IOM FDV-AH0

Hydraulic Actuated with Local Reset Deluge Valve

Installation Operation & Maintenance manual

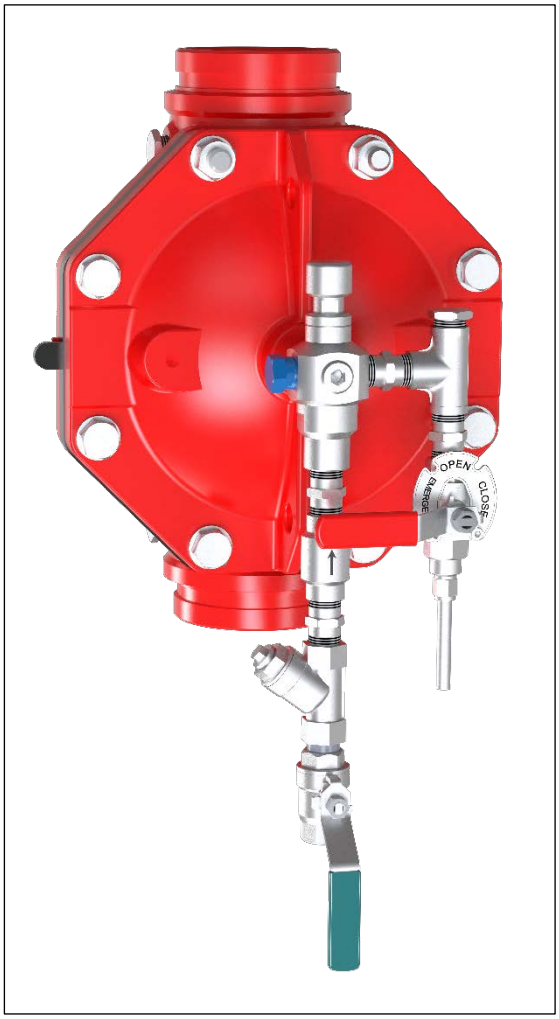
Fire Protection

RAPHAEL VALVES INDUSTRIES

FDV-AH0 – Hydraulic Actuated with Local Reset Deluge Valve

Description

This deluge system is based on the Raphael's FDV valve, equipped with a pneumatic actuated control trim. The FDV valve installed, have a range of optional materials and coating to fulfill operation condition needed, but the system function principle stays unchanged: in fire situation, a Hydraulic detection system - automatic sprinklers along the wet pilot line, trips the valve's control trim and consequently, pressurized water trapped in the FDV's control chamber are drained and the valve opens.



The trim is equipped with a PSA – a device that enables the local reset of the system i.e. closing the FDV valve by pressurizing the valve's control chamber. This system is suitable for automatic water spray at the pilot pipeline and with open nozzles at the main spraying pipelines.

Operation

SET position:

The trim is supplied by the line-pressure via ball valve (6 figure 1), “Y” strainer (5), flows through the PSA (2), and fills the FDV’s control chamber. Pressurized water in the valve’s control chamber gets trapped by the internal check-valve at the PSA, by inline check valve, by the closed automatic sprinklers along the wet pilot line and by the closed emergency valve, maintaining the deluge valve in closed position.

In case of minor leakage from the FDV’s control chamber piping, the PSA moves to its compensation state, ensuring the valve remains close.

FIRE situation:

When one or more of the wet pilot line sprinklers is subjected to fire, it blows open and the pressure drops.

Consequently, the trapped pressure at the valve’s control chamber drops, the FDV deluge valve opens and water flow into the sprinklers pipeline/s. The drop of pressure in the PSA’s upper manifold, causes the internal ball to move to its upper seal seat preventing upstream flow from entering the deluge valve control chamber. By that, the PSA latches the FDV valve in its open position.

Opening the Emergency ball valve, bypasses all terms, drains the FDV control chamber and opens the valve immediately.

RESET position

The first step in the trim’s RESET procedure is closing the Upstream Butterfly valve (7 figure 2) and the trim pressure supply valve (8).

At the second step, all the wet pilot line’s blown-open sprinklers should be replaced. Doing so, enables pressurizing the wet pilot line at the next step.

At the third step, the pressure supply valve needs to be opened. When done, the PSA (**2**) push-button should be pressed down until the FDV control chamber is fully pressurized.

At the last step, the Upstream Butterfly valve (**7** figure 2) should be opened and the systems is in SET position.

Parts list

1. – FDV Deluge valve
2. – PSA Pressure Surge Arrestor
3. – Wet pilot connection port (temporary plugged)
4. – Check Valve
5. – "Y" Strainer
6. – Trim Pressure supply valve
7. – Control chamber pressure gauge conn.
8. – Emergency valve
9. – Downstream side port (plugged)
10. – Downstream drain port (plugged)
11. – Upstream side port (plugged)
12. – Upstream side port (plugged)

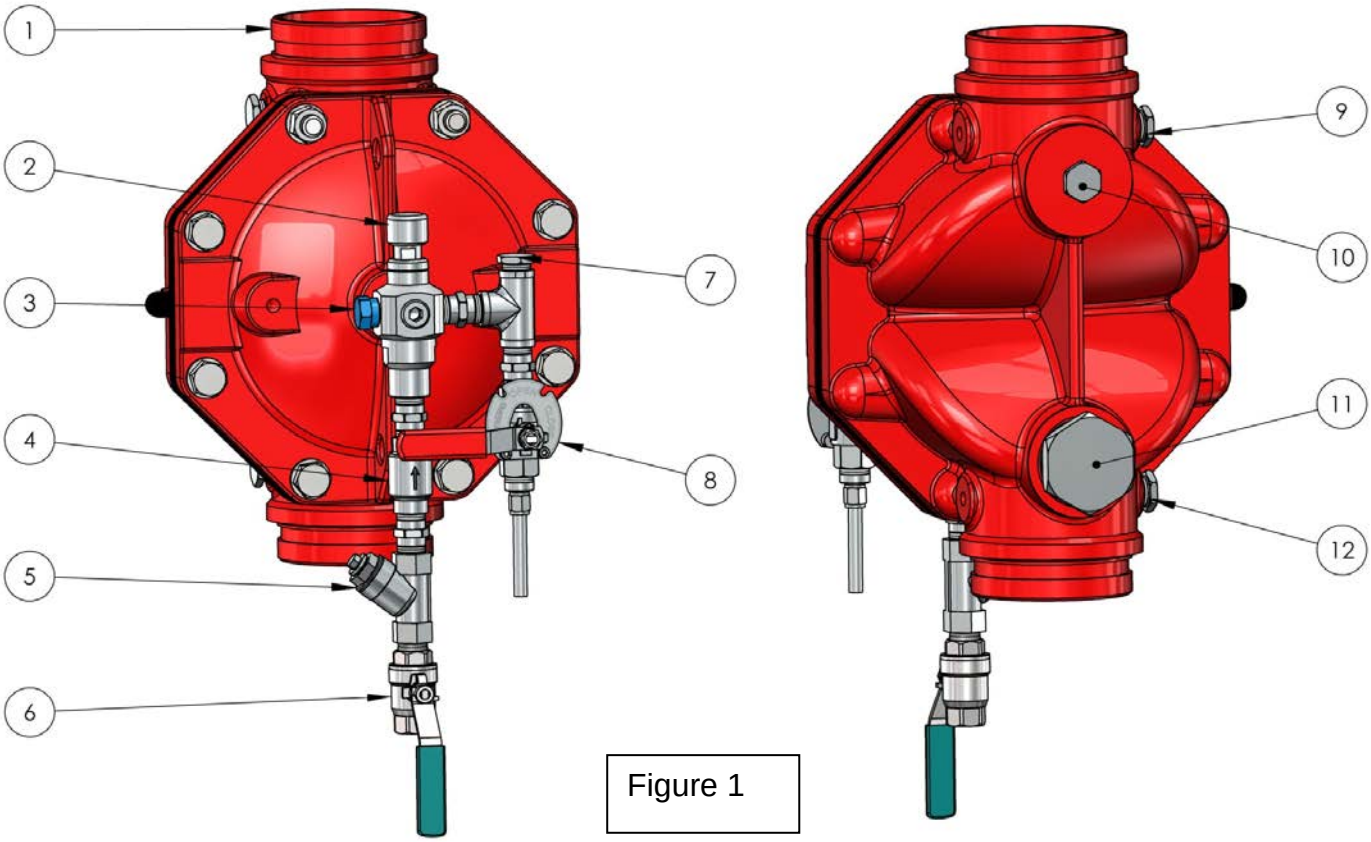


Figure 1

Installation

1. This system is supplied fully pre-assembled. Any change carried out at the system's trim components order, pipe and tubes length or ports for axillary 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 be kept, to enable assembly/disassembly and maintenance work.

4. It should be taken by account that water will be drained during regular maintenance on a routine base, during periodical tests procedures and when operating in fire situation. Therefore, a drainage plan should be considered.

5. Systems marked with a prefix "H", e.g. HFDV-AH0 are designed to be installed in horizontal orientation.

6. The downstream pipe connected to the FDV valve at a horizontal mount system, need to be supported firmly to prevent the pipeline's weight to be loaded on the system's valve.

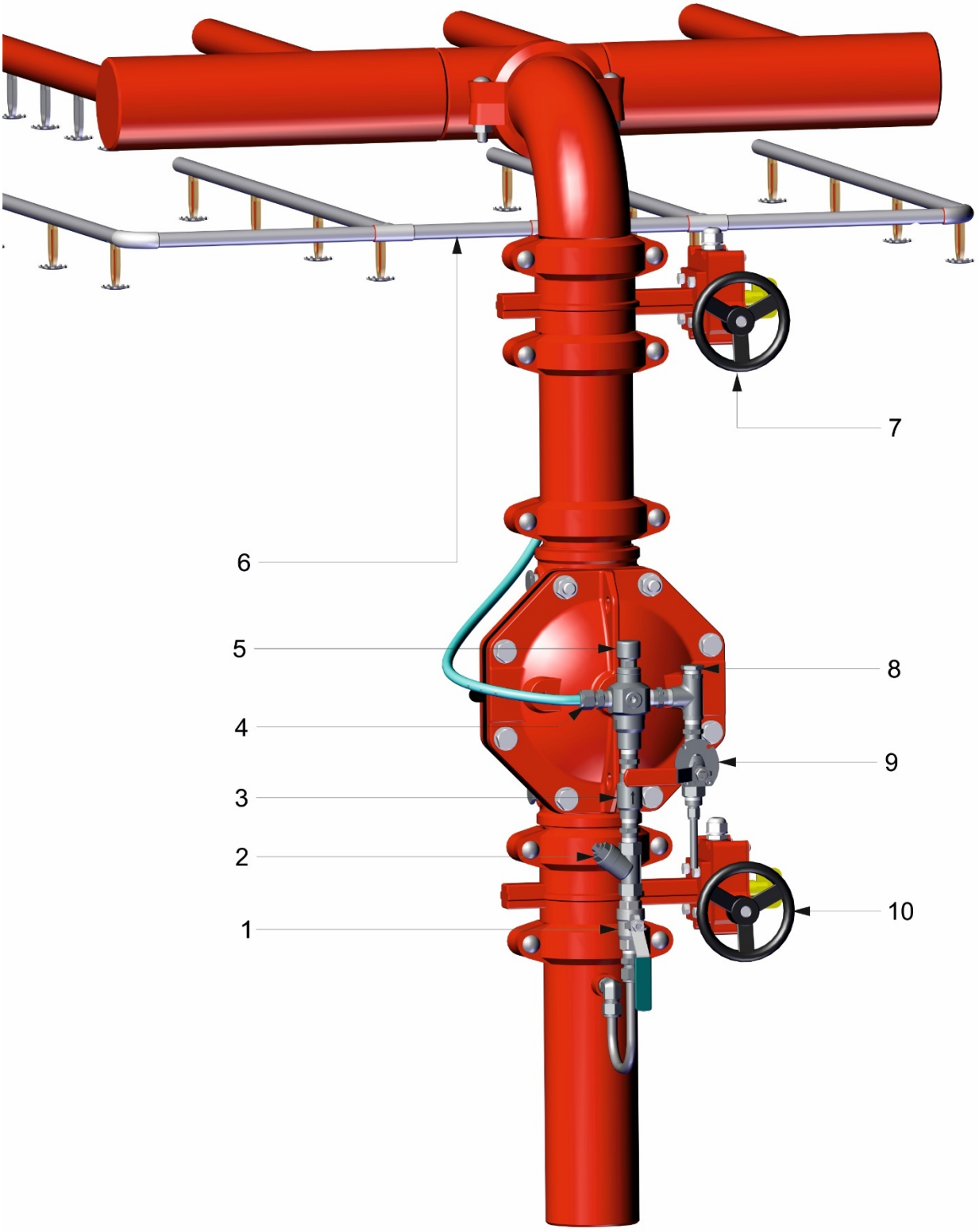
7. Any use of pipe/thread reduction-fittings installed at open ports designated for axillary components, (like trim pressure supply, FDV valve's drains or Emergency valve drain line), is prohibited.

8. All connections to water supply, alarms etc. should be done in accordance with figure 2:
   (4) – Wet pilot pipeline connection (1/2" NPT female).
   (1) – Trim pressure supply connection (1/2" NPT female).

9. The FDV valve should be installed with the flow arrow marked on the valve's body, in the proper direction.

Parts Installation List

1. Trim supply valve (1/2” NPT female)
2. “Y” Strainer
3. Check valve
4. Wet pilot connection port (1/2” NPT female, temporary plugged)
5. PSA – Pressure Supply Arrestor
6. Wet pilot valve
7. Downstream separation butterfly valve
8. Control chamber pressure gauge connection (1/2” NPT female - plugged)
9. Emergency valve
10. Downstream separation butterfly valve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1

Commissioning the system - phase 1.

Filling and pressurizing the system

The procedure described should be carried out after system installation completion and a comprehensive inspection.
(Reference Drawing - figure 2)

1. Make sure the trim pressure supply ball valve (**1**) is Closed.
2. Make sure butterfly valves (**7** & **10**) are fully close.
3. Make sure that Emergency valve (**9**) is fully closed.
4. Unplug the metal plug at the FDV's drain port or open the drain valve If equipped.
5. Open the trim pressure supply valve (**1**).
6. Press the PSA's push-button (**5**) and fill the trim, pressurize the pilot line to the rated pressure and Pressurize the FDV deluge control chamber
7. Open gradually the upstream butterfly valve (**10**) and make sure the downstream drain port / valve is not dripping.
8. Leave the downstream drain port or valve

The system is ready for the "**fire situation simulation**".

Commissioning the system - phase 2.

Fire Situation Simulation (Reference Drawing - figure 2)

The procedure described, should be carried out after the system was pressurized and a comprehensive leakage inspection was commissioned. Energizing the solenoid can simulate a fire situation and cause the system to response by opening the FDV deluge valve.

NOTICE:
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 personnel and the close central fire station must be reported.

1. Open the inspector's valve. The wet pilot line will depressurize and the FDV deluge valve will opens, admitting water into the spray sprinklers pipeline.

2. Close the inspector's valve. The deluge needs to close.

3. Open the Emergency valve (**9**). The deluge needs to open. observe the drain flow through its metal tube: the flow should run for a few second, draining the valve's control chamber, and stop. A drain flow for an extended time or a constant flow can indicate an internal leakage at the PSA device.

The valve is ready for **Commissioning the system - phase 3.**

Commissioning the system - phase 3.

Resetting & placing in service (Reference Drawing - figure 2)

The procedure described, should be carried out after any periodic operational test, simulated or real fire situation.

After a real fire situation, replace all blown-open sprinklers before pressurizing the pilot line.

1. Close the Upstream Butterfly valve (**10**)
2. Close the trim pressure supply (**1**).
3. Close the Emergency valve (**9**)**.**
   After a real fire situation**,** all the Wet pilot line's blown-open sprinklers should be replaced.
4. Disassemble the "Y" strainer (**3**) and clean its screen. Assemble the strainer.
5. Open the pressure supply valve (**1)**.
6. The PSA (**5**) push-button should be pressed down until the Wet pilot is fully pressurized (to upstream pressure).
7. Open the Upstream Butterfly valve (**10)** and check the open downstream drain port (or valve) for leakage or dripping. If ok, plug this port.
8. Open the downstream butterfly valve (**7**).

System is in SET state and placed in service.

Maintenance (Reference Drawing - figure 2)

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.

The Maintenance and inspection procedures are based on the relevant chapters at the NFPA 25.

Daily Inspection

Make sure that the deluge valve's heating system (If equipped), functions correctly and that the Fire protection valve surrounding temperature is 4°C min.

Monthly Inspection

1. Observe the FDV valve for external damage: observe the piping and hose connections for leakage or damage.

2. Verify that the upstream butterfly valve (**10**) and the Trim pressure supply valve (**1**) are in fully open position.

3. Observe the FDV control chamber pressure gauge (if installed) make sure that its readings is the required supply water pressures.

4. Press the PSA push-button (**5**) for 5 sec. to assure FDV valve control chamber is pressurized and then, release.

5. Drain condensed water by removing temporary the downstream drain plug (12 figure 1). In case a constant dripping or leakage is observed, it might indicate a deluge valve sealing problem.
   If ok, reinstall the plug.

Annual test procedure

1. Conduct the monthly test & inspection procedure.

2. Perform the procedure described in chapter - **Commissioning the system - phase 2. -** Fire Situation Simulation. Check the system's proper operation.

3. Follow the procedure described in chapter - **Commissioning the system - phase 3.** - Resetting & placing in service, chapter ***Resetting after a Fire Situation Simulation.***

Every 5 years inspection procedure **(reference drawing Figure 2)**

This major inspection procedure includes the removal of the trim, the dismantling of the FDV'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. Close both separation valves (**10 & 7**), and the trim pressure supply valve (**1**).

2. Open both deluge valves drain ports by removing its plugs (**10 & 11 figure 1**). Drain the FDV's control chamber using the Emergency valve (**1**1).

3. Open the Wet pilot line inspector's valve and depressurize.

4. Turn off or disconnect all relevant electrical circuits.

5. Disconnect the Wet pilot line's connection (**4**). Release all relevant tubes fitting nuts and remove the disassembled trim.

6. Remove all the FDV's cover bolts. The cover will hang on its studs. Release both nuts and remove the cover carefully.

7. Observer the internals of the valve and cover for excessive scale residuals, foreign particles, damaged coating (rust, cracks or pealing). Worn or damaged parts should be replaced. Consult Raphael's local representative or the service department for any maintenance or part replacement issue.

8. Replace the Diaphragm with the one supplied with the system's 5 years maintenance kit. The identification tongue should point to the valve's stamped flow direction arrow side.

9. 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 "Bolt's torque moments table".

10. Reinstall the trim carefully: avoid causing twists or dents on bent tubes and do not overtight the compression fitting's nuts.

11. When the system is fully reassembled, perform the "**Commissioning the system - phase 1** - Filling and pressurizing the system" procedure.
12. Perform the "***Annual maintenance procedure***".

Bolt's Torque Moments Table

Valve size	1.5"	2"	2.5"	3"	4"	6"	8"	10"
Torque lb/ft	22	29	36	54	65	72	87	118

Equivalent pipe length for FDV deluge valves

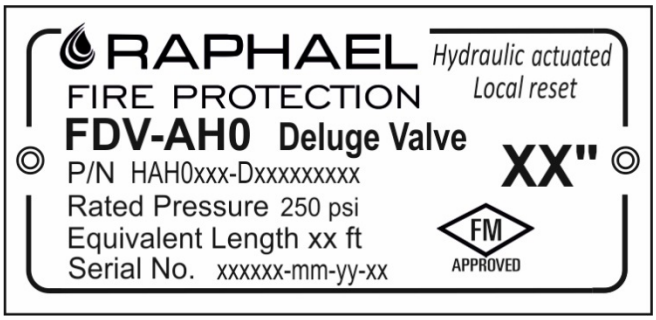
Valve size	Equivalent length value ft (m)
1.5"	11 (3.6)
2"	24 (7.3)
2.5"	25 (7.6)
3"	28 (8.5)
4"	31 (9.4)
6"	46 (14)
8"	72 (21.9)
10"	117 (35.6)

Marking

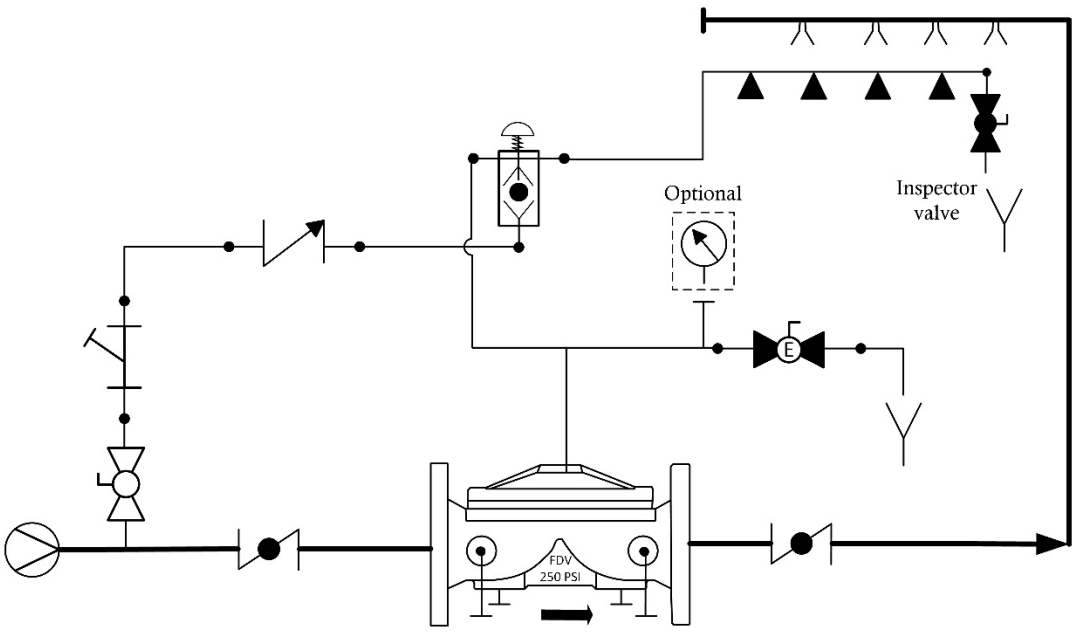
The FDV valves are marked by a laser engraved, black anodized, 0.8mm (0.031”) thick metal plate, riveted to the valve’s cover.

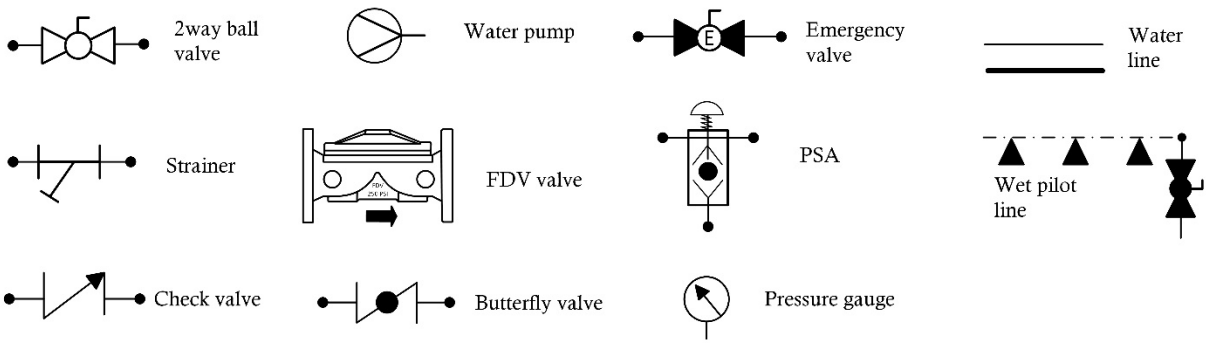
The marking plate contains the data about:

- *Company name and trademark.*
- *Application’s type* - Hydraulic actuated local reset.
- *The Application’s part number* (P/N) - actuation type–valve properties
- *Rated pressure*: 250 psi
- *Equivalent Length: reference table - page 13.*
- *Serial Number* – work order-MM-YY-xxx (number in batch 001-999)
- *FM approved symbol*
- *The Application’s* diameter in inch - XX”



Hydraulic actuated, Local Reset FDV
Basic Deluge valve Type: FDV-AH0





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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