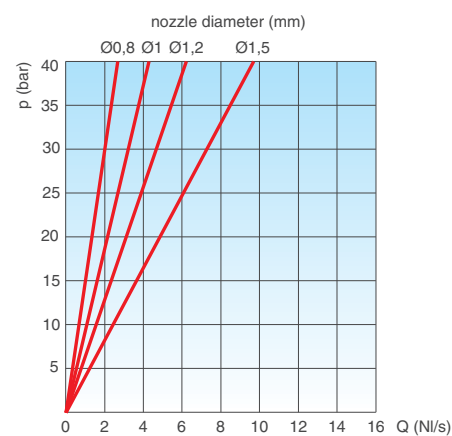
The air flow charts were created in Kg/s from laboratory tests and numerical analysis without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60° C.  
Higher temperatures on request.  
Maximum pressure 16 bar;  
Minimum pressure 0,2 bar. Lower on request.

### Standard

Designed in compliance with EN-1074/4.  
Flanges according to EN 1092/2.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes and variations on the flanges and painting details on request.

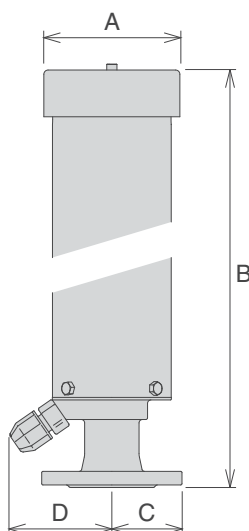


AIR RELEASE DURING WORKING CONDITIONS

### Weights and dimensions

DN mm	A mm	B mm	C mm	D mm	Weight Kg
50	160	750	82,5	120	20,5
	160	1000	82,5	120	23,2
	160	1250	82,5	120	25,3
	160	1500	82,5	120	28,6
80	160	750	100	120	22,0
	160	1000	100	120	24,7
	160	1250	100	120	26,8
	160	1500	100	120	30,1

All values are approximate, consult CSA service for more details.

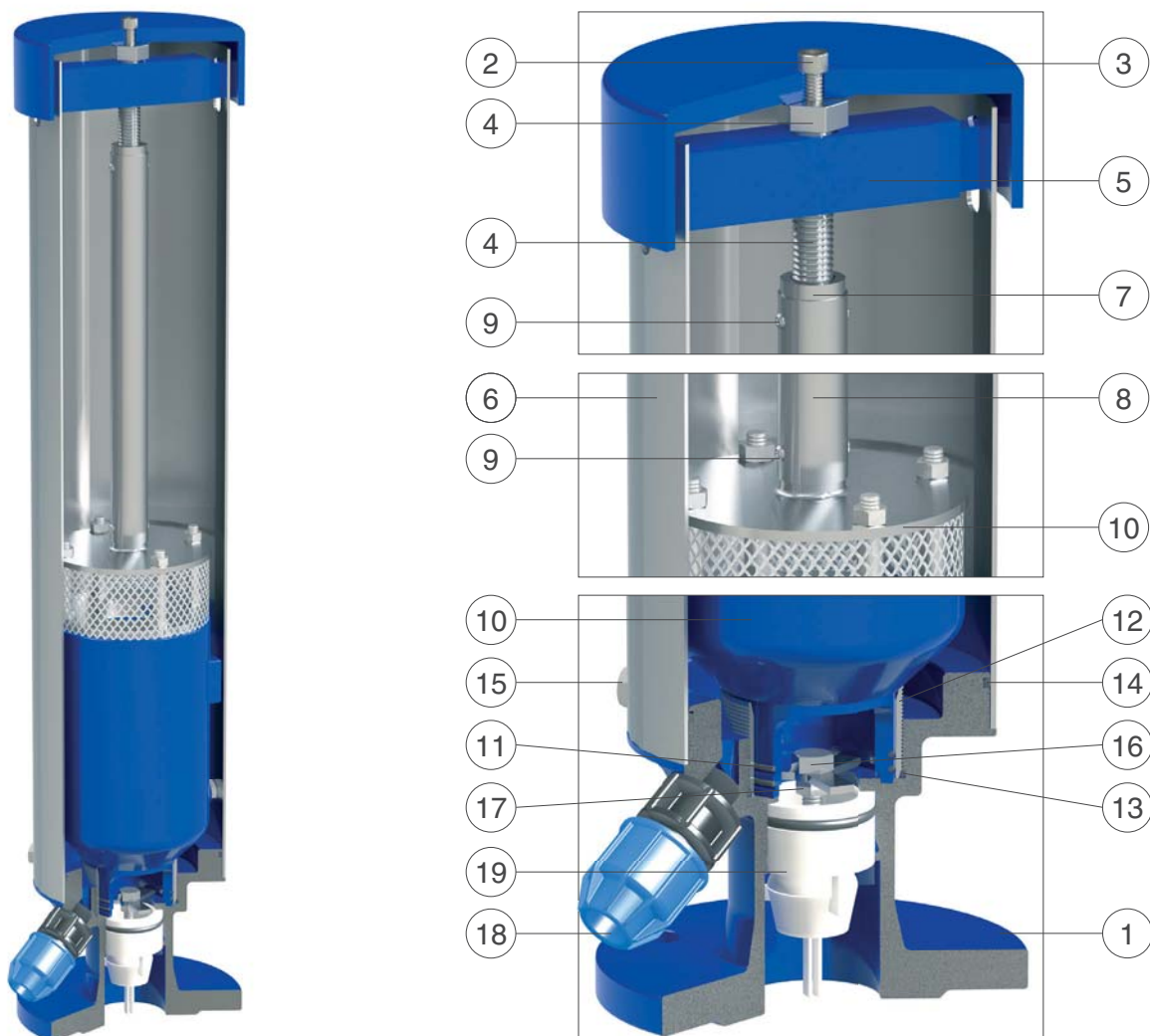


### Nozzle choice

Nozzle diameter in mm according to the PN of the air valve.

PN 10	PN 16	PN 25	PN 40
1,5	1,2	1	0,8

## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Screw	stainless steel AISI 304	stainless steel AISI 316
3	Cap	painted aluminium S11	
4	Driving screw	stainless steel AISI 304	
5	Guiding plate	painted steel	
6	Stand pipe	stainless steel AISI 304	
7	Screw housing	stainless steel AISI 303	
8	Maneuvering pipe	stainless steel AISI 304	
9	Plug	stainless steel AISI 304	
10	FOX 2"	in different executions (see FOX technical details)	
11	O-ring	NBR	EPDM/Viton/silicone
12	Threaded sleeve	stainless steel AISI 304	
13	O-ring	NBR	EPDM/Viton/silicone
14	O-ring	NBR	EPDM/Viton/silicone
15	Screws	stainless steel AISI 304	stainless steel AISI 316
16	Opening screw	stainless steel AISI 304	stainless steel AISI 316
17	Locking nut	stainless steel AISI 304	stainless steel AISI 316
18	Drainage	polypropylene	
19	Check valve	Delrin (polyoxymethylene)	

The list of materials and components is subject to changes without notice.



## Anti-surge water combination underground air valve - Mod. SATURNO 3F - RFP

The SATURNO underground air valve has been designed to provide the proper solution for those locations requiring cost saving, frost protection, installation under roads, pavements, buildings. The air valve will ensure the operation of the pipeline networks allowing the release of air pockets during working conditions, the entrance of large volumes of air during draining operations and the controlled air discharge to avoid water hammer events.



### Technical features and benefits

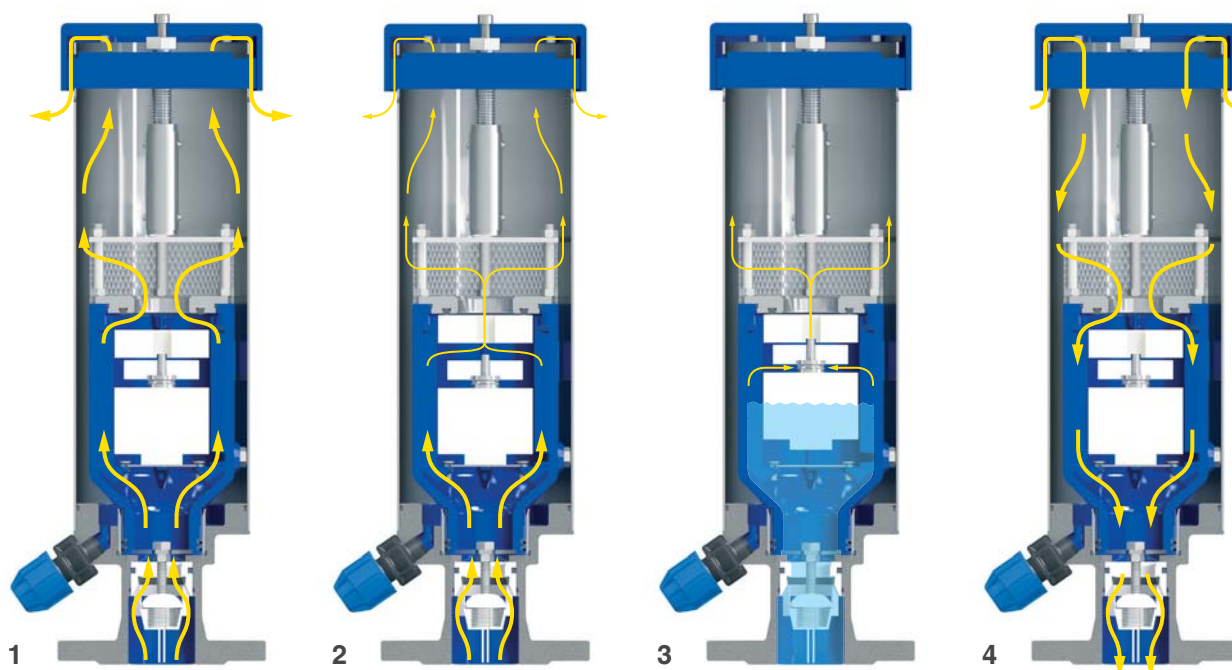
- SATURNO is designed to provide an alternative solution to conventional air valves installations avoiding chambers, structures, pits and sectioning devices between the air valve and the pipeline.
- Built in check valve for integral shut-off system when removing the air valve for maintenance purposes.
- Stand pipe in stainless steel for the maximum resistance against corrosion and to support the upper maneuvering system.
- Flanged basement to house the check valve and the drain port needed to avoid the accumulation of water inside the standpipe.
- Surge prevention combination air valve FOX 3F RFP automatically operated by the flow medium, and moving through the upper maneuvering system into a guidance bush with two O-rings for water tightness.
- Maintenance can be carried out from the top extracting the air valve from the standpipe.

### Applications

- At high points and changes in slope of water distribution networks.
- Pressurized system with treated water.
- In areas exposed to frost, under the roads, buildings.



## Operating principle



### 1. Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The air valve, thanks to the aerodynamic body and deflector, will make sure to avoid premature closures of the mobile block during this phase.

### 2. Controlled outflow

If the differential pressure of air, during pipe filling, increases above a certain value without control there is the risk of water hammer and damages to the system. Should that happen the RFP upper float will rise automatically, reducing the outflow and consequently the velocity of the approaching water column.

### 3. Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives at water pressure, therefore its volume increases pushing the water level downwards allowing the air release.

### 4. Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.



## Installation

The installation of SATURNO simply requires a derivation from the main pipe, a manhole on top to allow for maintenance operations. The picture depicts the proper installation where the drain port plays a fundamental role, allowing for water discharge from the stand pipe. The drain should be located on a layer of gravel or crushed rock.

## Air valve removal

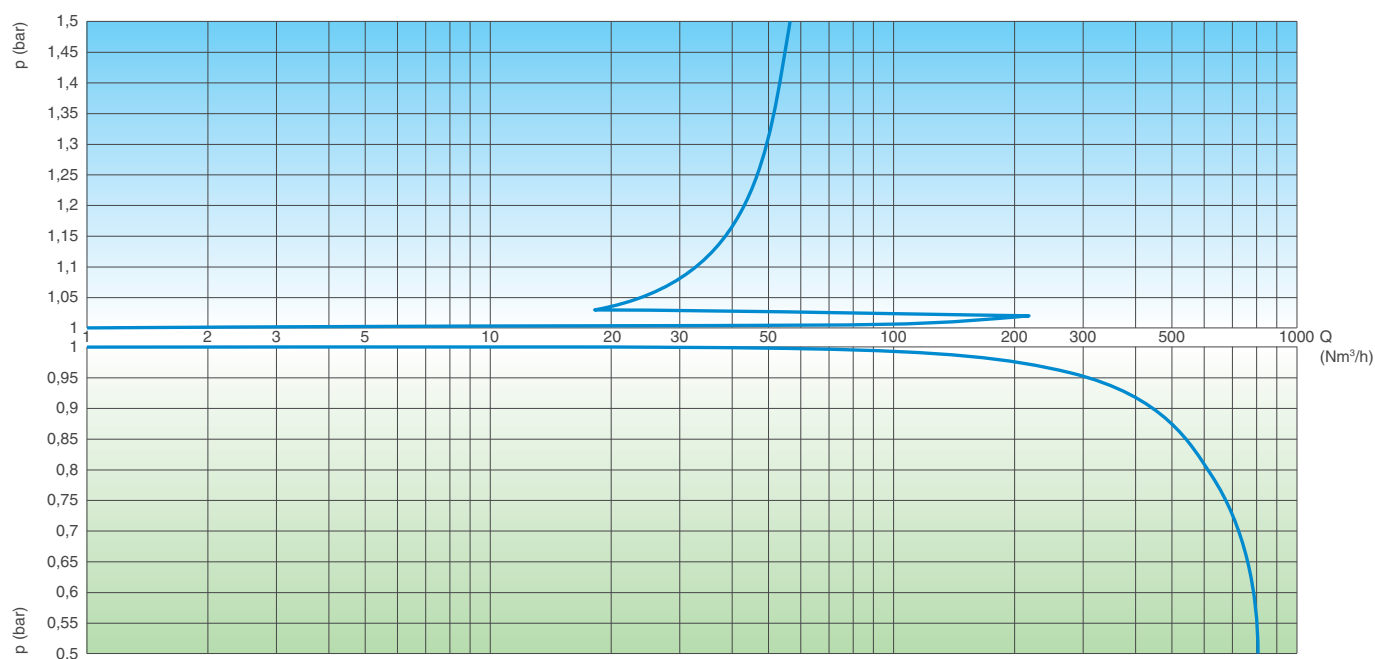
The design of the underground air valve SATURNO allows for a maintenance and replacement, without removing the air valve from the pipe, simply by acting on the cap and maneuvering key from above as shown on the picture on the right. All components will be pulled out from the top without the need of digging, and additional costs.



## Technical data

### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

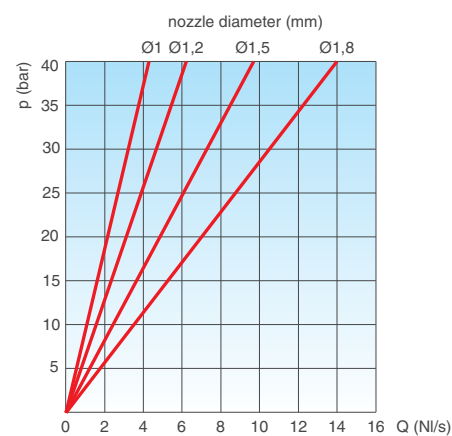
The air flow charts were created in Kg/s from laboratory tests and numerical analysis without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60° C.  
Higher temperatures on request.  
Maximum pressure 16 bar;  
Minimum pressure 0,2 bar. Lower on request.

### Standard

Designed in compliance with EN-1074/4.  
Flanges according to EN 1092/2.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes and variations on the flanges and painting details on request.

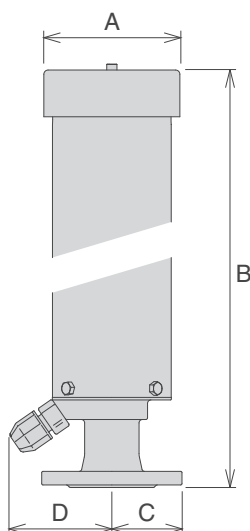


AIR RELEASE DURING WORKING CONDITIONS

### Weights and dimensions

DN mm	A mm	B mm	C mm	D mm	Weight Kg
50	160	750	82,5	120	20,5
	160	1000	82,5	120	23,2
	160	1250	82,5	120	25,3
	160	1500	82,5	120	28,6
80	160	750	100	120	22,0
	160	1000	100	120	24,7
	160	1250	100	120	26,8
	160	1500	100	120	30,1

All values are approximate, consult CSA service for more details.

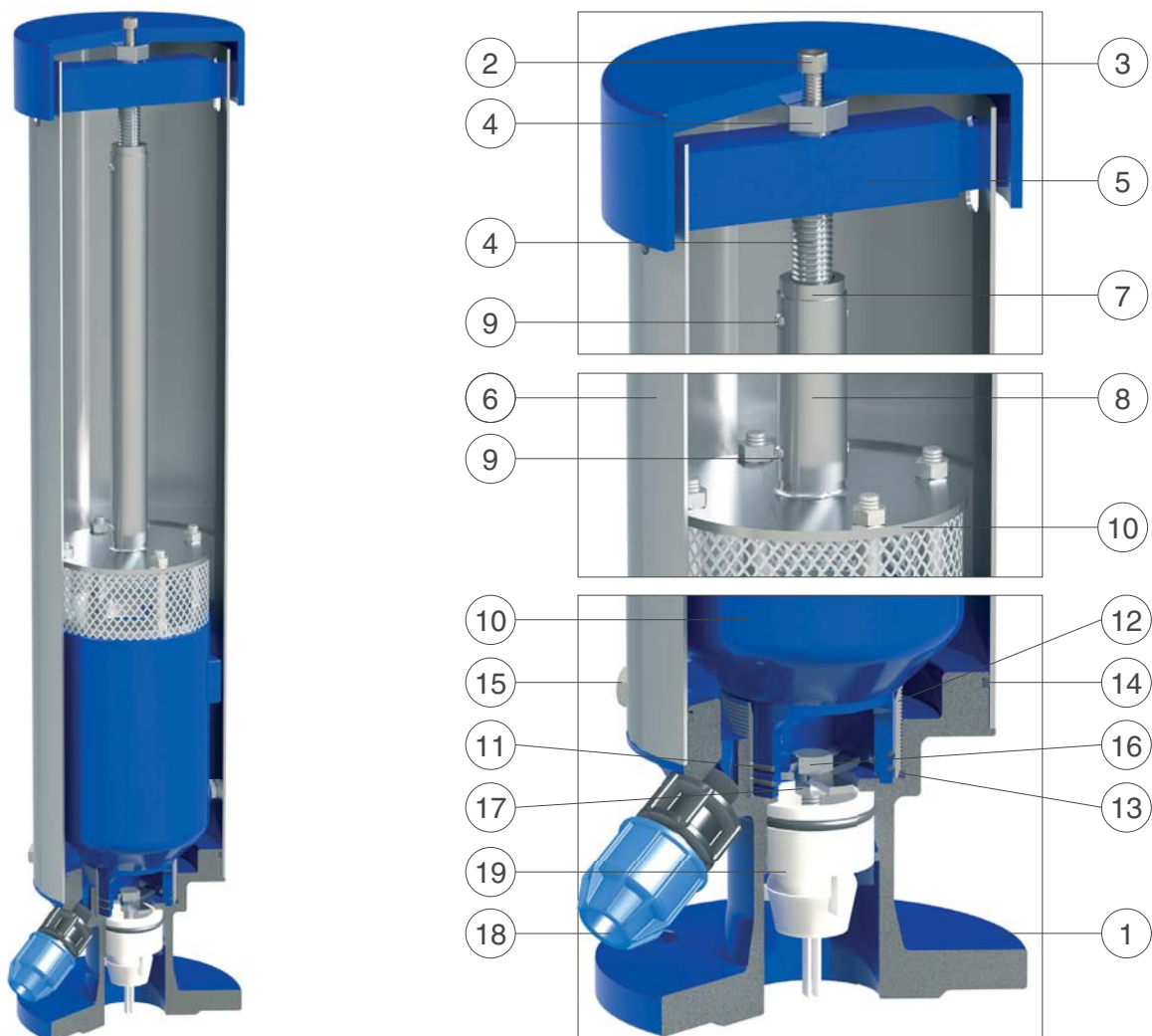


### Nozzle choice

Nozzle diameter in mm according to the PN of the air valve.

PN 10	PN 16	PN 25	PN 40
1,8	1,5	1,2	1

## Technical details



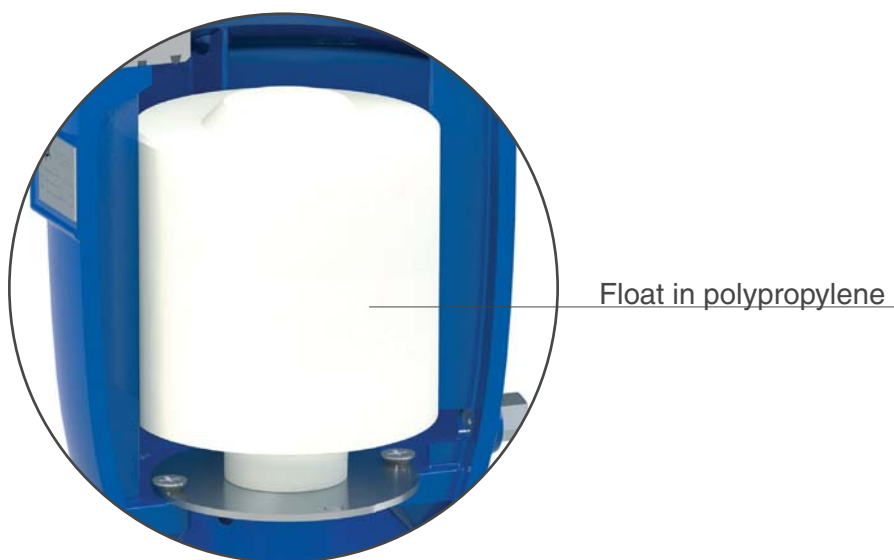
N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Screw	stainless steel AISI 304	stainless steel AISI 316
3	Cap	painted aluminium S11	
4	Driving screw	stainless steel AISI 304	
5	Guiding plate	painted steel	
6	Stand pipe	stainless steel AISI 304	
7	Screw housing	stainless steel AISI 303	
8	Maneuvering pipe	stainless steel AISI 304	
9	Plug	stainless steel AISI 304	
10	FOX 2"	in different executions (see FOX technical details)	
11	O-ring	NBR	EPDM/Viton/silicone
12	Threaded sleeve	stainless steel AISI 304	
13	O-ring	NBR	EPDM/Viton/silicone
14	O-ring	NBR	EPDM/Viton/silicone
15	Screws	stainless steel AISI 304	stainless steel AISI 316
16	Opening screw	stainless steel AISI 304	stainless steel AISI 316
17	Locking nut	stainless steel AISI 304	stainless steel AISI 316
18	Drainage	polypropylene	
19	Check valve	Delrin (polyoxymethylene)	

The list of materials and components is subject to changes without notice.



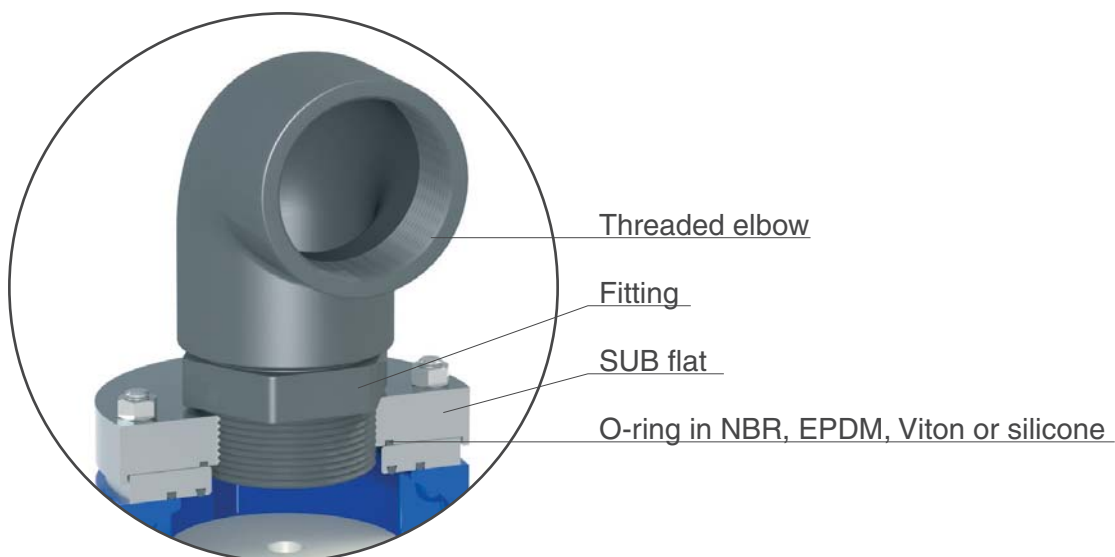
## FOX/LYNX air valves range vacuum breaker version

Designed to allow the discharge and entrance of large volumes of air during pipe filling and draining /bursts, this version is usually recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the air release won't be required.



## FOX/LYNX conveyance system bias kit - Mod. SUB

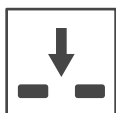
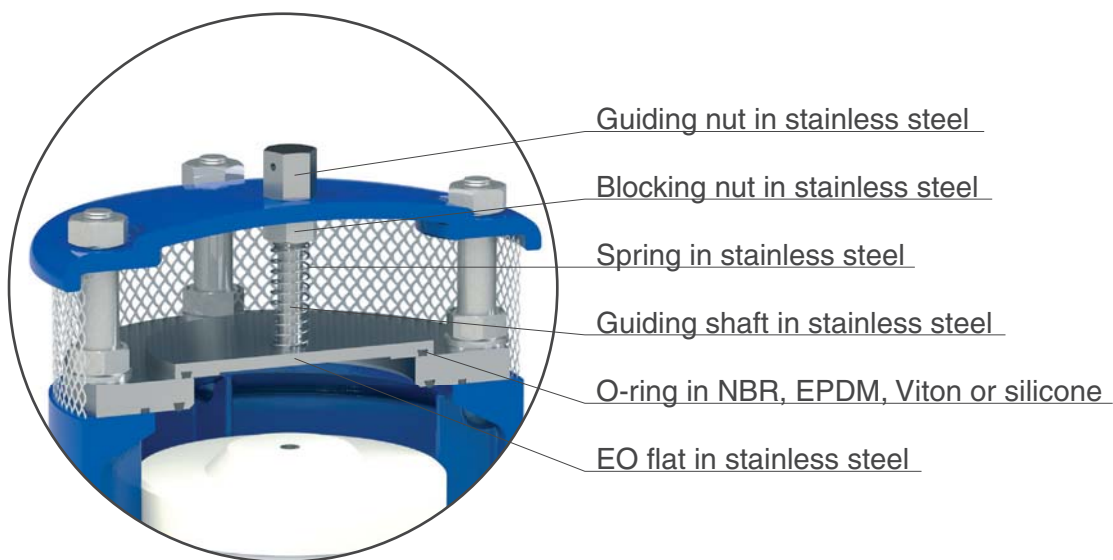
The air conveyance system SUB, provided with watertight threaded elbow for air conveyance and submerged applications, has been created to be retrofitted on existing CSA FOX air valves or as a standalone version. Another benefit of SUB is to convey spurts coming from the rapid closure of the air valve. The SUB kit is produced in plastic, different materials are available on request.





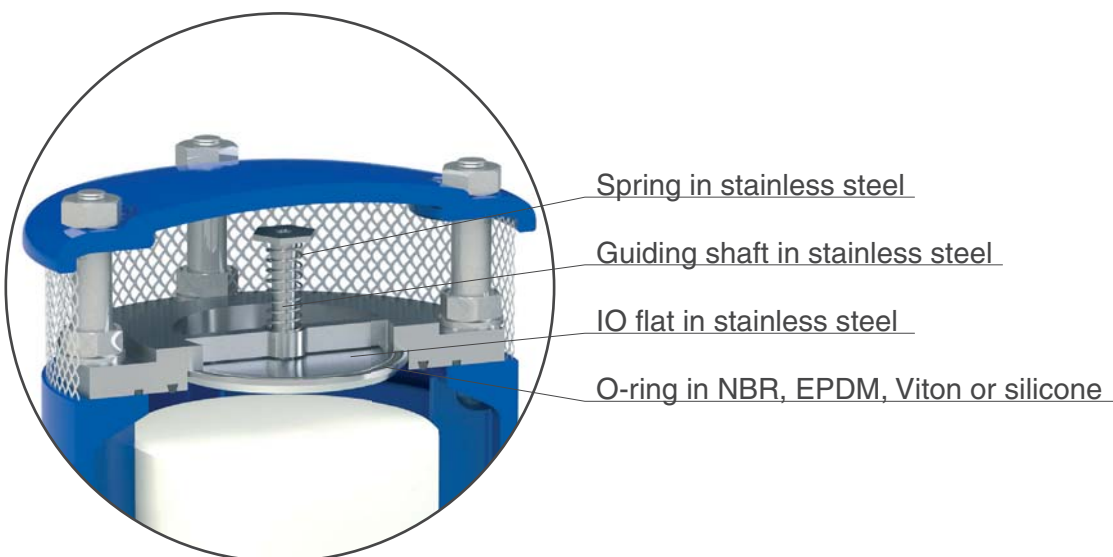
## FOX/LYNX air valves range discharge only bias kit EO

The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and whenever for project requirements air entrance must be avoided.



## FOX/LYNX air valves range entrance only bias kit IO

The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.







## Combination air valve Mod. ARGO

The CSA combination, triple function, automatic air valve Mod. ARGO, for irrigation and treated water applications, will ensure the proper operation allowing the release of air pockets during working conditions and the evacuation and entrance of large volumes of air during filling and draining operations.



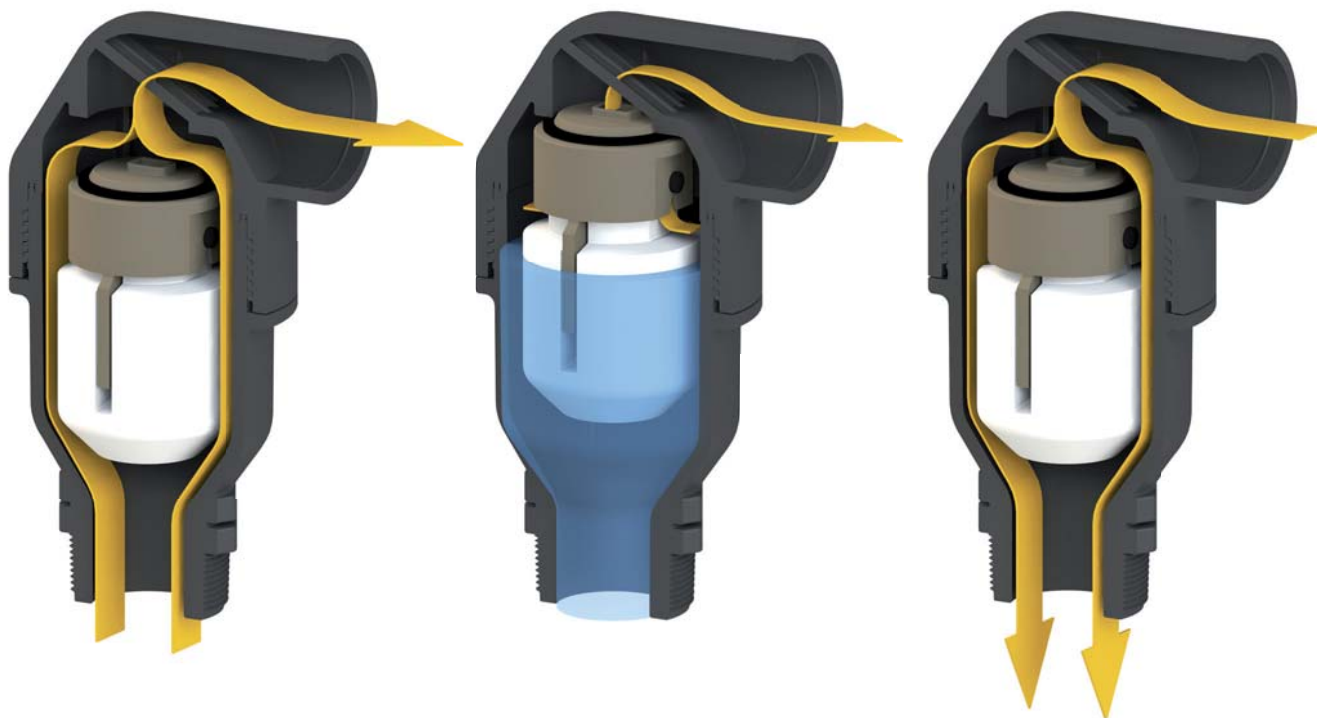
### Technical features and benefits

- Single chamber body PN 16 bar rated, provided with internal ribs for accurate guiding of the float.
- The aerodynamic full bore body prevents premature closures of the mobile block also at high velocity air intake and discharge.
- Available with bias kits for air discharge only, entrance only and anti-shock feature.
- Drainage valve for chamber control and pressure relief during maintenance available on request.
- Maintenance can be easily performed from the top, without removing the air valve from the pipe.
- Compact and reliable structure whose parts are fully corrosion, chemical resistant. Lower maintenance.
- Designed in compliance with EN 1074/4 standard.
- Approved for potable water use.
- Factory approval and quality control following ISO 9001:2008.

### Applications

- Main irrigation networks.
- Water distribution networks.
- Cooling systems, process and industrial plants.
- In general this model is used on changes in slope and at the high points of the pipeline.

## Operating principle - ARGO 3F



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The air valve ARGO 3F, thanks to the aerodynamic full port body and float, will make sure to avoid premature closures of the mobile block during this phase.

### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the automatic orifice.

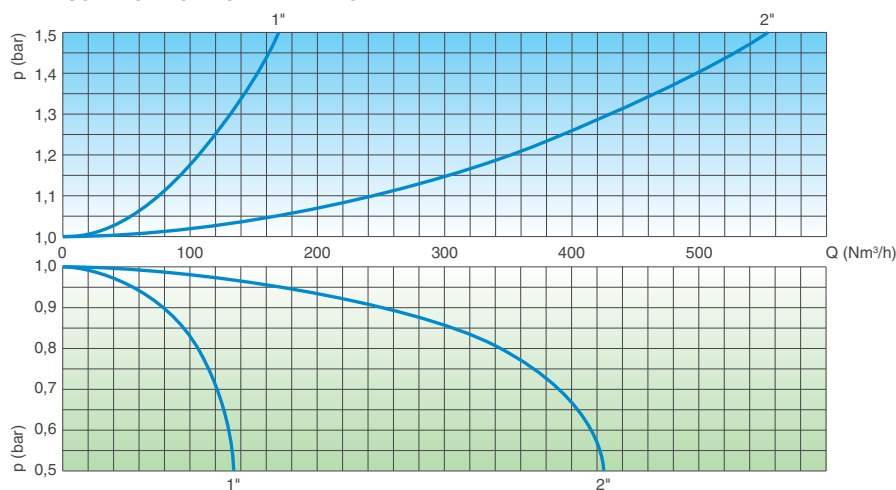
### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

## Technical data - ARGO 3F

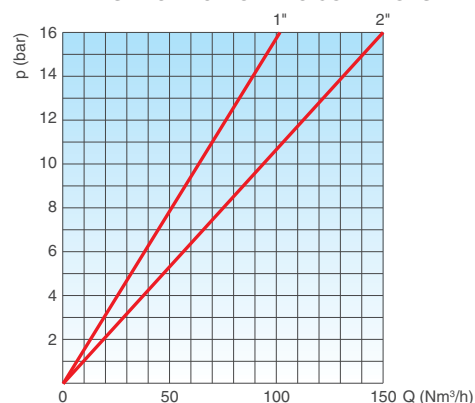
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

AIR RELEASE DURING WORKING CONDITIONS



The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm<sup>3</sup>/h using a safety factor.

## Operating principle - ARGO 3F AS



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

### Controlled air discharge

During the air discharge it is necessary to avoid rapid closures of the float, responsible of water hammer effects. The anti-shock device will control the air outflow reducing the velocity of the approaching water column and minimizing the risk of overpressure.

### Air release during working conditions

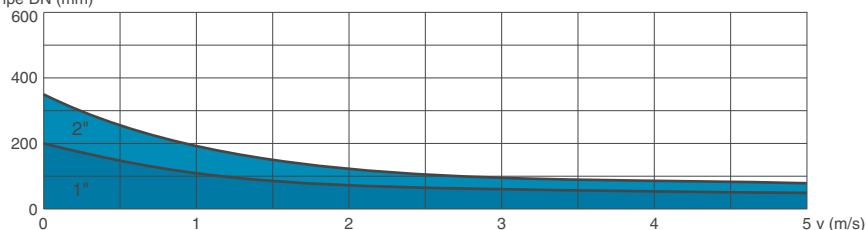
During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the automatic orifice.

## Technical data - ARGO 3F AS

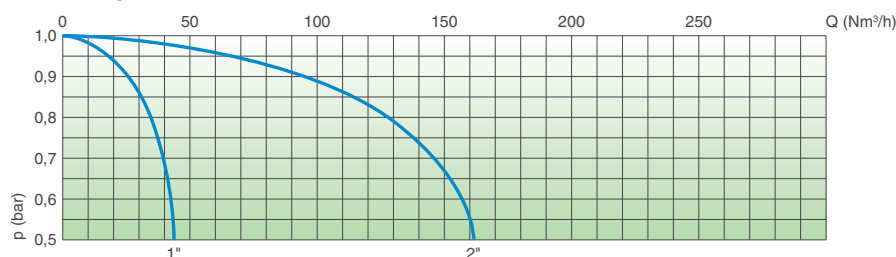
### Air valve selection chart

Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity in m/s.

Pipe DN (mm)

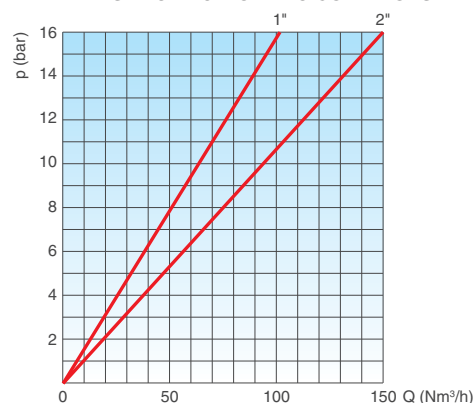


### Air flow performance charts



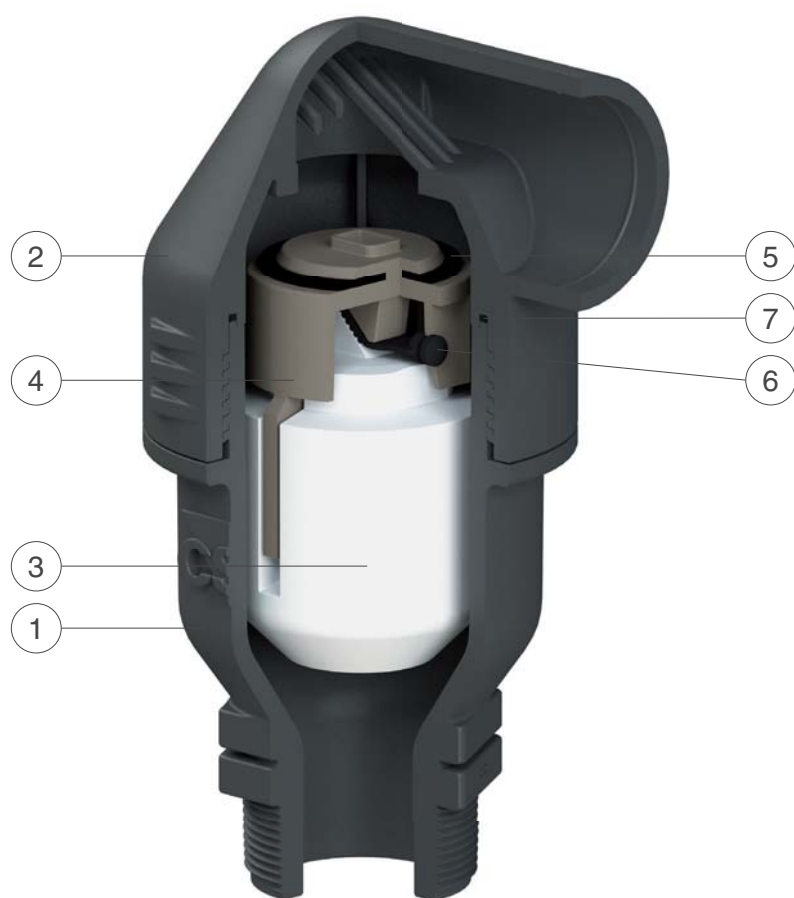
AIR ENTRANCE DURING PIPE DRAINING

### AIR RELEASE DURING WORKING CONDITIONS



The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm³/h using a safety factor.

## Technical details



AS/IO device in polypropylene with threaded connection 2".



EO device in polypropylene with threaded connection 2".

N.	Component	Material	Features
1	Body	glass reinforced polypropylene	provided with ribs for accurate guiding
2	Cap	glass reinforced polypropylene	provided with protection grid
3	Float	polypropylene	solid and resistant to high pressure
4	Kinetic plug	glass reinforced polypropylene	with high air release capacity
5	Kinetic orifice seal	EPDM	
6	Automatic orifice seal	EPDM	
7	O-ring	EPDM	

The list of materials and components is subject to changes without notice.

### Working conditions

Treated water max. 60°C.  
Max. pressure 16 bar.  
Min. pressure 0,3 bar;  
lower on request.

### Valve selection

Body material: glass-reinforced PP.  
Inlet size: DN 25, DN 50 (1", 2").  
Connections: threaded male BSPT or NPT.  
Certified in compliance with EN-1074/4.

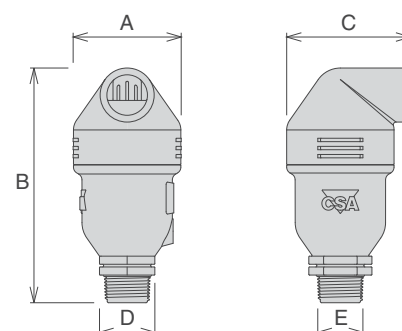
### Nozzle specification

air valve size	kinetic orifice		autom. or.
	d (mm)	A (mm <sup>2</sup> )	A (mm <sup>2</sup> )
1"	21	346	5
2"	45	1590	12

### Weights and dimensions

CONNECTION (E) inch	A mm	B mm	C mm	D mm	Weight Kg
Threaded 1"	80	167	92	CH 41	0,3
Threaded 2"	110	226	135	CH 65	0,75

All values are approximate, consult CSA service for more details.







## Wastewater air valves



### ■ Wastewater combination air valve Mod. SCF

The model allows air release in working conditions, and the entrance and the discharge of large volumes of air during pipe draining and filling.

62



### ■ Wastewater anti-shock combination air valve Mod. SCF - AS

The model guarantees air release in working conditions, the entrance of large quantities of air and the controlled discharge to avoid water hammer events.

66



### ■ Wastewater combination air valve with anti-surge mechanism Mod. SCF - RFP

The model guarantees air release in working conditions, the entrance of large quantities of air and a controlled outflow speed to avoid water hammer events.

70



### ■ Wastewater combination air valve Mod. SCF 2"

Model with threaded connection 2". It allows air release and the entrance and the discharge of air during pipe draining and filling.

74



### ■ Wastewater anti-shock combination air valve Mod. SCA 2"

Model with threaded connection 2". It allows air release, the entrance of air and the controlled discharge to avoid water hammer events.

78



### ■ Wastewater high capacity air release valve Mod. SCF RO

Model for the release of large quantity of air during working conditions only.

82

■ Version for submerged applications SUB series

84

■ Version for air discharge only SCF - EO series

86

■ Version for air entrance only SCF - IO series

86

Wastewater pumping station installation layout

87



## Wastewater combination air valve Mod. SCF

SCF air valve guarantees the proper operation of sewage lines allowing the entrance and the discharge of large volumes of air, during pipe draining and filling operations, and the release of air pockets during working conditions.



### Technical features and benefits

- Large lower body designed with strongly sloped funnel shaped walls to avoid deposit of grease or other material, and containing four ribs obtained by casting to guide the stainless steel float.
- Upper body containing a casing that protects the air release device against spurts during rapid filling.
- Mobile block including a large AISI 316 stainless steel float, placed on the lower body, and connected through a stainless steel rod to the air release system.
- Flat obturator in solid polypropylene to avoid deformations and to prevent it from remaining stuck to the gaskets, while other materials have the tendency to do it.
- Drainage valve for chamber control and draining.
- Nozzle and gasket holder (patent pending) wear resistant thanks to gasket compression control.
- Maintenance can be easily performed from the top without removing the air valve from the pipe.
- Evacuation bend in polypropylene standard for DN 50/65 and on request for other DN (through SUB kit).

### Applications

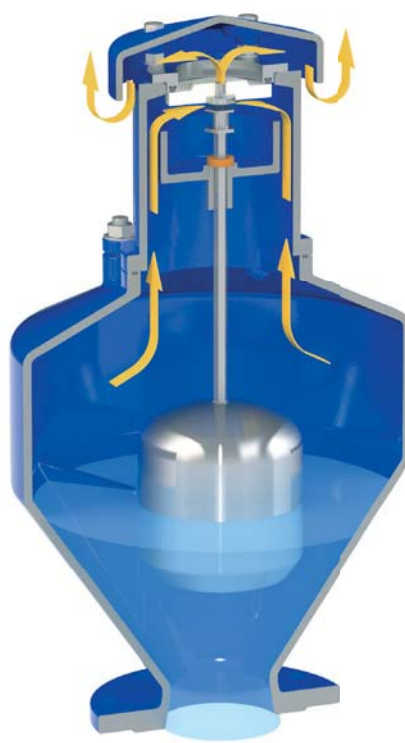
- Sewage main transmission lines.
- Treatment plants.
- Irrigation systems in presence of solids/debris in suspension.
- Whenever the technology of air valves for treated water can't be used for the risk of clogging and damages to the internal components.

## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as liquid flows in. The SCF, thanks to an aerodynamic body and deflector, will make sure to avoid premature closures of the mobile block during this phase.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part. Little by little it is compressed and its volume increases, pushing the liquid level downwards and allowing the air release through the nozzle.



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing liquid. This is to avoid negative pressure and serious damages to the pipeline and the entire system.

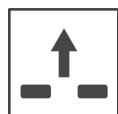
## Optional



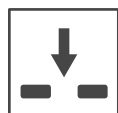
■ **Vacuum breaker version Mod. SCF 2F**, to allow the entrance and discharge of large volumes of air only. This model is normally recommended on changes in slope ascending, long ascending segments, and wherever the air release won't be required.



■ **Version for submerged applications, SUB series**, standard for DN 50/65, available both for SCF and SCF 2F Models, with elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying spurts coming from the rapid closure of the air valve.



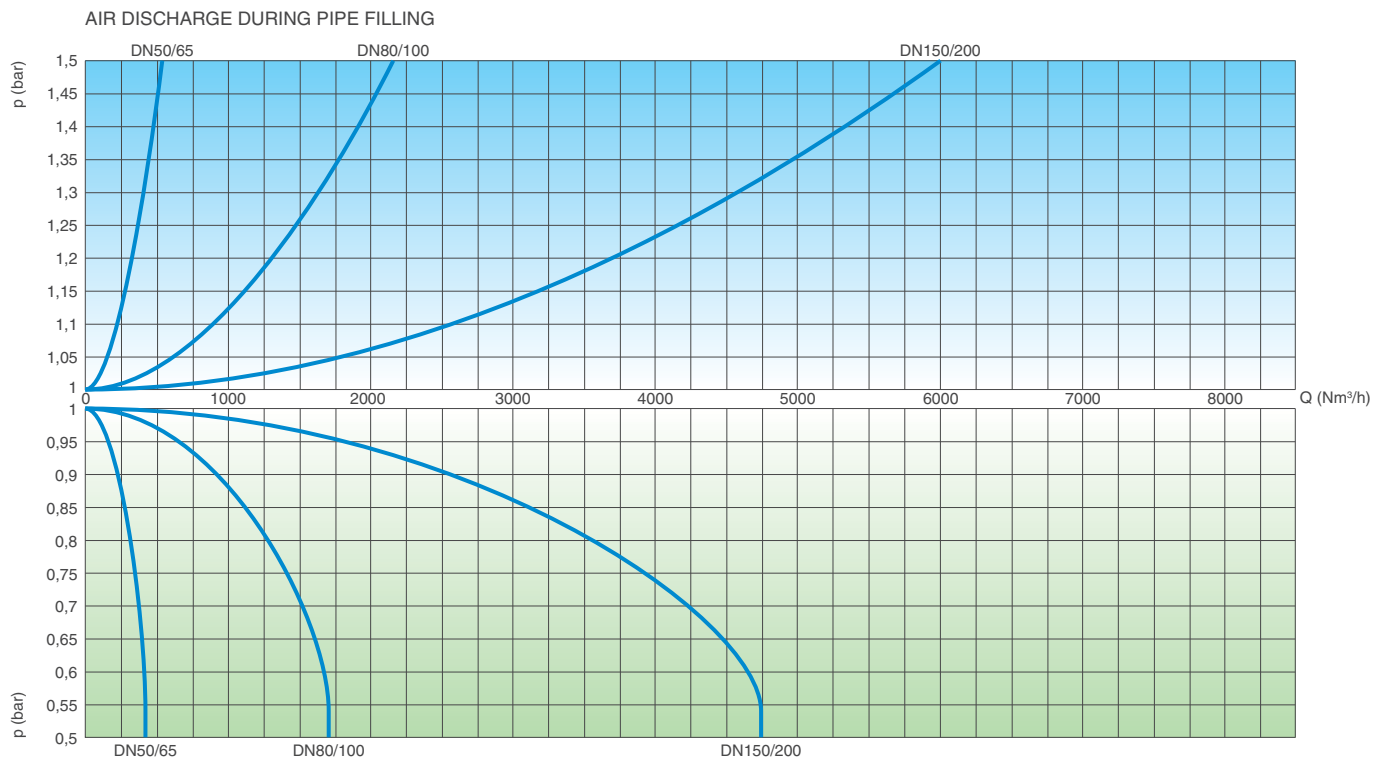
■ **Version for air discharge only EO series** (on request), available both for SCF and SCF 2F models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided.



■ **Version for air entrance only IO series**, available for vacuum breaker model. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

### Air flow performance charts



The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm<sup>3</sup>/h using a safety factor.

### Working conditions

Water and waste water max. 60°C.  
Maximum pressure 16 bar.  
Minimum pressure 0,2 bar. Lower on request.  
Higher temperatures on request.

### Standard

Certificated and tested in compliance with EN-1074/4.  
Flanges according to EN 1092/2.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes on the flanges and painting details available on request.

### Nozzle choice

Nozzle diameter in mm according to the size of the air valve and the PN.

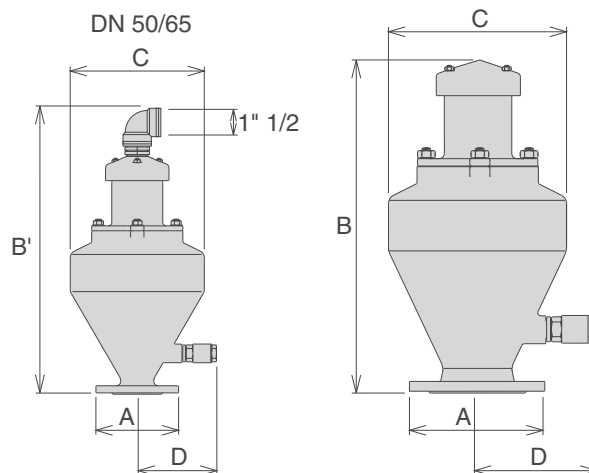
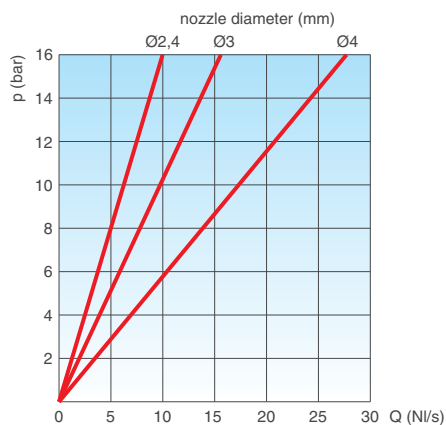
	PN 10	PN 16
DN 50/65	2,4	2,4
DN 80/100	3	3
DN 150/200	4	4

### Weights and dimensions

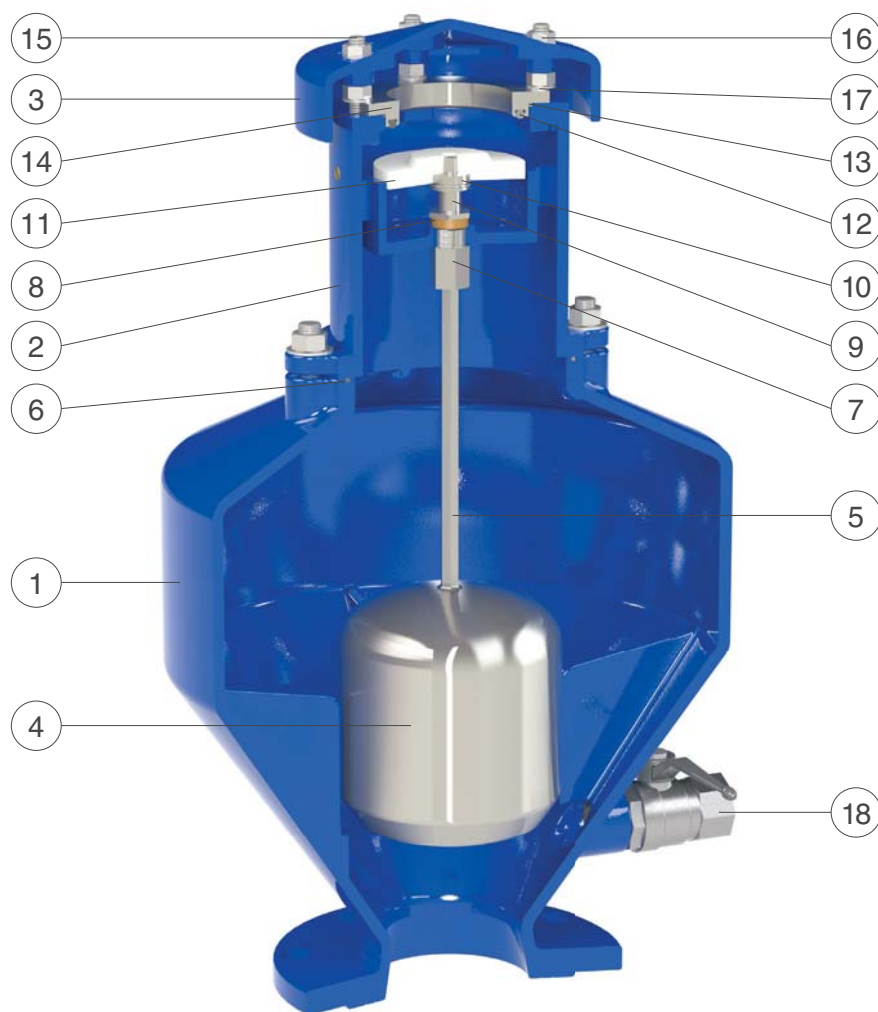
DN mm	A mm	B mm	B' mm	C mm	D mm	Weight Kg
50/65	185	-	650	300	190	29
80/100	220	600	-	350	202	40
150	285	850	-	488	243	78
200	340	850	-	488	243	82

All values are approximate, consult CSA service for more details.

### AIR RELEASE DURING WORKING CONDITIONS



## Technical details



Threaded PP evacuation bend 1" 1/2 supplied as a standard for DN 50/65.

N.	Component	Standard material	Optional
1	Lower body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Upper body	ductile cast iron GJS 500-7 or GJS 450-10	
3	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
4	Float	stainless steel AISI 316	
5	Float shaft	stainless steel AISI 316	
6	O-ring	NBR	EPDM/Viton/silicone
7	Driving sleeve	stainless steel AISI 303	stainless steel AISI 316
8	Plane gasket	NBR	
9	Gasket holder	stainless steel AISI 316	
10	Nozzle subset	stainless steel AISI 316	
11	Obturator flat	polypropylene	
12	Seat gasket	NBR	EPDM/Viton/silicone
13	O-ring	NBR	EPDM/Viton/silicone
14	Seat	stainless steel AISI 304 (AISI 303 for DN 50/65)	stainless steel AISI 316
15	Studs	stainless steel AISI 304	stainless steel AISI 316
16	Nuts	stainless steel AISI 304	stainless steel AISI 316
17	Washers	stainless steel AISI 304	stainless steel AISI 316
18	Ball valve 1"	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.





## Wastewater anti-shock combination air valve - Mod. SCF - AS

The SCF-AS guarantees the proper operation of pressurized sewage systems allowing the release of air pockets in working conditions, the entrance of large quantities of air in case of pipe bursting or draining operations and a controlled air outflow speed to minimize the risk of water hammer events.



### Technical features and benefits

- Large lower body designed with strongly sloped funnel shaped walls to avoid deposit of grease or other material, and containing four ribs obtained by casting to guide the stainless steel float.
- Upper body containing a casing that protects the air release device against spurts during rapid filling.
- Mobile block including a large AISI 316 stainless steel float, placed on the lower body, and connected through a stainless steel rod to the air release system.
- Anti-Shock automatism composed of a metallic disk with 2 or more adjustable orifices, a guide bar and a counteracting spring in stainless steel.
- Drainage valve for chamber control and draining.
- Nozzle and gasket holder (patent pending) wear resistant thanks to gasket compression control.
- Maintenance can be easily performed from the top without removing the air valve from the pipe.

### Applications

- To protect pumping stations and nodes of sewage main transmission lines exposed to water hammer and column separation in case of pump failure.
- Treatment plants subject to rapid changes of the flow rate.
- Whenever the technology of air valves for treated water can't be used and a protection against water hammer is needed.

## Operating principle



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing liquid. This is to avoid negative pressure and serious damages to the pipeline and the entire system.



### Controlled air discharge

During the air discharge it is necessary to avoid rapid closures of the mobile block, responsible of water hammer effects. The SCF AS will control the air outflow reducing the water approach velocity and thus minimizing the risk of overpressure.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part. Little by little it is compressed and its volume increases, pushing the liquid level downwards and allowing the air release through the nozzle.

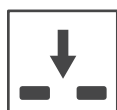
## Optional



■ **Vacuum breaker version Mod. SCA**, to allow the entrance and the discharge of large volumes of air only with the anti-water hammer feature. This model is normally recommended at the pumps, on changes in slope ascending, long ascending segments exposed to transients events and, more in general, wherever air release won't be required still providing some protection against water hammer.



■ **Version for submerged applications SUB series**, standard for DN 50/65, available both for SCF AS and SCA Models, with elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying spurts coming from the rapid closure of the air valve.



■ **Version for air entrance only IO series**, available for vacuum breaker model SCA. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

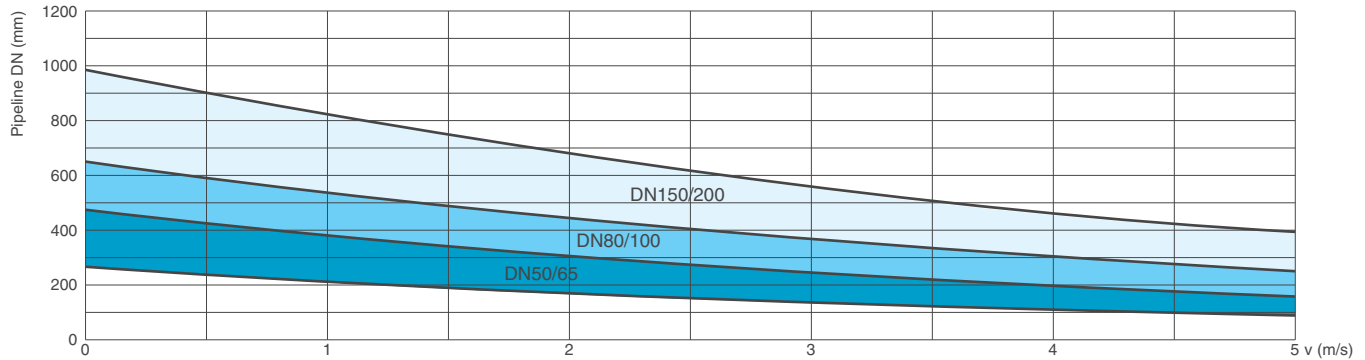


■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be adjusted on request according to the project conditions and the results of the transient analysis.

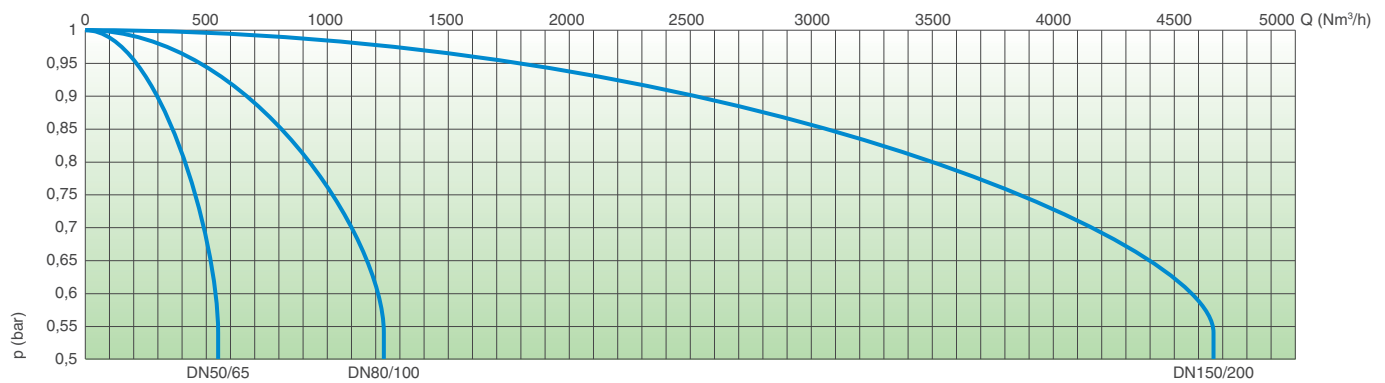
## Technical data

### Air valve selection chart

Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity expressed in m/s.



### Air flow performance chart



AIR ENTRANCE DURING PIPE DRAINING

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm³/h using a safety factor.

### Working conditions

Water and waste water max. 60°C.  
Maximum pressure 16 bar.  
Minimum pressure 0,2 bar. Lower on request.  
Higher temperatures on request.

### Standard

Certificated and tested in compliance with EN-1074/4.  
Flanges according to EN 1092/2.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes on the flanges and painting details available on request.

### Nozzle choice

Nozzle diameter in mm according to the size of the air valve and the PN.

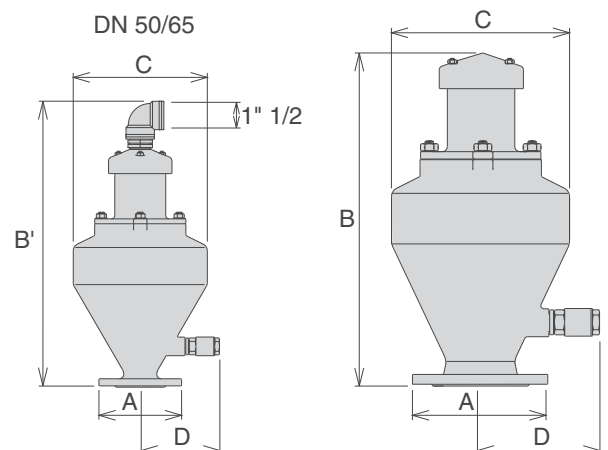
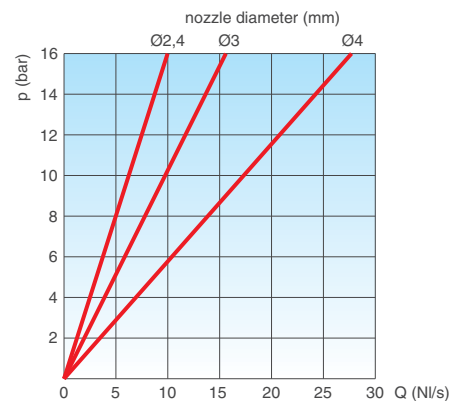
	PN 10	PN 16
DN 50/65	2,4	2,4
DN 80/100	3	3
DN 150/200	4	4

### Weights and dimensions

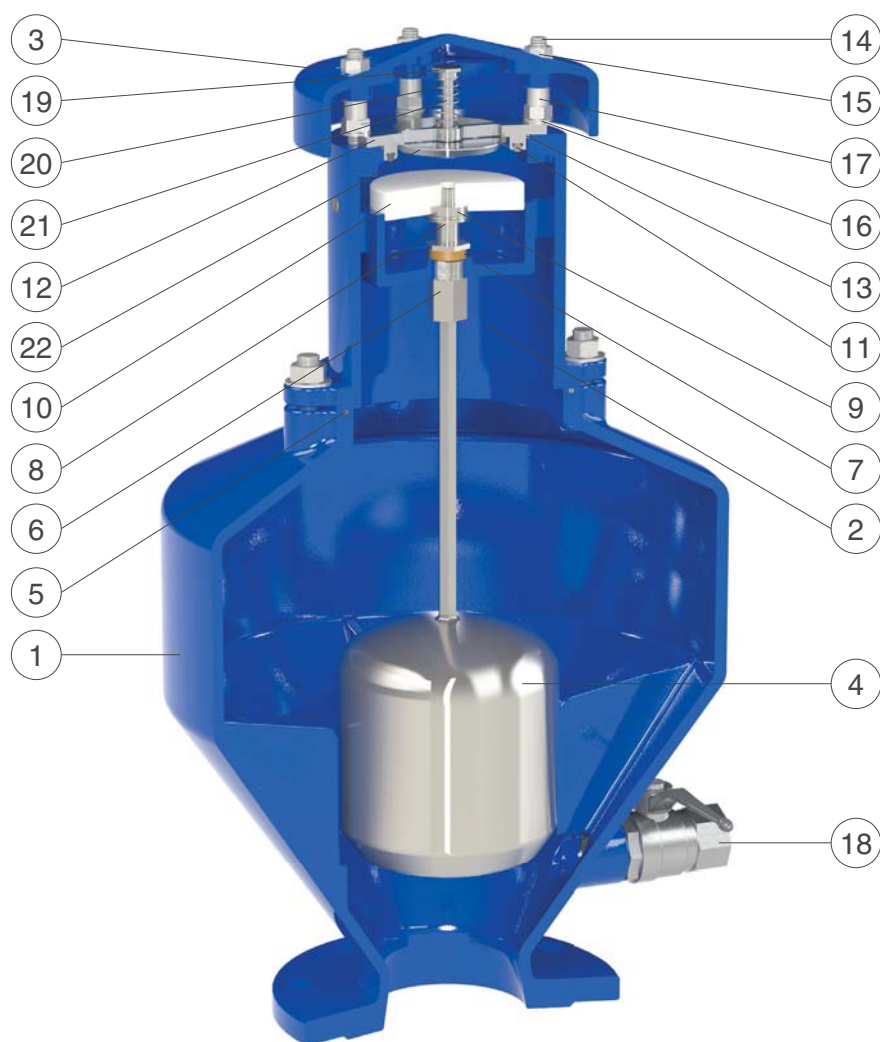
DN mm	A mm	B mm	B' mm	C mm	D mm	Weight Kg
50/65	185	-	650	300	190	29
80/100	220	615	-	350	202	40
150	285	870	-	488	243	78
200	340	870	-	488	243	82

All values are approximate, consult CSA service for more details.

### AIR RELEASE DURING WORKING CONDITIONS



## Technical details



Threaded PP evacuation bend 1" 1/2 supplied as a standard for DN 50/65.

N.	Component	Standard material	Optional
1	Lower body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Upper body	ductile cast iron GJS 500-7 or GJS 450-10	
3	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
4	Float with shaft	stainless steel AISI 316	
5	O-ring	NBR	EPDM/Viton/silicone
6	Driving sleeve	stainless steel AISI 303	stainless steel AISI 316
7	Plane gasket	NBR	
8	Gasket holder	stainless steel AISI 316	
9	Nozzle subset	stainless steel AISI 316	
10	Obturator flat	polypropylene	
11	Seat gasket	NBR	EPDM/Viton/silicone
12	AS seat	stainless steel AISI 304	stainless steel AISI 316
13	O-ring	NBR	EPDM/Viton/silicone
14	Studs	stainless steel AISI 304	stainless steel AISI 316
15	Nuts	stainless steel AISI 304	stainless steel AISI 316
16	Washers	stainless steel AISI 304	stainless steel AISI 316
17	Spacers	stainless steel AISI 304	
18	Ball valve 1"	stainless steel AISI 316	
19	Spring guide nut (from DN 150)	stainless steel AISI 303	stainless steel AISI 316
20	Spring	stainless steel AISI 302	stainless steel AISI 316
21	AS shaft	stainless steel AISI 303	stainless steel AISI 316
22	AS flat	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.

## Wastewater combination air valve with anti-surge mechanism - Mod. SCF - RFP

The SCF RFP guarantees the proper operation and safety of pressurized sewage systems allowing the release of air pockets in working conditions and the entrance of large quantities of air, in case of pipe bursting or draining phases. The air discharge velocity is maintained within a safety level by means of a anti-surge mechanism to prevent water hammer.



### Technical features and benefits

- Large lower body designed with strongly sloped funnel shaped walls to avoid deposit of grease or other material, and containing four ribs obtained by casting to guide the stainless steel float.
- Mobile block including a large AISI 316 stainless steel float, placed on the lower body and connected through a stainless steel rod to the air release system.
- Drainage valve for chamber control and draining.
- RFP anti-surge automatism composed of two floats in solid polypropylene, where the upper one will be automatically lifted in case of excessive air outflow, reducing the water approach velocity and avoiding potential water hammer events.
- Nozzle and gasket holder (patent pending) wear resistant thanks to gasket compression control.
- Maintenance can be easily performed from the top without removing the air valve from the pipe.
- Upper body in stainless steel AISI 316.

### Applications

- Sewage main transmission lines.
- Treatment plants.
- Irrigation systems in presence of solids/debris in suspension.
- Whenever the technology of air valves for treated water can't be used, for the risk of clogging and damages to the internal components, and the proper protection of the system has to be provided.



## Operating principle



### 1. Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as liquid flows in. The SCF RFP, thanks to a large upper body and an aerodynamic deflector, will make sure to avoid premature closures of the mobile block during this phase.



### 2. Controlled outflow

If the differential pressure of air across the valve during pipe filling, and the consequent air outflow, rises above a certain value without control, there is the risk of potential water hammer and damages to the system caused by rapid closures of the mobile block. Should that happen the SCF RFP anti-surge float will rise automatically reducing air outflow and slowing down the velocity of the approaching water column.



### 3. Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part. Little by little it is compressed and its volume increases, pushing the liquid level downwards and allowing the air release through the nozzle.



### 4. Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing liquid to avoid negative pressure and serious damages to the pipeline, and the entire system.

## Optional



■ **Vacuum breaker version Mod. SCF 2F RFP**, to allow the entrance of large volumes of air only with the controlled air outflow thanks to the RFP technology. This model is normally recommended in changes on slope ascending, long ascending segments, and wherever the air release won't be required.

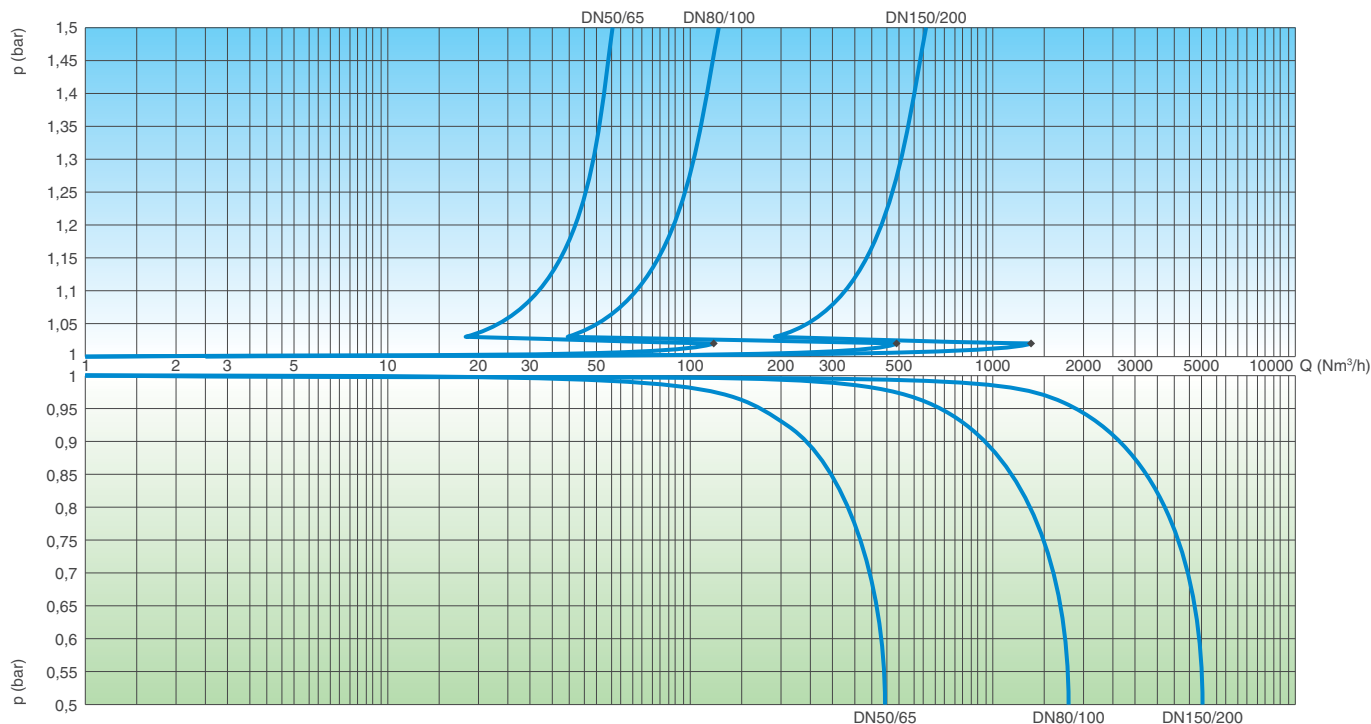


■ **Version for submerged applications SUB series**, standard for DN 50/65, available both for SCF RFP and SCF 2F RFP Models, with elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying spurts coming from the rapid closure of the air valve.

## Technical data

### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm³/h using a safety factor.

### Working conditions

Water and waste water max. 60°C.  
Maximum pressure 16 bar.  
Minimum pressure 0,2 bar. Lower on request.  
Higher temperatures on request.

### Standard

Certificated and tested in compliance with EN-1074/4.  
Flanges according to EN 1092/2.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes on the flanges and painting details available on request.

### Nozzle choice

Nozzle diameter in mm according to the size of the air valve and the PN.

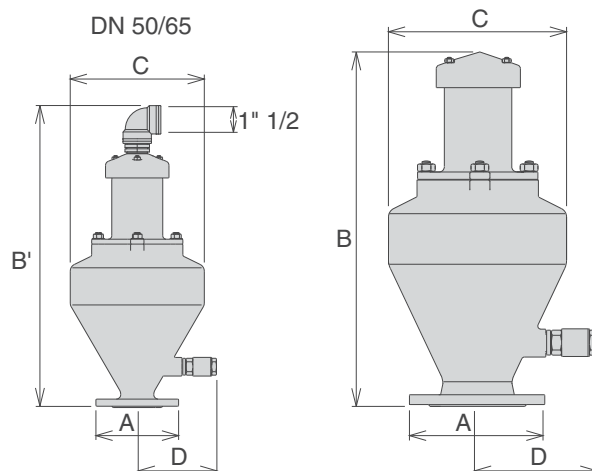
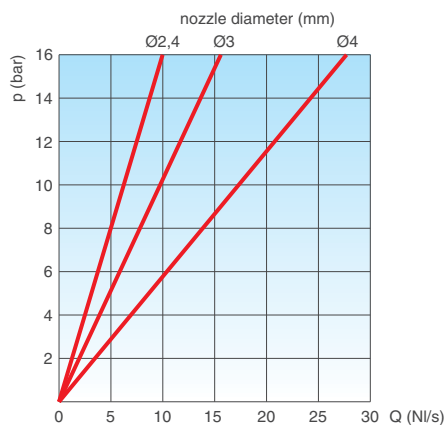
	PN 10	PN 16
DN 50/65	2,4	2,4
DN 80/100	3	3
DN 150/200	4	4

### Weights and dimensions

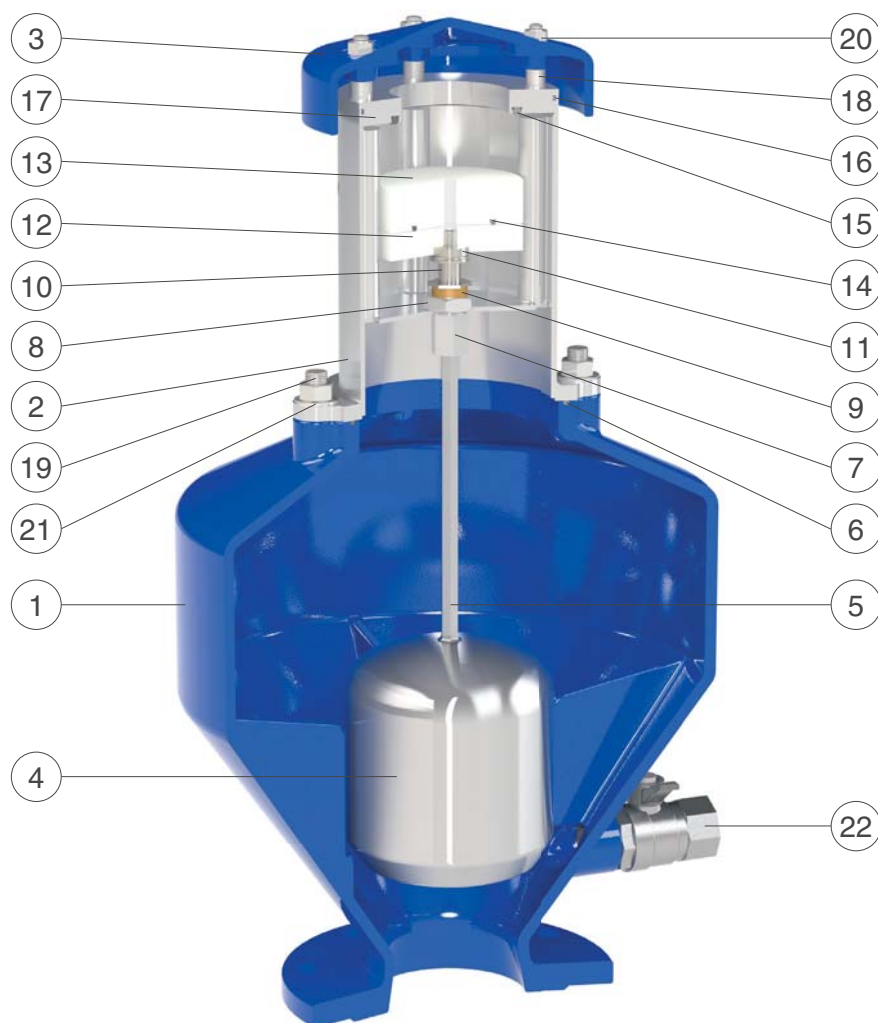
DN mm	A mm	B mm	B' mm	C mm	D mm	Weight Kg
50/65	185	-	680	300	190	29
80/100	220	645	-	350	202	40
150	285	870	-	488	243	78
200	340	870	-	488	243	82

All values are approximate, consult CSA service for more details.

AIR RELEASE DURING WORKING CONDITIONS



## Technical details



Threaded PP evacuation bend 1" 1/2 supplied as a standard for DN 50/65.

N.	Component	Standard material	Optional
1	Lower body	ductile cast iron GJS 500-7 or GJS 450-10	
2	RFP upper body	stainless steel AISI 316	
3	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
4	Float	stainless steel AISI 316	
5	Float shaft	stainless steel AISI 316	
6	O-ring	NBR	EPDM/Viton/silicone
7	Driving sleeve	stainless steel AISI 303	stainless steel AISI 316
8	Nut	stainless steel AISI 304	stainless steel AISI 316
9	Plane gasket	NBR	
10	Gasket holder	stainless steel AISI 316	
11	Nozzle subset	stainless steel AISI 316	
12	RFP obturator flat	polypropylene	
13	Anti-surge flat	polypropylene	
14	Anti-surge flat gasket	NBR	EPDM/Viton/silicone
15	Seat gasket	NBR	EPDM/Viton/silicone
16	O-ring	NBR	EPDM/Viton/silicone
17	Seat	stainless steel AISI 316	
18	Spacers	stainless steel AISI 304	
19	Studs	stainless steel AISI 304	stainless steel AISI 316
20	Nuts	stainless steel AISI 304	stainless steel AISI 316
21	Washers	stainless steel AISI 304	stainless steel AISI 316
22	Ball valve 1"	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.



## Wastewater combination air valve Mod. SCF 2"

The air valve guarantees the proper operation of sewage lines allowing the entrance of a large quantity of air in case of pipe burst or draining, the release of air pockets during working conditions and the discharge during pipe filling.



### Technical features and benefits

- Lower body designed with strongly sloped funnel shaped walls to avoid deposit of grease or other material, it contains four ribs to guide the stainless steel float.
- Upper body containing the air release device which is protected by a stainless steel deflector against spurts caused by rapid filling.
- Mobile block, including a large AISI 316 stainless steel float, placed on the lower body and connected through a stainless steel rod to the air release mechanism.
- Compact and light, the SCF 2" features an innovative technology making it suitable even to the most demanding environments.
- Drainage valve for chamber control and draining.
- Maintenance can be easily performed from the top without removing the air valve from the pipe.
- Evacuation bend suitable for flooded environments with 1" elbow outlet.

### Applications

- Sewage main transmission lines.
- Treatment plants.
- Irrigation systems in presence of solids/debris in suspension.
- Whenever the technology of air valves for treated water can't be used for the risk of clogging and damages to the internal components.

## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as liquid flows in. The SCF 2", thanks to an aerodynamic body and deflector, will make sure to avoid premature closures of the mobile block during this phase.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part. Little by little it is compressed and its volume increases, pushing the liquid level downwards and allowing the air release through the nozzle.



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing liquid. This is to avoid negative pressure and serious damages to the pipeline and the entire system.

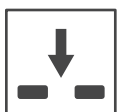
## Optional



■ **Vacuum breaker version Mod. SCF 2" 2F**, to allow the entrance and discharge of large volumes of air only. This model is normally recommended on changes in slope ascending, long ascending segments, and wherever the air release won't be required.



■ **Version for air discharge only SCF 2" EO series** (on request), available both for SCF 2" and SCF 2" 2F models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided.



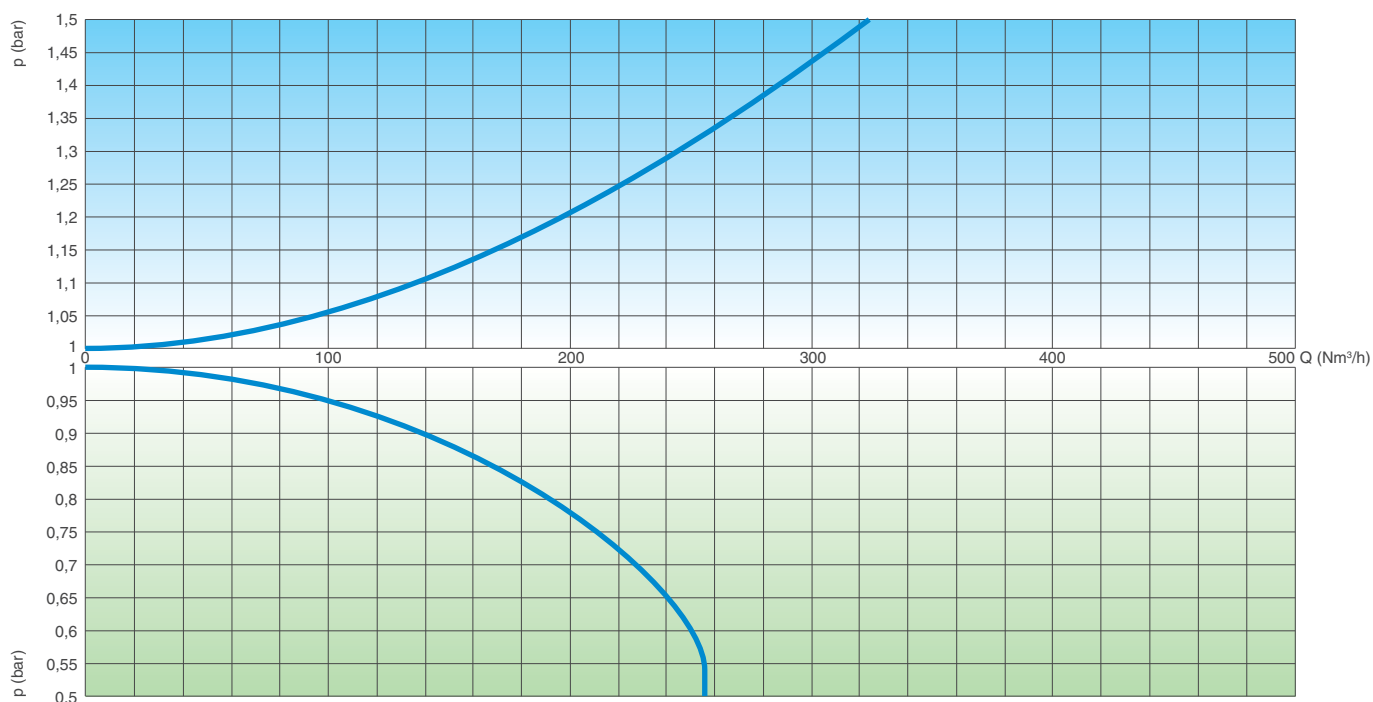
■ **Version for air entrance only SCF 2" IO series**, available for vacuum breaker model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.



## Technical data

### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm³/h using a safety factor.

### Working conditions

Water and waste water max. 60°C.

Maximum pressure 16 bar.

Minimum pressure 0,2 bar. Lower on request.

### Standard

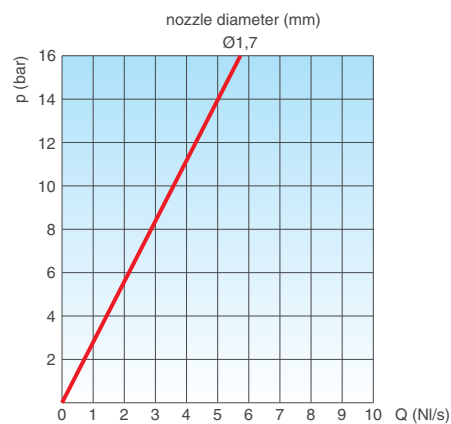
Certified and tested in compliance with EN-1074/4.

Manufactured with 2" inlet; supplied on request with flanges according to EN 1092/2 / ANSI.

Epoxy painting applied through fluidized bed technology blue RAL 5005.

Changes on the flanges and painting details available on request.

AIR RELEASE DURING WORKING CONDITIONS



### Nozzle choice

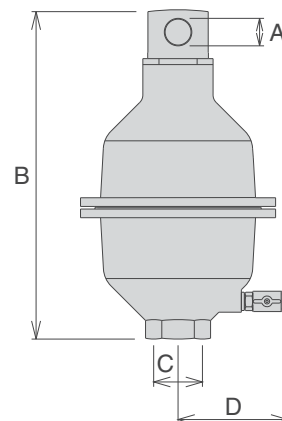
Nozzle diameter in mm according to the size of the air valve and the PN.

PN 10	PN 16
1,7	1,7

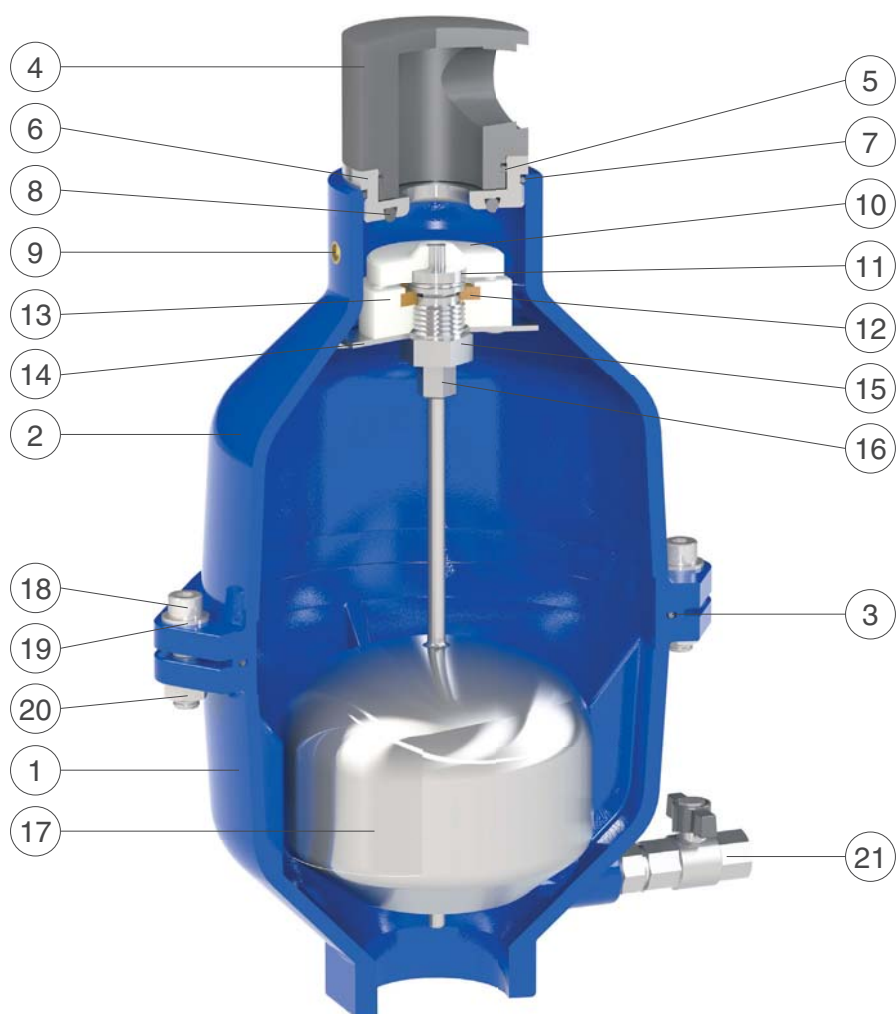
### Weights and dimensions

C inch	A inch	B mm	D mm	Main orifice mm²	Nozzle orifice mm²	Weight Kg
2"	1"	380	137	490	2,3	10,5

All values are approximate, consult CSA service for more details.



## Technical details



N.	Component	Standard material	Optional
1	Lower body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Upper body	ductile cast iron GJS 500-7 or GJS 450-10	
3	O-ring	NBR	EPDM/Viton/silicone
4	Cap	PVC	
5	O-ring	NBR	EPDM/Viton/silicone
6	Seat	stainless steel AISI 316	
7	O-ring	NBR	EPDM/Viton/silicone
8	Seat gasket	NBR	EPDM/Viton/silicone
9	Plug	brass	stainless steel AISI 316
10	Obturator	polypropylene	
11	Nozzle subset	stainless steel AISI 316	
12	Plane gasket	NBR	
13	Lower gasket holder	polypropylene	
14	Deflector	stainless steel AISI 316	
15	Guiding nut	stainless steel AISI 316	
16	Upper gasket holder	stainless steel AISI 316	
17	Float	stainless steel AISI 316	
18	Screws	stainless steel AISI 304	stainless steel AISI 316
19	Washers	stainless steel AISI 304	stainless steel AISI 316
20	Nuts	stainless steel AISI 304	stainless steel AISI 316
21	Drain valve	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.



## Wastewater anti-shock combination air valve - Mod. SCA 2"

The air valve guarantees the proper operation of sewage lines allowing the entrance of large quantities of air in case of pipe burst or draining phases, the release of air pockets during working conditions and the controlled air outflow speed.



### Technical features and benefits

- Lower body designed with strongly sloped funnel shaped walls to avoid grease and/or other material deposit, and it contains four ribs to guide the stainless steel float.
- Upper body containing the AS and the air release mechanism which is protected by a stainless steel deflector against spurts caused by rapid filling.
- Mobile block including a large AISI 316 stainless steel float, placed on the lower body and connected through a stainless steel rod to the air release mechanism.
- Anti-Shock automatism composed of a metallic disk with 2 or more adjustable orifices, a guide bar and a counteracting spring in stainless steel.
- Drainage valve for chamber control and draining.
- Maintenance can be easily performed from the top without removing the air valve from the pipe.
- Evacuation bend suitable for flooded environments with 1" elbow outlet.

### Applications

- To protect pumping stations and nodes of sewage main transmission lines exposed to water hammer and column separation in case of pump failure.
- Treatment plants subject to rapid changes of the flow rate.
- Whenever the technology of air valves for treated water can't be used and a protection against water hammer is needed.

## Operating principle



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing liquid. This is to avoid negative pressure and serious damages to the pipeline and the entire system.



### Controlled air discharge

During the pipe filling it is necessary to avoid rapid closures of the mobile block, responsible of water hammer effects. The SCA 2" will control the air outflow reducing the water approach velocity and thus minimizing the risk of overpressure.



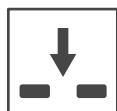
### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part. Little by little it is compressed and its volume increases, pushing the liquid level downwards and allowing the air release through the nozzle.

## Optional



■ **Vacuum breaker version**, to allow the entrance of large volumes of air only with the anti water hammer feature. This model is normally recommended at the pumps and on changes in slope ascending, long ascending segments exposed to transients events. More in general wherever air release won't be required still providing some protection against water hammer.



■ **Version for air entrance only SCA 2" IO series**, available for vacuum breaker model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

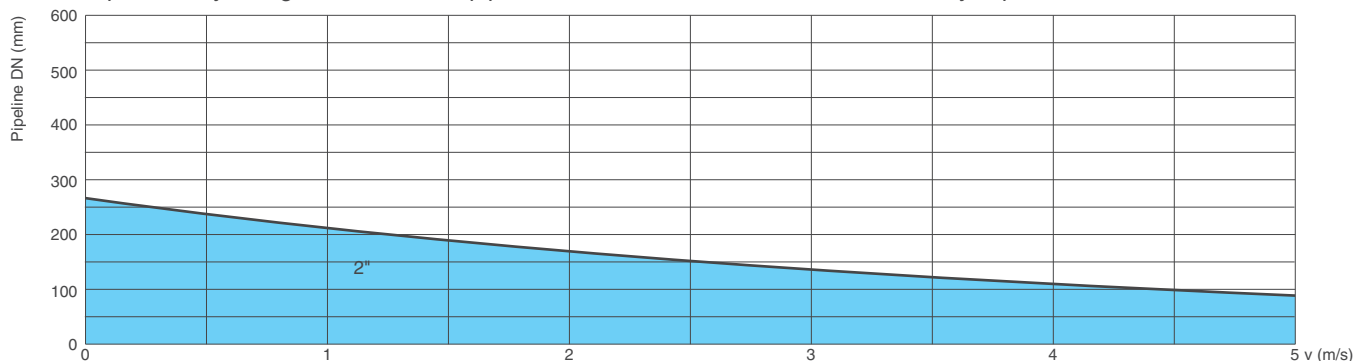


■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be adjusted on request according to the project conditions and the results of the transient analysis.

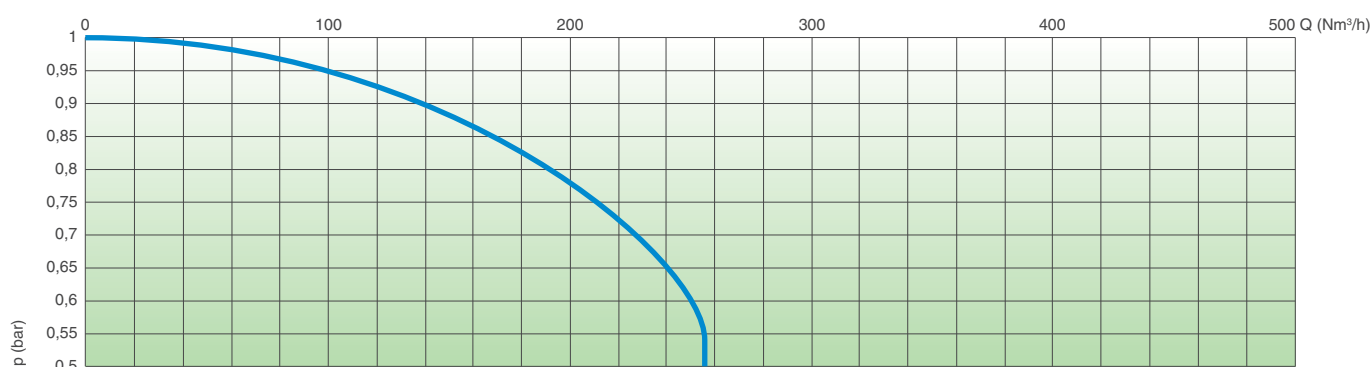
## Technical data

### Air valve selection chart

Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity expressed in m/s.



### Air flow performance chart



AIR ENTRANCE DURING PIPE DRAINING

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm<sup>3</sup>/h using a safety factor.

### Working conditions

Water and waste water max. 60°C.

Maximum pressure 16 bar.

Minimum pressure 0,2 bar. Lower on request.

### Standard

Certified and tested in compliance with EN-1074/4.

Manufactured with 2" inlet; supplied on request with flanges according to EN 1092/2 / ANSI.

Epoxy painting applied through fluidized bed technology blue RAL 5005.

Changes on the flanges and painting details available on request.

### Nozzle choice

Nozzle diameter in mm according to the size of the air valve and the PN.

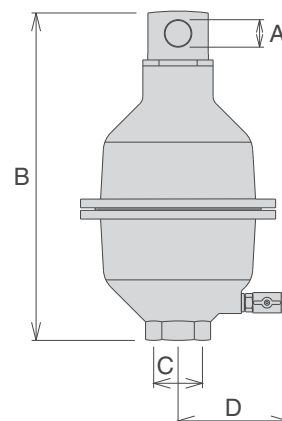
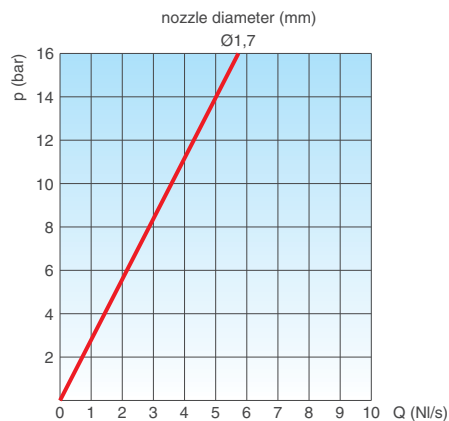
PN 10	PN 16
1,7	1,7

### Weights and dimensions

C inch	A inch	B mm	D mm	Main orifice mm <sup>2</sup>	Nozzle orifice mm <sup>2</sup>	Weight Kg
2"	1"	389	137	490	2,3	10,8

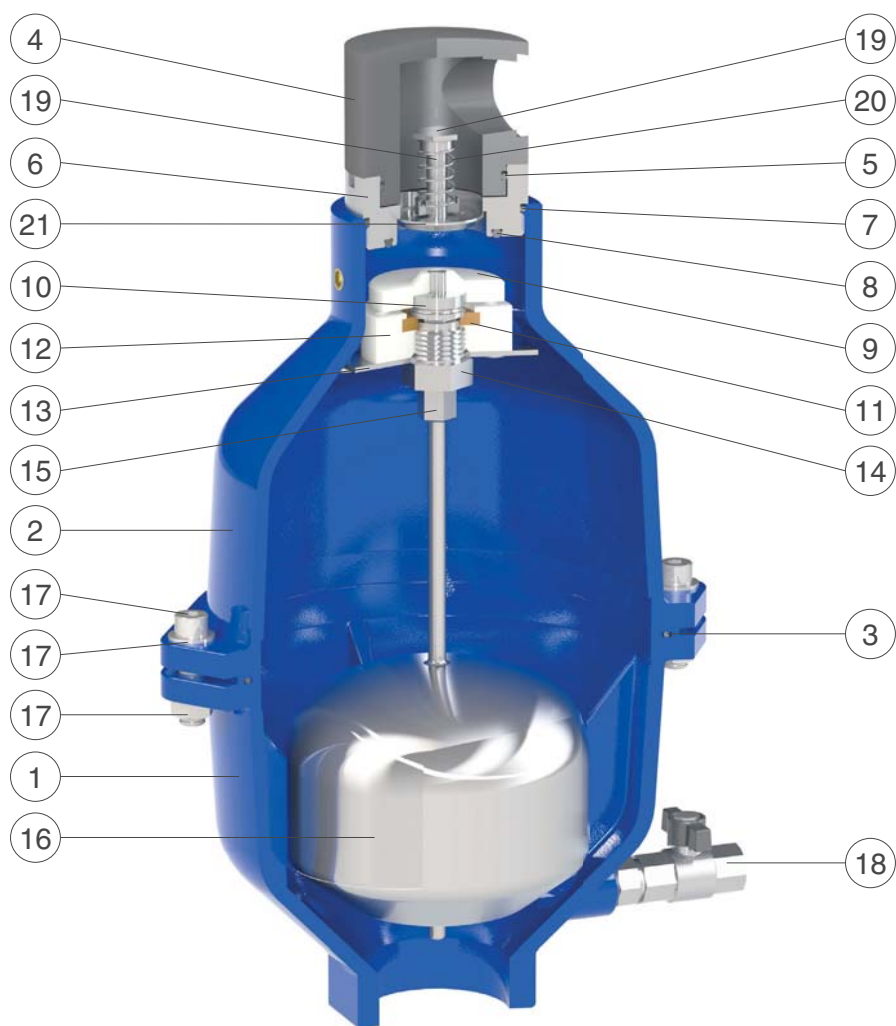
All values are approximate, consult CSA service for more details.

### AIR RELEASE DURING WORKING CONDITIONS





## Technical details



N.	Component	Standard material	Optional
1	Lower body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Upper body	ductile cast iron GJS 500-7 or GJS 450-10	
3	O-ring	NBR	EPDM/Viton/silicone
4	Cap	PVC	
5	O-ring	NBR	EPDM/Viton/silicone
6	Seat	stainless steel AISI 316	
7	O-ring	NBR	EPDM/Viton/silicone
8	Seat gasket	NBR	EPDM/Viton/silicone
9	Obturator	polypropylene	
10	Nozzle subset	stainless steel AISI 316	
11	Plane gasket	NBR	
12	Lower gasket holder	polypropylene	
13	Deflector	stainless steel AISI 316	
14	Guiding nut	stainless steel AISI 316	
15	Upper gasket holder	stainless steel AISI 316	
16	Float	stainless steel AISI 316	
17	Screws, washers and nuts	stainless steel AISI 304	stainless steel AISI 316
18	Drain valve	stainless steel AISI 316	
19	AS shaft	stainless steel AISI 316	
20	Spring	stainless steel AISI 302	stainless steel AISI 316
21	AS flat	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.



# Wastewater high capacity air release valve Mod. SCF RO

SCF RO air valve guarantees the proper operation of sewage lines allowing the release of large quantity of air during working conditions.



## Technical data

### Working conditions

Water and waste water max. 60°C.  
Maximum pressure 16 bar.  
Minimum pressure 0,2 bar. Lower on request.  
Higher temperatures on request.

### Standard

Certified and tested in compliance with EN-1074/4.  
Flanges according to EN 1092/2.  
Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting available on request.

### Nozzle choice

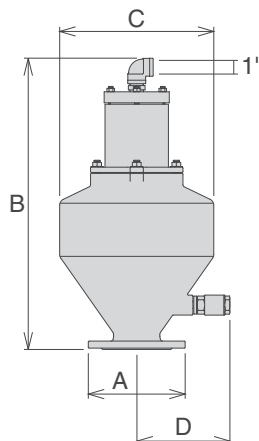
Nozzle diameter in mm, larger sizes available on request.

	PN 10	PN 16
DN 50/65	3	3
DN 80/100	3	3
DN 150/200	4	4

### Weights and dimensions

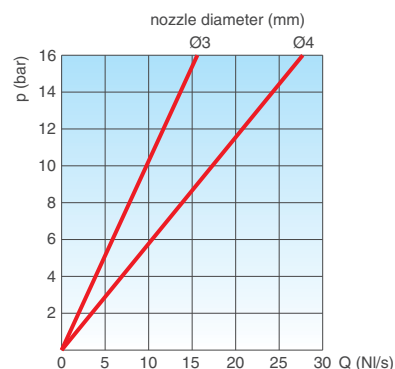
DN mm	A mm	B mm	C mm	D mm	Wt Kg
50/65	185	550	300	190	28
80/100	220	610	350	202	38
150	285	815	488	243	73
200	340	815	488	243	77

All values are approximate, consult CSA service for more details.

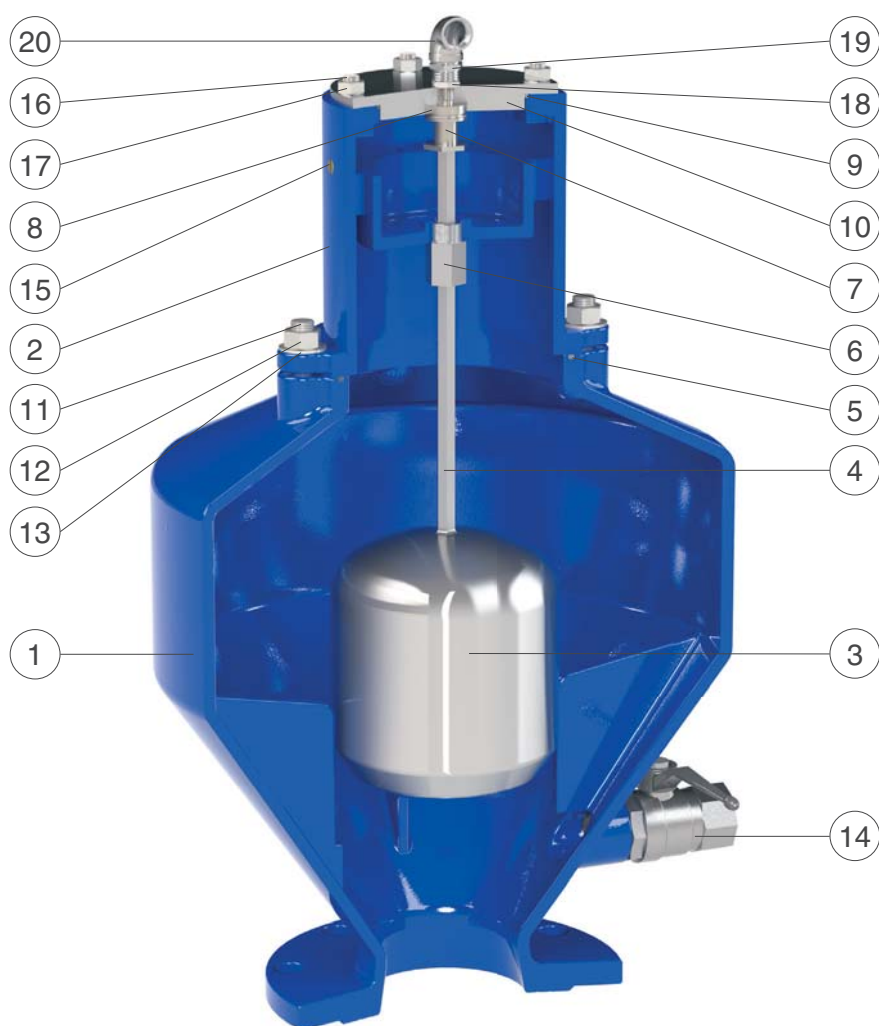


### Air flow performance chart in working conditions

AIR RELEASE DURING WORKING CONDITIONS



## Technical details



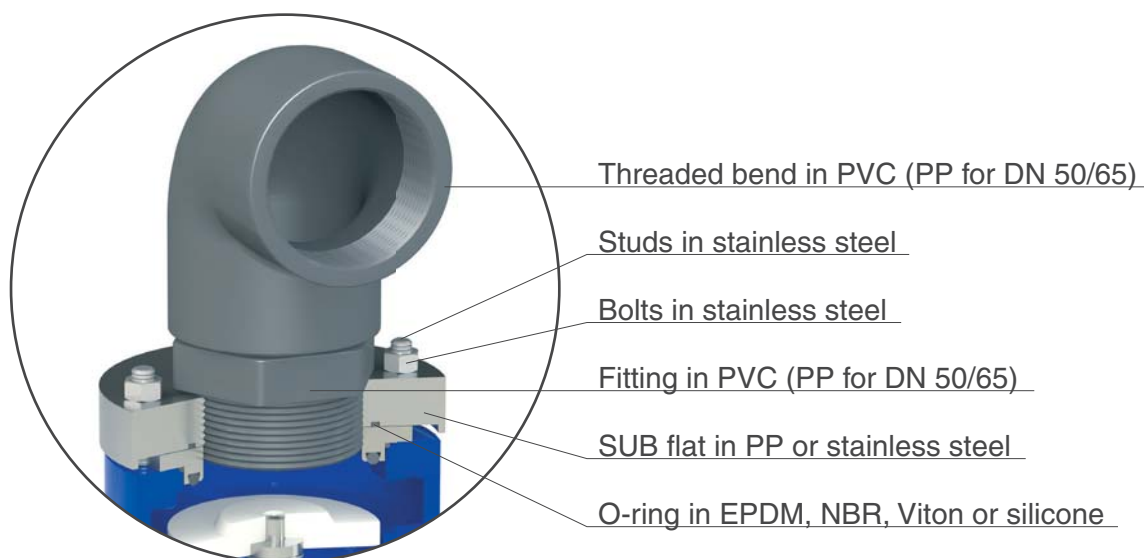
N.	Component	Standard material	Optional
1	Lower body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Upper body	ductile cast iron GJS 500-7 or GJS 450-10	
3	Float	stainless steel AISI 316	
4	Float shaft	stainless steel AISI 316	
5	O-ring	NBR	EPDM/Viton/silicone
6	Driving sleeve	stainless steel AISI 303	stainless steel AISI 316
7	Gasket holder	stainless steel AISI 316	
8	Nozzle subset	stainless steel AISI 316	
9	O-ring	NBR	EPDM/Viton/silicone
10	RO seat	stainless steel AISI 304	stainless steel AISI 316
11	Studs	stainless steel AISI 304	stainless steel AISI 316
12	Nuts	stainless steel AISI 304	stainless steel AISI 316
13	Washers	stainless steel AISI 304	stainless steel AISI 316
14	Ball valve 1"	stainless steel AISI 316	
15	Plug	brass	stainless steel
16	Studs	stainless steel AISI 304	stainless steel AISI 316
17	Nuts	stainless steel AISI 304	stainless steel AISI 316
18	Nut	stainless steel AISI 304	stainless steel AISI 316
19	Threaded fitting	stainless steel AISI 316	
20	Threaded bend	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.

# Wastewater combination air valve - Mod. SCF

## Version for submerged applications - SUB series

**Version for submerged applications, SUB series**, with threaded elbow for air conveyance, standard for DN 50/65, is available on request for other DN. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, reducing noise and conveying spurts coming from possible rapid closure of the air valve.



### Technical data

#### Working conditions

Water and waste water max. 60°C.  
Maximum pressure 16 bar.  
Min. press. 0,2 bar. Lower on request.  
Version for higher temperatures available on request.

#### Standard

Certified and tested in compliance with EN-1074/4. Flanges according to EN 1092/2. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting details available on request.

#### Weights and dimensions

DN mm	A mm	B* mm	C mm	D mm	Wt Kg
50/65	185	665	300	190	28
80/100	220	770	350	202	38
150	285	1040	488	243	74
200	340	1040	488	243	78

\*: maximum dimension (of the RFP model).  
All values are approximate, consult CSA service for more details.

#### Evacuation bends

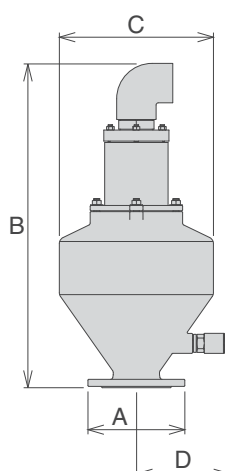
Evacuation bend sizes in relation to air valve DN.

	Bend
DN 50/65	1" 1/2
DN 80/100	2" 1/2
DN 150/200	4"

#### Nozzle choice

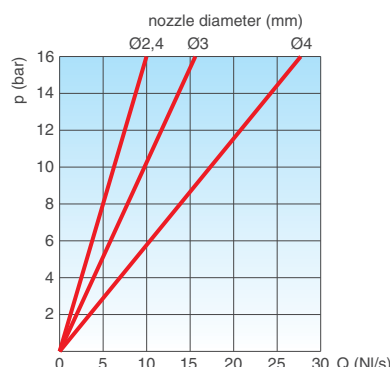
Nozzle diameter in mm according to the size of the air valve and the PN.

	PN 10	PN 16
DN 50/65	2,4	2,4
DN 80/100	3	3
DN 150/200	4	4



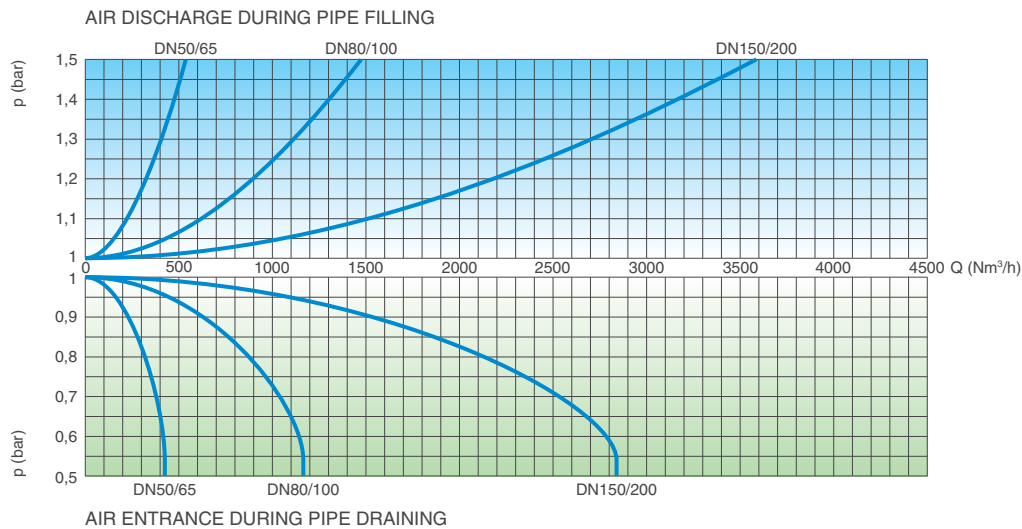
#### Air flow performance chart in working conditions

AIR RELEASE DURING WORKING CONDITIONS



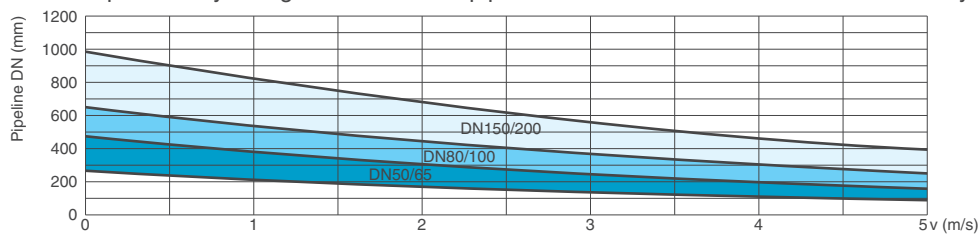
## Technical data

### SCF SUB - Air flow performance charts

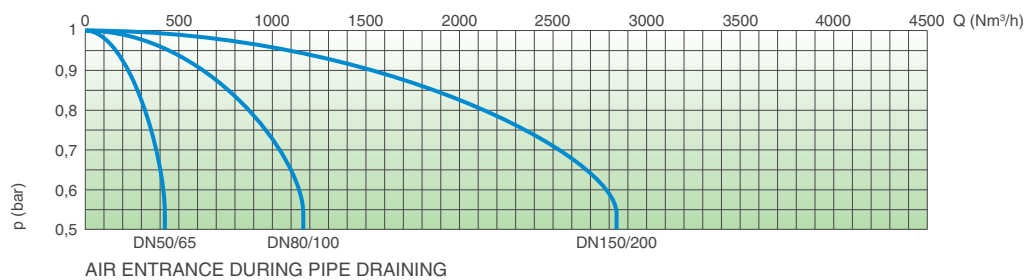


### SCF AS SUB - Air valve selection chart

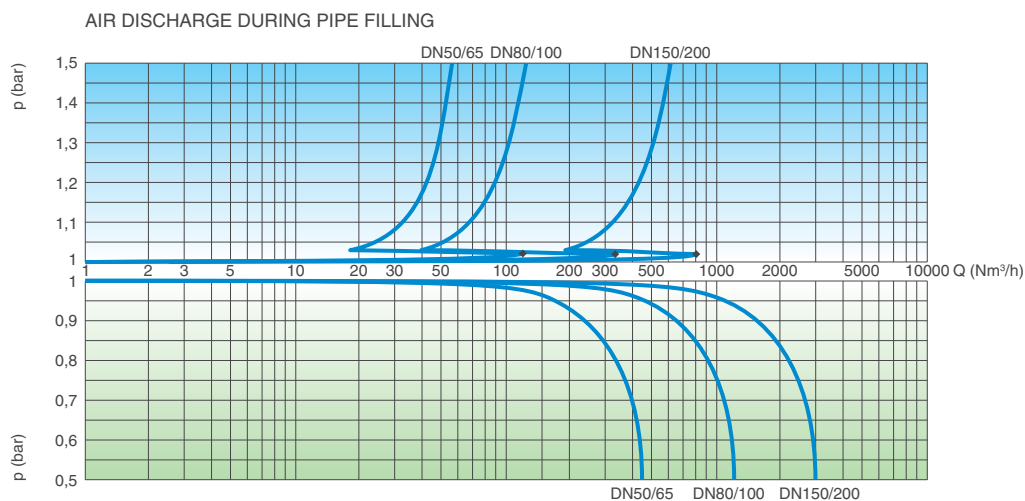
Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity expressed in m/s.



### SCF AS SUB - Air flow performance charts



### SCF RFP SUB - Air flow performance charts



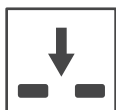
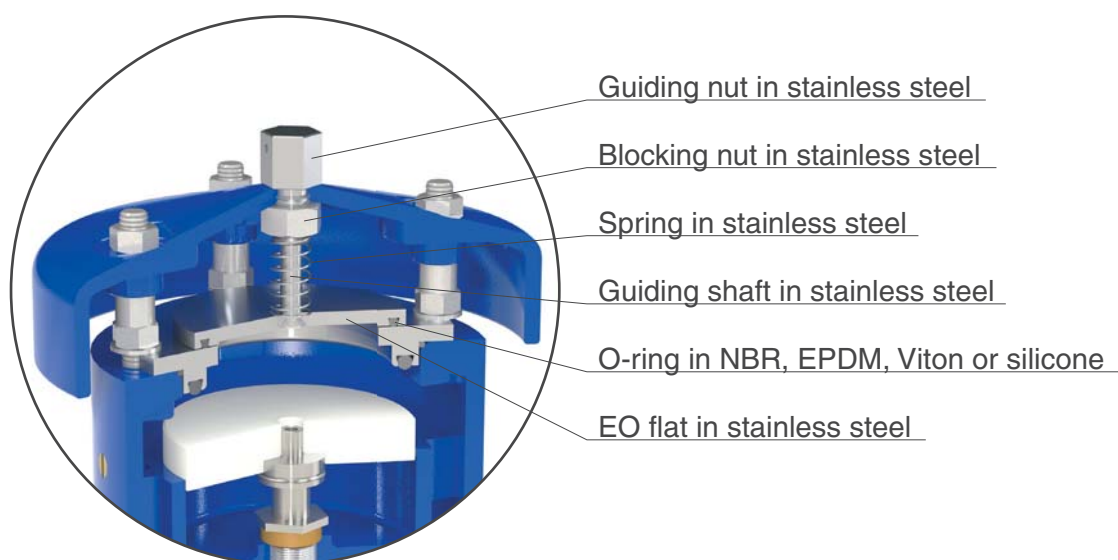
The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm³/h using a safety factor.





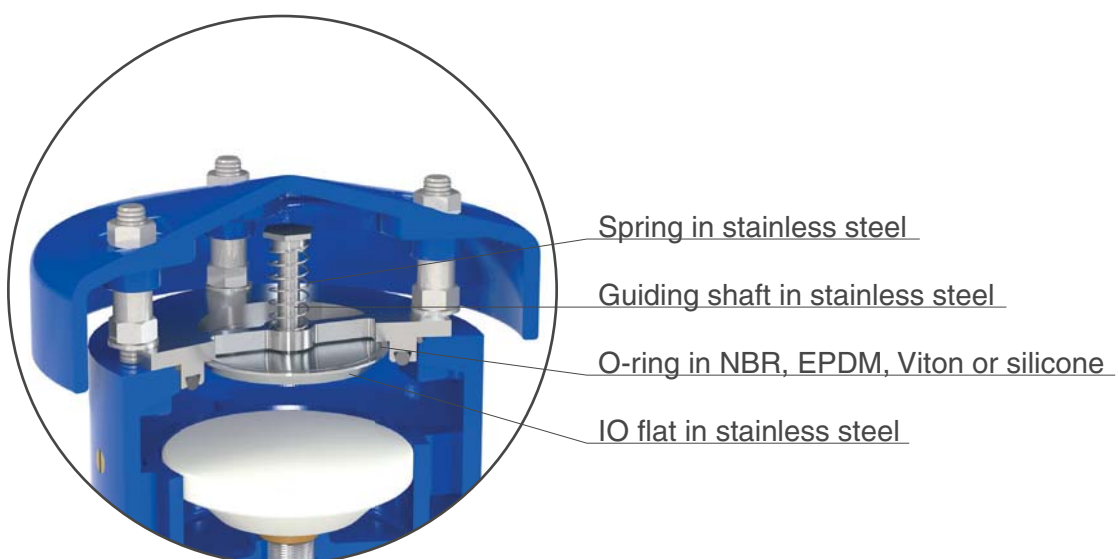
## Version for air discharge only SCF - EO series

**Version for air discharge only EO series**, available both for SCF and SCF 2F models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and whenever for project requirements air entrance must be avoided. For the compact line of SCF 2" the EO bias kit will be composed of a check valve and threaded elbow.



## Version for air entrance only SCF - IO series

**Version for air entrance only IO series**, available for vacuum breaker SCF 2F model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.



## Wastewater pumping station installation layout

The illustration below shows the use of CSA wastewater anti-slam air valves in combination with CSA air vented anti-surge tank A.V.A.S.T., in a common wastewater pumping station. The anti-slam air valve will allow the entrance of large volumes of air in case of negative pressure, the release of air pockets during working conditions and the controlled air discharge to avoid water hammer, otherwise generated during pump start up and pump failure scenarios. CSA expertise in the field of water hammer modeling and prevention can provide the right solution, through an accurate sizing and assessment of the devices needed to ensure the protection of the system.



The picture on the left shows the particular of CSA anti-slam wastewater air valves installed on the pump riser, just upstream of the check valve. When the pump is idle, the riser will be filled with air, down to the water level in the sump. The air valve is needed to avoid at any time the onset of negative pressure, yet assuring a controlled air venting when pump is operated. This is achieved by means of CSA anti-slam device and is extremely important to avoid pump overload and water hammer events, otherwise generated during abrupt closures caused by rapid water approach velocity and uncontrolled filling of the pump's raiser.



## Valves for industry and seawater



### Air valves in stainless steel/Duplex GOLIA series

- Combination air valve for industry in stainless steel Mod. GOLIA 3F 90
- Anti-shock combination air valve in stainless steel Mod. GOLIA 3F - AS 94
- Anti-surge combination air valve in stainless steel Mod. GOLIA 3F - RFP 98



### Air valves for industry and wastewater SCS series

- Wastewater combination air valve in stainless steel AISI 316 Mod. SCS 102
- Wastewater anti-shock combination air valve in AISI 316 Mod. SCS - AS 106



- GOLIA air valves range conveyance system bias kit Mod. SUB 110
- Version for air discharge only GOLIA - EO series 112
- Version for air entrance only GOLIA - IO series 112
- Version for air discharge only SCS - EO series 113
- Version for air entrance only SCS - IO series 113

### ■ Air release valve for high temperature Mod. VENTOLO - ST

Model for air release only. 114



### ■ Downstream pressure reducer-stabilizer for high temperatures Mod. VRCD - ST

The model reduces and stabilizes the downstream pressure to a constant value, regardless of flow rate and upstream pressure variations. 116



### ■ Pressure relief/sustaining valve for high temperatures Mod. VSM - ST

This model maintains and sustains a pre-set upstream pressure value, discharging any excess downstream. 120





## Combination air valve for industry Mod. GOLIA 3F

The CSA air valve Mod. Golia 3F will ensure the proper operation of the pipeline network allowing the release of air pockets during working conditions, the evacuation and entrance of large volumes of air during filling and draining operations.



Valves for industry

### Technical features and benefits

- Entirely made in high resistant materials suitable for industrial and aggressive environments.
- Mobile block composed of a cylindrical float and upper disk in solid polypropylene, that are joined together by the CSA air release system. The solid cylindrical floats avoid deformations and ensure a great sliding precision.
- Nozzle and gasket holder, part of CSA air release system, entirely made in AISI 316/Duplex and designed with gasket compression control to prevent aging process and consequent leakage during working conditions.
- Connection between the stand pipe and the components without any welded parts.
- Maintenance can be easily performed from the top, without removing the air valve from the pipe.
- Mesh and cap in stainless steel.
- High flow design with reduced turbulence thanks to the single chamber design.
- Supplied with flanged or threaded outlets including studs.

### Applications

- Seawater main transmission lines.
- Desalination plants.
- Demineralized water.
- Mining.
- Refineries and petrochemical plants.

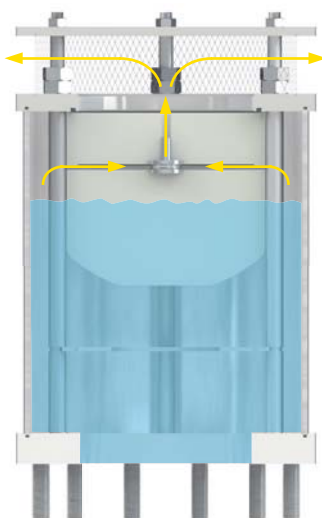


## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The Golia 3F, thanks to an aerodynamic full port body and deflector, will make sure to avoid premature closures of the mobile block during this phase.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

## Optional



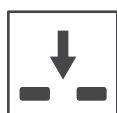
■ **Vacuum breaker version Mod. Golia 2F**, to allow the entrance and discharge of large volumes of air only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the air release won't be required.



■ **Version for submerged applications, SUB series**, available both for Golia 3F and 2F Models, with elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying spurts coming from the rapid closure of the air valve.



■ **Version for air discharge only EO series**, available both for Golia 3F and 2F models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided.

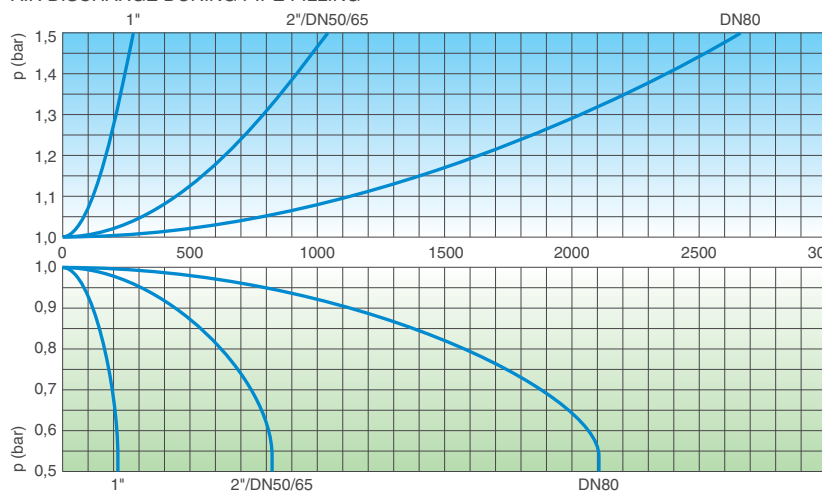


■ **Version for air entrance only IO series**, available for Golia 2F model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

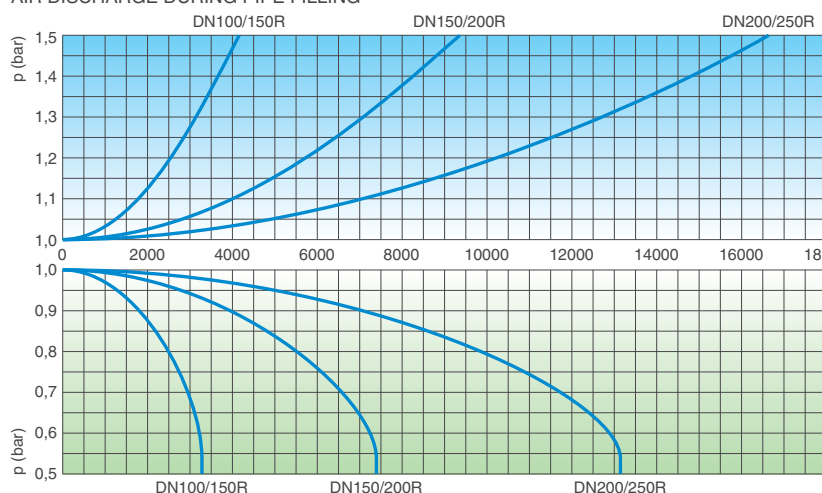
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING

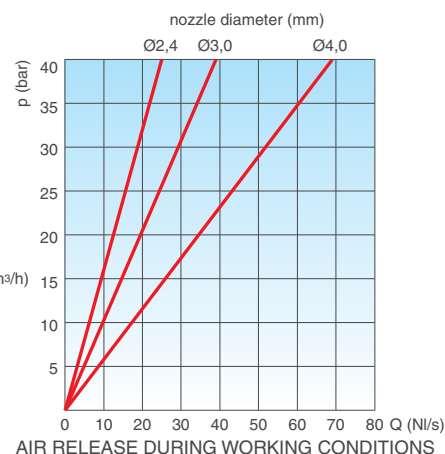
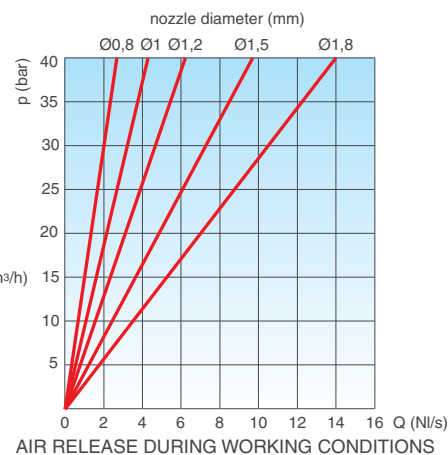


AIR ENTRANCE DURING PIPE DRAINING

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING



The air flow charts were created in Kg/s from laboratory tests and numerical analysis without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60°C.  
Max. pressure 40 bar.  
Min. pressure 0,2 bar. Lower pressure on request.  
Version for high temperatures on request.

### Standard

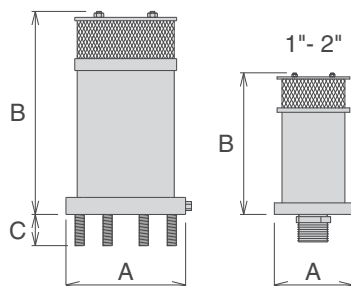
Designed in compliance with EN-1074/4 and AWWA C-512.  
Flanges according to EN 1092/2 or ANSI.  
Gaskets in NBR, EPDM or Viton.  
Changes and variations on the flanges and gaskets on request.

### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm	Weight Kg
Threaded 1"	95	200	-	6,4
Threaded 2"	165	255	-	6,4
Flanged 50	165	255	40	8,0
Flanged 65	185	255	40	8,0
Flanged 80	200	285	50	12,0
Flanged 100	235	335	50	17,0
Flanged 150R	235	385	50	27,0
Flanged 150	300	445	70	45,0
Flanged 200R	360	445	70	49,0
Flanged 200	360	515	70	62,0
Flanged 250R	405	515	70	72,0

R: reduced bore. Larger sizes available on request.

All values are approximate, consult CSA service for more details.

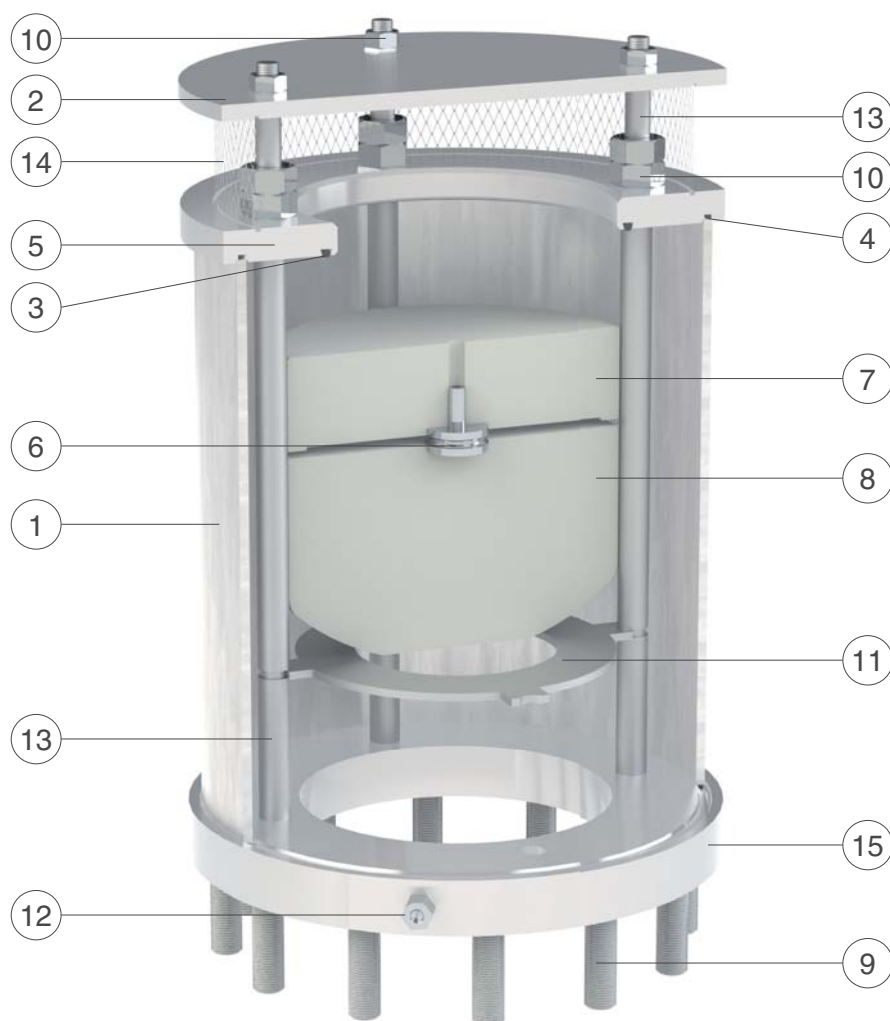


### Nozzle choice

	PN 10	PN 16	PN 25	PN 40
1"	1,2	1,2	1	0,8
2"/DN 50/65	1,5	1,2	1	0,8
DN 80	1,8	1,5	1,2	1
DN 100/150R	2,4	1,8	1,8	1,2
DN 150/200R	4	3	2,4	1,8
DN 200/250R	4	4	4	3

Nozzle diameter in mm according to the size of the air valve and the PN.

## Technical details



N.	Component	Standard material	Optional
1	Body	stainless steel AISI 316	s.s. Duplex/Super Dupl.
2	Cap	stainless steel AISI 304	stainless steel AISI 316
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 316	s.s. Duplex/Super Dupl.
6	Nozzle Subset	stainless steel AISI 316	stainless steel Duplex
7	Upper flat	polypropylene	
8	Float	polypropylene	
9	Studs	stainless steel AISI 304	stainless steel AISI 316
10	Bolts	stainless steel AISI 316	
11	Deflector	stainless steel AISI 316	s.s. Duplex/Super Dupl.
12	Drain valve	stainless steel AISI 316	
13	Spacers	stainless steel AISI 316	s.s. Duplex/Super Dupl.
14	Screen	stainless steel AISI 304	stainless steel AISI 316
15	Flange	stainless steel AISI 316	s.s. Duplex/Super Dupl.

The list of materials and components is subject to changes without notice.



# Anti-shock combination air valve for industry

## Mod. GOLIA 3F - AS

The CSA anti-shock, non slam, surge dampening combination air valve Mod. GOLIA 3F AS will allow the release of air pockets during working conditions, the entrance of large volumes of air during draining operations and pipeline bursts and the air discharge with controlled speed, to avoid potential damages due to water hammer.



### Technical features and benefits

- Entirely made in high resistant materials suitable for industrial and aggressive environments.
- Mobile block composed of a cylindrical float and upper disk in solid polypropylene, that are joined together by the CSA air release system. The solid cylindrical floats avoid deformations and ensure a great sliding precision.
- Nozzle and gasket holder, part of CSA air release system, entirely made in AISI 316/Duplex and designed with gasket compression control to prevent aging process and consequent leakage during working conditions.
- Anti-water hammer surge prevention system (also called AS function), never in contact with water, obtained by a spring and shaft in stainless steel, disk with adjustable sonic nozzles for air flow control.
- Mesh and cap in stainless steel.
- High flow design with reduced turbulence thanks to the single chamber design.
- Supplied with flanged or threaded outlets including studs.

### Applications

- Seawater main transmission lines. Desalination plants.
- Demineralized water.
- Mining.
- Refineries and petrochemical plants.
- To protect pumping stations and nodes of sewage main transmission lines exposed to water hammer and column separation in case of pump failure.

## Operating principle



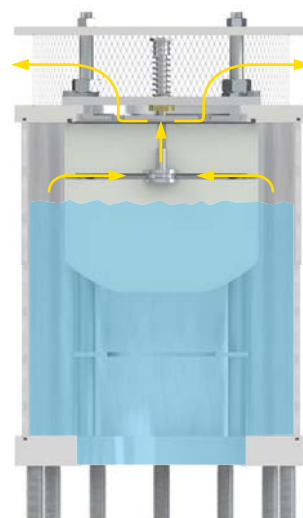
### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.



### Controlled air discharge

During the air discharge it is necessary to avoid rapid closures of the float, responsible of water hammer effects. The Golia 3F AS, thanks to the anti-shock feature, will control the air outflow thus reducing the velocity of the approaching water column and minimizing the risk of overpressure.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water level downwards allowing the air release through the nozzle.

## Optional



■ **Vacuum breaker version Mod. Golia 2F AS**, to allow the entrance of large volumes of air and the controlled outflow only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems.



■ **Version for submerged applications, SUB series**, available both for Golia 3F AS and 2F AS Models, with elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying spurts coming from the closure away from the air valve.



■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be modified on request according to the project conditions and the result of transient analysis.

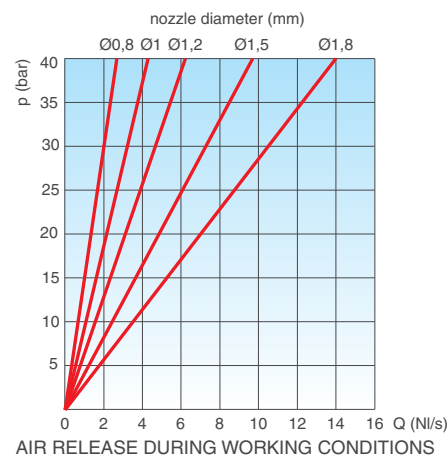
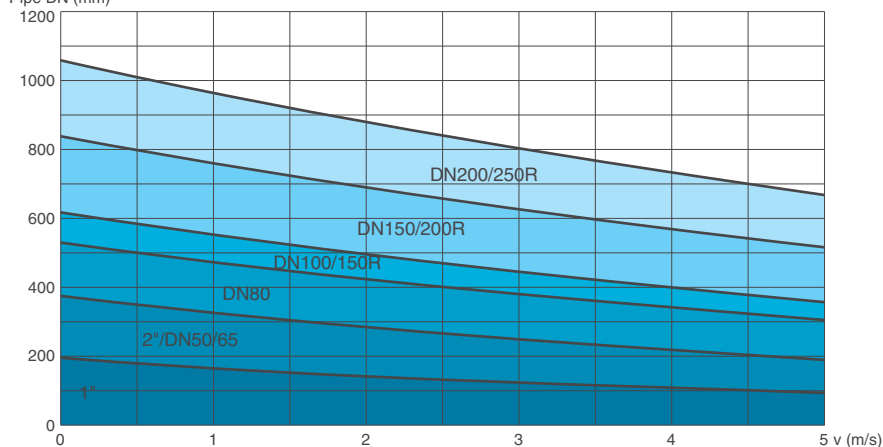


## Technical data

### Air valve selection chart

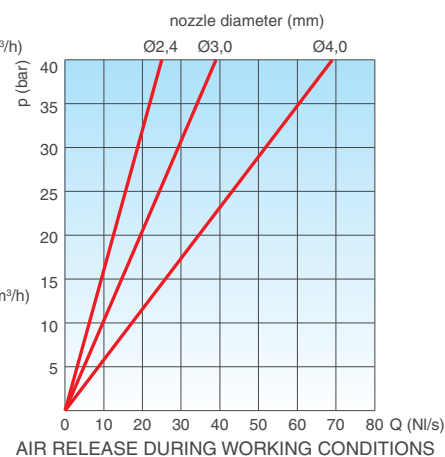
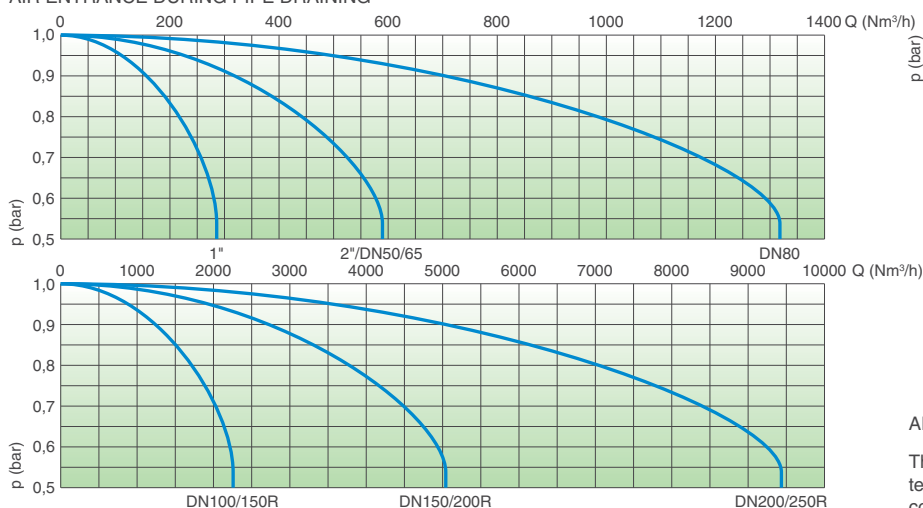
Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity in m/s.

Pipe DN (mm)



### Air flow performance charts

AIR ENTRANCE DURING PIPE DRAINING



The air flow charts were created in Kg/s from laboratory tests and numerical analysis without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60°C.  
Max. pressure 40 bar.  
Min. pressure 0,2 bar. Lower pressure on request.  
Version for high temperatures on request.

### Standard

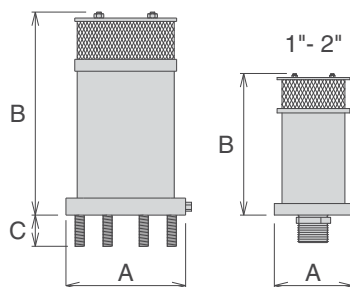
Designed in compliance with EN-1074/4 and AWWA C-512.  
Flanges according to EN 1092/2 or ANSI.  
Gaskets in NBR, EPDM or Viton.  
Changes and variations on the flanges and gaskets on request.

### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm	Weight Kg
Threaded 1"	95	200	-	6,4
Threaded 2"	165	255	-	6,4
Flanged 50	165	255	40	8,0
Flanged 65	185	255	40	8,0
Flanged 80	200	285	50	12,0
Flanged 100	235	335	50	17,0
Flanged 150R	235	385	50	27,0
Flanged 150	300	445	70	45,0
Flanged 200R	360	445	70	49,0
Flanged 200	360	515	70	62,0
Flanged 250R	405	515	70	72,0

R: reduced bore. Larger sizes available on request.

All values are approximate, consult CSA service for more details.

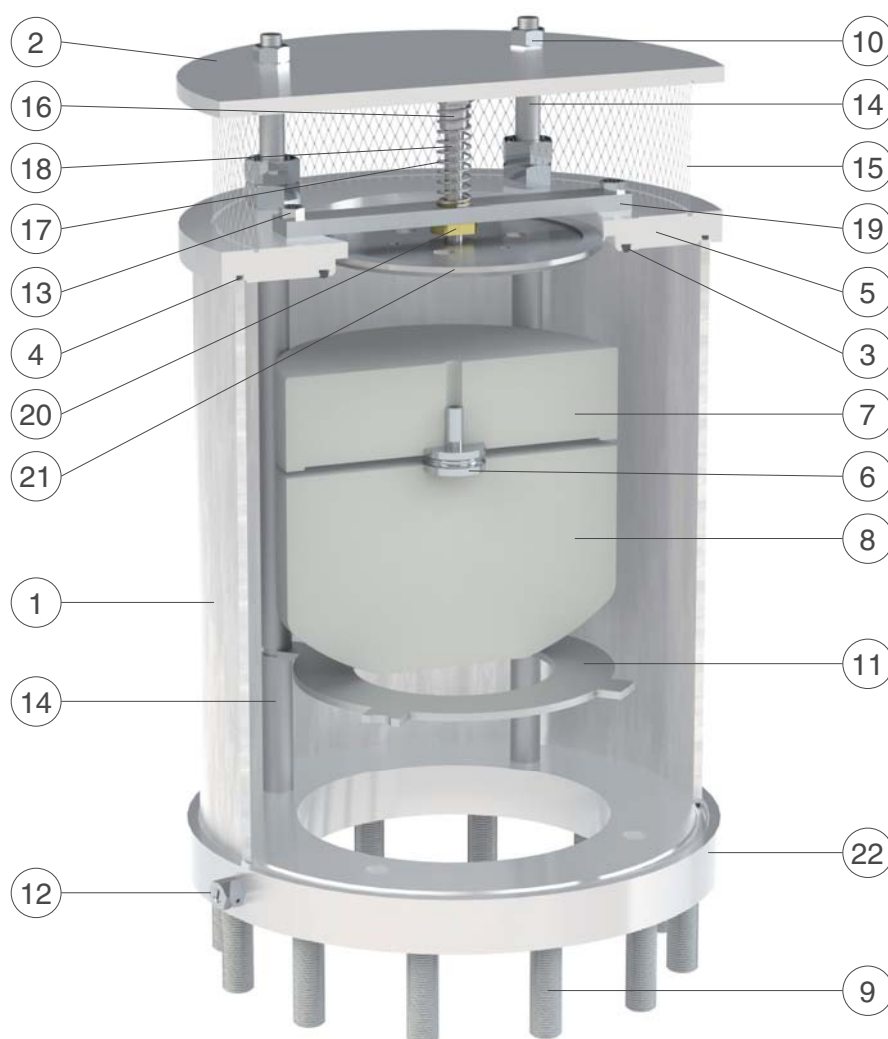


### Nozzle choice

	PN 10	PN 16	PN 25	PN 40
1"	1,2	1,2	1	0,8
2"/DN 50/65	1,5	1,2	1	0,8
DN 80	1,8	1,5	1,2	1
DN 100/150R	2,4	1,8	1,8	1,2
DN 150/200R	4	3	2,4	1,8
DN 200/250R	4	4	4	3

Nozzle diameter in mm according to the size of the air valve and the PN.

## Technical details



N.	Component	Standard material	Optional
1	Body	stainless steel AISI 316	s.s. Duplex/Super Dupl.
2	Cap	stainless steel AISI 304	stainless steel AISI 316
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 316	s.s. Duplex/Super Dupl.
6	Nozzle subset	stainless steel AISI 316	stainless steel Duplex
7	Upper flat	polypropylene	
8	Float	polypropylene	
9	Studs	stainless steel AISI 304	stainless steel AISI 316
10	Nuts	stainless steel AISI 316	
11	Deflector	stainless steel AISI 316	s.s. Duplex/Super Dupl.
12	Drainage valve	stainless steel AISI 316	
13	Screws (from DN 150R)	stainless steel AISI 316	
14	Spacers	stainless steel AISI 316	s.s. Duplex/Super Dupl.
15	Screen	stainless steel AISI 304	stainless steel AISI 316
16	Spring guide nut (from DN 100)	stainless steel AISI 303	stainless steel AISI 316
17	Spring	stainless steel AISI 302	stainless steel AISI 316
18	AS shaft	stainless steel AISI 303	stainless steel AISI 316
19	Spring support (from DN 150R)	stainless steel AISI 304	stainless steel AISI 316
20	Guiding nut (from DN 150R)	Delrin (polyoxymethylene)	
21	AS flat	stainless steel AISI 316	
22	Flange	stainless steel AISI 316	s.s. Duplex/Super Dupl.

The list of materials and components is subject to changes without notice.



# Anti-surge combination air valve for industry

## Mod. GOLIA 3F - RFP

The CSA surge dampening, anti-slam combination air valve Mod. GOLIA 3F RFP will ensure the proper operation of the system allowing the air release during working conditions, and the entrance of large volumes of air during draining. In addition to that this model will always control the air outflow within a safety limit, without the risk of water hammer.



### Technical features and benefits

- Uncontrolled pipeline filling operations and transient events will inevitably generate the rapid closure of the air valves installed along the system, with consequent damages. The CSA air valve GOLIA 3F RFP will automatically adjust the outflow capacity, thus reducing the velocity of the incoming water column minimizing the risk of water hammer.
- The spray effect during closure and the risk of drowning, compared to standard combination air valves, are reduced.
- Entirely made in high resistant materials suitable for industrial and aggressive environments.
- Mobile block composed of a cylindrical float and obturator, joined together by the CSA air release system, along with the upper disk all made in solid polypropylene. The solid cylindrical floats, obtained by CNC machining, avoid deformations and ensure a great sliding precision.
- Nozzle and gasket holder, part of CSA air release system, entirely made in AISI 316/Duplex and designed with gasket compression control to prevent aging process and consequent leakage during working conditions.

### Applications

- Seawater main transmission lines.
- Desalination plants.
- Demineralized water.
- Mining.
- Refineries and petrochemical plants.

## Operating principle



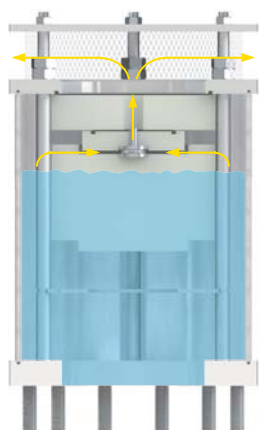
### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as water flows in. The Golia 3F RFP, thanks to an aerodynamic full port body and deflector, will make sure to avoid premature closures of the mobile block during this phase.



### Controlled outflow

If the differential pressure of air, during pipe filling, increases above a certain value without control, the RFP upper float will rise automatically, reducing the outflow and consequently the velocity of the approaching water column to avoid the risk of water hammer and damages to the system.



### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part of the air valve. Little by little it is compressed and the pressure arrives to water pressure, therefore its volume increases pushing the water downwards allowing the air release through the nozzle.



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing water to avoid negative pressure and serious damages to the pipeline, and to the entire system.

## Optional



■ **Vacuum breaker version Mod. Golia 2F RFP**, to allow the entrance of large volumes of air and the controlled outflow only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the water hammer effect has to be reduced without the necessity of air release.



■ **Version for submerged applications, SUB series**, available both for Golia 3F RFP and 2F RFP Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying spurts coming from the closure away from the air valve.

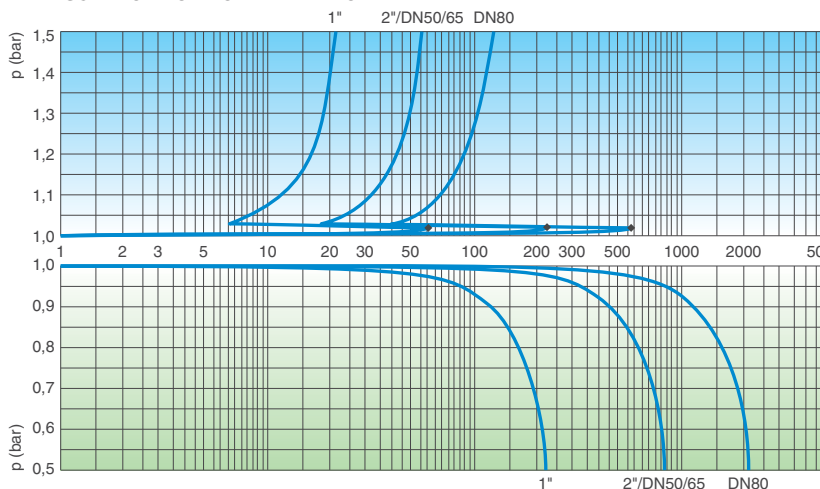


■ **Version for air discharge only EO series**, available both for Golia 3F RFP and 2F RFP models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided.

## Technical data

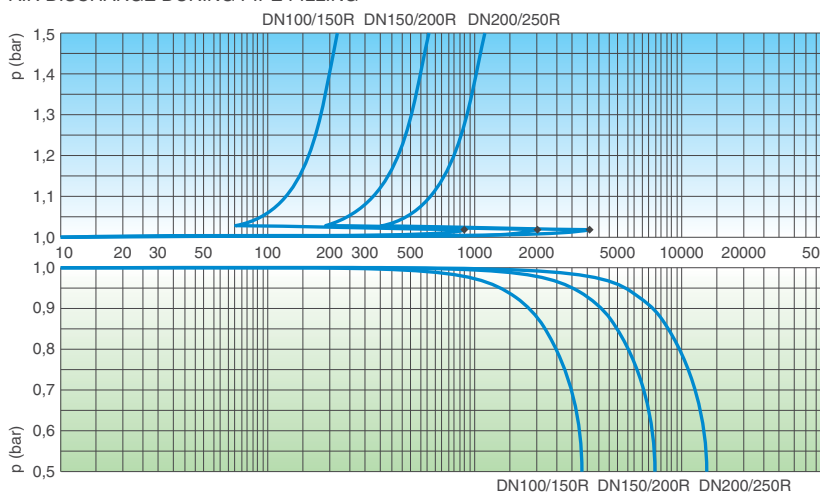
### Air flow performance charts

#### AIR DISCHARGE DURING PIPE FILLING

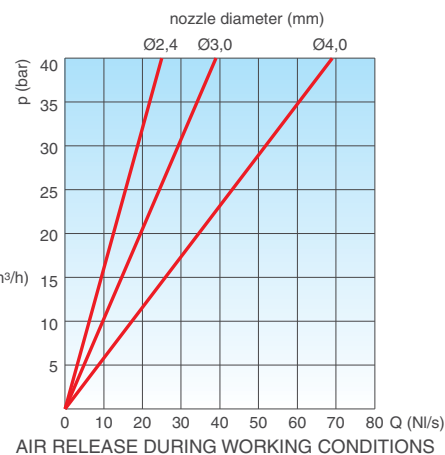
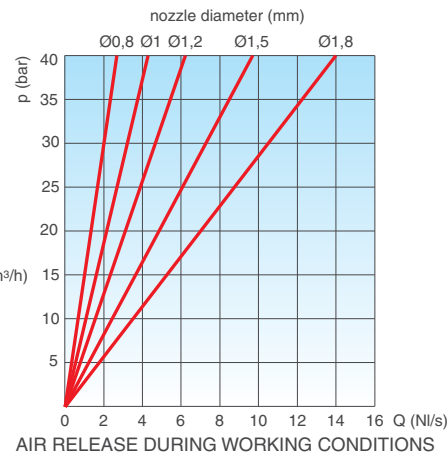


#### AIR ENTRANCE DURING PIPE DRAINING

#### AIR DISCHARGE DURING PIPE FILLING



#### AIR ENTRANCE DURING PIPE DRAINING



The air flow charts were created in Kg/s from laboratory tests and numerical analysis without the screen, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water max. 60°C.  
Max. pressure 40 bar.  
Min. pressure 0,2 bar. Lower pressure on request.  
Version for high temperatures on request.

### Standard

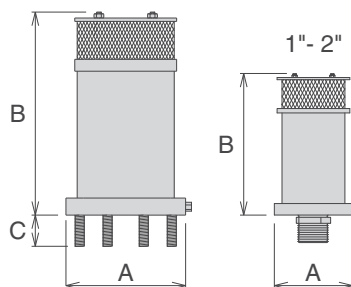
Designed in compliance with EN-1074/4 and AWWA C-512.  
Flanges according to EN 1092/2 or ANSI.  
Gaskets in NBR, EPDM or Viton.  
Changes and variations on the flanges and gaskets on request.

### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm	Weight Kg
Threaded 1"	95	200	-	6,4
Threaded 2"	165	255	-	6,4
Flanged 50	165	255	40	8,0
Flanged 65	185	255	40	8,0
Flanged 80	200	285	50	12,0
Flanged 100	235	335	50	17,0
Flanged 150R	235	385	50	27,0
Flanged 150	300	445	70	45,0
Flanged 200R	360	445	70	49,0
Flanged 200	360	515	70	62,0
Flanged 250R	405	515	70	72,0

R: reduced bore. Larger sizes available on request.

All values are approximate, consult CSA service for more details.



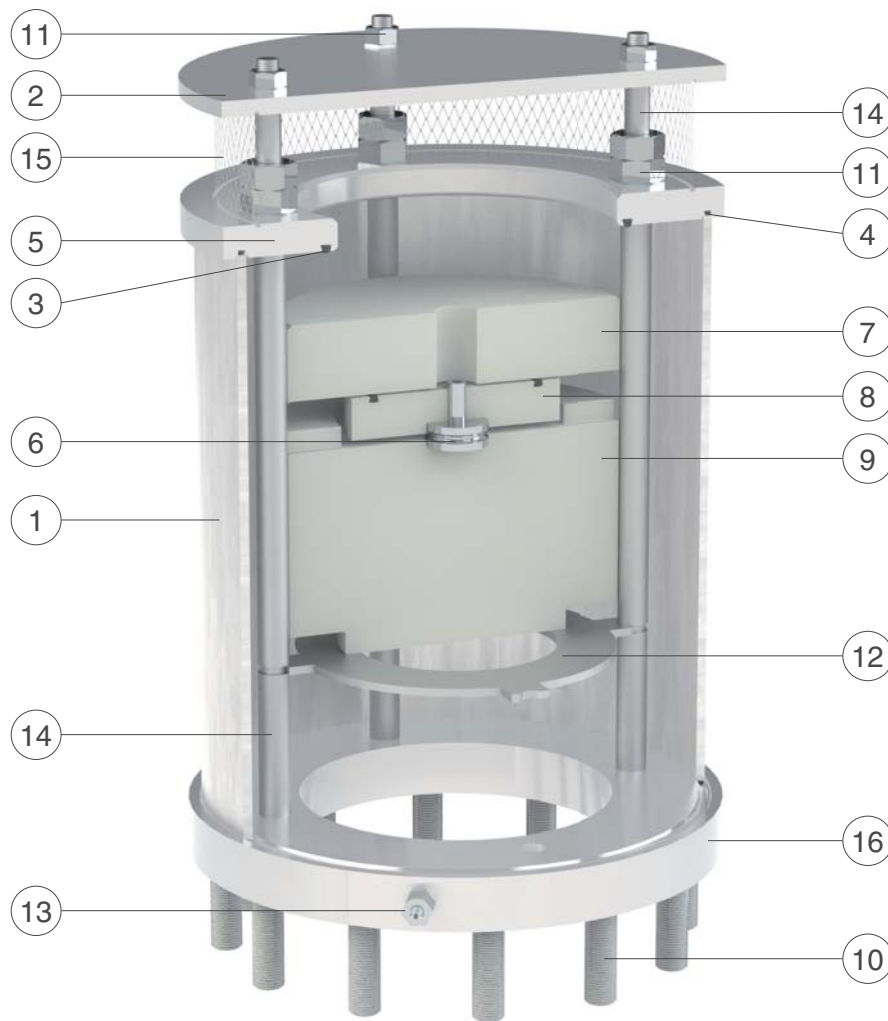
### Nozzle choice

	PN 10	PN 16	PN 25	PN 40
1"	1,5	1,2	1	0,8
2"/DN 50/65	1,8	1,5	1,2	1
DN 80	1,8	1,5	1,2	1
DN 100/150R	3	2,4	1,8	1,2
DN 150/200R	4	3	2,4	1,8
DN 200/250R	4	4	4	3

Nozzle diameter in mm according to the size of the air valve and the PN.



## Technical details



N.	Component	Standard material	Optional
1	Body	stainless steel AISI 316	s.s. Duplex/Super Dupl.
2	Cap	stainless steel AISI 304	stainless steel AISI 316
3	O-ring	NBR	EPDM/Viton/silicone
4	O-ring	NBR	EPDM/Viton/silicone
5	Seat	stainless steel AISI 316	s.s. Duplex/Super Dupl.
6	Nozzle Subset	stainless steel AISI 316	stainless steel Duplex
7	RFP flat	polypropylene	
8	Upper flat	polypropylene	
9	Float	polypropylene	
10	Studs	stainless steel AISI 304	stainless steel AISI 316
11	Bolts	stainless steel AISI 316	
12	Deflector	stainless steel AISI 316	s.s. Duplex/Super Dupl.
13	Drain valve	stainless steel AISI 316	
14	Spacers	stainless steel AISI 316	s.s. Duplex/Super Dupl.
15	Screen	stainless steel AISI 304	stainless steel AISI 316
16	Flange	stainless steel AISI 316	s.s. Duplex/Super Dupl.

The list of materials and components is subject to changes without notice.

## Wastewater combination air valve for industry in stainless steel AISI 316 - Mod. SCS

The air valve guarantees the proper operation of sewage/industrial lines allowing the entrance of large quantity of air in case of pipe bursting or draining, the release of air pockets during working conditions and the discharge during pipe filling.



### Technical features and benefits

- Lower body in AISI 316 designed with strongly sloped funnel shaped walls to avoid grease or other material deposit.
- Upper body in AISI 316 containing the air release device in stainless steel, protected against possible projections and spurts during rapid filling phases, by a stainless steel deflector.
- Mobile block including a shaft and a large float, both in stainless steel AISI 316, placed on the lower body and connected to the air release mechanism and to the main orifice obturator.
- Drainage valve for chamber control and draining.
- Maintenance can be easily performed from the top without removing the air valve from the pipe.
- Evacuation threaded elbow suitable for flooded environments with 1" threaded outlet.

### Applications

- Industrial and civil plants in presence of liquid with solids and debris.
- Mining.
- Deep well boreholes.
- Special version for coal seam gas.

## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as liquid flows in. The SCS, thanks to an aerodynamic body and deflector, will make sure to avoid premature closures of the mobile block during this phase.

### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part. Little by little it is compressed and its volume increases, pushing the liquid level downwards allowing the air release through the nozzle.

### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing liquid, to avoid negative pressure and serious damages of the pipeline and the entire system.

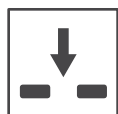
## Optional



■ **Vacuum breaker version Mod. SCS 2F**, to allow the entrance and discharge of large volumes of air only. This model is normally recommended in changes in slope ascending, long ascending segments, and wherever the air release won't be required.



■ **Version for air discharge only SCS EO series (on request)**, available both for SCS and SCS 2F models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air entrance must be avoided.

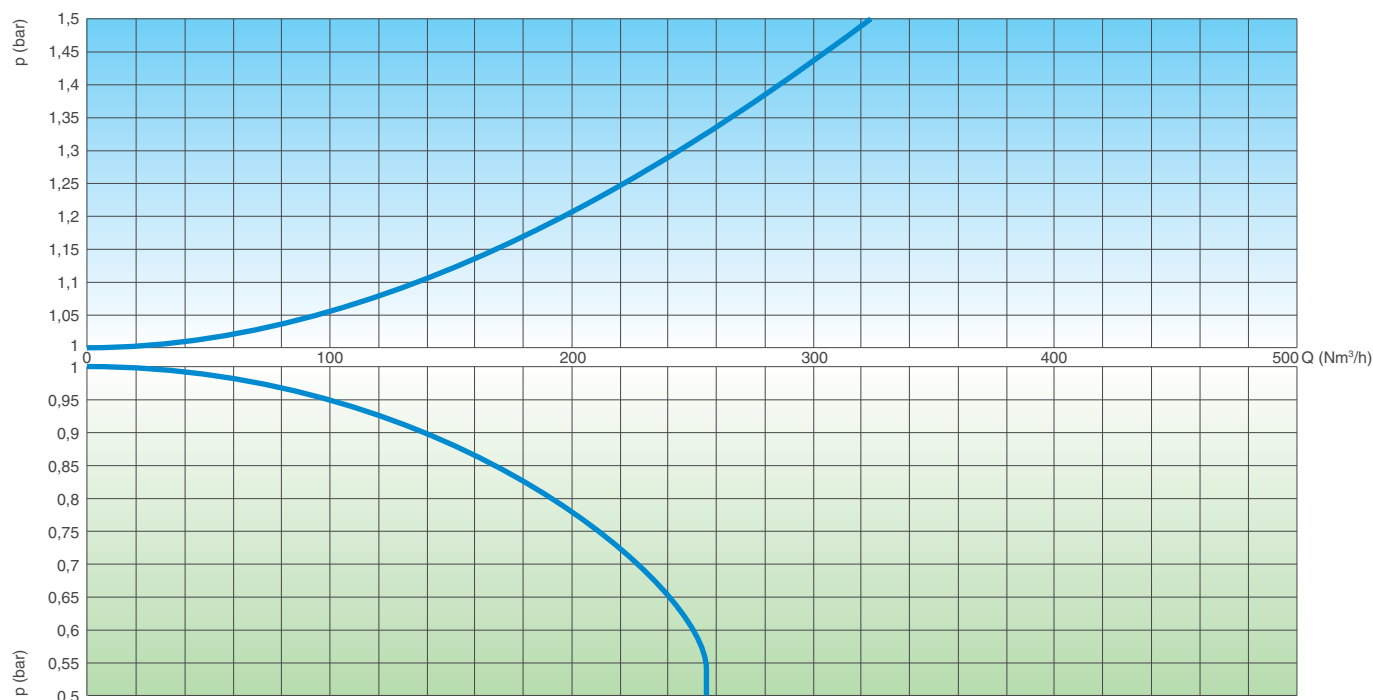


■ **Version for air entrance only SCS IO series**, available for vacuum breaker model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm³/h using a safety factor.

### Working conditions

Treated water and wastewater max. 60°C.

Maximum pressure 16 bar.

Minimum pressure 0,2 bar. Lower on request.

Version for high temperature available on request.

### Standard

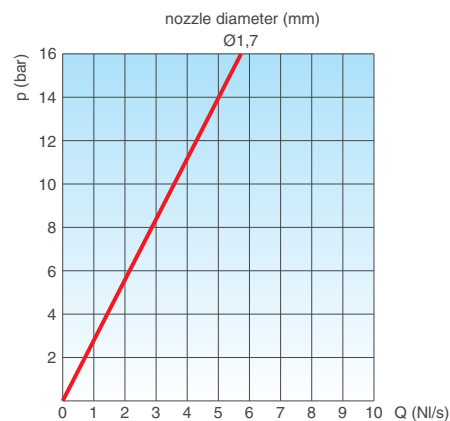
Certified and tested in compliance with EN 1074/4.

Manufactured with 2" inlet; supplied on request

with flanges according to EN 1092/2 or ANSI.

Changes on the flanges details on request.

AIR RELEASE DURING WORKING CONDITIONS



### Nozzle choice

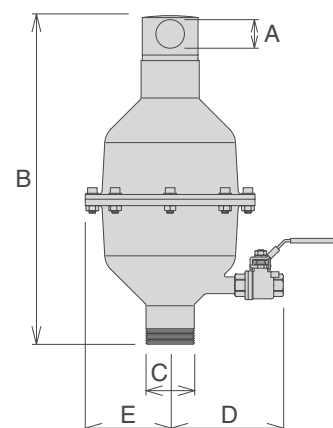
Nozzle diameter in mm according to the PN of the air valve.

PN 10	PN 16
1,7	1,7

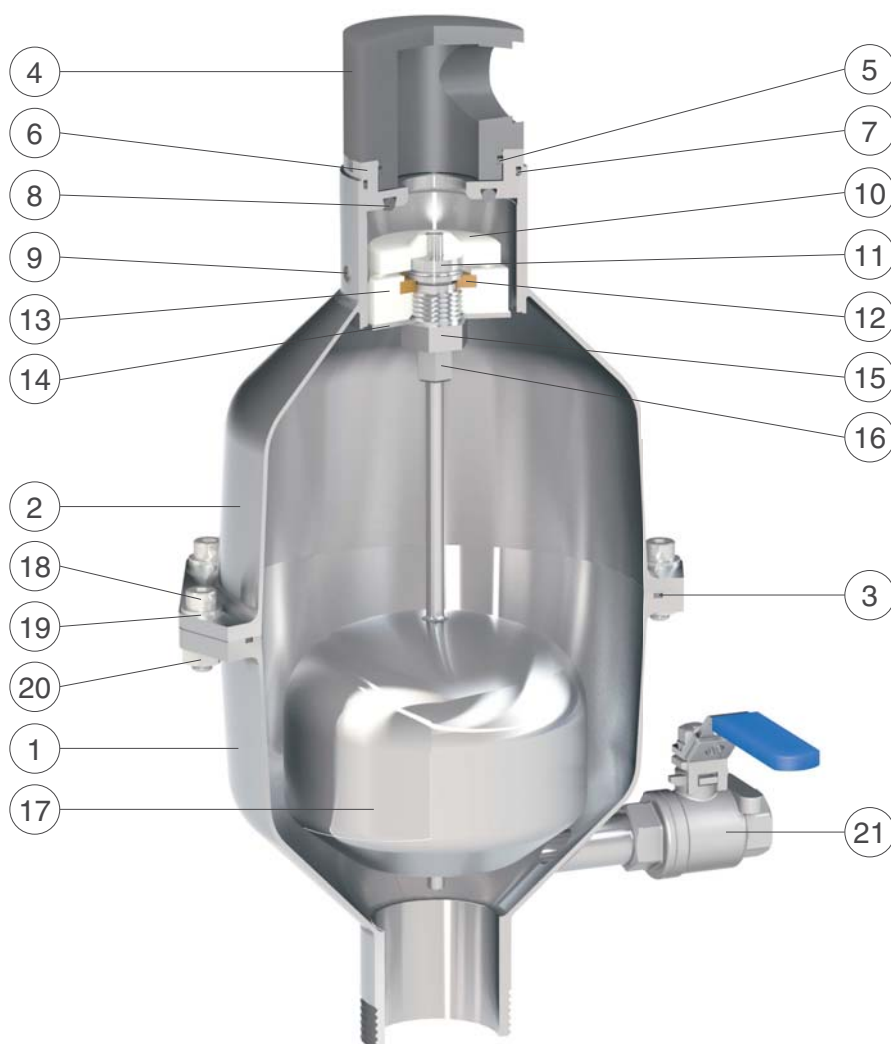
### Weight and dimensions

C inch	A inch	B mm	D mm	E mm	Main orifice mm²	Nozzle orifice mm²	Weight Kg
2"	1"	415	137	106,5	490	2,3	4

All values are approximate, consult CSA service for more details.



## Technical details



N.	Component	Standard material	Optional
1	Lower body	stainless steel AISI 316	
2	Upper body	stainless steel AISI 316	
3	O-ring	NBR	EPDM/Viton/silicone
4	Cap	PVC	
5	O-ring	NBR	EPDM/Viton/silicone
6	Seat	stainless steel AISI 316	
7	O-ring	NBR	EPDM/Viton/silicone
8	Seat gasket	NBR	EPDM/Viton/silicone
9	Plug	stainless steel AISI 316	
10	Obturator	polypropylene	
11	Nozzle subset	stainless steel AISI 316	
12	Plane gasket	NBR	
13	Lower gasket holder	polypropylene	
14	Deflector	stainless steel AISI 316	
15	Guiding nut	stainless steel AISI 316	
16	Upper gasket holder	stainless steel AISI 316	
17	Float	stainless steel AISI 316	
18	Screws	stainless steel AISI 304	stainless steel AISI 316
19	Washers	stainless steel AISI 304	stainless steel AISI 316
20	Nuts	stainless steel AISI 304	stainless steel AISI 316
21	Drain valve	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.





# Wastewater anti-shock combination air valve in stainless steel AISI 316 - Mod. SCS - AS

The CSA anti-shock, non slam, surge dampening combination air valve guarantees the proper operation of sewage lines allowing the entrance of large air quantity in case of pipe bursting or draining, the release of air pockets during working conditions and the controlled air outflow speed to prevent surge effects.



## Technical features and benefits

- Lower body in AISI 316 designed with strongly sloped funnel shaped walls to avoid grease and other material deposit.
- Upper body in AISI 316 containing the air release device protected against possible projections and spurts during rapid filling phases, by a stainless steel deflector.
- Mobile block including a shaft and a large float, both in stainless steel AISI 316, placed on the lower body and connected to the air release mechanism and to the main orifice obturator.
- Anti-Shock automatism, never in contact with the fluid, is composed of a metallic disk with 2 or more adjustable orifices, a guide bar and a counteracting spring in stainless steel.
- Drainage valve for chamber control and draining.
- Maintenance can easily be performed from the top without removing the air valve from the pipe.
- Evacuation threaded elbow suitable for flooded environments with 1" threaded outlet.

## Applications

- Industrial and civil plants, exposed to water hammer events, in presence of liquid with solids and debris.
- Mining.
- Deep well boreholes.
- Special version for coal seam gas.

## Operating principle



### Entrance of large volumes of air

During pipeline draining, or pipe bursts, it is necessary to bring in as much air as the quantity of outflowing liquid, to avoid negative pressure and serious damages to the pipeline and the entire system.

### Controlled air discharge

During the pipe filling it is necessary to avoid rapid closures of the mobile block, responsible of water hammer effects. The SCS AS will control the air outflow reducing the water approach velocity and thus minimizing the risk of overpressure.

### Air release during working conditions

During operation the air produced by the pipeline is accumulated in the upper part. Little by little it is compressed and its volume increases, pushing the liquid level downwards allowing the air release through the nozzle.

## Optional



■ **Vacuum breaker version**, to allow the entrance of large volumes of air only with the anti water hammer feature. This model is normally recommended at the pumps and in changes in slope ascending, long ascending segments exposed to transients events. More in general wherever air release won't be required still providing some protection against water hammer.

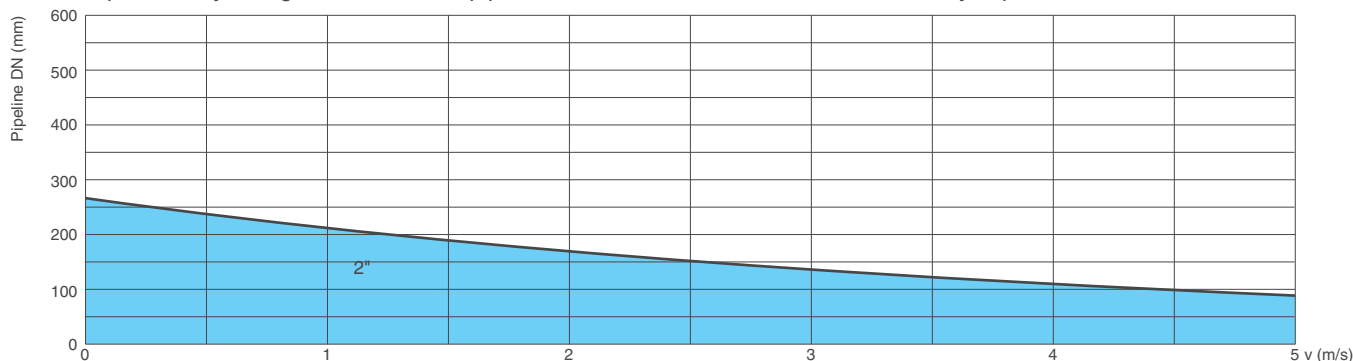


■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be modified on request according to the project conditions and the transient analysis.

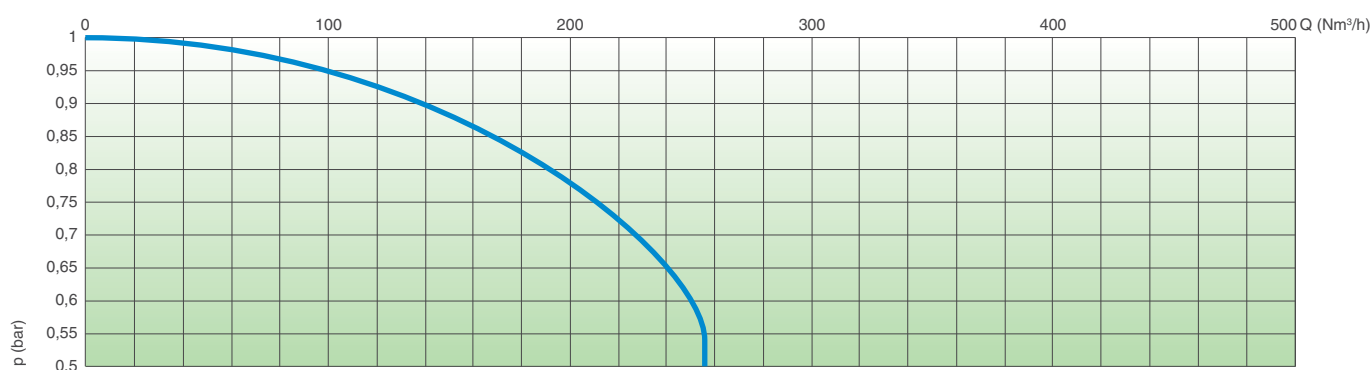
## Technical data

### Air valve selection chart

Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity expressed in m/s.



### Air flow performance chart



AIR ENTRANCE DURING PIPE DRAINING

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm<sup>3</sup>/h using a safety factor.

### Working conditions

Treated water and wastewater max. 60°C.

Maximum pressure 16 bar.

Minimum pressure 0,2 bar. Lower on request.

Version for high temperature available on request.

### Standard

Certified and tested in compliance with EN 1074/4.

Manufactured with 2" inlet; supplied on request

with flanges according to EN 1092/2 or ANSI.

Changes on the flanges details on request.

### Nozzle choice

Nozzle diameter in mm according to the PN of the air valve.

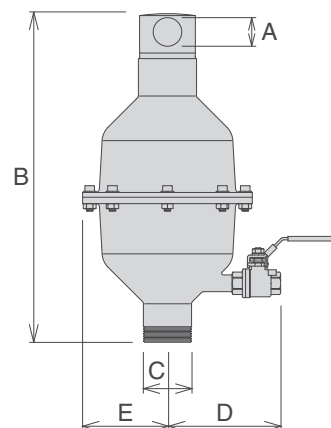
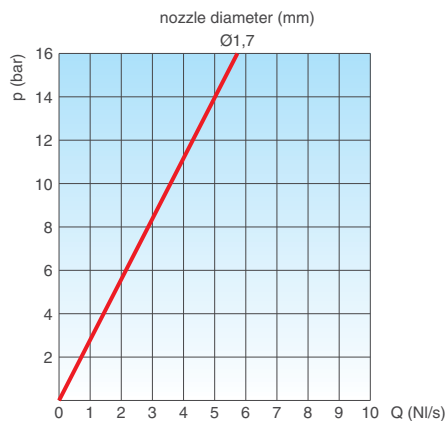
PN 10	PN 16
1,7	1,7

### Weight and dimensions

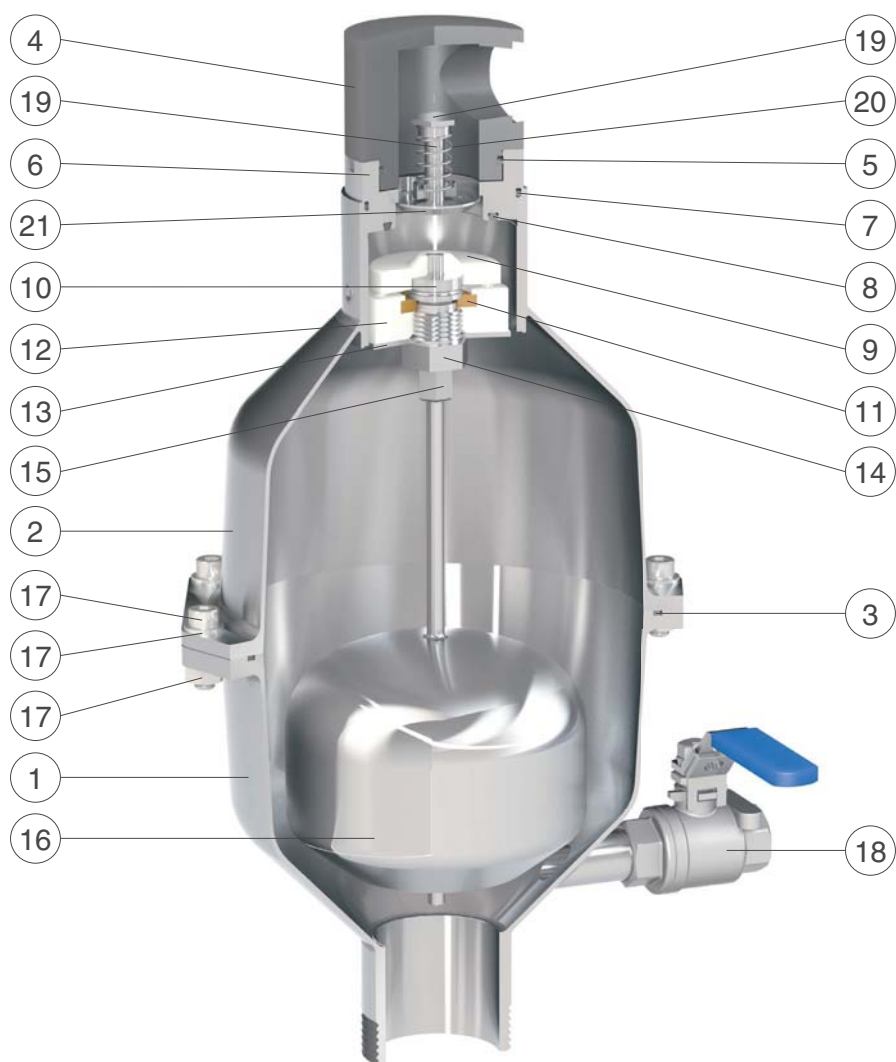
C inch	A inch	B mm	D mm	E mm	Main orifice mm <sup>2</sup>	Nozzle orifice mm <sup>2</sup>	Weight Kg
2"	1"	421	137	106,5	490	2,3	4

All values are approximate, consult CSA service for more details.

### AIR RELEASE DURING WORKING CONDITIONS



## Technical details



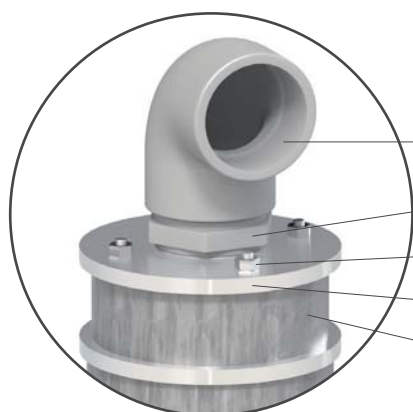
N.	Component	Standard material	Optional
1	Lower body	stainless steel AISI 316	
2	Upper body	stainless steel AISI 316	
3	O-ring	NBR	EPDM/Viton/silicone
4	Cap	PVC	
5	O-ring	NBR	EPDM/Viton/silicone
6	Seat	stainless steel AISI 316	
7	O-ring	NBR	EPDM/Viton/silicone
8	Seat gasket	NBR	EPDM/Viton/silicone
9	Obturator	polypropylene	
10	Nozzle subset	stainless steel AISI 316	
11	Plane gasket	NBR	
12	Lower gasket holder	polypropylene	
13	Deflector	stainless steel AISI 316	
14	Guiding nut	stainless steel AISI 316	
15	Upper gasket holder	stainless steel AISI 316	
16	Float	stainless steel AISI 316	
17	Screws, washers and nuts	stainless steel AISI 304	stainless steel AISI 316
18	Drain valve	stainless steel AISI 316	
19	AS shaft	stainless steel AISI 316	
20	Spring	stainless steel AISI 302	
21	AS flat	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.

# GOLIA air valves range

## conveyance system bias kit - Mod. SUB

The air conveyance system SUB, provided with watertight threaded elbow for submerged applications, has been created to be retrofitted on existing CSA GOLIA air valves or as a standalone version. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is the possibility of conveying spurts coming from the rapid closure of the air valve.



**Plastic elbow for 1", 2", DN 50-200R**

Threaded elbow in PVC (PP for 1", 2", DN 50-65)

Fitting in PVC (PP for 1", 2", DN 50-65)

Nuts in stainless steel

SUB flat in stainless steel

SUB extension in stainless steel



**Elbow in stainless steel for DN 200 and 250R**

SUB flat and elbow in stainless steel

Nuts in stainless steel

SUB extension in stainless steel

### Technical data

#### Working conditions

Treated water max. 60°C.  
Max. pressure 40 bar.  
Min. pressure 0,2 bar. Lower on request.  
Version for high temperatures on request.

#### Standard

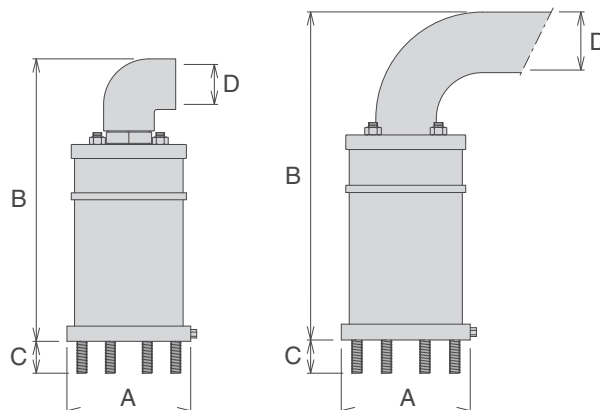
Certified and tested in compliance with EN 1074/4.  
Flanges according to EN 1092/2 or ANSI.  
Gaskets in NBR, EPDM or Viton.  
Changes and variations on the flanges and gaskets on request.

#### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm	D inch	Weight Kg
Threaded 1"	95	285	-	1"	7,0
Threaded 2"	165	380	-	2"	7,7
Flanged 50	165	380	40	2"	9,3
Flanged 65	185	380	40	2"	9,3
Flanged 80	200	435	50	2" 1/2	13,4
Flanged 100	235	510	50	3"	19,7
Flanged 150R	235	560	50	3"	29,7
Flanged 150	300	650	70	4"	51,4
Flanged 200R	360	650	70	4"	55,4
Flanged 200	360	830	70	6"	78,3
Flanged 250R	405	830	70	6"	88,3

R: reduced bore. - Larger sizes available on request. - Approximate values.

Mod. SUB is stock available up to DN 200R, for larger sizes consult with CSA.

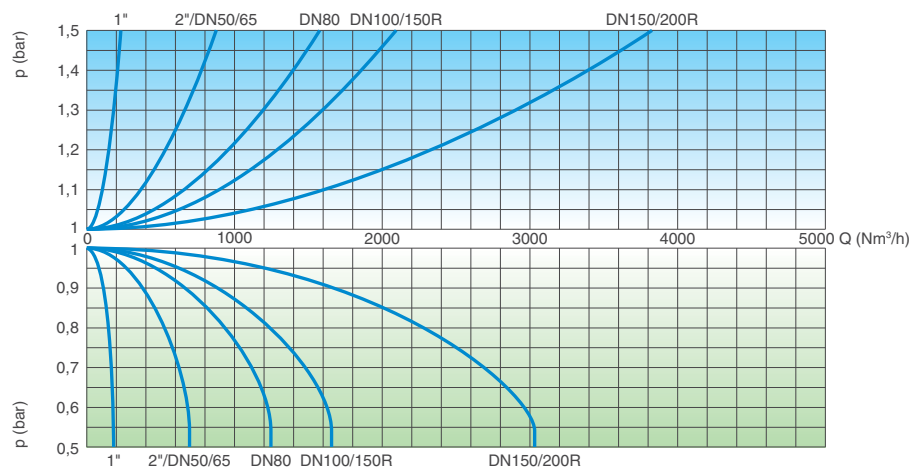




## Technical data

### GOLIA SUB - Air flow performance charts

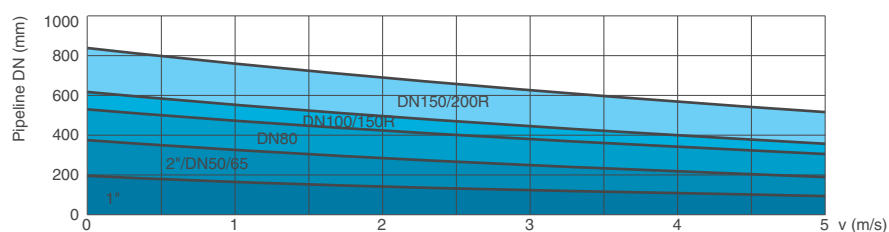
#### AIR DISCHARGE DURING PIPE FILLING



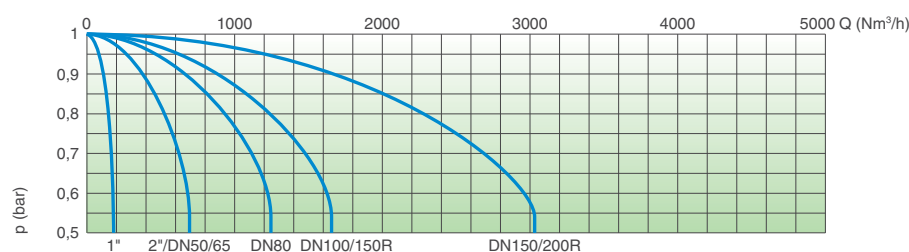
#### AIR ENTRANCE DURING PIPE DRAINING

### GOLIA AS SUB - Air valve selection chart

Air valve preliminary sizing as a function of pipeline internal diameter and fluid flow velocity in m/s.



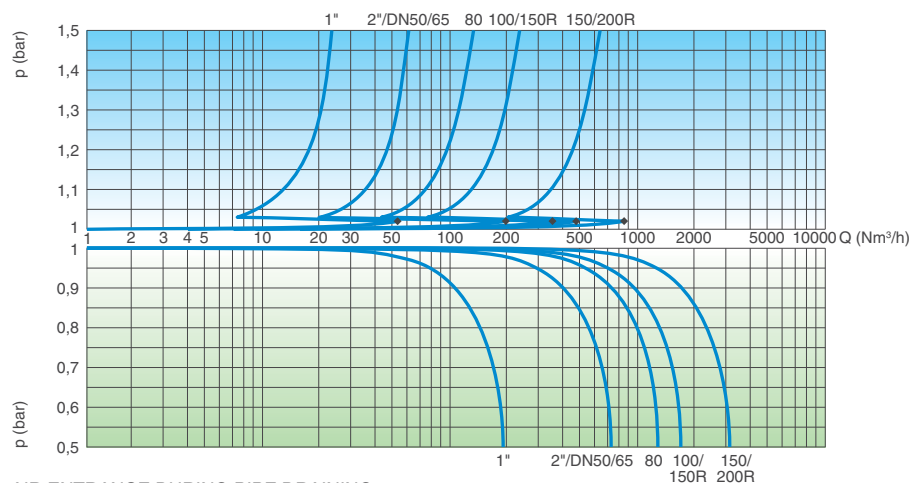
### GOLIA AS SUB - Air flow performance chart



#### AIR ENTRANCE DURING PIPE DRAINING

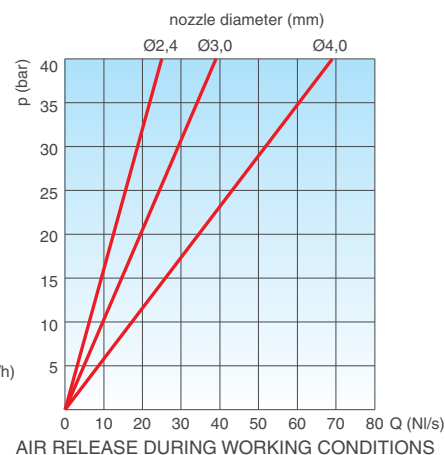
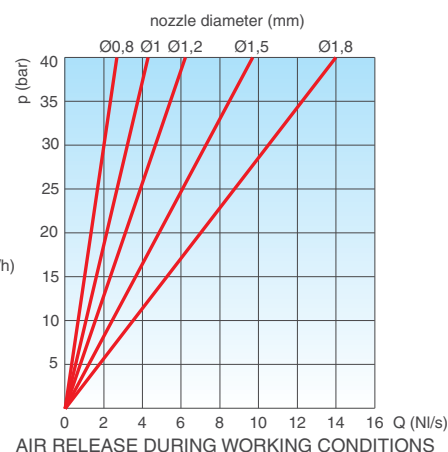
### GOLIA RFP SUB - Air flow performance charts

#### AIR DISCHARGE DURING PIPE FILLING



#### AIR ENTRANCE DURING PIPE DRAINING

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in Nm³/h using a safety factor.



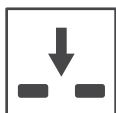
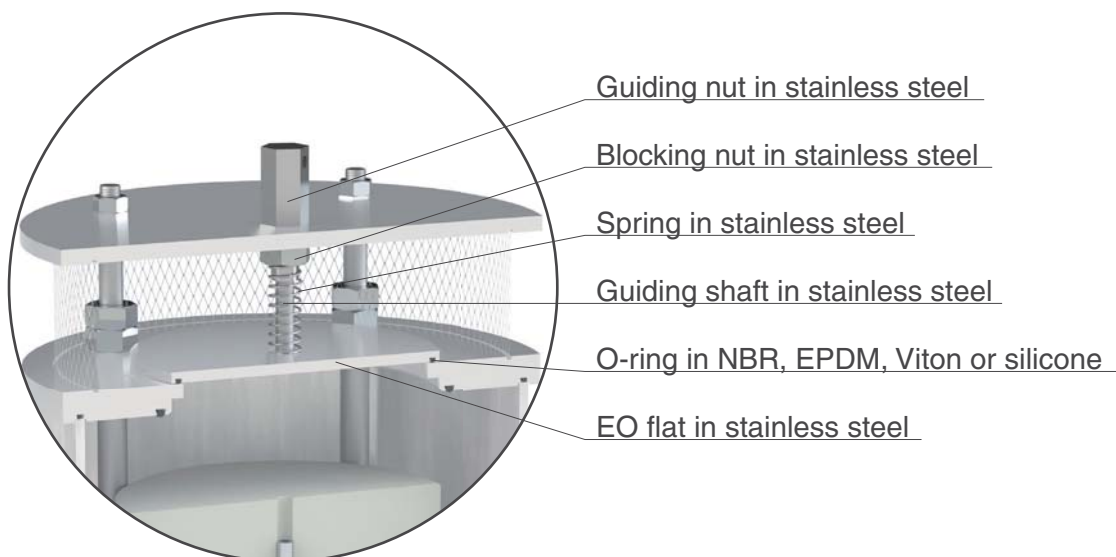
### Nozzle choice

For the nozzle choice make reference to the available technical data sheets of the GOLIA models.



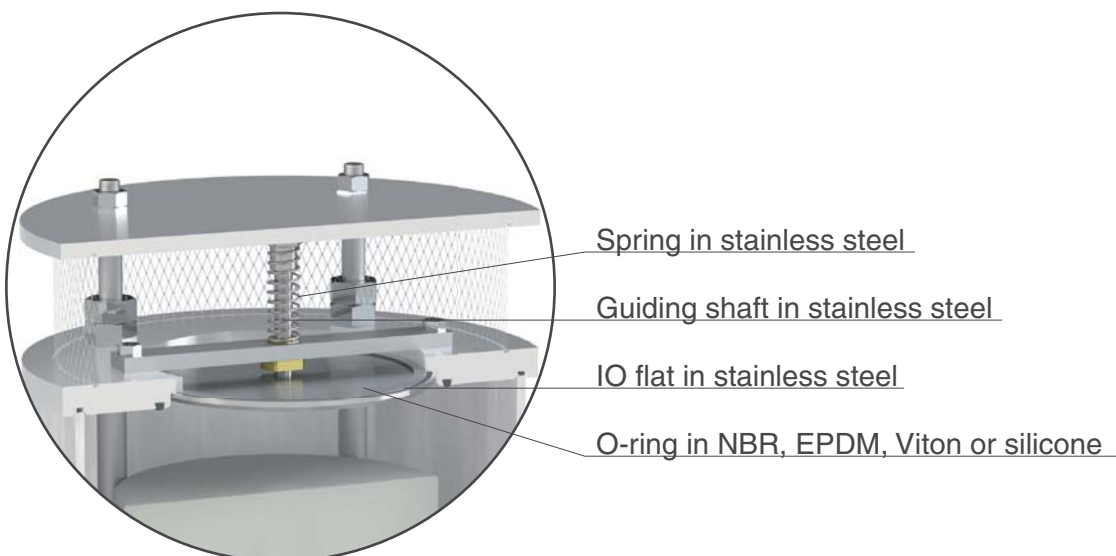
## Version for air discharge only GOLIA - EO series

**Version for air discharge only EO series**, available both for GOLIA 3F and 2F models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and whenever for project requirements air entrance must be avoided.



## Version for air entrance only GOLIA - IO series

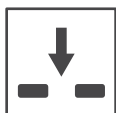
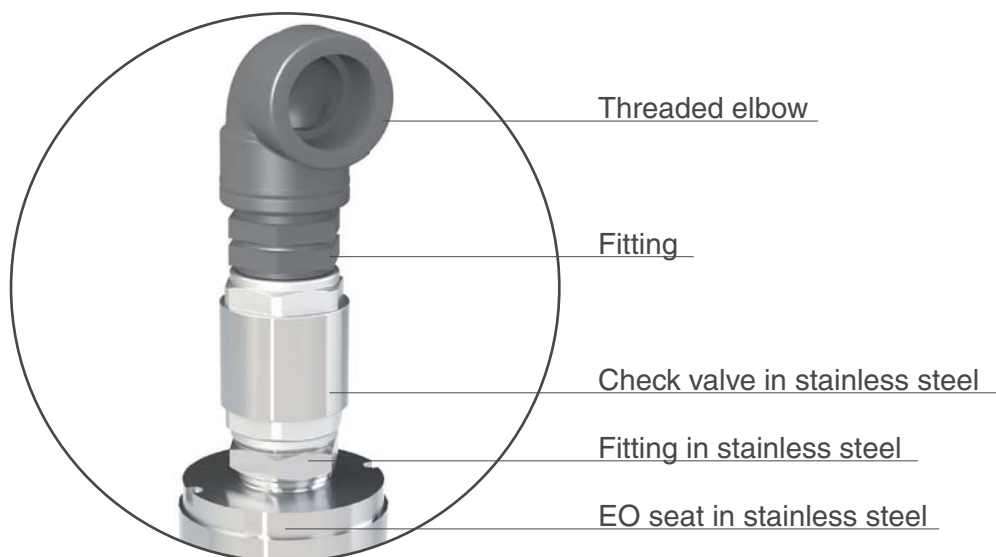
**Version for air entrance only IO series**, available for GOLIA 2F model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.





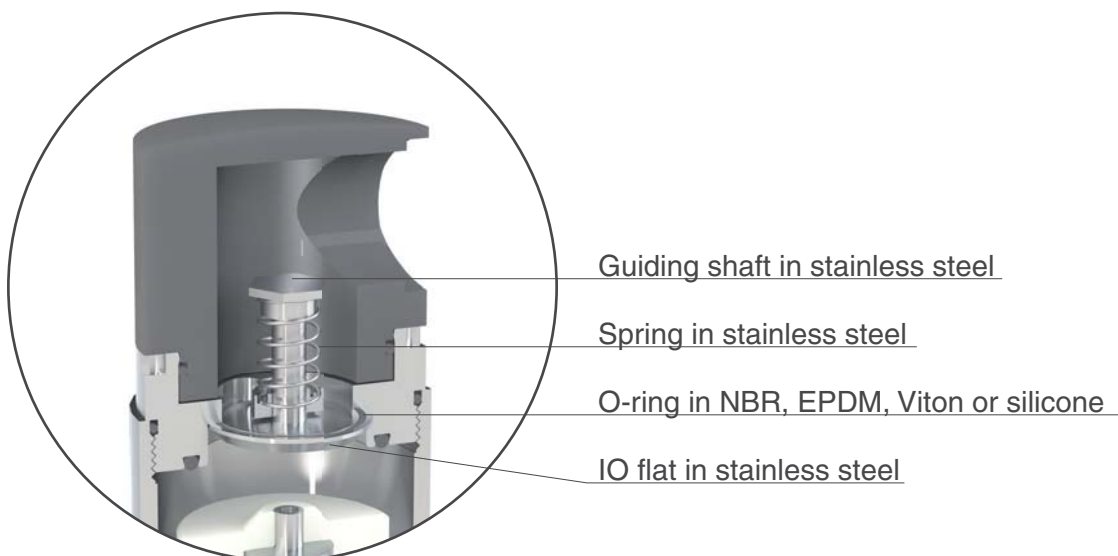
## Version for air discharge only SCS - EO series

**Version for air discharge only EO series (on request)**, available both for SCS and SCS 2F models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and whenever for project requirements air entrance must be avoided. The threaded elbow is normally produced in plastic, available on request in different materials.



## Version for air entrance only SCS - IO series

**Version for air entrance only IO series**, available for vacuum breaker model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.





## Air release valve for high temperature Mod. VENTOLO ST

The CSA single function, automatic air release valve Ventolo will ensure the proper operation of the system allowing the release of air pockets accumulated during working conditions. Thanks to the nickel coating of the main components and special gaskets, it is suitable for high temperatures and pressures up to 40 bar.



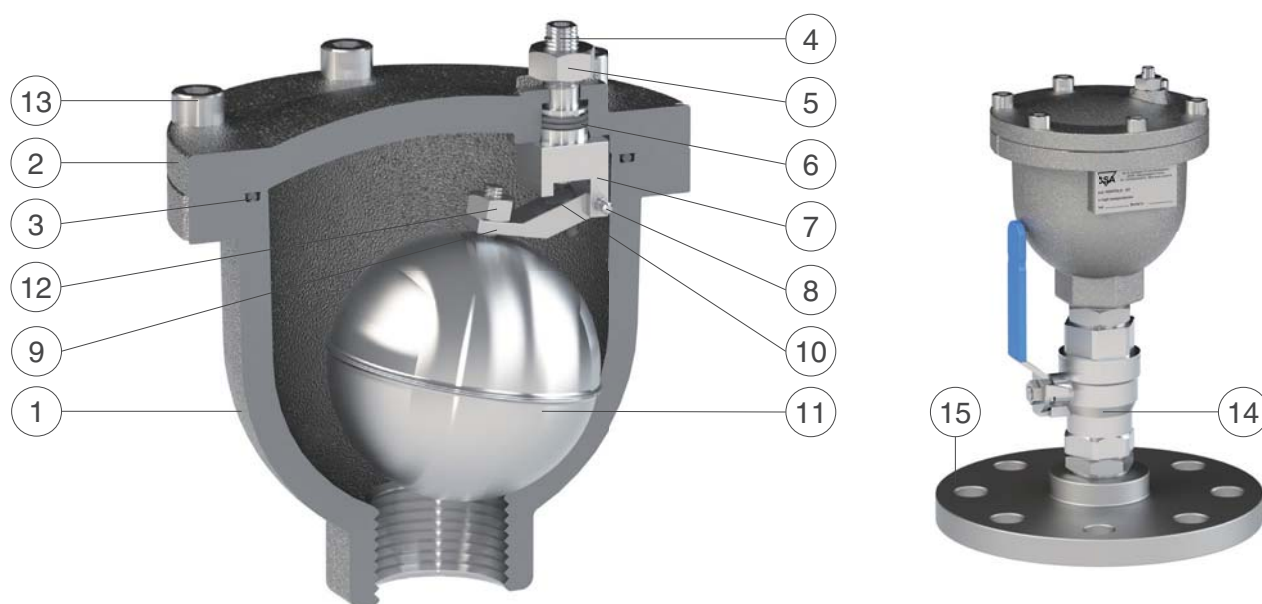
### Technical features and benefits

- Body and cover in nickel-plated ductile cast iron, PN 40 bar rated.
- Float in stainless steel AISI 304.
- Lever and pivots in AISI 303 or 316.
- Nozzle in stainless steel AISI 303 or 316.
- Compass lever technology to allow large air release capacity through the nozzle.
- Double O-ring to guarantee the perfect water tightness during working conditions.
- Gasket compression control thanks to the adjustable nozzle.
- Nuts and bolts in stainless steel AISI 304 or 316.
- Minimum working pressure 0,1 bar.

### Applications

- Industrial plants.
- Heating systems.
- Process plants.
- Buildings and civil installations in general.

## Technical details



N.	Component	Standard material	Optional
1	Body	nickel-plated ductile cast iron GJS 450-10 or 500-7	
2	Cap	nickel-plated ductile cast iron GJS 450-10 or 500-7	
3	O-ring	Viton	
4	Nozzle	stainless steel AISI 303	stainless steel AISI 316
5	Nut	stainless steel AISI 304	stainless steel AISI 316
6	O-ring	Viton	
7	Upper lever	stainless steel AISI 303	stainless steel AISI 316
8	Pivot	stainless steel AISI 303	stainless steel AISI 316
9	Lower lever	stainless steel AISI 303	stainless steel AISI 316
10	Nozzle gasket	silicone	
11	Float	stainless steel AISI 304	stainless steel AISI 316
12	Nut	stainless steel AISI 304	stainless steel AISI 316
13	Screw	stainless steel AISI 304	stainless steel AISI 316
14	Ball valve with fittings	stainless steel AISI 304	stainless steel AISI 316
15	Flange	nickel-plated steel	AISI 304/AISI 316

The list of materials and components is subject to changes without notice.

### Working conditions

Treated water max. 100°C.

Max. pressure 40 bar;

Min. pressure 0,1 bar.

### Standard

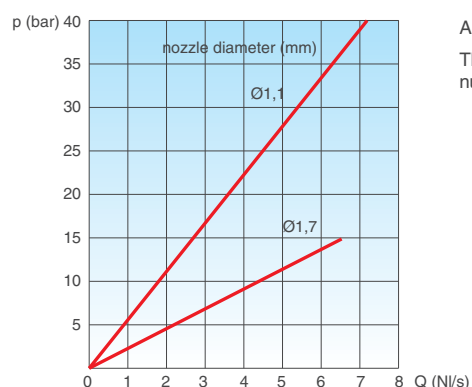
Certified and tested in compliance with EN 1074/4.

Standard connection 1", flanged on request. Flanges according to EN 1092/2.

Body and cap nickel-plated.

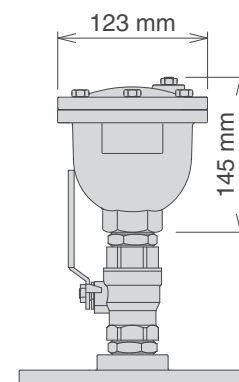
Changes and variations on the flanges and coating details available on request.

### Air flow performance chart



#### AIR RELEASE DURING WORKING CONDITIONS

The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted in NI/s using a safety factor.





## Downstream pressure reducer-stabilizer for high temperatures - Mod. VRCD ST

The CSA direct acting pressure reducing valve Mod. VRCD ST reduces and stabilizes the downstream pressure to a constant value, regardless of flow rate and upstream pressure variations. It can be used for water, air and fluids in general with a maximum working pressure of 40 bar.



### Technical features and benefits

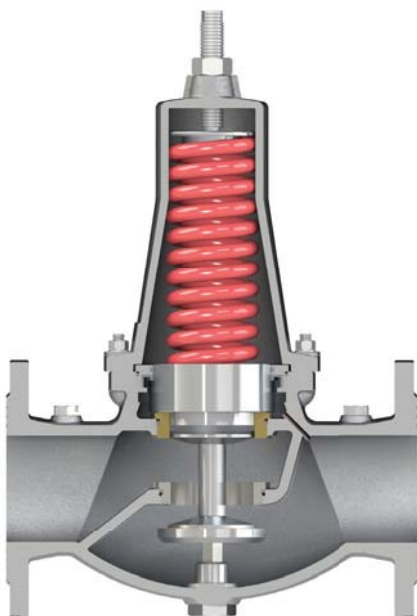
- Flanged version DN 50-150.
- Upstream and downstream pressure balanced, to stabilize the downstream pressure to a pre-set (and adjustable) value regardless of upstream pressure variations without creating unwanted upsurges.
- Ductile cast iron for body and cap, piston in stainless steel, seat in stainless steel, guiding bush in stainless steel as well as bolts and nuts.
- Innovative self cleaning piston technology (patent pending) to improve performances reducing maintenance operations.
- Mobile block composed of three components in gun metal/stainless steel obtained by CNC to ensure the maximum accuracy and sliding precision, this is to avoid friction and unexpected leakage.
- Upstream/downstream pressure outlets for gauges.
- Large expansion chamber to reduce noise and to provide an excellent resistance to cavitation.
- Body and cap nickel-plated for high temperatures.

### Applications

- Industrial plants.
- Heating systems.
- Process plants.
- Buildings and civil installations in general.

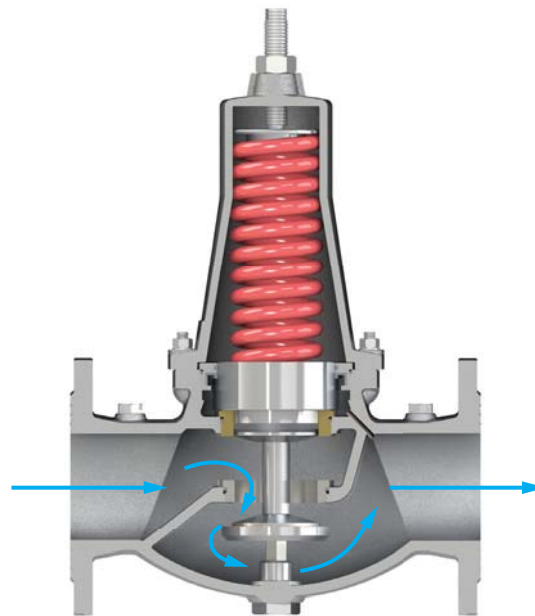
## Operating principle

The operating principle of VRCD ST is based on a piston sliding into two rings in stainless steel/bronze of different diameters. These rings, tightly connected to the body, form a watertight chamber also known as the compensation chamber which is necessary for the accuracy and stability of the valve.



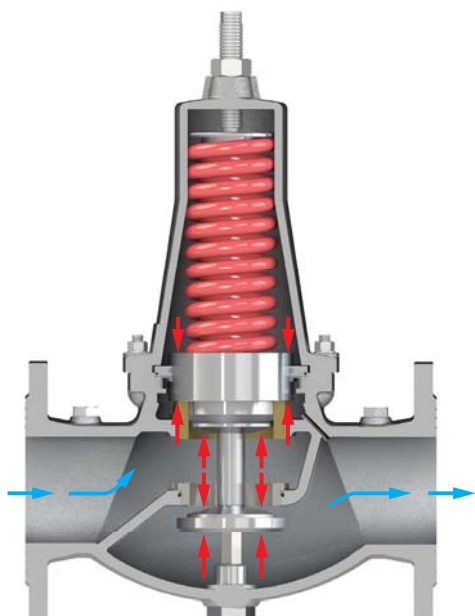
### Valve normally open

Without any pressure the VRCD ST is a normally open valve, where the piston is kept pushed down by the force of the spring located in the cover.



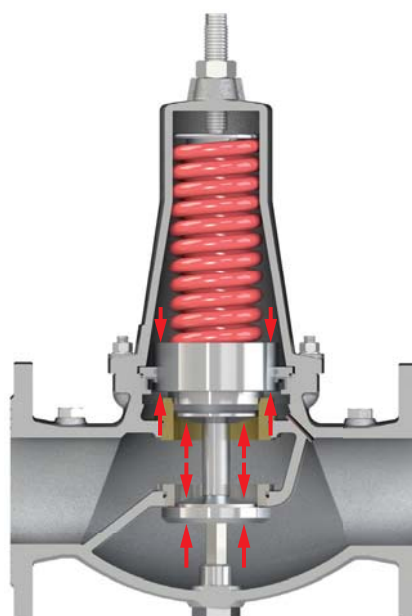
### Valve fully open

During working conditions, should the downstream pressure drop below the valve's set point obtained by the compression of the spring, the VRCD ST will open completely allowing the full passage.



### Valve modulating

Should the downstream pressure rise above the valve's set point the resultant of the force obtained by the downstream pressure, acting on the mobile block and the compensation chamber against the spring pushing downwards, will move the obturator in order to produce the required head loss to modulate and stabilize the downstream pressure.



### Valve fully closed (static conditions)

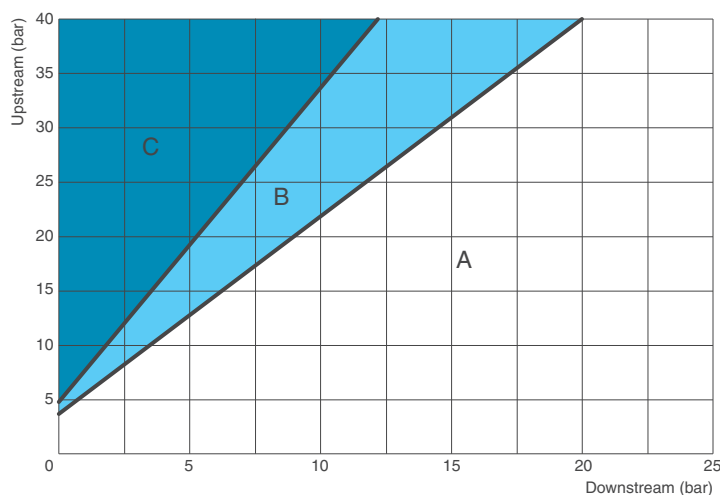
Should the water supply be interrupted from downstream the system will go in static conditions, the VRCD ST will maintain and stabilize the required pressure even with no flow thanks to the pressure balanced technology and compensation chamber.

## Technical data

DN mm	50	65	80	100	125	150
Kv (m³/h)/bar	20	47	72	116	147	172

### Head loss coefficient

Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

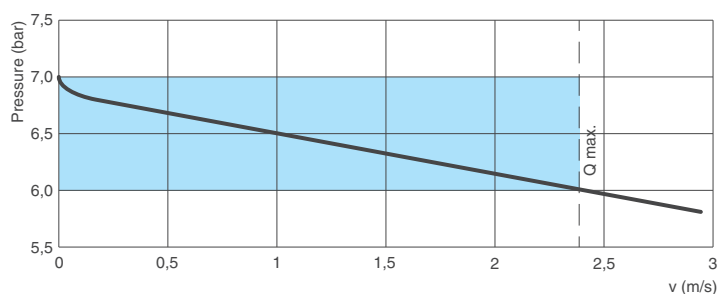


### Cavitation chart

- A: Recommended working conditions;
- B: Incipient cavitation;
- C: Damage cavitation.

Ensure that the working point, obtained connecting upstream (y axis) and downstream (x axis) pressure conditions, falls on the A zone with the smallest valve to meet the required flow.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed DP shall not exceed 24 bar.



### Reduced pressure falloff

The plot is showing the reduced pressure falloff that occurs through the valve when the flow increases. Ensure that the operating conditions fall on the area depicted in blue for the recommended fluid flow velocity through the valve.

### Working conditions

Treated water with a maximum temperature of 100°C.

Upstream pressure (inlet): maximum 40 bar.

Downstream pressure (outlet): adjustable from 1,5 to 6 bar or from 5 to 12 bar. Higher downstream pressure values on request.

### Standard

Certified and tested in compliance with EN 1074/5.

Flanges according to EN 1092/2.

Body and cap nickel-plated.

Changes on flanges and coating available on request.

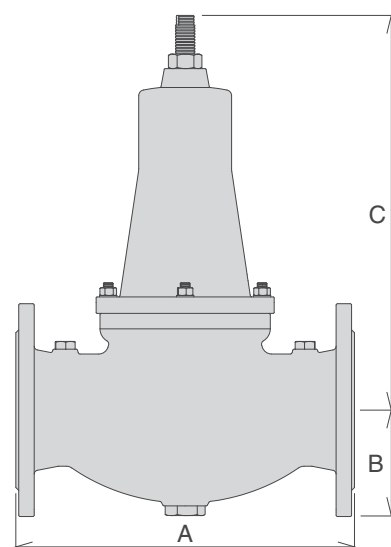
### Recommended flow rate

DN (mm)	50	65	80	100	125	150
Flow rate min. (l/s)	0,3	0,5	0,8	1,2	1,8	2,6
Flow rate max. (l/s)	3,9	6,6	10	15	24	35

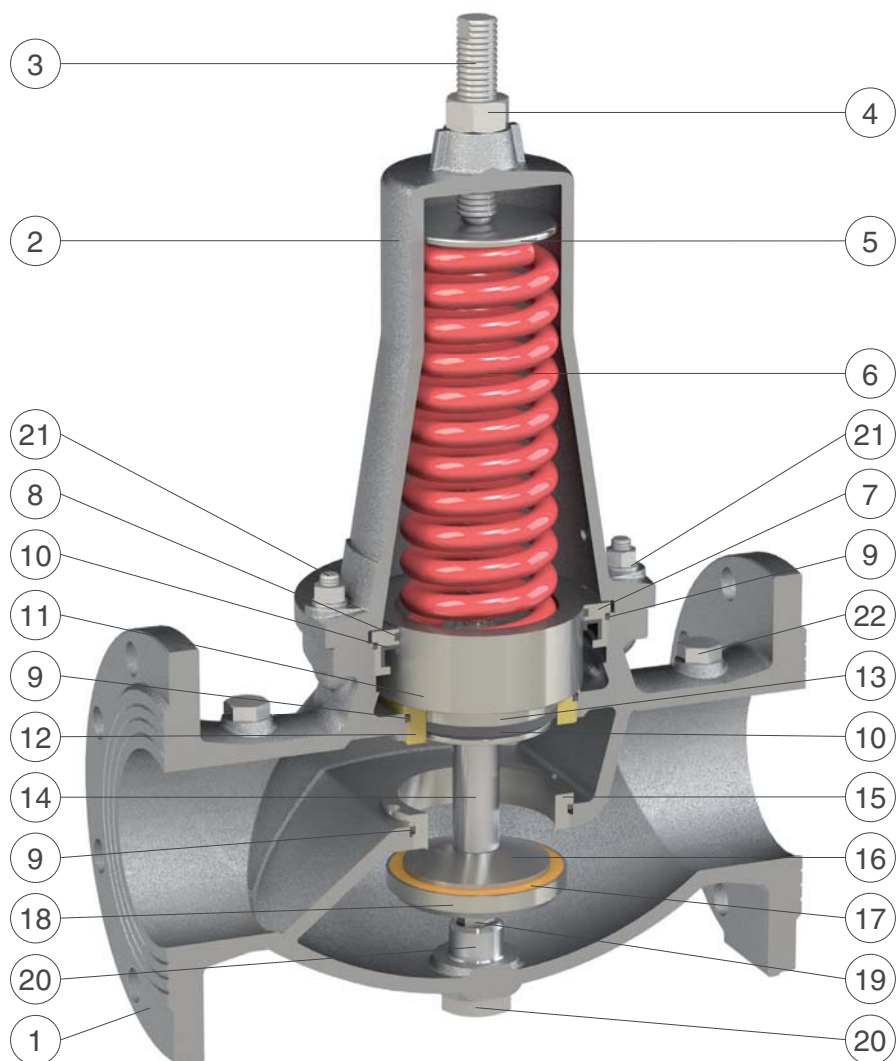
### Weights and dimensions

DN (mm)	50	65	80	100	125	150
A (mm)	230	290	310	350	400	450
B (mm)	83	93	100	110	135	150
C (mm)	280	320	350	420	590	690
Weight (Kg)	12	19	24	34	56	74

Values are approximate, consult CSA service for more details.



## Technical details



N.	Component	Standard material	Optional
1	Body	nickel-plated ductile cast iron GJS 450-10 or 500-7	
2	Cap	nickel-plated ductile cast iron GJS 450-10 or 500-7	
3	Driving screw	stainless steel AISI 304	stainless steel AISI 316
4	Nut	stainless steel AISI 304	stainless steel AISI 316
5	Spring guide	stainless steel AISI 303	stainless steel AISI 316
6	Spring	spring painted steel 52SiCrNi5	
7	Main bush	stainless steel AISI 304	stainless steel AISI 316
8	Sliding ring	PTFE	
9	O-rings	Viton	
10	Gasket	Viton	
11	Upper piston	st. st. AISI 303 (bronze CuSn5Zn5Pb5 for DN 125-150)	stainless s. AISI 303/316
12	Lower ring	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
13	Lower piston	stainless steel AISI 303	stainless steel AISI 316
14	Spacer	stainless steel AISI 303	stainless steel AISI 316
15	Obturator sealing seat	stainless steel AISI 304	stainless steel AISI 316
16	Gasket support	stainless steel AISI 303	stainless steel AISI 316
17	Plane gasket	Viton	
18	Gasket holder	stainless steel AISI 303	stainless steel AISI 316
19	Guiding shaft	stainless steel AISI 303	stainless steel AISI 316
20	Driving tap	stainless steel AISI 303	stainless steel AISI 316
21	Studs, nuts and washers	stainless steel AISI 304	stainless steel AISI 316
22	Taps for pressure gauges	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.



## Pressure relief/sustaining valve for high temperatures - Mod. VSM ST

The CSA direct acting upstream pressure relief/sustaining valve Mod. VSM ST automatically maintains and sustains a pre-set upstream pressure, discharging any excess downstream, regardless of variations in demand and downstream pressure fluctuations.



### Technical features and benefits

- Flanged version DN 50-150.
- Upstream pressure balanced, to stabilize and maintain the upstream pressure to a minimum pre-set (and adjustable) value regardless of demand and downstream pressure variations.
- Ductile cast iron for body and cap, piston in stainless steel, seat in stainless steel, guiding bush in stainless steel as well as bolts and nuts.
- Innovative self cleaning piston technology (patent pending) to improve performances reducing maintenance operations.
- Mobile block composed of three components in gun metal/stainless steel obtained by CNC to ensure the maximum accuracy and sliding precision, this is to avoid friction and unexpected leakage.
- Upstream/downstream pressure outlets for gauges.
- Large expansion chamber to reduce noise and to provide an excellent resistance to cavitation.
- Body and cap nickel-plated for high temperatures.

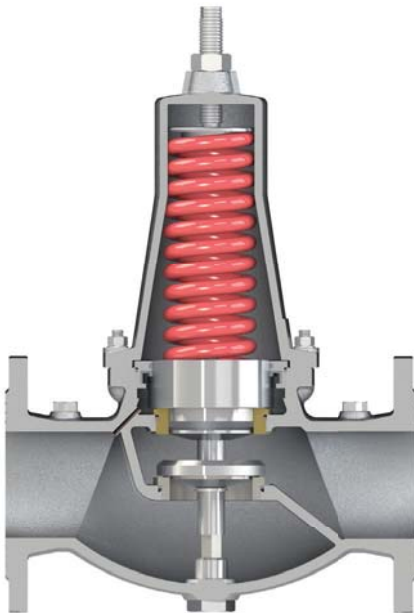
### Applications

- Industrial plants.
- Heating systems.
- Process plants.
- Buildings and civil installations in general.



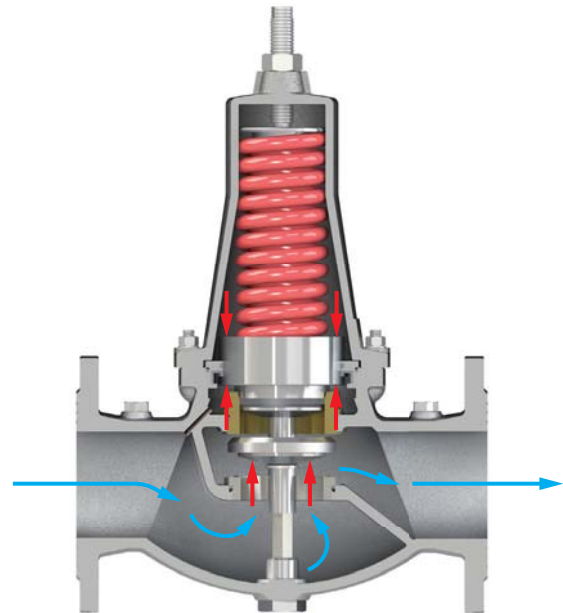
## Operating principle

The operating principle of VSM ST is based on a piston sliding into two rings in stainless steel/bronze of different diameters. These rings, tightly connected to the body, form a watertight chamber also known as the compensation chamber.



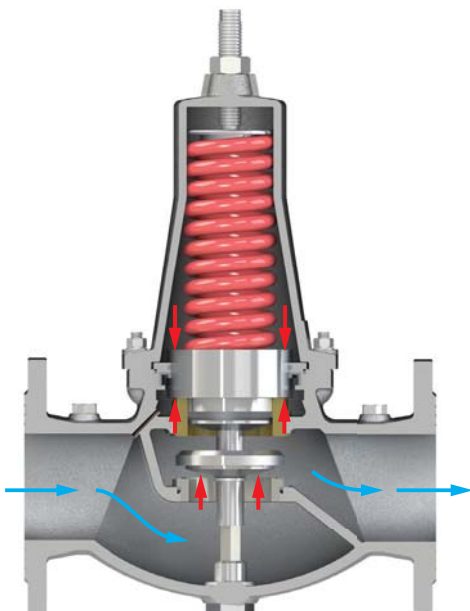
### Valve normally closed

Without any incoming pressure the VSM ST is a normally closed valve, as shown in the picture, where the obturator is kept pushed down to the seat by the force of the spring.



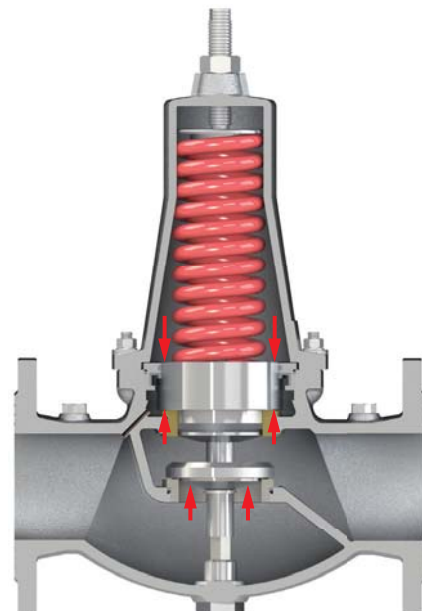
### Valve fully open

Should the upstream pressure rise above the set point of the valve, obtained by the compression of the spring, the VSM ST will open completely allowing the full passage through the seat.



### Valve modulating

Should the upstream pressure fluctuate around the valve's set point, the obturator, thanks to the difference in force between the spring pushing downwards and the incoming pressure underneath and through the compensation chamber pushing upwards, will move throttling the flow through the seat in order to maintain the minimum required value.



### Valve fully closed (static conditions)

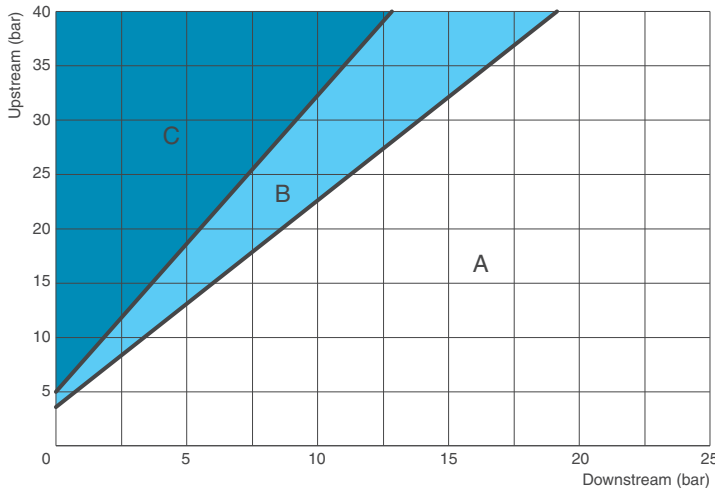
Should the water supply be interrupted from upstream pressure begins to drop, in this case the VSM ST will react immediately to maintain and stabilize the required upstream pressure even with no flow thanks to the pressure balanced technology and compensation chamber.

## Technical data

DN mm	50	65	80	100	125	150
Kv (m³/h)/bar	22	51	83	122	166	194

### Head loss coefficient

Kv coefficient representing the flow rate which is flowing through the valve fully open producing a head loss of 1 bar.



### Cavitation chart

- A: Recommended working conditions;
- B: Incipient cavitation;
- C: Damage cavitation.

Ensure that the working point, obtained connecting upstream (y axis) and downstream (x axis) pressure conditions, falls on the A zone with the smallest valve to meet the required flow. The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure sustaining the maximum allowed DP shall not exceed 17 bar. The pressure relief function will tolerate higher pressure differential values.

### Working conditions

Treated water/air temperature: max. 100°C.

Maximum working pressure 40 bar.

Upstream pressure values: from 1,5 to 6 bar or from 5 to 12 bar.

Higher values on request.

### Standard

Certified and tested in compliance with EN 1074/5.

Flanges according to EN 1092/2.

Body and cap nickel-plated.

Changes on flanges and coating available on request.

### Recommended flow rate - pressure sustaining

DN (mm)	50	65	80	100	125	150
Flow rate min. (l/s)	0,4	0,6	0,9	1,4	2,2	3,2
Flow rate max. (l/s)	4,5	7,6	11	18	28	40

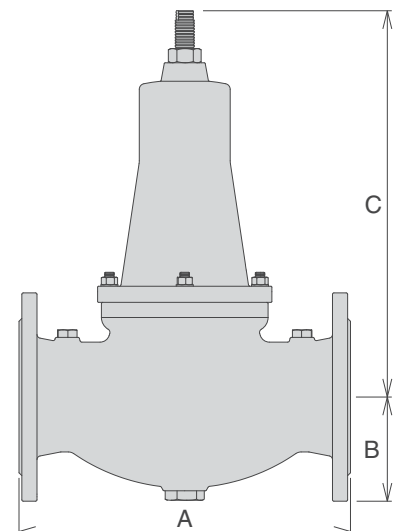
### Recommended flow rate - pressure relief

DN (mm)	50	65	80	100	125	150
Flow rate max. (l/s)	8,8	14	22	35	55	79

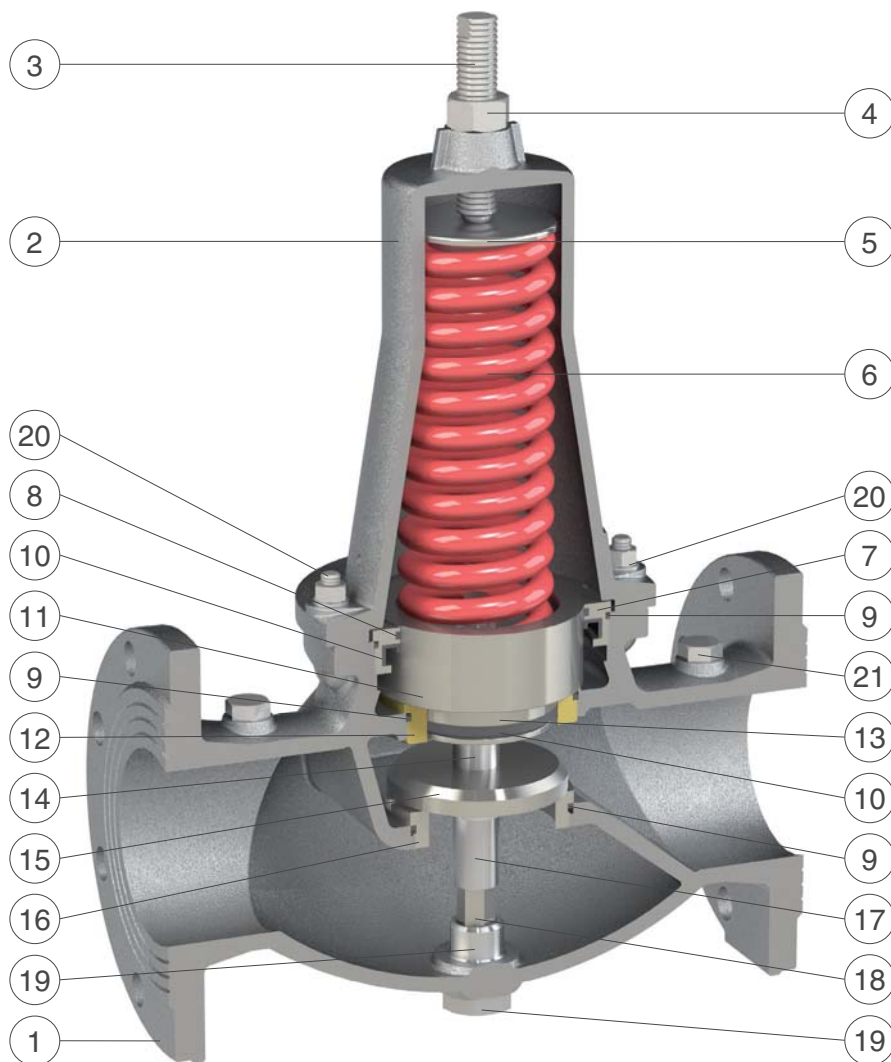
### Weights and dimensions

DN (mm)	50	65	80	100	125	150
A (mm)	230	290	310	350	400	450
B (mm)	83	93	100	110	135	150
C (mm)	280	320	350	420	590	690
Weight (Kg)	12	19	24	34	56	74

Values are approximate, consult CSA service for more details.



## Technical details



N.	Component	Standard material	Optional
1	Body	nickel-plated ductile cast iron GJS 450-10 or 500-7	
2	Cap	nickel-plated ductile cast iron GJS 450-10 or 500-7	
3	Driving screw	stainless steel AISI 304	stainless steel AISI 316
4	Nut	stainless steel AISI 304	stainless steel AISI 316
5	Spring guide	stainless steel AISI 303	stainless steel AISI 316
6	Spring	spring painted steel 52SiCrNi5	
7	Main bush	stainless steel AISI 304	stainless steel AISI 316
8	Sliding ring	PTFE	
9	O-rings	Viton	
10	Gasket	Viton	
11	Upper piston	st. st. AISI 303 (bronze CuSn5Zn5Pb5 for DN 125-150)	stainless s. AISI 303/316
12	Lower reinforcements	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
13	Lower piston	stainless steel AISI 303	stainless steel AISI 316
14	Central spacer	stainless steel AISI 303	stainless steel AISI 316
15	Obturator with plane gasket	st. st. AISI 303 and Viton	stainless steel AISI 316
16	Obturator sealing seat	stainless steel AISI 304	stainless steel AISI 316
17	Lower spacer	stainless steel AISI 303	stainless steel AISI 316
18	Guiding shaft	stainless steel AISI 303	stainless steel AISI 316
19	Driving tap	stainless steel AISI 303	stainless steel AISI 316
20	Studs, nuts and washers	stainless steel AISI 304	stainless steel AISI 316
21	Taps for pressure gauges	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.







# Automatic control valves XLC 300 and 400 series

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## Automatic control valves XLC 300 and 400 series

The CSA XLC range consist of a globe pattern hydraulically operated automatic control valves, namely 400 for the full bore and 300 for the reduced bore series, entirely produced in ductile cast iron with internal components in stainless steel. Diaphragm actuated PN 25 class, the valve is designed to perform a tremendous range of applications including pressure reduction, relief, sustain, flow control, level control and many more. Each function is obtained simply by changing the circuitry and pilots, that can be combined together.

All information herewith contained referring to operating principle, case studies and installation guidelines, are applicable to the XLC 300 and 400 series unless otherwise stated.



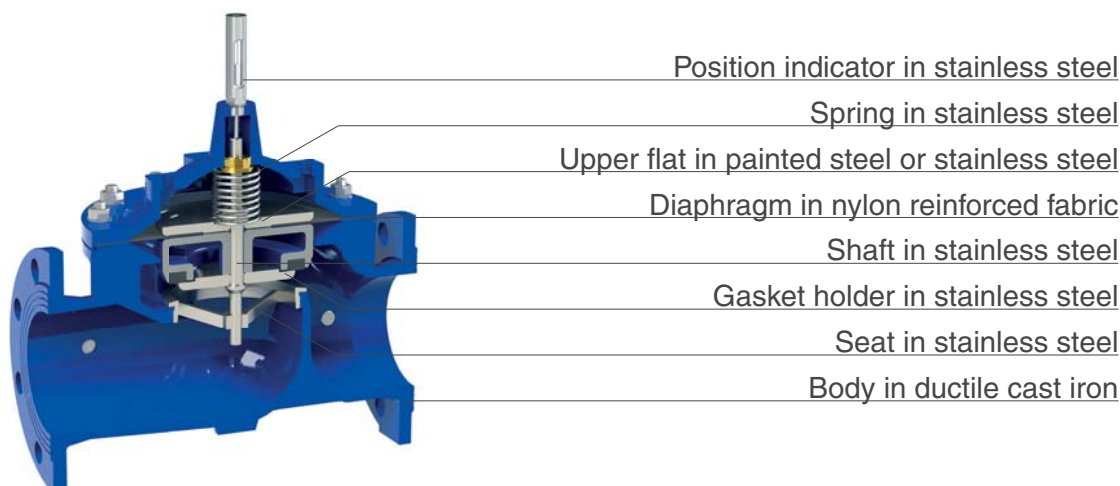
### Technical features and benefits

- Body in ductile cast iron, PN 25 bar rated, globe pattern design in compliance with EN 1074 standards and available from DN 50 mm up to DN 600 mm.
- Designed to reduced head loss and minimize turbulence under a wide flow range.
- Double chambered actuator as an option.
- Stainless steel seat and mobile block assembly entirely removable from the valve.
- Silent operation and absence of vibrations, suitable for buildings and urban applications.
- Technology to reduce the risk of diaphragm failure, the latter manufactured with nylon reinforced fabric.
- Different versions of the modulating assembly, more in details the seat and the gasket holder, to provide excellent resistance to cavitation, low flow stability and obstacle free design.
- In-line serviceable from the top with having to remove the valve from the pipe.
- High quality materials and reliability for long lasting performances with internals all made in stainless steel, obturator and wedge in ductile cast iron for large diameters.

### Applications

- Main transmission lines and water distribution networks.
- Industrial plants.
- Cooling system.
- High-rise buildings.

## Technical features

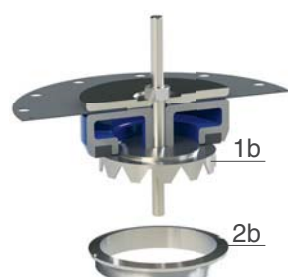


The mobile block includes the obturator, upper flat, diaphragm, shaft and gasket holder, the latter engineered with different versions to guarantee the maximum accuracy and best performances in accordance to the results of the sizing and to the design requirements.



### Standard version of gasket holder and sealing seat

On the standard version the shaft is guided in two points, through the cap and the seat, moving frictionless during modulation. The gasket holder (1a) is machined with a fillet whose radius reduces the risk of hunting at small opening percentage.



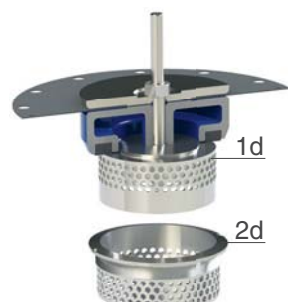
### LF version for low flow stability

The LF includes a gasket holder (1b) with progressive opening allows for stability also in presence of extreme low flow values. Once the opening percentage has increased above the LF system operating range the valve will open completely, ensuring the minimum energy dissipation thanks to unobstructed flow pattern.



### AC version for low flow stability and cavitation prevention

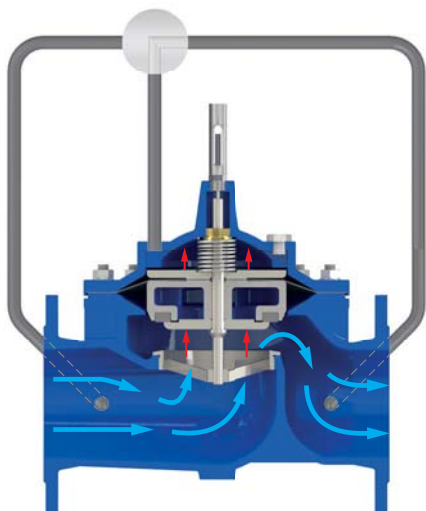
The anti-cavitation trim AC mobile block includes a gasket holder (1c) designed to increase the allowable pressure ratio and resistance to cavitation, improving at the same time the valve's stability to guarantee the maximum accuracy also in case of no flow.



### CP anti-cavitation version

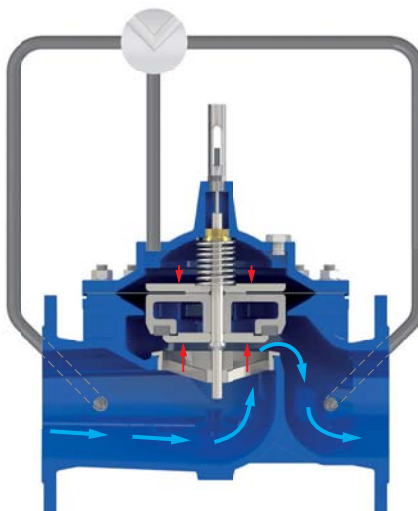
The CP system includes two cages (1d, 2d) for double energy dissipation between inlet and outlet, whose holes can be customized according to the project in hand and required performances, this is to avoid damages to the valve without a drastic reduction of the valve's Kv.

## Operating principle on-off mode



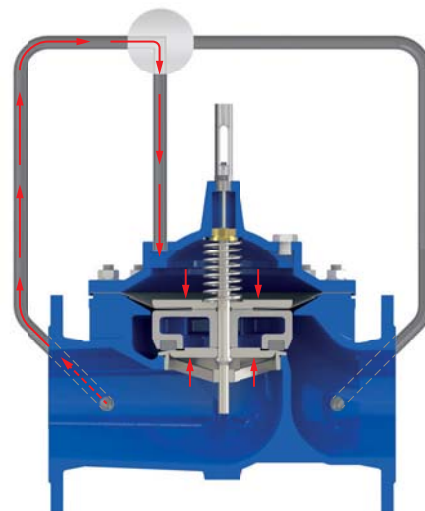
### Valve opening

If the pressure inside the control chamber is put in communication with the atmosphere or some other lower pressure zone, the upstream pressure will act on the obturator, pushing it upwards allowing the complete opening of the valve.



### Valve isolated from the line

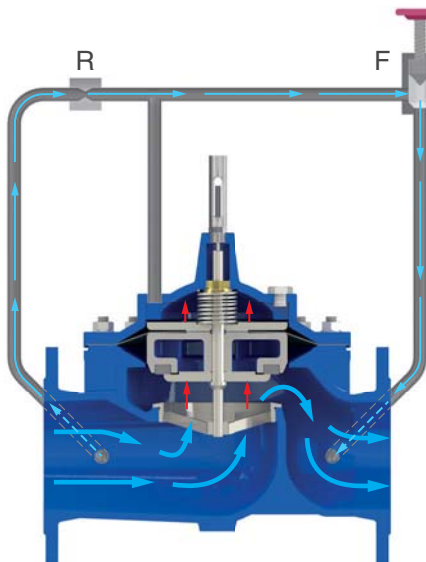
Should the control chamber be isolated from the line pressure and the rest of the circuitry the valve will remain in the same position, therefore producing the head loss corresponding to such opening percentage.



### Valve closing

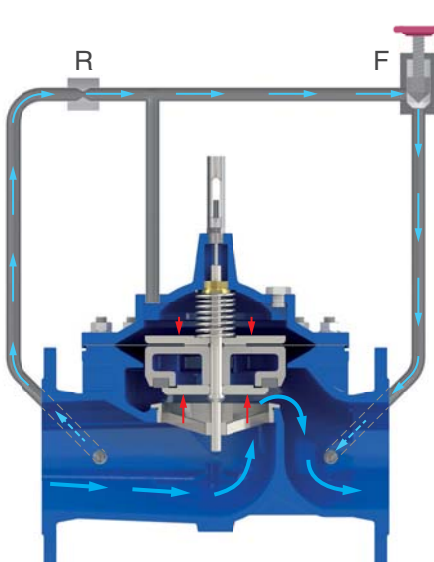
If the control chamber is put in communication with the upstream pressure, thanks to the difference in area between the upper flat with diaphragm, larger than the obturator underneath, the valve will close completely.

## Operating principle modulating mode



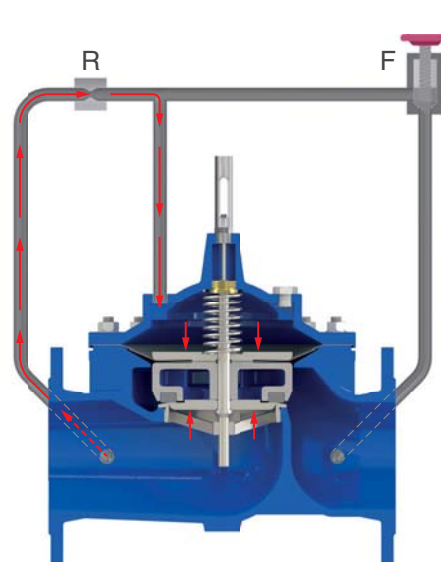
### Valve opening

When the main valve is required to modulate a restriction (R) is needed between the upstream line pressure and the control chamber, in addition to a regulator (F) on the circuit. Should the latter open completely pressure inside the control chamber will be put in communication with downstream, allowing for the full opening of the main valve.



### Valve modulating

If the flow regulator (F) is throttled pressure will build up between it and the control chamber, causing the valve to modulate according to an intermediate position. This is obtained thanks to the pressure difference created by the restriction (R) and to the difference in section between the upper flat acting on the diaphragm and the obturator.



### Valve closing

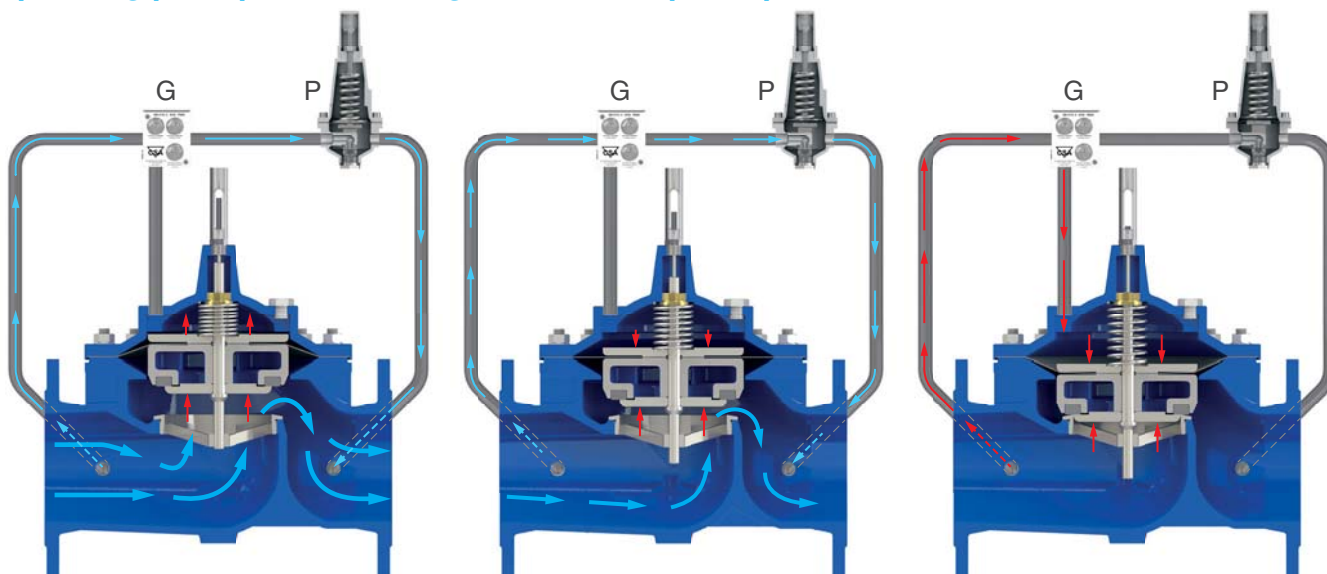
Should the flow regulator (F) be completely closed, the upstream line pressure is all diverted to the main control chamber. The mobile block is moved by the force exerted on the upper diaphragm flat pushing the obturator down onto the seat, interrupting the flow through the main valve.

## GR.I.F.O. 3/8" PN 25 flow control device

The CSA exclusive unit flow control device with built-in filter GR.I.F.O. (patent pending) has been designed to enhance flow stability and accuracy on CSA hydraulic control valves XLC series thanks to a combination of adjustable needle valves and check valves. Entirely built in stainless steel, impervious to corrosion, compact and provided with several pressure ports, GR.I.F.O. allows for a tremendous range of regulation reducing at the same time the complexity of the circuit compared to the other solutions available on the market. GR.I.F.O. is composed of the following: a filter, with fine mesh in stainless steel AISI 316, to protect the hydraulic circuitry from possible dirt; three adjustable needle flow stabilizers valves in stainless steel with check valves, needed for the regulation of the main valve's response time, opening and closing speed that remain independent one from the other; filtered and unfiltered pressure ports.



## Operating principle modulating mode - example of pressure reduction



### Valve opening

Should the downstream pressure drop below the pilot's (P) preset and adjustable set point the latter will open, allowing flow and pressure to be relieved out of the main chamber. The mobile block will be lifted increasing the passage between the obturator and the seat trying to re-establish the desired downstream pressure value.

### Valve modulating

As a consequence of gradual change in demands the pilot (P) will keep regulating the flow in and out of the main chamber to compensate for pressure variations. The mobile block will reproduce the pilot's movement, throttling the passage between the seat and obturator to produce the head-loss required for the pressure reduction.

### Valve closing

Should the downstream pressure rise above the pilot's (P) set point the latter will close, allowing pressure to be built up inside the main chamber. The mobile block will be pushed down trying to restore the desired downstream value. In case of static conditions pilot will be fully closed with the valve maintaining the downstream pressure.



## Downstream pressure reducing stabilizing automatic control valve Mod. XLC 310/410



The CSA model XLC 310/410 is a globe pattern hydraulically operated automatic control valve that reduces and stabilizes the downstream pressure to a constant value, regardless of variation in demands and upstream pressure conditions. Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage. The CSA pressure reducing stabilizing valve XLC 310/410 is extremely versatile and can be used for a wide range of applications.

### Applications

- Downstream of pumps to reduce the pressure on the main supply line.
- Installed in derivation from the main line to stabilize the pressure of secondary line and water users.
- As a protection against rise in pressure of industrial equipment and civil installations.
- On the inlet supply line of storage tanks to stabilize pressure and flow required for the level control.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet and outlet pressure, and flow rate are required for the proper sizing.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- A minimum length of 3 DN downstream of the valve is recommended for the best accuracy.

### Additional features

- XLC 310/410-FR downstream pressure reducing with back-flow prevention.
- XLC 310/410-H downstream pressure reducing with high sensitivity pilot.
- XLC 310/410-G downstream pressure reducing with over pressure guard.

### Working conditions

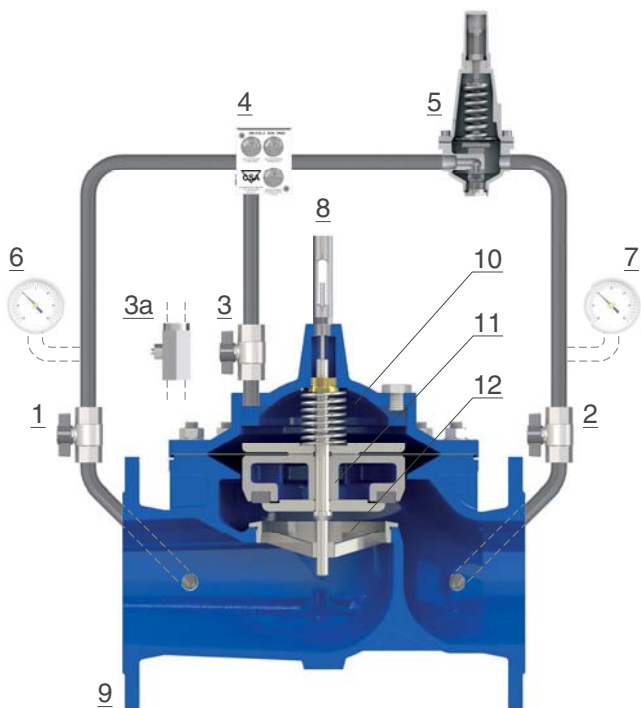
- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 25 bar.
- Maximum temperature: 70°C.

### Downstream pressure pilot adjustment range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.
- Higher values up to 25 bar on request.
- Values lower than 0,7 available with high sensitivity pilots.



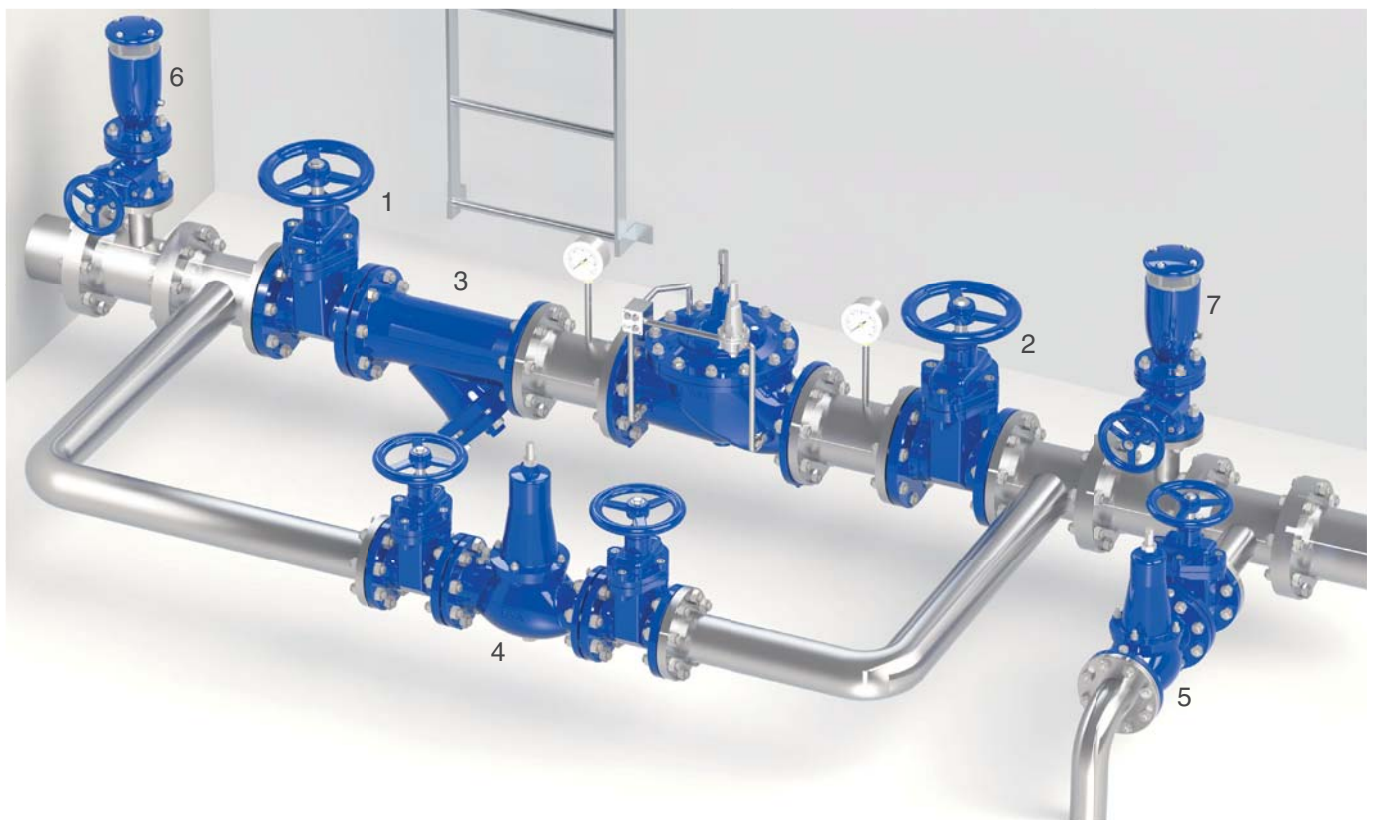
## Operating principle



The CSA model XLC 310/410 is an automatic control valve operated by a 2 ways pilot (5) with pre-set set and adjustable value. Should the downstream pressure rise above the pilot set point the latter will throttle and limit the flow to direct inlet pressure to the main chamber (10), thus pushing down the obturator (11) to generate the head loss required for the valve (9) to reduce and stabilize the downstream pressure to a constant value. Should the downstream pressure fall below the pilot set point the obturator (11) will raise increasing the passage through the seat (12), thus reducing the head loss followed by the rise in pressure. The flow in and out of the main chamber (10) is controlled by the CSA unit regulation device with filter GR.I.F.O. (4) provided with three needle valves and flow stabilizers, needed for the valve's response time and accuracy also in case of rapid variation in demand. Thanks to the isolation ball valves (1-2-3) the control circuit and its components can be maintained without interrupting the flow through the main line.

## Installation layout

The XLC 310/410 installation lay-out includes sectioning devices (1, 2) and by-pass for maintenance operations, and a filter (3) to prevent dirt from reaching the control valve. The direct acting pressure reducer VRCD (4) is the best choice on the by-pass thanks to its reliability also after long periods of inactivity. Anti-surge combination air valves FOX 3F AS (6, 7) are recommended upstream and downstream as well as a pressure relief valve VSM (5) to prevent rise in pressure on the main line.





## Downstream pressure reducing valve with two set points Mod. XLC 310/410-ND

The CSA model XLC 310/410-ND is a globe pattern hydraulically operated automatic control valve that reduces and stabilizes the downstream pressure to two pre-set and adjustable values, regardless of variation in demands and upstream pressure conditions, usually corresponding to night and day regulation. Normally equipped with visual position indicator, the valve is designed to reduce head loss, throttling noise and cavitation damage. The CSA pressure reducing valve XLC 310/410-ND is extremely versatile and mainly used for pressure management and water loss reduction campaigns.

### Applications

- A well-planned pressure management program will extend the life of the system increasing safety and reliability. The automatic control valve CSA XLC Model. 310/410-ND, thanks to the battery operated programmer, is designed to automatically optimize the downstream pressure regulations in two steps, both adjustable, where the lower values usually corresponds to night time low consumption requirements.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- A minimum length of 3 DN downstream of the valve is recommended for the best accuracy.
- The programmer is battery operated with an average lifespan of 13 months if used on a daily basis, different solutions on request.

### Additional features

- XLC 310/410-ND-FR night and day downstream pressure reduction with back-flow prevention.
- XLC 310/410-ND-H night and day downstream pressure reduction with high sensitivity pilot.
- XLC 310/410-ND-5 night and day downstream pressure reduction with solenoid control.

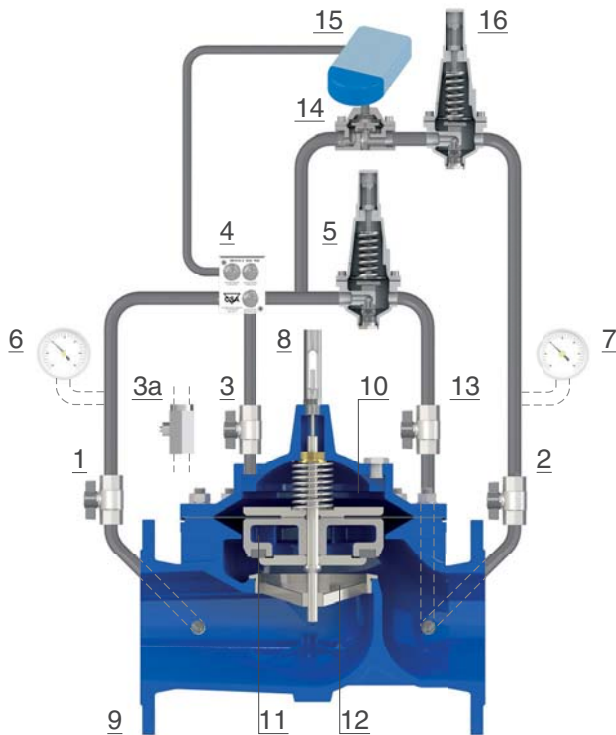
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 16 bar.
- Maximum temperature: 70°C.

### Downstream pressure pilot adjustment range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.

## Operating principle



The valve is operated by two 2 ways pilot (5-16), for pressure reduction with pre-set set and adjustable values, activated by a battery operated timer (15) acting on a flow accelerator (14). During night time regulation (low pressure) pilot 5 is working being the two ways valve (14) closed. Should the downstream pressure rise above the pilot (5) set point the latter will throttle and limit the flow to direct inlet pressure to the main chamber (10), to generate the head loss required for the valve (9) to reduce and stabilize the downstream pressure. During the day, or according to the customer's program of the timer (15), the pilot (16) is activated, and being its set point higher than the night time pilot (5) the latter will be forced to the closed position. The flow in and out of the main chamber (10) is controlled by the CSA exclusive unit regulation device with filter called GR.I.F.O. (4) and provided with three needle valves and flow stabilizers, needed for the valve's response time and accuracy also in case of rapid variation in demand.

## Installation layout

The recommended XLC 310/410-ND installation lay-out includes sectioning devices (1, 2) and by-pass for maintenance operations, and a filter (3) to prevent dirt from reaching the control valve. The direct acting pressure reducer VRCD (4) is the best choice on the by-pass thanks to its reliability also after long periods of inactivity. Anti-surge combination air valves FOX 3F AS (6, 7) are recommended upstream and downstream as well as a pressure relief valve VSM (5) to prevent rise in pressure on the line.







## Pressure management automatic control valve Mod. XLC 310/410-T

The CSA model XLC 310/410-T automatic control valve reduces and stabilizes the downstream pressure correlating the pilot setting with demand, regardless of changes and fluctuations of upstream pressure conditions, through signals supplied by a CSA controller or existing PLC either using a web interface or battery operated solutions. The CSA pressure reducing stabilizing valve XLC 310/410-T stands out as the ideal solution for pressure management, and water loss reduction, as it can be interfaced with any existing SCADA and remote control system in addition to pressure sensors installed at the critical nodes and supply inlets.

### Applications

- A well-planned pressure management program will extend the life of the system increasing safety and reliability. The CSA XLC 310/410-T is designed to automatically optimize the downstream pressure with a real time adjustment as a function of demand, flow rate and pressure values at the critical nodes, obtained with CSA controllers and web interface. Setting can be easily changed from remote from any portable device with a powerful and intuitive programming interface.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Available with several CSA controllers namely DC1, DC2, DC3 designed to be either power supplied to guarantee real time communication through web interface, or provided with battery and if required turbines, depending on the project requirements and the level of informations exchanged back and forth to the valve.

### Additional features

- XLC 310/410-T-FR pressure management valve with back-flow prevention.
- XLC 310/410-T-H pressure management valve with high sensitivity pilot.
- XLC 310/410-T-5 pressure management valve with solenoid control.

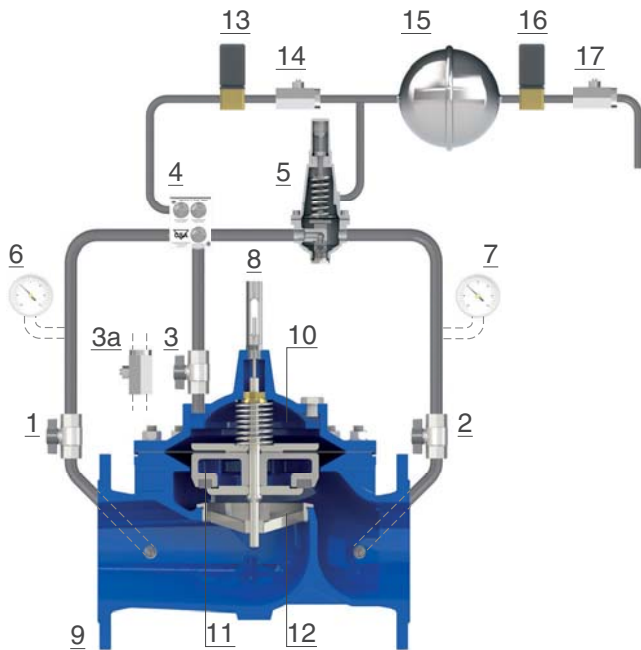
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 16 bar.
- Maximum temperature: 70°C.

### Downstream pressure pilot adjustment range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.
- Values lower than 0,7 available with high sensitivity pilots.

## Operating principle



The CSA model XLC 310/410-T is an automatic control valve operated by a 2 ways pilot (5) whose cover receives pressure from a secondary line, onto which two solenoids (13 and 16) are acting through signals from a CSA controller linked to flow and pressure measurement devices. The purpose of this valve is to change the downstream pressure reduction set-point according to a flow rate curve that can be modified. Therefore should the system require an increase of the downstream pressure value the solenoid (13) will open in response to an impulse, vice-versa the 16 will decrease it by discharging pressure into atmosphere.

Needle valves (14, 17) and the buffer (15) are required to throttle the flow and improve the valve's stability. The flow in and out of the main chamber (10) is controlled by the CSA exclusive unit regulation device with filter called GR.I.F.O. (4) and provided with three needle valves and flow stabilizers, needed for the valve's response time and accuracy also in case of rapid variation in demand.

## Installation layout

In the following installation lay-out the CSA valve XLC 310/410-T (1) receives impulses from the CSA controller (2), either power supplied or battery operated, working in combination with flow rate (3) and pressure measurement (4) devices (located near the valve or on critical points of the networks). Anti-surge combination air valves FOX 3F AS (6, 7) are recommended upstream and downstream as well as a pressure relief valve, like CSA direct acting model VSM (5) to prevent rise in pressure on the main line.







## Downstream pressure reducing and upstream pressure sustaining valve Mod. XLC 312/412

The CSA Model XLC 312/412 is a globe pattern hydraulically operated automatic control valve with two independent functions. It sustains the upstream pressure to a minimum and pre-set value regardless of changes in demand, and it prevents at the same time the downstream pressure from rising above a maximum set-point. Both values are adjustable. Normally equipped with visual position indicator and made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- Downstream of pumps to reduce pressure on the supply line and to prevent pump overload.
- To stabilize the pressure of secondary lines and avoid possible depressurization of the main transmission pipe.
- On gravity fed transmission lines to ensure a minimum operating pressure to consumers located upstream, preventing downstream pressure from rising above critical values in case of low consumption.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet and outlet pressure, flow rate are required for the proper sizing.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- A minimum length of 3 DN downstream and upstream of the valve is recommended for the best accuracy.

### Additional features

- XLC 312/412-FR upstream pressure sustaining and downstream pressure reduction valve with back-flow prevention.
- XLC 312/412-H upstream pressure sustaining and downstream pressure reduction valve with high sensitivity pilot.
- XLC 312/412-5 upstream pressure sustaining and downstream pressure reduction valve with solenoid control.

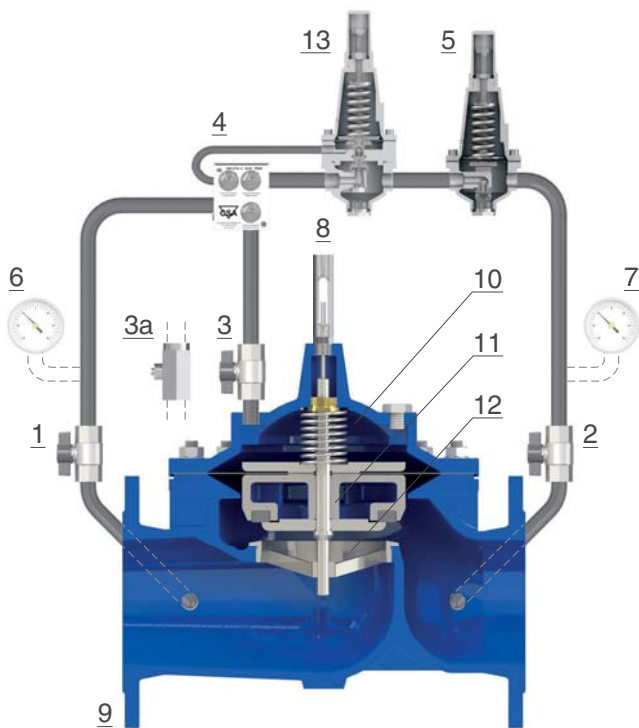
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 25 bar.
- Maximum temperature: 70°C.

### Downstream and upstream pilots range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar
- Higher values up to 25 bar on request.
- For the pressure reduction pilot values lower than 0,7 available with high sensitivity pilots.

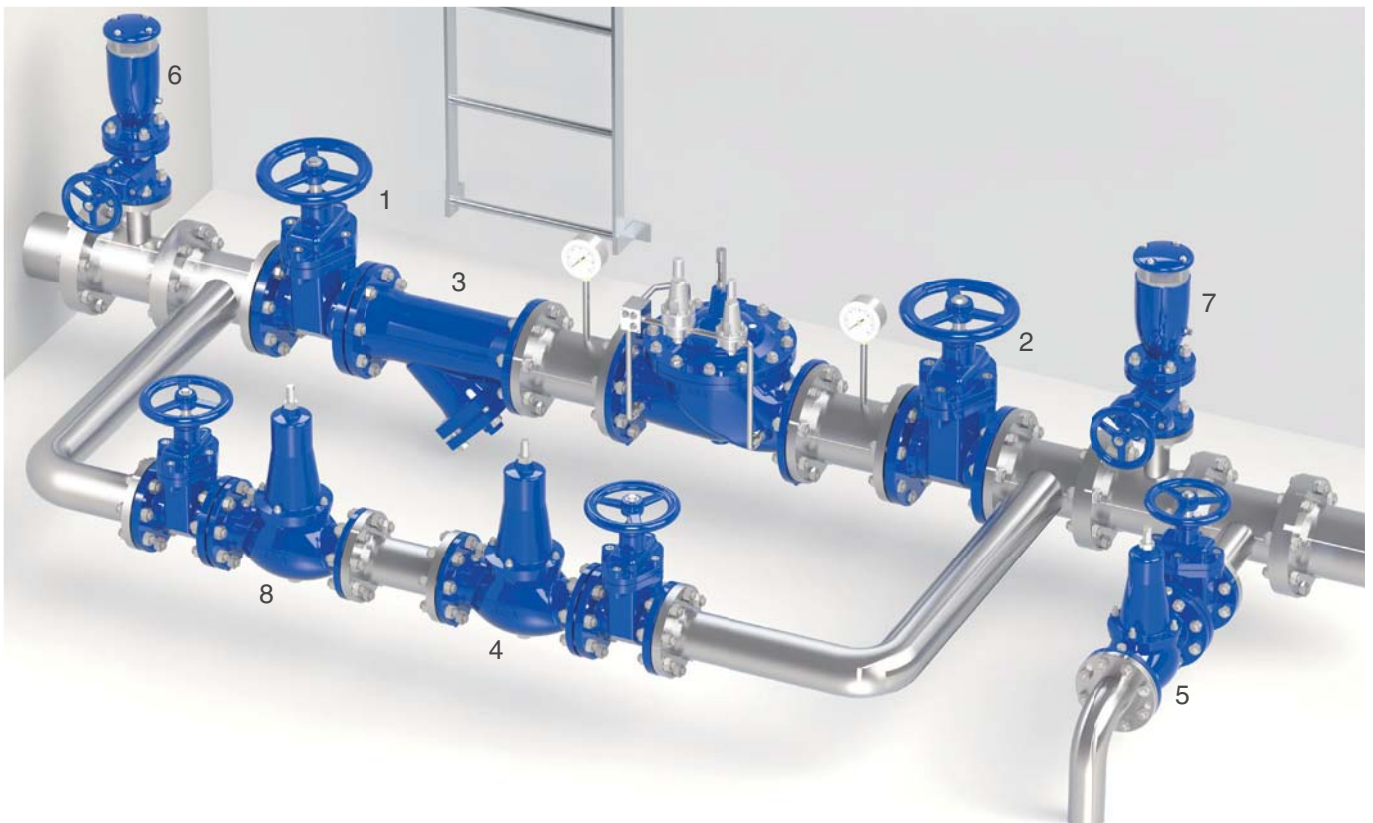
## Operating principle



The CSA model XLC 312/412 is an automatic control valve operated by two 2 ways pilots, respectively for the upstream pressure sustaining (13) and the downstream pressure reduction, (5) both with pre-set set and adjustable value. Should the upstream pressure fall below the master pilot's (13) set point the latter will throttle and limit the flow to direct inlet pressure to the main chamber (10), to sustain and stabilize the upstream pressure to a constant value. Should the upstream pressure be higher than the pilot's (13) set point the latter will open, allowing flow through the main valve (9) where at this point the pilot (5) will control and maintain the required downstream pressure. The flow in and out of the main chamber (10) is controlled by the CSA exclusive unit regulation device with filter called GR.I.F.O. (4) and provided with three needle valves and flow stabilizers, needed for the valve's response time and accuracy also in case of rapid variation in demand.

## Installation layout

The XLC 312/412 installation lay-out includes sectioning devices (1, 2) and by-pass for maintenance, and a filter (3) to prevent dirt from reaching the control valve. The direct acting pressure sustaining VSM (8) and reducer VRCD (4) are the best choice on the by-pass thanks to their reliability also after long periods of inactivity. Anti-surge combination air valves FOX 3F AS (6, 7) are recommended upstream and downstream as well as an additional pressure relief valve VSM (5) to prevent rise in pressure on the line.





## Downstream pressure reducing stabilizing valve with solenoid control Mod. XLC 315/415

The CSA model XLC 315/415 is a globe pattern hydraulically operated automatic control valve that reduces and stabilizes the downstream pressure to a constant value, regardless of variation in demands and upstream pressure conditions. Thanks to a solenoid control the valve will also open or close in response to a signal. Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- On the by-pass line of storage tank to ensure the required water supply and pressure control during maintenance.
- As a protection against rise in pressure of industrial equipments and civil installation with on-off control from remote for alarms and emergencies.
- Energy saving with controlled pumping and water supply hours.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet pressure, outlet pressure, flow rate and application are required for the proper sizing and cavitation analysis.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- A minimum length of 3 DN downstream of the valve is recommended for the best accuracy.

### Additional features

- XLC 315/415-FR downstream pressure reduction valve with solenoid control and back-flow prevention system.
- XLC 315/415-H downstream pressure reduction and solenoid control with high sensitivity pilot.
- XLC 315/415-G downstream pressure reduction valve with solenoid control and over pressure guard system.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 16 bar. Higher on request.
- Maximum temperature: 70°C.

### Downstream pressure pilot adjustment range

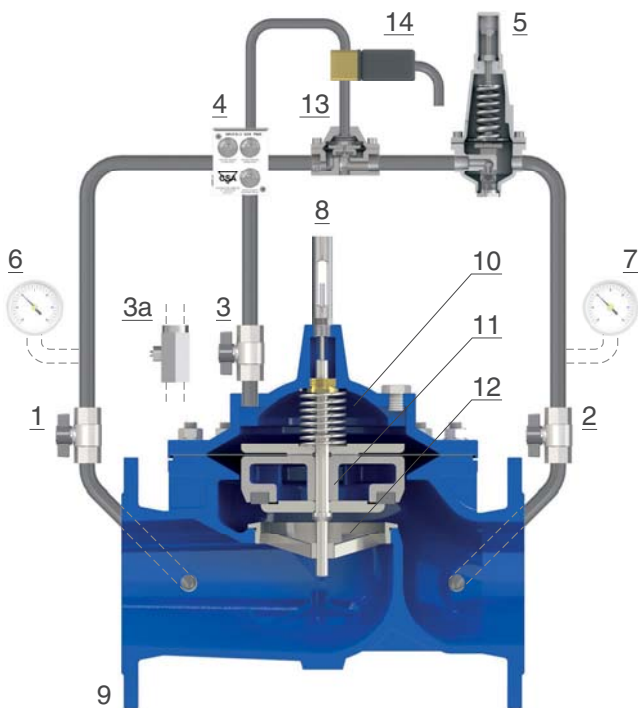
- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar
- Values lower than 0,7 available with high sensitivity pilots.

### Solenoid electrical data

- Voltages: 24 V DC, 24 V/50 Hz, 230 V/50 Hz. Other voltages on request.
- Power consumption: inrush AC (VA) 24, hold AC (VA) 17 (8 W), DC hot/cold coil 8/9 W.



## Operating principle



The CSA Model. XLC 315/415 is an automatic control valve operated by a two ways pilot (5), for downstream pressure reduction with pre-set adjustable value, and a solenoid valve (14) acting on a flow accelerator (13) to allow for normally open or normally closed function. Should the impulse to the solenoid (14) be set to have the flow accelerator (13) open if the downstream pressure rises above the pilot's set point (5) the latter will throttle, and limit the flow to divert line pressure to the main chamber (10), this to move the obturator down and generate the head loss required for the valve (9) to stabilize and maintain the desired downstream pressure. Should the downstream pressure fall below the pilot set point the obturator (11) will raise increasing the passage through the seat (12), reducing the head loss followed by the rise in pressure. The flow in and out of the main chamber (10) is controlled by the CSA exclusive unit regulation device with filter called GR.I.F.O. (4) and provided with three flow stabilizers, needed for the valve's response time and accuracy.

## Installation layout

Sectioning devices (1, 2) and by-pass are very important for maintenance operations, as well as the filter (3) to prevent dirt from reaching the control valve. The valve is receiving impulses to the solenoid from a CSA controller (8) or a remote signal. The direct acting pressure reducer VRCD (4) is the best choice on the by-pass thanks to its reliability also after long periods of inactivity. Anti-surge air valves FOX 3F AS (6, 7) are recommended as well as a pressure relief valve VSM (5), to prevent rise in pressure on the line.





## Upstream pressure relief automatic valve Mod. XLC 320/420-R

The CSA Model XLC 320/420-R is a globe pattern hydraulically operated automatic control valve that, installed in derivation from the main line, will relieve the excessive upstream pressure when it rises above the pre-set and adjustable value. Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage. The CSA pressure relief valve XLC 320/420-R is extremely versatile and can be used for a wide range of applications in combination with several CSA accessories and additional functions.

### Applications

- Downstream of pumps to protect the pipeline against rise in pressure during pump start up and pump failure.
- As a protection against rise in pressure in industrial equipment and civil installations.
- Downstream of pressure reducing station and modulating devices to protect the system against unwanted pressure fluctuations.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet pressure, outlet pressure, flow rate and application are required for the proper sizing and cavitation analysis.
- For the recommended flow rate, and operating conditions, please use the charts available on the XLC series engineering.
- When the valve discharges to atmosphere the AC (anti-cavitation) system is advised.

### Additional features

- XLC 320/420-R-FR upstream pressure relief valve with back-flow prevention.
- XLC 320/420-R-5 upstream pressure relief valve with solenoid control.
- The valve can be supplied without the GR.I.F.O. to increase the reaction time.

### Working conditions

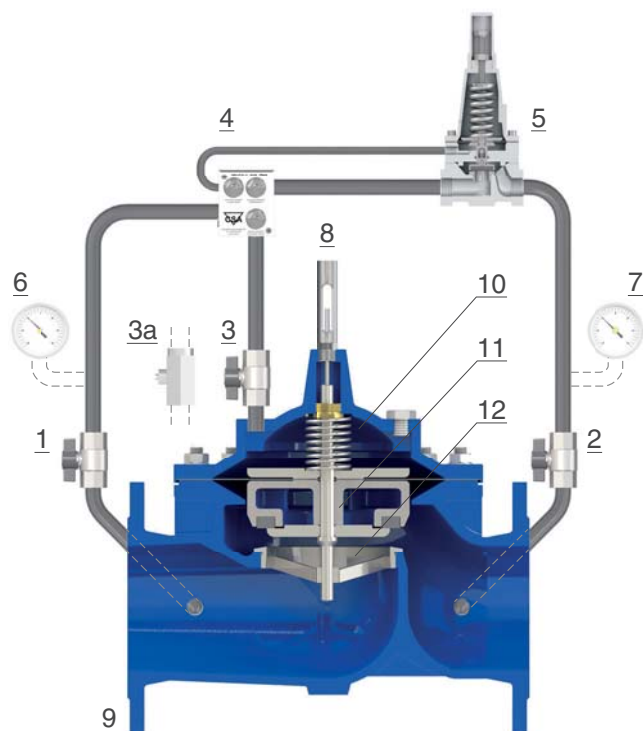
- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 25 bar.
- Maximum temperature: 70°C.

### Pressure relief pilot adjustment range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.
- Higher values up to 25 bar on request.



## Operating principle

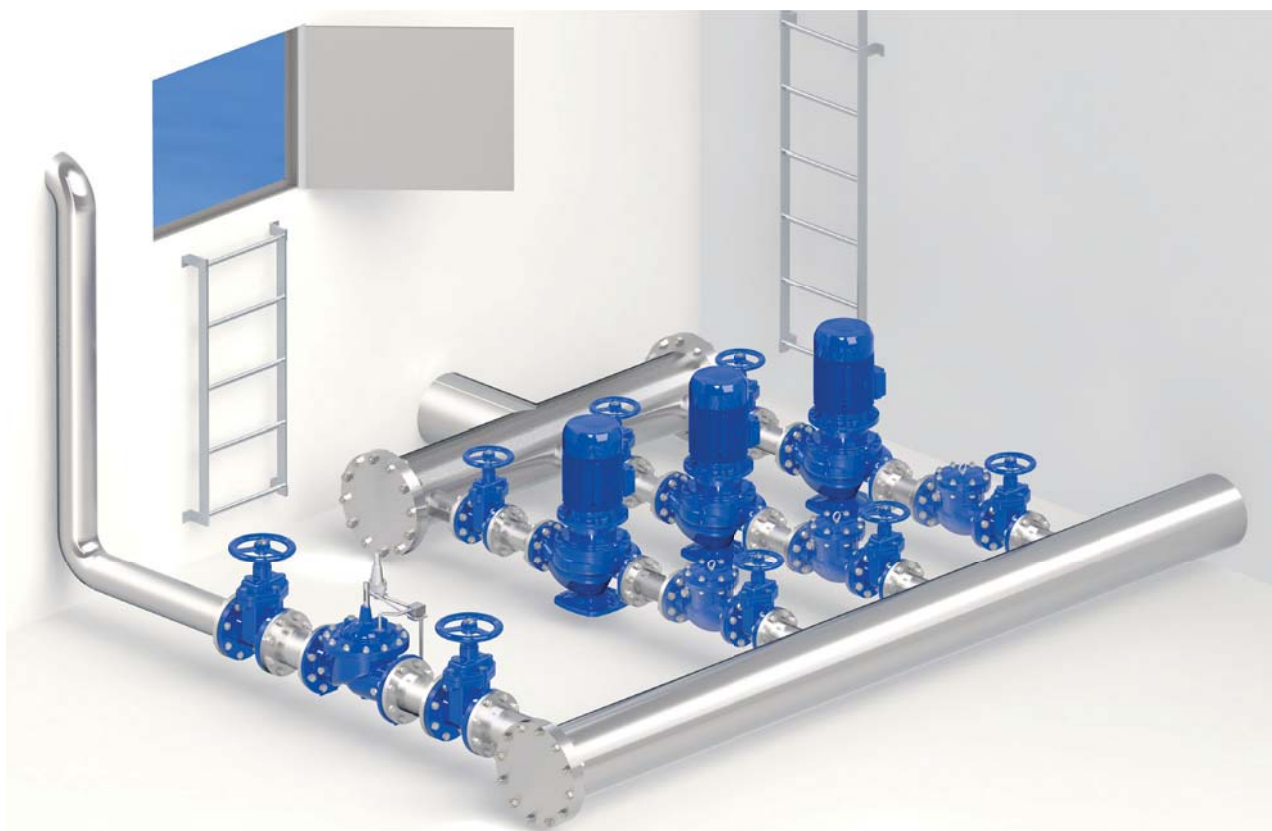


The CSA Model XLC 320/420-R is an automatic control valve operated by a high flow capacity two ways pilot (5), with pre-set and adjustable set point value, sensing the upstream pressure from the GR.I.F.O. (4). Should the line pressure rise above the pilot's set point the latter will open thus relieving the chamber (10) and moving the obturator (11) upwards, to discharge water and pressure through the main valve (9) downstream protecting the system. Should the upstream pressure be lower than the pilot's set point the latter will throttle (close eventually) diverting all pressure towards the main chamber (10) thus pushing the obturator (11) onto the seat (12), interrupting the flow rate.

The flow in and out of the main chamber is controlled by the CSA exclusive unit flow GR.I.F.O. (4) providing accuracy and absence of unwanted chattering.

## Installation layout

The picture below shows the recommended installation lay-out of the CSA XLC 320/420-R, used as a pressure relief in derivation from the main line to protect a pumping station. The sectioning devices are very important for maintenance operations; whenever possible a filter too is needed to prevent dirt from reaching the control valve. The set point should always remain within 0,5-1 bar above the maximum steady state pressure value of the pumps.





## Upstream pressure sustaining automatic valve Mod. XLC 320/420-S

The CSA Model XLC 320/420-S is a globe pattern hydraulically operated automatic control valve that, installed in-line, will sustain the upstream pressure to a pre-set and adjustable value regardless of variations in demand. Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage. The XLC 320/420-S is extremely versatile and can be used for a wide range of applications in combination with several CSA accessories and additional functions.

### Applications

- Downstream of pumps to prevent overload and for cavitation protection.
- On the inlet supply line of storage tanks to stabilize pressure and flow required for the level control.
- On gravity fed supply lines to ensure the minimum pressure to consumers located at higher elevation zones, in case of high consumption of the lower zones.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet pressure, outlet pressure, flow rate and application are required for the proper sizing and cavitation analysis.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- A minimum length of 3 DN upstream of the valve is recommended for the best accuracy.

### Additional features

- XLC 320/420-S-FR pressure sustaining valve with back-flow prevention.
- XLC 320/420-S-5 pressure sustaining valve with solenoid control.
- XLC 320/420-S-H pressure sustaining valve with high sensitivity pilot.

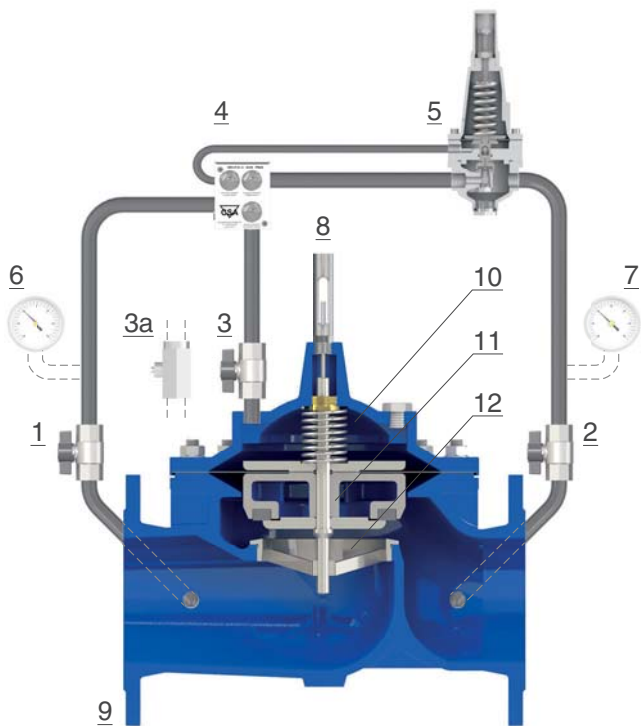
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 25 bar.
- Maximum temperature: 70°C.

### Upstream pressure pilot adjustment range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.
- Higher values up to 25 bar on request.

## Operating principle

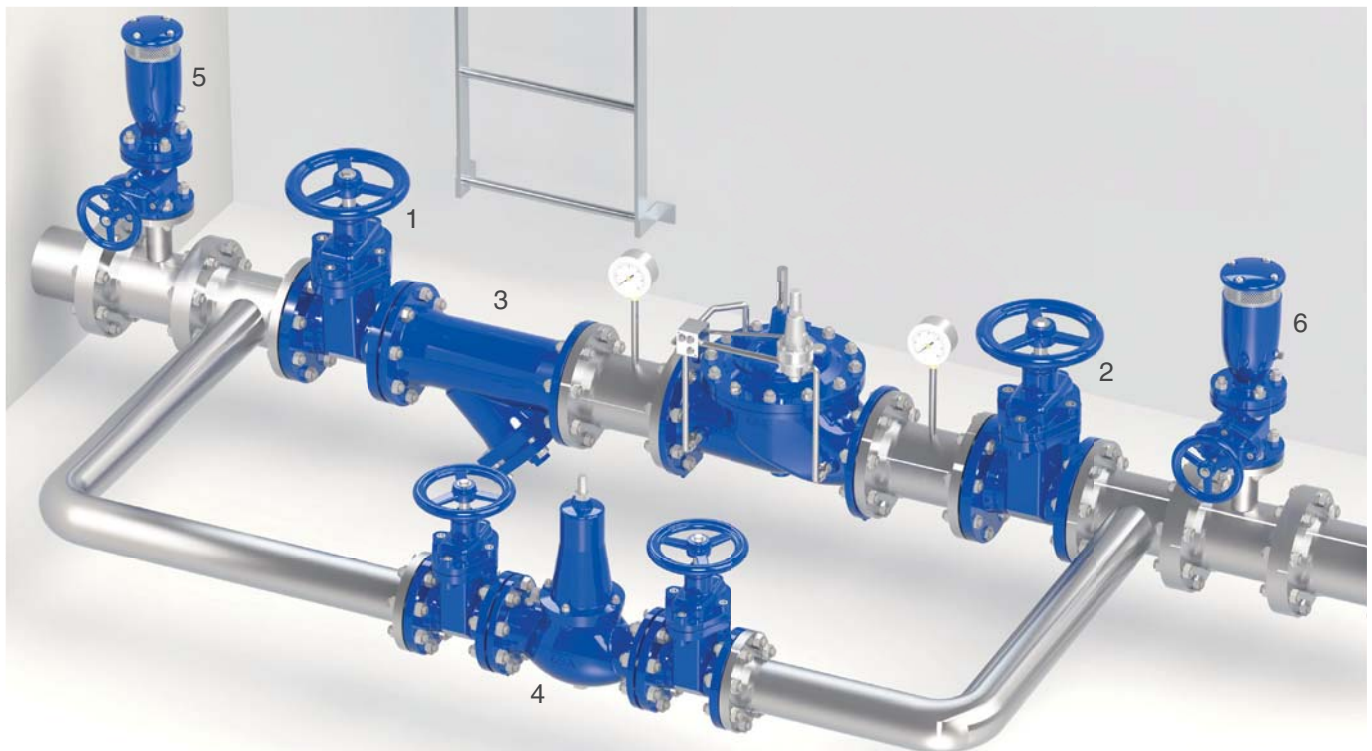


The CSA Model XLC 320/420-S is an automatic control valve operated by a high sensitivity two ways pilot (5), with pre-set and adjustable set point value, sensing the upstream pressure from the GR.I.F.O. (4). Should the line pressure rise above the pilot's set point the latter will open thus relieving the chamber (10) and moving the obturator (11) upwards, to discharge water and pressure through the main valve (9) downstream protecting the system. Should the upstream pressure be lower than the pilot's set point the latter will throttle (close eventually) diverting all pressure towards the main chamber (10) thus pushing the obturator (11) onto the seat (12), interrupting the flow rate.

The flow in and out of the main chamber is controlled by the CSA exclusive unit flow GR.I.F.O. (4) providing accuracy and absence of unwanted chattering.

## Installation layout

The recommended installation lay-out of the CSA XLC 320/420-S, used as a pressure sustain in-line, includes sectioning devices (1, 2) and by-pass for maintenance operations, and a filter (3) to prevent dirt from reaching the control valve. The direct acting pressure sustain valve CSA Mod. VSM (4) is the best choice on the by-pass thanks to its reliability also after long periods of inactivity. Anti-surge combination air valves CSA Mod. FOX 3F AS (5, 6) are recommended upstream and downstream of the installation.







## Upstream pressure relief surge anticipating control valve Mod. XLC 321/421

The CSA Model XLC 321/421, installed in derivation from the main line, will act as a protection of the system against the devastating effects of water hammer caused by pump failure. Thanks to a circuit composed of two pilots, hydraulic accelerators and CSA exclusive flow control stabilizer, the valve will serve both as a pressure relief, in case of rise of pressure, and as an anticipator of water hammer in case of pump failure providing the valve with a response time almost instantaneous. For the proper sizing and water hammer analysis please contact CSA.

### Applications

- At the pumping stations, downstream of pumps check valves in derivation from the main line.
- The valve is usually associated to CSA anti-surge combination air valves FOX 3F AS and other CSA products chosen by the water hammer analysis.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.
- CSFL mechanical flow regulator.

### Note to the engineer

- For the recommended flow rate, and operating conditions, please use the charts available on the XLC series engineering.
- CSA needs the project data for a surge analysis which is highly recommended for the sizing and setting of XLC 321/421.
- The AC (anti-cavitation) system is always recommended for this kind of valve.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 1,5 bar.
- Maximum operating pressure: 25 bar.
- Maximum temperature: 70°C.

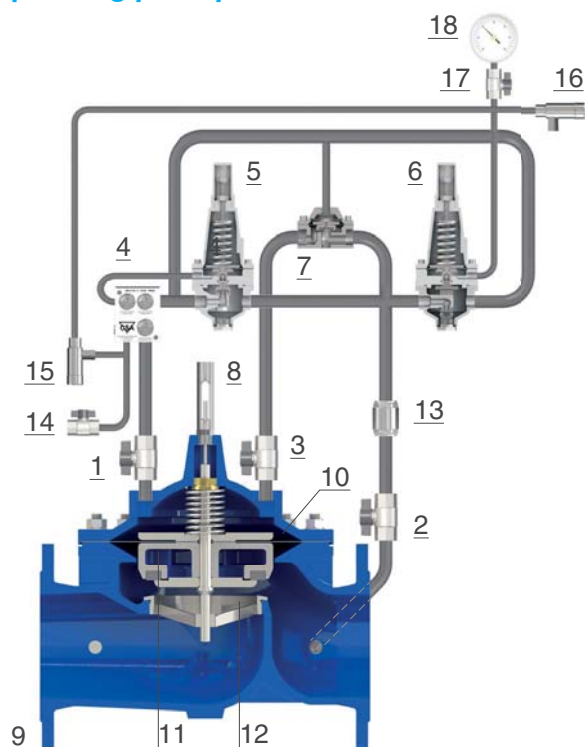
### Upstream pressure pilot adjustment range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.
- Higher values up to 25 bar on request.

### Pressure relief pilot adjustment range

- Red spring: 1,5 to 15 bar.
- Higher values up to 25 bar on request.

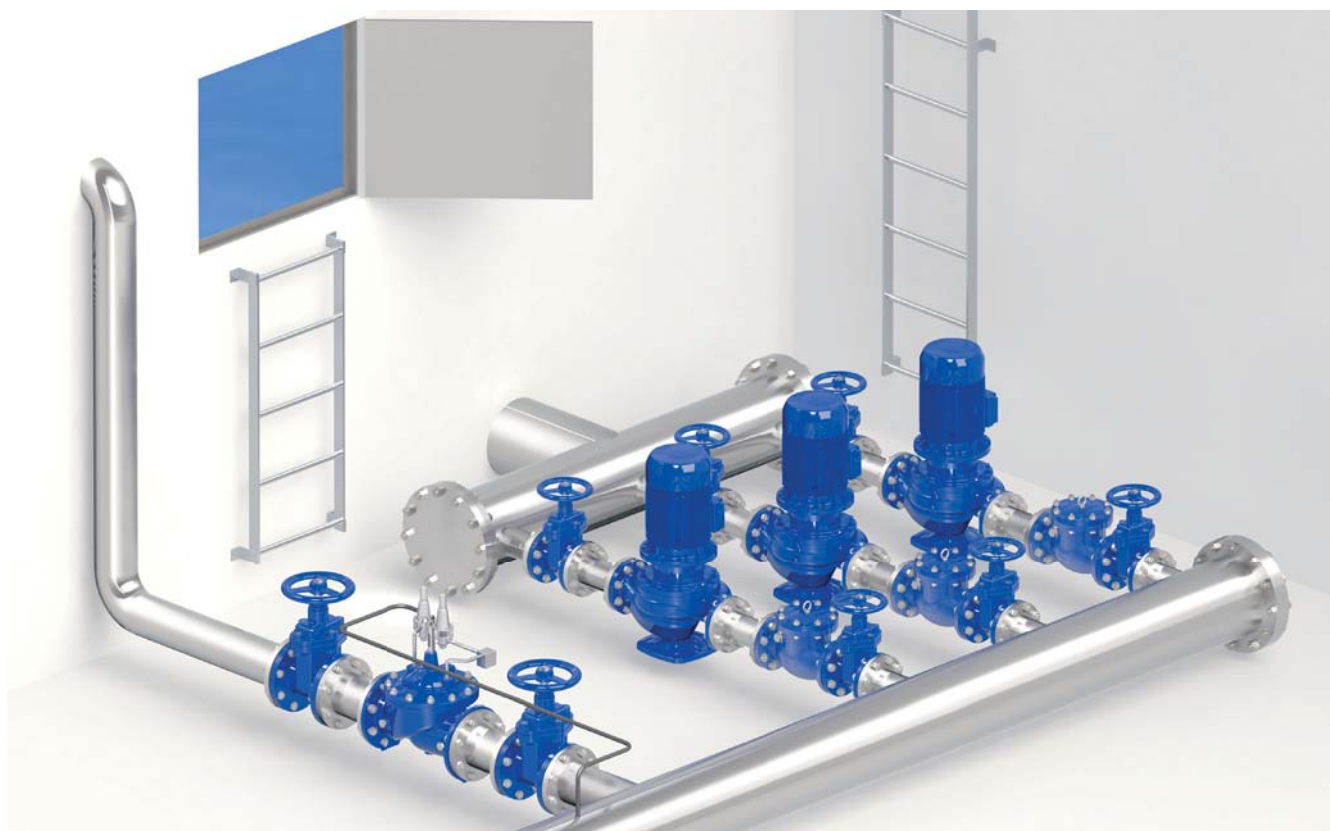
## Operating principle



The circuit is sensing the pressure of the main line through a dedicated pressure port (14). Two pilots, one for high pressure (5) and the second for low pressure (6), are both pre-set according to the results of the water hammer analysis. Should the upstream pressure rise above the high pressure pilot (5) the latter will open putting the main chamber (10) in communication with the downstream boundary condition (usually atmosphere, tank or other lower pressure values) thus pushing the obturator upwards in order to open the main valve (9) and discharge the exceeding pressure. Should the pump trip due to power failure the lower pressure pilot (6) will first sense the decrease in pressure, to allow flow through the accelerator (7) and relieve pressure of the control chamber (10), thus causing the opening of the main valve (9) with a response time almost immediate. Needle valves (15 and 16) are used for the proper regulation and set up. The flow in and out of the main chamber is controlled by the flow stabilizer GR.I.F.O. (4) providing accuracy and absence of chattering.

## Installation layout

The installation lay-out of the CSA XLC 321/421, used as a protection device in derivation from the main line includes sectioning devices, very important for maintenance operations. Whenever possible a filter too is needed to prevent dirt from reaching the control valve. Anti-surge combination air valves CSA Mod. FOX 3F AS are advised near the XLC 321/421 to avoid negative pressure conditions (if likely to occur), and also used as a static pressure sensing port for the circuit through their drainage valve.







## Upstream pressure sustaining level control valve Mod. XLC 324/424

The CSA Model XLC 324/424 is a globe pattern hydraulically operated automatic control valve that sustains the upstream pressure to a pre-set value regardless of variations in demand and, at the same time, it controls and regulates the minimum and maximum level inside a tank. Should the upstream pressure drop below the set point, during opening, the valve will throttle ensuring the water supply to higher zone consumers. The CSA XLC 324/424 is extremely important to stabilize HGL, contain unwanted surges and to limit the excessive flow to the tank.

### Applications

- To prioritize high zone consumers during tank filling thanks to the upstream pressure sustaining function.
- On the inlet supply line of storage tanks to limit the flow required for the level control, in accordance with water demand patterns.
- On high rise buildings to ensure the proper regulation and control of rooftops reservoirs, avoiding possible overflow and damages, maintaining the required upstream pressure.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Avoid possible high points and steep changes in slopes of the piping between the valve and the level control pilot.
- The AC (anti-cavitation) system is needed for application with static values above 7 bar, in this case consult with CSA for the proper valve sizing.

### Additional features

- XLC 324/424-FR upstream pressure relief/sustaining valve with back-flow prevention.
- XLC 324/424-5 upstream pressure relief/sustaining automatic valve with solenoid control for electric float back-up.
- XLC 324/424-R upstream pressure relief/sustaining valve with surge prevention pilot.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 16 bar.
- Recommended working pressure: 6 bar. Higher on request.
- Maximum temperature: 70°C.

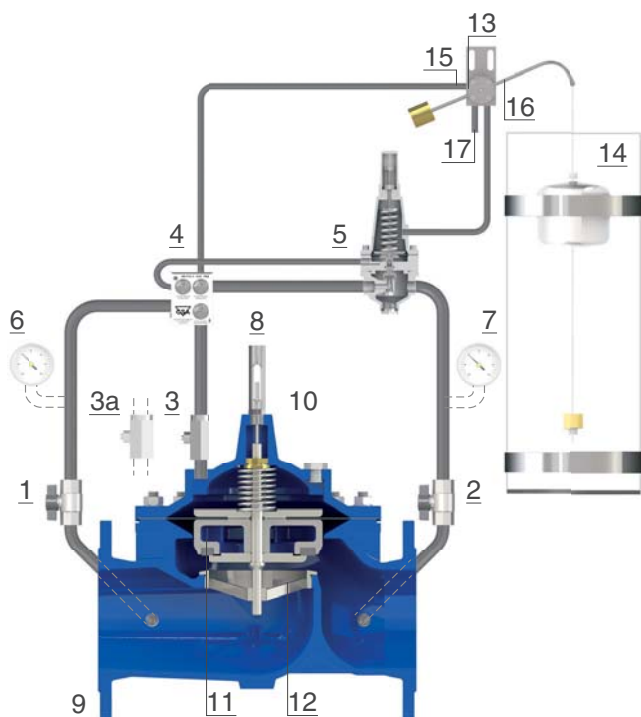
### Upstream pressure pilot adjustment range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.

### Level control pilot adjustment range

- Between 0,2 and 4 meters.

## Operating principle



The XLC 324/424 is an automatic control valve operated by a two ways pilot for upstream pressure sustain (5) linked to a pilot for minimum and maximum level control (13), that can be installed inside the main tank or on an external stilling container (as per the picture). The valve is always closed when the level of the tank has reached the maximum, as all pressure will be diverted from upstream (1) to the cover of the pressure sustaining pilot (5) going through the three ways level control unit Rotoway (13). When water reaches the minimum level inside the tank the pressure of the pilot's cover (5) is relieved through the drain (17) of the three ways pilot (13), the main valve (9) will then sustain the line pressure to the minimum pre-set and adjustable value of the pilot (5). The flow in and out of the main chamber is controlled by the CSA exclusive unit flow GR.I.F.O. (4) providing accuracy and absence of unwanted chattering.

## Installation layout

In the installation lay-out of the CSA XLC 324/424, performing the level control through an external stilling tank (2), a maximum vertical distance of 4 meters is recommended between the valve and the maximum water level. The sectioning devices (1) are very important for maintenance operations; whenever possible a filter (3) too is needed to prevent dirt from reaching the control valve. Anti-surge air valves FOX 3F AS are advised upstream of the valve for air release during working conditions and commissioning.





## Upstream pressure sustaining valve with solenoid control Mod. XLC 325/425

The CSA Model XLC 325/425 is a globe pattern hydraulically operated automatic control valve that sustains the upstream pressure to a pre-set value regardless of variations in demand. Thanks to the solenoid control the valve will be able to close or open, in response to a signal sent from remote or by an external controller. Should the upstream pressure drop below the pilot set point the valve will close drip tight, assuring the proper operation also in static conditions.

### Applications

- On the inlet supply line of storage tanks, to control the flow and the level through an electric float.
- On gravity fed supply lines to prioritize the consumers at the higher elevation zones, with the safety of opening/closing according to signals/alarms.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet pressure, outlet pressure, flow rate and application are required for the proper sizing and cavitation analysis.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- A minimum length of 3 DN upstream of the valve is recommended for the best accuracy.

### Additional features

- XLC 325/425-FR upstream pressure sustaining with solenoid control and back-flow prevention.
- XLC 325/425-R upstream pressure relief valve with fast acting pilot and solenoid control.
- XLC 325/425-H upstream pressure sustaining valve with high sensitivity pilot and solenoid control.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Max. operating press.: 16 bar. Higher on request.
- Maximum temperature: 70°C.

### Upstream pressure pilot adjustment range

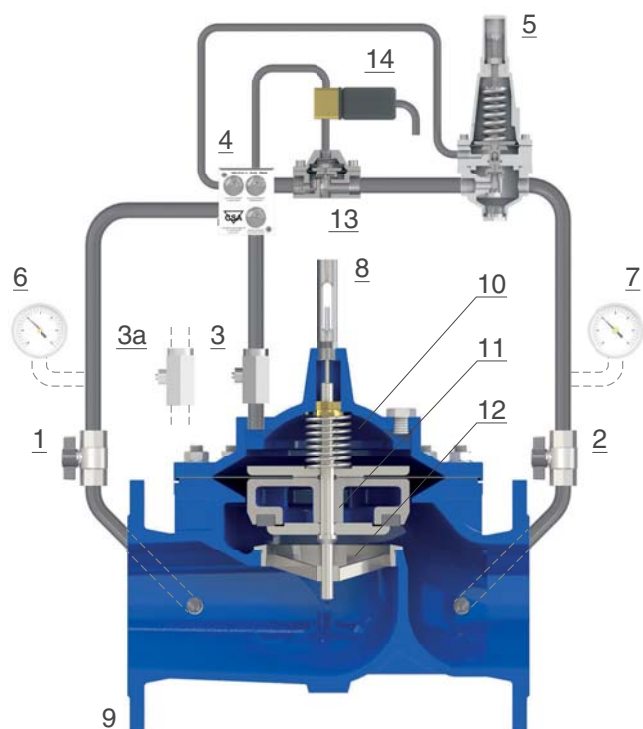
- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.
- Higher values up to 25 bar on request.
- Values lower than 0,7 available on request.

### Solenoid electrical data

- Voltages: 24 V DC, 24 V/50 Hz, 230 V/50 Hz. Other voltages on request.
- Power consumption: inrush AC (VA) 24, hold AC (VA) 17 (8 W), DC hot/cold coil 8/9 W.



## Operating principle



The CSA Model XLC 325/425 is an automatic control valve operated by a two ways pilot (5), sensing the line pressure through the GR.I.F.O., and a solenoid (14) acting on a flow accelerator (13). Should the upstream pressure rise above the pilot's set point the latter will open relieving the control chamber (10) and lifting up the obturator allowing flow through the main valve (9). If the line pressure drops below the pilot's set point the latter will throttle diverting pressure towards the main chamber (10), to push the obturator downwards in order to create the head loss required for pressure sustaining function. The solenoid (14) will interrupt the flow through the circuit, closing the accelerator (13), in response to signals coming from a CSA controller or from remote.

The flow in and out of the main chamber is controlled by the flow stabilizer GR.I.F.O. (4) providing accuracy and absence of chattering.

## Installation layout

In the following picture the CSA XLC 325/425 is linked to a CSA controller (7) or any other electronic device sending impulses to the solenoid on the circuit. Sectioning devices (1, 2) and by-pass are needed for maintenance operations, and a filter (3) to prevent dirt. The pressure sustaining valve VSM (4) is the best choice on the by-pass thanks to its reliability also after long periods of inactivity. Anti-surge air valves FOX 3F AS (5, 6) are recommended upstream and downstream of the installation.





## Differential pressure sustaining valve Mod. XLC 395/495

The CSA Model XLC 395/495 is a globe pattern hydraulically operated automatic control valve that sustains a minimum upstream pressure differential value between two points, pre-set and adjustable, regardless of variations in demand. Entirely made in ductile cast iron with FBT epoxy (fluid bed technology) coating with internals in stainless steel, the valve has been designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- On the main supply line of pumping stations to prevent overload and to avoid cavitation.
- On cooling systems for pressure balancing between circuits.
- On filtration systems for emergency by-pass.

### Additional features

- XLC 395/495-FR differential upstream pressure sustaining valve with back-flow prevention.
- XLC 395/495-5 differential upstream pressure sustaining valve with solenoid control.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 25 bar.
- Maximum temperature: 70°C.

### Note to the engineer

- Inlet pressure, outlet pressure, flow rate and application are required for the proper sizing and cavitation analysis.
- For flow rate and operating conditions use the charts on XLC series engineering.
- A minimum length of 3 DN upstream of both pressure ports is recommended for the proper operation and the best accuracy.

### Upstream pressure pilot adjustment range

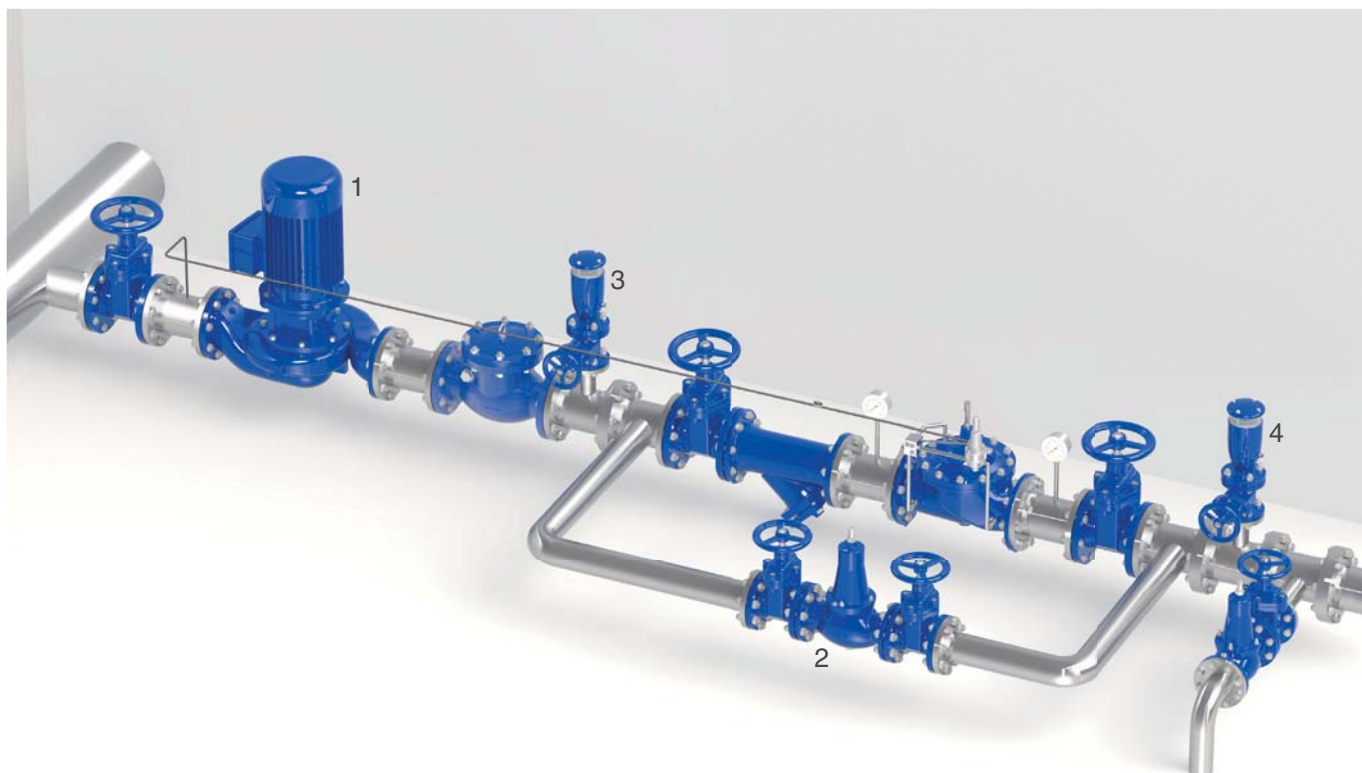
- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.
- Higher values up to 25 bar on request.
- Values lower than 0,7 available on request.



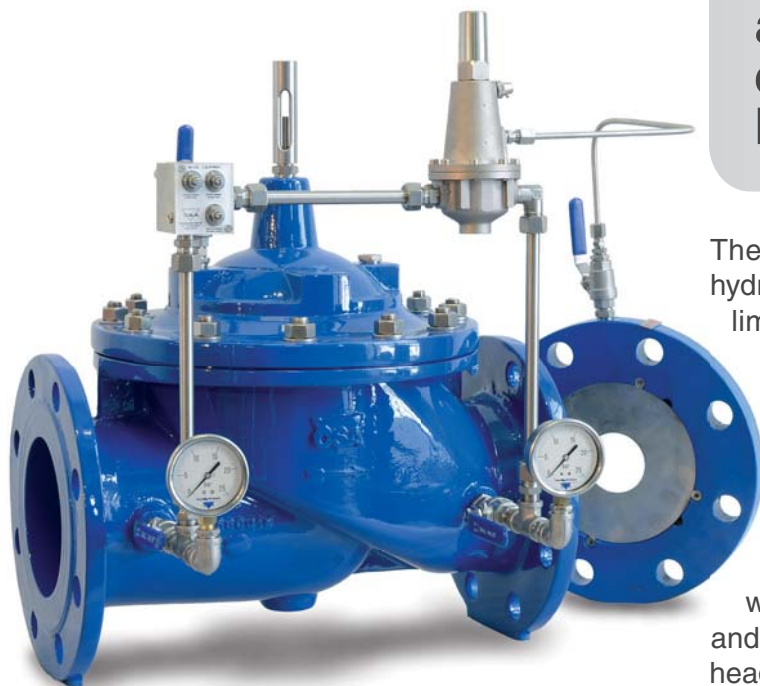
A detailed technical cutaway diagram of a pressure washer. The main body is blue, and the internal components are silver. The diagram is annotated with 14 numbered callouts: 1. Trigger gun; 2. Spray lance; 3. Spray lance connector; 4. High-pressure hose; 5. Spray lance; 6. Pressure gauge; 7. Pressure gauge; 8. Spray lance; 9. Motor unit; 10. Spray lance; 11. Spray lance; 12. Spray lance; 13. Spray lance; 14. Spray lance.

The first point is actually the downstream pressure (7) acting on the pilot's cover, while the second (13) is the upstream pressure, sensed either upstream or through an external port away from the valve, and connected to the pilot's intermediate body (14). Both values are required for the valve to work, creating the differential pressure needed for the design, whose circuit is controlled by the exclusive CSA unit flow control device GR.I.F.O (4) for the best accuracy and proper response time. Should the difference in pressure rise above the pilot's set point the latter will open thus discharging the main chamber (10) and moving the obturator (11) towards the open position. Should the difference in pressure be lower than the pilot's set point the latter with throttle, diverting all pressure towards the main chamber (10) thus pushing the obturator (11) onto the seat (12) and reducing the flow rate through the main supply line.

The picture shows the installation lay-out of the CSA XLC 395/495 used for pump control, to avoid overload and cavitation, where pressure is taken before and after the pump (1) in order to maintain the required difference in pressure. In case of by-pass, needed for maintenance, the pressure sustaining valve VSM (2) is the best choice thanks to its reliability also after long periods of inactivity. Anti-surge combination air valves FOX 3F AS (3, 4) are recommended upstream and downstream of the installation.



## Flow rate automatic control valve Mod. XLC 330/430



The CSA model XLC 330/430 is a globe pattern hydraulically operated automatic control valve that limits the flow to a pre-set value, regardless of pressure variations. In case of flow rate lower than the required set point the valve will be fully opened. The valve is supplied with an orifice plate assembly, needed for the proper functioning and connected to the pilot. Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT (fluid bed technology) epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- Downstream of pumps to prevent overload and for cavitation protection.
- On the inlet supply lines of tanks to prevent excessive flow.
- In distribution networks and on the supply lines of residential and industrial districts to limit the flow during peak hours.
- In filtration systems to prevent excessive flow avoiding damages and malfunctioning.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet and outlet pressure, flow rate are required for the proper sizing.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- For the best accuracy leave 5 DN between the valve and the orifice plate and 3 DN downstream of it (picture in the next page).

### Additional features

- XLC 330/430-FR flow rate control valve with back-flow prevention.
- XLC 330/430-H flow rate control valve with high sensitivity pilot.

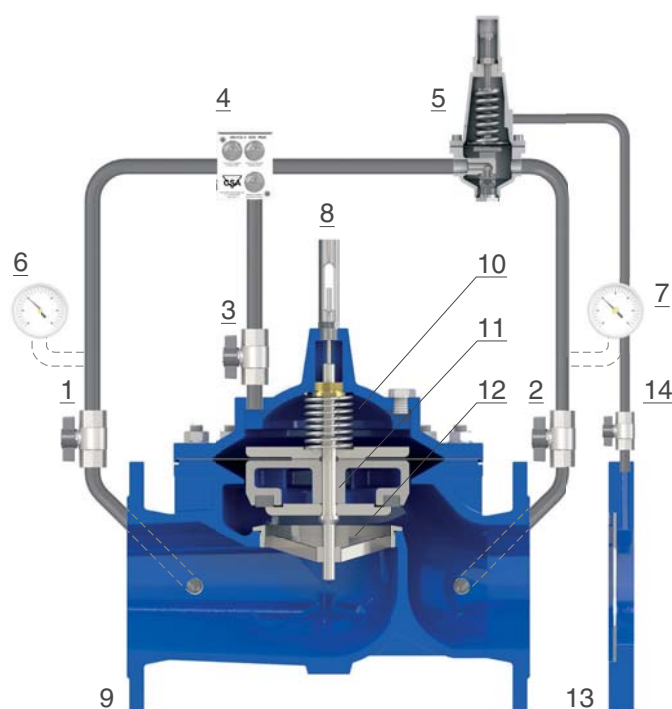
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 1,2 bar.
- Maximum operating pressure: 16 bar. Higher on request.
- Maximum temperature: 70°C.

### Flow rate control pilot adjustment range

- The orifice plate assembly is calculated and machined according to the maximum flow rate. An adjustment range of the value is possible according to the regulation flow chart supplied with the valve.

## Operating principle



The CSA model XLC 330/430 is operated by a two ways pilot (5), for flow control, with pre-set set and adjustable values, sensing the drop in pressure produced by the orifice plate (13), where a stainless steel disk is inserted inside a flange and connected to the pilot with a sensing line (14) non supplied.

Should the flow exceed the maximum value the differential pressure will increase and pilot (5) will throttle and limit the flow to direct inlet pressure to the main chamber (10), to generate the head loss required through the seat (12) for the valve (9) to control the flow. Should the flow remain below the pilot's set point, the differential pressure across the orifice plate (13) will be less than the pilot's (5) spring force, therefore the valve will remain fully open.

Pressure in and out of the main chamber (10) is controlled by the CSA exclusive regulation device with filter called GR.I.F.O. (4), needed for the valve's response time and accuracy.

## Installation layout

The picture shows the recommended lay-out of the CSA XLC 330/430. The flange orifice (8), calculated and machined according to the project's requirements, is connected to the valve's pilot (9). Sectioning devices (1, 2) and by-pass are very important for maintenance operations, as well as the filter (3) to prevent dirt from reaching the control valve. Anti-surge combination air valves FOX 3F AS (6, 7) are recommended, as well as a pressure relief valve, like CSA VSM (5) to prevent rise in pressure on the main line.





## Flow control and pressure reducing automatic valve Mod. XLC 331/431



The CSA model XLC 331/431 is a globe pattern hydraulically operated automatic control valve that reduces and stabilizes the downstream pressure to a constant set-point, regardless of variation in demands, limiting at the same time the flow rate to a maximum value. Normally equipped with visual position indicator and made in ductile cast iron with FBT (fluid bed technology) epoxy coating and stainless steel, the valve reduces head loss, throttling noise and cavitation damage. The valve is supplied with an orifice plate assembly, needed for the proper functioning and connected to the pilot.

### Applications

- Downstream of pumps to reduce the pressure and prevent overload.
- As a protection against rise in pressure of industrial equipment, plants and civil installations, limiting the flow to prioritize high zones consumers.
- In filtration systems to prevent excessive flow and unwanted rise in pressure avoiding damages and malfunctioning.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet and outlet pressure, flow rate are required for the proper sizing.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- For the best accuracy leave 5 DN between the valve and the orifice plate and 3 DN downstream of it (picture in the next page).

### Additional features

- XLC 331/431-FR pressure reduction and flow control valve with back-flow prevention.
- XLC 331/431-H pressure reduction and flow control valve with high sensitivity pilot.
- XLC 331/431-5 pressure reduction and flow control valve with solenoid control.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 1,5 bar.
- Maximum operating pressure: 16 bar. Higher on request.
- Maximum temperature: 70°C.

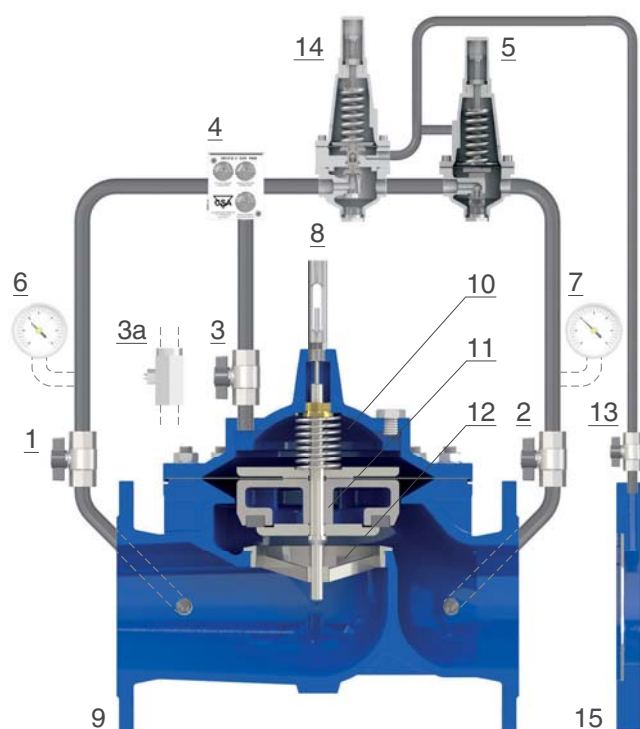
### Downstream pressure pilot adjustment range

- Red spring: 1,5 to 15 bar.

### Flow rate control pilot adjustment range

- The orifice plate assembly is calculated and machined according to the maximum flow rate. An adjustment range of the value is possible according to the regulation flow chart supplied with the valve.

## Operating principle



The CSA model XLC 331/431 is operated by two 2 ways pilots (14-5), namely for pressure reduction and flow control, with pre-set and adjustable values. The downstream pressure is sensed after the orifice plate assembly (15). Should the downstream pressure rise above the pilot (14) set-point the latter will throttle and limit the flow to direct inlet pressure to the main chamber (10), to reduce and stabilize the downstream pressure to a constant value. Should the downstream pressure fall below the pilot set-point the obturator (11) will raise, to reduce the head loss followed by the rise in pressure. The flow rate control pilot (5) receives the downstream pressure on the cover where the spring is adjusted to compensate the difference in pressure produced by the orifice plate assembly. Should the flow exceed the maximum value the pilot (5) will throttle and limit the flow to direct inlet pressure to the main chamber (10), to generate the head loss required for flow control. The CSA regulation device with filter called GR.I.F.O. (4) guarantees the valve's response time and accuracy.

## Installation layout

The installation lay-out of the CSA XLC 331/431 includes sectioning devices (1, 2) and by-pass, with CSA direct acting pressure control valves (4), very important for maintenance operations. The orifice plate assembly (8) needs to be located 5 DN downstream of the valve leaving 3 DN more before any change in direction, slope and cause of turbulence in the fluid. FOX 3F AS (6, 7) are recommended for air release and commissioning as well as pressure relief valve CSA VSM (5) to prevent rise in pressure on the line.







## Flow regulation valve with minimum-maximum level control **Mod. XLC 334/434**

The CSA Model XLC 334/434 is a globe pattern hydraulically operated automatic control valve that controls the minimum and maximum level of a tank limiting, at the same time, the maximum flow to a requested value regardless of pressure variations.

Normal equipped with visual position indicator and made in ductile cast iron with FBT (fluid bed technology) epoxy coating and stainless steel, the valve reduces head loss, throttling noise and cavitation damage. An orifice plate assembly, needed for the proper functioning, is supplied with the valve.

### Applications

- On the outlet supply of storage tanks or downstream booster pump stations to control the maximum flow and limit the level within the required values.
- On the rooftop reservoirs as hydraulic back up for level control to avoid overflow.
- On the inlet supply line of storage tanks to control the level and avoid excess in flow during opening.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- For the best accuracy leave 5 DN between the valve and the orifice plate and 3 DN downstream of it.

### Additional features

- XLC 334/434-FR minimum and maximum flow level control valve with back flow prevention system.
- XLC 334/434-5 minimum and maximum level control valve with solenoid.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 1,2 bar.
- Maximum operating pressure: 16 bar.
- Recommended working pressure: 6 bar. Higher on request.
- Maximum temperature: 70°C.

### Flow rate control pilot adjustment range

- The orifice plate assembly is calculated and machined according to the maximum flow rate. An adjustment range of the value is possible according to the regulation flow chart supplied with the valve.

### Min.-max. level control pilot adjustment range

- Between 0,2 and 4 meters.

## Installation layout

In the installation lay-out the CSA XLC 334/434, flow regulation valve with minimum and maximum level control, is used on an external stilling tank (2). The flange orifice (5), calculated and machined according to the project's requirements, is connected to the valve's pilot (6). The sectioning devices (1) and by-pass, where CSA direct acting pressure sustaining valves Model VSM (4) are advised, are very important for maintenance operations, as well as the filter (3) to prevent dirt from reaching the control valve.



## Flow automatic control valve with solenoid control Mod. XLC 335/435



The CSA Model XLC 335/435 is a globe pattern hydraulically operated automatic control valve that, working in combination with an orifice plate assembly, limits the maximum flow to a maximum pre-set value, adjustable and regardless of pressure variations. In case of flow rate lower than the required set point the valve will be fully opened. The circuit is also equipped with a solenoid and flow accelerator to enable on-off control in response to signals. Entirely made in ductile cast iron with FBT (fluid bed technology) epoxy coating and stainless steel, the valve reduces head loss, throttling noise and cavitation damages.

### Applications

- Downstream of pumps to prevent overload and for cavitation protection with on-off control in case of alarms and emergencies.
- On the inlet supply lines of tanks to prevent excessive flow with the possibility of electric float back up.
- In main transmission lines and water distribution systems to equalize operating supply hours between valves and limit the flow for various regimes.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet and outlet pressure, flow rate are required for the proper sizing.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- For the best accuracy leave 5 DN between the valve and the orifice plate and 3 DN downstream of it (picture in the next page).

### Additional features

- XLC 335/435-FR flow regulation with solenoid control valve with back flow prevention system.
- XLC 335/435-H flow regulation with solenoid control valve with high sensitivity pilot.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 1,2 bar.
- Max. operating press.: 16 bar. Higher on request.
- Maximum temperature: 70°C.

### Flow rate control pilot adjustment range

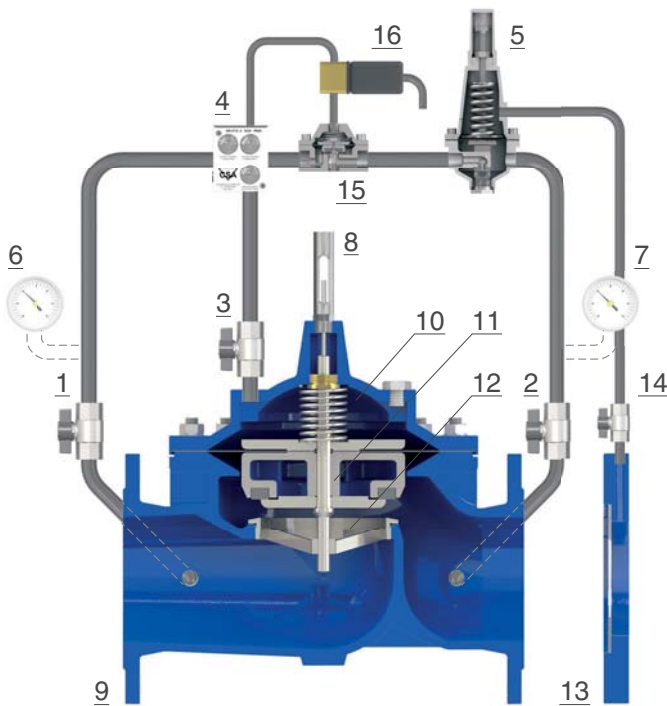
- The orifice plate assembly is calculated and machined according to the maximum flow rate. An adjustment range of the value is possible according to the regulation flow chart supplied with the valve.

### Solenoid electrical data

- Voltages: 24 V DC, 24 V/50 Hz, 230 V/50 Hz. Other voltages on request.
- Power consumption: inrush AC (VA) 24, hold AC (VA) 17 (8 W), DC hot/cold coil 8/9 W.



## Operating principle



The XLC 335/435 is operated by a 2 ways pilot (5), for flow control with pre-set and adjustable values, sensing the drop in pressure produced by the orifice plate (13). Should the flow exceed the maximum value the differential pressure will increase and pilot (5) will throttle and limit the flow, to direct inlet pressure to the main chamber (10) and generate the head loss required through the seat (12) for the valve (9) to control the flow rate. Should the flow remain below the pilot's set-point, the differential pressure across the orifice plate (13) will be less than the pilot's (5) spring force, therefore the valve will remain fully open. A solenoid valve (16) working in combination with an hydraulic accelerator (15) is either interrupting the flow through the circuit pushing the valve (9) to the closed position, or discharging the main chamber (10) to by-pass the flow control pilot (5) and open the main valve (9) completely. Pressure in and out of the main chamber (10) is controlled by the CSA exclusive regulation device with filter called GR.I.F.O. (4), needed for the valve's response time and accuracy.

## Installation layout

In the picture the CSA XLC 335/435 is linked to CSA controller (10) or any other electronic device sending impulses according to the function required. The flange orifice (8) is connected to the valve's pilot (9). Sectioning devices (1, 2) and a by-pass with CSA pressure control valves (4) are needed for maintenance operations. Anti-surge air valves CSA FOX 3F AS (6, 7) are recommended for air release and commissioning, as well as a pressure relief valve CSA VSM (5) to prevent rise in pressure.





## Burst automatic control valve Mod. XLC 380/480

The CSA Model XLC 380/480 is a globe pattern hydraulically operated automatic control valve that senses the increase in flow above a pre-set and adjustable value of a high sensitivity pilot, diverting the upstream pressure to the main control chamber and causing a complete closure, to be manually reset after that. As long as the flow rate remains below the set point, the valve will be fully open minimizing head loss. Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT (fluid bed technology) coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damages.

### Applications

- On gravity fed supply lines to avoid depressurization in case of pipe burst due, for example, to landslides.
- On the outlet supply line of storage tanks, water towers to close in case of pipe bursts downstream, preventing level from dropping below a minimum value.
- On water distribution systems and critical supply lines to interrupt flow in case of severe failures like earthquakes, external damages.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet pressure, outlet pressure, flow rate and application are required for the proper sizing and cavitation analysis.
- A minimum length of 3 DN downstream and upstream of the valve is recommended for the best accuracy (picture in the next page).

### Additional features

- XLC 380/480-FR burst automatic control valve with back-flow prevention.
- XLC 380/480-5 burst automatic control valve with solenoid control.

### Working conditions

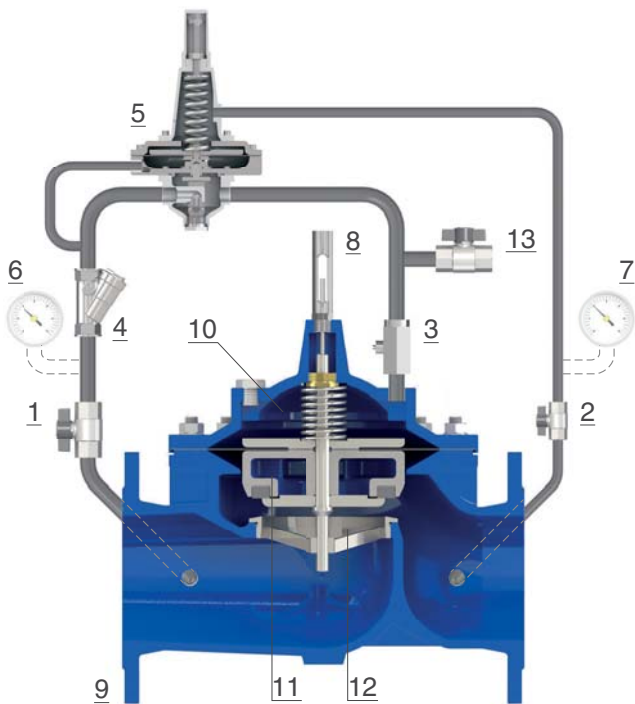
- Fluid: treated water.
- Minimum operating pressure: 1,5 bar.
- Maximum operating pressure: 16 bar.
- Recommended working pressure: 6 bar. Higher on request.
- Maximum temperature: 70°C.

### Flow rate control pilot adjustment range

- The valve is supplied with the pilot set to the required threshold flow rate, whose adjustment range is available according to the regulation flow chart supplied with the valve.



## Operating principle

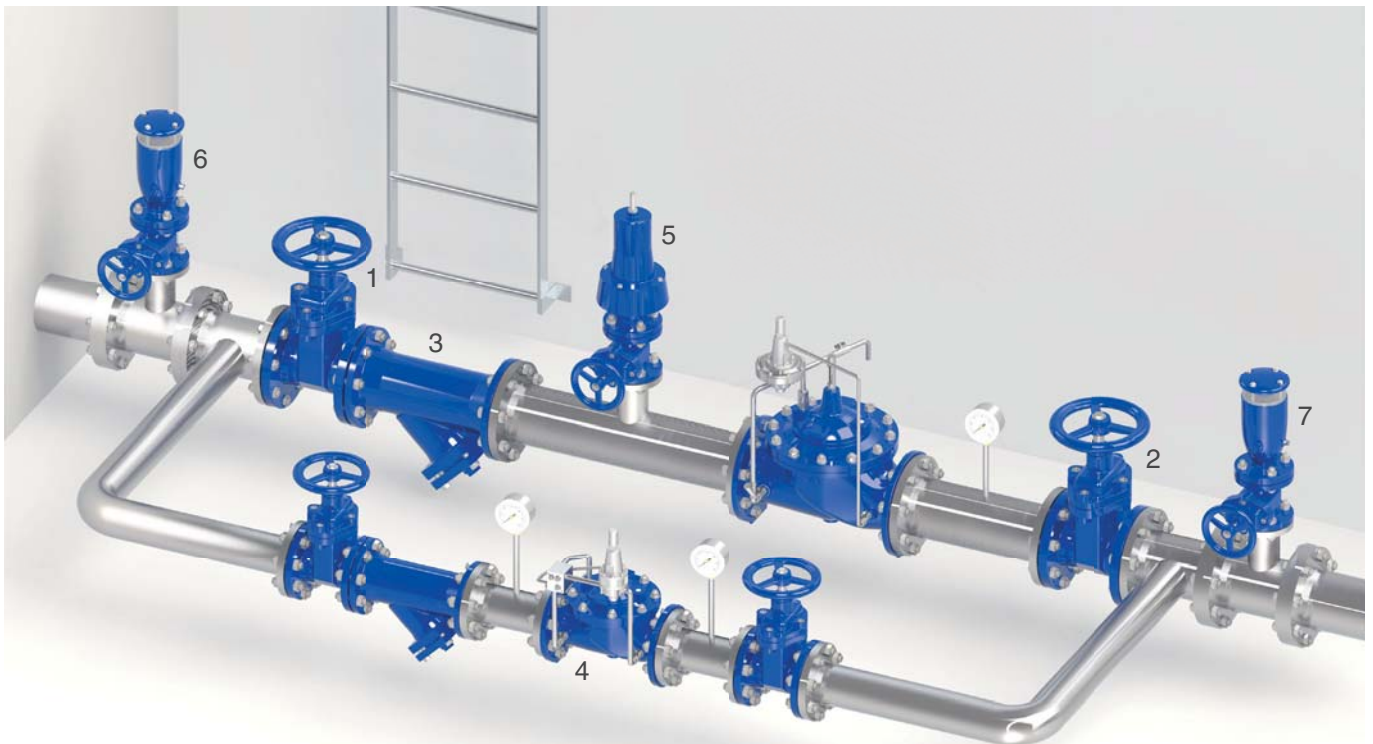


The CSA model XLC 380/480 is operated by a 2 ways high sensitivity pilot (5), for flow control, with pre-set set and adjustable values, sensing the drop in pressure through the valve produced by the flow rate. Should the latter exceed the maximum value the differential pressure will increase and pilot (5) will open, putting the upstream pressure in communication with the main chamber (10) and closing the main valve (9). Should the flow remain below the pilot's set-point the valve will remain fully open. Once it has been closed the valve needs to be open manually through the isolation ball valve (13) discharging the main chamber (10).

Pressure in and out of the main chamber (10) is controlled by the CSA needle valve (3) for a smooth regulation, while a filter (4) will prevent debris and dirt from entering the hydraulic circuit with the risk of clogging and possible malfunctioning.

## Installation layout

The CSA valve XLC 380/480 may cause pressure surge upon closure depending on the location, fluid velocity, differential pressure. A pressure relief valve installed upstream, CSA VSM or fast acting CSA VRCA (5), is therefore recommended, along with a pressure sustaining valve XLC 420 (4) or VSM on the by-pass line for the maintenance operations. Anti-surge combination air valves FOX 3F AS (6, 7) are also needed for air control and water hammer protection during commissioning and pipe filling.





## Minimum-maximum level automatic control valve Mod. XLC 340/440

The CSA Model XLC 340/440 is a globe pattern hydraulically operated automatic control valve that regulates the minimum-maximum level of a tank, with an adjustable range, regardless of upstream pressure variations. Thanks to a CSA needle valve the response time can be regulated, to prevent water hammer effects during the closing phase. Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- On storage tank to perform a minimum and maximum control, decreasing the operating cycles and therefore maintenance, using at the same time most of the storage capacity.
- For level control with an external container should the main tank not be accessible.
- On rooftop and elevated reservoir in general where level control is maintained through pumps operations, and an hydraulic backup is needed to avoid overflow.

### Accessories

- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- CSFL mechanical flow regulator.

### Note to the engineer

- Avoid bends and high points on the piping to connect the main valve to the level control pilot to prevent the formation of air pockets.
- A minimum of 0,6 bar on the pilot is needed, failing in doing so would create delays and malfunctioning. Consider the use of a sustaining pilot for low pressure conditions and/or the CSFL mechanical flow regulator.

### Additional features

- XLC 340/440-FR minimum maximum level control with back-flow prevention.
- XLC 445 minimum maximum level control with solenoid control.
- XLC 340/440-R minimum maximum level control with surge prevention pilot.

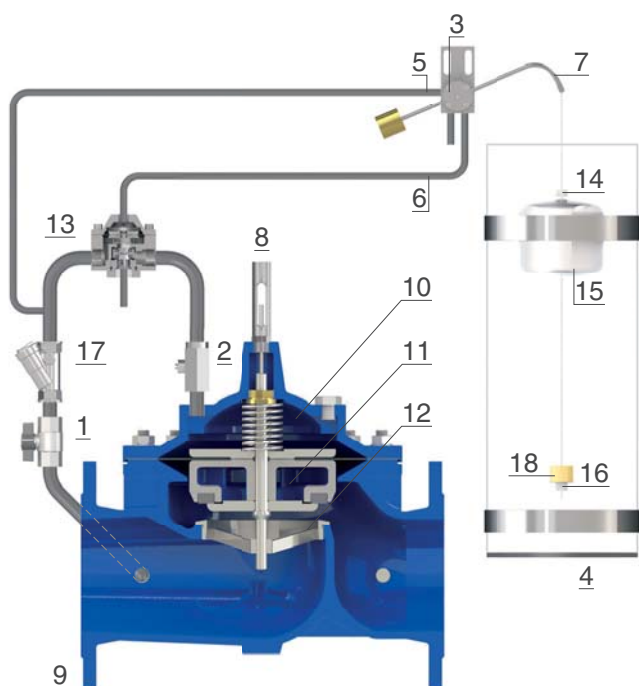
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,6 bar on the pilot.
- Maximum operating pressure: 16 bar.
- Recommended working pressure: 6 bar. Higher on request.
- Maximum temperature: 70°C.

### Min.-max. level control pilot adjustment range

- Between 0,2 and 4 meters.

## Operating principle (for DN 150-600)



The CSA valve model XLC 340/440 is operated by a 3 ways pilot connected to the valve by means of two pipes, not supplied. The level control pilot, entirely made in stainless steel, is composed of a body (3), lever (7), float (15) and wire, and contains two mechanical blocks adjustable and set to the required level (14 and 16). Should the latter reach the maximum level the float (15) moves the upper block (14) upwards, to rotate the lever (7) thus allowing the closing of the valve by putting the upstream pressure in communication with the chamber of the valve (10) or the hydraulic accelerator (13) (available from DN 150 and above). The valve remains closed until the level drops to the lower set point (16) which enables the rotation of the lever (7) putting the chamber (10 or 13) in communication with the atmosphere, thus raising the obturator (11) to generate flow through the seat (12). A needle valve on the chamber (2) will control pressure and flow in and out to prevent surges during closure.

## Installation layout

The picture shows the layout of the XLC 340/440 minimum-maximum level control valve. The connection between the valve and the pilot (4) is obtained by means of two pipes, one linked to the upstream pressure and the other to the chamber. Sectioning devices (1) and filter (3) are needed for maintenance operations and to prevent dirt from entering the main valve. The external stilling container (2), strongly advised, allows for the proper control reducing turbulence of the water surface without having to access the tank.





## Constant level automatic control valve Mod. XLC 360/460-MCP

The CSA Model XLC 360/460-MCP is a globe pattern hydraulically operated automatic control valve that regulates the constant level of a tank, regardless of upstream pressure variations, by means of a stainless steel proportional flow modulating pilot. Thanks to a needle valve on the chamber the response time can be adjusted, to prevent water hammer effects during the closing phase. Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- For break pressure tanks and when a proportional level control is needed within the pilot's range.
- For level control on gravity fed pipelines.
- For small tank and in need of maintaining a constant level with a continuous modulating.

### Accessories

- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- CSFL mechanical flow regulator.

### Note to the engineer

- Avoid bends and high points on the piping to connect the main valve to the level control pilot to prevent the formation of air pockets.
- For the proper functioning a minimum of 0,6 bar on the pilot is needed, failing in doing so would create delays and malfunctioning. Consider the use of a sustaining pilot for low pressure conditions and/or the CSA CSFL mechanical flow regulator.

### Additional features

- XLC 360/460-MCP-FR constant level control valve with back-flow prevention.
- XLC 360/460-MCP-R constant level control valve with surge prevention pilot.

### Working conditions

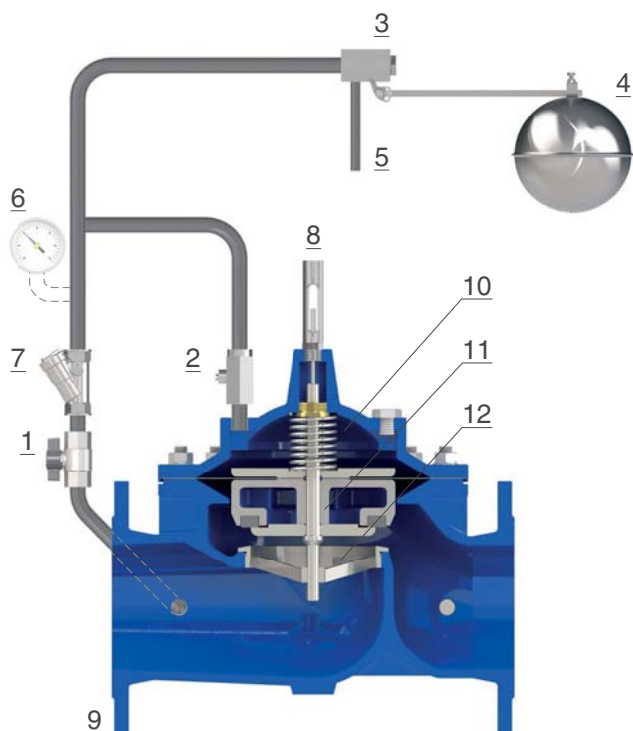
- Fluid: treated water.
- Minimum operating pressure: 0,6 bar on the pilot.
- Maximum operating pressure: 16 bar.
- Recommended working pressure: 6 bar. Higher on request.
- Maximum temperature: 70°C.

### Constant level pilot adjustment range

- 85 mm as a standard, different on request.



## Operating principle



The CSA model XLC 360/460-MCP is operated by a 2 ways flow modulating proportional pilot (3) entirely made in stainless steel and connected to the valve by means of a pipe, not supplied. Should the level inside the tank drop due to consumption the pilot (3) will open through the drain (5) discharging the main chamber (10), and generating a passage through the seat (12) in proportion to the demand, lifting the obturator (11) upwards accordingly. Should the tank level rise due to the refilling the pilot (3) will modulate, throttling the flow through the drain (5) and, if required, closing the valve by putting the upstream pressure in communication with the main chamber (10). A fixed orifice is present on the filter (7) for the proper functioning, while a needle valve on the chamber (2) will control pressure and flow in and out to prevent surges during closure.

## Installation layout

The XLC 360/460-MCP is linked to the pilot (2) through a single pipe. Sectioning devices (1) are recommended for maintenance and a filter (3) is needed upstream, to prevent dirt from entering the main valve, affecting the performance. The constant level control pilot (2) should always be located in a position away from the water surface turbulence created by the inlet supply pipe to the tank. In case of static values higher than 6 bar the AC (anti-cavitation) system and a CSA pressure reducer VRCD are advised.







## Constant level automatic control valve **XLC 360/460 - Rotoway**

The CSA Model XLC 360/460-Rotoway is a globe pattern hydraulically operated automatic control valve that regulates the constant level of a tank, by means of a three ways pilot in stainless steel, regardless of upstream pressure variations. Thanks to a CSA needle valve the response time can be adjusted, to prevent water hammer effects during the closing phase. Normally equipped with visual position indicator, and entirely made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- For break pressure tanks, when a constant level control is needed and a stainless steel pilot is required.
- For level control on gravity fed pipelines.
- For small tank in need of maintaining a constant level with on/off regulation.

### Accessories

- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.
- AC anti-cavitation trim to provide a higher resistance to cavitation and accurate regulation in case of low flow.
- CSFL mechanical flow regulator.

### Note to the engineer

- Avoid bends and high points on the piping to connect the main valve with the level control pilot to prevent the formation of air pockets.
- For the proper functioning a minimum of 0,6 bar on the pilot is needed, failing in doing so would create delays and malfunctioning. Consider the use of a sustaining pilot for low pressure conditions and/or the CSA CSFL mechanical flow regulator.

### Additional features

- XLC 360/460-Rotoway-FR constant level control valve with back-flow prevention.
- XLC 360/460-Rotoway-R constant level control valve with surge prevention pilot.

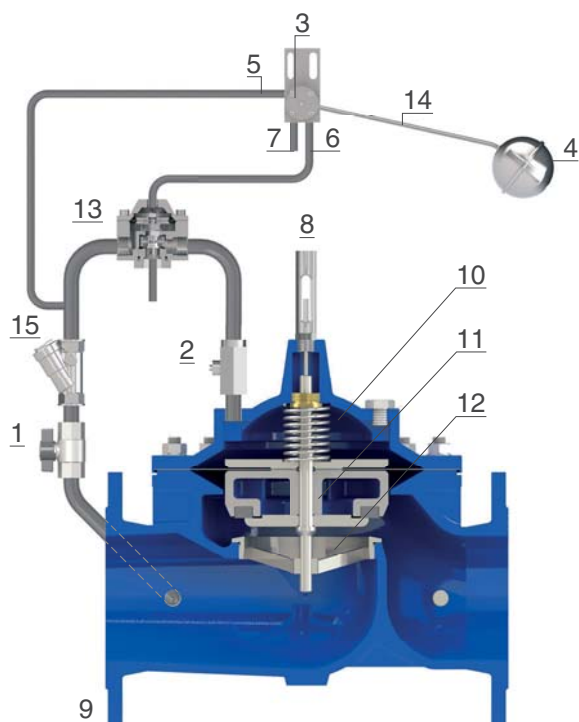
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,6 bar on the pilot.
- Maximum operating pressure: 16 bar.
- Recommended working pressure: 6 bar. Higher on request.
- Maximum temperature: 70°C.

### Constant level pilot adjustment range

- 360 mm as standard, different on request by changing the lever.

## Operating principle (for DN 150-600)



CSA model XLC 360/460-Rotoway is operated by a 3 ways pilot connected to the valve by means of two pipes, not supplied. The pilot assembly, entirely made in stainless steel, is composed of a body (3), float (4) sensing the water level variation and a lever (14) which can be adapted according to the project requirements. Should the water level reach the maximum threshold the float (4) moves upwards, rotating the lever (14) thus allowing the closing of the valve by putting the upstream pressure in communication with the chamber (10) of the valve or the hydraulic accelerator (13) (available from DN 150 and above). The valve remains closed until the level drops to the lowest set point (16), which enables the rotation of the lever (14) putting the chamber (10) in communication with the atmosphere, thus raising the obturator (11) to generate flow through the seat (12). The exclusive CSA needle valve on the chamber (2) will control pressure and flow in and out to prevent surges during closure.

## Installation layout

In the installation layout the XLC 360/460 Rotoway is linked to the pilot (2) through two pipes. The filter (3) is needed upstream to prevent dirt and sectioning devices (1) are mandatory to perform maintenance operations. The constant level control pilot (2) should always be located in a position away from the water surface turbulence created by the inlet supply pipe to the tank. In case of static values higher than 6 bar the AC (anti-cavitation) system and a CSA pressure reducer VRCD are advised.





## Constant level control valve with on-off solenoid control Mod. XLC 365/465-MCP

The CSA Model XLC 365/465-MCP maintains the constant level of a tank, regardless of upstream pressure variations, by means of a flow modulating proportional pilot in stainless steel.

The circuit is also equipped with a solenoid to enable an on-off control mode in response to signals from remote or by a controller. Thanks to a CSA needle valve the response time can be adjusted, to prevent water hammer effects during the closing phase. Normally equipped with visual position indicator, and entirely made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- For break pressure tanks with a proportional level control and emergency electronic backup, to prevent overflow.
- For level control on gravity fed pipelines with on/off mode operated from remote or alarms.

### Accessories

- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.
- AC anti-cavitation trim to provide a higher resistance to cavitation and accurate regulation in case of low flow.
- CSFL mechanical flow regulator.

### Note to the engineer

- Avoid bends and high points on the piping to connect the main valve with the level control pilot to prevent the formation of air pockets.
- For the proper functioning a minimum of 0,6 bar on the pilot is needed, failing in doing so would create delays and malfunctioning. Consider the use of a sustaining pilot for low pressure conditions and/or the CSA CSFL mechanical flow regulator.

### Additional features

- XLC 365/465-MCP-FR constant level valve with solenoid control and back-flow prevention.
- XLC 365/465-MCP-R constant level valve with solenoid control and surge prevention pilot.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,6 bar on the pilot.
- Maximum operating pressure: 16 bar.
- Recommended working pressure: 6 bar. Higher on request.
- Maximum temperature: 70°C.

### Constant level pilot adjustment range

- 85 mm as a standard, different on request.

### Solenoid electrical data

- Voltages: 24 V DC, 24 V/50 Hz, 230 V/50 Hz. Other voltages on request.
- Power consumption: inrush AC (VA) 24, hold AC (VA) 17 (8 W), DC hot/cold coil 8/9 W.

A detailed technical cutaway diagram of a pressure washer. The main body is blue, and the internal components are silver. The diagram is labeled with numbers 1 through 13:

- 1: Trigger gun
- 2: Spray lance
- 3: Spray lance
- 4: Spray lance
- 5: Spray lance
- 6: Spray lance
- 7: Spray lance
- 8: Spray lance
- 9: Spray lance
- 10: Spray lance
- 11: Spray lance
- 12: Spray lance
- 13: Spray lance

A fixed orifice is present on the filter (7) for the proper functioning, while a needle valve (2) on the chamber (10) will control pressure and flow in and out to prevent surges during closure.

The XLC 365/465-MCP is linked to the pilot (2) through a single pipe and operated by signals sent by a CSA controller or from remote. Sectioning devices (1) are recommended for maintenance and a filter (3) is needed upstream, to prevent dirt from entering the main valve. The level pilot (2) should always be located in a position away from the turbulence created by the inlet supply pipe to the tank. In case of static values higher than 6 bar the AC (anti-cavitation) system and a CSA pressure reducer VRCD are advised.







## High sensitivity altitude automatic control valve **Mod. XLC 370/470**

The CSA Model XLC 370/470 is a globe pattern hydraulically operated automatic valve that maintains the constant level of a reservoir and water tower, regardless of upstream pressure variations. The modulating control ensures a smooth regulation and absence of water hammer, as the valve will react proportionally to the variations in demand. Normally equipped with visual position indicator, and entirely made in ductile cast iron with FBT epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- To perform the level control of elevated tanks and water towers.
- Through the high sensitivity pilot to control the water level, without accessing the tank and the need of any piping and pilots.
- On the tank and reservoirs outlet supply lines to control the consumption by means of the storage static pressure.

### Accessories

- Linear position transmitter with 4-20 mA output Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- Inlet pressure, outlet pressure, flow rate and application are required for the proper sizing and cavitation analysis.
- For the proper functioning a minimum of 0,38 bar static value acting on the pilot is needed. Consider the use of a sustaining pilot for low pressure conditions and/or the CSA CSFL mechanical flow regulator.

### Additional features

- XLC 370/470-FR altitude automatic control valve with back-flow prevention.
- XLC 427 upstream pressure sustaining and altitude control valve.
- XLC 427-5 altitude automatic control valve with on-off solenoid control.
- The valve can be supplied without the regulation device GR.I.F.O. on request.

### Working conditions

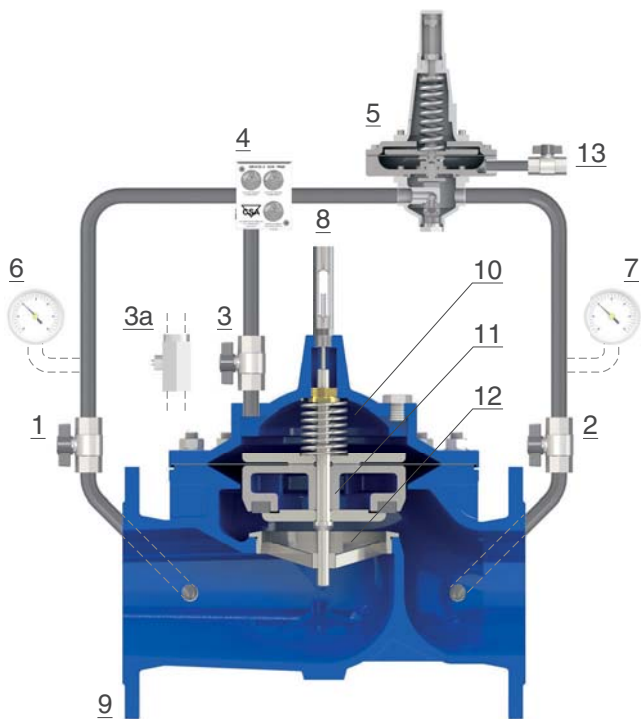
- Fluid: treated water.
- Min. operating pressure on the valve: 0,7 bar.
- Minimum static pressure on the pilot: 0,25 bar.
- Max. operating press.: 16 bar.
- Recommended working pressure: 6 bar. Higher on request.
- Maximum temperature: 70°C.

### Altitude pilot adjustment range

- Blue spring: 0,38 to 1,8 bar.
- Red spring: 0,6 to 4 bar.
- Different values on request.



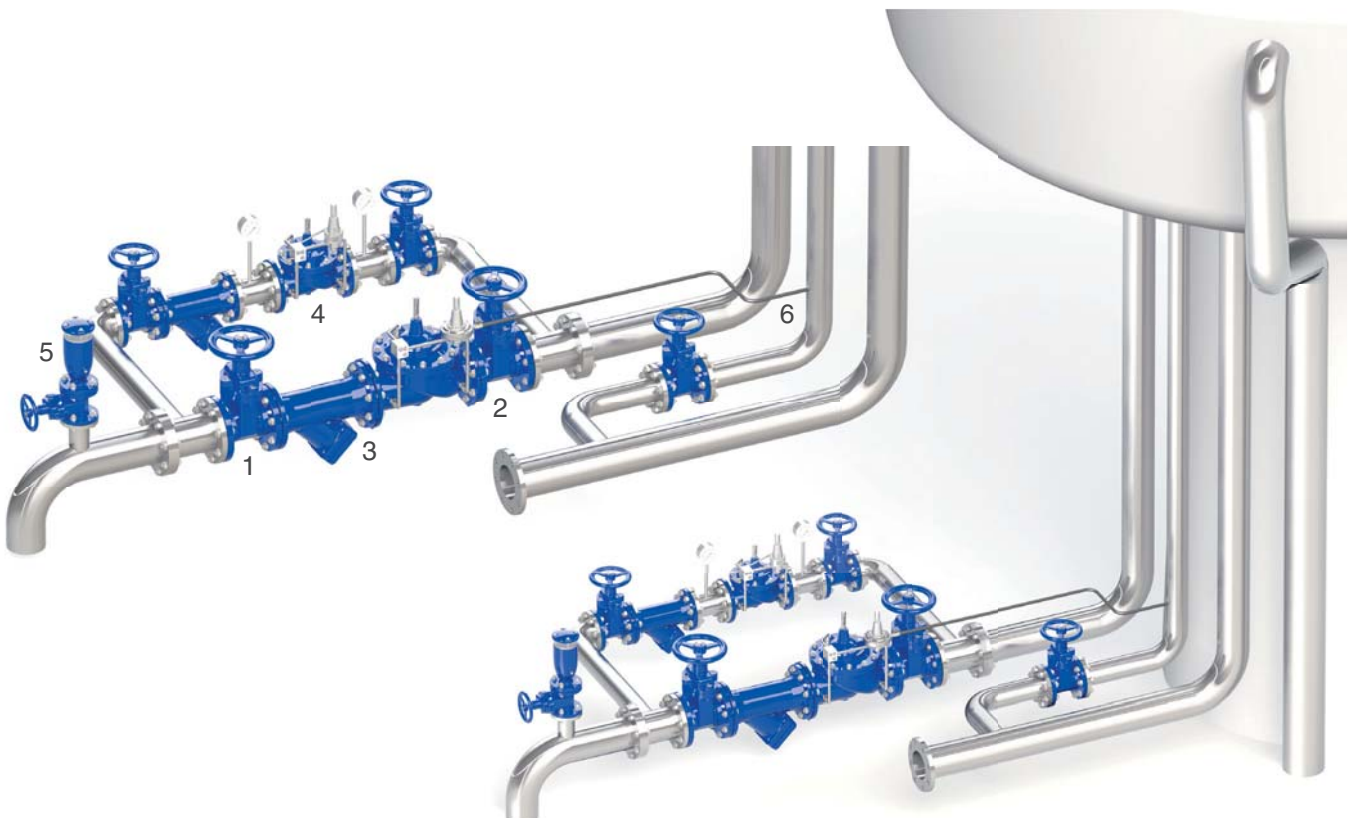
## Operating principle



The CSA Model XLC 370/470 is operated by a 2 ways high sensitivity pilot (5) sensing the static pressure of the level in need of regulation through the port (13). Should the latter drop due to consumption, the pilot (5) will open proportionally, relieving pressure out of the main chamber (10) thus lifting the obturator upwards (11) to generate flow through the seat and refill the storage. When the water level rises the pilot (5) will modulate throttling the flow through the circuit and diverting pressure back to the chamber (10), pushing the obturator downwards, and eventually closing the valve once the level has reached maximum set-point. Pressure in and out of the main chamber (10) is controlled by the CSA exclusive regulation device with filter called GR.I.F.O. (4), needed for the valve's response time and accuracy.

## Installation layout

Level control is obtained without any external piping and simply through a pilot sensing the static pressure coming from the water tower. The lay-out includes sectioning devices (1, 2) and by-pass, where CSA automatic control valves (4) are advised, for maintenance operations, and a filter (3) to prevent dirt from entering the main valve. Anti-surge combination air valves FOX 3F AS (5) are recommended upstream to release air pockets accumulated in working conditions, and to discharge large volumes of air during filling.





## On-off solenoid automatic control valve Mod. XLC 350/450

The CSA Model XLC 350/450 is a globe pattern hydraulically operated automatic control valve that opens and closes in response to signals applied to the solenoid on the circuit, regardless of upstream pressure variations. Thanks to a CSA needle valve located on the chamber the reaction time can be adjusted, to prevent water hammer effects during the closing phase. Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT (fluid bed technology) epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- On main supply lines and water distribution networks to interrupt water supply in case of alarms and emergencies.
- In combination with an electric float for tank level regulation and control.
- As a system protection to shut-off in case of burst events.
- In filtration systems for back flushing.
- On storage tanks for automatic refreshing.

### Accessories

- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.
- CSFL mechanical flow regulator.

### Note to the engineer

- Inlet pressure, outlet pressure, flow rate and application are required for the proper sizing and cavitation analysis.
- Recommended flow rate and operating conditions on the XLC series engineering.
- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.

### Additional features

- XLC 350/450-FR on-off solenoid control valve with back-flow prevention system.
- XLC 350/450-R on-off solenoid control valve with surge prevention system.

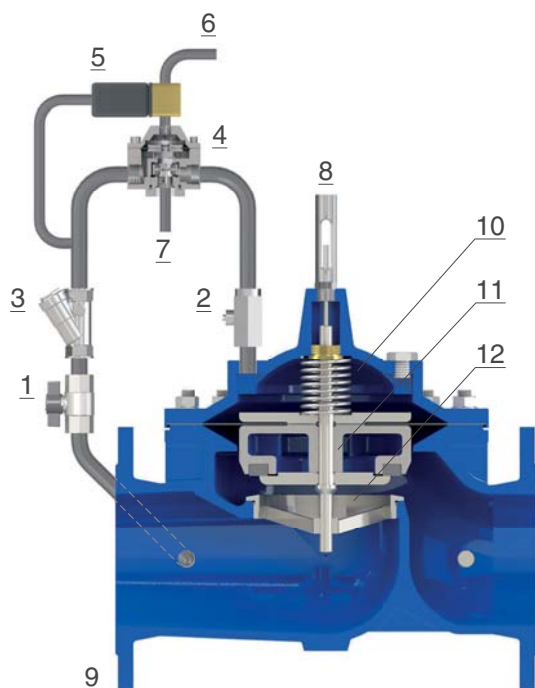
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 16 bar. Higher on request.
- Maximum temperature: 70°C.

### Solenoid electrical data

- Voltages: 24 V DC, 24 V/50 Hz, 230 V/50 Hz. Other voltages on request.
- Power consumption: inrush AC (VA) 24, hold AC (VA) 17 (8 W), DC hot/cold coil 8/9 W.

## Operating principle (for DN 150-600)



The CSA model XLC 350/450 is operated by a solenoid (5) working in combination with a flow accelerator or as a standalone unit, receiving impulses by remote or by a CSA controller, to perform either a fully closed or open function depending on what the valve is supposed to do in absence of power supply. The hydraulic accelerator (4) is present from DN 150 mm and above. In case of a normally open valve, for example, when the impulse is sent to the solenoid (5), the upstream pressure is diverted into the main chamber (10) directly, or through the hydraulic accelerator (4), pushing the obturator (11) towards the seat (12) then interrupting the supply. Should the signal be removed pressure will be taken out of the main chamber (10) directly or through the hydraulic accelerator (4), to lift the obturator (11) upwards then opening the main valve (9). Pressure in and out of the main chamber (10) is controlled by the CSA needle valve (2) needed for the valve's response avoiding possible surges and rapid pressure fluctuations. A filter (3) will protect the solenoid and the rest of the circuit from dirt.

## Installation layout

The picture shows the layout of the CSA XLC 350/450 linked to a CSA controller (4) or any other electronic device sending impulses. In this case an electric float (2) is used for water tank level regulation, according to the function required. Sectioning devices (1) are important for maintenance operations as well as a filter (3) to prevent dirt from entering the valve. Anti-surge combination air valves FOX 3F AS are recommended upstream of the installation for air release during operating conditions and pipe filling.





## On-off solenoid control battery operated flush valve Mod. XLC 350/450-P

The CSA Model XLC 350/450-P is a globe pattern hydraulically operated automatic control valve, normally closed, that opens in response to the signals supplied by a battery operated programmer, regardless of upstream pressure variations. The main function is to flush pipelines and/or to create water circulation by using up to three programs per day.

Normally equipped with visual position indicator and entirely made in ductile cast iron with FBT (fluid bed technology) epoxy coating and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage.

### Applications

- In derivation from main supply lines to create water circulation through specific programs where power supply is not available.
- Installed in water distribution networks to flush and clean dead ends and segments with water in stagnant conditions.

### Accessories

- Pressure measurement kit.
- Self-flushing and high capacity filter.
- Box container for submerged application.
- CSFL mechanical flow regulator.

### Note to the engineer

- Inlet pressure, outlet pressure, flow rate and application are required for the proper sizing and cavitation analysis.
- Recommended flow rate and operating conditions on the XLC series engineering.
- Oversizing the valve may generate excessive pressure drop during opening, likely to prevent the valve from closing.

### Additional features

- XLC 350/450-P-FR on-off solenoid control valve with battery operated programmer and back-flow prevention system.
- XLC 350/450-P-R on-off solenoid control valve with battery operated programmer and surge prevention system.

### Working conditions

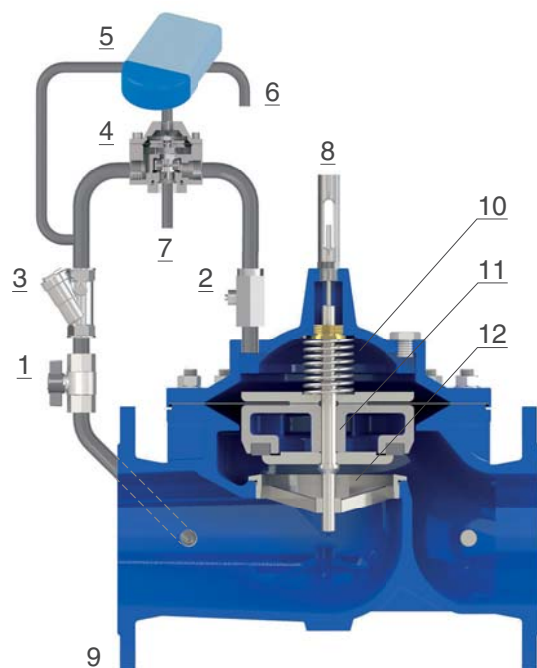
- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 16 bar. Higher on request.
- Maximum temperature: 70°C.

### Battery operated programmer

- Make reference to the operating and installation manual provided with the valve.



## Operating principle (for DN 150-600)

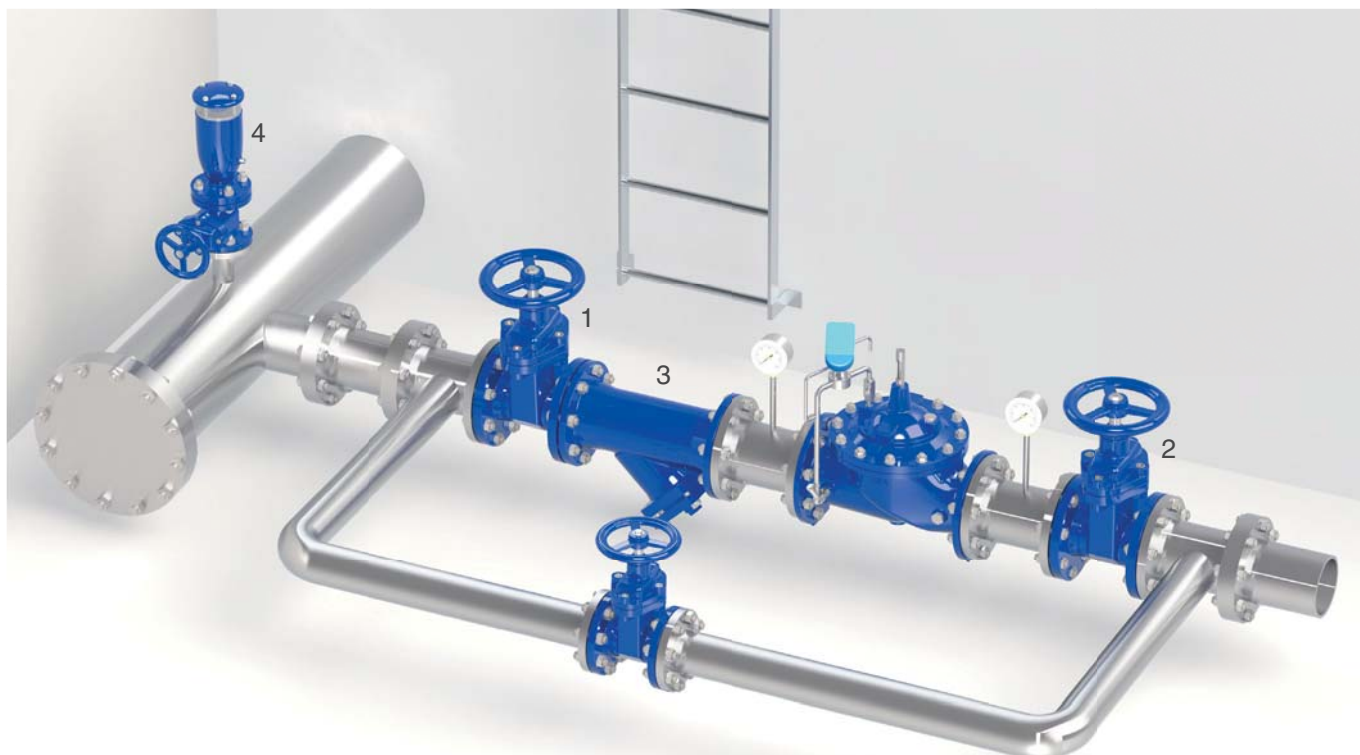


CSA model XLC 350/450-P is controlled by a battery programmer sending impulses to the solenoid (5), to open the valve accordingly up to three programs per day. When the solenoid is activated by the programmer water is taken out of the main chamber (10) directly or through the accelerator (4), thus pushing the obturator (11) upwards and generating the full flow through the main valve (9). The hydraulic accelerator (4) is present for DN 150 mm and above. When another impulse is triggered by the programmer, at the end of the water supply cycle, pressure is diverted back towards the chamber (10) interrupting the flow.

Pressure in and out of the main chamber (10) is controlled by the CSA needle valve (2) needed for the valve's response avoiding possible surges and rapid pressure fluctuations. A filter (3) will protect the solenoid and the rest of components to prevent dirt from entering the mechanical assemblies.

## Installation layout

The picture shows the recommended layout of the CSA XLC 350/450-P, battery operated solenoid control valve used to flush pipelines, discharging directly into atmosphere or to the drainage system. Sectioning devices (1, 2) are important for maintenance operations as well as a filter (3) to prevent dirt from entering the valve. Anti-surge combination air valves FOX 3F AS (4) are recommended upstream to release air pockets in working conditions, and discharge large volumes of air during pipe filling and commissioning.







## Step by step solenoid control valve Mod. XLC 353/453

The CSA Model XLC 353/453 is a globe pattern hydraulically operated automatic control valve that modulates in response to signals applied to the solenoids valves. Thanks to CSA needle valves located on the circuit the reaction time of the opening and closing can be adjusted, independently one from the other, to ensure a smooth and accurate regulation. A manual emergency circuit is usually supplied with valve in case of power failure. Normally equipped with 4-20 mA position transmitter and made in ductile cast iron with FBT (fluid bed technology) epoxy coating and stainless steel, the valve reduces head loss, throttling noise and cavitation damage.

### Applications

- In combination with CSA controllers for pressure management and leakage reduction to regulate pressure versus flow.
- On the inlet supply line of storage tanks to perform level regulation and control.
- On the outlet supply line of storage tanks for flow control as a function of the water level.
- On heating and cooling systems to ensure flow control according to the temperature.

### Accessories

- Linear position transmitter Mod. CSA CSPL.
- On-off position transmitter Mod. CSA CSPO.
- Pressure measurement kit.
- Self-flushing and high capacity filter.
- CSFL mechanical flow regulator.

### Note to the engineer

- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- Recommended flow rate and operating conditions on the XLC series engineering.
- The duration of impulses sent to the solenoid is important and changes with valve size and operating pressure.

### Additional features

- XLC 353/453-FR step by step solenoid control valve with back-flow prevention system.
- XLC 353/453-5 step by step solenoid valve with emergency opening system from remote.
- XLC 353/453-R step by step solenoid control valve with surge control system.

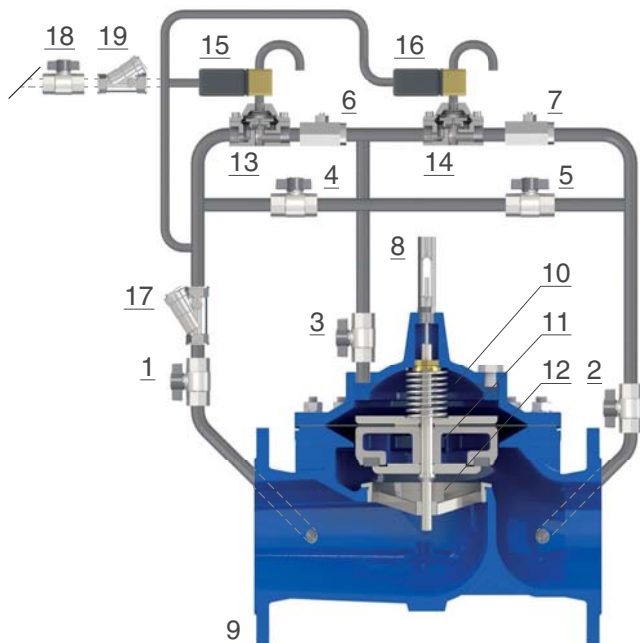
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 1,5 bar.
- Maximum operating pressure: 16 bar. Higher on request.
- Maximum temperature: 70°C.

### Solenoid electrical data

- Voltages: 24 V DC, 24 V/50 Hz, 230 V/50 Hz. Other voltages on request.
- Power consumption: inrush AC (VA) 24, hold AC (VA) 17 (8 W), DC hot/cold coil 8/9 W.

## Operating principle



The model XLC 353/453 includes two solenoids (15-16) receiving impulses and acting on hydraulic accelerators (13-14), normally closed. Should a signal be sent to the upstream solenoid (15), the latter will allow some flow through (13) and towards the main chamber (10), in proportion to the numbers and duration of such impulses and controlled by the needle valve 6, throttling the passage between obturator (11) and seat (12). In the same way by using the downstream solenoid (16) water will be taken out of the main chamber, with flow and the opening speed controlled by the needle valve (7).

The main valve will therefore modulate in response to the signals sent to both solenoids.

The manual circuit (4-5) is always supplied, unless otherwise stated, and necessary to regulate the valve in case of power failure. A filter (3) will protect the solenoid and the rest of components to prevent dirt from entering the mechanical assemblies.

We recommend to connect the pressure sensing line upstream as shown in the picture (18, 19).

## Installation layout

In the picture the XLC 353/453 is installed in combination with a flow meter (5). A CSA controller (8) or other PLC units will constantly send impulses to the valve's solenoids to maintain the same flow regardless of pressure variations, or to manage the pressure according to variations in demand to reduce water loss and leakage. Sectioning devices (1, 2) and a by-pass, with CSA direct acting valves (4), are important for maintenance as well as a filter (3) and anti-surge air valves FOX 3F AS (6, 7) upstream and downstream.





## Booster pump automatic control valve **Mod. XLC 390/490**

The CSA Model XLC 390/490 is a globe pattern hydraulically operated automatic control valve, active check valve, that isolates the pump from the system during pump starting and stopping to prevent and avoid surges and water hammer events. The valve opens and closes in response to signals applied to the solenoid on the circuit where a needle valve will adjust the response time for an accurate and smooth regulation. Equipped with a limit switch activated by the position indicator's movement, made in ductile cast iron and stainless steel, the valve is designed to reduced head loss, throttling noise and cavitation damage.

### Applications

- At the pumps to enable start and stop cycles avoiding surges and water hammer.
- To prevent water hammer during pump switching in batteries and parallel operation.
- To ensure an accurate and surge free check prevention system.

### Accessories

- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Note to the engineer

- CSA anti-cavitation low flow stability plugs are recommended to provide an accurate regulation in case of low flow conditions.
- Recommended flow rate and operating conditions on the XLC series engineering.
- The duration of impulses sent to the solenoid is important and changes with valve size and operating pressure.

### Additional features

- XLC 491 booster pump pressure reducing valve.
- XLC 492 booster pump pressure sustaining control valve.
- XLC 493 booster pump with flow control valve.

### Working conditions

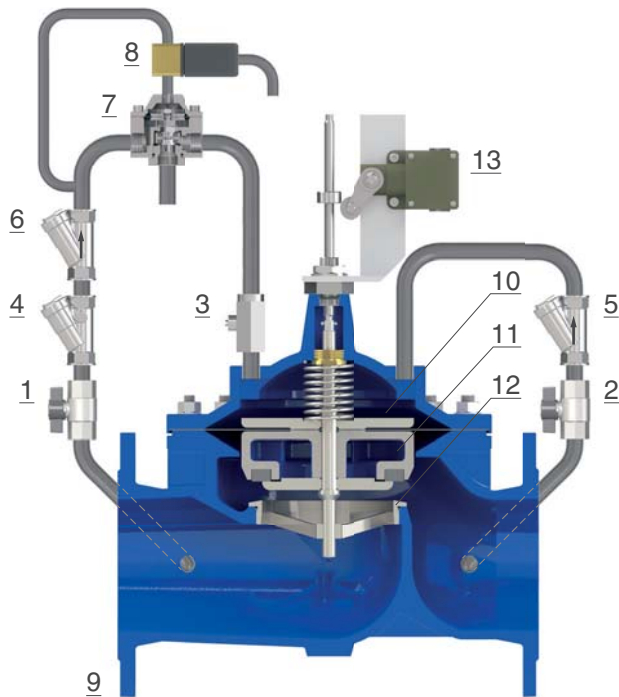
- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 16 bar. Higher on request.
- Maximum temperature: 70°C.

### Solenoid electrical data

- Voltages: 24 V DC, 24 V/50 Hz, 230 V/50 Hz. Other voltages on request.
- Power consumption: inrush AC (VA) 24, hold AC (VA) 17 (8 W), DC hot/cold coil 8/9 W.



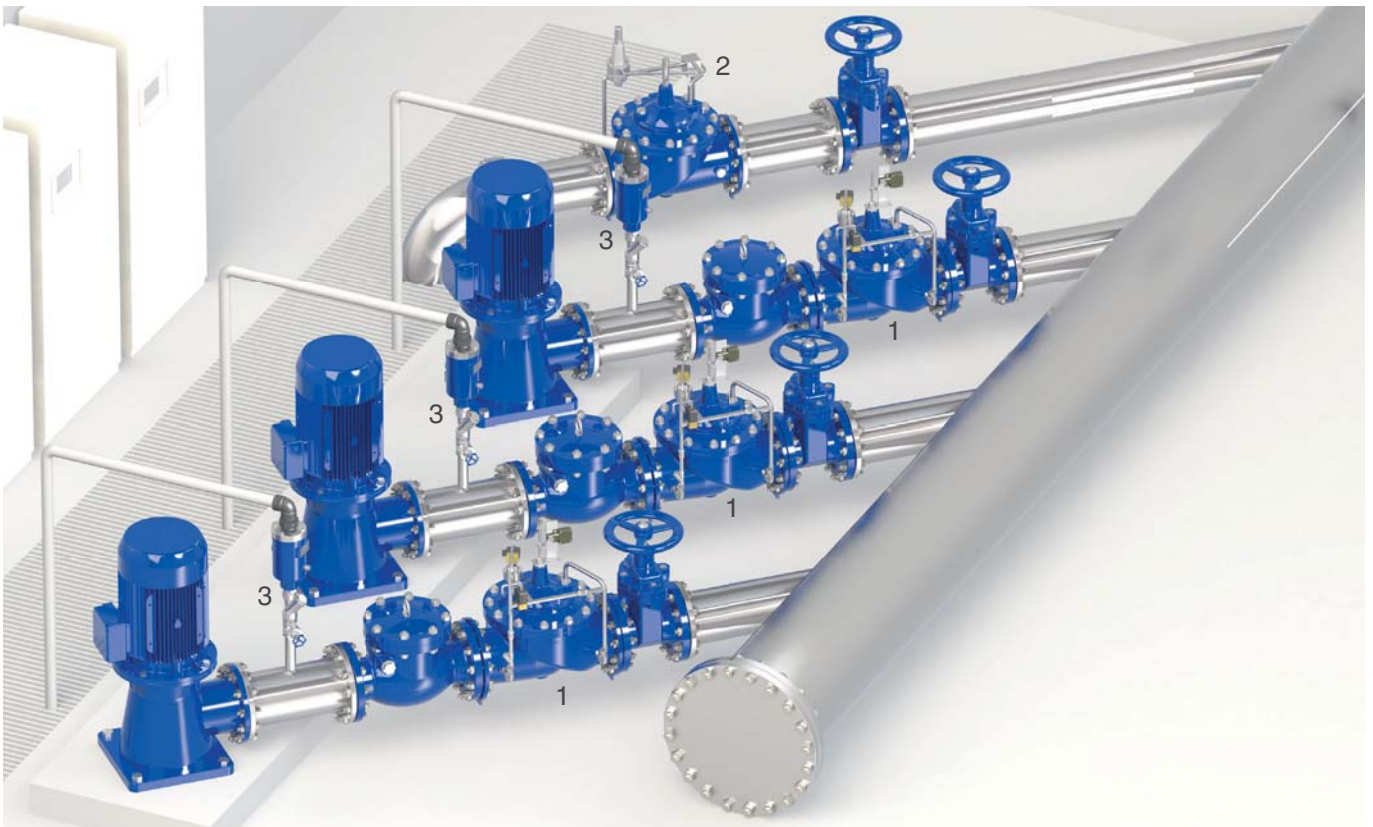
## Operating principle (for DN 150-600)



When pumps are turned off the valve is completely closed although the solenoid (8) is de-energized, with the upstream pressure in communication with the upper chamber (10). When the pump start command is issued pressure builds up upstream as the solenoid is energized to open the valve slowly, while the hydraulic relay (7) will put the control chamber in communication with the atmosphere pushing the obturator (11) upwards to generate a gradual increase of the flow rate. When shut down is required pumps are kept running while the solenoid (8) is de-energized switching the position of the hydraulic accelerator (7) and diverting line pressure and flow towards the upper chamber (10), with gradual closing of the obturator (11). Once the position indication's rod has reached a pre-determined opening percentage, indicating a flow almost interrupted, the limit switch assembly (13) will send a signal to the pump to close it. In case of power failure with negative pressure wave propagation and flow variation the active check valve system (6) will close the valve without creating momentum and minimizing surges.

## Installation layout

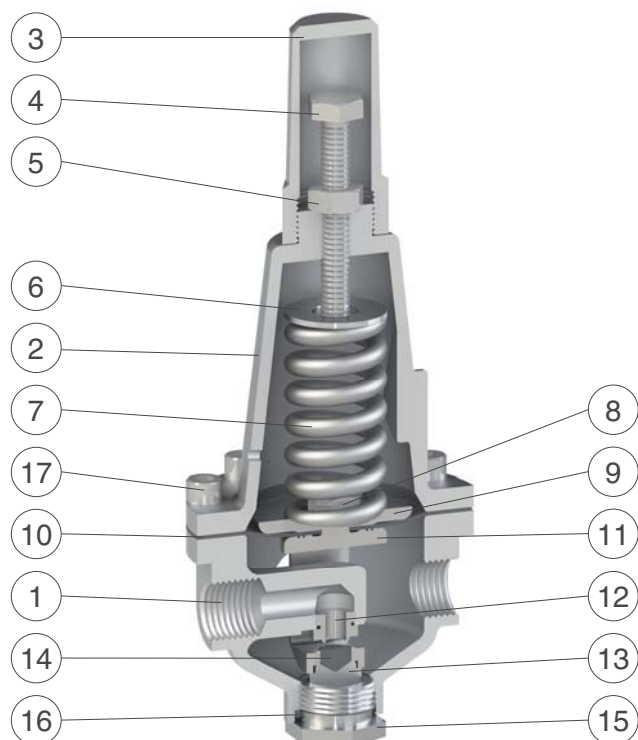
The picture below shows the recommended installation layout of CSA XLC 390/490 (1) as an effective surge prevention system and protection device for water pumping stations, in combination with CSA pressure relief valves XLC model 420-R (2) or surge anticipating XLC model 421. Anti-slam combination air valves are recommended upstream (3) and downstream of the booster pump control as well as sectioning devices and bypass required for the proper maintenance.



# Direct acting pressure reducing-stabilizing valve

## Mod. Microstab MRV

The Microstab MRV model is a two ways direct acting downstream pressure reducing-stabilizing valve. Diaphragm operated, the MRV will maintain an outlet pressure, preset and adjustable, to a fixed value regardless of variation of the upstream pressure and demand. This product is normally used for the regulation of XLC series and, due to its high sensitivity, accuracy and long lasting performances, as a stand-alone unit for water distribution systems, industrial installation, buildings. Supplied with a wide choice of optional materials and spring range, MRV is available with the versions PN 16, 25 and 40 bar on request with reinforced diaphragm.



N.	Component	Material
1	Body	nickel-plated bronze/st. steel
2	Cover	nickel-plated bronze/st. steel
3	Hood	stainless steel
4	Regulating screw	stainless steel
5	Nut	stainless steel
6	Spring guide	stainless steel
7	Spring	painted steel 52SiCrNi5/st. st.
8	Self-locking nut	stainless steel
9	Upper flat	stainless steel
10	Diaphragm	neoprene
11	Obturator holder	stainless steel
12	Sealing seat	stainless steel
13	Gasket holder	stainless steel
14	Plane gasket	NBR
15	Tap	stainless steel
16	O-ring	NBR
17	Screw	stainless steel

The list of materials and components is subject to changes without notice.

### Working conditions

Treated water maximum 70°C.  
Minimum pressure: 0,5 bar in addition to head loss.  
Maximum pressure: 25 bar.  
Higher on request.

### Technical data

Kv equal to 0,82 m<sup>3</sup>/h.  
Recommended flow rate: 0,5 m<sup>3</sup>/h.  
Weight 1,55 Kg.  
Normally supplied with 3/8" F.

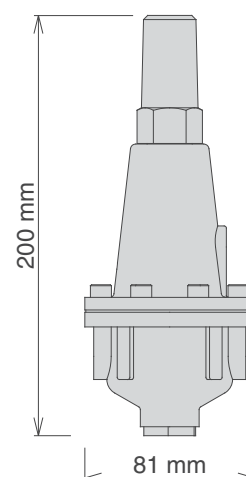
### Downstream pressure adjustment

Spring	Pressure range (bar)
blue	0,7 - 7
red	1,5 - 15

Higher values available on request.

### Standard

Design and testing in accordance with EN 1074.

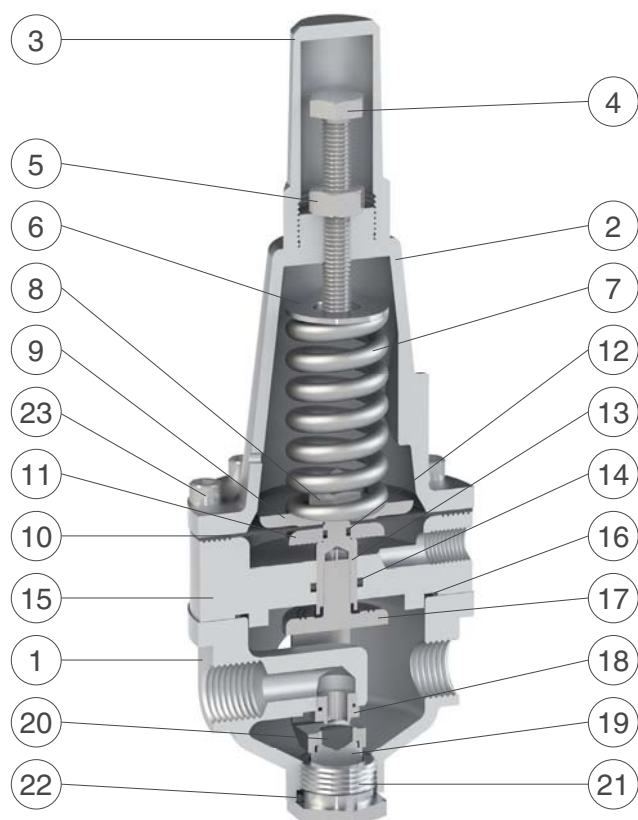




# Direct acting pressure reducing-stabilizing valve

## Mod. Microstab MRV 2

The Microstab MRV 2 model is a two ways direct acting downstream pressure reducing-stabilizing valve with pressure sensing port. Diaphragm operated, the MRV 2 will maintain an outlet pressure, preset and adjustable, to a fixed value regardless of variation of the upstream pressure and demand. This product is normally used for the regulation of XLC series and, due to its high sensitivity, accuracy and long lasting performances, as a stand-alone unit for water distribution systems, industrial installation, buildings. Supplied with a wide choice of optional materials and spring range, MRV 2 is available with the PN 16 and 25 bar versions.



N.	Component	Material
1	Body	nickel-plated bronze/st. steel
2	Cover	nickel-plated bronze/st. steel
3	Hood	stainless steel
4	Regulating screw	stainless steel
5	Nut	stainless steel
6	Spring guide	stainless steel
7	Spring	painted steel 52SiCrNi5/st. st.
8	Self-locking nut	stainless steel
9	Upper flat	stainless steel
10	Diaphragm	neoprene
11	Diaphragm lower disk	stainless steel
12	O-ring	NBR
13	Shaft	stainless steel
14	O-ring	NBR
15	Intermediate body	stainless steel
16	O-ring	NBR
17	Obturator holder	stainless steel
18	Sealing seat	stainless steel
19	Gasket holder	stainless steel
20	Plane gasket	NBR
21	Tap	stainless steel
22	O-ring	NBR
23	Screws	stainless steel

The list of materials and components is subject to changes without notice.

### Working conditions

Treated water maximum 70°C.  
Minimum pressure: 0,5 bar in addition to head loss.  
Maximum pressure: 25 bar.  
Higher on request.

### Technical data

Kv equal to 0,82 m³/h.  
Recommended flow rate: 0,5 m³/h.  
Weight 2,25 Kg.  
Normally supplied with 3/8" F.

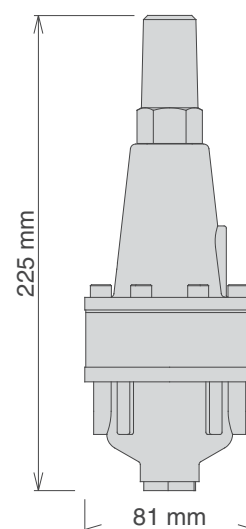
### Downstream pressure adjustment

Spring	Pressure range (bar)
blue	0,7 - 7
red	1,5 - 15

Higher values available on request.

### Standard

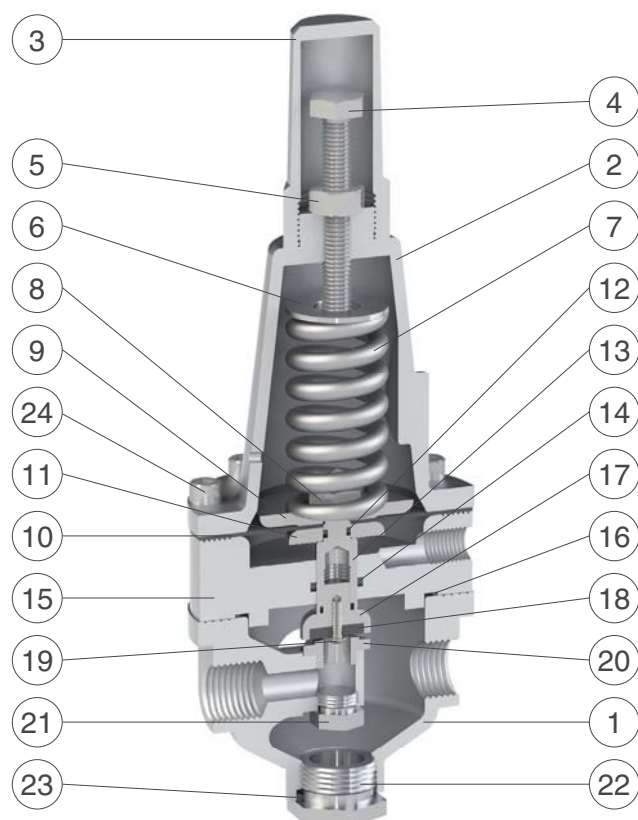
Design and testing in accordance with EN 1074.



# Direct acting pressure sustaining valve

## Mod. Microstab MSM

The Microstab MSM model is a two ways direct acting upstream pressure sustaining valve. Diaphragm operated, the MSM will maintain an inlet pressure, preset and adjustable, to a fixed value regardless of variation of the downstream pressure and demand. This product is normally used for the regulation of XLC series and, due to its high sensitivity accuracy and long lasting performances, as a stand-alone unit for water distribution systems, industrial installation, buildings. Supplied with a wide choice of optional materials and spring range, MSM is available with the versions PN 16, 25 and, on request, 40 bar with reinforced diaphragm.



N.	Component	Material
1	Body	nickel-plated bronze/st. steel
2	Cover	nickel-plated bronze/st. steel
3	Hood	stainless steel
4	Regulating screw	stainless steel
5	Nut	stainless steel
6	Spring guide	stainless steel
7	Spring	painted steel 52SiCrNi5/st. st.
8	Self-locking nut	stainless steel
9	Upper flat	stainless steel
10	Diaphragm	neoprene
11	Diaphragm lower disk	stainless steel
12	O-ring	NBR
13	Shaft	stainless steel
14	O-ring	NBR
15	Intermediate body	stainless steel
16	O-ring	NBR
17	Gasket container	stainless steel
18	Gasket	NBR
19	Screw	stainless steel
20	Sealing seat	stainless steel
21	Tap	stainless steel
22	Tap	stainless steel
23	O-ring	NBR
24	Screws	stainless steel

The list of materials and components is subject to changes without notice.

### Working conditions

Treated water maximum 70°C.  
Minimum pressure: 0,5 bar in addition to head loss.  
Maximum pressure: 25 bar.  
Higher on request.

### Technical data

Kv equal to 0,9 m³/h.  
Recommended flow rate: 0,5 m³/h.  
Weight 2,23 Kg.  
Normally supplied with 3/8" F.

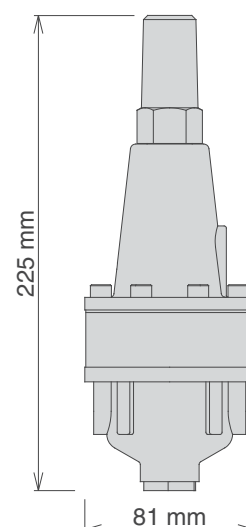
### Upstream pressure adjustment

Spring	Pressure range (bar)
blue	0,7 - 7
red	1,5 - 15

Higher values available on request.

### Standard

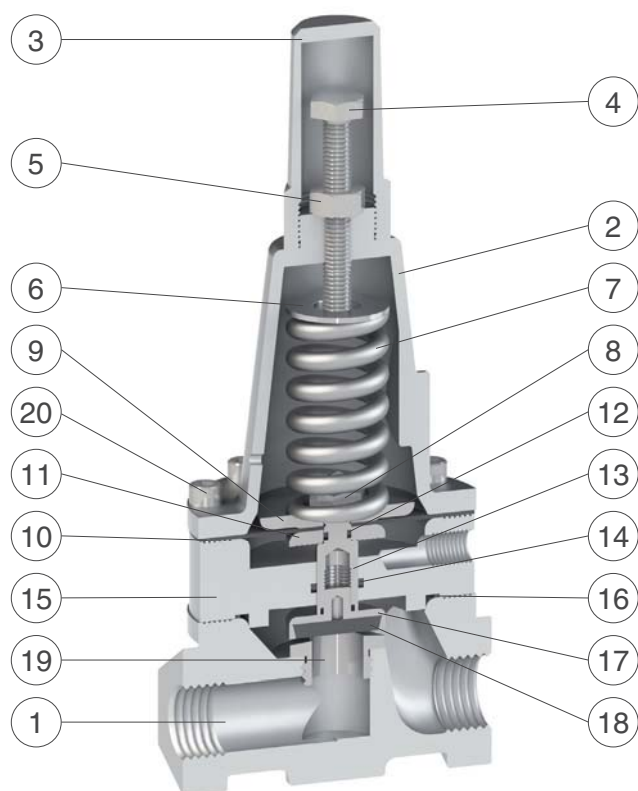
Design and testing in accordance with EN 1074.



# Direct acting quick pressure relief valve

## Mod. Microstab PSM

The Microstab PSM model is a two ways fast acting relief valve. Diaphragm operated, the PSM will discharge the excessive inlet pressure values, according to a preset and adjustable spring set point, regardless of variations of the downstream pressure and demand. This product is normally used for the regulation of XLC series and, due to its high sensitivity and accuracy and long lasting performances, as a stand-alone unit for water distribution systems, industrial installation, buildings. Supplied with a wide choice of optional materials and spring range, PSM is available with the PN 16 and 25 bar versions.



N.	Component	Material
1	Body	nickel-plated bronze/st. steel
2	Cover	nickel-plated bronze/st. steel
3	Hood	stainless steel
4	Regulating screw	stainless steel
5	Nut	stainless steel
6	Spring guide	stainless steel
7	Spring	painted steel 52SiCrNi5/st. st.
8	Self-locking nut	stainless steel
9	Upper flat	stainless steel
10	Diaphragm	neoprene
11	Diaphragm lower disk	stainless steel
12	O-ring	NBR
13	Shaft	stainless steel
14	O-ring	NBR
15	Intermediate body	stainless steel
16	O-ring	NBR
17	Gasket container	stainless steel
18	Gasket	NBR
19	Sealing seat	stainless steel
20	Screws	stainless steel

The list of materials and components is subject to changes without notice.

### Working conditions

Treated water maximum 70°C.  
Minimum pressure: 0,5 bar in addition to head loss.  
Maximum pressure: 25 bar.  
Higher on request.

### Technical data

Kv equal to 3,5 m³/h.  
Recommended flow rate: 2,1 m³/h.  
Weight 2,37 Kg.  
Normally supplied with 1/2" F.

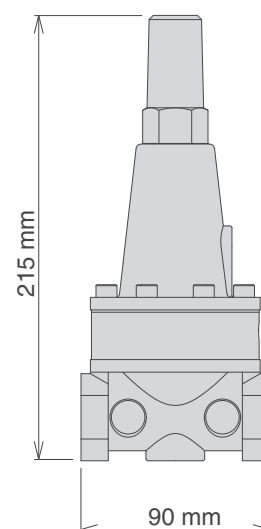
### Relief pressure adjustment

Spring	Pressure range (bar)
blue	0,7 - 7
red	1,5 - 15

Higher values available on request.

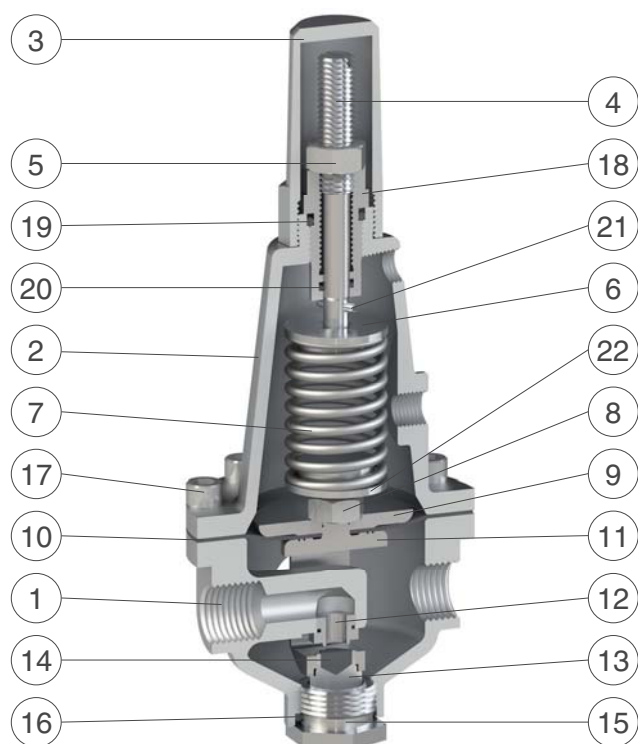
### Standard

Design and testing in accordance with EN 1074.



## Flow control valve Mod. Microstab MLP

The Microstab MLP model is a two ways direct acting flow control valve. Diaphragm operated, the MLP will limit the maximum flow rate, preset and adjustable, to a fixed value regardless of upstream pressure variations where an additional adjustable assembly unit is required. This product is normally used for the regulation of XLC series and, due to its high sensitivity, accuracy and long lasting performances, as a stand-alone unit for water distribution systems, industrial installation, buildings. Supplied with a wide choice of optional materials, and available with the PN 16 and 25 bar version, MLP is provided with a flow rate regulation chart for on-site adjustments according to the compression of the spring.



N.	Component	Material
1	Body	nickel-plated bronze/st. steel
2	Cover	nickel-plated bronze/st. steel
3	Hood	stainless steel
4	Driving screw	stainless steel
5	Nut	stainless steel
6	Upper spring guide	stainless steel
7	Spring	stainless steel
8	Self-locking nut	stainless steel
9	Upper flat	stainless steel
10	Diaphragm	neoprene
11	Obturator holder	stainless steel
12	Sealing seat	stainless steel
13	Gasket holder	stainless steel
14	Plane gasket	NBR
15	Tap	stainless steel
16	O-ring	NBR
17	Screw	stainless steel
18	Water tight spacer	stainless steel
19	O-ring	NBR
20	O-ring	NBR
21	Stop pin	stainless steel
22	Lower spring guide	stainless steel

The list of materials and components is subject to changes without notice.

### Note to the engineer

For the functioning an orifice plate assembly is required downstream, to generate the differential pressure necessary to balance the spring force inside the cover and sized according to the flow rate requirement.

### Technical data

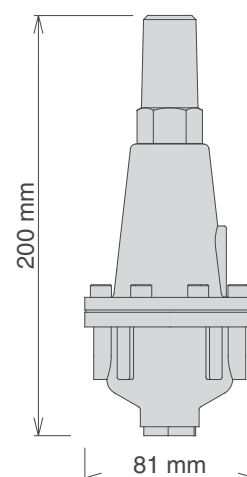
Kv equal to 0,9 m<sup>3</sup>/h.  
Weight 1,65 Kg.  
Normally supplied with 3/8" F.

### Working conditions

Treated water maximum 70°C.  
Minimum pressure: 0,5 bar in addition to head loss.  
Maximum pressure: 16 bar.  
Higher on request.

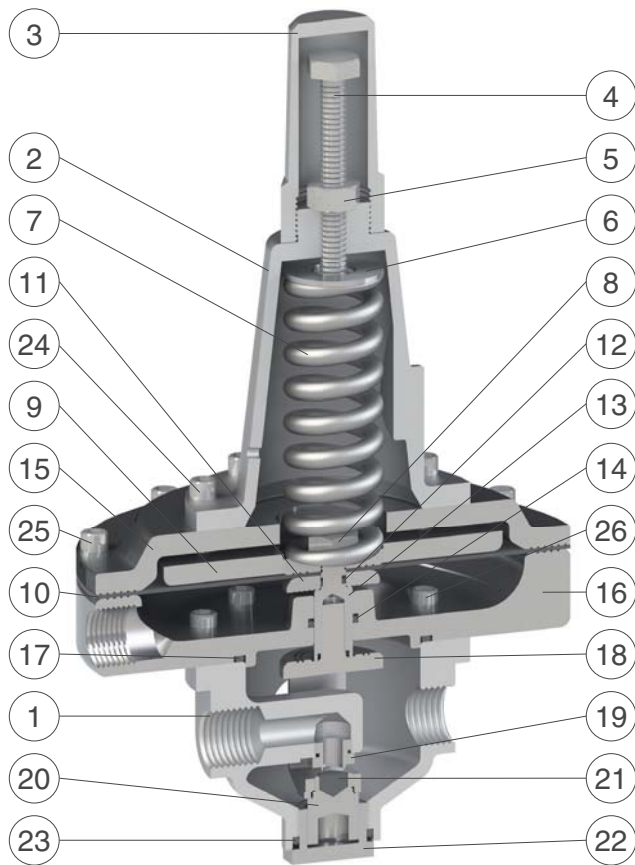
### Standard

Design and testing in accordance with EN 1074.



# High sensitivity altitude/pressure reduction pilot Mod. Microstab MPZ

The Microstab MPZ model is a two ways direct acting modulating valve with remote sensing intermediate chamber. Diaphragm operated, the MRV will maintain a preset and adjustable tank level, whose static value is sensed through a dedicated pressure port, with an accurate and proportional modulating effect acting against the spring force located on the cover. This product is normally used for the regulation of XLC 470 control valves, designed for high sensitivity level control. Supplied with optional materials and different springs MPZ can also be used as independent altitude level/pressure reduction control valve.



N.	Component	Material
1	Body	nickel-plated bronze/st. steel
2	Cover	nickel-plated bronze/st. steel
3	Hood	stainless steel
4	Regulating screw	stainless steel
5	Nut	stainless steel
6	Spring guide	stainless steel
7	Spring	painted steel 52SiCrNi5/st. st.
8	Self-locking nut	stainless steel
9	Upper flat	stainless steel
10	Diaphragm	neoprene
11	Diaphragm lower disk	stainless steel
12	O-ring	NBR
13	Shaft	stainless steel
14	O-ring	NBR
15	Upper flange	nickel-plated brass/st. steel
16	Lower flange	nickel-plated brass/st. steel
17	O-ring	NBR
18	Obturator holder	stainless steel
19	Sealing seat	stainless steel
20	Gasket holder	stainless steel
21	Plane gasket	NBR
22	Tap	stainless steel
23	O-ring	NBR
24	Screws	stainless steel
25	Screws	stainless steel
26	Screws and O-rings	stainless steel and NBR

The list of materials and components is subject to changes without notice.

## Working conditions

Treated water maximum 70°C.  
Minimum pressure: 0,5 bar in addition to head loss.  
Maximum pressure: 16 bar.  
Recommended working pressure: 6 bar. Higher on request.

## Level adjustment

Spring	Level adjustment (m)
blue	3,8 - 18
red	6 - 40

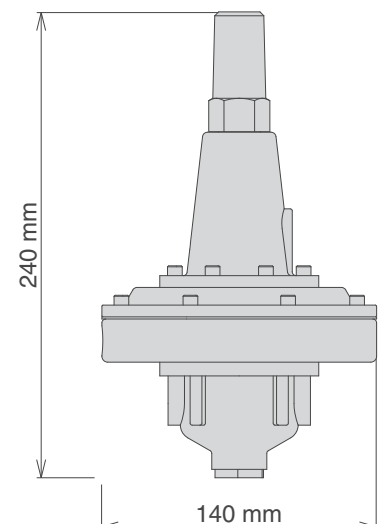
Different values available on request.

## Technical data

Kv equal to 0,82 m³/h.  
Weight 4,65 Kg.  
Normally supplied with 3/8" F.

## Standard

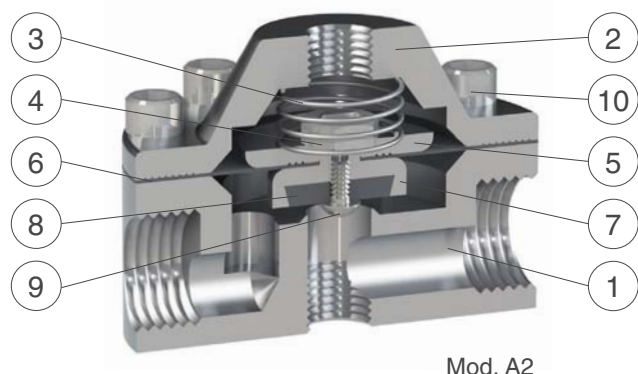
Design and testing in accordance with EN 1074.





## Two and three ways flow accelerators Mod. A2 and A3

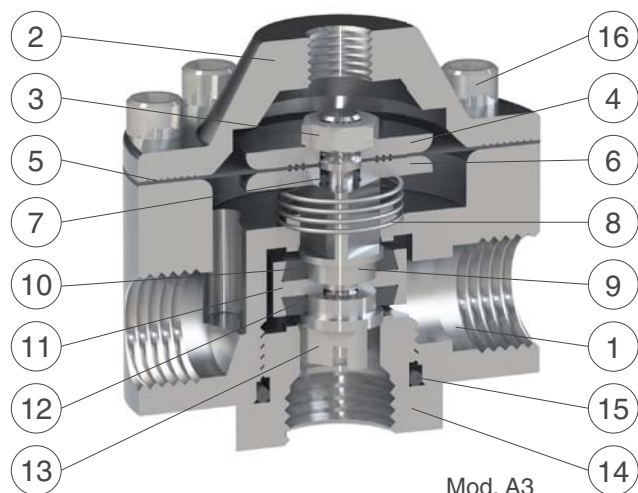
The CSA hydraulic auxiliary valve, hydraulic relay, flow accelerator, is available in a two and three ways versions, namely A2 and A3, depending on the application and on the valve size for which it is required. This unit is a diaphragm actuated valve, operated in response to pressure applied to its control chamber, designed to be used on the circuits of the CSA XLC control valves series in order to enhance hydraulic capacity increasing at the same time performances and reliability. Used for a wide number of applications, the CSA A2 and A3 stand out for long lasting performances due to the choice of high quality materials and its design features.



Mod. A2

### Mod. A2

N.	Component	Material
1	Body	stainless steel
2	Cover	stainless steel
3	Spring	stainless steel
4	Nut	stainless steel
5	Disk	stainless steel
6	Diaphragm	neoprene
7	Obturator	stainless steel
8	Plane gasket	NBR
9	Screw	stainless steel
10	Screws	stainless steel



Mod. A3

### Mod. A3

N.	Component	Material
1	Body	stainless steel
2	Cover	stainless steel
3	Nut	stainless steel
4	Disk	stainless steel
5	Diaphragm	neoprene
6	Disk	stainless steel
7	O-ring	NBR
8	Spring	stainless steel
9	Shaft	stainless steel
10	Gasket	NBR
11	Obturator	stainless steel
12	Gasket	NBR
13	Guiding nut	stainless steel
14	Lower seat	stainless steel
15	O-ring	NBR
16	Screws	stainless steel

The list of materials and components is subject to changes without notice.

### Working conditions

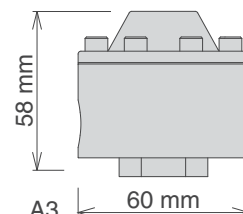
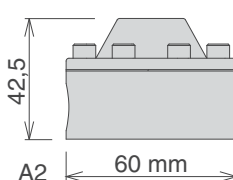
Treated water maximum 70°C.  
Maximum pressure: 25 bar.

### Technical data

A2 Kv: 1,4 m³/h.  
A3 globe pattern Kv: 0,93 m³/h.  
A3 angle pattern Kv: 1,1 m³/h.  
A2 weight: 0,58 Kg. A3 weight: 0,74 Kg.  
Normally supplied with 3/8" F.

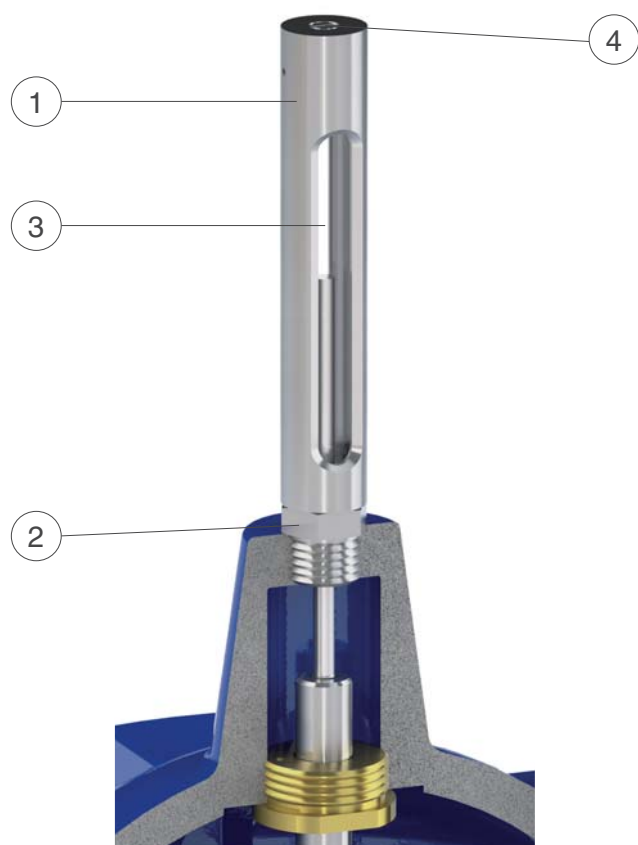
### Standard

Design and testing in accordance with EN 1074.



## Visual position indicator Mod. CSPV

The CSA visual position indicator Mod. CSPV is designed to visually and easily display the valve position and regulation behaviour. The valve's indication rod shows the opening percentage of the internal mobile block, moving into a transparent tube with a solid stainless steel/nickel plated brass housing. The latter, open on two opposite sides for a clear vision, is provided with a manual air release system on top in order to allow air discharge during set up and maintenance. Supplied as a standard position indicator tool for CSA valves, the Mod. CSPV can be replaced by the linear 4-20 mA, on-off position transmitters or the mechanical flow regulator.



N.	Component	Material
1	Upper part	stainless steel
2	Lower part	stainless steel
3	Glass pipe	Pyrex glass
4	Rod	stainless steel

The list of materials and components is subject to changes without notice.

### Working conditions

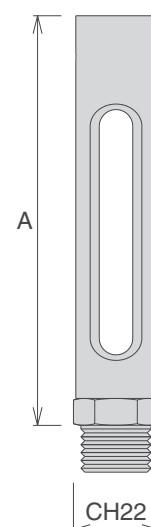
Treated water maximum 70°C.  
Maximum pressure: 25 bar.

### Weight and dimensions

Valve DN	A (mm)	Weight (Kg)
from 50 to 125	82	0,23
from 150 to 250	110	0,27
from 300 to 600	175	0,36

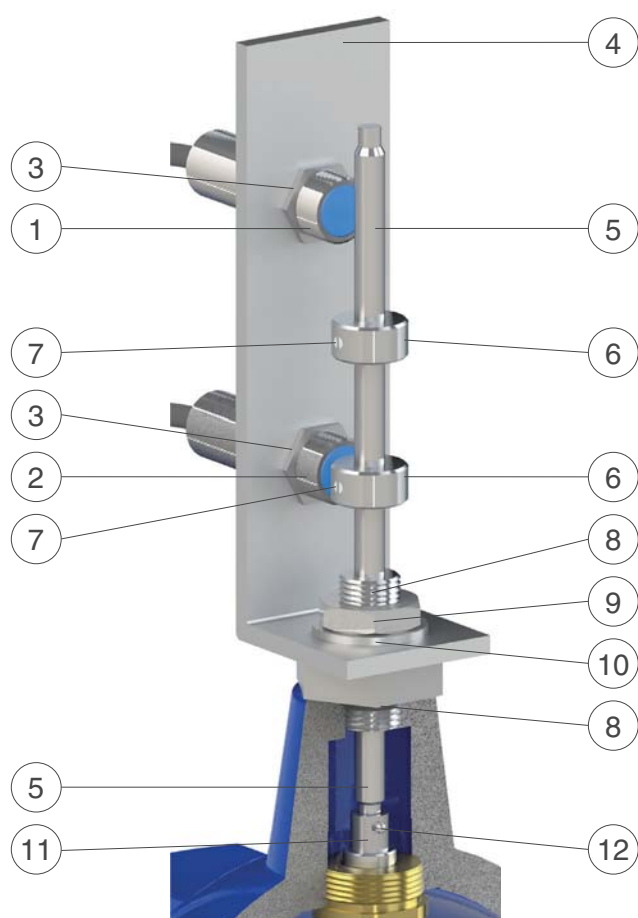
### Standard

Design and testing in  
accordance with EN 1074.



## On-off position transmitter assembly Mod. CSPO

The CSA position indicator assembly model CSPO has been designed to be installed on every XLC control valves series with the purpose of providing on-off signals in relation to one or two points, normally corresponding to the opened and closed positions. The CSPO is operated by means of magnets fixed on the control valve's indication stem whose movement will provide the required signal when going through the sensing area of magnetic inductive proximity sensors, located on a bracket.



N.	Component	Material
1	Open valve proximity sensor	nickel-plated brass
2	Close valve proximity sensor	nickel-plated brass
3	Locking nuts	aluminium
4	Bracket	stainless steel
5	Stem	stainless steel
6	Sensor indicator disks	stainless steel
7	Screws	stainless steel
8	Guiding nut	stainless steel
9	Nut	stainless steel
10	Washer	stainless steel
11	Connecting screw	stainless steel
12	Stop pin	stainless steel

The list of materials and components is subject to changes without notice.

### Working conditions

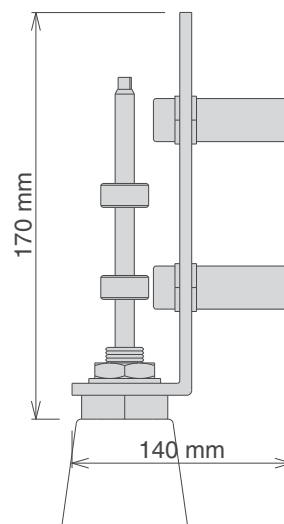
Treated water maximum 70°C.  
Maximum pressure: 25 bar.

### Standard

Design and testing in accordance with EN 1074.

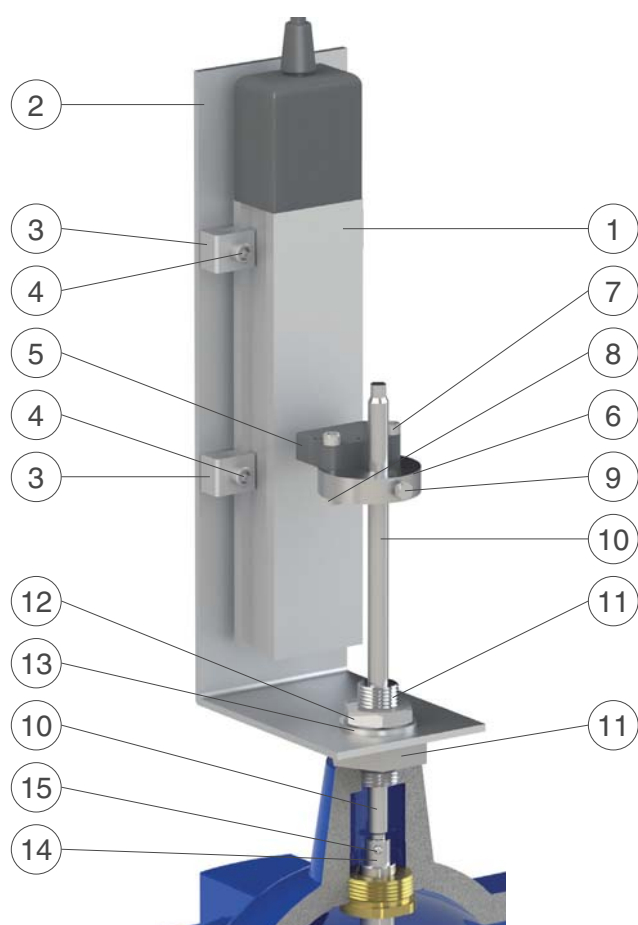
### Technical data

Power supply: 12-24 V DC.  
Protection: IP69, IP68.



# Contactless linear position transducer with magnetostrictive technology - Mod. CSPL

The linear position transmission system model CSPL has been designed to be installed on XLC control valves series with the purpose of providing a 4-20 mA output, in relation to the opening percentage. It is operated by means of a magnet fixed on the control valve's indication stem, whose movement will impart the required signal through a contactless technology. The CSPL is usually supplied with step by step or pressure management XLC control valve, although it can be assembled on any existing CSA valve simply by replacing few components.



N.	Component	Material
1	Position transducer	aluminium
2	Bracket	stainless steel
3	Bracket connections	aluminium
4	Screws	stainless steel
5	Magnet	stainless steel
6	Magnet support	stainless steel
7	Screws	stainless steel
8	Nuts	stainless steel
9	Screw	stainless steel
10	Stem	stainless steel
11	Guiding nut	stainless steel
12	Nut	stainless steel
13	Washer	stainless steel
14	Connecting screw	stainless steel
15	Mechanical stop pin	stainless steel

The list of materials and components is subject to changes without notice.

## Working conditions

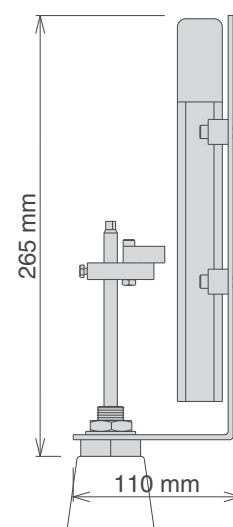
Treated water maximum 70°C.  
Maximum pressure: 25 bar.

## Standard

Design and testing in accordance with EN 1074.

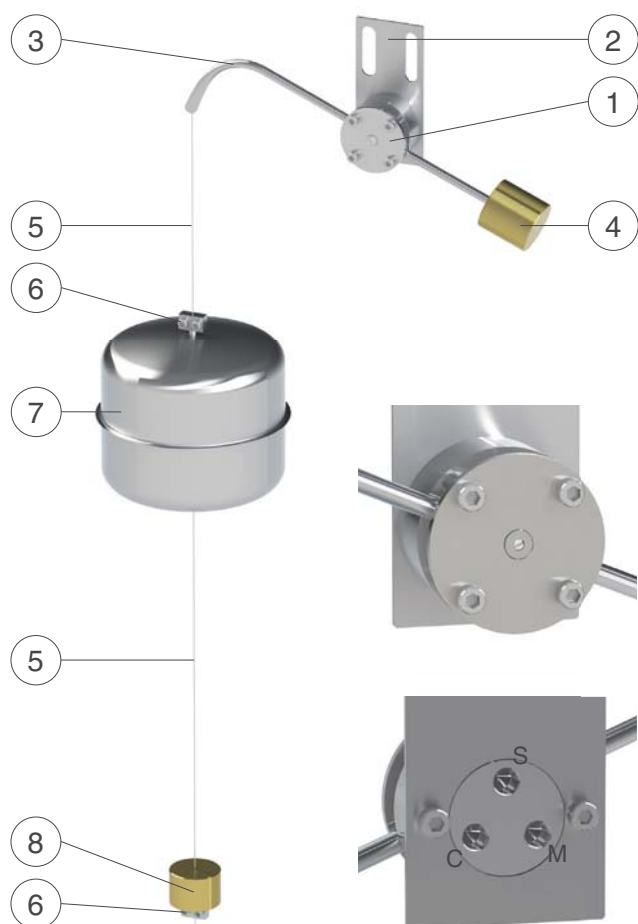
## Technical data

Power supply: 24 V DC  $\pm$  20%.  
Output signal: 4-20 mA.  
Protection: IP67.



## Three ways on-off level vertical float for minimum and maximum tank regulation - Mod. Rotoway

The CSA assembly for minimum and maximum level control, named Rotoway, is composed of a three ways body in stainless steel and all the accessories to provide a fully independent unit designed to operate on CSA control valves XLC series. Internals and construction details make Rotoway suitable for long operating cycles also in presence of high differential pressure, with the level control regulation range up to 4 m length. The operating principle is based upon the movement of the float that, sliding on a wire, imparts the force to the lever to switch from open to the closed positions, by means of mechanical stops corresponding to the minimum and maximum level of the tank, both pre-set and adjustable.



N.	Component	Material
1	Rotoway pilot	stainless steel, bronze, Delrin
2	Bracket	stainless steel
3	Rod	stainless steel
4	Counterweight	brass/stainless steel
5	Wire	stainless steel
6	Stop collars	brass
7	Float	stainless steel
8	Counterweight	brass/stainless steel

The list of materials and components is subject to changes without notice.

### Front view

The picture shows the front view of the three ways Rotoway case, the screws in the middle is used to adjust and balance the lever linked to the float mechanism.

### Rear view

The picture shows the rear view of the three ways Rotoway case with pressure port connections, S for drain, C for chamber and M for upstream, used to operate the CSA XLC control valves according to the set up and installation manual.

### Working conditions

Treated water maximum 70°C.  
Design pressure: 16 bar.  
Recommended working pressure: 6 bar.  
Higher on request.

### Standard

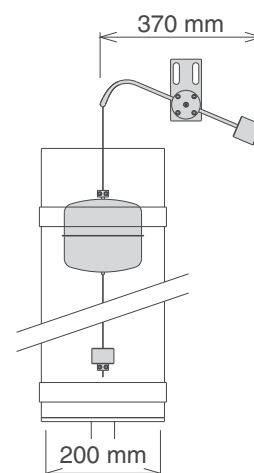
Design and testing in accordance with EN 1074.

### Technical data

Normally supplied with 1/8" F.

### Installation

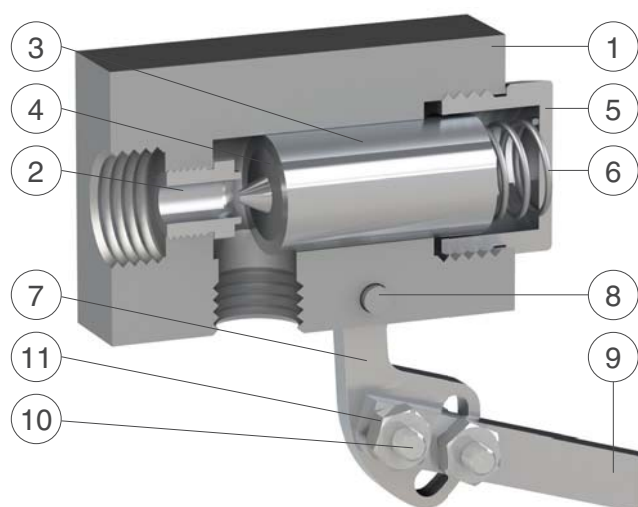
The Rotoway assembly is usually located on top of water level inside the main reservoir, although it can be installed in a stilling tank for better performances and maintenance purposes. The picture on the right shows the recommended size of the pipe, required for such application.





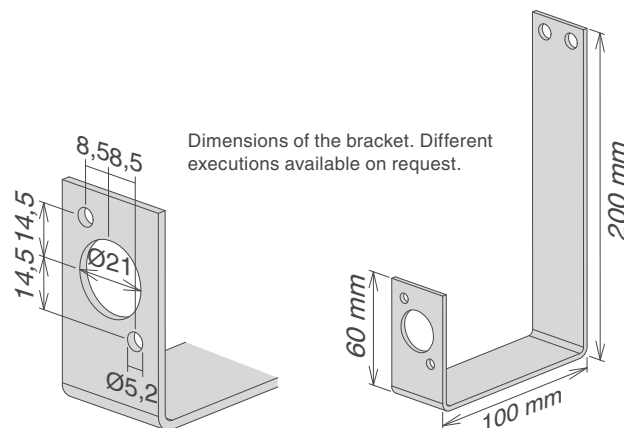
## Two ways modulating proportional constant level control pilot - Mod. MCP

The CSA MCP is a two ways proportional modulating float valve, designed to maintain the constant level of a tank regardless of upstream pressure variations. This product, entirely made in stainless steel and created for the regulation of CSA level control valves XLC series, thanks to its high accuracy and reliability can also be used as a stand-alone unit for water distribution systems, industrial installations, buildings. MCP is actuated by a float, sensing the water level of the tank, and whose variation will impart a force to the lever to which it is connected in order to move the piston horizontally and modulate the flow passage between the seat and the obturator proportionally to the consumption.



N.	Component	Material
1	Body	stainless steel
2	Seat	stainless steel
3	Obturator	stainless steel
4	Plane gasket	NBR
5	Tap	stainless steel
6	Spring	stainless steel
7	Lever	stainless steel
8	Pivot	stainless steel
9	Rod	stainless steel
10	Screws	stainless steel
11	Nuts	stainless steel
12	Float	stainless steel
13	Screw	stainless steel

The list of materials and components is subject to changes without notice.



### Working conditions

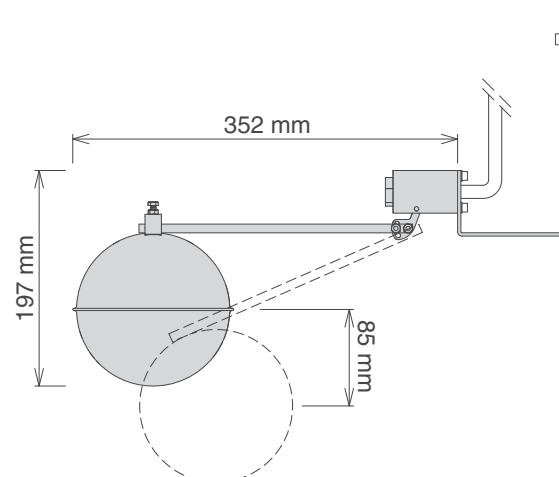
Treated water maximum 70°C.  
Design pressure: 16 bar.  
Recommended working pressure: 6 bar.  
Higher values on request.

### Standard

Design and testing in accordance with EN 1074.

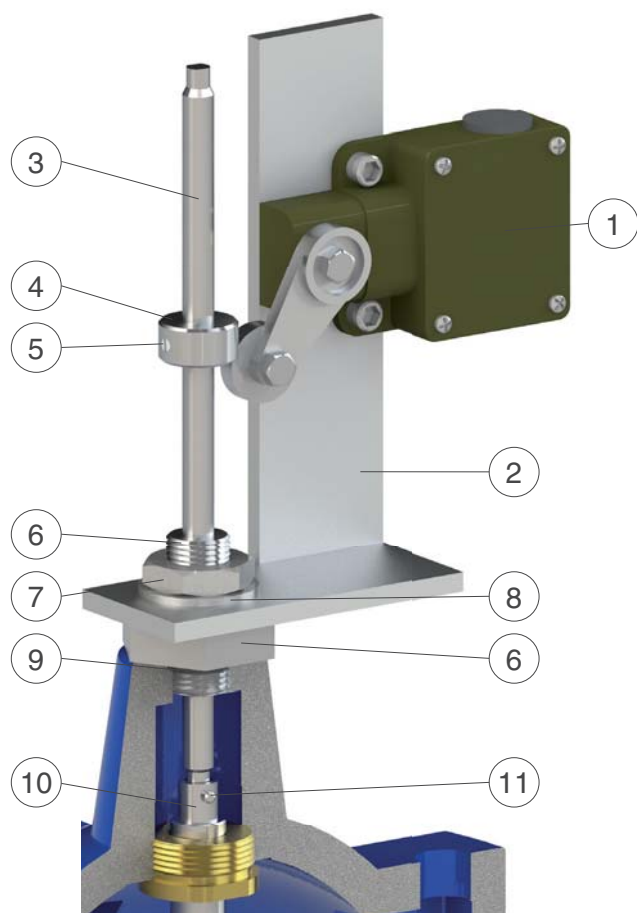
### Technical data

Kv: 0,67 m<sup>3</sup>/h.  
Stroke of the float: 85 mm, different on request.



## On-off limit switch assembly Mod. CSLS

The CSA limit switch assembly CSLS has been designed to be installed on every XLC control valves series with the purpose of providing on-off signals in relation to the position. The activation point is given by the disk acting on the limit switch, adjustable to the required position. The entire assembly is located on a bracket in stainless steel holding the water tight nut threaded on the chamber while the stem is connected to the main shaft, by means of a bearing pin to allow for tolerance and unwanted friction during movement.



N.	Component	Material
1	Switch	steel/stainless steel
2	Bracket	stainless steel
3	Stem	stainless steel
4	Indicator disk	stainless steel
5	Screw	stainless steel
6	Guiding nut	stainless steel
7	Nut	stainless steel
8	Washer	stainless steel
9	O-ring	NBR
10	Connecting screw	stainless steel
11	Stop pin	stainless steel

The list of materials and components is subject to changes without notice.

### Technical data

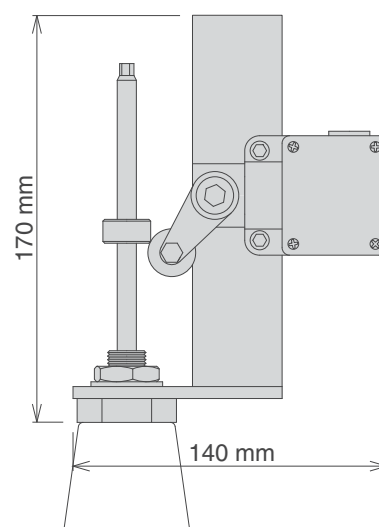
Protection: IP67.

Metal case.

Different executions and more information on request.

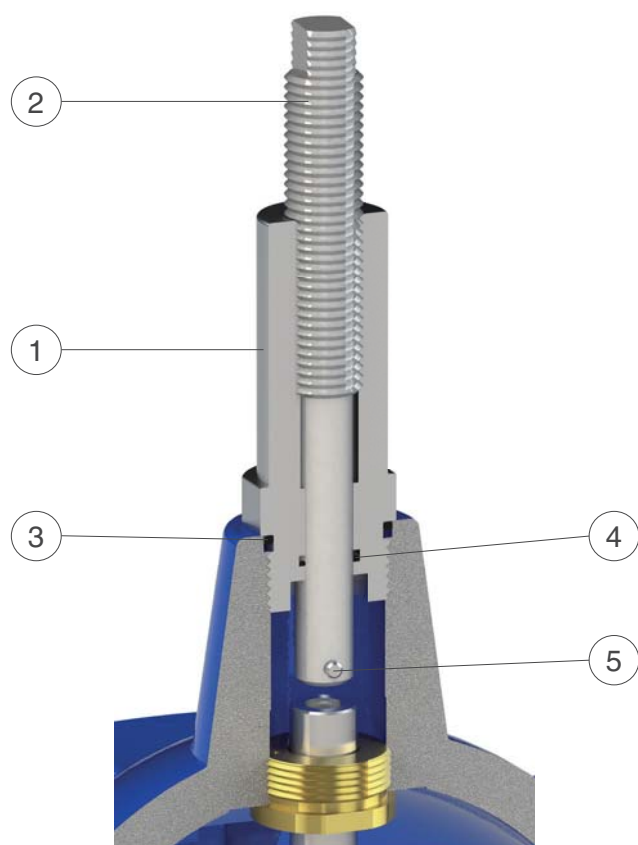
### Standard

According to EN 60947-5-1, EN 60947-1, EN 60204-1, EN ISO 14119, EN ISO 12100, EN 60529.



## Mechanical flow regulator Mod. CSFL

The CSA mechanical flow regulator Mod. CSFL is designed for the manual control of the maximum opening percentage of the valve in working conditions. Entirely made in stainless steel this accessory can be installed on every model of CSA XLC series control valve, and replace existing position indicators, output signal and any other CSA solutions located on top of the control chamber. The CSFL is mostly recommended for surge anticipation valves, surge relief, level control and whenever the possibility of the manual adjustment of the maximum flow may be needed for the proper regulation of the valve and the safety of the system.



N.	Component	Material
1	Body	stainless steel
2	Regulating screw	stainless steel
3	O-ring	NBR/EPDM/Viton
4	O-ring	NBR/EPDM/Viton
5	Stop pin	stainless steel

The list of materials and components is subject to changes without notice.

### Working conditions

Treated water maximum 70°C.  
Maximum pressure: 25 bar.  
Higher values on request.

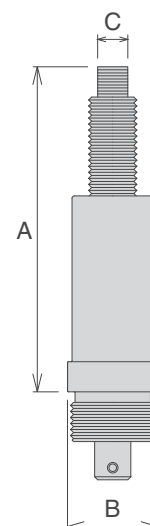
### Standard

Design and testing in accordance with EN 1074.

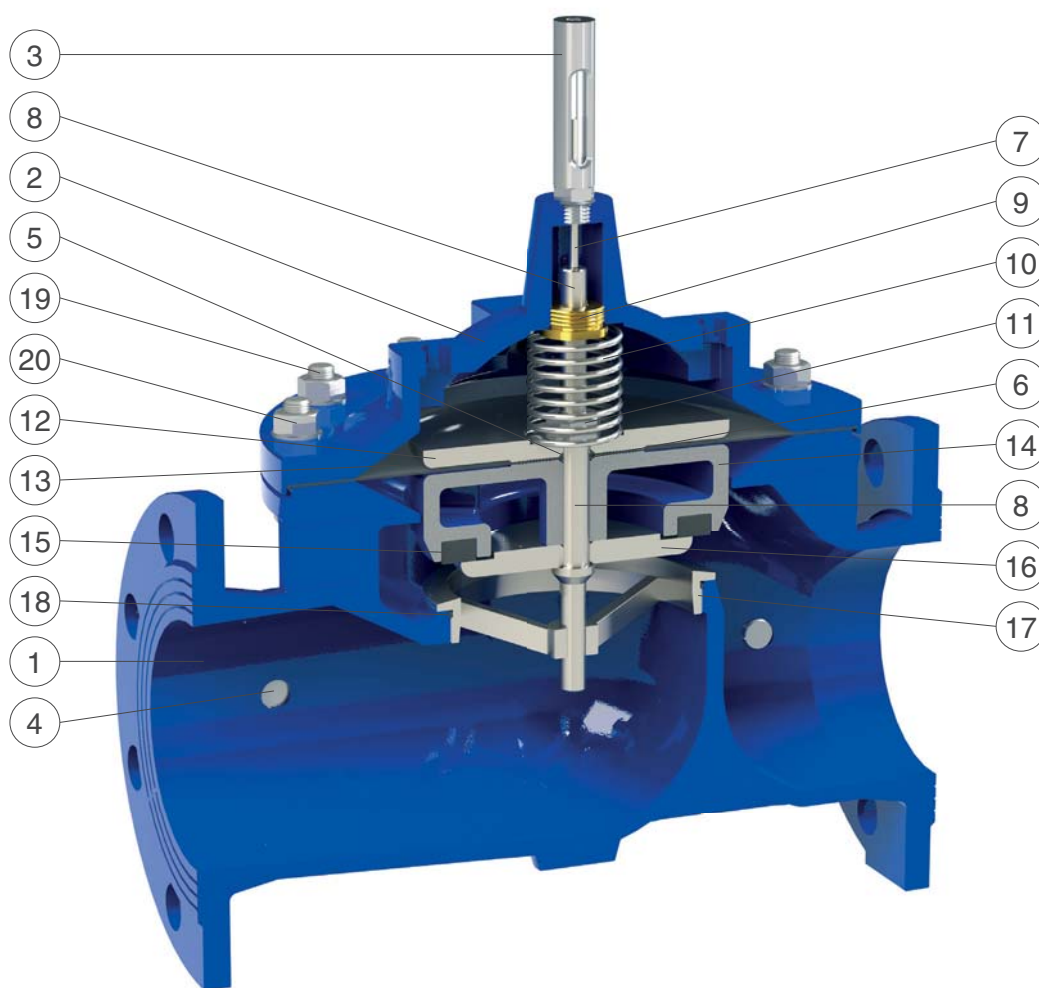
### Dimensions

Valve DN (mm)	A max. (mm)	B (mm)	C (mm)
50-65	95	CH24	CH8
80-100	121	CH30	CH10
150-200	199	CH42	CH15

Bigger sizes available on request.



## XLC 400 - Standard version - Technical details

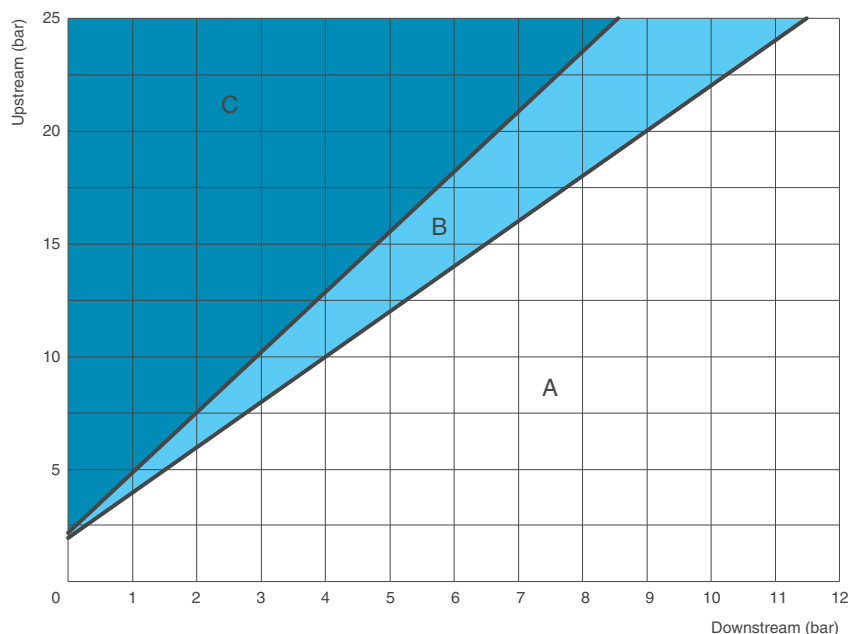


N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Position indicator	s.s. AISI 303 (nickel-plated brass from DN 300)	stainless steel AISI 303
4	Pressure outlet taps	stainless steel AISI 316	
5	Upper flat O-ring	NBR	EPDM/Viton
6	Obturator O-ring	NBR	EPDM/Viton
7	Indicator stem	stainless steel AISI 303	stainless steel AISI 316
8	Main shaft	stainless steel AISI 303	stainless steel AISI 316
9	Guide ring	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
10	Spring	stainless steel AISI 302	
11	Locking nut	stainless steel AISI 304	stainless steel AISI 316
12	Upper flat	painted steel	stainless s. AISI 304/316
13	Diaphragm	polyamide-Nylon	neoprene/EPDM-Nylon
14	Obturator	AISI 303 (DN 50-65), steel, duct. c. iron (from DN 150)	stainless s. AISI 304/316
15	Plane gasket	NBR	
16	Gasket holder	stainless steel AISI 303 (304 from DN 150)	stainless steel AISI 316
17	Seat	stainless steel AISI 303 (316 from DN 150)	stainless steel AISI 316
18	Seat O-ring	NBR	EPDM/Viton
19	Studs	stainless steel AISI 304	stainless steel AISI 316
20	Nuts and washers	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.

## XLC 400 - Standard version - Technical data

DN (mm)	40	50	65	80	100	150	200	250	300	400
Kv (m³/h)	40,6	40,6	68	100	169	410	662	1126	1504	2675
Stroke (mm)	15	15	18	21	27	43	56	70	84	110



### Head loss coefficient

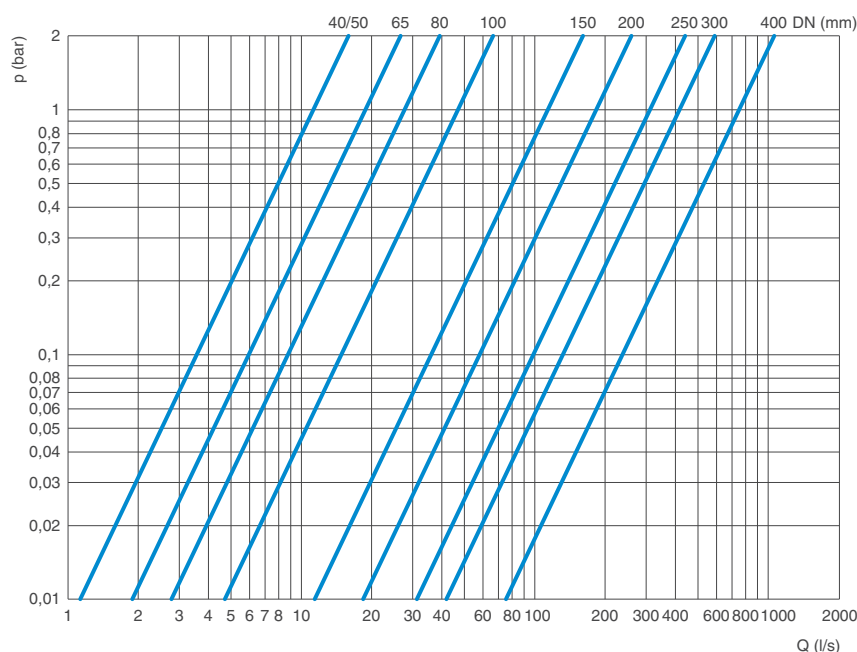
Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the 3 zones to be identified as follows:

- A: Recommended working conditions;
- B: Noise cavitation;
- C: Damage cavitation.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.



### Head loss chart

The chart indicates the head loss of XLC 400 automatic control valves fully open versus flow rate in l/s.

### Recommended flow rate

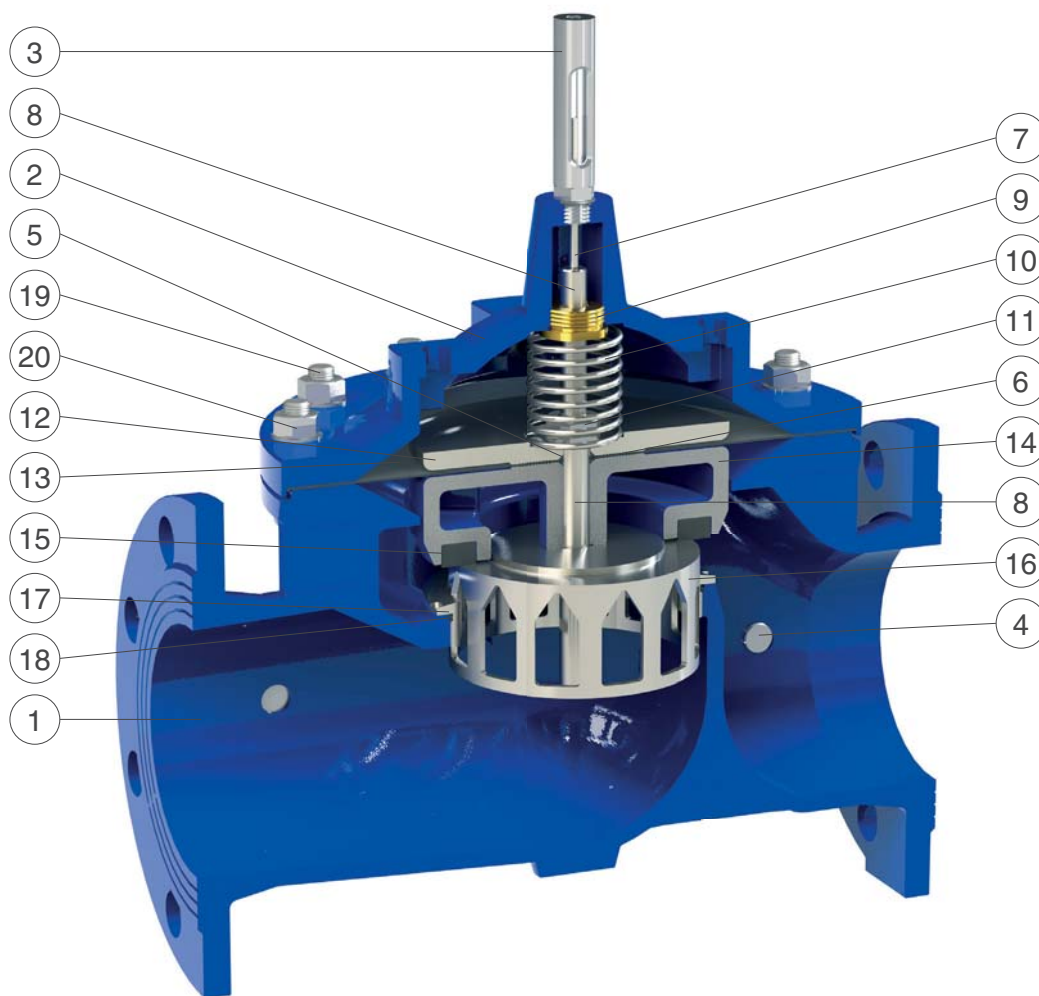
The following chart shows the recommended flow rate for the proper sizing of XLC 400 control valves.

DN (mm)			40/50	65	80	100	150	200	250	300	400
Flow rate (l/s)	Low head loss (0,1-0,15 bar)	Max.	3,9	6,6	10	16	35	63	98	140	250
		Min.	1	1,7	2,5	3,9	8,8	16	25	35	63
	Recommended	Max.	9,8	17	25	39	88	157	245	353	628
		Max.	15	25	38	59	132	235	368	530	942

All values are approximate, consult CSA service for more details.



## XLC 400 - AC version - Technical details

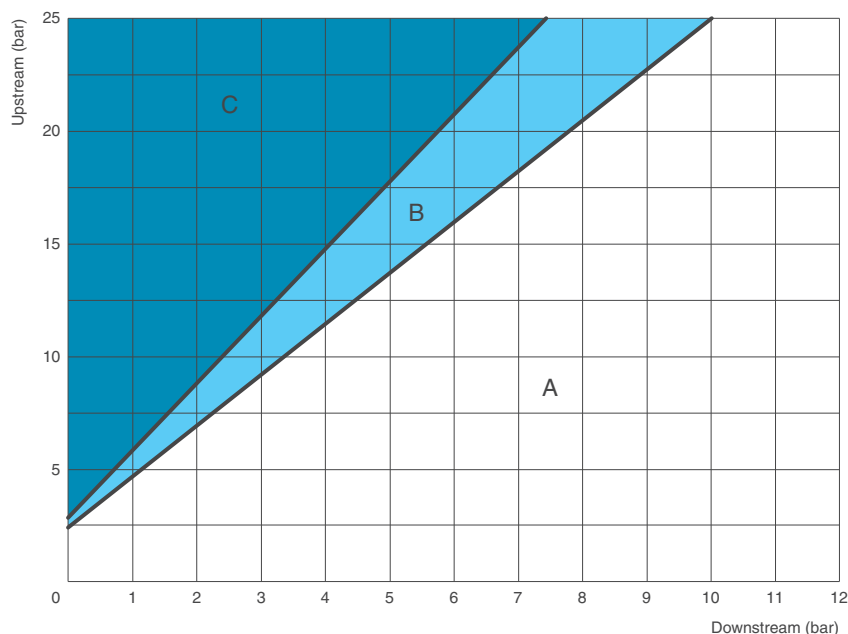


N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Position indicator	s.s. AISI 303 (nickel-plated brass from DN 300)	stainless steel AISI 303
4	Pressure outlet taps	stainless steel AISI 316	
5	Upper flat O-ring	NBR	EPDM/Viton
6	Obturator O-ring	NBR	EPDM/Viton
7	Indicator stem	stainless steel AISI 303	stainless steel AISI 316
8	Main shaft	stainless steel AISI 303	stainless steel AISI 316
9	Guide ring	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
10	Spring	stainless steel AISI 302	
11	Locking nut	stainless steel AISI 304	stainless steel AISI 316
12	Upper flat	painted steel	stainless s. AISI 304/316
13	Diaphragm	polyamide-Nylon	neoprene/EPDM-Nylon
14	Obturator	AISI 303 (DN 50-65), steel, duct. c. iron (from DN 150)	stainless s. AISI 304/316
15	Plane gasket	NBR	
16	V-port	stainless steel AISI 303 (304 from DN 150)	stainless steel AISI 316
17	Seat for system AC	stainless steel AISI 303 (316 from DN 150)	stainless steel AISI 316
18	Seat O-ring	NBR	EPDM/Viton
19	Studs	stainless steel AISI 304	stainless steel AISI 316
20	Nuts and washers	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.

## XLC 400 - AC version - Technical data

DN (mm)	40	50	65	80	100	150	200	250	300	400
Kv (m³/h)	32,5	32,5	56	79	132	312	523	867	1173	2113
Stroke (mm)	15	15	18	21	27	43	56	70	84	110



### Head loss coefficient

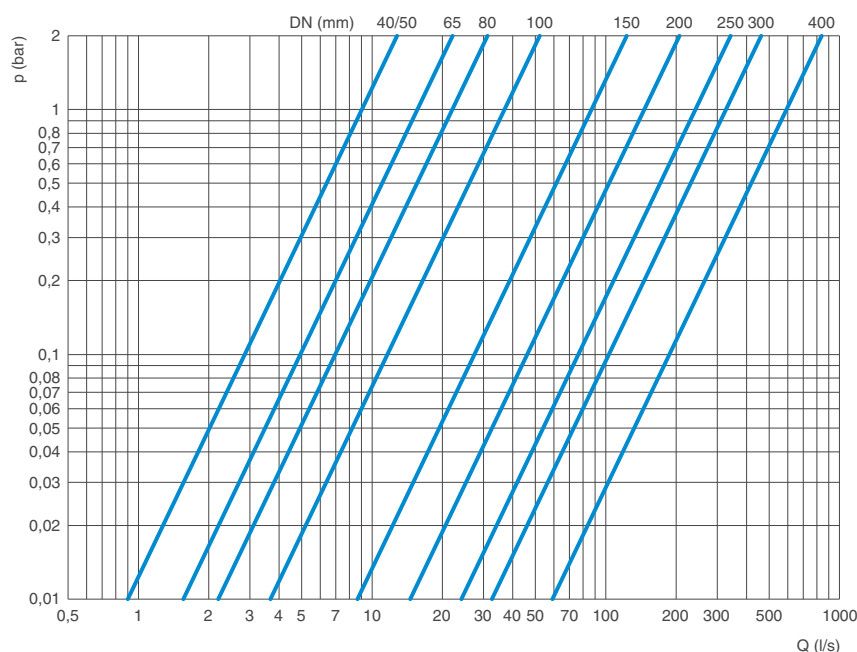
Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the 3 zones to be identified as follows:

- A: Recommended working conditions;
- B: Noise cavitation;
- C: Damage cavitation.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.



### Head loss chart

The chart indicates the head loss of XLC 400-AC automatic control valves fully open versus flow rate in l/s.

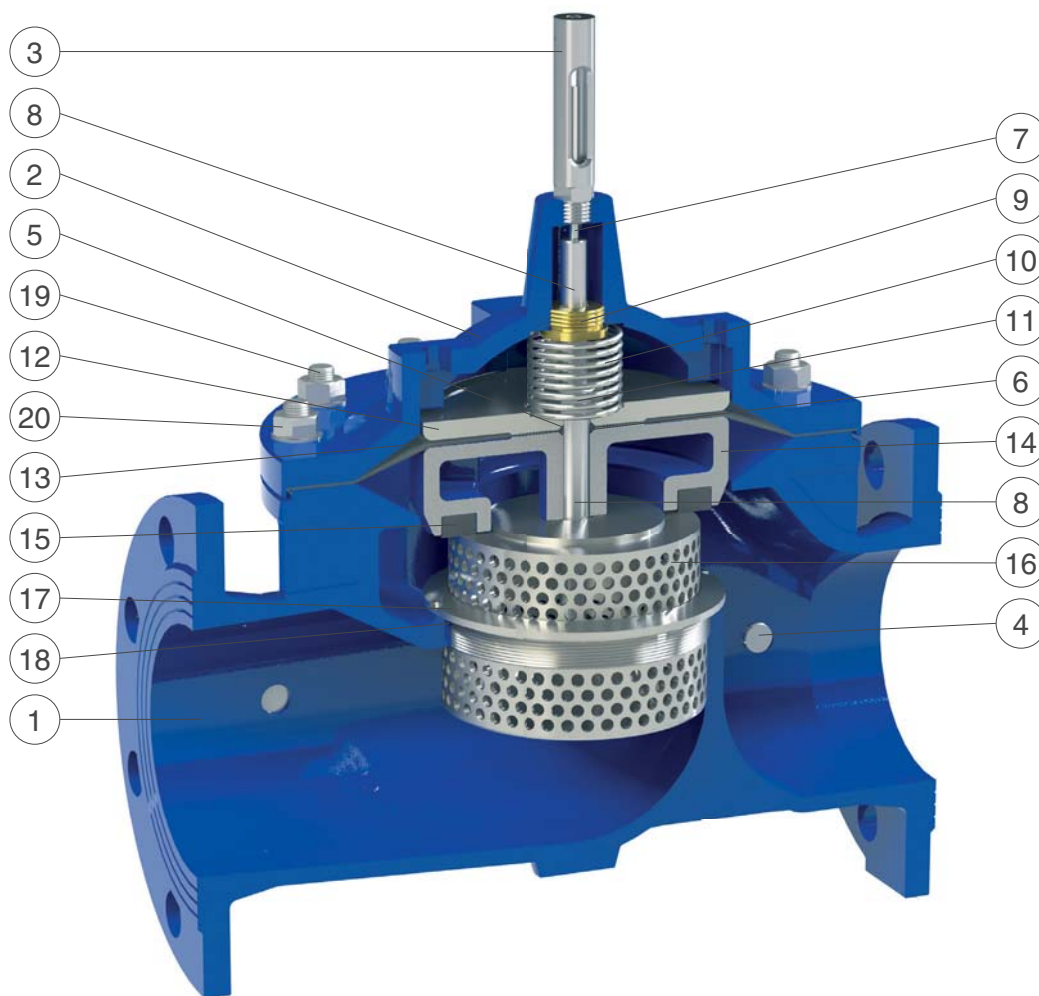
### Recommended flow rate

The following chart shows the recommended flow rate for the proper sizing of XLC 400-AC control valves.

DN (mm)			40/50	65	80	100	150	200	250	300	400
Flow rate (l/s)	Low head loss (0,1-0,15 bar)	Max.	2,8	4,9	6,9	11	27	45	76	103	185
	Recommended	Min.	0,5	0,9	1,4	2,2	4,9	8,8	14	20	35
		Max.	7,9	14	19	30	67	124	188	274	496
	Pressure relief	Max.	12	20	30	46	100	185	283	412	744

The technical informations are indicative and can change according to the number and dimension of the slots.

## XLC 400 - CP anti-cavitation version - Technical details

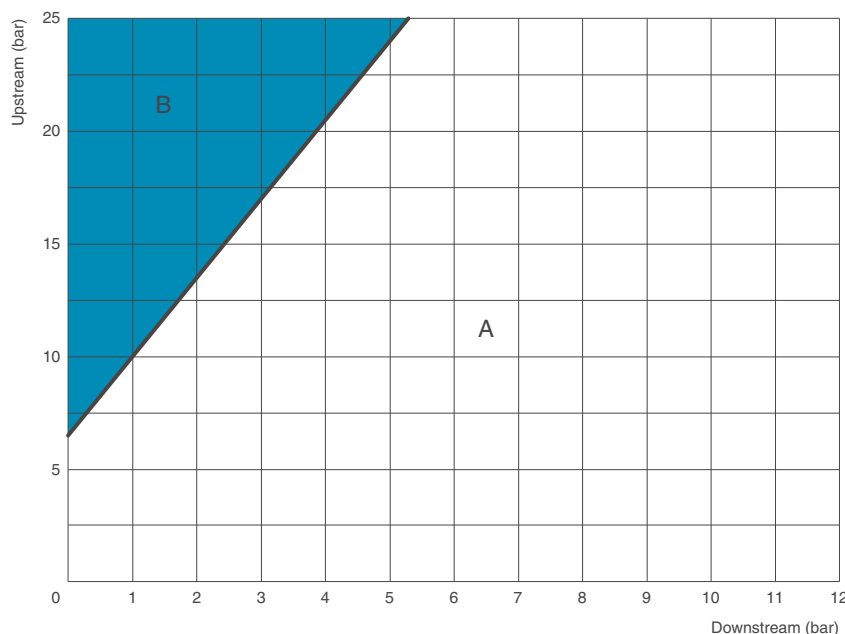


N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Position indicator	s.s. AISI 303 (nickel-plated brass from DN 300)	stainless steel AISI 303
4	Pressure outlet taps	stainless steel AISI 316	
5	Upper flat O-ring	NBR	EPDM/Viton
6	Obturator O-ring	NBR	EPDM/Viton
7	Indicator stem	stainless steel AISI 303	stainless steel AISI 316
8	Main shaft	stainless steel AISI 303	stainless steel AISI 316
9	Guide ring	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
10	Spring	stainless steel AISI 302	
11	Locking nut	stainless steel AISI 304	stainless steel AISI 316
12	Upper flat	painted steel	stainless s. AISI 304/316
13	Diaphragm	polyamide-Nylon	neoprene/EPDM-Nylon
14	Obturator	AISI 303 (DN 50-65), steel, duct. c. iron (from DN 150)	stainless s. AISI 304/316
15	Plane gasket	NBR	
16	Anti-cavitation gasket holder CP	stainless steel AISI 303 (304 from DN 150)	stainless steel AISI 316
17	Seat for anti-cavitation system CP	stainless steel AISI 303 (316 from DN 150)	stainless steel AISI 316
18	Seat O-ring	NBR	EPDM/Viton
19	Studs	stainless steel AISI 304	stainless steel AISI 316
20	Nuts and washers	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.

## XLC 400 - CP anti-cavitation version - Technical data

DN (mm)	40	50	65	80	100	150	200	250	300	400
Kv (m³/h)	20	20	34	50	84	205	331	563	752	1337
Stroke (mm)	15	15	18	21	27	43	56	70	84	110



### Head loss coefficient

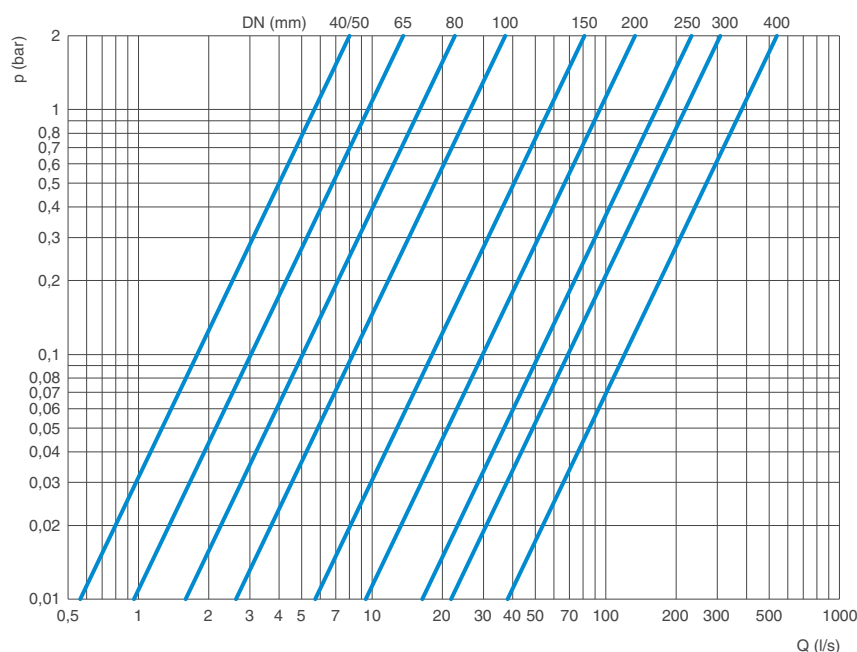
Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the two zones to be identified as follows:

- A: Recommended working conditions;
- B: Damage cavitation.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.



### Head loss chart

The chart indicates the head loss of XLC 400-CP automatic control valves fully open versus flow rate in l/s.

### Recommended flow rate

The following chart shows the recommended flow rate for the proper sizing of XLC 400-CP control valves.

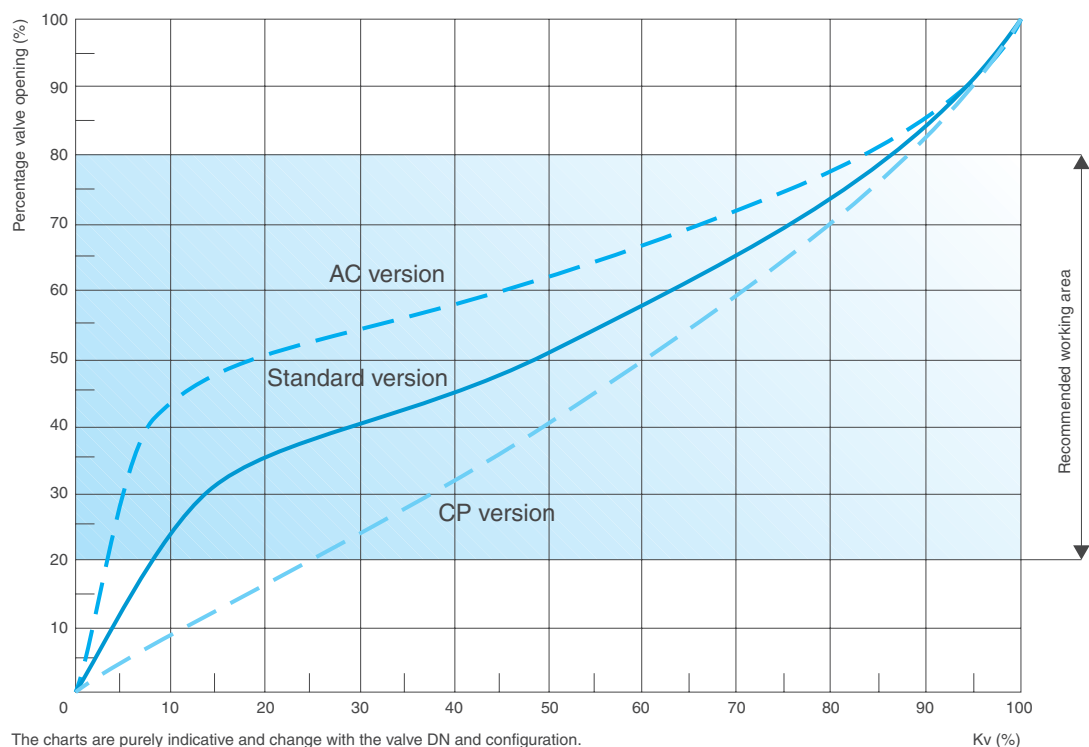
DN (mm)			40/50	65	80	100	150	200	250	300	400
Flow rate (l/s)	Recommended	Min.	0,4	0,7	1,0	1,6	3,5	6,3	9,8	14	25
		Max.	3,9	6,6	9,7	16	40	64	109	146	260
	Pressure relief	Max.	9,8	16	25	39	88	157	245	353	628

The technical informations are indicative and can change according to the number and dimension of the holes.

## XLC 400 - Standard and anti-cavitation versions - Technical data

### Kv to valve opening chart

The following chart shows the opening percentage of XLC 400, XLC 400-AC and XLC 400-CP versus the Kv.



The charts are purely indicative and change with the valve DN and configuration.

Kv (%)

### Working conditions

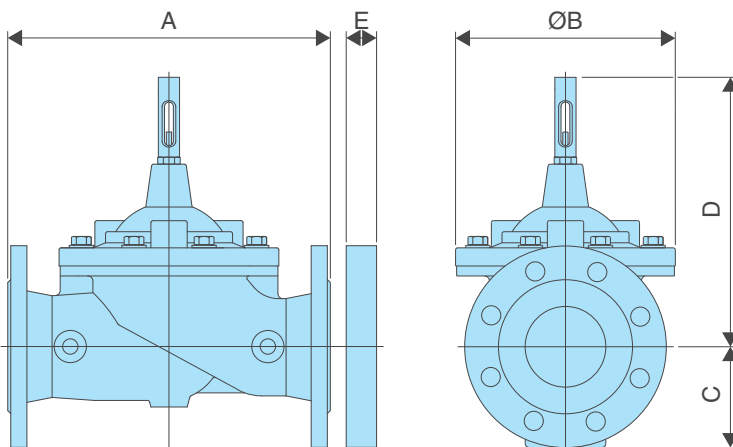
Treated filtered water.  
Maximum temperature: 70°C.  
Minimum pressure on the pilot : 0,5 bar plus head loss.  
Maximum pressure : 25 bar.

### Standard

Certified and tested in compliance with EN 1074/5.  
Pressure rating 25 bar.  
Flanges according to EN 1092/2 (different drilling on request).  
Epoxy painting applied through FBT technology blue RAL 5005.

### Weights and dimensions

DN (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (Kg)
40	230	162	83	235	30	18
50	230	162	83	235	30	18
65	290	194	93	275	30	23,5
80	310	218	100	295	30	28
100	350	260	118	335	30	39
150	480	370	150	450	30	84
200	600	444	180	495	30	138
250	730	570	213	600	40	264
300	850	676	242	720	40	405
400	1100	870	310	915	40	704

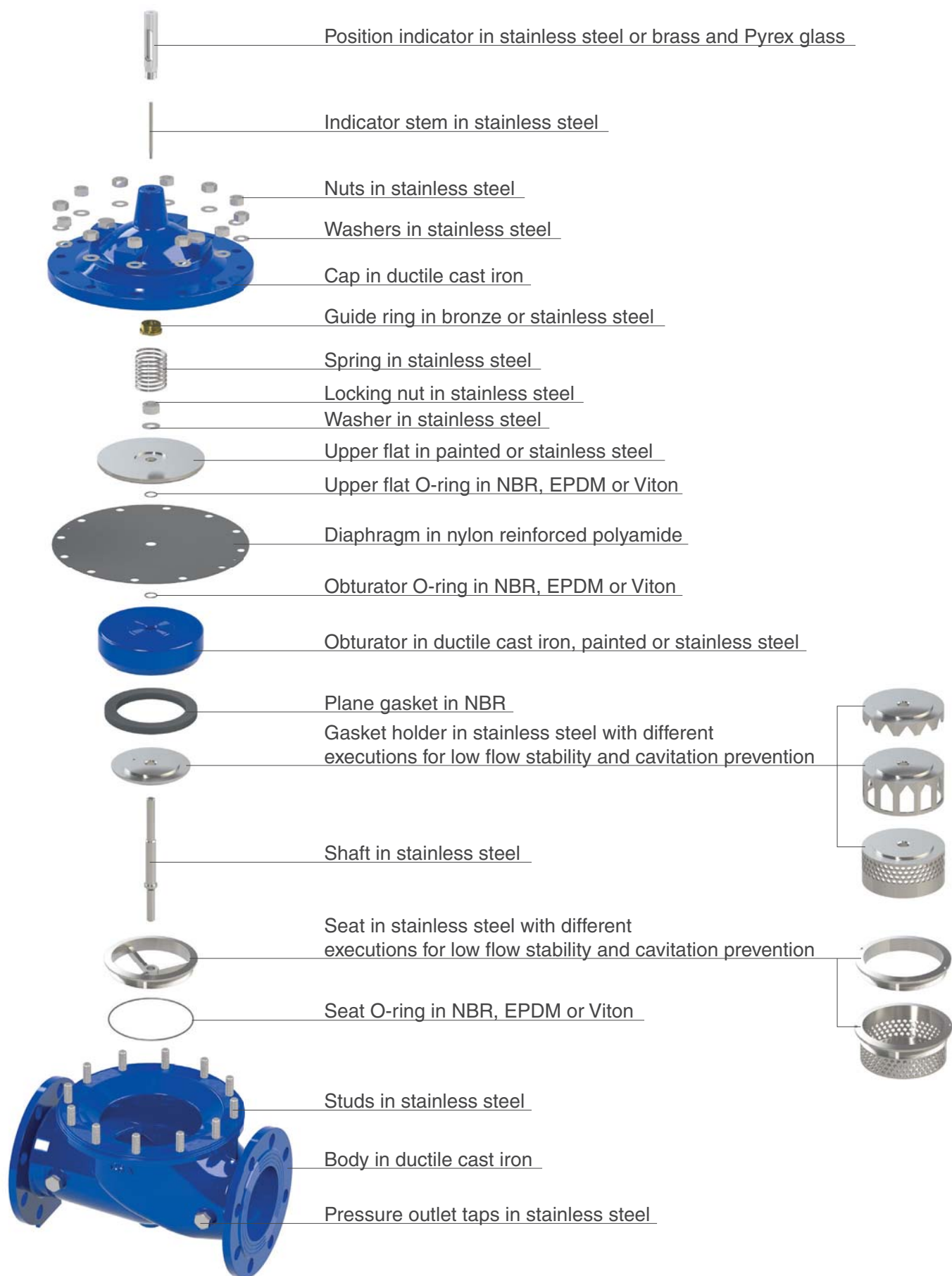


The dimension E in the picture above refers only to applications where it is necessary to add a flanged orifice downstream or upstream of the valve, for example for flow control or cavitation prevention.

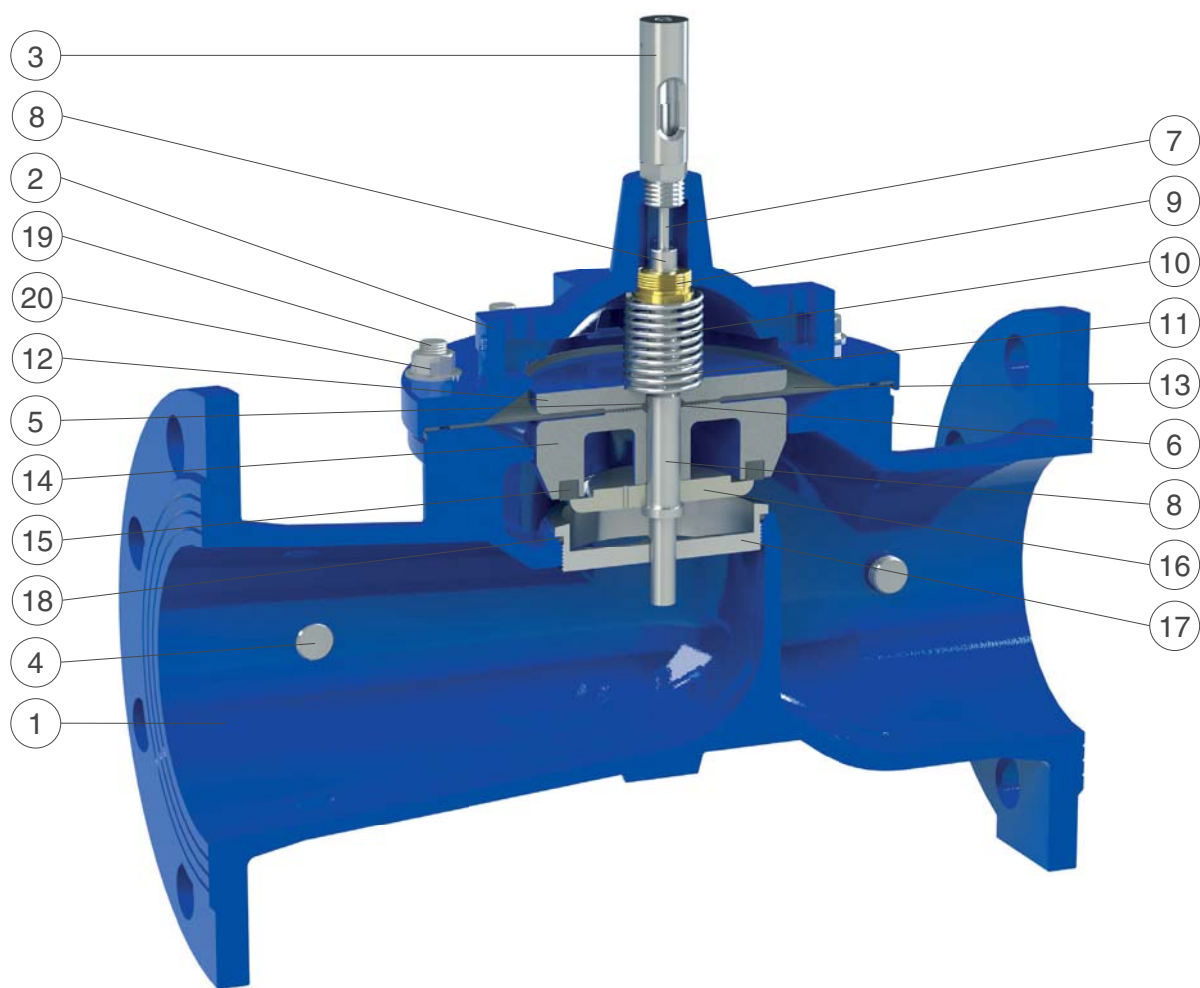
All values are approximate, consult CSA service for more details.



## XLC 400 - Standard and anti-cavitation versions - Spare parts breakdown



## XLC 300 - Standard version - Technical details

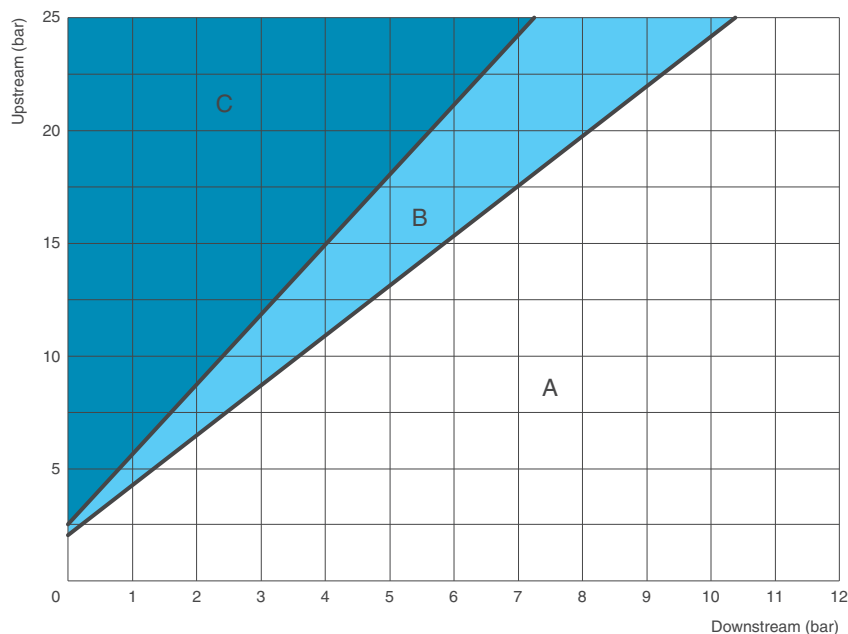


N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Position indicator	s.s. AISI 303 (nickel-plated brass for DN 400)	stainless steel AISI 303
4	Pressure outlet taps	stainless steel AISI 316	
5	Upper flat O-ring	NBR	EPDM/Viton
6	Obturator O-ring	NBR	EPDM/Viton
7	Indicator stem	stainless steel AISI 303	stainless steel AISI 316
8	Main shaft	stainless steel AISI 303	stainless steel AISI 316
9	Guide ring	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
10	Spring	stainless steel AISI 302	
11	Locking nut	stainless steel AISI 304	stainless steel AISI 316
12	Upper flat	painted steel	stainless s. AISI 304/316
13	Diaphragm	polyamide-Nylon	neoprene/EPDM-Nylon
14	Obturator	AISI 303 (DN 80), p. steel, duct. c. iron (from DN 200)	stainless s. AISI 304/316
15	Plane gasket	NBR	
16	Gasket holder	stainless steel AISI 303 (304 from DN 200)	stainless steel AISI 316
17	Seat	stainless steel AISI 303 (316 from DN 200)	stainless steel AISI 316
18	Seat O-ring	NBR	EPDM/Viton
19	Studs	stainless steel AISI 304	stainless steel AISI 316
20	Nuts and washers	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.

## XLC 300 - Standard version - Technical data

DN (mm)	80	100	125	150	200	250	300	400	500	600
Kv (m³/h)	54	118	187	198	487	802	1256	1742	3089	3236
Stroke (mm)	15	21	27	27	43	56	70	84	110	110



### Head loss coefficient

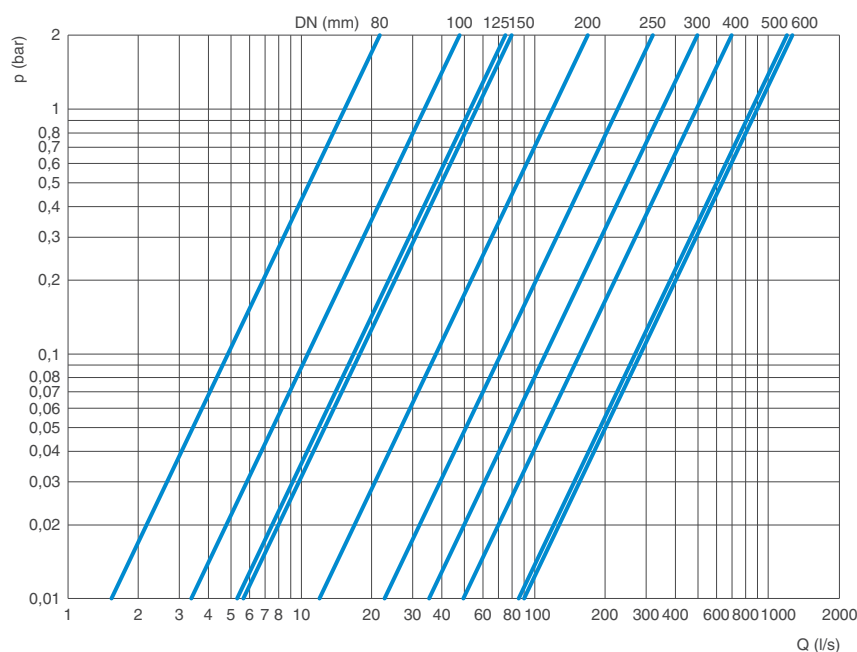
Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the 3 zones to be identified as follows:

- A: Recommended working conditions;
- B: Noise cavitation;
- C: Damage cavitation.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.



### Head loss chart

The chart indicates the head loss of XLC 300 automatic control valves fully open versus flow rate in l/s.

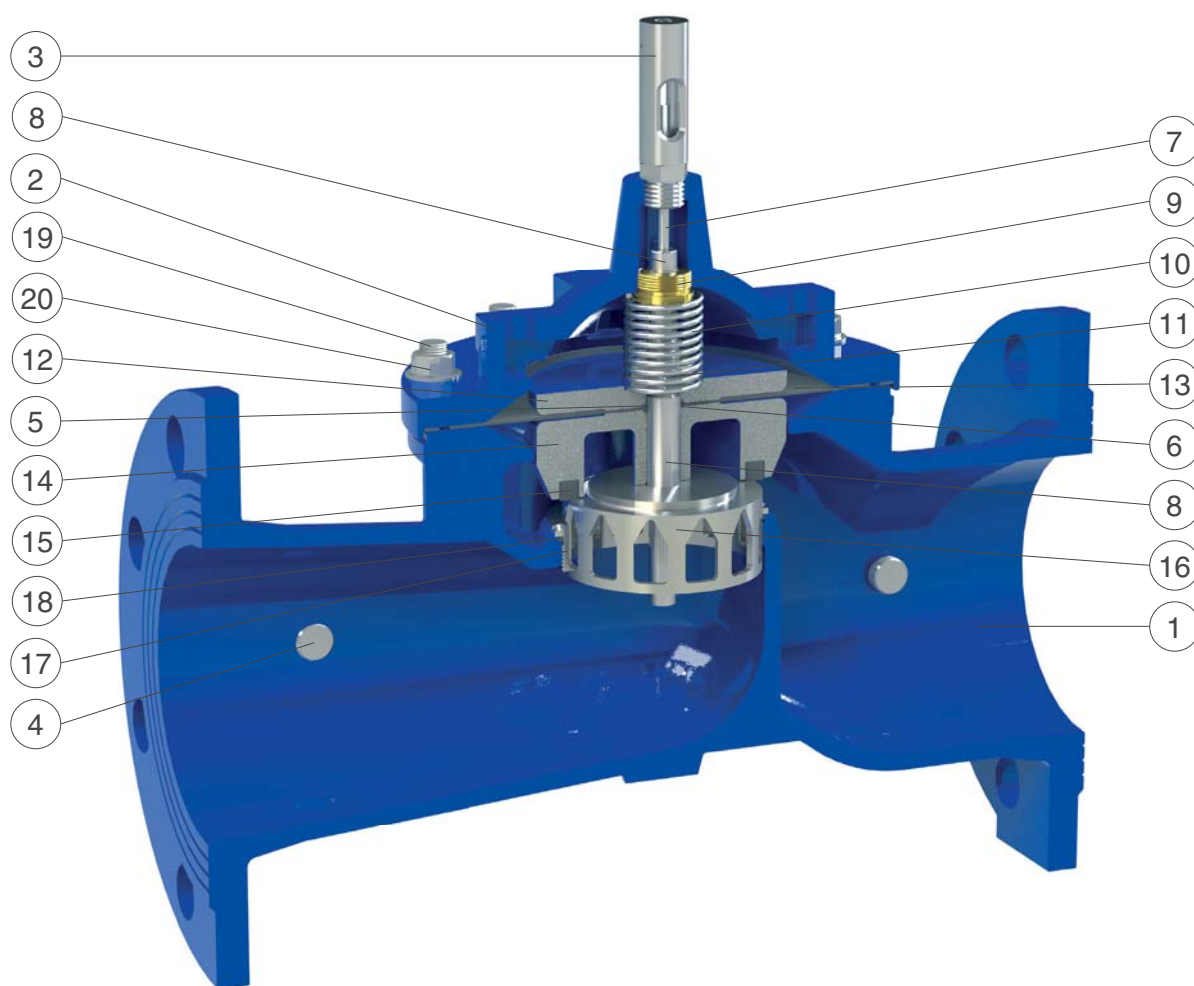
### Recommended flow rate

The following chart shows the recommended flow rate for the proper sizing of XLC 300 control valves.

DN (mm)			80	100	125	150	200	250	300	400	500	600
Flow rate (l/s)	Low head loss (0,1-0,15 bar)	Max.	4,7	10	16	17	36	70	110	153	271	284
		Min.	1,0	2,5	3,9	4,1	8,8	16	25	35	63	63
	Recommended	Max.	11	29	43	45	101	180	274	406	695	728
		Max.	15	38	59	62	132	235	368	530	942	942

All values are approximate, consult CSA service for more details.

## XLC 300 - AC version - Technical details

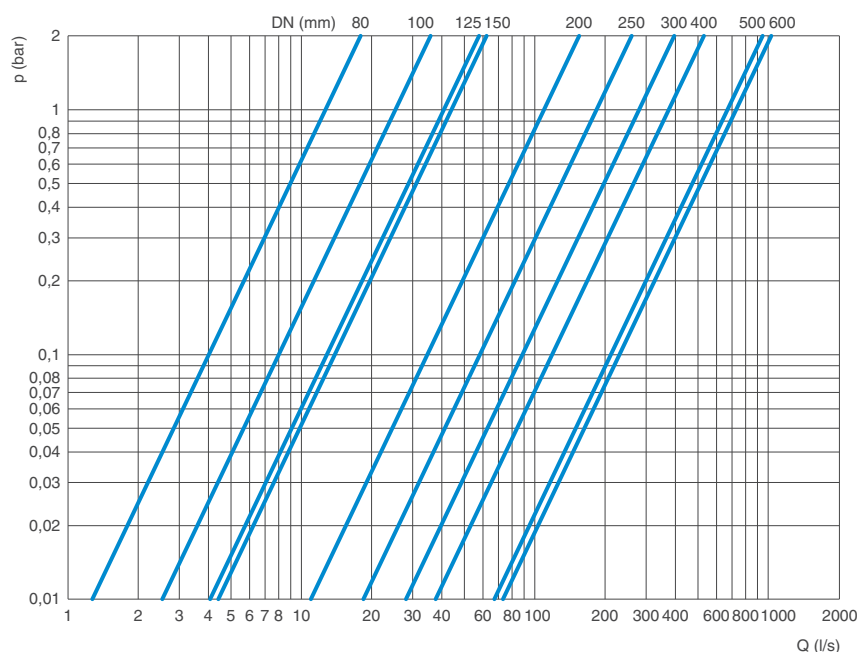
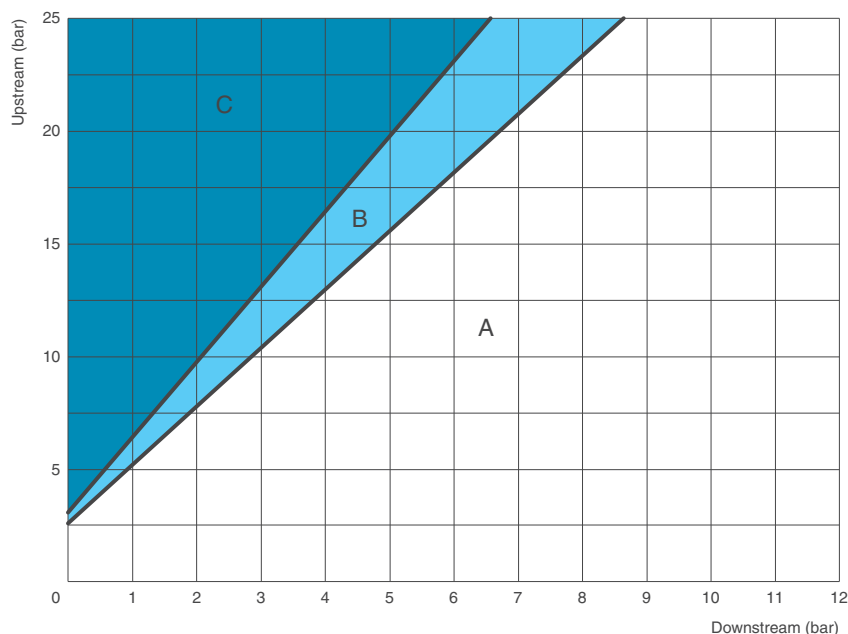


N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Position indicator	s.s. AISI 303 (nickel-plated brass for DN 400)	stainless steel AISI 303
4	Pressure outlet taps	stainless steel AISI 316	
5	Upper flat O-ring	NBR	EPDM/Viton
6	Obturator O-ring	NBR	EPDM/Viton
7	Indicator stem	stainless steel AISI 303	stainless steel AISI 316
8	Main shaft	stainless steel AISI 303	stainless steel AISI 316
9	Guide ring	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
10	Spring	stainless steel AISI 302	
11	Locking nut	stainless steel AISI 304	stainless steel AISI 316
12	Upper flat	painted steel	stainless s. AISI 304/316
13	Diaphragm	polyamide-Nylon	neoprene/EPDM-Nylon
14	Obturator	AISI 303 (DN 80), p. steel, duct. c. iron (from DN 200)	stainless s. AISI 304/316
15	Plane gasket	NBR	
16	V-port	stainless steel AISI 303 (304 from DN 200)	stainless steel AISI 316
17	Seat for system AC	stainless steel AISI 303 (316 from DN 200)	stainless steel AISI 316
18	Seat O-ring	NBR	EPDM/Viton
19	Studs	stainless steel AISI 304	stainless steel AISI 316
20	Nuts and washers	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.

## XLC 300 - AC version - Technical data

DN (mm)	80	100	125	150	200	250	300	400	500	600
Kv (m³/h)	43	93	146	154	377	633	967	1356	2409	2588
Stroke (mm)	15	21	27	27	43	56	70	84	110	110



### Recommended flow rate

The following chart shows the recommended flow rate for the proper sizing of XLC 300-AC control valves.

DN (mm)			80	100	125	150	200	250	300	400	500	600
Flow rate (l/s)	Low head loss (0,1-0,15 bar)	Max.	1,2	2,6	4	4,3	10	17	27	37	67	72
		Min.	0,5	1,4	2,2	2,3	4,9	8,8	14	20	35	35
	Recommended	Max.	8,8	23	33	35	78	142	211	316	542	582
		Max.	12	30	46	48	102	185	283	412	734	753

The technical informations are indicative and can change according to the number and dimension of the slots.

### Head loss coefficient

Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the 3 zones to be identified as follows:

- A: Recommended working conditions;
- B: Noise cavitation;
- C: Damage cavitation.

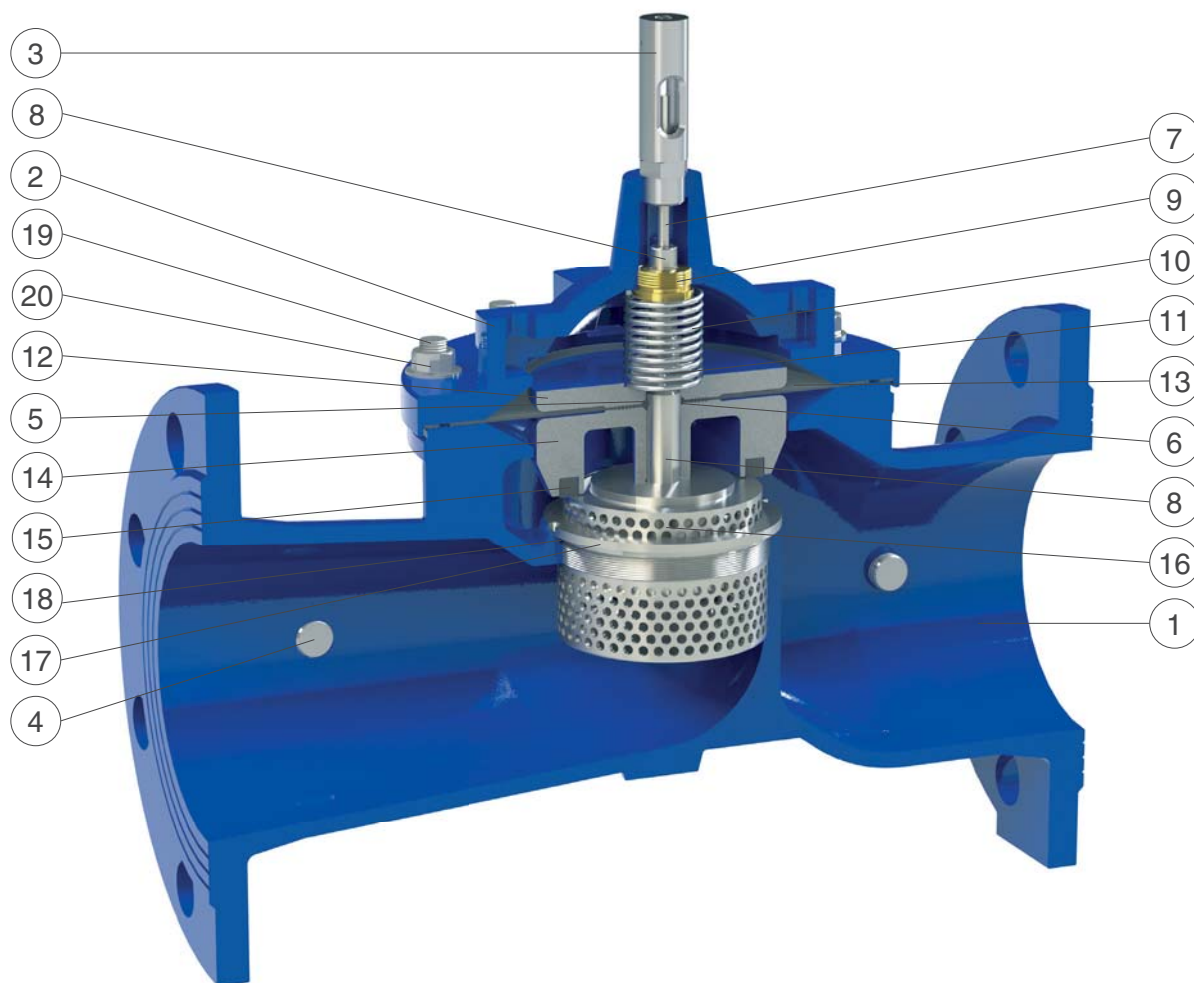
The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.

### Head loss chart

The chart indicates the head loss of XLC 300-AC automatic control valves fully open versus flow rate in l/s.



## XLC 300 - CP anti-cavitation version - Technical details

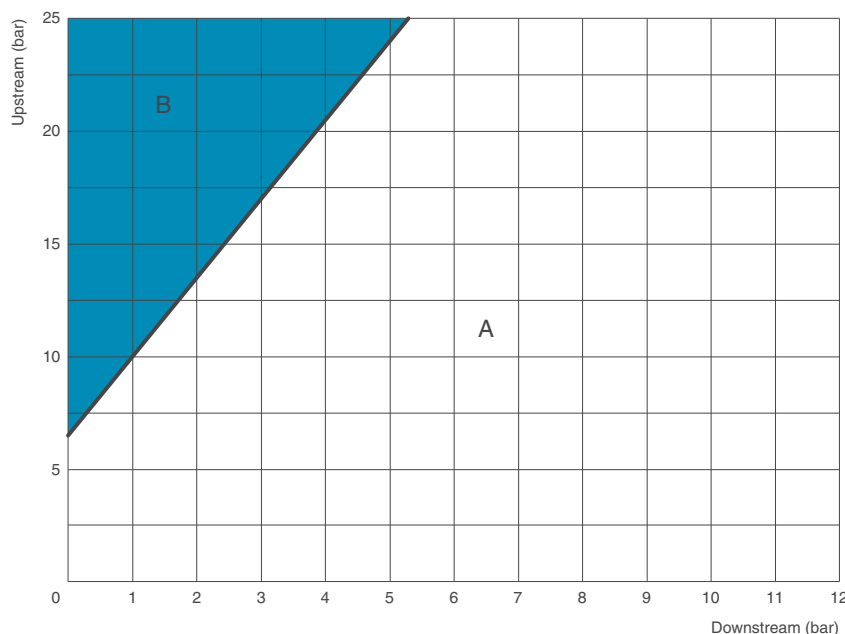


N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Position indicator	s.s. AISI 303 (nickel-plated brass for DN 400)	stainless steel AISI 303
4	Pressure outlet taps	stainless steel AISI 316	
5	Upper flat O-ring	NBR	EPDM/Viton
6	Obturator O-ring	NBR	EPDM/Viton
7	Indicator stem	stainless steel AISI 303	stainless steel AISI 316
8	Main shaft	stainless steel AISI 303	stainless steel AISI 316
9	Guide ring	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
10	Spring	stainless steel AISI 302	
11	Locking nut	stainless steel AISI 304	stainless steel AISI 316
12	Upper flat	painted steel	stainless s. AISI 304/316
13	Diaphragm	polyamide-Nylon	neoprene/EPDM-Nylon
14	Obturator	AISI 303 (DN 80), p. steel, duct. c. iron (from DN 200)	stainless s. AISI 304/316
15	Plane gasket	NBR	
16	Anti-cavitation gasket holder CP	stainless steel AISI 303 (304 from DN 200)	stainless steel AISI 316
17	Seat for anti-cavitation system CP	stainless steel AISI 303 (316 from DN 200)	stainless steel AISI 316
18	Seat O-ring	NBR	EPDM/Viton
19	Studs	stainless steel AISI 304	stainless steel AISI 316
20	Nuts and washers	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.

## XLC 300 - CP anti-cavitation version - Technical data

DN (mm)	80	100	125	150	200	250	300	400	500	600
Kv (m³/h)	24	53	72	89	207	361	565	783	1390	1456
Stroke (mm)	15	21	27	27	43	56	70	84	110	110



### Head loss coefficient

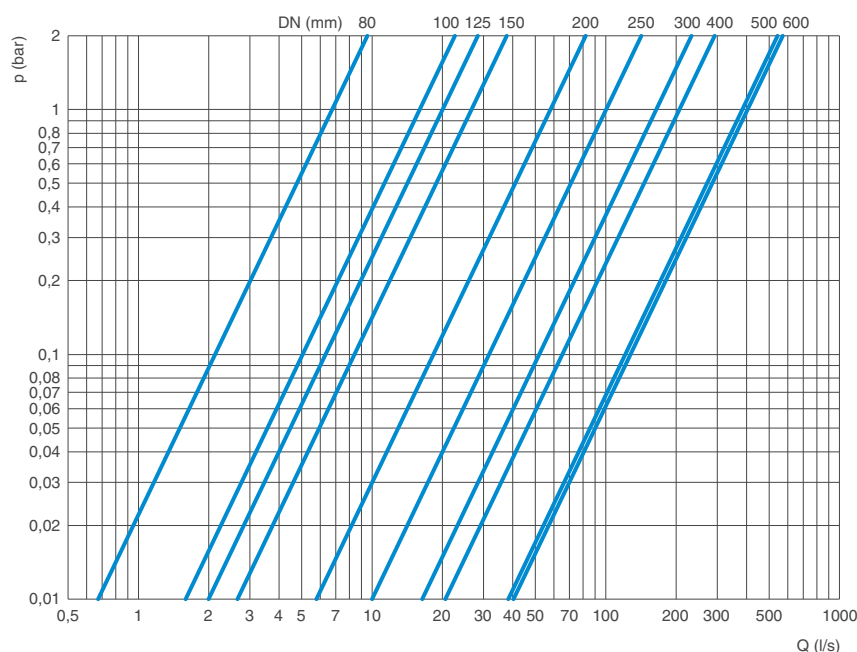
Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the two zones to be identified as follows:

- A: Recommended working conditions;
- B: Damage cavitation.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.



### Head loss chart

The chart indicates the head loss of XLC 300-CP automatic control valves fully open versus flow rate in l/s.

### Recommended flow rate

The following chart shows the recommended flow rate for the proper sizing of XLC 300-CP control valves.

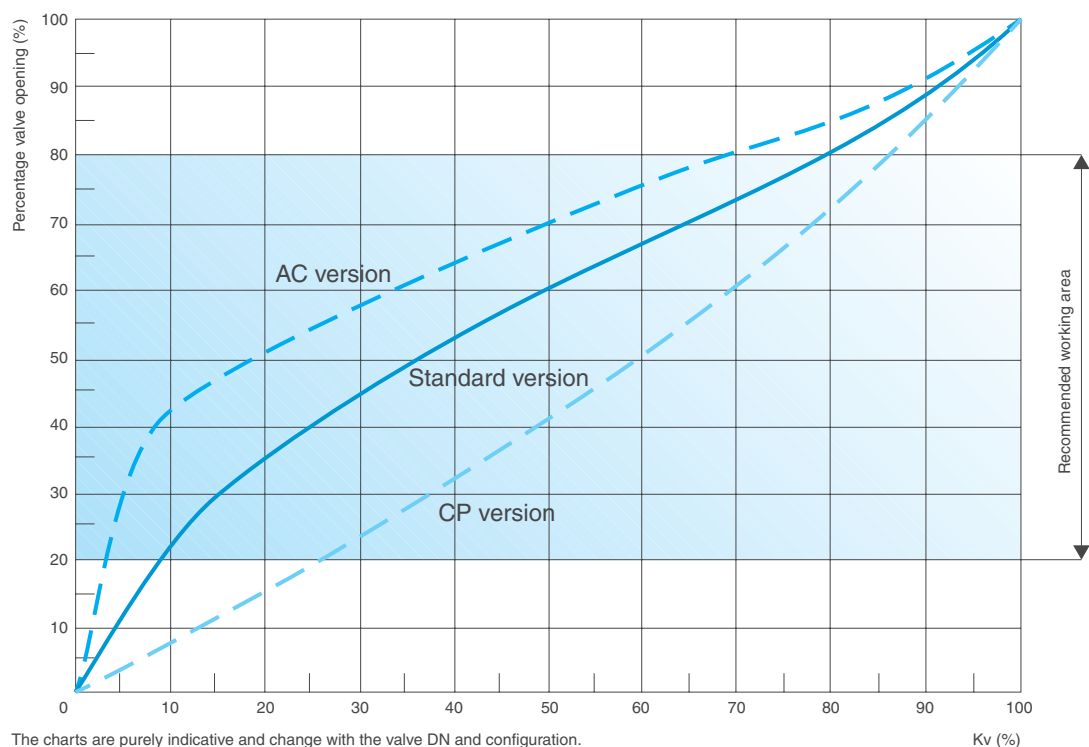
DN (mm)			80	100	125	150	200	250	300	400	500	600
Flow rate (l/s)	Recommended	Min.	0,7	1,0	2,2	2,3	4,1	6,4	9,2	16	26	37
		Max.	5,1	11	16	18	43	75	118	163	289	303
	Pressure relief	Max.	11	25	40	42	98	170	267	370	656	688

The technical informations are indicative and can change according to the number and dimension of the holes.

## XLC 300 - Standard and anti-cavitation versions - Technical data

### Kv to valve opening chart

The following chart shows the opening percentage of XLC 300, XLC 300-AC and XLC 300-CP versus the Kv.



The charts are purely indicative and change with the valve DN and configuration.

Kv (%)

### Working conditions

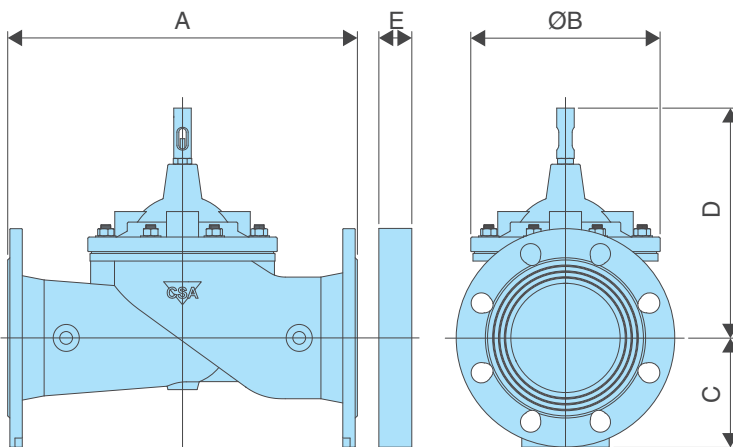
Treated filtered water.  
Maximum temperature: 70°C.  
Minimum pressure on the pilot : 0,5 bar plus head loss.  
Maximum pressure : 25 bar.

### Standard

Certified and tested in compliance with EN 1074/5.  
Pressure rating 25 bar.  
Flanges according to EN 1092/2 (different drilling on request).  
Epoxy painting applied through FBT technology blue RAL 5005.

### Weights and dimensions

DN (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (Kg)
80	310	162	100	245	30	24
100	350	218	118	280	30	34
125	400	260	135	350	30	47
150	480	260	150	350	30	54
200	600	370	180	460	30	97
250	730	444	213	515	40	172
300	850	570	242	605	40	304
400	1100	680	310	745	40	480
500	1250	870	365	945	40	782
600	1450	870	423	970	40	922



The dimension E in the picture above refers only to applications where it is necessary to add a flanged orifice downstream or upstream of the valve, for example for flow control or cavitation prevention.

All values are approximate, consult CSA service for more details.

## XLC 300 - Standard and anti-cavitation versions - Spare parts breakdown



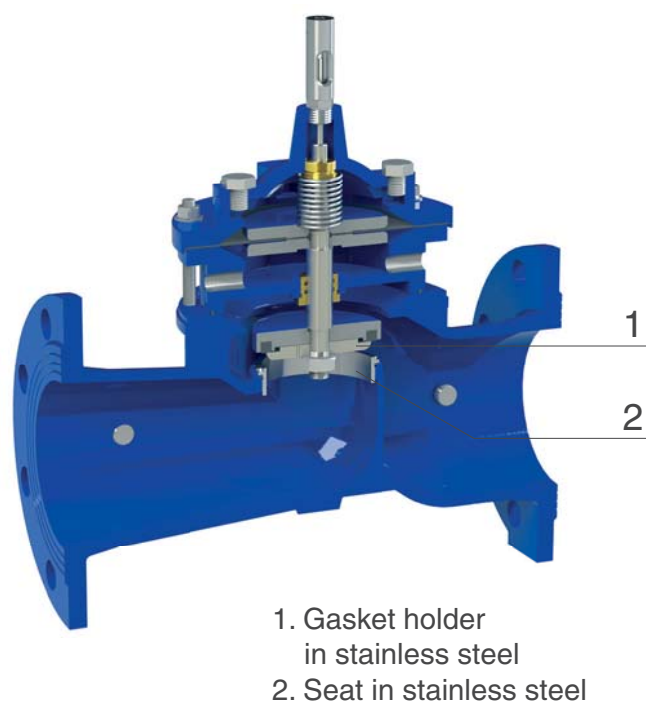
# Double chamber control valves XLC DC series

The CSA XLC double chamber DC series, applicable for the full bore and reduced bore versions, consist of a globe pattern hydraulically operated automatic control valve. The intermediate chamber, in communication with the atmosphere or pressurized, separates the upper cover from the lower part with a diaphragm PN 25 bar class. The valve works with lower differential pressure with a faster response, both aspects extremely useful in special applications like pump control and proportional downstream pressure reduction. Low flow stability and anti-cavitation cages are available on request prior to sizing.



## Technical features

### Standard version of mobile block and sealing seat



### AC version for low flow stability and cavitation prevention



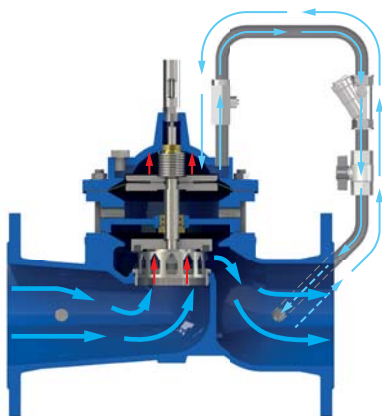
### CP double cage anti-cavitation version



The standard gasket holder guarantees the maximum accuracy also for low flow and small opening. The shaft of the mobile block is guided in two points, through the cover and the guide on the intermediate chamber, moving frictionless during modulation. The anti-cavitation trim AC mobile block includes a gasket holder designed to increase the allowable pressure ratio and resistance to cavitation, improving at the same time the valve's stability to guarantee the maximum accuracy also in case of no flow. The CP system includes two cages for double energy dissipation between inlet and outlet, obtained by the gasket holder and seat moving one inside the other, whose holes can be customized according to the project in hand and required performances, this is to avoid damages to the valve without a drastic reduction of the valve's Kv.

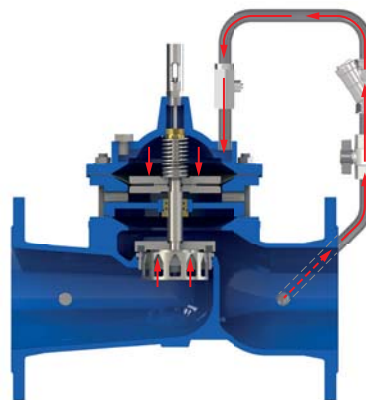


## Operating principle modulating mode - proportional pressure reduction



### Valve modulating

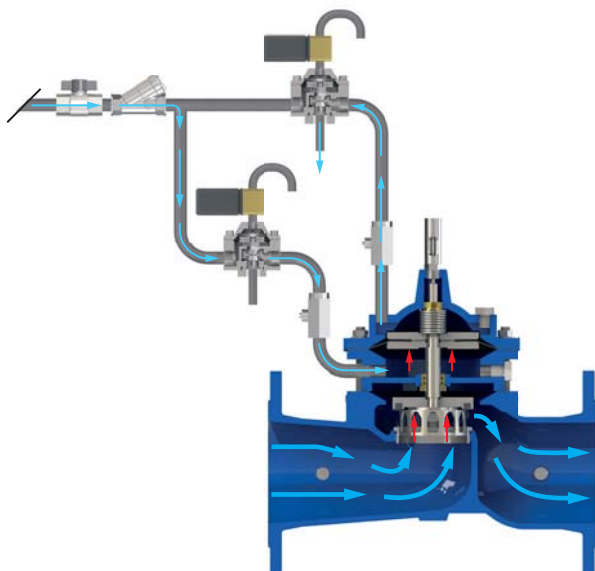
Due to the difference in surface between the upper flat of the control chamber and the obturator, the double chamber valve will keep modulating in case of water supply. That allows the regulation of the downstream value based on fixed ratio between inlet outlet, with the mobile block opening percentage changing according to the upstream pressure variations. The pressure ratio can be modified on request.



### Valve closed in static conditions

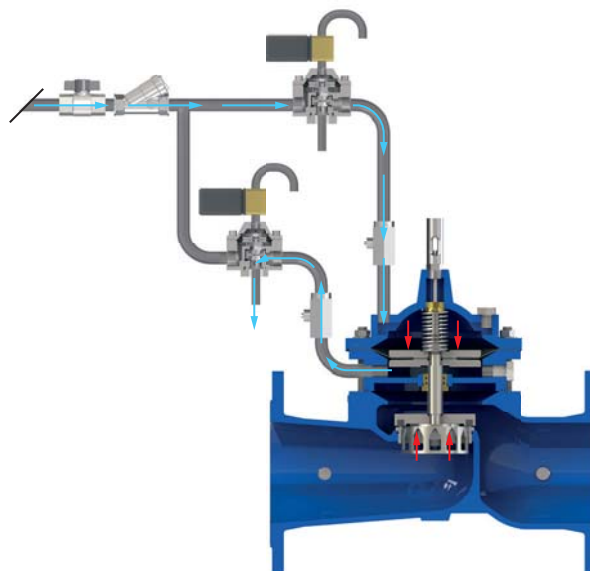
In case of static condition the downstream pressure is entirely applied on the upper control chamber through the hydraulic circuit (equipped with strainer and needle valve). That generates to different forces whose values are proportional to the surfaces, in particular the area of the diaphragm flat being wider than the one of the obturator causes a higher value pushing downwards with a drip tight closure of the valve.

## Operating principle on-off mode - remote control



### Valve opening

The intermediate and upper chambers can be put in communication with the pressure source to allow for the on-off mode. In particular the picture shows the application with solenoid valves applied on CSA 3 ways hydraulic relays, should the intermediate chamber be pressurized the force will act on the entire surface of the diaphragm flat causing the full opening of the valve.



### Valve closing

Should the pressure be applied on the upper chamber, while the intermediate is discharged through the hydraulic relay, the valve obturator will be pushed down causing the closure of the valve. The needle valves are present on the communication circuits for both chambers and needed for the regulation to avoid unwanted pressure surges.



## Double chamber proportional pressure reducing valve **XLC 300/400-DC-PR**

The CSA double chamber proportional pressure reducing valve is a globe pattern hydraulically operated automatic control valve that, installed in-line, will reduce and stabilize the upstream pressure to a lower downstream value according to a fixed ratio. Equipped with double chamber technology the valve is extremely reactive, increasing the safety and reliability of the line. Produced in compliance with PN 16/25 bar pressure standards and entirely made in ductile cast iron FBT epoxy painted and stainless steel, the valve is provided with anti-cavitation low flow stability system.

### Applications

- To perform a double pressure reduction stage in combination with other CSA reducing control valves.
- The valve is used on the inlet supply line of storage tanks to stabilize pressure upstream of CSA valves for level control either mechanical or pilot operated.
- On gravity fed supply lines and long downhill slopes to dissipate high differences in elevation, with multiple installations.

### Accessories

- Pressure measurement kit.
- Self-flushing and high capacity filter.
- Mechanical flow limiter.
- Double cage CP for high differential pressures and reduced noise.

### Note to the engineer

- Inlet and outlet pressure, and flow rate are required for the proper sizing.
- A minimum length of 3 DN downstream of the valve is recommended for the best accuracy.
- The downstream pressure will change depending on the inlet pressure and following a fixed ratio.

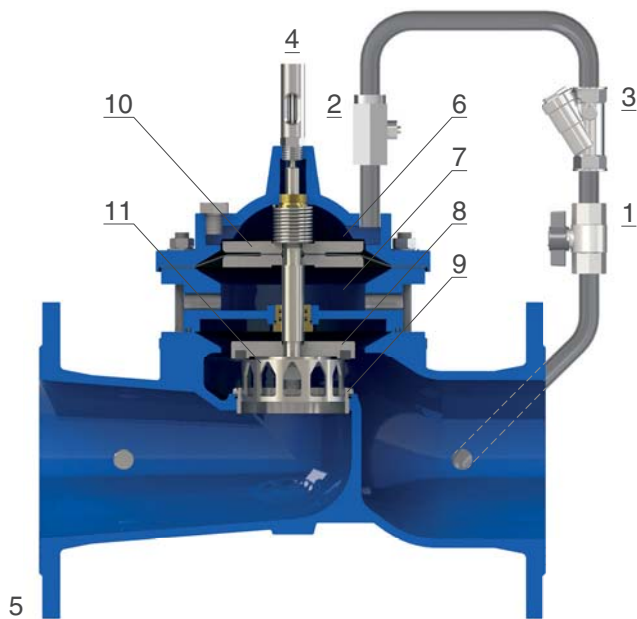
### Additional features

- XLC 300/400-DC-PR-FR double chamber proportional pressure reducing valve with back-flow prevention.
- XLC 300/400-DC-PR-5 double chamber proportional pressure reducing valve with solenoid control.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 25 bar.
- Maximum temperature: 70°C.

## Operating principle



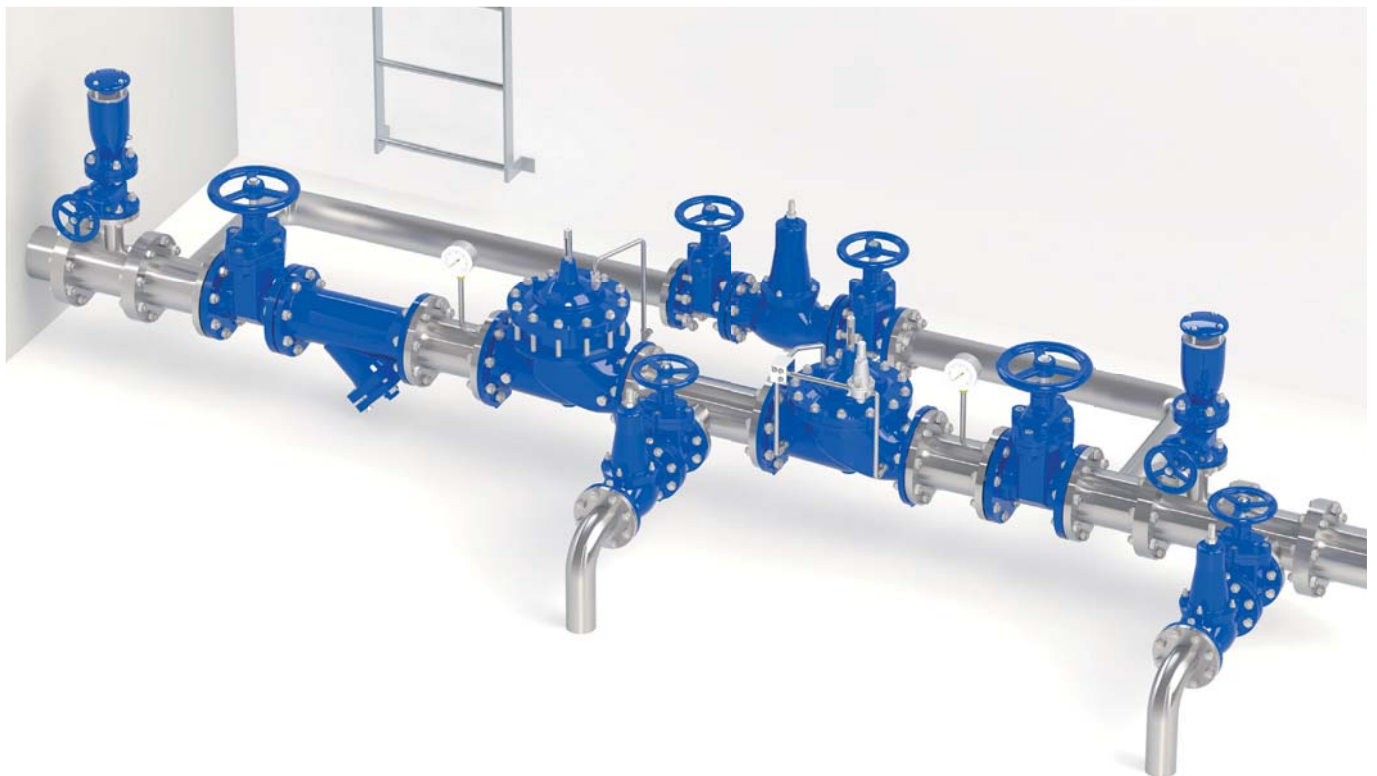
The CSA Model XLC 300/400-DC-PR is an automatic control valve with double chamber technology, operated by means of the downstream pressure force (1) acting on the upper part of the control chamber (6) that separates the lower part with fluid flow from the intermediate chamber (7), in communication with the atmosphere. Due to the difference between the areas of the seal disks of the upper chamber (10) and the obturator (8), the valve will reduce the upstream pressure following a fixed ratio even in static conditions. This is due to the net force resulting from the downstream pressure acting on two difference surfaces.

The AC system (11) the valve is equipped with, allows for low flow stability and a higher resistance to cavitation compared with the standard design.

The flow in and out of the upper control chamber is regulated by the CSA high sensitivity needle valve (2) in stainless steel, needed to regulate the response time of the valve and to guarantee accuracy also in case of rapid variation in demand.

## Installation layout

The installation lay-out of the XLC 300/400-DC-PR, in combination with a downstream pilot operated pressure stabilizing control valve XLC 310/410, includes sectioning devices and by-pass for maintenance operations along with a filter to prevent dirt from reaching the control valves. Anti-surge combination air valves FOX 3F AS are recommended upstream and downstream of the installation, as well as direct acting pressure relief models VSM between the two pressure reducing units and further downstream.





## Deep well pump control valve Mod. XLC 390-DC-DW and XLC 490-DC-DW

The CSA double chamber deep well control valve is a globe pattern hydraulically and electronically operated diaphragm automatic control valve, that prevents water hammer events in deep well applications by allowing a pump flow circulation. The valve opens and shuts off in response to electric signals generated during the pump starting and stopping operations. Produced with PN 25 bar pressure class body and entirely made in ductile cast iron FBT epoxy painted and stainless steel, the valve is designed to work with low differential pressure values, reduce head loss, throttling noise and cavitation damage.

### Applications

- Downstream of deep well pumps to avoid pressure surges.

### Additional features

- XLC 392/492-DC-DW deep well pump control with pressure sustaining function.

### Accessories

- Pressure measurement kit.
- Self-flushing and high capacity filter.

### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 16 bar. Higher on request.
- Maximum temperature: 70°C.

### Note to the engineer

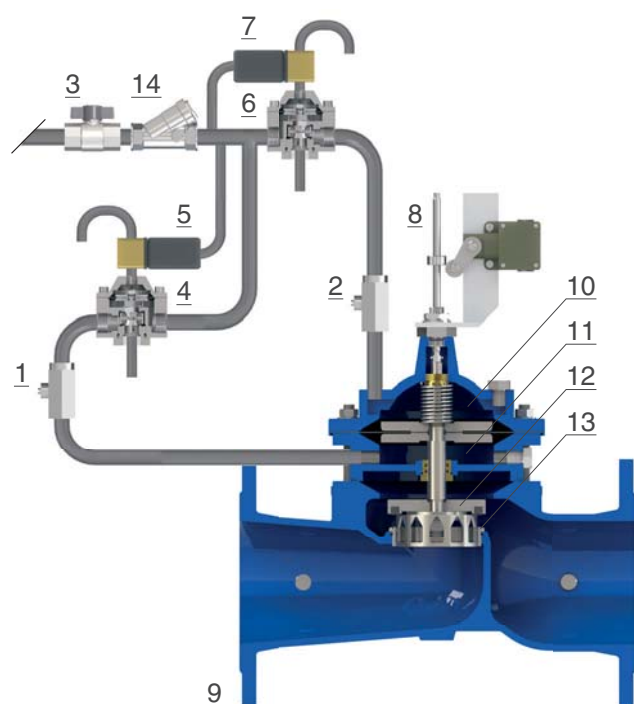
- For the proper sizing check the pump flow when and the static pressure value acting on the valve. When the pump is running at full flow the combined head losses of the control valve, piping and discharge line should not exceed 85% of the static pressure.

### Solenoid electrical data

- Voltages: 24 V DC, 24 V/50 Hz, 230 V/50 Hz. Other voltages on request.
- Power consumption: inrush AC (VA) 24, hold AC (VA) 17 (8 W), DC hot/cold coil 8/9 W.



## Operating principle

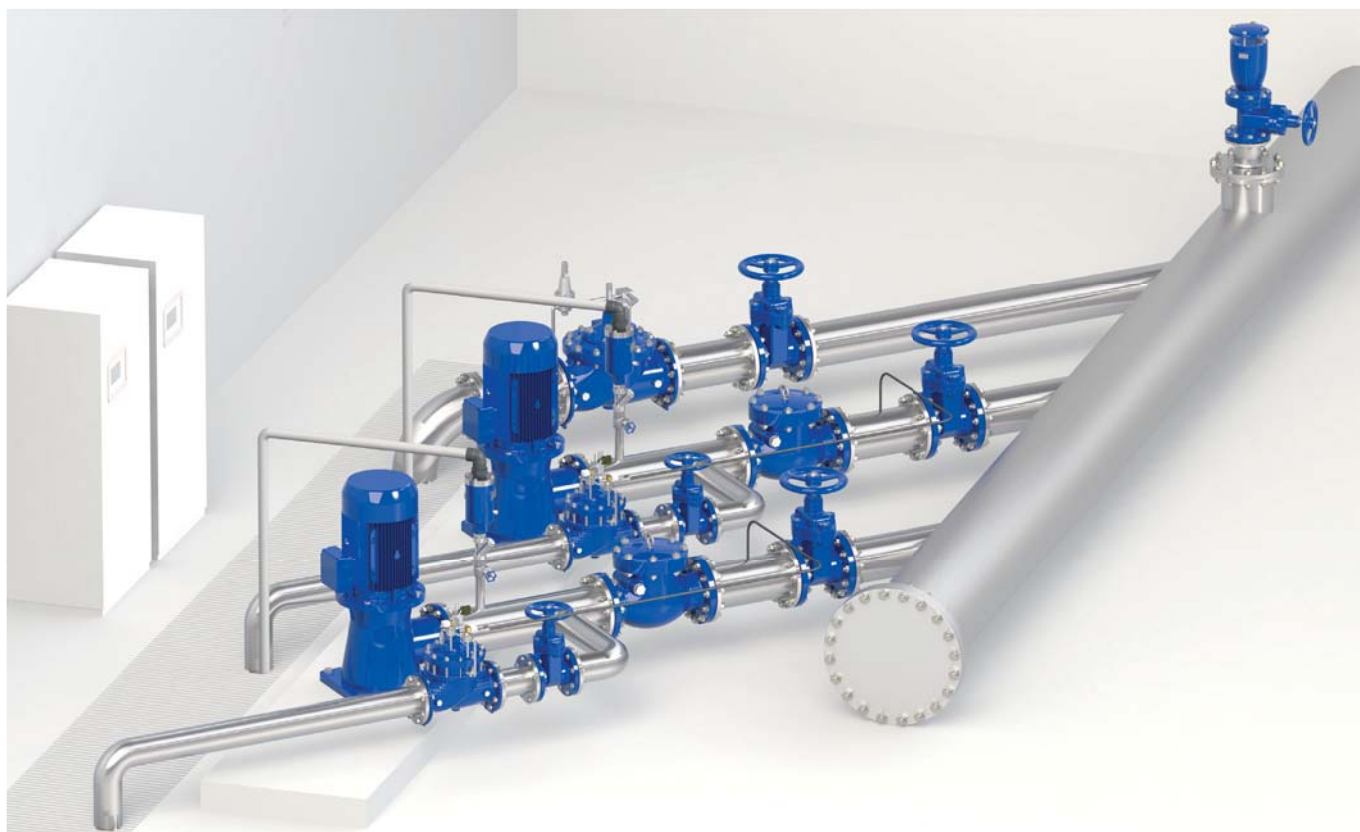


The CSA model XLC 390/490-DC-DW is a double chamber automatic control valve operated by a 2 hydraulic circuits supplied by filtered pressure sensed (14) downstream of the check valve on the main line. The first going to the intermediate chamber through a two ways hydraulic relay (4), the second going to the upper control chamber acting on another two ways relay (6). The three ways solenoid valves (5) and (7) keep the relays normally closed in absence of impulses. Prior to the pump start up a signal is sent to the solenoid (5) in order to open the control valve, with the needle valve (1) controlling the opening rate. The limit switch will provide confirmation of the full opening of the valve while the pressure is gradually transferred to the main line. Impulses are now being sent to the solenoid (7) to pressurize the upper chamber, also in this case a second needle valve (2) will allow for the closing speed control.

Prior to pump shut off the valve is open with the same procedure to divert flow to the discharge line and allowing for absence of unwanted surges.

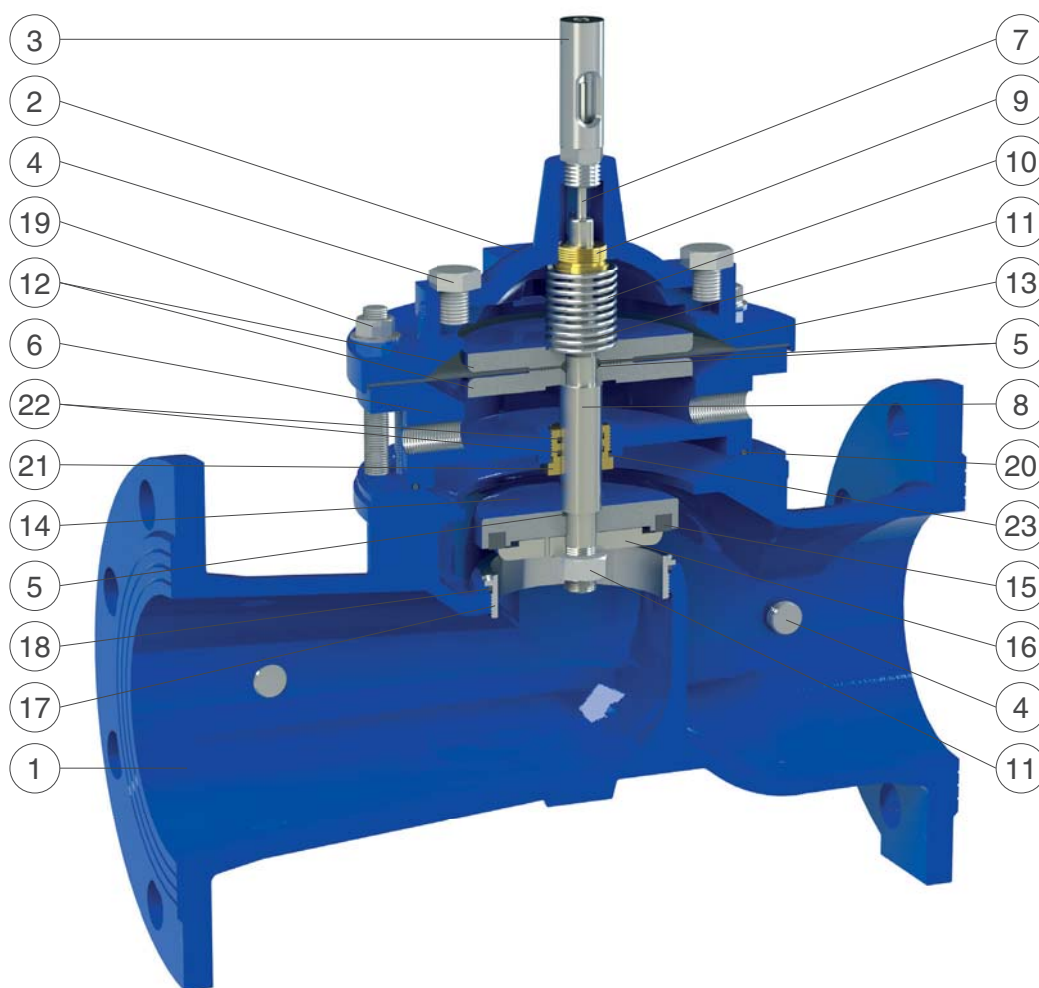
## Installation layout

The valve must be installed in derivation from the line discharging at first air, water and sand once the pump is started, and connected with a pressure port downstream the check valve. The recommended installation layout includes sectioning devices for maintenance operations, anti-surge combination air valves FOX 3F AS on the manifold to prevent negative pressure conditions during power failure along with CSA XLC 321/421 surge anticipating control valve, to avoid further pressure surges.





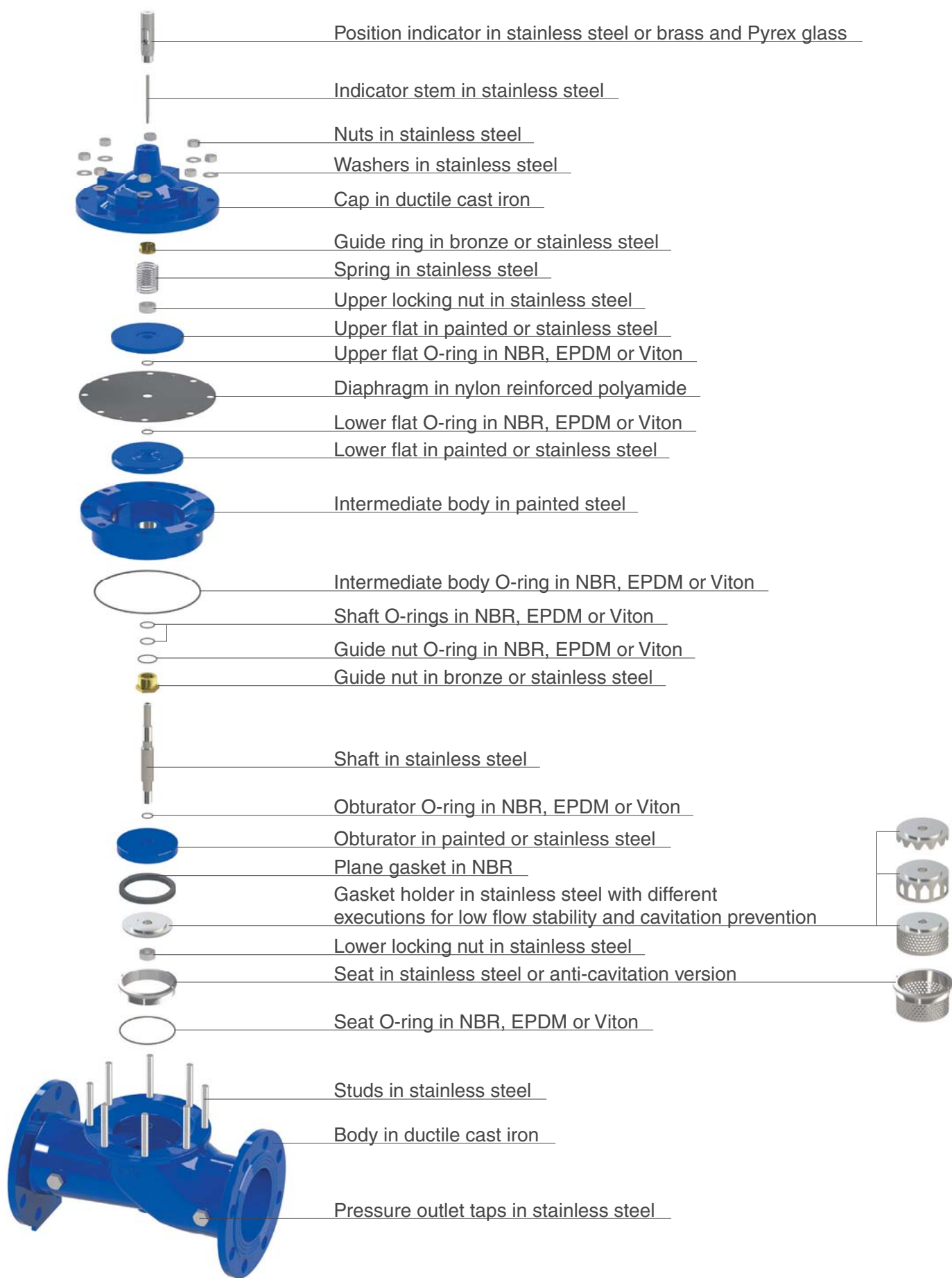
## XLC DC - Standard version - Technical details



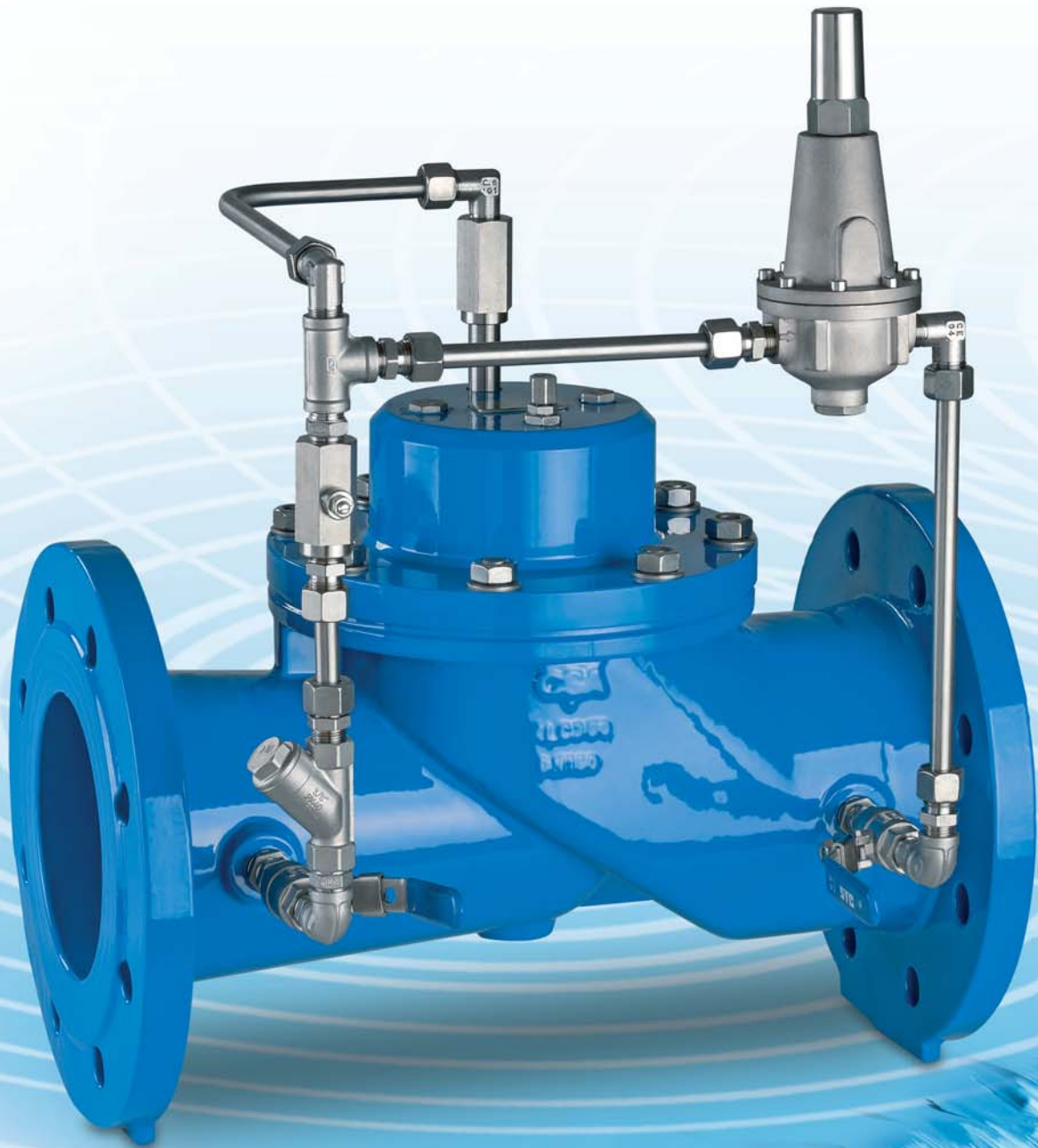
N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Position indicator	s.s. AISI 303 (nickel-plated brass from DN 300)	stainless steel AISI 303
4	Pressure outlet taps	stainless steel AISI 316	
5	O-rings	NBR	EPDM/Viton
6	Intermediate body	painted steel	cast iron GJS 450-10
7	Indicator stem	stainless steel AISI 303	stainless steel AISI 316
8	Main shaft	stainless steel AISI 303	stainless steel AISI 316
9	Guide ring	bronze CuSn5Zn5Pb5	stainless s. AISI 303/316
10	Spring	stainless steel AISI 302	
11	Upper and lower locking nuts	stainless steel AISI 304	stainless steel AISI 316
12	Upper and lower flats	painted steel	stainless s. AISI 304/316
13	Diaphragm	polyamide-Nylon	neoprene/EPDM-Nylon
14	Obturator	painted steel	stainless s. AISI 304/316
15	Plane gasket	NBR	
16	Gasket holder	stainless steel AISI 303 (304 from DN 150)	stainless steel AISI 316
17	Seat	stainless steel AISI 303 (316 from DN 150)	stainless steel AISI 316
18	Seat O-ring	NBR	EPDM/Viton
19	Studs, nuts and washers	stainless steel AISI 304	stainless steel AISI 316
20	Intermediate body O-ring	NBR	EPDM/Viton
21	Guide screw	bronze CuSn5Zn5Pb5	stainless s. AISI 303/316
22	O-rings	NBR	EPDM/Viton
23	O-ring	NBR	EPDM/Viton

The list of materials and components is subject to changes without notice.

## XLC DC - Standard and anti-cavitation versions - Spare parts breakdown



For the technical data and hydraulic performances of XLC DC make reference to the pages about XLC 400 and 300.





# Automatic control valves XLC 500 and 600 series

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## Main configurations:

■ Downstream pressure reducing stabilizing automatic control valve Mod. XLC 510 and 610	224
■ Upstream pressure sustaining automatic valve Mod. XLC 520-S and 620-S	226

## Technical and sizing:

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## Automatic control valves XLC 500 and 600 series

The CSA XLC range consist of a globe pattern hydraulically operated automatic control valves, namely 600 for the full bore and 500 for the reduced bore series, entirely produced in ductile cast iron and steel with internal components in stainless steel.

Piston actuated PN 40 class, the valve is designed to perform mainly pressure reduction and sustain. Each function is obtained simply by changing the circuitry and pilots, that can be combined together if needed.

All information herewith contained referring to operating principle, case studies and installation, are applicable to the XLC 500 and 600 series unless otherwise stated.



### Technical features and benefits

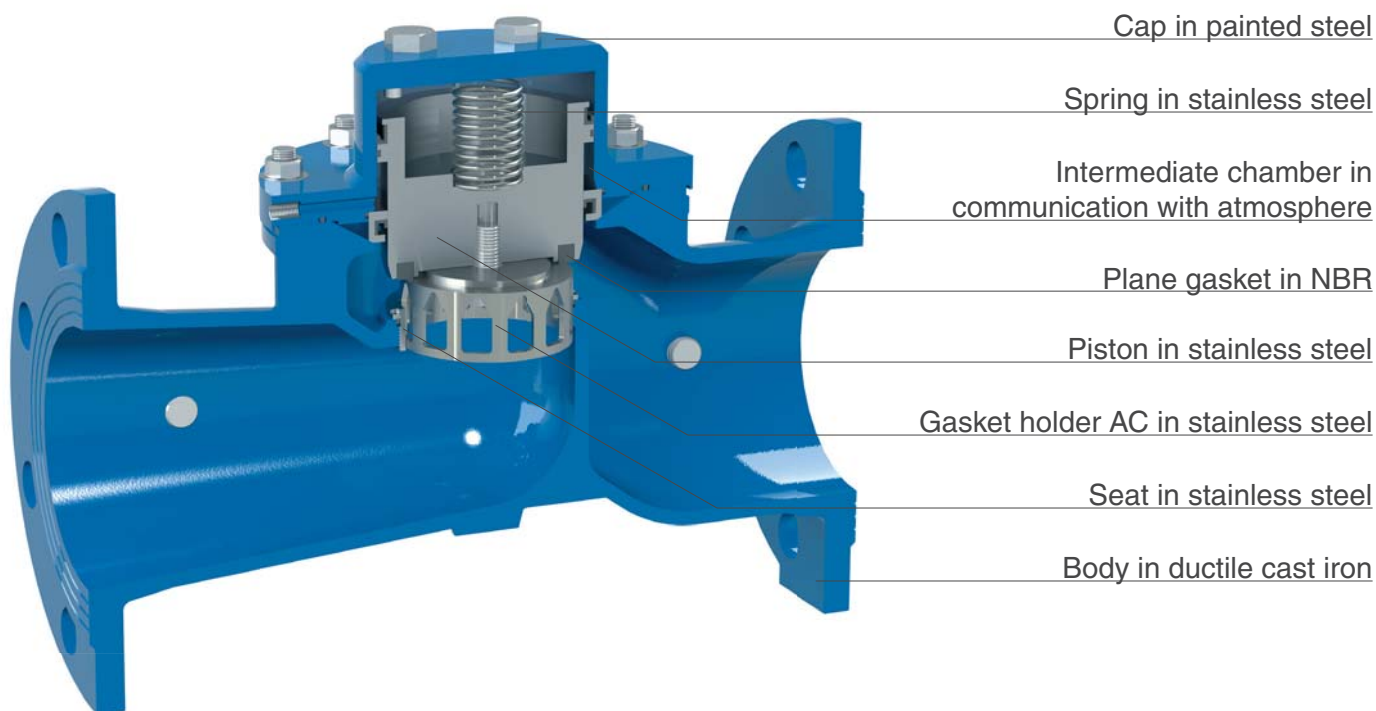
- Body in ductile cast iron, PN 40 bar rated, globe pattern design in compliance with EN 1074 standards and available from DN 50 mm up to DN 200 mm.
- Designed to reduced head loss and minimize turbulence under a wide flow range.
- Throttling plug to ensure stability at low flow.
- Silent operation and absence of vibrations, suitable for buildings and urban applications.
- Excellent resistance to cavitation, thanks to the large expansion chamber and to CSA solutions for flow regulation either AC, designed for stability also in case of low flow conditions, and the CP for extreme pressure ratio thanks to a double step through customised cages sliding one into the other.
- In-line serviceable from the top without having to remove the valve from the pipe.
- High quality materials which guarantee reliability for long lasting performances with internals all made in stainless steel.

### Applications

- High pressure main transmission lines.
- Industrial plants.
- Cooling system.
- Long downhill segments with high elevated terrain.



## Technical features



### AC version for low flow stability and cavitation prevention



1. Low flow stability gasket holder for cavitation prevention
2. Obstacle free seat

### CP anti-cavitation version



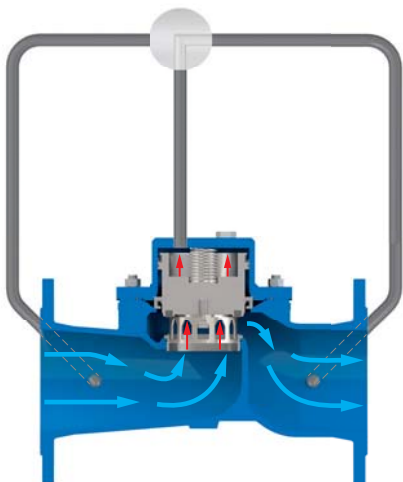
1. Anti-cavitation gasket holder
2. Anti-cavitation seat in stainless steel

The anti-cavitation trim AC mobile block includes a gasket holder designed to increase the allowable pressure ratio and resistance to cavitation, improving at the same time the valve's stability to guarantee the maximum accuracy also in case of no flow.

The intermediate chamber, in communication with atmosphere and located between the upper and lower part of the piston, ensures a smooth and fine regulation.

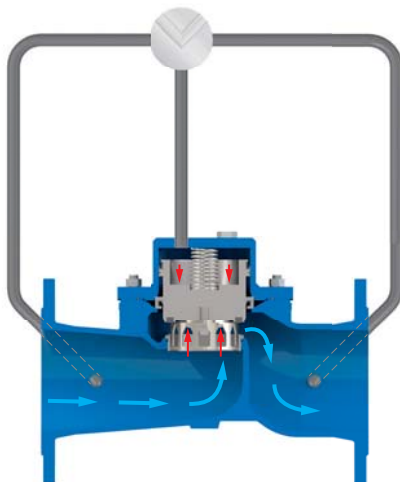
The CP system includes two cages for double energy dissipation between inlet and outlet, whose holes can be customized according to the project in hand and required performances, this is to avoid damages to the valve without a drastic reduction of the valve's Kv.

## Operating principle on-off mode



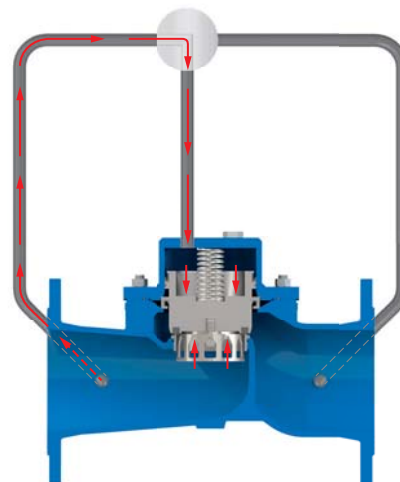
### Valve opening

If the pressure inside the control chamber is put in communication with the atmosphere or a lower pressure zone, the upstream pressure will act on the lower part of the piston, pushing it upwards allowing the complete opening of the valve.



### Valve isolated from the line

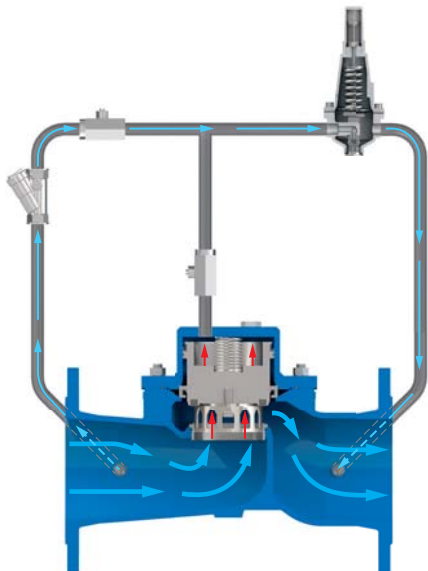
Should the control chamber be isolated from the line pressure and the rest of the circuitry, the valve will remain in the same position, therefore producing the head loss corresponding to such opening percentage.



### Valve closing

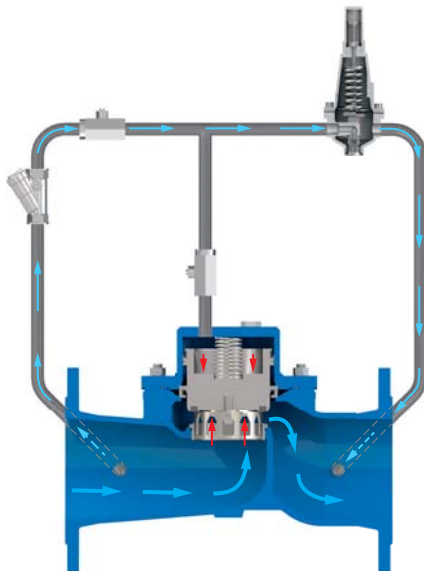
If the control chamber is put in communication with the upstream pressure, thanks to the difference in area between the piston and the seat, the valve will close completely.

## Operating principle modulating mode - example of pressure reduction



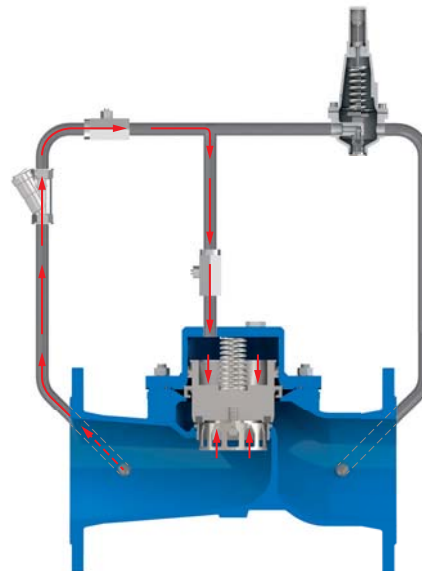
### Valve opening

Should the downstream pressure drop below the pilot's preset and adjustable set point the latter will open, allowing flow and pressure to be relieved out of the main chamber. The mobile block will be lifted to increase the passage between the piston and the seat, trying to re-establish the desired downstream pressure value.



### Valve modulating

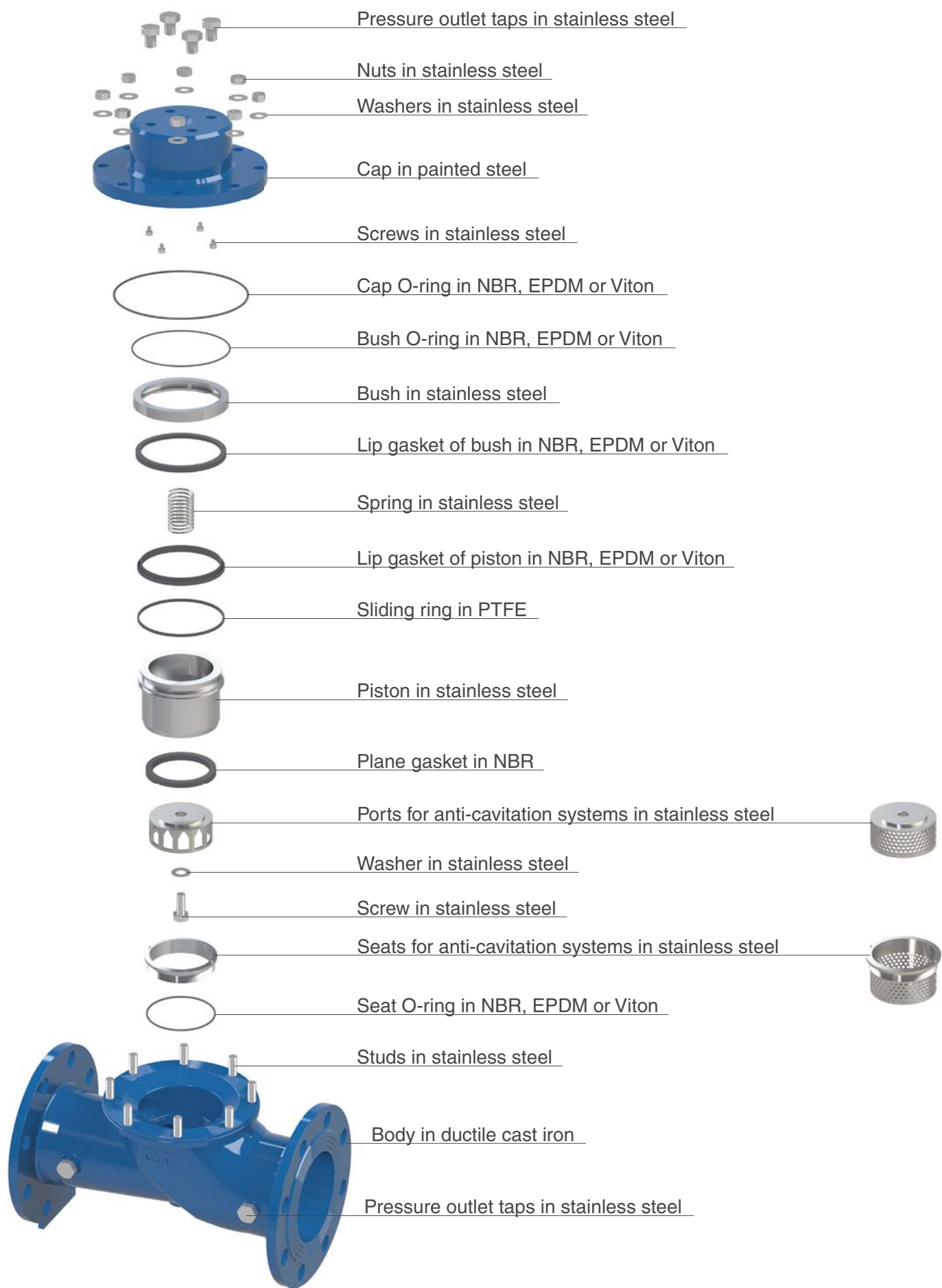
As a consequence of gradual change in demands the pilot will keep regulating the flow in and out of the main chamber, to compensate for pressure variations. The mobile block reproduces the pilot's movement, throttling the passage between the seat and piston in order to generate the head-loss required for the pressure reduction.



### Valve closing

Should the downstream pressure rise above the pilot's set point the latter will close, allowing for pressure build up inside the main chamber. The mobile block will be pushed down trying to re-establish the desired downstream value. In static conditions pilot will be fully closed, with the valve maintaining the desired downstream pressure.

## XLC 500 and 600 - AC and CP versions - Spare parts breakdown





## Downstream pressure reducing stabilizing automatic control valve Mod. XLC 510 and 610

The CSA model XLC 510 and 610 series is a globe pattern piston operated automatic control valve, that reduces and stabilizes the downstream pressure to a constant value, regardless of variation in demands and upstream pressure conditions. Produced in compliance with PN 40 bar pressure standards and entirely made in ductile cast iron FBT epoxy painted and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage. The valve is normally equipped with anti cavitation low flow stability system AC, the double cage CP on request.

### Applications

- Downstream of pumps to reduce the pressure on the main supply line.
- In derivation from the main line to stabilize the pressure of secondary line.
- As a protection against rise in pressure of industrial equipment and civil installations.
- On the inlet supply line of storage tanks in case of high static values to stabilize pressure and flow for the level control.

### Accessories

- Pressure measurement kit.

### Note to the engineer

- Inlet and outlet pressure, and flow rate are required for the proper sizing.
- CP double stage pressure reduction trim is recommended to provide a higher resistance to cavitation, and accurate regulation in case of low flow.
- A minimum length of 3 DN upstream of the valve is recommended for the best accuracy.

### Additional features

- XLC 510/610-FR downstream pressure reducing with back-flow prevention.
- XLC 510/610-H downstream pressure reducing with high sensitivity pilot.

### Working conditions

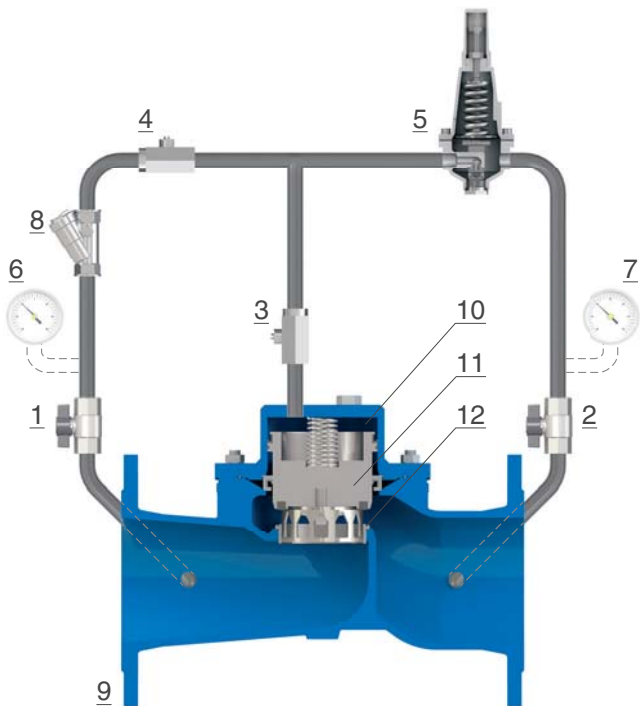
- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 40 bar.
- Maximum temperature: 70°C.

### Downstream pressure pilot adjustment range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.
- Higher values up to 25 bar on request.
- Values lower than 0,7 available with high sensitivity pilots.



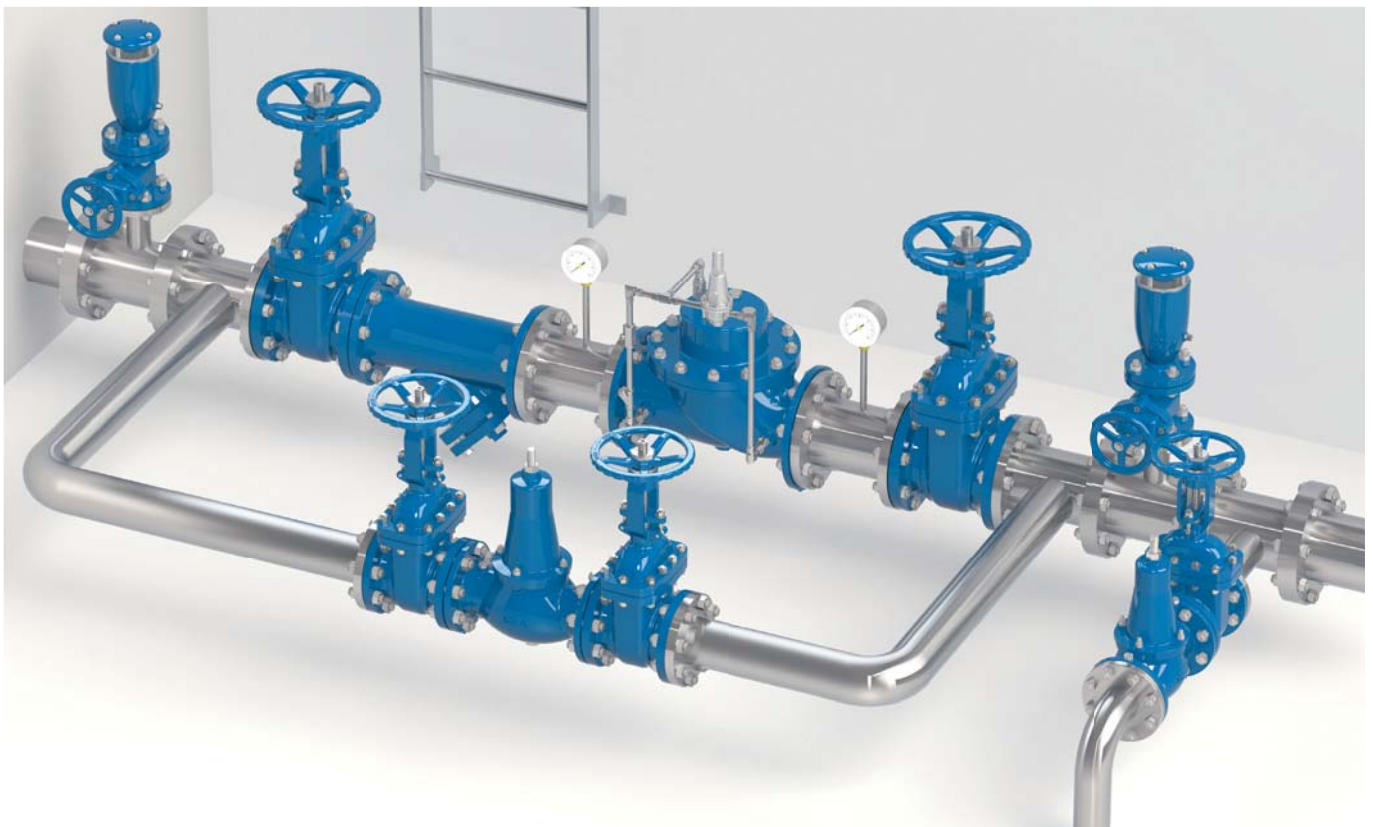
## Operating principle



The CSA model XLC 510/610 is an automatic control valve operated by a 2 ways pilot (5) with pre-set set and adjustable value. Should the downstream pressure rise above the pilot set point the latter will throttle and limit the flow to direct inlet pressure to the main chamber (10), thus pushing down the piston (11) to generate the head loss required for the valve (9) to reduce and stabilize the downstream pressure to a constant value. Should the downstream pressure fall below the pilot set point the piston (11) moves up increasing the passage through the seat (12), thus reducing the head loss through the valve. The flow in and out of the main chamber (10) is controlled by the CSA high sensitivity needle valve in stainless steel (3), needed for the valve's response time and accuracy also in case of rapid variation in demand. Thanks to isolation ball valves and a needle valve on the chamber (1, 2 and 3) the circuit and its components can be maintained without interrupting the flow.

## Installation layout

The recommended XLC 510/610 installation layout includes sectioning devices and by-pass for maintenance operations, and a strainer to prevent dirt from reaching the control valve. The direct acting pressure reducer VRCD is the best choice on the by-pass thanks to its reliability also after long periods of inactivity. Anti-surge combination air valves FOX 3F AS are recommended upstream and downstream as well as a pressure relief valve CSA VSM installed in derivation from the line to prevent rise in pressure.







## Upstream pressure sustaining automatic valve Mod. XLC 520-S and 620-S

The CSA Model XLC 520-S and 620-S series is a globe pattern hydraulically operated automatic control valve that, installed in-line, will sustain the upstream pressure to a pre-set and adjustable value regardless of variations in demand. Produced in compliance with PN 40 bar pressure standards and entirely made in ductile cast iron FBT epoxy painted and stainless steel, the valve is designed to reduce head loss, throttling noise and cavitation damage. The valve is normally equipped with anti cavitation low flow stability system AC, the double cage CP on request.

### Applications

- Downstream of pumps to prevent overload and for cavitation protection.
- On the inlet supply line of storage tanks to stabilize pressure and flow required for the level control.
- On gravity fed supply lines with high static values to ensure the minimum pressure to consumers at higher elevation zones, in case of high consumption of the lower zones.

### Accessories

- Pressure measurement kit.

### Note to the engineer

- Inlet and outlet pressure, and flow rate are required for the proper sizing.
- CP double stage pressure reduction trim is recommended to provide a higher resistance to cavitation, and accurate regulation in case of low flow.
- A minimum length of 3 DN upstream of the valve is recommended for the best accuracy.

### Additional features

- XLC 520/620-S-FR pressure sustaining valve with back-flow prevention.
- XLC 520/620-S-H pressure sustaining valve with high sensitivity pilot.

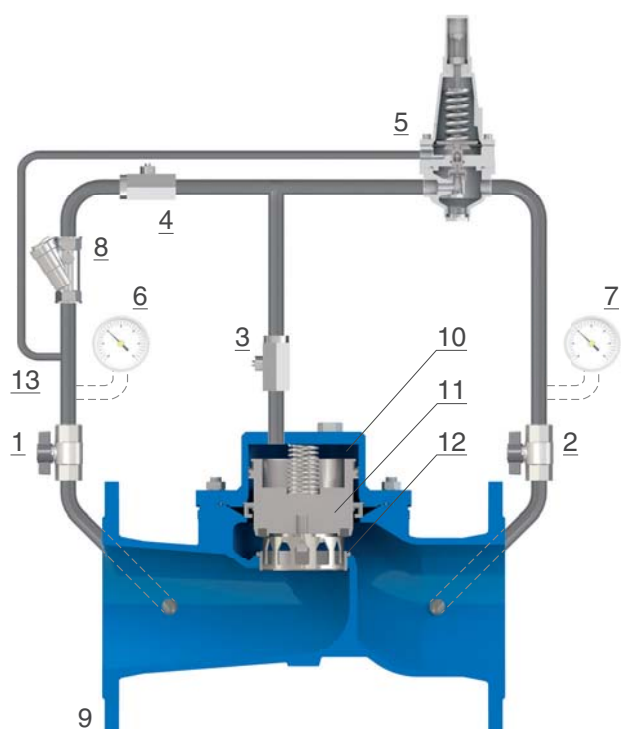
### Working conditions

- Fluid: treated water.
- Minimum operating pressure: 0,7 bar.
- Maximum operating pressure: 40 bar.
- Maximum temperature: 70°C.

### Upstream pressure pilot adjustment range

- Blue spring: 0,7 to 7 bar.
- Red spring: 1,5 to 15 bar.
- Higher values up to 25 bar on request.

## Operating principle

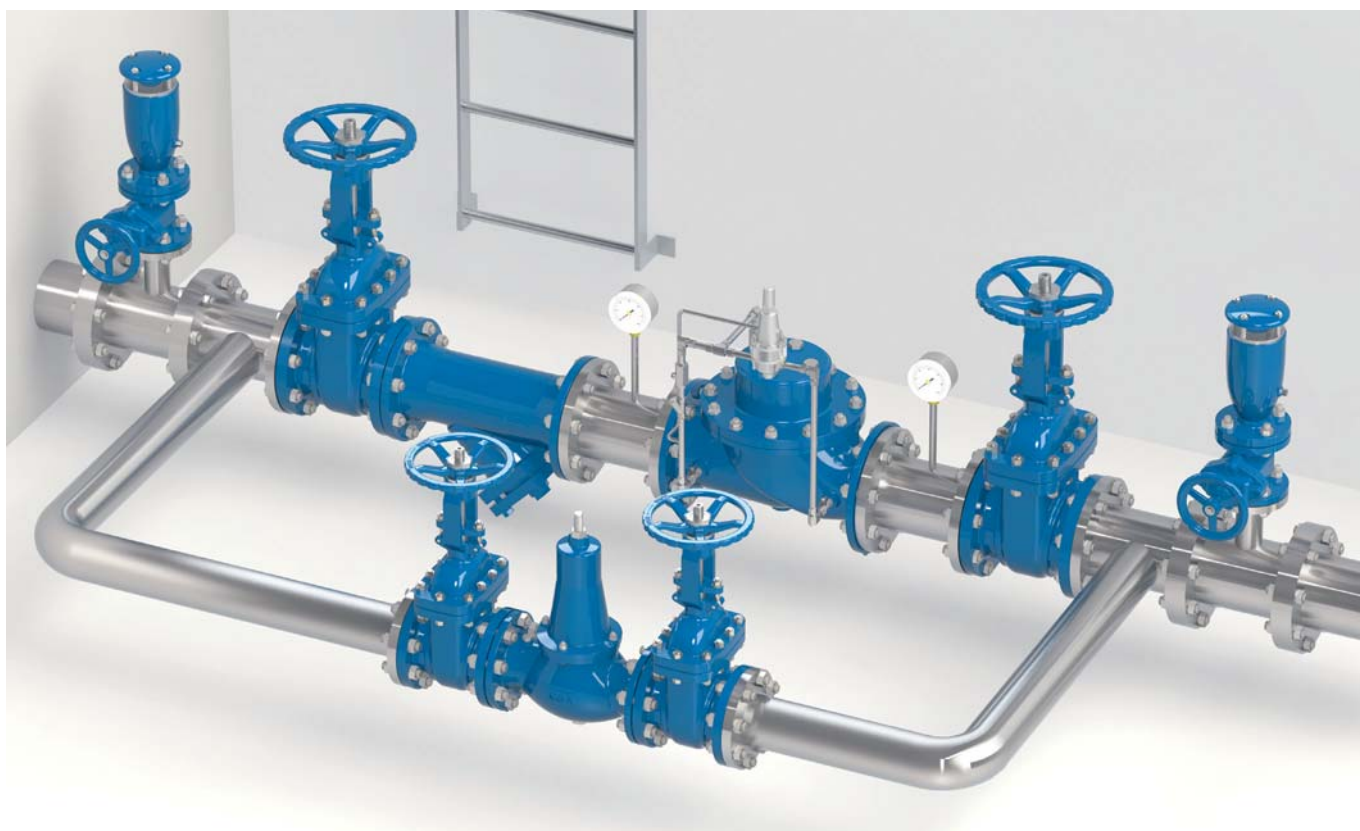


The CSA Model XLC 520/620-S is an automatic control valve operated by a high sensitivity two ways pilot (5), with pre-set and adjustable set point value, sensing the unfiltered upstream pressure from the inlet supply line (13). Should the line pressure rise above the pilot's set point the latter will open thus relieving the chamber (10) and moving the obturator (11) upwards, to discharge water and pressure through the main valve (9) downstream protecting the system. Should the upstream pressure be lower than the pilot's set point the latter will throttle (close eventually), diverting all pressure towards the main chamber (10) thus pushing the obturator (11) onto the seat (12), interrupting the flow rate.

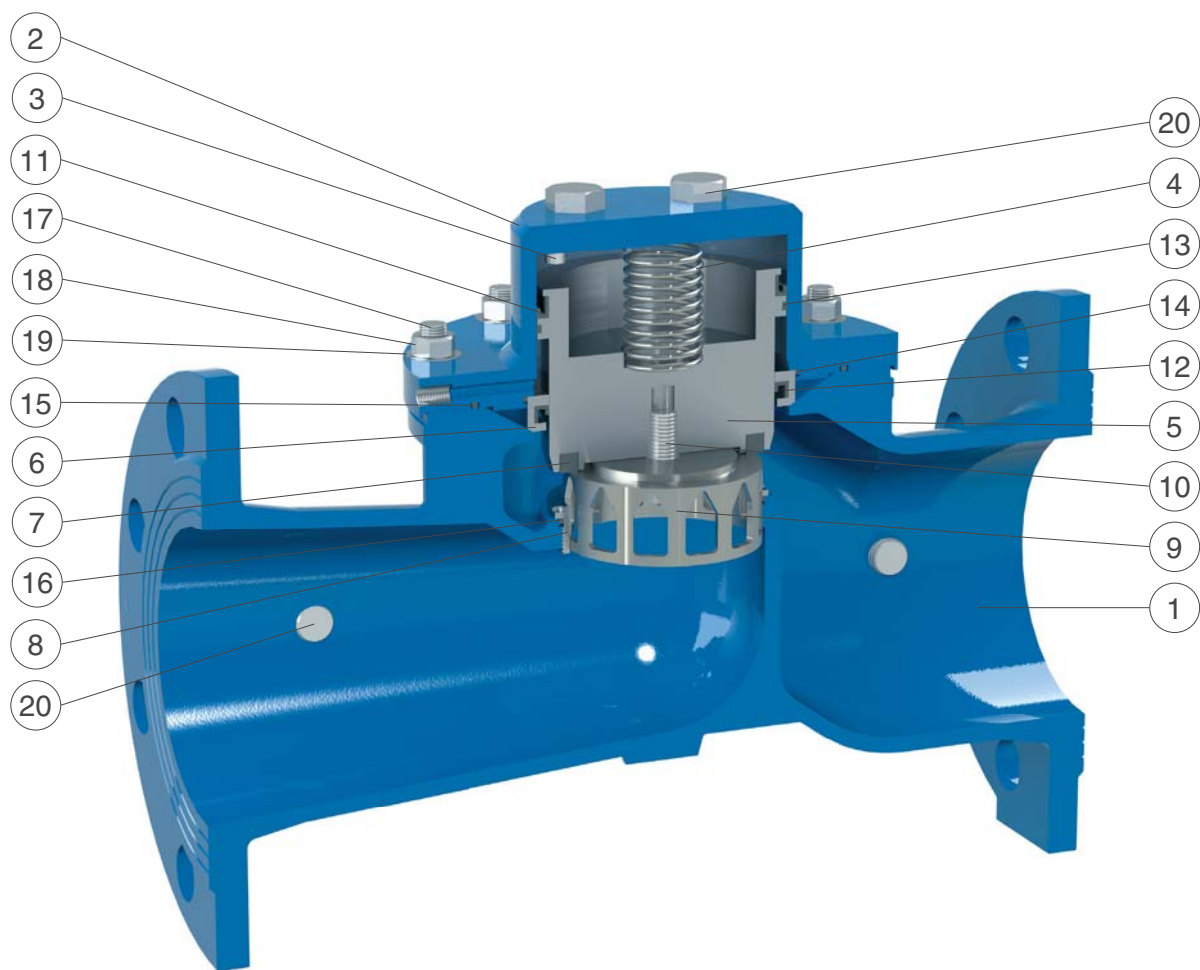
The flow in and out of the main chamber (10) is controlled by the CSA high sensitivity needle valve in stainless steel (3), needed for the valve's response time and accuracy also in case of rapid variation in demand. Thanks to isolation ball valves and a needle valve on the chamber (1, 2 and 3) the circuit can be maintained without interrupting the flow.

## Installation layout

The recommended installation lay-out of the CSA XLC 520/620-S, used as a in-line pressure sustaining, includes sectioning devices and by-pass for maintenance operations, and a strainer to prevent dirt from reaching the control valve. The direct acting pressure sustain valve CSA Mod. VSM is the best choice on the by-pass thanks to its reliability also after long periods of inactivity. Anti-surge combination air valves CSA Mod. FOX 3F AS are recommended upstream and downstream of the installation.



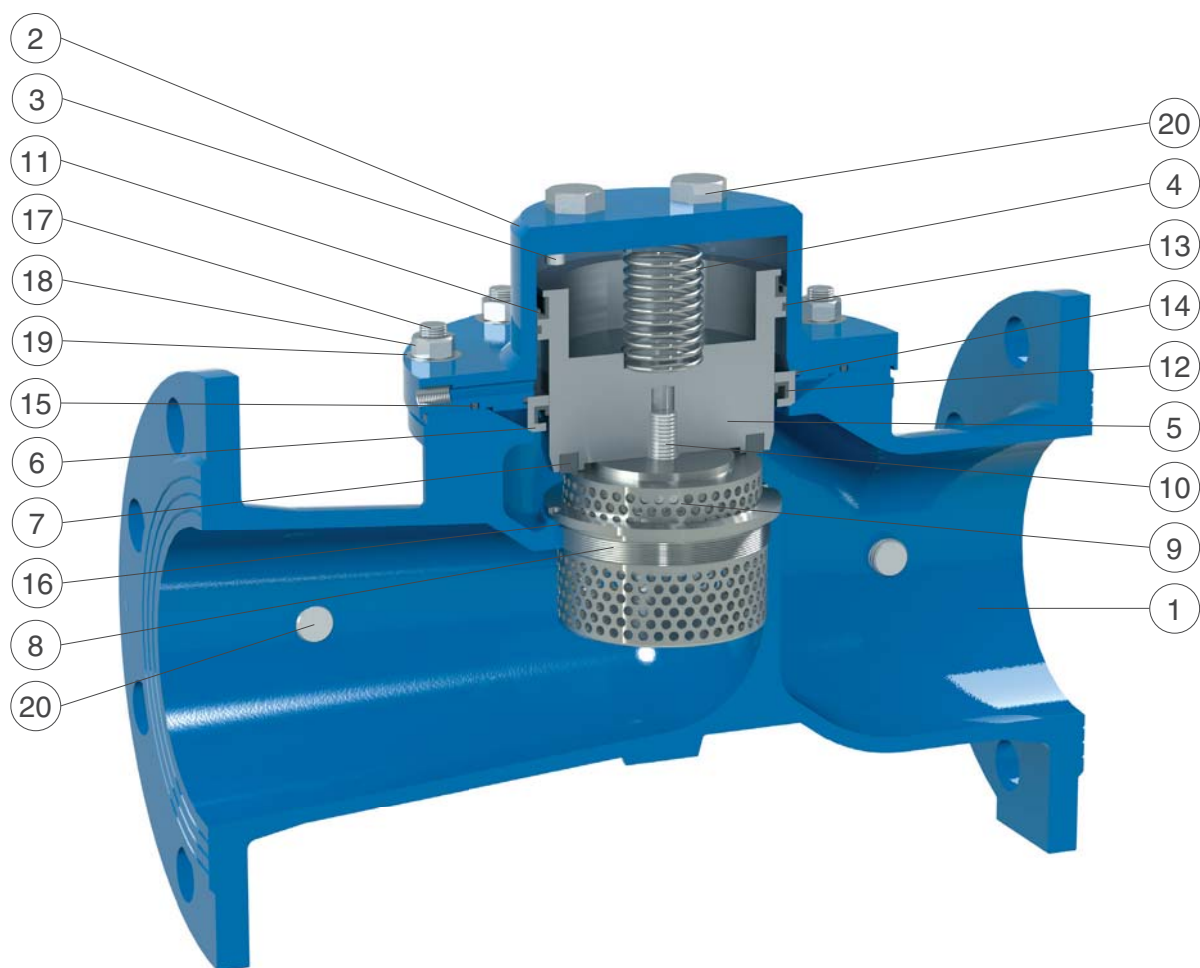
## XLC 500 and 600 - AC version - Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 450-10 or GJS 500-7	
2	Cap	painted steel and stainless steel AISI 303	
3	Screws	stainless steel AISI 304	stainless steel AISI 316
4	Spring	stainless steel AISI 302	
5	Piston	stainless steel AISI 303	stainless steel AISI 316
6	Bush	stainless steel AISI 303	stainless steel AISI 316
7	Plane gasket	NBR	
8	Seat for system AC	stainless steel AISI 303 (316 from DN 150FB/200RB)	stainless steel AISI 316
9	V-port	stainless steel AISI 303 (304 from DN 150FB/200RB)	stainless steel AISI 316
10	Screw with washer	stainless steel AISI 304	stainless steel AISI 316
11	Gasket	NBR	
12	Gasket	NBR	
13	Sliding ring	PTFE	
14	O-ring	NBR	EPDM/Viton
15	O-ring	NBR	EPDM/Viton
16	Seat O-ring	NBR	EPDM/Viton
17	Studs	stainless steel AISI 304	stainless steel AISI 316
18	Nuts	stainless steel AISI 304	stainless steel AISI 316
19	Washers	stainless steel AISI 304	stainless steel AISI 316
20	Pressure outlet taps	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.

## XLC 500 and 600 - CP version - Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 450-10 or GJS 500-7	
2	Cap	painted steel and stainless steel AISI 303	
3	Screws	stainless steel AISI 304	stainless steel AISI 316
4	Spring	stainless steel AISI 302	
5	Piston	stainless steel AISI 303	stainless steel AISI 316
6	Bush	stainless steel AISI 303	stainless steel AISI 316
7	Plane gasket	NBR	
8	Seat for anti-cavitation system CP	stainless steel AISI 303 (316 from DN 150FB/200RB)	stainless steel AISI 316
9	Anti-cavitation gasket holder CP	stainless steel AISI 303 (304 from DN 150FB/200RB)	stainless steel AISI 316
10	Screw with washer	stainless steel AISI 304	stainless steel AISI 316
11	Gasket	NBR	
12	Gasket	NBR	
13	Sliding ring	PTFE	
14	O-ring	NBR	EPDM/Viton
15	O-ring	NBR	EPDM/Viton
16	Seat O-ring	NBR	EPDM/Viton
17	Studs	stainless steel AISI 304	stainless steel AISI 316
18	Nuts	stainless steel AISI 304	stainless steel AISI 316
19	Washers	stainless steel AISI 304	stainless steel AISI 316
20	Pressure outlet taps	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.

## XLC 600 - AC version - Technical data

DN (mm)	40	50	65	80	100	150
Kv (m³/h)	32,5	32,5	56	79	132	312
Stroke (mm)	15	15	18	21	27	43

### Head loss coefficient

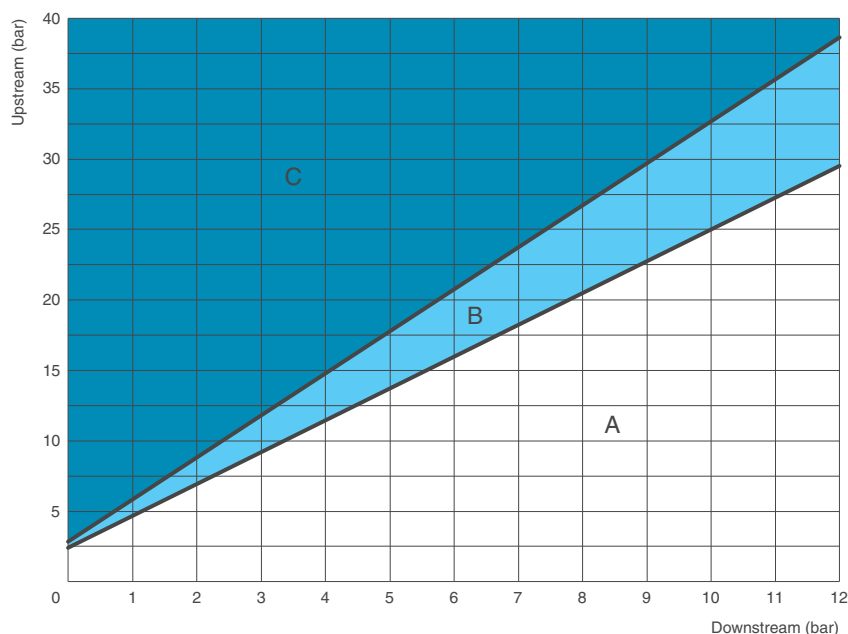
Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the 3 zones to be identified as follows:

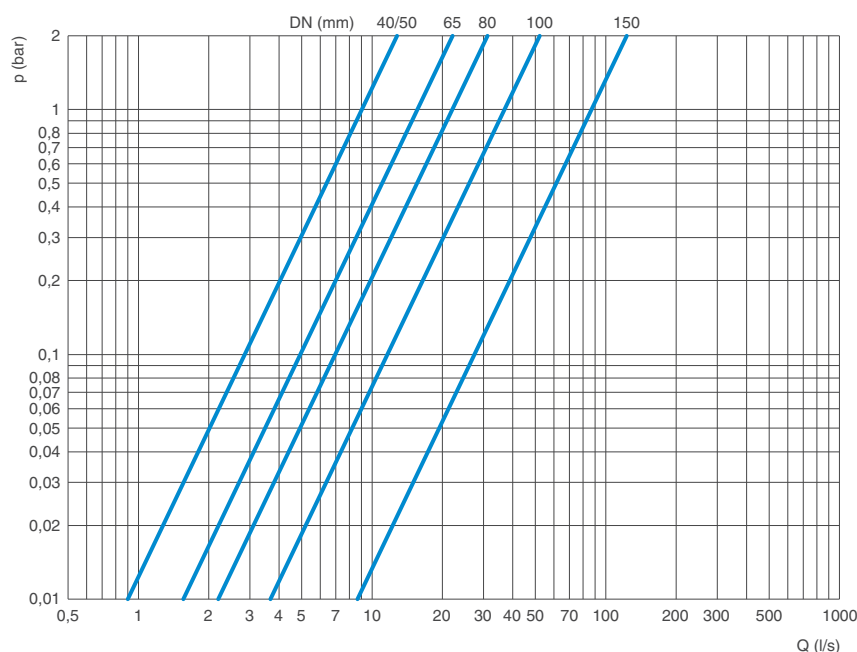
- A: Recommended working conditions;
- B: Noise cavitation;
- C: Damage cavitation.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.



### Head loss chart

The chart indicates the head loss of XLC automatic control valves fully open versus flow rate in l/s.



### Recommended flow rate

The following chart shows the recommended flow rate for the proper sizing of XLC control valves.

DN (mm)			40/50	65	80	100	150
Flow rate (l/s)	Low head loss (0,1-0,15 bar)	Max.	2,8	4,9	6,9	11	27
		Min.	0,5	0,9	1,4	2,2	4,9
	Recommended	Max.	7,9	14	19	30	67
		Max.	12	20	30	46	100

The technical informations are indicative and can change according to the number and dimension of holes.



## XLC 600 - CP anti-cavitation version - Technical data

DN (mm)	40	50	65	80	100	150
Kv (m³/h)	20	20	34	50	84	205
Stroke (mm)	15	15	18	21	27	43

### Head loss coefficient

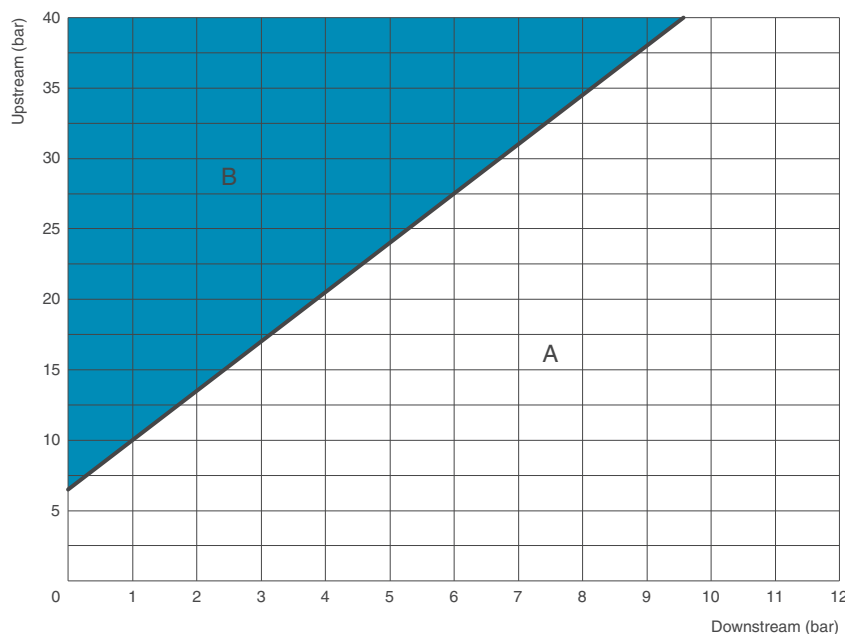
Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the two zones to be identified as follows:

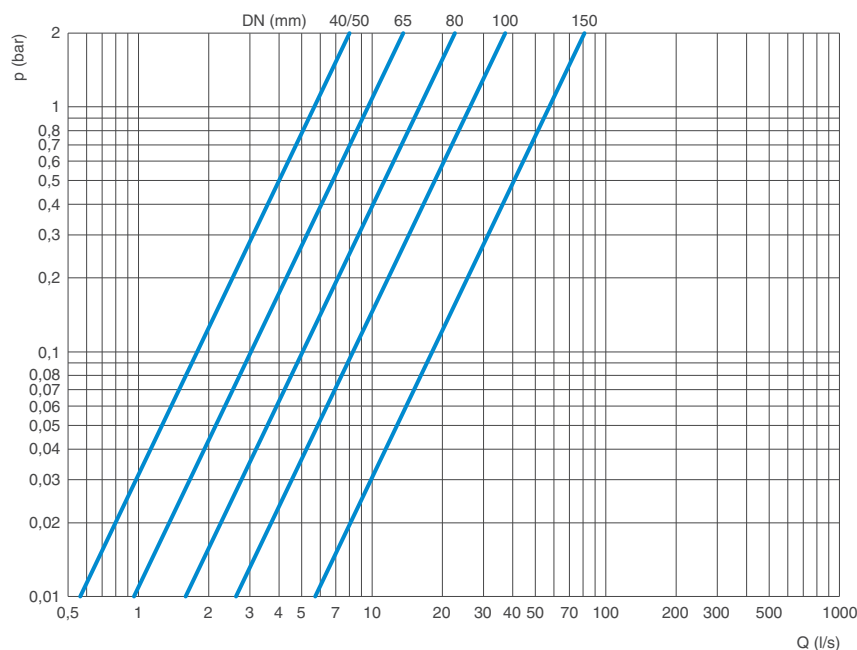
- A: Recommended working conditions;
- B: Damage cavitation.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.



### Head loss chart

The chart indicates the head loss of XLC automatic control valves fully open versus flow rate in l/s.



### Recommended flow rate

The following chart shows the recommended flow rate for the proper sizing of XLC control valves.

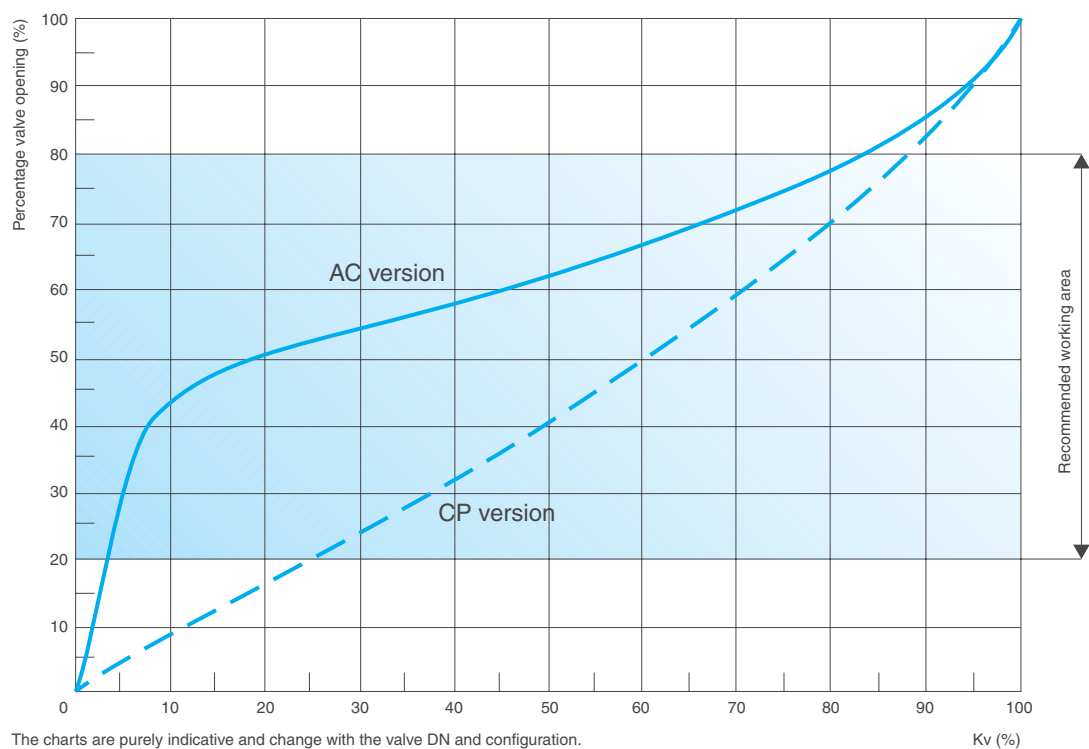
DN (mm)			40/50	65	80	100	150
Flow rate (l/s)	Recommended	Min.	0,4	0,7	1,0	1,6	3,5
		Max.	3,9	6,6	9,7	16	40
	Pressure relief	Max.	9,8	16	25	39	88

The technical informations are indicative and can change according to the number and dimension of holes.

## XLC 600 - AC and CP versions - Technical data

### Kv to valve opening chart

The following chart shows the opening percentage of XLC 600-AC and XLC 600-CP versus the Kv.



### Working conditions

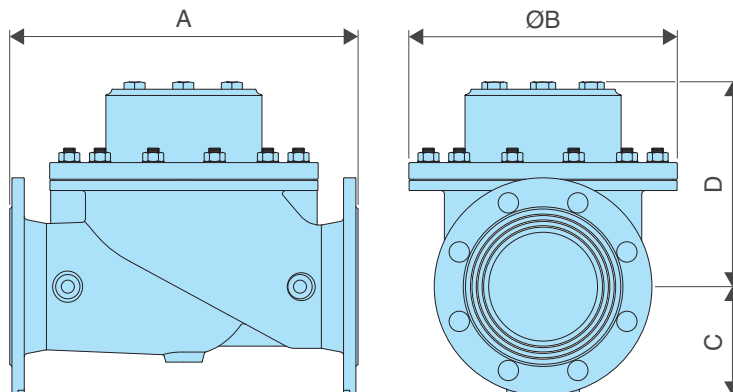
Treated filtered water.  
Maximum temperature: 70°C.  
Minimum pressure on the pilot : 0,5 bar plus head loss.  
Maximum pressure: 40 bar.

### Standard

Certified and tested in compliance with EN 1074/5.  
Pressure rating 40 bar.  
Flanges according to EN 1092/2 (different drilling on request).  
Epoxy painting applied through FBT technology blue RAL 5005.

### Weights and dimensions

DN (mm)	A (mm)	B (mm)	C (mm)	D (mm)	Weight (Kg)
40	230	162	83	140	15
50	230	162	83	140	15
65	290	194	93	160	23
80	310	218	100	180	30,5
100	350	260	118	205	43,5
150	480	370	150	285	110



All values are approximate, consult CSA service for more details.

## XLC 500 - AC version - Technical data

DN (mm)	80	100	125	150	200
Kv (m³/h)	43	93	146	154	377
Stroke (mm)	15	21	27	27	43

### Head loss coefficient

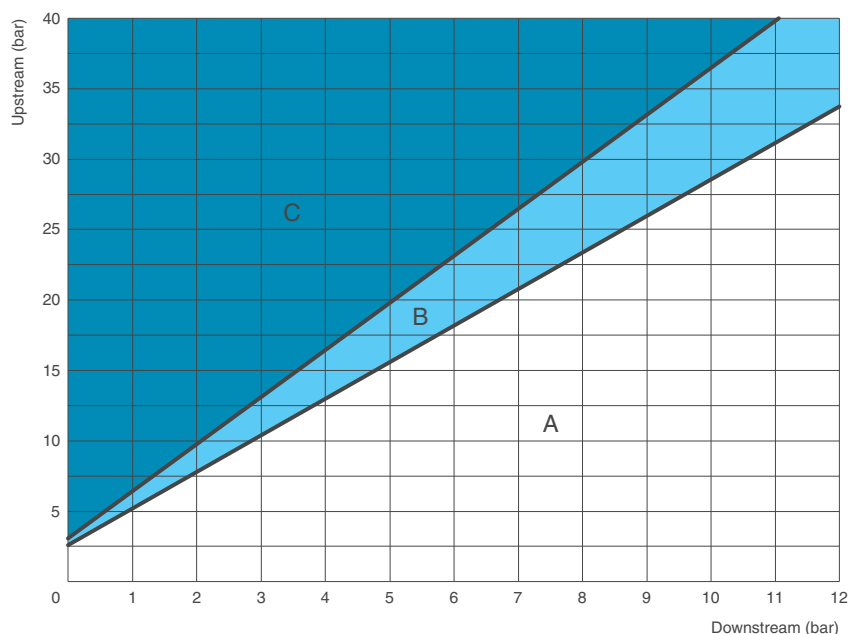
Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the 3 zones to be identified as follows:

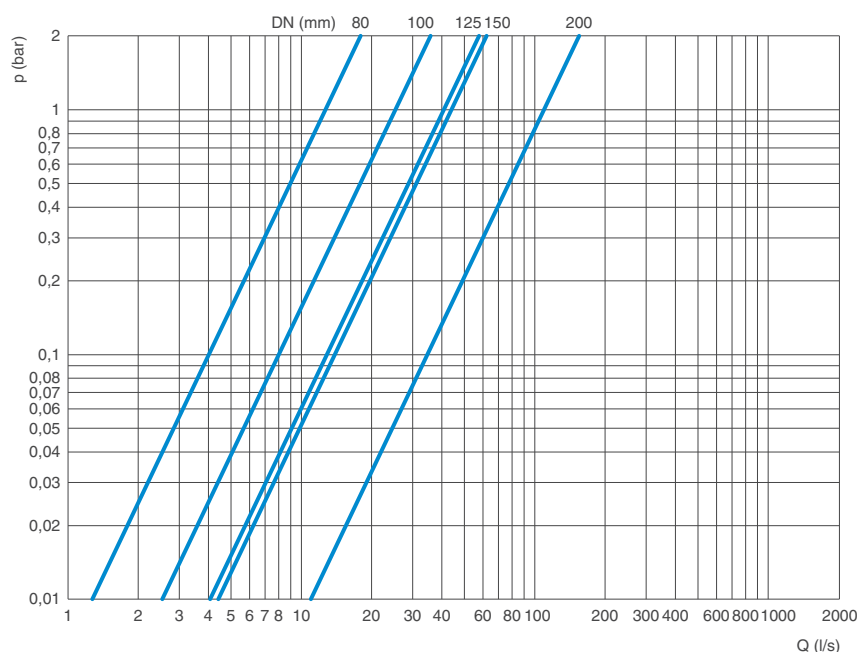
- A: Recommended working conditions;
- B: Noise cavitation;
- C: Damage cavitation.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.



### Head loss chart

The chart indicates the head loss of XLC automatic control valves fully open versus flow rate in l/s.



### Recommended flow rate

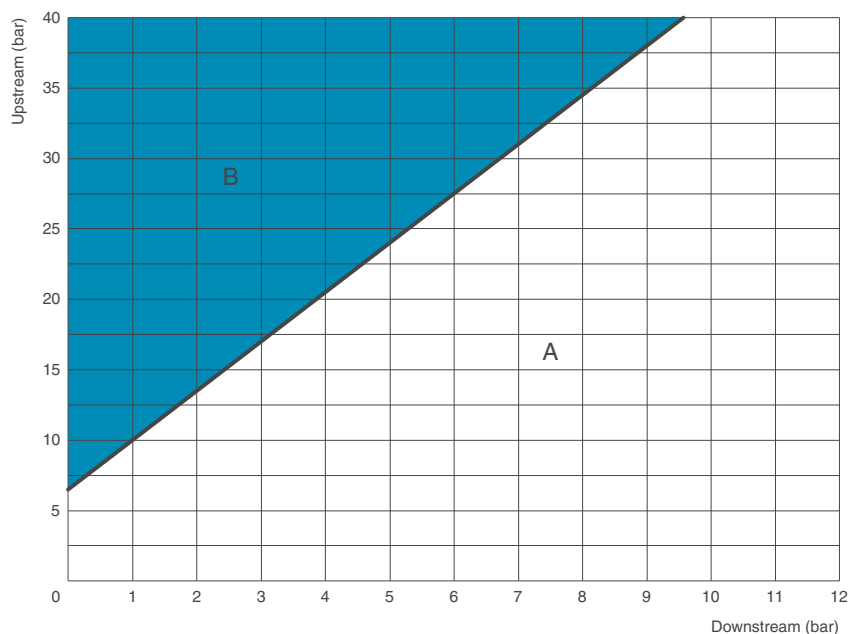
The following chart shows the recommended flow rate for the proper sizing of XLC control valves.

DN (mm)			80	100	125	150	200
Flow rate (l/s)	Low head loss (0,1-0,15 bar)	Max.	1,2	2,6	4	4,3	10
	Recommended	Min.	0,5	1,4	2,2	2,3	4,9
		Max.	8,8	23	33	35	78
		Pressure relief	Max.	12	30	46	48

The technical informations are indicative and can change according to the number and dimension of holes.

## XLC 500 - CP anti-cavitation version - Technical data

DN (mm)	80	100	125	150	200
Kv (m³/h)	24	53	72	89	207
Stroke (mm)	15	21	27	27	43



### Head loss coefficient

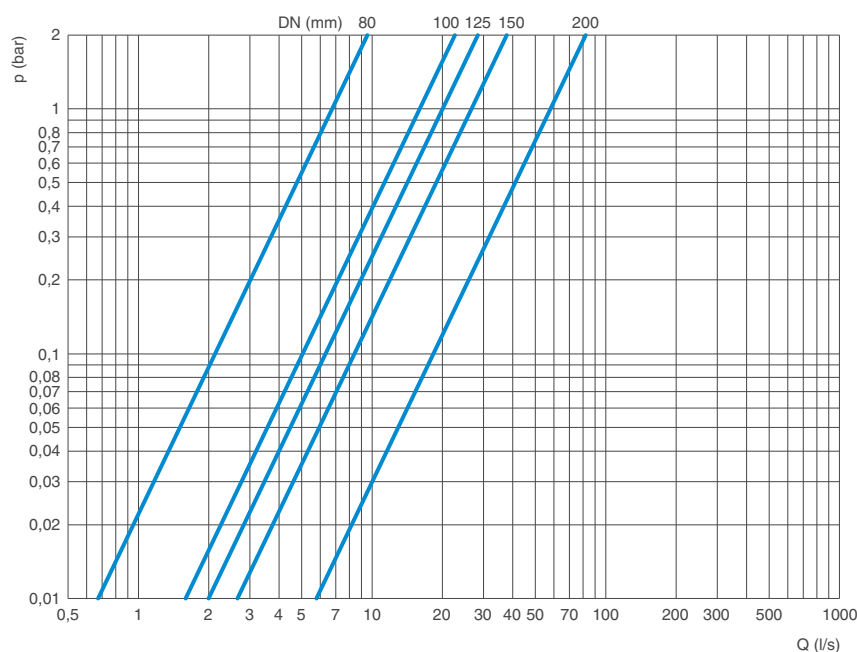
Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

The cavitation analysis is very important since it may lead to substantial damages, in addition to vibration and noise. The cavitation chart has to be used to determine whether the working point obtained by the intersection of the lines, connecting upstream (y axis) and downstream (x axis) pressure conditions, lies within one of the two zones to be identified as follows:

- A: Recommended working conditions;
- B: Damage cavitation.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 15 bar.



### Head loss chart

The chart indicates the head loss of XLC automatic control valves fully open versus flow rate in l/s.

### Recommended flow rate

The following chart shows the recommended flow rate for the proper sizing of XLC control valves.

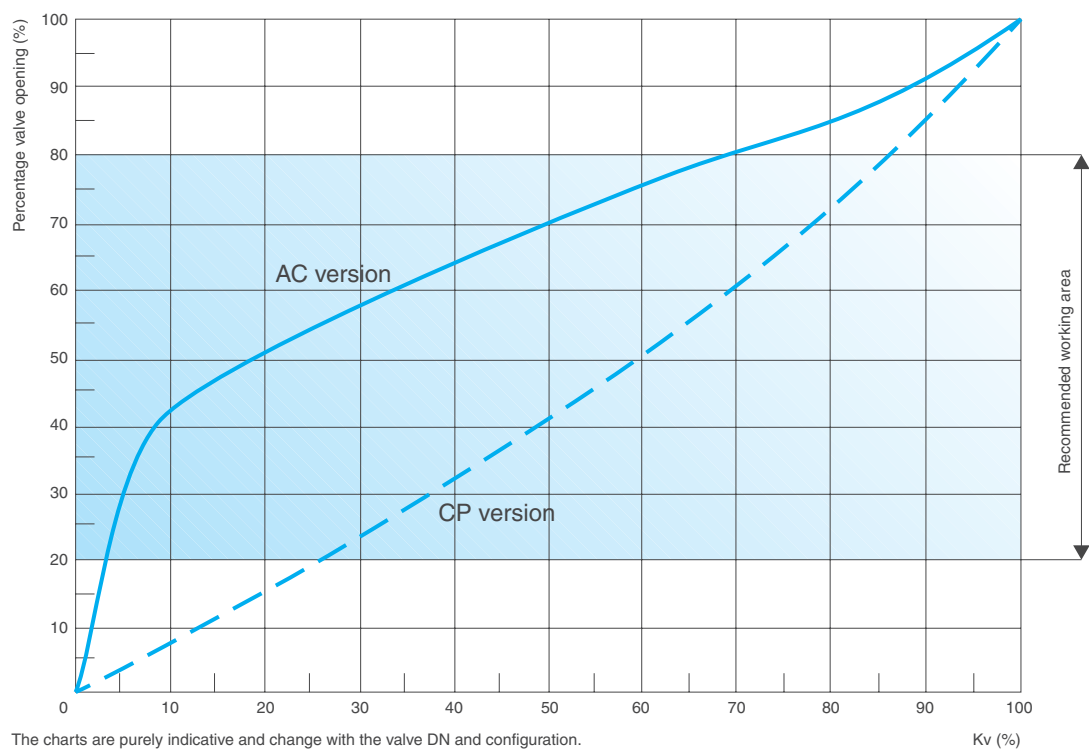
DN (mm)			80	100	125	150	200
Flow rate (l/s)	Recommended	Min.	0,7	1,0	2,2	2,3	4,1
		Max.	5,1	11	16	18	43
	Pressure relief	Max.	11	25	40	42	98

The technical informations are indicative and can change according to the number and dimension of holes.

## XLC 500 - AC and CP versions - Technical data

### Kv to valve opening chart

The following chart shows the opening percentage of XLC 500-AC and XLC 500-CP versus the Kv.



### Working conditions

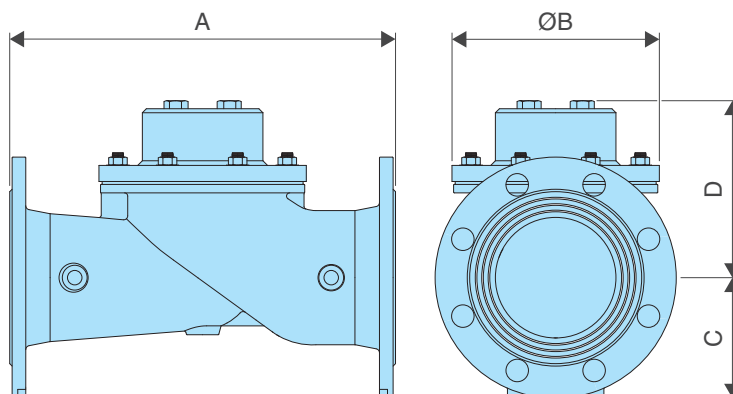
Treated filtered water.  
Maximum temperature: 70°C.  
Minimum pressure on the pilot : 0,5 bar plus head loss.  
Maximum pressure: 40 bar.

### Standard

Certified and tested in compliance with EN 1074/5.  
Pressure rating 40 bar.  
Flanges according to EN 1092/2 (different drilling on request).  
Epoxy painting applied through FBT technology blue RAL 5005.

### Weights and dimensions

DN (mm)	A (mm)	B (mm)	C (mm)	D (mm)	Weight (Kg)
80	310	162	100	155	20
100	350	218	118	185	34
125	400	260	135	225	56
150	480	260	150	225	58,5
200	600	370	180	295	122



All values are approximate, consult CSA service for more details.





## Pressure control valves



### ■ Downstream pressure reducer-stabilizer Mod. VRCD

The model reduces and stabilizes the downstream pressure to a constant value, regardless of flow rate and upstream pressure variations.

238



### ■ Downstream pressure reducer-stabilizer Mod. VRCD - M

Reducer diaphragm operated for a high accuracy or regulation.  
Maximum pressure 16 bar.

244



### ■ Downstream pressure reducer-stabilizer in stainless steel Mod. VRCD FF

Model in stainless steel with a maximum working pressure of 64 bar and threaded connections.

248



### ■ Downstream pressure reducer-stabilizer for high pressure Mod. RDA

Reducing-stabilizing valve with body in electro-welded steel for pressures up to 64 bar and flanged connections.

252



### ■ Pressure relief/sustaining valve Mod. VSM

This model maintains and sustains a pre-set upstream pressure value, discharging any excess downstream.

258



### ■ Pressure relief/sustaining valve in stainless steel Mod. VSM FF

Model in stainless steel with threaded connections.

264



### ■ Fast acting anti-water hammer valve Mod. VRCA

The valve avoids the rising of the pressure above a pre-set value discharging the excessive volume of water directly into the atmosphere.

268



## Downstream pressure reducer-stabilizer Mod. VRCD

The CSA direct acting pressure reducing valve Mod. VRCD reduces and stabilizes the downstream pressure to a constant value, regardless of flow rate and upstream pressure variations. It can be used for water, air and fluids in general with a maximum working pressure of 40 bar.



### Technical features and benefits

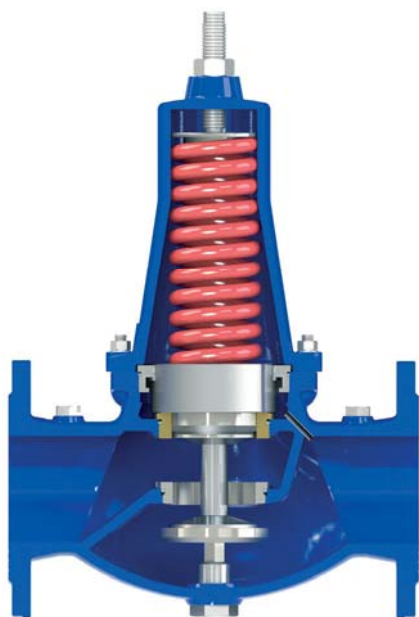
- Flanged version DN 50-150.
- Upstream and downstream pressure balanced, to stabilize the downstream pressure to a pre-set (and adjustable) value regardless of upstream pressure variations without creating unwanted upsurges.
- Ductile cast iron for body and cap, piston in stainless steel, seat in stainless steel, guiding bush in stainless steel as well as bolts and nuts.
- Innovative self cleaning piston technology (patent pending) to improve performances reducing maintenance operations.
- Mobile block composed of three components in gun metal/stainless steel obtained by CNC to ensure the maximum accuracy and sliding precision, this is to avoid friction and unexpected leakage.
- Upstream/downstream pressure outlets for gauges.
- Large expansion chamber to reduce noise and to provide an excellent resistance to cavitation.
- Epoxy powder applied using FBT technology.

### Applications

- Water distribution systems.
- Buildings and civil installations.
- Irrigations.
- Cooling systems.
- Fire protection systems and in general whenever the pressure reduction has to be ensured.

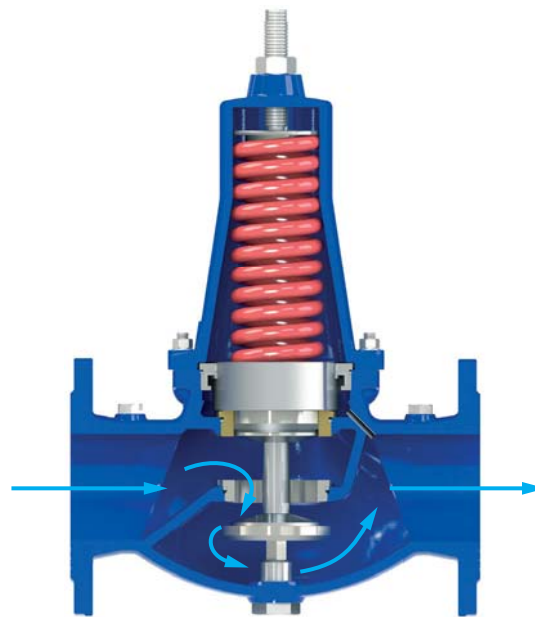
## Operating principle

The operating principle of VRCD is based on a piston sliding into two rings in stainless steel/bronze of different diameters. These rings, tightly connected to the body, form a watertight chamber also known as the compensation chamber which is necessary for the accuracy and stability of the valve.



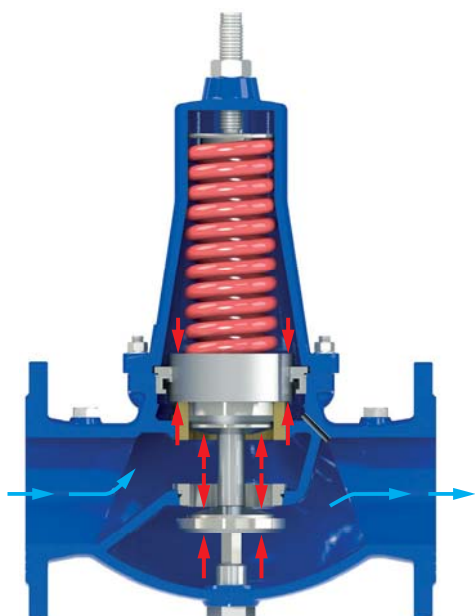
### Valve normally open

Without any pressure the VRCD is a normally open valve, where the piston is kept pushed down by the force of the spring located in the cover.



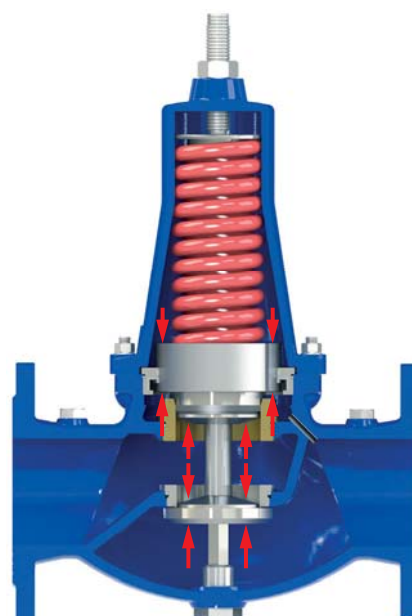
### Valve fully open

During working conditions, should the downstream pressure drop below the valve's set point obtained by the compression of the spring, the VRCD will open completely allowing the full passage.



### Valve modulating

Should the downstream pressure rise above the valve's set point the resultant of the force obtained by the downstream pressure, acting on the mobile block and the compensation chamber against the spring pushing downwards, will move the obturator producing the required head loss to modulate and stabilize the downstream pressure.



### Valve fully closed (static conditions)

Should the water supply be interrupted from downstream the system will work in static conditions, the VRCD will maintain and stabilize the required pressure even with no flow thanks to the pressure balanced technology and compensation chamber.

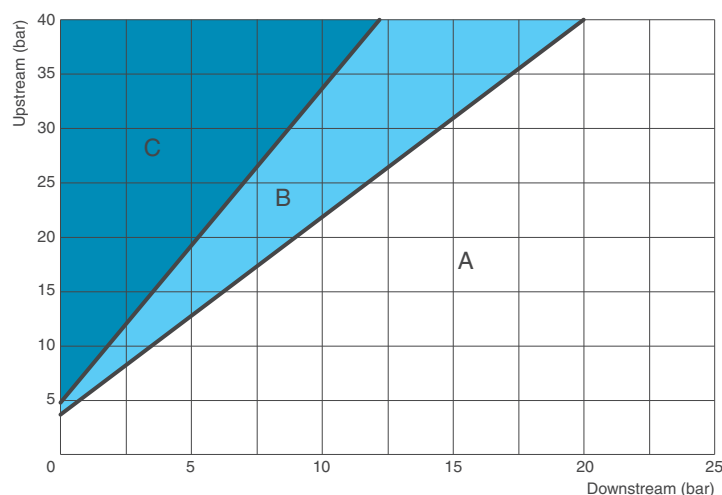


## Technical data

DN mm	50	65	80	100	125	150
Kv (m <sup>3</sup> /h)/bar	20	47	72	116	147	172

### Head loss coefficient

Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

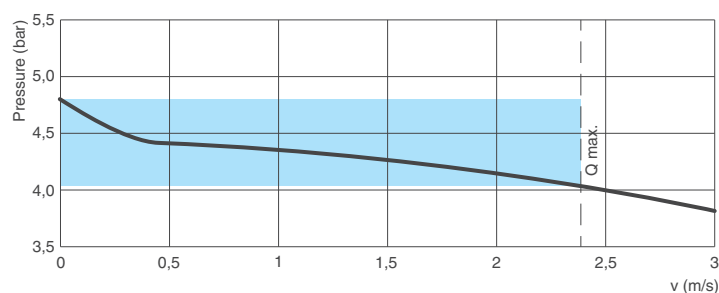


### Cavitation chart

- A: Recommended working conditions;
- B: Incipient cavitation;
- C: Damage cavitation.

Ensure that the working point, obtained connecting upstream (y axis) and downstream (x axis) pressure conditions, falls on the A zone with the smallest valve to meet the required flow.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 24 bar.



### Reduced pressure falloff

The plot is showing the reduced pressure falloff that occurs through the valve when the flow increases. Ensure that the operating conditions fall on the area depicted in blue for the recommended fluid flow velocity through the valve.

### Working conditions

Treated water with a maximum temperature of 70°C.  
Upstream pressure (inlet): maximum 40 bar. Downstream pressure (outlet): adjustable from 1,5 to 6 bar or from 5 to 12 bar. Higher downstream pressure values on request.

### Standard

Certified and tested in compliance with EN 1074/5.  
Flanges according to EN 1092/2. Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes on flanges and painting on request.

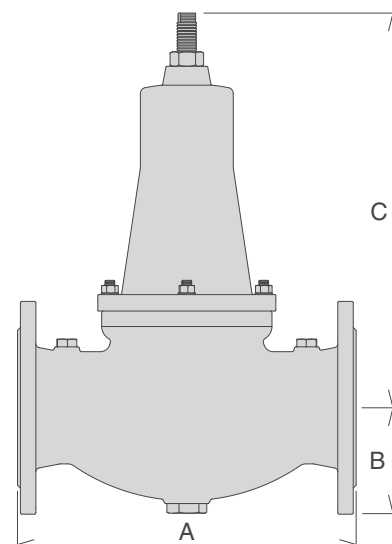
### Recommended flow rate

DN (mm)	50	65	80	100	125	150
Flow rate min. (l/s)	0,3	0,5	0,8	1,2	1,8	2,6
Flow rate max. (l/s)	4,7	8,0	12	18	29	42
Exceptional (l/s)	6,9	11	17	27	42	61

### Weights and dimensions

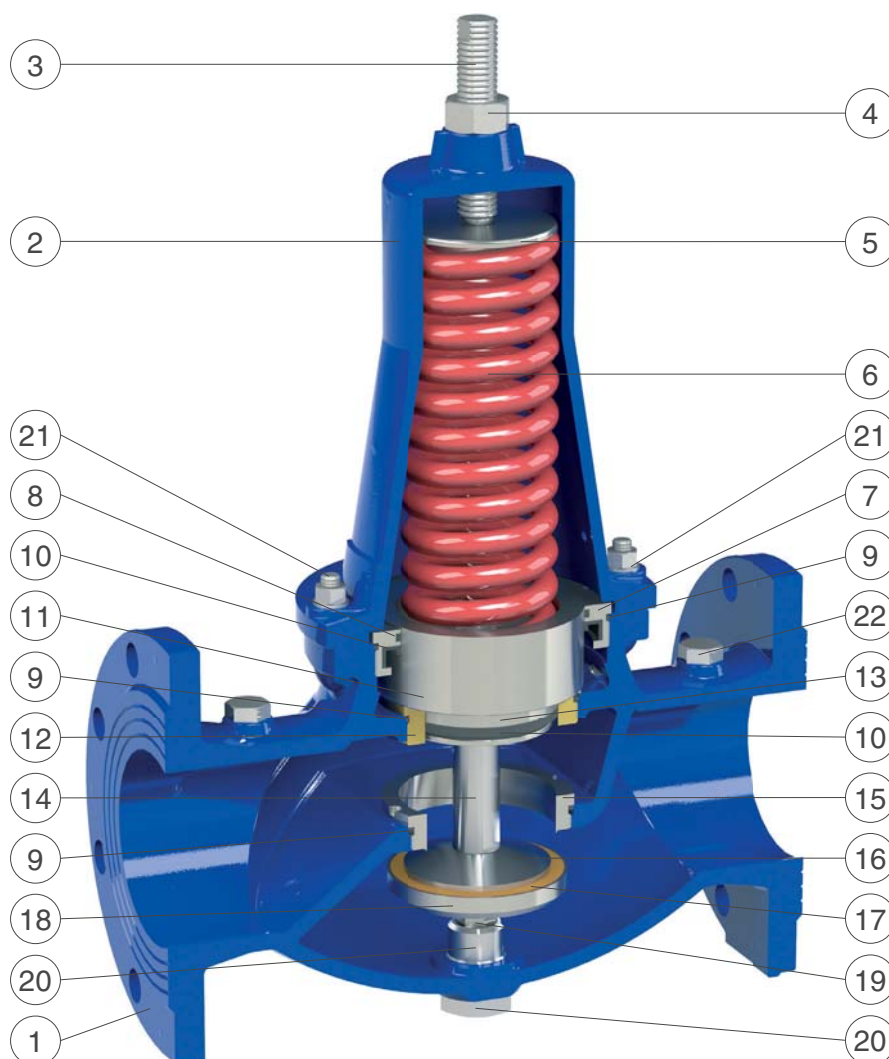
DN (mm)	50	65	80	100	125	150
A (mm)	230	290	310	350	400	450
B (mm)	83	93	100	110	135	150
C (mm)	280	320	350	420	590	690
Weight (Kg)	12	19	24	34	56	74

Values are approximate, consult CSA service for more details.





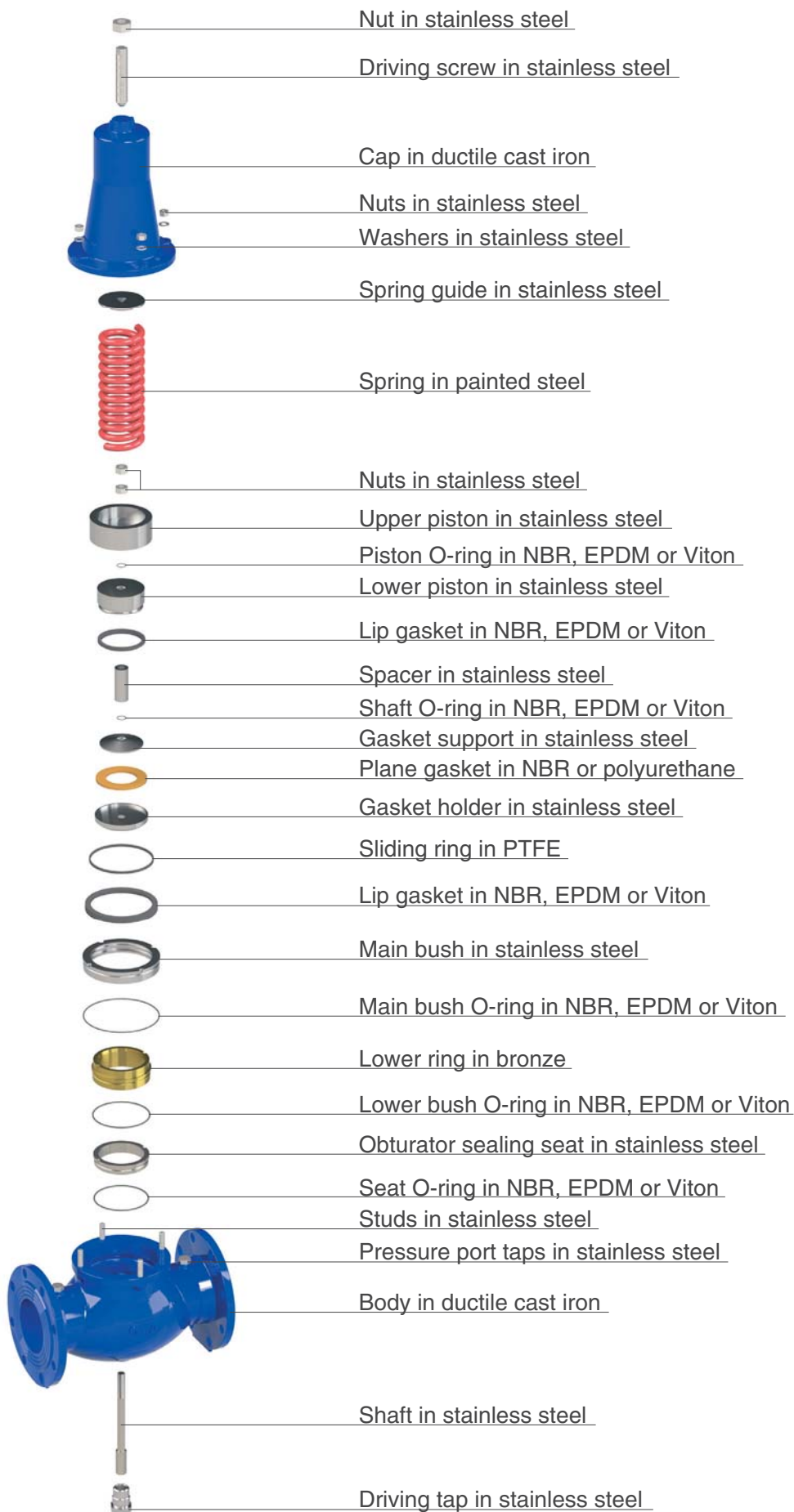
## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Driving screw	stainless steel AISI 304	stainless steel AISI 316
4	Nut	stainless steel AISI 304	stainless steel AISI 316
5	Spring guide	stainless steel AISI 303	stainless steel AISI 316
6	Spring	spring painted steel 52SiCrNi5	
7	Main bush	stainless steel AISI 304	stainless steel AISI 316
8	Sliding ring	PTFE	
9	O-rings	NBR	EPDM/Viton
10	Gasket	NBR	EPDM/Viton
11	Upper piston	s.s. AISI 303 (bronze CuSn5Zn5Pb5 for DN 125-150)	stainless s. AISI 303/316
12	Lower ring	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
13	Lower piston	stainless steel AISI 303	stainless steel AISI 316
14	Spacer	stainless steel AISI 303	stainless steel AISI 316
15	Obturator sealing seat	stainless steel AISI 304	stainless steel AISI 316
16	Gasket support	stainless steel AISI 303	stainless steel AISI 316
17	Plane gasket	NBR (polyurethane for PN 25-40)	
18	Gasket holder	stainless steel AISI 303	stainless steel AISI 316
19	Guiding shaft	stainless steel AISI 303	stainless steel AISI 316
20	Driving tap	stainless steel AISI 303	stainless steel AISI 316
21	Studs, nuts and washers	stainless steel AISI 304	stainless steel AISI 316
22	Taps for pressure gauges	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.

## Spare parts breakdown



## Installation layout

The installation layout of the CSA pressure reducer VRCD includes a filter upstream to prevent the entrance of debris, stones and particles likely to damage the internal components, and sectioning devices. A by-pass line, with one more VRCD, is highly recommended to ensure water supply during maintenance. CSA anti-slam combination air valves FOX AS series are needed before and after the installation as well as CSA pressure relief valve VSM downstream, to discharge possible increase in pressure.



## Installation layout

The picture below shows the recommended installation layout of CSA direct acting pressure reducer CSA VRCD installed on a line for level control applications, in combination with equilibrium ball float valve ATHENA. The reason is to prevent cavitation and potential damages arising from high static values acting on it once the level has reached the maximum value, with the valve on its fully closed position.





## Downstream pressure reducer-stabilizer Mod. VRCD-M

The CSA direct acting pressure reducing valve Mod. VRCD-M reduces and stabilizes the downstream pressure to a constant value, regardless of flow rate and upstream pressure variations. It can be used for water and fluids in general.



### Technical features and benefits

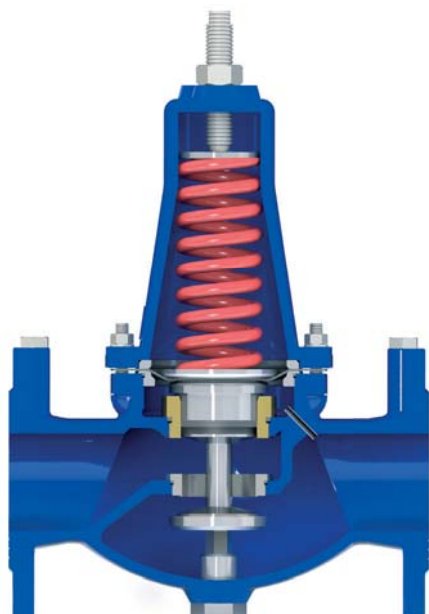
- Flanged version DN 50-150.
- Upstream and downstream pressure balanced, to stabilize the downstream pressure to a pre-set (and adjustable) value regardless of upstream pressure variations without creating unwanted upsurges.
- Ductile cast iron for body and cap, piston in stainless steel, seat in stainless steel as well as bolts and nuts.
- Diaphragm in polyamide nylon reinforced fabric.
- Innovative self cleaning piston technology (patent pending) to improve performances reducing maintenance operations.
- Mobile block composed of components in gun metal/stainless steel obtained by CNC to ensure the maximum accuracy and sliding precision, this is to avoid friction and unexpected leakage.
- Upstream/downstream pressure outlets for gauges.
- Large expansion chamber to reduce noise and to provide an excellent resistance to cavitation.
- Epoxy powder applied using FBT technology.

### Applications

- Water distribution systems.
- Buildings and civil installations.
- Irrigations.
- Cooling systems.
- Fire protection systems and in general whenever the pressure reduction has to be ensured.

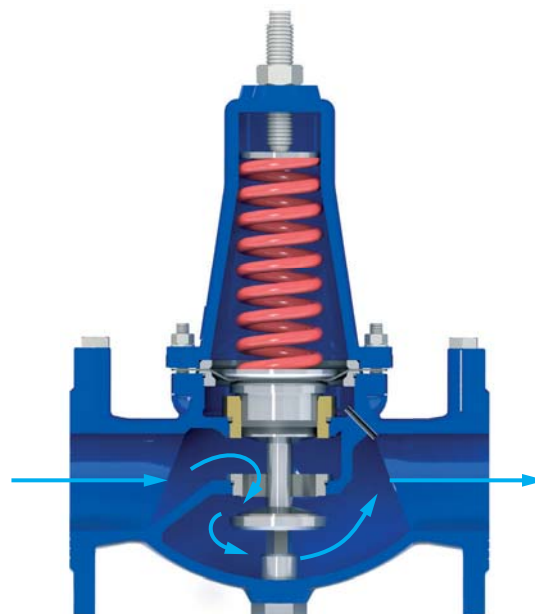
## Operating principle

The operating principle of VRCD-M is based on a piston sliding into a ring in stainless steel/bronze of different diameters. This ring, tightly connected to the body, and the diaphragm form a watertight chamber also known as the compensation chamber which is necessary for the accuracy and stability of the valve.



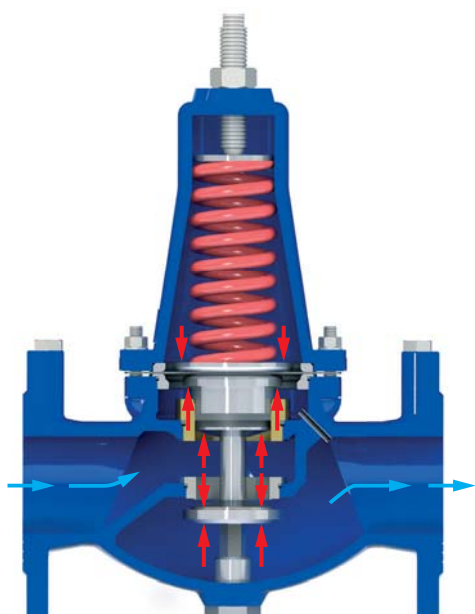
### Valve normally open

Without any pressure the VRCD-M is a normally open valve, where the piston is kept pushed down by the force of the spring located in the cover and acting above the diaphragm.



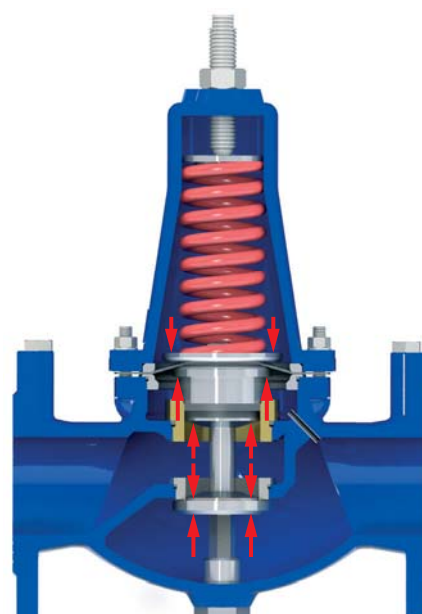
### Valve fully open

During working conditions, should the downstream pressure drop below the valve's set point obtained by the compression of the spring, the VRCD-M will open completely allowing the full passage.



### Valve modulating

Should the downstream pressure rise above the valve's set point the resultant of the force obtained by the downstream pressure, acting on the diaphragm through the compensation chamber against the spring pushing downwards, will move the obturator producing the required head loss to modulate and stabilize the downstream pressure.



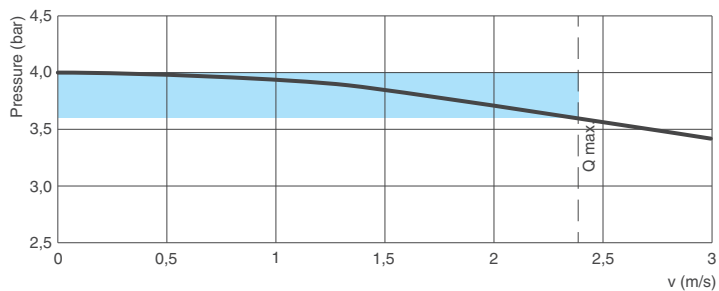
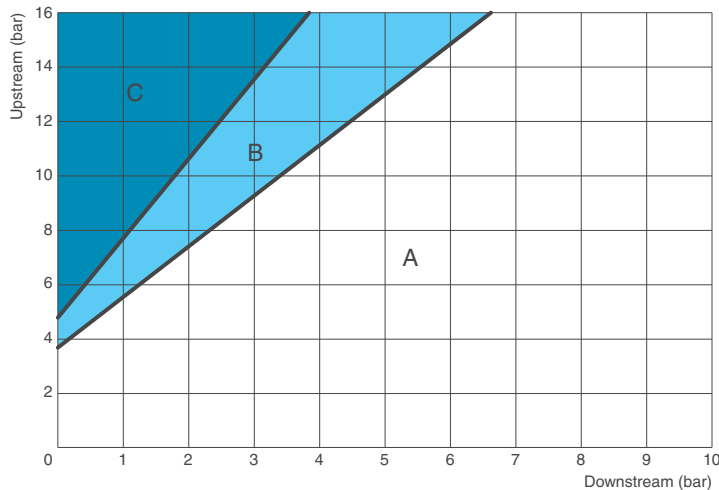
### Valve fully closed (static conditions)

Should the water supply be interrupted from downstream the system will work in static conditions, the VRCD-M will maintain and stabilize the required pressure even with no flow thanks to the pressure balanced technology and compensation chamber.



## Technical data

DN mm	50	65	80	100	125	150
Kv (m³/h)/bar	20	47	72	116	147	172



### Working conditions

Treated water with a maximum temperature of 70°C.  
Upstream pressure (inlet): maximum 16 bar.  
Downstream pressure (outlet): adjustable from 1,5 to 5 bar.  
Different values on request.

### Recommended flow rate

DN (mm)	50	65	80	100	125	150
Flow rate min. (l/s)	0,3	0,5	0,8	1,2	1,8	2,6
Flow rate max. (l/s)	5,1	8,6	13	20	31	45
Exceptional (l/s)	6,9	11	17	27	42	61

### Weights and dimensions

DN (mm)	50	65	80	100	125	150
A (mm)	230	290	310	350	400	450
B (mm)	83	93	100	110	135	150
C (mm)	280	320	350	420	590	690
Weight (Kg)	12	19	24	34	56	74

Values are approximate, consult CSA service for more details.

### Head loss coefficient

Kv coefficient representing the flow rate which is flowing through the valve fully open, and producing a head loss of 1 bar.

### Cavitation chart

- A: Recommended working conditions;
- B: Incipient cavitation;
- C: Damage cavitation.

Ensure that the working point, obtained connecting upstream (y axis) and downstream (x axis) pressure conditions, falls on the A zone with the smallest valve to meet the required flow.

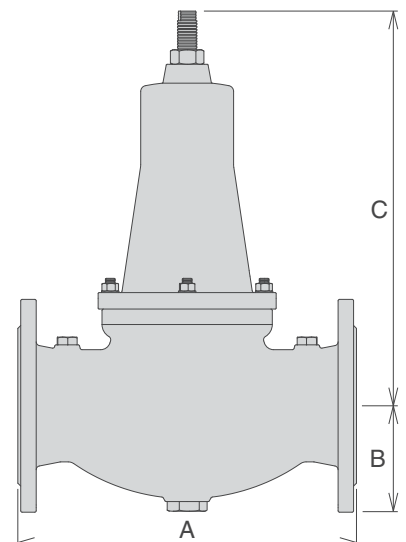
The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 24 bar.

### Reduced pressure falloff

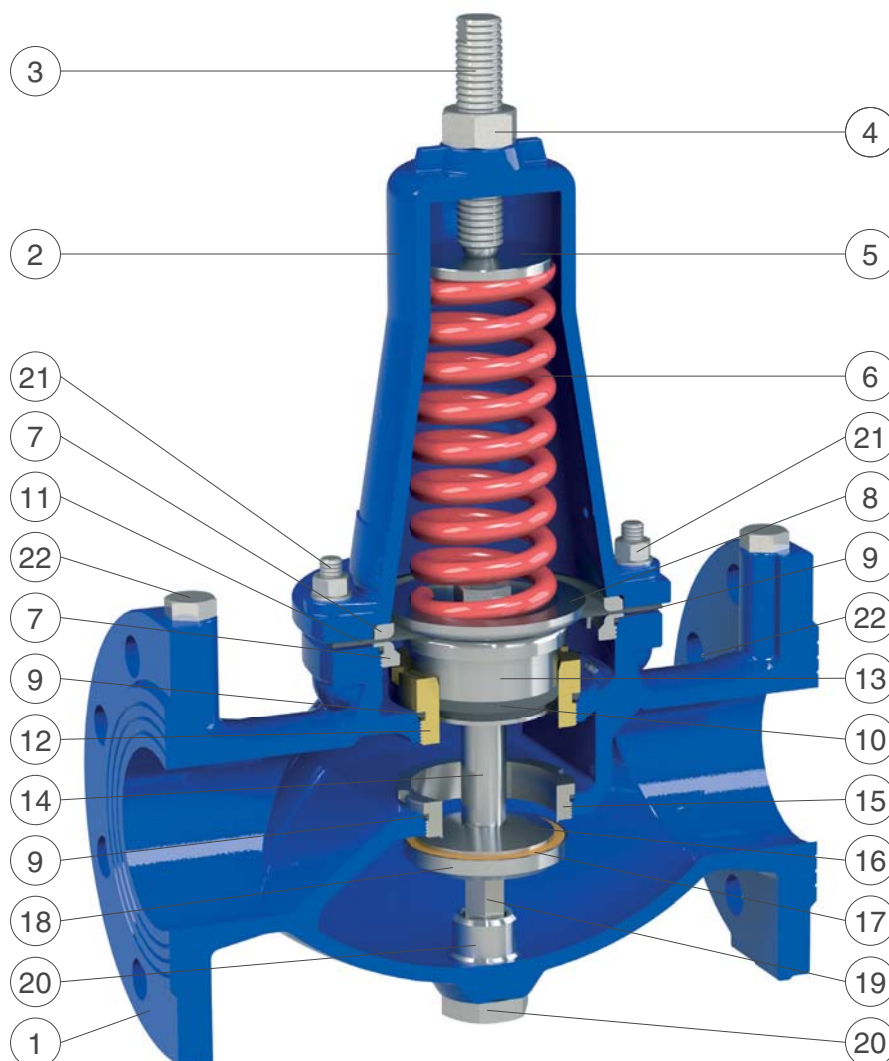
The plot is showing the reduced pressure falloff that occurs through the valve when the flow increases. Ensure that the operating conditions fall on the area depicted in blue for the recommended fluid flow velocity through the valve.

### Standard

Certified and tested in compliance with EN 1074/5.  
Flanges according to EN 1092/2. Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes on flanges and painting on request.



## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Driving screw	stainless steel AISI 304	stainless steel AISI 316
4	Nut	stainless steel AISI 304	stainless steel AISI 316
5	Spring guide	stainless steel AISI 303	stainless steel AISI 316
6	Spring	spring painted steel 52SiCrNi5	
7	Upper and lower compression rings	stainless steel AISI 304	stainless steel AISI 316
8	Upper flat	painted steel	stainless s. AISI 304/316
9	O-rings	NBR	EPDM/Viton
10	Gasket	NBR	EPDM/Viton
11	Diaphragm	polyamide-Nylon	neoprene/EPDM-Nylon
12	Lower ring	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
13	Piston	stainless steel AISI 303	stainless steel AISI 316
14	Spacer	stainless steel AISI 303	stainless steel AISI 316
15	Obturator sealing seat	stainless steel AISI 304	stainless steel AISI 316
16	Gasket support	stainless steel AISI 303	stainless steel AISI 316
17	Plane gasket	NBR	
18	Gasket holder	stainless steel AISI 303	stainless steel AISI 316
19	Guiding shaft	stainless steel AISI 303	stainless steel AISI 316
20	Driving tap	stainless steel AISI 303	stainless steel AISI 316
21	Studs, nuts and washers	stainless steel AISI 304	stainless steel AISI 316
22	Taps for pressure gauges	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.



## Downstream pressure reducer-stabilizer in stainless steel - Mod. VRCD FF

The CSA direct acting pressure reducing valve Mod. VRCD FF reduces and stabilizes the downstream pressure to a constant value, regardless of flow rate and upstream pressure variations. It can be used for water, air and fluids in general with a maximum working pressure of 64 bar.



### Technical features and benefits

- Entirely manufactured in stainless steel machined from a solid bar.
- Upstream and downstream pressure balanced, to stabilize the downstream pressure to a pre-set (and adjustable) value regardless of upstream pressure variations without creating unwanted upsurges.
- Innovative self cleaning piston technology (patent pending) to improve performances reducing maintenance operations.
- Mobile block composed of stainless steel internals obtained by CNC to ensure the maximum accuracy and sliding precision, this is to avoid friction and unexpected leakage.
- Excellent resistance to cavitation and aggressive environments thanks to the design and the use of gaskets in special materials.
- Wide flow range and downstream pressure regulation values with long lasting performances compared to other solution in brass or different materials.

### Applications

- Water distribution systems for high pressure ratio.
- Buildings and civil installations whenever stainless steel is required or advised for project aspects.
- Demineralized water and bottling plants.
- Industry and cooling systems.
- Mining and refineries.

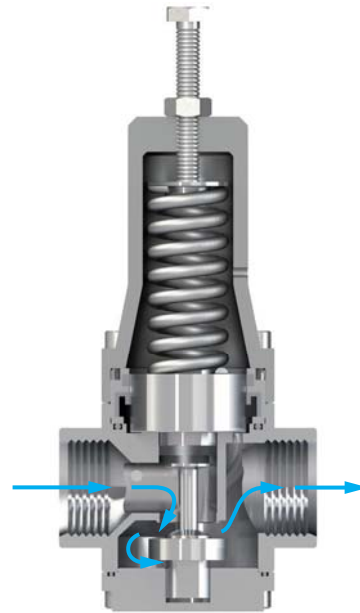
## Operating principle

The operating principle of VRCD FF, upstream pressure balanced, is based on a piston sliding into two rings of different diameters. These rings form a watertight chamber, also known as the compensation chamber, which is necessary for the accuracy and stability of the valve.



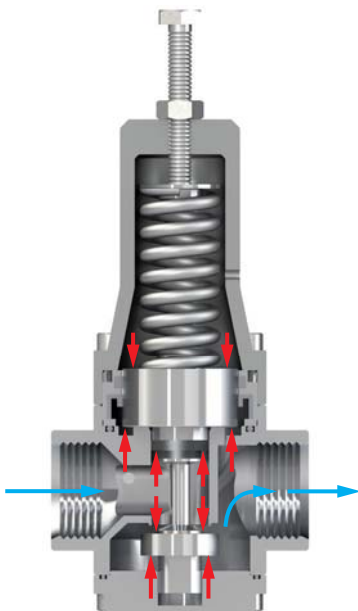
### Valve normally open

Without any pressure the VRCD FF is a normally open valve, where the piston is kept pushed down by the force of the spring located in the cover.



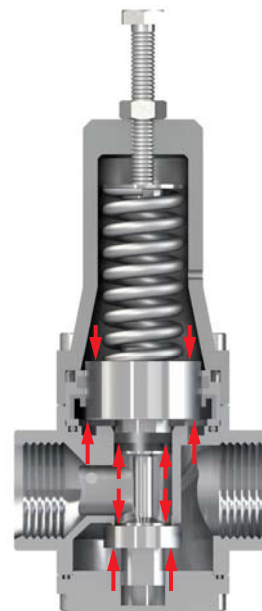
### Valve fully open

During working conditions, should the downstream pressure drop below the valve's set point obtained by the compression of the spring, the VRCD FF will open completely allowing the full passage.



### Valve modulating

Should the downstream pressure rise above the valve's set point the resultant of the force obtained by the downstream pressure acting on the mobile block and the compensation chamber against the spring pushing downwards, will move the obturator producing the required head loss to modulate and stabilize the downstream pressure.

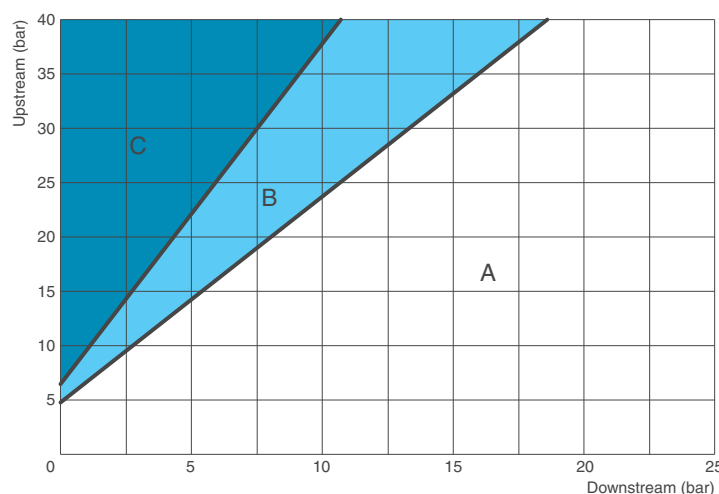


### Valve fully closed (static conditions)

Should the water supply be interrupted from downstream the system will go in static conditions, the VRCD FF will maintain and stabilize the required pressure even with no flow thanks to the pressure balanced technology and compensation chamber.

## Technical data

Thread (inches)	1/2"	1"	1" 1/2	2"
Kv (m³/h)/bar	2,9	7,2	10,8	21



### Head loss coefficient

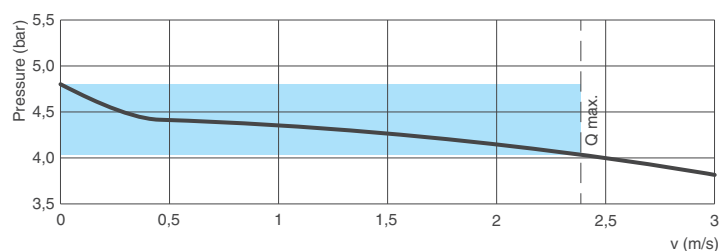
Kv coefficient representing the flow rate which is flowing through the valve fully open producing a head loss of 1 bar.

### Cavitation chart

- A: Recommended working conditions;
- B: Incipient cavitation;
- C: Damage cavitation.

Ensure that the working point, obtained connecting upstream (y axis) and downstream (x axis) pressure conditions, falls on the A zone with the smallest valve to meet the required flow.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 24 bar, for higher values contact CSA assistance.



### Reduced pressure falloff

The plot is showing the reduced pressure falloff that occurs through the valve when the flow increases. Ensure that the operating conditions fall on the area depicted in blue for the recommended fluid flow velocity through the valve.

### Working conditions

Treated water with a maximum temperature of 70°C (120°C on request).

Upstream pressure (inlet): maximum 40/64 bar.

Higher downstream pressure values on request.

### Standard

Certified and tested in compliance with EN 1074/5.

Threaded BSP connections.

Variations on the thread available on request.

### Recommended flow rate

Thread (inches)	1/2"	1"	1" 1/2	2"
Flow rate min. (l/s)	0,02	0,05	0,11	0,30
Flow rate max. (l/s)	0,35	0,98	2,20	4,45
Exceptional (l/s)	0,39	1,50	2,80	6,90

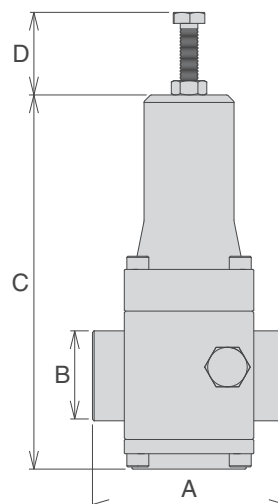
### Springs pressure ranges

Thread (inches)	1/2"	1"	1" 1/2	2"
Spring pressure (bar)	1,5-10	1,5-10	1,5-7	1,5-6
	2-20	2-20	2-15	5-12

### Weights and dimensions

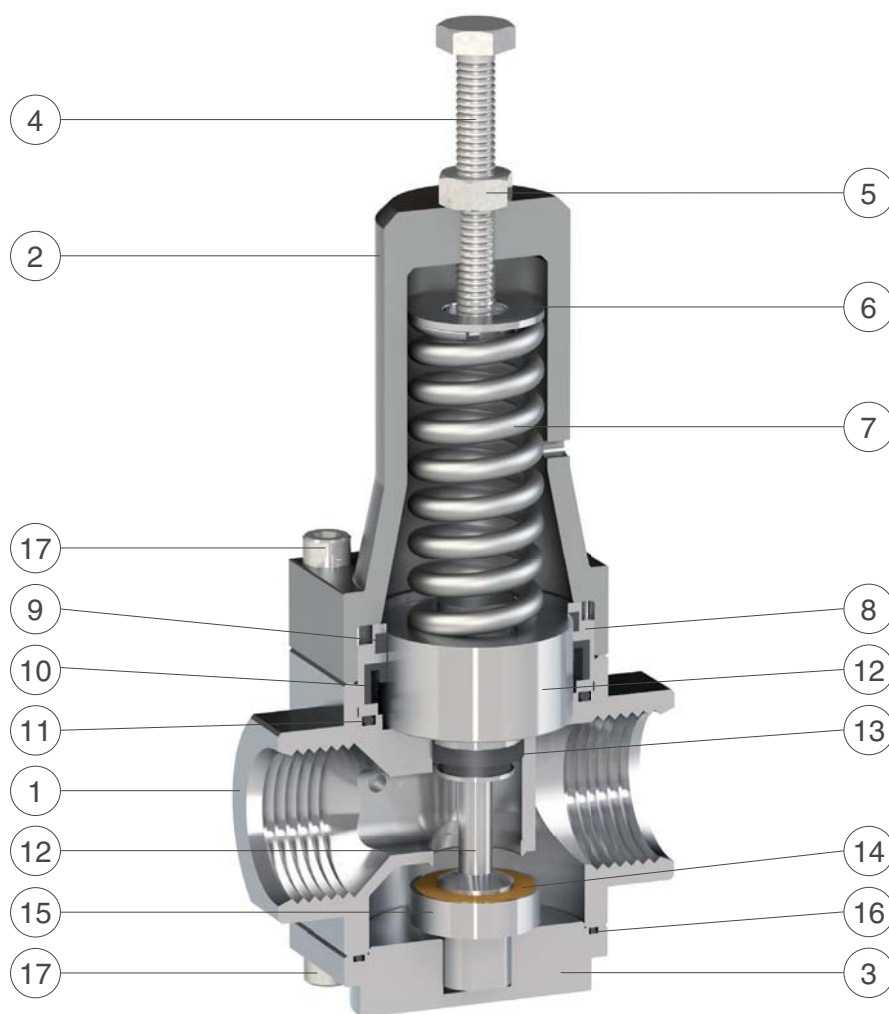
Thread inches	A mm	B mm	C mm	D mm	Weight Kg
1/2"	53	- -	108	25	1,0
1"	90	CH 41	170	45	2,1
1" 1/2	110	CH 55	205	50	2,8
2"	152	CH 70	290	60	5,9

Values are approximate, consult CSA service for more details.





## Technical details



N.	Component	Standard material	Optional
1	Body	s.s. AISI 303 (1"-1" 1/2), AISI 304 (1/2"-2")	stainless steel AISI 316
2	Cap	nickel-plated aluminium S11	stainless steel AISI 316
3	Driving tap	s.s. AISI 303 (1"-1" 1/2), AISI 304 (1/2"-2")	stainless steel AISI 316
4	Driving screw	stainless steel AISI 304	stainless steel AISI 316
5	Nut	stainless steel AISI 304	stainless steel AISI 316
6	Spring guide	stainless steel AISI 304	stainless steel AISI 316
7	Spring	s.s. AISI 302 (painted steel 52SiCrNi5 for 2")	
8	Main bush	stainless steel AISI 304	stainless steel AISI 316
9	Sliding ring	PTFE	
10	Upper gasket	NBR	EPDM/Viton
11	O-ring	NBR	EPDM/Viton
12	Piston	stainless steel AISI 303	stainless steel AISI 316
13	Lower gasket	NBR	EPDM/Viton
14	Plane gasket	polyurethane	
15	Obturator guide	stainless steel AISI 303	stainless steel AISI 316
16	Tap O-ring	NBR	EPDM/Viton
17	Screws	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.



## Downstream pressure reducer-stabilizer for high pressure - Mod. RDA

The CSA direct acting pressure reducing valve Mod. RDA reduces and stabilizes the downstream pressure to a constant value, regardless of flow rate variations. It can be used for water, air and fluids in general up to a temperature of 70° C and a maximum pressure of 64 bar.



### Technical features and benefits

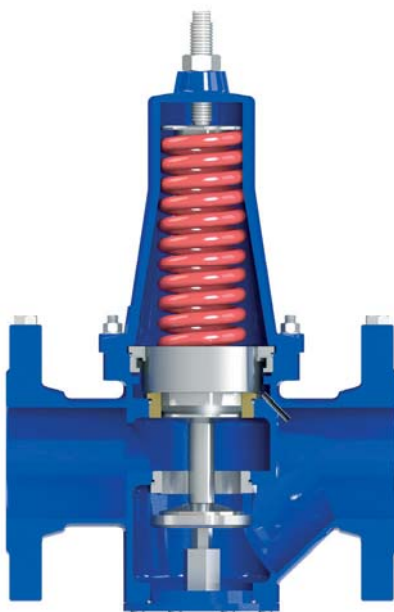
- Flanged version DN 50-150 PN 64 rated.
- Ductile cast iron cap and body in electro-welded steel, piston and mobile block in stainless steel.
- Upstream and downstream pressure balanced, to stabilize the downstream pressure to a pre-set (and adjustable) value regardless of upstream pressure variations without creating unwanted upsurges.
- Innovative self cleaning piston technology (patent pending) to improve performances reducing maintenance operations.
- Mobile block composed of three components in gun metal/stainless steel obtained by CNC to ensure the maximum accuracy and sliding precision, this is to avoid friction and unexpected leakage.
- Upstream and downstream pressure outlets for gauges.
- Large expansion chamber and materials providing an excellent resistance to cavitation and long lasting performances.
- Epoxy powder applied using FBT technology.

### Applications

- Water distribution systems for high pressure ratio.
- Mining.
- Industry and cooling systems.
- Dams and power plants.

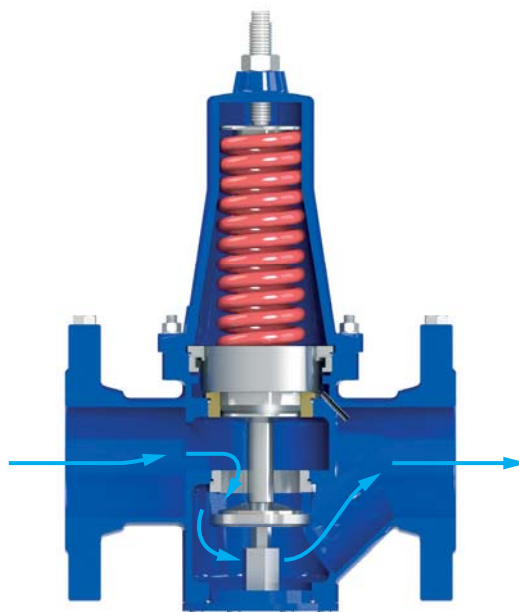
## Operating principle

The operating principle of RDA is based on a piston sliding into two rings in stainless steel/bronze of different diameters. These rings, tightly connected to the body, form a watertight chamber also known as the compensation chamber which is necessary for the accuracy and stability of the valve.



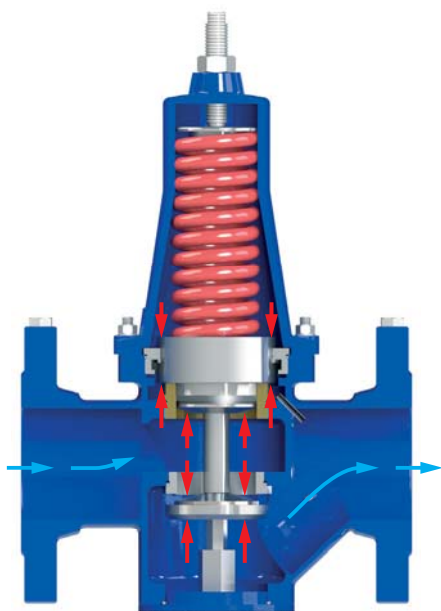
### Valve normally open

Without any pressure the RDA is a normally open valve, where the piston is kept pushed down by the force of the spring located in the cover.



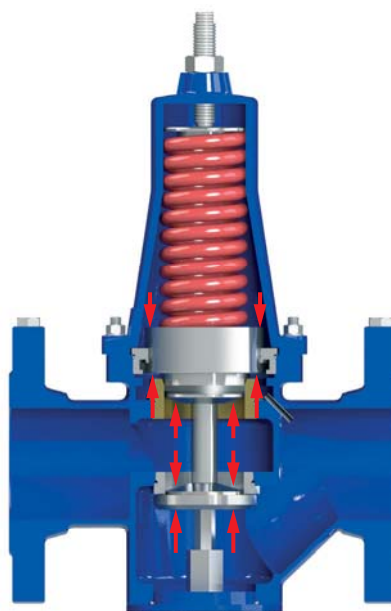
### Valve fully open

During working conditions, should the downstream pressure drop below the valve's set point obtained by the compression of the spring, the RDA will open completely allowing the full passage.



### Valve modulating

Should the downstream pressure rise above the valve's set point the resultant of the force obtained by the downstream pressure, acting on the mobile block and the compensation chamber against the spring pushing downwards, will move the obturator producing the required head loss to modulate and stabilize the downstream pressure.



### Valve fully closed (static conditions)

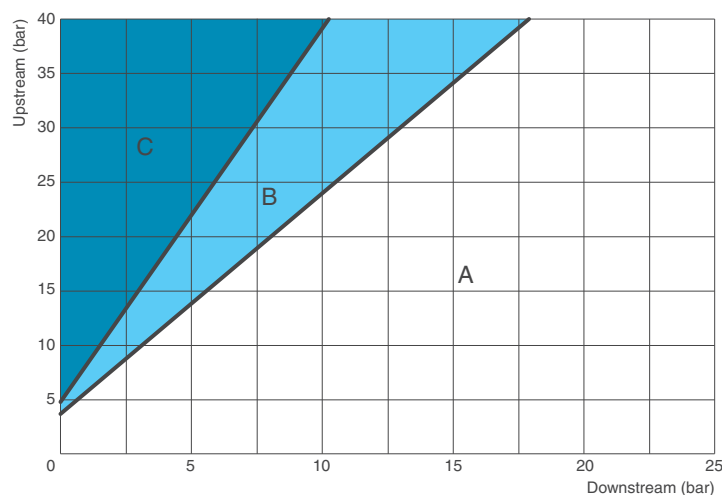
Should the water supply be interrupted from downstream the system will go in static conditions, the RDA will maintain and stabilize the required pressure even with no flow thanks to the pressure balanced technology and compensation chamber.

## Technical data

DN (mm)	50	80	100	150
Kv (m³/h)/bar	18	63	98	147

### Head loss coefficient

Kv coefficient representing the flow rate which is flowing through the valve fully open producing a head loss of 1 bar.

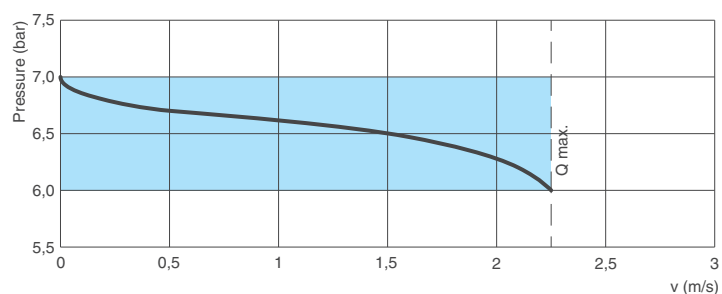


### Cavitation chart

- A: Recommended working conditions;
- B: Incipient cavitation;
- C: Damage cavitation.

Ensure that the working point, obtained connecting upstream (y axis) and downstream (x axis) pressure conditions, falls on the A zone with the smallest valve to meet the required flow.

The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure reduction the maximum allowed  $\Delta p$  shall not exceed 24 bar, for higher values contact CSA assistance.



### Reduced pressure falloff

The plot is showing the reduced pressure falloff that occurs through the valve when the flow increases. Ensure that the operating conditions fall on the area depicted in blue for the recommended fluid flow velocity through the valve.

### Working conditions

Treated water with a maximum temperature of 70°C.

Upstream pressure (inlet): maximum 64 bar.

Downstream pressure (outlet): standard from 1,5 to 6 bar or from 5 to 12 bar. Higher values on request.

### Standard

Certified and tested in compliance with EN 1074/5.

Flanges according to EN 1092/2. Epoxy painting applied through fluidized bed technology blue RAL 5005.

Changes on flanges and painting on request.

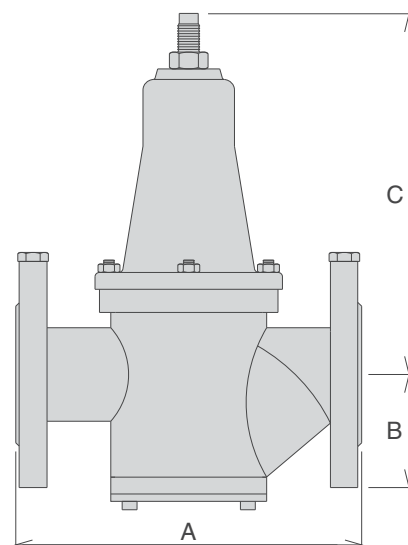
### Recommended flow rate

DN (mm)	50	80	100	150
Flow rate min. (l/s)	0,3	0,8	1,2	2,6
Flow rate max. (l/s)	3,9	10	15	35
Exceptional (l/s)	6,9	17	27	61

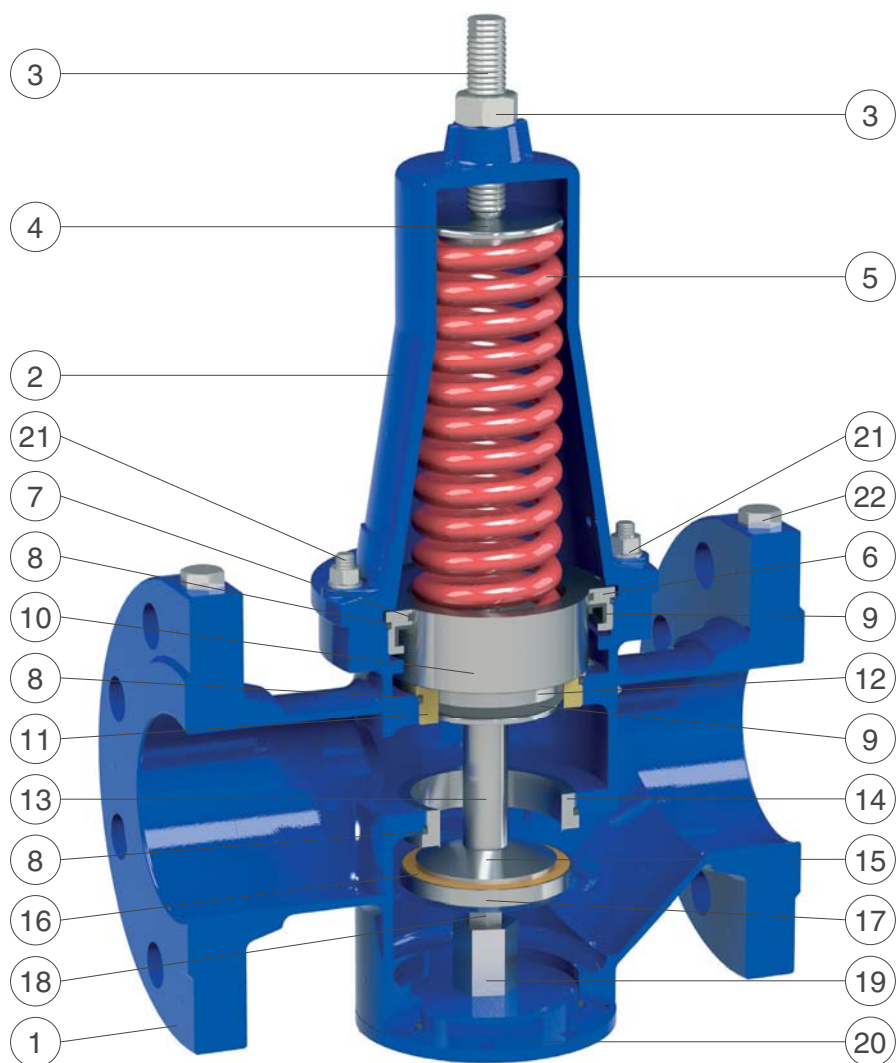
### Weights and dimensions

DN (mm)	50	80	100	150
A (mm)	230	310	350	480
B (mm)	90	108	126	172
C (mm)	240	340	400	500
Weight (Kg)	15	29	40	90

Values are approximate, consult CSA service for more details.



## Technical details

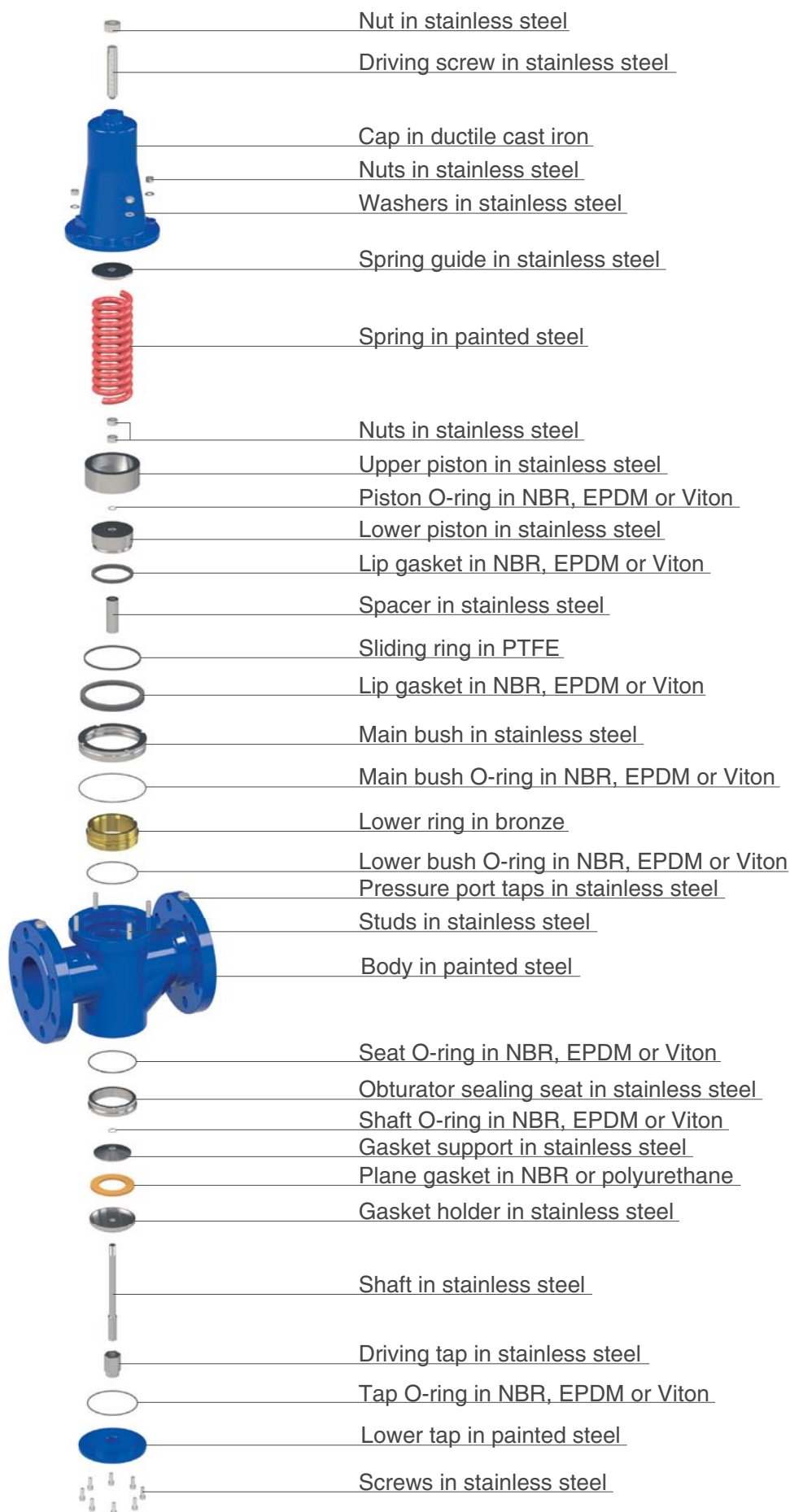


N.	Component	Standard material	Optional
1	Body	painted steel	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Driving screw and nut	stainless steel AISI 304	stainless steel AISI 316
4	Spring guide	stainless steel AISI 303	stainless steel AISI 316
5	Spring	spring painted steel 52SiCrNi5	
6	Main bush	stainless steel AISI 304	stainless steel AISI 316
7	Sliding ring	PTFE	
8	O-rings	NBR	EPDM/Viton
9	Gasket	NBR	EPDM/Viton
10	Upper piston	s.s. AISI 303 (bronze CuSn5Zn5Pb5 for DN 150)	stainless s. AISI 303/316
11	Lower reinforcements	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
12	Lower piston	stainless steel AISI 303	stainless steel AISI 316
13	Spacer	stainless steel AISI 303	stainless steel AISI 316
14	Obturator sealing seat	stainless steel AISI 304	stainless steel AISI 316
15	Gasket support	stainless steel AISI 303	stainless steel AISI 316
16	Plane gasket	polyurethane	
17	Obturator guide	stainless steel AISI 303	stainless steel AISI 316
18	Guiding shaft	stainless steel AISI 303	stainless steel AISI 316
19	Driving tap	stainless steel AISI 303	stainless steel AISI 316
20	Lower tap	painted steel	
21	Studs, nuts and washers	stainless steel AISI 304	stainless steel AISI 316
22	Taps for pressure gauges	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.



## Spare parts breakdown



## Installation layout

The installation layout of the CSA direct acting pressure reducer RDA includes a strainer upstream to prevent the entrance of debris, stones and particles likely to damage the internal components, and sectioning devices needed for inspection and maintenance. CSA anti-slam combination air valves FOX AS series are needed before and after the installation as well as CSA direct acting pressure relief valve VSM located downstream, to discharge any possible increase in pressure.



## Installation layout

The picture shows CSA pressure reducers installed in series, case of two steps pressure reduction applications, with the first as RDA (in carbon welded steel) followed by the VRCD line in ductile cast iron. The idea is to avoid excessive pressure dissipation on the VRCD with the potential for cavitation and wear. Direct acting pressure sustaining/relief valves are located between the two PRV and downstream of the second to prevent dangerous rise in pressure, as well as to avoid damages on the ductile cast iron unit.





## Pressure relief/sustaining valve Mod. VSM

The CSA direct acting upstream pressure relief/sustaining valve Mod. VSM automatically maintains and sustains a minimum pre-set upstream pressure, discharging any excess downstream, regardless of variations in demand and downstream pressure fluctuations.



### Technical features and benefits

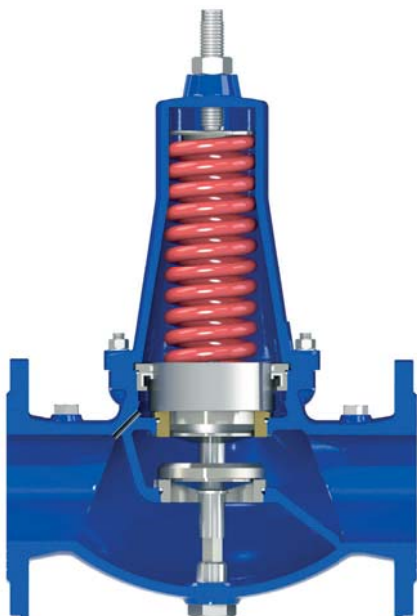
- Flanged version DN 50-150.
- Upstream pressure balanced, to stabilize and maintain the upstream pressure to a minimum pre-set (and adjustable) value regardless of demand and downstream pressure variations.
- Ductile cast iron for body and cap, piston in stainless steel, seat in stainless steel, guiding bush in stainless steel as well as bolts and nuts.
- Innovative self cleaning piston technology (patent pending) to improve performances reducing maintenance operations.
- Mobile block composed of three components in gun metal/stainless steel obtained by CNC to ensure the maximum accuracy and sliding precision, this is to avoid friction and unexpected leakage.
- Upstream/downstream pressure outlets for gauges.
- Large expansion chamber to reduce noise and to provide an excellent resistance to cavitation.
- Epoxy powder applied using FBT technology.

### Applications

- Water distribution systems as a pressure relief/discharge valve.
- Fire fighting systems to discharge overpressure caused by pumps.
- Irrigation systems as an effective protection against water hammer and to prevent pumps from overload.
- Industrial plants, civil buildings and more.

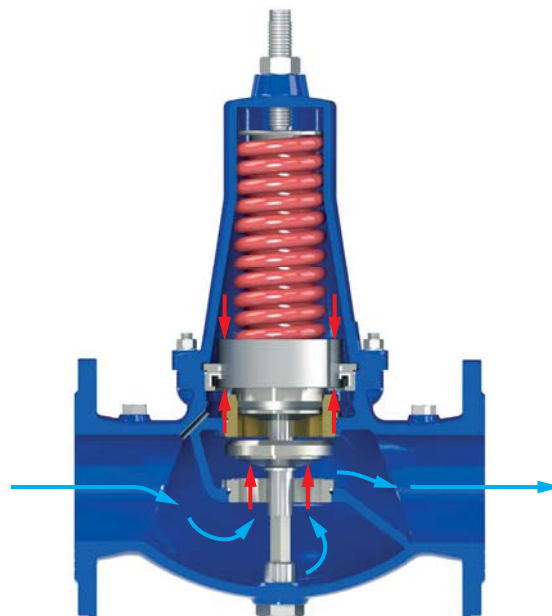
## Operating principle

The operating principle of VSM is based on a piston sliding into two rings in stainless steel/bronze of different diameters. These rings, tightly connected to the body, form a watertight chamber also known as the compensation chamber.



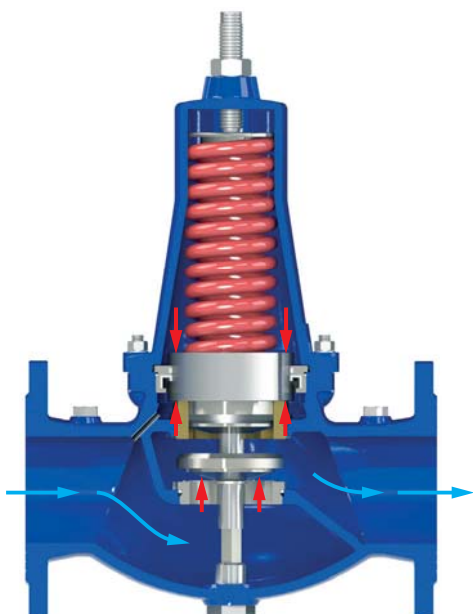
### Valve normally closed

Without any incoming pressure the VSM is a normally closed valve, as shown in the picture, where the obturator is kept pushed down to the seat by the force of the spring.



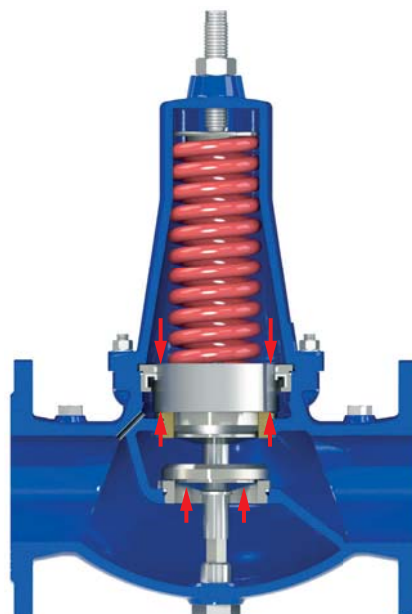
### Valve fully open

Should the upstream pressure rise above the set point of the valve, obtained by the compression of the spring, the VSM will open completely allowing the full passage through the seat.



### Valve modulating

Should the upstream pressure fluctuate around the valve's set point the obturator, thanks to the difference in force between the spring pushing downwards and the incoming pressure underneath and through the compensation chamber pushing upwards, will move throttling the flow through the seat in order to maintain the minimum required value.



### Valve fully closed (static conditions)

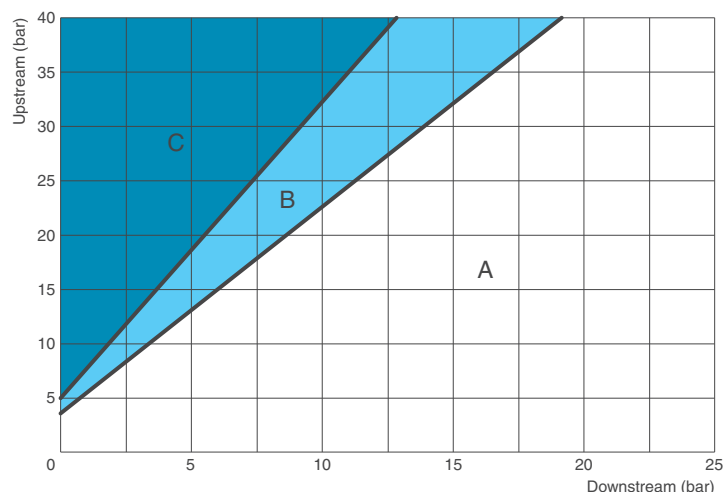
Should the water supply be interrupted from upstream pressure begins to drop, in this case the VSM will react immediately to maintain and stabilize the required upstream pressure even with no flow thanks to the pressure balanced technology, and compensation chamber.

## Technical data

DN mm	50	65	80	100	125	150
Kv (m³/h)/bar	22	51	83	122	166	194

### Head loss coefficient

Kv coefficient representing the flow rate which is flowing through the valve fully open producing a head loss of 1 bar.



### Cavitation chart

- A: Recommended working conditions;
- B: Incipient cavitation;
- C: Damage cavitation.

Ensure that the working point, obtained connecting upstream (y axis) and downstream (x axis) pressure conditions, falls on the A zone with the smallest valve to meet the required flow. The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure sustaining the maximum allowed  $\Delta p$  shall not exceed 17 bar. The pressure relief function will tolerate higher pressure differential values.

### Working conditions

Treated water/air temperature: max. 70°C.

Maximum working pressure 40 bar.

Upstream pressure values: from 1,5 to 6 bar or from 5 to 12 bar.

Higher values on request.

### Standard

Certified and tested in compliance with EN 1074/5.

Flanges according to EN 1092/2. Epoxy painting applied through fluidized bed technology blue RAL 5005.

Changes on flanges and painting on request.

### Recommended flow rate - pressure sustaining

DN (mm)	50	65	80	100	125	150
Flow rate min. (l/s)	0,4	0,6	0,9	1,4	2,2	3,2
Flow rate max. (l/s)	4,5	7,6	11	18	28	40

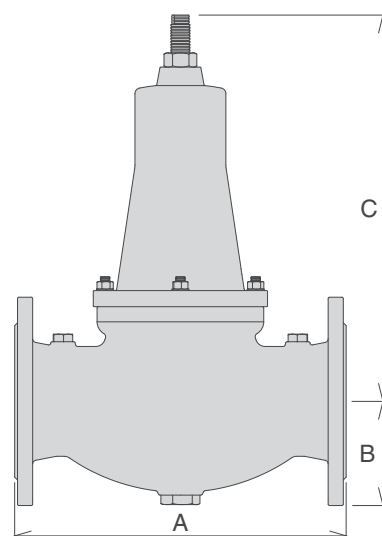
### Recommended flow rate - pressure relief

DN (mm)	50	65	80	100	125	150
Flow rate max. (l/s)	8,8	14	22	35	55	79

### Weights and dimensions

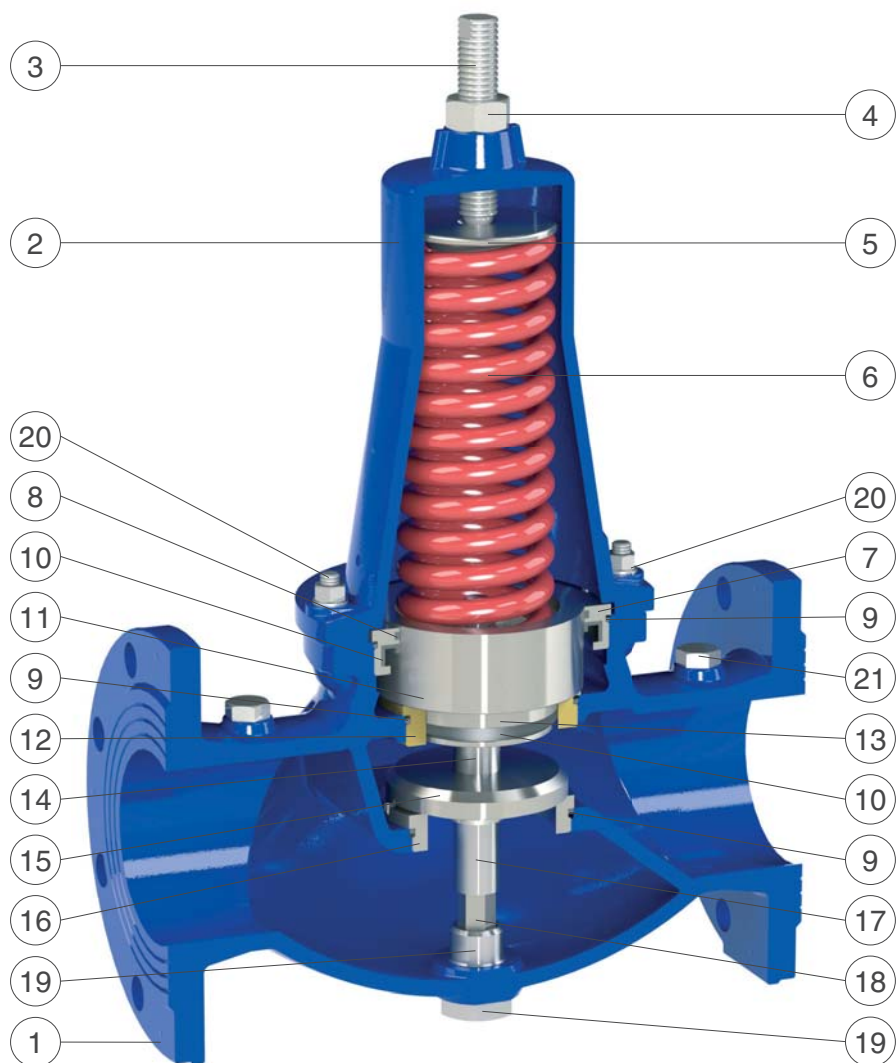
DN (mm)	50	65	80	100	125	150
A (mm)	230	290	310	350	400	450
B (mm)	83	93	100	110	135	150
C (mm)	280	320	350	420	590	690
Weight (Kg)	12	19	24	34	56	74

Values are approximate, consult CSA service for more details.





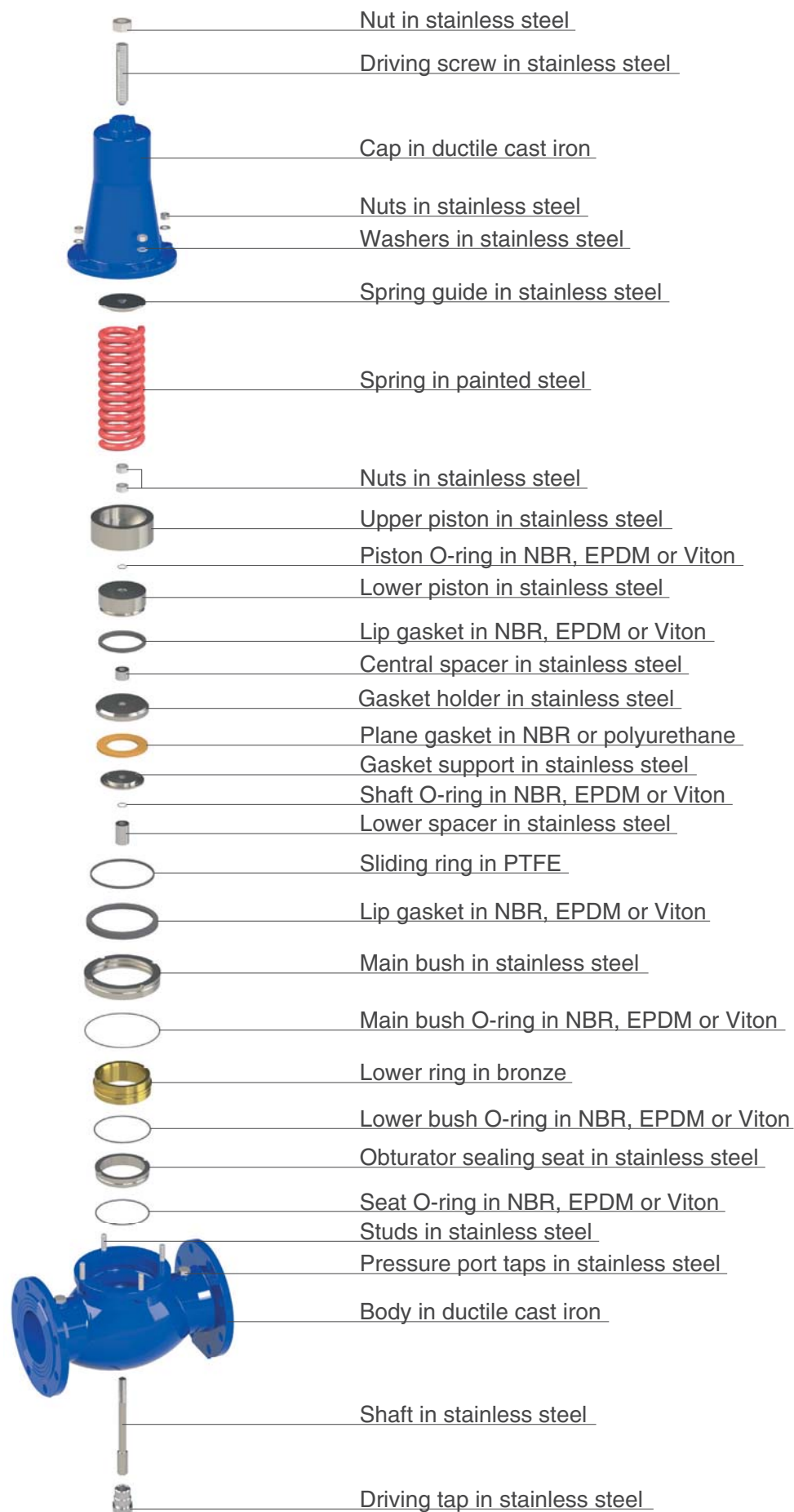
## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	ductile cast iron GJS 500-7 or GJS 450-10	
3	Driving screw	stainless steel AISI 304	stainless steel AISI 316
4	Nut	stainless steel AISI 304	stainless steel AISI 316
5	Spring guide	stainless steel AISI 303	stainless steel AISI 316
6	Spring	spring painted steel 52SiCrNi5	
7	Main bush	stainless steel AISI 304	stainless steel AISI 316
8	Sliding ring	PTFE	
9	O-rings	NBR	EPDM/Viton
10	Gasket	NBR	EPDM/Viton
11	Upper piston	s.s. AISI 303 (bronze CuSn5Zn5Pb5 for DN 125-150)	stainless s. AISI 303/316
12	Lower reinforcements	bronze CuSn5Zn5Pb5	stainless s. AISI 304/316
13	Lower piston	stainless steel AISI 303	stainless steel AISI 316
14	Central spacer	stainless steel AISI 303	stainless steel AISI 316
15	Obturator guide	stainless steel AISI 303	stainless steel AISI 316
16	Obturator sealing seat	stainless steel AISI 304	stainless steel AISI 316
17	Lower spacer	stainless steel AISI 303	stainless steel AISI 316
18	Guiding shaft	stainless steel AISI 303	stainless steel AISI 316
19	Driving tap	stainless steel AISI 303	stainless steel AISI 316
20	Studs, nuts and washers	stainless steel AISI 304	stainless steel AISI 316
21	Taps for pressure gauges	stainless steel AISI 316	

The list of materials and components is subject to changes without notice.

## Spare parts breakdown



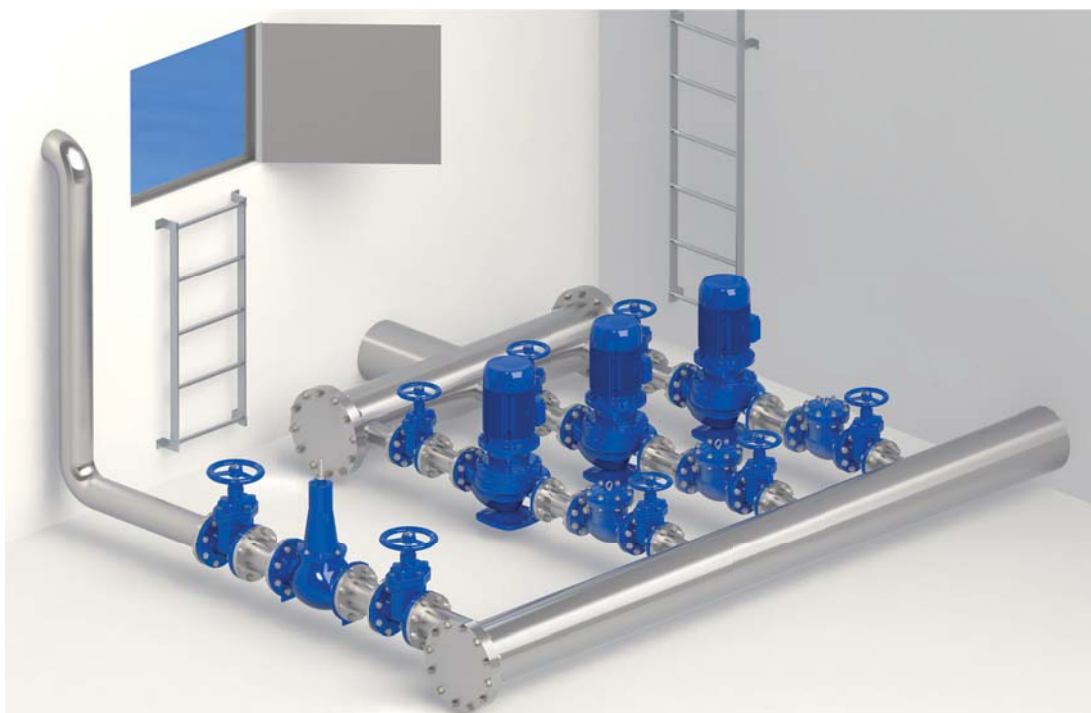
## Installation layout

The picture below shows the installation of CSA pressure relief/sustaining valve VSM as an effective protection device for pressure reducing valves stations, in this case obtained by means of CSA pressure reducing valve VRCD. On the by-pass a smaller VRCD will guarantee for the proper regulation even during maintenance while combination anti-surge air valves CSA Mod. FOX 3F AS allow for the protection against negative pressure and effective removal of air pockets, gathered during start up and working conditions.



## Installation layout

The picture below shows the installation layout of CSA pressure relief/sustaining valve VSM as an effective surge prevention system and protection device for water pumping stations, located in derivation from the main line just downstream of pumps. Thanks to the direct acting pressure balanced piston technology the VSM will guarantee a faster response compared to control valve ensuring the absence of unwanted surge in case of rapid pump start up and, more important, transients consequent to power failure.





## Pressure relief/sustaining valve in stainless steel - Mod. VSM FF

The CSA direct acting spring loaded valve Mod. VSM FF automatically maintains and sustains a minimum pre-set upstream pressure, discharging any excess downstream, regardless of variations in demand and downstream pressure fluctuations. The piston actuated VSM FF will operate in derivation from the line, as a protection from unwanted pressure rises and/or on the line as pressure sustaining valve.



### Technical features and benefits

- Entirely manufactured in stainless steel machined from a solid bar, without any welding.
- Upstream pressure balanced piston technology.
- Different spring ranges available.
- Mobile block composed of stainless steel internals obtained by CNC to ensure the maximum accuracy and sliding precision, this is to ensure the best reliability and to avoid friction.
- Excellent resistance to cavitation and aggressive environments thanks to the design and the use of a wide selection of gaskets made in special materials.

### Applications

- Water distribution systems.
- Fire fighting systems.
- Irrigation systems.
- Buildings and civil installations whenever stainless steel is required or advised for project requirements.
- Demineralized water and bottling plants.
- Industry and cooling systems.

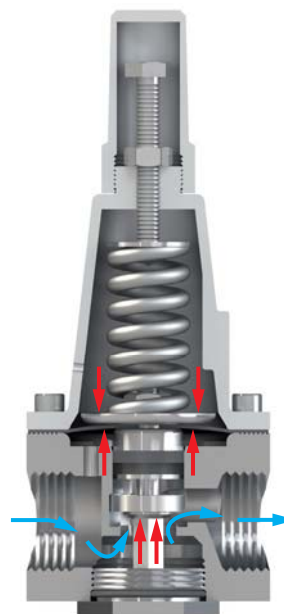
## Operating principle

The operating principle of VSM FF is based on a piston sliding into the body through a drip tight lip gasket. The latter and the diaphragm on the upper part form a watertight chamber, also known as the compensation chamber.



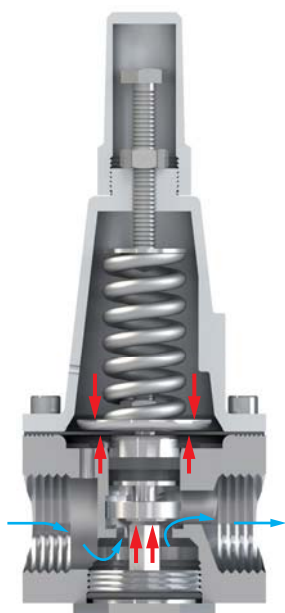
### Valve normally closed

Without any incoming pressure the VSM FF is a normally closed valve, as shown in the picture, where the obturator is kept pushed down to the seat by the force of the spring.



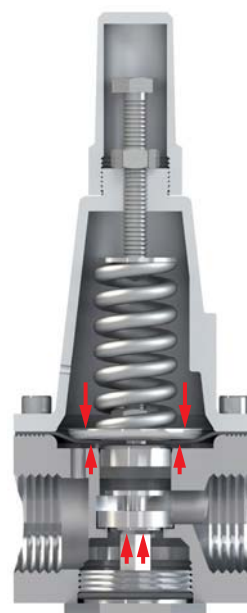
### Valve fully open

Should the upstream pressure rise above the set point of the valve, obtained by the compression of the spring, the VSM FF will open completely allowing the full passage through the seat.



### Valve modulating

Should the upstream pressure fluctuate around the valve's set point the obturator, thanks to the difference in force between the spring pushing downwards and the incoming pressure underneath and through the compensation chamber pushing upwards, will move throttling the flow through the seat in order to maintain the minimum required value.



### Valve fully closed (static conditions)

Should the water supply and upstream pressure begin to drop, the VSM FF will react immediately to maintain and stabilize the required value even in static conditions, thanks to the pressure balanced technology and compensation chamber.

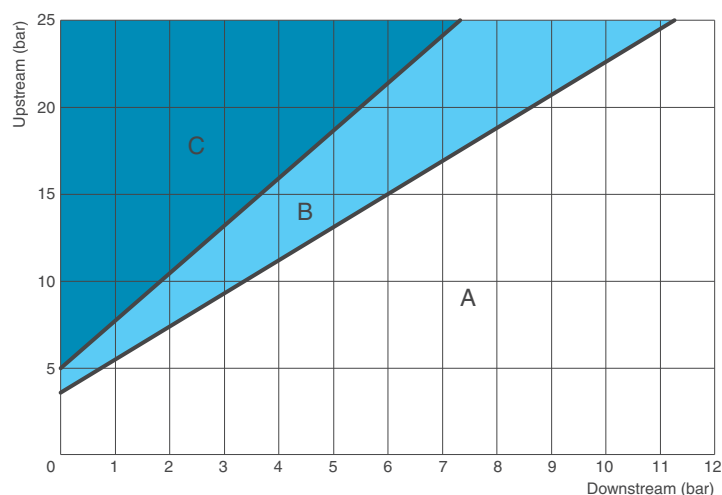


## Technical data

Thread (inches)	1"
Kv (m³/h)/bar	4,95

### Head loss coefficient

Kv coefficient representing the flow rate which is flowing through the valve fully open producing a head loss of 1 bar.



### Cavitation chart

- A: Recommended working conditions;
- B: Incipient cavitation;
- C: Damage cavitation.

Ensure that the working point, obtained connecting upstream (y axis) and downstream (x axis) pressure conditions, falls on the A zone with the smallest valve to meet the required flow, contact CSA for further assistance. The chart is to be used for valves modulating with an opening percentage between 35-40% at standard water temperature and elevation below 300 m. For continuous pressure sustaining the maximum allowed  $\Delta p$  shall not exceed 17 bar. The pressure relief function will tolerate higher pressure differential values.

### Working conditions

Treated water with a maximum temperature of 70°C.  
Higher temperatures on request.  
Upstream pressure (inlet): maximum 25 bar.

### Standard

Certified and tested in compliance with EN 1074/5.  
Threaded BSP connections.  
Variations on the thread available on request.

### Recommended flow rate - pressure sustaining

Thread (inches)	1"
Flow rate min. (l/s)	0,03
Flow rate max. (l/s)	0,8

### Recommended flow rate - pressure relief

Thread (inches)	1"
Flow rate max. (l/s)	1,4

### Springs pressure ranges

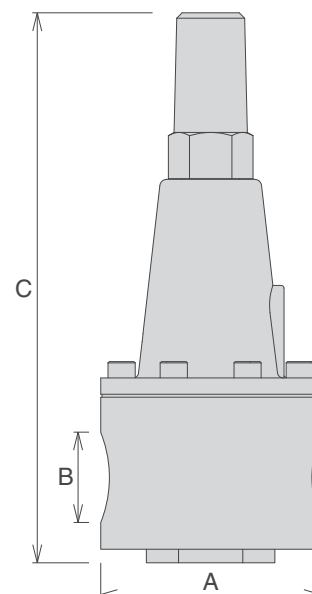
Thread (inches)	1"
Spring pressure (bar)	0,7-7
	1,5-15

Higher values available on request.

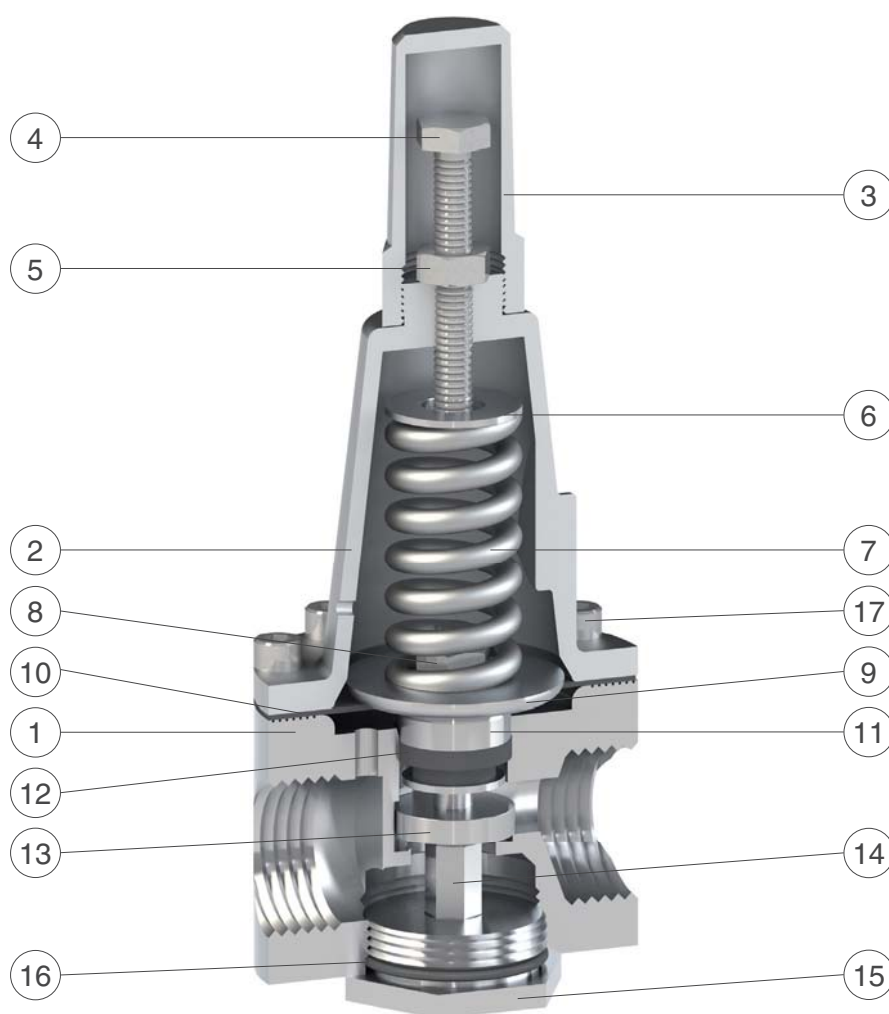
### Weights and dimensions

Thread (B) inches	1"
A (mm)	81
C (mm)	205
Weight (Kg)	2,7

Values are approximate, consult CSA service for more details.



## Technical details



N.	Component	Standard material	Optional
1	Body	stainless steel AISI 303	stainless steel AISI 316
2	Cover	nickel-plated bronze	stainless steel
3	Hood	stainless steel AISI 303	stainless steel AISI 316
4	Regulating screw	stainless steel AISI 304	stainless steel AISI 316
5	Nut	stainless steel AISI 304	stainless steel AISI 316
6	Spring guide	stainless steel AISI 303	stainless steel AISI 316
7	Spring	painted steel 52SiCrNi5	
8	Self-locking nut	stainless steel AISI 304	stainless steel AISI 316
9	Upper flat	stainless steel AISI 303	stainless steel AISI 316
10	Diaphragm	neoprene	
11	Piston	stainless steel AISI 303	stainless steel AISI 316
12	Lip gasket	NBR	EPDM/Viton
13	Obturator with plane gasket	stainless steel AISI 303 and polyurethane	stainless steel AISI 316
14	Blocking nut	stainless steel AISI 303	stainless steel AISI 316
15	Driving tap	stainless steel AISI 303	stainless steel AISI 316
16	O-ring	NBR	EPDM/Viton
17	Screws	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.



## Fast acting anti-water hammer valve Mod. VRCA

The CSA fast acting, surge prevention, pressure relief valve Mod. VRCA has been designed to avoid the devastating effects of water hammers in pipeline networks. The purpose is actually to prevent pressure from rising above a pre-set value, thanks to its capability of discharging the excessive volume of water directly into the atmosphere.



### Technical features and benefits

- Solid and compact design suitable for treated and raw water and to reduce blow-back.
- Negligible inertia of the internal mobile parts ensuring the absence of friction and long lasting performances.
- Perfect water tightness and excellent resistance to cavitation and harsh working conditions due to the floating obturator technology and to the use of special gaskets and high resistant stainless steel grades.
- Fast and accurate response without any hysteresis effect thanks to high frequency annealed springs.
- Reduced overpressure thanks to a wide selection of spring and ranges in pressure.
- Water vertical discharge deflector.

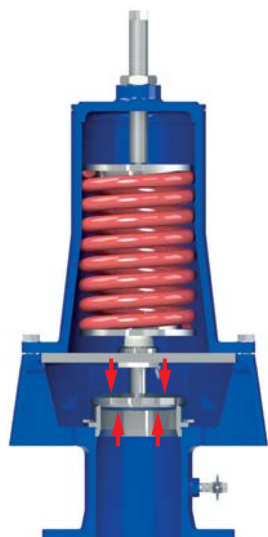
### Applications

- Downstream of pumping stations to cushion sudden overpressure as a result of pump start up and power failure (in case of one of more pumps in parallel).
- Downstream and upstream of main transmission lines, or pipe segments, not able to endure critical conditions such as sudden and unexpected rise in pressure, and to guarantee reliable system protection.
- Downstream of a pressure reducing valve as a safety device.
- Upstream of modulating and sectioning devices with rapid response time, likely to generate unwanted surges.
- In general, whenever and wherever pipe bursts are expected.

## Operating principle

The valve must be pre-set at first, simply acting on the spring, to open whenever the pressure rises above a certain value considered critical for the system.

The particular shape and construction, along with the perfect centring of the mobile block, will protect the upper part against water spurts coming from VRCA operation cycles. The valve is supplied with a pressure gauge and drainage ball valve, in order to facilitate the pressure measurement and setting procedure directly on the field.

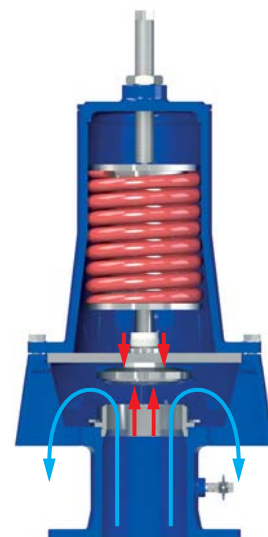


### Valve closed

Should the pressure remain below the valve's set point the VRCA will be perfectly closed, thanks to the compression of the spring pushing the obturator down to the seat.

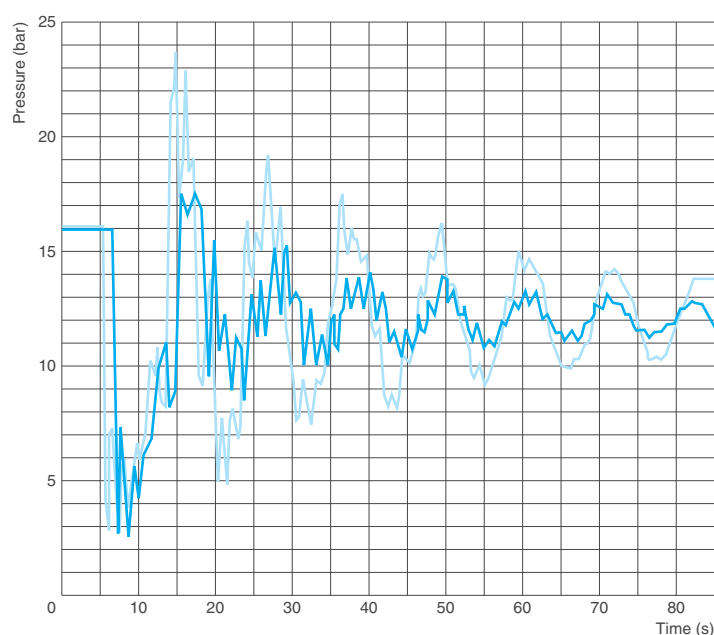
### Valve open

Should the pressure rise above the valve's set point the obturator will rise, discharging to the atmosphere the excessive fluid volume necessary to avoid the upsurge.

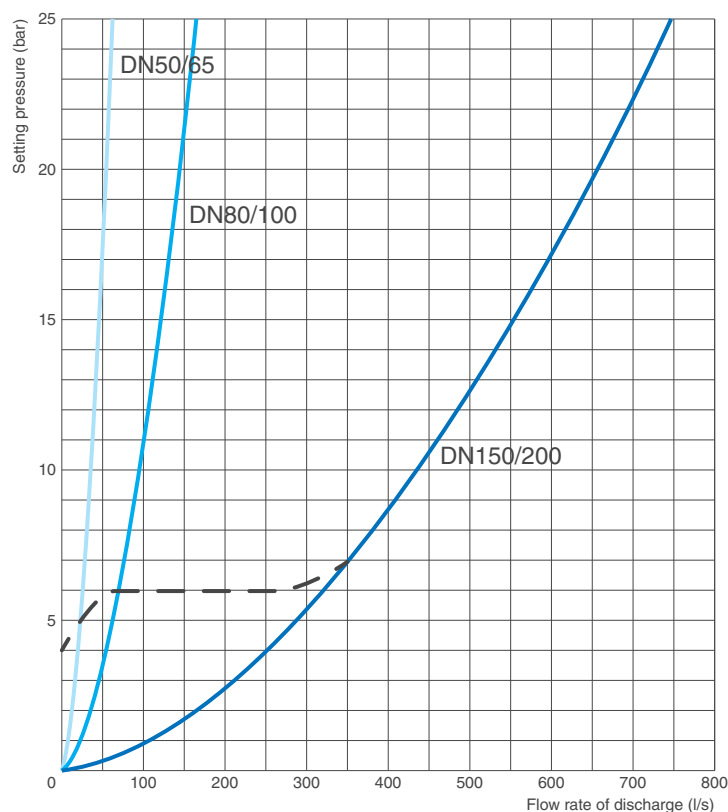


## Fast acting performance

The graph below shows the response of the fast acting pressure relief valve VRCA under transient conditions. In this particular case we have actual pressure recordings from a pump station subject to frequent power failures. Without any protection the system was subject to a decrease in pressure at first followed by a dangerous surge, depicted on the plot in light blue, while with the installation of the VRCA fast acting relief valve the increase in pressure was contained with no further damage to the pipeline. The frequency of the recording with the valve shows the absence of delay with regards to the same without, proving the adequate response time. On the picture on the right particular of the valve during discharge, the vertical deflector on the lower body ensures the absence of spurts around it.



## Technical data

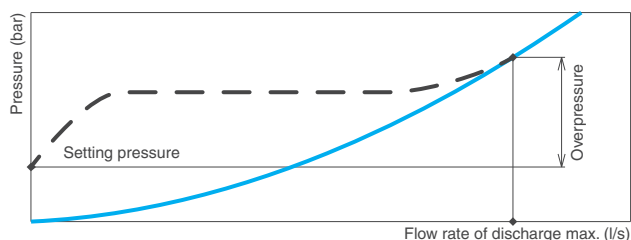


DN mm	PN bar	Setting bar	Flow rate max. l/s	Overpressure bar
50/65	10	1-8	36	0,8
50/65	16	8-16	47	1,5
50/65	25	16-25	62	2,2
80/100	10	1-8	95	1
80/100	16	8-16	126	2
80/100	25	16-25	165	2,5
150/200	10	1-8	435	2
150/200	16	8-16	577	2,5
150/200	25	16-25	745	3,5

### Valve discharge sizing chart

The plot on the left shows the valve's capacity during discharge with full opening of the obturator. For the adequate protection of the pipeline we strongly advice to size the valve in order to cope with at least 35% of the nominal flow, while a more comprehensive and detailed surge analysis is available from CSA on request.

The overpressure is another important aspect to be considered during sizing, with an indication of the behaviour of the valve under transient events depicted below by a tolerance between static and dynamic expressed by the overpressure value.

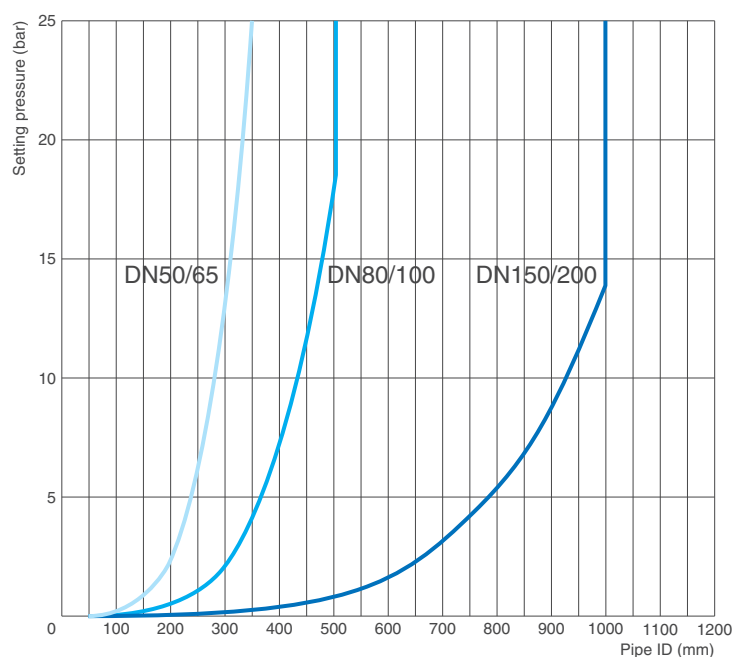


### Discharge rate and overpressure

The table shows the discharge flow rates of the valve with different pressure set-points, and the corresponding overpressure. The VRCA are supplied with three springs to cover the following pressure ranges:

- 1-8 bar,
- 8-16 bar,
- 16-25 bar.

Higher values are available on request for the DN 50/65 and the DN 80/100.



### Preliminary sizing chart

The function of the fast acting relief valve CSA Mod. VRCA is to protect piping systems, pumps, vessels and other equipment from excess in pressure and potential damages.

For the sizing overpressure values, blow-down effects and installation criteria must be taken into account, purely as an indication and for a preliminary assessment use the following chart showing the recommended valve's DN versus pressure setting and pipe ID. Ensure that the operating conditions fall on the left of the curve of the chosen valve.



## Installation

The fast acting pressure relief valve VRCA must be installed in a vertical position with isolation device to ensure the proper maintenance and, if required, setting on the field. The installation chamber, if within a closed environment of underground, shall be provided with a proper drainage system to avoid the risk of flooding during the valve's discharge. Shouldn't a valve be enough for the purpose we recommend the installation of two units in parallel with a manifold to be sized on request, and/or two or even more valves in series located on separated outlets.



## Working conditions

Treated and raw water with a maximum temperature of 70°C.

Maximum pressure 25 bar. Spring setting ranges: 1-8 bar, 8-16 bar, 16-25 bar.

Higher pressure values on request.

## Standard

Certified and tested in compliance with EN 1074/5. Flanges according to EN 1092/2.

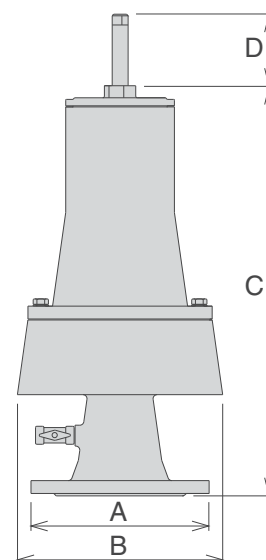
Epoxy painting blue RAL 5005 applied through fluidized bed technology.

Changes on flanges and painting on request.

## Weights and dimensions

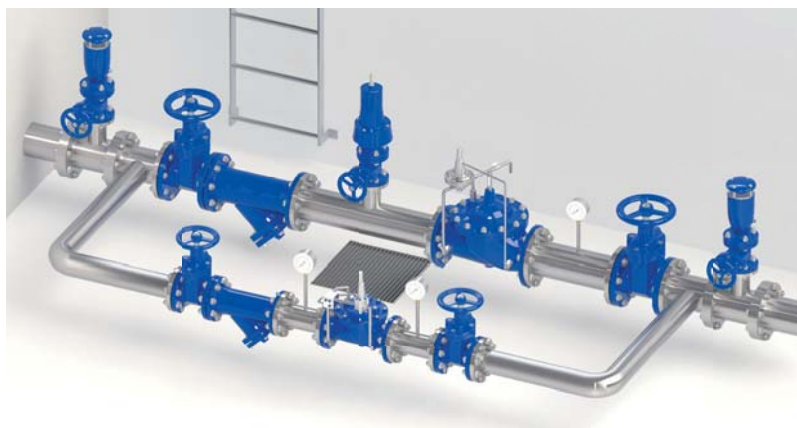
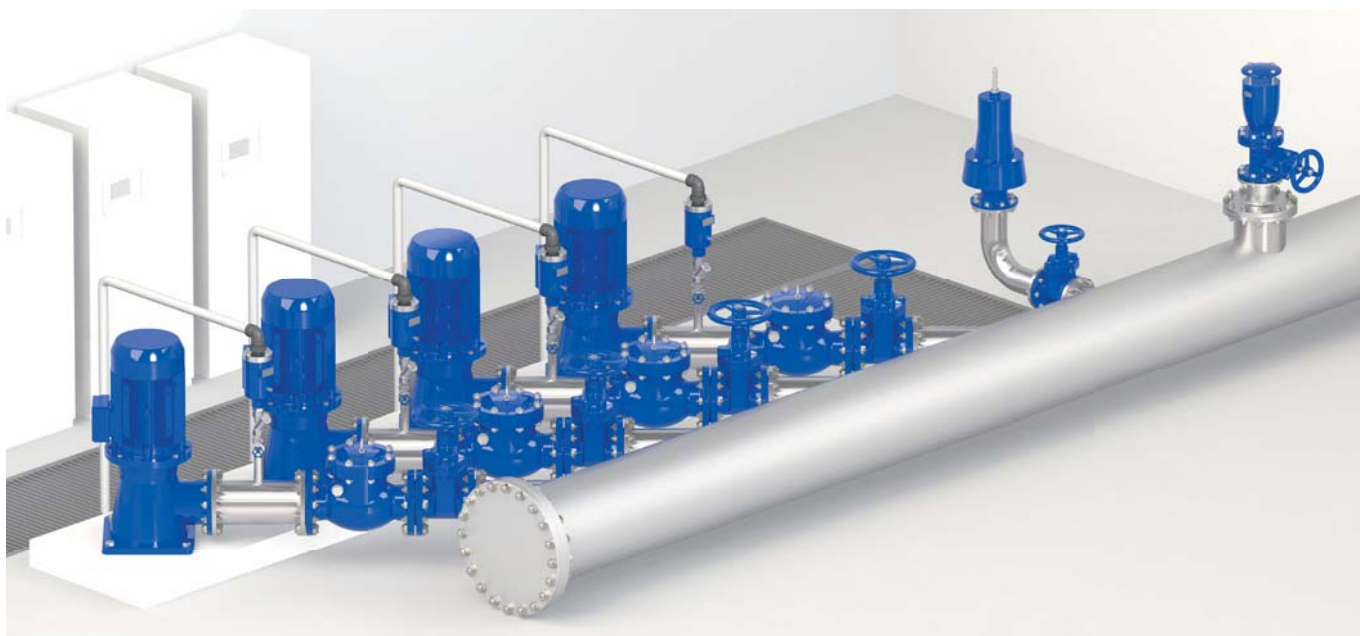
DN mm	A mm	B mm	C mm	D mm	Seat DN mm	Weight Kg
50/65	185	185	417	40	40	14
80/100	235	242	540	50	62	28
150	300	404	720	220	137	75
200	360	404	720	220	137	79

Values are approximate, consult CSA service for more details.



## Example of common applications

**Pumping station.** The following pictures shows some common applications for the fast acting pressure relief valve VRCA. The VRCA is installed downstream of pumps check valves, as close to the drain as possible. The installation in vertical position, away from the main pipe, avoid potential spurts generated during discharge. Particular of the installation with an anti surge combination air valve CSA FOX / Lynx 3F AS for the protection against negative pressure conditions.



### Burst valves and opening/closing devices

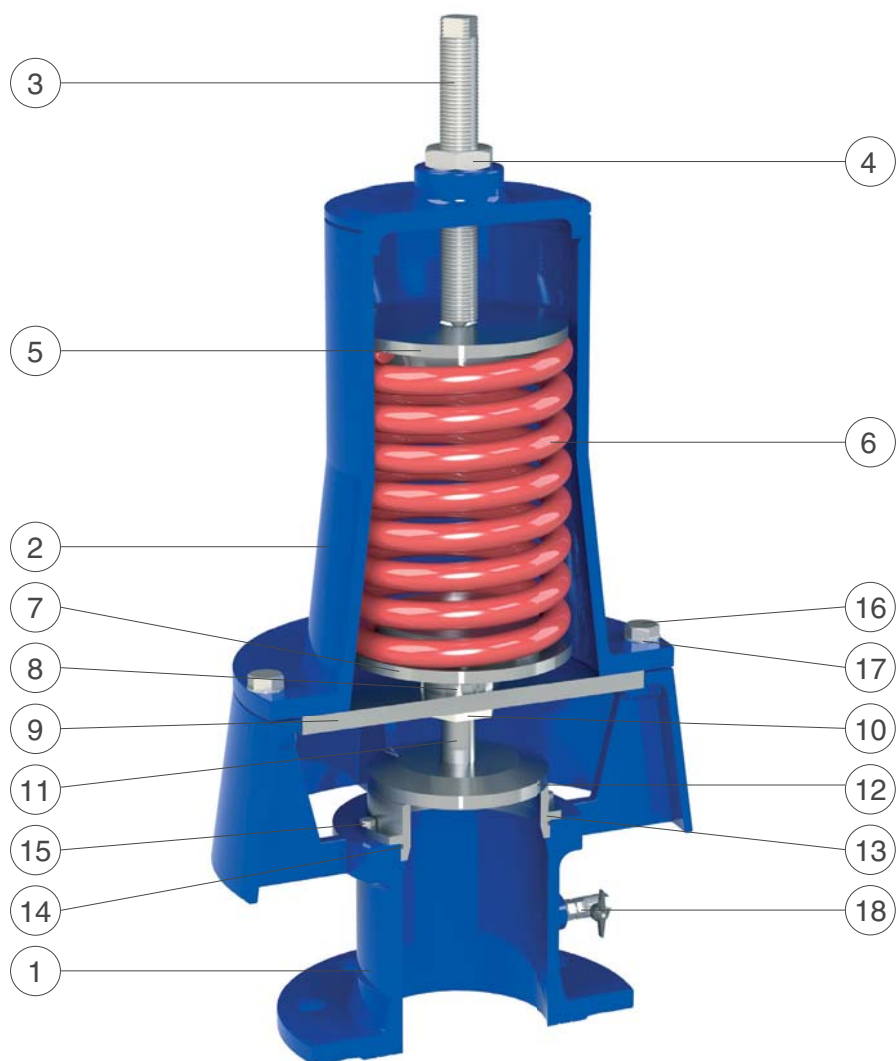
The VRCA is installed upstream of fast closing devices, such as burst flow automatic control valve Mod XLC 380/480 model, due to the potential upsurge created by the flow interruption. Air valves CSA combination anti-surge FOX or LYNX 3F AS or RFP are always recommended upstream and downstream of the installation.



### Level control

In case of level control, especially with valve controlling the minimum and maximum, the risk of overpressure and danger to the pipeline has to be considered. We strongly recommend, should that be the case, to install a VRCA upstream of the regulating device or to contact CSA for different solutions.

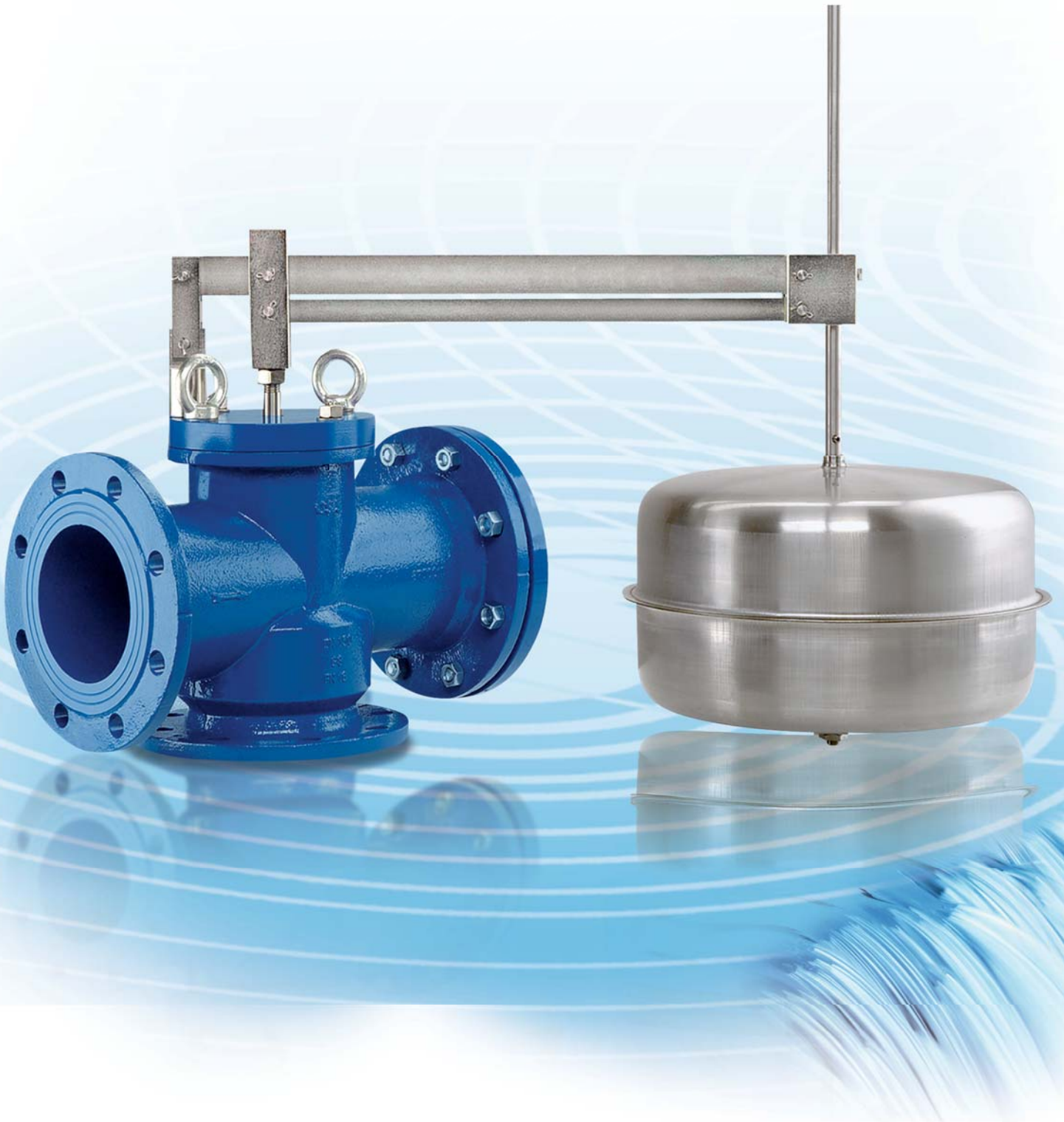
## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 500-7 or GJS 450-10	
2	Cap	duct. cast iron GJS 500-7 or 450-10 and painted steel	
3	Driving screw	stainless steel AISI 304	stainless steel AISI 316
4	Nut	stainless steel AISI 304	stainless steel AISI 316
5	Spring support	stainless steel AISI 303 (304 for DN 150-200)	stainless steel AISI 316
6	Spring	spring painted steel 52SiCrNi5	
7	Spring housing	stainless steel AISI 303 (304 for DN 150-200)	stainless steel AISI 316
8	Ring	stainless steel AISI 304	stainless steel AISI 316
9	Separation plate	s.s. AISI 304 (painted steel for DN 150-200)	stainless steel AISI 316
10	Driving sleeve	Delrin (s. s. AISI 304 for DN 150-200)	
11	Shaft	stainless steel AISI 304	stainless steel AISI 316
12	Obturator	stainless steel AISI 303 (304 for DN 150-200)	stainless steel AISI 316
13	Sealing seat	stainless steel AISI 304 (303 for DN 50/65)	stainless steel AISI 316
14	O-ring	NBR	EPDM/Viton
15	Screws	stainless steel AISI 304	stainless steel AISI 316
16	Screws	stainless steel AISI 304	stainless steel AISI 316
17	Washers	stainless steel AISI 304	stainless steel AISI 316
18	Ball valve 1/4"	nickel-plated brass	stainless steel AISI 316

The list of materials and components is subject to changes without notice.





## Float valves Athena



### ■ Equilibrium ball float valve with balanced single seat Mod. ATHENA

Direct acting level control valve. The body with three ways allows both the angle and globe pattern installations. 276

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### ■ Equilibrium ball float valve with balanced single seat Mod. ATHENA 1"- 1" 1/4

Model with threaded connection. For the level regulation of small tanks and reservoirs. 280

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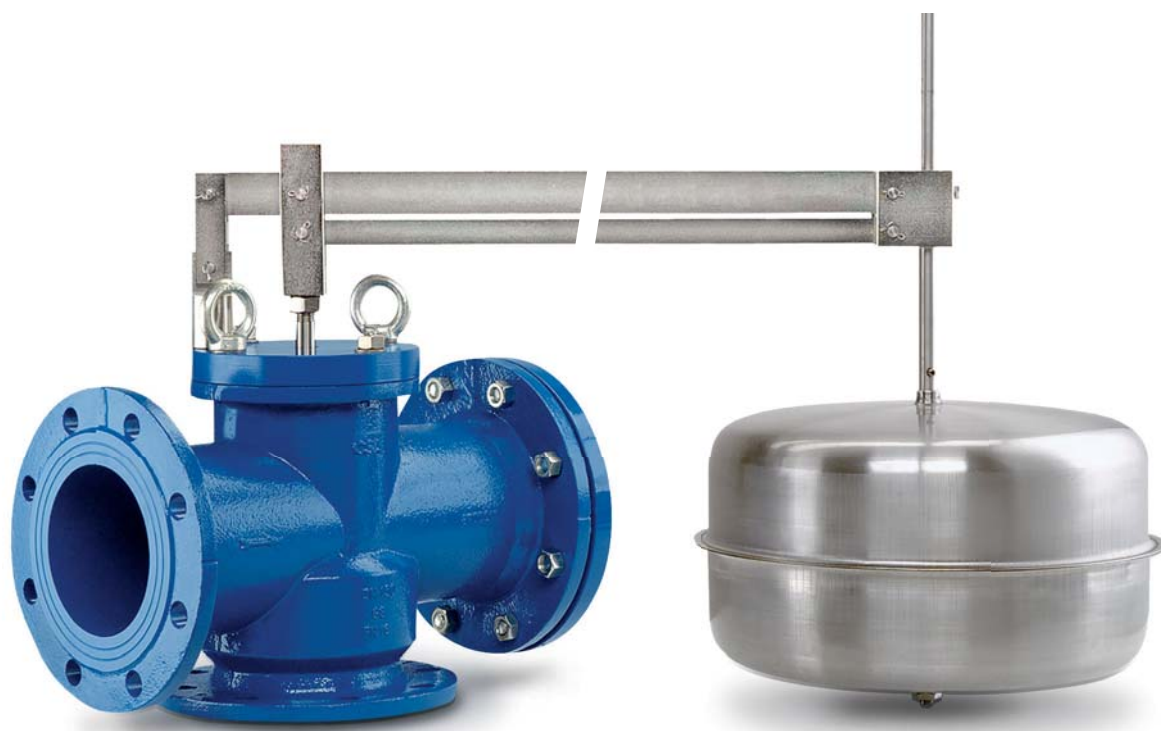
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## Equilibrium ball float valve with balanced single seat - Mod. ATHENA

The ATHENA is a single seat upstream pressure balanced equilibrium ball float valve, which automatically controls the constant level of a tank or reservoir, regardless of upstream pressure variations, and shuts off when the maximum level is reached. Thanks to its exclusive technology ATHENA brings the concept of reliability and performance to the highest standards.



### Technical features and benefits

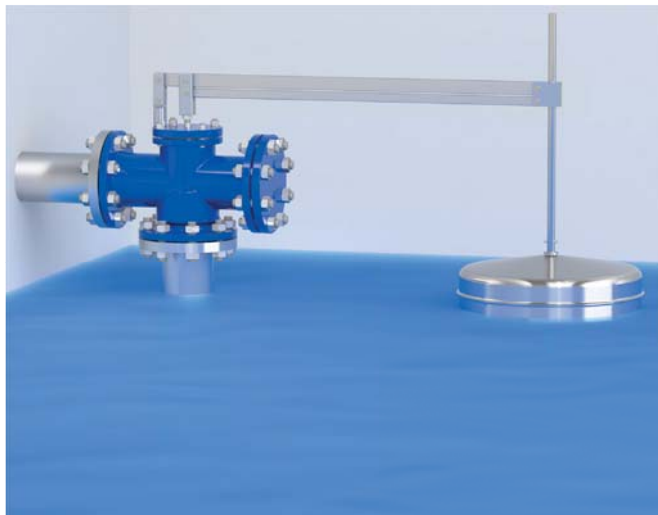
- Body in ductile cast iron with three ways, allowing the installation both with an angle or a globe pattern, containing an interchangeable sealing seat and piston in stainless steel and a guiding bush in bronze.
- Mobile block composed of the main shaft, obturator, gasket retainer and piston featuring a unique self-cleaning technology (pat. pending) to reduce the accumulation of dirt and maintenance operations.
- The lever mechanism, in zinc-plated or stainless steel, is obtained from a double rod (single rod for DN 40/50/65) which, by means of pivots, puts the shaft in communication with the float which imparts the movement allowing the opening or closing of the valve.
- A large float in stainless steel AISI 304/316 is connected to the lever mechanism by means of a stainless steel pipe, onto which it exerts a vertical force.
- The valves modulates and throttle the inflow proportionally to the consumption, accuracy and perfect water-tightness is guaranteed also with low pressure values.
- Thanks to the upstream pressure balanced seat the movement of the obturator and valve performance is not affected by upstream pressure fluctuations, transient and unwanted surges are therefore avoided.

### Applications

- Water distribution systems.
- Fire protection storage tanks.
- Irrigation systems.
- Whenever the constant level regulation and control function is required.

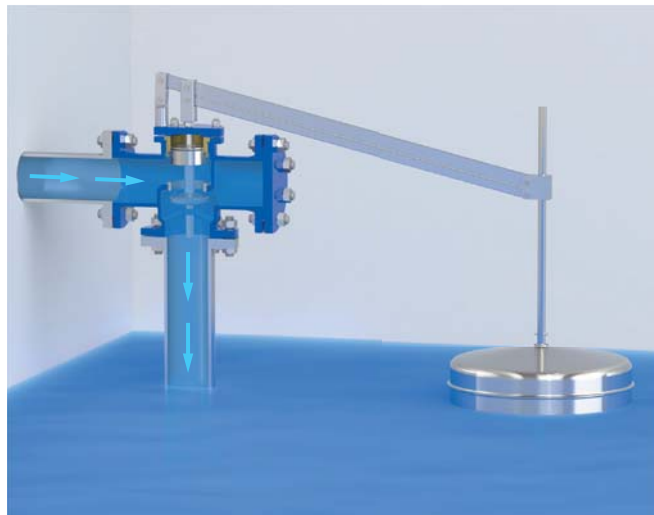
## Operating principle - Angle pattern installation

Athena ball float valve is the best solution for a constant maximum level control balancing the inflow and outflow demand. Driven by a large float in stainless steel the valve closes drip-tight at the maximum level, and modulates to maintain it as soon as it drops due to consumptions.



### Closed valve

When water level reaches the maximum operating point levers are perfectly horizontally aligned and the valve closes thanks to the upward force exerted by the float.

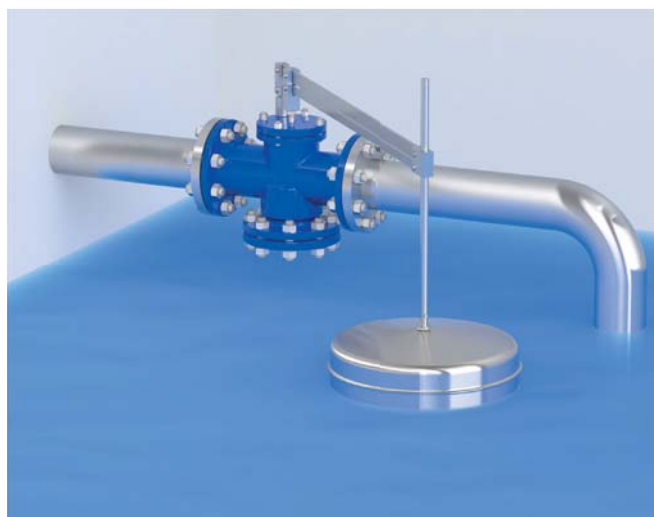
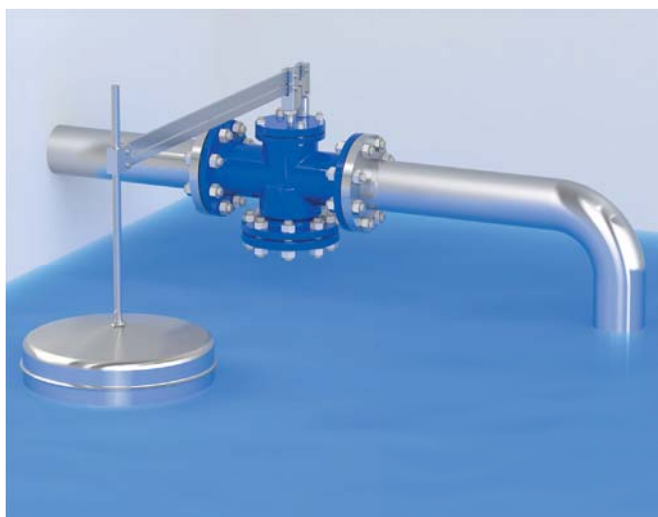


### Opened valve

As the reservoir level drops the valve opens proportionally through the levers, receiving a downward force from the float, to increase the filling rate.

## Globe pattern installation

The three ways body of Athena allows both the installations an angle and globe pattern, simply by placing the blank flange to the desired outlet. The lever mechanism is normally aligned with the valve axis. It is possible to rotate it on site, with an angle of 45°/90°, to fit the installation requirements.



## Optional



■ **Anti freezing device.** On request the valve is provided with a 3/8" G threaded outlet, which can be used as an anti-freezing device, simply by replacing the tap with a drainage ball valve discharging directly into the tank.

During the winter season, when the temperature drops consistently, the partial opening of the drainage port will create a flow circulation avoiding frost and possible damages related to it.

## Technical data



### Installation

- Make sure that the supply pipe has the flanges drilled according to the requested PN and that ATHENA is installed horizontally, properly fixed and sustained.
- Gate valves and filters have to be installed to allow for maintenance operations, and to prevent dirt from reaching the internal components of the valve.
- Position the valve in a place which is easy to reach and wide enough for maintenance and control purposes.
- Observe the overflow level and make sure that the outlet flange remains always above it, this is to avoid back-flow.
- In case of excessive  $\Delta p$ , to avoid cavitation and possible damages to the valve, a direct acting pressure reducing valve CSA VRCD series should be installed.

### Working conditions

Treated water maximum temperature 70°C.  
Max. pressure PN 16 (please contact us for higher values).  
To avoid cavitation recommended  $\Delta p$  6,5 bar for angle pattern, and 4,8 bar for globe pattern installation.

### Standard

Certified and tested in compliance with EN-1074/5.  
Flanges according to EN 1092/2.  
Epoxy painting applied through fluidized bed technology blue RAL 5005. Variations on flanges and painting on request.

DN mm	40	50	65	80	100	125	150	200	250	300
Kv (m³/h)/bar	21,6	21,6	46,8	68,4	108	155	245	360	648	1008

DN mm	40	50	65	80	100	125	150	200	250	300
Kv (m³/h)/bar	18,4	18,4	39,6	59,4	90	133	209	313	576	864

### Head loss coefficient for angle pattern

Kv coefficient representing the flow rate flowing through the valve fully open, and producing a head loss of 1 bar.

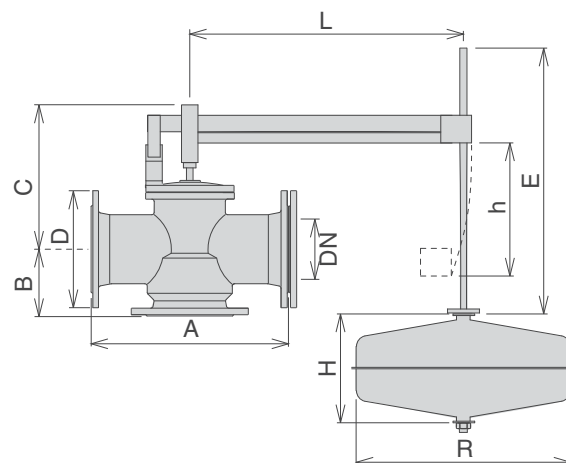
### Head loss coefficient for globe pattern

Kv coefficient representing the flow rate flowing through the valve fully open, and producing a head loss of 1 bar.

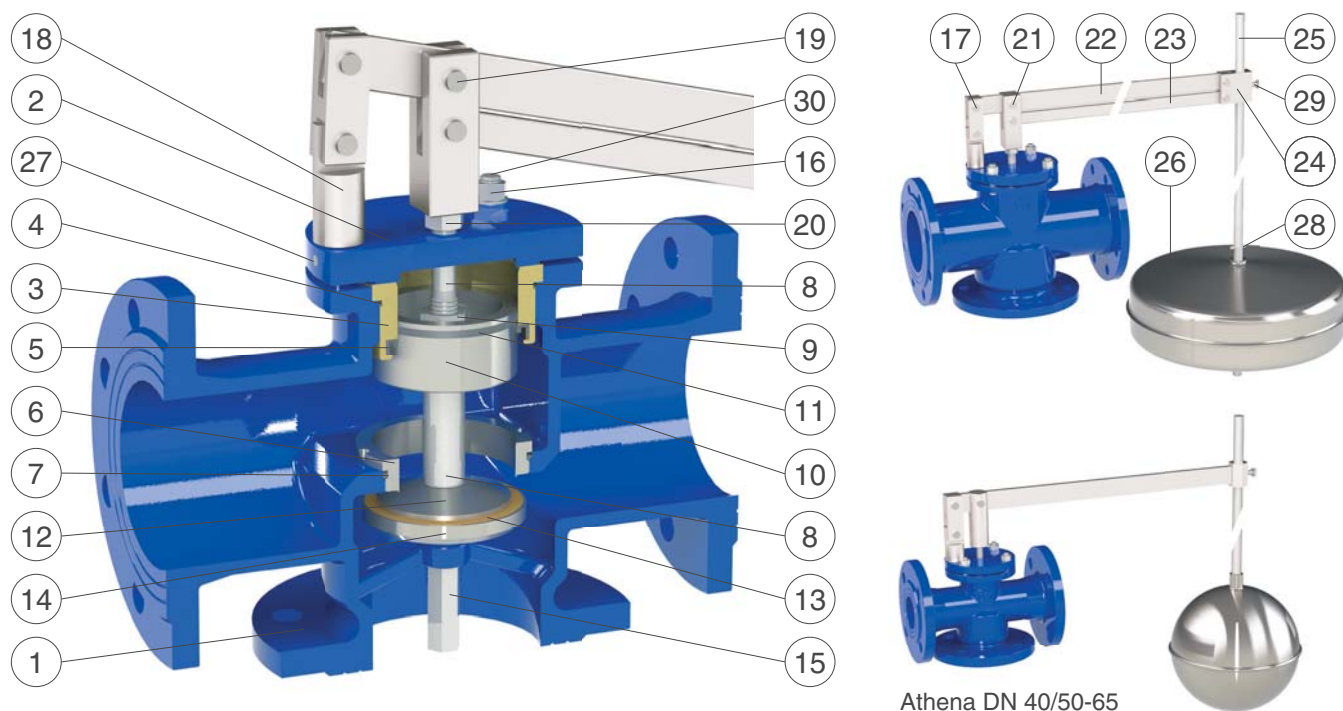
### Weights and dimensions

DN mm	A mm	B mm	C mm	D mm	L mm	H mm	R mm	h mm	E mm	Wt Kg
40	230	82,5	173	165	600	Ø220		105	525	21
50	230	82,5	173	165	600	Ø220		105	525	21
65	290	92,5	193	185	600	Ø220		180	525	26
80	310	100	235	200	800	200	300	210	820	33
100	350	125	233	220	800	180	400	267	820	41
125	400	125	238	250	800	180	400	267	820	49
150	480	162	371	285	1000	250	400	400	820	79
200	600	183	420	340	1000	250	400	418	820	118
250	730	270	540	405	1220	300	500	510	1258	215
300	850	300	610	460	1400	400	500	610	1460	250

All values are approximate, consult CSA service for more details.



## Technical details



Athena DN 40/50-65

N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 450-10 or GJS 500-7	
2	Cap	painted steel	
3	Guiding bushing	bronze CuSn5Zn5Pb5 (painted steel for DN 250-300)	stainless s. AISI 304/316
4	O-ring	NBR	EPDM/Viton
5	Lip gasket	NBR	EPDM/Viton
6	Seat	stainless steel AISI 304	stainless steel AISI 316
7	O-ring	NBR	EPDM/Viton
8	Guiding shaft	stainless steel AISI 303	stainless steel AISI 316
9	Blocking nut	stainless steel AISI 304	stainless steel AISI 316
10	Piston	stainless steel AISI 303	stainless steel AISI 316
11	Guiding ring	PTFE	
12	Counter-seat	stainless s. AISI 303 (painted steel for DN 250-300)	stainless s. AISI 304/316
13	Plane gasket	NBR	polyurethane
14	Obturator	stainless s. AISI 303 (AISI 304 for DN 200-250-300)	stainless steel AISI 316
15	Tightening nut	stainless steel AISI 303	stainless steel AISI 316
16	Nuts (or screws) and washers	stainless steel AISI 304	stainless steel AISI 316
17	Upper coupling	zinc-plated steel	stainless s. AISI 304/316
18	Lower coupling	zinc-plated steel	stainless s. AISI 304/316
19	Pivots	stainless steel AISI 303	stainless steel AISI 316
20	Blocking nut	stainless steel AISI 304	stainless steel AISI 316
21	Shaft pivot	zinc-plated steel	stainless s. AISI 304/316
22	Upper lever	zinc-plated steel	stainless s. AISI 304/316
23	Lower lever (from DN 80)	zinc-plated steel	stainless s. AISI 304/316
24	Float coupling (from DN 80)	zinc-plated steel	stainless s. AISI 304/316
25	Float rod	stainless steel AISI 304	stainless steel AISI 316
26	Float	stainless steel AISI 304	stainless steel AISI 316
27	Plug (screw from DN 150 to 300)	stainless steel AISI 304	stainless steel AISI 316
28	Elastic pin (from DN 80)	stainless steel AISI 304	
29	Screw	stainless steel AISI 304	stainless steel AISI 316
30	Studs (from DN 150 to 300)	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.



## Equilibrium ball float valve with balanced single seat - Mod. ATHENA 1"- 1 1/4"

The ATHENA 1" - 1 1/4" is an equilibrium, single seat upstream pressure balanced float valve, which automatically controls the constant level of a tank or reservoir, regardless of upstream pressure variations, and shuts off when the maximum level is reached. Thanks to its exclusive technology this valve brings the concept of reliability and performance to the highest standards.



### Technical features and benefits

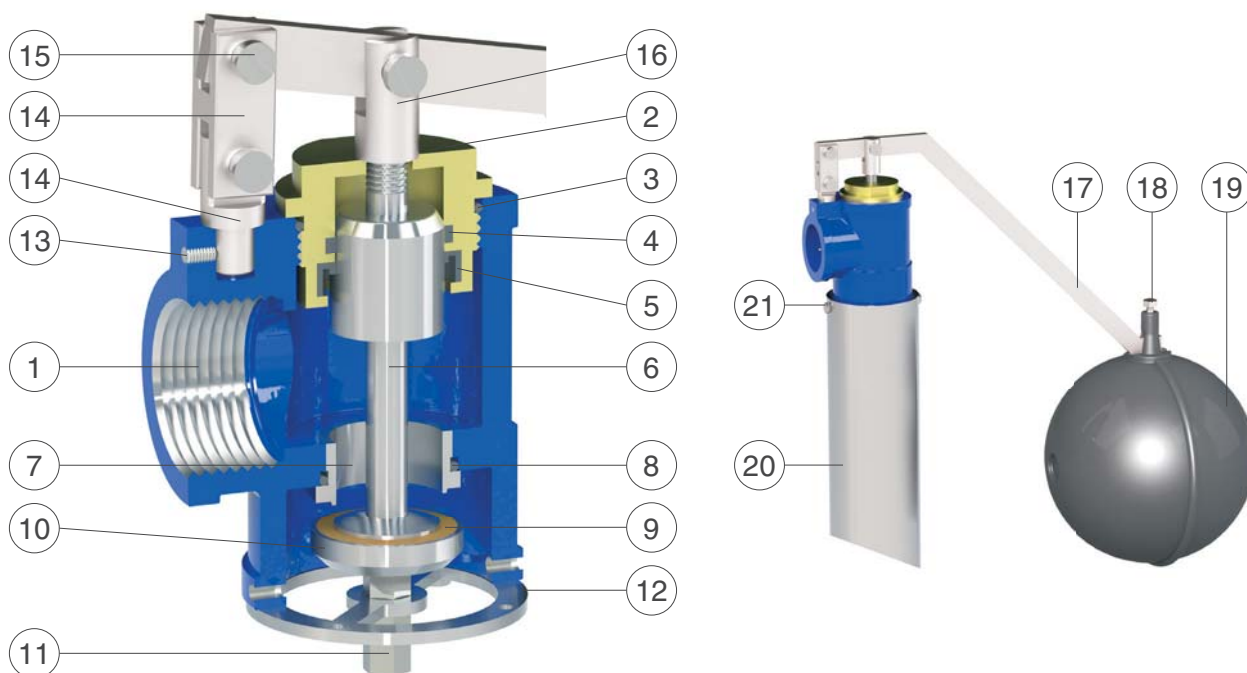
- Body in ductile cast iron PN 16.
- Cover in brass or stainless steel provided with the self cleaning piston technology driving system.
- Mobile block containing the piston and obturator, both in stainless steel.
- The lever mechanism is made in zinc-plated or stainless steel and composed of a rod which, thanks to a system of pivots, puts the main shaft in communication with the float allowing the opening or closing of the valve.
- Designed for angle pattern installation only and to allow flow conveyance through the outlet.
- The valves modulates and throttle the inflow proportionally to the consumption, accuracy and perfect water-tightness is guaranteed also with low pressure values.
- Thanks to the upstream pressure balanced seat the movement of the obturator and valve performance is not affected by upstream pressure fluctuations, transient and unwanted surges are therefore avoided.
- Pipe (available on request) Ø 76,1X1,5 mm in stainless steel to convey the flow towards the tank.

### Applications

- Water distribution systems.
- Fire protection storage tanks.
- Irrigation systems.
- Whenever the constant level regulation and control function is required.



## Technical details



N.	Component	Standard material	Optional
1	Body	ductile cast iron GJS 450-10 or GJS 500-7	
2	Cap	brass	stainless s. AISI 303/316
3	O-ring	NBR	EPDM/Viton
4	Guiding ring	PTFE	
5	Gasket	NBR	EPDM/Viton
6	Piston with shaft	stainless steel AISI 303	stainless steel AISI 316
7	Seat	stainless steel AISI 303	stainless steel AISI 316
8	O-ring	NBR	EPDM/Viton
9	Plane gasket	NBR	polyurethane
10	Obturator	stainless steel AISI 303	stainless steel AISI 316
11	Tightening nut	stainless steel AISI 303	stainless steel AISI 316
12	Lower guiding ring	stainless steel AISI 304	stainless steel AISI 316
13	Plug	stainless steel AISI 304	stainless steel AISI 316
14	Upper and lower coupling	zinc-plated steel	stainless s. AISI 304/316
15	Pivots	stainless steel AISI 303	stainless steel AISI 316
16	Shaft coupling	zinc-plated steel	stainless steel AISI 316
17	Float lever	zinc-plated steel	stainless steel AISI 316
18	Screw	zinc-plated steel	stainless s. AISI 304/316
19	Float	polyethylene	stainless steel
20	Conveying pipe (optional)	stainless steel AISI 304	stainless steel AISI 316
21	Screws (optional)	stainless steel AISI 304	stainless steel AISI 316

The list of materials and components is subject to changes without notice.

## Working conditions and head loss

Treated water maximum temperature 70°C.

Maximum pressure PN 16.

To avoid cavitation, recommended  $\Delta p$  8 bar.

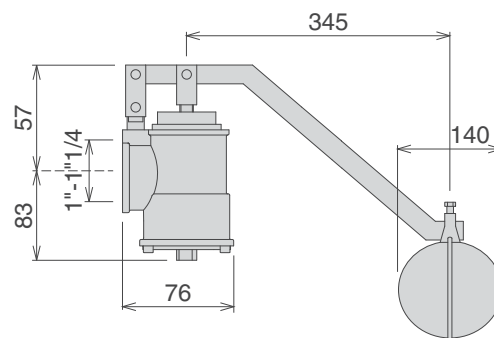
The Kv of the valve, meaning the flow rate expressed in m<sup>3</sup>/h producing a head loss of 1 bar, is 12,6.

## Standard

Certified and tested in compliance with EN 1074/5.

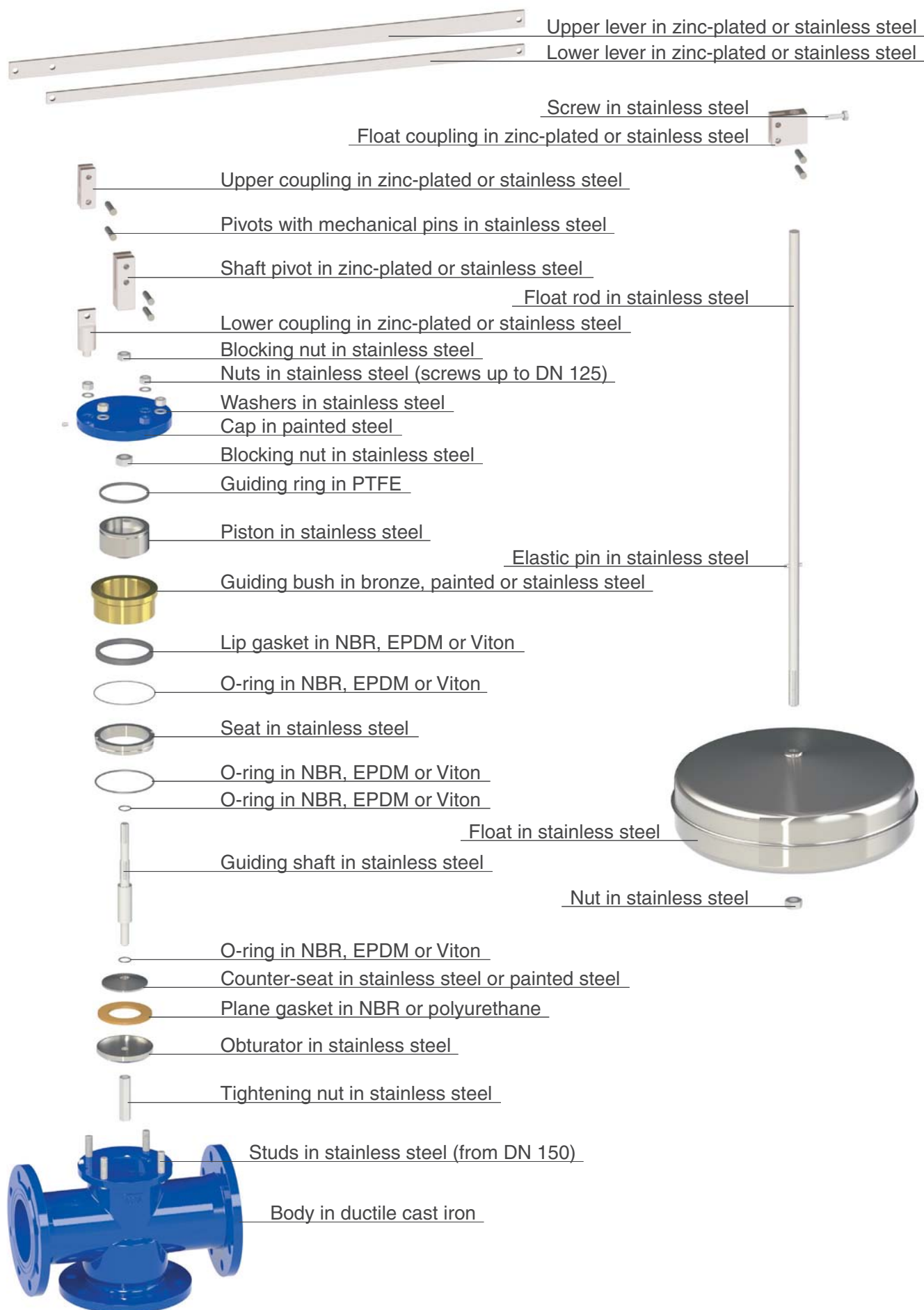
Threaded BSP connections.

Epoxy painting applied through fluidized bed technology blue RAL 5005.

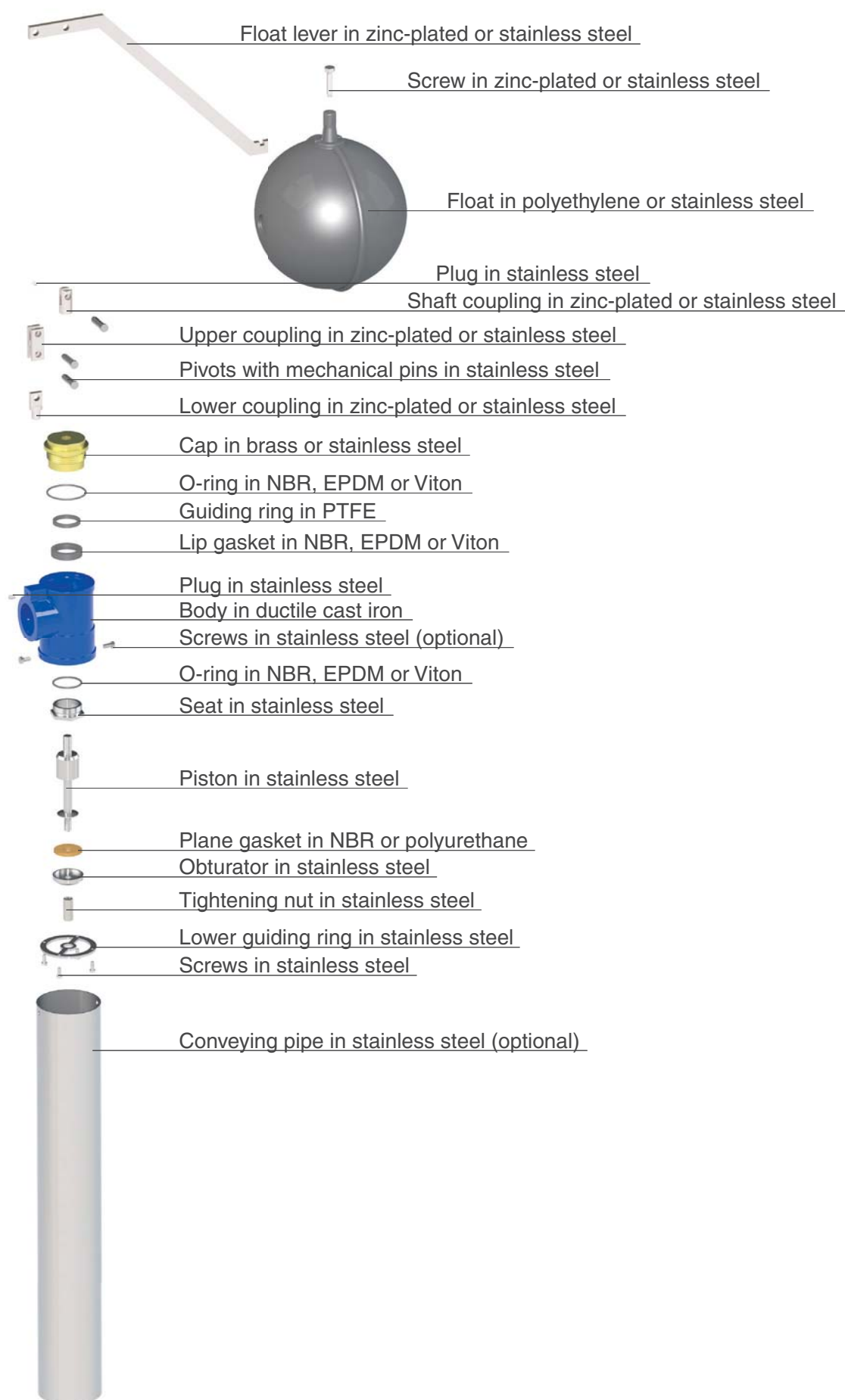


Values are approximate, consult CSA for more details.

## Spare parts breakdown

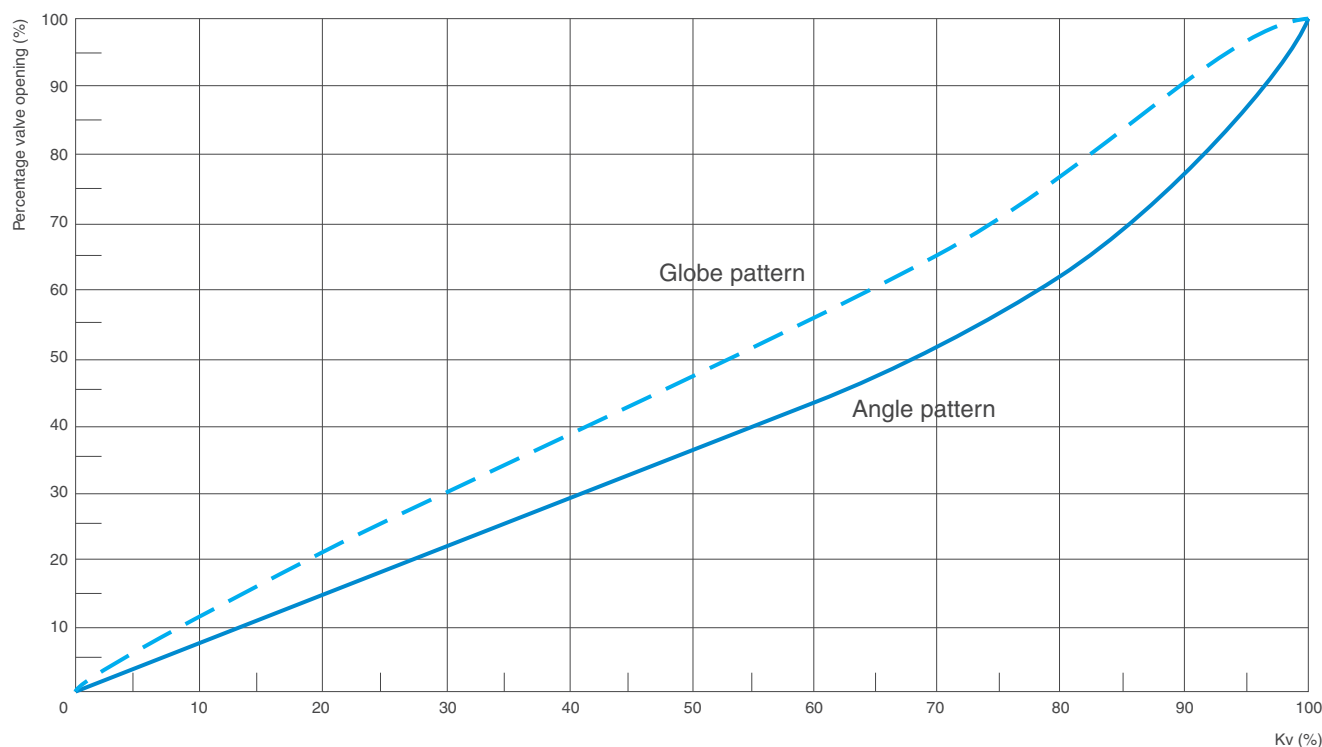


## Spare parts breakdown



## Kv to valve opening chart

The following chart shows the opening percentage of Athena valves versus the Kv.



## Recommended flow rate

The following chart shows the recommended flow rate for the proper sizing of Athena valves.

### Athena - angle pattern

DN (mm)	40/50	65	80	100	125	150	200	250	300
Flow rate min. (l/s)	0,3	0,5	0,8	1,2	1,9	2,7	4,8	7,4	11
Flow rate max. (l/s)	6,4	10	16	25	40	58	103	161	233
Emergency (l/s)	7,8	13	20	31	49	70	125	196	282

### Athena - globe pattern

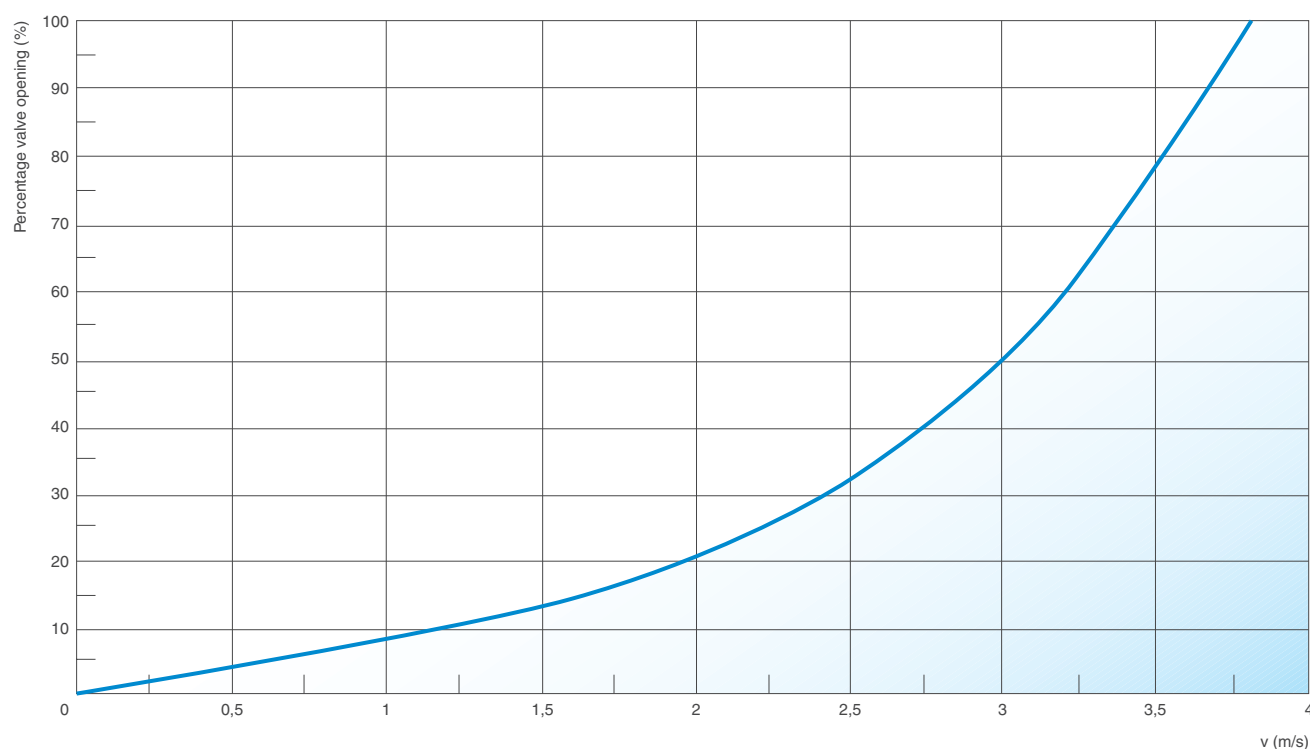
DN (mm)	40/50	65	80	100	125	150	200	250	300
Flow rate min. (l/s)	0,4	0,7	1,1	1,6	2,5	3,6	6,3	9,9	15
Flow rate max. (l/s)	5,1	8,6	13	20	31	45	81	127	183
Emergency (l/s)	6,4	10	16	25	40	58	103	161	233

### Athena 1" - 1 1/4"

Flow rate min. (l/s)	0,1
Flow rate max. (l/s)	1,9
Emergency (l/s)	2,4

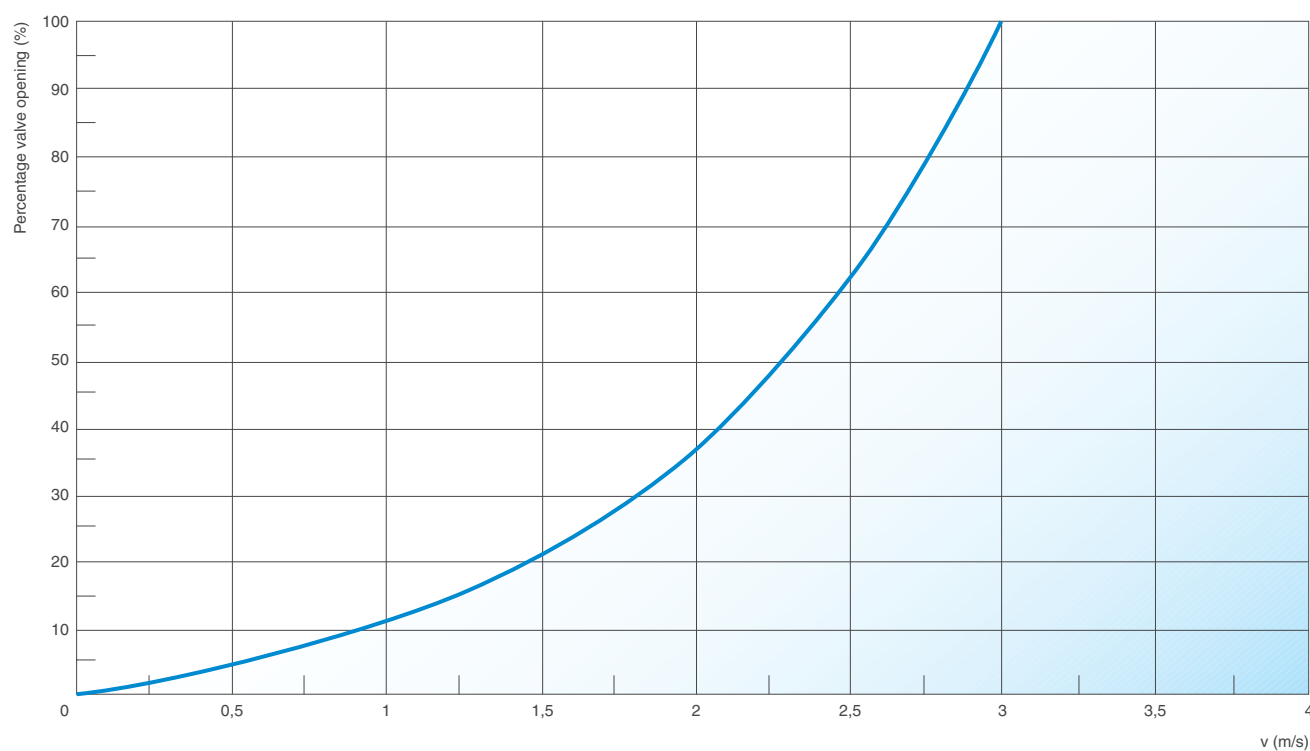
## Velocity chart to opening - Angle pattern

The following chart shows the maximum recommended velocity, versus opening percentage, to avoid cavitation.



## Velocity chart to opening - Globe pattern

The following chart shows the maximum recommended velocity, versus opening percentage, to avoid cavitation.









## Anti surge tank A.V.A.S.T.

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## Air vented anti surge tank A.V.A.S.T.

The innovative anti-surge tank A.V.A.S.T. has been designed to contain the devastating effects of water hammer, more precisely the transients coming from the sudden pump failure both for water and sewer systems. The device, fully automatic, proved to be an innovative and reliable solution thanks to the absence of air compressors, electricity, panels, bladders, pre-charges. A.V.A.S.T. is the ideal solution to avoid damages sometimes fatal for our systems as a consequence of uncontrolled overpressures and negative pressure waves.



### Technical features and benefits

- Designed for treated water and wastewater.
- Available from 250 up to 25000 litres PN 6/10/16.
- Innovative system (patent pending) to avoid bladders and compressors.
- Low maintenance and reduced volumes compared to air vessels, bladders and tanks working with pre-charges.
- Patented anti-shock device to control air outflow yet ensuring the maximum inflow during negative pressure conditions.
- Produced in different materials, welding in compliance with EN and ASME standards.
- Supported by CSA transient analysis and calculation software.

### Applications

- To protect pumping station from negative and positive pressure conditions caused by pump failure and used in:
- Wastewater pressurized main lines.
- Irrigation.
- Water mains and distributions systems.

## Water hammer

The term water hammer is commonly used as a synonymous of unsteady flow, suggesting noise and fast changing pressure variations sometimes related to devastating effects on the system.

Pipelines, both for water and sewage, are vital for our modern civilization and their safety and protection should be one of the top priorities. During the studying and assessment of the pipeline network their behaviour under transient conditions will reveal the potential for damages. This involves numerical simulations carried out to reproduce events, planned or accidental, with consequences on the system.

The main causes of transients are :

- sudden changes in demand
- pump start up
- pump failure
- rapid closing and opening of isolation devices
- rapid filling of pipe line and fire fighting installations
- opening and closing fire hydrants
- pipe flushing and draining operations
- feed tanks draining

Water hammer can also be described as a propagation of energy, as in the transmission of sound, and from basic physics as a wave motion the energy is associated with the elastic deformation of the medium.

The celerity of sound waves  $a$  in rigid pipes is given by

$$a = \sqrt{\frac{\frac{K}{\rho}}{1 + K \cdot \frac{D}{E \cdot e}}}$$

Where  $E$  is the modulus of elasticity;

$D$  is the pipe diameter;

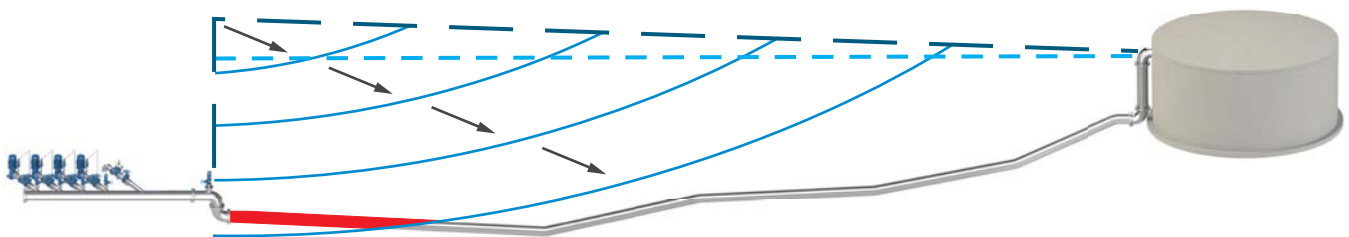
$e$  is the wall thickness;

$K$  is the bulk modulus;

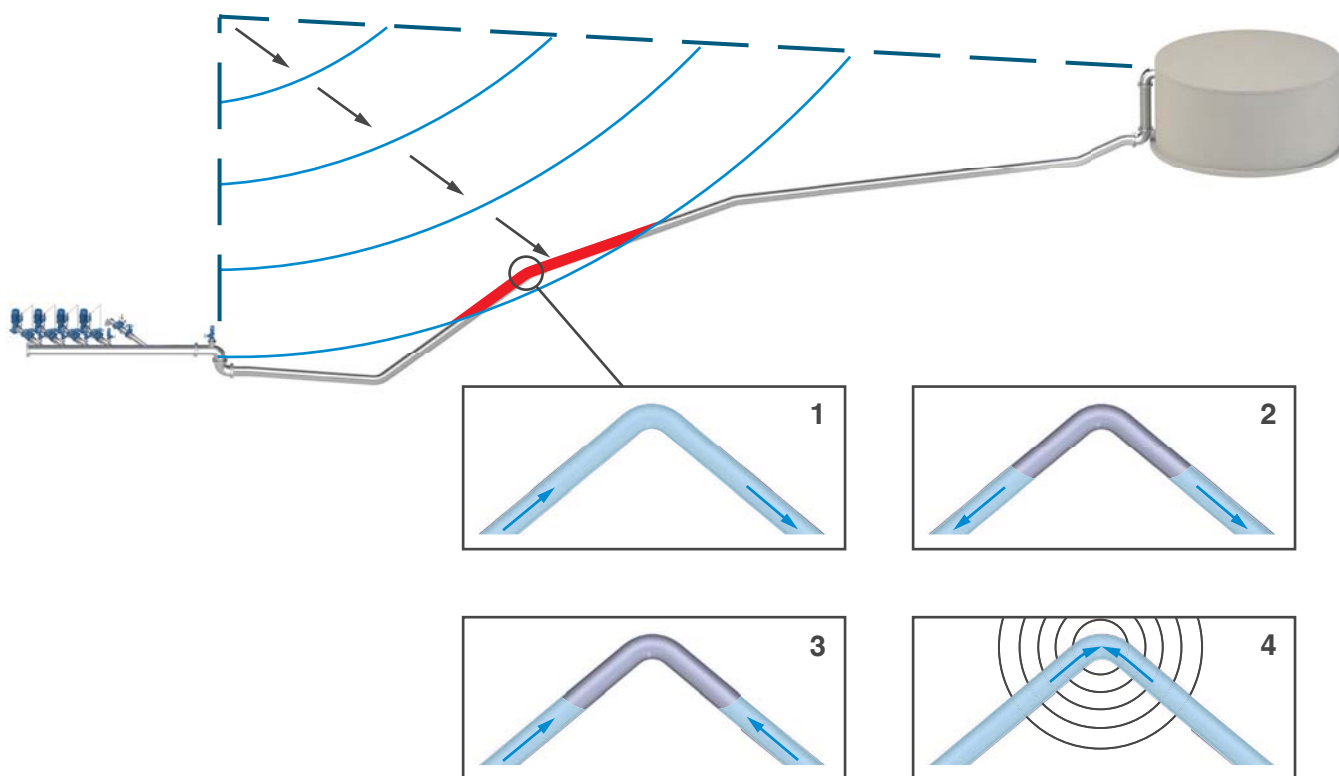
$\rho$  is the density of the fluid medium.

## Pump failure

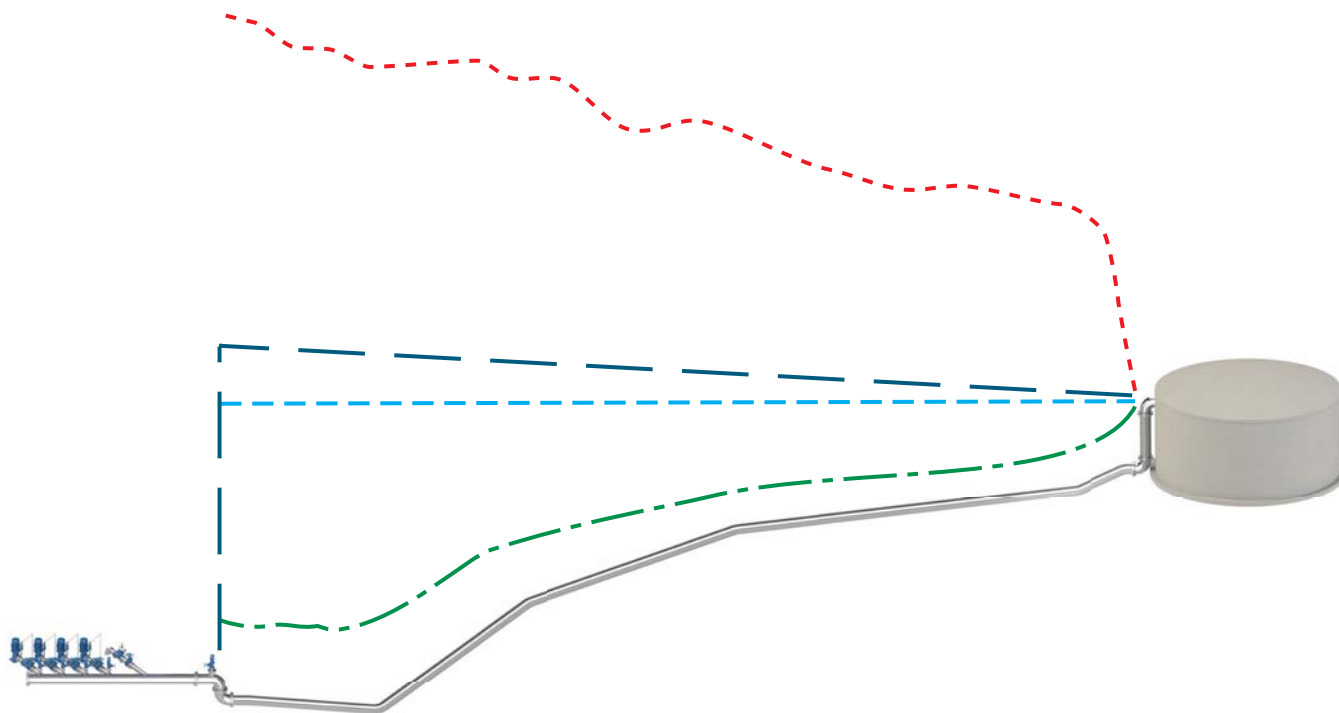
One of the most critical occurrence in water and wastewater system is the pump failure also called pump trip. This definition means actually a full blackout, interrupting the pump's head and causing a deceleration with consequent negative pressure variation propagating with a speed whose value depends on the fluid and pipe properties. Negative pressure is always a problem for possible pipe deformation, collapse, gaskets movements and entrance of contaminated water and pollution through points of leakage. If the hydraulic grade line, during the pump failure, drops to a negative value corresponding to the vapour pressure there is the risk of column separation, generated by the formation and collapse of vapour pockets producing serious and unexpected high frequency rises in pressure, sometimes fatal for the system.



The plot above shows a pipeline profile, with pumps and downstream tank as boundary conditions, where the dark blue dotted line represents the HGL and the light blue dotted line is the static. The picture represents the negative pressure wave propagating downstream as an effect of pump failure, where the red segment depicts the area exposed to negative during the initial phase of the event.



The plot above shows the negative pressure wave propagating downstream, as an effect of pump failure. The red segment depicts the area exposed to severe negative pressure. The change in slope represents a location at risk of column separation, caused by vapour pockets forming and then collapsing creating unwanted water hammer as explained on the 4 pictures.



The results of pump failure can be summarized in a plot showing the envelope of the maximum and minimum pressure values reached during the simulation, in the picture above shown respectively in green and red. It is evident how the system reaches a full vacuum on the entire profile and an extreme rise in pressure due to the column separation, occurred at the change in slope.



## Water hammer prevention

In order to prevent transients and unwanted damages on the pipeline systems we basically have to reduce the variations in velocity of the fluid and, when this happens, try to proceed as slow as possible.

It will therefore be mandatory to:

- operate slowly during valve operations, especially on the final position of the device.
- control the pipe filling through the use of anti-surge combination air valves, example the CSA RFP models.
- introduce air or water into the pipeline, at those locations where negative pressure conditions are likely to occur.
- adopt controlled pump start up procedures to avoid rapid changes in flow.
- carry out detailed computer analysis to evaluate and assess the risk associated to the system and transient events.

One of the best and most reliable solutions to the problem, and working as a standalone or in combination with other devices like anti-shock air valves and pressure relief valves, is the CSA air vented anti surge tank also called A.V.A.S.T.

This type of anti surge device can be installed in derivation from the main line or directly on top of it, and simply provided with an isolation device to allow for maintenance. No additional check valves, by pass or restrictions are needed. Compared to other solutions A.V.A.S.T. doesn't need any kind of compressor, bladder or external source of energy. This means a reduced maintenance, higher reliability and, more important, a lower volume is needed to provide the same degree of protection, in comparison with bladder tanks or air vessels.



## Operating principle - First phase of transient after pump failure

As a consequence of power failure A.V.A.S.T. will avoid negative pressure conditions, using the fluid and its storage capacity, by means of the force obtained thanks to the effect of the stand pipe and the automatic air compression around it.



### First phase 1

In case of pump failure AVAST will supply liquid to the pipe, avoiding negative pressure conditions. The liquid level will therefore drop inside of it according to the variation in pressure.



### First phase 2

When the liquid drops also inside the stand pipe the anti-shock air valve, located on top, will allow the entrance of large volumes of air avoiding negative pressure inside the A.V.A.S.T.



### First phase 3

When the liquid drops below the stand pipe lowest point the air inflow through the air valve will recharge the air pockets around the stand pipe, previously expanded due to the variation in pressure.



### First phase 4

Thanks to its innovative operating principle A.V.A.S.T. will allow the drop in the liquid level to the very bottom of it, or even further, therefore using the entire storage volume. The protection against negative pressures will always be ensured through the air valve located on top.

## Operating principle - Second phase of transient after pump failure

On the second phase of transient caused by pump failure water column will come back pushing air and water towards the pump station and the A.V.A.S.T. anti-surge device, whose technology is devised to absorb and cushion unwanted surges even during this event.



### Second phase 1

On the second phase of transient water will come back pushing the liquid level upwards, air will start flowing out of the anti-shock air valve system on top (pat. Pending) controlling the water approach velocity and avoiding unexpected rises in pressure.



### Second phase 2

The more the pressure the more the fluid level will raise. As long as it remains below the bottom of the standpipe air is discharged through the upper anti-shock air valve system.



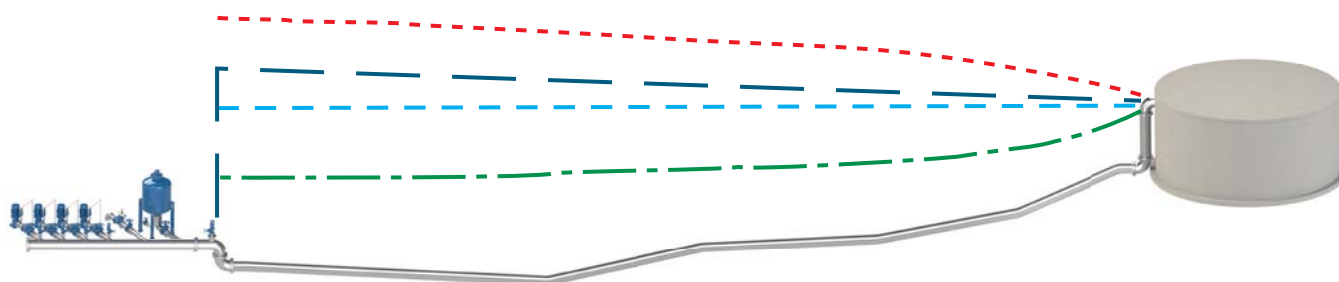
### Second phase 3

As the liquid level rises above the standpipe lowest point air is compressed around it, while the air outflow through the anti-shock air valve on top will continue.

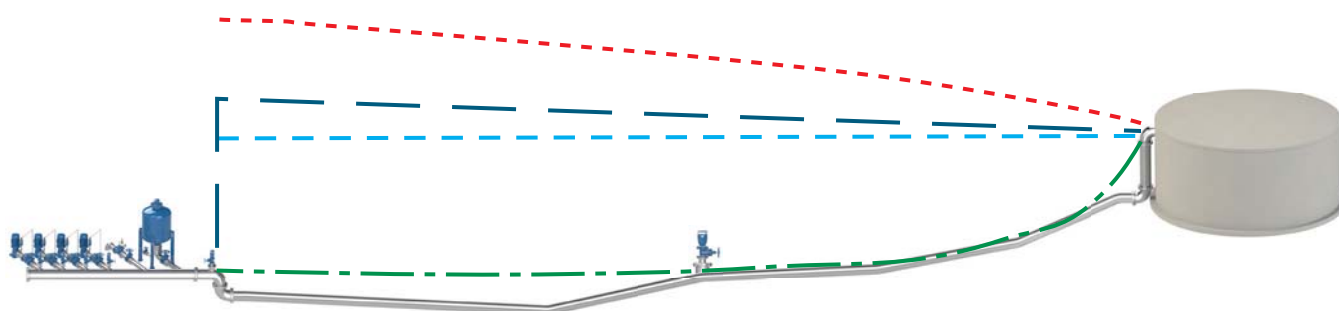


### Second phase 4

At the end of the transient event, once pressure has stabilized, the liquid has filled up the standpipe compressing the air pockets around and closing the anti-shock air valve located on top. The liquid level around the standpipe depends on the A.V.A.S.T. geometry and operating pressure.

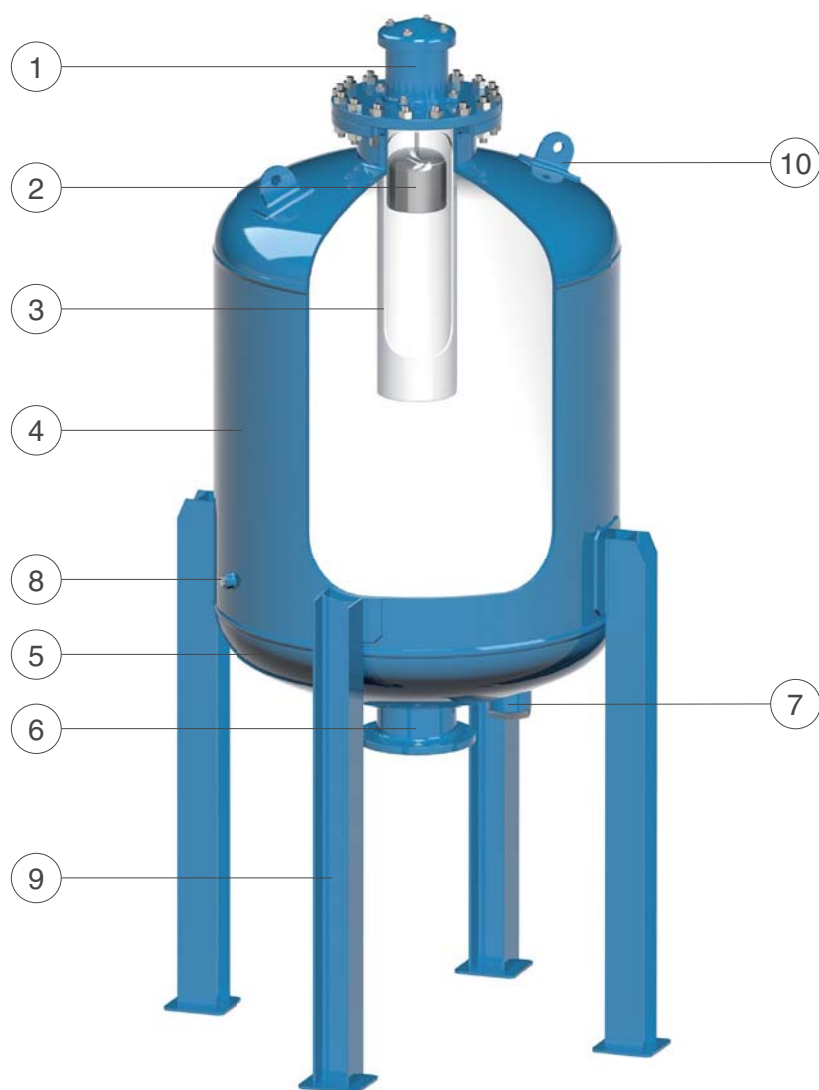


The plot above shows the pressure envelope of the transient event caused by pump failure on a pipeline with A.V.A.S.T. installed as a protection. The red and green are the maximum and minimum pressure values reached during the simulation, it is clearly visible the beneficial effect in terms of negative pressure and consequently reduction of water hammer.



The plot above shows the pressure envelope of the transient event caused by pump failure on a pipeline with A.V.A.S.T. installed as a protection, in combination with anti-shock air valves (CSA AS series). In this case the effect of the air valve will help reducing the volume of A.V.A.S.T., containing budget and design requirements. The red and green are respectively the maximum and minimum pressure values reached during the simulation. Depending on the fluid A.V.A.S.T. can be placed at the pumping station or along the profile and calculated to perform with air valves and pressure relief valves, CSA VRCA series, if required.

## Technical details



Threaded elbow for air conveyance system supplied on request.

N.	Component	Standard material	Optional
1	Air valve CSA anti hammer type	in different executions for treated and wastewater	
2	Float	stainless steel AISI 316	polypropylene
3	Dipping tube	painted steel	different material on request
4	Shell	painted steel	different material on request
5	Base plate	painted steel	different material on request
6	Flanged outlet	painted steel	different material on request
7	Drain outlet	painted steel	2"-3" or flanged DN 50-150
8	Pressure outlet for gauge	painted steel	1/2"-2"
9	Legs	painted steel	different material on request
10	Lifting plates	painted steel	different material on request

The list of materials and components is subject to changes without notice.

### Working conditions

Treated water / Waste water 70° C max.;  
Maximum pressure 16 bar;  
Minimum pressure 0,3 bar on the top.

### Design standards

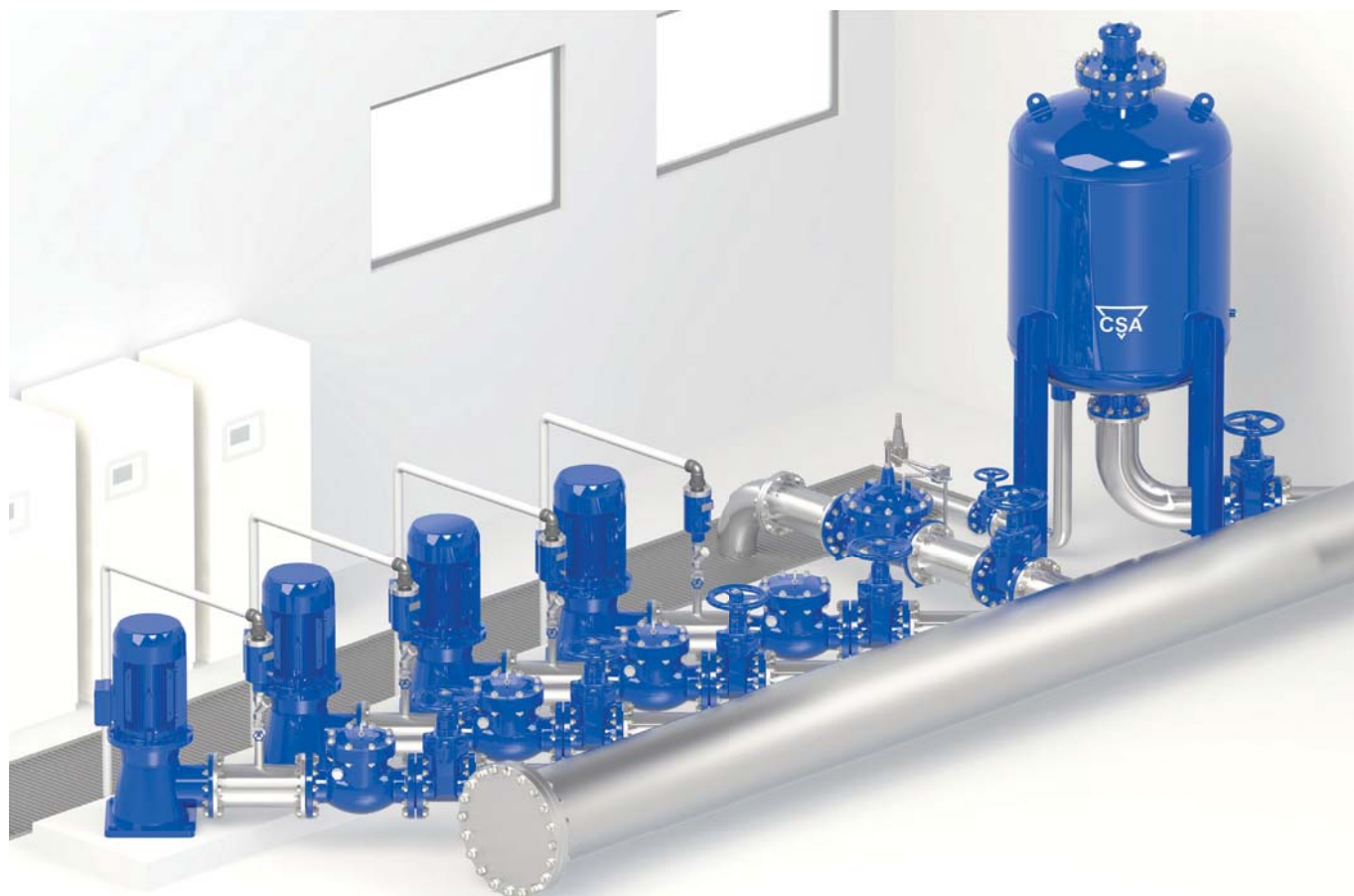
CND, NDE, X RAY according to applicable standards to be specified in the order.  
Welding and painting according to project requirements.  
Outlet flanges according to EN 1092/2 or ANSI;  
variations on flanges details available on request.  
Wind, seismic events available on request.



## Installation layout for water applications

CSA Air vented anti surge tanks A.V.A.S.T. represent one of the most effective and versatile means of providing protection at pumping stations. This is because they allow the introduction of flow during pump failure thus limiting the rate of acceleration/deceleration that occurs in the pipe in case of pump trip.

The illustration below shows the use of CSA A.V.A.S.T., in a common water pumping station, installed without the need if any check valves, by-pass and restrictions otherwise necessary for air vessels with compressors and different solutions. In addition to that, the picture shows more CSA equipment for the regulation and control of the system such as anti-shock air valves and anticipating control valves, sized and determined as a result of detailed water hammer analysis part of CSA consulting services.



CSA anti-shock combination air valves are extremely important at the pumping station located before and after the check valve. The first due to their protection against negative pressure on the riser when the pump is turned off, and consequent control of the air outflow at the pump start up preventing overload and rapid changes in flow and unwanted surged. The air valves downstream of check valves, for each pump and/or on the main line, are needed to avoid vacuum and the propagation of negative pressure waves along the system as a consequence of pump failure, controlling and slowing down the returning water approach velocity. CSA relief valves or surge anticipating are sometimes needed to discharge excess in pressure and to reduce the volume of A.V.A.S.T.

## Installation layout for wastewater applications

CSA air vented anti-surge tanks A.V.A.S.T. represent one of the most effective and versatile means of providing protection at pumping stations. This is because they allow the introduction of flow during pump failure thus limiting the rate of acceleration/deceleration that occurs in the pipe in case of pump trip.

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### Advanced testing facilities

Designed to reproduce real conditions of modern water distribution systems the CSA testing facility is able to assess the dynamic performances of automatic control valves, direct acting pressure control valves, air valves and anti water hammer valves.

Provided with a high capacity booster pumps station, and linked to an advanced high frequency pressure transducers and flow meters, the testing rig allows for a real time visualization of pressure and flow evolutions. Water hammer events can also be simulated and recorded to prove the efficacy of CSA fast acting relief valve, in addition to level control for which, using an auxiliary stilling tank, a part of the pipeline system is entirely dedicated.

The PLC and control station allows for the operation of step by step and solenoid operated valves to determine the sensitivity of such kind of application and pressure management solutions. Thanks to this important and powerful tool valves can be customized, simulated and set according to the project requirements assuring the perfect performance and accuracy.

### The testing process

All our valves undergo severe tests according to EN standards to ensure they are mechanically resistant, watertight, and high performing. After testing every valve is identified by means of a metallic tag or sticker, and duly registered and certified.



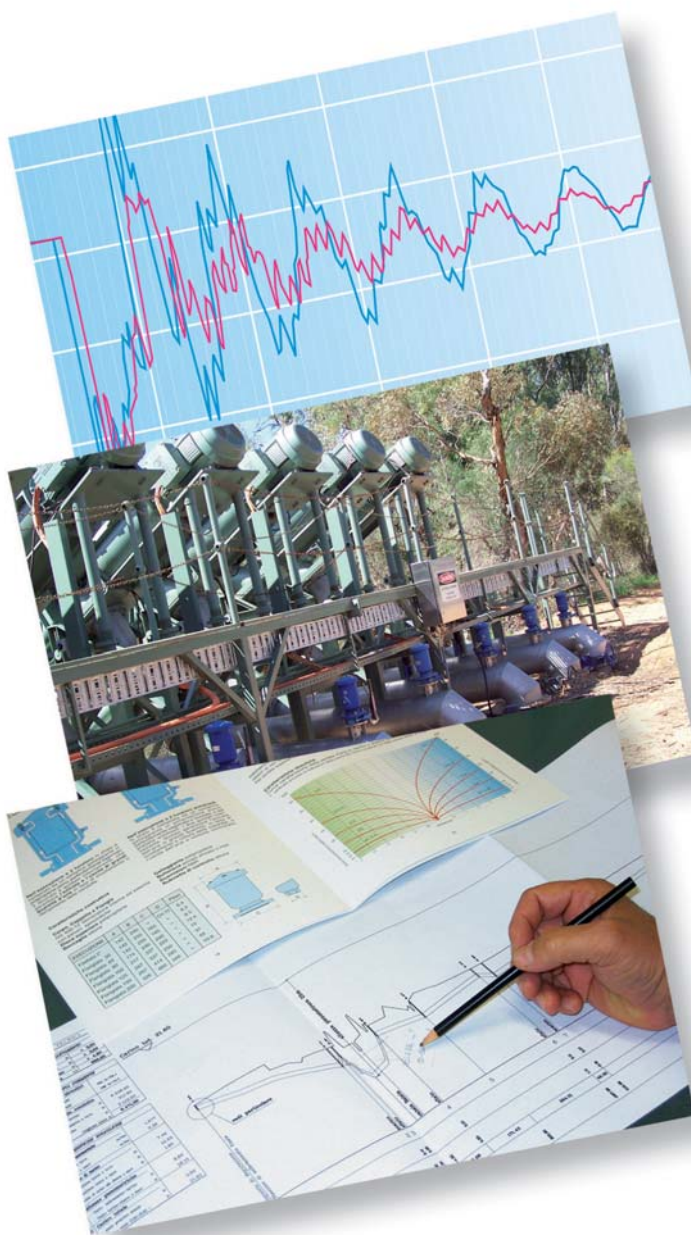
## CSA HYCONSULT

### Water hammer analysis CSA Hyconsult

CSA Hyconsult was founded to provide designers and consultants, involved in the design of water distribution and sewage systems, with accurate and unique technical support.

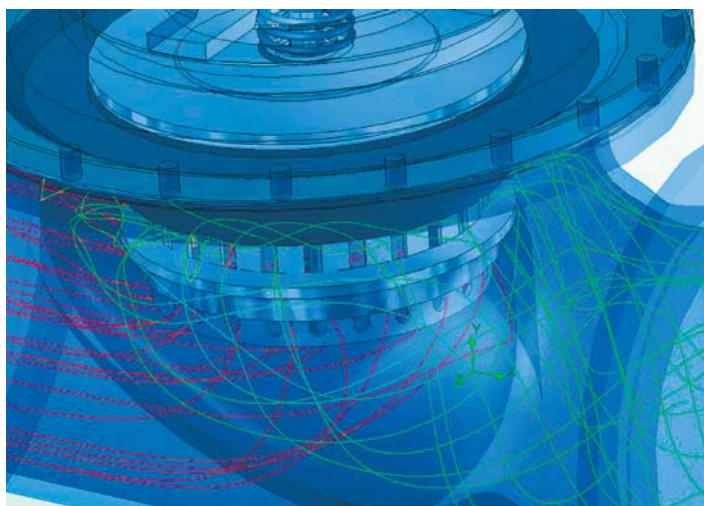
CSA Hyconsult has specialized in hydraulic modelling and transients analysis, entirely through the use of modern computational tools and advanced algorithms. Simulations are essential to predict system responses to events under a wide range of conditions without disrupting the actual system.

Using simulations, problems can be anticipated in possible or existing situations, and solutions can be evaluated in order to invest time, money and material in the most productive manner.



### Research and innovation

CSA has always regarded knowledge as being indispensable for the kind of research that consistently feeds innovation at all levels. The R&D department at CSA constantly strives to improve product performance and continually searches for new solutions to meet our customer's needs. Twenty years of experience in valve design and sizing, supported by advanced computational tools, cooperation with external entities at the highest level, and test facilities for the verification of theoretical results which are available for our customers, guarantee our professionalism and reliability.





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