

INSTALLATION

OPERATION

MAINTENANC



FDV-R-PN2 & FDV-Ra-PN2

Hydraulically operated Pressure Reducing Valve



Description

This Pressure reduction system is based on the Raphael's FDV-R or FDV-Ra angled valves, equipped with a pilot for precise pressure reducing applications in fluctuating flows. The FDV-R and the FDV-Ra valves installed, have a range of optional materials and coating to fulfill operation condition needed, but the system function principle stays unchanged:

In flow conditions, the pressure-reducing pilot senses the downstream pressure and keeps it at a steady level by adjusting in real time.

The system is equipped with a self-cleaning strainer, can be installed at any orientation requested and is suitable for all purpose Fire protection water supply pipelines.

Operation

(Reference drawing – figure 1)

The PRPV Pressure Reducing Pilot Valve (5) is adjusted to a set outlet pressure.

During water flow through the FDV-R or FDV-Ra valve (4), the pilot valve senses the pressure changes at the downstream and governs the FDV-R control chamber's drain flow. As the valve's control chamber receives a constant flow from the upstream through the needle valve, the pressure at the control chamber changes according to the flow ratio between the upstream flow and the drain through the pilot valve.

When the valve's downstream pressure rises above the set pressure, water fills the PRPV's internal space and applies force onto the pilot's diaphragm. The seal assembly moves upwards and restricts partially the water passage through the pilot's seal seat. Consequently, the control chamber drain flow reduces. Therefore, the pressure applied onto the valve's diaphragm, increases. The valve's flow becomes reduced, and the downstream pressure drops gradually as well.

When the force applied by the downstream pressure becomes balanced with the pilot's spring counter force, the PRPV changes the valve's flow rate in accordance with the change of water pressure and keeps the downstream pressure at the set value.

FDV-R-PN2 & FDV-Ra-PN2

hydraulically operated Pressure Reducing Valves

Parts list

1. Upstream gauge.
2. Needle valve.
3. Downstream gauge.
4. FDV-Ra (right) or FDV-R (left) valve
5. PRPV - Pressure reducing pilot valve.
6. Internal self-cleaning filter
7. Sense tube (downstream)

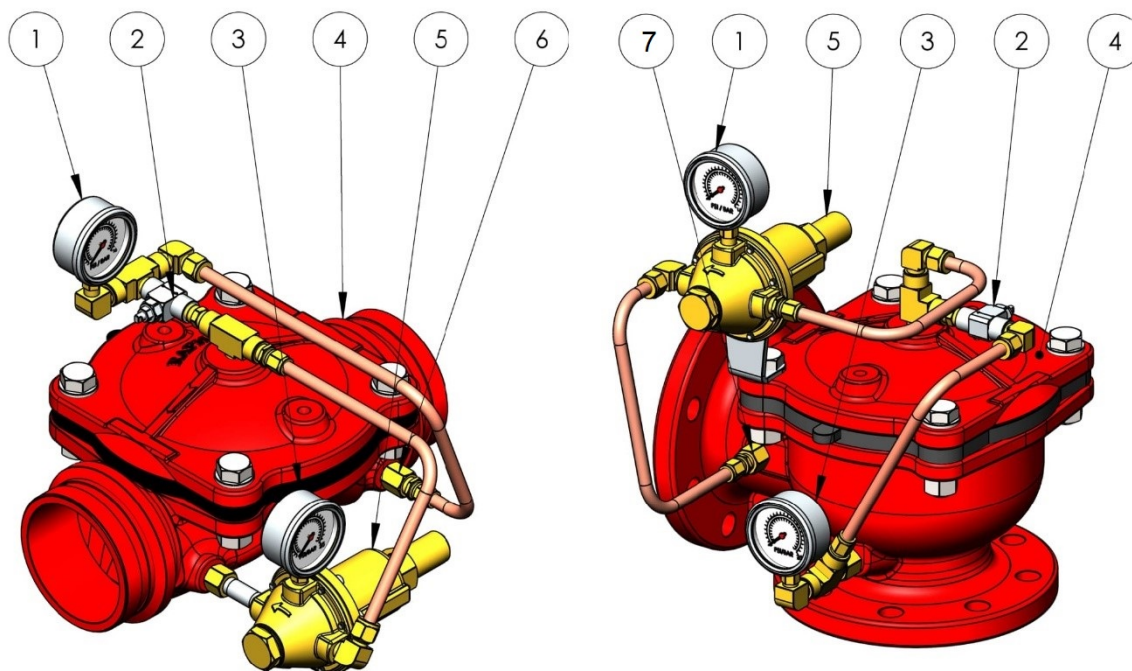


Figure 1

Installation

1. This system is supplied pre-assembled and factory pre-adjusted set pressure according to customer's request. Any change carried out at the system's trim components adjustments or order, pipe and tubes length or ports for auxiliary connection sizes, will affect the system operation and therefore, prohibited.
2. The system cannot be installed at a location where it might be subjected to freezing temperatures.
3. Sufficient room around the system location should kept, to enable assembly/disassembly and maintenance work.
4. The system described, can be mounted horizontally or vertically after changing the pressure gauges orientation. When ordered for horizontal installation, the valve's p.n. will start with the letter H.
5. A system with the downstream pipe connected to the FDV-R valve at a horizontal mount, is to be supported firmly to prevent the pipeline's weight to be loaded on the valve's body.

Commissioning the system

Filling the System:

Flush thoroughly the supply pipeline before installing the reducing valve.

It is advised to fill empty pipeline gradually by opening the main supply valve partially. This should be done whenever a possibility of destructive "water hammer" might occur.

After running a reasonable amount of water through the valve, close the main supply valve, disconnect the upstream tube by opening its fitting's nuts. Dismantle the strainer and clean it thoroughly. Then, it needs to be re-installed:

Dry the strainer's thread, smear sealant pastes over the accessory threads and install it back into its bore. Re install the copper tube and open the main supply valve.

Adjusting the downstream pressure:

For set pressure adjustment, follow those instructions:

1. Take off the adjusting screw cover by loosen its 4M hexagon socket screw and unscrewing this cover off.
2. Release the adjustment screw-locking nut.
3. Set pressure adjustment -
 - To increase the downstream pressure: Turn the adjusting screw clockwise
 - To decrease the downstream pressure: Turn the adjusting screw counterclockwise.
4. When reached to the desired pressure, tighten the locknut at the adjusting screw. Re-install the cover and tighten the 4M cover's locking screw.

Maintenance

Prior to any stoppage of the fire protection system, a fire patrol should be placed in the area covered by the interrupted system.

Prior to generating any test procedures, turning on false alarms or turning off the alarm system, the local safety personal and the close central fire station have to be notified.

Quarterly inspection

1. Verify that the FDV-R valve and its trim piping & accessories is free from physical damage.

Annual maintenance procedure

1. Conduct the quarterly inspection.
2. Make sure that the required supply water pressure is applied to the valve's inlet
3. Open the pipelines drain valve, let the downstream pressure to stabilize and compare it to the known set pressure. If needed, re-adjust pressure according to the process described at the chapter **Adjusting the downstream pressure**

Every 5 years inspection procedure

This major inspection procedure includes the removal of the trim, the dismantling of the FDV-R's valve cover and a performance of a comprehensive internal part examination. Then, the relevant trim accessories should be replaced or maintained, After the completion, the Annual maintenance procedure is to be conducted.

1. Close the OS&Y/ main supply valve. Drain water and make sure that there is no pressure at the pipeline.
2. Release all relevant tubes fitting nuts.
 1. Remove the disassembled trim.
 2. Remove all the FDV-R's cover bolts.
3. Observe the internals of the valve and cover for excessive scale residuals, foreign particles, damaged coating (rust, cracks, or peeling). Worn or cavitation damaged parts should be replaced. Consult Raphael's local representative or the service department for any maintenance or part replacement issue.
4. Replace the Diaphragm with the one supplied with the system's maintenance kit. The identification tongue should point to the valve's stamped flow direction arrow side.
5. Reinstall the valve's cover: use the Anti-seize paste tube supplied at the maintenance kit for bolts and nuts lubrication. Tighten bolts in accordance with "Bolt's torque moments table".
6. The PRPV pilot should be replaced.
7. Reinstall the trim carefully: avoid causing twists or dents on bent tubes and do not overtight the compression fittings nuts. When the system is fully reassembled, perform the "**Commissioning the system and** procedure and perform the "*Annual maintenance procedure*".

Technical data

- Maximum inlet pressure – 250 psi
- Outlet set pressure range at 1½”, 2”, 2½”, 3”, 8”, 10”, 12” valves diameter - 50-200 psi
- Outlet set pressure range at 4”, 6” - 50-200 psi

Cover bolt’s Torque Moments Table

Valve size	Torque lb/ft	Valve size	Torque lb/ft
2”	22	8”	65
2.5”-3”	36	10”-12”	72
4”	36	14”-16”	108
6”	58		

Construction materials and coatings

FDV-R & FDV-Ra valves materials:

Standard: Ductile Iron ASTM A-536

Optional:

- Cast Steel ASTM A-216 Grade WCB
- Stainless steel ASTM A743, CF8M
- Nickel Aluminum bronze ASTM B148 UNS C95800.

Materials and coating options:

For Ductile Iron & Cast Steel:

❖ *Standard:*

Fusion Bonded Epoxy (FBE) and Polyester - dual layer, RAL 3000 (for cast steel).

Optional:

❖ *for Ductile Iron & cast steel: Rilsan PA11/ Nylon 11 ().*

❖ *for CF8M, CF8 and N.A.B: Polyester powder RAL 3000 or 3020 ().*

❖ *For Ductile Iron: Internal – Enamel glazing / External – Epoxy base, with polyurethane top coated.*

Trim tubing, piping & accessories materials:

❖ *Standard:*

Tubing – Copper; fittings and accessories - Brass

❖ *Stainless steel AISI 316, 304 and CF8M.*

Optional:

❖ *Tubing, fittings – Cupro nickel Nickel CuNi 9010 ; accessories - Aluminum bronze ASTM B148 UNS C95800 or MONEL® nickel-copper alloy 400*

**Pressure reducing control FDV-R valve
Type: FDV-R/FDV-Ra/FDV-PN2**

