

# Comeval®



CSA

*Control valves, Air valves and Protection devices*

*Flowing innovation  
.... since 1974*



[www.comeval.es](http://www.comeval.es)



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 CSA's rapid growth 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.

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## Combination air valve Mod. FOX 3F

The CSA 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.



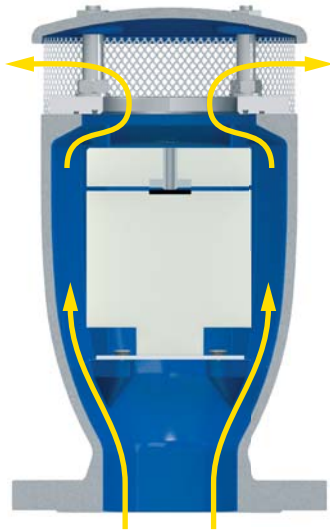
### Technical features and benefits

- Single chamber full bore body in ductile cast iron, PN 40 bar rated, provided with internal ribs for consistent and accurate guiding of the mobile block.
- Aerodynamic deflector in stainless steel to avoid premature closures.
- 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 (pat. 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 more optional outlets (for submerged applications, air inlet only, air outlet only).

### Applications

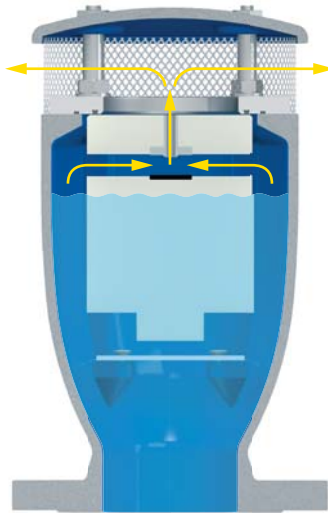
- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used on changes in slope and at the high points of the pipeline.

## 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 of the pipeline, and to the entire system.

## Optional



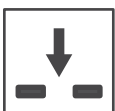
■ **Vacuum breaker version Mod. FOX 2F**, to allow the entrance and discharge of large volumes of air only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the air release won't be required.



■ **Version for submerged applications, SUB series**, available both for FOX 3F and 2F Models, with 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.

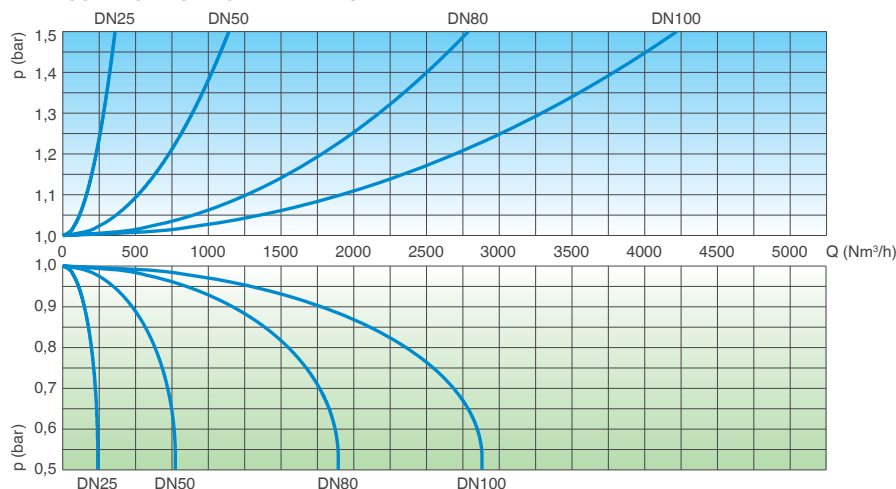


■ **Version for air entrance only IO series**, available for FOX 2F model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

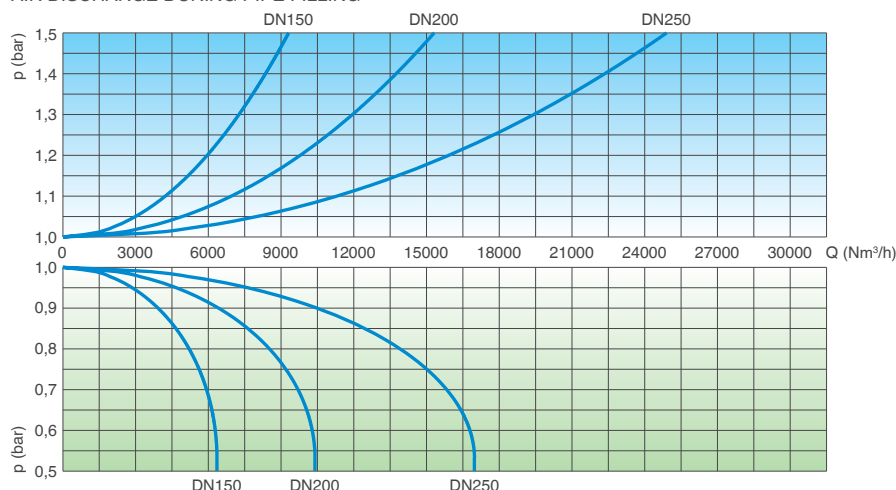
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

### Working conditions

Treated water max. 60°C.

Max. pressure 40 bar.

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

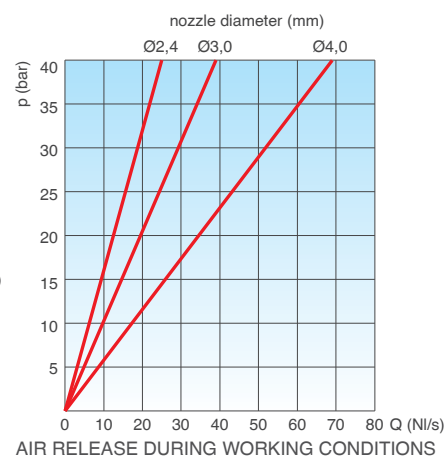
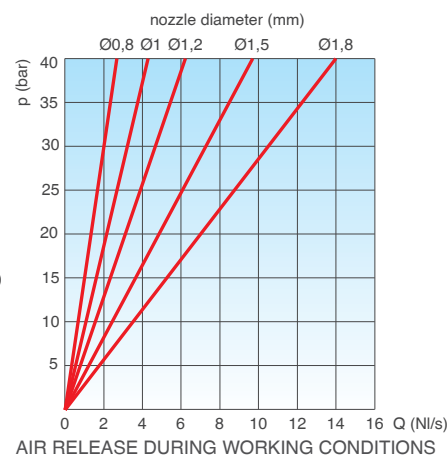
### Standard

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

### Weights and dimensions

| CONNECTION<br>inch/mm | A<br>mm | B<br>mm | C<br>mm |     | D<br>mm | Weight<br>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     | 315     | 210     | 205 | -       | 13,8         |
| Flanged 100           | 206     | 370     | 235     | 220 | -       | 21,7         |
| Flanged 150           | 285     | 515     | 305     | 285 | -       | 44,5         |
| Flanged 200           | 380     | 625     | 375     | 340 | -       | 85,0         |
| Flanged 250           | 440     | 785     | 450     | -   | -       | 134,0        |

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

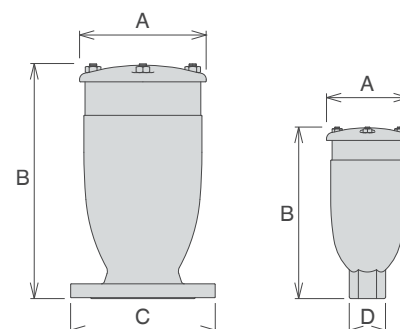


The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted using a safety factor.

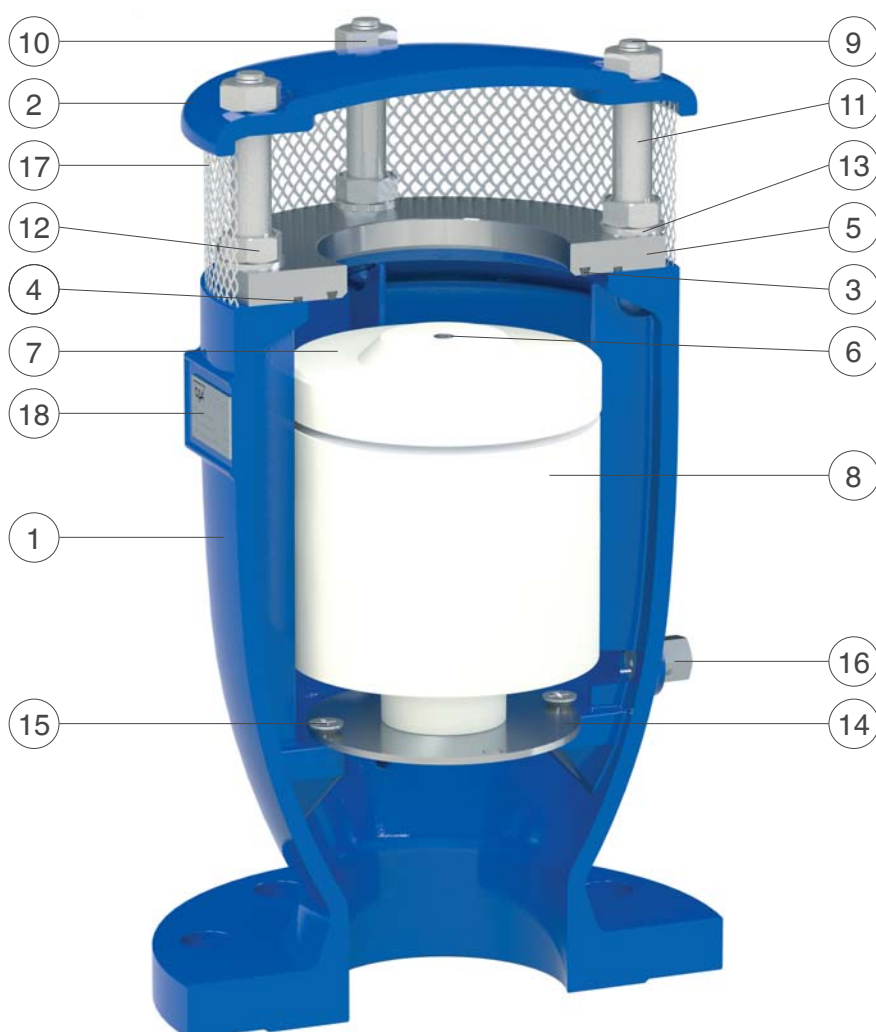
### Nozzle choice

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

|        | PN 10 | PN 16 | PN 25 | PN 40 |
|--------|-------|-------|-------|-------|
| DN 25  | 1,2   | 1,2   | 1     | 0,8   |
| 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 water hammer combination air valve

## Mod. FOX 3F - AS

The CSA 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 air discharge with controlled speed, to prevent water hammer.



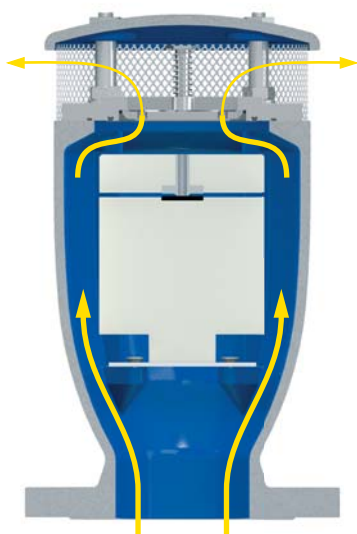
### Technical features and benefits

- Single chamber full bore body in ductile cast iron, PN 40 bar rated, provided with internal ribs for consistent and 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 (pat. 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 sonic nozzles for air flow 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

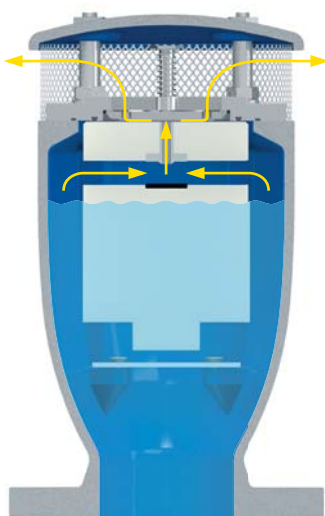
- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used near pumps, on changes in slope ascending, and at the high points of the pipeline subjected to water hammer.

## Operating principle



### Controlled air discharge

During the pipe filling it is necessary to avoid rapid closures, 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. 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.



### 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 of the pipeline, and to the entire system.

## 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 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.

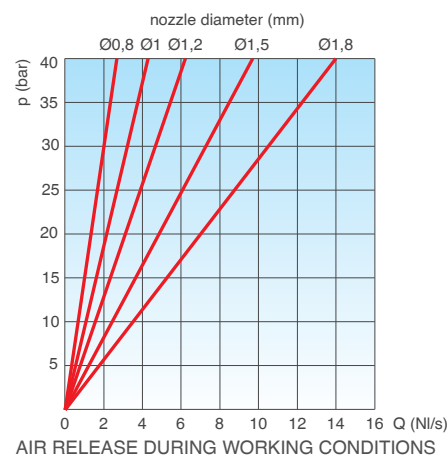
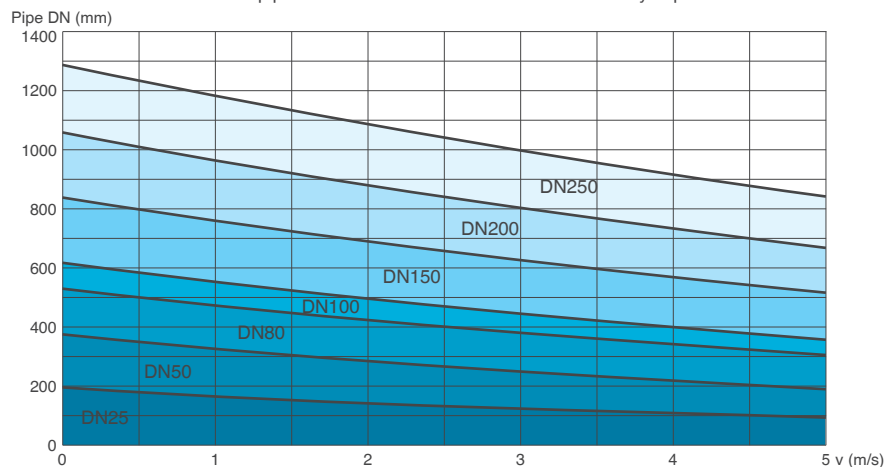


■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be modified on request according to the project conditions and the transient analysis.

## Technical data

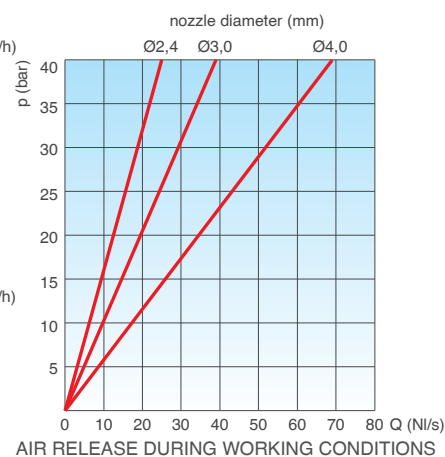
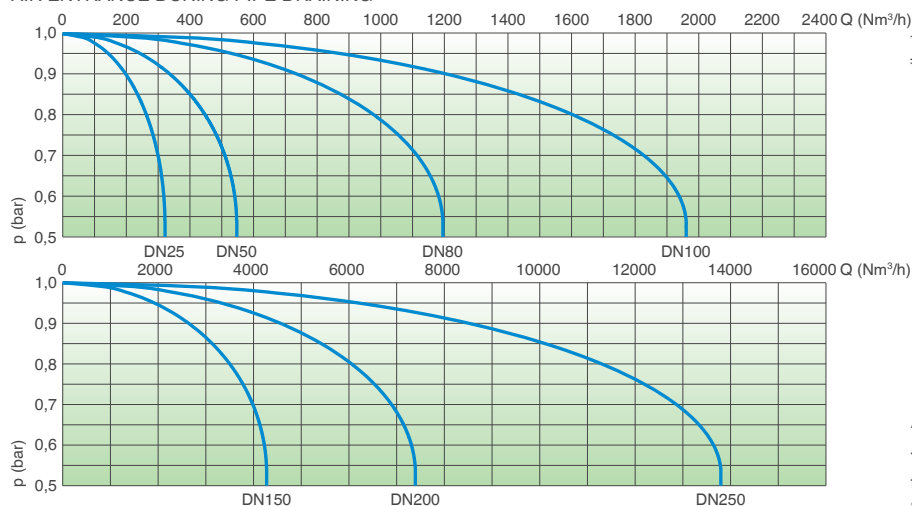
### Air valve selection chart

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



### Air flow performance charts

AIR ENTRANCE DURING PIPE DRAINING



The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted 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. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

### Weights and dimensions

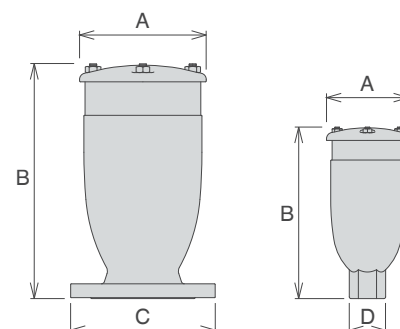
| CONNECTION<br>inch/mm | A<br>mm | B<br>mm | C<br>mm |     | D<br>mm | Weight<br>Kg |
|-----------------------|---------|---------|---------|-----|---------|--------------|
| Threaded 1"           | 117     | 240     | -       | -   | CH 45   | 4,0          |
| Threaded 2"           | 141     | 295     | -       | -   | CH 70   | 7,5          |
| Flanged 50            | 141     | 305     | 165     | -   | -       | 9,5          |
| Flanged 80            | 172     | 315     | 210     | 205 | -       | 13,8         |
| Flanged 100           | 206     | 370     | 235     | 220 | -       | 21,7         |
| Flanged 150           | 285     | 515     | 305     | 285 | -       | 44,5         |
| Flanged 200           | 380     | 625     | 375     | 340 | -       | 85,0         |
| Flanged 250           | 440     | 785     | 450     | -   | -       | 134,0        |

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

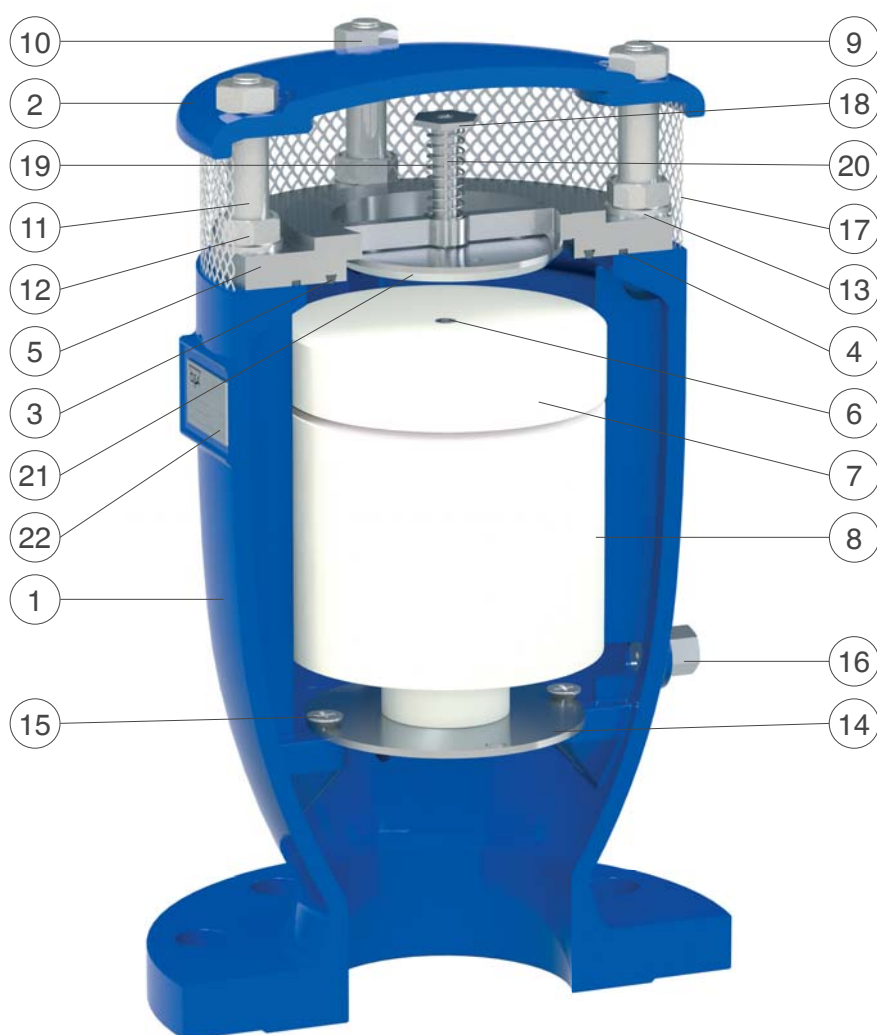
### Nozzle choice

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

|        | PN 10 | PN 16 | PN 25 | PN 40 |
|--------|-------|-------|-------|-------|
| DN 25  | 1,2   | 1,2   | 1     | 0,8   |
| 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                  |                          |
| 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 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.



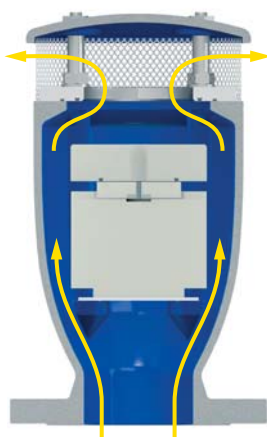
### Technical features and benefits

- 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 consistent and 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 (pat. 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.

### Applications

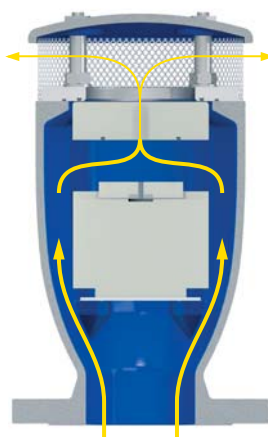
- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used, in combination with CSA AS technology, on changes in slope and high points of the profile to provide the best air control and safety of the pipeline.

## Operating principle



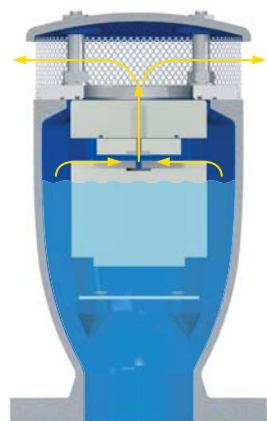
### Discharge of large volumes of air

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



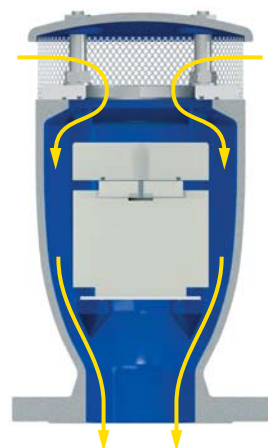
### Controlled outflow

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 of 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 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.

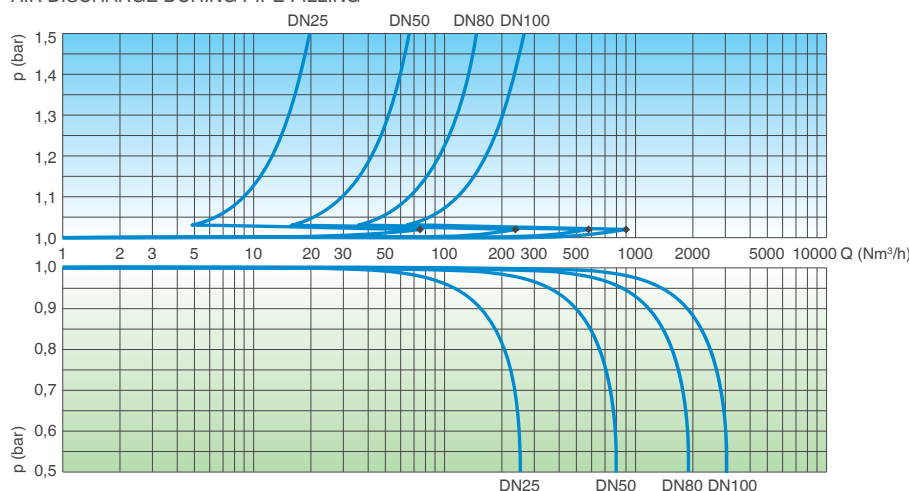


■ **Version for air discharge only EO series**, available both for FOX 3F RFP and 2F RFP models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements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

## Technical data

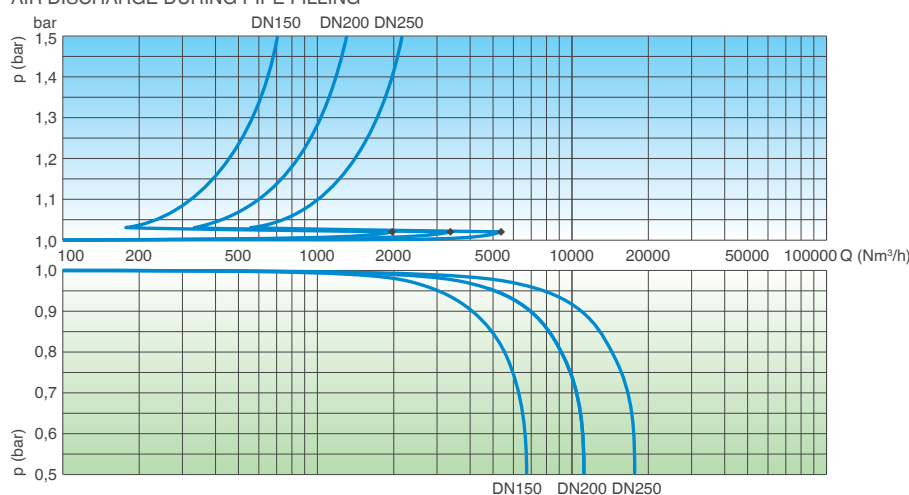
### Air flow performance charts

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.

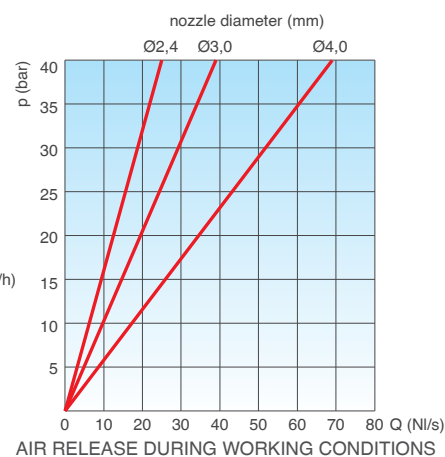
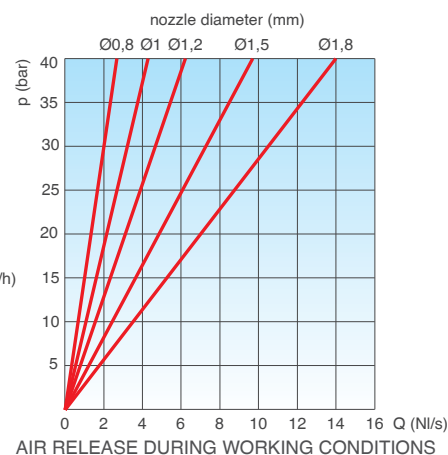
### Standard

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

### Weights and dimensions

| CONNECTION<br>inch/mm | A<br>mm | B<br>mm | C<br>mm |     | D<br>mm | Weight<br>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     | 315     | 210     | 205 | -       | 13,8         |
| Flanged 100           | 206     | 370     | 235     | 220 | -       | 21,7         |
| Flanged 150           | 285     | 515     | 305     | 285 | -       | 44,5         |
| Flanged 200           | 380     | 625     | 375     | 340 | -       | 85,0         |
| Flanged 250           | 440     | 785     | 450     | -   | -       | 134,0        |

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

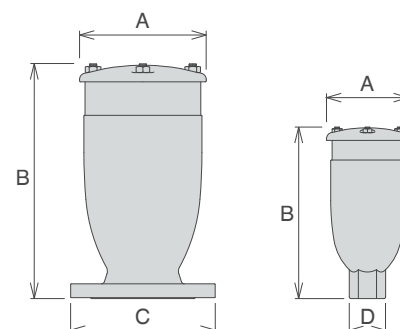


The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted using a safety factor.

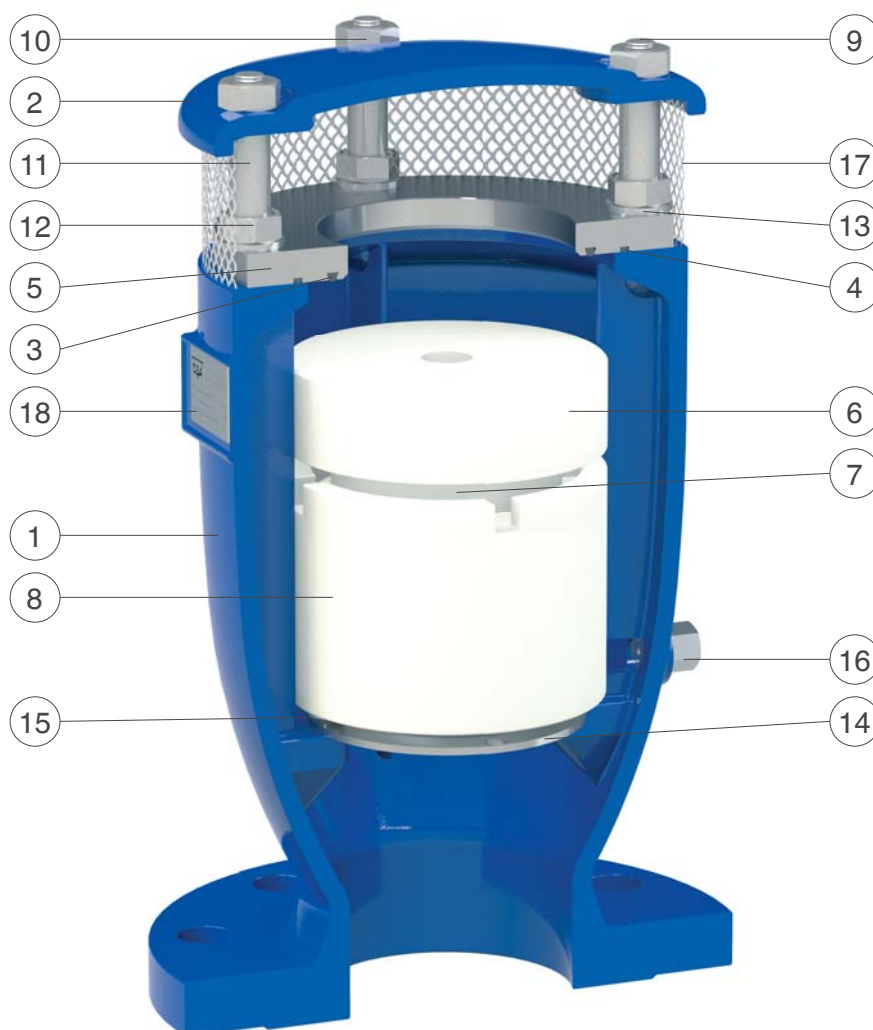
### Nozzle choice

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

|        | PN 10 | PN 16 | PN 25 | PN 40 |
|--------|-------|-------|-------|-------|
| DN 25  | 1,5   | 1,2   | 1     | 0,8   |
| 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 o 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                   |                          |

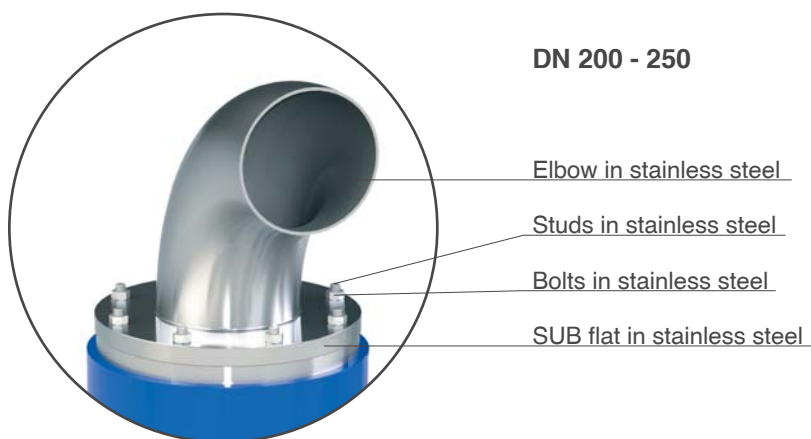
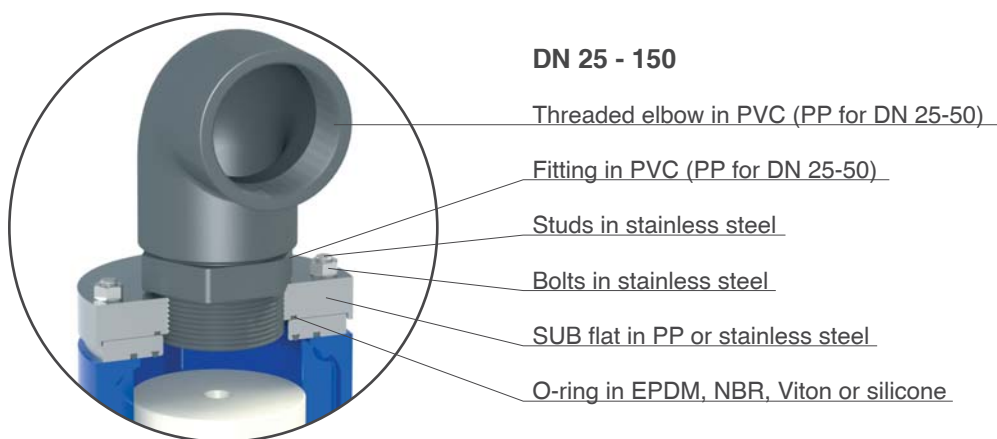
The list of materials and components is subject to changes without notice.



# Combination air valve - Mod. FOX 3F

## Version for submerged applications - SUB series

**Version for submerged applications, SUB series** available for all CSA FOX models except for EO version, 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.



### Technical data

#### Working conditions

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

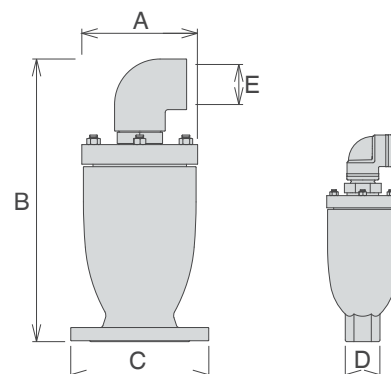
#### Standard

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

#### Weights and dimensions

| CONNECTION<br>inch/mm | A<br>mm | B<br>mm | C<br>mm |     | D<br>mm | E<br>inch | Weight<br>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     | 432     | 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           | 429     | 1060    | 450     | -   | -       | 8"        | 147,0        |

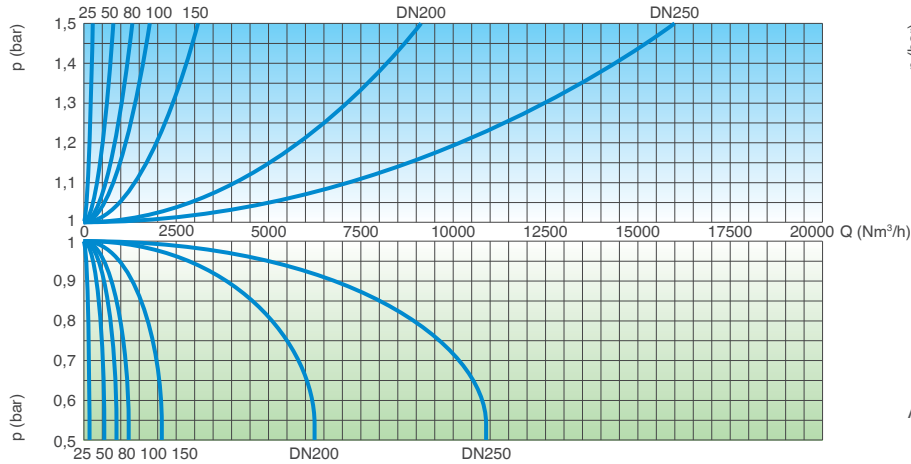
All values are approximate, consult CSA service for more details.



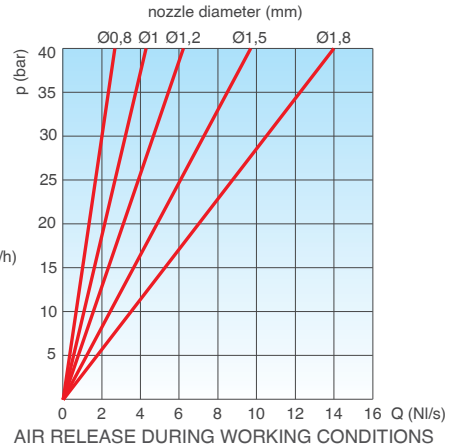
## Technical data

### FOX SUB - Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING

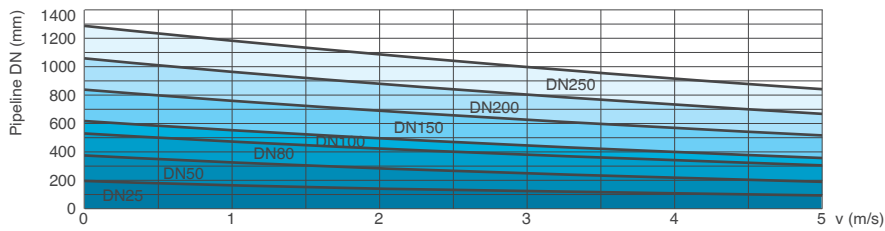


AIR ENTRANCE DURING PIPE DRAINING

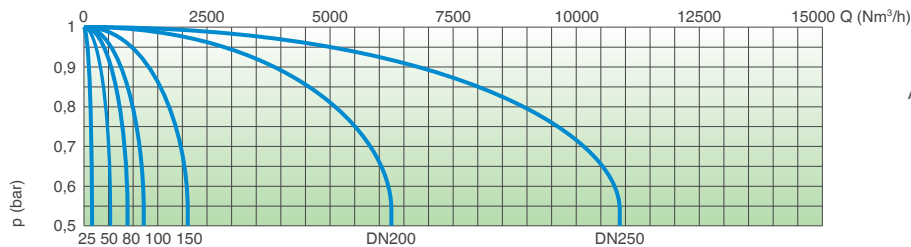


### FOX AS SUB - Air valve choice chart

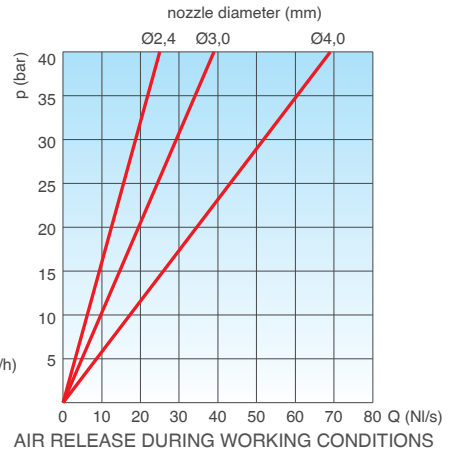
Air valve size as a function of pipeline internal diameter and fluid flow velocity expressed in m/s.



### FOX AS SUB - Air flow performance charts

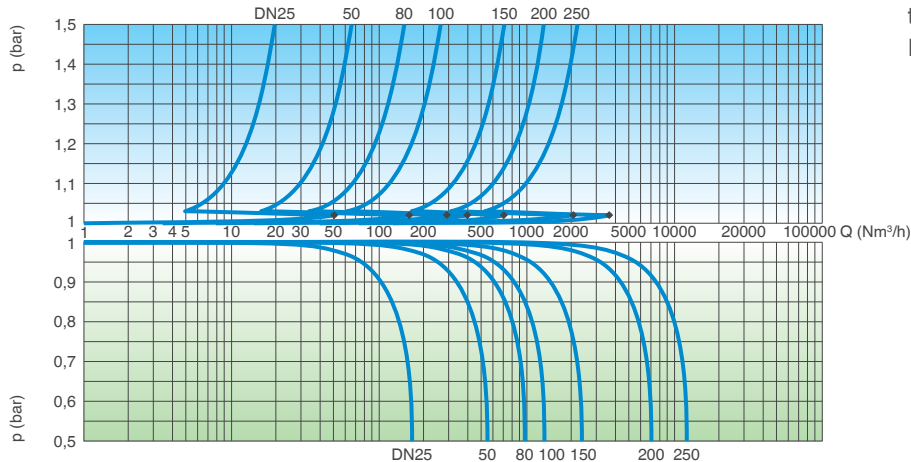


AIR ENTRANCE DURING PIPE DRAINING



### 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 using a safety factor.

### Nozzle choice

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



## Combination air valve Mod. Lynx 3F

The CSA 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.



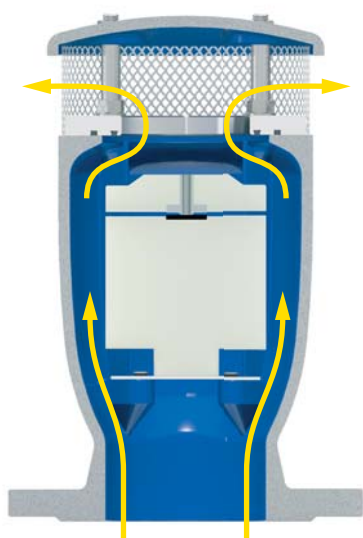
### Technical features and benefits

- Single chamber body in ductile cast iron, PN 40 bar rated, provided with internal ribs for consistent and accurate guiding of the mobile block.
- Aerodynamic deflector in stainless steel to avoid premature closures.
- 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 (pat. 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 more optional outlets (for submerged applications, air inlet only, air outlet only).

### Applications

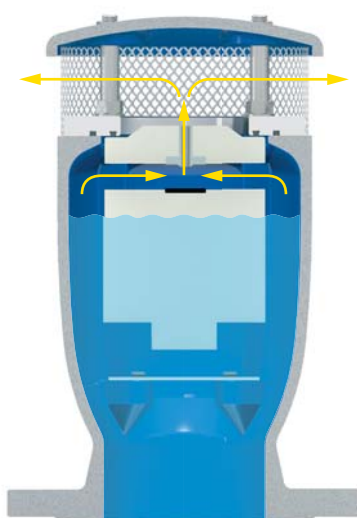
- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used on changes in slope and at the high points of the pipeline.

## 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 of the pipeline, and to the entire system.

## Optional



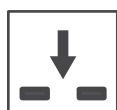
■ **Vacuum breaker version Mod. Lynx 2F**, to allow the entrance and discharge of large volumes of air only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the air release won't be required.



■ **Version for submerged applications, SUB series**, available both for Lynx 3F and 2F Models, with 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.

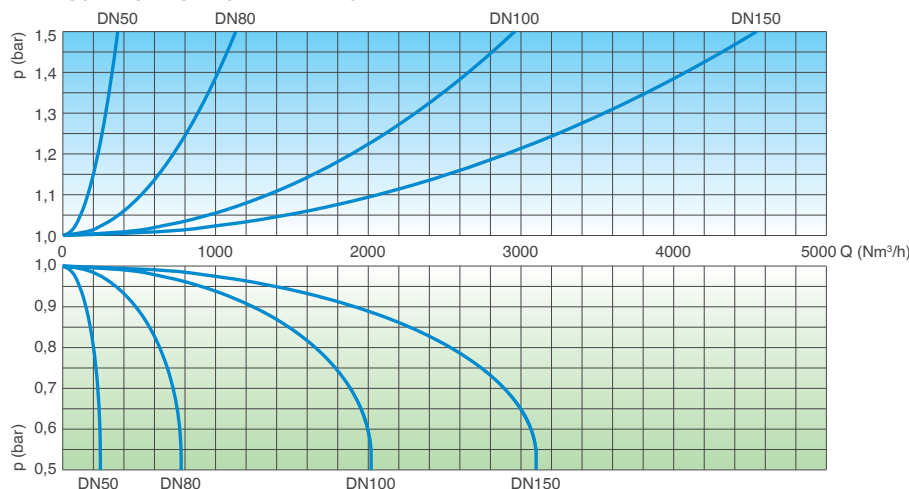


■ **Version for air entrance only IO series**, available for Lynx 2F model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

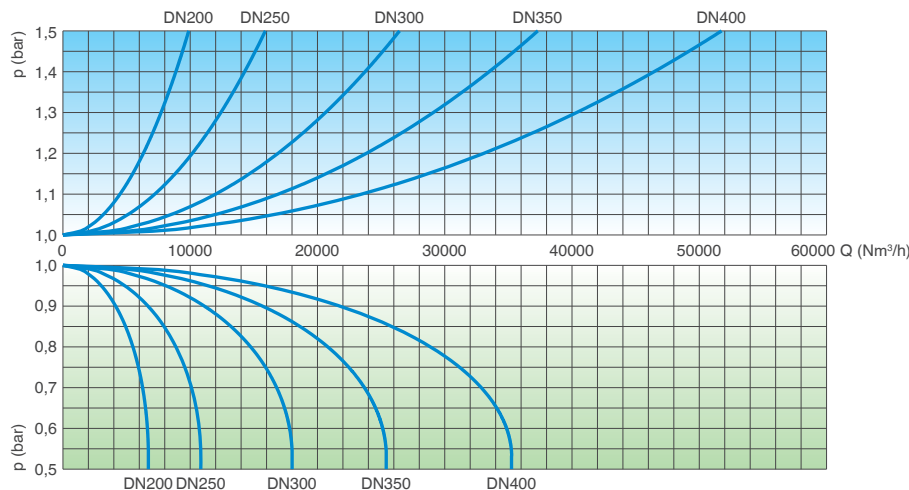
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING

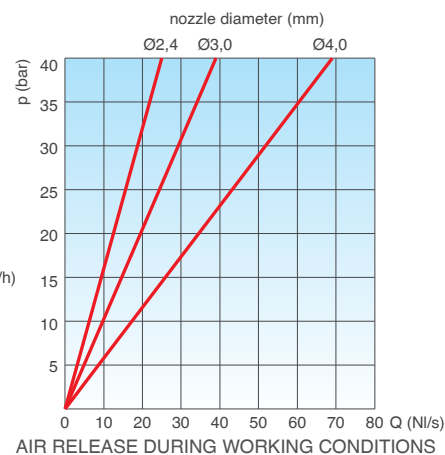
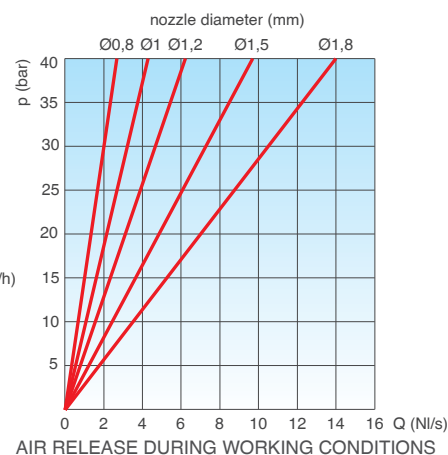


AIR ENTRANCE DURING PIPE DRAINING

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING



The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted 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 size of the air valve and the PN (table aboard).

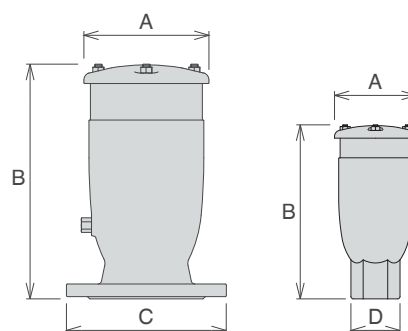
|        | PN 10 | PN 16 | PN 25 | PN 40 |
|--------|-------|-------|-------|-------|
| DN 50  | 1,2   | 1,2   | 1     | 0,8   |
| DN 80  | 1,8   | 1,5   | 1,2   | 0,8   |
| DN 100 | 1,8   | 1,5   | 1,2   | 1     |
| DN 150 | 2,4   | 1,8   | 1,8   | 1,2   |
| DN 200 | 4     | 3     | 2,4   | 1,8   |
| 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. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

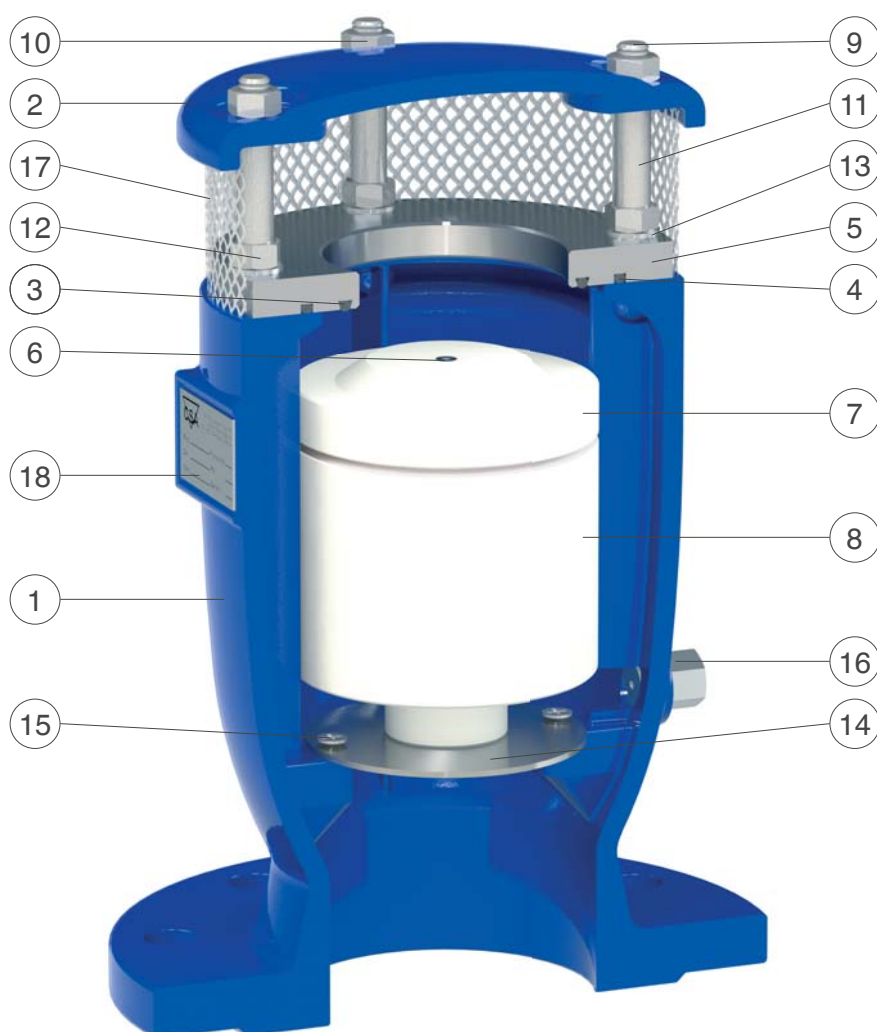
### Weights and dimensions

| CONNECTION mm | A mm | B mm | C mm |     | D mm  | Weight Kg |
|---------------|------|------|------|-----|-------|-----------|
| Threaded 2"   | 117  | 231  | -    | -   | CH 70 | 4,8       |
| Flanged 50    | 117  | 236  | 165  | -   | -     | 6,8       |
| 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  | 515  | 375  | 340 | -     | 55,0      |
| Flanged 250   | 380  | 625  | 450  | -   | -     | 101,0     |
| Flanged 300   | 414  | 735  | 485  | -   | -     | 127,0     |
| Flanged 350   | 492  | 850  | 580  | -   | -     | 250,5     |
| Flanged 400   | 578  | 995  | 660  | -   | -     | 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 water hammer combination air valve

## Mod. Lynx 3F - AS

The CSA 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 consistent and 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 (pat. 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 sonic nozzles for air flow 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

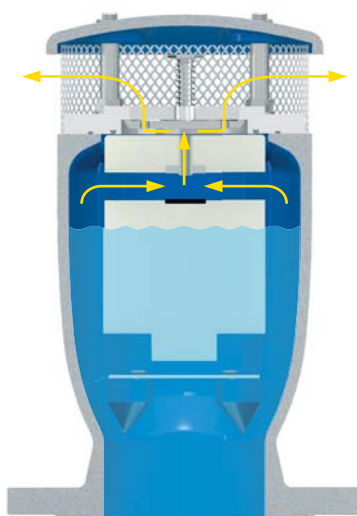
- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used near pumps, on changes in slope ascending, and at the high points of the pipeline subjected to water hammer.

## Operating principle



### Controlled air discharge

During the pipe filling it is necessary to avoid rapid closures, 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. 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.



### 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 of the pipeline, and to the entire system.

## 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 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.

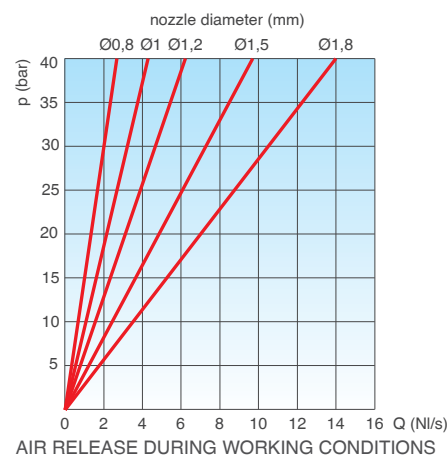
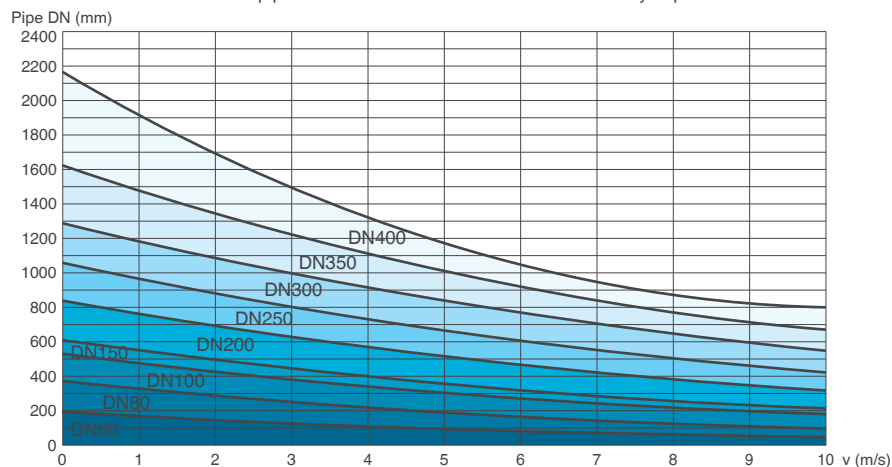


■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be modified on request according to the project conditions and the transient analysis.

## Technical data

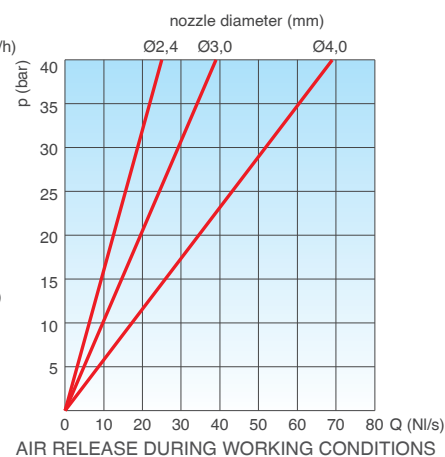
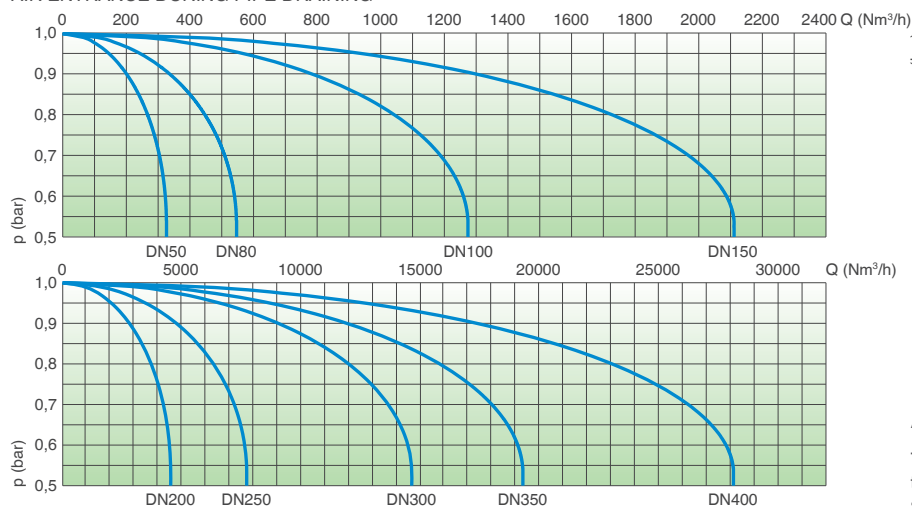
### Air valve selection chart

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



### Air flow performance charts

AIR ENTRANCE DURING PIPE DRAINING



The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted 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 size of the air valve and the PN (table aboard).

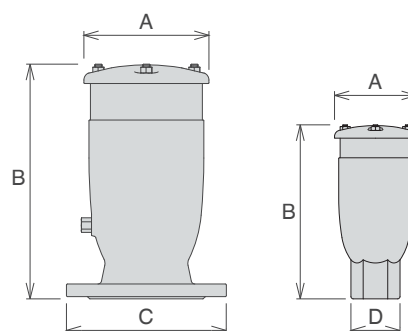
|        | PN 10 | PN 16 | PN 25 | PN 40 |
|--------|-------|-------|-------|-------|
| DN 50  | 1,2   | 1,2   | 1     | 0,8   |
| DN 80  | 1,8   | 1,5   | 1,2   | 0,8   |
| DN 100 | 1,8   | 1,5   | 1,2   | 1     |
| DN 150 | 2,4   | 1,8   | 1,8   | 1,2   |
| DN 200 | 4     | 3     | 2,4   | 1,8   |
| 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. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

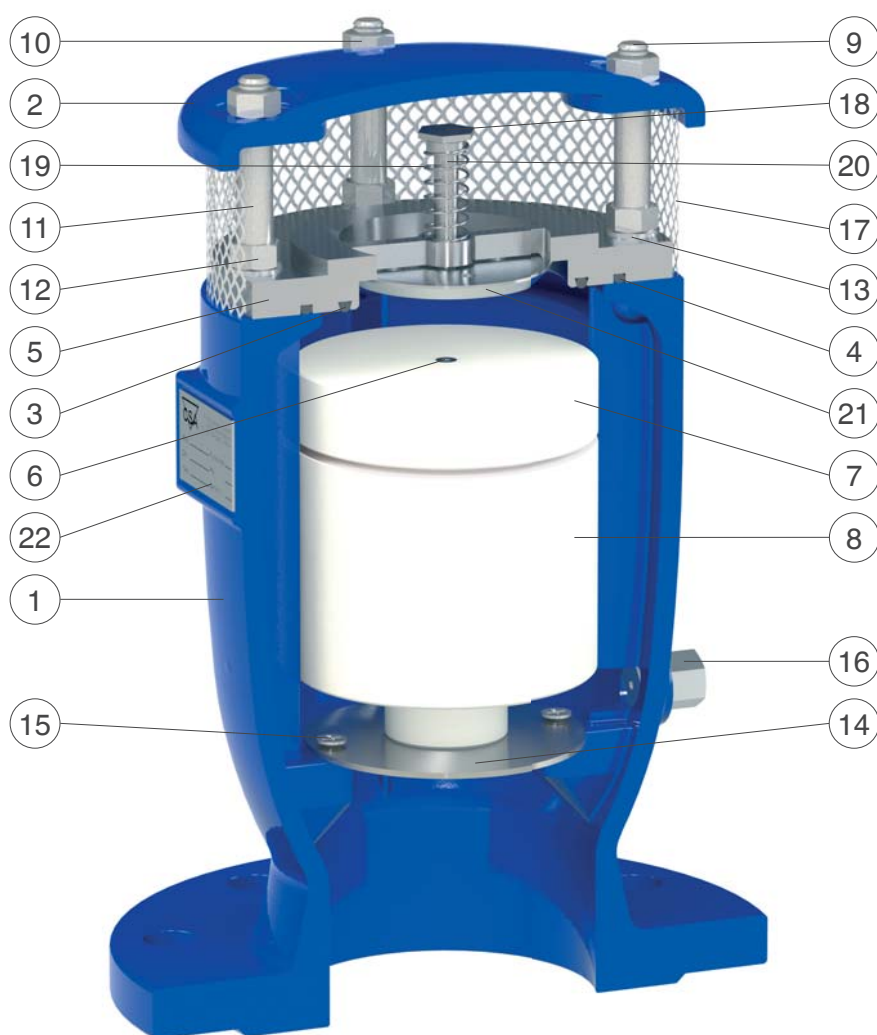
### Weights and dimensions

| CONNECTION mm | A mm | B mm | C mm |     | D mm  | Weight Kg |
|---------------|------|------|------|-----|-------|-----------|
| Threaded 2"   | 117  | 231  | -    | -   | CH 70 | 4,8       |
| Flanged 50    | 117  | 236  | 165  | -   | -     | 6,8       |
| 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  | 515  | 375  | 340 | -     | 55,0      |
| Flanged 250   | 380  | 625  | 450  | -   | -     | 101,0     |
| Flanged 300   | 414  | 735  | 485  | -   | -     | 127,0     |
| Flanged 350   | 492  | 850  | 580  | -   | -     | 250,5     |
| Flanged 400   | 578  | 995  | 660  | -   | -     | 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 100) | stainless steel AISI 303                  | stainless steel AISI 316 |
| 19 | Spring                         | stainless steel AISI 302                  |                          |
| 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 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.



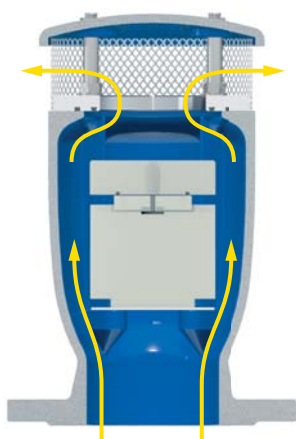
### Technical features and benefits

- 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 for consistent and 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 (pat. 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.

### Applications

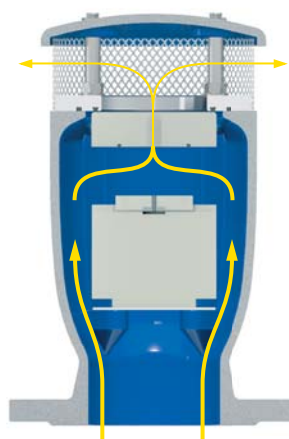
- Main transmission lines.
- Water distribution networks.
- Irrigation systems.
- In general this model is used, in combination with CSA AS technology, on changes in slope and high points of the profile to provide the best air control and safety of the pipeline.

## Operating principle



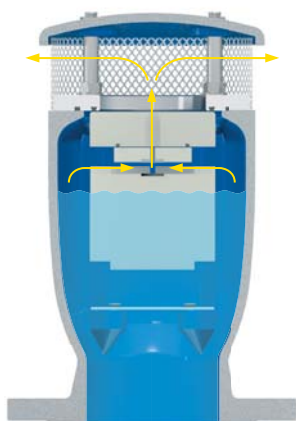
### Discharge of large volumes of air

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



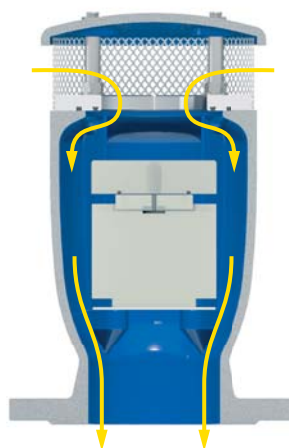
### Controlled outflow

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 of 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 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.

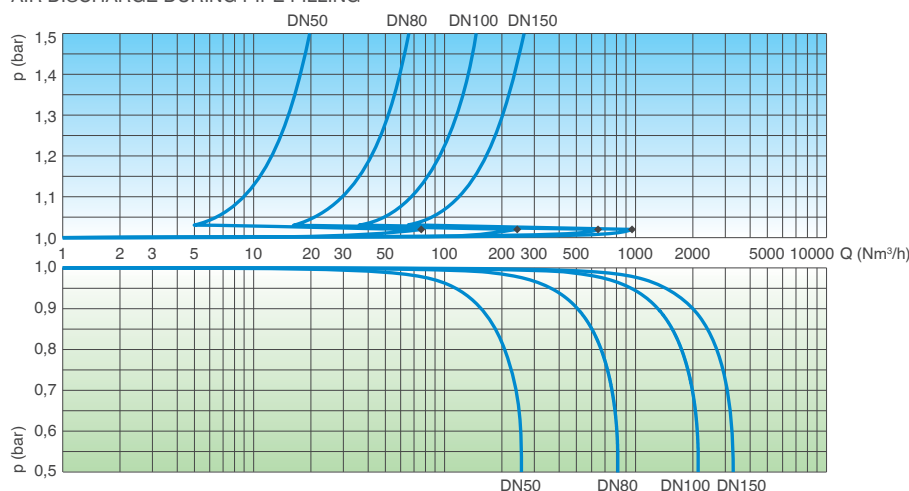


■ **Version for air discharge only EO series**, available both for Lynx 3F RFP and 2F RFP models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements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

## Technical data

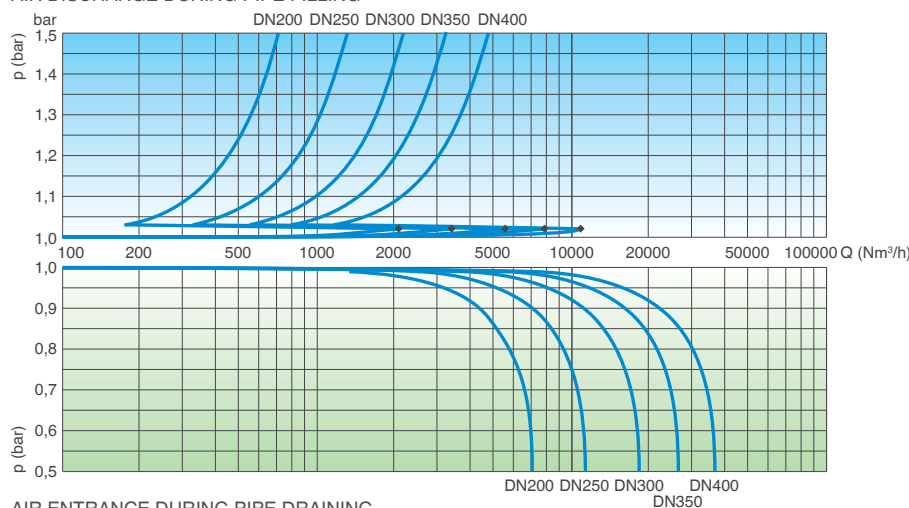
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

### Working conditions

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

### Standard

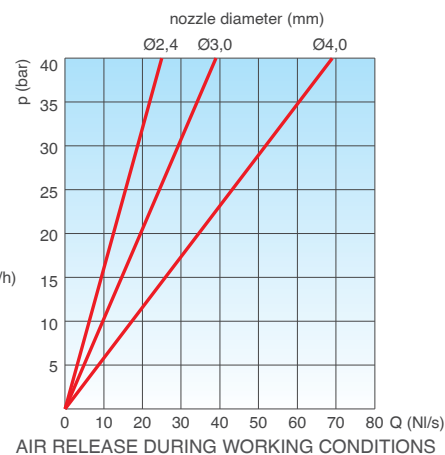
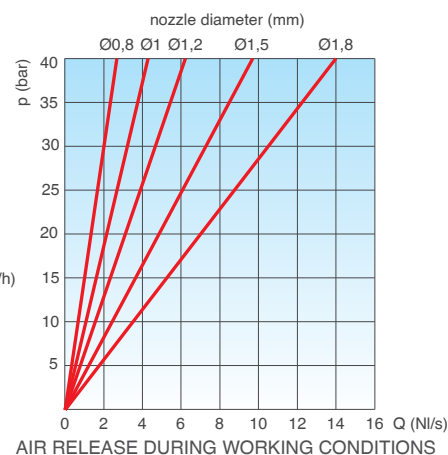
Designed in compliance with EN-1074/4 and AWWA C-512. Flanges according to EN 1092/2 or ANSI. Epoxy painting applied through fluidized bed technology blue RAL 5005. Changes on the flanges and painting on request.

### Weights and dimensions

| CONNECTION<br>mm | A<br>mm | B<br>mm | C<br>mm |     | D<br>mm | Weight<br>Kg |
|------------------|---------|---------|---------|-----|---------|--------------|
| Threaded 2"      | 117     | 231     | -       | -   | CH 70   | 4,8          |
| Flanged 50       | 117     | 236     | 165     | -   | -       | 6,8          |
| 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     | 515     | 375     | 340 | -       | 55,0         |
| Flanged 250      | 380     | 625     | 450     | -   | -       | 101,0        |
| Flanged 300      | 414     | 735     | 485     | -   | -       | 127,0        |
| Flanged 350      | 492     | 850     | 580     | -   | -       | 250,5        |
| Flanged 400      | 578     | 995     | 660     | -   | -       | 304,0        |

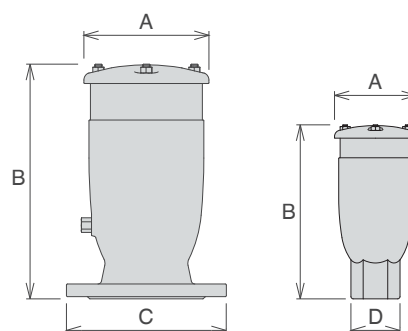
### Nozzle choice

Nozzle diameter in mm according to the size of the air valve and the PN (table aboard).



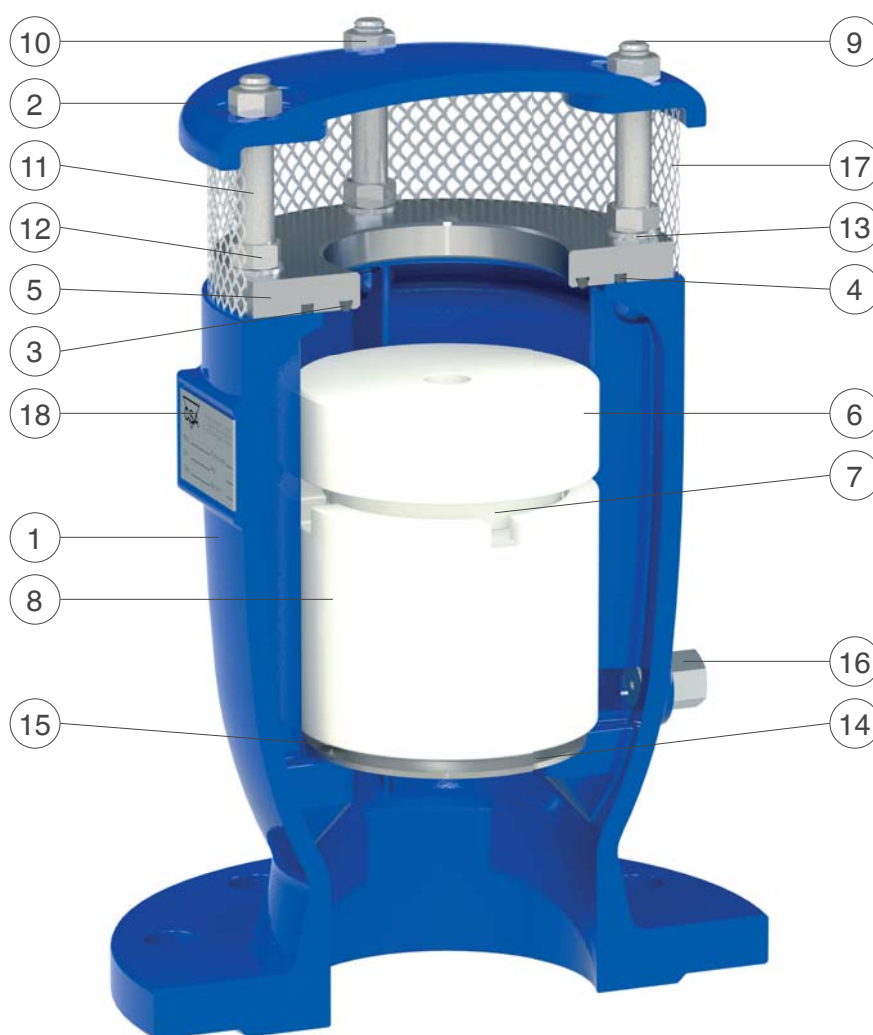
The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted using a safety factor.

|        | PN 10 | PN 16 | PN 25 | PN 40 |
|--------|-------|-------|-------|-------|
| DN 50  | 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     |



Values are approximate, consult CSA service for more details.

## Technical details



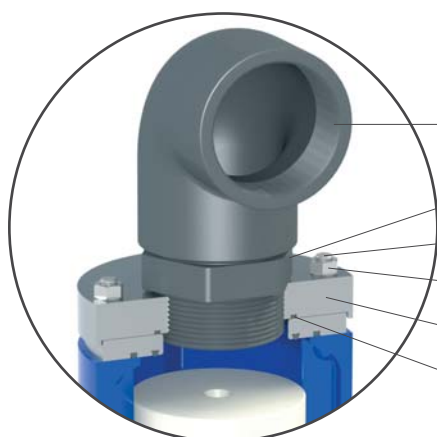
| N. | Component                     | Standard material                          | Optional                 |
|----|-------------------------------|--------------------------------------------|--------------------------|
| 1  | Body                          | ductile cast iron GJS 500-7 o GJS 450-10   |                          |
| 2  | Cap                           | ductile cast iron GJS 500-7 o 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.

# Combination air valve - Mod. Lynx 3F

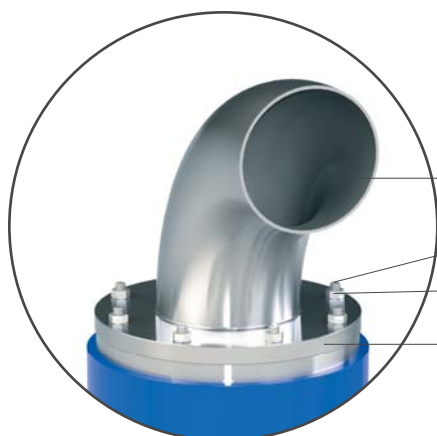
## Version for submerged applications - SUB series

**Version for submerged applications, SUB series** available for all CSA Lynx models except for EO version, 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.



**DN 50 - 200**

- Threaded elbow in PVC (PP for DN 50-80)
- Fitting in PVC (PP for DN 50-80)
- Studs in stainless steel
- Bolts in stainless steel
- SUB flat in PP or stainless steel
- O-ring in EPDM, NBR, Viton or silicone



**DN 250 - 400**

- Elbow in stainless steel
- Studs in stainless steel
- Bolts in stainless steel
- SUB flat in stainless steel

### Technical data

#### Working conditions

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

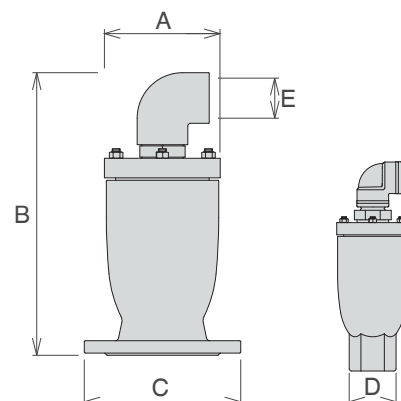
#### Standard

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

#### Weights and dimensions

| CONNECTION<br>mm | A<br>mm | B<br>mm | C<br>mm |     | E<br>inch | Weight<br>Kg |
|------------------|---------|---------|---------|-----|-----------|--------------|
| Flanged 50       | 105     | 298     | 165     | -   | 1"        | 6,8          |
| Flanged 80       | 128     | 395     | 210     | 205 | 2"        | 10,8         |
| Flanged 100      | 158     | 420     | 235     | 220 | 2" 1/2    | 13,8         |
| Flanged 150      | 192     | 474     | 300     | 285 | 3"        | 23,0         |
| Flanged 200      | 272     | 648     | 375     | 340 | 4"        | 55,0         |
| Flanged 250      | 359     | 828     | 450     | -   | 6"        | 108,5        |
| Flanged 300      | 414     | 1047    | 485     | -   | 8"        | 140,0        |
| Flanged 350      | 492     | 1270    | 580     | -   | 10"       | 270,5        |
| Flanged 400      | 578     | 1480    | 660     | -   | 12"       | 332,5        |

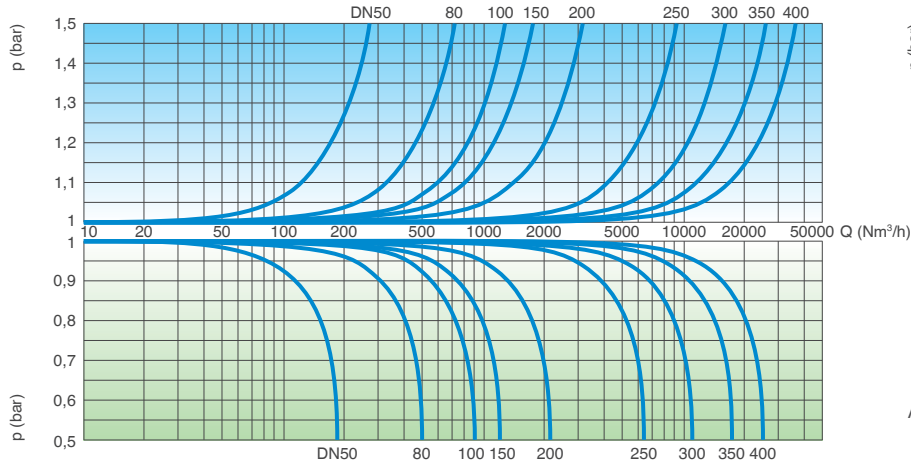
All values are approximate, consult CSA service for more details.



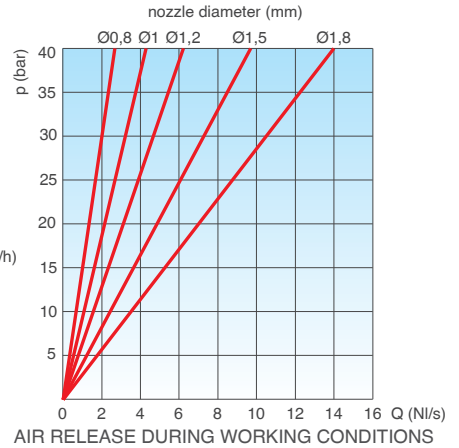
## Technical data

### Lynx SUB - Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING

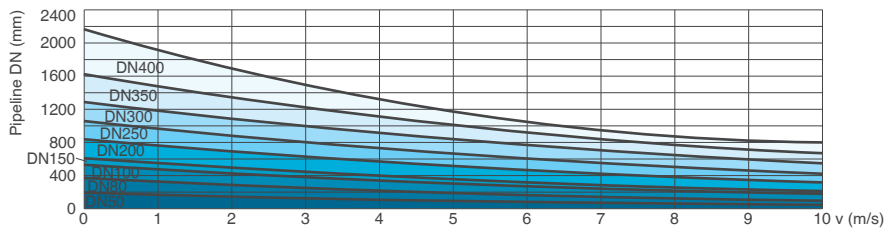


AIR ENTRANCE DURING PIPE DRAINING

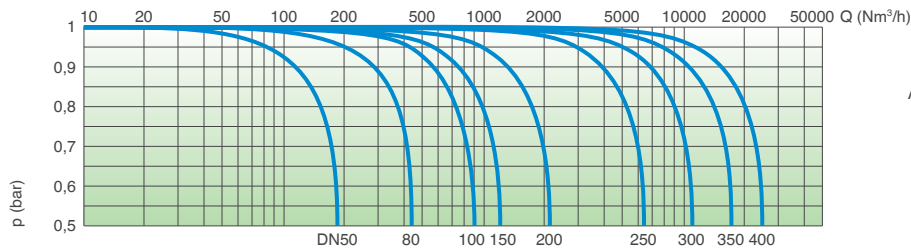


### Lynx AS SUB - Air valve choice chart

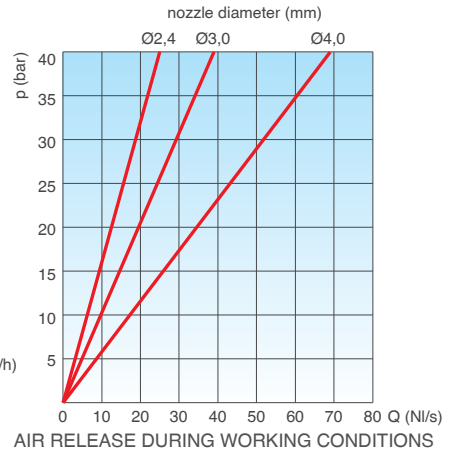
Air valve size as a function of pipeline internal diameter and fluid flow velocity expressed in m/s.



### Lynx AS SUB - Air flow performance charts

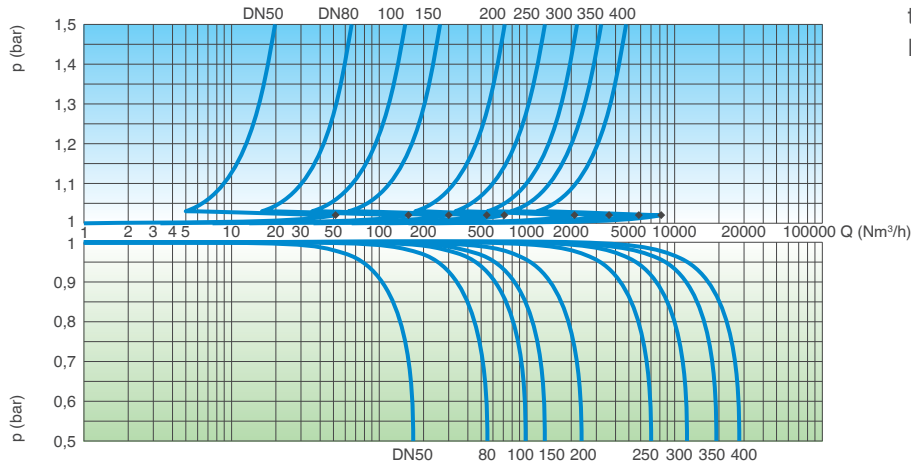


AIR ENTRANCE DURING PIPE DRAINING



### 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 using a safety factor.

### Nozzle choice

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



## Combination air valve Mod. FOX 3F - HP

The CSA air 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.



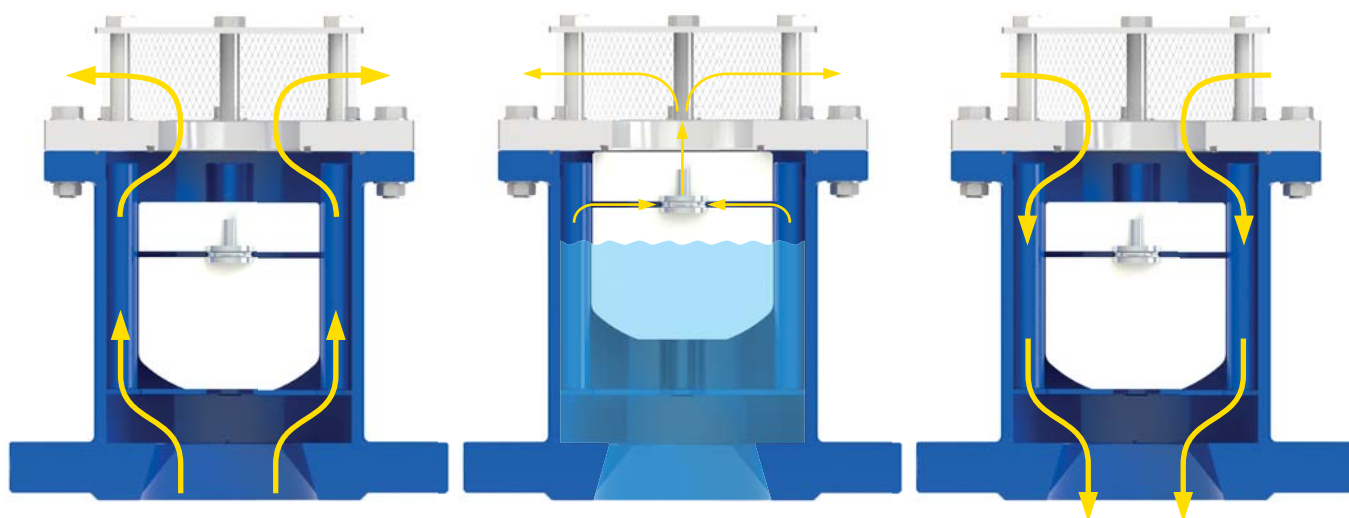
### Technical features and benefits

- 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 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 (pat. 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.
- Mesh and cap in stainless steel.

### Applications

- Main transmission lines.
- Mines.
- 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 when ductile cast iron is not acceptable.

## 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 of the pipeline, and to the entire system.

## Optional



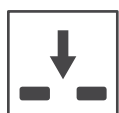
■ **Vacuum breaker version Mod. FOX 2F HP** to allow the entrance and discharge of large volumes of air only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the air release won't be required.



■ **Version for submerged applications, SUB series**, available both for FOX 3F HP and 2F HP Models, with 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.



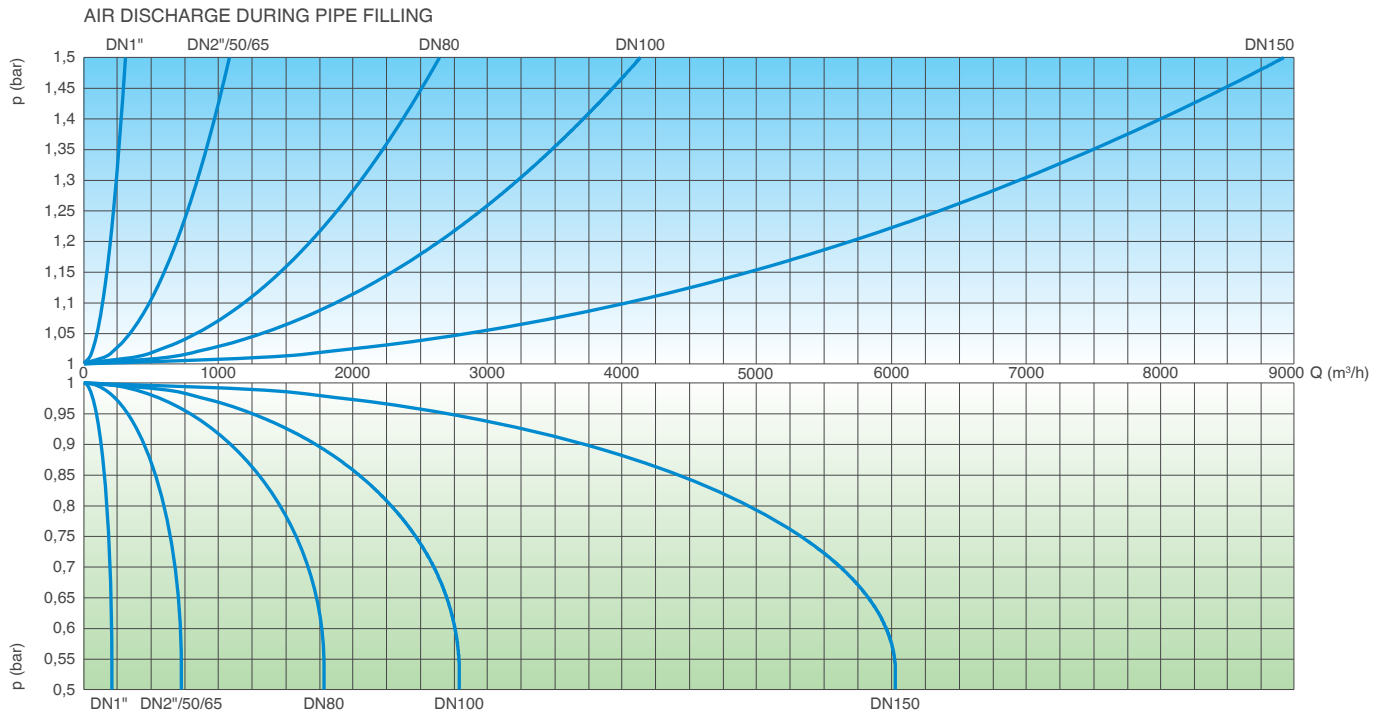
■ **Version for air discharge only EO series**, available both for FOX 3F HP and 2F HP models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements air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



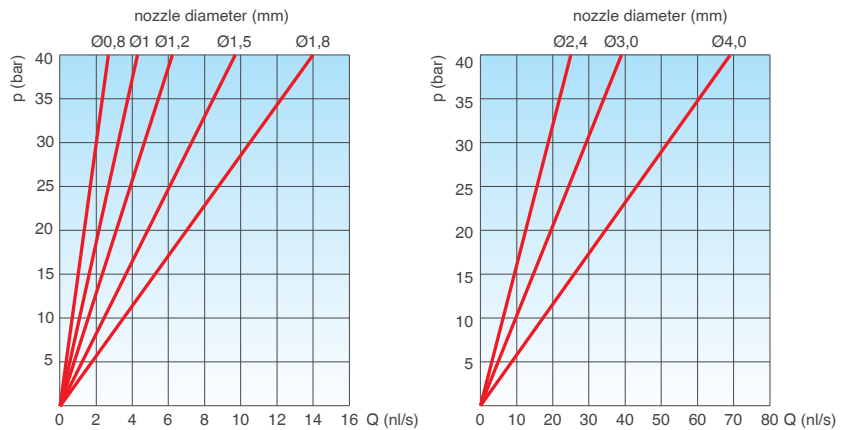
The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted using a safety factor.

### Working conditions

Treated water max. 60° C. Version for high temperature available on request.  
Maximum pressure 64 bar.  
Minimum pressure 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.  
Changes and variations on the flanges and painting details available on request.

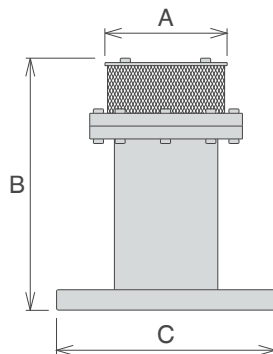


AIR RELEASE DURING WORKING CONDITIONS

### Weights and dimensions

| CONNECTION<br>inch/mm | A<br>mm | B<br>mm | C<br>mm | Weight<br>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.

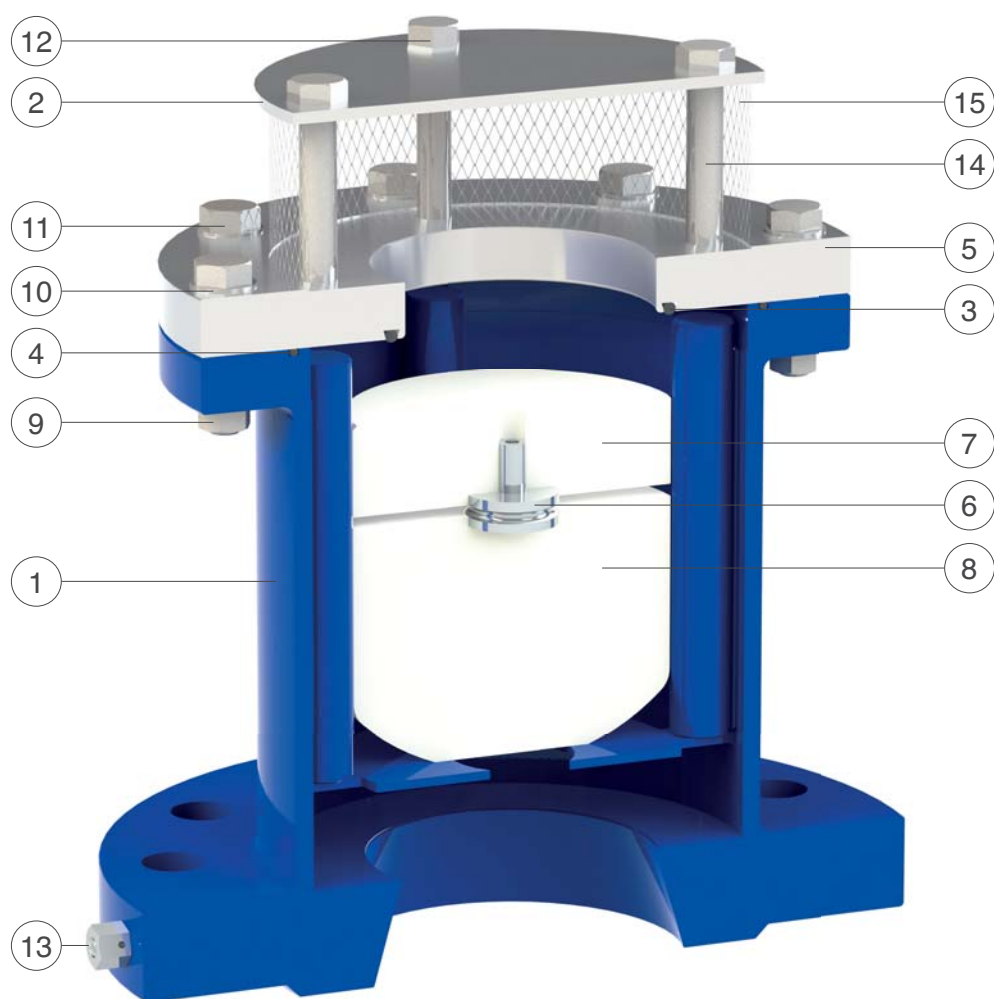


### Nozzle choice

|             | PN<br>10 | PN<br>16 | PN<br>25 | PN<br>40 | PN<br>64 |
|-------------|----------|----------|----------|----------|----------|
| DN 1"       | 1,2      | 1,2      | 1        | 0,8      | 0,8      |
| DN 2"/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 Fe 37      |                          |
| 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 | Filter        | stainless steel AISI 304 |                          |

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



## Anti water hammer combination air valve Mod. FOX 3F - AS - HP

The CSA air valve Mod. FOX 3F AS HP 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.



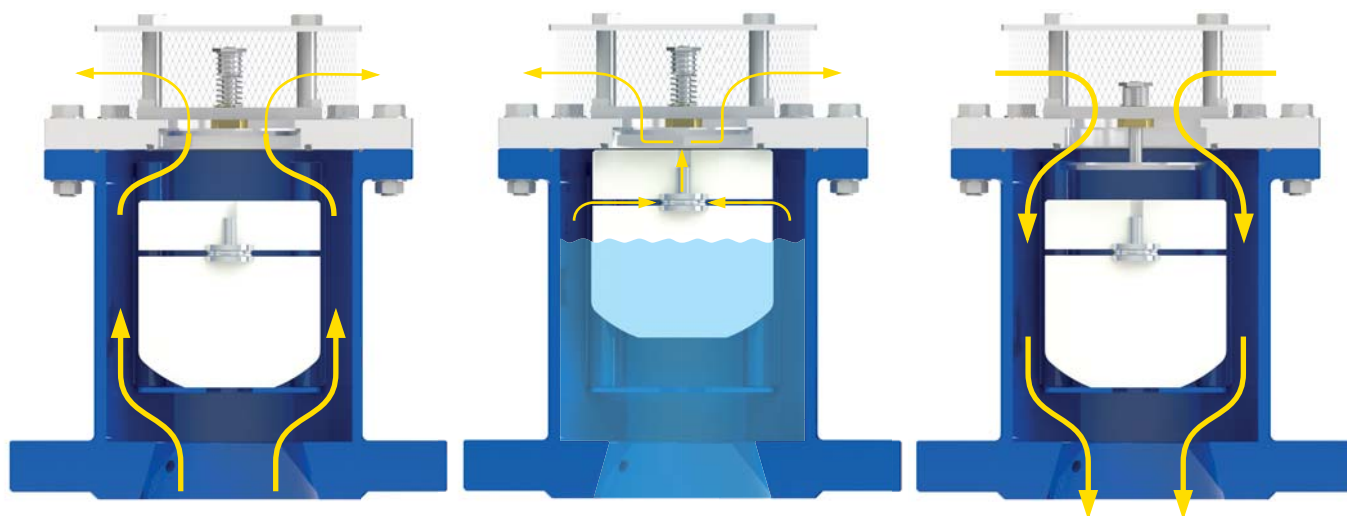
### Technical features and benefits

- 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 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 (pat. 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.
- Mines.
- Dams and high pressure systems.
- In general this model is used on changes in slope ascending, and at the high points of the pipeline subjected to water hammer.

## Operating principle



### Controlled air discharge

During the pipe filling it is necessary to avoid rapid closures, 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.

### 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 of the pipeline, and to the entire system.

## 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 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.

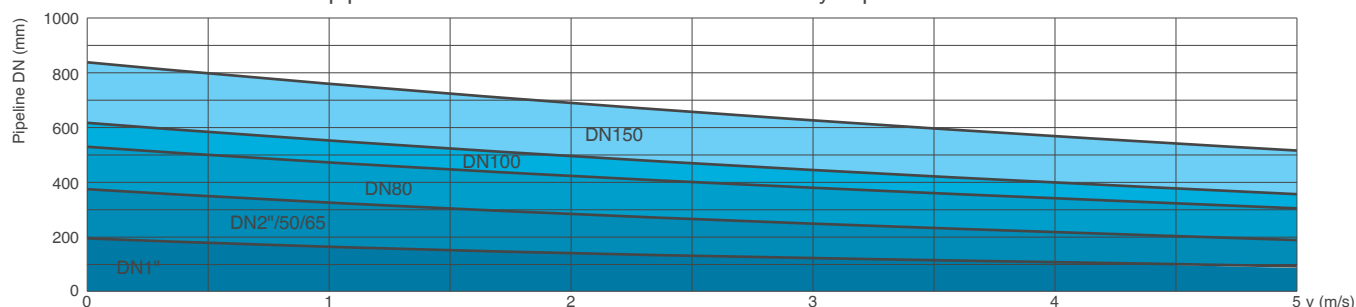


■ The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AS device, can be modified on request according to the project conditions and the transient analysis.

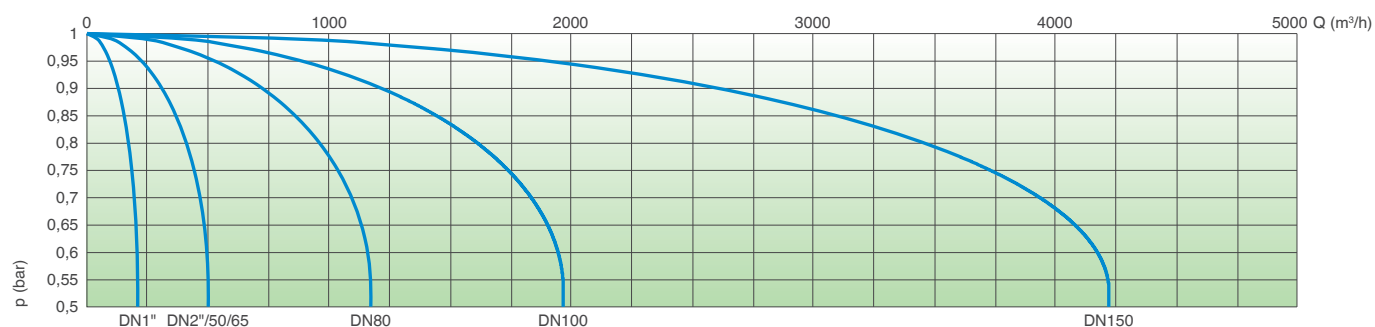
## Technical data

### Air flow performance charts

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



### Air flow performance charts



AIR ENTRANCE DURING PIPE DRAINING

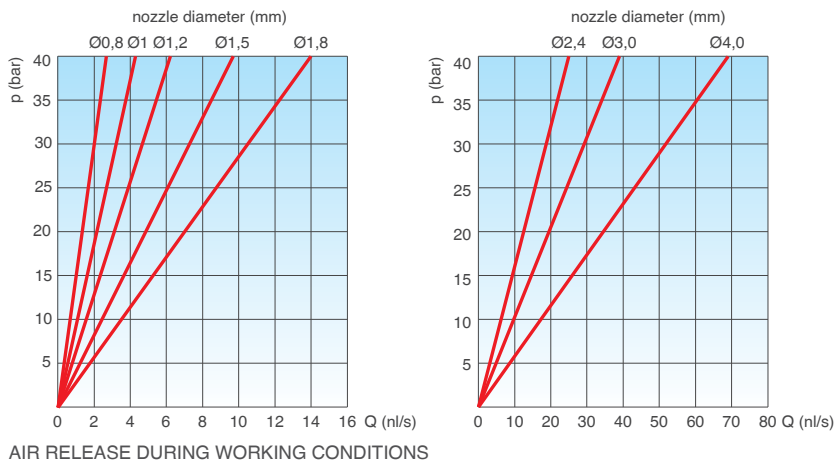
The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted using a safety factor.

### Working conditions

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

### Standard

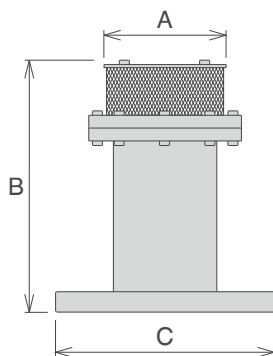
Designed in compliance with EN-1074/4.  
Flanges according to EN 1092/2, ANSI.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes and variations on the flanges and painting details available on request.



AIR RELEASE DURING WORKING CONDITIONS

### Weights and dimensions

| CONNECTION<br>inch/mm | A<br>mm | B<br>mm | C<br>mm | Weight<br>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         |



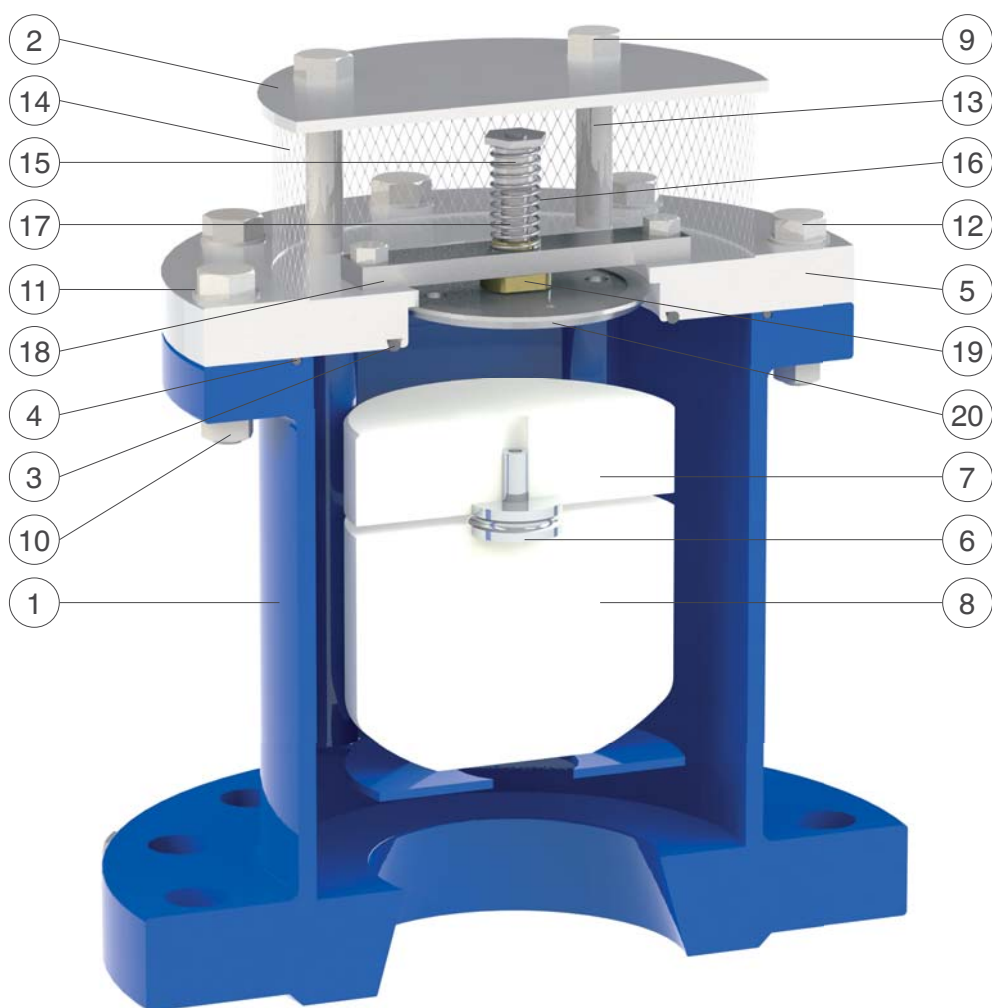
### Nozzle choice

|             | PN<br>10 | PN<br>16 | PN<br>25 | PN<br>40 | PN<br>64 |
|-------------|----------|----------|----------|----------|----------|
| DN 1"       | 1,2      | 1,2      | 1        | 0,8      | 0,8      |
| DN 2"/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.

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

## Technical details



| N. | Component                      | Standard material         | Optional                 |
|----|--------------------------------|---------------------------|--------------------------|
| 1  | Body                           | painted steel Fe 37       |                          |
| 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 | Filter                         | stainless steel AISI 304  |                          |
| 15 | Spring guide nut               | stainless steel AISI 303  | stainless steel AISI 316 |
| 16 | Spring                         | stainless steel AISI 302  |                          |
| 17 | AS shaft                       | stainless steel AISI 303  | stainless steel AISI 316 |
| 18 | Support with screws (in DN150) | stainless steel AISI 304  | stainless steel AISI 316 |
| 19 | Guiding nut (in DN150)         | 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 air release valve Ventolo will ensure the proper operation of the system allowing the release of air pockets accumulating during working conditions.



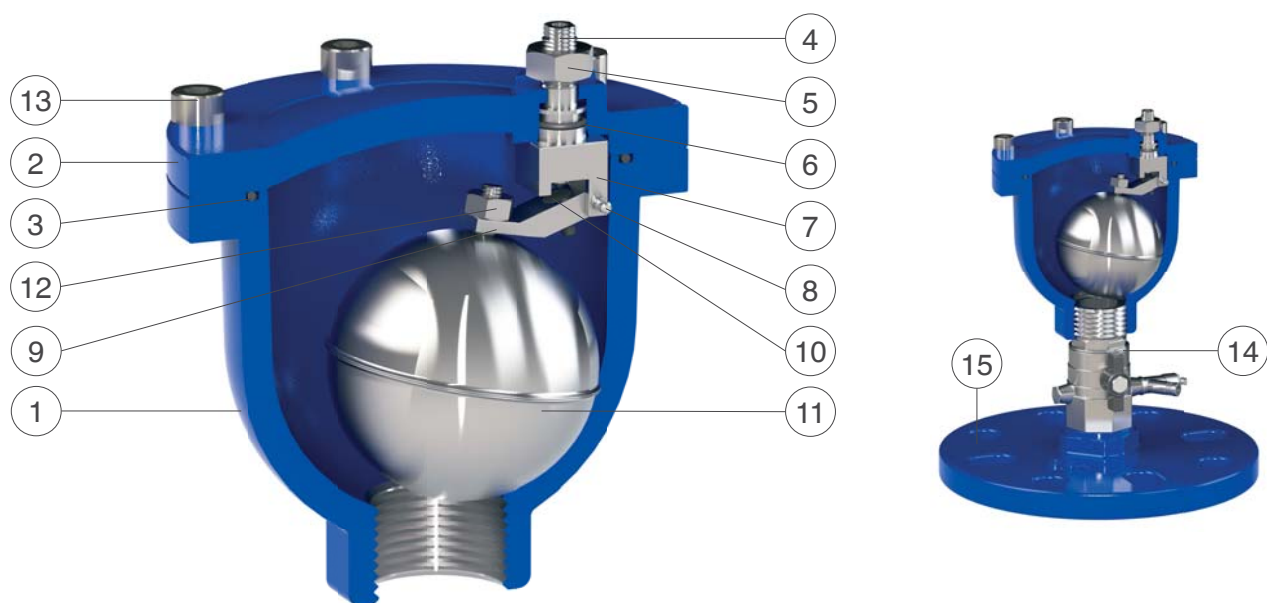
### Technical features and benefits

- Body and cover in ductile cast iron, PN 40 bar rated.
- Float in stainless steel AISI 304.
- Lever and pivots in AISI 303/316.
- Nozzle in stainless steel AISI 303/316.
- 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 304/316.
- Minimum working pressure 0,1 bar.

### Applications

- Water distribution systems, irrigation, buildings.
- Pumps case.
- Control valves and modulating devices.
- In general only when the air release function is required, it can be combined with CSA air valves FOX series for the kinetic functions of air outflow and inflow.

## Technical details



| N. | Component     | Standard material           | Optional                  |
|----|---------------|-----------------------------|---------------------------|
| 1  | Body          | ductile cast iron GJS 500-7 |                           |
| 2  | Cap           | ductile cast iron GJS 500-7 |                           |
| 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    |                           |
| 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 OT58    | stainless steel AISI 316  |
| 15 | Flange        | ductile cast iron GJS 500-7 | painted Fe 37/AISI304/316 |

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

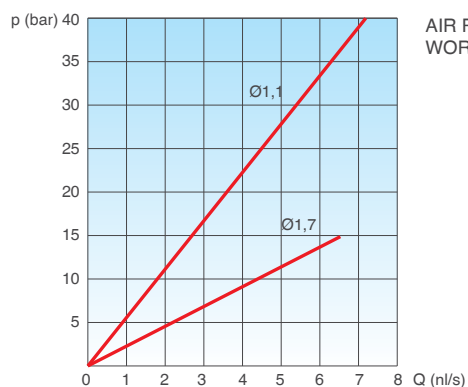
### Working conditions

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

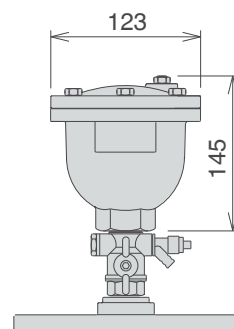
### Standard

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

### Air flow performance charts



AIR RELEASE DURING  
WORKING CONDITIONS





## Combination air valve Mod. EOLO

The CSA combination air valve Eolo will ensure the proper operation of the system allowing the release of air pockets accumulating during working conditions, the entrance and discharge of large volumes of air during pipe draining and filling.



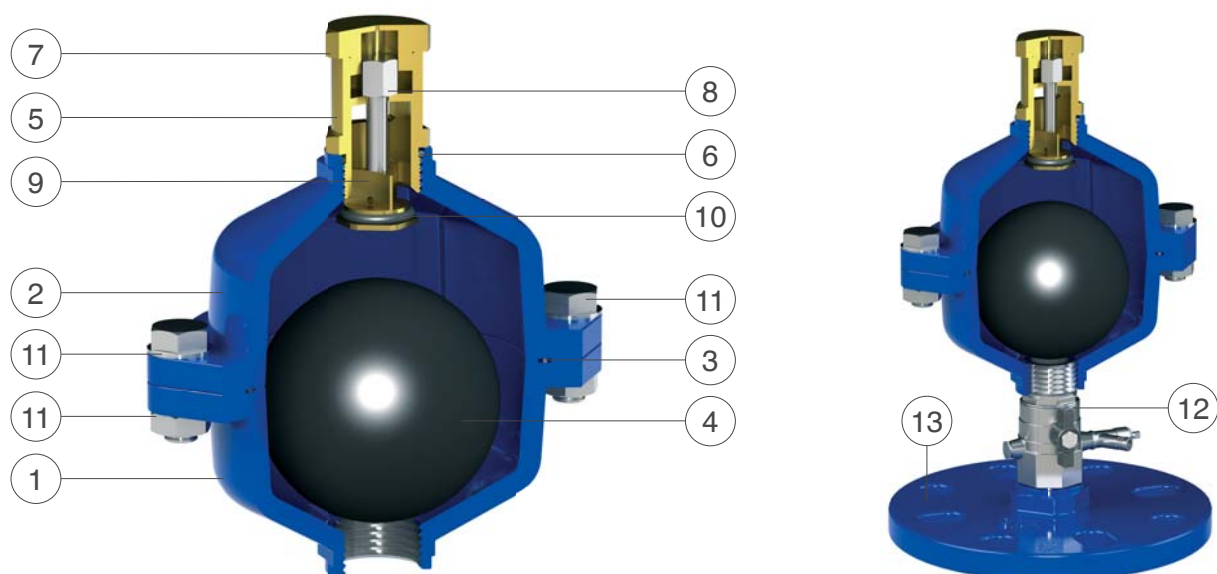
### Technical features and benefits

- Upper and lower bodies in ductile cast iron GJS 500/7 PN 25 rated.
- Float in stainless steel AISI 304 covered with vulcanized NBR.
- Patented air release system with gasket compression control in brass.
- Guiding shaft of the air release system in stainless steel AISI 303/316.
- Nuts and bolts in stainless steel AISI 304/316.
- Simple and compact.

### Applications

- Water distribution systems.
- Irrigation, cooling systems.
- Buildings.
- In general where the air release function is necessary along with a certain air flow capacity, limited to the kinetic passage of this model for which please see the air charts on the next page.

## Technical details



| N. | Component                 | Standard material                   | Optional                  |
|----|---------------------------|-------------------------------------|---------------------------|
| 1  | Lower body                | ductile cast iron GJS 500-7         |                           |
| 2  | Upper body                | ductile cast iron GJS 500-7         |                           |
| 3  | O-ring                    | NBR                                 | EPDM/Viton/silicone       |
| 4  | Float                     | NBR coated stainless steel AISI 304 |                           |
| 5  | Nozzle subset body        | brass OT58                          |                           |
| 6  | O-ring                    | NBR                                 | EPDM/Viton/silicone       |
| 7  | Nozzle subset tap         | brass OT58                          |                           |
| 8  | Shaft                     | stainless steel AISI 303            | stainless steel AISI 316  |
| 9  | Nozzle                    | brass OT58                          |                           |
| 10 | O-ring                    | NBR                                 |                           |
| 11 | Screws, washers and bolts | stainless steel AISI 304            | stainless steel AISI 316  |
| 12 | Ball valve                | nickel-plated brass OT58            | stainless steel AISI 316  |
| 13 | Flange                    | ductile cast iron GJS 500-7         | painted Fe 37/AISI304/316 |

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

## Working conditions

Treated water max. 60°C.

Higher temperatures on request.

Max. pressure 25 bar.

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

## Standard

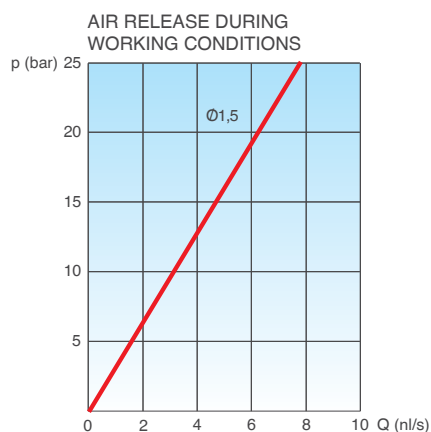
Designed in compliance with EN-1074/4.

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

Epoxy painting applies through fluidized bed technology blue RAL 5005.

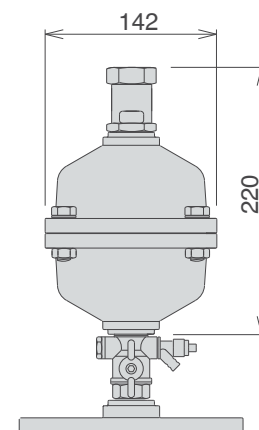
Changes and variations on the flanges and painting details available on request.

## Air flow performance charts



AIR DISCHARGE AND ENTRANCE DURING PIPE FILLING AND DRAINING

| $\Delta p$ (bar)                  | 0,1 | 0,2 | 0,3 | 0,4 | 0,5 |
|-----------------------------------|-----|-----|-----|-----|-----|
| Air discharge (m <sup>3</sup> /h) | 82  | 106 | 120 | 128 | 133 |
| Air entrance (m <sup>3</sup> /h)  | 78  | 90  | 118 | 125 | 127 |



## Water combination air valve underground version Mod. Saturno

The Saturno air valve has been designed to provide the proper solution for underground installations, when for cost savings or simply for practical reasons digging and chambers are not possible. The air valve will ensure the proper 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.



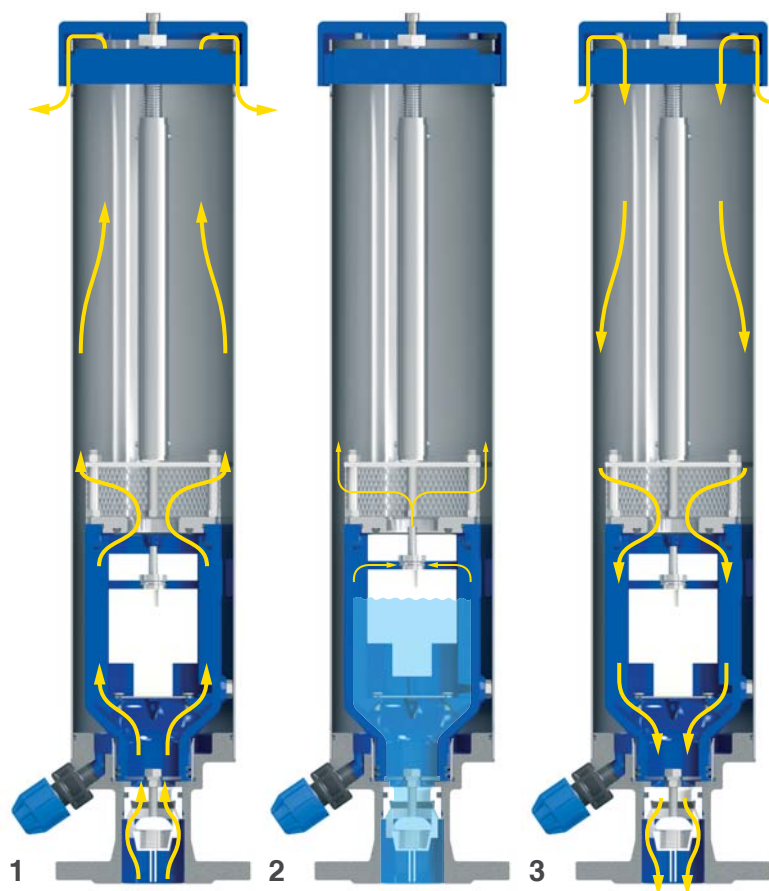
### Technical features and benefits

- A new and reliable solution compared to the conventional way of installing air valves, requiring deep excavation to house concrete structures and whatever necessary to create the proper chamber like TE pieces, sectioning devices, the air valves itself and more. Saturno's innovative concept is based on the possibility of installing it directly on the TE piece before filling up the trench without any sectioning device, therefore dramatically reducing the overall cost. A simple manhole on the ground ( DN 300 mm is recommended) is normally enough to carry out the proper maintenance.
- Standpipe in stainless steel firmly secured to the basement to protect the air valves inside of it, and to hold the upper guide connected to the maneuvering system.
- Flanged basement to hold the check valve and the exhaust pipe 3/8" to avoid the accumulation of water into the standpipe.
- The combination air valve FOX housed into the flanged basement where its movement is controlled by a shaft, connected to its cover and whose water tightness is ensured by two O-rings.
- The system allows for proper maintenance simply by sectioning the flow rotating the maneuvering screw from the top, and extracting it from above.

### Applications

- Water distribution networks.
- Pressurized system with treated water.

## Operating principle



### 1. Discharge of large volumes of air

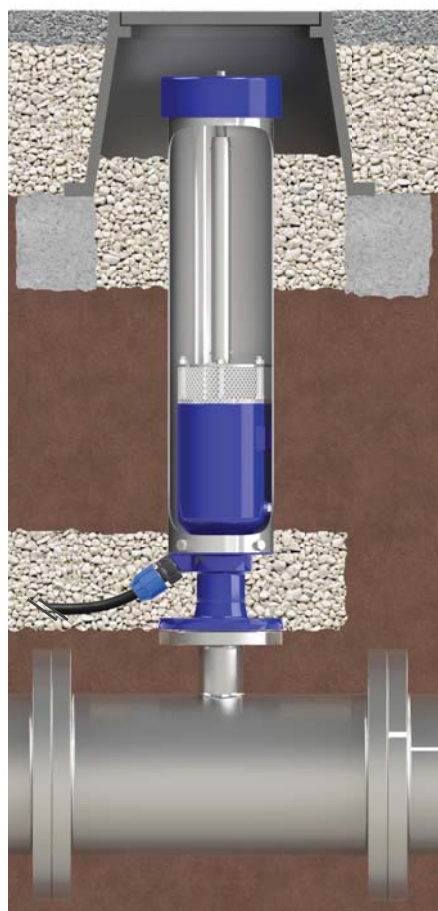
During the pipe filling it is necessary to discharge air as water flows in. The FOX 3F, thanks to an aerodynamic full port body and deflector, will make sure to avoid premature closures of the mobile block during this phase.

### 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 of the pipeline, and to the entire system.

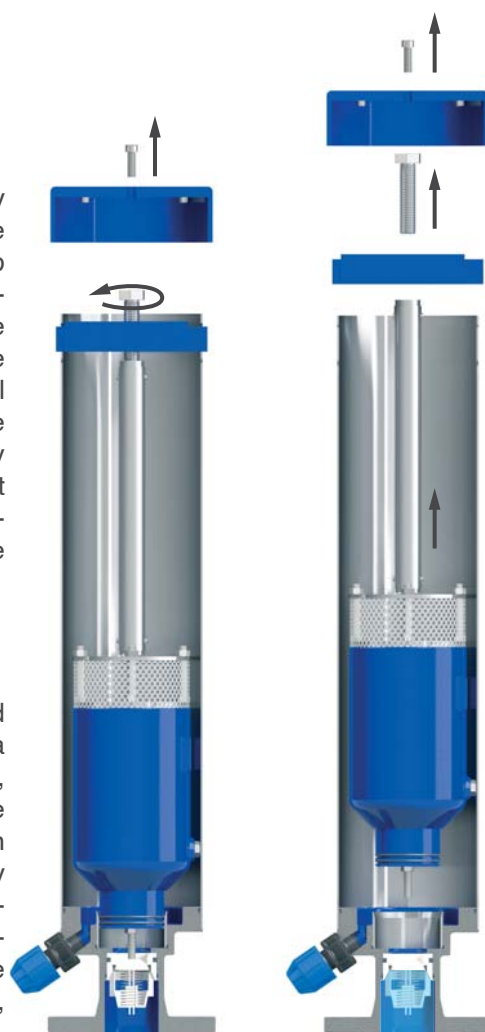


## Installation

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 main pipe. Normally supplied with 3/8" connection it should be positioned within a layer of small stones, to facilitate the draining.

## Air valve removal

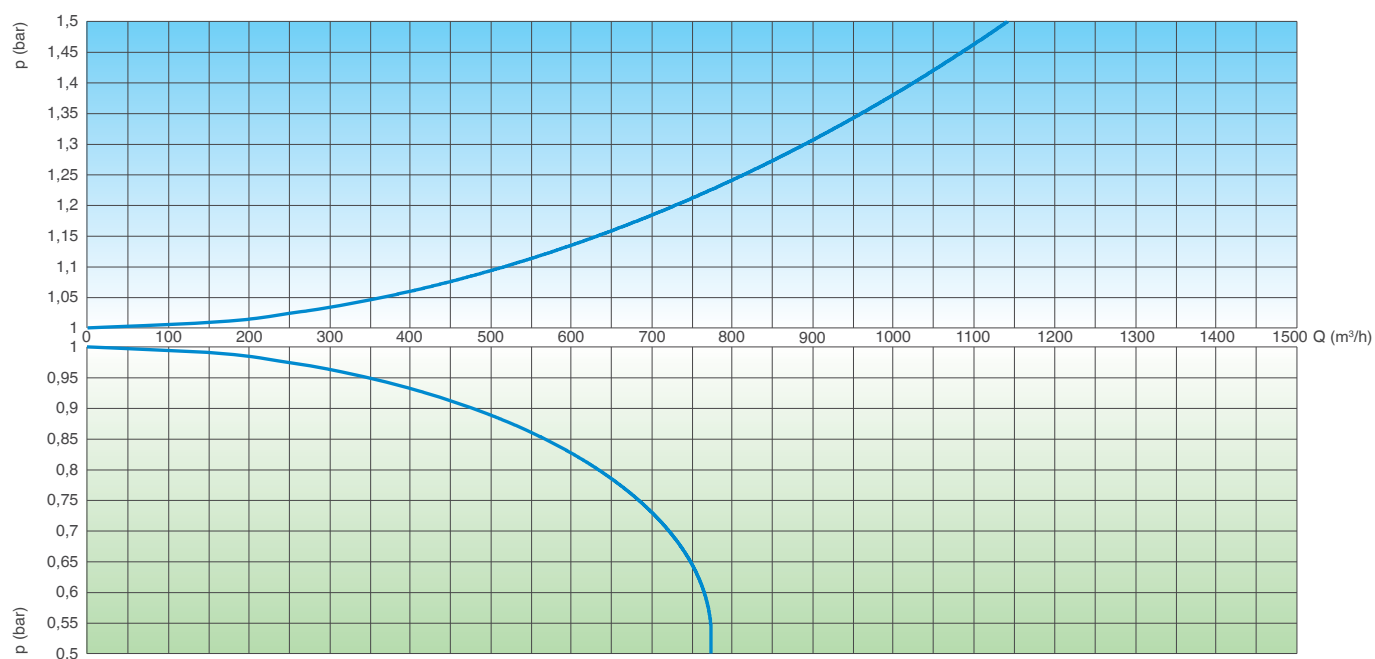
The design of the underground air valve Saturno allows for a maintenance and replacement, without removing the air valve from the pipe, simply acting on the cap and maneuvering key from above as shown on the picture on the right. All the components will be pulled out from the top without the need of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



## Technical data

### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

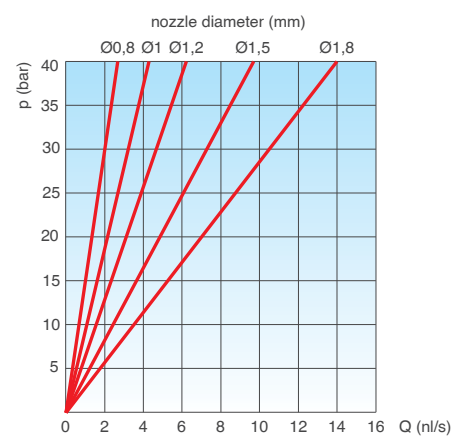
The air flow charts were created in Kg/s from laboratory tests and numerical analysis, then converted using a safety factor.

### 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 and AWWA C-512.  
Flanges according to EN 1092/2, ANSI.  
Epoxy painting applied through fluidized bed technology blue RAL 5005.  
Changes and variations on the flanges and painting details on request.

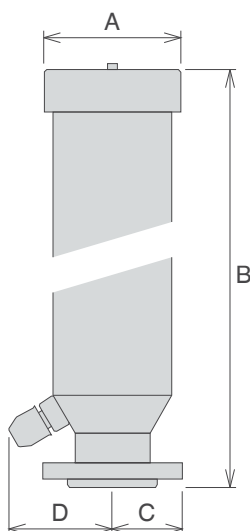


AIR RELEASE DURING WORKING CONDITIONS

### Weights and dimensions

| DN mm | A mm | B mm | C mm | D mm  | Weight Kg |
|-------|------|------|------|-------|-----------|
| 50    | 160  | 750  | 82,5 | 122,5 | 20,5      |
|       | 160  | 1000 | 82,5 | 122,5 | 23,2      |
|       | 160  | 1250 | 82,5 | 122,5 | 25,3      |
|       | 160  | 1500 | 82,5 | 122,5 | 28,6      |
| 80    | 160  | 750  | 100  | 122,5 | 22,0      |
|       | 160  | 1000 | 100  | 122,5 | 24,7      |
|       | 160  | 1250 | 100  | 122,5 | 26,8      |
|       | 160  | 1500 | 100  | 122,5 | 30,1      |

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

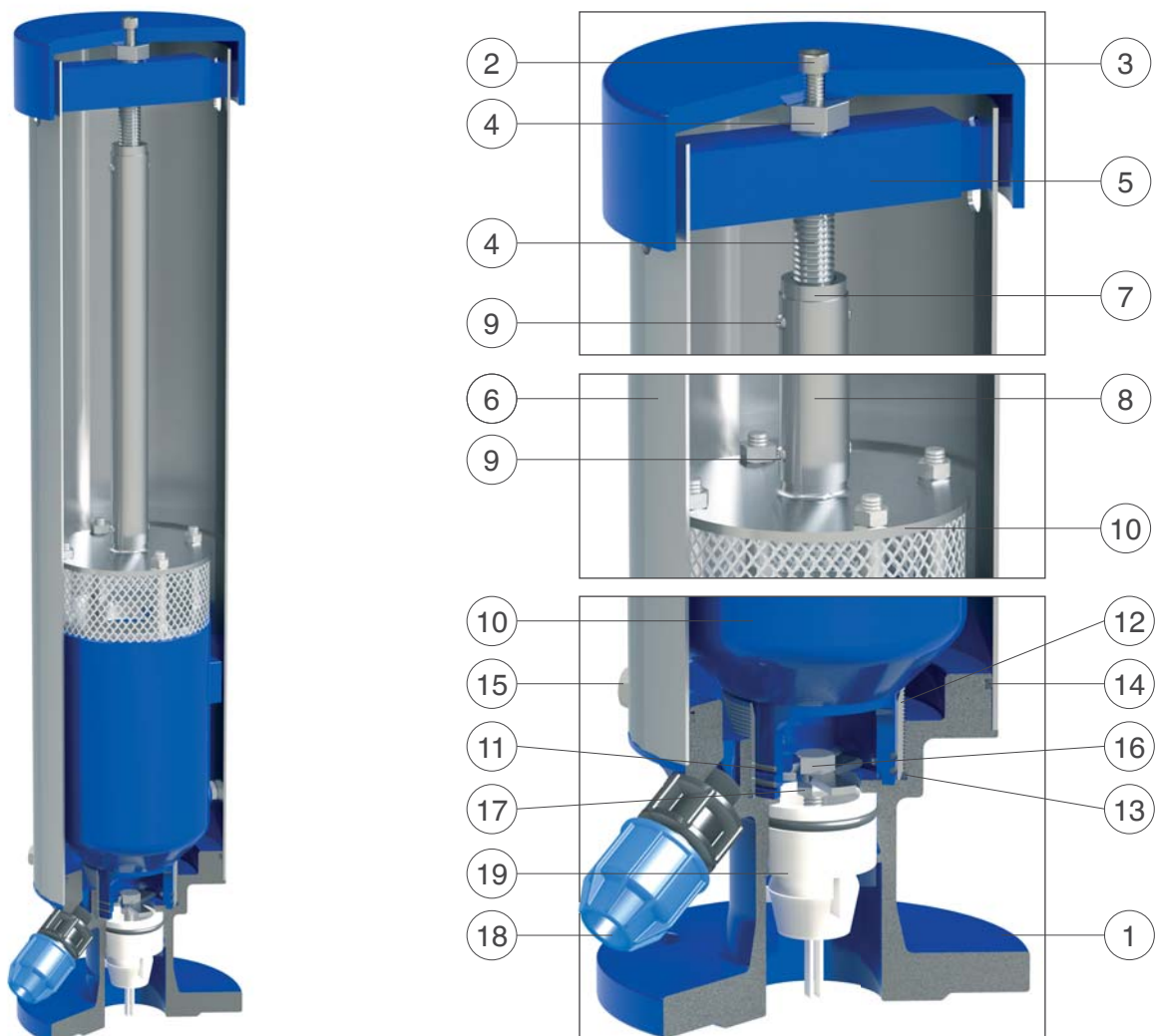


### Nozzle choice

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

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

## Technical details



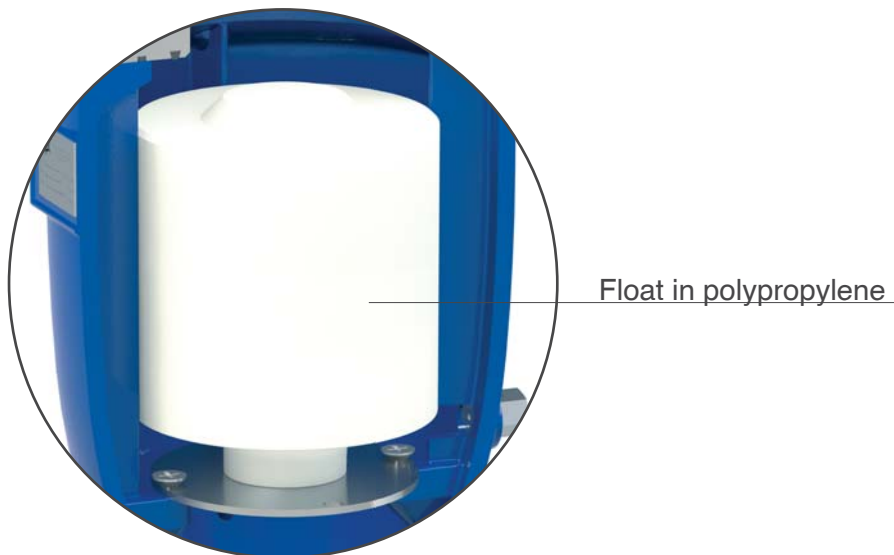
| N. | Component        | Standard material                                   | Optional                 |
|----|------------------|-----------------------------------------------------|--------------------------|
| 1  | Body             | ductile cast iron GJS 500-7 or GJS 450-10           |                          |
| 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 Fe 37                                 |                          |
| 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 DN 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.



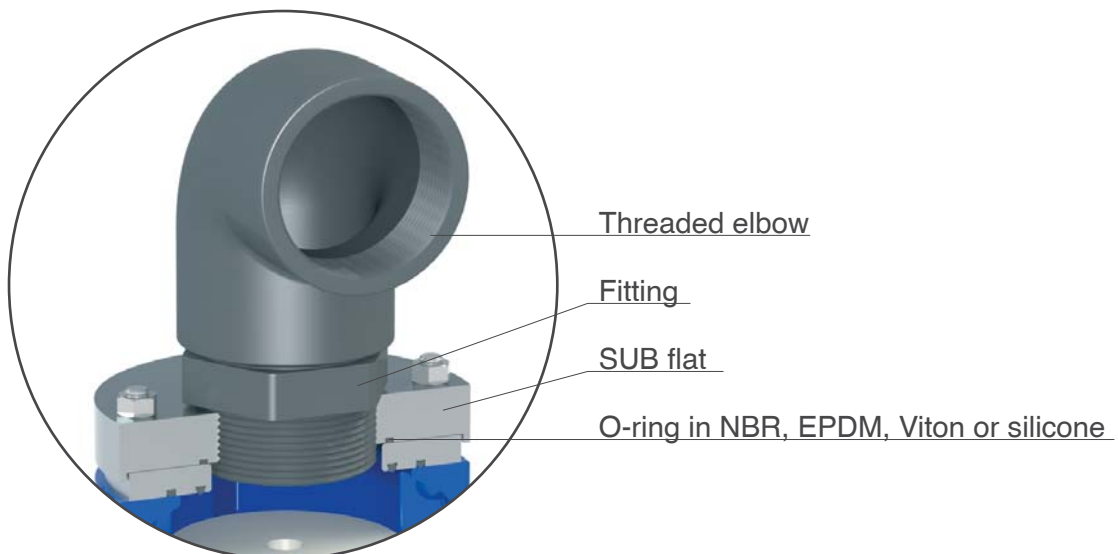
## Vacuum breaker version Mod. FOX 2F

**Vacuum breaker version Mod. FOX 2F**, to allow the entrance and discharge of large volumes during pipe filling and draining operations. 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 FOX - SUB series

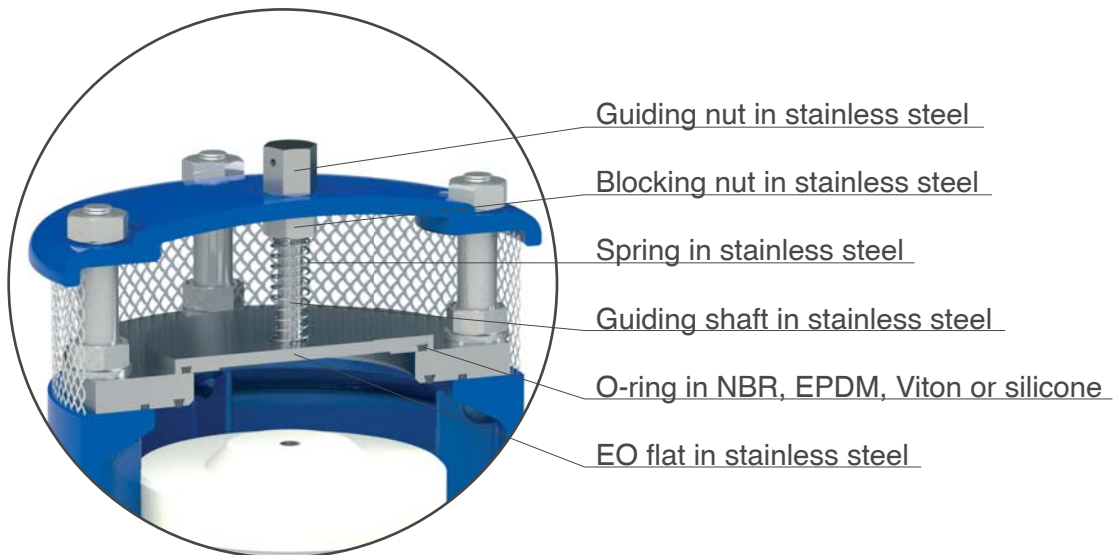
**Version for submerged applications, SUB series**, available both for FOX 3F and 2F Models, with elbow for air exhaust system. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying away spurts coming from the rapid closure of the air valve. The standard SUB kit is produce in plastic, different materials are available on request.





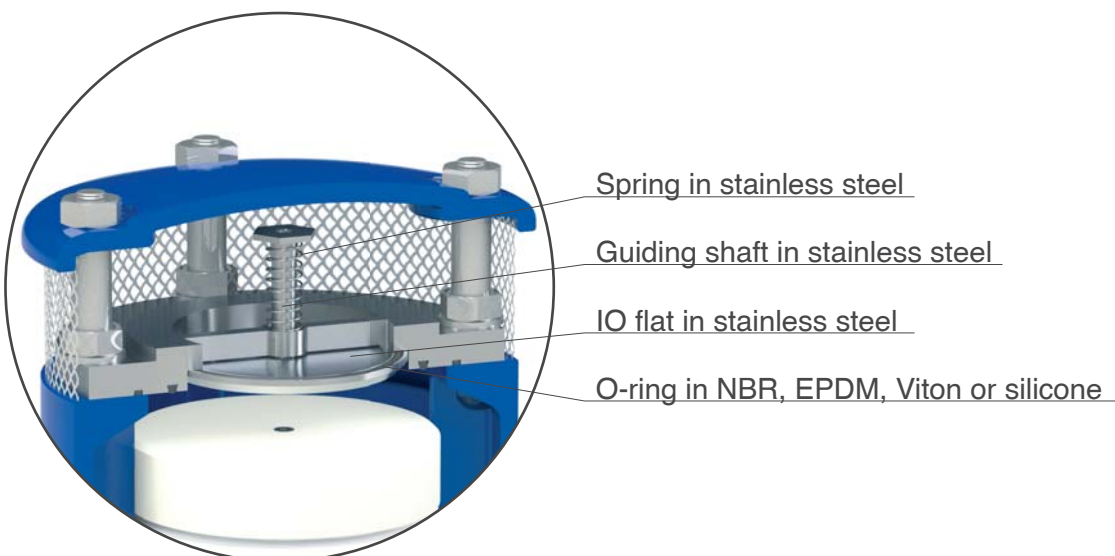
## Version for air discharge only FOX - EO series

**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 whenever for project requirements air entrance must be avoided.



## Version for air entrance only FOX - IO series

**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.





## 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.



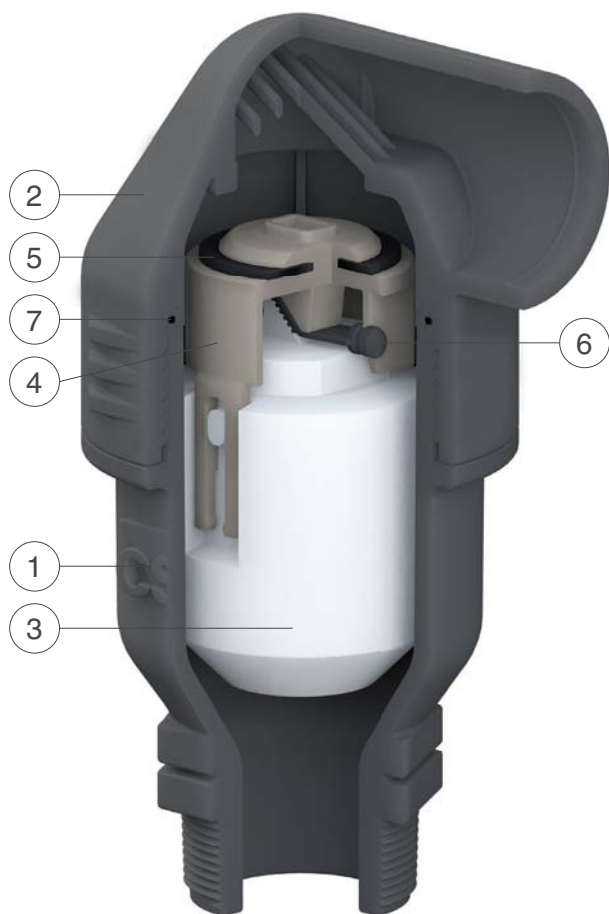
### Technical features and benefits

- 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.
- 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.
- Dynamic sealing prevents leakage under low pressure conditions.
- Compact and reliable structure whose parts are fully corrosion, chemical resistant. Lower maintenance.
- Designed in compliance with EN 1074/4 standard.
- 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.

## Technical data



| N. | Component              | Material                       |
|----|------------------------|--------------------------------|
| 1  | Body                   | glass reinforced polypropylene |
| 2  | Cap                    | glass reinforced polypropylene |
| 3  | Float                  | polypropylene                  |
| 4  | Kinetic plug           | glass reinforced polypropylene |
| 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 0,1 bar.

### Valve selection

Body material: glass-reinforced PP.

Inlet size: DN 25, DN 50 (1", 2").

Connections: threaded male BSPT or NPT.

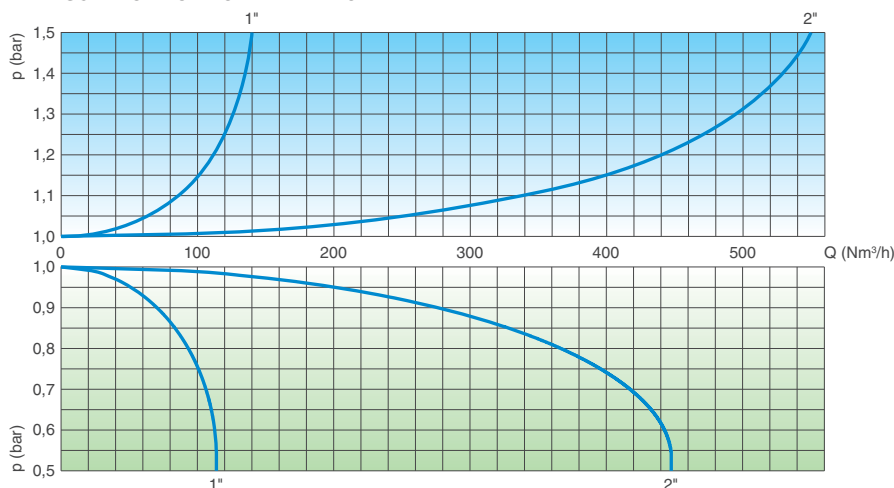
Designed in compliance with EN-1074/4.

### Nozzle specification

| air valve size | kinetic orifice |                      | automatic            |
|----------------|-----------------|----------------------|----------------------|
|                | d (mm)          | A (mm <sup>2</sup> ) | A (mm <sup>2</sup> ) |
| 1"             | 21              | 346                  | 5                    |
| 2"             | 45              | 1590                 | 12                   |

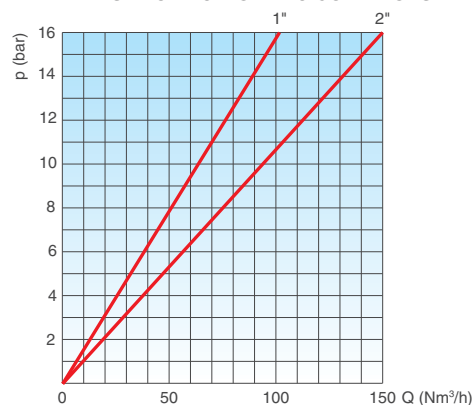
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

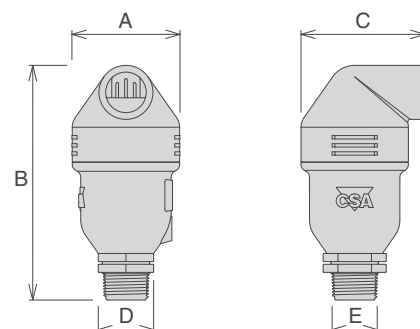
AIR RELEASE DURING WORKING CONDITIONS



### Weights and dimensions

| CONNECTION (E)<br>inch | A<br>mm | B<br>mm | C<br>mm | D<br>mm | Weight<br>Kg |
|------------------------|---------|---------|---------|---------|--------------|
| Threaded 1"            | 80      | 174     | 92      | CH 41   | 0,3          |
| Threaded 2"            | 110     | 229     | 135     | CH 65   | 0,8          |

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





### 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.



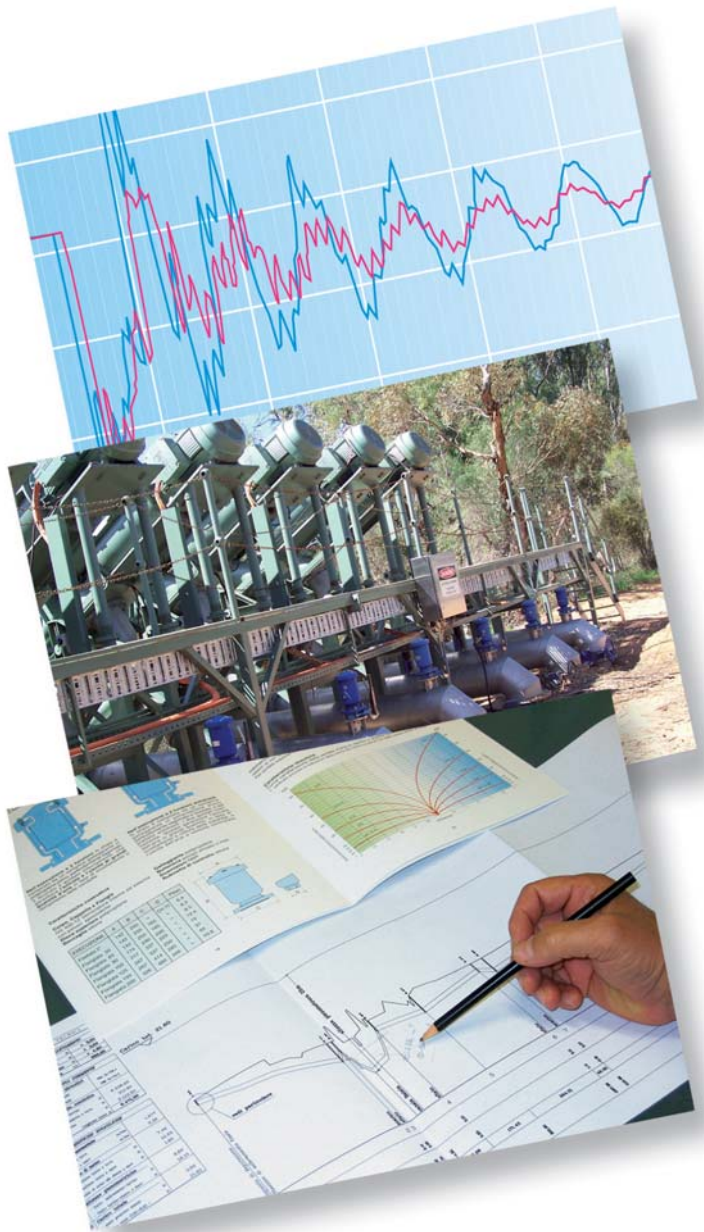
## CSA HYCONSULT

### 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.

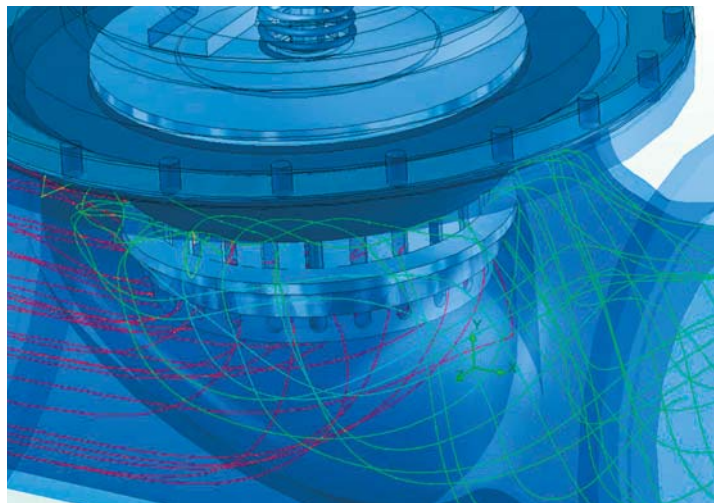
CSA Hyconsult has specialized in hydraulic modelling and transients analysis, entirely through the use of modern computational tools and advanced algorithms. Simulations are essential to predict system responses to events under a wide range of conditions without disrupting the actual system.

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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