

D-023 250 psi

Combination Air Valve for Wastewater **PATENTED**



Description

The D-023 Combination Air Valve combines an air & vacuum component and an air release component in a single body. The valve is specifically designed to operate with liquids carrying solid particles such as wastewater and effluents. The combination air valve discharges air (gas) during the filling or charging of the system, admits air into the system during drainage and at water column separation and releases accumulated air (gas) from the system while it is operating under pressure. The valve's unique design enables the separation of the liquid from the sealing mechanism and assures optimum working conditions.

Applications

- Pump stations for sewage, waste water & water treatment plants.
- Wastewater and effluent water transmission lines.

Operation

The air & vacuum component discharges air at high flow rates during the filling of the system and admits air into the system at high flow rates during drainage and at water column separation.

High velocity air will not blow the float shut. Water will lift the float which activates the sealing of the valve.

At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will enter the system.

The smooth discharge of air reduces pressure surges and other destructive phenomena.

The intake of air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

The air release component releases entrapped air in pressurized systems.

Without air valves, pockets of accumulated air may cause the following hydraulic disturbances:

- Restriction of effective flow due to a reduction of the flow area. In extreme cases this will cause complete flow stoppage.
- Obstruction of efficient hydraulic transmission due to air flow disturbances.
- Acceleration of cavitation damages.
- Increase in pressure transients and surges.
- Internal corrosion of pipes, fittings and accessories.
- Dangerous high-energy bursts of compressed air.
- Inaccuracies in flow metering.

As the system fills and is pressurized, the combination wastewater air valve functions in the following stages:

1. Air (gas) is discharged by the valve.
2. When the liquid level reaches the valve's lower portion, the float is lifted, pushing the sealing mechanism to its sealing position.
3. The entrapped air is confined in a pocket between the liquid and the sealing mechanism. The air pressure is equal to the system pressure.
4. Increases in system pressure compress the trapped air in the upper section of the conical chamber. The conical shape assures the height of the air gap. This enables separation of the liquid from the sealing mechanism.
5. Entrapped air (gas), accumulating at peaks and along the system, rises to the top of the valve and displaces the liquid in the valve's body.
6. When the liquid level lowers to a point where the float is no longer buoyant, the float drops, unsealing the air release seal. The air release orifice opens and allows part of the air that accumulated in the upper portion of the valve to be released to the atmosphere.
7. Liquid enters the valve. The float rises, pushing the air release seal to its sealing position. The remaining air gap prevents the wastewater from fouling the mechanism.

When internal pressure falls below atmospheric pressure (negative pressure):

1. The float will drop down, immediately opening the air & vacuum and air release orifices.
2. Air will enter into the system.

Main Features

- Working pressure range: 3 - 250 psi.
- Testing pressure: 360 psi.
- Maximum working temperature: 140° F.
- Maximum intermittent temperature: 194° F.
- The unique design of the valve prevents contact between the wastewater and the sealing mechanism by creating an air gap at the top of the valve. These features are achieved by:
 1. **The conical body shape and the external lever:** designed to maintain the maximum distance between the liquid and the sealing mechanism and still obtain minimum body length.
 2. **Spring-guided linkage between the float/rod assembly and the sealing mechanism:** allows free movement of the float and rod. Vibrations and movement of the float due to turbulence will not unseal the sealing mechanism.
 3. **Funnel-shaped lower body:** designed to ensure that residue wastewater matter will fall back into the system and be carried away by the main pipe.

- All inner metal parts made of stainless steel.
- Unique design of external lever prevents contact between the wastewater and the sealing mechanism, prevents clogging by floating solids and ensures drip-tight sealing.
- The D-023's orifice plug-disc linkage assembly is external, keeping the levers and pins outside the air valve body and its corrosive atmosphere.
- Discharge outlet enables for the connection of a vent pipe.
- The ball valve can be opened to release trapped pressure and drain the valve body prior to maintenance and for back-flushing during maintenance.

Valve Selection

- Size range availability: 3" - 8".
- Valves manufactured with flange ends to meet any requested standard.
- The 3" valve is also available with a threaded NPT connection.
- Standard stainless steel body, also available in welded/cast steel.
- Standard stainless steel two- directional venting outlet cover for D-023 stainless steel body.
- Standard ductile iron one -directional venting outlet cover for D-023 welded/cast steel body.
- Valve body made of ductile iron, fusion bonded epoxy coated in accordance with standard DIN 30677-2
- Additional coatings available upon request.
- **D-023 SB** Underground Air Valve System.
- Optional Accessories:
 - With a One-way, Out-only attachment, allows for air discharge only, prevents air intake.
 - With a Vacuum Breaker, In-only attachment, allows for air intake only, prevents air discharge.
 - With a Non-Slam discharge-throttling attachment, allows for free air intake, throttles air discharge - Model **D-023 NS**.
 - With a **Spray Guard®**

The Spray Guard® minimizes liquid spray discharge from the air valve outlet, mainly during rapid pipeline filling conditions.

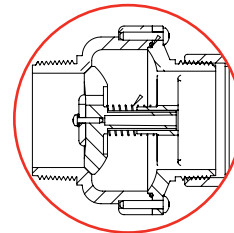
Operation: Fluid reaches the air valve at high speeds while the valve body is still empty. The Spray Guard® breaks the front of the fluid wave progressing along the walls of the air valve body and directs it downwards, thus preventing the fluid from reaching the orifice and discharge outlet.

Note

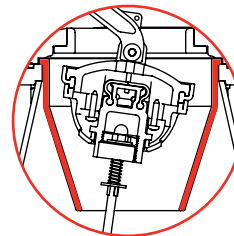
- The D-023 air valve is intended for use with raw wastewater. For use with aggressive liquids, please consult with our application engineers or with the marketing dept.
- For best suitability, it is recommended to send the fluid chemical properties along with the valve request.
- Upon ordering, please specify: model, size, working pressure, thread and flange standard and type of liquid.



D-023 SB

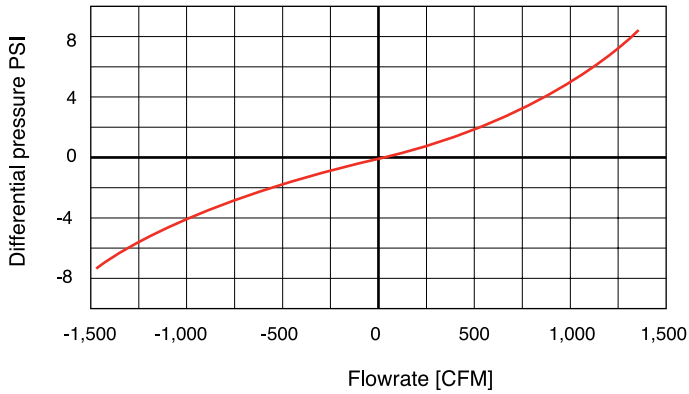


NS element

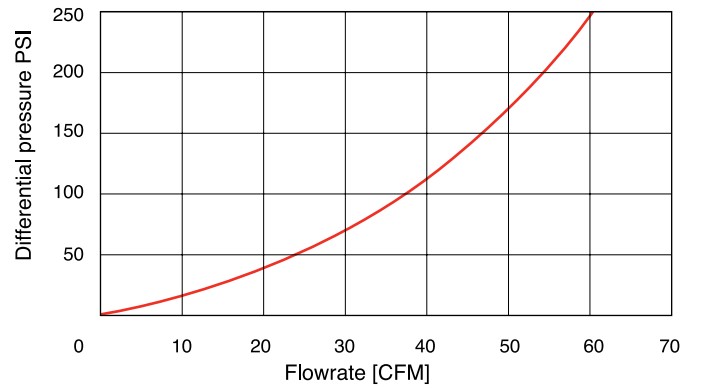


Spray Guard® element

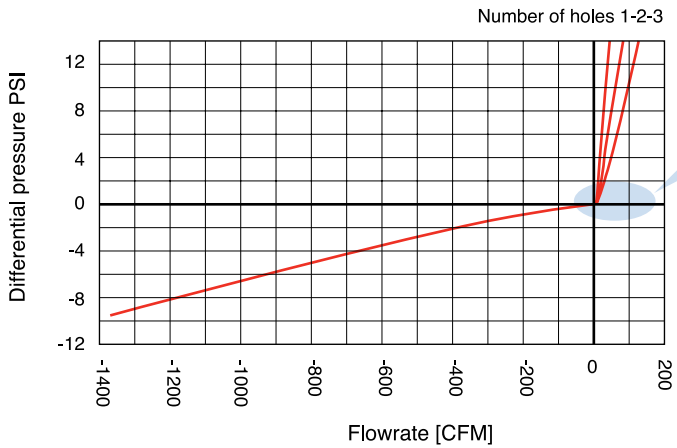
AIR & VACUUM FLOWRATE



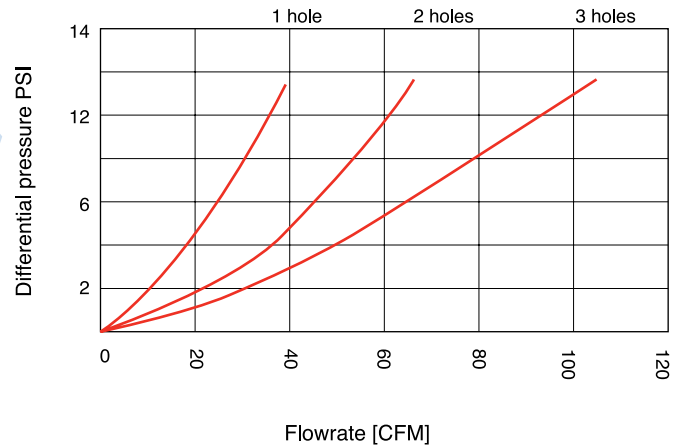
AIR RELEASE FLOWRATE



D-023 NS AIR AND VACUUM FLOW RATE WITH ADJUSTABLE NS C.V.

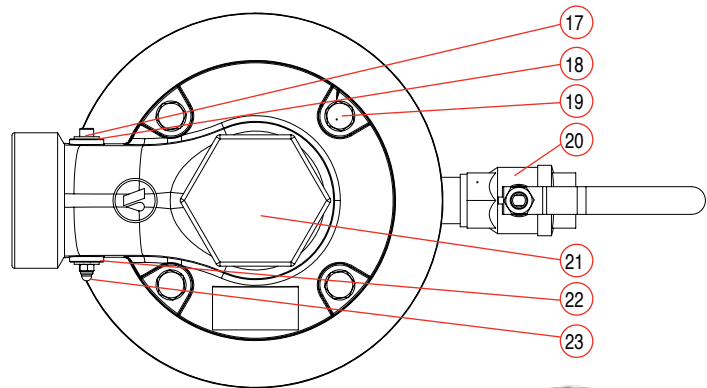
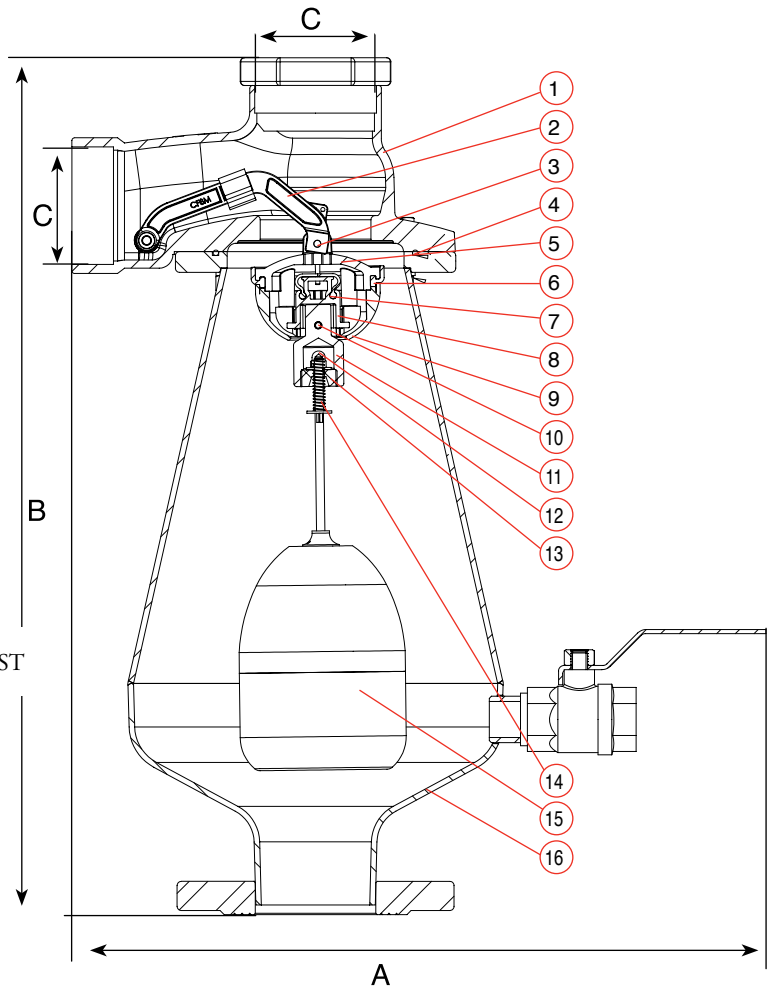


D-023 NS DISCHARGE SWITCHING REGION



PARTS LIST AND SPECIFICATION

No. Part	Material
1. Cover	ST ST ASTM A744 CF8M
2. Disk Arm Assy.	ST ST SAE 316 + E.P.D.M.
3. Rivet	ST ST SAE 316
4. O-Ring	BUNA-N
5. Air & Vacuum Disc	ST ST ASTM A744 CF8M / Reinforced Nylon
6. Air & Vacuum Disc Seal	E.P.D.M.
7. Air Release Disc Seal	E.P.D.M.
8. Air Release Disc	Reinforced Nylon
9. Air Release Disc Cover	Reinforced Nylon
10. Pin	ST ST SAE 316
11. Rod Adaptor	Polypropylene
12. Domed Nut	ST ST SAE 316
13. Stopper	Polypropylene
14. Spring	ST ST SAE 316
15. Float Assy.	Polypropylene + ST ST 316 / ST ST
16. Body 3"	ST ST SAE 316 / ST ST ASTM A744 CF8M
4" - 8"	ST ST SAE 316
17. Bolt	ST ST SAE 316
18. Washer	ST ST SAE 316
19. Bolt, Nut & Washer	ST ST SAE 316
20. Ball Valve 1"	ST ST SAE 316
21. Plug	Polypropylene / PVC
22. Bushing	Acetal
23. Domed Nut	ST ST SAE 316



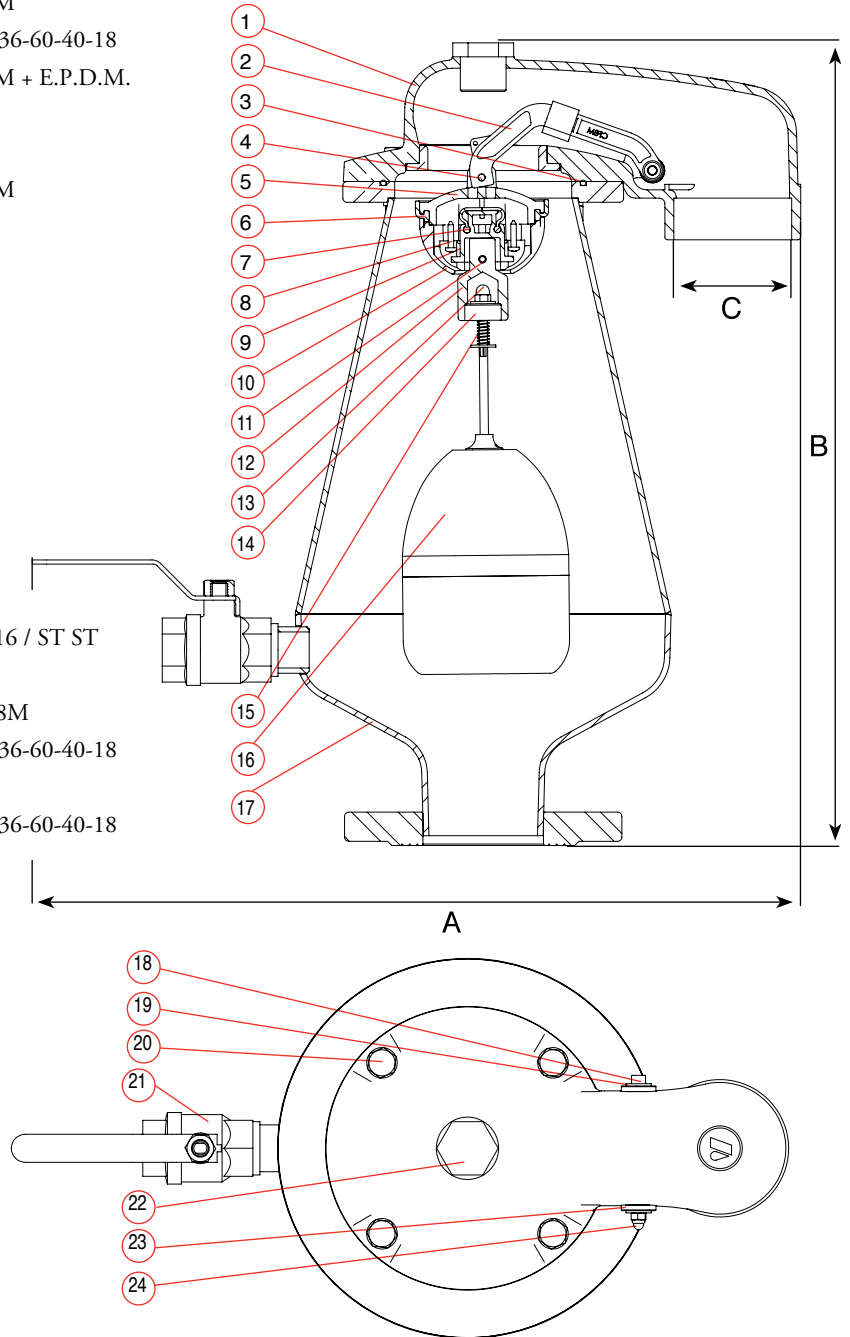
DIMENSIONS AND WEIGHTS

Inlet Size	Dimensions Inch		Connection C	Weight Lbs.	Orifice Area Sq.In.	
	A	B			Air Rel.	A / V
3" Threaded	19.7	24.4	3" NPSM Female	55.1	0.024	7.787
3" Flanged	19.7	24.4	3" NPSM Female	56.1	0.024	7.787
4" Flanged	19.7	24.4	3" NPSM Female	57.3	0.024	7.787
6" Flanged	19.7	24.4	3" NPSM Female	60.6	0.024	7.787
8" Flanged	19.7	24.4	3" NPSM Female	67.2	0.024	7.787



PARTS LIST AND SPECIFICATION

No. Part	Material
1. Cover	ST ST ASTM A744 CF8M / Ductile Iron ASTM A-536-60-40-18
2. Disk Arm Assy.	ST ST ASTM A744 CF8M + E.P.D.M.
3. O-Ring	BUNA-N
4. Rivet	ST ST SAE 304
5. Air & Vacuum Disc	ST ST ASTM A744 CF8M / Reinforced Nylon
6. Air & Vacuum Disc Seal	E.P.D.M.
7. Air Release Disc Seal	E.P.D.M.
8. Bolt (Screw)	ST ST SAE 304
9. Air Release Disc	Reinforced Nylon
10. Air Release Disc Cover	Reinforced Nylon
11. Pin	ST ST SAE 316
12. Rod Adaptor	Polypropylene
13. Domed Nut	ST ST SAE 316
14. Stopper	Polypropylene
15. Spring	ST ST SAE 316
16. Float Assy.	Polypropylene + ST ST 316 / ST ST
17. Body 3"	ST ST SAE 316 / ST ST ASTM A744 CF8M / Ductile Iron ASTM A-536-60-40-18
4" - 8"	ST ST SAE 316 / Ductile Iron ASTM A-536-60-40-18
18. Bolt	ST ST SAE 316
19. Washer	ST ST SAE 316
20. Bolt, Nut & Washer	ST ST SAE 316
21. Ball Valve 1"	ST ST SAE 316
22. Plug	Polypropylene
23. Bushing	Acetal
24. Domed Nut	ST ST SAE 316



DIMENSIONS AND WEIGHTS

Inlet Size	Dimensions Inch		Connection C	Weight Lbs.	Orifice Area Sq.In.	
	A	B			Air Rel.	A / V
3" Threaded	21.8	22.8	3" NPSM Female	47.5	0.024	7.787
3" Flanged	21.8	22.8	3" NPSM Female	48.5	0.024	7.787
4" Flanged	21.8	22.8	3" NPSM Female	50.7	0.024	7.787
6" Flanged	21.8	22.8	3" NPSM Female	54.0	0.024	7.787
8" Flanged	21.8	22.8	3" NPSM Female	60.6	0.024	7.787



Combination Air Valve for Wastewater- Non-Slam

The D-023 Combination Wastewater Non Slam accessory will dampen surge and prevent slam. The non slam accessory provides efficient surge suppression. At sudden drainage and/or water column separation (sudden pump trips or valve closure, for instance), the air & vacuum orifice admits air at high flow rates, thus preventing vacuum. As the water column and/or pressure wave returns, the large volumes of air are exhausted slowly through the smaller orifice of the non-slam accessory. This slowly exhausting air pocket dampens the slam of the returning water column, thus suppressing the pressure surge. As the water flow arrives at a much slower rate, dampened by the slower air discharge, it buoys up the main float, gently closing the air & vacuum component of the air valve.



D-023 NS Non-Slam Add-on Component Data Table for Variable Orifices

Model	Discharge Orifice Inch	Total NS area Sq.In.	NS orifice Inch	Switching point	Flow at 5.8 psi
1 orifice	2.95	0.078	0.314	Spring loaded Normally closed	23.5 CFM
2 orifices	2.95	0.15	0.445		44.1 CFM
3 orifices	2.95	0.23	0.547		61.8 CFM

DIMENSIONS AND WEIGHTS

Inlet Size	Dimensions Inch		Connection C	Weight Lbs.	Orifice Area Sq.In.	
	A	B			Air Rel.	A / V
3" Threaded	24.2	24.7	3" NPSM Female	56.2	0.024	7.78
3" Flanged	24.2	24.7	3" NPSM Female	57.2	0.024	7.78
4" Flanged	24.2	24.7	3" NPSM Female	58.4	0.024	7.78
6" Flanged	24.2	24.7	3" NPSM Female	61.7	0.024	7.78
8" Flanged	24.2	24.7	3" NPSM Female	68.3	0.024	7.78

