IOM FDV-DE1

ELECTRICALLY ACTUATED, REMOTE RESET, DELUGE VALVE

Installation Operation & Maintenance manual

Fire Protection

RAPHAEL VALVES INDUSTRIES

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Electrically Actuated, Remote Reset, 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-DE1 system remains unchanged. In a fire situation, an electrical detection system (heat or smoke detectors) trips the valve's control trim via the solenoid. Consequently, the pressurized water trapped in the FDV control chamber is drained, and the valve opens.



This system is suitable for water-spray pipelines equipped with open nozzles

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PARTS LIST

Electrically Actuated, Remote 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 p. gauge
8. Solenoid (2 way)
9. Orifice
10. EMU Emergency valve (2 way)
11. Upstream drain port (plugged)
12. Downstream drain valve
13. Water motor alarm port (plugged)

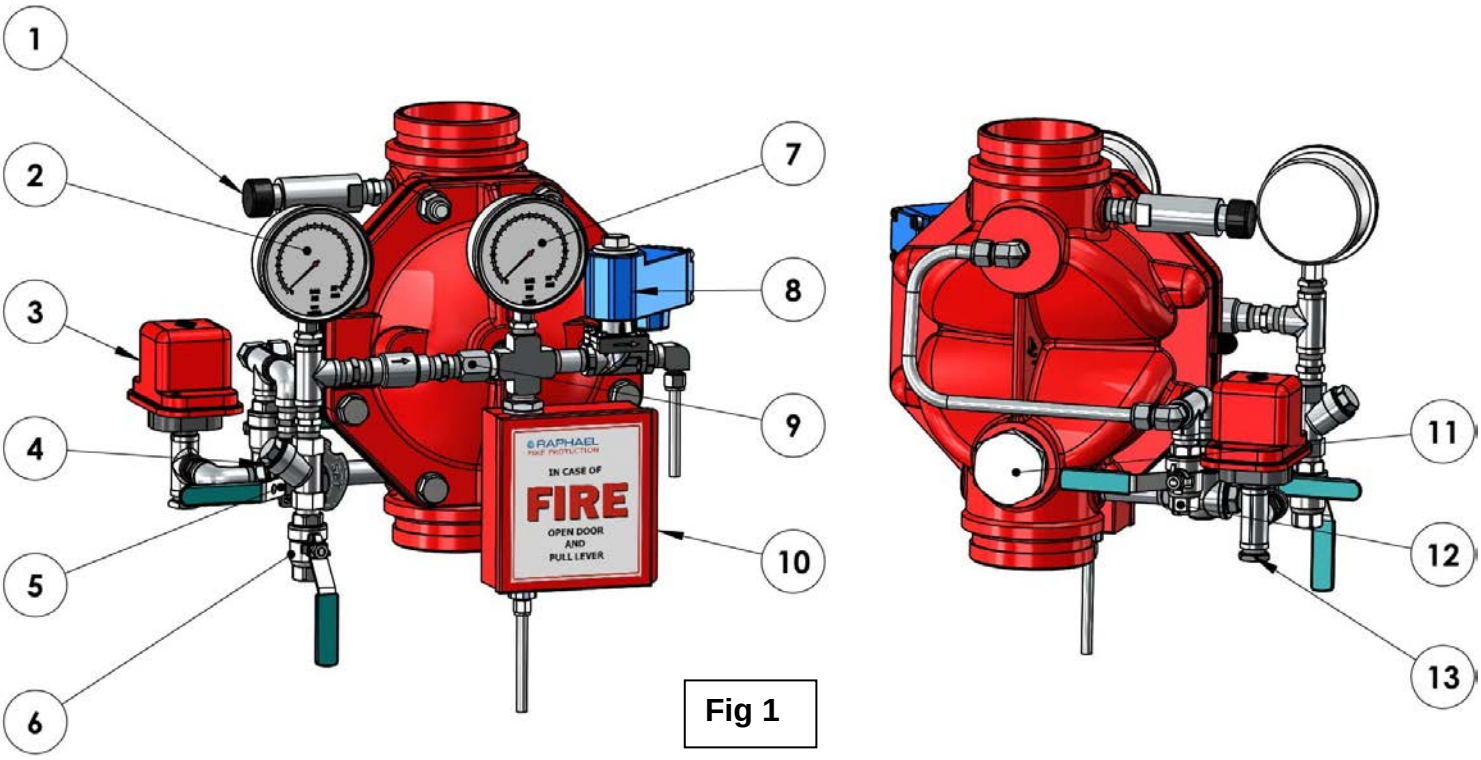


Fig 1

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OPERATION (Reference Figure 1)

SET position:

Water is supplied via the Trim supply valve (**6**), "Y" strainer (**5**), Check valve, flows through orifice (**9**) and fills the FDV's control chamber. Pressurized water in the valve's control chamber gets trapped by the check-valve, by the 2-way closed solenoid (**8**) and by the closed emergency unit - MEU (**10**), maintaining the deluge valve in its closed position.

FIRE situations:

When one or more of the electric smoke/heat sensors is tripped, it energizes the 2-way solenoid (**8**) through the control panel (**7** figure **2**). Getting tripped, this solenoid drains the FDV's Control chamber to the atmosphere. The solenoid drain flow overcomes the orifice (**9**) flow into the deluge control chamber and causes the FDV valve to open. The FDV deluge valve admits water into the open type of spray sprinklers pipeline/s.

Opening the EMU emergency valve (**10**), bypasses all terms, drains the FDV control chamber and opens the valve immediately.

RESET position:

When the solenoid (**8**) closes through the main control panel, upstream pressure flows through the orifice into the FDV valve's control chamber. When pressurized, the FDV deluge valve closes, and the sprinkler's water spray stops.

It is recommended to drain the sprinklers pipeline by opening the ball valve downstream drain valve.

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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 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 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 or vertical installation are marked with a prefix "H", e.g. HFDV-DE1.

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 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.
   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, Remote Reset, Deluge Valve

1. Trim supply valve (1/2” NPT female)
2. Y Strainer
3. 3-way alarm test valve
4. 2-way downstream drain valve (1/2” NPT female)
5. Pressure switch (optional. ½” NPT female connection) *
6. MADV – Manual Automatic Drain Valve
7. Main control box
8. Electric alarm detectors (heat or smoke sensors)
9. Downstream separation valve (butterfly or OSNY valves) **.
10. Solenoid valve (M20x1.5)
11. Upstream pressure gauge
12. MEU – Manuel Emergency Unit
13. Upstream separation valve (butterfly or OSNY valves) **.

* Optional

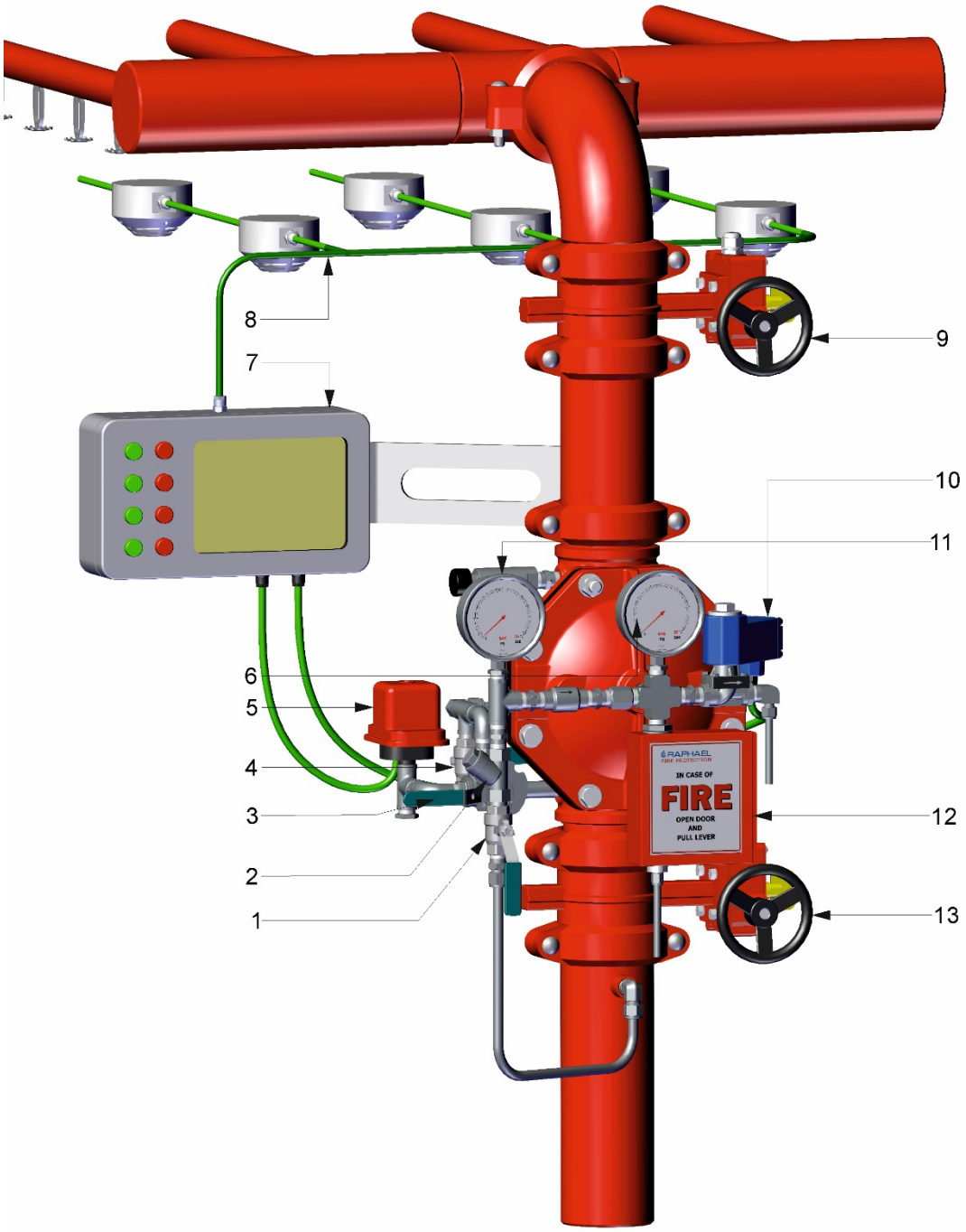
** Out of scope of supply

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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 butterfly valve (**13**) is fully closed.
2. Close the solenoid (**10**) through the control panel.
3. Make sure the trim pressure supply valve (**13**) is Closed.
4. EMU emergency valve (**12**) needs to be fully closed.
5. Make sure the FDV's downstream drain valve (**4**) is open and upstream drain port is plugged (or if equipped - upstream drain valve is close).
6. Open the trim pressure supply valve (**1**).
7. Gradually open the upstream butterfly valve (**13**) and make sure the downstream drain valve (**4**) is not dripping. A dripping might indicate an FDV valve sealing issue. (see Troubleshooting chapter in FDV's basic valves datasheet & IOM bulletin).
8. Close the Downstream drain valve (**4**).
9. Turn On the electric detection system through the control panel.

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

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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 (**9**) remains closed.

2. Open the downstream drain valve (**4**).

3. Energize to open the SOV (**10**) through the main control board (**7**). Observe the FDV control chamber drain through the SOV drain tube.

4. Assure that the Set/Test selection valve handle (**3**) points to the “Set”.

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

System is in 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 every periodic maintenance operational test - simulated or a real fire situation.

(Reference drawing - figure 2)

1. Deenergize the solenoid through the main control valve to close it.
   The FDV valve should close.

2. Close the upstream butterfly valve (**13**)

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

4. Clean the trim strainer (**2**). Reassemble the strainer screen.

5. Open the trim pressure supply valve.

6. Open the upstream butterfly valve. The FDV valve should remain closed.

7. Drain the spray pipeline though the FDV's downstream drain valve (**4**). At drainage end, close this valve.

The system is in SET state and placed in service.

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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 personnel 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 (**13** figure **2**) and the Trim pressure supply valve (1) are in fully open position.
   Downstream drain valve (**4**) and upstream drain valve (if equipped) are fully close.

3. Observe the FDV control chamber pressure gauge (**2**) and the upstream pressure gauge readings are the same and that the required supply water pressures are applied to the deluge Valve inlet and trim.

4. Push the MADV (MB) 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 (**3**) to TEST. The acoustic alarm should sound, and the alarm pressure switch (**5**) should transmit a signal to the main control board.

Annual test procedure

1. Conduct the monthly inspection procedure test & inspection.

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.

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

1. Close the upstream butterfly valve (**13**) and the trim pressure supply valve (**1**).

2. Open the drain valves (**4**) and the upstream drain valve if equipped. Drain the FDV's control chamber using the EMU Emergency valve (**12**).

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.

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

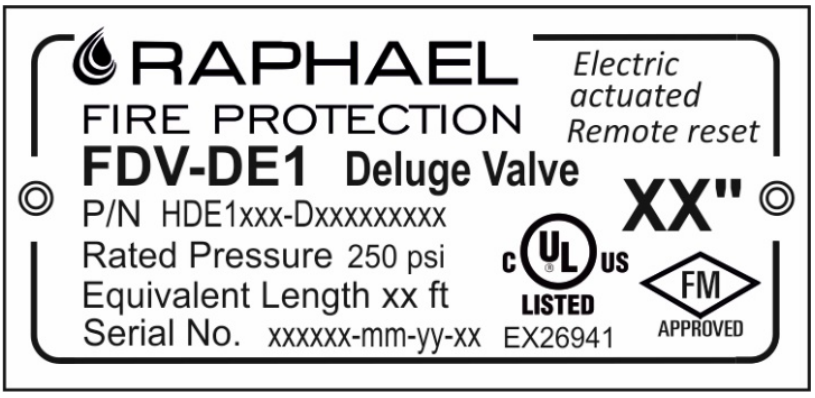
Valve size		1.5"	2"	2.5"	3"	4"	6"	8"	10"
Equivalent length value	ft	11	24	25	28	31	46	72	117
	m	3.6	7.3	7.6	8.5	9.4	14	21.9	35.6

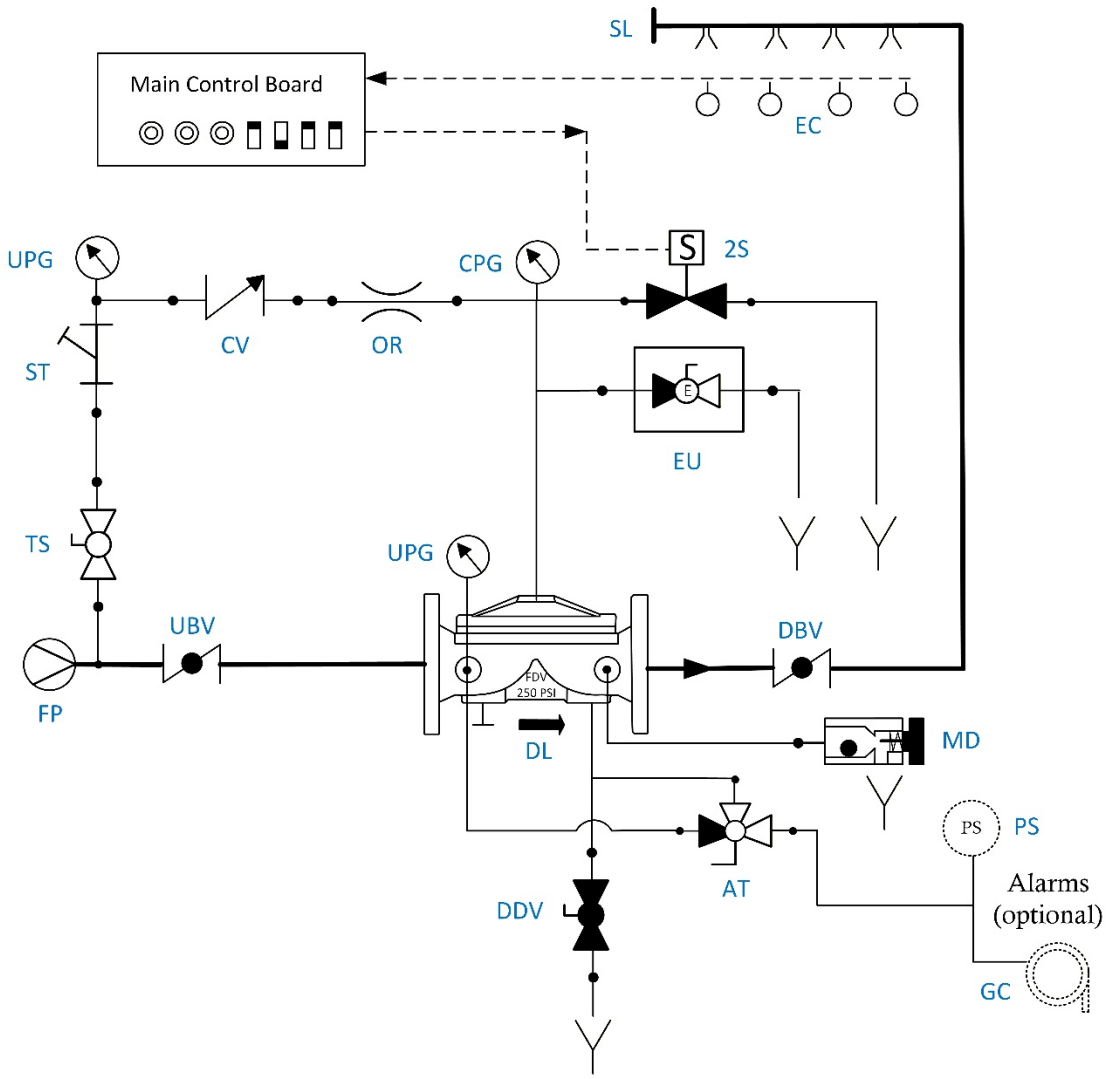
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MARKING

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-DE1*** *- Electric 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 Application’s* diameter in inch: XX”





TS -	Trim supply	UBV -	Upstream Butterfly Valve		Water lines
ST -	Strainer	DBV -	Downstream Butterfly Valve		
AT -	Alarm Test valve	CPG -	Control Chamber P. gauge	- - - - - -	Electrical line
GC -	Gong connection	UPG -	Upstream Pressure gauge		
CV -	Check Valve	S2 -	2-way Solenoid valve		
OR -	Orifice	EU -	Manual Emergency Valve		
PS -	Pressure Switch	SL -	Sprinkles Line		
DL -	Deluge Valve	DDV -	Downstream Drain Valve		
MD -	MADV – Manual / Automtic Drain Valve	FP -	Fire Pump		
ES -	Electric Sensors System	SL -	Sprinklers 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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RAPHAEL Valves Industries (1975) Ltd.

North Industrial Zone Or Akiva, 3063927 P.O.Box 555, Israel

Tel. +972 4 6263555 | info@raphael-valves.com | raphael-valves.com

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