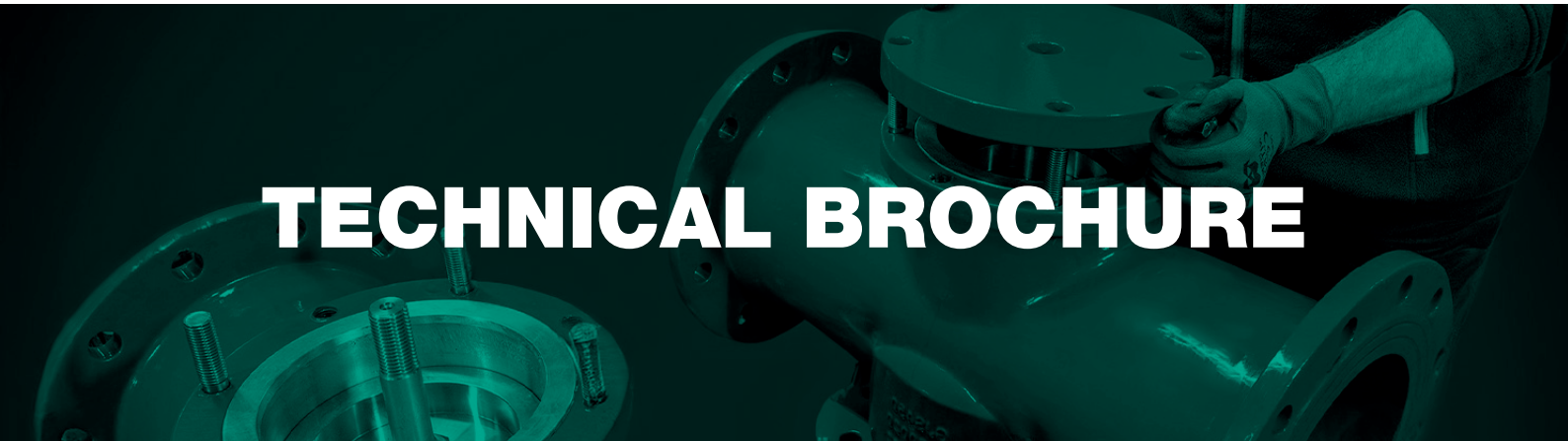
Pietro Fiorentini

WAVE PRO

Air valve for aqueduct, sea water, corrosive environments



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WAVE PRO_technicalbrochure_ENG_revA

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Combined automatic stainless steel air valve for industry **WAVE PRO 3S**

The WAVE PRO series air valves are single-chamber, full-bore combined automatic devices. They manage the air volumes inside the pipelines and allow the pressurised air to be degassed. They can be installed in aggressive environments: sea water, industrial plants, refineries and the like.

The WAVE PRO 3S model ensures smooth operation of the waterworks by performing three functions: degassing during operation, and the entrance and discharge of large volumes of air when draining and filling pipelines.

Constructive features and advantages

- Totally made of high-strength materials suitable for use in industrial and aggressive environments.
- Central mobile block consisting of a float and an upper plate, both cylindrical and made of solid polypropylene, joined by the nozzle and gasket holder. Solid floats avoid deformation at high pressures and, machined on a lathe, guarantee better flow.
- Nozzle and gasket holder made entirely of AISI 316 or Duplex stainless steel, designed to prevent gasket wear due to excessive crushing.
- Connection between outer pipe and other components without welded parts.
- Easy maintenance from above, without removing the air valve from the pipeline.
- Stainless steel cap and filter.
- Single chamber design allowing high flow rates and low turbulence.
- Supplied with flanged or threaded connections.

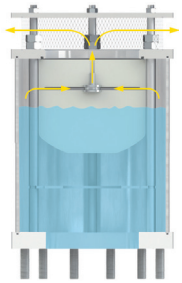
Main applications

- Sea water intake pipelines
- Desalination plants
- Demineralised water
- Mines
- Refineries and petrochemical plants
- Aggressive and corrosive fluids

Operating principle

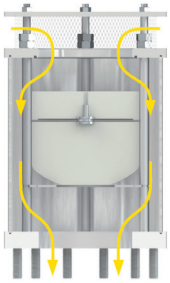
Discharge of large volumes of air

During the pipe filling, it is necessary to let out as much air as water enters. Thanks to the aerodynamic shape of the full-bore body and the deflector, the WAVE PRO 3S air valve prevents the mobile block from closing prematurely during this phase.



Pressurised air degassing

During operation, the air inside the pipeline accumulates at the top of the air valve, compresses, and arrives at the same pressure as the water. By increasing its volume, it pushes the float down and thus allows degassing through the nozzle.



Entrance of large volumes of air

During the pipe draining or in the event of pipe burst, it is necessary to draw in as much air as there is water coming out to avoid depressions and serious damage to the network.

Optional functions

Dual-function WAVE PRO 2S version, also called vacuum breaker. Suitable for locations no air release is needed.. It is used at upward slope changes and long ascending sections of the pipe; in dry and fire-prevention installations.

SUB version, with conveyance drain, available for WAVE PRO 2S and 3S models. The threaded bend, connected to a discharge pipe, allows the air valve to operate even in the event of flooding of the well or the installation site, without the risk of contaminated water entering the pipeline. A further advantage of the SUB model is that it prevents water spurts during air valve closing.

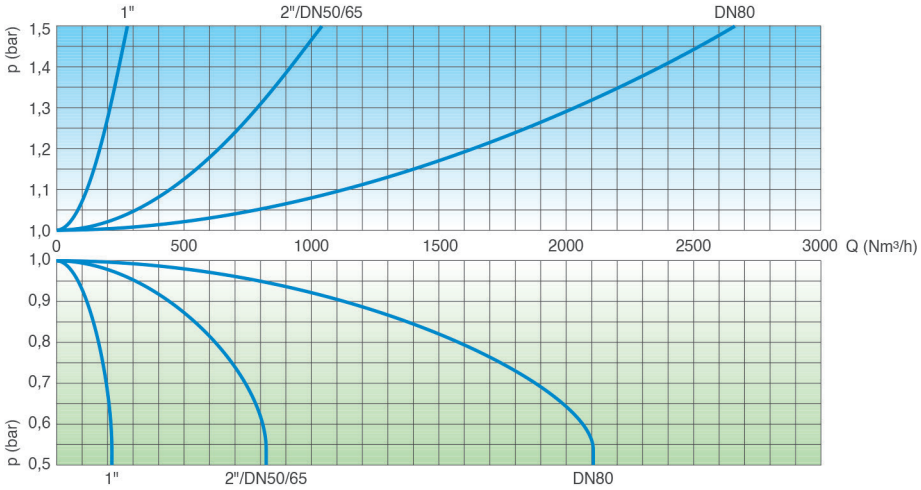
EO SERIES discharge only version, available for WAVE 2S and 3S models. This variant is designed to allow the air valve to be installed at critical points of the layout where HGL may drop below the pipe profile , and at any other junction where, for design reasons, air entrance must be avoided.

IO entrance only version, available for the WAVE PRO 2S dual function model. This variant is designed to allow for the installation of the air valve at critical points of the layout where, for design reasons, air discharge must be avoided. It should be noted that, when using the IO version, the air valve does not provide any protection against overpressure caused by filling the pipeline.

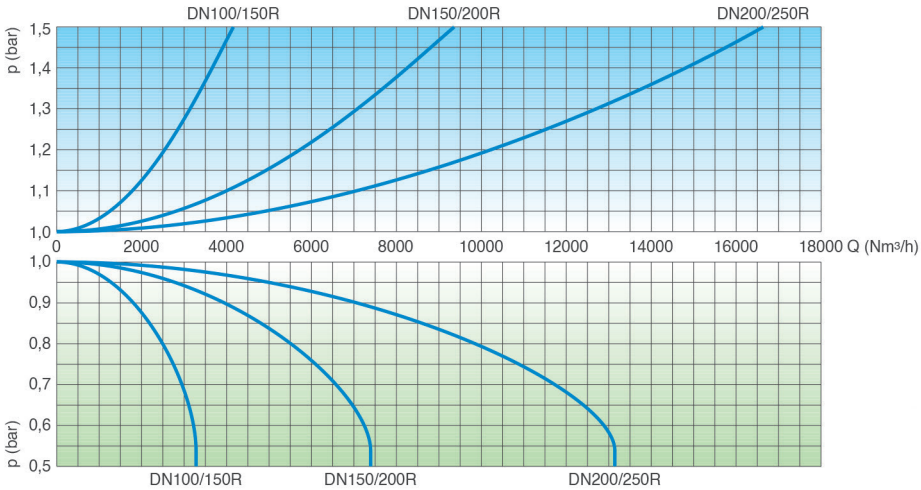
Technical data

Air flow characteristic charts

AIR OUTFLOW RATE DURING PIPELINE FILLING



AIR INFLOW RATE FOR PIPELINE DRAINING



AIR INFLOW RATE FOR PIPELINE DRAINING

The air flow rate charts were obtained in Kg/s, from laboratory tests and numerical analysis, and converted to Nm/h by applying a safety factor.

Operating conditions

Maximum treated water	60°C (High-temperature version on request)
Maximum pressure	40 bar
Minimum pressure	0.2 bar (lower on request)

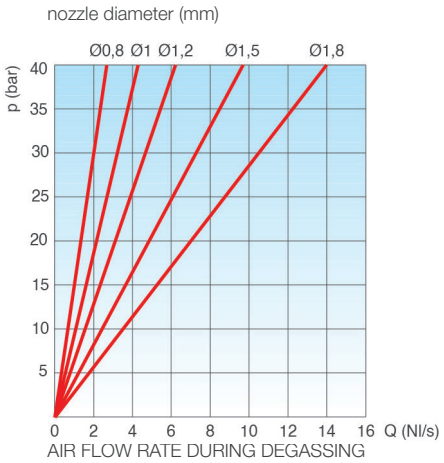
Standard

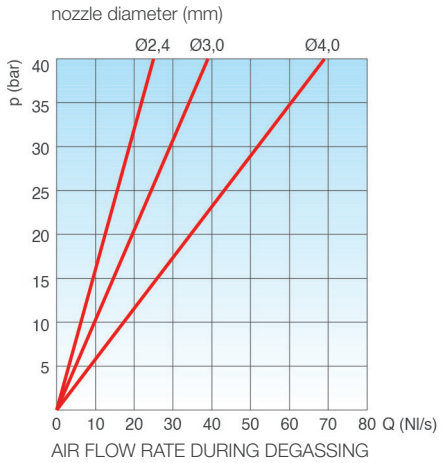
- Certification and testing according to EN 1074/4 and AWWA C-512
- Drilling according to EN 1092-2 or ANSI
- Gaskets made of NBR, EPDM or Viton

Flange and gasket modifications on request.

Choice of nozzle

Nozzle diameter in mm depending on air valve size and PN.



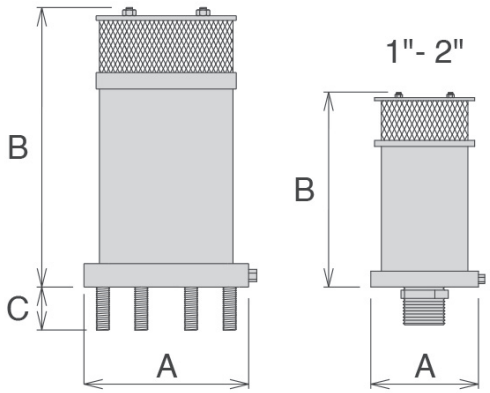


Air flow charts are obtained in Kg/s from laboratory tests and numerical analysis, without filtering, and converted to Nm3/h by applying an appropriate safety factor.

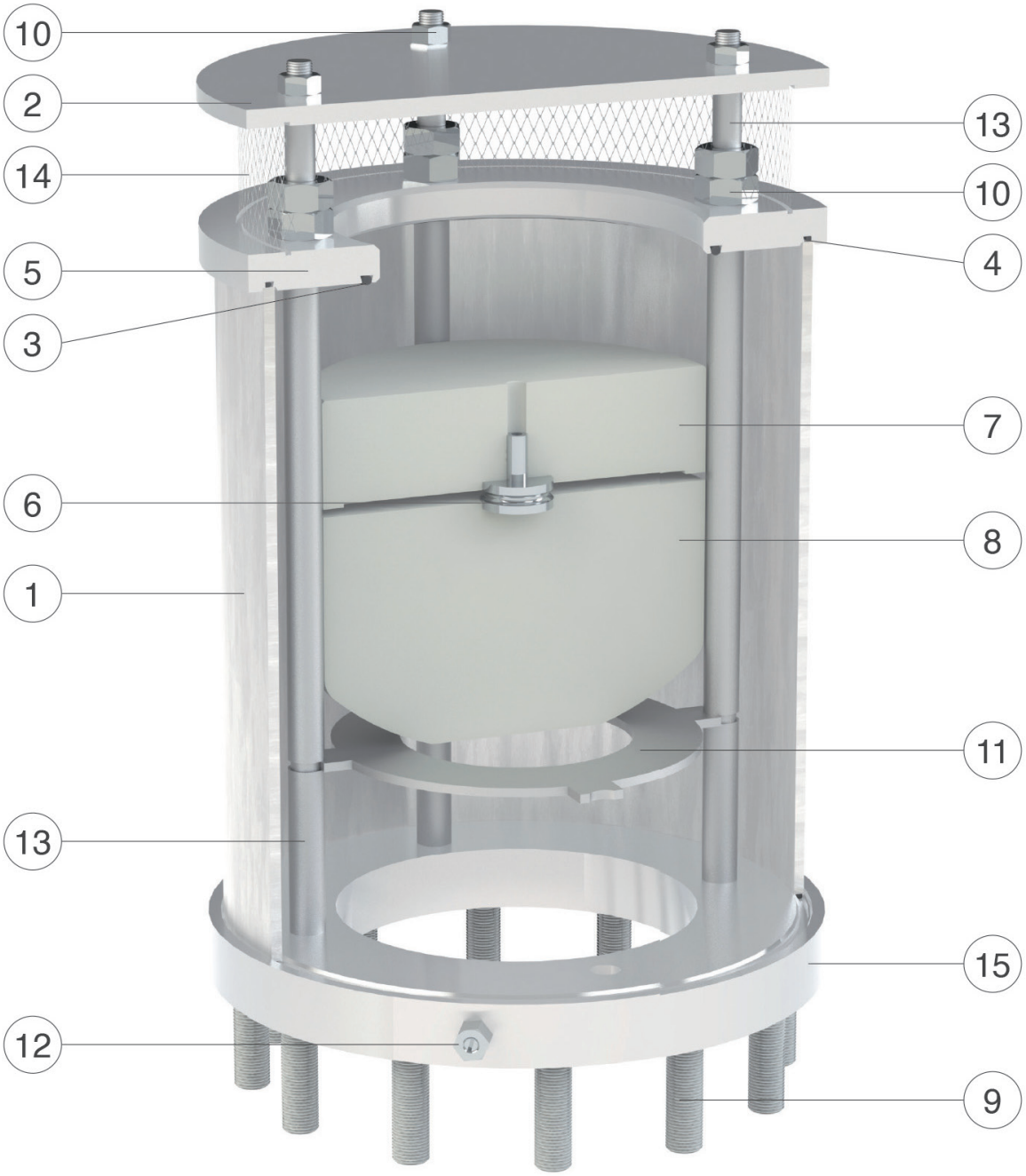
	PN 10	PN 16	PN 25	PN 40
1”	1.2	1.2	1	0.8
2”/DN 50/65	1.5	1.2	1	0.8
DN 80	1.8	1.5	1.2	1
DN 100/150R	2.4	1.8	1.8	1.2
DN 150/200R	4	3	2.4	1.8
DN 200/250R	4	4	4	3

Dimensions and weights

CONNECTION inches/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



Construction details



No.	Component	Standard material	Optional
1	Body	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
2	Cap	AISI 304 stainless steel	AISI 316 stainless steel
3	Seal seat gasket	NBR	EPDM/Viton/silicone
4	Seal seat O-ring	NBR	EPDM/Viton/silicone
5	Seal seat	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
6	Nozzle unit	AISI 316 stainless steel	Duplex stainless steel
7	Plug plate	polypropylene	
8	Float	polypropylene	
9	Studs	AISI 304 stainless steel	AISI 316 stainless steel
10	Nuts	AISI 316 stainless steel	
11	Deflector	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
12	Drain valve	AISI 316 stainless steel	
13	Spacers	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
14	Filter	AISI 304 stainless steel	AISI 316 stainless steel
15	Flange	AISI 316 stainless steel	st. steel Duplex/Super Dupl.

The table of materials and components is subject to change without notice.

Stainless steel anti-water hammer air valve for industry **WAVE PRO 3S-AWH**

The WAVE PRO series air valves are single-chamber, full-bore combined automatic devices. They manage the air volumes inside the pipelines and allow the pressurised air to be degassed. They can be installed in aggressive environments: sea water, industrial plants, refineries and the like.

The WAVE PRO 3S-AWH model, in addition to degassing, ensures the entrance of large volumes of air when draining the pipelines, and the discharge of air at a controlled speed during the filling phase to avoid the risk of water hammer.

Constructive features and advantages

- Totally made of high-strength materials suitable for industrial use and in aggressive environments.
- Central mobile block consisting of a float and an upper plate, both cylindrical and made of solid polypropylene, joined by the nozzle and gasket holder. Solid floats avoid deformation at high pressures and, machined on a lathe, guarantee better flow.
- Nozzle and gasket holder made entirely of AISI 316 or Duplex stainless steel, designed to prevent gasket wear due to excessive crushing.
- Anti-shock system (AWH) consisting of a stainless steel spring and guide shaft, and a plate with sizable holes to control the air discharge.
- Easy maintenance from above, without removing the air valve from the pipeline.

- Stainless steel cap and filter.
- Single chamber design allowing high flow rates and low turbulence.
- Supplied with flanged or threaded connections.

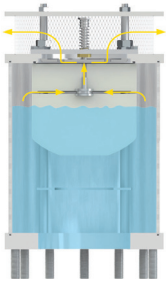
Main applications

- Sea water intake pipelines. Desalination plants
- Demineralised water, aggressive and corrosive fluids
- Mines
- Refineries and petrochemical plants
- Lifting stations and points in sewer systems exposed to water hammer, or separation of the water column, in the event of pump shutdown

Operating principle

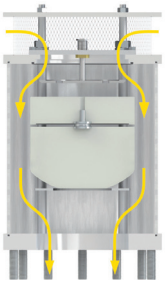
Controlled air discharge

During air discharge, the anti-shock system (AWH) reduces the speed of the incoming water column by decreasing the outflow. This avoids rapid air valve closures, the resulting overpressure and the risk of water hammer.



Pressurised air degassing

During operation, the air inside the pipeline accumulates at the top of the air valve and reaches the same pressure as the water. By increasing its volume, it pushes the float down and thus allows degassing through the nozzle.



Entrance of large volumes of air

In the event of emptying or rupture of the pipe, it is necessary to draw in as much air as there is water coming out to avoid depressions and serious damage to the network.

Optional functions

Dual-function WAVE PRO 2S-AWH version, also called vacuum breaker. Suitable for locations no air release is needed. It is used at upward slope changes and long ascending sections of the pipe; in dry and fire-prevention installations.

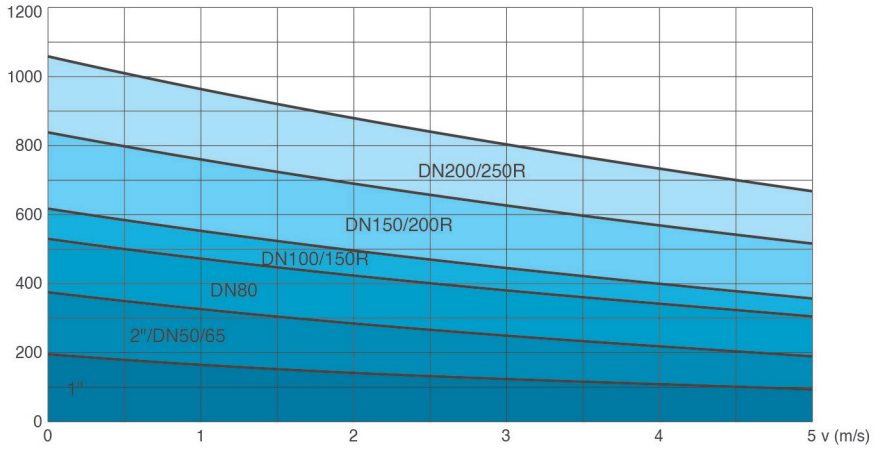
SUB version, with conveyance drain, available for WAVE PRO 2S-AWH and 3S-AWH models. The threaded bend, connected to a discharge pipe, allows the air valve to operate even in the event of flooding of the well or the installation site, without the risk of contaminated water entering the pipeline. A further advantage of the SUB model is that it prevents water spurts during air valve closing.

The force of the **counter spring** as well as the **sonic nozzles**, both responsible of the proper operation of the AWH, can be modified according to the to the project conditions and the results of the transient analysis.

Technical data

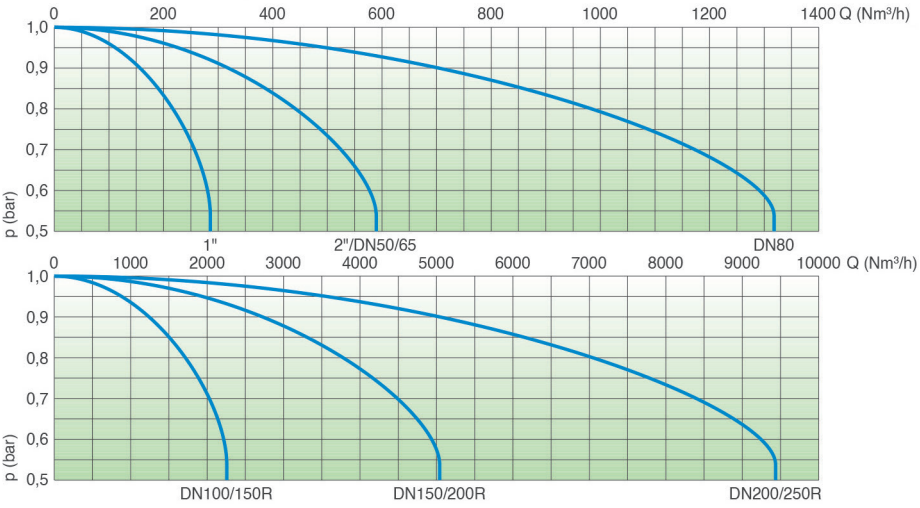
Air valve selection chart

Preliminary dimensioning according to pipeline diameter and required air discharge speed.
Pipeline DN (mm)



Air flow characteristic charts

AIR OUTFLOW RATE DURING PIPELINE FILLING



AIR INFLOW RATE FOR PIPELINE DRAINING

The air flow rate charts were obtained in Kg/s, from laboratory tests and numerical analysis, and converted to Nm/h by applying a safety factor.

Operating conditions

Maximum treated water	60°C (High-temperature version on request)
Maximum pressure	40 bar.
Minimum pressure	0.2 bar (lower on request)

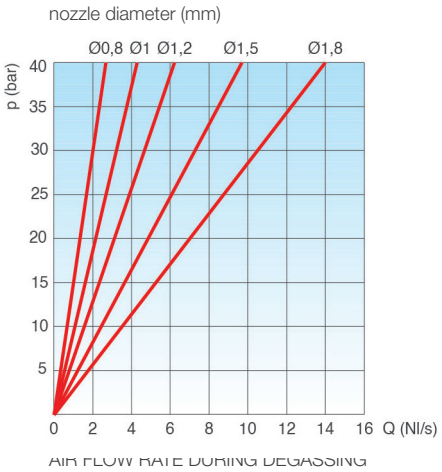
Standard

- Certification and testing according to EN 1074/4 and AWWA C-512
- Drilling according to EN 1092-2 or ANSI
- Gaskets made of NBR, EPDM or Viton

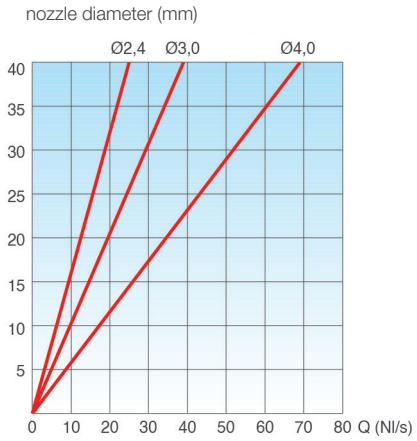
Flange and gasket modifications on request.

Choice of nozzle

Nozzle diameter in mm depending on air valve size and PN.



AIR FLOW RATE DURING DEGASSING



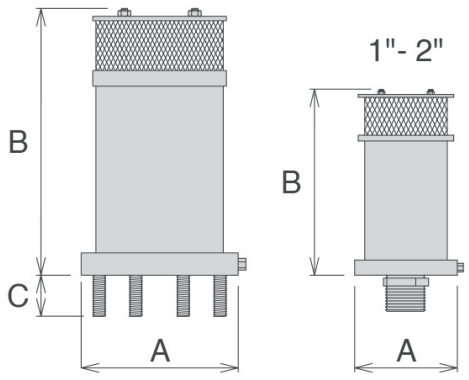
AIR FLOW RATE DURING DEGASSING

Air flow charts are obtained in Kg/s from laboratory tests and numerical analysis, without filtering, and converted to Nm3/h by applying an appropriate safety factor.

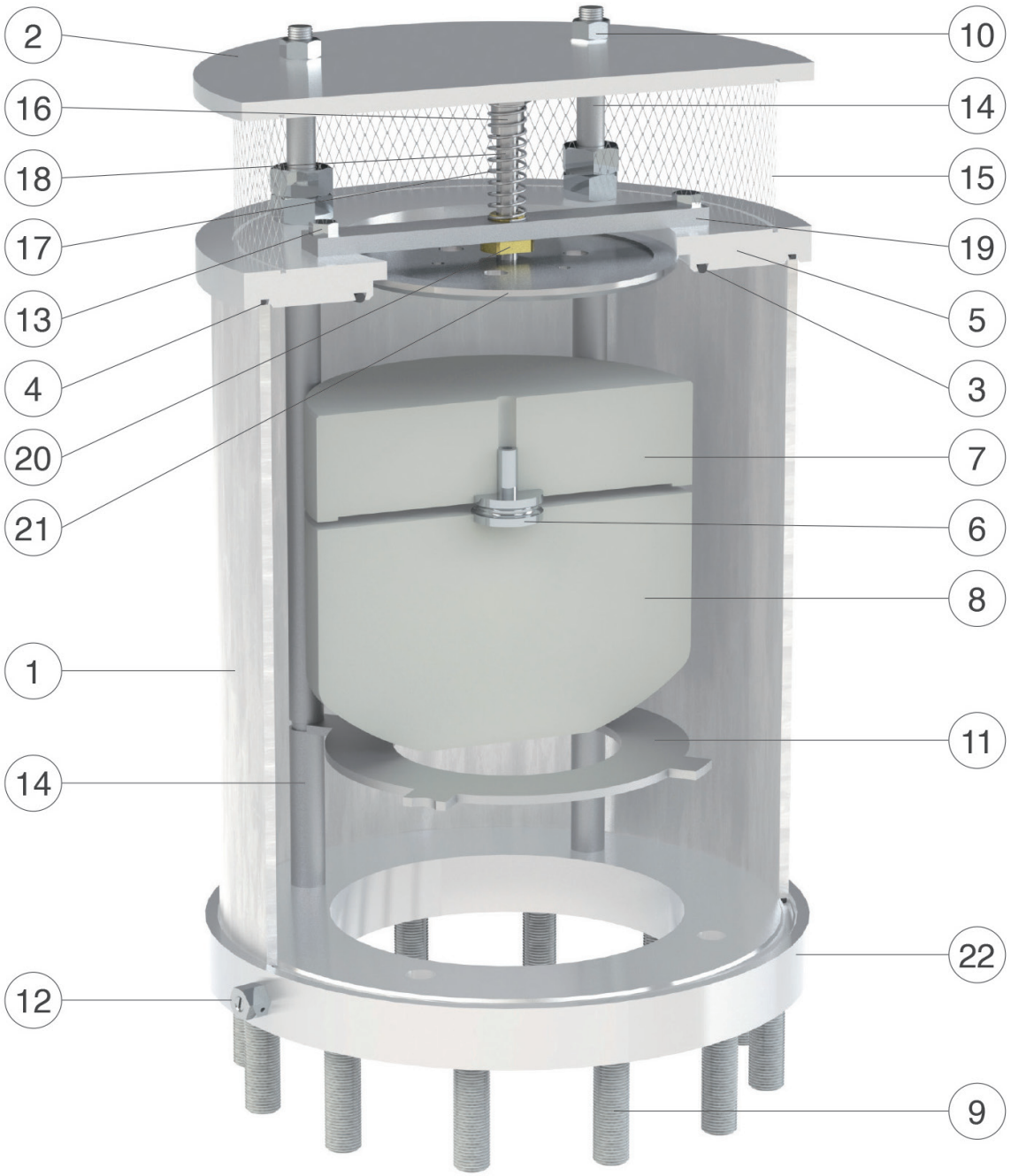
	PN 10	PN 16	PN 25	PN 40
1”	1.2	1.2	1	0.8
2”/DN 50/65	1.5	1.2	1	0.8
DN 80	1.8	1.5	1.2	1
DN 100/150R	2.4	1.8	1.8	1.2
DN 150/200R	4	3	2.4	1.8
DN 200/250R	4	4	4	3

Dimensions and weights

CONNECTION inches/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



Construction details



No.	Component	Standard material	Optional
1	Body	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
2	Cap	AISI 304 stainless steel	AISI 316 stainless steel
3	Seal seat gasket	NBR	EPDM/Viton/silicone
4	Seal seat O-ring	NBR	EPDM/Viton/silicone
5	AWH seal seat	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
6	Nozzle unit	AISI 316 stainless steel	Duplex stainless steel
7	Plug plate	polypropylene	
8	Float	polypropylene	
9	Studs	AISI 304 stainless steel	AISI 316 stainless steel
10	Nuts	AISI 316 stainless steel	
11	Deflector	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
12	Drain valve	AISI 316 stainless steel	
13	HH screws (from DN 150R)	AISI 316 stainless steel	
14	Spacers	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
15	Filter	AISI 304 stainless steel	AISI 316 stainless steel
16	Clamping nut (from DN 100)	AISI 303 stainless steel	EPDM/Viton/silicone
17	Spring	AISI 302 stainless steel	AISI 316 stainless steel
18	Guide shaft	AISI 303 stainless steel	AISI 316 stainless steel
19	Spring support (from DN 150R)	AISI 304 stainless steel	AISI 316 stainless steel
20	Guide nut (from DN 150R)	Delrin (polyoxymethylene)	
21	AWH plate	AISI 316 stainless steel	
22	Flange	AISI 316 stainless steel	st. steel Duplex/Super Dupl.

The table of materials and components is subject to change without notice.

Stainless steel anti-water hammer air valve for industry **WAVE PRO 3S-CSF**

The WAVE PRO series air valves are single-chamber, full-bore combined automatic devices. They manage the air volumes inside the pipelines and allow the pressurised air to be degassed. They can be installed in aggressive environments: sea water, industrial plants, refineries and the like.

The WAVE PRO 35-CSF model, in addition to degassing, ensures the entrance of large volumes of air when the pipelines are drained, and keeps the air discharge speed within a set safety limit to avoid the risk of water hammer.

Constructive features and advantages

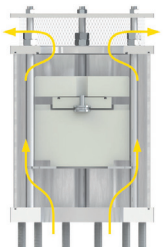
- Uncontrolled filling of the pipeline and varied motion phenomena cause the system air valves to close quickly, resulting in damage. In such cases, the WAVE LP90 3S-CS air valve, automatically decreases the outflow capacity and therefore reduces the speed of the incoming water column, minimising the risk of water hammer.
- It reduces to a minimum water spurts during closure, and the risk of flooding of the air valve during possible rapid filling of the pipeline at low pressure.
- Totally made of high-strength materials suitable for industrial use and in aggressive environments.
- Central mobile block consisting of a float and a plug plate, both cylindrical and made of solid polypropylene, joined by the nozzle, a gasket holder and an anti-water hammer CSF plate.Solid floats avoid deformation at high pressures and, machined on a lathe, guarantee better flow.

- Nozzle and gasket holder made entirely of AISI 316 or Duplex stainless steel, designed to prevent gasket wear due to excessive crushing.

Main applications

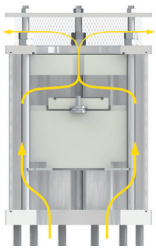
- Sea water intake pipelines
- Desalination plants
- Demineralised water
- Mines
- Refineries and petrochemical plants

Operating principle



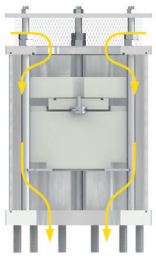
Discharge of large volumes of air

During the pipe filling, it is necessary to let out as much air as water enters. Thanks to the aerodynamic shape of the full-bore body and the deflector, the WAVE PRO 3S-CSF air valve prevents the mobile block from closing prematurely during this phase.



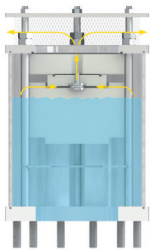
Controlled air discharge

During the filling of the pipeline, if the air pressure rises above a certain value, with the risk of water hammer and damage to the system, the CSF upper plate automatically rises, reducing the outflow and consequently the speed of the approaching water column.



Entrance of large volumes of air

During the pipe draining or in the event of pipe burst, it is necessary to draw in as much air as there is water coming out to avoid depressions and serious damage to the network.



Pressurised air degassing

During operation, the air produced by the pipeline accumulates at the top of the air valve, compresses, and arrives at the same pressure as the water. By increasing in volume, it pushes the float down and thus allows degassing.

Optional functions

Dual-function WAVE PRO 2S-CSF version, called vacuum breaker. Suitable for locations where no air release is needed. It is used at upward slope changes and long ascending sections of the pipe; in dry and fire-prevention installations.

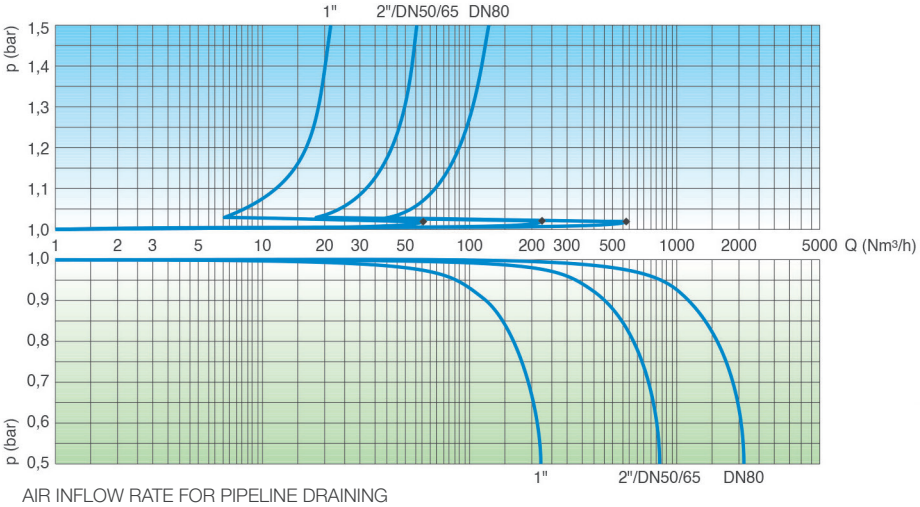
SUB version, with conveyance drain, available for WAVE PRO 2S-CSF and 3S-CSF models. The threaded bend, connected to a discharge pipe, allows the air valve to operate even in the event of flooding of the well or the installation site, without the risk of contaminated water entering the pipeline. Another advantage of the SUB model is that it prevents water spurts during air valve closing.

EO SERIES discharge only version, available for WAVE PRO 2S-CSF and 3S-CSF models. This variant is designed to allow the air valve to be installed at critical points of the layout where HGL may drop below the pipe profile, and at any other junction where, for design reasons, air entrance must be avoided.

Technical data

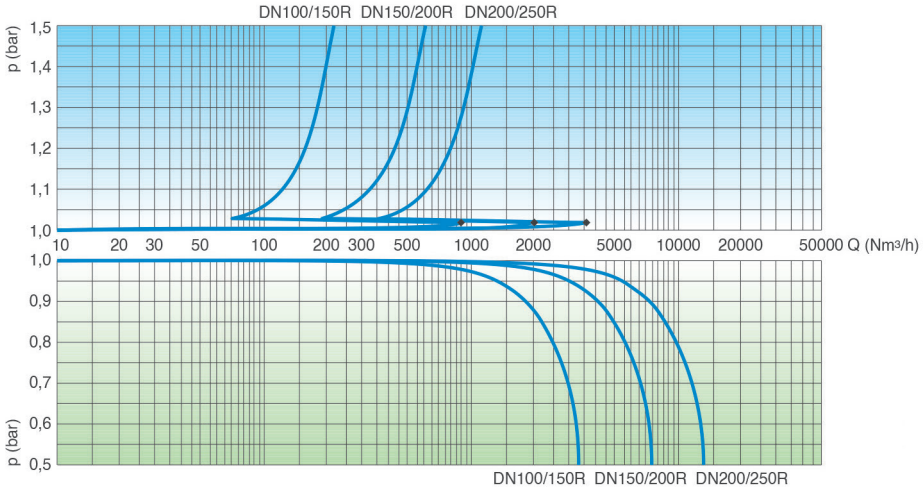
Air flow characteristic charts

AIR OUTFLOW RATE DURING PIPELINE FILLING



AIR INFLOW RATE FOR PIPELINE DRAINING

AIR OUTFLOW RATE DURING PIPELINE FILLING



AIR INFLOW RATE FOR PIPELINE DRAINING

Air flow charts are obtained in Kg/s from laboratory tests and numerical analysis, without filtering, and converted to Nm/h by applying a safety factor.

Operating conditions

Maximum treated water	60°C (Higher temperatures on request)
Maximum pressure	40 bar
Minimum pressure	0.2 bar (lower on request)

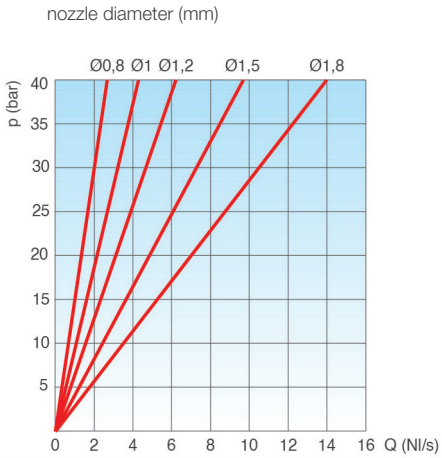
Standard

- Design according to EN 1074/4 and AWWA C-512
- Drilling according to EN 1092-2 or ANSI
- Gaskets made of NBR, EPDM or Viton

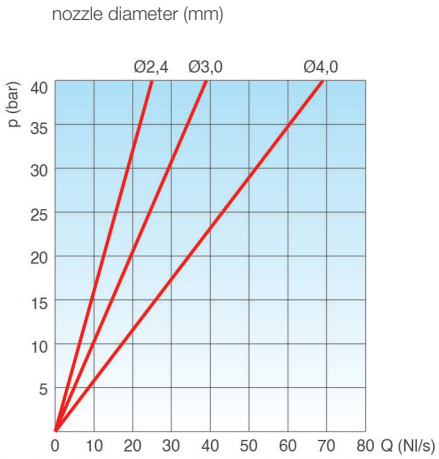
Flange and gasket modifications on request.

Choice of nozzle

Nozzle diameter in mm depending on the PN of the air valve.



FLOW RATE DURING DEGASSING



FLOW RATE DURING DEGASSING

Air flow charts are obtained in Kg/s from laboratory tests and numerical analysis, without filtering, and converted to Nm3/h by applying an appropriate safety factor.

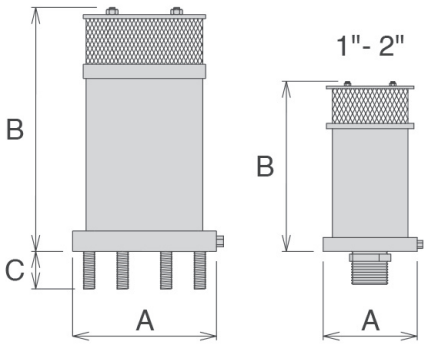
	PN 10	PN 16	PN 25	PN 40
1"	1.5	1.2	1	0.8
2”/DN 50/65	1.8	1.5	1.2	1
DN 80	1.8	1.5	1.2	1
DN 100/150R	3	2.4	1.8	1.2
DN 150/200R	4	3	2.4	1.8
DN 200/250R	4	4	4	3

A: Reduced bore. Larger dimensions on request.

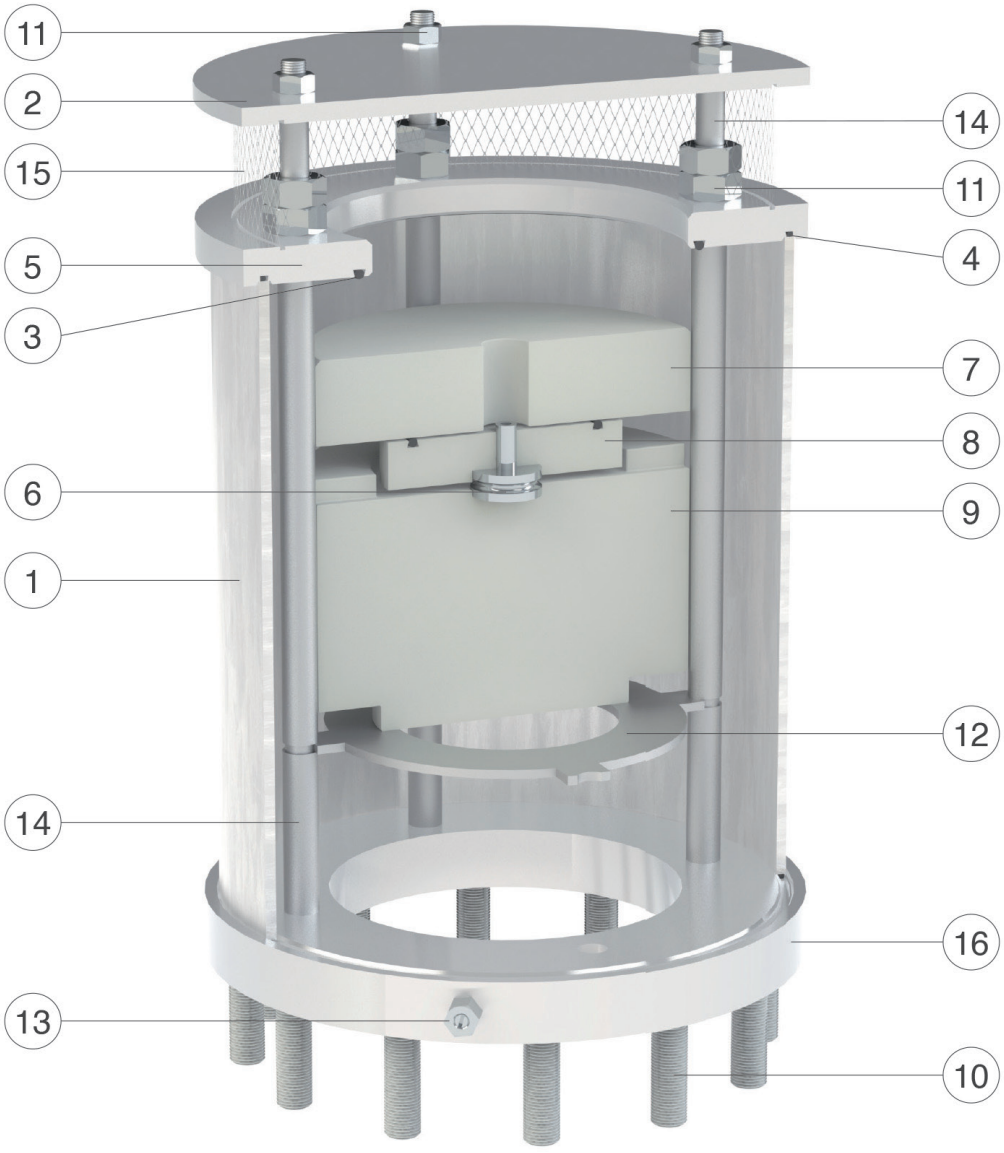
Dimensions and weights

CONNECTION inches/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

A: Reduced bore. Larger dimensions on request.



Construction details

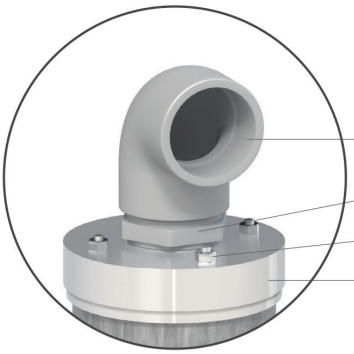


No.	Component	Standard material	Optional
1	Body	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
2	Cap	AISI 304 stainless steel	AISI 316 stainless steel
3	Seal seat gasket	NBR	EPDM/Viton/silicone
4	Seal seat O-ring	NBR	EPDM/Viton/silicone
5	Seal seat	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
6	Nozzle unit	AISI 316 stainless steel	Duplex stainless steel
7	CSF Plate	polypropylene	
8	Plug plate	polypropylene	
9	Float	polypropylene	
10	Studs	AISI 304 stainless steel	AISI 316 stainless steel
11	Nuts	AISI 316 stainless steel	
12	Deflector	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
13	Drain valve	AISI 316 stainless steel	
14	Spacers	AISI 316 stainless steel	st. steel Duplex/Super Dupl.
15	Filter	AISI 304 stainless steel	AISI 316 stainless steel
16	Flange	AISI 316 stainless steel	st. steel Duplex/Super Dupl.

The table of materials and components is subject to change without notice.

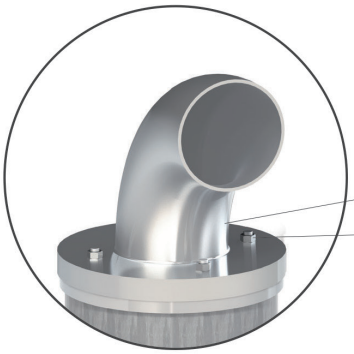
Conveyance system of WAVE PRO SUB air valves

The SUB system, with conveyance drain, is available on request for all WAVE PRO models, excluding the EO variants. A threaded bend, to be connected to a discharge pipe, allows the air valve to operate even in the event of flooding of the well or the installation site, without the risk of contaminated water entering the pipeline. Another advantage of the SUB model is the possibility of conveying spurts when the air valve is closing



Plastic bend for 1”, 2”, DN 50-200R

- PVC Threaded bend filettata di PVC (PP for 1”, 2”, DN 50-65)
- PVC fitting (PP for 1”, 2”, DN 50-65)
- Stainless steel nuts
- SUB plate in PP or stainless steel



Stainless steel bend for DN 200 nd 250R *

- Stainless steel SUB plate and bend
- Stainless steel nuts

Operating conditions

Maximum treated water	60°C (Higher temperatures on request)
Maximum pressure	40 ba
Minimum pressure	0.2 bar (lower on request)

Standard

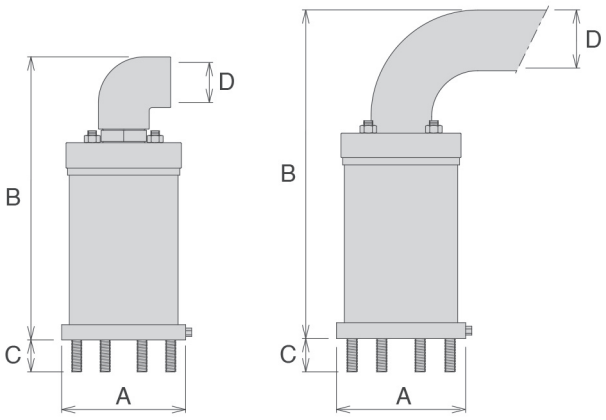
- Certification and testing according to EN 1074/4
- Drilling according to EN 1092-2 or ANSI
- Gaskets made of NBR, EPDM or Viton

Flange and gasket modifications on request.

Dimensions and weights

CONNECTION inches/mm	A mm	B mm	C mm	D mm	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

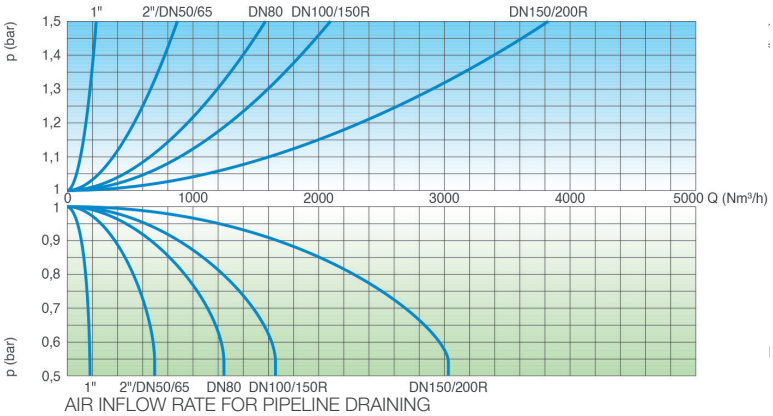
*: the SUB model is available up to DN 200R; for larger DNs please ask for information.



Technical data

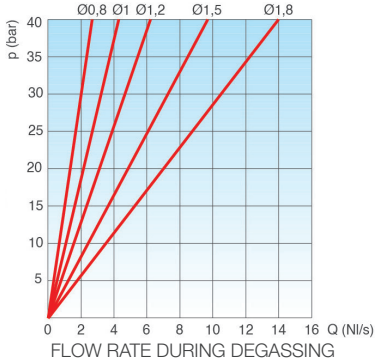
WAVE PRO 3S-SUB - Air flow characteristic charts

AIR OUTFLOW RATE DURING PIPELINE FILLING



AIR INFLOW RATE FOR PIPELINE DRAINING

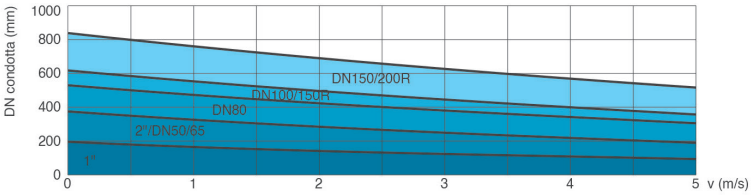
nozzle diameter (mm)



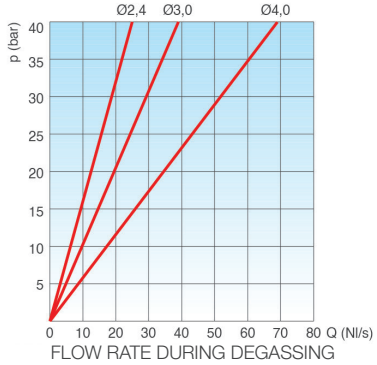
FLOW RATE DURING DEGASSING

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

Preliminary dimensioning according to pipeline diameter and required air discharge speed

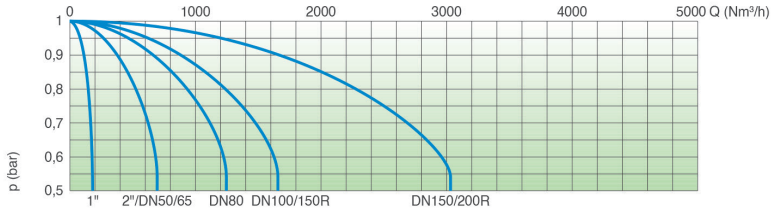


nozzle diameter (mm)



FLOW RATE DURING DEGASSING

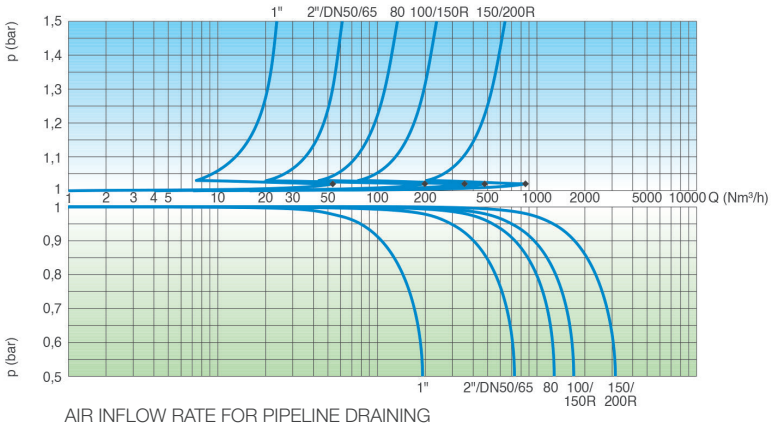
WAVE PRO 3S-AWH SUB - Air flow characteristic charts



AIR INFLOW RATE FOR PIPELINE DRAINING

WAVE PRO 3S-CSF SUB - Air flow characteristic charts

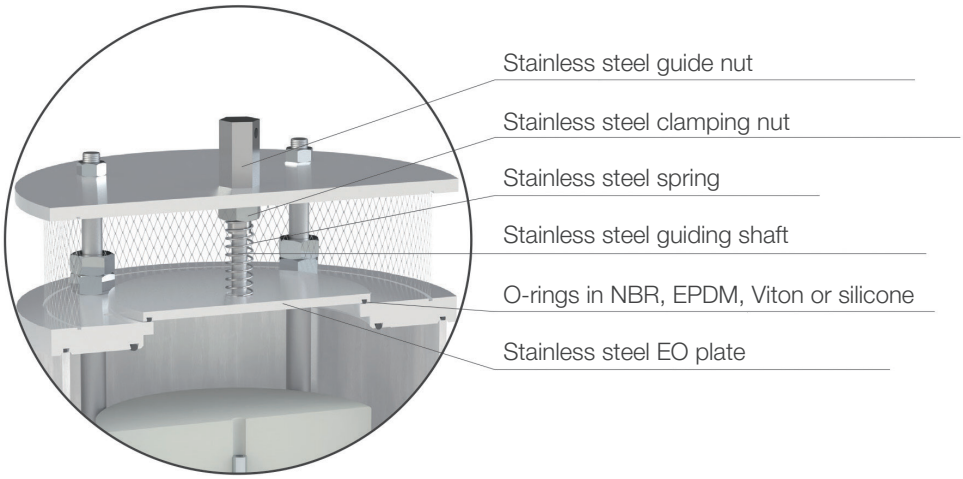
AIR OUTFLOW RATE DURING PIPELINE FILLING



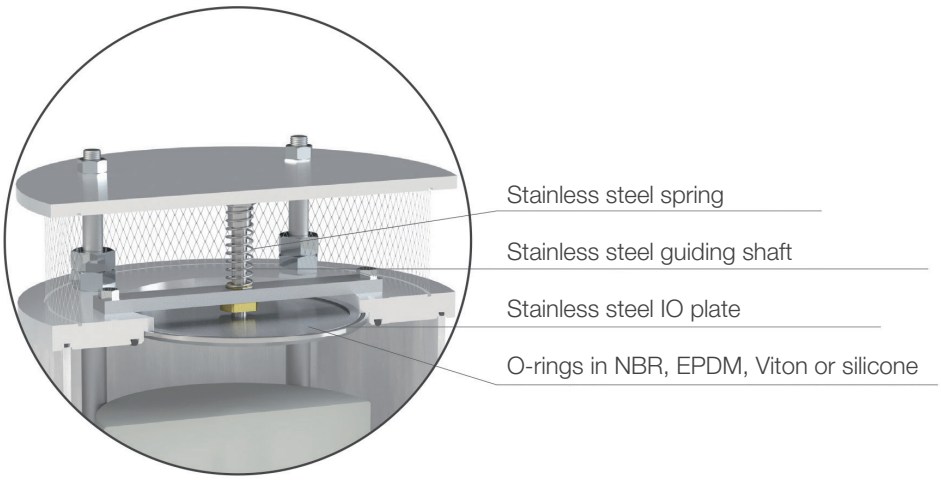
AIR INFLOW RATE FOR PIPELINE DRAINING

Air flow charts are obtained in Kg/s from laboratory tests and numerical analysis, without filtering, and converted to Nm/h by applying a safety factor.

EO SERIES discharge only version, available for WAVE PRO 2S and 3S models. This variant is designed to allow the air valve to be installed at critical points of the layout where HGL may drop below the pipe profile , and at any other junction where, for design reasons, air entrance must be absolutely avoided.



IO entrance only version, available for the WAVE PRO 2S dual function model. This variant is designed to allow for the installation of the air valve at critical points of the layout where air discharge must be avoided. It should be noted that, when using the IO version, the air valve does not provide any protection against overpressure caused by filling the pipeline.



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