IOM FDV-DH1

Hydraulic Actuation with Remote Reset Deluge Valve

Installation **O**peration & **M**aintenance manual

Fire Protection

RAPHAEL VALVES INDUSTRIES

FDV-DH1 – Hydraulically Actuated, Remote Reset Deluge Valve

Description

This deluge system is based on the Raphael's FDV valve, equipped with a hydraulic 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, pressurized water in the wet pilot detection system drains through one or more of the blown-open automatic sprinklers. Consequently, pressurized water trapped in the FDV's control chamber are drained through the vented wet pilot pipeline and the FDV valve opens.

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

The maximum wet pilot height should be based on pilot line's length calculations that considers the hydrostatic pressure caused by Columning phenomena.

Parts List

FDV-DH1 – Hydraulic actuated with Remote Reset Deluge Valve

1. – Upstream pressure gauge
2. – MADV (MB) Drain valve
3. – Pressure switch (Optional) (1/2” NPT female).
4. – Downstream drain valve
5. – Water motor alarm conn. (1/2” NPT female).
6. – Alarm test valve (3 way)
7. – “Y” Strainer
8. – Trim Pressure Supply Valve
9. – Needle valve
10. – Wet pilot’s conn. Port (1/2” NPT female)
11. – Deluge valve
12. – Control chamber pressure gauge
13. – MEU Manuel emergency unit
14. – Check valve
15. – Upstream drain (Plugged)

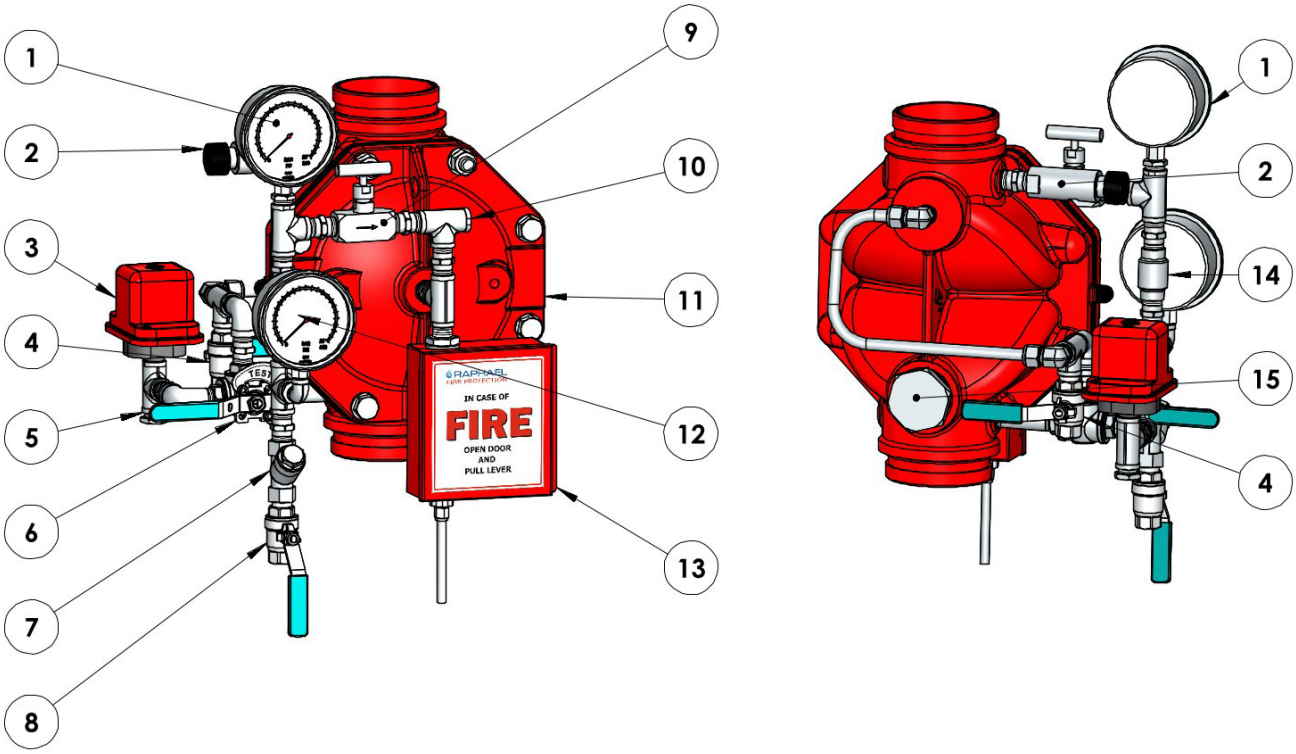


Figure .1

Operation (Reference Figure 1)

SET position:

Water is supplied by the trim pressure supply valve (**8**), "Y" strainer (**7**), the check valve (**14**) and the needle valve (**9**). The water fills the FDV's control chamber as well as the wet pilot line. Pressurized water in the valve's control chamber gets trapped by the check-valve (**14**), the automatic sprinklers located along the wet pilot line and by the closed emergency valve MEU (**13**), maintaining the deluge valve in closed position.

Fire Situation

When one or more of the wet pilot line automatic sprinklers is subjected to fire, it blows open and pressure is released to the atmosphere. The FDV's control chamber drains through the wet pilot's opened sprinkler/s, and the pressure decrease open the Delude valve.

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 first step in the trim's reset procedure is closing the Upstream Butterfly valve (**11** figure **2)**. This will stop the flow out of the open sprinkles and enable its replacement.
When done, the upstream butterfly needs to be opened. Upstream water flows into the wet pilot line through the needly valve and simultaneously into the FDV valve's control chamber. Consequently, the FDV valve closes.

It is recommended to drain the sprinklers pipeline by opening the ball valve connected to the FDV's downstream drain ball valve (**4**) or through the MADV (MB) (**2**).

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-DH1.

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.
   (**4**) – Alarm gong to alarm test valve - ½" NPT female.
   (**14**) – Wet pilot line connection – ½" NPT female (temporary plugged).

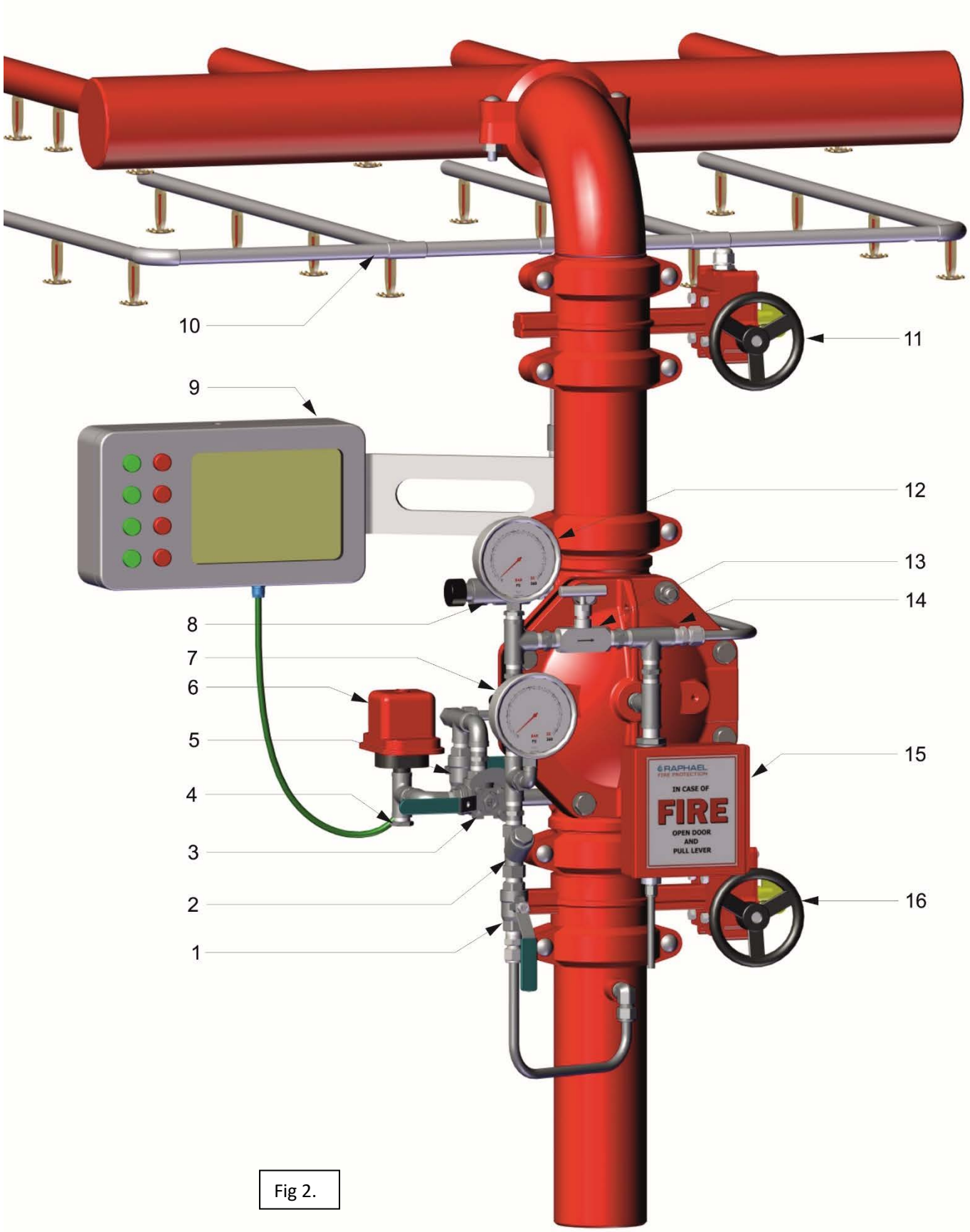
9. The FDV valve should be installed with the flow arrow marked on the valve's body, in the proper direction.

FDV-DH1 – Hydraulic Actuated with Remote Reset Deluge Valve

Installation parts list (reference figure 2)

1. Trim supply valve (1/2” NPT female).
2. Y Strainer.
3. 3-way alarm test valve.
4. Water Motor Alarm connection (1/2” NPT female, plugged).
5. Downstream drain valve (1/2” NPT female).
6. Pressure switch *****. (½” NPT female connection).
7. Upstream pressure gauge.
8. MADV – Manual Automatic Drain Valve (MB).
9. Main control board.
10. Wet pilot line.
11. Downstream separation valve (butterfly or OS&Y valves).
12. Control chamber pressure gauge.
13. Needle valve.
14. Wet pilot line connection port (1/2” NPT female).
15. MEU - Manual Emergency Unit.
16. Upstream separation valve (butterfly or OS&Y valves).

**** Optional***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RAPHAEL
FIRE PROTECTION
IN CASE OF
FIRE
OPEN DOOR
AND
PULL LEVER

Fig 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 (**11** & **16**) are open, and the trim supply valve (**1**) is closed.

2. Make sure the downstream separation butterfly or OS&Y (**11**) is fully close.

3. Make sure the trim pressure supply ball valve (**1**) is closed.

4. Make sure that MEU door (**15**) is fully closed. If open – turn valve's lever upwards and close the door.

5. Open the inspector's valve located at the very end of the wet pilot's pipeline (**10**).

6. Open the trim pressure supply valve (**1**). Let water flow out of the inspector's valve until a clear flow, free of air bubbles, is observed.

7. Close the inspector's valve and pressurize the trim, the FDV's control chamber and the wet pilot line. Make sure the FDV's downstream drain valve (**5**) is open and upstream drain valve (if equipped) is closed.

8. Open gradually the upstream separation butterfly valve (**16**) and make sure the downstream drain valve (**5**) is not dripping.

9. If ok, close the Downstream drain valve (**5**).

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. Make sure that the downstream butterfly valve (**11**) is close.

2. open downstream drain valve (**5**).

3. Open the inspector's valve (at the end of the dry pilot line **10** – not illustrated) and drain the pilot line. The pilot's pressure drop will cause the FDV deluge control chamber to be drained through the open inspector's valve and consequently, the FDV deluge valve will open.

4. Observe the downstream drain valve (**5**): A significant stream of water should flow out of this valve. If ok. -

The 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 <u>Simulation</u>:

1. Close the Upstream Butterfly valve (**16**)
2. Close the trim pressure supply (**1**).
3. Close the inspector's valve (at the end of wet pilot line **10**).
4. Disassemble the "Y" strainer (**2**) and clean its screen. Re-assemble the strainer.
5. Open the trim pressure supply valve (**1**). Observe the pressure increase and make sure both pressure gauges **7** & **6** show the same reading.
6. Fiest, the Upstream Butterfly valve (**3**) and then the downstream butterfly valve (**7**) need to be opened gradually. There should be no flow and no dripping through the downstream drain valve (**5**). If ok, close this valve.

Resetting after a <u>Real</u> Fire Situation:

1. Close the Upstream Butterfly valve (**16**)
2. Close the trim pressure supply (**1**).
3. All the Dry pilot line's blown-open sprinklers need to be replaced (**10**).
4. Disassemble the "Y" strainer (**2**) and clean its screen. Re-assemble the strainer.
5. Open the trim pressure supply valve (**1**). Observe the pressure gauges **7** & **6**: its reading needs to be the same.
6. Fiest, the Upstream Butterfly valve (**3**) and then the downstream butterfly valve (**7**) need to be opened gradually. There should be no flow and no dripping through the downstream drain valve (**5**). If ok, close this valve.

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 (**16**) and the Trim pressure supply valve (**1**) are in fully open position.
   Downstream drain valve (**5**) and upstream drain valve (if equipped) are fully close.

3. Observe the FDV control chamber pressure gauge (**12**) and the upstream pressure gauge (**7**) 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. Press the MADV drain valve and drain condensed water. In case a constant dripping or leakage is observed, it might indicate a deluge valve sealing problem.

5. Move the 3-way SET/TEST valve (**3**) to TEST. The acoustic alarm should sound, and the alarm pressure switch (**6**) 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 (**16**) and the trim pressure supply valve (**1**).

2. Open the downstream drain valve (**5**) and the upstream drain valve if equipped. Drain the FDV's control chamber using the EMU Emergency valve (**15**).

3. Turn off and disconnect all relevant electrical circuits (pressure switch cable)

4. Release all relevant tubes fitting nuts and the central union pipe connection (if equipped) at valve's 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. (relevant to valve size 4" and on)

7. Observer the internals of the valve and cover for excessive scale residuals, foreign particles, damaged coating (rust, cracks, or pealing).

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

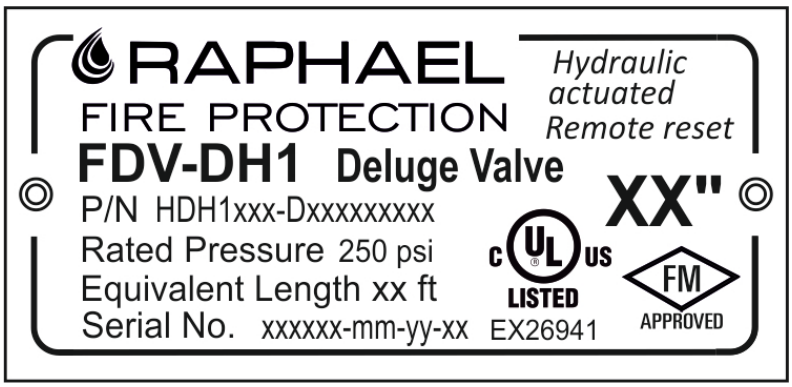
Equivalent pipe length for FDV deluge valves

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)

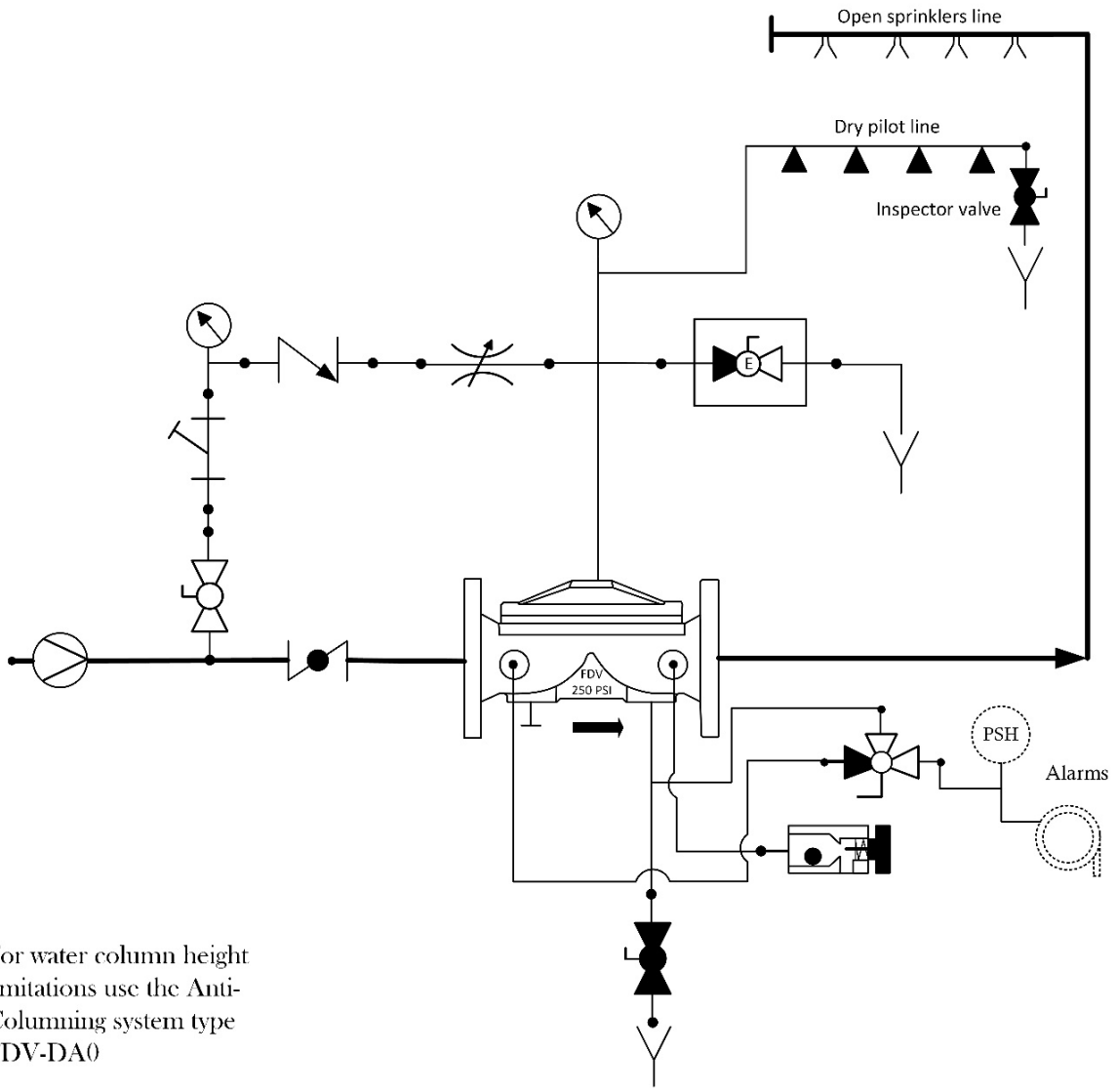
Marking

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

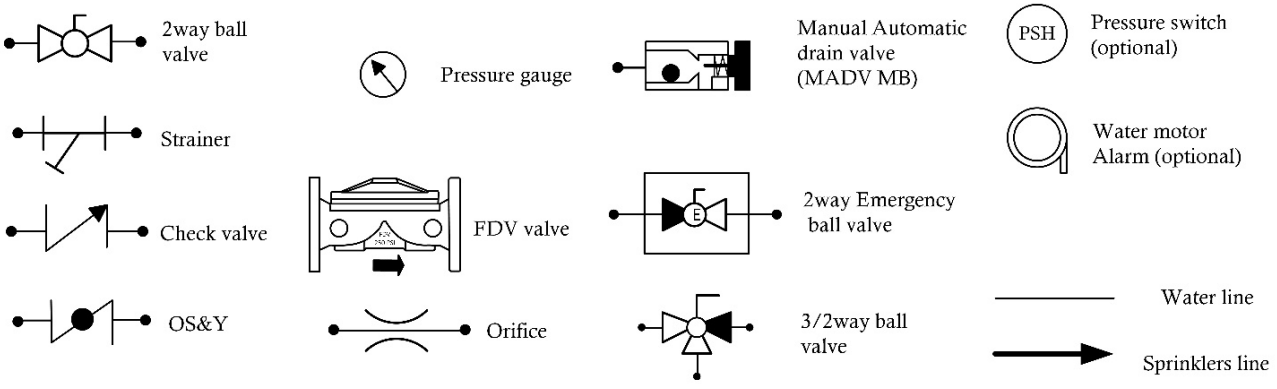
- *Company name and trademark.*
- *Short description (Italic letters)*
- *Application’s type*: FDV-DH1 – Hydraulic actuated Remote Reset.
- (P/N) *The Application’s part number*: System properties–Valve properties
- *Rated pressure*: 250 psi
- *Equivalent Length: reference table - page 13.*
- *Serial 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”



Hydraulic actuated, Remote Reset
FDV Deluge valve Type: FDV-DH1



For water column height limitations use the Anti-Columning system type FDV-DA0



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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