

# D-023 PN 16



## Combination Air Valve for Wastewater **PATENTED**

### Description

The D-023 Combination Air Valve combines an air & vacuum orifice and an air release orifice in a single body. The valve is specially designed to operate with liquids carrying solid particles such as wastewater and effluents. The combination air valve discharges air (gases) during the filling or charging of the system, admits air into the system while it is being emptied of liquid and releases accumulated air (gases) from the system while it is under pressure and operating. 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, effluent water and sea water supply 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 its drainage and at water column separation. High velocity air will not blow the float shut. Water will lift the float which seals 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 automatic air release component releases entrapped air in pressurized systems.

### **Without air valves, pockets of accumulated and entrained air may cause the following hydraulic disturbances:**

- Restriction of effective flow due to a throttling effect as would a partially closed valve. In extreme cases this will cause complete flow stoppage.
- Obstruction of efficient hydraulic transmission due to air flow disturbances.
- Accelerate cavitation damages.
- Pressure transients and surges.
- Corrosion in pipes, fittings and accessories.
- Danger of high-energy bursts of compressed air.
- Inaccuracies in flow metering.

### **As the system starts to fill, the combination wastewater valve functions according to the following stages:**

1. Entrapped air/gas is discharged by the valve
2. When the liquid level reaches the valve's lower portion, the lower 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 is lowered to a point where the float is no longer buoyant, the float drops, unsealing the rolling 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 rolling 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 floats will immediately drop down, opening the air & vacuum and air release orifices.
2. Air will enter the system.

### Main Features

- Working pressure range: 0.2 - 16 bar.
- Testing pressure: 25 bar.
- Maximum working temperature: 60° C.
- Maximum intermittent temperature: 90° C.
- 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:
  - **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.
  - **Spring loaded joint between the stem and the upper float:** vibrations of the lower float will not unseal the automatic valve. Release of air will occur only after enough air accumulates.
  - **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.
- 1" ball valve releases trapped pressure and drains the valve body prior to maintenance.
- Discharge outlet enables removal of excess fluids

## Valve Selection

- Size range availability: 3" - 8".
- Valves manufactured with flange ends to meet any requested standard.
- Standard metal body, also available with a ST ST body.
- Valve body coating: fusion bonded epoxy coating according to the standard DIN 30677-2.

- Additional coatings available upon request.

- Optional Accessories:

**D-023 V** - With a One-way, Out-only attachment, allows for air discharge only, prevents air intake.

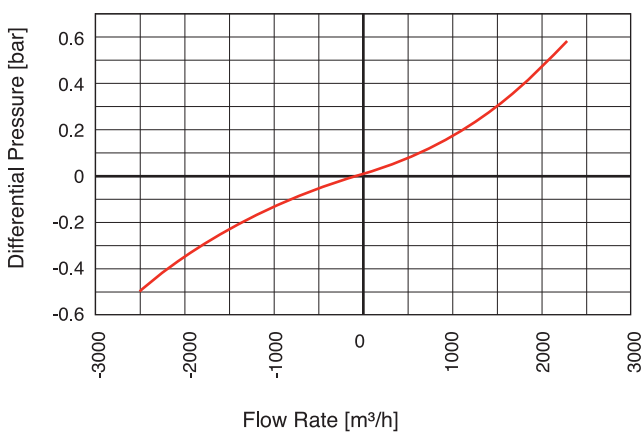
**D-023 I** - With a Vacuum Breaker, In-only attachment, allows for air intake only, prevents air discharge.

**D-023 NS** - With a Non-Slam discharge-throttling attachment, allows for free air intake, throttles air discharge.

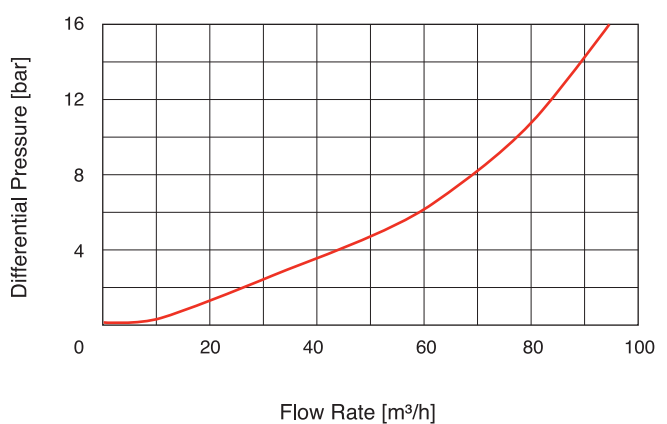
## Note

- 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, threads standard and type of liquid.

## AIR & VACUUM FLOW RATE



## AUTOMATIC AIR RELEASE FLOW RATE

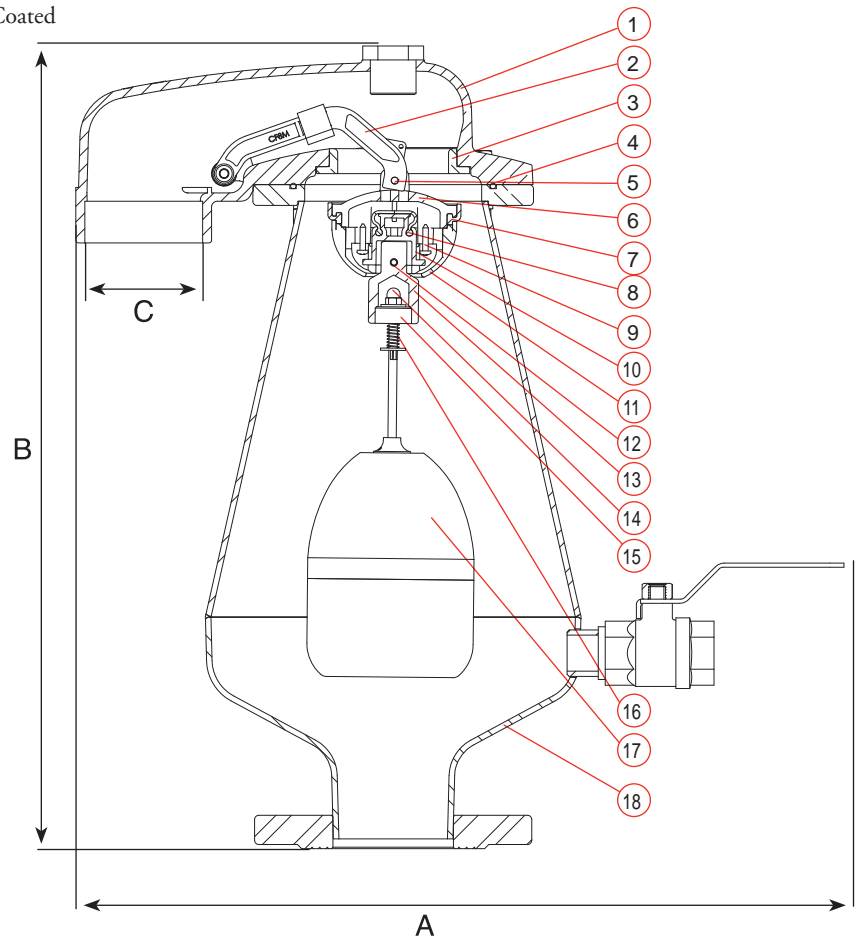
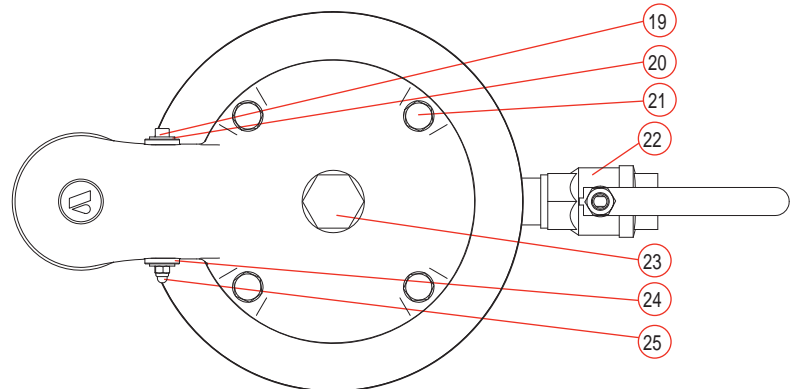


## DIMENSIONS AND WEIGHTS

Nominal Size	Dimensions mm		Connection C	Weight Kg.	Orifice Area mm <sup>2</sup>	
	A	B			Auto.	A / V
3" (80 mm)	554	580	3" BSP / NPSM Female	22	15.7	5024
4" (100 mm)	554	580	3" BSP / NPSM Female	23	15.7	5024
6" (150 mm)	554	580	3" BSP / NPSM Female	24.5	15.7	5024
8" (200 mm)	554	580	3" BSP / NPSM Female	27.5	15.7	5024

## PARTS LIST AND SPECIFICATION

No.	Part	Material
1.	Cover	Ductile Iron ASTM A-536-60-40-18 / ST ST ASTM A744 CF8M
2.	Disk Arm Assy.	ST ST ASTM A744 CF8M + E.P.D.M.
3.	Orifice (Ductile cover only)	Bronze B 62
4.	O-Ring	BUNA-N
5.	Rivet	ST ST SAE 304
6.	Air & Vacuum Disc	Reinforced Nylon / ST ST ASTM A744 CF8M
7.	Air & Vacuum Disc Seal	E.P.D.M.
8.	Air Release Disc Seal	E.P.D.M.
9.	Bolt (Screw)	ST ST SAE 304
10.	Air Release Disc	Reinforced Nylon
11.	Air Release Disc Cover	Reinforced Nylon
12.	Pin	ST ST SAE 304
13.	Rod Adaptor	Polypropylene
14.	Domed Nut	ST ST SAE 304
15.	Stopper	Polypropylene
16.	Spring	ST ST SAE 316
17.	Float Assy.	Polycarbonate + ST ST 316 / ST ST
18.	Body 3"	Steel Din St.37 / ST ST SAE 316
	4" - 8"	Steel Din St.37 / ST ST SAE 316
19.	Bolt	ST ST SAE 304
20.	Washer	ST ST SAE 304
21.	Bolt, Nut & Washer	ST ST SAE 316
22.	Ball Valve 1"	ST ST SAE 316
		/ Brass, Chrome Coated
23.	Plug	Polypropylene
24.	Bushing	Acetal
25.	Domed Nut	ST ST SAE 316



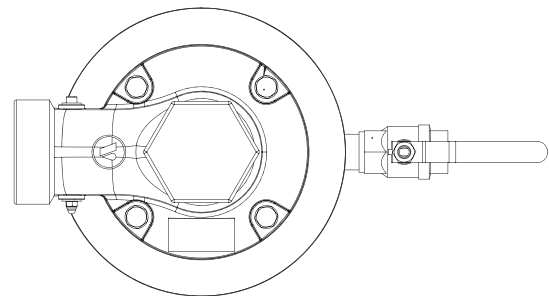
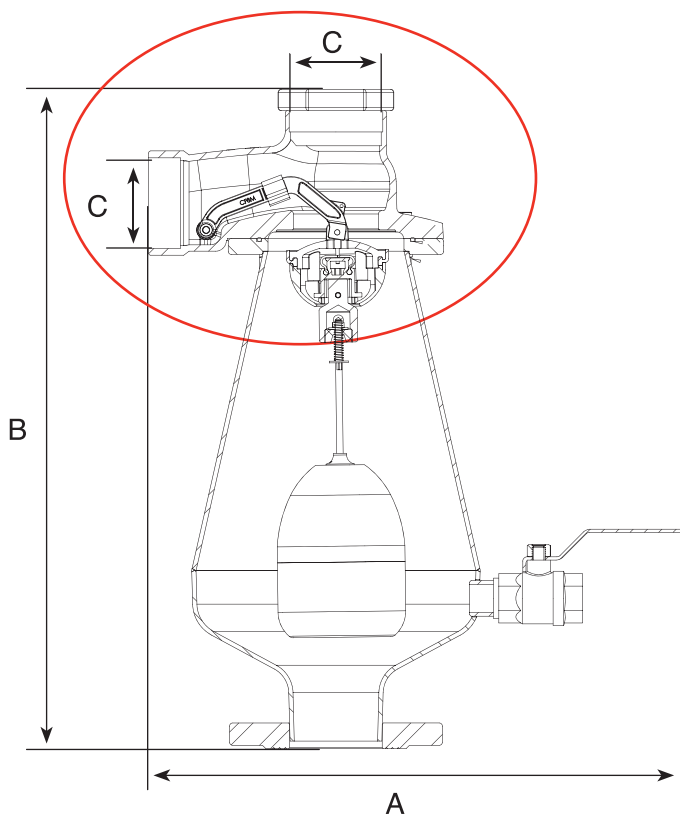
## Two-directional discharge outlet cover

The D-023 combination air valve for wastewater is available with an optional stainless steel two-directional discharge outlet cover.

One outlet is always open for air discharge while the other is closed with a plug. Both outlets have a 3" female thread.

With this option, air can be discharged either in a horizontal or vertical direction, depending on the installation. This option allows for easy vertical air discharge from valves installed in manholes.

This cover is standard on all D-023 SB underground air valves and is optional for all D-023 air valves, both stainless steel and epoxy coated.



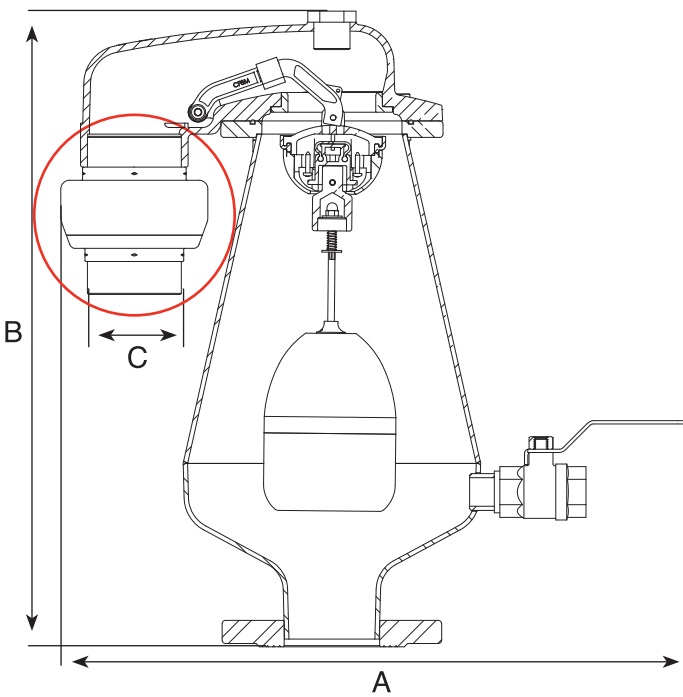
### DIMENSIONS AND WEIGHTS

Nominal Size	Dimensions mm		Connection C	Weight Kg.	Orifice Area mm <sup>2</sup>	
	A	B			Auto.	A / V
3" (80 mm)	500	620	3" BSP / NPSM Female	25	15.7	5024
4" (100 mm)	500	620	3" BSP / NPSM Female	26	15.7	5024
6" (150 mm)	500	620	3" BSP / NPSM Female	27.5	15.7	5024
8" (200 mm)	500	620	3" BSP / NPSM Female	30.5	15.7	5024

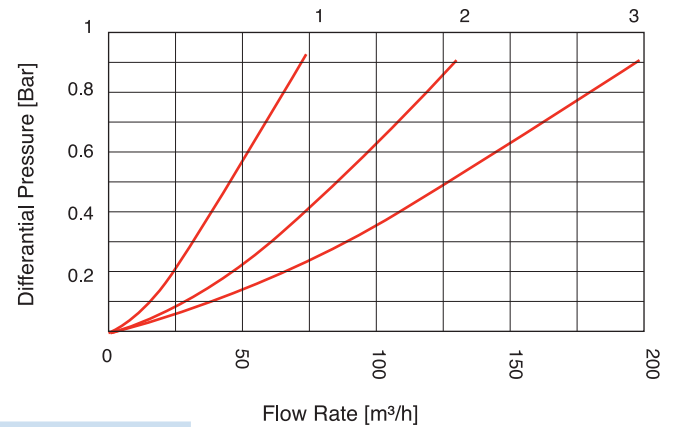
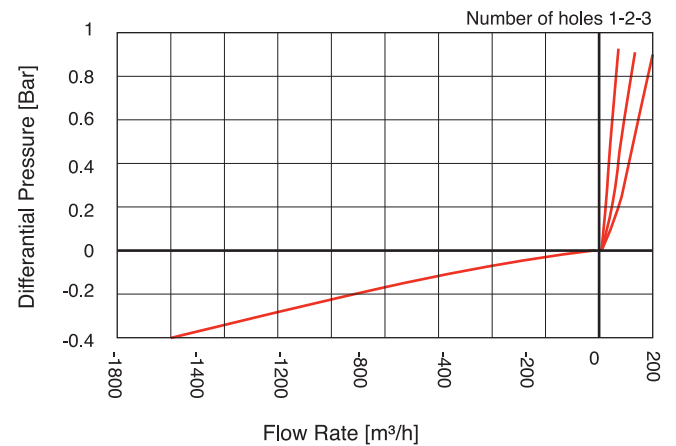
## Combination Air Valve for Wastewater - Non Slam

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.



WITH ADJUSTABLE NS C.V.



### DIMENSIONS AND WEIGHTS

Nominal Size	Dimensions mm		Connection C	Weight Kg.	Orifice Area mm <sup>2</sup>	
	A	B			Auto.	A / V
3" (80 mm)	573	580	3" BSP / NPSM Male	22.45	15.7	5024
4" (100 mm)	573	580	3" BSP / NPSM Male	23.45	15.7	5024
6" (150 mm)	573	580	3" BSP / NPSM Male	24.95	15.7	5024
8" (200 mm)	573	580	3" BSP / NPSM Male	27.95	15.7	5024

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

Model	Discharge orifice mm	Total NS area mm <sup>2</sup>	NS orifice mm	Switching point	Flow at 0.4 bar m <sup>3</sup> /h
1 orifice	75	50.3	8	Spring loaded normally closed	40
2 orifice	75	100.5	11.3		75
3 orifice	75	150.8	13.9		105

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