

 A.R.I. D-090**Underground Combination Air Valve**

The following is a step-by-step narrated description of the A.R.I. D-090 underground combination air valve installation, operation and maintenance processes.



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1. Safety Instructions

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 to 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 Aquestia 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 Aquestia for the product and/or applicable ordinances and/or codes.

Safety Instructions - 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.

Safety Instructions - 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.

Safety Instructions - 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.

Safety Instructions - 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 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 a 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 a 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.

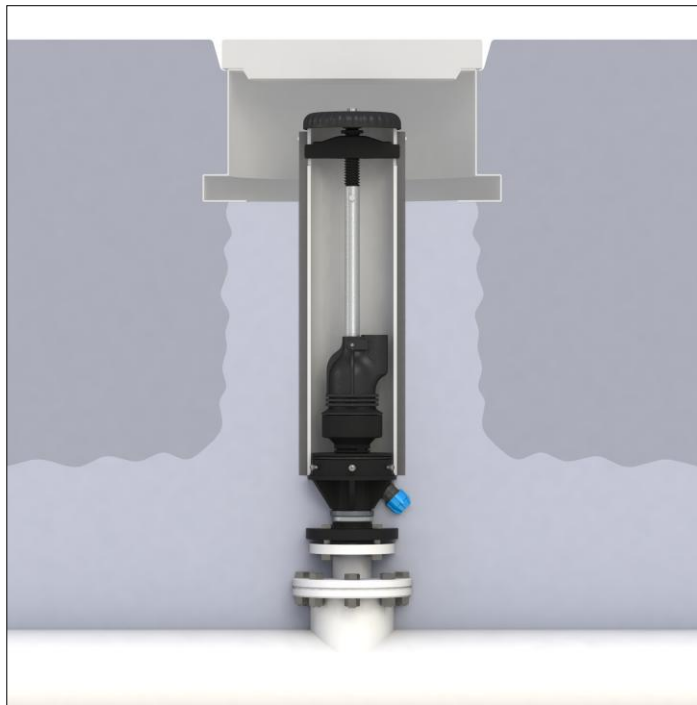
Safety Instructions - Before returning to regular operation

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



Underground Installations

- D-090P underground combination air valve is designed to be installed directly in the ground, eliminating the need for a manhole or inspection pit.
- Underground installations require a vent surface box to be placed atop the underground air valve.
- Use an angular installation to bypass an obstacle directly above the pipeline.

2.2. 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. Mount the air valve carefully on the rubber gasket of the main pipe riser's crown.
5. Place washers on each of the bolts & nuts that connect the air valve flange to the main pipe riser's crown.
6. Use ring wrench keys to tighten all the bolts and nuts using the crossover method.
7. The closure tightness of the bolts and nuts shall be according to the standard torque for their specific size.
8. Refill around the underground air valve with compactable material up to the seating level of the surface box.

2.3. Directions for Discharge Outlet

1. Recommended to leave the discharge outlet completely open and unhindered.
2. Avoid directing the discharge outlet opening in the direction of workers, bystanders or animals.
3. Avoid directing the discharge outlet opening in the direction of vulnerable equipment that can be damaged, such as electrical equipment, unstable structures, etc.
4. The surface box on top of the underground air valve shall offer a venting area equal to the orifice of the air valve (1,100 mm²).

3. Operation

The Air & Vacuum component, with the large orifice, discharges air at high flow rates during the filling of the system, and admits air into the system, at high flow rates, during system's drainage and at water column separation. High velocity air does not blow the float shut. Water lifts the float which seals the valve.

At any time during system operation, if the internal pressure of the system falls below the atmospheric pressure, air enters the system.

The smooth discharge of air reduces pressure surges and other destructive phenomena.

The intake of air in response to negative pressure protects the system from destructive vacuum conditions, and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

4. 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 chapter of this document and with all the relevant local and general safety instructions, standards and work regulations.

4.1. Preparation

Releasing Pressure:

The check valve integrated at the bottom of the air valve box makes it possible to remove the valve under operating pressure.

If a secondary shut off valve was installed, close it and continue the maintenance procedure listed below

4.2. Maintaining the D-090 air valve

Please refer to the drawings on the next two pages:

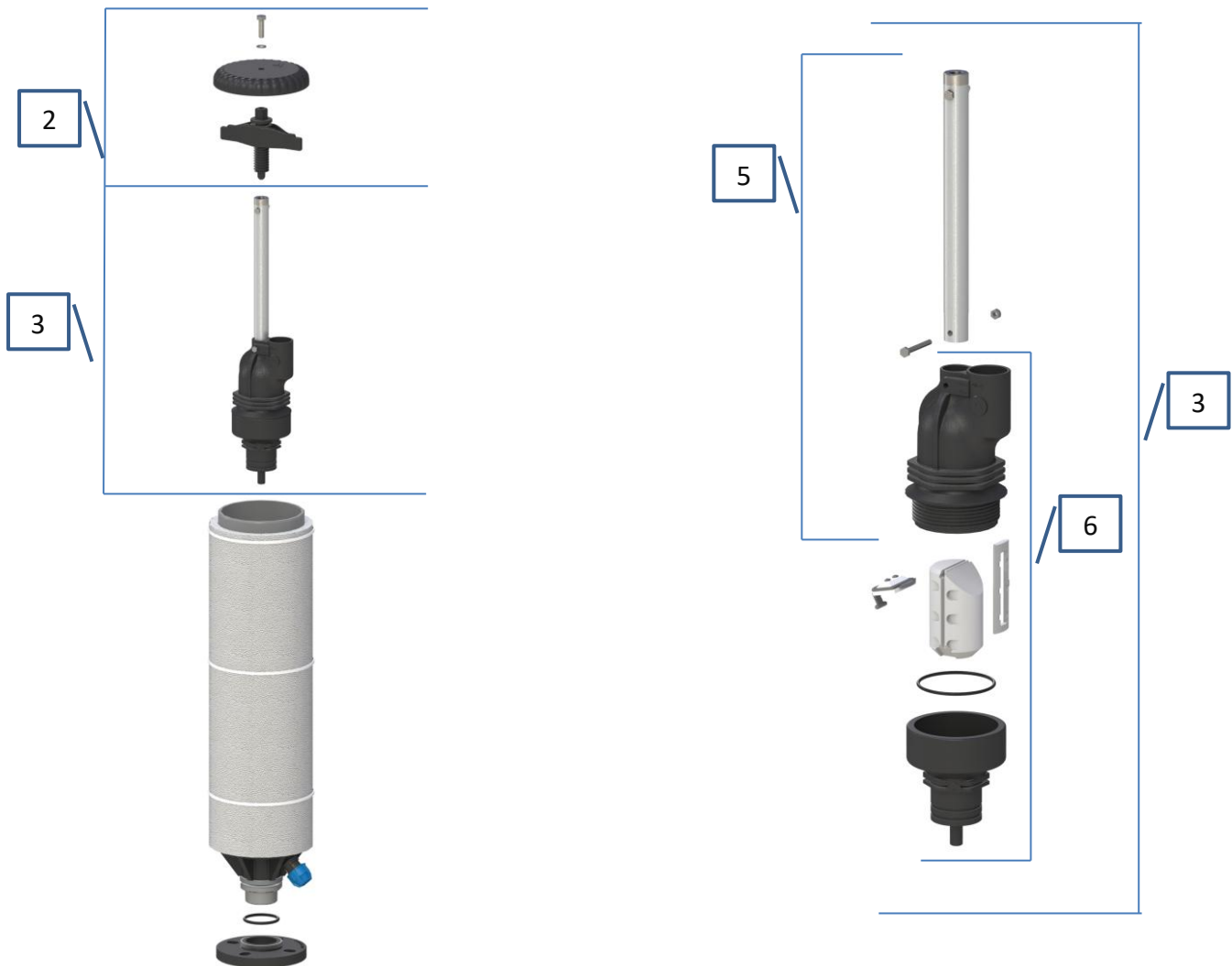
1. Disassemble the cover by turning the cover counterclockwise or alternatively unscrew the cover screw
2. Remove the cover together with the bridge and the bridge Rod (#2).
3. Remove the D-040 Air Valve (#3) from the air valve box.
4. Unscrew the body assembled to the bridge rod) (#5).
5. Slid out the Sealing assembly (# 3c), the float (# 3d) and the Clamping stem (# 3e) from the air valve body
6. Wash the Air & Vacuum Assembly parts (# 6) thoroughly under clean running water.
7. Visually examine the Sealing assembly (# 3c) for cracks or tears. Remove and replace, if necessary.
Manually verify the free and unhindered movement of the slots between the Upper and Lower Components of the Air & Vacuum Assembly (# 6). Clean any debris that might cause interference.
8. Wash the base (# 3g) and the body (# 3b) thoroughly under clean running water.
9. Visually examine the O-Rings (# 3f, # 3h) for cracks or tears. Remove and replace, if necessary.
10. ** Non-Slam version only:
Wash the Non-Slam Component thoroughly under clean running water. Make sure the internal parts are moving freely, Remove all debris.
11. Slide the Sealing assembly (# 3c), the float (# 3d) and the Clamping stem (# 3e) into the air valve body.
12. Reinstall the body (# 3b) Back to the base (# 3g)

13. Reconnect the D-040 Air Valve to the air valve box.

14. Reassemble the cover by turning the cover clockwise or alternatively screw the cover screw.

After correctly performed maintenance, when opening the check valve, an audible escape of the air from the housing should be evident, indicating that the valve was closed tightly.

The following is a drawing of the D-090 Main Components:



4.3. A.R.I. D-090 – Assembly BOM Table and Drawing

Parts List D-90		
	Part	Material
1	Valve Box Assembly	
1a	Cover	Polypropylene
1b	Air Valve Box	PVC
1c	Insulation Cover	Aluminum Coated Foamed PE
1d	Base	Reinforced Nylon
1e	Drainage Connector	Polypropylene + Acetal
1f	Check Valve	Acetal + NBR + Stainless Steel
1g	Adaptor	Stainless Steel 316
2	Bridge & Rod Assembly	
2a	Bridge Assembly	Reinforced Nylon
2b	Tightening Rod	Stainless Steel 304
2c	Lock Pin	Stainless Steel 304
3	D-40 Air Valve Assembly	
3a	One-Way or NS Check Valve (Optional)	Acetal + NBR + Stainless Steel
3b	Body	Reinforced Nylon
3c	Sealing assembly	Stainless Steel + R.N + EPDM
3d	float	Polypropylene
3e	Clamping stem	Reinforced Nylon
3f	O-ring	BUNA-N
3g	Base	Reinforced Nylon
3h	O-ring	NBR
4	Flange Assembly (Optional)	
4a	O-ring	NBR
4b	Flange	Reinforced Nylon



5. Troubleshooting

Symptom	Possible Causes	Solution
The Valve is leaking	• Contamination of deposits and foreign objects can affect the function of the valve. • Incorrect assembly after inspection. • Insufficient operating pressure.	• Carry out a thorough inspection of the valve and all its components. See the Maintenance chapter of this document. • Make sure that all components of the valve are installed correctly. Pay special attention to the correct assembly of the interior of the valve. • The valve is designed for a working pressure of 0.2 to 16 bar. Make sure that the minimum sealing pressure was reached at the installation site of the valve.