# IOM FDV-DE0

## ELECTRICALLY ACTUATED, LOCAL RESET, DELUGE VALVE

Installation Operation & Maintenance manual

**Fire Protection**

**RAPHAEL VALVES INDUSTRIES**

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# IOM FDV-DE0

**Electrically Actuated, Local Reset, 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 in a range of optional materials and coatings to meet the required operating conditions, while the functional principle of the system remains unchanged. In a fire situation, an electrical detection system - smoke or heat detectors - trips the FP control panel, and consequently, the solenoid valve is energized.

Once the SOV opens, the water trapped in the FDV control chamber is drained, and the valve opens.

The trim is equipped with a PSA – a device that enables a local system reset, i.e., closing the FDV valve by pressurizing the valve control chamber. In addition, the PSA serves as a latching device that keeps the valve open even in the event of a power outage.

This system is suitable for main spraying pipelines equipped with open nozzles.

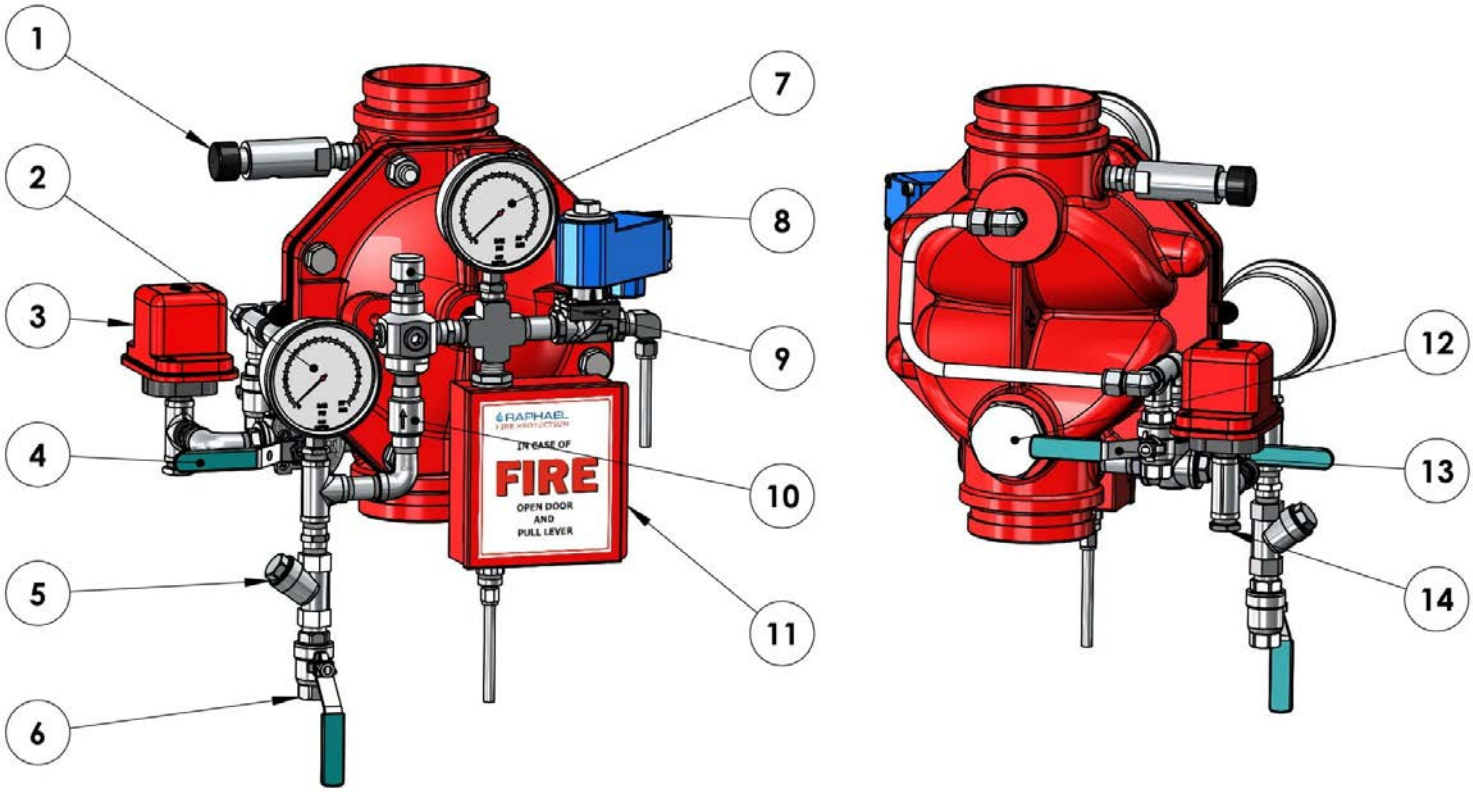
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# PARTS LIST

## Electrically Actuated, Local Reset, Deluge Valve

1. MADV
2. Upstream pressure gauge
3. Pressure switch (optional)
4. Alarm test valve (3 way)
5. “Y” Strainer
6. Trim Pressure Supply Valve
7. Control chamber PG.
8. Solenoid (2 way)
9. PSA-Pressure Surge Arrestor
10. Check Valve
11. EMU Emergency valve (2 way)
12. Upstream drain port (plugged)
13. Downstream drain valve
14. Water Motor Alarm conn. (optional)

**Fig. 1**



# OPERATION (Reference Figure 1)

## SET position:

The trim is supplied by the line pressure via the ball valve (**6**) and the “Y” strainer (**5**), flows through the PSA (**9**), and fills the FDV control chamber. Pressurized water in the valve’s control chamber is trapped by the PSA's internal check valve, by the check valve (**10**), the closed SOV (**8**), and by the closed emergency valve unit (**11**), thus maintaining the deluge valve in the closed position. In case of minor leakage from the FDV control chamber piping, the PSA moves to its compensation state, ensuring the valve remains closed.

## FIRE situations:

When one or more Smoke/Heat electrical detectors are tripped by a fire, they transfer a signal to the main fire protection control board and, consequently, the solenoid valve’s coil energizes and the SOV opens. The open SOV drains the FDV control chamber through the PSA’s (**9**) upper manifold, to the atmosphere. The FDV deluge valve opens and admits water to the sprinkler pipeline. 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. In this way the PSA latches the FDV valve in its open position. Opening the Emergency ball valve bypasses all controls/components, 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 solenoid valve’s coil.

In the second step, the PSA (**9**) push-button needs to be pressed down until the FDV control chamber is fully pressurized: The device should be pressed until the FDV closes and an additional time of 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 to 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 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-DE0.

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.
   (x) – Alarm gong to alarm test valve - ½" 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, Deluge Valve

1. Trim supply valve (1/2” NPT female)
2. “Y” Strainer
3. Water motor alarm connection ½” NPT (plugged)
4. Pressure switch (optional. ½” NPT female connection)
5. 2-way downstream drain valve (1/2” NPT female)
6. Upstream pressure gauge
7. PSA Pressure Surge Arrestor
8. Main control box *
9. MADV (MB) Manual Automatic Drain Valve (metal ball)
10. Electric alarm detectors (heat or smoke sensors)
11. Downstream separation valve (butterfly or OS&Y valves) *.
12. Solenoid valve N.C Upstream pressure gauge
13. Control chamber pressure gauge.
14. Check valve.
15. MEU – Manuel Emergency Unit
16. Downstream separation valve (butterfly or OS&Y valves) *.

*** Out of scope of supply**

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## Electrically Actuated, Local Reset, Deluge Valve

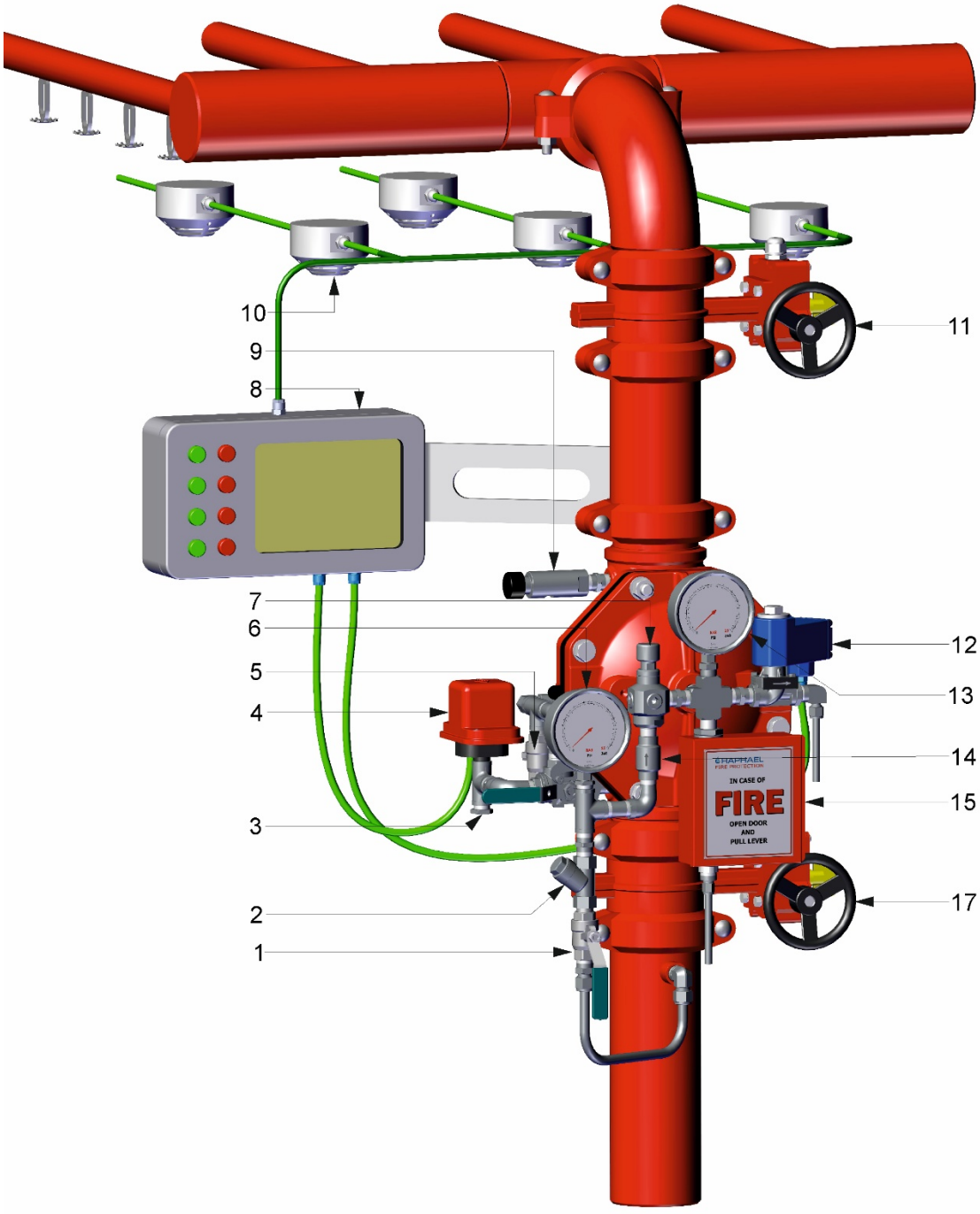



**Figure 2**

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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 (**17 & 11**) are closed.
2. Make sure the solenoid (**12**) is de-energized.
3. Make sure the trim pressure supply ball valve (**1**) is Closed.
4. Make sure that the Emergency valve at the MEU (**15**) is fully closed.
5. Make sure the FDV's downstream drain valve (**2**) is open.
6. Press and hold the PSA's push-button (**7**) and gradually open the trim pressure supply valve (**1**).
7. fill the trim and FDV's control chamber. The control chamber pressure gauge
8. reading should be identical to the line pressure at the upstream pressure gauge (**6**)
9. Gradually open the upstream butterfly valve (**17**) and make sure the downstream drain valve is not dripping.
10. Close the Downstream drain valve and open the downstream butterfly valve (**11**).

The system is ready for the "**fire situation simulation**".

# Commissioning the system - phase 2.

## Fire Situation Simulation

*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. Ensure during this test that the downstream butterfly valve (**11**) remains closed.

2. Open the downstream drain valve (**5**).

3. Energize to open the SOV (**13**) through the main control board (**8**). Observe the FDV control chamber drain through the SOV drain tube.

4. Assure that the Set/Test selection valve handle points to the “Set”.

5. Assure that the alarm pressure switch (**4**) transmits an alarm signal to the main control board and in addition, the acoustic alarm implemented by the water motor sounds.

**The system is ready for Resetting & placing in service**

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## 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, make sure that the SOV is closed by de-energizing its coil (through the FP main control board).***

(Reference drawing - figure 2)

1. Close the Upstream Butterfly valve (**17**).
2. Close the trim pressure supply (**1**).
3. Disassemble the “Y” strainer (**2**) and clean its screen. Assemble the strainer.
4. Open the trim pressure supply valve (**1**).
5. The PSA (**7**) push-button should be pressed down until the FDV control chamber is fully pressurized.
6. The Upstream Butterfly valve (**17**) and the downstream butterfly valve (**11**) need to be opened.

**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.***

***Maintenance and inspection procedures follow the NFPA 25 instructions for deluge valves.***

## 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 (17) 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. Press the PSA push-button (7) for about 5-10 sec. to assure FDV valve control chamber is pressurized and then, release. Make sure the control chamber pressure gauge (13) reading is equal to the upstream pressure gauge (6) reading.
4. Push the MADV (MB) (9) and make sure that after emptying condensing water, the drain flow stops. If a constant leakage is observed, it might indicate a deluge valve sealing problem.
5. Move the 3-way SET/TEST valve to TEST. The acoustic alarm should sound, and alarm pressure switch (**4**) should transmit a signal to the main control board.

## Annual test procedure

1. Conduct the monthly inspection procedure.

2. Perform the procedure described in chapter - **Commissioning the system - phase 2. -** Fire Situation Simulation. Check and confirm the system's proper operation.
3. Follow the procedure described in chapter - **Commissioning the system - phase 3**. - Resetting & placing in service. Check and confirm the system's proper operation.

## 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 maintained, referring their maintenance instruction. After the completion, the Annual maintenance procedure is to be conducted.*

1. Close the upstream butterfly valve (**17**) and the trim pressure supply valve (**1**).

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

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 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. 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.

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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 lubrication. Tight them in accordance with "Bolt's torque moments table".

11. Reinstall the 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 reassembled, perform the "**Commissioning the system - phase 1** - Filling and pressurizing the system" procedure.

13. Perform the "**Annual maintenance 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

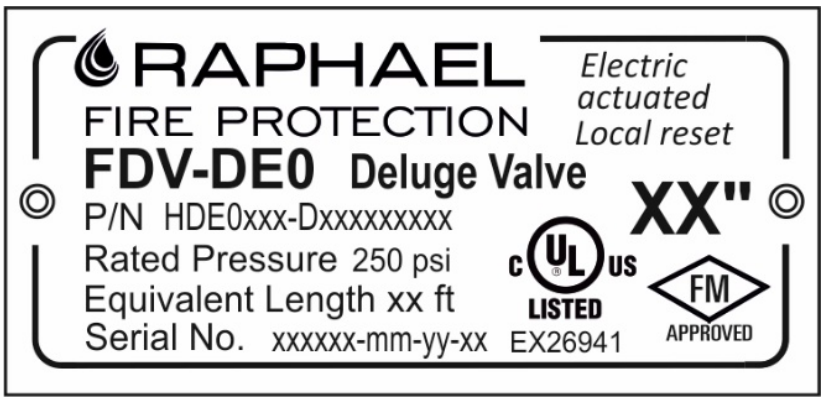
| **Valve size** | | 1.5" | 2" | 2.5" | 3" | 4" | 6" | 8" | 10" |
|---|---|---|---|---|---|---|---|---|---|
| **Equivalent length value** | ft | 11 | 24 | 25 | 28 | 31 | 46 | 72 | 117 |
| | m | 3.6 | 7.3 | 7.6 | 8.5 | 9.4 | 14 | 21.9 | 35.6 |

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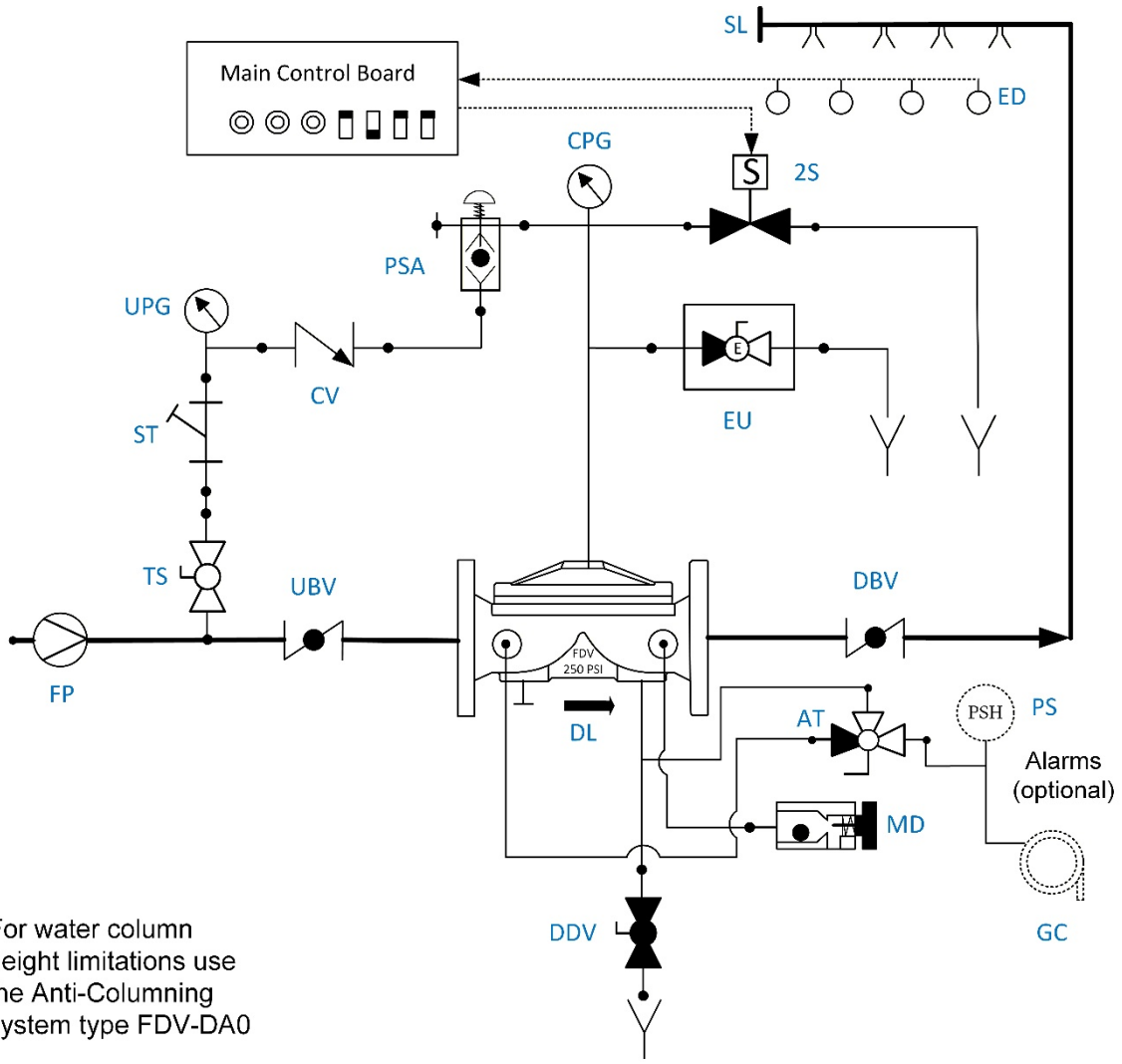
# MARKING

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-DE0** - 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 UL listing mark & QR code:* EXxxxxx
- *The Application’s* diameter in inch: XX”



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TS - Trim supply
ST - Strainer
AT - Alarm Test valve
GC - Gong connection
CV - Check Valve
PSA - Pressure Supply Arrestor
PS - Pressure Switch
DL - Deluge Valve
MD - MADV – Manual / Automtic Drain Valve
ED - Electrical detection

UBV - Upstream Butterfly Valve
DBV - Downstream Butterfly Valve
CPG - Control Chamber P. gauge
UPG - Upstream Pressure gauge
EU - Manual Emergency Valve
SL - Sprinkles Line
DDV - Downstream Drain Valve
FP - Fire Pump

Water lines
Electrical line

**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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