스 Aquestia

Air in Irrigation Systems – Recommendations & Solutions

Air bubbles, air pockets, or a lack of air (vacuum) in an <u>irrigation</u> system can cause operational issues and even damage to the system itself. So, it's important to control entry of air into the pipelines.



The Effects of Air Pockets and Air Bubbles

- 1. Uneven flow through the pipe, sometimes even stopping water flow altogether.
- 2. High losses of water head, and consequent energy losses.
- 3. Water hammer, which can damage pipes, accessories and connectors.
- 4. False readings of water meters and automatic metering devices, leading to a range of issues including payment for water not supplied, virtual use of water above licensed pumping limits, under utilization of available water supplies, and inadequate supply of water to crops.
- 5. Throttling of flows and accumulated pressure losses at system ends, resulting in inadequate supply of water to agricultural crops.
- 6. Extensive damage to impeller systems in water meters, hydrometers, sprinklers and sprayers.
- 7. Corrosion damage.

The Effects of Vacuum

- 1. Intake of mud and dirt into the system through drippers, causing blockages.
- 2. Drawing of seals, drippers and other accessories into the main distribution lines, causing blockages.
- 3. Uncontrolled entry of chemicals and fertilizers injected into agricultural and landscape irrigation systems.
- 4. Vacuum-induced collapse of pipes and accessories, due to sub-atmospheric pressures.
- 5. Cavitation, causing gradual damage to the pipeline over time through erosion and pitting.



Taking Control

There are three main types of air valves installed in irrigation systems: air & vacuum, automatic air release, and combination (double) valves.

Also known as kinetic valves, large orifice air valves, vacuum breakers, low-pressure air valves and airrelief valves, air & vacuum valves discharge large quantities of air from non-pressurized pipes. Used mainly when filling a line, these valves also make it possible to admit large quantities of air when lines are drained and in the event of water column separation.

Also known as an air release valve, small orifice air valve, or pressure air valve, automatic air release valves continuously release relatively small quantities of air from a pressurized line. Also known as double orifice air valves, combination air valves have the same function as both other types of valves mentioned – air & vacuum and automatic. They discharge or admit large volumes of air when filling or emptying a system, and continuously release small volumes of air when the line is pressurized.

Aquestia's Range of Advanced Air Valves



Technologically, the product range is based on the A.R.I. patented rolling seal mechanism, in place of the old system that used the valve float to seal air valve orifices. In this line of air valves, the rolling seal mechanism and the aerodynamically designed float provide much greater efficiency, thanks to the larger-sized orifices, and have better resilience to withstand dynamic valve closure. This new sealing mechanism enabled the development of small, lightweight air valves with a superior costbenefit ratio.

The R&D team at Aquestia has developed the <u>A.R.I. AV-010</u> air & vacuum valve specifically for use in agricultural and landscaping irrigation systems. The product is manufactured from composite materials and is available in 3", 2", 1" and 3/4" sizes. It is lightweight, compact and very competitively priced.







The A.R.I. SG-10 automatic air valve, part of the <u>A.R.I. S-050 series</u>, is a mere 87 mm wide, no more than 140 mm high, and weighs just 330 g. Despite its small dimensions, the area of the air orifice in this valve is 12 mm2. It permits the release of 152 m3 of air per hour, and can withstand pressures of up to 10 bar. The valve also has an integral self-cleaning mechanism, which prevents blockages, leaks and the sticking of particles to the sealing faces.



A.R.I. DG-10 combination air valve, part of the <u>A.R.I. D-040 series</u>, is 180 mm wide (including the protruding drainage funnel), 209 mm tall, and weighs just 1.1 kg. With an automatic orifice area of 12 mm2 and kinetic orifice area of 804 mm2, intake and release of air is very efficient – even more so than in much larger and much heavier air valves, which become overwhelmed and slam closed at lower differential pressures. As with the SG-10, the valve's integral self-cleaning mechanism prevents blockages, leaks and the sticking of particles to the sealing faces.

