Installation, Operation & Maintenance

Aquestia
Directing the Flow

A.R.I. NR-040 D

The following is a step-by-step narrated description of the A.R.I. NR-040 D Swing-type check valve installation, operation and maintenance processes.

A.R.I. NR-040 D is a Swing-type Check Valves designed specifically for drinking water systems, that allows for one-directional flow; preventing the return flow of liquid to its source. The valve has a triple-shaft sealing design, flexible bearings and removable lid; which makes it accurate and durable in long-term harsh conditions. The removable lid enables cleaning and maintenance without removing the valve from the pipeline.

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- Repairs made in and to the products by personnel not authorized by Aquestia
- Maintenance or repairs using parts or components other than those specified by Aquestia and in their original condition.
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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 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.

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. For lifting and positioning the product, use only approved lifting equipment operated by authorized employees and contractors.
3. 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 upstream of the check valve.
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 check valves with pressure release outlet, slowly open the pressure release plug or the ball valve and make sure that all pressure is released.
   B. For check valves without a pressure release outlet, slowly unscrew the flange bolts until all the pressure is released from the valve.
5. Make sure the check 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.

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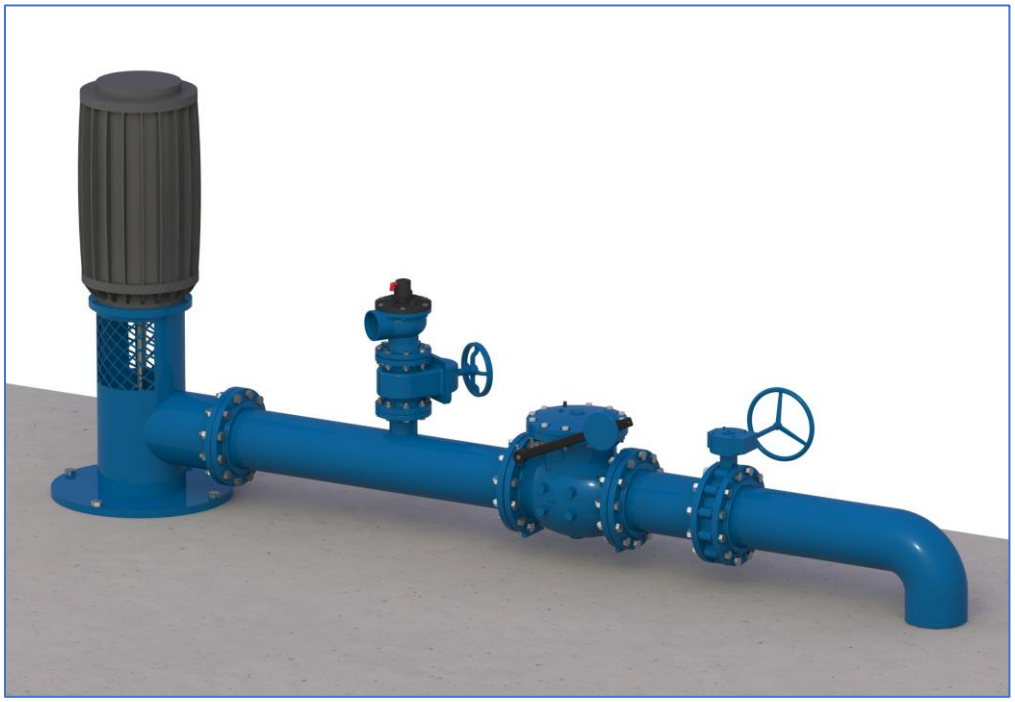
2. Installation

Important: Before performing any work on the check 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



2.2. Installation Instructions

1. Flush the system before installing the check valve to avoid any debris or sharp objects getting into the valve.
2. Carefully remove the check valve from the shipping package. Unload it carefully to a sturdy level surface taking care not to drop it.
3. The A.R.I. NR-040 D check valve can be installed either horizontally, or vertically while the flow direction is upwards.
4. The counterweight assembly is installed so the arm turns down at 45° angle when the valve is closed.
5. Shut-off valve – in order to allow maintenance and removal of the valve from the line, it is recommended to install a shut-off valve upstream or downstream of the valve, in order to isolate the valve from all the pressure sources of the pipeline.
6. Make sure the isolation valve is not interfering with the check valve's disc full movement.
7. Optional limit switch for flow control can be installed as an addon on the NR-040 D valve, please refer to the installation instructions of the limit switch.

3. Operation

A.R.I. NR-040 D is a Swing-type Check Valves designed specifically for drinking water systems, that allows for one-directional flow; preventing the return flow of liquid to its source.
The valve has a triple-shaft sealing design, flexible bearings and removable lid; which makes it accurate and durable in long-term harsh conditions.
The removable lid enables cleaning and maintenance without removing the valve from the pipeline.

4. Periodic Maintenance

Please note that the periodic maintenance of the check 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 valve, make sure that all workers on site are familiar with the safety instructions section of this document and with all the relevant local and general safety instructions, standards and work regulations.

Check for leakage from the shat bearings. If leaking:

- Shut off the pump and the isolating valve.
- Carefully release the pressure and drain the valve. Important: Discard liquid to comply with local regulation.
- Disassemble the Counterweight Assembly (3) and the Shaft's Assembly bearings by pushing the shaft from the opposite side. (in large diameters a special tool is required for pulling the bearing lock).
- Check the connection between the bearing and the shaft, replace the bearing if it is too loose.
- Replace the O-rings of the Shaft Assembly (5).
- Reassemble the Shaft Assembly (5) and the Counterweight Assembly (3).
- Check the Disc Assembly (4) for free movement.

At least once a year or when needed

- Shut off the pump and the isolating valve.
- Carefully release the pressure and drain the valve. Important: Discard liquid to comply with local regulation.
- Open the Cover (2) for internal inspection.
- Wash the internal parts and clean any dirt, solids and debris.
- Check the sealing of the Disc Assembly (4) and the Seat (9).
- Check for any wear and tear in the connection between the Disc Assembly (4) and the Seat (9), and between the Counterweight Assembly (3) and the Shaft Assembly (5).
- Check the Disc Assembly (4) for free movement.
- Replace the Cover O-ring (6).
- Reinstall the Cover (2), protect the bolts threads with grease.
- If needed correct damage to the valve's coating by brush painting.
- Test for leaks and correct if needed.

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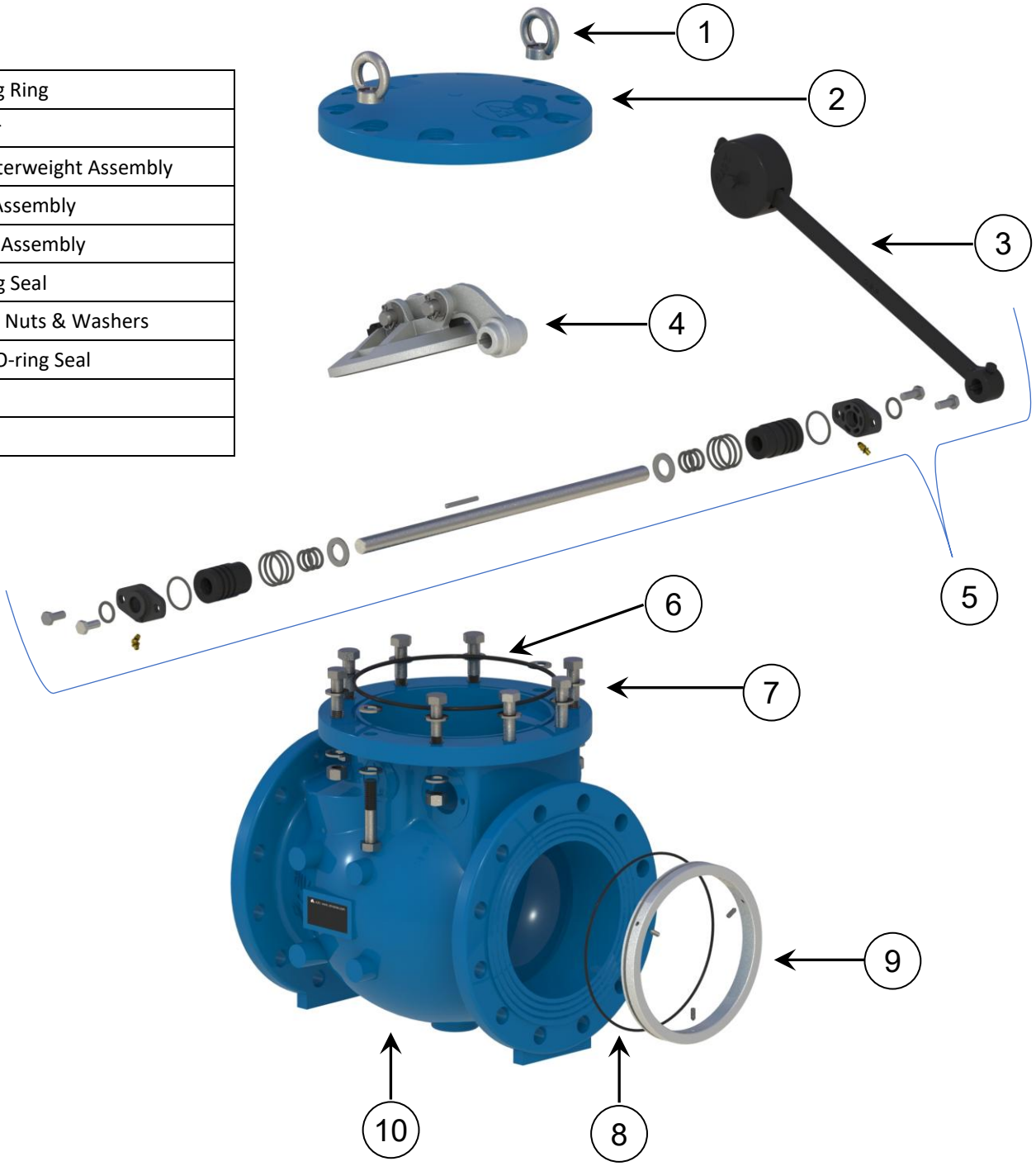
5. Assembly Drawings

NR-040 D

1	Lifting Ring
2	Cover
3	Counterweight Assembly
4	Disc Assembly
5	Shaft Assembly
6	O-ring Seal
7	Bolts, Nuts & Washers
8	Seat O-ring Seal
9	Seat
10	Body



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6. Troubleshooting

No.	Symptom	Possible Causes	Corrective Action
1.	Leakage from the shaft O-Ring	1. O-ring Elastomer deterioration. 2. Shaft Erosion at O-rings contact	1. Change the O-rings plugs. 2. Replace the complete shaft.
2.	The seats not properly sealed (reverse flow occurring)	1. Hard solid stuck on the seats. 2. Elastomer deterioration. 3. Exaggerated clearance between the internal parts due to Erosion.	1. Open the upper lid and clean both the two seats. If needed, replace the body seat. 2. Replace the rubber-lined disc. 3. Change the complete disc and arm assembly.
3.	The micro switch is out of function	The micro switch roller is no more in contact with the actuator came.	Check the tightening of the came retaining bolt on the shaft. Carefully fix the came in the right position for correct indication.
4.	Leakage from the upper cover	Defective O-ring seal.	Change the lid O-ring seal.