

 **A.R.I.** D-070

## Dynamic Combination Air Valve

The following is a step-by-step narrated description of the A.R.I. D-070 dynamic combination air valve installation, operation and maintenance processes.

A.R.I.D-070 air valve is designed for water systems that operate within the pressure and temperature framework of the model's specifications table.

Please consult Aquestia for products designed for other wastewater, or hazardous liquids systems.



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## 1. Safety Instructions

### General

1. Aquestia products always operate as components in a larger system. It is essential for the system designers, installers, operators and maintenance personnel to comply with all the relevant safety standards.
2. Installation, operation or maintenance of the product should be done only by qualified workers, technicians and/or contractors using only good engineering practices, complying with and observing all conventional safety instructions in order to minimize risk and/or danger and/or hazard to workers, the public or to property in the vicinity in accordance with all relevant local standards.
3. Extra safety considerations should be taken with hot and hazardous liquids or in hazardous environments' applications to avoid bodily/physical harm and damage to public or private property.
4. All individuals installing operating and/or handling the products including all workers should at all times adhere with the occupational safety and health (OSH) instructions and wear safety helmets, goggles, gloves, and any other personal safety equipment required by the local standards and regulations.
5. Use only appropriate standard tools and equipment operated by qualified operators when installing, operating and maintaining the product.
6. Prior to installation, operation, maintenance or any other type of action carried out on the product, read carefully the safety, installation and operation instructions of the product.
7. **Please note:**
  - Pressurized fluid and/or gas may be discharged from the product without prior warning. Make sure that the product's outlet port is not directed toward electrical elements (pumps) or people.
  - The pressurized fluid and/or gas that can be discharged from the product may create high noise levels. Take this into consideration when installing the product in areas sensitive to noise.
8. Always open and close valves slowly and gradually.
9. Please note that the maximum working pressure indicated at the product's specifications table doesn't include pressure changes caused by water hammer and pressure surge effects. Use the product only according to its designated pressure rate specifications.
10. Use the product only for its intended use as designed by Aquestia. Any misuse of the product may lead to undesired damages and may affect your warranty coverage. Please consult with A.R.I. prior to any non-regular use of this product and make no change or modification to the product without a prior written consent to be provided by Aquestia at Aquestia's sole discretion.
11. Please note that Aquestia shall **NOT** assume any liability with respect to any damage losses and/or expenses caused to any person and/or property whatsoever unless the product has been duly installed and thereafter maintained in strict compliance with its designated maintenance Instructions and/or any other installation and operation manuals provided by A.R.I. for the product and/or applicable ordinances and/or codes.

### Handling

1. Shipping and handling the product must be done in a safe and stable manner and in accordance with the relevant standards and regulations.
2. Storage should be in the original delivery crates or cases. Storage should be off the ground in a clean, dry indoor area.
3. For lifting and positioning the product, use only approved lifting equipment operated by authorized employees and contractors.
4. Prior to the installation visually verify that the product was not damaged during shipment to the installation site.

## Installation

1. Install the product according to the detailed Installation Instructions provided with it by Aquestia and according to the description given in this manual.
2. The user should install a manual Isolation Valve under the product's inlet port.
3. In all installation sites the user should enable good visibility and verify that the work and auxiliary equipment used are done in accordance with the relevant local authorized standards. Extra safety considerations should be taken on hazardous environment sites.
4. Check and re-tighten the bolts connecting the product to the pipeline during commissioning and before operating the product for the first time.

## Commissioning and operation

1. Read carefully the operation instructions prior to any attempt to operate the product.
2. Observe the safety stickers on the product and never perform any operation contradicting the instructions given.
3. In order to achieve maximum performance and smooth operation of the product it is crucial to perform the startup and first operation procedures exactly as described in this manual.
4. In cases where formal commissioning procedure is required it should be done by an authorized Aquestia technician prior to the first operation of the product.

## Maintenance

### Before any maintenance or non-regular operation please read the following:

1. Servicing the product should be done only by qualified technicians for this type of work.
2. Make sure that you know the exact type of the system's fluid. Act accordingly and comply with all the relevant standards and regulations set for handling this type of fluid.
3. Before disconnecting the product from the system and before releasing the residual pressure do **NOT**:
  - loosen or unscrew the product bolts;
  - remove any protection cover;
  - open any service port.
4. Before any maintenance or non-regular operation shut off the Isolation valve and release the residual pressure:
  - A. For air valves with pressure release outlet, slowly open the pressure release plug or the ball valve and make sure that all pressure is released. Please note that some air release valves, especially the waste water models, may contain significant volume of compressed gas with accumulated energy!
  - B. For air valves without a pressure release outlet, slowly unscrew the flange bolts until all the pressure is released from the valve.
5. Make sure the air valve is empty of all liquid prior to commencing maintenance.
6. Remove the product from the line only after ensuring that internal pressure has been released.
7. Place warning signs around the work area as required by the local standards and procedures.
8. Inspect the product's safety stickers and replace any damaged or faded sticker.
9. Manual cleaning of the product and/or its components using high water pressure or steam should be performed in accordance with its specific cleaning instructions, the local standards and regulations and without endangering the operator or the vicinity
10. Manual cleaning of product and/or its components using acid or other chemical agents should be performed in accordance with the specific cleaning instructions, the relevant safety instructions for using that chemical as given by its supplier, the local standards and regulations and without endangering the operator or his vicinity.
11. For products used in potable water systems if it is required to disinfect the product, do so according to the local water authority standards and regulations before putting the product into service.

**Before returning to regular operation**

1. Re-assemble any protection covers or protection mechanisms removed during service or maintenance operations.
2. Make sure that all the tools, ladders, lifting devices, etc. used during the maintenance procedures are taken away from the product area and stored.
3. Remove grease and fat material residues in order to avoid slipping.
4. In order to return the product to regular operation, follow the First Start-up Operation instructions as detailed in your user manual.

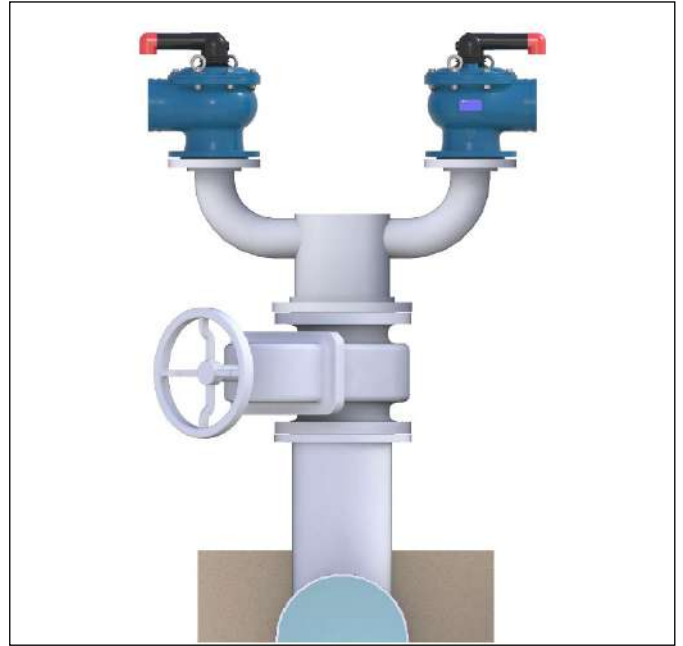
## 2. Installation

**Important:** Before performing any work on the air valve make sure that all workers on site are familiar with the safety instructions and the relevant local and general safety instructions and work regulations.

### 2.1. Installation Recommendations



Single Air Valve on an Isolating Valve at 45° to Air Valve outlet



Two Air Valves on a shared Isolating Valve. Air Valves outlets face outward and the Isolating Valve at 45° to Air Valve outlets



Two Air Valves on an Air Trap with separate Isolating Valves. Air Valve outlets face outward and the Isolating Valves at 45° to Air Valve outlets



#### Underground Installations

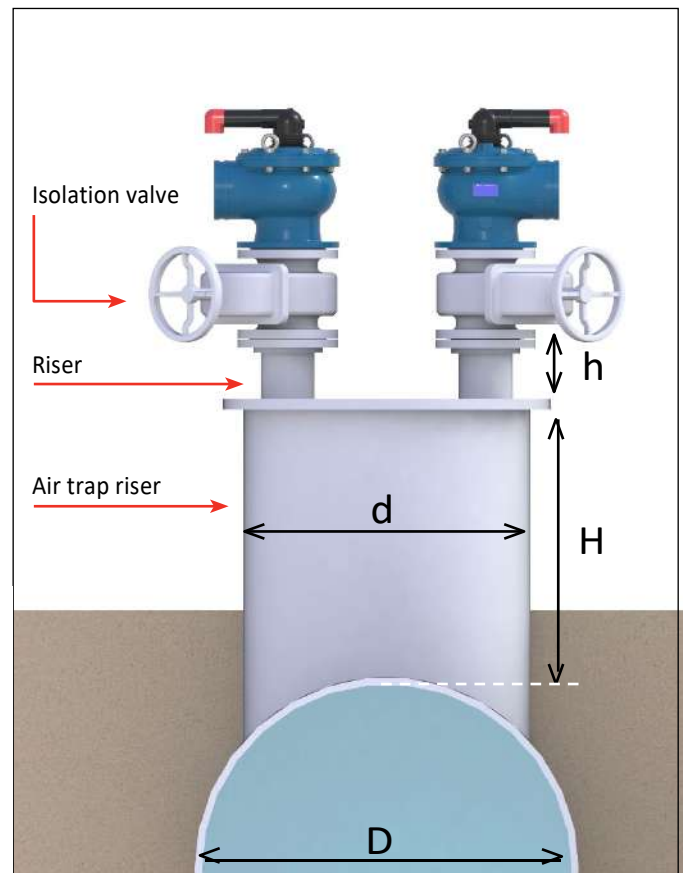
- Underground installations require a venting pipe from the manhole
- Use an angular installation to bypass an obstacle directly above the pipeline.

## 2.2. Conventions and Measurements

This paragraph presents and explains the terms and measurements used for the Installation process.

$D$  = Diameter of pipeline  
 $d$  = diameter of riser  
 $H$  = Height of riser on the pipeline  
 (measured from crown of pipeline)  
 $h$  = height of riser under the isolating valve

- For pipelines up to 12" (300mm) in diameter ( $D$ ), the Air Trap diameter ( $d$ ) should be the same as the pipeline diameter.
- For larger pipelines of up to 60" (1500mm) in diameter ( $D$ ), the Air trap diameter ( $d$ ) should be 60% of the pipeline diameter.
- For larger than 60" (1500mm) pipelines ( $D$ ), the Air trap diameter ( $d$ ) should be 35% of the pipeline diameter.
- The Riser length ( $h$ ) should be sufficient for inserting tools when installing or servicing the Isolating valve, however it shouldn't be longer than 6" (150mm).
- The Air trap length ( $H$ ) should allow easy access to the air valve from below and should be at least 6" (150mm).



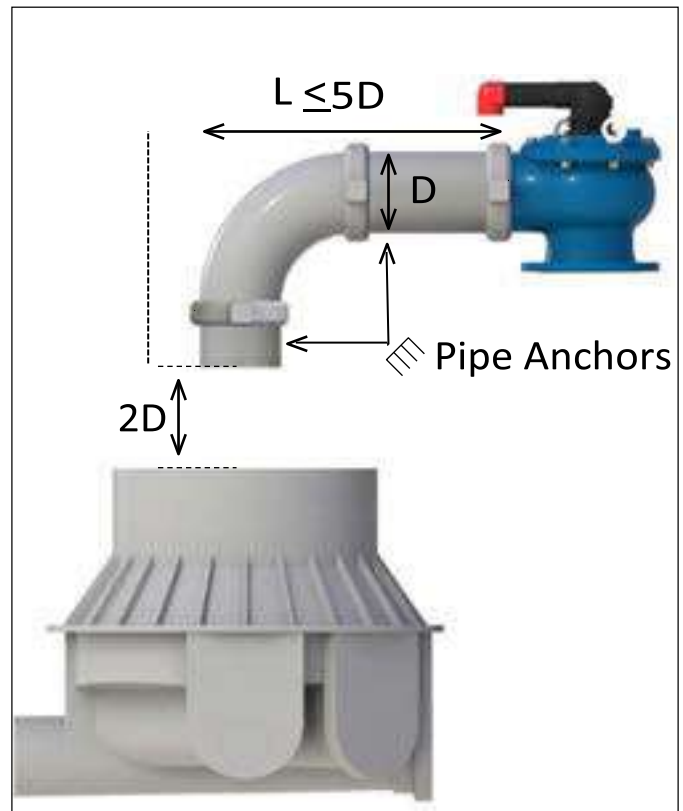
## 2.3. Installation Instructions

1. Flush the system before installing the air valve to avoid any debris or sharp objects getting into the air valve.
2. Carefully remove the air valve from the shipping package. Unload all air valves carefully to a sturdy level surface taking care not to drop them.
3. Air valves fitted with hoist rings should only be lifted and conveyed using these hoist rings.
4. Install an isolating valve below the air valve, connected by a Riser to the crown of the pipe.
5. Mount the air valve carefully on the rubber gaskets of the isolating valve.
6. Place washers on each of the bolts & nuts that connect the air valve flange to the isolating valve flange.
7. Tighten all the bolts and nuts using the crossover method.
  - a. The closure tightness of the bolts and nuts shall be according to the standard torque for their specific size.
  - b. Use ring wrench keys for the closing and opening of all bolts of the air valve (including the flange bolts).

## 2.4. Directions for Discharge Outlet D-070 Air Valve

1. Recommended to leave the discharge outlet completely open and unhindered:
  - a. Avoid directing the discharge outlet opening in the direction of workers, bystanders or animals.
  - b. Avoid directing the discharge outlet opening in the direction of vulnerable equipment that can be damaged, such as electrical equipment, unstable structures, etc.
2. If a drain pipe must be installed to direct the outlet discharge away from sensitive areas, please follow the recommended drawing (do not use flexible pipe):

D = Diameter of the air valve



## 3. Operation

When the system is charged and the pipeline begins to fill with water, air flows in the pipeline and enters into the dynamic air valve, raising the rolling diaphragm sealing assembly to the open position.

Air is then discharged, mainly through the large orifice as well as small amounts of air released through the pilot orifice. When the ensuing water enters the dynamic air valve, it fills the lower chamber and some of it flows up and enters into the pilot, raising the pilot float which raises the sealing mechanism to its sealed position. Pressure develops inside the pilot, bringing about a controlled lowering of the rolling diaphragm sealing assembly, which, in turn, seals the large orifice.

## 4. Troubleshooting

Symptom	Possible Causes	Remedy
Leakage from the Discharge Outlet	A. Debris or scale buildup on the Rolling Seal (Number [2] on the BOM table). B. Torn Rolling Seal.	Follow instructions for 5.3 Maintenance of the Pilot (Page 10).
	A. Debris or foreign object caught in the Rolling Diaphragm Sealing Assembly (Number [9] on the BOM table).	Follow instructions for 5.4 Maintenance of the Dynamic Valve Body (Page 14).
	A. Torn Sealing Assembly or Diaphragm.	Follow instructions for 5.4 Maintenance of the Dynamic Valve Body (Page 14).



## 5. Periodic Maintenance

Please note that the periodic maintenance of the air valve is an integral part of the proper pipeline maintenance regime; it should be maintained at least once a year in accordance with the quality and composition of the fluid in the system.

**Important:** Before performing any work on the air valve, make sure that all workers on site are familiar with the safety instructions as appear in chapter 1 of this document and with all the relevant local and general safety instructions, standards and work regulations.

### 5.1. Preparation

#### 5.1.1. Required tools and materials:

- 2 units - 19mm combination spanner
- 19mm ratchet boxwrench
- 4.5mm roll pin punch
- Small bowl with kitchen type liquid soap



#### 5.1.2. Releasing Pressure

- Shut the isolating valve located on the riser under the air valve.

##### Option A:

- Using two combination spanners, partially unscrew the bolts connecting the air valve to the riser in order to release the pressure. Wait till the pressure is released.

##### Option B. - for air valves with Plug (shown in picture 1):

- Use the 19mm ratchet box wrench [1] to gradually release the Plug of the pressure release port [2], wait till the pressure is released and then unscrew the Plug completely, remove it and drain the air valve [3].



## 5.2. Removing the Pilot

- Unscrew and remove the Pilot Body [1], [2], [3]



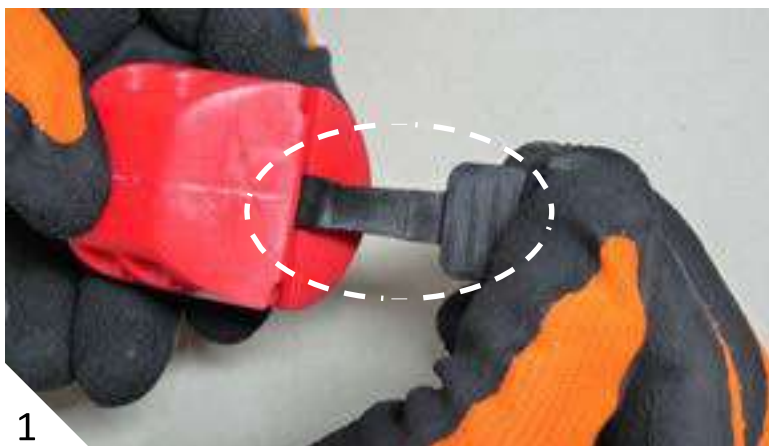
## 5.3. Maintenance of the Pilot

- Hold the Pilot Body [1], turn it to the side [2] and remove the Clamping Stem (A) and the Float (B), together with the Rolling Seal (C).



- Thoroughly but gently wash and clean all the components under clean running water. Pay attention to the sealing area inside the Body.

- Visually check the condition of the Rolling Seal [1]. If any cracks or tears are found, remove it from the Float [2].



- When required, replace the seal by inserting a new Rolling Seal into its designated groove. Please note: side 1 of the groove is slightly wider than the other, therefore the seal can be inserted only from the wider side of the groove.



- Dip the tail end of the Rolling Seal in the soap solution [1] and insert it into the Float groove [2]. Make sure to insert the seal with the correct side pointing up as depicted in picture [3].



- Using the 4.5mm roll pin punch, push the Rolling Seal into its place [1], make sure to align the arrow marked on the seal (A) with the center line marking of the Float (B)



- Check that the Disc at the opposite side of the Float it is not torn or cracked [1], make sure that it is loose and can freely rotate. Do not tighten its holding screw!



- Reassemble the Pilot by inserting the loose end of the Rolling Seal into its designated groove in the Body, make sure that the insertion direction and the end of the seal are as depicted on pictures [1A] and [1B].



- Insert the Float halfway into the Body [1], insert the Clamping Stem into the Rolling Seal groove of the Body; make sure that it is inserted in the direction depicted in picture [2]. Push the Float and the Clamping Stem together downwards into the Body until they are locked [3].



1



2



3

- Make sure that the O-ring of the air valve body is clean and intact [1] (replace it if needed). Re-screw the Pilot Assembly back to its place in the air valve's Cover [2]. Align the Outlet Elbow of the Pilot with the discharge outlet of the main air valve [3].



1



2



3

#### 5.4. Maintaining the Dynamic Valve Body

- Using the 19mm combination spanners, unscrew the bolts that connect the Cover to the Body [1] and remove the Cover [2].



- Remove the Rolling Diaphragm Sealing Assembly from the Body [1].



- Thoroughly wash and clean all the components under clean running water, remove coarse grime and accumulated scale. Pay attention to the passage opening of the Cover [1], and the Orifice Seat and Seal of the Body [2].



- Fold backwards the rubber part of the Rolling Diaphragm [1] and check for any cracks and tears [2] & [3]. Replace the entire Rolling Diaphragm Sealing Assembly if any damage is detected. Do not open screws of the assembly under any circumstances!



Make sure that the passage opening of the Diaphragm and the rubber Seal are clean [1].



- Reassemble the air valve; insert the Diaphragm [1], reinstall the Cover [2] make sure that the discharge outlets are aligned [3] and the Washers are correctly installed on the Cover bolts [4]. Tighten the bolts using the crossover method [5].



- For air valves with Plug, apply some Teflon seal tape on the pressure release Plug [1] and reinstall it using the 19mm ratchet box wrench [2].



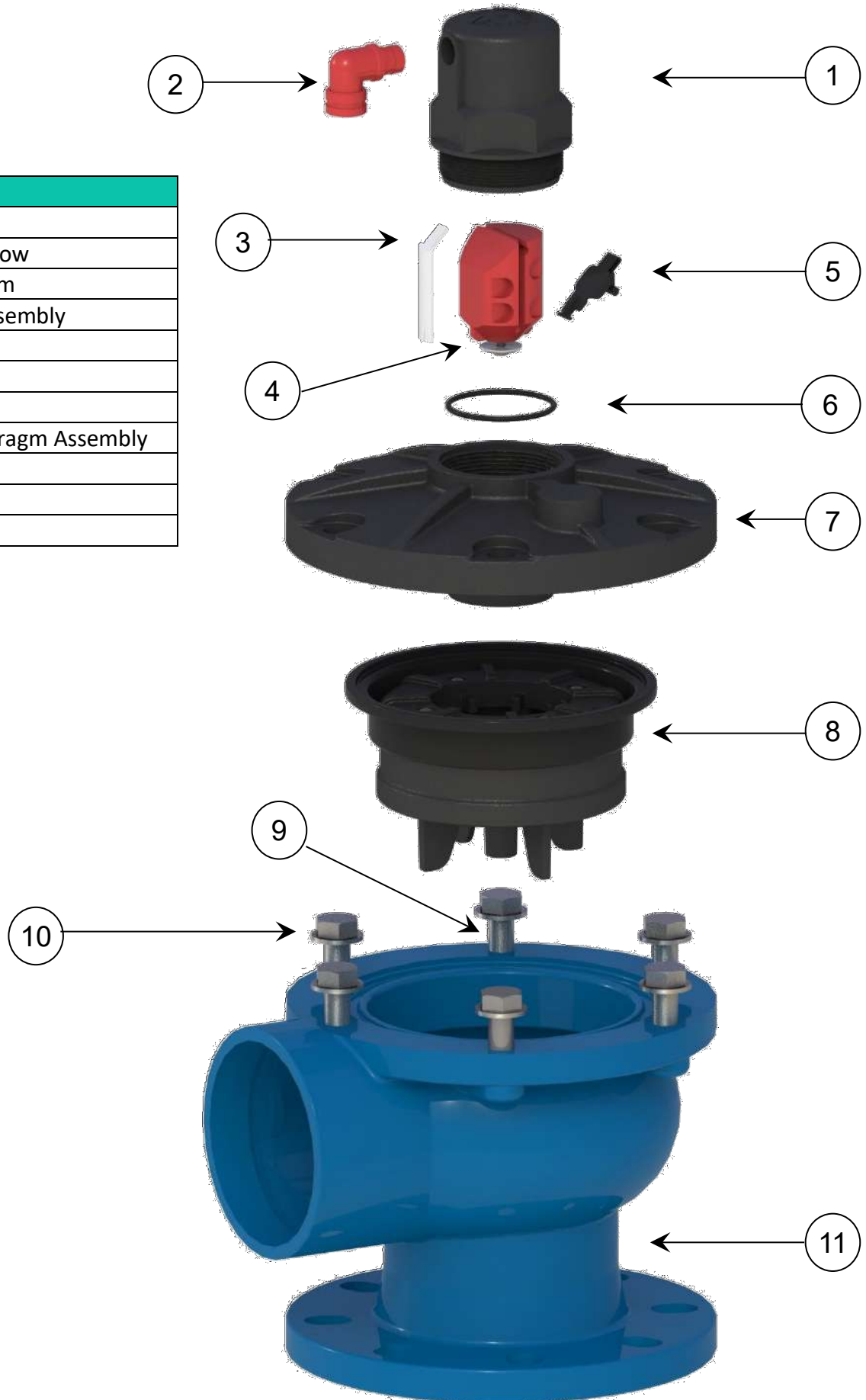
- Slowly open the isolating valve located on the riser under the air valve. Check the air valve for proper operation.



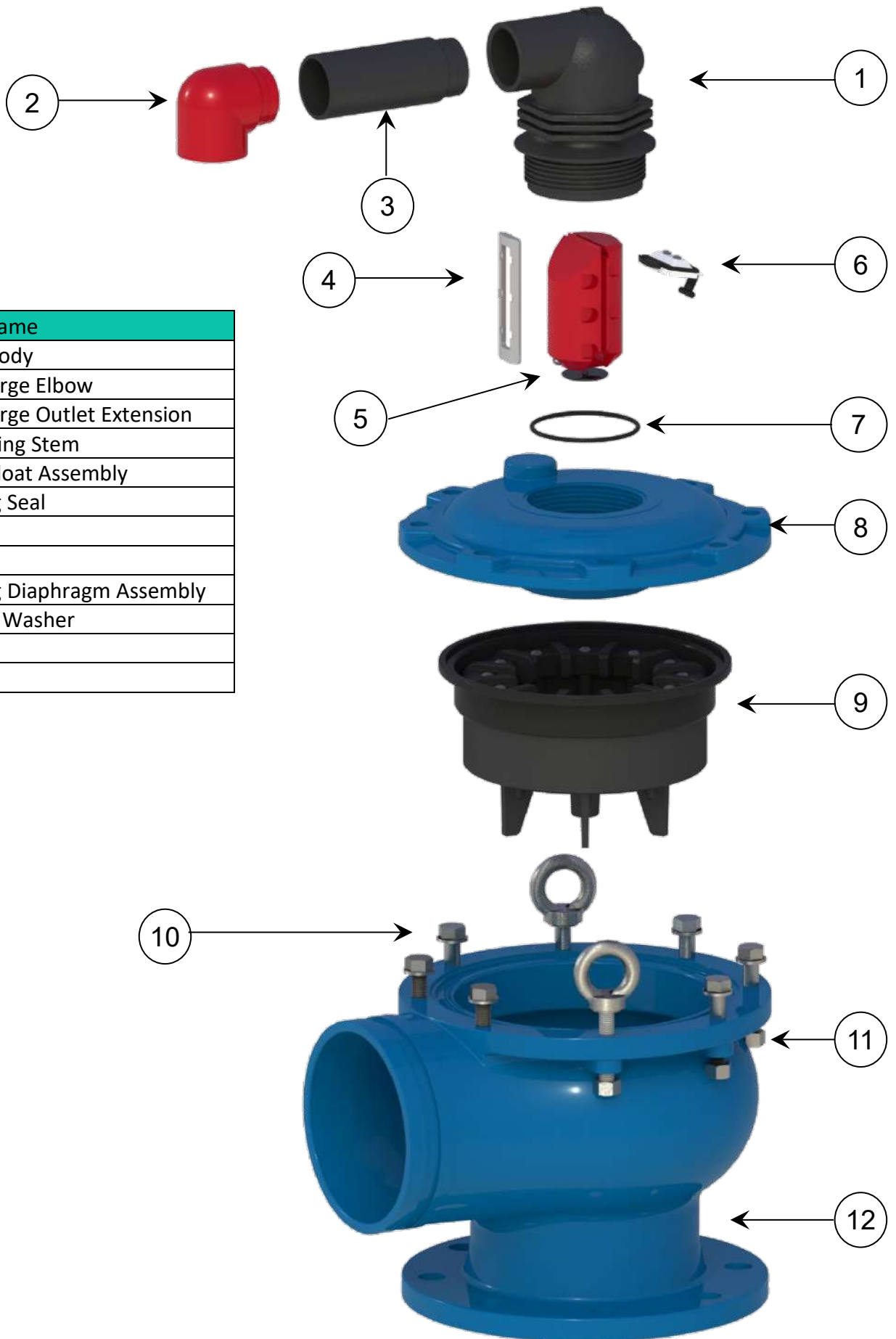
## 6. Assembly BOM Table and Drawing

3" & 4" Metal

No.	Part Name
1	Pilot Body
2	Discharge Elbow
3	Clamping Stem
4	Pilot Float Assembly
5	Rolling Seal
6	O-ring
7	Cover
8	Rolling Diaphragm Assembly
9	Bolt
10	Washer
11	Body



6" & 8"



No.	Part Name
1	Pilot Body
2	Discharge Elbow
3	Discharge Outlet Extension
4	Clamping Stem
5	Pilot Float Assembly
6	Rolling Seal
7	O-ring
8	Cover
9	Rolling Diaphragm Assembly
10	Bolt & Washer
11	Nut
12	Body

12" PN 16

No.	Part Name
1	Pilot Assembly
2	Internal Check Valve
3	Air Release Valve Assembly (x3)
4	Cover
5	Bolts, and Washers
6	Rolling Diaphragm Sealing Assembly
7	Washers & Nuts
8	Body
9	Ball Valve

