IOM FDV-AE1

ELECTRIC ACTUATION WITH REMOTE RESET BASIC DELUGE VALVE

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

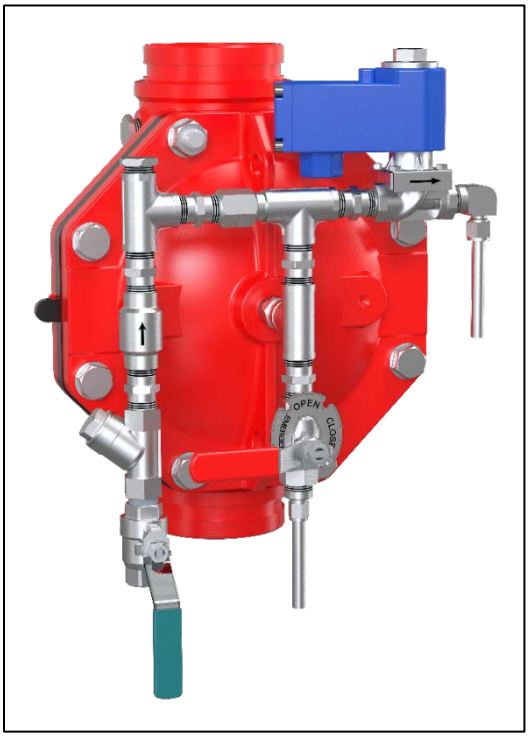
Fire Protection

RAPHAEL VALVES INDUSTRIES

ELECTRIC ACTUATION WITH REMOTE RESET BASIC DELUGE VALVE

Description

This deluge system is based on Raphael's FDV valve, equipped with an electrically remote-actuated control trim.
The installed FDV valve is available in a range of optional materials and coatings to meet the required operating conditions, while the functional principle of the FDV-AE1 system remains unchanged. In a fire situation, an electrical detection system (heat or smoke detectors) activates the valve's control trim through the solenoid. Consequently, the pressurized water trapped in the FDV control chamber is released, and the valve opens.
This system is suitable for water-spray pipelines equipped with open nozzles



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Parts List

1. – Deluge valve
2. – control chamber pressure gauge connection (plugged, ½" 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, ½" 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, ½" NPT) for optional acc. **List [2]**

Lists of optional accessories for plugged ports:

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

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

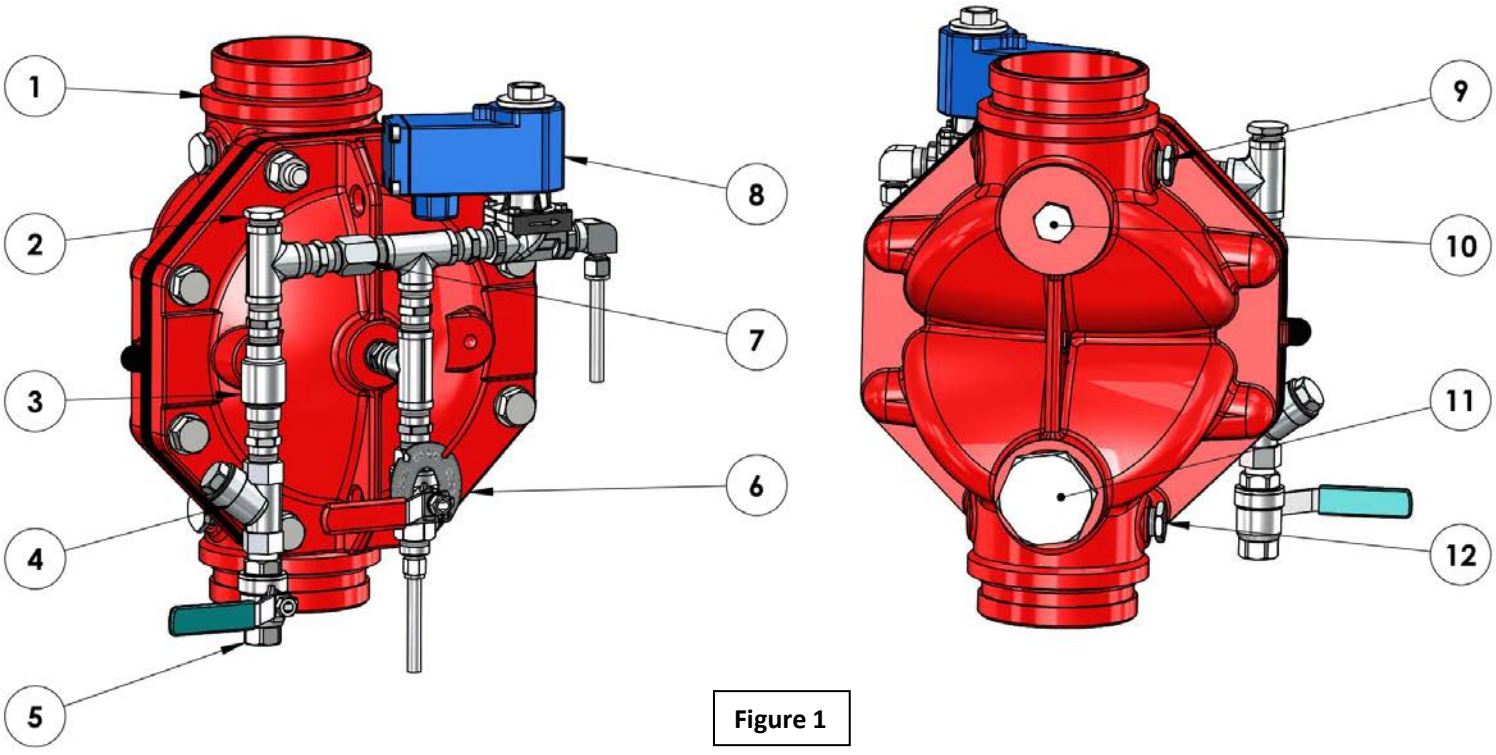


Figure 1

Operation (Reference Figure 1)

SET position:

Water is supplied through the trim pressure supply valve (**5**), the Y-strainer (**4**), and the check valve (**3**), then flows through the orifice (**7**) and fills the FDV control chamber. The pressurized water in the control chamber is trapped by the check valve (3), the closed solenoid valve (**8**), and the closed emergency valve (**6**), keeping the deluge valve in its closed position.

Fire Situation

When one or more electric smoke or heat sensors are activated, the control panel energizes the two-way solenoid valve (**8**). Once energized, the solenoid drains the FDV control chamber to the atmosphere. This drainage exceeds the incoming flow through the orifice, causing the FDV valve to open and allowing water to enter the spray-sprinkler pipeline.
Opening the emergency valve (**6**) bypasses all conditions, drains the control chamber, and opens the valve immediately.

Reset Position

When the solenoid is de-energized by the main control panel, the upstream pressure flows through the orifice (**7**) into the FDV control chamber, repressurizing it and closing the FDV deluge valve. Once the valve closes, water flow to the spray pipeline stops.
It is recommended to drain the sprinkler pipeline by opening the drain ball valve connected to the FDV downstream drain port (if installed).

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. HFDV-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.

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)

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).

ELECTRIC ACTUATION WITH REMOTE RESET BASIC DELUGE VALVE

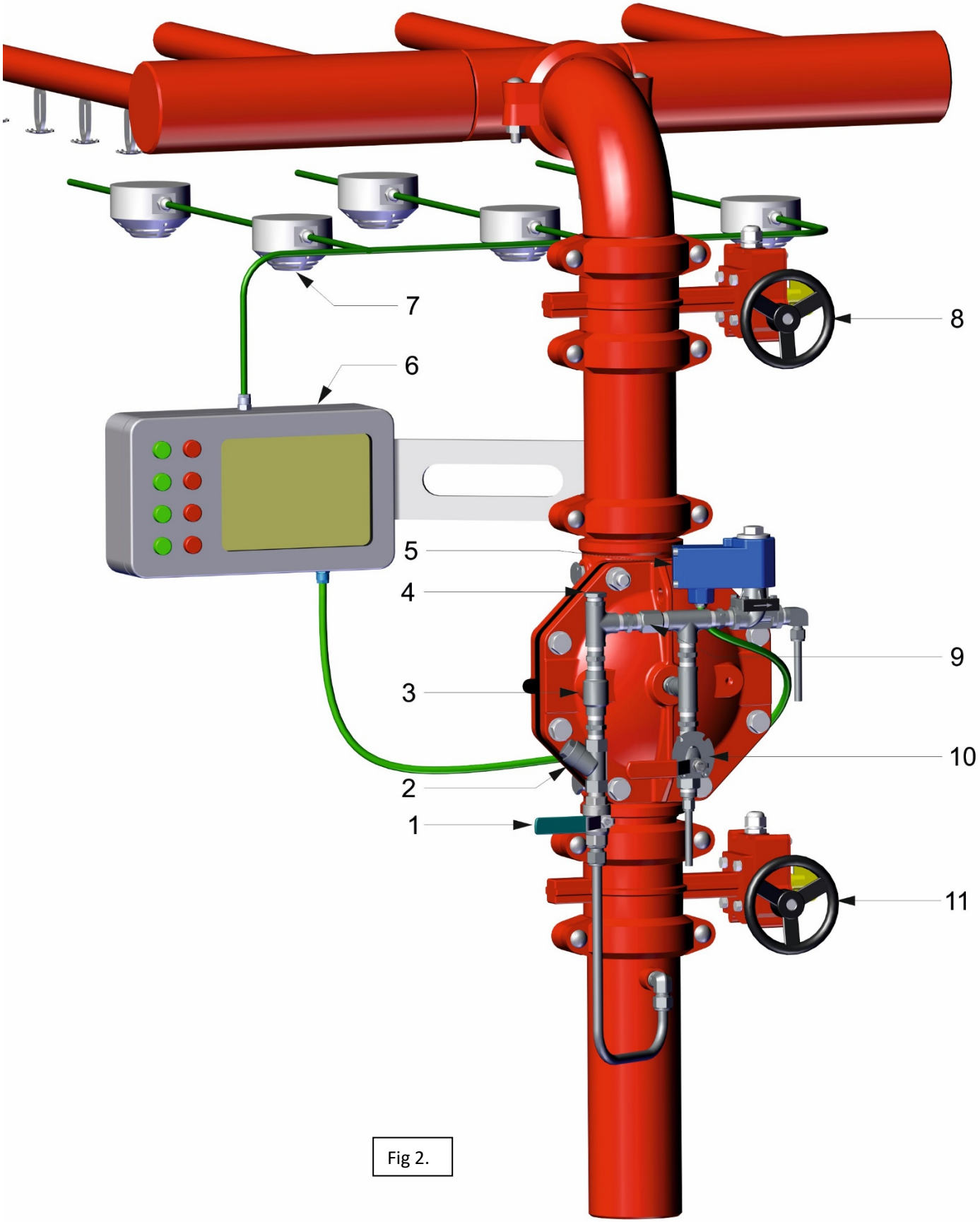


Fig 2.

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 figure 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 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.**

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

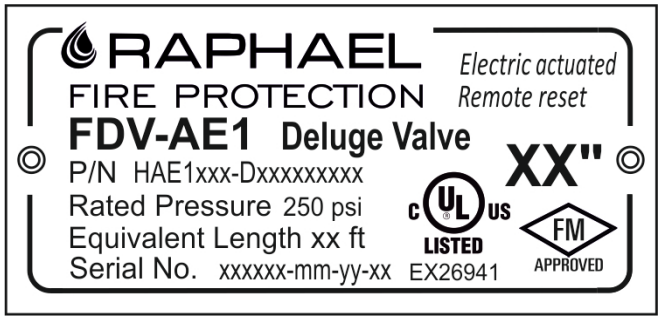
Equivalent pipe length for FDV deluge valves

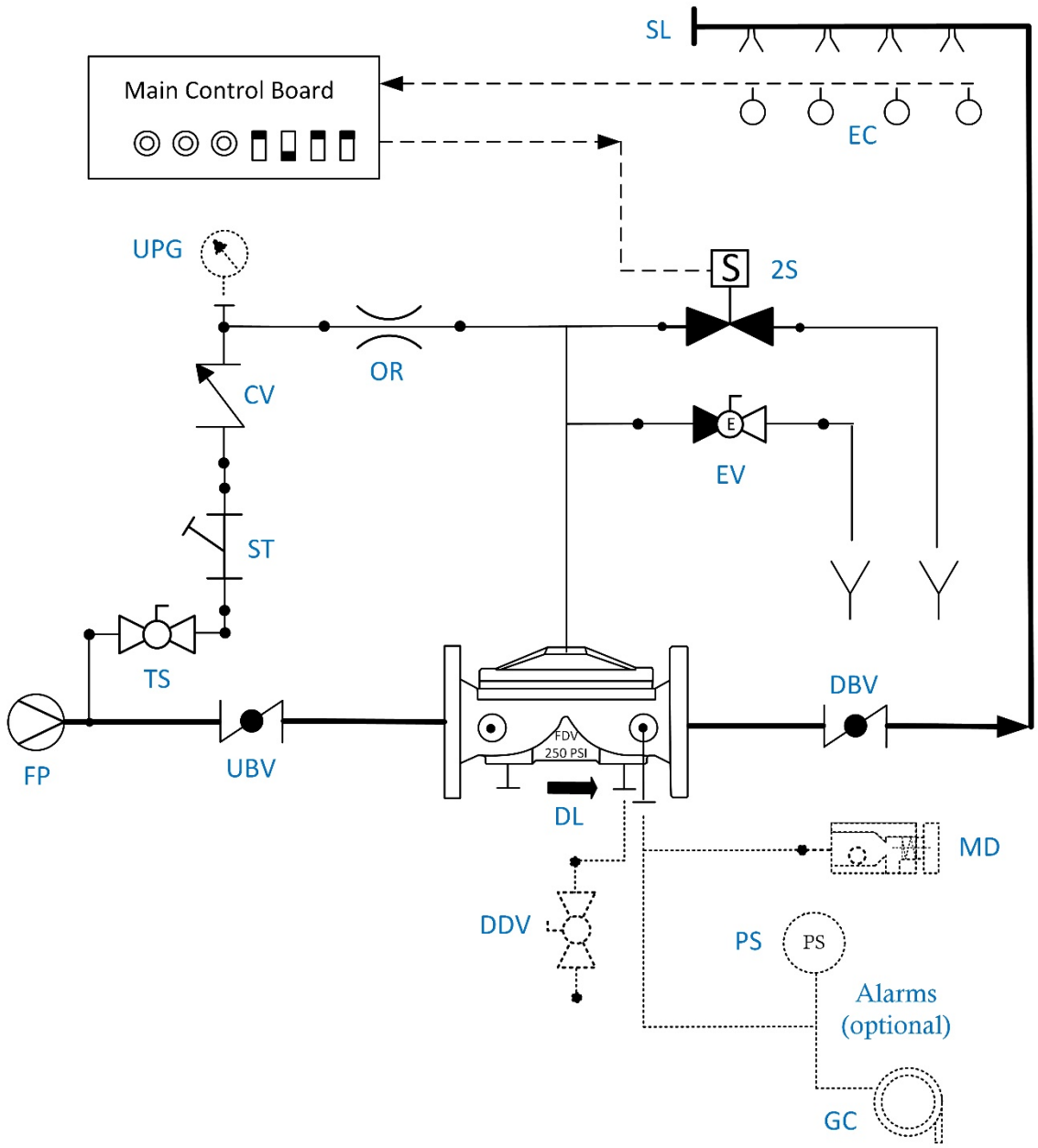
Valve size	Equivalent length value ft (m)
1.5"	11 (3.6)
2"	24 (7.3)
2.5"	25 (7.6)
3"	28 (8.5)
4"	31 (9.4)
6"	46 (14)
8"	72 (21.9)
10"	117 (35.6)

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”





TS - Trim supply
ST - Strainer
CV - Check Valve
OR - Orifice
DL - Deluge Valve
ES - Electric Sensors System
UBV - Upstream Butterfly Valve
DBV - Downstream Butterfly Valve
S2 - 2-way Solenoid valve
EV - Emergency Valve

SL - Sprinkles Line
FP - Fire Pump
SL - Sprinklers Line

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

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.



RAPHAEL

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