

IOM FDV-AE1

ELECTRIC ACTUATION WITH REMOTE RESET BASIC DELUGE VALVE

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

Fire Protection

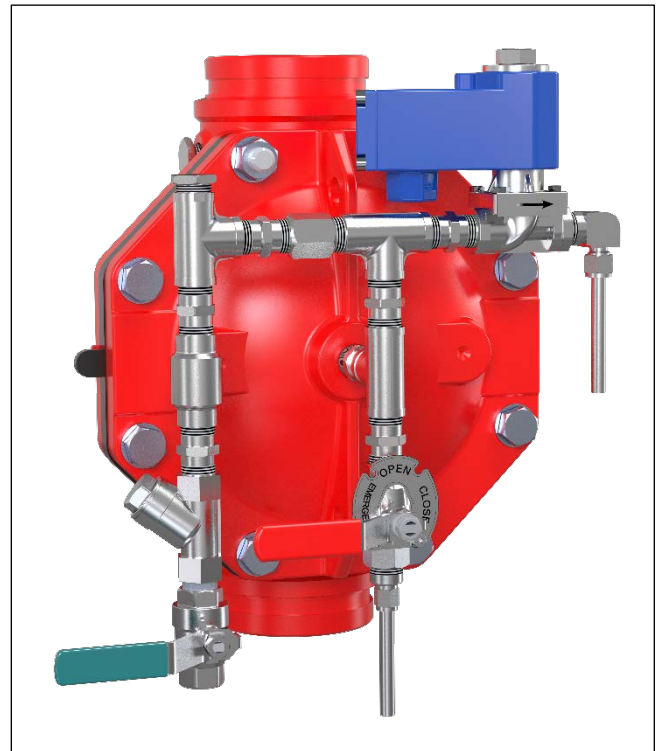
RAPHAEL VALVES INDUSTRIES

Description

This deluge system is based on the Raphael's FDV valve, equipped with an Electrical 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, an electrical detection system trips the valve's control trim through the solenoid and consequently, pressurized water trapped in the FDV's control chamber are drained and the valve opens.

Opening the emergency valve overcomes all terms and opens the deluge valve immediately.

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



Parts List

1. – Deluge valve
2. – control chamber pressure gauge connection (plugged, 1/2" NPT female)
3. – Check Valve
4. – "Y" Strainer
5. – Trim Pressure Supply Valve
6. – Emergency valve
7. – Orifice
8. – 2-way solenoid
9. – Downstream side port (plugged, 1/2" NPT) for optional acc. List ¹
10. – Downstream drain port (1/2" NPT) for optional acc. List ¹
11. – Upstream drain port for optional acc. List ²
12. – Upstream side port (plugged, 1/2" NPT) for optional acc. List ²

Lists of optional accessories for plugged ports:

List¹ – Downstream pressure gauge, WMA – water motor alarm, MADV – manual automatic drain valve, drain valve.

List² – Upstream pressure gauge, Drain valve.

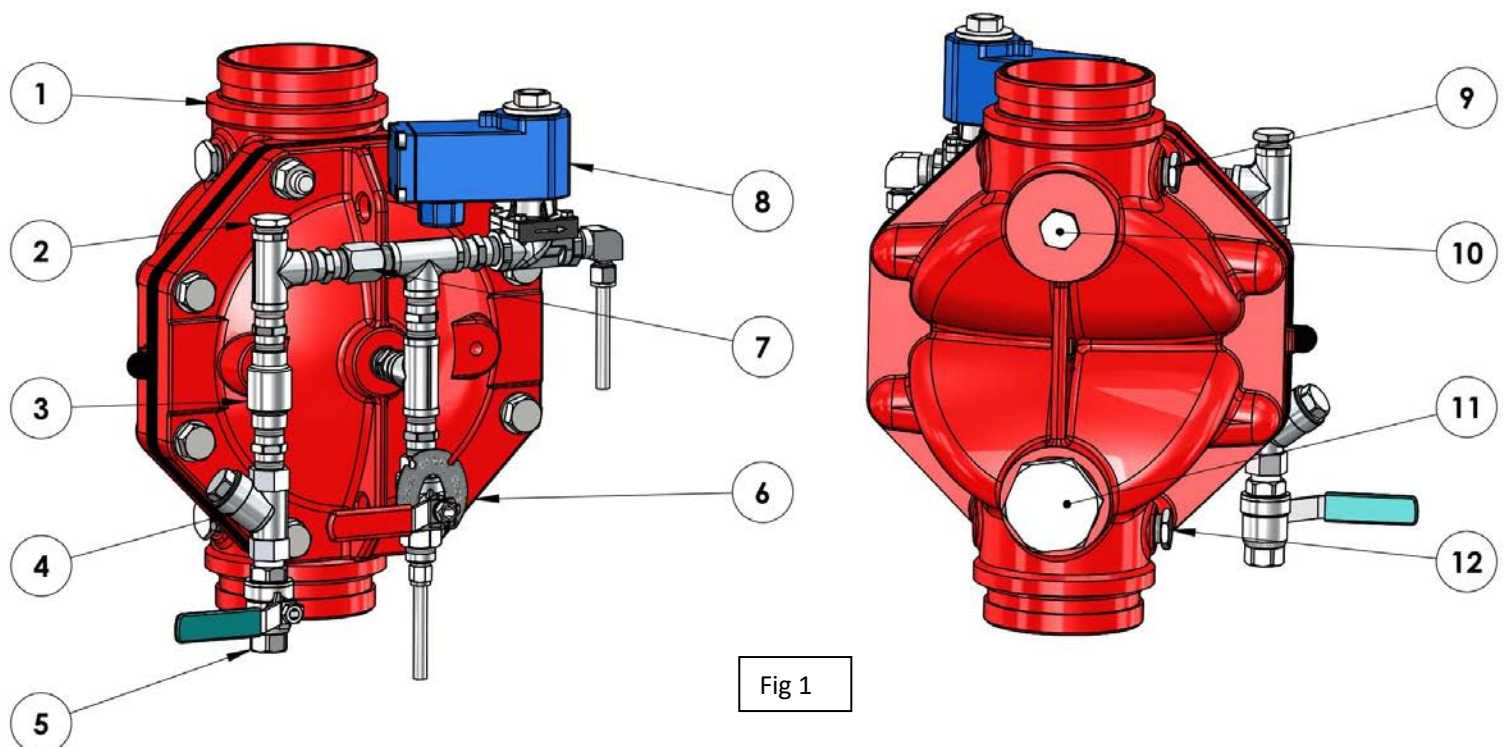


Fig 1

Operation (Reference Figure 1)

SET position:

Water is supplied by the Trim pressure supply valve (5), “Y” strainer (4), Check valve (3), flows through orifice (7) and fills the FDV’s control chamber. Pressurized water in the valve’s control chamber is trapped by the check-valve (3), by the closed solenoid valve (8) and by the closed emergency valve (6), maintaining the deluge valve in its closed position.

Fire Situation

When one or more of the electric fume/heat sensors is tripped, it energizes the 2-way solenoid (8) through the control panel. When tripped, this solenoid drains the FDV’s control chamber to the atmosphere. This drain overcomes the entering orifice flow into the deluge control chamber, causes the FDV valve to open and admits water into the spray sprinklers pipeline.

Opening the Emergency valve (6), bypasses all terms, drains the FDV control chamber and opens the valve immediately.

Reset Position

When the solenoid is de-energized through the main control panel, the upstream pressure flows through the orifice (7) into the FDV valve’s control chamber, pressurizes it and closes the FDV deluge valve. The valve closes and the water flow to the spray pipeline.

It is recommended to drain the sprinklers pipeline by opening the drain ball valve connected to the FDV’s downstream drain port (if equipped).

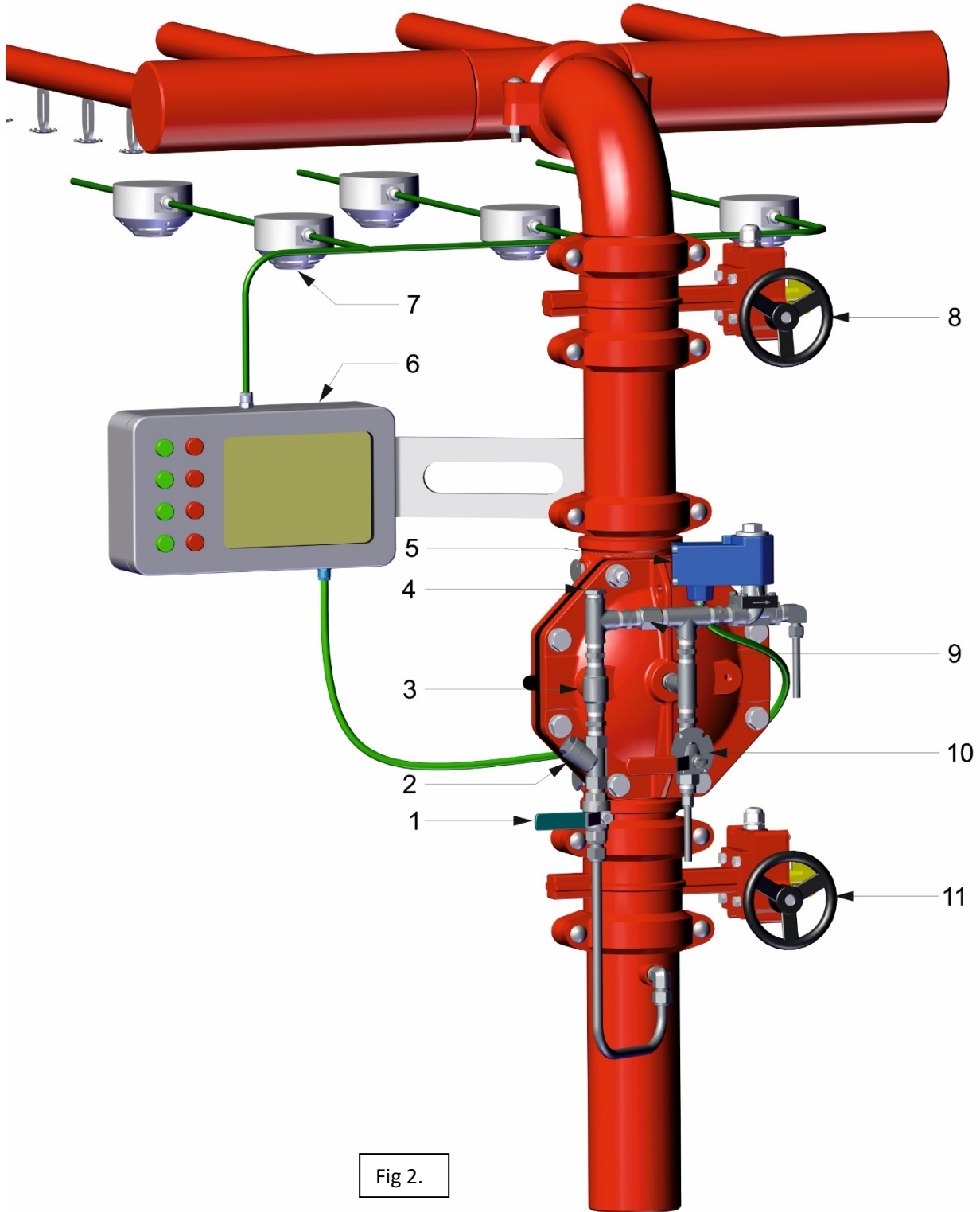
Installation (Reference Figure 2)

1. This system is supplied pre-assembled and factory pre-adjusted. Any change carried out at the system's trim components 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. Sufficient room around the system location should kept enabling 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. 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. HF DV-AE1.
6. The downstream pipe connected to the FDV valve at a horizontal mount, must 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, alarm pressure switch, trim pressure supply, Dry pilot pipeline, FDV valve's drains, etc.), is prohibited.
8. All connections to water supply, alarms etc. And other optional equipment should be done in accordance with **fig 1**:
 - * **(9)** – Pressure switch connection port (all ½" NPT female)
 - * **(9)** – Water motor alarm connection
 - * **(9)** – MADV manual automatic drain valve
 - * **(9 & 12)** – Pressure gauges connections
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. Check valve
4. Control chamber pressure gauge port (plugged)
5. Solenoid valve
6. Main Control hub
7. Electrical heat sensor
8. Downstream separation valve (butterfly or OS&Y valves).
9. Orifice
10. Manual Emergency valve
11. Upstream separation valve (butterfly or OS&Y valves).



Operation

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 upstream separation Butterfly valve (**11**) is fully closed.
2. Make sure the solenoid (**5**) is de-energized.
3. Make sure the trim pressure supply valve (**1**) is Closed.
4. Make sure Emergency valve (**10**) is fully closed.
5. Make sure the FDV's downstream drain plugged port (**10 fig 1**) is open.
6. Open the trim pressure supply valve (**1**).
7. Gradually open the upstream separation Butterfly valve (**11**) and make sure the open downstream drain port (**10 fig 1**) is not dripping. A dripping might indicate a FDV valve sealing issue.
8. Leave the downstream drain port (**10 fig 1**) unplugged.
9. Turn On the electric detection system (**7**).

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. Fully close the downstream separation butterfly valve **(8)**
2. Open the downstream drain port **(10 figur 1)** or open its ball valve if equipped.
3. Initiate a false alarm for the Heat/Smoke detection sensors **(7)** and make sure the solenoid **(5)** become energized through the main control panel **(6)**.
Trapped water will drain out of the FDV's control chamber and the valve will open.
Water supposed to flow out the drain port of the deluge valve.

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.

1. Turn off the false alarm for the Heat/Smoke detection sensors (7) at the control board (6) and de-energize by that the solenoid (5). The FDV valve should close.
2. Close the Upstream Butterfly valve (11)
3. Close the trim pressure supply (1).
4. Disassemble the "Y" strainer (3) and clean its screen. Re-assemble the strainer.
5. Open the pressure supply valve (1) and
6. make sure there is no leakage or dripping out of the open downstream drain port. If ok, re-install the plug.
7. The Upstream Butterfly valve (11) and the downstream butterfly valve (8) should be opened gradually.

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 deluge valve and its trim for external damage: observe the trim piping and hose connections for leakage or damage.
2. Verify that the upstream and downstream separation butterfly valves (**11 & 8**) and the Trim pressure supply valve (**1**) are in fully open position.
3. If the valve is not equipped with a drain valve, the downstream port needs to be unplugged, and the downstream pipeline need to be drain. When done, make sure there is no leakage or dripping.

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 & placing in service**.

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 (11) and the trim pressure supply valve (1).
2. Open both upstream and downstream drain ports plugs and drain the valve. Drain the FDV's control chamber using the Emergency valve (10).
3. Turn off or disconnect all relevant electrical.
4. Release all relevant tubes, fitting nuts and the central union pipe connection (if equipped) at valves cover centre.
5. Remove and disassembled front trim.
6. Remove all the FDV's cover bolts. The cover will hang on its studs (4" DN100 valve size and up). 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 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 side (from top view – at the left side).
10. Reinstall the valve's cover: use the Anti-seize paste 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

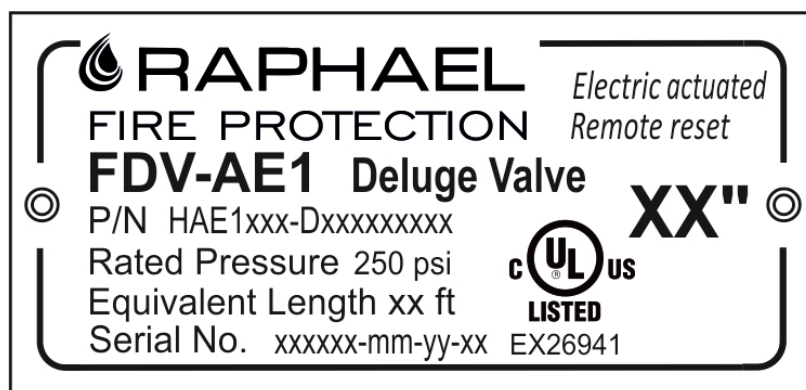
Equivalent pipe length for FDV deluge valves

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)

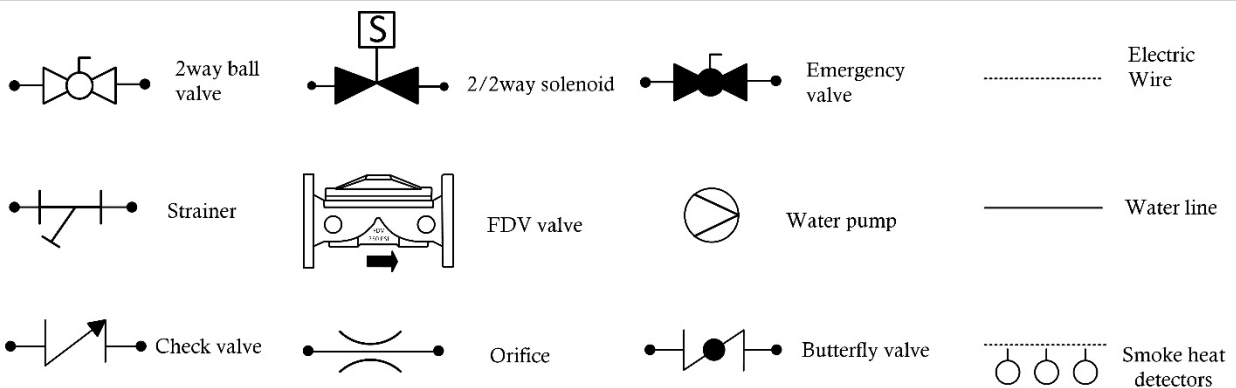
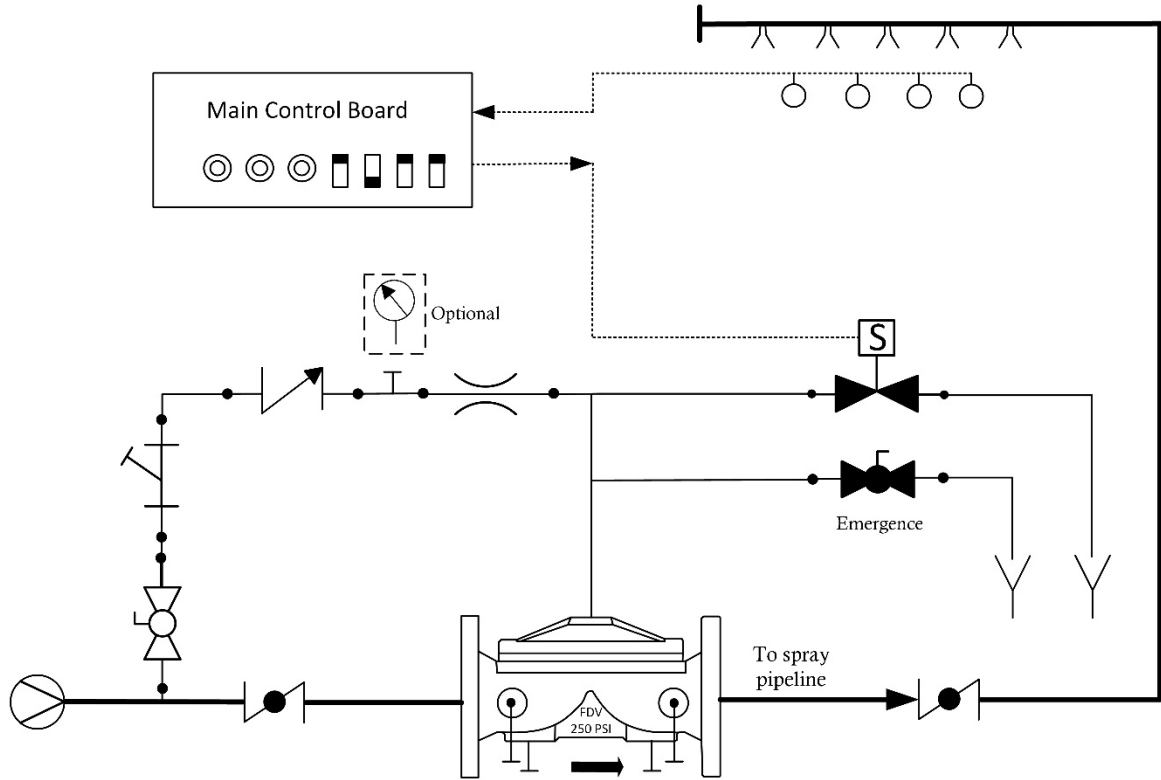
Marking

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-AE1 –Electric actuated, Remote Reset.*
- *(P/N) The Application's part number: System properties–Valve properties*
- *Rated pressure: 250 psi*
- *Equivalent Length: reference table - page 12.*
- *Serial Number: Work order number-MM-YY-Number in batch 01-99*
- *The UL listing mark & QR code: EXxxxxx*
- *The Application's diameter in inch: XX"*



Electric actuated, Remote Reset FDV Deluge valve
Type: **FDV-AE1**



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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