



**Industry & seawater  
air valves**

## Valves for industry and seawater



### Air valves in stainless steel/Duplex WAVE PRO series

- Combination air valve for industry in stainless steel Mod. WAVE PRO 3S
- Anti-shock combination air valve in stainless steel Mod. WAVE PRO 3S-AWH
- Anti-surge combination air valve in stainless steel Mod. WAVE PRO 3S-CSF

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### Air valves for industry and wastewater SWV PRO TH series

- Wastewater combination air valve in stainless steel AISI 316 Mod. SWV PRO TH 3S
- Wastewater anti-shock combination air valve in AISI 316 Mod. SWV PRO TH 3S-AWH

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- WAVE PRO air valves range conveyance system bias kit Mod. SUB
- Version for air discharge only WAVE PRO - EO series
- Version for air entrance only WAVE PRO - IO series
- Version for air discharge only SWV PRO TH - EO series
- Version for air entrance only SWV PRO TH - IO series

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### Air release valve for high temperature Mod. VNT HP-HT

Model for air release only.

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# Combination air valve for industry

## Mod. WAVE PRO 3S

The PF air valve Mod. WAVE PRO 3S 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

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

### Applications

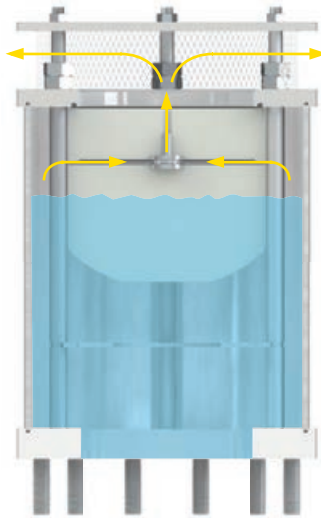
- Seawater main transmission lines.
- Desalination plants.
- Demineralized water.
- Mining.
- Refineries and petrochemical plants.

## Operating principle



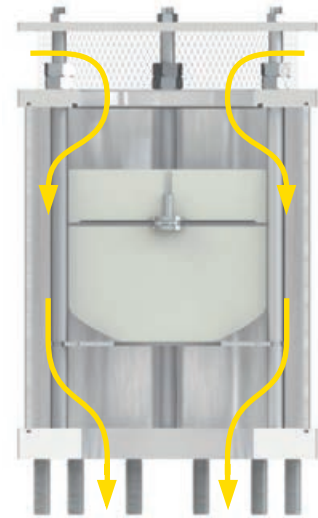
### Discharge of large volumes of air

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



### Air release during working conditions

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



### Entrance of large volumes of air

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

## Optional



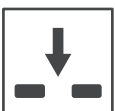
- **Vacuum breaker version Mod. WAVE PRO 2S**, to allow the entrance and discharge of large volumes of air only. This model is normally recommended in changes in slope ascending, long ascending segments, dry fire systems, and wherever the air release won't be required.



- **Version for submerged applications, SUB series**, available both for WAVE PRO 3S and 2S 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 WAVE PRO 3S and 2S 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.

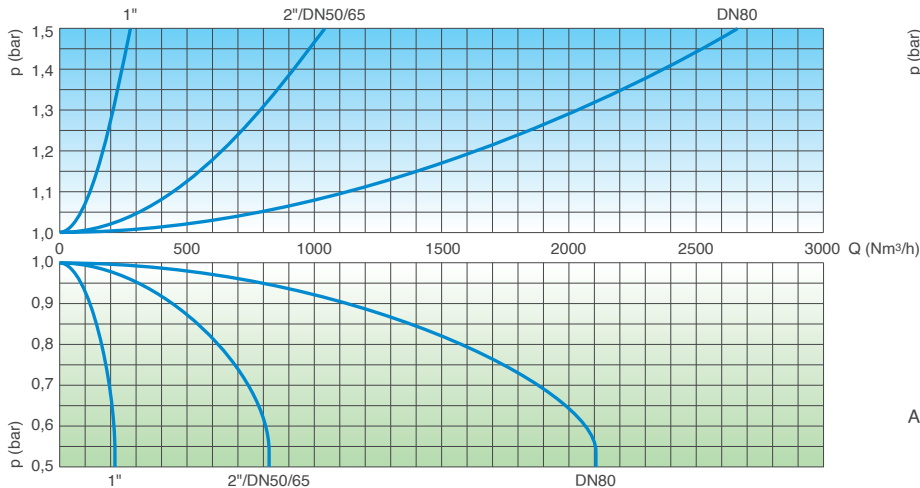


- **Version for air entrance only IO series**, available for WAVE PRO 2S model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

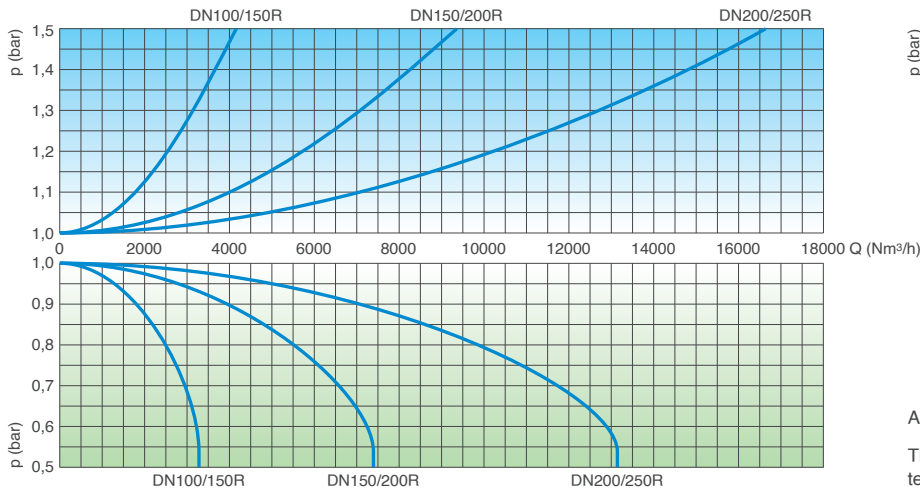
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING

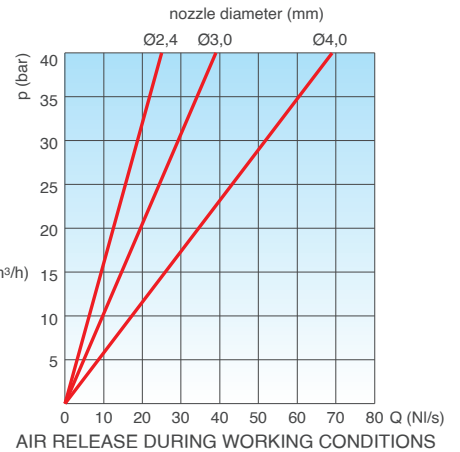
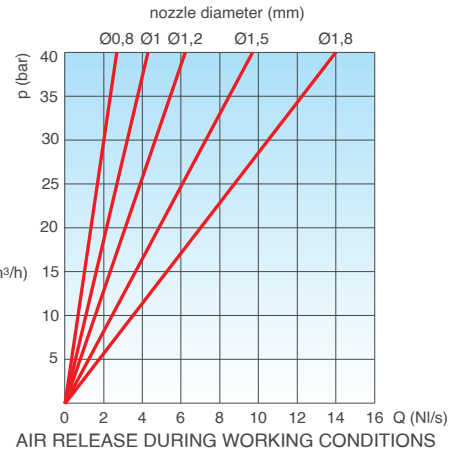


AIR ENTRANCE DURING PIPE DRAINING

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING



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

### Working conditions

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

### Standard

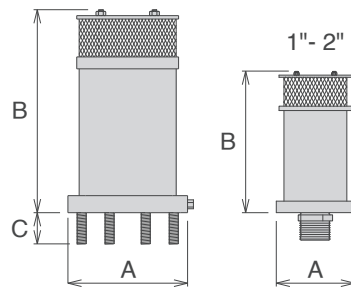
Designed in compliance with EN-1074/4 and AWWA C-512.  
Flanges according to EN 1092/2 or ANSI.  
Gaskets in NBR, EPDM or Viton.  
Changes and variations on the flanges and gaskets on request.

### Weights and dimensions

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

R: reduced bore. Larger sizes available on request.

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



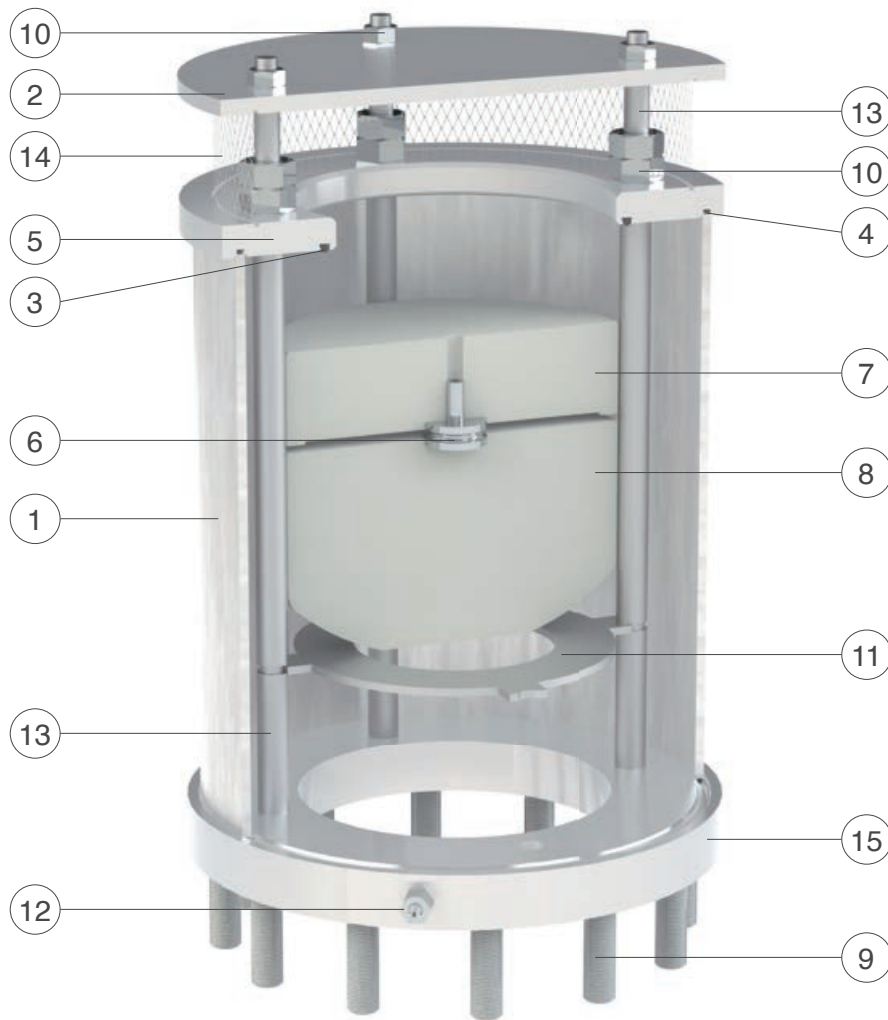
### Nozzle choice

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

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



## Technical details



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

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

# Anti-shock combination air valve for industry

## Mod. WAVE PRO 3S-AWH

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



### Technical features and benefits

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

### Applications

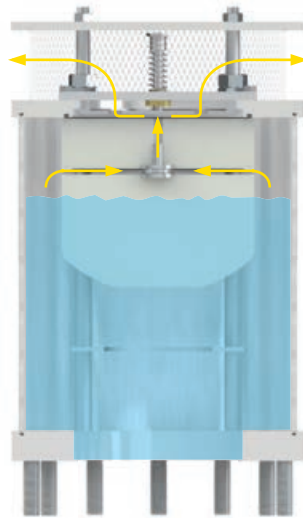
- Seawater main transmission lines. Desalination plants.
- Demineralized water.
- Mining.
- Refineries and petrochemical plants.
- To protect pumping stations and nodes of sewage main transmission lines exposed to water hammer and column separation in case of pump failure.

## Operating principle



### Controlled air discharge

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



### Air release during working conditions

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



### Entrance of large volumes of air

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

## Optional



- **Vacuum breaker version Mod. WAVE PRO 2S-AWH**, 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 WAVE PRO 3S-AWH and 2S-AWH 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.



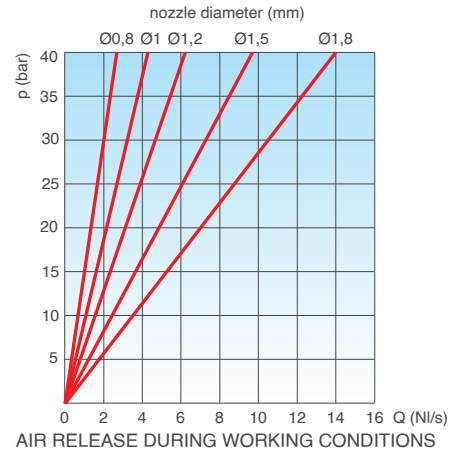
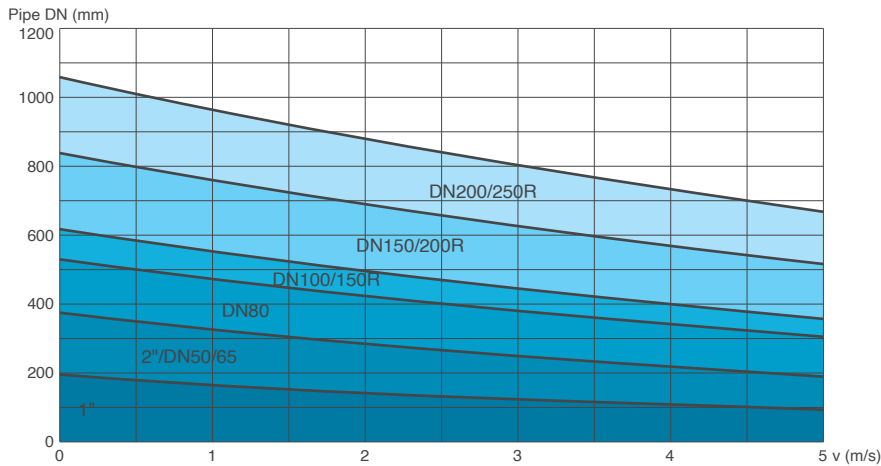
- The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AWH device, can be modified on request according to the project conditions and the result of transient analysis.



## Technical data

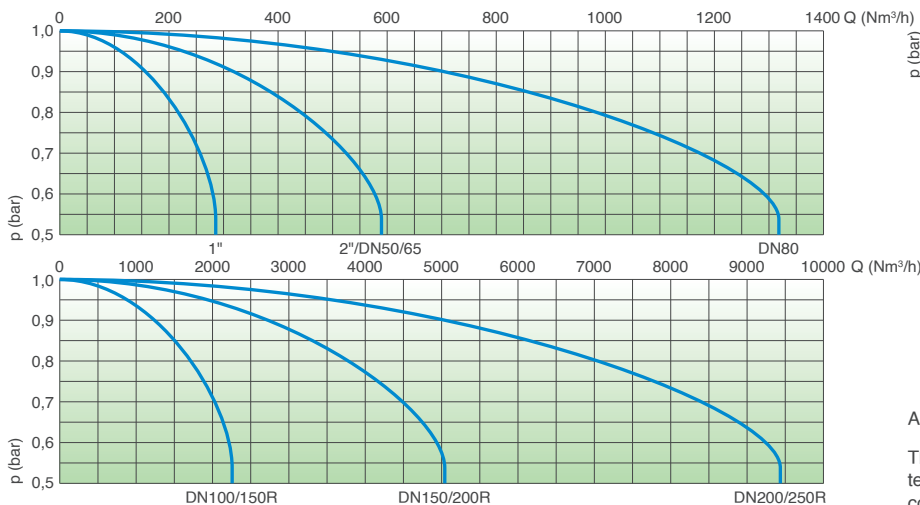
### Air valve selection chart

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

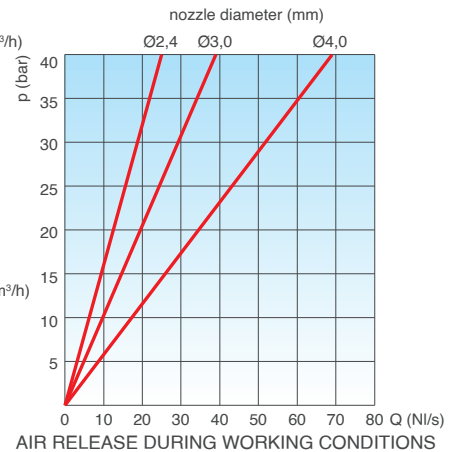


### Air flow performance charts

AIR ENTRANCE DURING PIPE DRAINING



AIR ENTRANCE DURING PIPE DRAINING



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

### Working conditions

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

### Standard

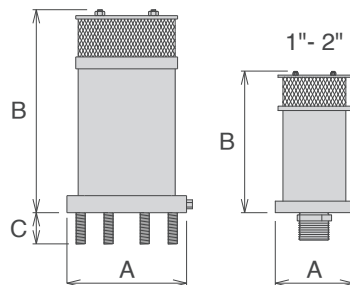
Designed in compliance with EN-1074/4 and AWWA C-512.  
Flanges according to EN 1092/2 or ANSI.  
Gaskets in NBR, EPDM or Viton.  
Changes and variations on the flanges and gaskets on request.

### Weights and dimensions

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

R: reduced bore. Larger sizes available on request.

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

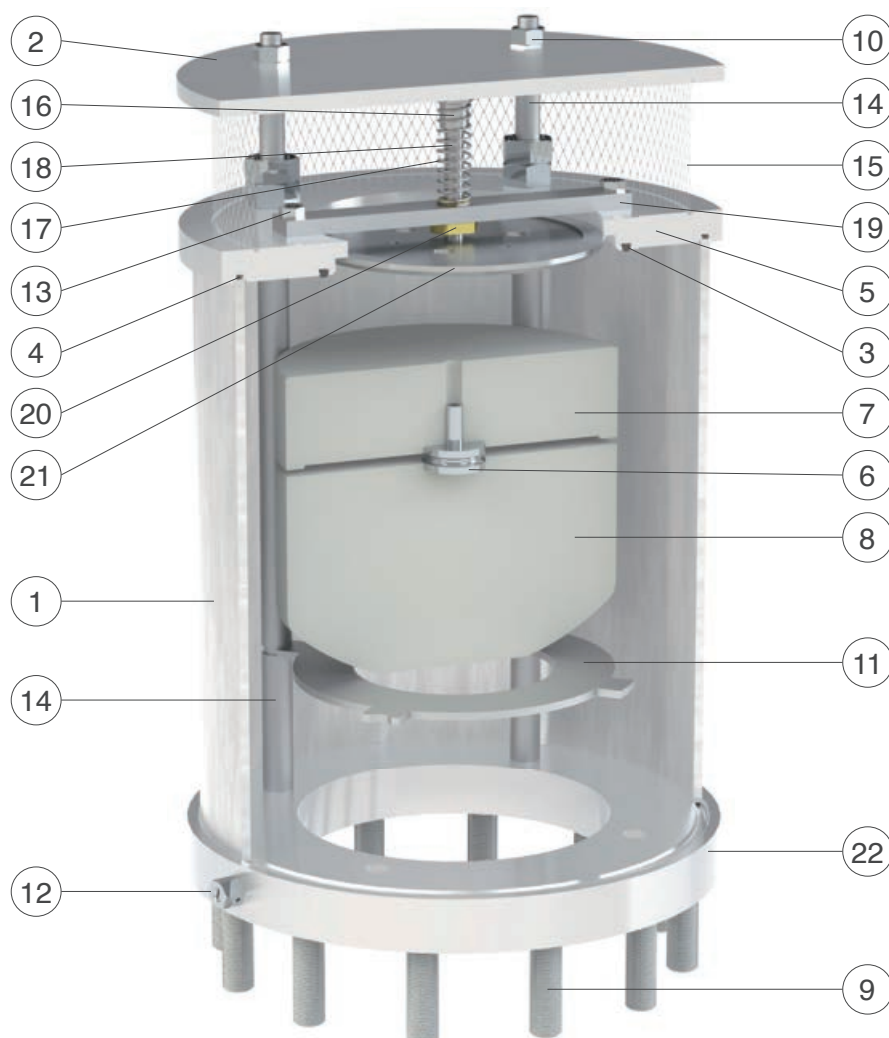


### Nozzle choice

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

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

## Technical details



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

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

# Anti-surge combination air valve for industry

## Mod. WAVE PRO 3S-CSF

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



### Technical features and benefits

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

### Applications

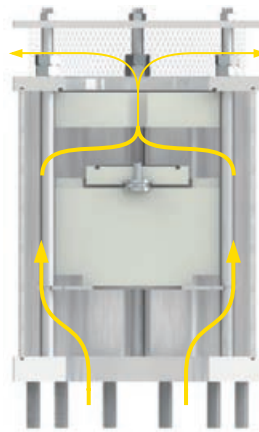
- Seawater main transmission lines.
- Desalination plants.
- Demineralized water.
- Mining.
- Refineries and petrochemical plants.

## Operating principle



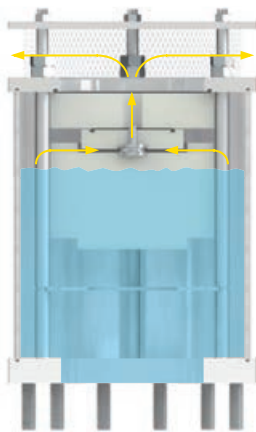
### Discharge of large volumes of air

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



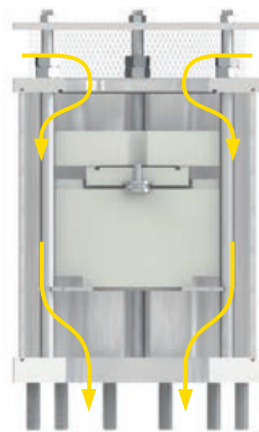
### Controlled outflow

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



### Air release during working conditions

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



### Entrance of large volumes of air

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

## Optional



■ **Vacuum breaker version Mod. WAVE PRO 2S-CSF**, 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 WAVE PRO 3S-CSF and 2S-CSF Models, with threaded elbow for air conveyance. The design sprang from the necessity of having an air valve performing also in case of flood, without the risk of contaminated water entering the pipeline. Another benefit of SUB is to avoid the spray effect, conveying spurts coming from the closure away from the air valve.

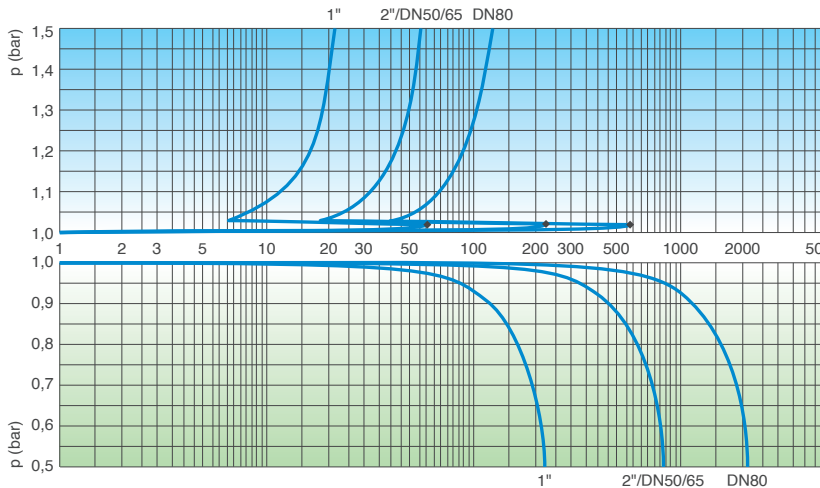


■ **Version for air discharge only EO series**, available both for WAVE PRO 3S-CSF and 2S-CSF models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and to any other node where for project requirements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

## Technical data

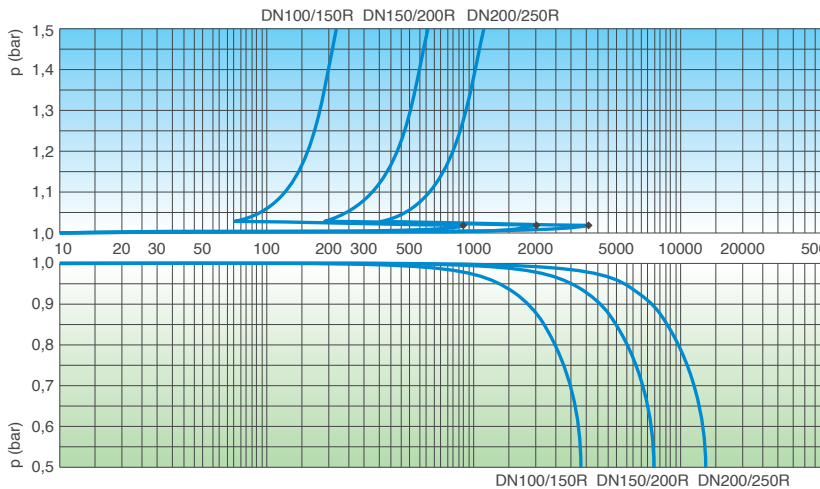
### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING

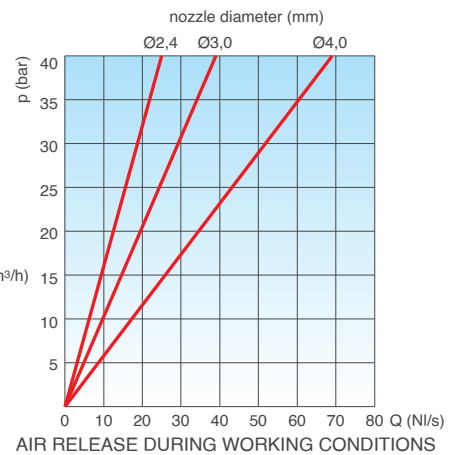
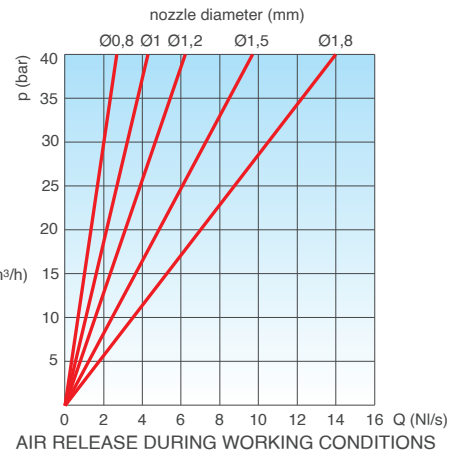


AIR ENTRANCE DURING PIPE DRAINING

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING



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

### Working conditions

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

### Standard

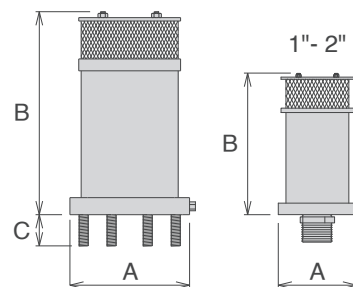
Designed in compliance with EN-1074/4 and AWWA C-512.  
Flanges according to EN 1092/2 or ANSI.  
Gaskets in NBR, EPDM or Viton.  
Changes and variations on the flanges and gaskets on request.

### Weights and dimensions

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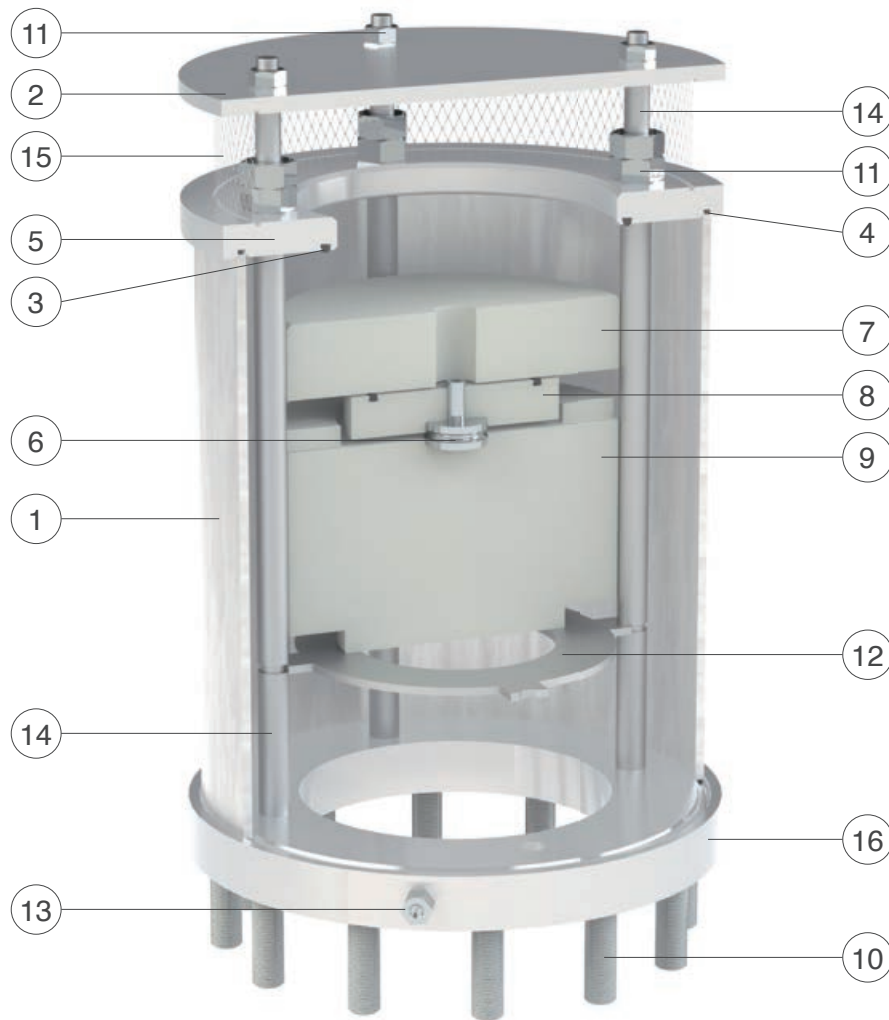
### Nozzle choice

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

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



## Technical details



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

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

# Wastewater combination air valve for industry in stainless steel AISI 316 - Mod. SWV PRO TH 3S

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



## Technical features and benefits

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

## Applications

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

## Operating principle



### Discharge of large volumes of air

During the pipe filling it is necessary to discharge air as liquid flows in. The SWV PRO TH 3S, thanks to an aerodynamic body and deflector, will make sure to avoid premature closures of the mobile block during this phase.

### Air release during working conditions

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

### Entrance of large volumes of air

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

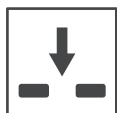
## Optional



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



- **Version for air discharge only SWV PRO TH EO series (on request)**, available both for SWV PRO TH and SWV PRO 2S 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.

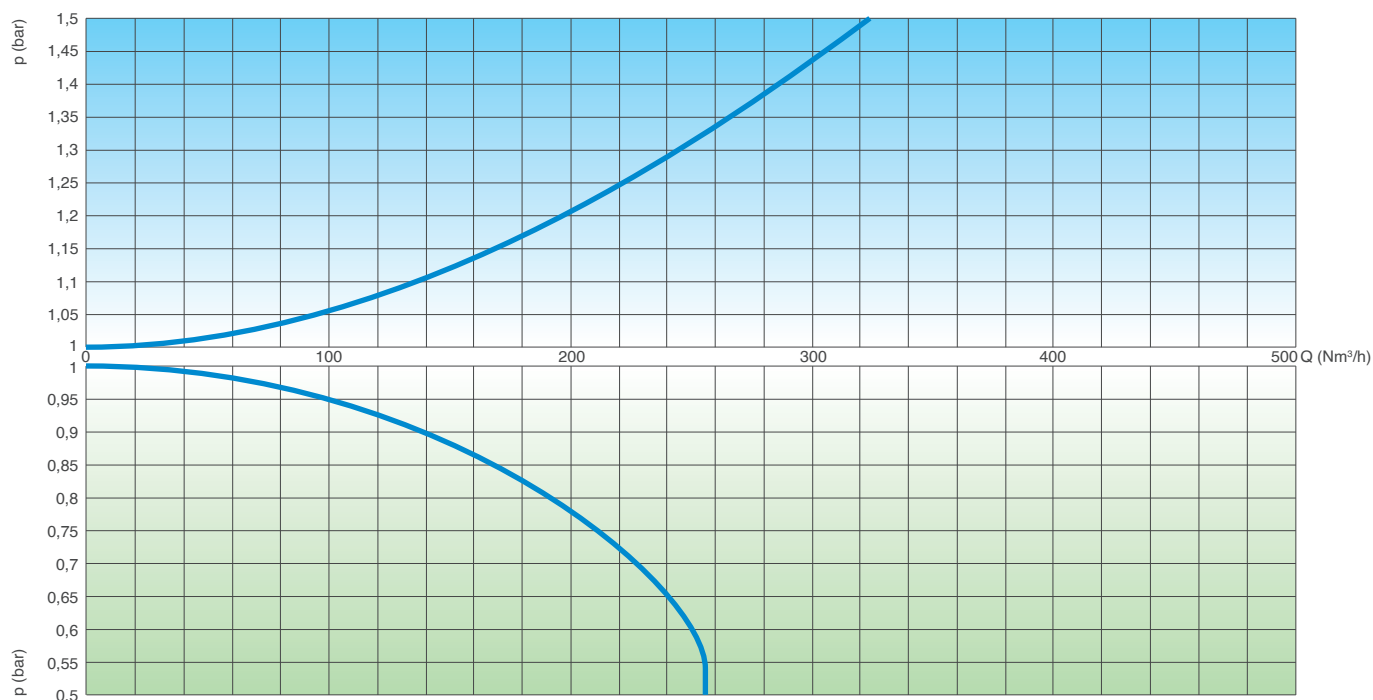


- **Version for air entrance only SWV PRO TH IO series**, available for vacuum breaker model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.

## Technical data

### Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

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

### Working conditions

Treated water and wastewater max. 60°C.  
 Maximum pressure 16 bar.  
 Minimum pressure 0,2 bar. Lower on request.  
 Version for high temperature available on request.

### Standard

Certified and tested in compliance with EN 1074/4.  
 Manufactured with 2" inlet; supplied on request with flanges according to EN 1092/2 or ANSI.  
 Changes on the flanges details on request.

### Nozzle choice

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

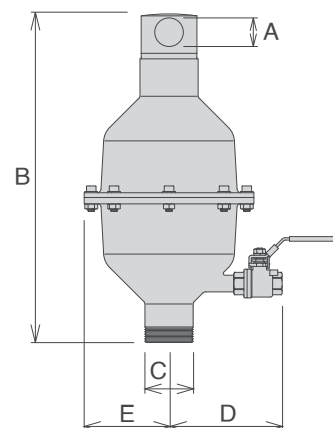
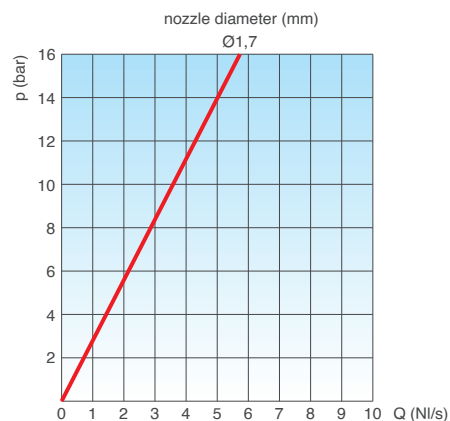
PN 10	PN 16
1,7	1,7

### Weight and dimensions

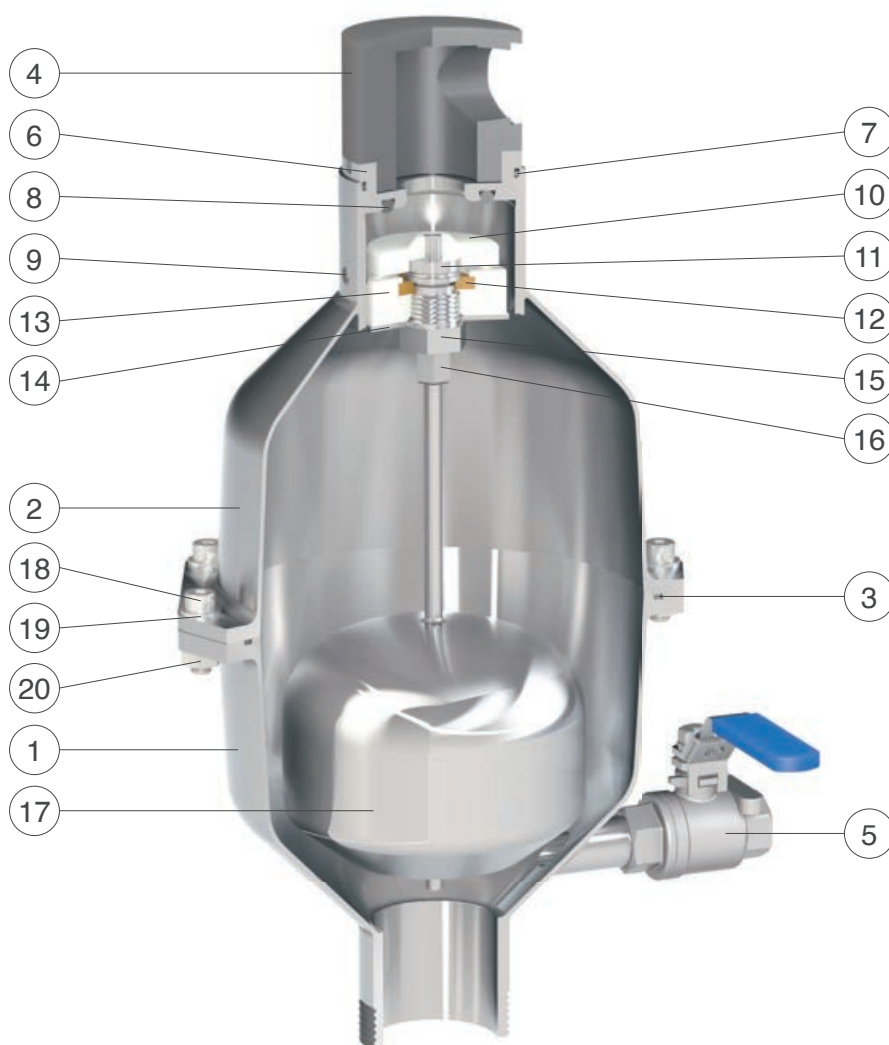
C inch	A inch	B mm	D mm	E mm	Main orifice mm <sup>2</sup>	Nozzle orifice mm <sup>2</sup>	Weight Kg
2"	1"	415	137	106,5	490	2,3	4

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

AIR RELEASE DURING WORKING CONDITIONS



## Technical details



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

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



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

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



### Technical features and benefits

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

### Applications

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

## Operating principle



### Controlled air discharge

During the pipe filling it is necessary to avoid rapid closures of the mobile block, responsible of water hammer effects. The SWV PRO TH 3S-AWH will control the air outflow reducing the water approach velocity and thus minimizing the risk of overpressure.

### Air release during working conditions

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

### Entrance of large volumes of air

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

## Optional



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

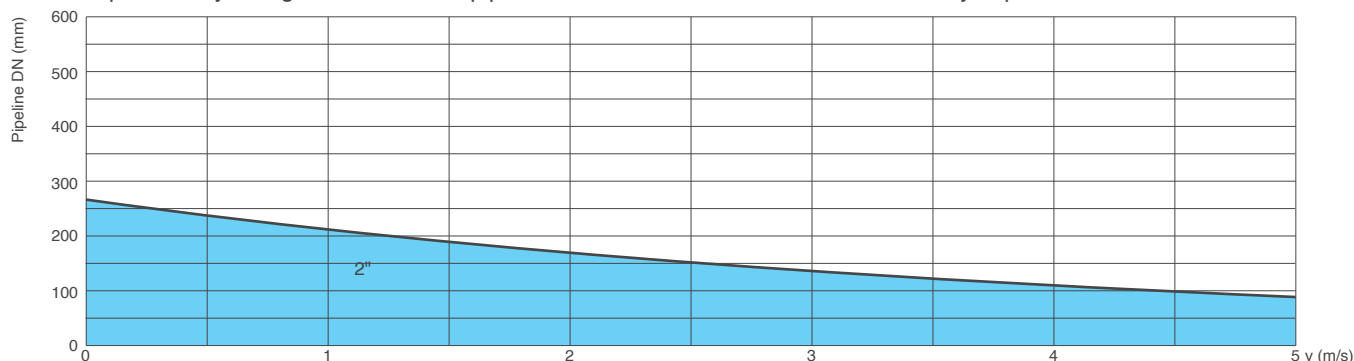


- The counteracting spring force as well as the sonic nozzles, both responsible of the proper operation of the AWH device, can be modified on request according to the project conditions and the transient analysis.

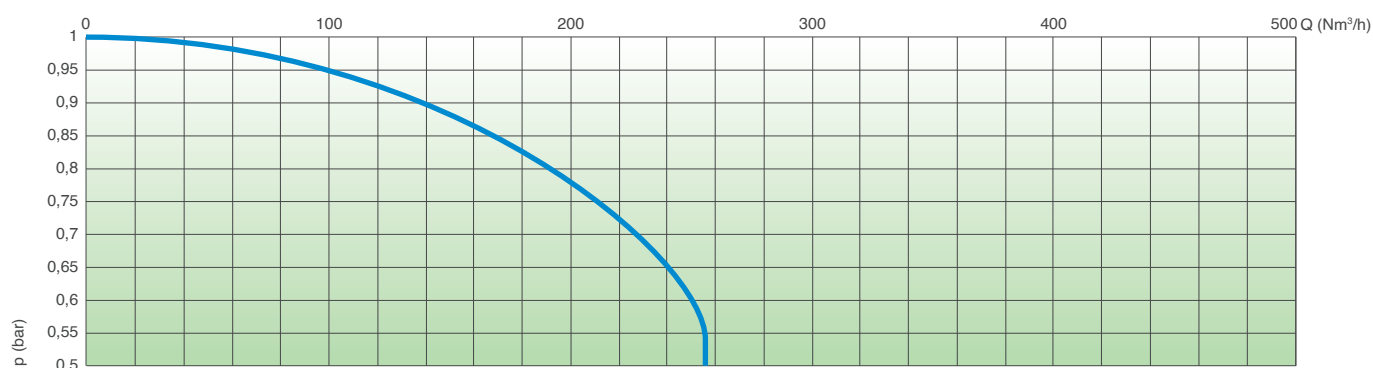
## Technical data

### Air valve selection chart

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



### Air flow performance chart



AIR ENTRANCE DURING PIPE DRAINING

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

### Working conditions

Treated water and wastewater max. 60°C.

Maximum pressure 16 bar.

Minimum pressure 0,2 bar. Lower on request.

Version for high temperature available on request.

### Standard

Certified and tested in compliance with EN 1074/4.

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

Changes on the flanges details on request.

### Nozzle choice

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

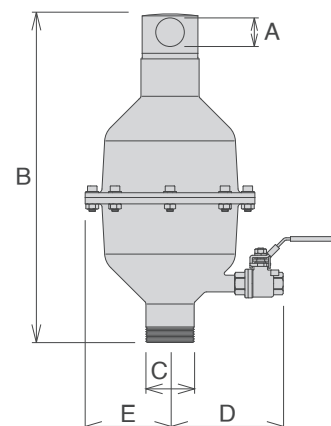
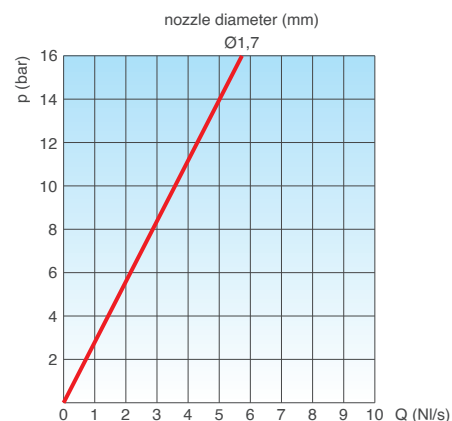
PN 10	PN 16
1,7	1,7

### Weight and dimensions

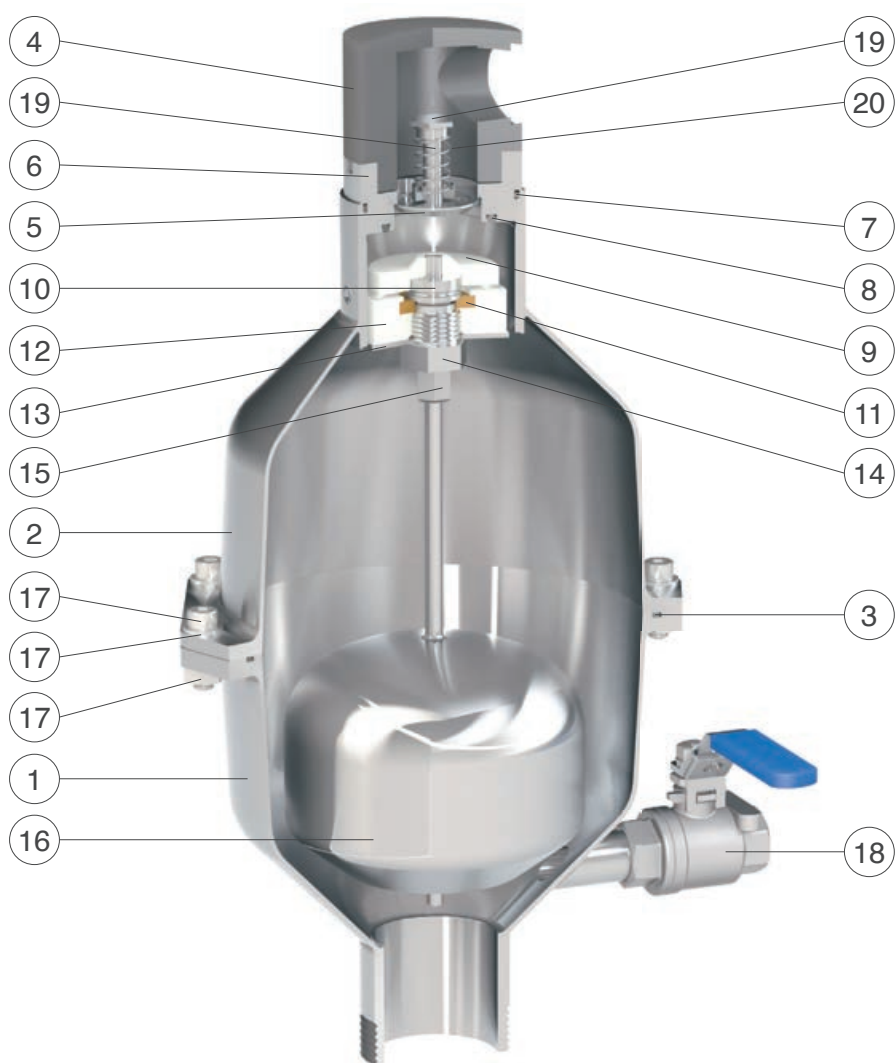
C	A	B	D	E	Main orifice	Nozzle orifice	Weight
inch	inch	mm	mm	mm	mm <sup>2</sup>	mm <sup>2</sup>	Kg
2"	1"	421	137	106,5	490	2,3	4

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

AIR RELEASE DURING WORKING CONDITIONS



## Technical details

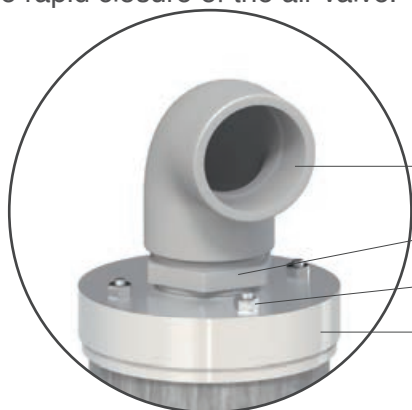


N.	Component	Standard material	Optional
1	Lower body	stainless steel AISI 316	
2	Upper body	stainless steel AISI 316	
3	O-ring	NBR	EPDM/Viton/silicone
4	Cap	PVC	
5	AS flat	stainless steel AISI 316	
6	Seat	stainless steel AISI 316	
7	O-ring	NBR	EPDM/Viton/silicone
8	Seat gasket	NBR	EPDM/Viton/silicone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

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

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

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



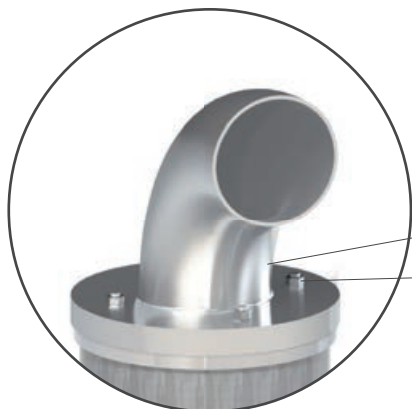
### Plastic elbow for 1", 2", DN 50-200R

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

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

Nuts in stainless steel

SUB flat in PP or stainless steel



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

SUB flat and elbow in stainless steel

Nuts in stainless steel

## Technical data

### Working conditions

Treated water max. 60°C.

Max. pressure 40 bar.

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

Version for high temperatures on request.

### Standard

Certified and tested in compliance with EN 1074/4.

Flanges according to EN 1092/2 or ANSI.

Gaskets in NBR, EPDM or Viton.

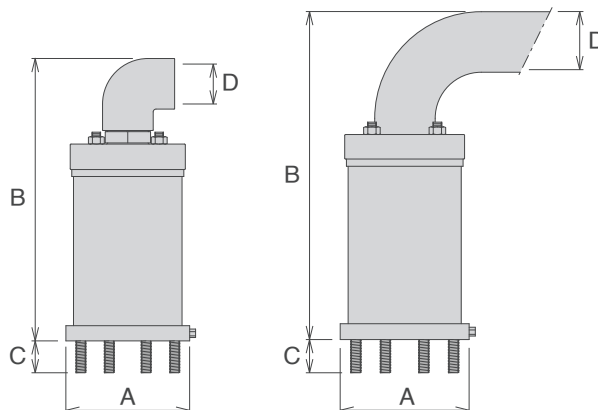
Changes and variations on the flanges and gaskets on request.

### Weights and dimensions

CONNECTION inch/mm	A mm	B mm	C mm	D inch	Weight Kg
Threaded 1"	95	252	-	1"	7,0
Threaded 2"	165	356	-	2"	7,7
Flanged 50	165	356	40	2"	9,3
Flanged 65	185	356	40	2"	9,3
Flanged 80	200	413	50	2" 1/2	13,4
Flanged 100	235	484	50	3"	19,7
Flanged 150R	235	494	50	3"	29,7
Flanged 150	300	624	70	4"	51,4
Flanged 200R	360	624	70	4"	55,4
Flanged 200	360	*	70	*	78,3
Flanged 250R	405	*	70	*	88,3

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

\*: Mod. SUB is stock available up to DN 200R, for larger sizes consult with PF.

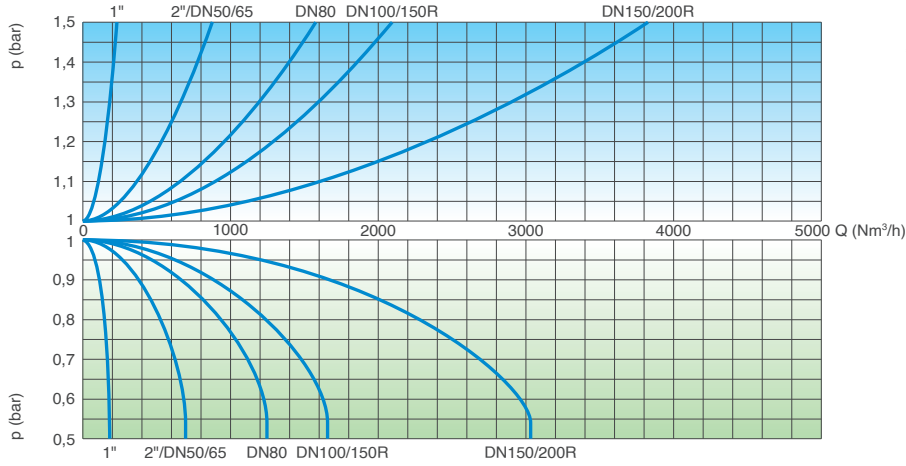




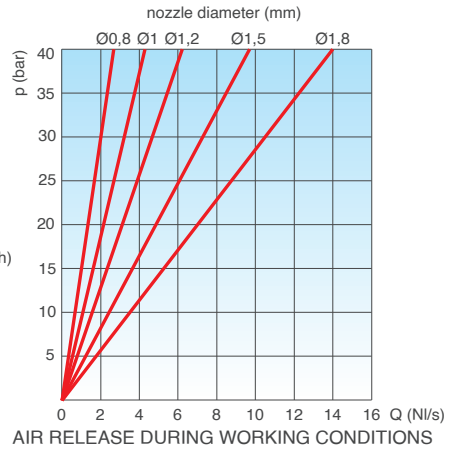
## Technical data

### WAVE PRO SUB - Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING

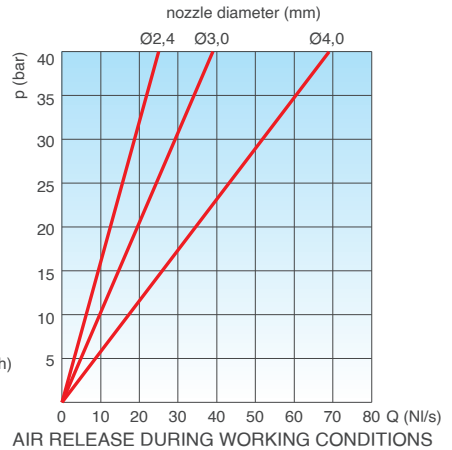
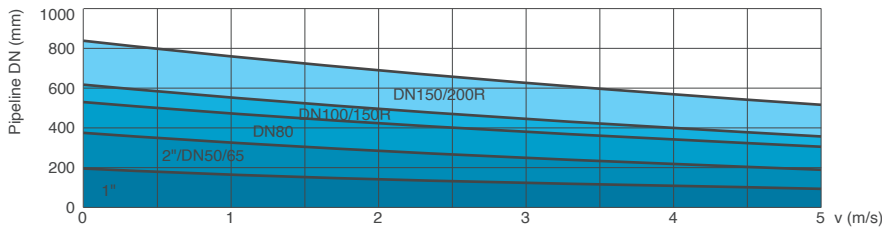


AIR ENTRANCE DURING PIPE DRAINING

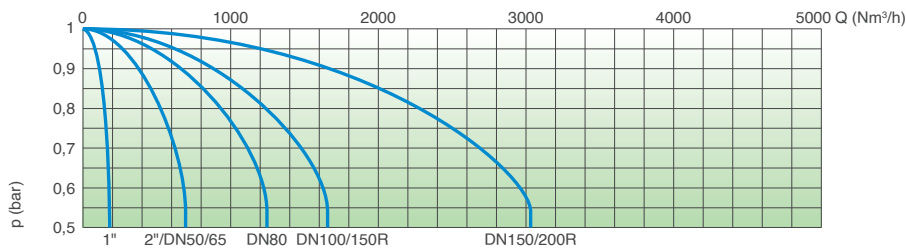


### WAVE PRO 3S-AWH SUB - Air valve selection chart

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



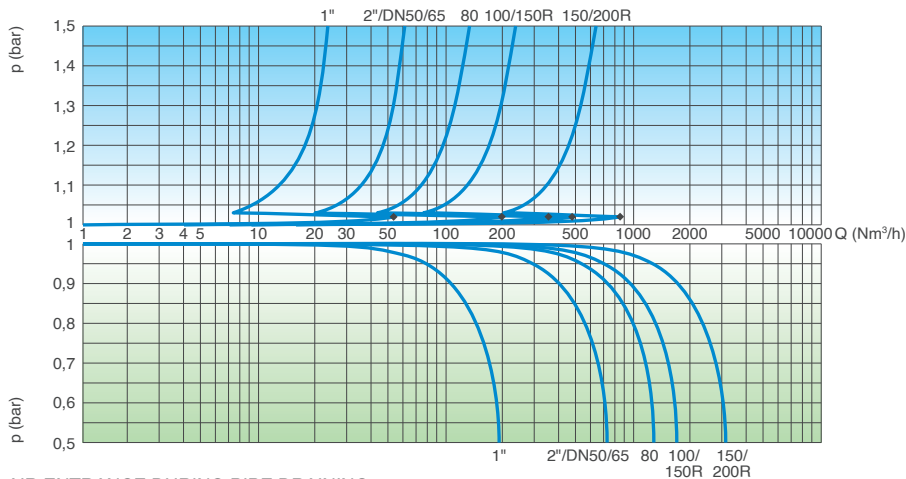
### WAVE PRO 3S-AWH SUB - Air flow performance chart



AIR ENTRANCE DURING PIPE DRAINING

### WAVE PRO 3S-CSF SUB - Air flow performance charts

AIR DISCHARGE DURING PIPE FILLING



AIR ENTRANCE DURING PIPE DRAINING

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

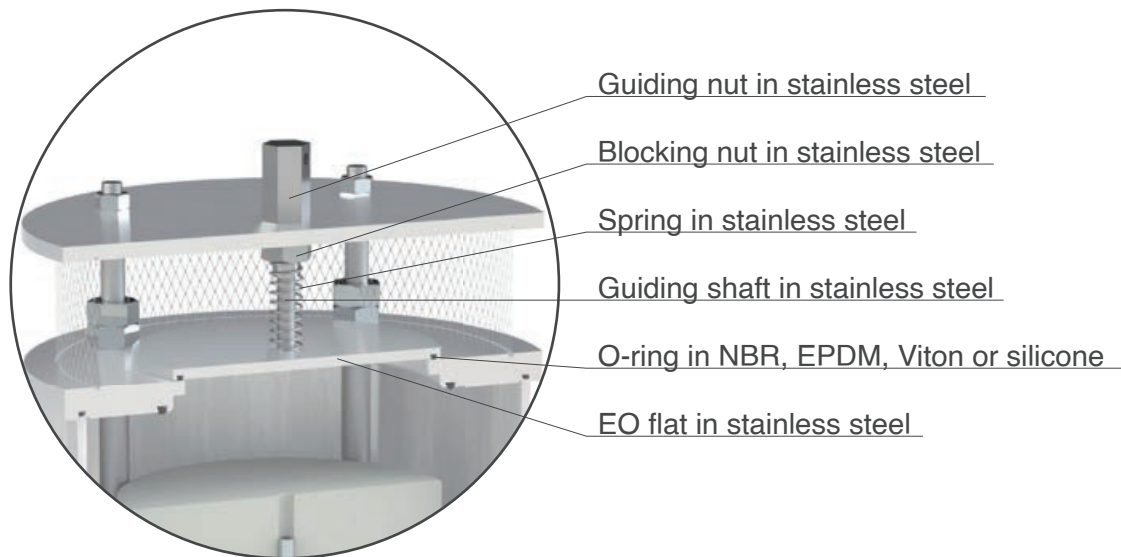
### Nozzle choice

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



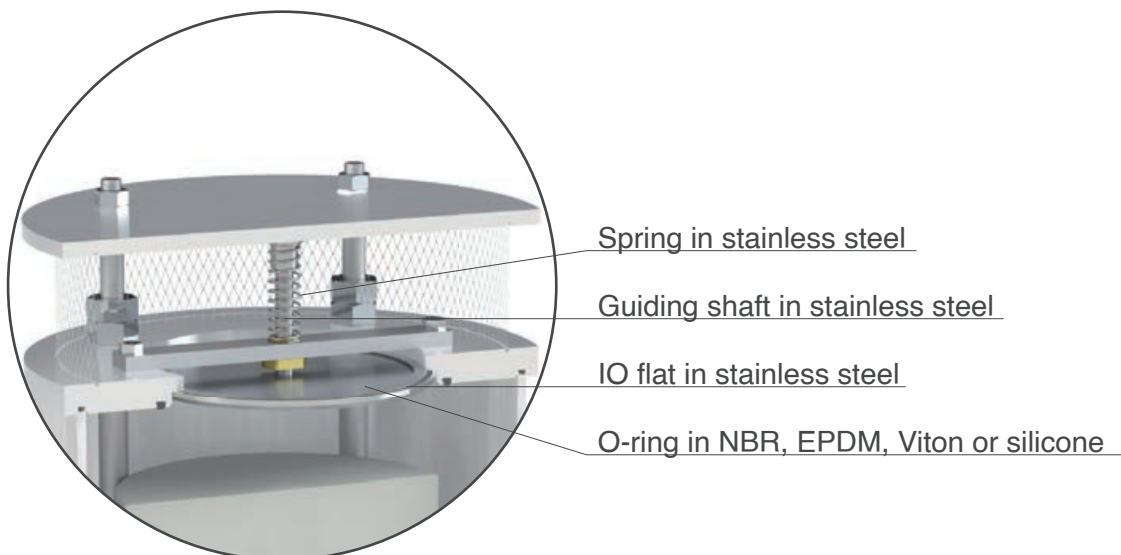
## Version for air discharge only WAVE PRO - EO series

**Version for air discharge only EO series**, available both for WAVE PRO 3S and 2S 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 WAVE PRO - IO series

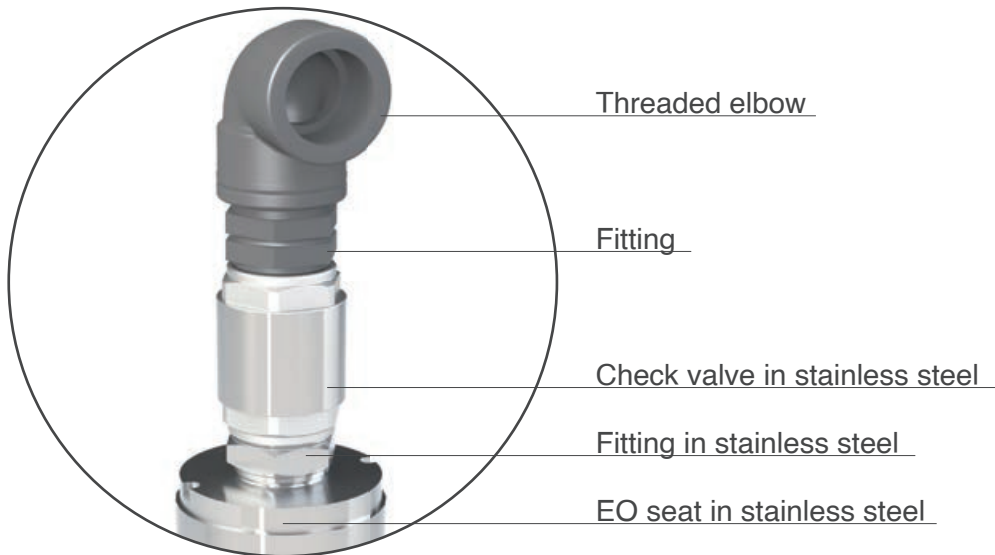
**Version for air entrance only IO series**, available for WAVE PRO 2S model only. The most important application of IO is to allow the air valve installation in those locations of the system where, for project requirements, air discharge and release must be avoided.





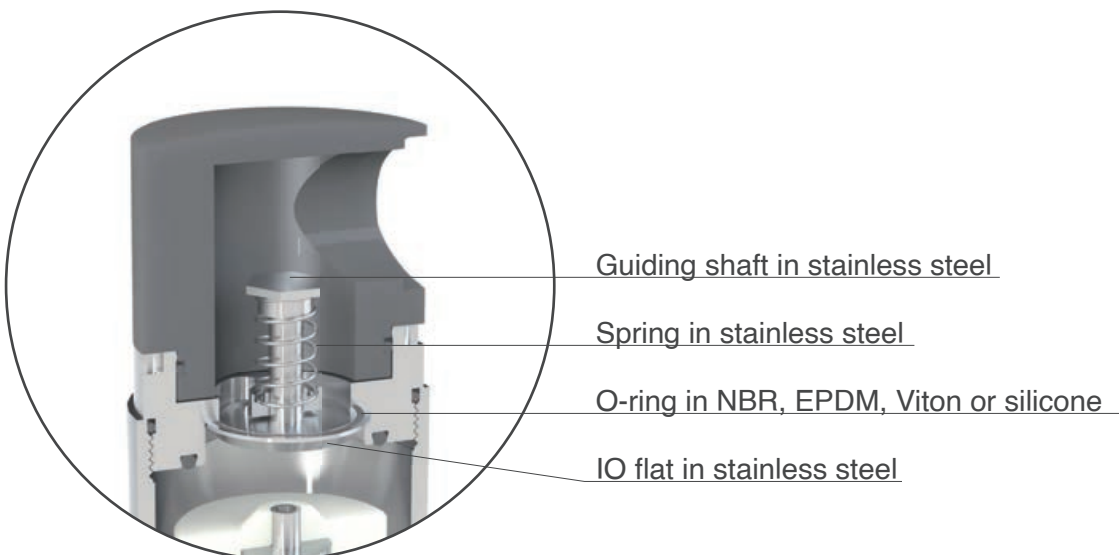
## Version for air discharge only SWV PRO TH - EO series

**Version for air discharge only EO series (on request)**, available both for SWV PRO TH 3S and 2S models. The most important application of EO is to allow the air valve installation in those locations of the system where HGL may drop below the pipe profile, and whenever for project requirements air entrance must be avoided. The threaded elbow is normally produced in plastic, available on request in different materials.



## Version for air entrance only SWV PRO TH - IO series

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



## Air release valve for high temperature Mod. VNT HP-HT

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



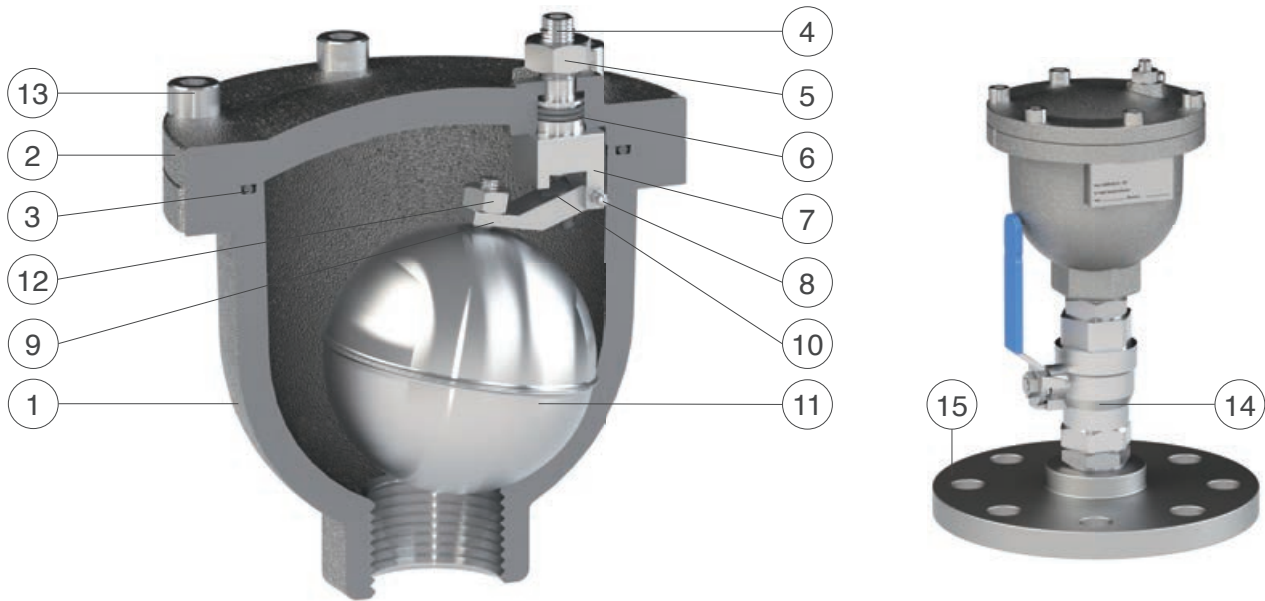
### Technical features and benefits

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

### Applications

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

## Technical details



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

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

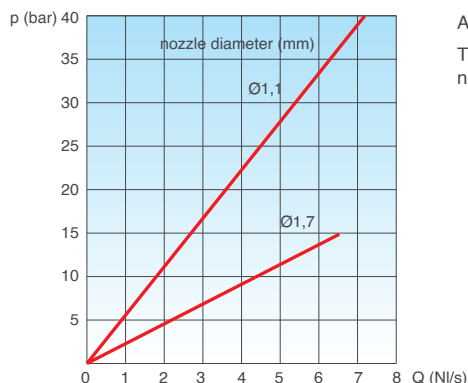
### Working conditions

Treated water max. 100°C.  
Max. pressure 40 bar;  
Min. pressure 0,1 bar.

### Standard

Certified and tested in compliance with EN 1074/4.  
Standard connection 1", flanged on request. Flanges according to EN 1092/2.  
Body and cap nickel-plated.  
Changes and variations on the flanges and coating details available on request.

### Air flow performance chart



#### AIR RELEASE DURING WORKING CONDITIONS

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

