



TRIPLE FUNCTION AIR VALVES





"picture: AVK International A/S product showroom"

THE AVK GROUP



DEDICATED PEOPLE

5,300+ employees,
hereof approx. 230 in
AVK International A/S



GLOBAL ORGANISATION

100+ AVK companies
worldwide



CONTINUOUS GROWTH

Net turnover EUR 1200
million (2023/24)

AVK YOUR LONG-TERM PARTNER

AVK has been in the valve business for more than 50 years. Today AVK is a global leader within valves, hydrants and accessories for water supply, gas supply, wastewater treatment and fire protection.

The wide AVK range

AVK Group A/S specialise in manufacturing gate valves, double eccentric butterfly valves, ball check valves, service connection valves, Supa Maxi™ couplings, extension spindles and selected types of hydrants and accessories.

We add numerous products to our range from the more than 20 other AVK factories in Europe as well as from AVK factories worldwide. These AVK factories specialise in other types of valves, hydrants and accessories, and jointly we are capable of offering a very wide selection of high quality products.

Global leadership and local commitment

Our geographical presence and product range is global, but our focus is local. Our customers are serviced by local sales organisations, in AVK's own sales companies or within our carefully selected distributors, who engage in their customers' needs. We are therefore able to offer tailor-made solutions that match local specifications.

A beneficial partnership

We want to build and invest in a longterm partnership with our customers. To earn our role as a long-term partner, we strive to deliver value for money. We deliver error-free, durable and maintenance-free products that constitute the most cost-efficient solution for our partners in the long run.

AN EXTENSIVE RANGE OF AIR VALVES FOR MANY APPLICATIONS

AVK offers a wide range of automatic air valves, air & vacuum valves and combination air valves for water supply, wastewater treatment and irrigation. AVK air valves are designed for optimal efficiency, longevity, and accurate air management. They play a crucial role in safeguarding pipelines from damages caused by air, ensuring a smooth flow of water, and reducing energy losses.



Water Supply

Great performance, minimum maintenance and durability are the characteristics of AVK's wide range of air valves for water supply. The air valves are also available in composite materials, which combine strength with extremely light weight.



Series 851/00
Automatic
Air Venting Valves

DN 25 PN 16



Series 831
Single Chamber,
Triple Acting Air Valves

DN 50-200 PN 10/16

- Special versions:
- Outlet only
 - Rapid filling preventer
 - Vented non-return



Series 851/4x
Dual Orifice,
Triple Acting Air Valves

DN 50-200
PN 10/16/25



Series 1731
Single Chamber,
Triple Acting Air Valves

DN 40-200
PN 25/40



Series 861
Single Chamber,
Triple Acting Air Valves

DN 250-400 PN 25/40

Special versions:
• Surge protection
• Anti-slam



Series 861
Plastic,
Combination Air Valves

DN 25-50 PN 10/16

Special versions:
• Surge protection



Irrigation

AVK offers a large selection of air valves compatible with irrigation systems using either groundwater, surface water or other non-conventional water sources. AVK's wide range of air valves for irrigation offer great performance, minimum maintenance and durability.



Series 851/00
Automatic
Air Venting Valves

DN 25 PN 16



Series 831
Single Chamber,
Triple Acting Air Valves

DN 50-200 PN 10/16

- Special versions:
- Outlet only
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Series 1731
Single Chamber,
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PN 25/40



Series 861
Single Chamber,
Triple Acting Air Valves

DN 250-400 PN 25/40

Special versions:
• Surge protection
• Anti-slam



Series 861
Plastic,
Combination Air Valves

DN 25-50 PN 10/16

Special versions:
• Surge protection



Wastewater Treatment

AVK wastewater air valves are designed to effectively handle the solids, debris, corrosive fluids and gases appearing in wastewater. Their innovative design with a large air gap between liquid and sealing system ensures a reliable function, even when used with aggressive liquids and liquids containing solid particles.



Series 851
Dual Orifice, Sewage
Triple Acting Air Valves

DN 80 PN 16



Series 861
Combination, Sewage
Air Valves

DN 50-200 PN 10/16

Special versions:
• Surge protection
• Anti-slam



Series L451
Combination, Plastic
Sewage Air Valves

DN 50-80 PN 10/16

WHY USE AIR VALVES IN WATER & WASTEWATER APPLICATIONS



Air is present in all water and wastewater pipelines, thus a safe and efficient operation requires continuous removal of air. Installing air valves secures smooth operation of the pipeline and reduces maintenance and replacement costs. When pockets of air form and get trapped, these pockets of air and wastewater gases are difficult to detect and will reduce the overall efficiency of the piping system.

Why air appears in pipelines?

Dissolved air exists in all fluid transmission systems. The principal sources are:

- Incomplete filling of the line which leaves air pockets at pipeline peaks.
- Dissolved air released from the fluid when pressure drops and/or tempreature rises.
- Air sucked into the system through opeinngs at e.g. joints, breaks/bursts and accessories.

The air pockets may also cause water hammer problems, full stoppage of flow, pipe bursts, system noise and pipe corrosion. Air in the pipeline can also cause unstable operation of control valves, meters and equipment. To secure a safe and efficient operation it is therefore critical to continually remove air and wastewater gases from the water system.

(1) Vacuum, (2) Air Entrainment and (3) Water Hammer are some of the most common causes of pipeline failure. These issues can be solved by a combination of different products where air valves play an important role.

Severe water pipe burst caused by damaged pipework



Collapsed pipe caused by vacuum



Pipe burst caused by water hammer

(1) Vacuum

Vacuum can occur in pipes due to pipe burst or pipe draining without allowing for sufficient air flow to enter in to the pipe. Vacuum in the system left unmanaged has been proven to cause:

- Damages, cracks and faulty connections of the pipe allow for suction of contaminants like mud and dirt.
- Fluctuation of pressures from positive to negative can result in fatigue loading which will weaken and eventually cause failure of the pipe wall.
- In extreme cases vacuum can even cause pipe collapse.

One solution to prevent contamination, weakening or even collapse is to remove the driving force being the vacuum. Air valves are the most efficient and cost-effective tool to achieve this and by installing and maintaining a system with air valves, negative pressure is managed, and the network remains protected.

Air valves are visually associated with the release of air from the system, and therefore commonly known as air release valves. However, this name is misleading as their equally important function are to introduce air into the pipeline.

(2) Air Entrainment

Air is present in all water and wastewater pipelines. The air may be absorbed at free surfaces, or entrained in turbulent flow at the entrance to the line, changes in direction or incline. The air may therefore be in the water or in the form of bubbles or pockets. Air is likely to accumulate on top of the pipe cross section where it will travel along the line to peaks where it will either remain in equilibrium, be entrained by the flowing water or be released through air valves.

Some of the issues and essentially dangers attributed to the presence of air within pressurised pipe systems can be categorised as follows:

- Reduction of effective bore of pipeline, causing in extreme cases complete blockages.
- Measurable energy losses.
- Water hammer or localised surges.
- Meters being affected and misreading flows in conjunction with premature failure due to internal damage to meters.
- Localised reduction in water supply or pressure.
- Extensive corrosion of pipeline resulting in premature failure.





DN 700 Cast iron pipe broken by water hammer



Severe pipe burst which can pose serious health and safety risks

(3) Water Hammer

A water hammer or pressure surge is typically created when a moving body of water hits an obstacle; for example, when flow of water meets a valve which is closed too quickly. The deceleration of forward velocity in the pipeline will send a shock wave back along the pipe with the potential to destroy both the pipe and equipment. The increased pressure wave will continue to travel along the pipeline until the energy has dissipated.

Some of the issues and essentially dangers caused by water hammer within pressurised pipe systems can be summarized as follows:

- Immediate mechanical failures, such as bursting pipes, cracked flanges & ruptured gaskets.
- The cylindrical stress induced by water hammer can lead to cracks in welds and threaded connections that may not be immediately visible, leading to long-term structural damages.
- Safety hazards due to the abrupt fluctuations in pressure can result in equipment failures, potentially putting individuals at risk.

I should also be mentioned that noise and vibrations signify stress on a pipeline system which can loosen pipe supports over time, thereby heightening the risk of leaks.

Apart from the resulting costs and downtime these aforementioned issues could cause, the health and safety risks are thus also considerable.

Air Valves also play an important role in reducing the risks of water hammer. By slowing down the venting of the pipeline the moving water will be slowed down as it reaches the air valve thus preventing a sudden closure of the air valve. In effect the air volume remaining acts as a cushion. In system locations where water column separation can occur the air valve will allow a considerable volume of air into the pipeline to avoid vacuum but restrict the exhalation of air into the atmosphere so that when water columns re-join it happens slowly.

Reducing water hammer

The risk of water hammer can be greatly reduced by operating the valves in a controlled, slow manner and managing the potential water hammer scenario. Using a selection of various automatic valve types, each of which provide protection to the system in different ways. In addition, thoughtful system design, which includes avoiding significant drops, sharp pipe bends and strategic placement of valves are essential for minimizing pressure surges and thus reducing the overall damaging effects of water hammer.



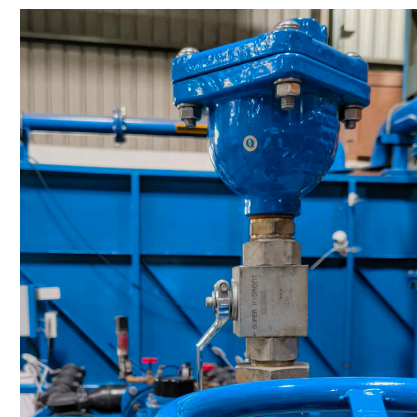
THE BENEFITS OF USING AIR VALVES CORRECTLY



Air valves are hydromechanical devices with an internal float mechanism designed to release trapped air and wastewater gases during filling and operation of a pipeline system and ensure air intake during draining to maintain a positive pressure. When air valves are correctly sized and placed onto a pipeline system, they offer countless of benefits that secure network safety and efficiency.

The benefits of using air valves correctly

- Reduced energy consumption and operational costs.
- Reduction of pressure losses.
- Reduced risk of water hammer.
- Reduced failure or inaccuracies in flow metering.
- Reduced corrosion.
- Reduced risk of contamination.
- Reduced risk of pipe burst and collapse.
- Reduced depreciation due to increased network.



Air Valve Main Types

Automatic Air Valves:

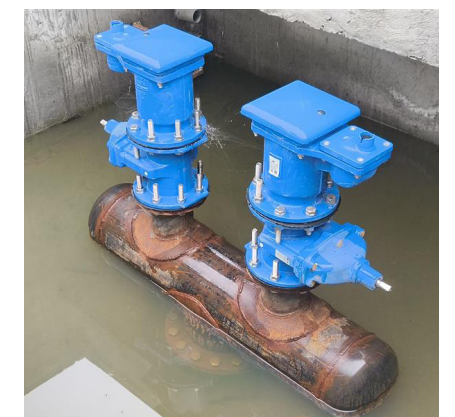
Continuously release relatively small volumes of air from a pressurized line. Automatic air valves are also known as small orifice air valves and pressure air valves. It is important to note that these valves do not offer large volume capacity and hence they are to be considered in connection with filling and emptying of the pipeline, neither as surge protection valves.

Kinetic Air Valves:

Discharge large volumes of air when filling a pipeline and make it possible to admit large volumes of air when lines are drained or when the pressure suddenly drops below atmospheric pressure. Kinetic Air Valves are also known large orifice air valves, vacuum breakers or single acting air valves. These valves will remain inactive when pipeline is pressurized.

Combination Air Valves:

Combine the function of automatic air valves and kinetic valves. The automatic air release function releases accumulated air from the system while it is under pressure, and the kinetic function discharges and admits large volumes of air during the filling or draining of pipelines. Combination air valves are also known as double orifice air valves, triple acting air valves and dual orifice air valves.



SERIES 831 SINGLE CHAMBER AIR VALVES

NEW



High performance, low maintenance and great durability, the new AVK' Series 831 triple acting single chamber air valves offers. The full unobstructed bore allows for a clear passage, enhancing discharge capacity. The float is robust, capable of withstanding sudden water hammer effects and quick closure. The tamper-proof design prevents unauthorized access. It is optimized for dynamic sealing, ensuring effective sealing even at low pressure.

Sturdy & Tamperproof:

AVK Series 831 air valves are standard equipped with a sturdy ductile iron cowl and a stainless-steel mesh protecting against unauthorized access and thus make the valve tamperproof.

Single Chamber Design:

The single chamber design offers in comparison to conventional double chamber air valves fewer internal parts and seals resulting in a longer life span and low maintenance. In addition, single chamber air valves are designed more compact.

The Range:

- DN 50 – PN 16
- DN 80 – PN 16
- DN 100 – PN 16
- DN 150 – PN 16
- DN 200 – PN 16

Enhanced Discharge Capacity:

The full unobstructed bore allows for a clear passage, enhancing discharge capacity.

Triple Acting Design:

1. Large air release during filling.
2. Continuously releases small volumes of air when the pipeline is under pressure.
3. Large air intake when the pipeline is being drained, preventing vacuum.

Versatility:

Series 831 is additionally available in 3 special versions, resulting in a complete and highly versatile range of air valves.

- **Outlet Only:**
Check valve, outflow only, intake blocked.
- **Rapid Filling Preventer:**
Surge protection / rapid filling preventer, free inflow, restricted outflow in steps.
- **Vented Non-Return (VNR):**
Free inflow, restricted outflow

Robust Float & Guide:

The robust float & guide design are capable of withstanding water hammer effects due to quick closure. Float and guide are available in two different material trims, either made from highly durable, WRAS approved ABS plastic or made from 1.4301/AISI304 stainless steel.

Design Standards:

- EN 1074-4, EN 12266, IS14845
- Flange drilling to EN1092, PN16

Test/Approvals:

- Hydraulic test according to EN 1074-1 / EN 12266
- Performance test according to EN 1074-4
- Performance test according to IS14845

SERIES 831 SPECIAL VERSIONS

Series 831 is additionally available in 3 special versions, resulting in a complete and highly versatile range of air valves. The Series 831 special models consist of an Outlet Only option, a Rapid Filling Preventer model, and a Vented Non-Return (VNR) variant.



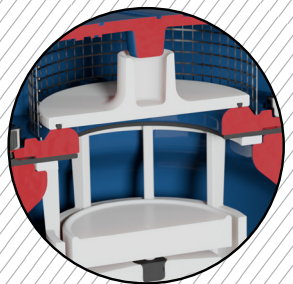
Outlet Only
Allows for the valve to work as a standard valve in the filling stage of the pipeline. Once the pipeline is completely vented and free of air, the large orifice closes, and the automatic air valve function (small orifice) takes over and vents during pressurized state of the pipeline. When pressure drops in the pipeline the non-return valve will prevent the valve from letting in air in the pipeline. This function may be desired in pipelines where pumps start and stop frequently, and where subsequent the water hammer risk is evident. It should be noted that an outlet only option does not prevent the risk of a pipe collapse in the event of pump failure and pipe rupture creating vacuum in the pipe.



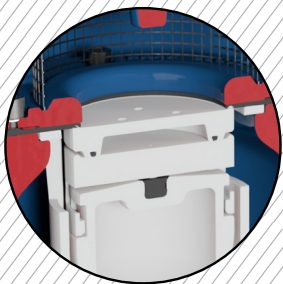
Rapid Filling Preventer
Allows for a 2-stage outlet functionality. The valve is fitted with a disk placed between the large float and the large orifice. The disk has several smaller holes that restricts the outlet capacity. This restriction of the outlet will prevent excessive velocity of the outlet air stream and thereby also prevent the valve slamming close with the risk of creating a pressure surge. The restriction on the outlet air flow is only engaged whenever the air velocity exceeds a pre-defined threshold, during low air flow the valve acts as a standard valve with no restrictions. The inlet flow of air thru the valve in are not restricted, meaning that the valve prevents the forming of vacuum in the pipes during emptying or in the event of a pipe rupture.



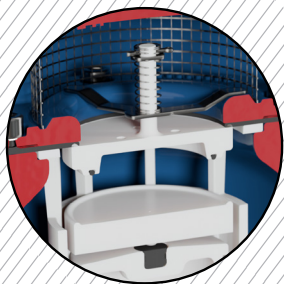
Vented Non-Return (VNR)
Works in a similar way as the rapid filling prevention valve, however with the one difference that the VNR valve has a spring-loaded restriction disk mounted. This means that the valve will have a restricted outflow regardless the velocity of the airflow. The restriction on the outlet air flow is engaged at all times but the inlet flow of air through the valve in are not restricted, meaning that the valve prevents the forming of vacuum in the pipes during emptying or in the event of a pipe rupture. The VNR models should be the preferred choice instead of the rapid filling prevention feature for applications where extraordinary protection of the pipeline against pressure surges are needed.



Check valve disc



Anti-surge disc

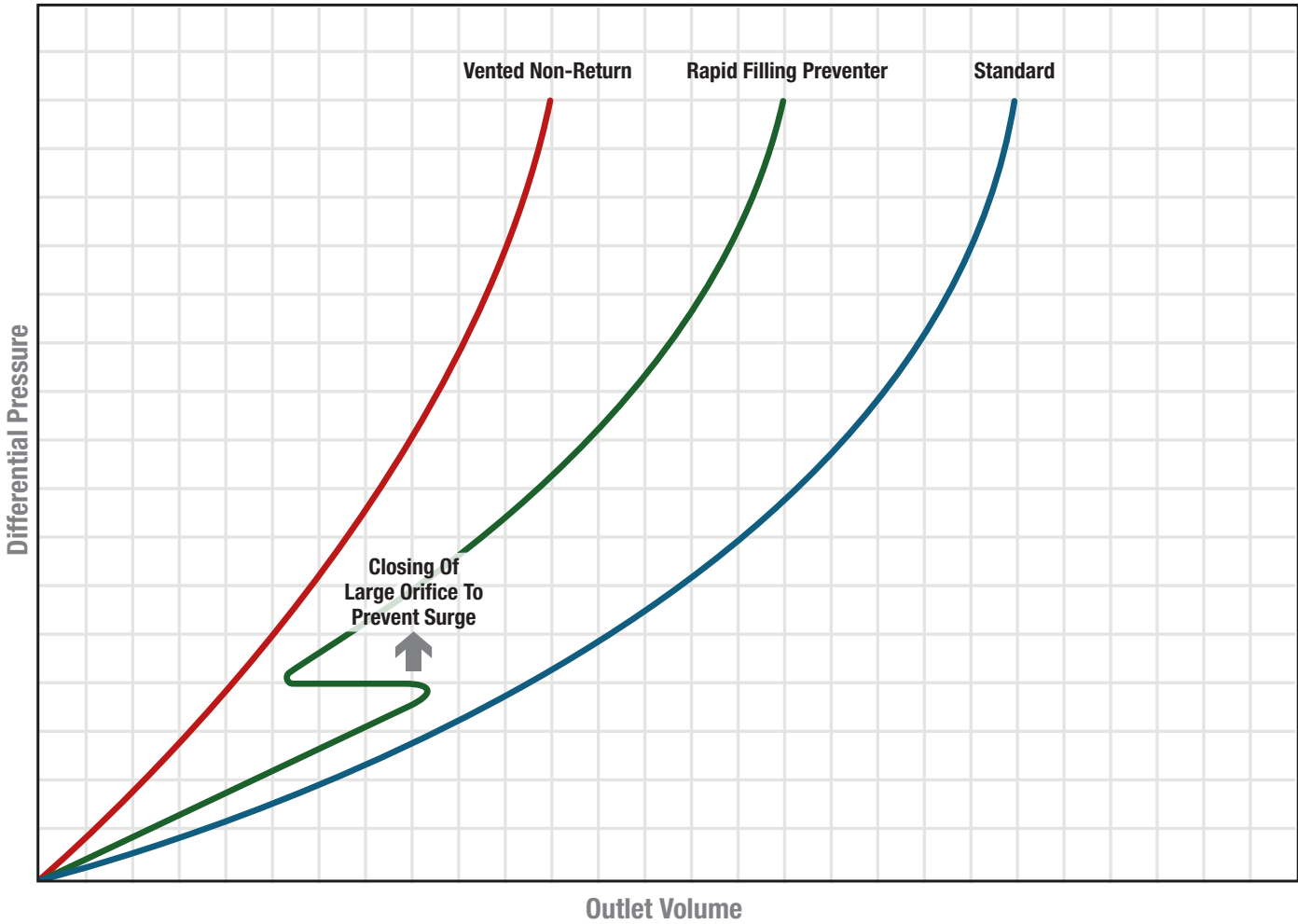


Spring-loaded VNR disc

SERIES 831 AIR FLOW PERFORMANCE

The air flow performance chart illustrates for Series 831 the functional differences in handling outlet flow and pressure. Compared are the differences between the Series 831 standard model versus the Rapid Filling Preventer and Vented Non-Return variants.

Series 831 Air Flow Performance Chart



- Important notes & explanations***
- The above chart is for illustration purpose only.
 - The standard Series 831 Combination Air Valve models offer predictable performance
 - The Vented Non-Return option ensures backflow protection but at a higher resistance.
 - The Rapid Filling Preventer has a controlled orifice closing mechanism that mitigates pressure surges, making it critical for pressure surge sensitive applications.

SERIES 851

DOUBLE ORIFICE TRIPLE ACTING AIR VALVES



AVK series 851 double orifice, triple action air valves are designed to allow air to rapidly either escape or enter the pipe system when filling or draining, as well as for automatic discharge of accumulated air during normal working conditions. The unique ‘Aerokinetic’ design allows air to escape during filling even at high velocities without lifting the float upwards causing the valve to close prematurely. This design ensures that the valve only closes after all air has left the system and water has entered the chamber.

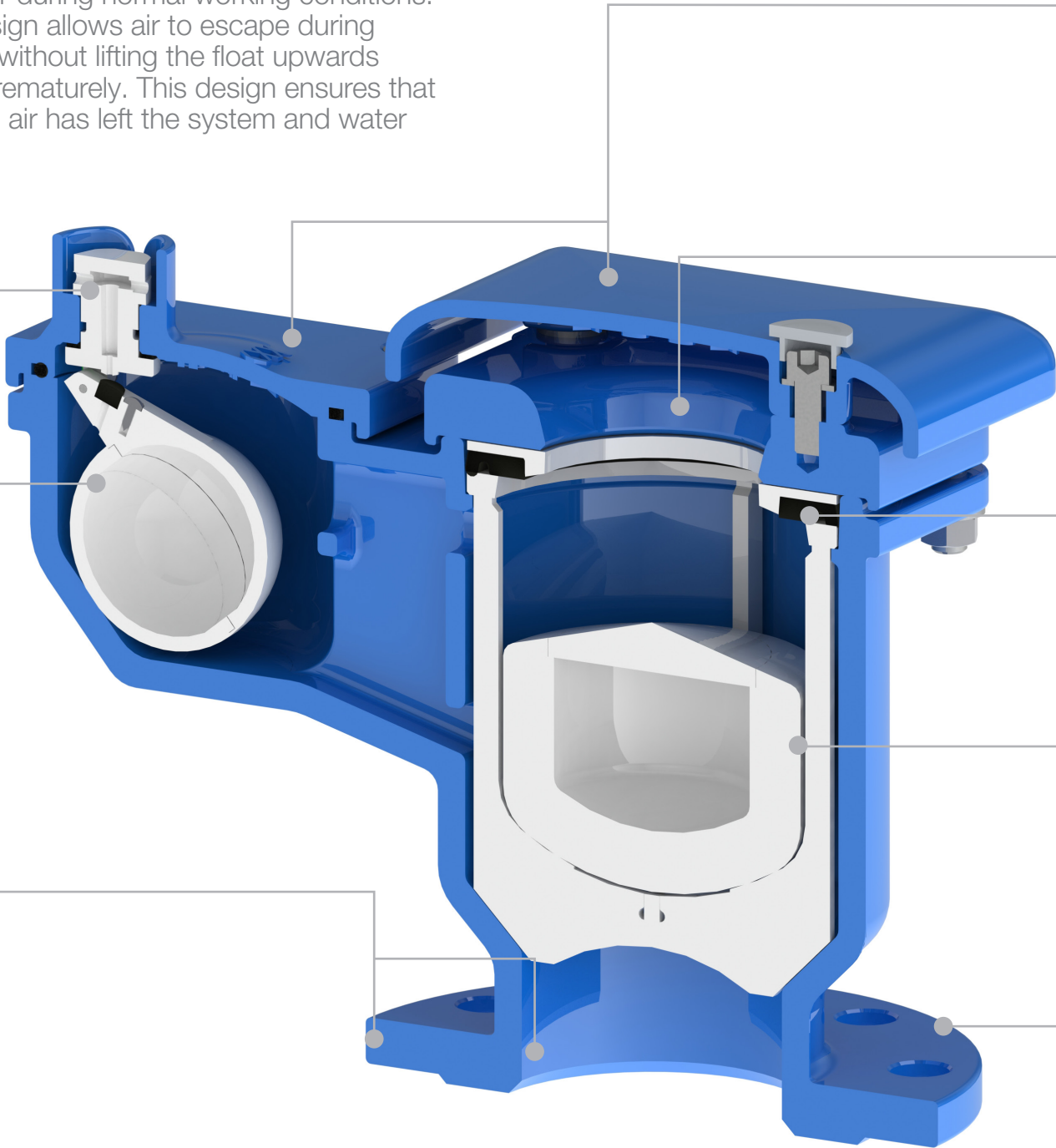
Small Orifice:
Allows air released in the pipeline during normal operation to escape as it gradually accumulates in the air chamber of the valve.

Float, Small Orifice:
Available in Stainless Steel 1.4401 (316), or alternatively WRAS approved ABS plastic.

The Range:

D (mm)	DN Flange	Flange Drilling
50	DN 40	PN10/16
50	DN 50	PN10/16
80	DN 80	PN10/16
100	DN 100	PN10/16
150	DN 150	PN10/16
150	DN 200	PN10
150	DN 200	PN16

D (mm)	DN Flange	Flange Drilling
50	DN 50	PN25
80	DN 80	PN25
100	DN 100	PN25
150	DN 150	PN25
150	DN 200	PN25



Bonnet & Cowl:
A sturdy ductile iron (EN-GJS-500-7) bonnet and cowl protect the valve from unauthorized access, ensuring the valve is tamperproof.

Large Orifice:
Allows air to be released rapidly and in large quantities from a pipeline during pipe filling.
Allows air to be drawn into the pipeline in equally large quantities during draining with the inflow rate being sufficiently high to prevent vacuum.

Seals & Coating:
All seals are made from drinking water approved EPDM according to WRAS. All ductile iron components are protected with drinking water approved fusion bonded epoxy coating according to GSK regulations.

Float, Large Orifice:
Available in Stainless Steel 1.4401 (316), or alternatively WRAS approved ABS plastic.

Design Standards:

- EN 1074-4
- IS 14845-2000
- Flange drilling to EN1092, PN10/16 & 25

Test/Approvals:

- Hydraulic test according to EN 1074-1 / EN 12266
- Materials approved according to WRAS

SERIES 851

PRODUCT RANGE

Series 851 consists of a highly versatile range of air valves designed to effectively secure water and irrigation networks. Whilst the core range of series 851 is focused on double orifice combination air valves, the range also includes single orifice automatic and kinetic air valve options. All models utilize high quality WRAS approved components, ensuring drinking water compatibility and a long-lasting operational life.



Series 851/00
Single Small Orifice Air Valve

This valve is designed to open and allow the escape of air which has accumulated in the system during pressurised working conditions.

- 1" female BSP thread for connection to pipe system



Series 851/4x
Double Orifice, Triple Acting Air Valve

Incorporates both the single small and large orifice functions in a single unit. The large orifice ventilates the pipeline during filling and emptying. The small orifice releases air under pressurised conditions.

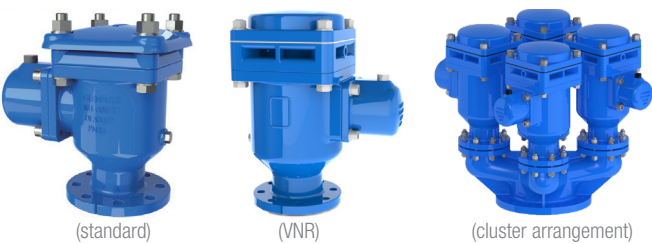
- DN 40 – DN 200 PN 16
- Also available as a Vented Non-Return (VNR) version
- Single cast body



Series 851/20
Single Large Orifice Air Valve

This valve is designed to permit large volumes of air to exhaust during initial filling of a line and also to allow air to enter the pipeline in sufficient quantities during emptying.

- 1" female BSP thread for connection to pipe



Series 851/1x
Double Orifice, Triple Acting Air Valve

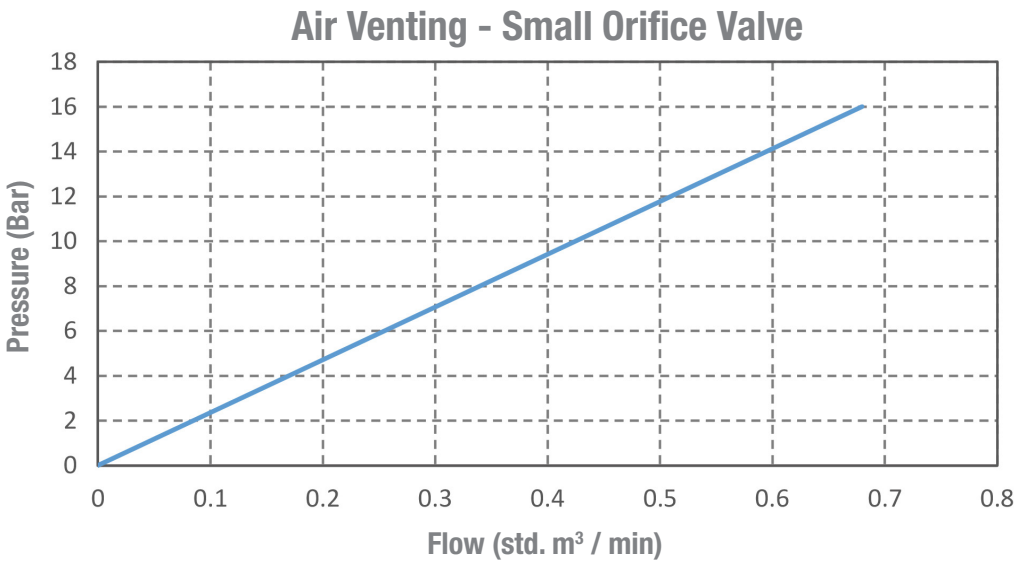
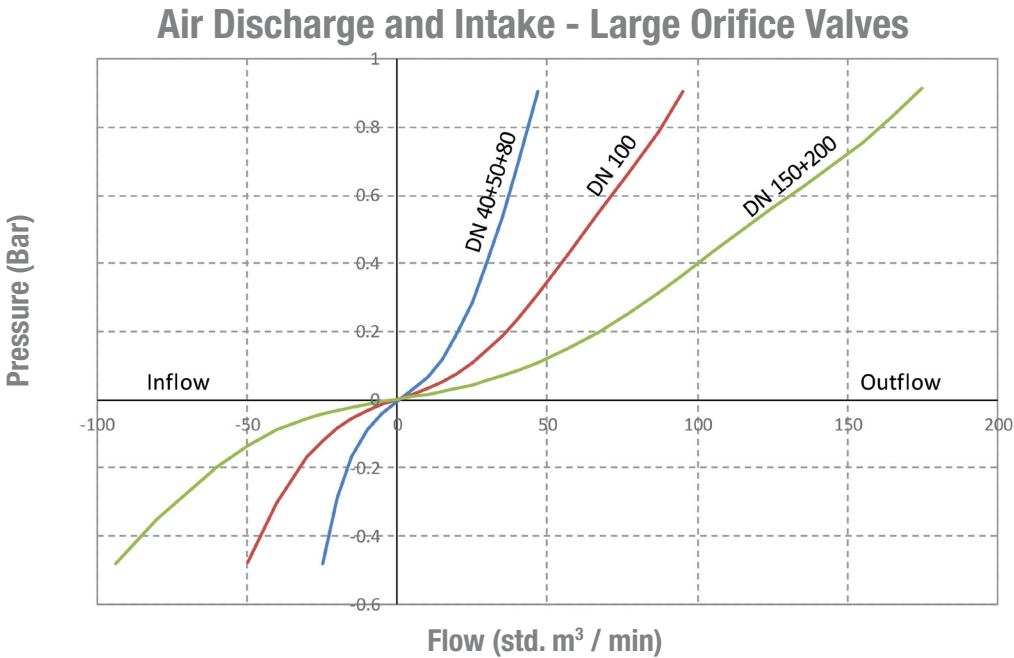
Incorporates both the single small and large orifice functions in a single unit. The large orifice ventilates the pipeline during filling and emptying. The small orifice releases air under pressurised conditions.

- DN 50 – DN 150 PN 25
- Also available as a Vented Non-Return (VNR) version
- Also available in various cluster arrangements

SERIES 851

AIR FLOW PERFORMANCE

Large orifice valves handle bulk air movement (in or out) during filling and emptying of pipelines. The larger the valve diameter, the more efficient the valve is in managing high volumes of air with minimal pressure variation. Small orifice valves are designed for continuous air release under pressure. Choosing the right size ensures protection against pressure surges and prevents vacuum conditions.



AIRSIZE® AVK AIR VALVE SIZING TOOL

Air Valves fulfill a crucial role in protecting and maintaining optimal performance of pipelines transporting pressurized fluids. Each main air valve type (automatic, kinetic or combination air valves) come with its own set of functionalities and advantages, thus it is essential to consider the unique features associated with each type when sizing them. Selecting an incorrect model or size can completely deprive the purpose of the air valve and overall safety and performance of the pipeline.



AIRSIZE Air Valve sizing tool

Air valves should always be sized considering:

- The volume of the fluids transported in the pipeline.
- The pipelines' geographical high and low points.
- Securing that the pipeline can be vented during pressurized stage.
- Securing that the pipeline can be vented in the event of both intentional and non-intentional filling and emptying.

In conclusion, focusing on solely the size of the pipeline would be insufficient. To answer to this need AVK has developed AIRSIZE®, a specialized air valve sizing software designed to aid engineers in the water, wastewater, and industrial sectors with selecting, sizing, and optimizing air valves for pipeline systems.

Benefits of using AVK's Airsize Air Valve Sizing Software

1. Optimized design:

After pre-selecting the air valve type, the software confirms that the correct air valve size is selected and recommends installation positions to optimize the performance and efficiency of the pipeline system.

2. Safety:

Proper valve sizing prevents issues such as vacuum formation, pipeline damage, and inefficient operation.

3. Time and cost saving:

By automating the sizing process, the software reduces the time spent on calculations and minimizes the risk of errors, thus saving both time and resources during the design phase.

4. Improved reliability and performance:

Correct valve sizing helps to maintain the integrity of the pipeline system, avoiding costly repairs, downtime, or equipment failure due to improper air valve selection.

5. Customization and flexibility:

The software accommodates a variety of pipeline materials and allows for setting of customized safety settings thus complying to individual customer preferences.

6. Documentation:

The software ensures that all design decisions are well-documented, providing a report than can be used as project documentation.

AIRSIZE® Key Features

1. AVK Support:

Aided by the Airsize sizing software, AVK provides sizing calculation services to customers for their project needs. Additionally, if customers wish to use the software independently, AVK offers access along with training to ensure a correct use of the Airsize software.

2. Automatic sizing calculations:

Airsize automatically calculates the required air valve sizes based on input parameters such as pipeline diameter, flow rate, operating pressure, pipeline length, and elevation changes. These calculations are performed using recognized hydraulic formulas, ensuring accuracy and reliability.

3. Valve type selection:

AVK offers different types of air valves, such as:

- Automatic Air Valves
- Combination Valves
- Anti-Surge Air Valves
- Vented Non-Return Air Valves
- Anti-Slam Air Valves
- Outlet only Air Valves

Airsize helps users select the correct valve type based on the system's needs, whether it's preventing vacuum conditions or ensuring the efficient release of air

4. Flow conditions and pressure profile analysis:

Airsize allows users to perform detailed flow and pressure profile analyses, considering different conditions like transient pressure surges, to evaluate when and how air valves will operate in response to pressure changes in the pipeline.

5. Detailed reports and documentation:

Airsize generates detailed reports documenting the valve sizing calculations, assumptions made, and selected valve specifications. This is helpful for design validation, regulatory approvals, and project documentation.

6. Support for multiple valve sizes:

Airsize can handle a range of valve sizes, allowing users to select the best size for their specific pipeline system needs. This flexibility is crucial when designing systems of varying scales—from small municipal systems to large industrial installations.

7. Customized design:

Airsize enables customization of the design based on specific project requirements. Users can adjust parameters such as flow rates, pressure conditions, and the presence of critical points (e.g., high points or low points in the pipeline) to ensure the air valve is correctly sized for optimal performance



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