

VENT-O-MAT[®]

SERIES RBX

AIR RELEASE AND VACUUM BREAK VALVES

FOR CLEAN WATER USE



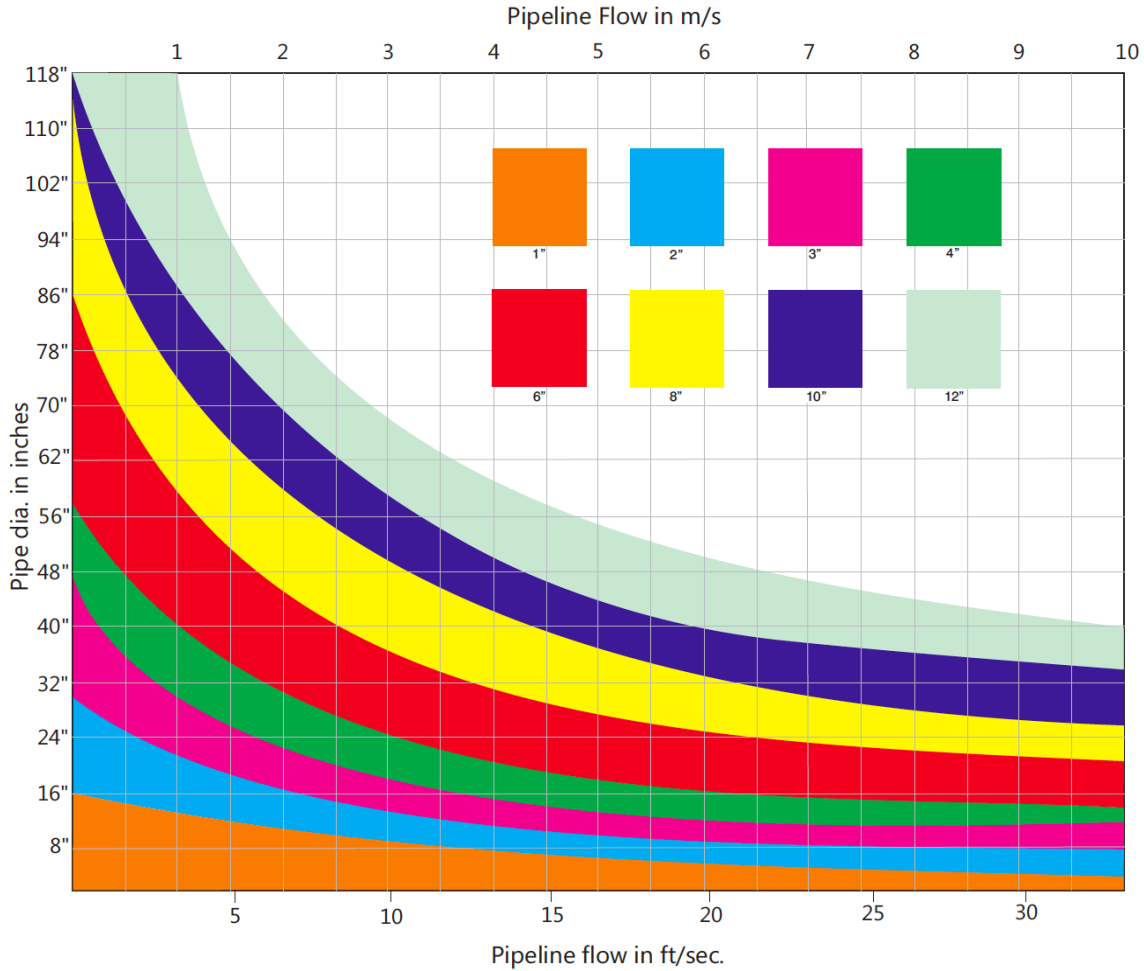
Certified to
NSF/ANSI 61 & 372



www.rfvalves.com

Series RBX

SELECTION & POSITIONING



Pipe Dia	Pipeline Velocity in Feet per Sec											
Inches	2	3	5	7	8	10	11	13	15	16	18	20
4	78	117	196	274	313	391	431	509	587	626	705	783
6	176	264	440	617	705	881	969	1145	1321	1409	1585	1762
8	313	470	783	1096	1253	1566	1722	2036	2349	2505	2819	3132
10	489	734	1223	1713	1957	2447	2691	3181	3670	3915	4404	4893
12	705	1057	1762	2466	2819	3523	3876	4580	5285	5637	6342	7047
14	958	1439	2398	3357	3836	4796	5275	6234	7193	7673	8632	9591
16	1253	1879	3132	4385	5011	6264	6890	8143	9295	10022	11275	12527
18	1585	2378	3964	5549	6342	7927	8720	10306	11891	12684	14269	15855
20	1957	2936	4893	6851	7830	9787	10766	12723	14680	15659	17616	19574
22	2368	3553	5921	8289	9474	11842	13026	15395	17763	18947	21316	23684
24	2819	4228	7047	9865	11275	14093	15502	18321	21140	22549	25368	28186
26	3308	4962	8270	11578	13232	16540	18194	21502	24810	26464	29772	33080
28	3836	5755	9591	13428	15346	19182	21101	24937	28773	30692	34528	38365
30	4404	6606	11010	15414	17616	22021	24223	28627	33031	35233	39637	44041
32	5011	7516	12527	17538	20044	25054	27560	32571	37582	40087	45098	50109
34	5657	8485	14142	19799	22627	28284	31113	36769	42426	45255	50911	56568
36	6342	9513	15855	22197	25368	31710	34880	41222	47564	50735	57077	63419
38	7066	10599	17665	24731	28265	35331	38864	45930	52996	56529	63595	70661
40	7830	11744	19574	27403	31318	39148	43062	50892	58721	62636	70466	78295
44	9474	14211	23684	33158	37895	47369	52105	61579	71053	75790	85263	94737
48	11275	16912	28186	39461	45098	56373	62010	73284	84559	90196	101471	112745
52	13232	19848	33080	46312	52928	66159	72775	86007	99239	105855	119087	132319
56	15346	23019	38365	53710	61383	76729	84402	99748	115094	122767	138113	153458
60	17616	26425	44041	61657	70466	88082	96890	114507	132123	140931	158584	176164
62	18810	28216	47026	65836	75242	94052	103457	122268	141078	150483	169294	188104
66	21316	31974	53290	74605	85263	106579	117237	138553	159869	170527	191843	213159
70	23978	35967	59945	83923	95912	119889	131878	155856	179834	191823	215801	239779
74	26797	40195	66991	93788	107186	133983	147381	174177	200974	214372	241169	267965
78	29772	44658	74429	104201	119087	148859	163745	193516	223288	238174	267946	297717

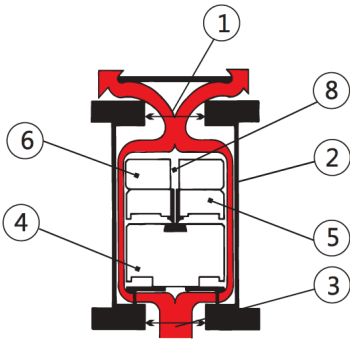
Conversion Table ft/sec of Pipeline Velocity to gal/min

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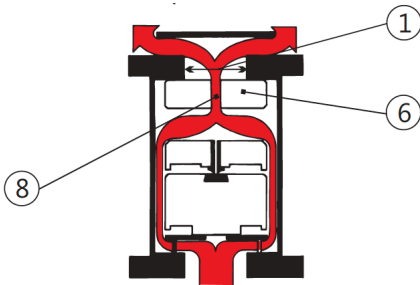
Series RBX OPERATION

VENTING OF A FILLING PIPELINE (SUB CRITICAL WATER APPROACH VELOCITY)



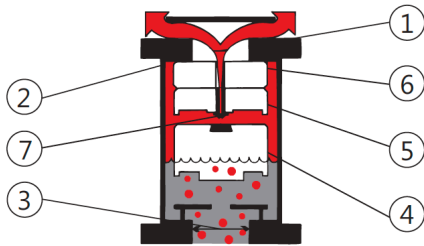
Air enters Orifice (3), travels through the annular space between the cylindrical floats (4), (5), and (6) and the valve Chamber Barrel (2) and discharges from the Large Orifice (1) into atmosphere.

VENTING OF A FILLING PIPELINE (EXCESSIVE WATER APPROACH VELOCITY)



In reaction to increased air flow, Float (6) closes Large Orifice (1) and air is forced through the "Anti-Shock" Orifice (8) resulting in deceleration of the approaching water due to the resistance of rising air pressure in the valve.

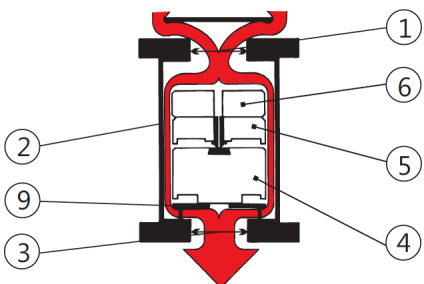
PRESSURED AIR RELEASE FROM A FULL PIPELINE



Subsequent to the filling of a pipeline, liquid enters the valve Barrel Chamber (2) and the Floats (4), (5) and (6) are buoyed so that the Large Orifice (1) is closed by Float (6), the valve will then become internally pressurized. A minimal working pressure of 0.5 bar (7.3 psi) acting on the relatively large area of the Orifice (1) will lock Float (6) into the closed position across the Large Orifice (1).

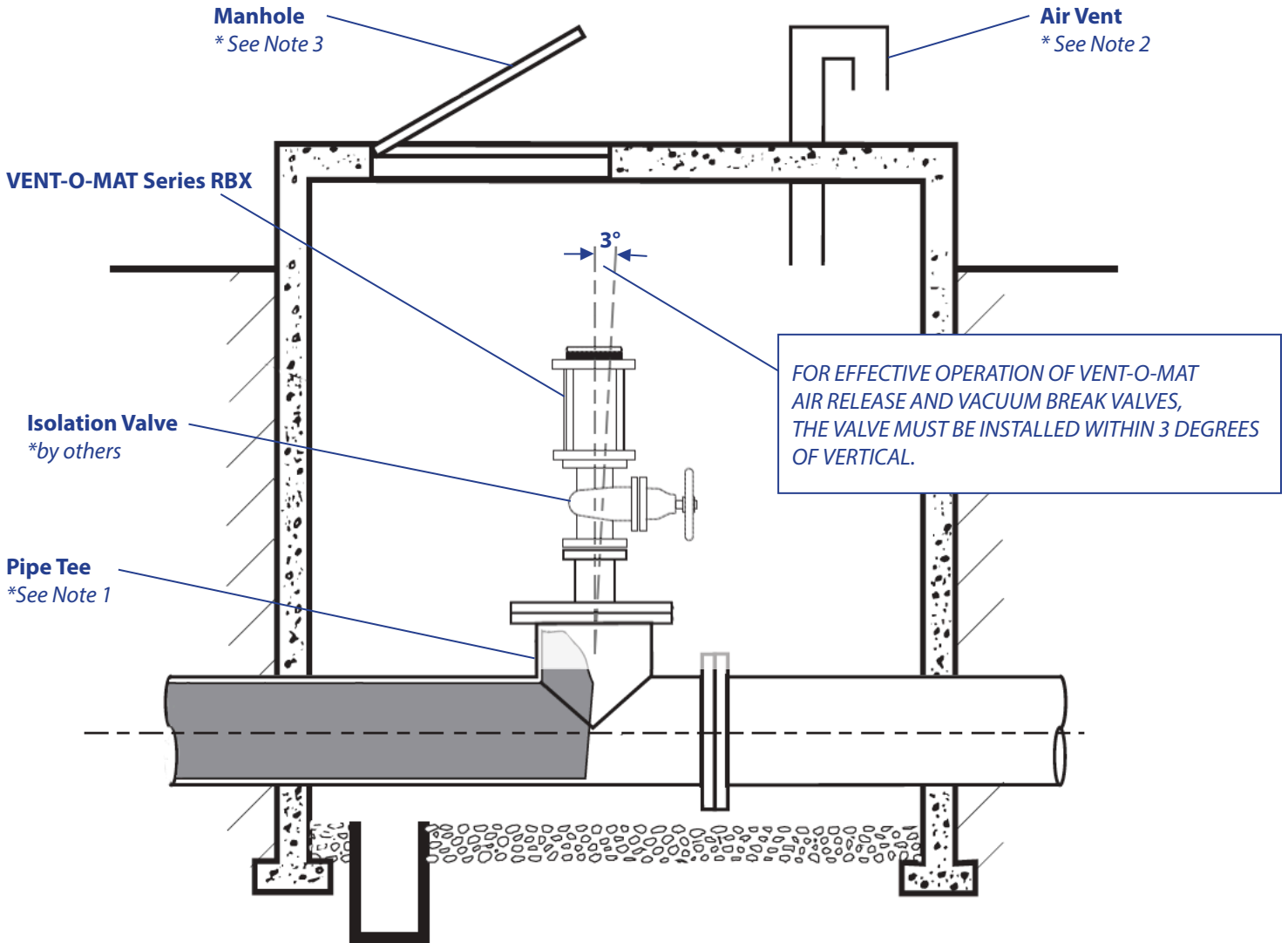
Disentrained air rises through the liquid and accumulates in the valve chamber, when the volume of air is sufficient to displace the liquid, Float (4) will no longer be buoyant and will gravitate downwards thereby opening the Small Orifice (7) and allowing accumulated air to be discharged into atmosphere, as air is discharged the liquid raises Float (4) and re-seals the Small Orifice (7) and prevents escape of liquid.

VACUUM RELIEF (AIR INTAKE) OF A DRAINING PIPELINE



Simultaneous drainage of liquid from Valve Chamber (2) causes Floats (4), (5) and (6) to gravitate downwards onto the Baffle Plate (9), thereby allowing atmospheric air through the valve to rapidly displace draining liquid in the pipeline and prevent potentially damaging internal negative pressure.

RECOMMENDED INSTALLATION ARRANGEMENTS



NOTE:

1. Pipe Tee or Air Accumulator should be 1/2 the Diameter of the Pipeline. eg. 12" Pipeline should utilize a 12"x6" Pipe Tee installed below the Isolation and Air Valve.
2. Air Vent diameter should be greater than or equal to the size of the Air Valve to ensure full valve performance and prevent restrictions.
3. Manhole Access - Multiple means of access can assist in serviceability. eg. (1) Larger Manhole access for human entry to the vault, (2) Smaller Manhole to access the valve from the surface.

Series RBX

COMPONENT DESCRIPTION & MATERIAL SPECIFICATIONS SCREWED - 1" & 2"

Type:

Series RBX - Double Orifice (Small & Large Orifice) with Anti Shock Orifice Mechanism.

End Connection:

Threaded NPT Male (ASME B1.20.1)

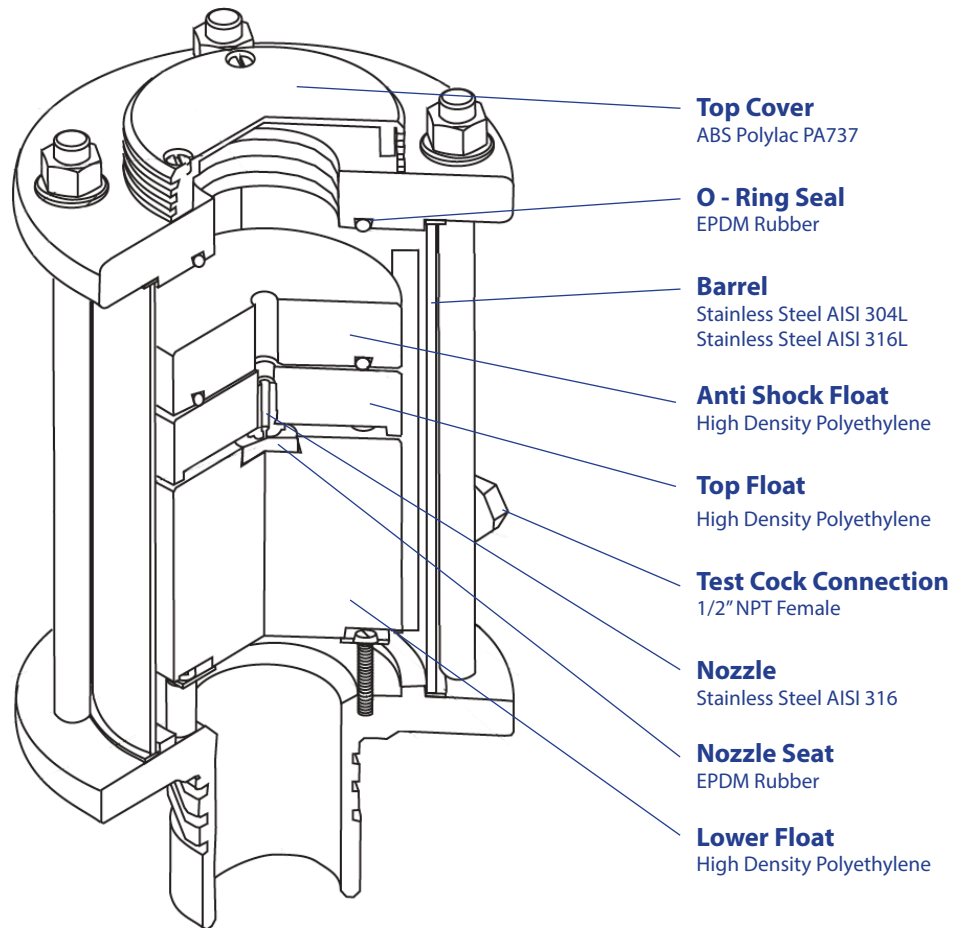
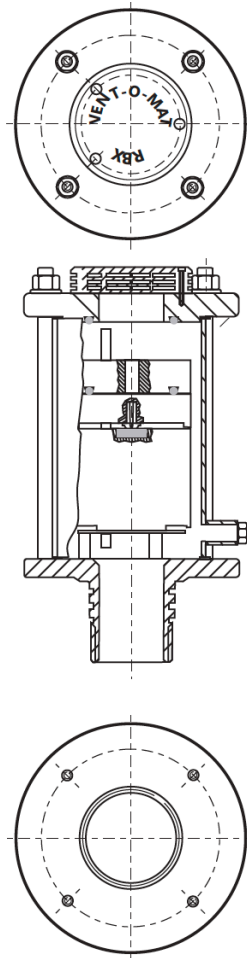
Nominal Sizes:

DN25 - 1"
DN50 - 2"

Model No's:

RBX 2521 ____ NPT ____ 363 psi
RBX 4021 ____ NPT ____ 580 psi

Pressure Ratings:



Operating Temperature Range:
40°F to 176°F

Acceptable Media:
Potable Water or Screen Raw Water (2mm Fine Screen)

Function:

- i) High volume air discharge - pipeline filling.
- ii) High volume air intake - pipeline draining
- iii) Pressurized air discharge - pipeline filled.
- iv) Surge dampening - high velocity air discharge, water column separation & liquid oscillation.

Flange Materials of Construction:
Stainless Steel AISI 304
Stainless Steel AISI 316

Standard Factory Tests:

- i) Hydrostatic - 1.5 x max. rated working pressure
- ii) Low head leak - 7.25 psi
- iii) Small orifice function at max. rated working pressure (minimum 1 valve in 10).

COMPONENT DESCRIPTION & MATERIAL SPECIFICATIONS STUDED - 3" TO 12"

Type:

Series RBX - Double Orifice (Small & Large Orifice) with Anti Shock Orifice Mechanism.

End Connection:

Studded flange (ASME B16.5)

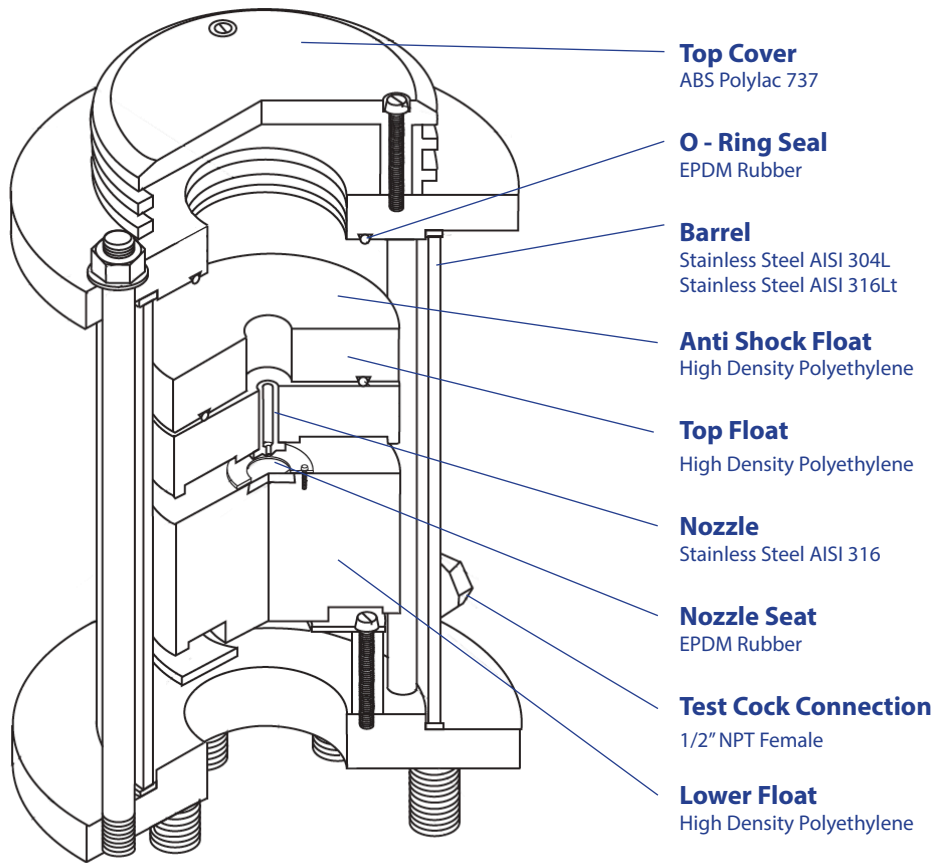
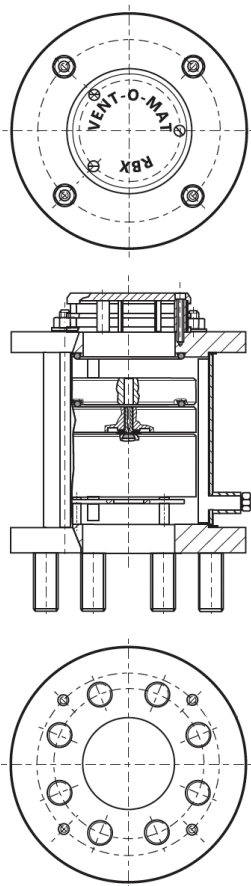
Nominal Sizes:

DN080 - 3"	DN200 - 8"
DN100 - 4"	DN250 - 10"
DN150 - 6"	DN300 - 12"

Model No's:

RBX1931	_____ ANSI 150#	_____ 276psi
RBX4051	_____ ANSI 300#	_____ 580psi
RBX6471	_____ ANSI 600#	_____ 928psi
RBX10071	_____ ANSI 600#	_____ 1450psi

Pressure Ratings:



Operating Temperature Range:

40°F to 176°F

Acceptable Media:

Potable Water or Screen Raw Water (2mm Fine Screen)

Function:

- i) High volume air discharge - pipeline filling.
- ii) High volume air intake - pipeline draining
- iii) Pressurized air discharge - pipeline filled.
- iv) Surge dampening - high velocity air discharge, water column separation & liquid oscillation.

Flange Materials of Construction:

Fusion Bonded Epoxy Ductile Cast Iron
Stainless Steel AISI 304
Stainless Steel AISI 316

Standard Factory Tests:

- i) Hydrostatic - 1.5 x max. rated working pressure
- ii) Low head leak - 7.25 psi
- iii) Small orifice function at max. rated working pressure (minimum 1 valve in 10).

Series RBX

COMPONENT DESCRIPTION & MATERIAL SPECIFICATIONS FLANGED - 1" TO 12"

Type:

Series RBX - Double Orifice (Small & Large Orifice) with Anti Shock Orifice Mechanism.

End Connection:

Flanged (ASME B16.5)

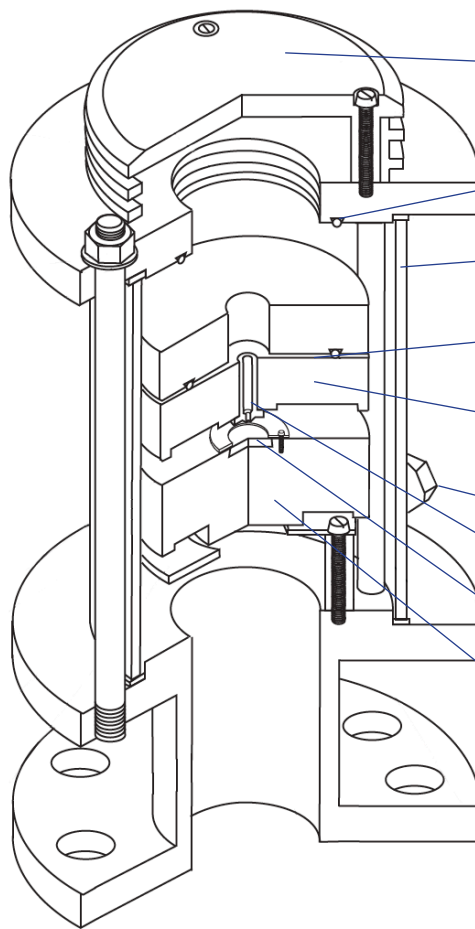
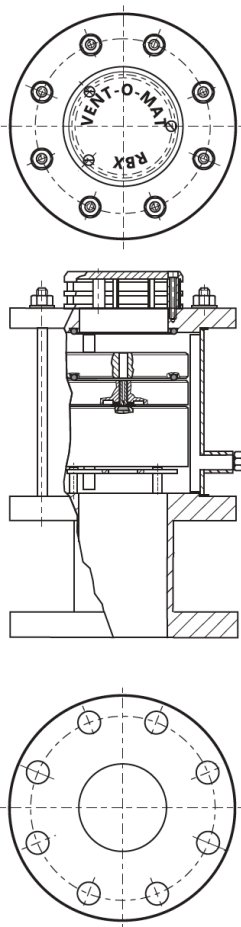
Nominal Sizes:

DN25 - 1"	DN150 - 6"
DN50 - 2"	DN200 - 8"
DN080 - 3"	DN250 - 10"
DN100 - 4"	DN300 - 12"

Model No's:

RBX1941	ANSI 150#	276psi
RBX4061	ANSI 300#	580psi
RBX6471	ANSI 600#	928psi
RBX10071	ANSI 600#	1450psi

Pressure Ratings:



Top Cover
ABS Polylac 737

O - Ring Seal
EPDM Rubber

Barrel
Stainless Steel AISI 304L
Stainless Steel AISI 316L

Anti Shock Float
High Density Polyethylene

Top Float
High Density Polyethylene

Test Cock Connection
1/2" NPT Female

Nozzle
Stainless Steel AISI 316

Nozzle Seat
EPDM Rubber

Lower Float

Operating Temperature Range:

40°F to 176°F

Acceptable Media:

Potable Water or Screen Raw Water (2mm Fine Screen)

Function:

- i) High volume air discharge - pipeline filling.
- ii) High volume air intake - pipeline draining
- iii) Pressurized air discharge - pipeline filled.
- iv) Surge dampening - high velocity air discharge, water column separation & liquid oscillation.

Flange Materials of Construction:

Fusion Bonded Epoxy Ductile Cast Iron
Stainless Steel AISI 304
Stainless Steel AISI 316

Standard Factory Tests:

- i) Hydrostatic - 1.5 x max. rated working pressure
- ii) Low head leak - 7.25 psi
- iii) Small orifice function at max. rated working pressure (minimum 1 valve in 10).

ORDERING GUIDE

050 **RBX** **25** **2** **1** **S4**

VALVE SIZE:

- 1" **025**
- 2" **050**
- 3" **080**
- 4" **100**
- 6" **150**
- 8" **200**
- 10" **250**
- 12" **300**

VALVE SERIES

OPTIONS: (choose all that apply)

- _ - STANDARD
- s - FLANGED OUTLET
- b - BIAS ANTI-SHOCK MODE VALVE PRESSURE RATING
- v - VENT ONLY OPERATION
- bv - VACUUM-BREAK ONLY OPERATION
- *see page 14

MATERIALS OF CONSTRUCTION:

- E4** - EPOXY FLANGES / 304s TRIM
- S4** - FULL 304 S/S CONSTRUCTION
- S6** - FULL 316 S/S CONSTRUCTION

VALVE TYPE: **1** - DOUBLE ACTING

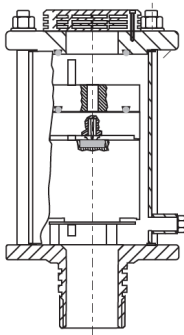
VALVE INLET CONNECTION:

- 2** - SCREWED - NPT
- 3** - STUDDED - ANSI 150#
- 4** - FLANGED - ANSI 150#
- 5** - STUDDED - ANSI 300#
- 6** - FLANGED - ANSI 300#
- 7** - FLANGED - ANSI 600#

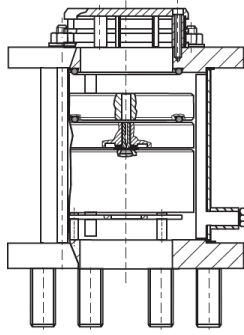
VALVE PRESSURE RATING:

- 19** - 19 bar (276 psi)
- 25** - 25 bar (363 psi)
- 40** - 40 bar (580 psi)
- 64** - 64 bar (928 psi)
- 100** - 100 bar (1450 psi)

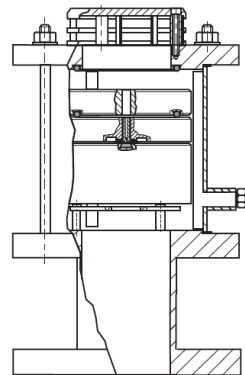
INLET CONNECTIONS



2 - SCREWED NPT



3 - STUDDED ANSI B16.5 CLASS 150#



4 - FLANGED ANSI B16.5 CLASS 150#

NOTES:

The options, materials, pressures, and configurations listed above are the most common. More options, materials, pressures, and configurations are available.

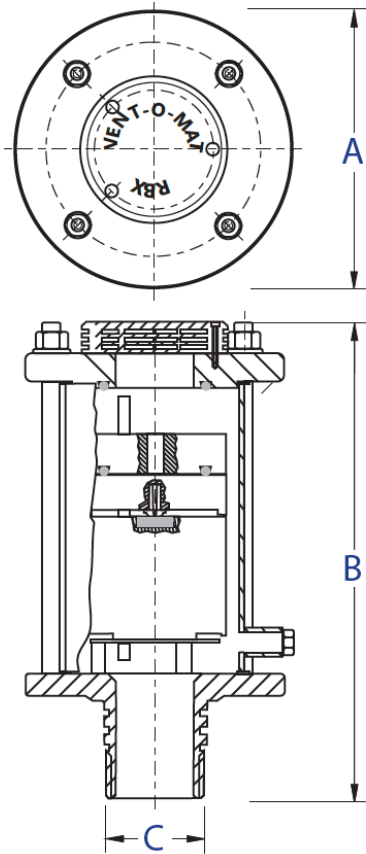


Valves can be made to meet American Iron & Steel (AIS), Buy America, and Buy American upon request.



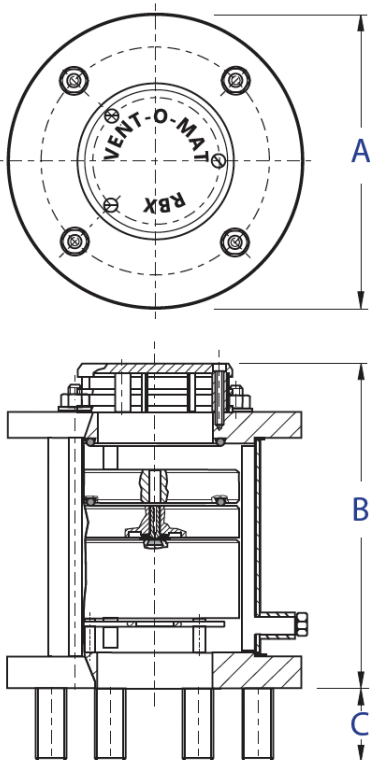
Series RBX

DIMENSIONS & WEIGHTS



SCREWED - 1" & 2" OVERALL DIMENSIONS & WEIGHTS

VALVE SIZE in.	MODEL No.	PRESSURE RATING	A in.	B in.	C in.	WEIGHT lbs. / Kg
1	025 RBX 2521	363 psi	4 ¾	10 7/16	1" NPT	9.5 / 4.31
1	025 RBX 4021	580 psi	4 ¾	12 ½	1" NPT	10.7 / 4.85
2	050 RBX 2521	363 psi	6 ½	12 9/10	2" NPT	20 / 9.07
2	050 RBX 4021	580 psi	6 ½	13 ¾	2" NPT	21 / 9.53

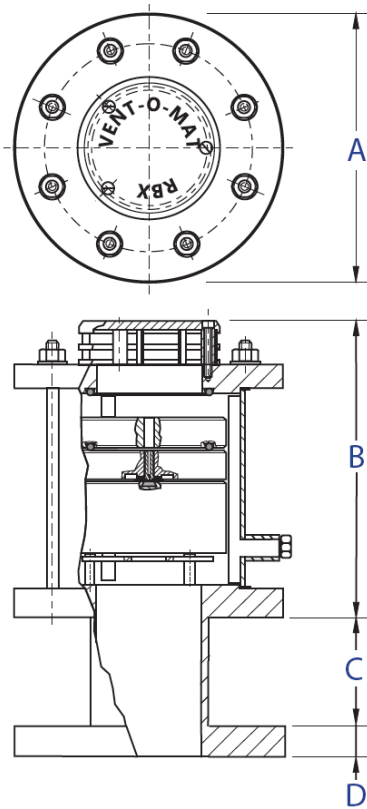


STUDED - 3" TO 12" OVERALL DIMENSIONS & WEIGHTS

VALVE SIZE in.	MODEL No.	PRESSURE RATING	A in.	B in.	C in.	WEIGHT lbs. / Kg
3	080 RBX 1931	276 psi	9 ¼	12	2	50.7 / 23.00
3	080 RBX 4051	580 psi	9 ¼	12	2	54.0 / 24.49
4	100 RBX 1931	276 psi	9 ¼	12 ½	2	49.6 / 22.50
4	100 RBX 4051	580 psi	9 ¼	12 ½	2	52.9 / 24.00
6	150 RBX 1931	276 psi	14	18	2	152.7 / 69.26
6	150 RBX 4051	580 psi	14	18	2	165.3 / 74.98
8	200 RBX 1931	276 psi	16	21 ½	2	213.8 / 96.98
8	200 RBX 4051	580 psi	16	21 ½	2	238.1 / 108.00
10	250 RBX 1931	276 psi	22 ¼	19	2 ¾	308.6 / 140
12	300 RBX 1931	276 psi	25 ¾	22 ¾	2 ¾	330.7 / 150

Series RBX

DIMENSIONS & WEIGHTS



FLANGED - 3" TO 12" OVERALL DIMENSIONS & WEIGHTS

VALVE SIZE in.	MODEL No.	PRESSURE RATING	A in.	B in.	C in.	D in.	WEIGHT lbs. / Kg
3	080 RBX 1941	276 psi	9 1/4	12	4	15/16	65 / 29.48
3	080 RBX 4061	580 psi	9 1/4	12	4	1 1/8	72 / 32.66
4	100 RBX 1941	276 psi	9 1/4	12 1/2	3	15/16	64 / 29.03
4	100 RBX 4061	580 psi	9 1/4	12 1/2	3	1 1/4	71 / 32.21
6	150 RBX 1941	276 psi	14	18	5	1	137 / 62.14
6	150 RBX 4061	580 psi	14	18	5	1 7/16	171 / 77.56
8	200 RBX 1941	276 psi	16	21 1/2	6	1 1/8	245 / 111.13
8	200 RBX 4061	580 psi	16	21 1/2	6	1 5/8	250 / 113.40
10	250 RBX 1941	276 psi	22 1/4	19	6 7/8	1 3/16	319.6 / 145
12	300 RBX 1941	276 psi	25 3/8	22 3/16	4 3/4	1 3/16	352.7 / 160

TEST SPECIFICATIONS

All air release valves supplied shall be subjected to the following testing procedures in the order laid down:

- (A) A high pressure strength and leak test whereby the valve is filled with water and pressurized to 1.5 times the rated working pressure which shall be held for a period of 2 minutes. Any leaking, weeping or sweating shall be reason for rejection.
- (B) A low head leak test whereby the valve is filled with water and pressurized to a maximum of 7.25 psi using a visible water column connected to the test rig. The valve shall be rejected if leak tightness is not maintained for 2 minutes.
- (C) Every tenth air release valve of the same size and pressure rating must be subjected to a small orifice function test - **"DROP TEST"** - whereby the valve is filled with water, pressurized to above rated working pressure and isolated from the test rig by closure of an isolating valve. A chamber in the test rig immediately prior to the isolating valve must be filled with compressed air at a pressure equal to that being maintained in the air release valve. The isolating valve is then opened so as to allow the air to rise in the air release valve without the pressure dropping lower than 29 - 44 psi above rated working pressure of the air release valve. The **"DROP TEST"** is then carried out by slowly bleeding off the pressure through a suitable cock until rated working pressure is reached and the float drops away from the orifice to allow discharge. Failure of the air release valve to function in the manner described will be reason for rejection.

On request the manufacturer shall provide batch certificates of test compliance which shall be cross referenced to serial numbers indelibly marked onto the identity label of each valve.

IMPORTANT NOTE: *It is impossible to inject air into an incompressible liquid, air injection can only be achieved if the liquid can be displaced which implies that the pressure in the test rig must be reduced to atmospheric, and absolutely nothing is proven by discharge through the small orifice of the air release valve at atmospheric pressure. "DROP TESTING" in this manner is not acceptable.*

SELECTION & POSITIONING

VALVE SELECTION FROM GRAPH

All the relevant information has been condensed into one graph to enable valve selection to be simple and easy and at the same time to allow flexibility to the designer to move within certain parameters which eventually allows the most suited and economically viable valve to be selected.

IMPORTANT NOTE: The graph is based on vacuum breaking and limiting vacuum to 0.34 bar (5 psi) below atmospheric. It is not good practice to go below 10 psi absolute (4.4 psi differential in pipeline at sea level). The graph allows for change in altitude and hence change in atmospheric pressure and is based on the assumption that more than one valve per section is used for vacuum protection and venting.

ACTUAL SELECTION (GRAVITY OR PUMPED PIPELINES)

Selection is based on the premise that pipelines are generally filled at a slower rate than they are drained, scoured or at which separation occurs (a maximum fill/ drain ratio of 1:1).

1. Determine the maximum drainage rate in ft/s either for scouring, pipe rupture or column separation for a particular pipeline section. Conversion from gal/min to ft/sec can be done fairly quickly; using the conversion table on page 11.
2. Move vertically on the selection graph (top of page 2) from the ft/s point and move horizontally from the pipe size finding the intersecting point.
3. This point should fall within the operating band of a particular valve size. Consideration must be given to the fact that the upper portion of the band approaches - 5 psi and the lower portion - 1.45 psi for each valve size, this allows the designer to see at a glance if the valve is too close to it's operating limits and to select the next valve size.

EXAMPLE OF VALVE SIZING (ASSUMING AN INDIVIDUAL SECTION)

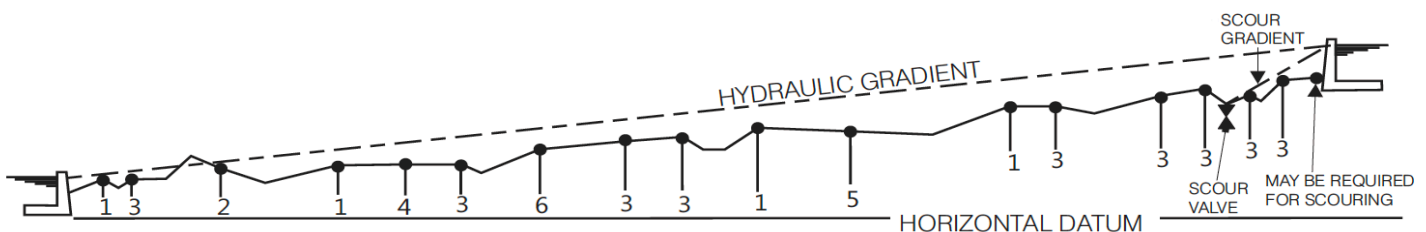
A Ø 16" pipeline draining at 99.6 gal/sec which equates to 9.85 ft/s, what valve size should be selected?

From the 9.85 ft/s point, on the graph on page 11, move vertically until the Ø16" pipe size horizontal line is intersected. This places the intersection point in the operating band of a 3" Vent-O-Mat RBX valve. But, if for example, the drainage rate is 132.8 gal/sec which equates to 13.1 ft/s, the valve would be operating close to it's limit and it may be prudent to change to a 4" Vent-O-Mat RBX.

VALVE POSITIONING

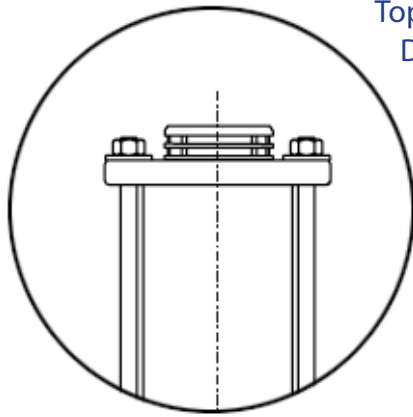
1. ON APEX POINTS (relative to hydraulic gradient).
2. 16 FEET BELOW APEX POINTS FORMED BY INTERSECTION OF PIPELINE AND HYDRAULIC GRADIENT - i.e. where pipeline siphoning over gradient an air release valve positioned on the apex would break the siphon. If positioning on apex is required a modified VENT-O-MAT Series RBX can be supplied.
3. NEGATIVE BREAKS (increase in downward slope or decrease in upward slope).
4. LONG HORIZONTAL SECTIONS - every 1/3 of a mile maximum.
5. LONG ASCENDING SECTIONS - every 1/3 of a mile maximum.
6. LONG DESCENDING SECTIONS - every 1/3 of a mile maximum.
7. PUMP DISCHARGE (not shown in diagram) - just subsequent to non return valve.
8. BLANK ENDS (not shown in diagram) - where a pipeline is terminated by a blind flange or a valve.

Alternatively: - 1.094 yard per every 0.04 inch in pipe diameter e.g. space air valves every 656.4 yards for a 24" inch diameter pipeline or every 875.2 yrd for a 32" inch diameter pipeline

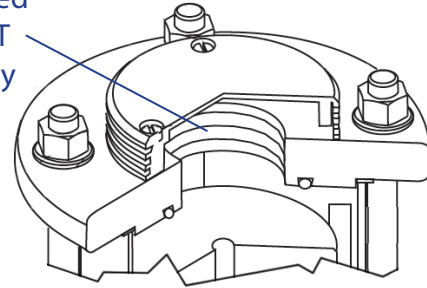


Series RBX

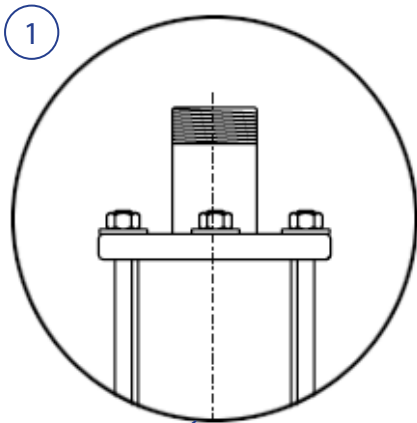
AVAILABLE DISCHARGE CONNECTIONS 1" TO 12"



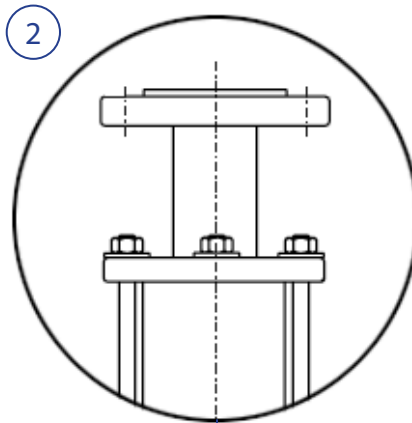
Top Cap With Standard
Discharge Screwed
Connection NPT
1" - 4" Valves Only



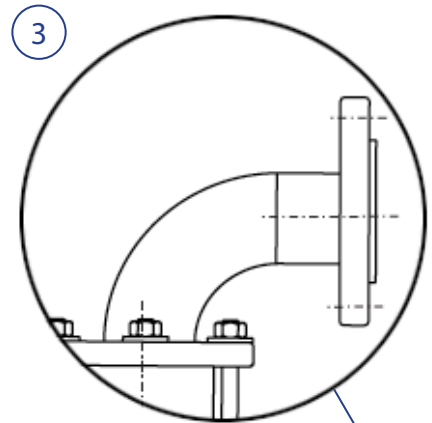
Swivel Outlet Configurations



1
Threaded NPT
Discharge Connection
1" - 4" Valves Only

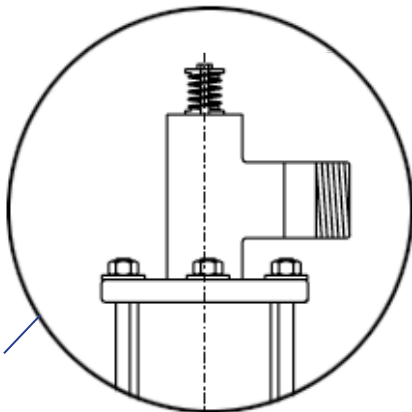


2
Swivel Flanged Outlet
Connection
Sizes: 1" - 12"

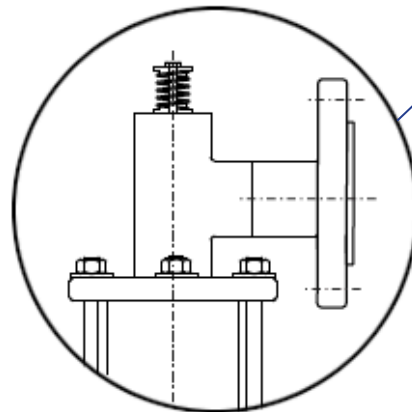


3
Swivel Outlet With Bend
Sizes: 1" - 12"

Biased Swivel Outlet Configurations



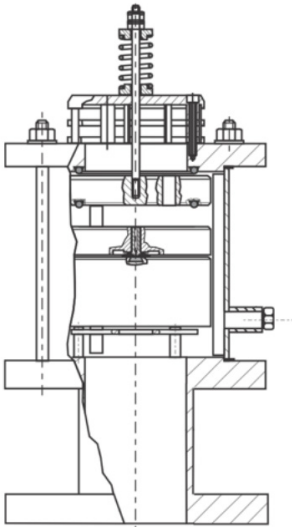
T-outlet With Bias
Screwed NPT Outlet



T-outlet With Bias
Flanged Outlet

SPECIAL CONFIGURATIONS (RBXb, RBXv, RBXbv)

RBXb – Biased Anti-Shock

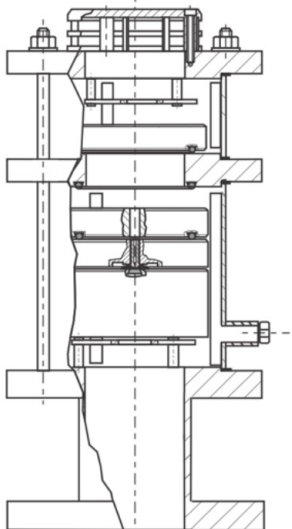


It is good engineering practice, for vertical turbine pumps and deepwell, submersible pump applications, to install air valves prior to the pump discharge check valve. The purpose of these valves is to prevent air entry into the pipeline and to break vacuum in the vertical riser upon pump shutoff.

Operation of conventional air valves in this application is such that the air in the vertical riser is released very rapidly upon pump startup, resulting in very high pressure transients when the water column slams the air valve shut and/or slams into the closed discharge check valve.

The Vent-O-Mat Series RBXb valve has specifically been developed for use on deep well submersible pump and vertical turbine pump applications where they are installed prior to the pump discharge check valve to fulfill the following functions:

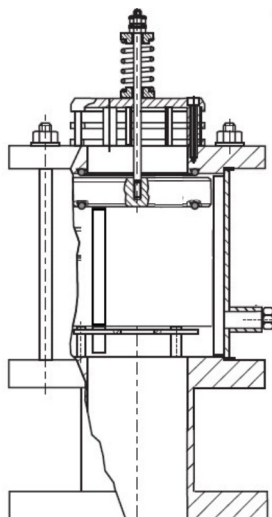
- Provide effective and controlled release of air in the vertical riser upon pump startup.
- Dampen surge pressures upon pump startup.
- Provide vacuum protection when the pump stops and the vertical column drains.



RBXv – Vent-Only

There are instances where the hydraulic gradeline falls below a peak point during normal operation and where air inflow would adversely affect the normal operation and surge characteristic of the pipeline. Air intake may also be undesirable under pump trip conditions for pipelines running through a marsh (surge protection in these instances would be in the form of surge vessels and/or the pipeline will be designed for full vacuum).

Vent-O-Mat offers the Series RBXv valve which has specifically been developed to ensure effective air release under all pipeline conditions but will not allow air entry under any operating condition.



RBXbv – Vacuum Break Only

In situations where vacuum break only operation is needed, Vent-O-mat offers the Series RBXbv. The Vacuum Break Only series will draw air from atmosphere into the pipeline or tank beginning when the internal pressure falls below atmospheric pressure outside the valve. The full port design allows for unrestricted intake flow into the protected pipeline or tank.



Valves can be made to meet American Iron & Steel (AIS), Buy America, and Buy American upon request.



VENT-O-MAT®

Series RBX

PRODUCT HIGHLIGHTS

Four Functions in one:

- * Initial air release
- * Continuous air release
- * Vacuum Break
- * Surge protection / anti-shock

Full port design for maximum pipeline protection under vacuum condition

Stainless steel construction, HDPE floats

No maintenance required

Up to 1000 psi maximum pressure designs

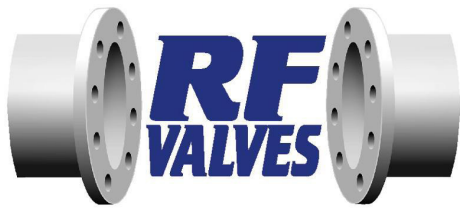
10 year warranty


NSF/ANSI 61 Certified



**Certified to
NSF/ANSI 61 & 372**






 RF Valves, Inc.
1342 Charwood Road
Suite A
Hanover, MD 21076 USA


 1.410.850.4404


 1.410.850.4464


 contact@rfvalve.com
www.rfvalve.com

Global Offices

 DFC
32 Lincoln Road
Benoni South, South Africa

 RF OY
Tullitie 11
53500 Lappeenranta, Finland

 Vent-o-mat Australia
5 Vangeli Street
Arndell Park NSW 2148, Australia

 DFC Brazil
Rua Álvaro da Silveira
40 – Santa Margarida
Belo Horizonte – Minas Gerais
Brasil

Local Representative

