

**VENT-O-MAT<sup>®</sup>**

**SERIES RBXc**

**AIR RELEASE VALVES**

**OWNER'S MANUAL**

**SPECIFICATIONS AND  
OPERATION MANUAL**

# Series RBXc

## OPERATION

### PRE NOTES:

#### 1. VENTING OF A FILLING PIPELINE:

The operation of a kinetic air release valve is such that fast approaching water is almost instantaneously halted by the valve's closure without the shock cushioning benefit of any retained air in the pipeline. Consequently a transient pressure rise or shock of potentially damaging proportions can be generated in a pipeline system, even at normal filling rates.

In addition to venting through the Large Orifice (1) when water approach velocities are sub critical, the Vent-O-Mat series RBXc air release valves feature an automatic 'Anti-Shock' Orifice (8) device that serves to decelerate water approaching at excessive speed, thereby limiting pressure rise to a maximum of 1.5 x rated working pressure of the valve.

#### 2. SURGE ALLEVIATION - PIPELINE PRESSURIZED:

In instances where a pipeline experiences water column separation due to pump stoppage, high shock pressures can be generated when the separated water column rejoins.

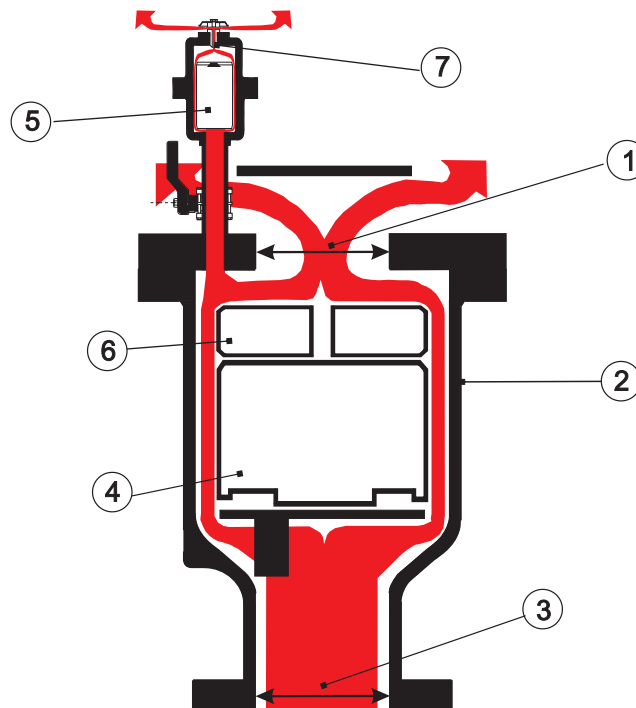
The Vent-O-Mat series RBXc takes in air through the unobstructed large orifice when water column separation occurs, but controls the discharge of air through the 'Anti-Shock' Orifice (8) as the separated column commences to rejoin. The rejoining impact velocity is thereby sufficiently reduced to prevent an unacceptably high surge pressure in the system. In the same way the series RBXc valve prevents high surge pressures resulting from liquid oscillation in a pipeline.

#### 3. PRESSURIZED AIR RELEASE FROM A FULL PIPELINE:

Effective discharge by the valve of pressurized air depends on the existence of a 'CRITICAL RELATIONSHIP' between the area of the Small Orifice (7) and the mass of Lower Float (4), i.e. the mass of the float must be greater than the force created by the working pressure acting on the orifice area. If the float is relatively too light or the orifice area relatively too great, the float will be held against the orifice, even when not buoyed, and air discharge will not be effected.

To ensure that the correct 'CRITICAL RELATIONSHIP' exists the requisite 'DROP TEST' must be applied to any air release valve which is intended for discharge of pressurized air.

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

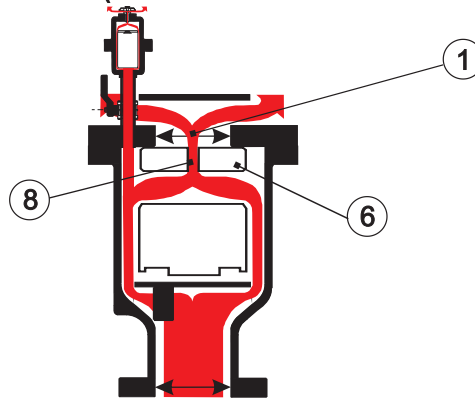


Air enters Orifice (3), travels through the annular space between the cylindrical floats (4), (5), and (6) and the valve Chamber (2) and discharges from the Large Orifice (1) into atmosphere.

# Series RBXc

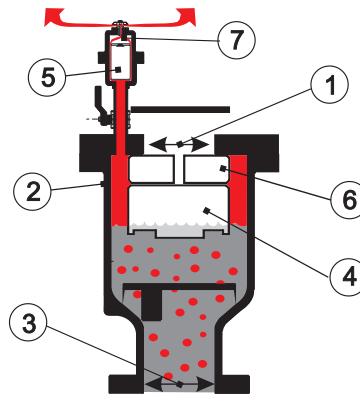
## OPERATION

### VENTING OF A FILLING PIPELINE (EXCESSIVE WATER APPROACH VELOCITY)



In reaction to increased air flow, the “Anti-Shock” 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. **Attention is drawn to Pre Note 1 and 2 on page 1.**

### PRESSURIZED AIR RELEASE FROM A FULL PIPELINE

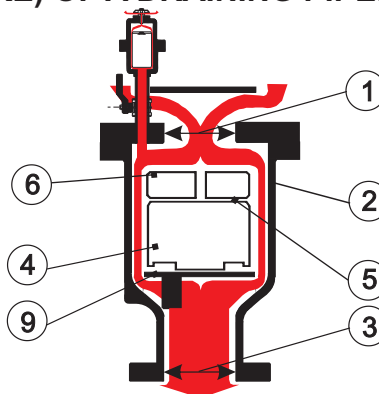


Subsequent to the filling of a pipeline, liquid enters the valve Chamber (2) and the Floats (4), (5) and (6) are buoyed so that the Large Orifice (1) is closed by the “Anti-Shock” Float (6), the valve will then become internally pressurized. A minimal working pressure of < 0.5 bar (7.3 psi) acting on the relatively large area of the Orifice (1) will lock the “Anti-Shock” 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 (5) 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 and Float (5) re-seals the Small Orifice (7) and prevents the escape of liquid.

**Specific attention is drawn to pre note 3 on page 1.**

### 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.

### COMPONENT DESCRIPTION & MATERIAL SPECIFICATION FLANGED - DN250 (10") & DN300 (12")

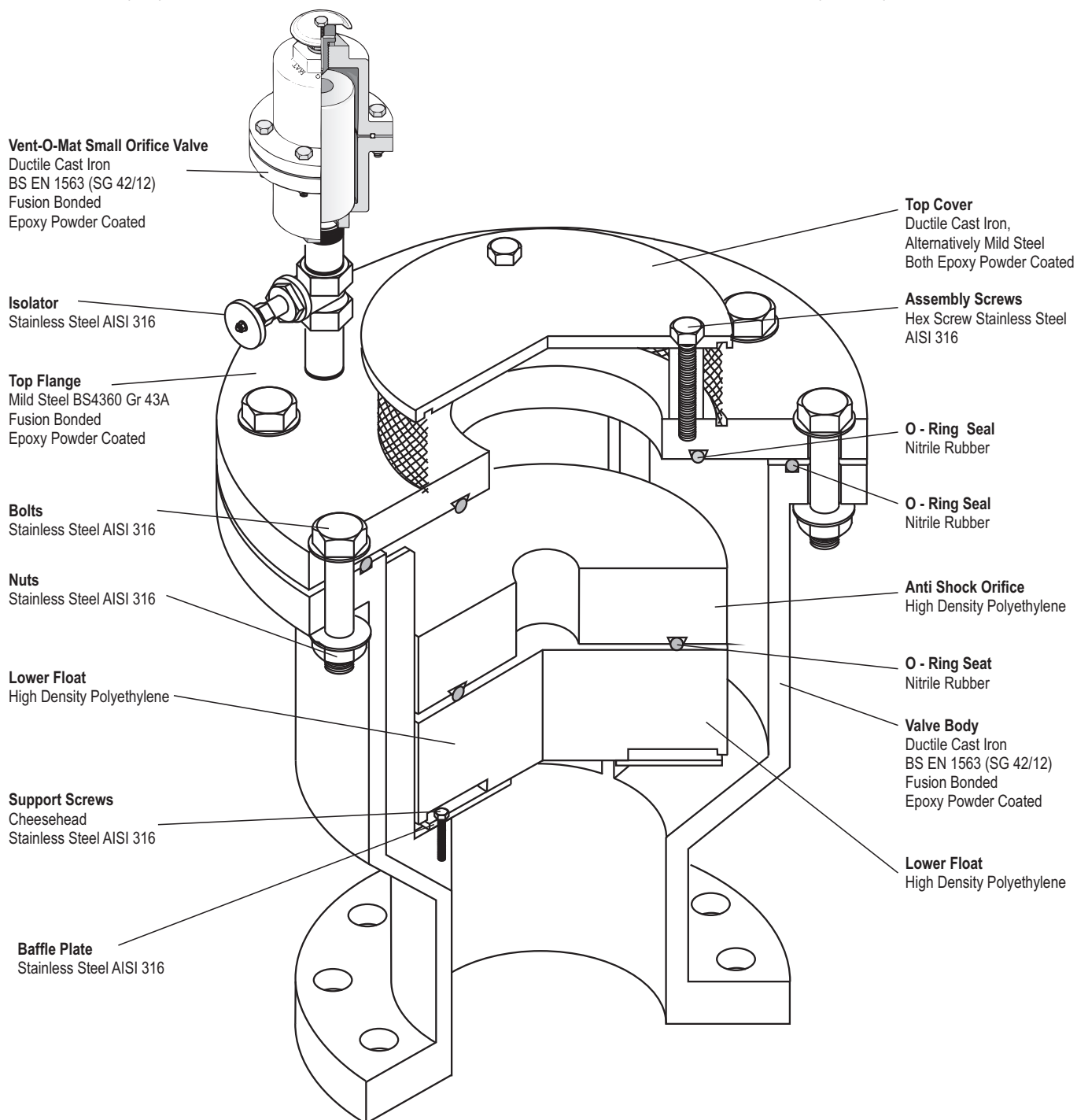
**Type:**  
Series RBXc - Double Orifice (Small & Large Orifice)  
with Anti Shock Orifice Mechanism

**End Connection:**  
Flanged

**Nominal Sizes:**  
DN250 (10")  
DN300 (12")

**Model No's:**  
RBXc 1601 & 1631 \_\_\_\_\_ PN16 (232 psi)  
RBXc 2501 & 2531 \_\_\_\_\_ PN25 (363 psi)

**Pressure Ratings:**



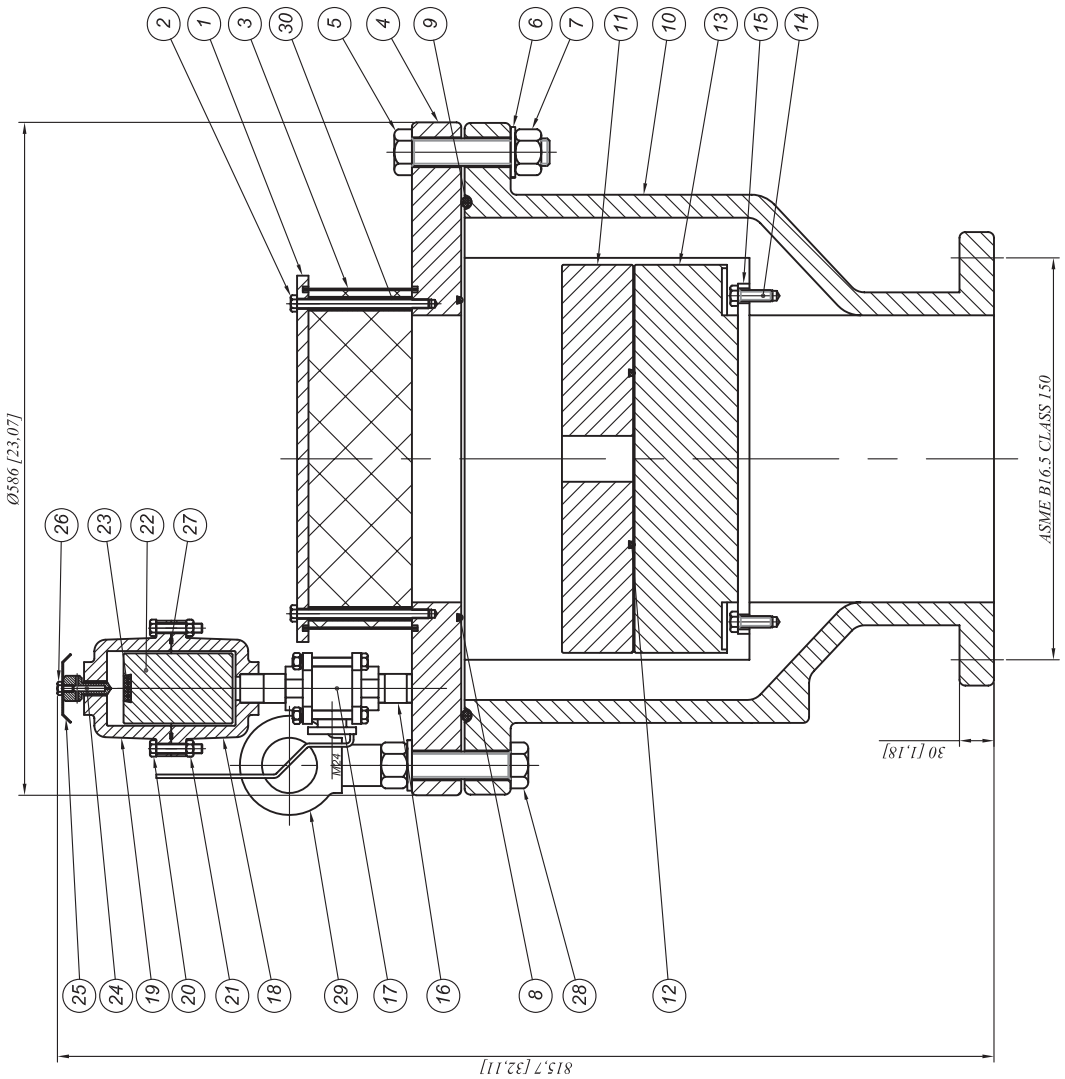
# VENT-O-MAT

TITLE:  
DN250 (10") - PN16 (232psi) VENT-O-MAT  
SERIES RBX DBL ACTING AIR VALVE

DRAWN: D.D. DATE: 04/09/2007 CHECKED: L.H. DATE: 04/09/2007

SCALE: 1:4	A3	PROJECTION: 1 ST. ANGLE	2 2ND ANGLE
REV.	DATE	SIGN	DESCRIPTION

NOTE:  
1. DIMENSIONS IN BRACKETS ARE IN INCHES.  
2. BOTH INTERNAL AND EXTERNAL SURFACES ARE COATED WITH FUSION BONDED EPOXY TO APPROX 9mil THICK.



DN mm (in)	MODEL No.	WEIGHT kg (lb)
250 (10")	250RBXc1631	230 (507)

ITEM	QTY	DESCRIPTION	MATERIAL
1	1	250RBXc TOP COVER	M/STEEL F.B.E.
2	4	TOP COVER SCREWS	GALVANISED M/STEEL
3	1	250RBXc SCREEN MESH	S/ STEEL 304
4	1	250RBXc TOP FLANGE	DUCTILE CAST IRON F.B.E.
5	10	FLANGE BOLTS	GALVANISED M/STEEL
6	12	M24 WASHERS	GALVANISED M/STEEL
7	12	M24 NUTS	GALVANISED M/STEEL
8	1	270 x 5 O-RING SEAL	E.P.D.M. (NSF61)
9	1	438 x 9 O-RING SEAL	E.P.D.M. (NSF61)
10	1	250RBXc BODY	DUCTILE CAST IRON F.B.E.
11	1	250RBXc ANTI SHOCK FLOAT	WHITE HDPE
12	1	140 x 5 O-RING SEAL	E.P.D.M. (NSF61)
13	1	250RBXc LOWER FLOAT	WHITE HDPE
14	4	BAFFLE PLATE SCREWS	S/ STEEL 316
15	1	250RBXc BAFFLE PLATE	M/STEEL F.B.E.
16	1	1" BSP NIPPLE	S/ STEEL 316
17	1	1" BSP BALL VALVE	S/ STEEL 316
18	1	25RC LOWER CASTING	DUCTILE CAST IRON F.B.E.
19	1	25RC 1/2" LOWER CASTING	DUCTILE CAST IRON F.B.E.
20	6	25RC FLANGE BOLTS	GALVANISED M/STEEL
21	6	M8 NUTS	GALVANISED M/STEEL
22	1	25RC FLOAT - 16 BAR	WHITE HDPE
23	1	NOZZLE SEAT	E.P.D.M. (NSF61)
24	1	NOZZLE	S/ STEEL 316
25	1	NOZZLE CAP	S/ STEEL 316
26	1	NOZZLE CAP SCREW	S/ STEEL 316
27	1	80 x 3 O-RING SEAL	E.P.D.M. (NSF61)
28	2	FLANGE BOLTS	GALVANISED M/STEEL
29	2	M24 EYE BOLT	GALVANISED M/STEEL
30	4	TOP COVER SPACERS	NYLON
31			

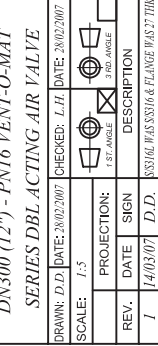
# VENT-O-MAT

## VENT-O-MAT

TITLE: **DN300 (12") - PN16 VENT-O-MAT**  
**SERIES DBL-ACTING AIR VALVE**

DRAWN: D.D. [DATE: 20/02/2007] CHECKED: L.H. [DATE: 20/02/2007]  
 SCALE: 1:5  
 PROJECTION: 1<sup>ST</sup> ANGLE 2<sup>ND</sup> ANGLE  
 REV. DATE SIGN DESCRIPTION  
 1 14/03/07 D.D. 85316G MASSIVE & FLANGE HAS 27mm

12 11 10 9 8 7 6 5 4 3 2 1



NOTE  
 1. DIMENSIONS IN BRACKETS ARE IN INCHES

DN mm (in)	MODEL No.	WEIGHT kg (lb)
300 (12")	300RBxc1631	315 (694)

ITEM	QTY	DESCRIPTION	MATERIAL
1	1	300RBxc TOP COVER	M/STEEL F.B.E.
2	4	TOP COVER SCREWS	S/STEEL 304
3	1	300RBxc SCREEN MESH	S/STEEL 304
4	1	300RBxc UPPER FLANGE	M/STEEL F.B.E.
5	14	FLANGE BOLTS	S/STEEL 304
6	16	M24 WASHERS	S/STEEL 304
7	16	M24 NUTS	S/STEEL 304
8	1	340 x 5 O-RING SEAL	E.P.D.M.
9	1	546 x 10 O-RING SEAL	E.P.D.M.
10	1	300RBxc BODY	DUCTILE CAST IRON F.B.E.
11	1	300RBxc ANTI SHOCK FLOAT	WHITE HDPE
12	1	140 x 5 O-RING SEAL	E.P.D.M.
13	1	300RBxc LOWER FLOAT	WHITE HDPE
14	4	BAFFLE PLATE SCREWS	S/STEEL 316L
15	1	300RBxc BAFFLE PLATE	S/STEEL 316L
16	2	1" BSP NIPPLE	S/STEEL 316L
17	1	1" BSP BALL VALVE	S/STEEL 316L
18	1	25RC LOWER CASTING	DUCTILE CAST IRON F.B.E.
19	1	25RC 1/4" LOWER CASTING	DUCTILE CAST IRON F.B.E.
20	6	25RC FLANGE BOLTS	S/STEEL 304
21	6	M8 NUTS	S/STEEL 304
22	1	25RC FLOAT - 16 BAR	WHITE HDPE
23	1	NOZZLE SEAT	NATURAL RUBBER
24	1	NOZZLE	S/STEEL 316L
25	1	NOZZLE CAP	S/STEEL 316L
26	1	NOZZLE CAP SCREW	S/STEEL 316L
27	1	80 x 3 O-RING SEAL	E.P.D.M.
28	2	FLANGE BOLTS	S/STEEL 304
29	2	M24 EYE BOLT	GALVANISED M/STEEL

300RBxc1631 300RBxc1631 S6T TYPE: 300RBxc1631 S6T DRG NO./GA REF. NO. SHEET: 1 OF 1

## **SURGE & WATERHAMMER PROTECTION**

### **Introduction**

The Vent-O-Mat Series RBXc "Anti-Shock" air release and vacuum break valve, is the product of extensive research into the development of an efficient, but cost effective solution to surge problems (both mass liquid oscillation and elastic transient phenomena) associated with any operating pipeline. Automatic dampening, relevant to the pipeline's needs is provided by either one of two design features. These special features are unique in a pipeline component of such compact and economic design.

### **Surge Protection - Initial Filling**

The RBXc incorporates the additional floating "Anti-Shock" Orifice which is aerodynamically engineered to throttle air discharge when water approach velocity would otherwise become too great and induce an unacceptable pressure rise. The air throttling action increases resistance to the flow of the approaching water which consequently decelerates to a velocity which reduces the pressure rise when the valve closes (see operation of valve on pages 1 & 2). Vent-O-Mat series RBXc is an essential precaution for pipeline priming.

### **Surge Protection - Pump Trip Conditions**

In instances where a pipeline experiences water column separation due to pump stoppage, high shock pressures can be generated when the separated water column rejoins.

The Vent-O-Mat series RBXc takes in air through the unobstructed large orifice when water column separation occurs, but controls the discharge of air through the "Anti-Shock" Orifice as the separated column commences to rejoin. The rejoining impact velocity is thereby considerably reduced to alleviate high surge pressures in the system (see operation of valve on pages 1 & 2).

Other surge control measures may, dependant on pipeline profile, diameter and operating conditions, be needed to provide the primary surge alleviation function with the Vent-O-Mat air-valves forming an integral and valuable addition in a combined strategy for further reducing surge pressures. The benefit of the "Anti-Shock" Orifice can be readily demonstrated by suitable surge modeling software.

### **Surge Protection - Pipeline Operating**

The operation of valves and similar flow control devices can cause high-pressure transients in an operating pipeline.

The unique, single chamber design of the Vent-O-Mat series RBXc valve enables a pocket of air to be trapped in the valve chamber. Automatic operation of the small orifice control float regulates the volume of air entrapped.

The volume maintained in the valve will provide a cushioning benefit to the pipeline for short duration transient pressure "spikes". This effect can be modelled by the design engineer using suitable surge software

## **SURGE & WATERHAMMER PROTECTION**

### **Computer Modelling**

The effectiveness of Vent-O-Mat series RBXc has been substantiated by independent third party testing and by thousands of applications globally. Effective computer modelling, based on practical tests, has been ensured in the well-known and respected commercially available **SURGE 2000** surge analysis software programme. Accurate results are also obtained by other commercially available surge analysis software programmes such as FLOWMASTER and TRANSAM.

### **Holistic Surge & Water Hammer Protection**

Vent-O-Mat forms an integral part of a well planned, holistic surge protection strategy that should, according to application needs and financial constraints, include surge vessels, check valves, control valves and/or any other equipment needed to alleviate unacceptable surge behaviour.

### **Technical and Financial Benefits**

The Vent-O-Mat series RBXc valve offers definite financial and technical advantages when incorporated as part of a holistic surge protection strategy. This includes:

1. Improved alleviation of surge behaviour including reduction of:
  - Surge pressure magnitudes by slowing surge velocities
  - Duration of oscillation following a pump trip, as the air-valve continuously absorbs and dissipates the energies of the surge.
2. Potential for reduction in size and/or quantity of conventional surge protection devices such as surge vessels etc.
3. Automatic protection during initial filling when most surge protection devices are not operational.
4. Holistic protection as each air valve installed has design features to automatically damp surges.
5. The valve is virtually maintenance free.

### **Service**

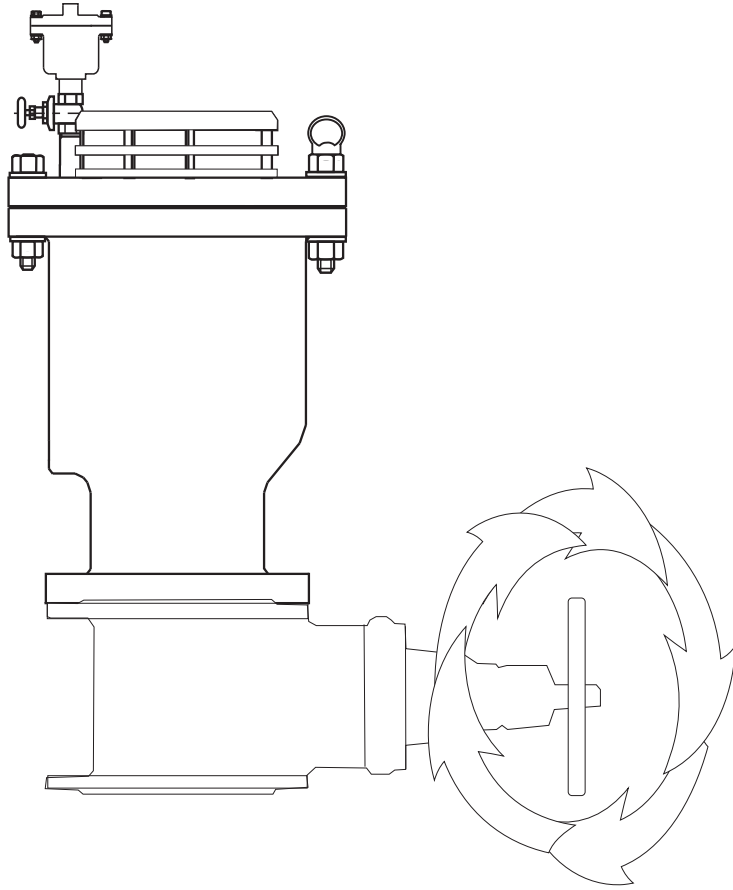
Vent-O-Mat is committed to finding the most cost effective and efficient solution to pipeline complexities. Services include air valve sizing and positioning and assistance to consulting engineers on defining appropriate surge and water hammer protection strategies. Vent-O-Mat has built a sound relationship with many international consulting firms and has gained global recognition for selling solutions!



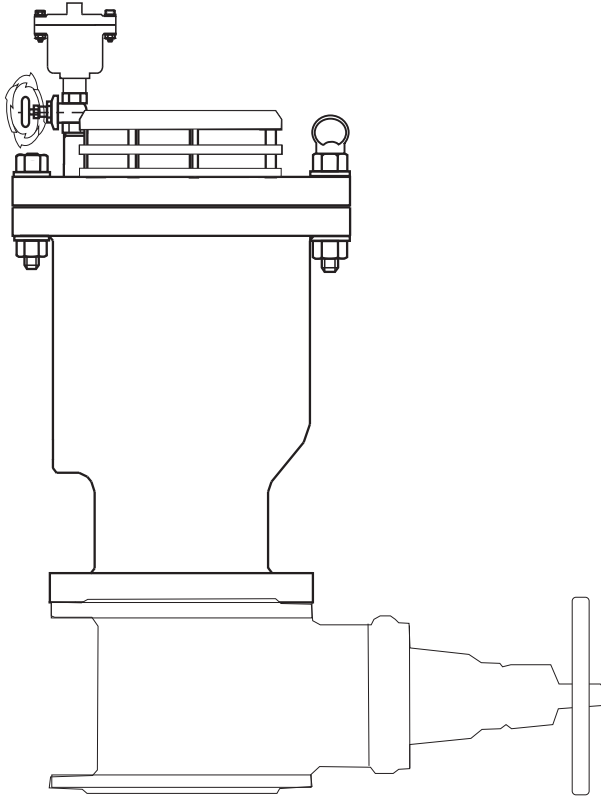
**Why ?**

- **"ANTI - SHOCK" - "ANTI - SURGE"** - The RBXc is the only air release valve available that is supplied as standard with a mechanism which operates automatically to prevent pipeline damage from the high induced pressure transients associated with high velocity air discharge. Surge resulting from liquid column separation and liquid oscillation is dramatically reduced as an automatic function of this mechanism.
- **PERFORMANCE** - The RBXc has been designed and developed to provide the optimum usable and safe performance relative to all functions. Selection data has been substantiated through CSIR and other testing and can therefore, be confidently referenced.
- **QUALITY** - The RBXc economically offers the highest quality construction and materials available in an air release and vacuum break valve. Stringent manufacturing and test procedures are maintained to ensure the best possible service and reliability is given by every valve produced.
- **SERVICEABILITY** - The RBXc design facilitates extreme ease of service and maintenance. Components are in corrosion free materials to allow problem free disassembly and reassembly even after many years of operation. All maintenance spares are replaceable without special tools or skills.
- **VACUUM BREAK** - The RBXc series large orifice diameters equal the nominal size of the valve, i.e., a 200mm (8") valve has a 200mm (8") orifice. This ensures the least possible resistance to the intake of air and consequently the least possible negative pressure within a draining pipeline.
- **COMPACTNESS** - Although extremely robust the RBXc valve's lightweight and compact construction offers handling transport and installation advantages.
- **BACK UP** - Vent -O- Mat provides highly committed customer orientated sales, service, spares and technical back up - TRY US!!!

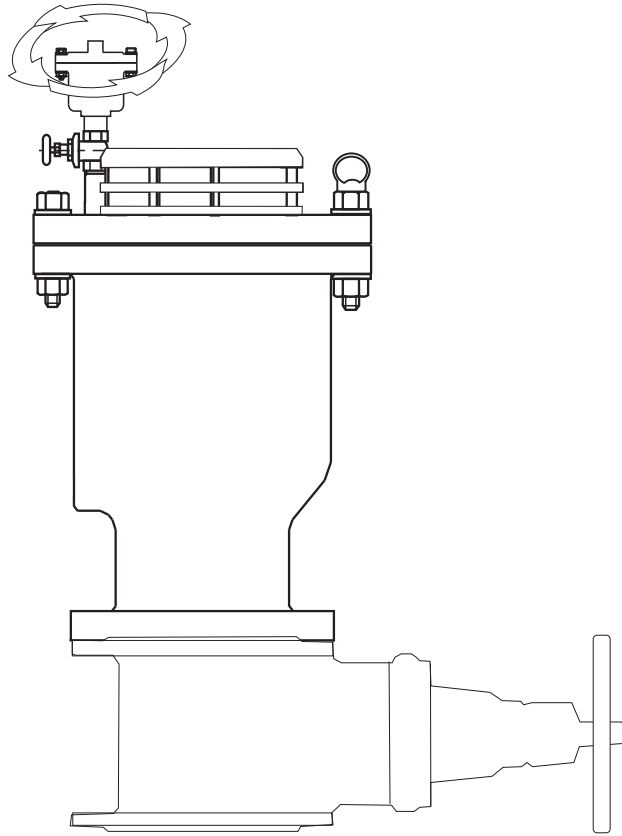
## Maintenance



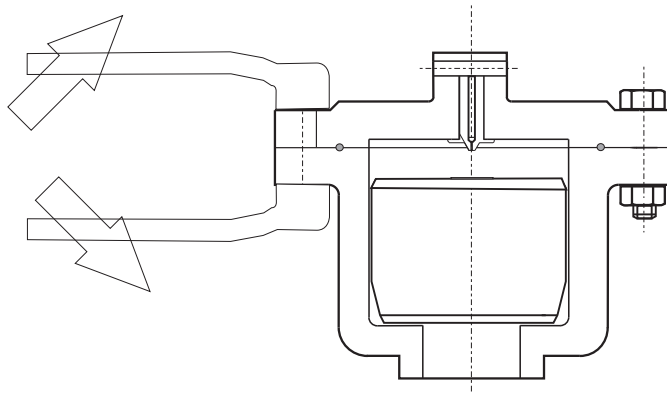
Step One : Isolate Air Valve



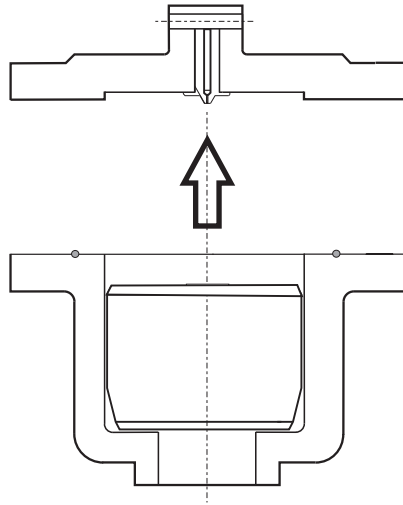
Step Two Isolate Small Orifice Valve



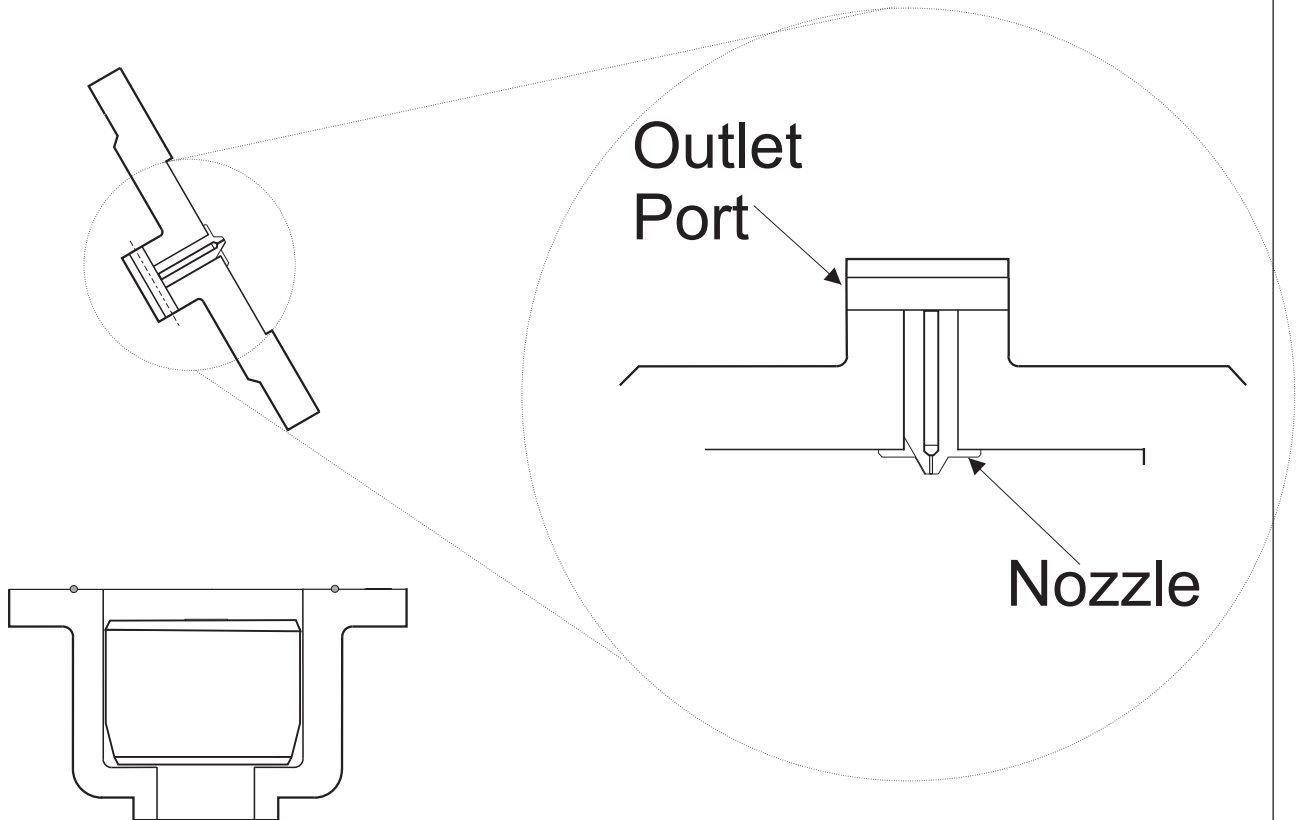
Step Three: Remove Small orifice valve



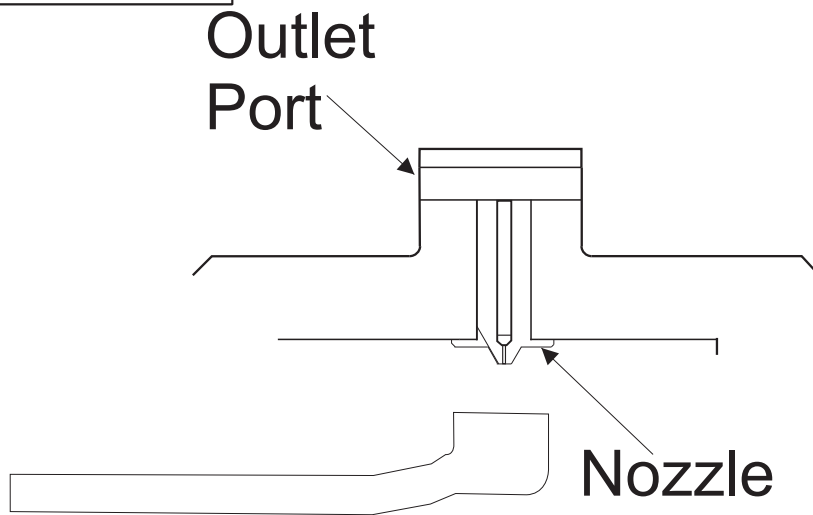
Step Four Remove Nuts and bolts from Small Orifice Valve.



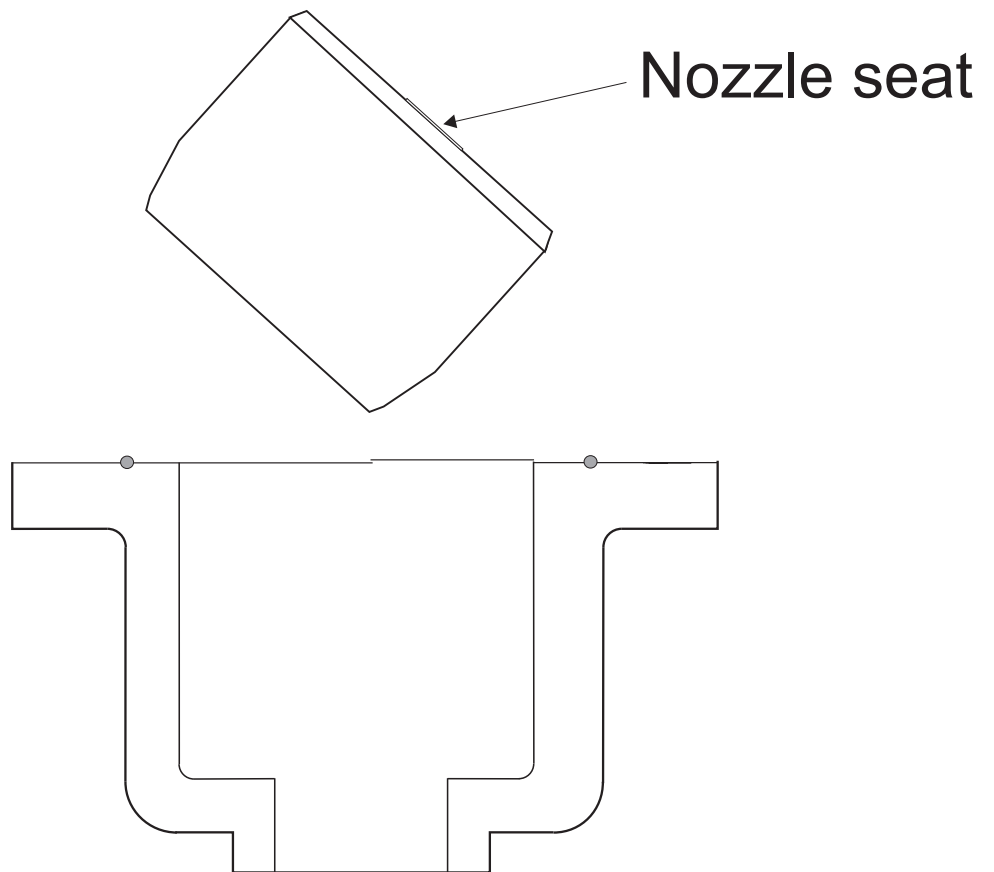
Step Five: Remove Top Cover from Small orifice Valve.



Step Six : Check nozzle and outlet port are clear and free of debris.

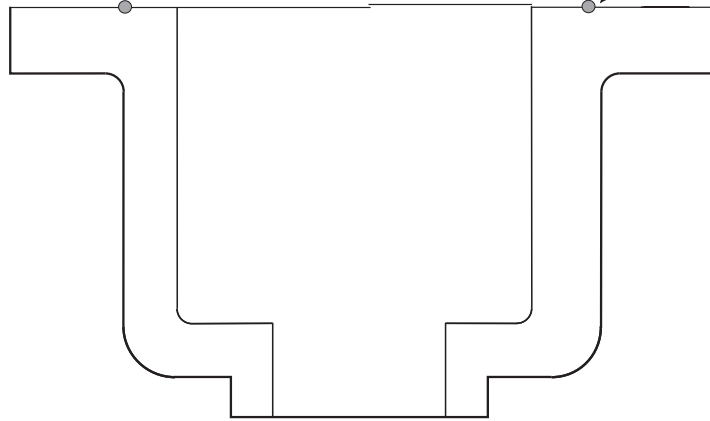


Step Seven: If the Nozzle is damaged remove and replace with nozzle from spares kit.



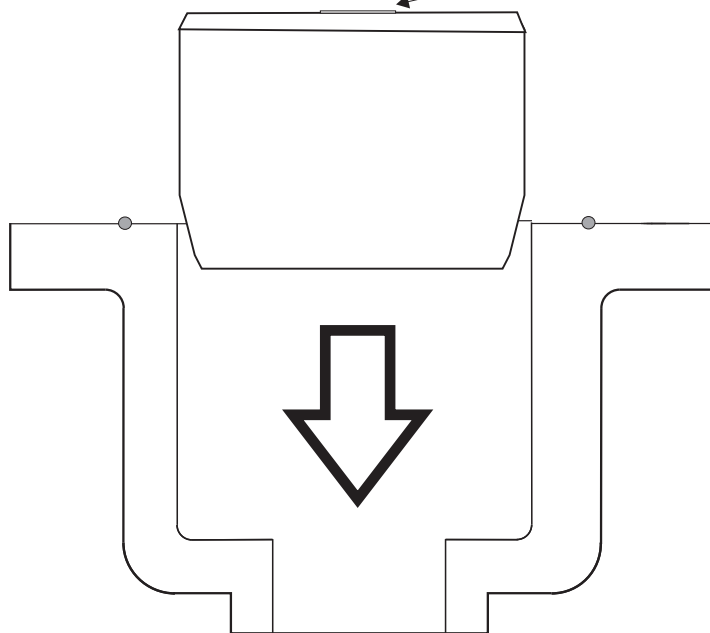
Step Eight Check the Nozzle seat for damage if any is apparent remove and replace with seat from spares Kit

O'ring Seal

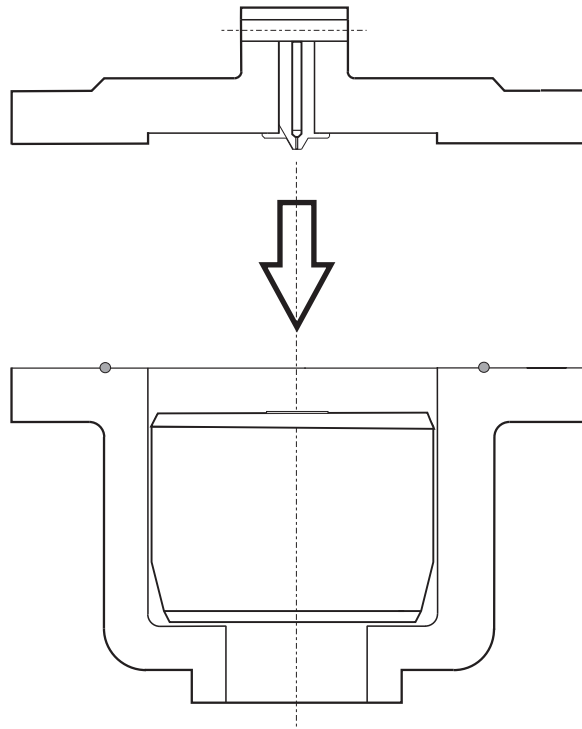


Step nine: Check the O'ring seal for damage and if necessary replace with o' ring from spares kit.

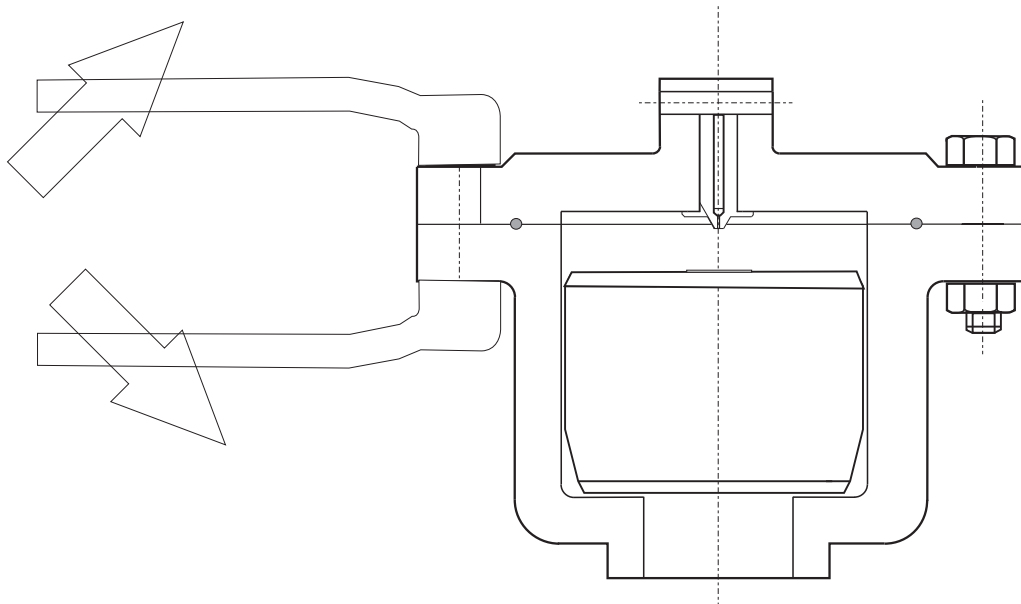
Nozzle seat



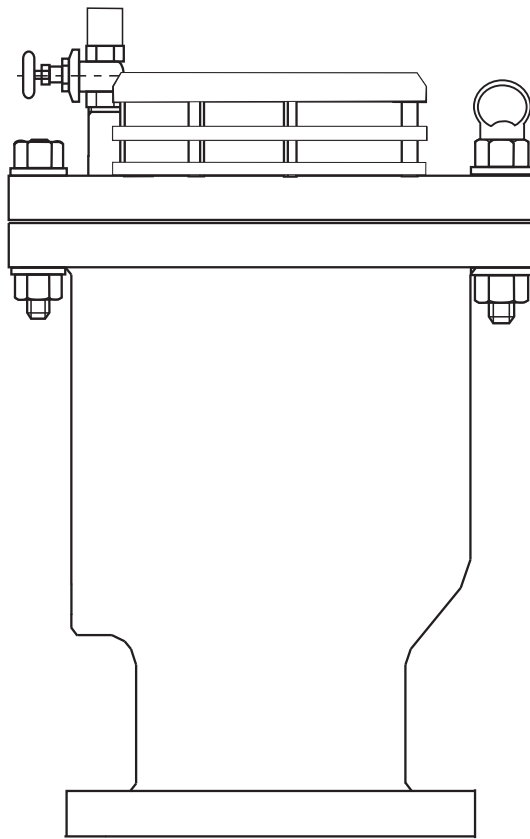
Step Ten: Replace float making sure nozzle seat is facing upward



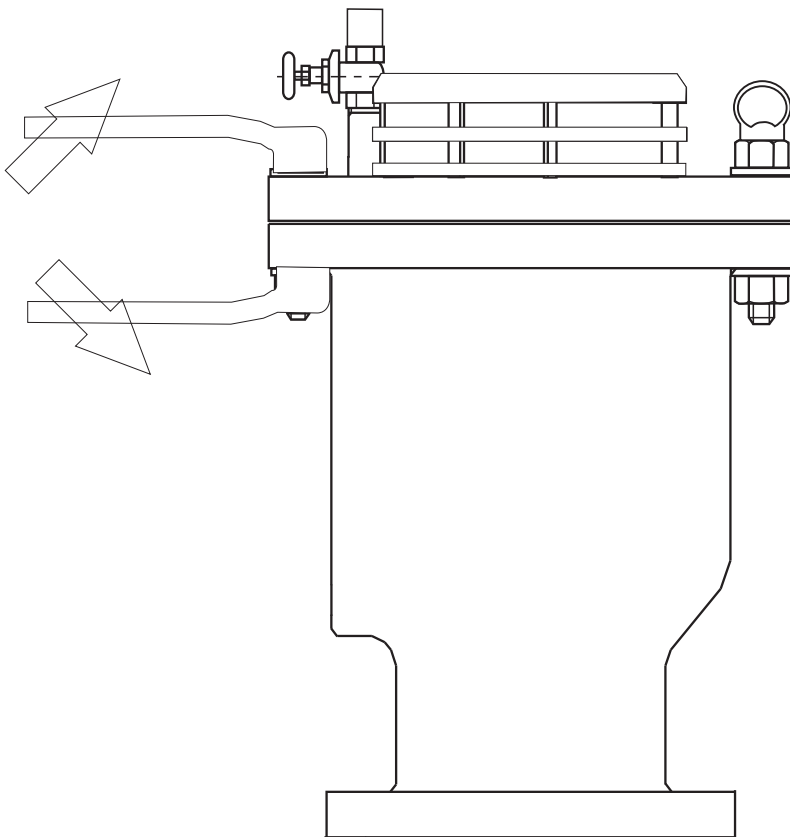
Step Eleven: replace top cover making sure the o'ring is in the groove and remains in place when the top cover is put in place



Step Twelve: Replace nuts and bolts cross tighten nuts

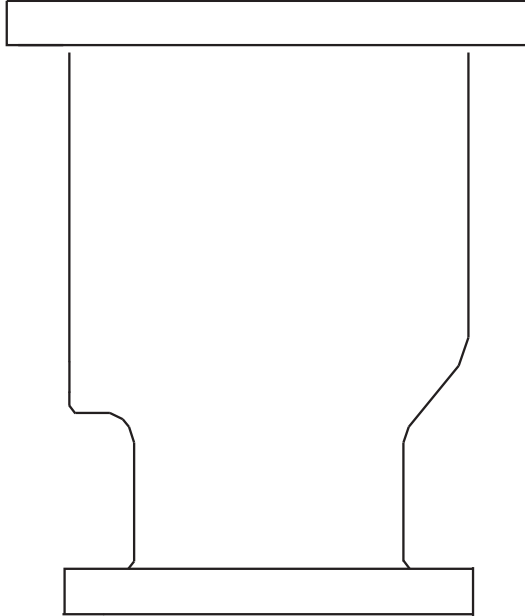
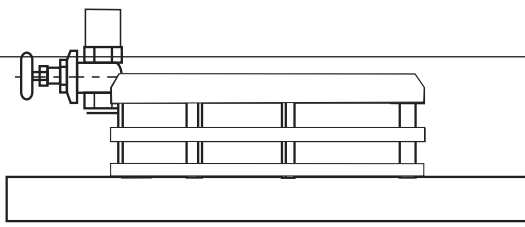


Step Thirteen: Before removing the top cap any excess pressure that may be trapped within the Valve body may be safely released using the small orifice Isolating valve by slowly opening the isolating valve ensure that the main Isolator is fully closed before doing this.

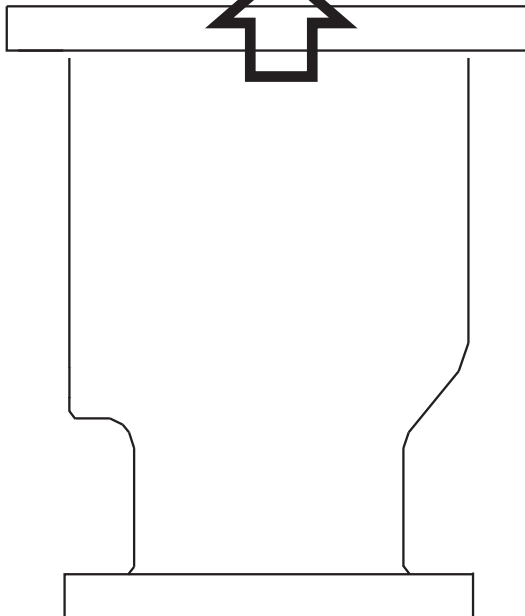
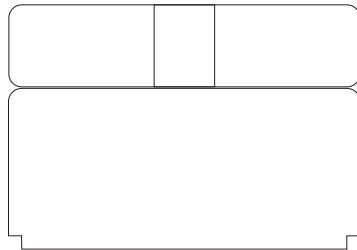


Step fourteen: Loosen nuts and bolts.

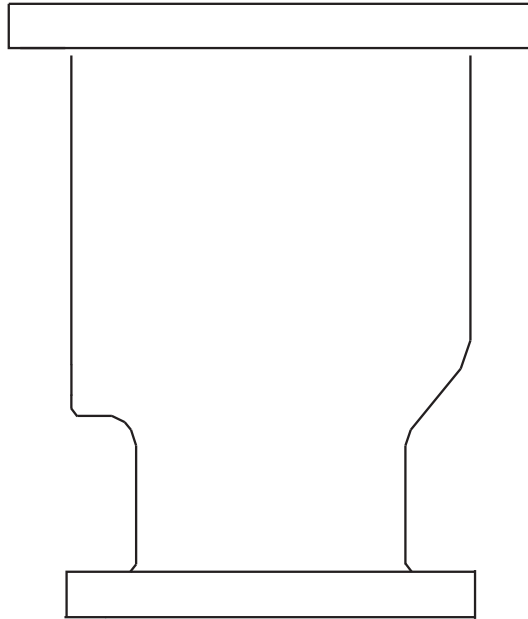
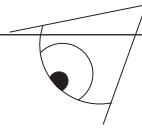




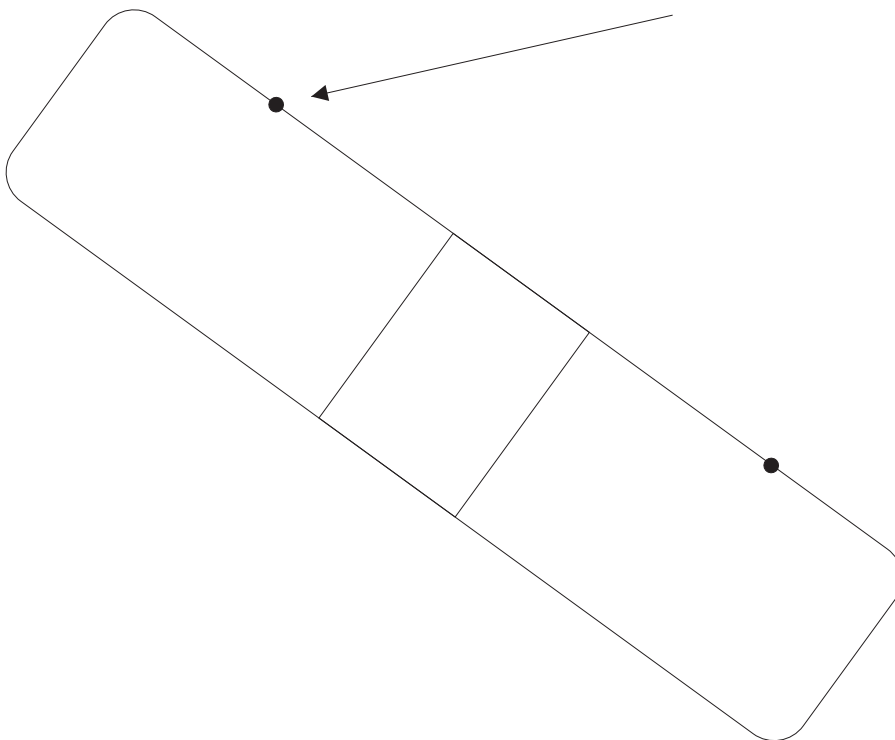
Step fifteen: Remove Top flange assembly



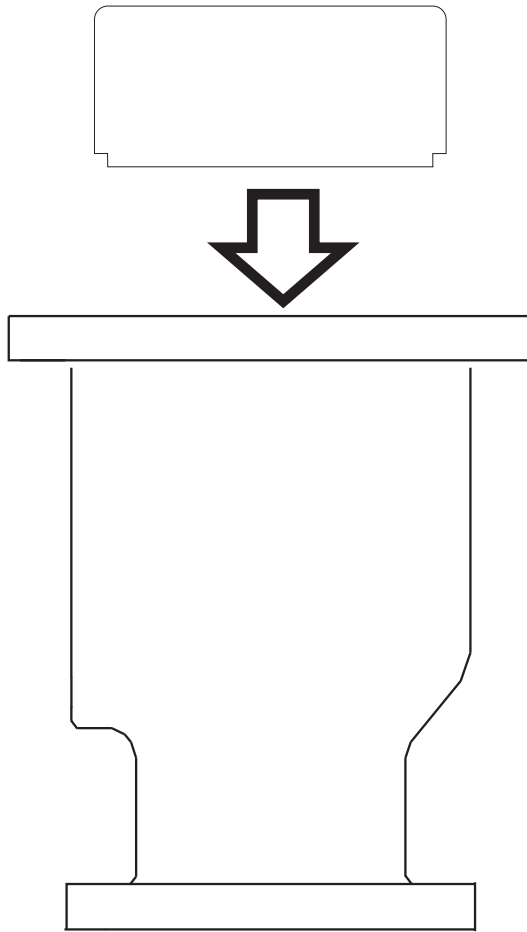
Step Sixteen: Remove Floats from Valve Body



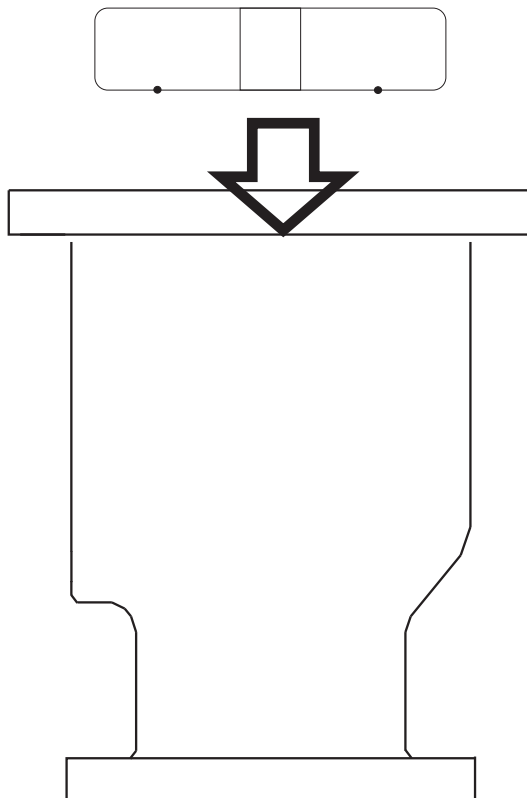
Step Seventeen : Check that the internals of the valve body are free from debris



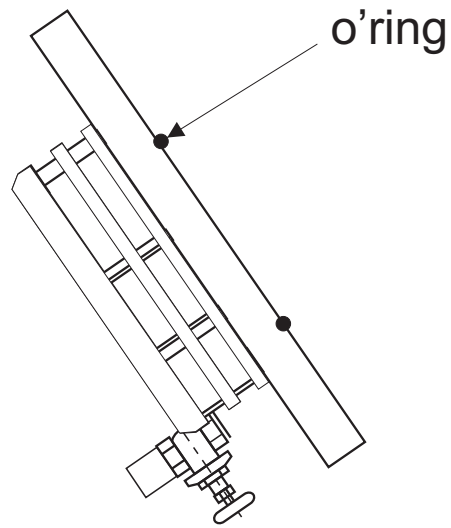
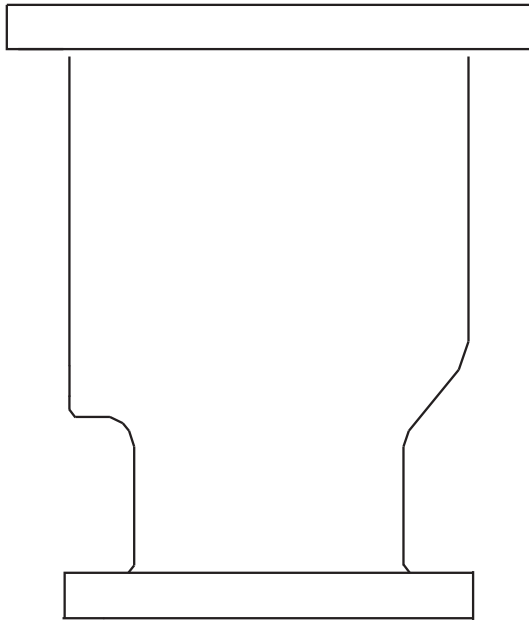
Step Eighteen: Check the O’ring on the “Anti-Shock float for damage replace with O’ring in spares kit if necessary.



Step nineteen: Replace lower float making sure that the lip on the float touches the baffle plate at the bottom of the valve and the flat face of the float is facing upwards.

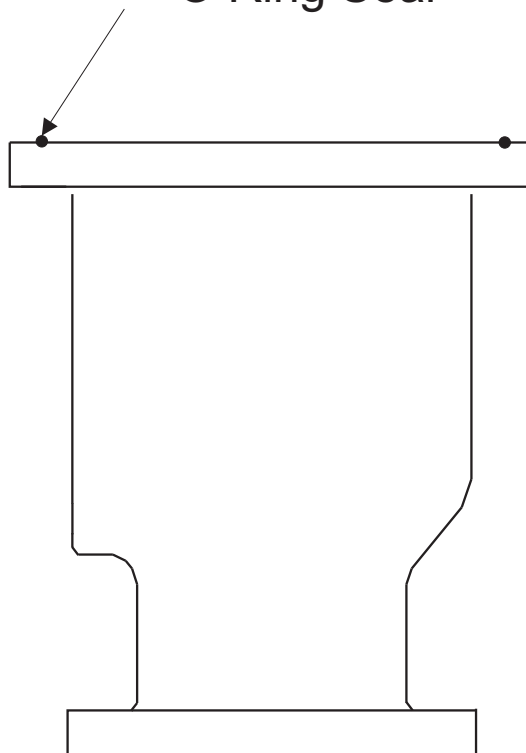


Step Twenty: Replace the "Anti-Shock Float" Making sure the O'ring is facing down and the flat face is facing up.

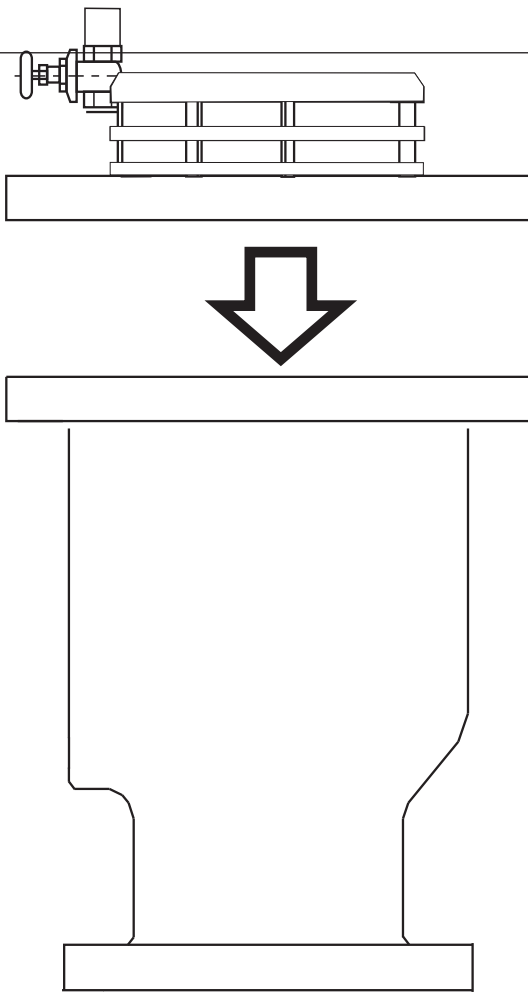


Step twenty one: Check o'ring in top flange assembly for damage and replace with O'ring from spares kit if necessary.

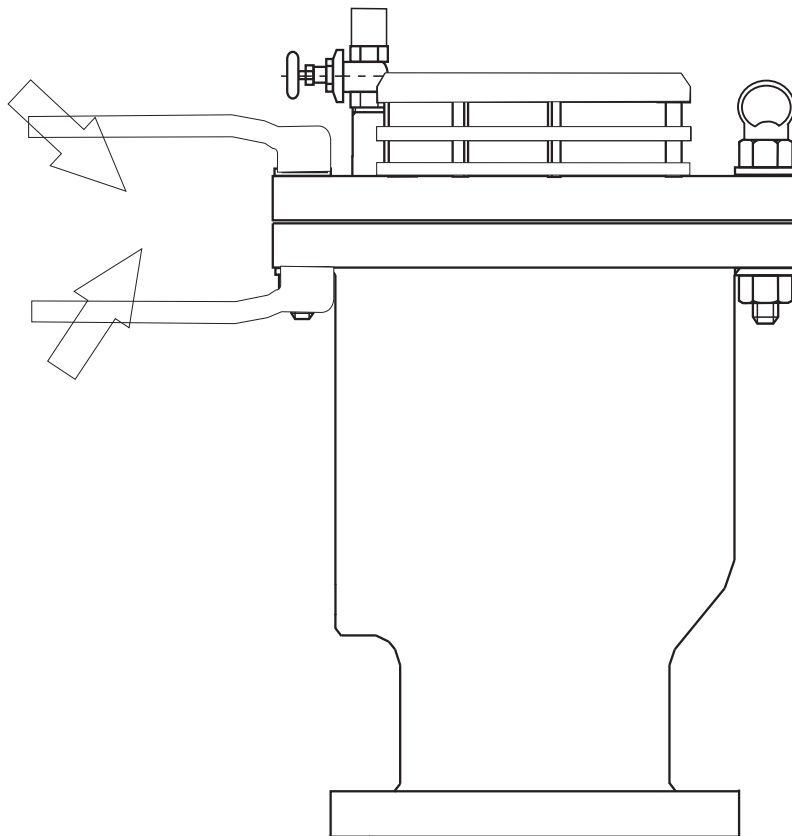
## O Ring Seal



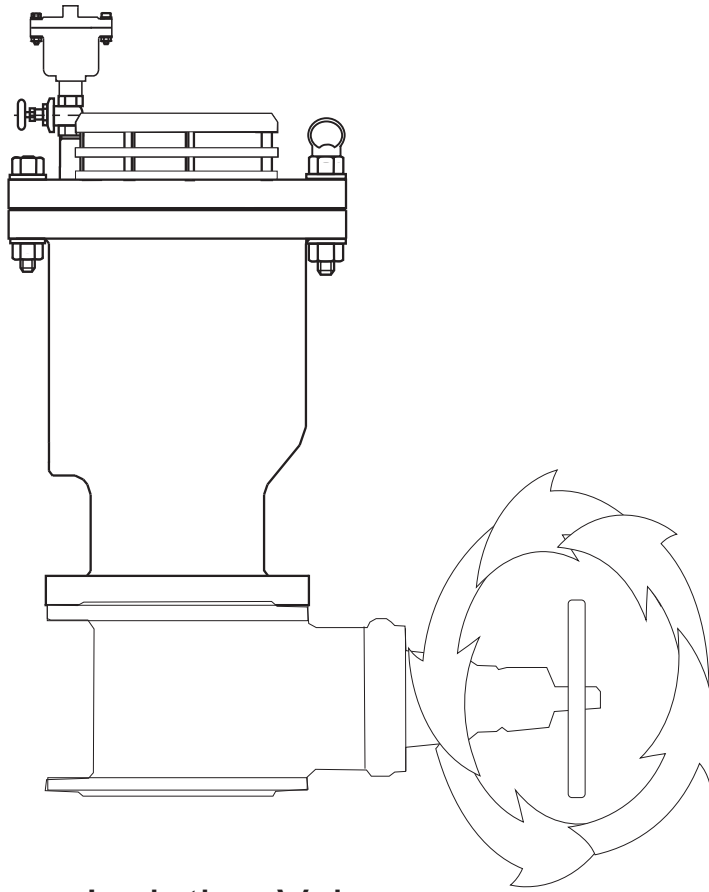
Step Twenty Two: Check o'ring seal for damage and replace with spare O'ring Seal provided in spares kit if necessary. Make Sure that it is properly placed in the groove before fitting Top flange assembly.



Step Twenty Three: Replace top flange assembly making sure not to disrupt the O'ring groove.



Step twenty four: replace nuts and bolts nuts and bolts must be cross tightened



Step Twenty Five: Open Isolating Valve.

**VENT-O-MAT<sup>®</sup>**

**SERIES RBXc**

**AIR RELEASE AND VACUUM BREAK VALVES**

**OWNER'S MANUAL**

**Distributed By:**

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