IOM FDV-AH1

HYDRAULICALLY ACTUATED, REMOTE RESET, ECONOMIC DELUGE VALVE

Installation Operation & Maintenance manual

Fire Protection

RAPHAEL VALVES INDUSTRIES

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IOM FDV-AH1

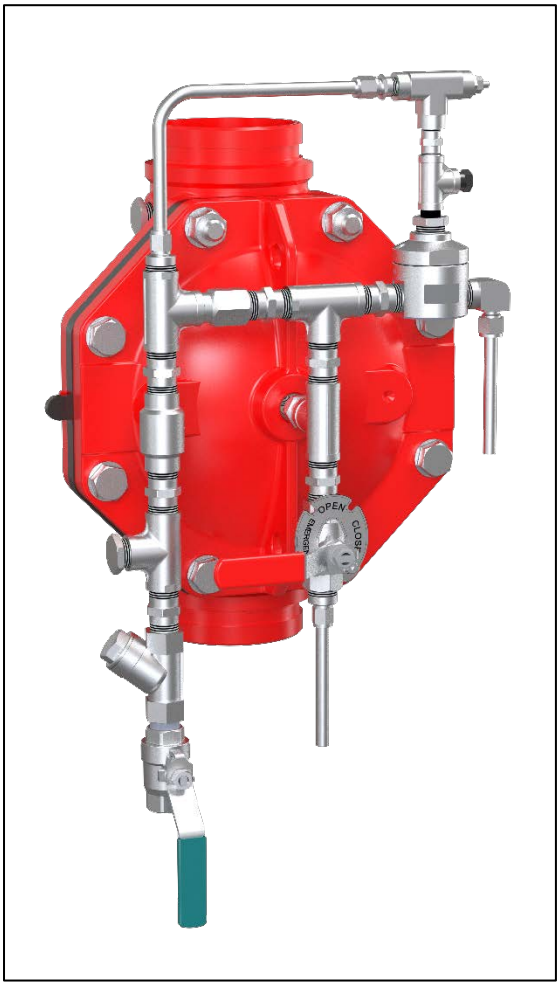
Hydraulically Actuated, Remote Reset, Economic Deluge Valve

DESCRIPTION

This deluge system is based on Raphael's FDV valve and is equipped with a hydraulically actuated control trim.
The FDV valve can be supplied in a range of optional materials and coatings to meet various operating conditions; however, the system's functional principle remains unchanged.

In fire situations, pressurized water in the wet pilot detection system is drained through one or more blown-open automatic sprinklers.
Consequently, the pressurized water trapped in the FDV's control chamber is released through the vented wet pilot pipeline, causing the FDV valve to open.

This system is suitable for water-spray pipelines with open nozzles.



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PARTS LIST

Hydraulically Actuated, Remote Reset, Economic Deluge Valve

1. FDV Deluge Valve
2. Pressure gauge connection (1/2” NPT female)
3. Orifice
4. Check Valve
5. “Y” Strainer
6. Trim Pressure supply
7. Emergency valve
8. Hydraulic actuator
9. pilot line port (1/4” NPT female)
10. Needle valve
11. Downstream side port (1/2” NPT female, plugged)
12. Downstream drain port (1/2" NPT female, plugged)
13. Upstream drain port (plugged)
14. Downstream side port (1/2" NPT female, plugged)
15. Upstream side port (1/2" NPT female, plugged)

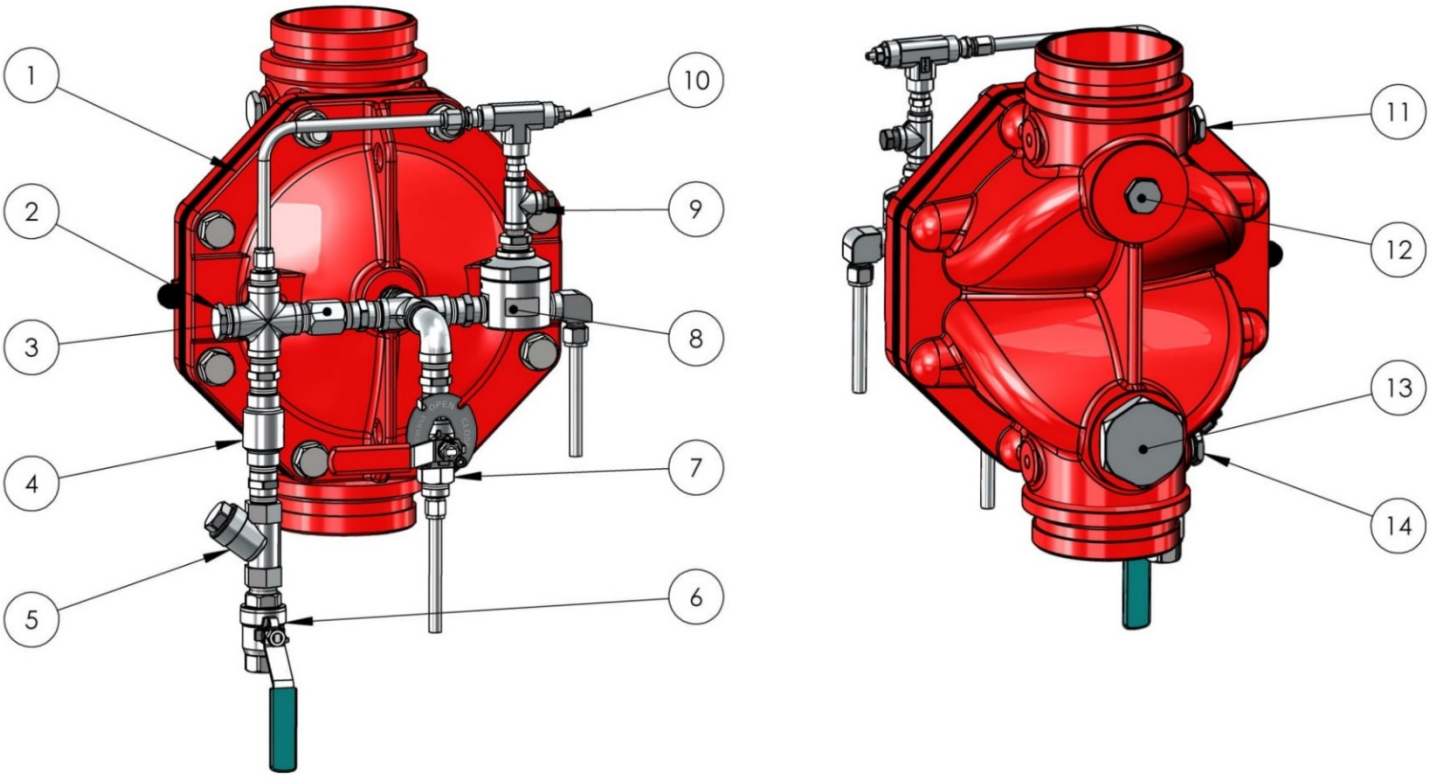


Fig. 1

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OPERATION (Reference Figure 1)

SET position:

Water is supplied by the trim supply valve (**6**), through the "Y" strainer (**5**), check valve (**4**), flows through the Orifice (**3**) and fills the FDV's control chamber. Pressurized water in the valve's control chamber gets trapped by the check-valve (**4**), by the HAV-2 actuator (**8**) and by the closed Emergency valve (**7**), maintaining the deluge valve in closed position. The pressurized water in the Wet pilot line (connected to HAV-2's control chamber at port **9**), forces the HAV-2 diaphragm against its inlet orifice and holds it in its CLOSE state.

FIRE situation:

When one or more of the automatic sprinklers located along the Wet pilot line gets subjected to flames heat and blows-open, it depressurizes. The pressure drop in the wet pilot line and the HAV-2 (**8**) actuator's control chamber, causes this device to shift to its OPEN state and drain The FDV deluge valve's control chamber. The opened FDV valve admits water into the sprinklers pipeline/s.

Opening the Emergency valve (**7**) bypasses all conditions, drain the FDV valve's control chamber and open the valve immediately.

RESET position

Resetting this system requires the replacement of all Wet pilot line's blown-open automatic sprinklers. The replacement enables the pressurizing of the Wet pilot line and the HAV-2 control chamber.

As the HAV-2 moves to its CLOSE state, it blocks the FDV's control chamber drainage while the upstream is constantly filled through the orifice (**3**). Consequently, the FDV valve closes and the open nozzles spray, stops.
By that, the system moved into its SET position.

The open sprinklers pipeline should be drained by removing temporarily the downstream until fully drained.

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INSTALLATION (Reference Figure 2)

1. This system is supplied pre-assembled and factory pre-adjusted (apart from needle valve 10 figure 1). Any change carried out at the system's trim components adjustments or 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. To enable assembly/disassembly and maintenance work, keep sufficient room around the system location.
4. It should be considered that water will be drained during regular maintenance on a routine basis, during periodical tests procedures and when operating in fire situation. Therefore, a drainage plan should be considered.
5. The upstream and downstream pipe connected to the FDV valve at a horizontal or vertical mount, is to be supported firmly to prevent the pipeline's weight loaded on the system's valve.
6. Any use of pipe/thread reduction-fittings installed at open ports designated for axillary components, (like Wet pipeline connection, Trim supply valve etc.), is prohibited.
7. All connections to water supply, alarms etc. should be done in accordance with figure 2:
   (1) – Trim pressure supply - valve ½" NPT female.
   (8) – Wet pilot pipe.
8. The FDV valve should be installed with the flow arrow marked on the valve's body, in the proper direction.

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INSTALLATION PARTS LIST (Reference Figure 2)

Hydraulically Actuated, Remote Reset, Economic Deluge Valve

1. Trim supply valve
2. “Y” strainer
3. Check Valve
4. Upstream pressure gauge (1/2” NPT female, plugged – optional)
5. Orifice
6. Wet pilot line
7. Downstream butterfly valve
8. Needle valve
9. Wet pilot connection port (1/4” NPT female, plugged)
10. Hydraulic actuator type HAV-2
11. Emergency valve
12. Upstream butterfly valve

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Hydraulically Actuated, Remote Reset, Economic Deluge Valve

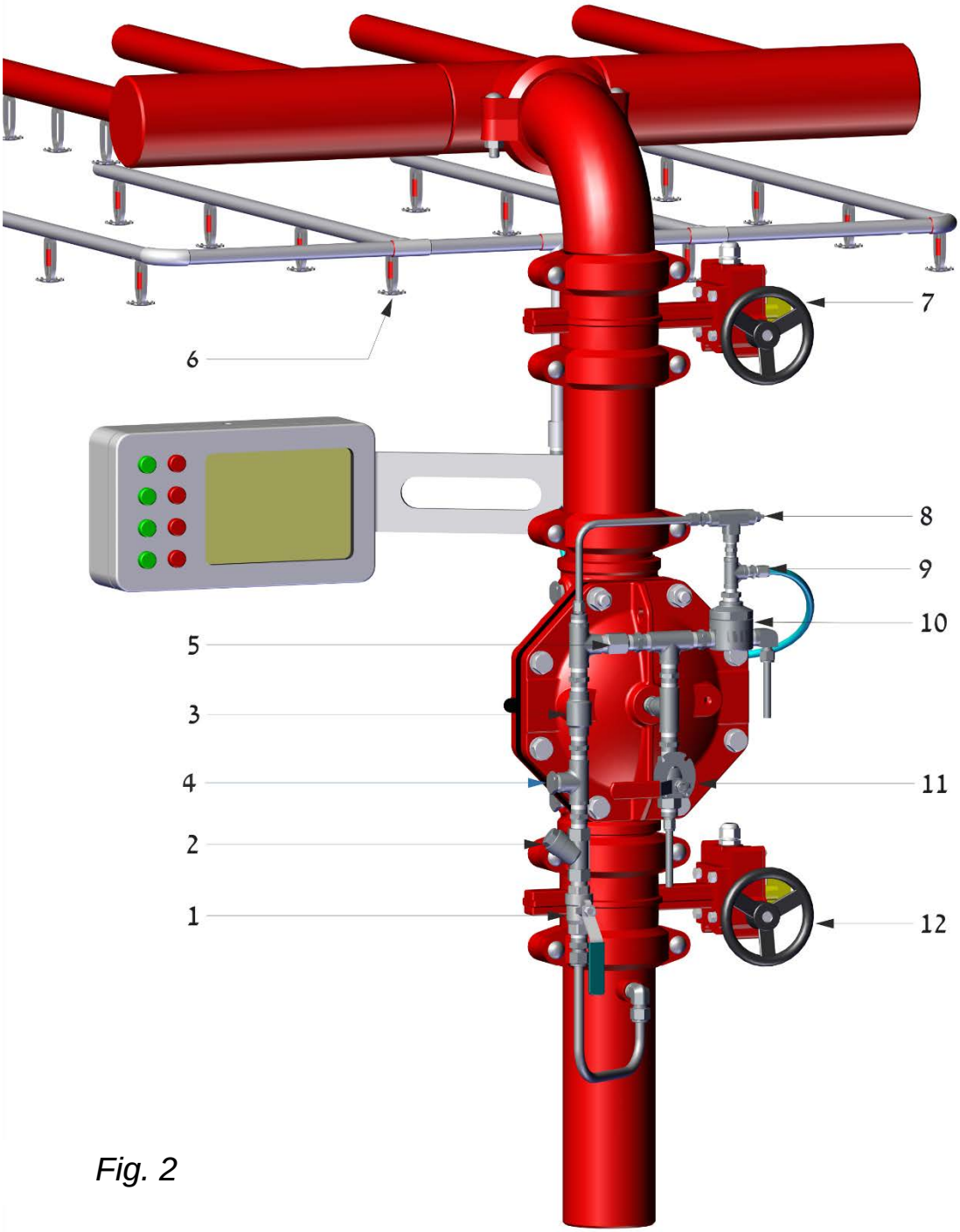


Fig. 2

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OPERATING INSTRUCTIONS (Reference Drawing - figure 2)

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 that Emergency valve (**11**) is fully closed.
3. Open the inspector's valve located at the very end of the wet pilot's pipeline (**6**) – not illustrated.
4. Open fully the needle valve (**8**).
   Note*: If this process was performed as a part of the annual fire test, do not change needle valve adjustment.*
5. Open the trim pressure supply valve (**1**). Let water flow out of the inspector's valve until a clear flow, free of air bubbles are observed.
6. Close the inspector's valve and pressurize the trim, the FDV's control chamber, the wet pilot's line and the HAV-2's control chamber. Check the Wet pilot line's gauge (not illustrated) for a proper set pressure and that there are no leaks.
7. Unscrew and remove the FDV's downstream drain Plug (**12 figure 1**).
8. Open gradually the upstream butterfly isolation valves (**12**) and make sure that there is no leak out of downstream drain port. A dripping might indicate an FDV valve sealing issue. (see Troubleshooting chapter in FDV's basic valves datasheet & IOM bulletin)
9. Do not re-install the downstream drain plug (11 figure 1) and leave this port open.
   Note*: If this process was performed as a part of the annual fire test, re install the plug.*

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

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Needle valve adjustment.

The procedure described should be carried out after installation only, and after the system was pressurized and a comprehensive leakage inspection was commissioned.
***Note:** Keep the downstream drain port open and downstream insulation valve close.*

- The Needle valve needs to be adjusted as its state is influenced by the local wet pilot pipeline height, length, the working pressure of the deluge system and the sprinkles distance and its orifice (type).
  Its initial state needs to be fully open.

- The de-pressurizing of the pilot pipeline is done by opening the inspector's valve at the most remote location on the pilot's line.
  ***Note**: it is most important to make sure that this valve opening is identical to an automatic sprinkler orifice. use a blown-open automatic sprinkler and screw it into the inspector's valve exit.*

- If when opening the inspector valve, the actuator (10 figure 2) opens and drains the deluge control chamber, no additional adjustment is required.
  If when opening the inspector valve, the actuator remains close, release the counter nut and turn the slotted adjustment screw clockwise.
  the needle valve's SE gradually the needle valve until reached to the point when the actuator opens. The deluge valve is supposed to open as well, and water will flow out of the open downstream drain port.

- Fix the needle valve's stem position by tightening its counter nut.

- Close the inspector's valve. The actuator needs to close, and the deluge valve needs to close as well.

- Check for leakage/dripping at the downstream drain port.
  If ok, screw its plug.

The system is ready for the **"Fire Situation Simulation"**

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Commissioning the system - phase 2.

Fire Situation Simulation (Reference Drawing - figure 2)

The procedure described below should be carried out after the needle valve was adjusted (after installation) and, after the system was pressurized and a comprehensive leakage inspection was commissioned (as a part of the annual maintenance procedure)

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 notified.

- Close the downstream separation valve (7 figure 2)
- Make the deluge downstream drain port plug (12 figure 1) removed.
- Open the inspector's valve at the pilot pipeline. The deluge valve needs to open, and a water flow needs to be observed out of the open drain port.
- If ok, close the inspector's valve.
- The deluge needs to close and after the drainage stops, no leaking or dripping should be observed at the downstream drain port.
- Observe the pilot pipeline for dripping and proper set pilot pressure.

The valve is ready for "**Resetting & placing in service**"

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Commissioning the system - phase 3.

Resetting & placing in service

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

1. Close the upstream separation butterfly valve (**12**).
2. Fully drain the open sprinklers large pipeline.
3. Close the trim pressure supply valve (**1**)
4. ***After Simulated fire situation:*** make sure the wet pilot line inspector's valve is close.
   After Real fire situation: replace all blown-open automatic sprinklers on the wet pilot line.
5. Remove the trim strainer's plug (**3**), flash and clean the screen.
   Re-assemble the strainer's screen.
6. Open the trim pressure supply valve (**1**) and pressurize the pilot line.
7. After pilot line become pressurized, open the upstream separation valve (**12**)
8. Observe the port outlet for dripping, as deluge needs to be fully closed.
   If ok, reinstall the plug.
9. Open the downstream separation valve (**7**).

The system is in **SET** state and placed in service.

MAINTENANCE (Reference 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 personnel 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 (**12**) and the Trim pressure supply valve (**1**) are in fully open position.

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

4. Drain condensed water by removing temporarily 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.

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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

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

1. Close both separation valves (**12 & 7**), and the trim pressure supply valve (**1**).

2. Open both deluge valves drain ports by removing its plugs (**13 & 12 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. 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. The trim accessory HAV-2 should be replaced in accordance with the NFPA-25, in "Standard for the inspection testing and maintenance of water-based fire protection systems".

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

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

13. 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

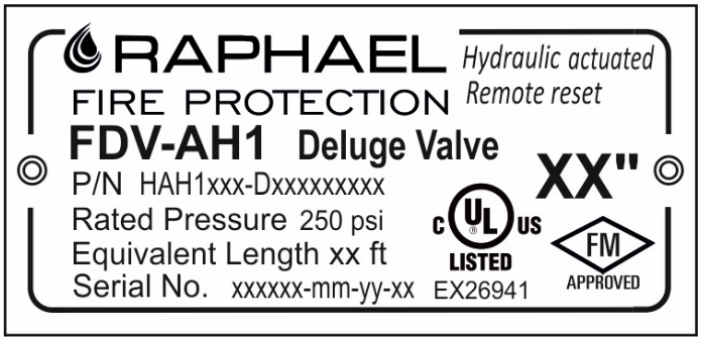
Valve size		1.5"	2"	2.5"	3"	4"	6"	8"	10"
Equivalent length value	ft	11	24	25	28	31	46	72	117
	m	3.6	7.3	7.6	8.5	9.4	14	21.9	35.6

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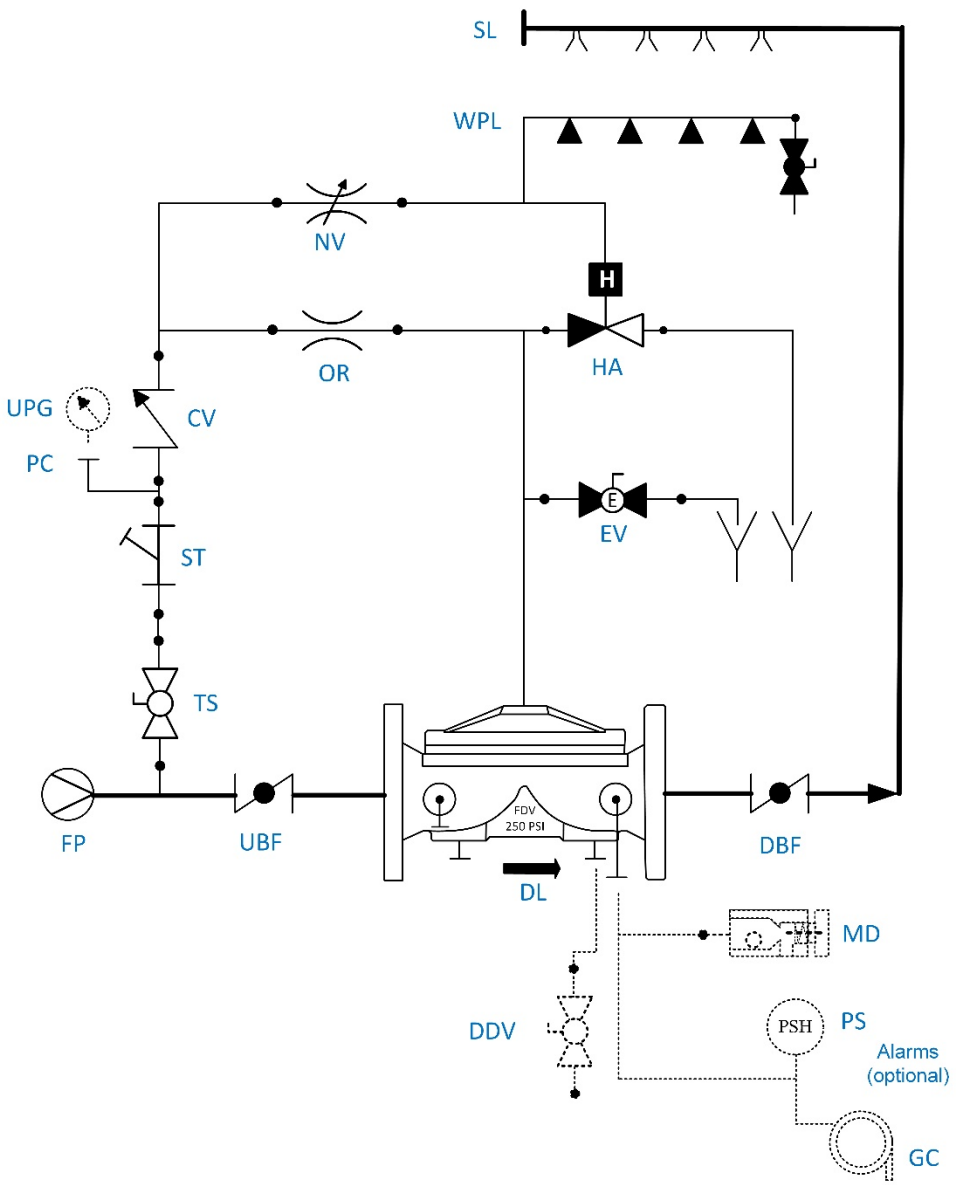
MARKING

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-AH1 – Hydraulic actuated Remote Reset.
- (P/N) *The Application’s part number*: System properties–Valve properties
- *Rated pressure*: 250 psi
- *Equivalent Length: reference table - page 16.*
- *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”



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TS - Trim supply
ST - Strainer
AT - Alarm Test valve
CV - Check Valve
OR Orifice
DL - Deluge Valve
UBV - Upstream Butterfly Valve
DBV - Downstream Butterfly Valve
NV - Needle Valve
EV - Emergency Valve

SL - Sprinkles Line
DDV - Downstream Drain Valve
FP - Fire Pump
HA - 2-Way Hydraulic Actuator

OPTIONAL

PS - Pressure Switch
MD - MADV – Manual / Automtic Drain Valve
GC - Gong connection
UPG - Upstream Pressure gauge

Water lines
Optional

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.



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RAPHAEL Valves Industries (1975) Ltd.

North Industrial Zone Or Akiva, 3063927 P.O.Box 555, Israel

Tel. +972 4 6263555 | info@raphael-valves.com | raphael-valves.com

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