# IOM FDV-R-RN2 & FDV-Ra-RN2

Hydraulically Operated Pressure Relief Valve

**I**nstallation **O**peration & **M**aintenance manual

**Fire Protection**

## RAPHAEL VALVES INDUSTRIES

# FDV-Ra/R-RN2 hydraulically operated Pressure Relief Valve

## Description

This Pressure relief application is based on the Raphael's FDV-Ra (angled pattern) and FDV-R (globe) valves, equipped with a pilot for precise pressure relief in fluctuating flow conditions or, when there is a need to protect the pump from high pressure and no flow condition.

The FDV-R valve installed, has a range of optional materials and coating to fulfill operation condition needed, but the function principle stays unchanged:

In flow conditions, the pressure relief pilot senses the upstream pressure and keeps the valve close until the pressure rises above the pilot's set.
Once the upstream exceeds the set pressure, the valve opens and reduces the pressure by releasing water out of the system's line.

This valve is suitable and authorized for use in fire protection systems.
the valve is equipped with a self-cleaning strainer, can be installed at any orientation requested and is suitable for all purpose water supply pipelines.

# Operation

## Initial state – (figure 1).

The valve's control chamber pressure is adjusted through the QRPV to a higher level than the defined main supply line pressure. A water supply with desired pressure is represented in the figure below. The QRPV is in its close state.

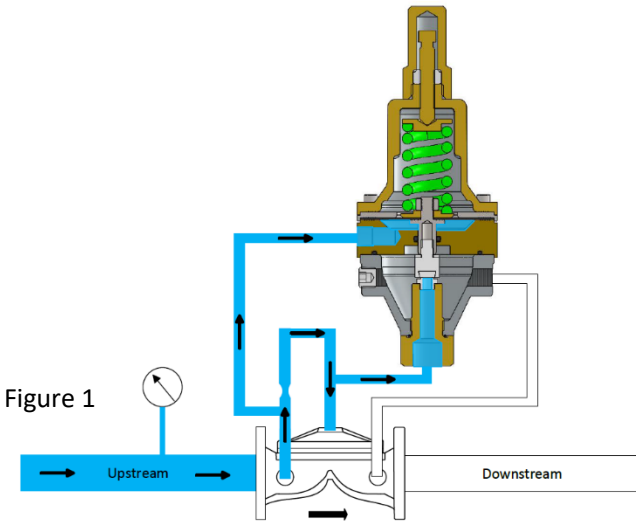



Figure 1

## Intermediate state – (figure 2)

A sudden pressure rise change in the upstream pressure (indicated by the manometer in figure 2) is conveyed into the QRPV internal space and applied on the pilot's diaphragm. The seal assembly moves upwards and opens the water passage through the seal seat. Consequently, the control chamber drains flow increases, thereby opening the valve and draining the excess pressure from the system.

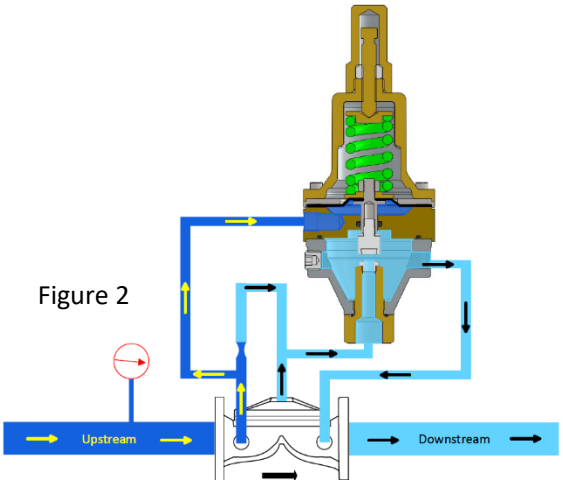



Figure 2

## Final State – (figure 1).

After the excess pressure has been drained, the QRPV's spring overcomes the desired system's upstream pressure, exerted on it by the diaphragm, closing the pilot's water passage and thereby closing the valve, reverting to its initial stage (as shown in figure 1).

## FDV-Ra- RN2 / FDV-R-RN2

## Hydraulically operated Pressure relief valve

## Parts list

1. FDV-R & FDV-Ra valves.
2. Needle valve.
3. Upstream pressure gauge
4. QRPV (Quick Relies Pilot Valve)
5. Self-cleaning strainer

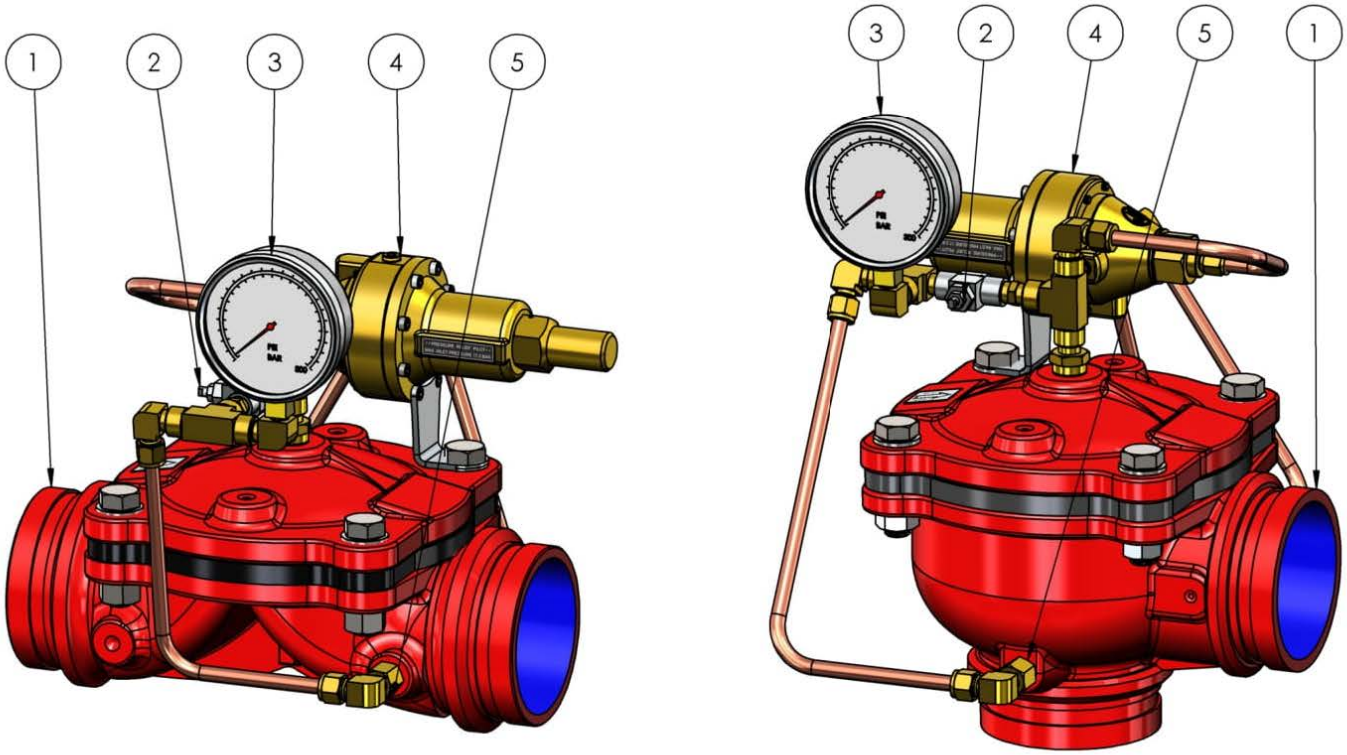



*Figure 1*

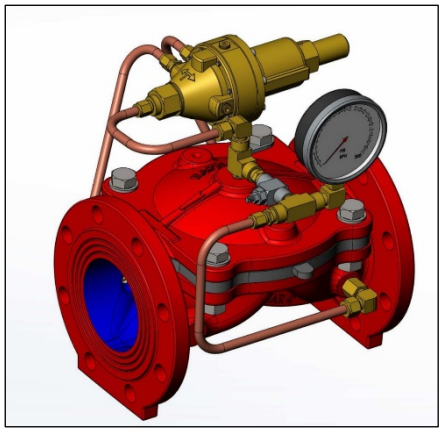
# Installation

*The FDV-Ra-RN2 and the FDV-R-RN2 pressure relief valve models are normally installed at the pipeline in a tee configuration where the pressure relief valve's downstream releases water out. The relief branching is located right after the fire pump, while the system's check valve should be installed right after.*

1. This system is supplied pre-assembled and factory pre-adjusted, including the QRPV pilot's set pressure and the needle valve position. Any change carried out at the system's trim components adjustments pipe and tubes length or order, will affect the system's operation and therefore, prohibited.
2. The system cannot be installed at a location where it might be subjected to freezing temperatures.
3. It is advised to free the excess water flow out of the valve's downstream with minimum restriction possible. Every interference of this flow will raise the actual relief pressure and increase the relief time!
4. Sufficient room around the system location should kept, to enable assembly/disassembly and maintenance work.
5. The valves are supplied according to costumers request but if the installation orientation need to be change, it can be done following the short process described in pages 5 & 6.
6. The downstream pipe connected to the FDV-Ra/R valve at a horizontal mount, is to be supported firmly to prevent the pipeline's weight to be loaded on the system's valve.

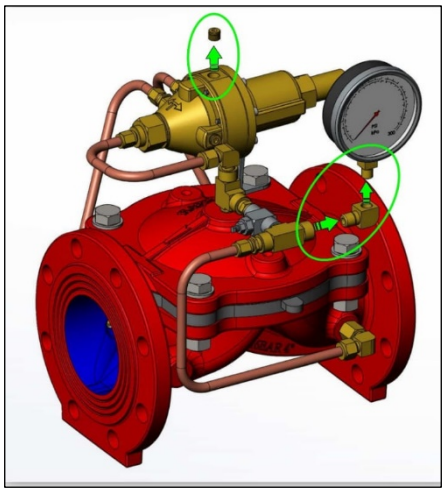
# Modifying a pressure relief valve from a horizontal installation to a vertical mounting

Typical pressure relief valve for horizontal installation



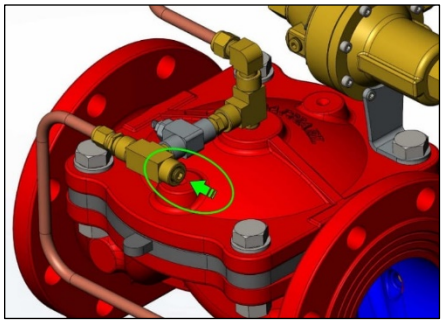
**Step 1**

Unscrew and remove the hexagon socket head ¼" plug from the side port of the QRPV pilot.
Unscrew and remove the pressure gauge and the male-female ¼" elbow.
Keep accessories for the next steps.



**Step 2**

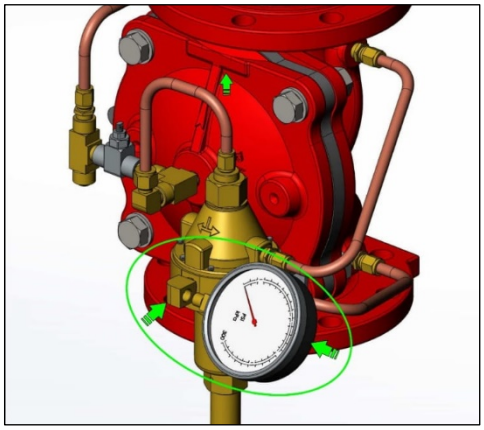
Install the hexagon socket head ¼" plug into the open branch of the Tee fitting



**Step 3**

Install the male-female ¼" elbow at the QRPV pilot's open port.

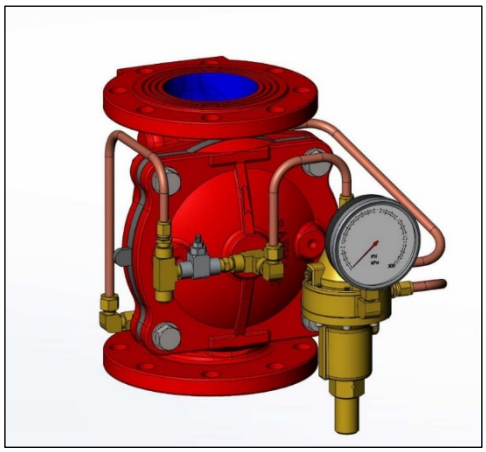
Position the elbow temporary at the angle shown to enable the pressure gauge installation



**Step 4**

Turn the elbow together with the pressure gauge installed to its final full vertical position.

End of process.



## Commissioning the system

### Setting the relief opening:

1. Release the pilot valve locknut and completely loosen the adjusting screw.
2. Tight the adjusting screw four turns beyond the point as the spring resistance is encountered.
3. Release the needle valve locknut.
4. Tight completely the needle valve adjusting screw and then, release it one turn counterclockwise. Tight the needle valve locknut.
5. Turn on the system pump in 100% capacity.
6. Slowly tighten the QRPV pilot's adjusting screw until valve closes.
7. Turn the adjusting screw one clockwise additional full turn.
8. Tight back the locking nut and shut off the system pump.

# 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 must 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. Follow the procedure described in chapter - **Setting the relief pressure value**. Check and confirm system's proper operation.

# Every 5 years inspection procedure

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

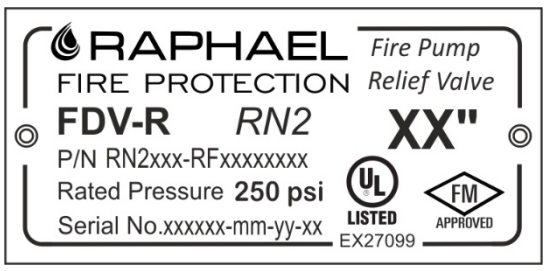
1. Stop pump/s, close the supply valve and assure that system pipelines are fully drained.
2. Release all relevant tubes fitting nuts and remove the disassembled trim.
3. Remove all the FDV-Ra/R cover bolts. Lift cover using the right sized shackles connected through the lifting eyes at the cover side ribs.
4. Observer the internals of the valve and cover for excessive scale residuals, foreign particles, damaged coating (rust, cracks, or pealing). Cavitation worn or damaged parts should be replaced. Consult Raphael's local representative or the service department for any maintenance or part replacement issue.
5. 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.
6. Reinstall the valve's cover: use the Anti-seize paste tube supplied in the maintenance kit for bolts and nuts lubrication. Tight them in accordance with the "Bolt's torque moments table".
7. The QRPV pilot elastomers should be replaced. Use the QRPV elastomers replacement kit.
8. Reinstall the trim carefully: avoid causing twists or dents on bent tubes and do not overtight the compression fittings nuts.
9. When the system is fully reassembled, perform the **Setting the relief pressure value**" procedure.

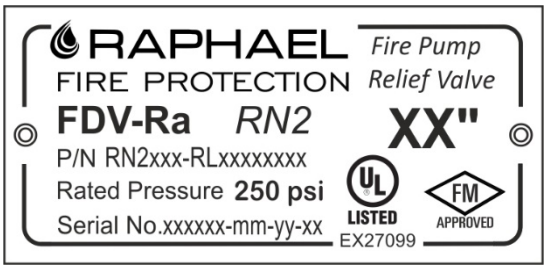
| Valve size | Torque Lb/ft |
|---|---|
| 1.5"-2" | 22 |
| 2.5"-3" | 36 |
| 4" | 36 |
| 6" | 58 |
| 8" | 65 |
| 10"-12" | 72 |
| 14"-16" | 108 |

# Marking

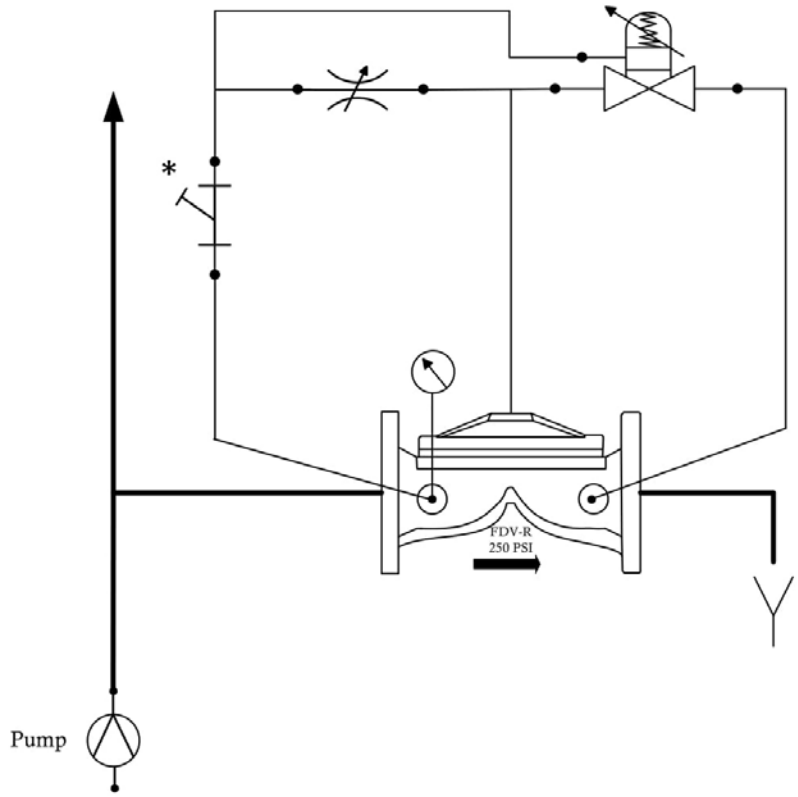
The FDV valves are marked by a laser engraved, black anodized, 0.8mm (0.031”) thick metal plate, riveted to the valve’s cover.

- *Company name and trademark.*
- *Short description (Italic letters)*
- *Application’s type*: FDV-R-PN2 – Hydraulically Operated Pressure Reducing.
- (P/N) *The Application’s part number*: System properties–Valve properties
- *Rated pressure*: 250 psi
- *Serial Number*: Work order number-MM-YY-Number in batch 01-99
- *The UL listing mark & QR code:* EXxxxxx
- *The FM approved mark*
- *The Application’s* diameter in inch: XX”



# FDV-R-RN2 / FDV-Ra-RN2
# Pressure Relief Valve




* Inline finger Strainer

FDV-R Valve

Pressure gauge

QRPV Pilot

Main Pipeline

Trim pipe/ tube

Pump

Needle Valve

Rev. – 17/08/2021

**RAPHAEL**, founded in 1949, is the first Israeli manufacturer of water control valves. RAPHAEL´s research department constantly strives to introduce new and innovative products and solutions for water control systems including water works, fire-protection and irrigation systems.


RAPHAEL

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