IOM FDV-AE0

ELECTRICALLY ACTUATED, LOCAL RESET, ECONOMIC DELUGE VALVE

Installation Operation & Maintenance manual

Fire Protection

RAPHAEL VALVES INDUSTRIES

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IOM FDV-AE0

Electrically Actuated, Local Reset, Economic Deluge Valve

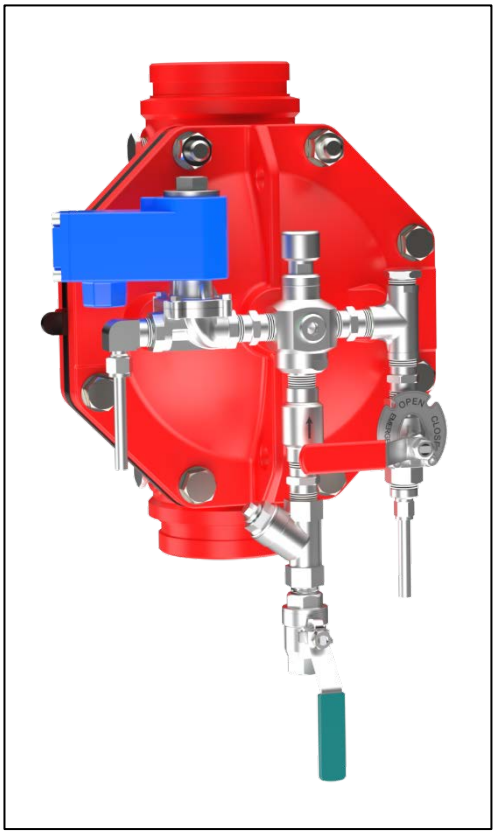
DESCRIPTION

This deluge system is based on Raphael's FDV valve, equipped with an electrically actuated control trim. The installed FDV valve is available with a range of optional materials and coatings to meet the required operating conditions, but the system's functional principle remains unchanged: in a fire situation, an electrical detection system (smoke or heat detectors/sensors) activates the fire-protection control board, which in turn energizes the solenoid valve.

Once the solenoid valve opens, the water trapped in the FDV control chamber is released, and the valve opens.

The trim is equipped with a PSA, a device that allows local resetting of the system and also serves as a latching mechanism, ensuring that the deluge valve remains open even if the solenoid closes.

This system is suitable for open nozzles installed on the main spraying pipelines.



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PARTS LIST

Electrically Actuated, Local Reset, Economic Deluge Valve

1. Deluge valve
2. PSA Pressure Supply Arrestor
3. 2-way solenoid
4. Check Valve
5. "Y" Strainer
6. Trim Pressure Supply Valve
7. Emergency valve
8. Bottom downstream drain port & side port (1/2" NPT) for optional acc. **List [1]**

8S Side downstream port (1/2" NPT) for optional acc **List[1]**

9. Bottom upstream drain port & side port for optional acc. **List [2]**

8S Side upstream port (1/2" NPT) for optional acc **List [2]**

List[1] – Downstream pressure gauge, WMA – water motor alarm, MADV – manual automatic drain valve, drain valve.

List [2] - Upstream pressure gauge, Drain valve.

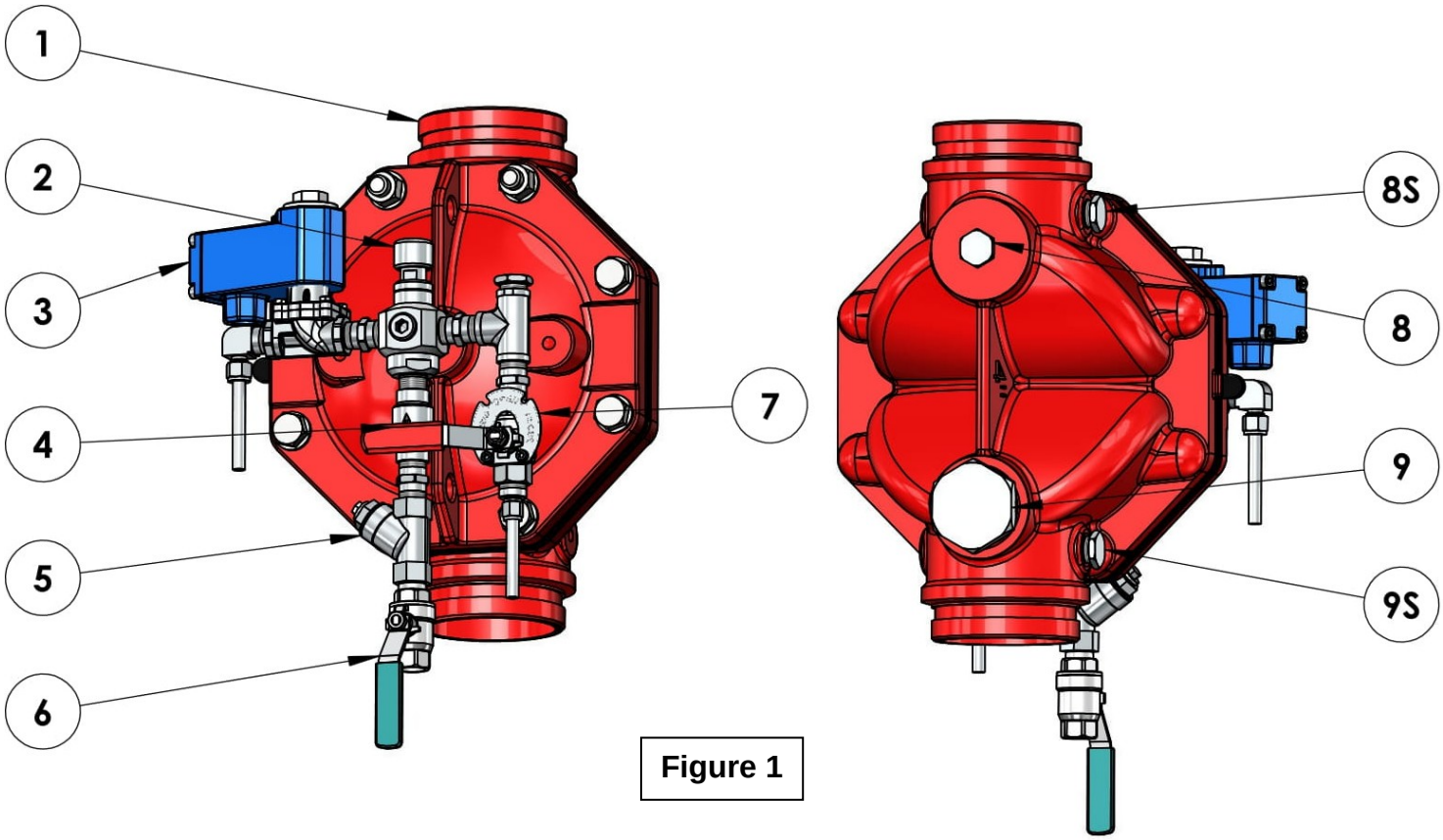


Figure 1

OPERATION (Reference Figure 1)

SET position:

The trim is supplied by the line-pressure via ball valve (**6**), "Y" strainer (**5**), flows through the check valve (**4**), the PSA (**2**) while its push-button is pressed, and fills the FDV's control chamber. Pressurized water in the valve's control chamber gets trapped by the PSA (**2**) while its push-button is released, by the check-valve (**4**), the closed SOV (**3**) and by the closed emergency valve (**7**), maintaining the deluge valve in closed position.

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

Fire Situation:

When one or more smoke or heat electrical detectors get alarmed by fire, a signal transferred to the main fire protection control board and consequently, the solenoid valve's coil is energized and opened. The open SOV drains the FDV's control chamber through the PSA's upper manifold, to the atmosphere. The FDV deluge valve opens and water flows into the sprinkler's 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 (**7**), 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 de-energizing the solenoids (**3**) valve's coil. At the second step, the PSA (**2**) push-button should be pressed down until the FDV control chamber is fully pressurized: The device should be pressed until the FDV closes and some additional 5-10 seconds, to guarantee that the deluge valve's control chamber is fully pressurized.

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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 be kept enabling assembly/disassembly and maintenance work.

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 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-AE0. Be aware that that the PSA (**12** fig 2) must always be oriented vertically.

6. The downstream pipe connected to the FDV valve at a vertical or horizontal mount must be supported firmly to prevent the pipeline's weight 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, 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**:

   * (**8**) – Pressure switch connection port (all ½" NPT female)
   * (**8**) – Water motor alarm connection
   * (**8**) – MADV manual automatic drain valve
   * (**8S & 9S**) – Pressure gauges connections
   * (**6**) – Trim 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.

10. Before performing the high-pressure leak test, make sure that the butterfly valve or the OS&Y valve upstream of the deluge valve is closed, in order to prevent damage to the diaphragms in the valve and in the trim components.

11. Make sure that the gong connected to its designated outlet is supported so that its weight, along with the weight of the piping attached to it, is not applied to the valve trim.

INSTALLATION PARTS LIST (Reference Figure 2)

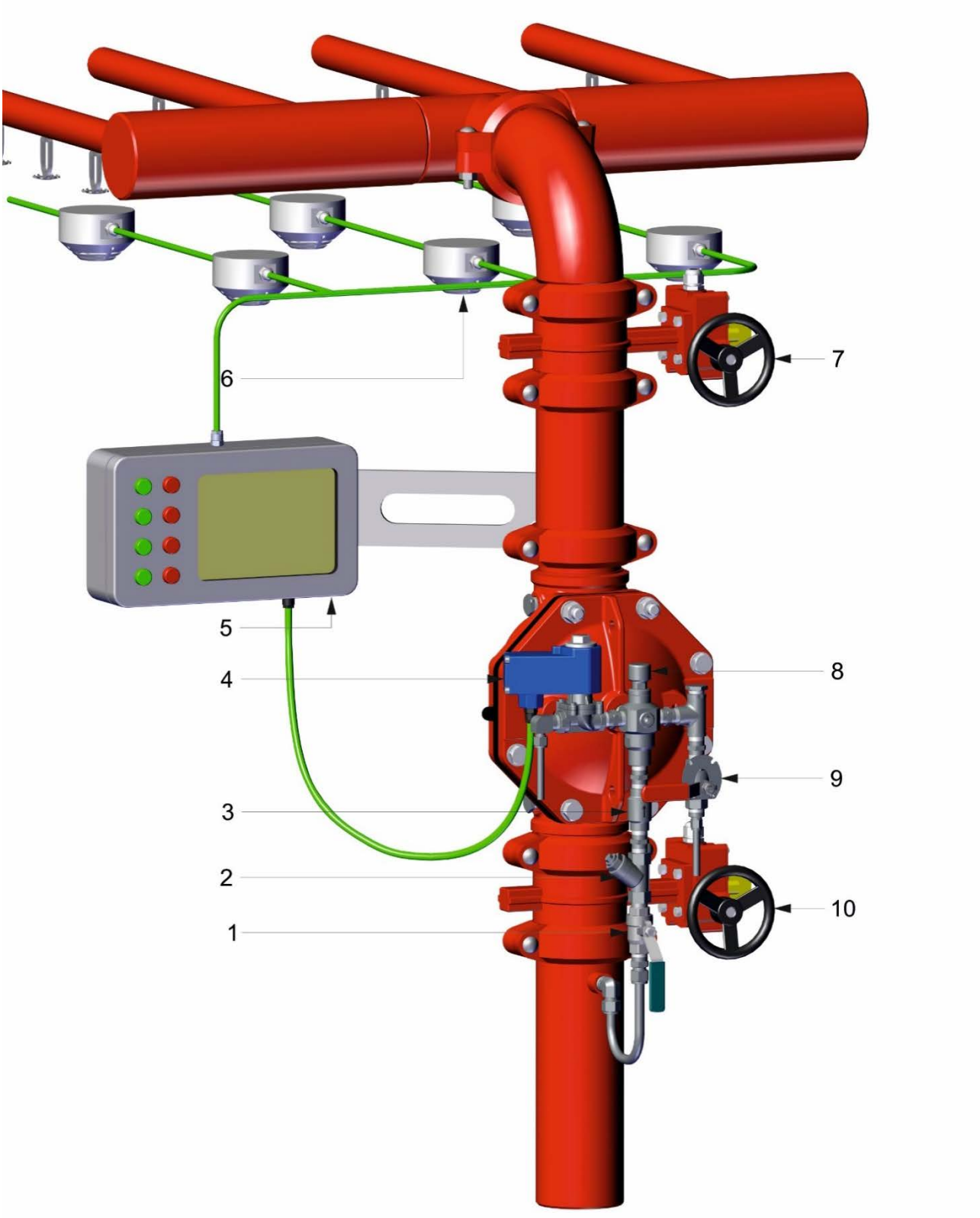
Electrically Actuated, Local Reset, Economic Deluge Valve

1. Trim supply valve (1/2” NPT female)
2. “Y” Strainer
3. Check Valve
4. Solenoid valve
5. Main Control hub
6. Electrical heat / smoke sensors
7. Downstream separation valve (butterfly or OS&Y valves).
8. PSA Pressure supply arrestor
9. Manual Emergency valve
10. Upstream separation valve (butterfly or OS&Y valves).

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Electrically Actuated, Local 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 Upstream & Downstream butterfly valves (**10 & 7**) are fully closed.
2. Make sure the solenoid valve (**4**) is de-energized.
3. Make sure that Emergency valve (**9**) is fully closed.
4. Open the trim pressure supply ball valve (**1**)
5. Make sure the FDV's downstream drain valve (**8 fig 1**) is open (unplug the metal plug or open the drain valve If equipped).
6. Press the PSA's push-button (**8**) about 5-15 sec, depending on the valves size, and fill the trim and FDV's control chamber.
7. Open gradually the upstream butterfly valve (**10**) and make sure the downstream drain valve is not dripping.
8. Leave the downstream drain port or valve (if equipped) open and close the downstream separation valve (**7**).

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 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. Make sure that the downstream separation butterfly valve (**7**) is closed

2. Make sure that the downstream drain port (**8 figure 1**) or its ball valve if equipped, is open.

3. Initiate a false alarm for the Heat/Smoke detection sensors (**6**) and make sure the solenoid (**4**) becomes energized through the main control panel (**5**).
   Trapped water will drain out for a few seconds, draining the valve's control chamber, and stop.

   Note that A drain flow for an extended period, or a constant flow can indicate an internal leakage at the PSA device.

4. The deluge valve should open, and a significant flow should flow out of the open downstream port / valve.
   If it's ok, -

   The system is ready for re-setting and placing in service.

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. 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 (**6**) at the control board (**5**), de-energizing and closing the solenoid valve (**4**).

2. Close the Upstream Butterfly valve (**10**)

3. Close the trim pressure supply (**1**).

4. Disassemble the “Y” strainer (**2**) and clean its screen. Re-assemble the strainer.

5. Open the pressure supply valve (**1**) and press the PSA device (**8**) push button for about 5-15 sec, depending on the valve’s size.

6. Open gradually the Upstream Butterfly valve (**10**). Make sure there is no leakage or dripping out of the open downstream drain port. If it’s ok, re-install the plug or close the valve (if equipped).

7. Open the downstream butterfly valve (**7**).

The system is in SET state and placed in service.

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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 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** & **15**) and the Trim pressure supply valve (**1**) are fully open.

3. If the valve is not equipped with a drain valve, the downstream port needs to be unplugged, and the downstream pipeline needs to be drained. 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.**

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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 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 the upstream butterfly valve (**15**) 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 (**14**).
3. Turn off or disconnect all relevant electrical wiring.
4. Release all relevant tubes, fitting nuts and the central union pipe connection (if equipped) at valves cover center.
5. Remove and disassemble 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 (4" DN100 valve size and up only).
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 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.**

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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

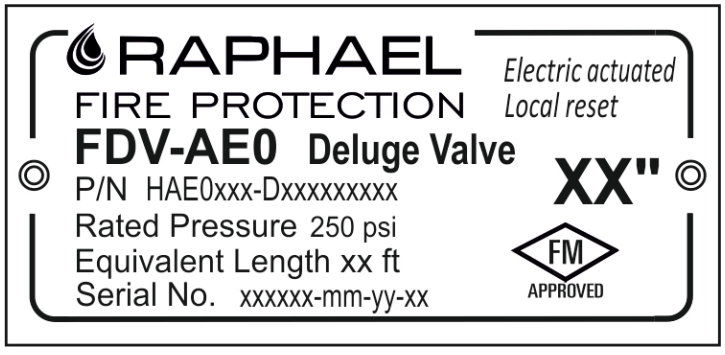
Equivalent pipe length for FDV deluge valves

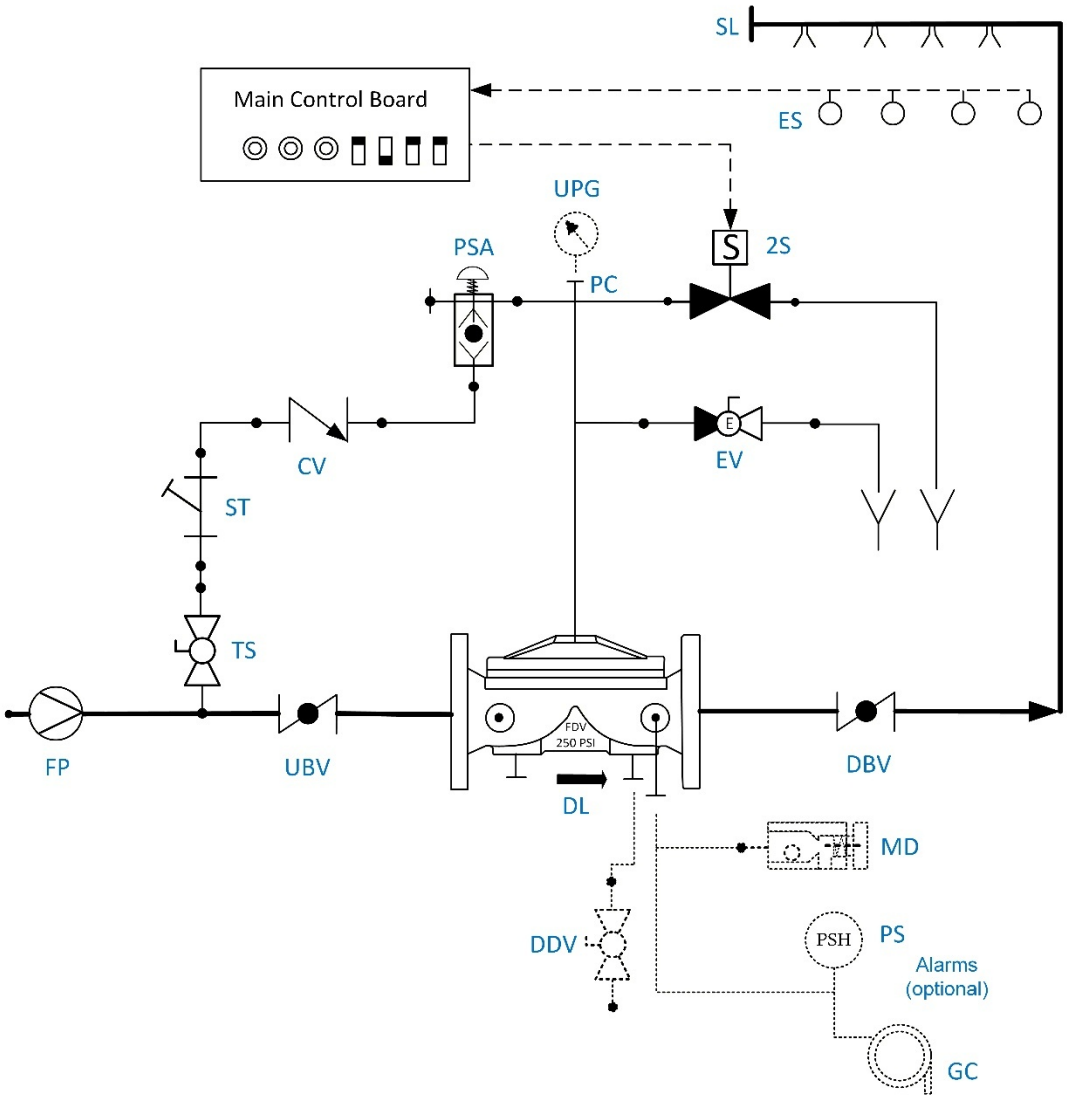
Valve size		1.5"	2"	2.5"	3"	4"	6"	8"	10"
Equivalent length value	ft	11	24	25	28	31	46	72	117
	m	3.6	7.3	7.6	8.5	9.4	14	21.9	35.6

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-AE0 – Electric actuated, Local 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 Application's* diameter in inch: XX"





TS - Trim supply
ST - Strainer
PC - Pressure Gauge connection
CV - Check Valve
ES - Electric Sensores
PSA - Pressure Supply Arrestor
SL - Sprinkles Line
DL - Deluge Valve
EV - Emergency Valve
FP - Fire Pump

UBV - Upstream Butterfly Valve
DBV - Downstream Butterfly Valve
DL - Deluge Valve

Optional
UPG - Upstream Pressure gauge
DDV - Downstream drain valve
PS - Pressure Switch
MD - MADV – Man. / Auto. Drain Valve
GC - Gong Connection

Water lines
Electrical line
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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