Series ERP - Valves for Sewerage and Slurry Applications

AIR RELEASE AND VACUUM BREAK VALVES INCORPORATING VARIABLE ORIFICE TECHNOLOGY

FOR UNCOMPLICATED AND EFFICIENT AIR MANAGEMENT AND SURGE PROTECTION

OPERATION

Series ERP for Sewerage and Slurry Applications

a.

b.

a.

Air enters the valve and flows through the annular space between the floats and the valve body and discharges from the Large Orifice into atmosphere.

The discharging air immediately impacts the Variable Orifice Shuttle which rises as the air differential pressure increases across the large orifice (the operating principle differs substantially to conventional anti surge devices)

As the air flow increases so will the Variable Orifice Shuttle rise further forcing air through a narrower path, resulting in the uniform deceleration of the approaching liquid due to the resistance of rising air pressure in the valve.

b.

Liquid enters the valve chamber and buoys the floats sealing off all outlets.

The design has a specific volume related to the operating pressure of the pipeline and anticipated surge conditions.

The air volume is calculated so that liquid will never exceed the maximum surge level indicated in red. This prevents the fouling of the valve's orifice seals.

Under normal operating conditions, liquid will gravitate to the lower end of the valve, indicated in blue.

The control float has a deadband that prevents cold fats from opening the small orifice.

Series ERP for Sewerage and Slurry Applications

c.

d.

c.

Disentrained air and gas rises through the liquid and accumulates in the valve .

When the volume of air is sufficient to displace the liquid, the Control Float will no longer be buoyant and will move downwards thereby opening the Small Orifice and allow accumulated air to be discharged into atmosphere.

The control float will close the small orifice when sufficient air/gas has been released to restore the liquid to the normal operating level.

The normal operating level leaves much of the valve free of liquid thereby eliminating possible leaks and the fouling of the orifice seals.

d.

Drainage of liquid from the valve causes the Floats to move downwards, thereby allowing atmospheric air through the valve to rapidly displace draining liquid in the pipeline and prevent potentially damaging internal partial vacuum conditions.

Any effluent within the valve will be drawn into the pipeline because of the configuration of the valve.

MATERIALS OF CONSTRUCTION

Series ERP for Sewerage and Slurry Applications

Top Cover Nut S/Steel
AISI 304 or 316

Top Cover
S/Steel AISI 304 or 316

Variable Orifice Guide
S/Steel AISI 304 or 316

Top Flange Bolt S/Steel
AISI 304 or 316

Variable Orifice Shuttle
S/Steel AISI 304 or 316

Top Flange Washer
S/Steel AISI 304 or 316

Top Flange Assembly
Steel Fusion Bonded Epoxy Coated to 300 microns

Outlet Orifice O-Ring Seat
EPDM

O -Ring Seal
EPDM

Pressurised Air Discharge Orifice
S/Steel AISI 316

Outlet Orifice Sealing Float
High Density Polyethylene

Press. Air Discharge Orifice Seat
EPDM

Control Float
High Density Polyethylene

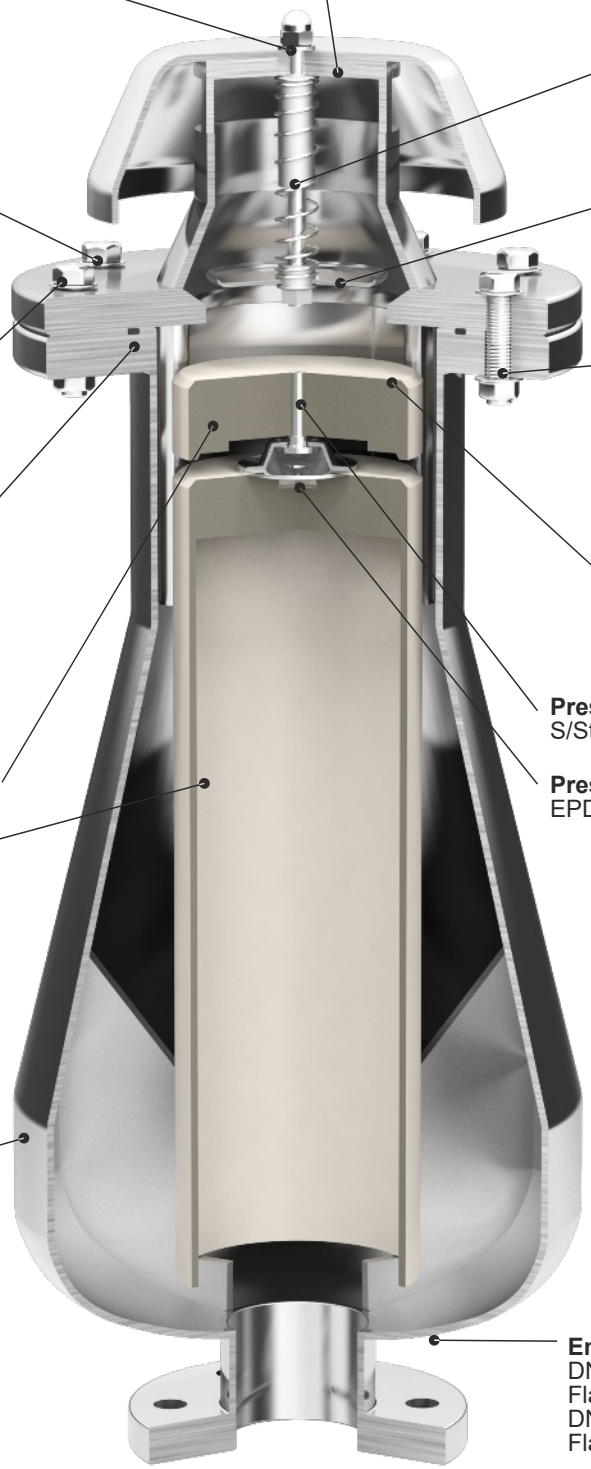
Body
Steel Fusion Bonded Epoxy Coated to 300 microns

End Connection
DN50:
Flanged or Screwed BSP Female
DN80 to DN300:
Flanged

Note:
Valve can be coated in alternative coatings on request

MATERIALS OF CONSTRUCTION

Series ERP for Sewerage and Slurry Applications



Top Cover Nut S/Steel AISI 304 or 316

Top Cover S/Steel AISI 304 or 316

Variable Orifice Guide S/Steel AISI 304 or 316

Top Flange Bolt StS/Steel AISI 304 or 316

Variable Orifice Shuttle S/Steel AISI 304 or 316

Top Flange Washer S/Steel AISI 304 or 316

Top Flange Assembly S/Steel 304 or 316

Outlet Orifice O-Ring Seat EPDM

O -Ring Seal EPDM

Pressurised Air Discharge Orifice S/Steel AISI 304 or 316

Outlet Orifice Sealing Float High Density Polyethylene

Press. Air Discharge Orifice Seat EPDM

Control Float High Density Polyethylene

Body S/Steel 304 or 316

End Connection
DN50:
Flanged or Screwed BSP Female
DN80 to DN300:
Flanged

Note:
Valve can be coated to prevent theft
Valve can be supplied in Duplex or Super Duplex on request

FEATURES & BENEFITS

Series ERP for Sewerage and Slurry Applications

AIRFLO Variable Orifice Air Valves are designed for high performance and low maintenance. The principle of the design is to ensure, through the integrity of the materials of construction, and the performance characteristic of each function that the optimum pipeline performance is achieved with every installed air valve. Some of the features of AIRFLO include:

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S/Steel Cover:
Does not deteriorate with time. Cannot be damage by Maintenance Staff stepping on it .

Patented Variable Orifice Technology:
Infinitely and progressively controls air discharge and adjusts orifice outlet relative to pipeline conditions to ensure optimum Surge protection while providing effective air release.

O-Ring Seal and Seat :
Dynamic seal and seat arrangement that ensures driptight sealing without failure regardless of operating pressure.

Direct Acting Small Orifice :
Ensure effective pressurised air release regardless of operating pressure.

Unique keying of rubber seat to prevent drawout under high pressure conditions

DeadBand in Float :
Prevents the opening of the small orifice and the bleeding of the safety air pocket in valve

Impact Zone:
Ensures driptight sealing under low pressure conditions.

Enhances surge protection under operating conditions.

Body Design:
Wide body to reduce height and increase working pressure.

Tapered sides and wide body prevents blockages and limits fat buildup

Full Flow Areas :
Flow areas equal the nominal size of the valve. There is no restriction to air intake and a smooth transition of flow due to the shape of the valve body and overall profile of the of the valve.

DIMENSIONS & WEIGHTS PN16

Series ERP for Sewerage and Slurry Applications

DESIGN TYPE
Variable Orifice Air Release and Vacuum Break Valve with Automatic Surge Protection

ACCEPTABLE MEDIA
Sewerage and Effluent

OPERATING PRESSURE RANGE
PN 16 - PN25 available on request

OPERATING TEMPERATURE RANGE
-5^{O} TO 80^{O}

SIZE RANGE
DN50 to DN200
DN250 and DN300 available on request

MATERIALS OF CONSTRUCTION
S/Steel 304 or 316 -
Super Duplex available on request
Seals in EPDM
Floats in High Density Polyethylene

STANDARD FACTORY TESTS
Low Head - 2 metres; Body 1.5 times PN

END CONNECTIONS
Screwed BSP Female DN50
Flanged DN50 to DN200
DN250 and DN300 available on request

STANDARD DESIGN
AIRFLO's standard design provides for functions as standard namely:

- Unrestricted Air Intake - Pipeline Draining
- Controlled Air Discharge
- Pressurised Air Discharge
- Surge Management under rapid filling and pump trip conditions

Size DN	Press. Rating	Model No:	End Connection	A	B	C	Weight
50	PN16	50 ERP 16S CA3 or CA6	Screwed	220	945	2" BSP	20
50	PN16	50 ERP 16F CA3 or CA6	Flanged	220	950	165	20
80	PN16	80 ERP 16F CA3 or CA6	Flanged	285	950	200	38
100	PN16	100 ERP 16F CA3 or CA6	Flanged	285	980	220	38
150	PN16	150 ERP 16F CA3 or CA6	Flanged	395	980	285	82
200	PN16	200 ERP 16F CA3 or CA6	Flanged	445	980	340	98

DIMENSIONS & WEIGHTS PN16

Series ERP for Sewerage and Slurry Applications

DESIGN TYPE
Variable Orifice Air Release and Vacuum Break Valve with Automatic Surge Protection

ACCEPTABLE MEDIA
Sewerage and Effluent

OPERATING PRESSURE RANGE
PN 16 - PN25 available on request

OPERATING TEMPERATURE RANGE
-5^{O} TO 80^{O}

SIZE RANGE
DN50 to DN200
DN250 and DN300 available on request

MATERIALS OF CONSTRUCTION
Steel Fusion Epoxy Coated to 300 microns or,
coated with a Thermoplastic coating to 500 microns
Seals in EPDM
Floats in High Density Polyethylene
Bolts and Nuts and Trim S/Steel AISI 304 or 316

STANDARD FACTORY TESTS
Low Head - 2 metres; Body 1.5 times PN

END CONNECTIONS
Screwed BSP Female DN50
Flanged DN50 to DN200
DN250 and DN300 available on request

STANDARD DESIGN
AIRFLO's standard design provides for functions as standard namely:

- Unrestricted Air Intake - Pipeline Draining
- Controlled Air Discharge
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- Surge Management under rapid filling and pump trip conditions

Size DN	Press. Rating	Model No:	End Connection	A	B	C	Weight
50	PN16	50 ERP 16S SA	Screwed	220	945	2" BSP	20
50	PN16	50 ERP 16F SA	Flanged	220	950	165	20
80	PN16	80 ERP 16F SA	Flanged	285	950	200	38
100	PN16	100 ERP 16F SA	Flanged	285	980	220	38
150	PN16	150 ERP 16F SA	Flanged	395	980	285	82
200	PN16	200 ERP 16F SA	Flanged	445	980	340	98

OUTLET CONFIGURATIONS

Series ERP for Sewerage and Slurry Applications

AIRFLO Variable Orifice Air Valves are available in a variety of outlet configurations as well as with and without backflushing ports. To suit a particular application. Standard options are as follows:

1" backflush port arrangement as standard complete with full bore Ball valve isolators

Attachment on outlet to tap off gases

Vacuum Break Bias arrangement will break vacuum but not discharge air

WHY AIRFLO SERIES ERP AIR VALVES?

Series ERP for Sewerage and Slurry Applications

AIRFLO is a patented compact, single chamber design with minimum operating parts that enhances performance whilst simplifying operation and solves many of the short comings of conventional air valve designs such as:

- **Advanced Surge Protection -** Each AIRFLO valve is fitted with with a Variable Orifice that automatically adjusts the discharge port to the most appropriate orifice size relevant to the pipeline conditions to uniformly decelerate water approaching at excessive speed, thereby limiting pressure rise upon valve closure. This feature distinguishes AIRFLO from the limitations of conventional anti-shock and anti-slam devices that are dependant on a fixed orifice or a specific switching pressure to activate their surge protection.

- **Vacuum Protection -** AIRFLO air valves feature an unobstructed large orifice and a smooth flow path for air intake ensuring effective vacuum breaking under pipe draining conditions. The AIRFLO design and flow path is such that it prevents the partial closure of the intake orifice under vacuum conditions thereby providing increased vacuum protection of more than 30% in comparison to other designs. AIRFLO intake and discharge characteristics has been verified by 3rd party comparative testing (SABS tests 12H050 and 13H197), allowing the engineer to confidently reference its performance.

- **Higher Working Pressure and Compact Body Design -** The AIRFLO is a compact design with large annular flow areas and distinctive body design that it holds a larger air capacity than conventional sewer air valve designs. This provides the benefit of higher working pressures of PN16 as standard whilst keeping a large air pocket between the operating mechanism and the liquid within the valve. In addition, the lightweight design provides greater performance and savings in handling and valve chamber design.

- **Self Cleansing -** The AIRFLO design has a large annular space around the float. In addition the body is specifically tapered to prevent fats and grease from building up in the valve. Further, the float is hollow, with vertical walls and made of smooth HDPE to discourage any adherence of fats to the operating float. Under initial filling and surge conditions, the valve maintains a compression zone that prevent effluent from reaching the upper regions of the valve. Under normal operating conditions, the volume of air in the valve and the buoyancy of the float contains effluent to the lower 1/3rd of the valve. Consequently, all debris that has entered the valve is flushed back into the pipeline under vacuum conditions.

- **Pressurised Air Release -** Pressurised air release in the AIRFLO design is achieved by the understanding of the relationship that exists between the size of the small orifice and the weight of the control float which ensures effective air discharge even under high pressure conditions.

- **Design Flexibility , Size Range and Service -** AIRFLO provides the largest air valve range in terms of size, materials of construction and function of any manufacturer in South Africa. Our products are backed by excellent technical support and after sales service.

Series ERP for Sewerage and Slurry Applications

The AIRFLO series ERP Valve has four functions, namely:

Large volume air intake - vacuum conditions: The large orifice of the air valve is equal to or greater than the nominal diameter of the valve ensuring no restrictions during air intake. The characteristic of the valve is such that it prevents the fluttering of the float under intake conditions thereby maximising air intake.

Intake Capacities of AIRFLO Series ERP Air Valves in nl/sec

Bar	DN 50	DN 80	DN100	DN 150	DN 200	DN 250	DN 300
-0.05	71	182	281	633	1120	1750	2520
-0.1	98	250	387	870	1539	2405	3463
-0.15	116	297	459	1034	1829	2857	4115
-0.2	130	332	514	1156	2044	3194	4600
-0.25	140	359	555	1248	2208	3450	4968
-0.3	148	378	585	1317	2330	3641	5243
-0.35	153	393	608	1367	2418	3779	5441

nl/sec = normal litres per second @ 20 degrees Celsius and 1.01325 bar absolute

Note: Choked orifice conditions commence at approximately 0.35 bar Δp under vacuum conditions. It is therefore imperative to ensure that the air valves are correctly sized for vacuum conditions, taking the limitations of the air valve, pipeline seals and pipeline material into account.

Large volume low pressure air discharge - normal filling conditions: The air valve will discharge large volumes of low pressure air under normal filling conditions. The Variable Orifice works in such a manner that it will automatically adjust the outlet discharge to the differential pressure across the large orifice

Surge Protection - excessive filling conditions, re-joining columns subsequent to pump trip - The operation of the AIRFLO Variable Orifice is such that the orifice progressively reduces in size as the differential pressure across the large orifice increases. The orifice therefore decreases from a full port at atmospheric pressure until it reaches its smallest discharge port at 0.05 bar Δp. AIRFLO therefore behaves differently to “Anti-Shock” or “Anti-Slam” designs in that it does not require a specific switching point but is constantly in a surge protection mode, eliminating the potential slam that can occur with conventional designs in the sub-critical phases of discharge and provides a more holistic surge protection comparatively.

Pressurised air discharge - The valve will automatically release pressurised air once the pipeline is hydraulically full. The small orifice is design to fully opens up to the valve’s maximum working pressure.

AIRFLO Inlet and Discharge Orifices

Valve Size DN	Inlet Orifice & Flow Path in mm	Variable Orifice Diameters in mm at 0.05 bar Δp	Small Orifice Diameters in mm
50	50	10	2
80	80	15	2.5
100	100	18	2.5
150	150	25	5
200	200	35	5
250	250	42	8
300	300	54	8

Please consult with REXUS for more detailed information on the transitioning orifice sizes of the Variable Orifices at varying deferential pressures across the large orifice or for assistance with Air Valve Sizing and Positioning and Surge and Waterhammer Analysis

Airflo Variable Orifice Air Valves

Series ESP Model CA Variable Orifice Air Valve is a triple function valve with automatic surge protection for use in potable and strained raw water applications.

Valves are manufactured in full Stainless Steel 304 or 316 as standard. Valves can also be manufactured in Duplex or Super Duplex on request.

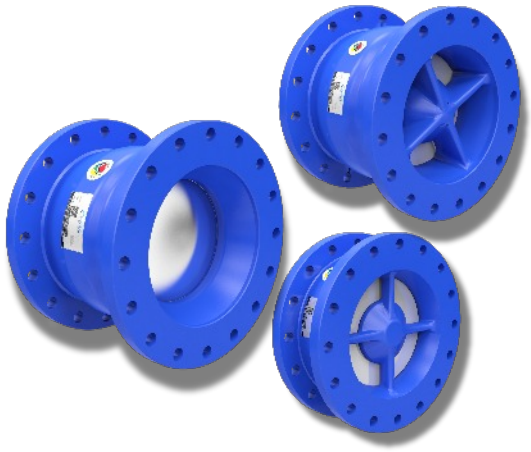
Valves are available in sizes DN25 to DN300 and for pressure ratings PN10 to PN100

Airflo Variable Orifice Air Valves

Series ESP Model SA Variable Orifice Air Valve is a triple function valve with automatic surge protection for use in potable and strained raw water applications

Valves are manufactured in fusion bonded epoxy coated Steel. The top cover, jointing and internal trim are in Stainless Steel 304 or 316.

Valves are available in sizes DN25 to DN300 and for pressure ratings PN10 to PN100



Checkflo Nozzle Check Valves

CHECKFLO Nozzle Check Valves are available in the reliable Central Shaft design as well as the Annular Disc design for superior surge protection and efficient low head pipeline operation.

Valves are available in a variety of materials and trim options in both short and long face to face dimensions

Valves are available in sizes DN50 to DN1200 and for pressure ratings PN10 to PN63

Checkflo Silent Check Valves

CHECKFLO Silent Check Valves are of a conical disc design with metal to metal or soft seal options for cost effective surge protection.

CHECKFLO Silent Check Valves are available in a variety of materials and trim options.

Valves are available in sizes DN80 to DN1000 and for pressure ratings PN10 to PN40

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