

R-20 SM 3W

Pressure Sustaining Control Valve 3 Way

The following is a step by step narrated description of the Eliptix R-20 SM 3W Accelerated Pressure Sustaining, Manual Control, Downstream Vent Control Valve installation, operation and maintenance processes.

The A.R.I. R-20 SM Series is line of large sized, metal, diaphragm-operated hydraulic control valves. The valves are suitable for installation in industrial, water transmission and waterworks systems for various infrastructure applications.

The R-20 SM series has an innovative elliptic shaped diaphragm that integrates well with a wide variety of regulating control pilots, solenoids and control accessories.

They are compatibility designed for water level control, flow control, electric & remote control as well as pressure reducing & pressure sustaining operation.

The R-20 SM 3-Way Accelerated Pressure Sustaining Manual Control, Downstream Vent, Control Valve is designed to sustain and maintain a pre-defined level of upstream pressure and efficiently and rapidly relieve excess pressure to the downstream system.

The R-20 SM valves are available in 2"-14" sizes.



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- 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.

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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 all products' outlet ports are not directed toward electrical elements (pumps) or people.
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 manual Isolation Valves at the valve's upstream and downstream ports.
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 (when exist) 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 valves and release the residual pressure:
 - A. For control valves with a pressure release outlet, slowly open the pressure release plug or the ball valve and make sure that all pressure is released.
 - B. For control valves without a pressure release outlet, slowly unscrew the flange bolts until all the pressure is released from the valve.
5. Make sure the control 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.

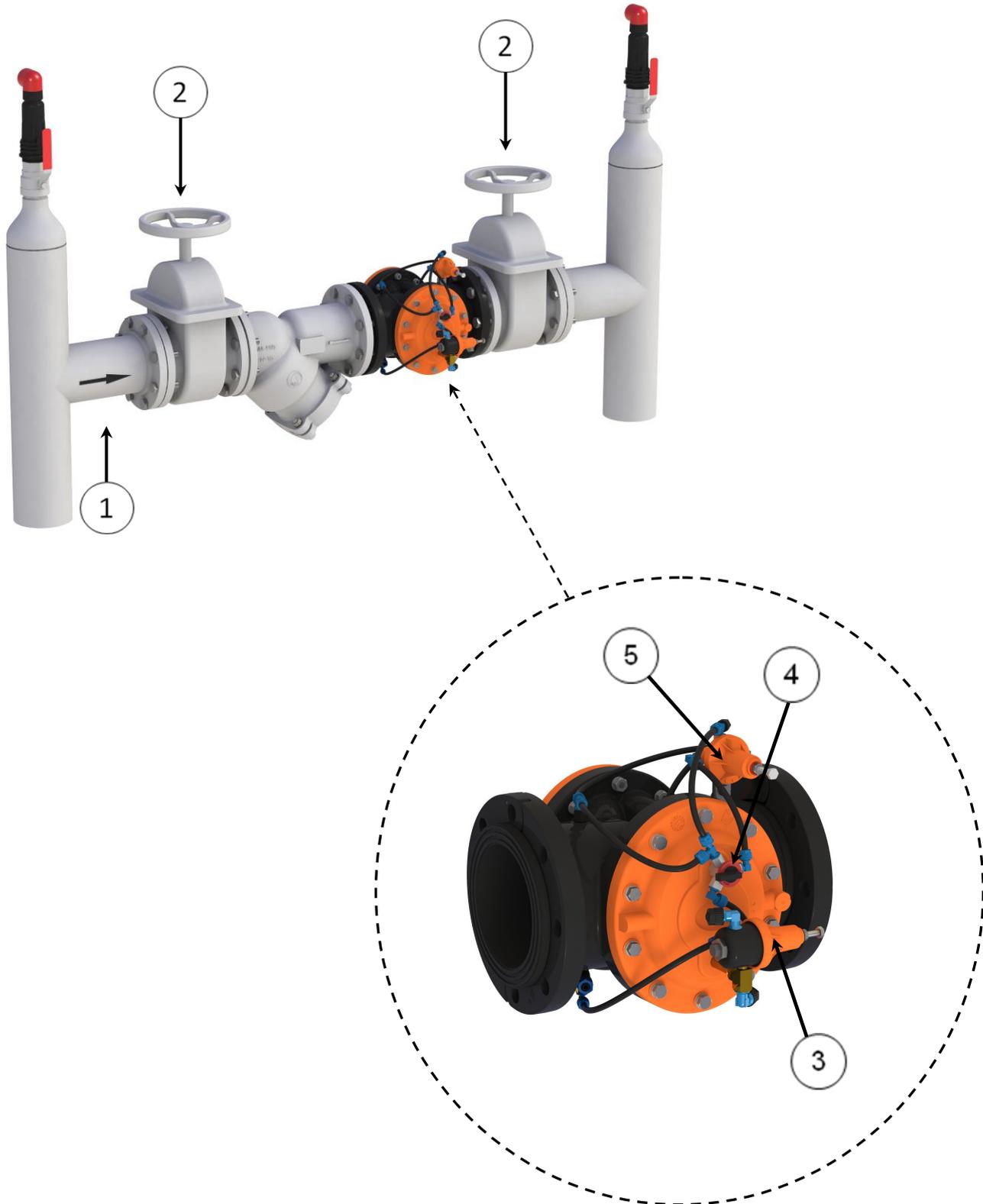
2. INSTALLATION

2.1. Pre installation requisites

1. Important: Before performing any work on the 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. Before installing the valve, flush the pipeline to remove scale, dirt and other particles that might affect the valve performance.
3. Carefully remove the valve from the shipping package. Unload all valves carefully to a sturdy level surface taking care not to drop them.
4. Valves fitted with hoist rings should only be lifted and conveyed using these hoist rings.
5. It is recommended that the valve be easily accessible as well as clearly marked to prevent damage.

2.2. Installation procedure

1. Install the valve as indicated by the arrow on the valve bonnet, indicating flow direction [1].
2. It is recommended to install isolation valves [2] upstream and downstream of the control valve.
3. Turn the 3-way manual selector ball valve [4] to Auto position.
4. Check for leaks; tighten bolts & fittings, if necessary.
5. Close the 2 isolation valves.



2.3. Initial Start-up - The Control Valve

1. Make sure that the upstream and downstream isolation valves are closed.
2. Turn adjusting screw [3A] clockwise until the screw head touches the pilot's bonnet.
3. Turn adjusting screw [5A] counter-clockwise until the screw head touches the pilot's bonnet.
4. Turn the 3-way manual selector ball valve [4] to Auto position.
5. Slowly open the upstream isolation valve.
6. Slightly open the downstream isolation valve.
7. The following is a general description of the Accelerated Pressure Sustaining, Manual Control, Downstream Vent Application:

This R-20 SM automatic control valve is a Normally Close Valve (N.C.) activated by the line pressure, which maintains a minimal preset upstream pressure by releasing excessive pressure to the downstream system. Even with the valve's large diameter its accelerating pilot ensures efficient and rapid response to line pressure fluctuations.

When the line upstream pressure rises above the preset point the valve opens to release the excessive pressure to the downstream system and maintains the upstream pressure at the pre-set level.

When the upstream pressure drops below the setting the valve closes.

The Pressure Sustaining Pilot operation (Pilot #3):

When the upstream pressure is higher than the settings, the pilot decreases the internal pressure of the control chamber by releasing water to the downstream port of the valve, causing the valve's diaphragm to slightly open and decrease the upstream pressure back to the required settings level.

When the upstream pressure is lower than the settings, the pilot increases the internal pressure of the control chamber by introducing water to the chamber, causing the valve's diaphragm to slightly close and decrease the downstream pressure, so the upstream pressure returns back to the required settings level.

The Acceleration Pilot operation (Pilot #5):

When the upstream pressure is higher than the settings, the pilot closes the water passage through port #2, allowing the Pressure Sustaining Pilot (pilot #3) to decrease the upstream pressure back to the required level.

When the upstream pressure is lower than the settings, the pilot increases the internal pressure of the control chamber by introducing water to the chamber, and together with the water introduced by the Pressure Sustaining Pilot (pilot #3) the valve decreases the downstream pressure so the upstream pressure returns back to the required level.

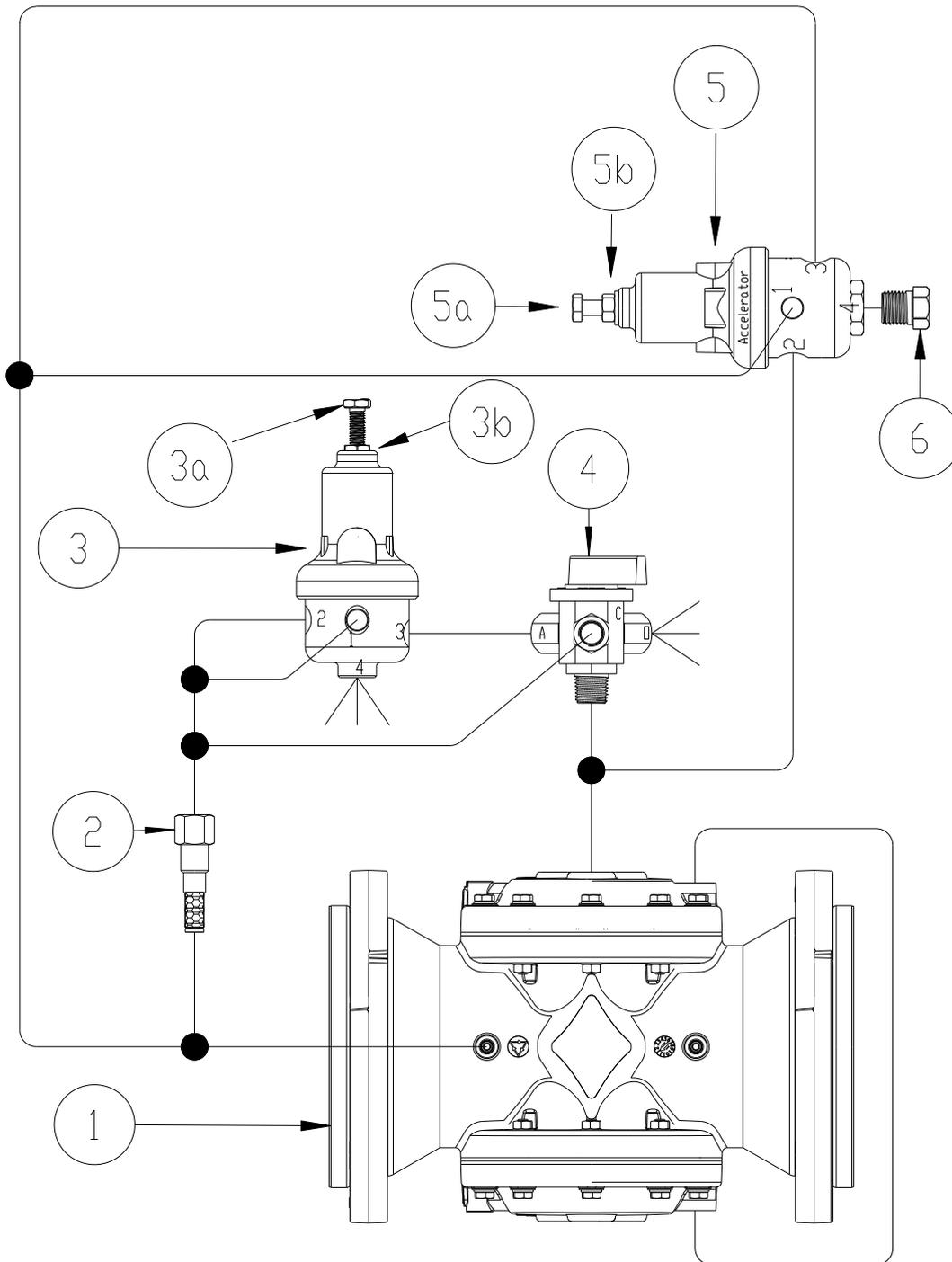
The Manual Selector operation (Selector #4):

This selector allows the system's operator to set the main valve operation mode to either manually open or to automatic operation mode.

The Orifice Plate (Plate #8):

The orifice plate is an optional addition for cases where the downstream pressure is expected to be lower than 0.4bar. The orifice plate builds back pressure across the control valve suitable for the required flow-rate.

8. Make sure that there is a downstream flow demand.
9. Make sure that the upstream pressure is higher or equal to the required pressure.
10. Turn the pilot valve's locking nut (3B) counter clockwise, until it touches the adjusting bolt (3A) head.
11. Turn adjusting bolt (3A) counter-clockwise until you reach the required upstream pressure.
12. Turn the accelerator adjusting bolt (5A) clockwise until the upstream pressure begins to rise above the required set point.
13. Turn the accelerator adjusting bolt (5A) counter-clockwise one turn.
14. Turn the locking nuts (3B, 5B) clockwise until it touches the pilot bonnet. Tighten the nuts carefully.



main valve
Flow direction

| No. | Description | QTY. |
|-----|-----------------------------------|------|
| 1 | Main Valve | 1 |
| 2 | Finger Filter | 1 |
| 3 | Multipurpose pilot valve, 3-Way | 1 |
| 4 | Manual Selector, ball valve,3-Way | 1 |
| 5 | Accelerator pilot valve, 3-Way | 1 |
| 6 | Plug | 1 |

3. OPERATION INSTRUCTIONS

1. To manually open the valve, turn the 3-way manual selector ball valve [4] to open position.

Please note:

- By doing so you will have no control over the system pressure and flow-rates.
2. In order to change the minimum upstream preset pressure see section 2.3

4. MAINTENANCE

Under regular operation A.R.I.'s valves require minimal maintenance and no lubrication, however in freezing climates the valve should be dismantled and drained for the winter months.

4.1. Periodic Inspection

1. Every 6 months visually inspect the valve's diaphragm for any tears.
2. Every 12 months inspect the valve's operation and clean the Finger Filter.
3. Check the downstream pressure; adjust if required.

4.2. Storing the valve

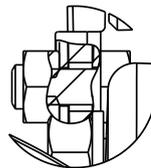
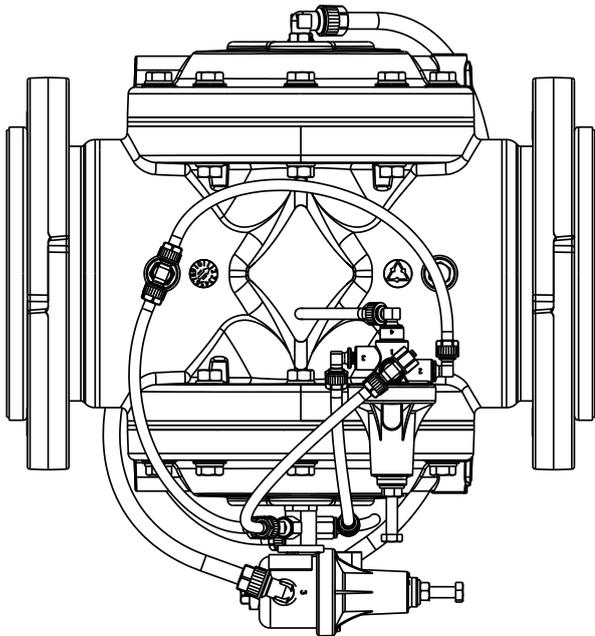
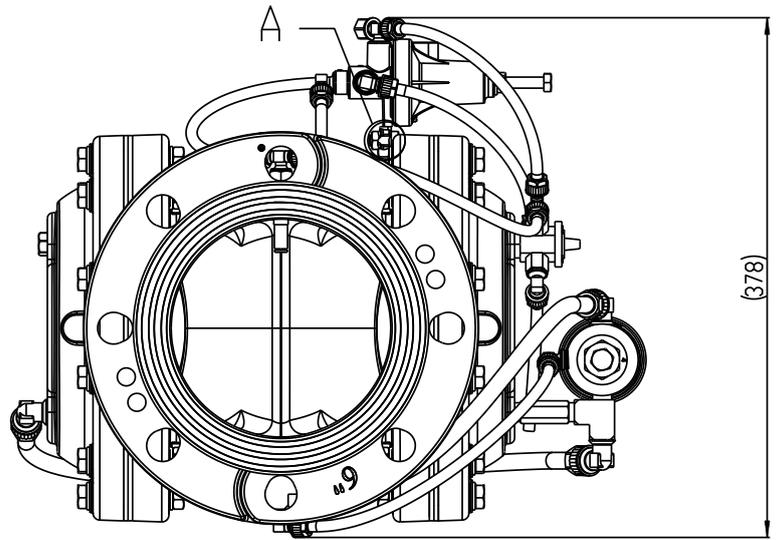
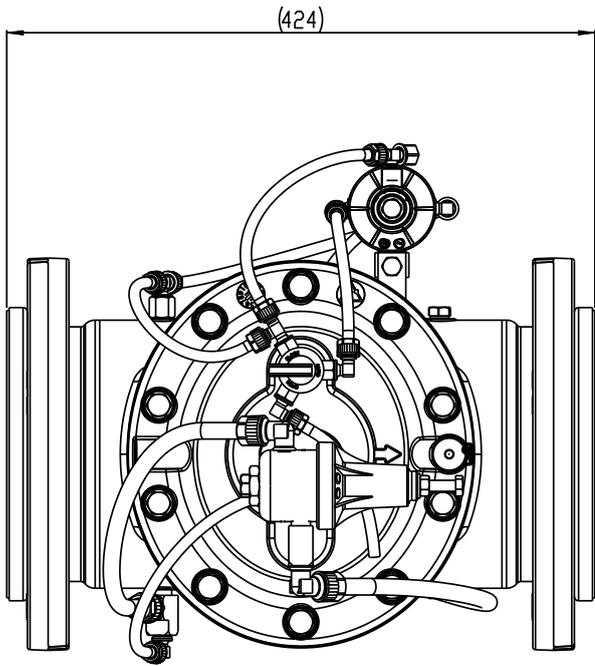
It is not recommended to store the valve or its spare parts for long periods (years); under improper storage conditions rubber parts can harden, have ozone cracking, grow mold bloom and heat aging.

It is recommended to order new rubber parts when required.

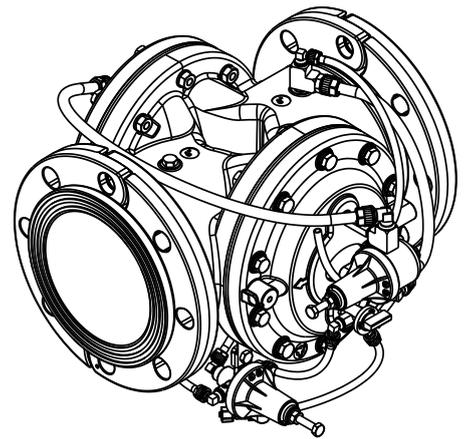
5. TROUBLESHOOTING

| Problem | Cause | Check | Solution |
|--------------------------------------|--|--|---|
| Valve does not open | 1. Inlet pressure is too low | 1. Check the inlet pressure | 1. Make sure that the water supply and/or the pump is on. |
| Valve does not close | 1. Debris on the sealing seat | 1. The valve is constantly discharging to the downstream a small amount of water | 1. Switch the 3-way ball valve (4) to its "OPEN" position then switch the 3-way ball valve (4) back to its "Auto" position. If the problem continues, turn off the water supply to the valve, remove the bonnet and remove the foreign object. |
| | 2. Diaphragm is damaged | | 2. Turn off the water supply to the valve, remove the bonnet and replace the diaphragm |
| | 3. The 3-way ball valve (4) is at "Open" position. | 3. Check the position of the 3-way ball valve (4). | 3. Switch the 3-way ball valve (4) to its "Auto" position. |
| | 4. Blocked pilot | | 4. Contact A.R.I.'s field service |
| Unstable upstream pressure | Blocked or damaged pilot | Unstable pressure upstream of the valve | Contact A.R.I.'s field service |
| Incorrect, stable, upstream pressure | Wrong preset pressure | | Readjust the upstream pressure as described in the Initial Set-up chapter (2.3). |

6. DIMENSIONAL DRAWING



DETAIL A
SCALE 1 : 1



Dimensions are in mm.

7. A.R.I. LIMITED WARRANTY

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 option, any items proven defective in workmanship or material.

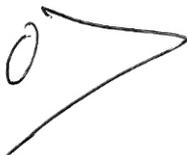
A.R.I. will not be responsible, nor does this warranty extended to any consequential or incidental damages or expenses of any kind or nature regardless of the nature thereof, including without limitation, injury to persons or property, loss of use of the products, loss of goodwill, loss of profits or 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 our 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.

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