



Anti shock air valve for high-rise buildings and pumping stations DNS-1-3F-AS-BF-HR-SE

The DNS air valve DNS-1-3F-AS-BF-HR-SE will ensure the proper operation of the system 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.



We can refer to hydraulic transients meaning a temporary flow and pressure condition occurring in a hydraulic system between an initial steady-state condition and a final steady-state condition. If changes occur rapidly following the operation of a flow-control device (like a valve closure or pump start), the compressibility of the liquid and the elasticity of the pipeline cause a transient pressure wave propagating along the system. The variation can be either positive leading to excessive pressure and consequently damages, bursts or negative, causing pipe collapse and deformation.

In case of risers in general and for high-rise buildings in particular air valves need to be installed for the removal of air pockets, and water hammer for such applications is normally related to their fast closure in case of rapid filling and pump start up.

The anti-shock DNS air valves DNS-1-3F-AS-BF-HR-SE, a special version of the existing air valves range, has been designed to ensure the proper operation on the system any circumstances avoiding the sudden impact between the water surface and the float with consequent slow closing. This model will also ensure the entrance of large volumes of air during pipe filling/draining and the air release during working conditions.

Technical features and benefits

- 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 DNS, 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 DNS air release system in AISI 316 (pat. Pending).
- Nozzle and gasket holder, part of DNS air release system, entirely made in AISI 316 and designed with gasket compression control to prevent aging process and consequent leakage during working conditions.
- 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.
- Threaded outlet elbow to avoid spray effect, conveying spurts coming from the closure away from the valve. This feature will also allow the proper operation in case of flood, without the risk of contaminated water entering the pipeline.
- The air valve is fitted with a Y strainer to prevent debris, solids from reaching the upper part where the air release system and seat is located causing possible malfunctioning.

Applications

- Pipeline risers.
- High-rise buildings.
- Irrigation and treated water pumping stations.

Operating principle



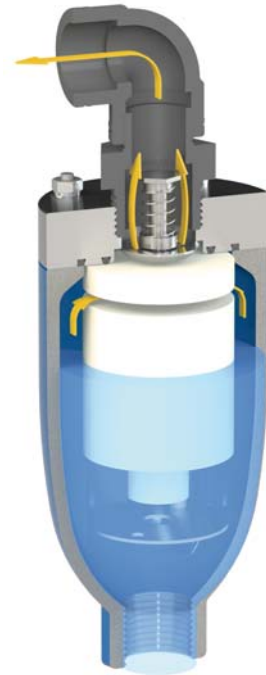
Entrance of large volumes of air

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



Controlled air discharge

During the pipe filling it is necessary to avoid rapid closures, responsible of water hammer effects. The DNS-1-3F-AS-BF-HR-SE, 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.

Installation



- 1- Pressure reducing valve XLC 410
- 2- Relief valve VSM FF
- 3- Anti-slam air valve FOX HR

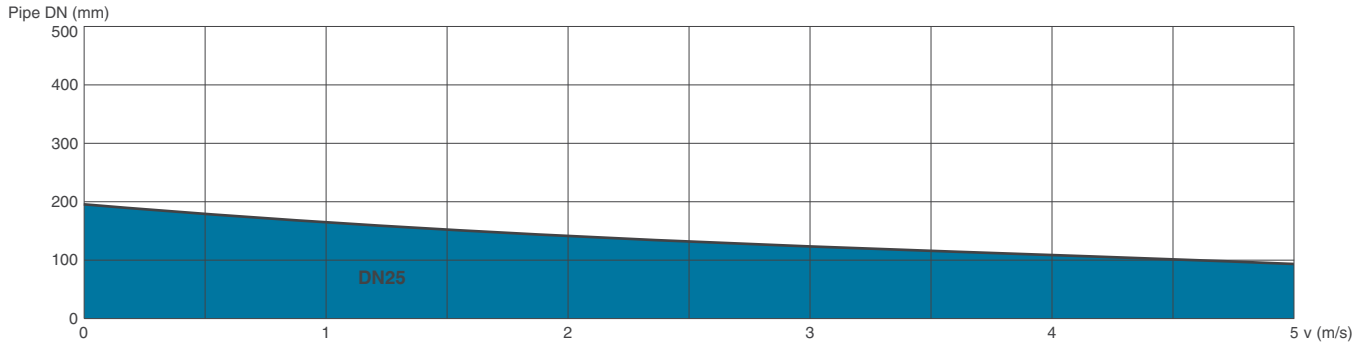
Some example of applications are depicted in the picture A and B. The first showing the installation on a vertical riser typical of a high rise building and plants. On the second image the air valve is located before and after the check valve of a pump to allow for the controlled air discharge during pump start and air release in working conditions. We strongly advise to check and guarantee a minimum working pressure in order to avoid leakage, that can happen especially with high rise applications in dynamic conditions.



Technical data

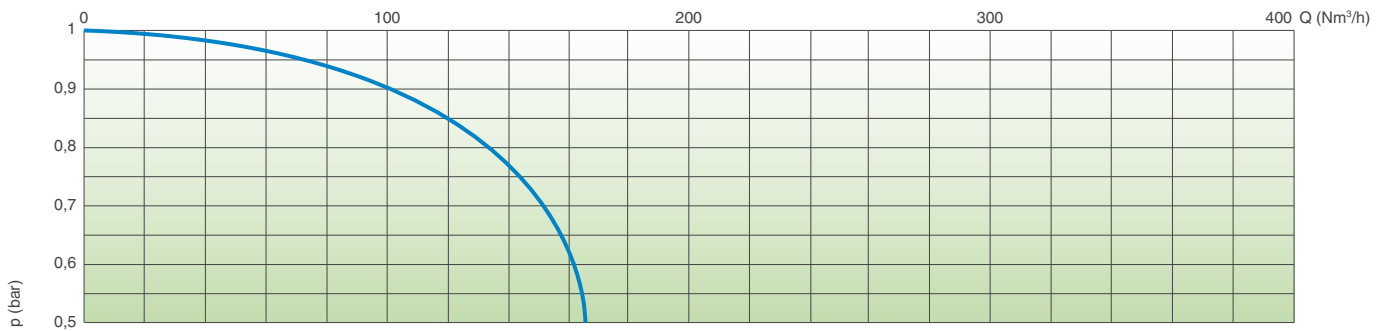
Air valve selection chart

Range of application of the air valve as a function of pipeline internal diameter and fluid flow velocity expressed in m/s.



Air flow performance charts

AIR ENTRANCE DURING PIPE DRAINING

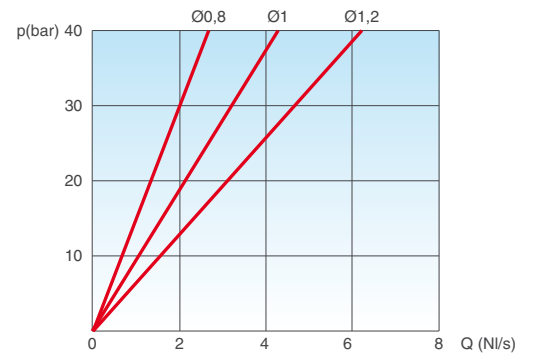


Working conditions

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

Standard

Designed in compliance with EN-1074/4 and AWWA C-512.
Epoxy painting applied through fluidized bed technology blue RAL 5005.
Changes and variations on painting available on request.



AIR RELEASE DURING WORKING CONDITIONS

Nozzle choice

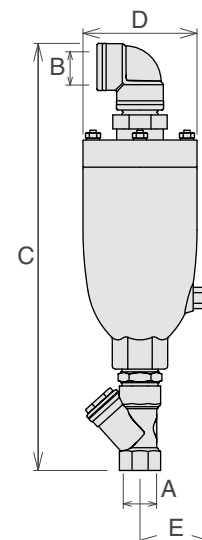
Nozzle diameter in mm according to the size of the air valve and the PN.

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

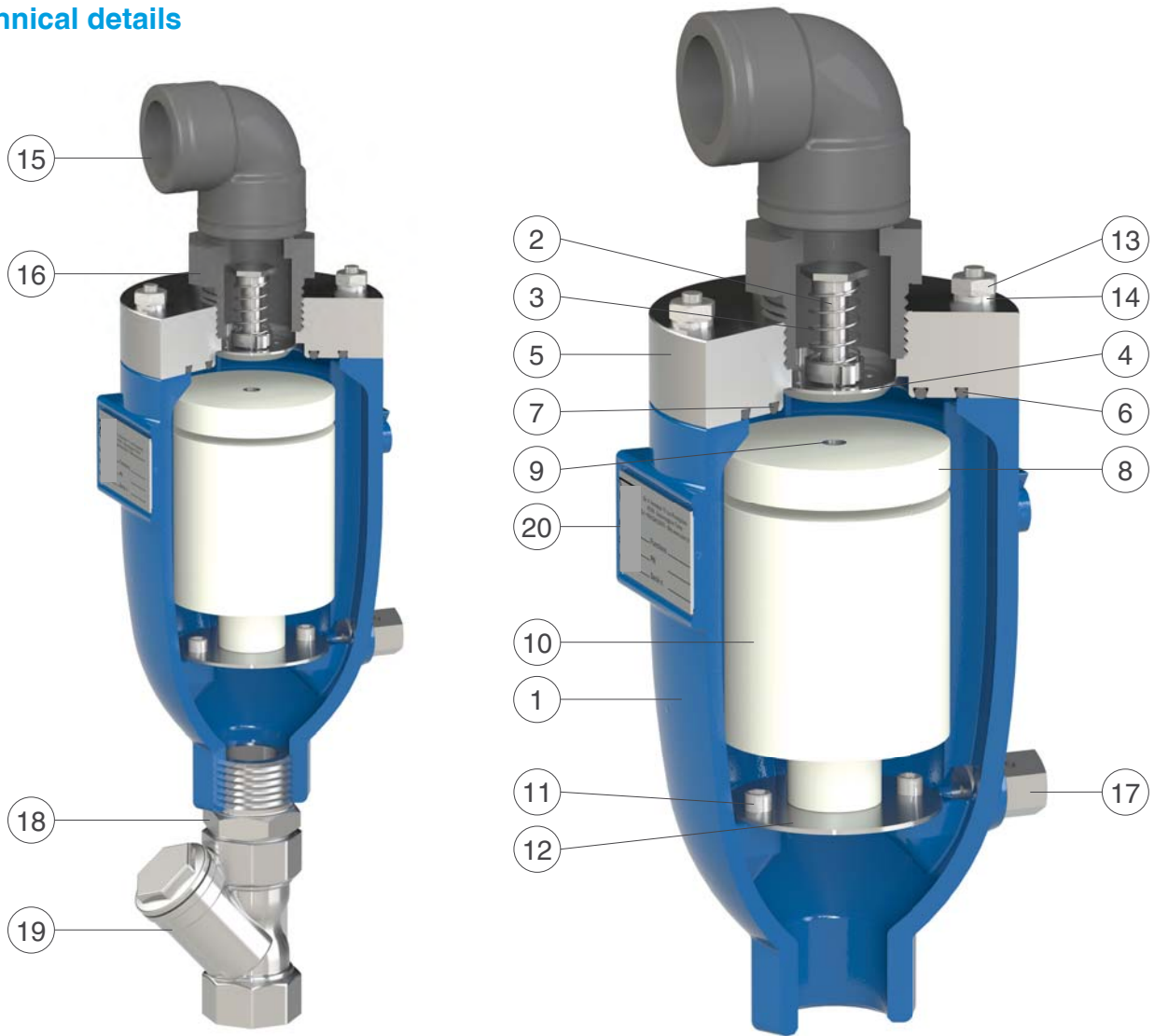
Weights and dimensions

| A inch | B inch | C mm | D mm | E mm | Weight Kg |
|--------|--------|------|------|------|-----------|
| 1" | 1" | 395 | 105 | 70 | 3,2 |

DN 2", flanged and larger size available on request.



Technical details



| N. | Component | Standard material | Optional |
|----|---------------------|---|-----------------------------|
| 1 | Body | ductile cast iron GJS 450-10 or GJS 500-7 | |
| 2 | AS shaft | stainless steel AISI 303 | |
| 3 | AS spring | stainless steel AISI 302 | |
| 4 | AS flat | stainless steel AISI 303 | |
| 5 | HR seat | stainless steel AISI 303 | |
| 6 | O-ring | NBR | EPDM/Viton/silicone |
| 7 | O-ring | NBR | EPDM/Viton/silicone |
| 8 | Upper flat | polypropylene | |
| 9 | Nozzle subset | stainless steel AISI 316 | |
| 10 | Float | polypropylene | |
| 11 | Screws | stainless steel AISI 304 | stainless steel AISI 316 |
| 12 | Deflector | stainless steel AISI 304 | stainless steel AISI 316 |
| 13 | Nuts | stainless steel AISI 304 | stainless steel AISI 316 |
| 14 | Washer | stainless steel AISI 304 | stainless steel AISI 316 |
| 15 | Threaded elbow 1" | polypropylene | stainless steel AISI 316 |
| 16 | Fitting 1 1/4" - 1" | polypropylene | stainless steel AISI 316 |
| 17 | Drain valve | stainless steel AISI 303 | stainless steel AISI 316 |
| 18 | Fitting 1" | brass | stainless steel AISI 316 |
| 19 | Filter 1" | bronze | brass/stain. steel AISI 316 |
| 20 | Tag | stainless steel | |

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