

# VENT-O-MAT®

## SERIES RPS

CATT AIR RELEASE & VACUUM BREAK VALVES  
FOR

INDUSTRIAL, IRRIGATION AND SMALL RETICULATION SYSTEMS



CONTROLLED AIR TRANSFER TECHNOLOGY AIR VALVES



## Series RPS CATT Air Release & Vacuum Break Valves

### VALVE OPERATION

#### PRE NOTES

The Vent-O-Mat range of Series RPS was developed in response to a demand for a compact and lightweight, general purpose range of air valves for irrigation and small reticulation systems. Incorporated in this unique design is the Vent-O-Mat "Anti-Shock" technology, which provides automatic surge damping regardless of flow and discharge conditions. In addition, the valve utilises a unique diaphragm and direct acting float system to provide the largest capacity air discharge, air intake and pressurised air release capability of any general purpose, small reticulation air valve design.

#### Large Volume Air Discharge - Sub Critical Water Approach Velocity

Air enters the large orifice flows around the annular area between the floats and the valve chamber and discharges into atmosphere.

#### Large Volume Air Discharge - Excessive Water Approach Velocity

In reaction to an increase in air velocity, the "Anti-Shock Cartridge" (1) closes the large orifice and air is forced through the annular orifices and discharged from the central orifice, resulting in a deceleration of the approaching liquid due to the resistance of air pressure in the valve.

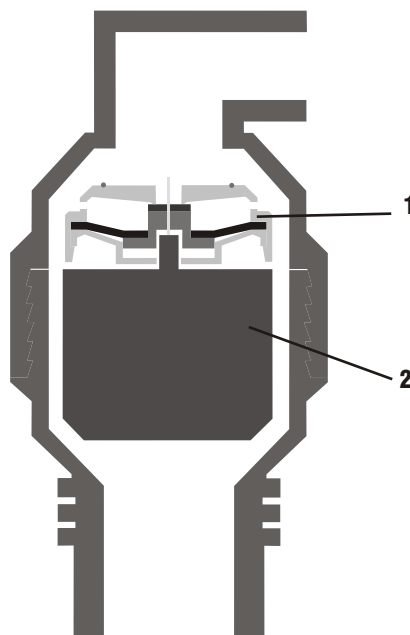
#### Pressurised Air Release

Subsequent to the filling of a pipeline, liquid enters the valve chamber and the "Anti-Shock Cartridge" (1), and Lower Float (2) are buoyed so that the large orifice is closed by the "Anti-Shock Cartridge" (1), the valve will then become internally pressurized.

Disentrained air rises through the liquid and accumulates in the valve chamber, when the volume of air is sufficient to displace the liquid, the Lower Float (2) will no longer be buoyant and will gravitate downwards thereby opening the small orifice and simultaneously relieve air in the lower float chamber, allowing accumulated air to force down the diaphragm and for air to be discharged into atmosphere. As air is discharged the liquid raises the Lower Float (2) and re-seals the small orifice and prevents escape of liquid

#### Vacuum Air Relief (Air Intake) - Pipeline Draining

Simultaneous drainage of liquid from the valve chamber causes the "Anti-Shock Cartridge" (1) and Lower Float (2) to gravitate downwards, thereby allowing atmospheric air through the valve to rapidly displace draining liquid in the pipeline and prevent potentially damaging internal negative pressure.



# VENT-O-MAT®

## Series RPS CATT Air Release & Vacuum Break Valves

### AIR VALVE SIZING

Air valves are first and foremost sized for vacuum conditions (drainage) which may result from scouring of the pipeline, pipeline rupture or instantaneous pump stoppage causing column separation.

The objective in sizing an air valve for vacuum conditions is to determine the smallest air release and vacuum break valve capable of admitting air into the pipeline whilst not exceeding a differential pressure that would put the pipeline and gasket joint at risk due to negative internal pressure.

Good pipeline design practice dictates that the following negative pressures not be exceeded for various pipe material to ensure that pipe collapse or seal failure does not occur.

Pipe Material	Recommended Negative Differential
Steel	0.35 bar
Ductile Iron	0.35 bar
Fibre Cement	0.35 bar
GRP	0.20 bar

Pipe Material	Recommended Negative Differential
uPVC	0.15 bar - 0.20 bar
HDPE	0.15 bar - 0.20 bar
Concrete	0.35 bar

Air valves are generally sized on scouring velocities or partial rupture to economise on the valve size selected. The following rupture rates (as a percentage of pipeline area), are generally used.

Pipeline Material Rupture Rate on which to base Size of Air Valve			
Steel	10 - 15 %	Ductile Iron	10 - 15 %
GRP	10 - 15 %	uPVC	10 - 20 %
Fibre Cement	50 - 100 %	HDPE	10 - 20 %

Scouring rates are generally 11 to 12% of pipeline area.

### Sizing of Air Valves for Air Discharge (Initial Filling Conditions) and/or Drainage Conditions

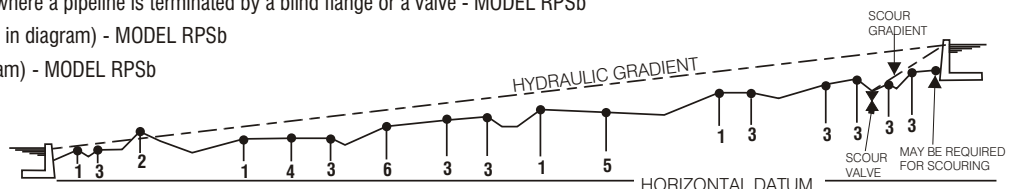
The unique 3 orifice design of the RPS valve ensures effective and efficient pipeline de-aeration regardless of initial filling velocities. This implies that sizing for discharge is only necessary if the pipeline is relatively flat and there are no defined peaks on the pipeline. Below is a quick sizing guide. Determine the flow rate or velocity in the pipeline due to drainage (vacuum) or initial filling and select the relevant valve from the table.

Pipeline Flow Velocity		Pipeline Dia.	Valve Size	Pipeline Flow		Pipeline Dia.	Valve Size
0.5 m/sec.	0.1 to 1.6 l/sec.	NB16 to Nb65	DN25	0.5 m/sec.	1.6 to 75 l/sec.	NB65 to NB450	DN50
1 m/sec.	0.1 to 1.6 l/sec.	NB16 to NB50	DN25	1 m/sec.	1.6 to 75 l/sec.	NB50 to NB350	DN50
1.5 m/sec.	0.1 to 1.6 l/sec.	NB16 to NB32	DN25	1.5 m/sec.	1.6 to 75 l/sec.	NB32 to NB250	DN50
2 m/sec.	0.1 to 1.6 l/sec.	Nb16 to NB25	Dn25	2 m/sec.	1.6 to 75 l/sec.	NB16 to NB200	Dn50

Below is a quick sizing guide. Determine the flow rate or velocity in the pipeline due to drainage (vacuum) or initial filling and select the relevant valve from the table.

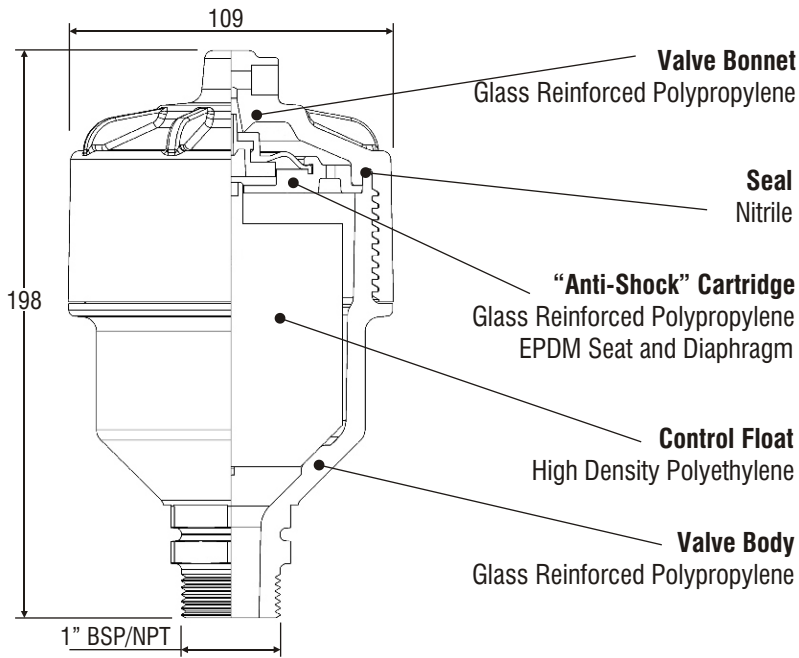
### AIR VALVE POSITIONING

1. ON APEX POINTS (relative to hydraulic gradient) - MODEL RPS
2. APEX POINTS ABOVE THE HYDRAULIC GRADIENT - MODEL RPSv
3. NEGATIVE BREAKS (increase in downward slope or decrease in upward slope) - MODEL RPS
4. LONG HORIZONTAL SECTIONS - every 600 metres (1/3 of a mile) maximum -MODEL RPS
5. LONG ASCENDING SECTIONS - every 600 metres (1/3 of a mile) maximum - MODEL RPS
6. LONG DESCENDING SECTIONS - every 600 metres (1/3 of a mile) maximum - MODEL RPS
7. PUMP DISCHARGE (not shown in diagram) - just subsequent to non return valve - MODEL RPSb
8. BLANK ENDS (not shown in diagram) - where a pipeline is terminated by a blind flange or a valve - MODEL RPSb
9. PRIOR TO WATER METERS (not shown in diagram) - MODEL RPSb
10. ON TOP OF TANKS (not shown in diagram) - MODEL RPSb



# VENT-O-MAT®

## Series RPS CATT Air Release & Vacuum Break Valves MATERIALS OF CONSTRUCTION & OVERALL DIMENSIONS



**Valve Model No:**  
025 RPS 1611 (BSP)    025 RPS 1621 (NPT)

**Valve Size:**  
DN25

**Pressure Rating:**  
PN16

**Operating Pressure Range:**  
0.2 Bar to 16 Bar

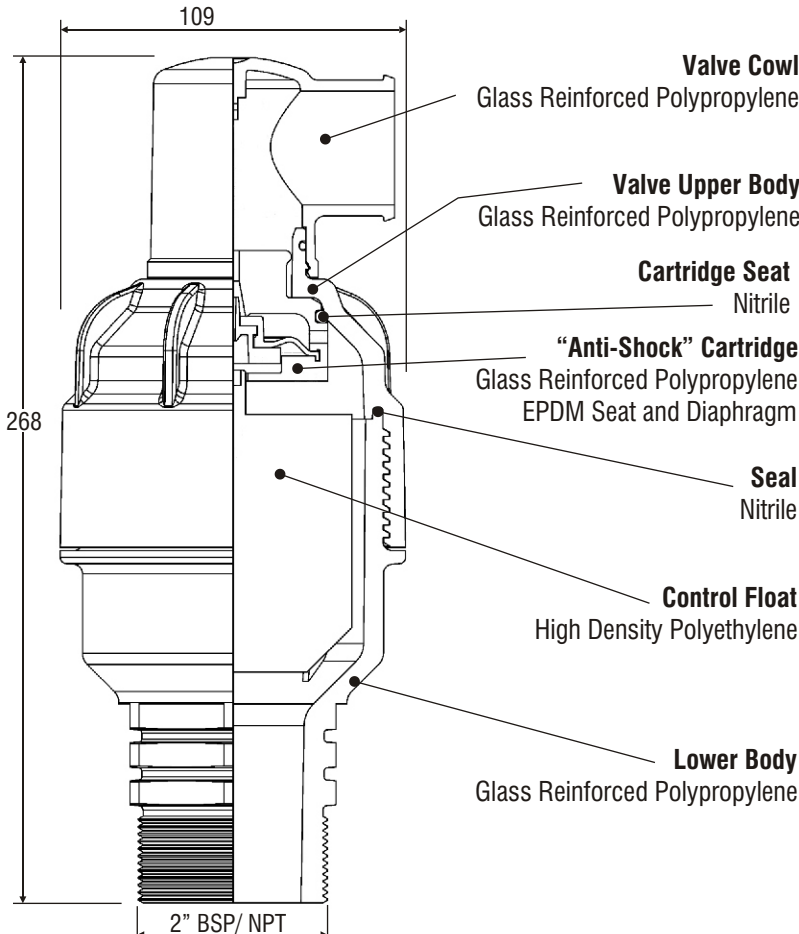
**Temperature Range:**  
0 to 85

**Test Pressure:**  
1.5 times working pressure

**End Connection:**  
1" BSP/NPT Male

**Weight:**  
0.8 kg

**Operation:**  
Controlled Air Discharge  
Large Volume Air Intake  
Pressurized Air Discharge  
Surge Dampening - Rapid Filling Column Separation



**Valve Model No:**  
050 RPS 1611 (BSP)    050 RPS 1621 (NPT)

**Valve Size:**  
DN50

**Pressure Rating:**  
PN16

**Operating Pressure Range:**  
0.1 Bar to 16 Bar

**Temperature Range:**  
0 to 85

**Test Pressure:**  
1.5 times working pressure

**End Connection:**  
2" BSP/NPT Male

**Weight:**  
1 kg

**Operation:**  
Large Volume Air Discharge  
Large Volume Air Intake  
Pressurized Air Discharge  
Surge Dampening - Rapid Filling Column Separation



# Series RPS CATT Air Release & Vacuum Break Valves

## VENT-O-MAT SERIES RPS DESIGN OPTIONS

The Vent-O-Mat range of Series RPS was developed for easy adaptability to all possible air valve operational requirements, the valve is available in three design options, namely:

### **Standard “Anti-Shock” Function**

The Series RPS is supplied as standard with three discharge orifices to ensure the effective release of air under all operating conditions. Incorporated in the design is an automatic surge alleviation function to minimise surge and waterhammer under rapid filling and/or column separation conditions. In addition, the valve provides the most effective vacuum protection of any small reticulation air valve design.

### **Controlled Air Discharge**

Air discharge needs to be controlled in instances where an air valve is placed just prior to or subsequent to a check valve on a pumping main or, where an air valve is three times or less the diameter of the main pipeline diameter or, where the pipeline length is relatively short.

The Series RPSb valve is an adaptation of the basic RPS design to ensure controlled air discharge, pressurized air release and large volume air intake.

### **Biased Air Out**

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).

The Series RPSv is an adaptation of the basic RPS design to ensure effective air release under all pipeline conditions but will not allow air entry under any operating condition.

## WHY SPECIFY SERIES RPS AIR VALVES?

### **Three Discharge Orifices**

The RPS valve has three discharge orifices as standard to ensure the effective release of air under any all operating conditions.

### **Automatic Surge Protection**

The RPS is the only small reticulation 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.

### **Large Capacity Pressurized Air Discharge**

The Series RPS has been designed to provide the largest pressurized air discharge capacity of any small reticulation air valve design.

### **Adaptability**

The RPS has been developed for easy adaptation to all possible air valve functions, ensuring effective surge protection and discharge and/or intake of air in accordance to the dynamics of a pipeline system.

### **Quality**

The RPS 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.

### **Vacuum Break**

The RPS provides the largest air intake capacity of any small reticulation air valve design ensuring the least possible resistance to the intake of air and consequently the least possible negative pressure within a draining pipeline

### **Compactness**

The RPS is of a robust, lightweight and compact construction offering handling transport and installation advantages.

**Distributed By:**

**VENT-O-MAT**

32 Lincoln Road Industrial Sites, Benoni South, Gauteng South Africa  
PO. Box 5064 Benoni South, 1502 South Africa  
Tel: National (+27 11)748 0287 Fax: (+27 11) 421 3230  
e-Mail Address: [dfc@dfc.co.za](mailto:dfc@dfc.co.za) Web: [www.ventomat.com](http://www.ventomat.com)

All information is subject to change without prior notice

**Vent-O-Mat RPS 2003/0001**