TORO Count on it.

Air/Vacuum Valves

Micro-Irrigation

Air and vacuum control is essential to the safety, longevity, efficiency, and performance of an irrigation system. Air must be allowed to exit pipelines 1) upon startup to prevent water hammer, 2) during normal operation to prevent the development of air pockets, and 3) air must be allowed to enter pipelines and laterals at shut down to prevent vacuum suction. Various types of valves and vents are available to perform these functions.

1/2" Vacuum Breaker

1" Plastic Air Vent

1" & 2" Continuous Acting Air Release Valves

1" & 2" Air Release and Vacuum Relief Valves

2", 3" & 4" Aluminum Air Vents

Application:

Removal of Air from Pipelines

- **Avoid Water Hammer:** Air must be allowed to escape pipelines at the same rate as water enters the pipeline during system startup to avoid dangerous water hammer from occurring.
- **Remove entrained or dissolved air:** Air that has accumulated at high points during system operation must be allowed to escape to avoid air pockets which restrict the flow of water and can cause water hammer.

Allow the Entry of Air into Pipelines

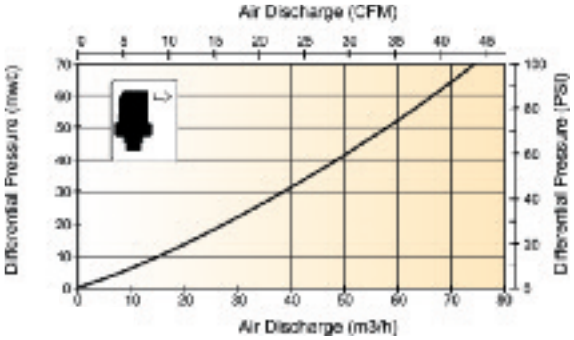
- **Prevent Vacuum Suction in Pipelines:** Air must be allowed to re-enter main and submain pipelines as water drains during system shut down to prevent negative suction from occurring and potential collapse of the pipelines.
- **Prevent Vacuum Suction in Laterals:** Laterals which are buried or submerged in water may ingest dirty water and/or soil through the emitters as a result of vacuum suction if air is not allowed to enter the laterals during system shut-down and drainage.

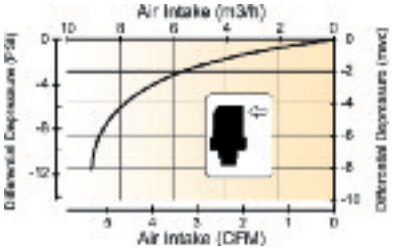
Continuous Acting Air Release Valves

1" & 2" Combination Large Volume Air Relief and Continuous Acting Air Release & Vacuum Relief Valve

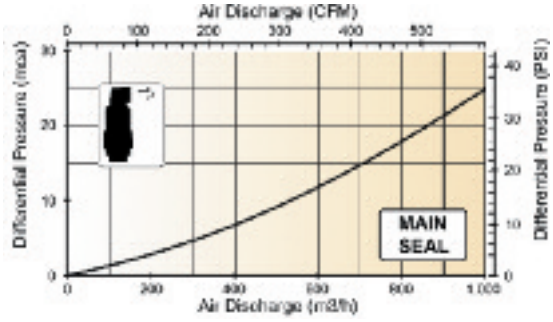
- Install at highest points on filter and pump stations to provide both instantaneous and continuous air relief
- Install on main manifolds every 1000 feet to introduce air into the irrigation system at shutdown to prevent pipe collapse
- Install at highest point of slope to provide vacuum relief at system shutdown

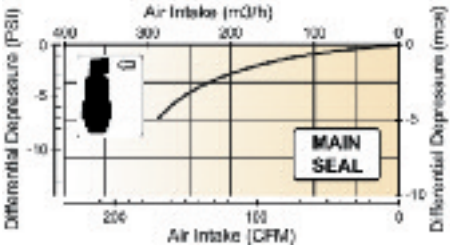
Model #ARV-1-A

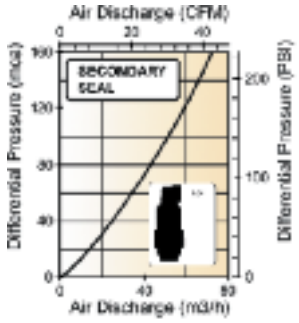




Model #ARV-2-KA







Specifications		
Part Number	**ARV-1-A**	**ARV-2-KA**
Valve Type	**Single Acting Continuous**	**Dual Acting Continuous**
Connection - male NPT (in)	1	2
Working Pressure (psi)	170	225
Sealing Pressure (psi)	3	3
Volume of air release without valve closing and without the presence of water (CFM)	41.2	590
Release Air Volume @ 5 psi	8.8 CFM	140 CFM
Units per Box	20	8
Box Weight (lbs)	15	16
Packing Dimensions (in)	15" x 11" x 8"	

Unit Glossary:

CFM	Cubic Feet per Minute
PSI	Pounds per Square Inch
m3/h	Cubic Meters per Hour
in	Inches

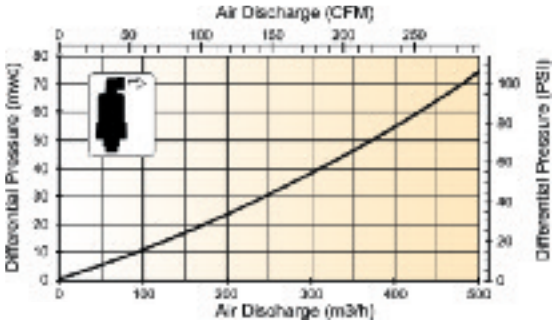
1 Cubic Foot of Water = 7.48 Gallons

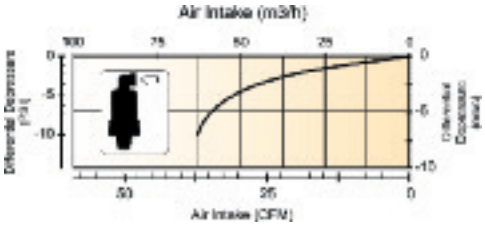
Air Release and Vacuum Relief Valves

1" & 2" Air Release & Vacuum Relief Valves

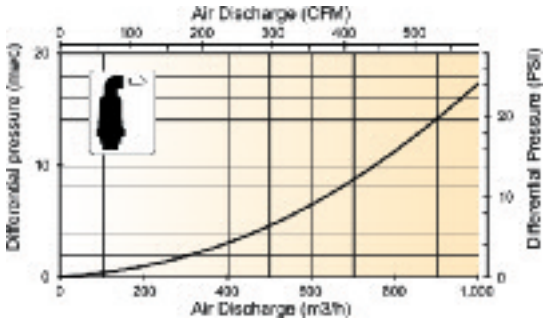
- Install on manifolds to exhaust air at system start-up
- Install on manifolds to introduce air into the pipeline and provide vacuum relief after system shutdown
- Install downstream of valves to introduce air into the pipeline and provide vacuum relief after valve shutdown
- Install at highest point of slope to introduce air into the pipeline and provide vacuum relief after valve shutdown

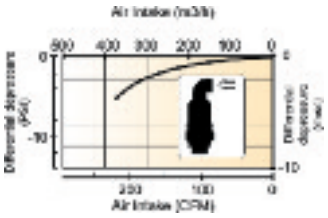
Model #ARV-1-K





Model #ARV-2-K





Specifications		
Part Number	**ARV-1-K**	**ARV-2-K**
Valve Type	**Air / Vacuum Relief Non-Continuous**	
Connection - male NPT (in)	1	2
Working Pressure (psi)	225	225
Sealing Pressure (psi)	3	3
Volume of air release without valve closing and without the presence of water (CFM)	295	590
Release Air Volume @ 5 psi	26 CFM	260 CFM
Units Per Box	14	8
Box Weight (lbs)	12	14
Packing Dimensions (in)	15" x 11" x 8"	

Aluminum Air Vents

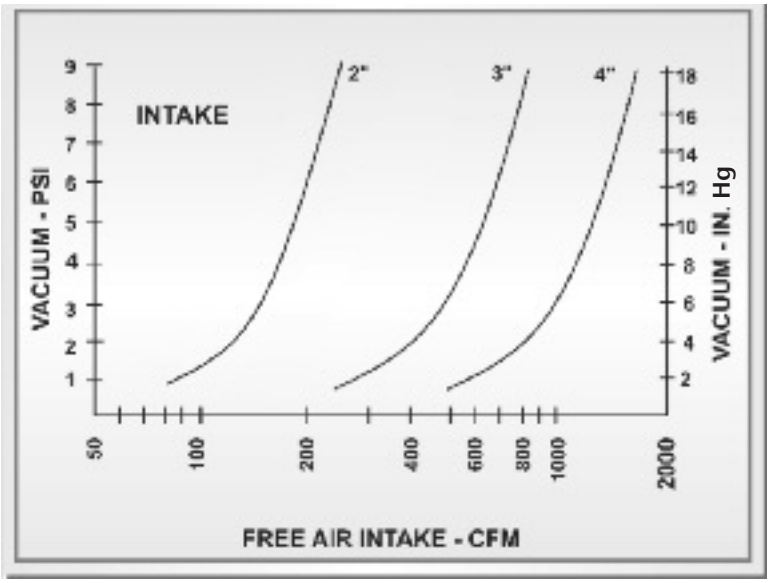
Application:

The Aluminum Air Vent series can be used on gravity or higher pressure systems, allowing for operation up to 150 psi on the 2" model and 100 psi on 3" and 4" models. The float and precision O-Ring provide a tight seal at a very low pressure, while the strong aluminum alloy body and full baffle allow for maximum vent capacity without premature closing.

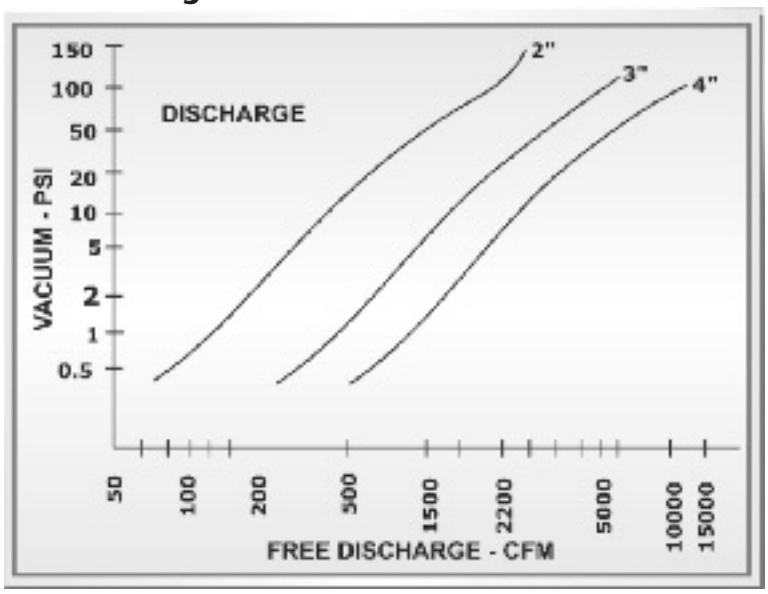
Features and Benefits:

- Cast Aluminum body combines lightweight strength and corrosion resistance
- Synthetic rubber O-ring assures a positive seal even with low head applications
- Simple design ensures trouble-free performance
- Available in 2", 3", & 4" Female NPT inlet

Air Intake Flow Chart



Air Discharge Flow Chart



*Conversion: 1 cubic foot of water = 7.48 gallons

Specifications			
Part Number	**ARV-2AV**	**ARV-3AV**	**ARV-4AV**
Valve Type	**Aluminum Air Vent**	**Aluminum Air Vent**	**Aluminum Air Vent**
Connection - female NPT (in)	2	3	4
Working Pressure (psi)	Max. 150	Max. 100	Max. 100
Units per Box	25	10	4

1/2" Vacuum Breaker

Application:

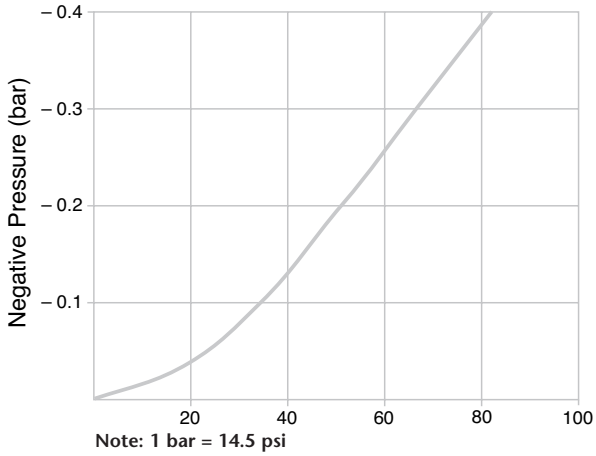
The 1/2" Air & Vacuum Relief Valve (ARV) is specifically designed to prevent soil ingestion of emitters from back siphoning.

Closed Open

Model #YD-500-34

Air Intake Flow Chart

1/2" Vacuum Breaker (ARV)

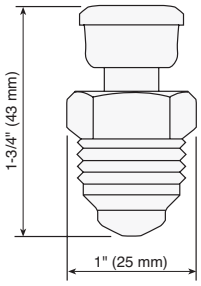


Note: 1 bar = 14.5 psi

Features:

- Large Air Passage
- High resistance to chemicals
- Smooth, reliable operation
- Easy to handle and maintain
- Plastic construction
- Buna-N Seal

Specifications	
Part Number	YD-500-34
Valve Type	1/2" Vacuum Breaker
Connection - male NPT (in)	0.5
Working Pressure (psi)	Max. 150
Temperature (°F)	Max. 180
Units per Bag	10
Weight (lbs ; grams)	0.024 ; 11



1" Plastic Air Vent

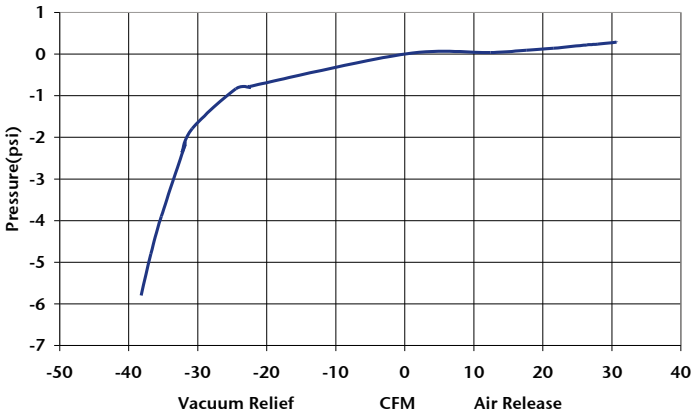
Application:

The 1" Plastic Air Vent provides instant air and vacuum relief. The brightly colored cap allows for easy visibility and is removable for easy maintenance.

Model #ARV-BBK1

Specifications	
Part Number	ARV-BBK1
Valve Type	Plastic Air Vent
Connection - male NPT (in)	1
Sealing Pressure (psi)	80
Totally sealed from (psi)	5
Units per box	25
Box weight (lbs)	5

Performance Graph of ARV-BBK1



*Performance Data Tested and Verified at CIT, Fresno, California.
**Conversion: 1 cubic foot of water = 7.48 gallons

Installation*

The simplest method for selecting the proper size of air/vacuum relief valves is called the "four-to-one" rule. This rule specifies that the clear opening diameter of the air/vacuum relief valve be no less than 1/4 the inner diameter of the pipe. Thus, for an 8-inch pipe, the air/vacuum relief valve should have a clear opening diameter of no less than 2 inches.**

1. Air vents (vacuum relief) should be installed downstream of all shut-off valves.

2. Air vents (vacuum relief) should ideally be installed at or near all high points in manifolds (both inlet and flushing manifolds).

3. Air vents (vacuum relief) can be damaged by field equipment, so some designs consolidate control valves and vacuum relief valves for several blocks in one location.

4. Air vents must be installed so that they do not become sources of contaminants for the drip system. Most air vents open up if the system is not operating, and dirt can fall into the pipelines.

   Solutions include:

   - High enough installation to prevent soil particles from entering the manifolds
   - Horizontal (rather than vertical) positioning of some types of vacuum relief valves. In particular, this deals with the common use of various check valves for vacuum relief. Those check valves have typically been installed vertically. Some growers use spring-loaded check valves as dual vacuum/relief and fertilizer injection ports, and the same cautions apply.

5. On very steep ground, some systems have many air vents along manifolds to break the vacuum quickly.

* Source: Irrigation and Training Research Center (ITRC), BioResource and Agricultural Engineering (BRAE) Dept., California Polytechnic State University (CalPoly)
** Source: Toro Micro-Irrigation Design Manual

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