

## COMBINATION AIR VALVE MODEL D-020

The following is a step by step narrated description of the A.R.I. D-020 industrial combination air valve installation, operation and maintenance processes.

The D-020 air valve is designed for systems that operate within the pressure and temperature framework of the model's specifications table. Please consult A.R.I. for products designed for other hazardous liquids systems.



## TABLE OF CONTENTS

1. Safety Instructions .....	Page 3
2. Installation .....	Page 6
3. Operation .....	Page 8
4. Troubleshooting .....	Page 8
5. Periodic Maintenance .....	Page 9
6. Assembly BOM table and Drawing .....	Page 19
7. Ordering Replacement Parts .....	Page 20
8. Limited Warranty .....	Page 21

### Disclaimer

This document is an Installation, Operation and Maintenance (IOM) manual for A.R.I. Flow Control Accessories Ltd. (A.R.I.) products. The information enclosed herein contains restricted, privileged, proprietary and confidential information, intended only for usage by authorized A.R.I. technicians. If you are not a qualified technician, you must not take any action in reliance upon this document, unless otherwise permitted in writing by A.R.I.

A.R.I. has made every effort to ensure that this document is accurate; A.R.I. disclaims liability for any inaccuracies or omissions that may have occurred.

All the procedures, drawings, pictures and/or any other information provided in this document are presented as general information only; they can be altered, removed or changed without A.R.I.'s prior written approval. A.R.I. makes no commitment to update or keep the information in this document current and/or up-to-date, and reserves the right to make improvements, alterations and/or modifications to this document and/or to the products described in this document, at any time without providing any notice with respect thereto. Nothing in this Disclaimer derogates in any way whatsoever from the confidential nature of any document enclosed hereto, including for avoidance of doubt, any mistake or clerical error or other error. None of the procedures provided in this Disclaimer and/or in any document enclosed hereto may be used in any form or by any means without the prior written consent from A.R.I. If you received this Disclaimer and/or in any document enclosed hereto in error or by mistake or if this Disclaimer and/or in any document enclosed hereto is not intended for you, please notify A.R.I. in writing immediately.

A.R.I. assumes that all users understand the risks involved within this Disclaimer and/or in any document enclosed hereto.

A.R.I. accepts/assumes no liability whatsoever, whether caused by: accessing and/or relying upon this Disclaimer and/or in any document enclosed hereto including without limitation any links, procedures or materials.

A.R.I. shall NOT assume any liability for any costs, direct or indirect, including loss of income, loss of profits and/or goodwill, legal actions and/or damages of any kind whatsoever including any, damages accidents, equipment damage or bodily injury resulting from and/or related to any of the following:

- product has not 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;
- Repairs made in and to the products by personnel not authorized by A.R.I.
- Maintenance or repairs using parts or components other than those specified by A.R.I. and in their original condition.
- Operating the products in ways other than the operating procedures described in the manuals provided by A.R.I., or resulting from not following the cautionary remarks and warnings in the product manual.
- Improper storage, workplace conditions and environmental conditions which do not conform to those stated in the Product manual.
- Fires, earthquakes, floods, lightning, natural disasters, or acts of God.

A.R.I. does not warrant and hereby disclaims any express or implied warranties that the product will work properly in environments and applications other than its original design purpose, and makes no warranty and representation, either implied or expressed, with respect to the quality, performance, merchantability, or fitness for any other particular purpose.

Except as provided herein and to the full extent permitted by law, A.R.I. shall not be responsible and/or liable for direct, special, incidental or consequential damages or loss resulting from any breach of the above or under any other legal theory.

This document does not replace any certified drawing, procedure or information provided by A.R.I. in reference to a specific customer, site or project.

All rights reserved.

## 1. SAFETY INSTRUCTIONS

### General

1. A.R.I. 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 A.R.I. 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 A.R.I. at A.R.I.'s sole discretion.
11. Please note that A.R.I. 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 A.R.I. 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 A.R.I. 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 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 wastewater 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.

## 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**

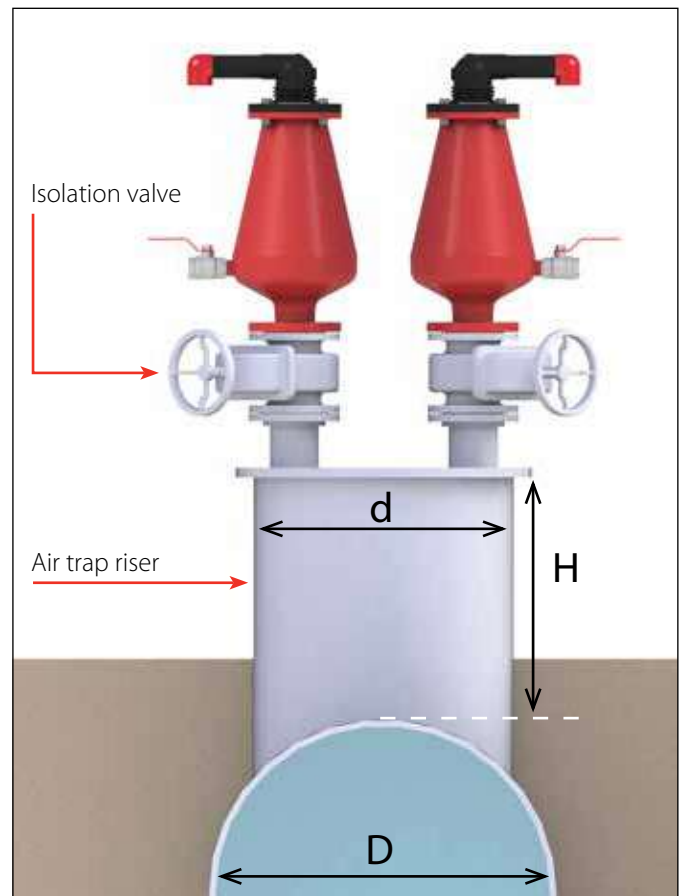
- Underground installations require a venting pipe from the manhole
- Use an angular installation to bypass an obstacle directly above the pipeline.

## 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)

- 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 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).

### 3. OPERATION

When the system is charged and the pipeline begins to fill, the water flowing in the pipeline enters into the combination air valve, raising the air/ vacuum and air release floats to their sealing position.

During filling, air is discharged mainly through the air/ vacuum orifice as well as small amounts of air released through the air release orifice. As the pipeline becomes fully pressurized, the air/ vacuum orifice will seal and entrapped air will then be automatically released only from the air release orifice.

During pipe draining or water column separation, the floats will drop down due to the vacuum created, and air will enter into the pipeline through the air/ vacuum orifice.

### 4. TROUBLESHOOTING

Symptom	Possible Causes	Remedy
Discharge Elbow and/or Extension broken	Part was mishandled or hit	Gently remove the part with a flat screwdriver and replace
Leakage from the Discharge Elbow	A. Low pressure B. Debris caught in the Rolling Seal Assy. or Rolling Seal torn or cracked	A. Requires a minimum pressure of 0.05 bar (0.7 psi) to seal properly B. Follow instructions replacing Rolling Seal Assy. Section 5.3 (Pages 11, 12)
Leakage from the Ball Valve	A. Ball Valve not completely closed B. Debris caught inside the Ball Valve	Open, then fully close the Ball Valve



## 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 on Page 3 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
- 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
- Open the Ball Valve to release pressure and drain the air valve
- Important: Discard liquid to comply with local regulations



## 5.2. Removing the Cover Assembly

- Turn the black Body counterclockwise to loosen it from the Cover [1]
- Using the two 19mm combination spanners, open and remove the four Bolts, Nuts and Washers [2]
- Store the four Bolts, Nuts and Washers in an accessible area [3]



1



2



3

- Lift and extract the Cover assembly from the valve Body [1], [2], [3]



1



2



3

- Unscrew the black Body from the Cover [1]

- Place the entire assembly on a clean, flat surface [2]



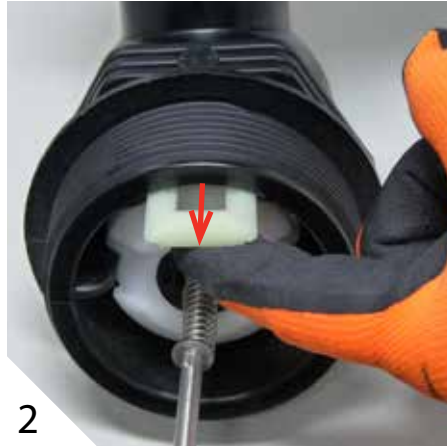
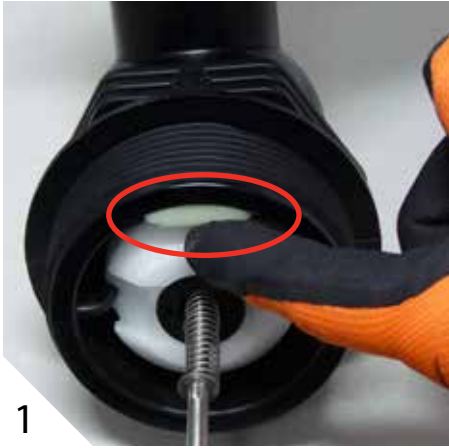
1



2

## 5.2. Periodic Maintenance

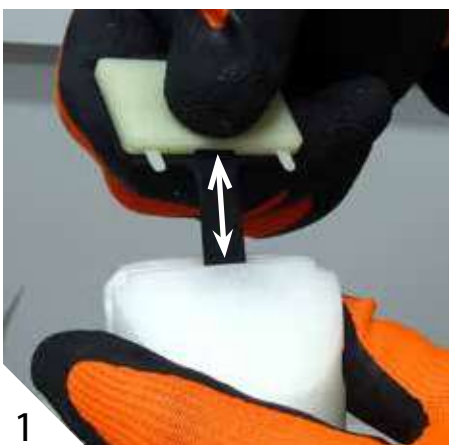
- Grasp the Clamping Stem and pull out to remove it from the valve Body [1], [2], [3]



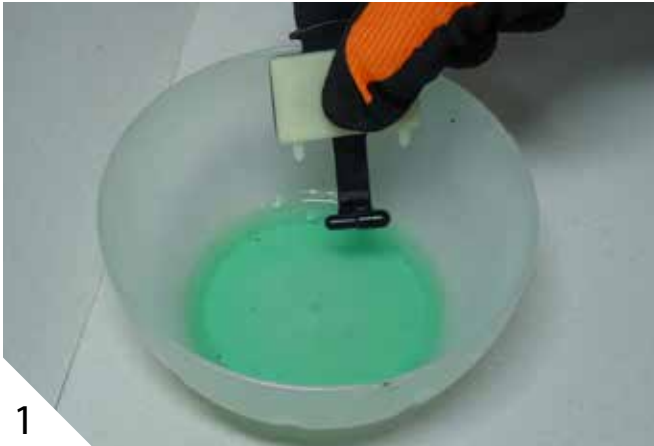
- Separate the Cover & Float assembly from the black Body [1], [2]



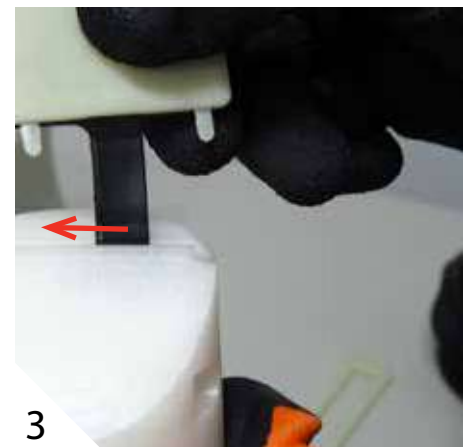
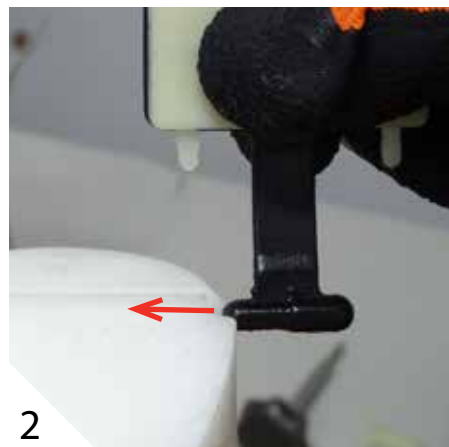
- Check the integrity of the Rolling Seal by stretching it to check for cracks or tears [1], [2]
- If replacement is necessary, remove the Rolling Seal Assembly [3]



- Take a new Rolling Seal Assembly and dip the tail end into the liquid soap solution [1]



- Note for the correct direction [1]. Insert the tail end of the Rolling Seal Assembly into the groove on the Float [2].
- Gently pull the Rolling Seal Assembly until it is partially inserted into the Float groove [3].



- Use the 4.5mm Roll Pin Punch to push the Rolling Seal Assembly to the middle of the Float [1] and align the middle of the Rolling Seal Assembly tail with the midline of the Float [2].



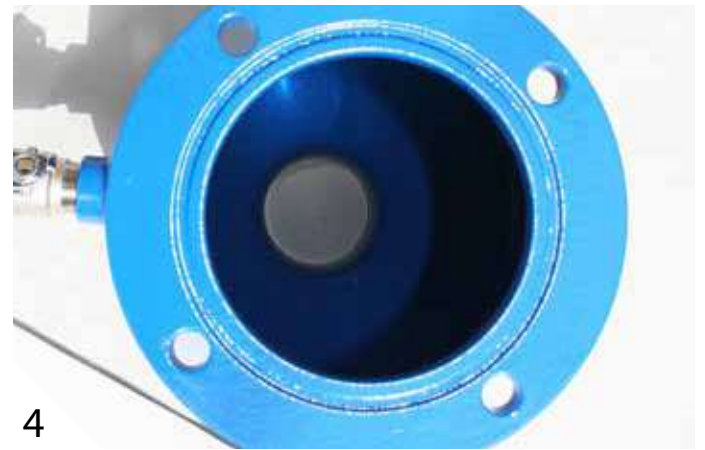
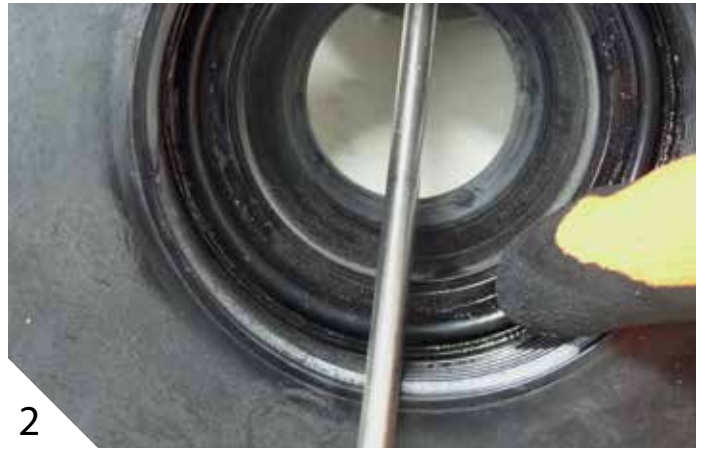
- Check the integrity of the upper side Cover O-ring [1]. Remove and replace, if necessary [2].



- Thoroughly but gently wash and clean all the components (Cover & Float Assembly [1] + Air Valve Body [2]) under clean running water to remove all grime.



• Important: Pay special attention to the sealing area of the black Body [1], the area around the O-ring in the Cover [2], the large Float [3] and the inside of the valve Body [4].



- Position the Cover & Float assembly at the edge of the table so the float can hang over the end of the table [1].



- Insert the triangular end of the Rolling Seal assembly into the groove on the front side of the black Body [1]. Continue to insert until the triangular end is halfway into the groove [2], [3].



- Slide the two grooves found on the sides of the Float onto the two rails found in the inside of the black Body [1]



- Hold the Clamping Stem[1], and insert it with smooth side up into the same groove and just behind the triangular end of the Rolling Seal [2]



- Simultaneously push down on the Float and the Clamping Stem [1] until the end so they sit flush with the valve black Body [2], [3].





- Manually screw the black Body [1] into the top of the Cover [2], [3].



- Insert the Cover & Float Assembly into the main valve Body [1], [2].

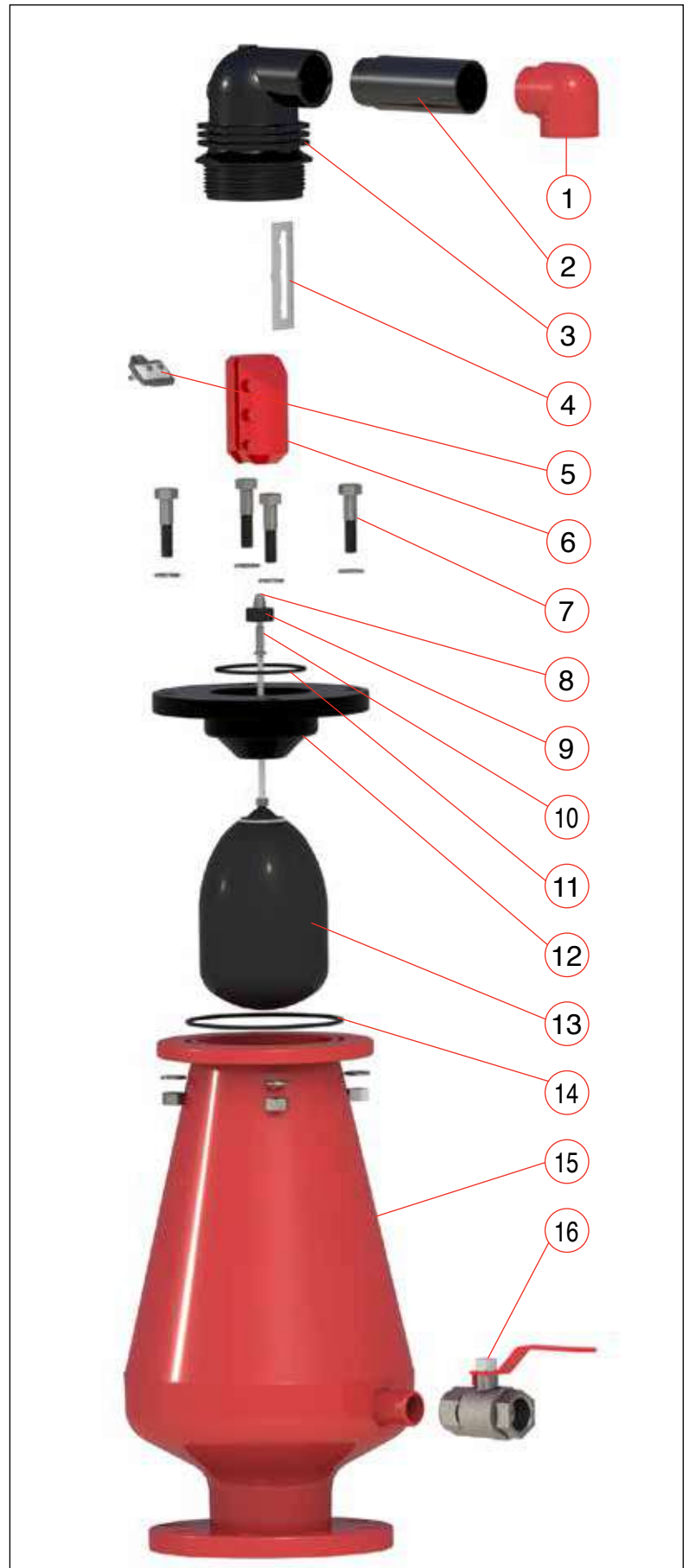


- Insert the four Bolts, Nuts and Washers [1]. Tighten using the crossover method [2].
  - Close the Ball Valve [3], [4].
- \* Slowly open the isolating valve located on the riser under the air valve. Check the air valve for proper operation.



## 6. ASSEMBLY BOM TABLE AND DRAWING

No.	Part name	QTY.
1	Discharge Elbow	1
2	Extension	1
3	Body	1
4	Clamping Stem	1
5	Rolling Seal Assembly	1
6	Float	1
7	Bolt, Nut & Washer	4
8	Domed Nut	1
9	Stopper	1
10	Spring	1
11	O-ring	1
12	Cover	1
13	Float Assy.	1
14	O-ring	1
15	Body	1
16	Ball Valve	1



## 7. Ordering Replacement Parts

Manual No. D020.IOM.ENG01

Size \_\_\_\_\_

PN \_\_\_\_\_

S/N \_\_\_\_\_

Cat. No. \_\_\_\_\_

BOM No.	Part	Quantity
[1]	Discharge Elbow	
[2]	Extension	
[4]	Clamping Stem	
[5]	Rolling Seal Assembly	
[7]	Bolt, Nut & Washer	
[8]	Domed Nut	
[9]	Stopper	
[10]	Spring	
[11]	O-ring (Cover)	
[13]	Float Assembly	
[1-6], [8-13]	Complete Float, Seal & Cover Assy. Kit	
[14]	O-ring (Body)	

- BOM DRAWING see page 19

- We highly recommend that you send a photo of the product identification tag with all replacement parts requests in order to insure parts compatibility. See example below:



## A.R.I. Standard International Warranty

A.R.I. manufactured products are guaranteed to be free from defect in material and/or workmanship and to perform as advertised when properly installed, used and maintained in accordance with current instructions, written or verbal.

Should any item prove defective within the time period set forth for that item(s), but in any case not later than within 12 (Twelve) months of that product having left A.R.I.'s premises, and subject to receipt by A.R.I. or its authorized representative, of written notice thereof from the purchaser within 30 days of discovery of such defect or failure - A.R.I. will repair or replace or refund the purchase price, at its sole discretion, any items proven defective in workmanship or material.

A.R.I. will not be responsible, nor does this warranty extend to any consequential or incidental damages or expenses of any kind or nature regardless of the nature thereof, including without limitation, injury to persons or property, loss of use of the products, loss of goodwill, loss of profits or any other contingent liabilities of any kind or character alleged to be the cause of loss or damage to the purchaser.

This warranty does not cover damage or failure caused by misuse, abuse or negligence, nor shall it apply to products upon which repairs or alterations have been made by other than an authorized A.R.I. representative. This warranty does not extend to components, parts or raw materials used by A.R.I. but manufactured by others, which shall be only to extent warranted by the manufacturer's warranty.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, EXCEPT THIS WARRANTY WHICH IS GIVEN IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Guy Sagie  
Chief Executive Officer

A handwritten signature in black ink, appearing to read "Guy Sagie", written over a horizontal line.