

IOM FDV-DP1

Pneumatically Actuated, Remote Reset Deluge Valve

INSTALLATION OPERATION & MAINTENANCE MANUAL

FIRE PROTECTION

RAPHAEL VALVES INDUSTRIES

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 pneumatic detection system (dry pilot line sprinklers), trips the valve's control trim and consequently, pressurized water trapped in the FDV's control chamber are drained and the valve opens.

This system is suitable for automatic water spray at the dry pilot pipeline and with open nozzles at the main spraying pipelines.



Parts List

FDV-DE1– Electric actuated with Remote Reset Deluge Valve

- | | |
|-------------------------------------|--------------------------------|
| 1. – MADV (MB) Drain valve | 9. – Deluge valve |
| 2. – Pneumatic actuator | 10.– Orifice |
| 3. – Pressure switch (Optional) | 11.– MEU Manual emergency unit |
| 4. – Downstream drain valve | 12.– Upstream pressure gauge |
| 5. – Alarm test valve (3 way) | 13.– PAV-2 Pneumatic actuator |
| 6. – “Y” Strainer | 14.– Upstream drain (Plugged) |
| 7. – Trim Pressure Supply Valve | |
| 8. – Control chamber pressure gauge | |

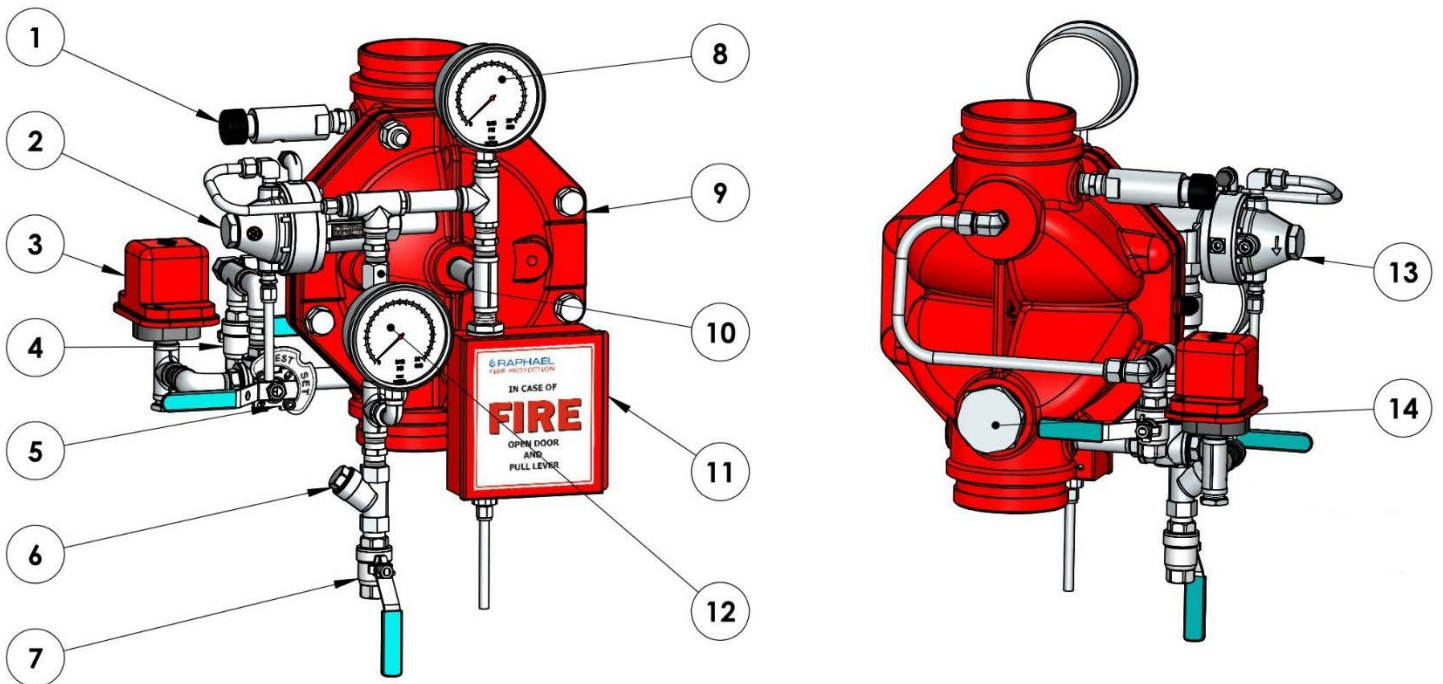


Figure .1

Operation (Reference Figure 1)

SET position:

Water is supplied by the trim pressure supply valve (7), passes the “Y” strainer (6), check valve flows through the orifice (10) and fills the FDV’s control chamber.

Pressurized water in the FDV valve’s control chamber get trapped by the check-valve, by the pneumatic actuator PAV-2 (2) and by the closed emergency valve MEU (11), maintaining the deluge valve in closed position.

The PAV-2 actuator’s sense chamber is subjected to constant pneumatic pressure in the dry pilot line, keeping the actuator in its CLOSE state and by that, blocking the FDV’s drain line.

Fire Situation

When one or more of the dry pilot line automatic sprinklers is subjected to fire, it blows open and the pneumatic pressure vents to the atmosphere.

When its sense chamber gets de-pressurized, the PAV-2 (2) moves to its OPEN state and drains the FDV’s control chamber through the PAV-2 vented port, to the atmosphere. The FDV deluge valve opens, and admits water into the open spray nozzles pipeline/s.

Opening the MEU door and pulling down the ball valve’s handle, bypasses all terms, drains the FDV control chamber and opens the valve immediately.

Reset Position

The upstream butterfly valve needs to be closed and all the blown-open sprinklers at the dry pilot line, should be replaced. This enables the re-pressurizing of the dry pilot line and the sense chamber of the PAV-2 actuator. Consequently, the PAV-2 actuator moves to its close position and blocks the valve’s control chamber drain line. Simultaneously, upstream pressure flows through the orifice, pressurizing the deluge control chamber, causes it to close. The open sprinklers water spray stops. Then, the upstream butterfly valve needs to be opened

It is recommended to drain the spray pipeline by opening the FDV’s downstream drain valve (14) or by pressing the MADE (MB) push-button (1).

Installation (Reference Figure 2)

1. This system is supplied pre-assembled and factory pre-adjusted. Any change carried out at the system's trim components order, pipes 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. maintaining sufficient room around the system location ensures operational safety, and ease of maintenance.
4. It should be considered 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. The system described is to be mounted vertically only. Systems with identical operation but for horizontal installation are marked with a prefix "H", e.g. HFDV-DP1.
6. The downstream pipe connected to the FDV valve at Vertical and horizontal mount system, is 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 water motor alarm, trim pressure supply, FDV valve's drains), is prohibited.
8. All connections to water supply, should be done in accordance with figure 2
(1) – Trim pressure supply connection - ½" NPT female.
Alarm gong to alarm test valve - ½" NPT female.
(11 Fig 2) – Dry pilot line to the PAV-2 actuator – ¼" NPT female (temporary plugged).
9. The FDV valve should be installed with the flow arrow marked on the valve's body, in the proper direction.

Installation parts list.

(reference - figure 2)

1. Trim supply valve (1/2" NPT female)
2. Y Strainer
3. Upstream separation valve (butterfly or OS&Y valves) .
4. MEU Manual Emergency Unit
5. Upstream pressure gauge
6. Downstream pressure gauge
7. Downstream separation valve (butterfly or OS&Y valves) .
8. Dry pilot line
9. MADV – Manual Automatic Drain Valve (MB)
10. PAV-2 Pneumatic Actuator Valve 2 way.
11. Pressure switch*. (1/2" NPT female connection) *
12. Downstream drain valve (1/2" NPT female)
13. 3-way alarm test valve
14. ASK Air Supply Kit (In & out 1/4" NPT female) *.

* **Optional**

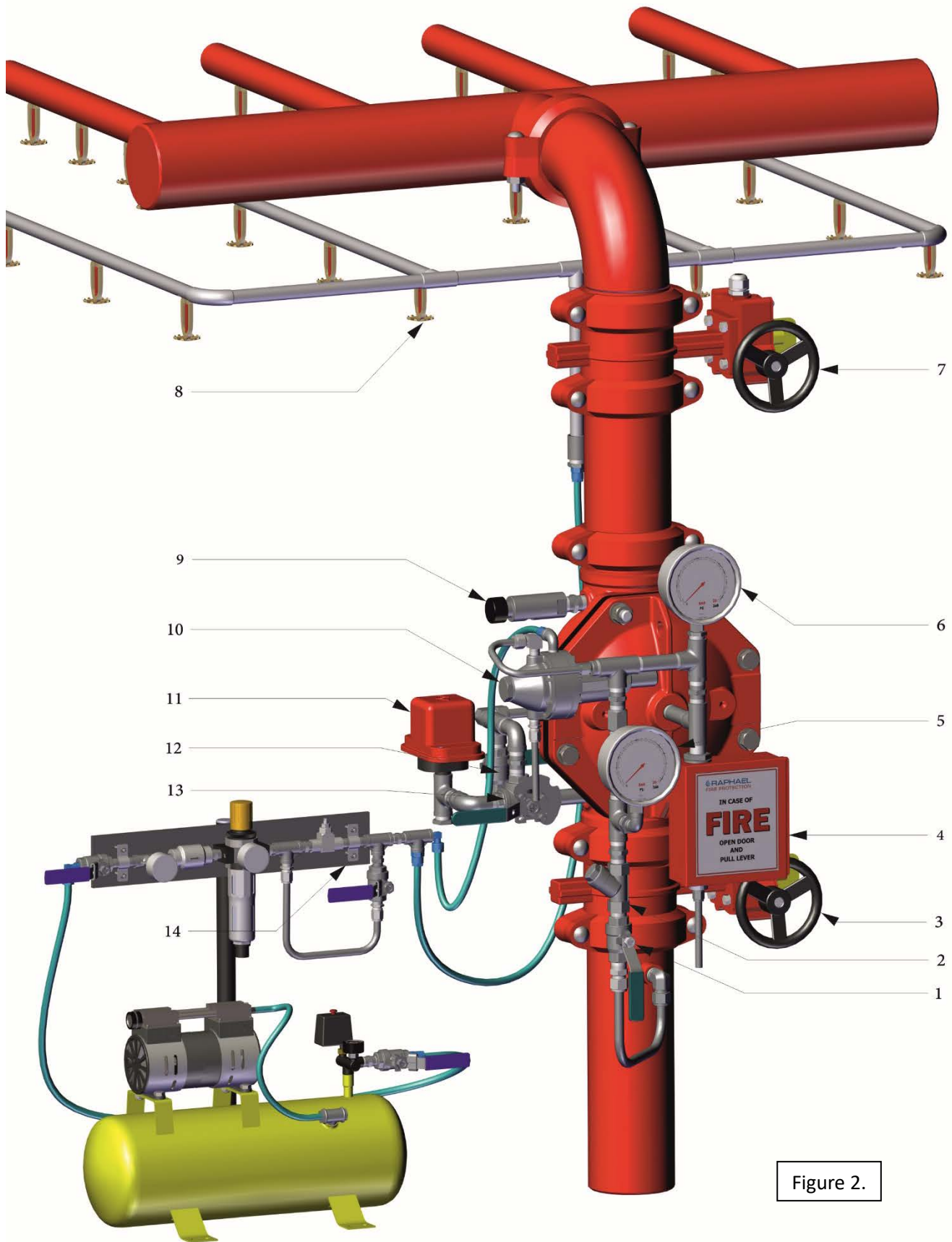


Figure 2.

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. The filling process is performed only after flushing the pipeline. The flushing needs to be done when both butterfly valves (**3 & 7**) are open, and the trim supply valve (**1**) is close.
2. Make sure the upstream butterfly valve (**3**) is fully close.
3. Make sure the trim pressure supply ball valve (**1**) is Closed.
4. Make sure that the Emergency valve in the EMU (**4**) is fully closed.
5. Pressurize the pilot line to the rated pressure. No adjustments at the PAV-2 actuator are needed as the device is factory set.
6. Make sure the FDV's downstream drain valve (**12**) is open and upstream drain remains plugged or its valve (if equipped) is close.
7. Open the trim pressure supply valve (**1**) and fill the trim and FDV's control chamber.
8. Open gradually the upstream butterfly valve (**3**) and make sure the downstream drain (**12**) valve is not dripping.
9. If ok, close the Downstream drain 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.

(Reference drawing - figure 2)

1. open downstream drain valve (12).
2. Close the downstream butterfly valve (7).
3. Open the inspector's valve (at the end of the dry pilot line 8 – not illustrated) and vent the pilot line. The pilot's pressure drop will cause the PAV-2 actuator to open and drain the FDV's control chamber. Consequently, the FDV deluge valve will open.
4. Observe the downstream drain valve (12): A significant stream of water should flow out of this valve. If ok. -

System is ready for re-setting and placing in service.

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.

Resetting after a Fire Situation Simulation:

1. Close the Upstream Butterfly valve (3)
2. Close the trim pressure supply (1).
3. Close the inspector's valve (at the end of dry pilot line 8).
4. Disassemble the "Y" strainer (2) and clean its screen. Re-assemble the strainer.
5. Open the pressure supply valve (1). Pressure gauges 5 & 6 need to show the same reading.
6. The Upstream Butterfly valve (3) and the downstream butterfly valve (7) should be opened gradually.

Resetting after a Real Fire Situation:

1. Close the Upstream Butterfly valve (3)
2. Close the trim pressure supply (1).
3. Close the entrance ball valve at the ASK (14)
4. All the Dry pilot line's blown-open sprinklers need to be replaced (8).
5. When done, open the entrance ball valve at the ASK (14)
6. Disassemble the "Y" strainer (2) and clean its screen. Re-assemble the strainer.
7. Open the pressure supply valve (1). Pressure gauges 5 & 6 need to show the same reading.
8. Open gradually the Upstream Butterfly valve (3).

System is in SET state and placed in service.

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.

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 (**3** figure 2) and the Trim pressure supply valve (**1**) are in fully open position.
Downstream drain valve (**12**) and upstream drain valve (if equipped) are fully close.
3. Observe the FDV control chamber pressure gauge (**6**) and the upstream pressure gauge (**5**) make sure that its readings are the same and that the required supply water pressures are applied to the deluge Valve inlet and trim.
4. Push the MADV (MB) (**9**) and make sure that after emptying condensing water, the drain flow/dripping stops. If a constant leakage is observed, it might indicate a deluge valve sealing problem.
5. Move the 3 way SET/TEST valve (**13**) to TEST. The acoustic alarm should sound, and the alarm pressure switch (**11**) should transmit a signal to the main control board.

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 a performance of a comprehensive internal part examination. Then, the relevant trim accessories should be replaced, After the completion, the Annual maintenance procedure is to be conducted.

1. Close the upstream butterfly valve (3) and the trim pressure supply valve (1).
2. Open the drain valves (12) and the upstream drain valve if equipped. Drain the FDV's control chamber using the EMU Emergency valve (4).
3. Turn off or disconnect all relevant electrical circuits.
4. Release all relevant tubes fitting nuts and the central union pipe connection (if equipped) at valves cover center.
5. Remove the disassembled front 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. Observe the internals of the valve and cover for excessive scale residuals, foreign particles, damaged coating (rust, cracks, or peeling).
8. Worn or damaged parts should be replaced. Consult Raphael's local representative or the service department for any maintenance issue or part replacement issue.
9. Replace the Diaphragm. The identification tongue should point to the valve's stamped size (diameter in inch) side.
10. Reinstall the valve's cover: use the Anti-seize paste tube supplied in the maintenance kit for bolts and nuts pre-installation lubrication. Tight it in accordance with "**Bolt's torque moments table**".

11. Reinstall the front 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 re-assembled, perform the "**Commissioning the system - phase 1** - Filling and pressurizing the system" procedure.
13. Perform the **Annual test 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

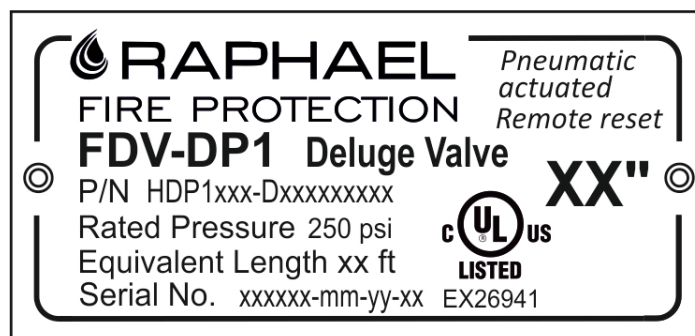
Equivalent pipe length for FDV deluge valves

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)

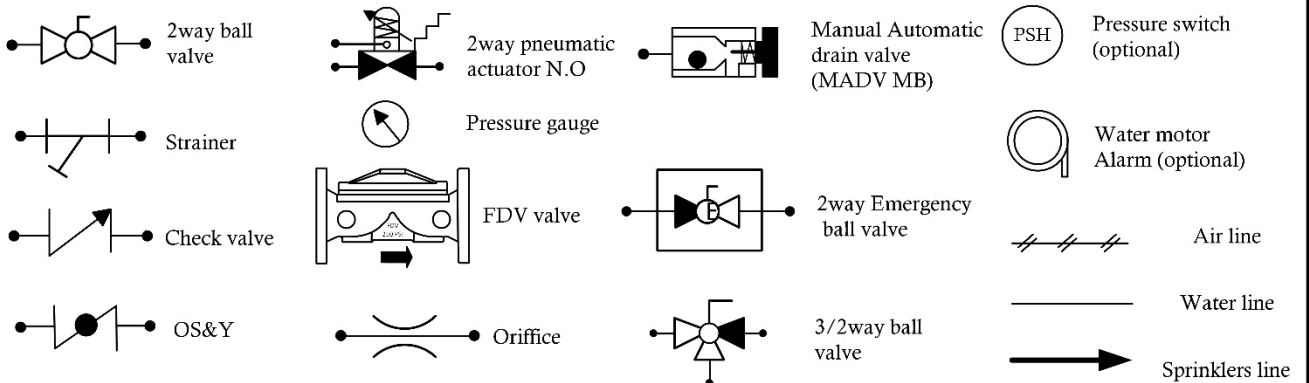
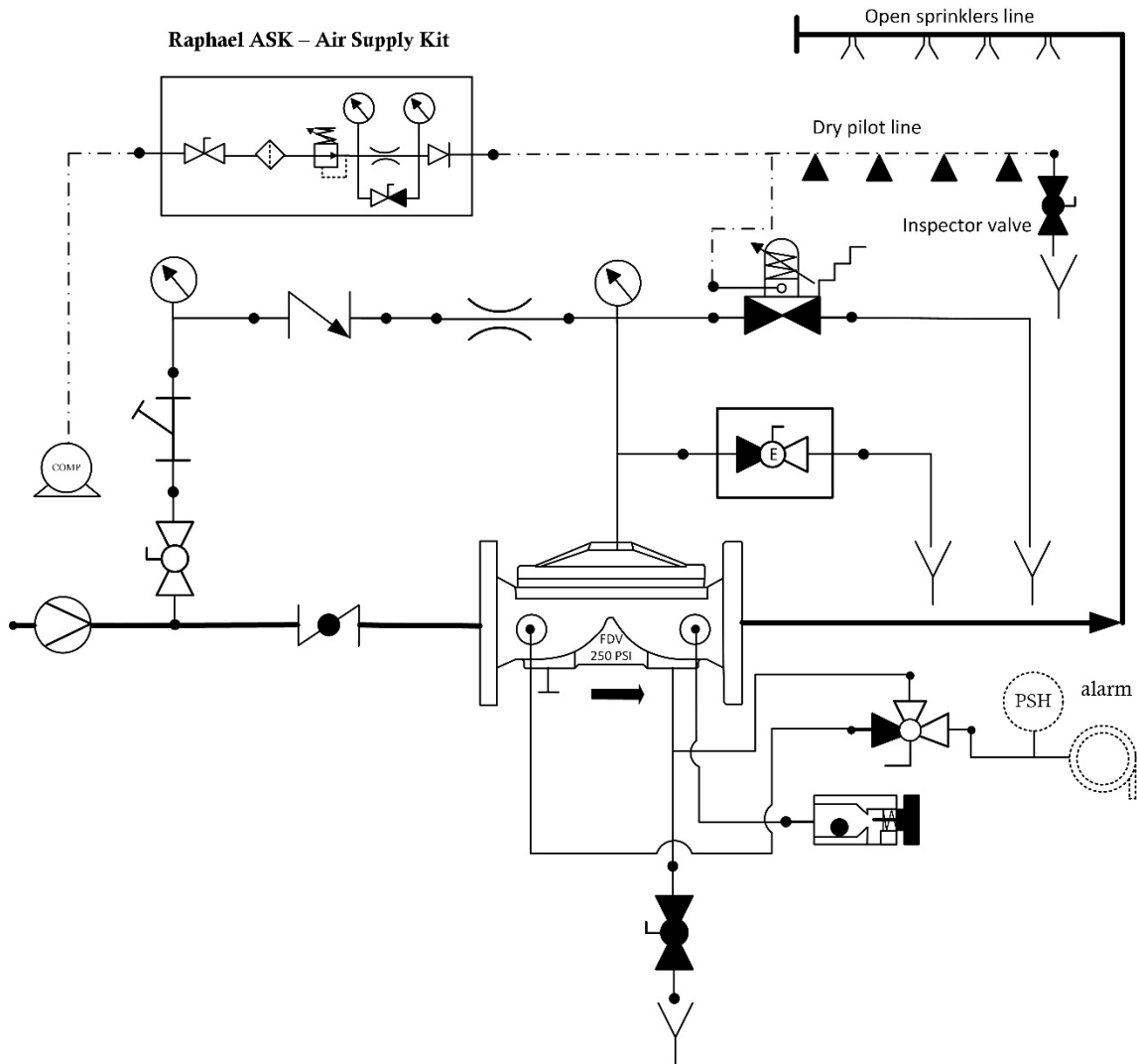
Marking

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

- *Company name and trademark.*
- *Short description (Italic letters)*
- *Application’s type: FDV-DP1 - Pneumatic actuated Remote Reset.*
- *(P/N) The Application’s part number. System properties–Valve properties*
- *Rated pressure: 250 psi*
- *Equivalent Length: reference table - page 13.*
- *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”*



Pneumatic actuated, Remote Reset FDV Deluge valve Type: FDV-DP1



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.



Waterworks



Fire Protection



Irrigation



Smart Solutions

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