IOM FDV-3W-AE1

3 WAY ELECTRICALLY ACTUATED, REMOTE RESET, ECONOMIC DELUGE VALVE

Installation Operation & Maintenance manual

Fire Protection

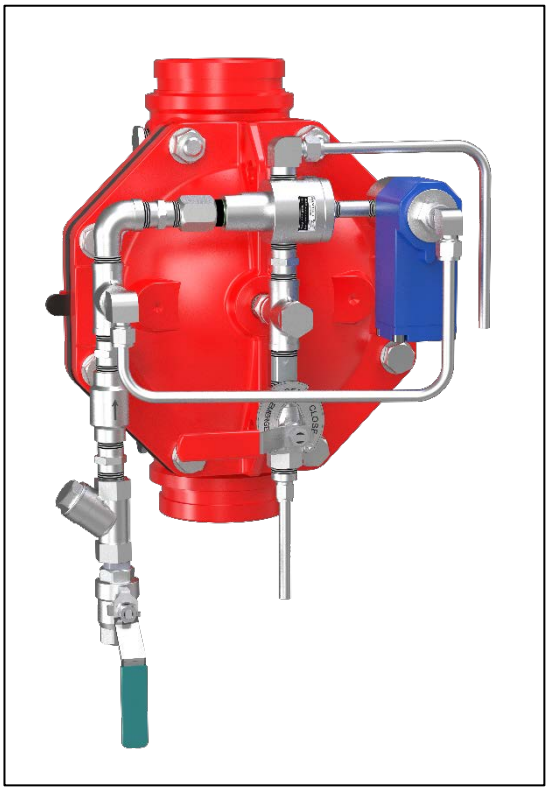
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IOM FDV-3W-AE1

3 Way Electrically Actuated, Remote Reset, Economic Deluge Valve

DESCRIPTION



This deluge system is based on Raphael's FDV valve, equipped with a three-way hydraulically actuated control trim. The valve and its trim are available in a range of optional materials and coatings to suit various operational and ambient conditions, but the system's functional principle remains unchanged: in a fire situation, an electric detection system (smoke or heat detection) trips the three-way solenoid valve that actuates the three-way actuator. Consequently, the actuator drains the pressurized control chamber, causing the valve to open. The three-way operation ensures full opening of the deluge valve, delivering maximum flow to the sprinkler pipeline.

The valve can be supplied with a flexible scope of special accessories (for seawater, brackish water, explosion-proof environments, etc.).

The system is suitable for water-spray pipelines with open nozzles.

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PARTS LIST

3 Way Electrically Actuated, Remote Reset, Economic Deluge Valve

1. FDV Deluge valve
2. Orifice
3. Check Valve
4. "Y" Strainer
5. Trim Pressure Supply Valve
6. 3-way hydraulic actuator valve
7. 3-way solenoid
8. Control chamber pressure gauge connection (1/4" NPT female, plugged)
9. Manual Emergency valve
10. Downstream side port (plugged, ½" NPT) for optional acc. List [1]
11. Downstream drain port (1/2" NPT) for optional acc. List [1]
12. Upstream drain port for optional acc. List [2]
13. Upstream side port (plugged, ½" NPT) for optional acc. List [2]

Lists of optional accessories for plugged ports:

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

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

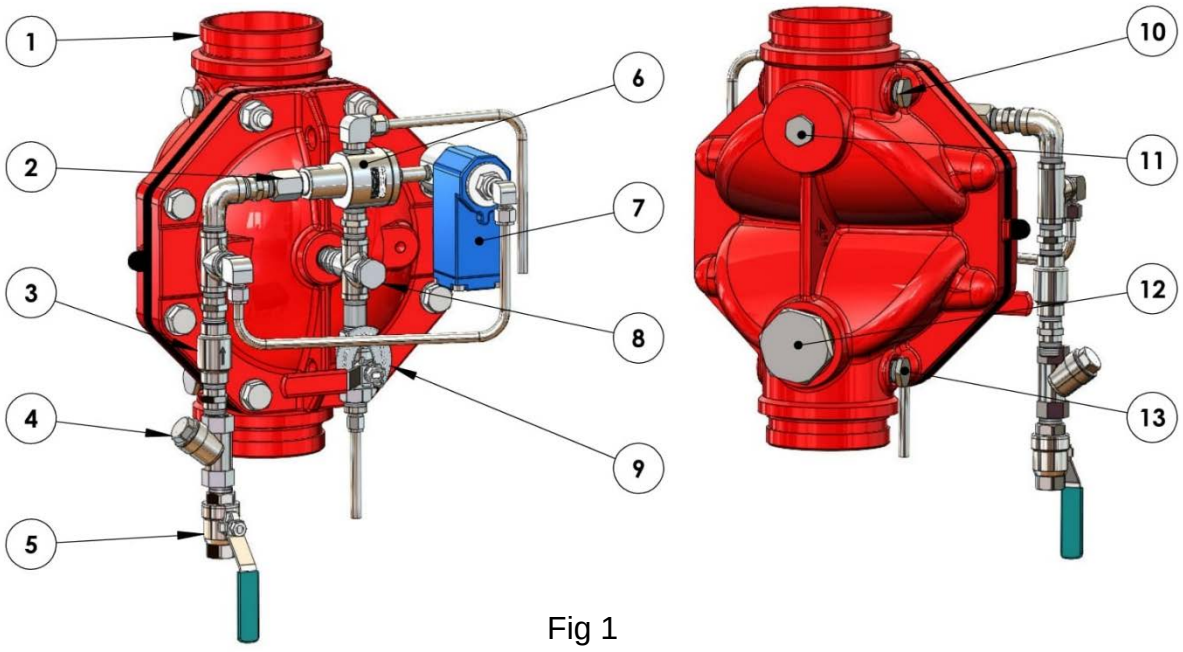


Fig 1

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OPERATION (Reference Figure 1)

SET position:

Water is supplied by the trim supply valve (**5**), through the "Y" strainer (**4**), check valve (**3**) through the HAV-3 actuator (**6**), and fills the FDV's control chamber. Pressurized water in the FDV valve's control chamber is trapped by the check-valve (**3**), and by the closed emergency valve (**9**), maintaining the deluge valve in closed position.

The free pass of upstream pressure through the closed SOV (**7**), keeps the HAV-3 actuator's control chamber pressurized and consequently, the actuator enables upstream to pressurize the control chamber of the deluge valve. Therefore, the deluge is drip-tight close.

FIRE situation

When one or more of the heat or smoke detectors is triggered, the main FP control board transmits an electric pulse (in case of latching SOV) or continues signal (regular SOV) to the solenoid's coil (**7**).

When energized, the open SOV drains the HAV-3 control chamber and shifts it to its OPEN state. Consequently, the FDV deluge valve's control chamber pressure is drained through the actuator's vented path and the opened deluge valve admits water into the sprinklers pipeline/s.

Opening the Emergency valve (**9**) bypasses all conditions, drains the FDV valve's control chamber and opens the valve immediately.

Reset Position

Resetting this system requires stopping the alarm at the main control FP board and interrupting the electrical signal to the SOV coil (or transmitting another pulse to a SOV's latching coil). The closed SOV pressurizes the HAV-3 actuator's control chamber and moves to its the CLOSE state. Consequently, the FDV deluge valve's control chamber is pressurized and the deluge valve closes. The nozzles spray stops, and the system moved into the SET position.

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 basis, during periodical tests procedures and when operating in a fire situation. Therefore, a drainage plan should be considered.
5. The system described can be mounted vertically or horizontally.

6. The downstream pipe connected to the FDV valve at a horizontal or vertical 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**:

   * (**10**) – Pressure switch connection port (all ½" NPT female)
   * (**10**) – Water motor alarm connection
   * (**10**) – MADV manual automatic drain valve
   * (**10 & 13**) – 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)

3 Way Electrically Actuated, Remote Reset, Economic Deluge Valve

1. Trim supply valve (1/2” NPT female)
2. “Y” Strainer
3. Check Valve
4. HAV-3 3-way hydraulic actuator
5. Main Control hub
6. Electrical heat sensor
7. Downstream separation valve (butterfly or OS&Y valves).
8. 3-way Solenoid valve
9. Control chamber pressure gauge connection (1/4” NPT female)
10. Manual Emergency valve
11. Upstream separation valve (butterfly or OS&Y valves).

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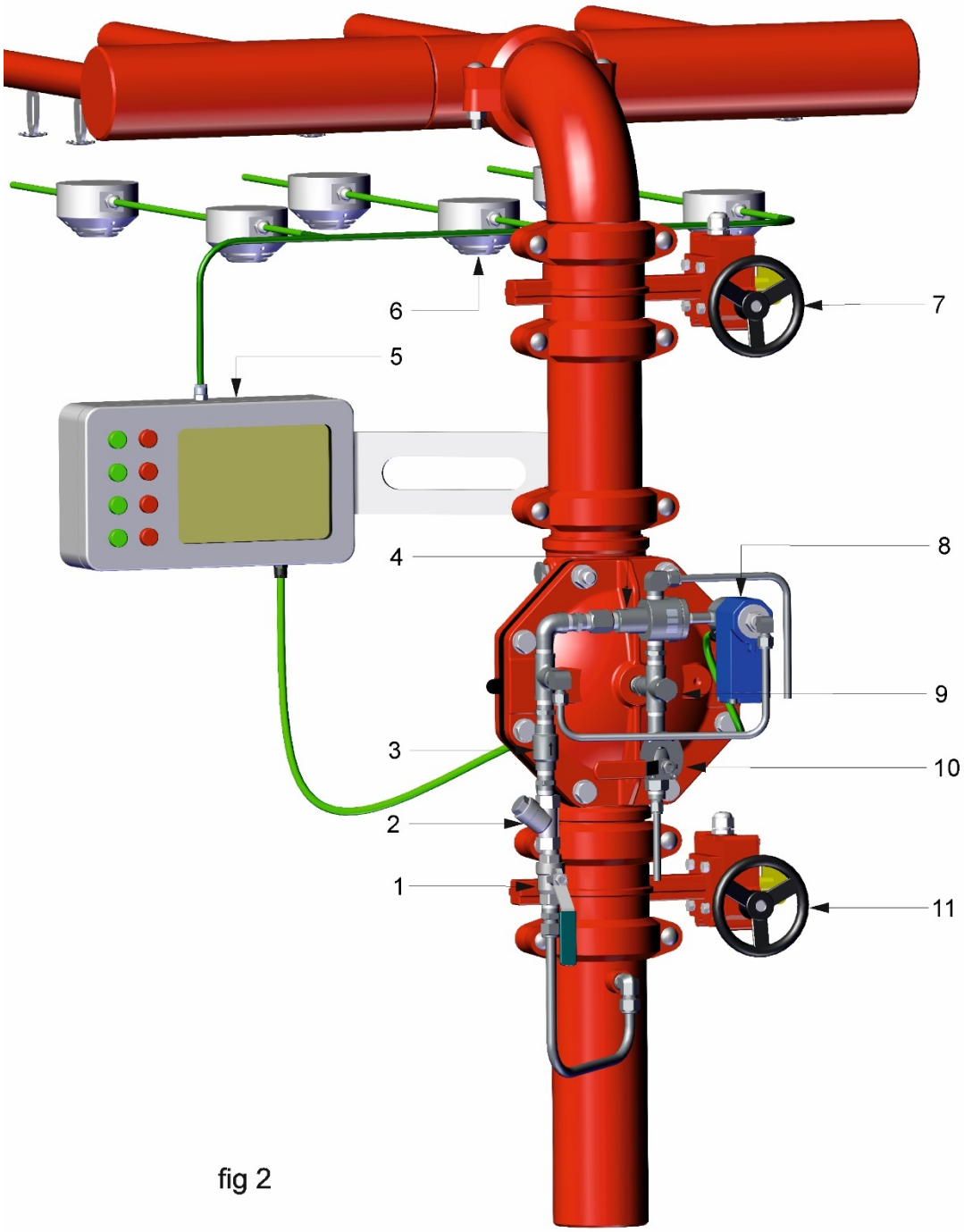


fig 2

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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 (**11**) is fully close.
2. Make sure the trim pressure supply ball valve (**1**) is Closed.
3. Make sure that the Emergency valve (**10**) is fully closed.
4. Make sure SOV (**8**) coil is de-energized.
5. unplug the downstream drain port (**11 fig 1**)
6. Open the trim pressure supply valve (**1**).
7. Gradually open the upstream butterfly valve (**11**) and make sure the downstream drain port is not dripping. A dripping might indicate a FDV valve sealing issue.
8. leave the Downstream drain port (**11 fig 1**) open.

The system is ready for 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. Close the downstream butterfly valve (**7**) and make sure that the FDV's downstream drain port (**11 fig 1**) is open.

2. Initiate a false alarm at the main FP control board (**5**) and energize the SOV coil.

3. Observe the FDV's control chamber drain through the drain tube located behind the control chamber pressure gauge (3/8" tube open to the atmosphere). The flow should stop after a few tens of seconds.

4. Observe the water flow through the open FDV's downstream drain port (**11 fig 1**). A significant flow should flow out the open valve.

The system is ready for re-setting and 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, replace all blown-open sprinklers before pressurizing the pilot line.

1. Turn off the false alarm at the main FP control board. The SOV coil should become de-energized (or receive another electric pulse, in case of latching solenoid). The FDV valve should close.

2. Close the upstream butterfly valve (**11**)

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

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

5. Open the trim pressure supply valve.

6. Open the upstream separation butterfly valve (**11**). The FDV valve should remain closed.

7. Drain the spray pipeline out of the open downstream drain port. At drainage end, reinstall the ½" NPT plug.

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

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 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 (**7** & **11**) and the Trim pressure supply valve (**1**) are in fully open position.

3. unplug the downstream drain port (**11 fig 1**). Make sure there is no leakage or dripping. When done, screw in the ½" NPT plug.

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 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. unscrew both upstream and downstream drain port plugs and drain the deluge valve. Drain the FDV's control chamber using the Emergency valve (**10**).
3. Turn off or disconnect all relevant electrical components and wiring.
4. Release all relevant tubes, fitting nuts at valves cover center.
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.**

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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

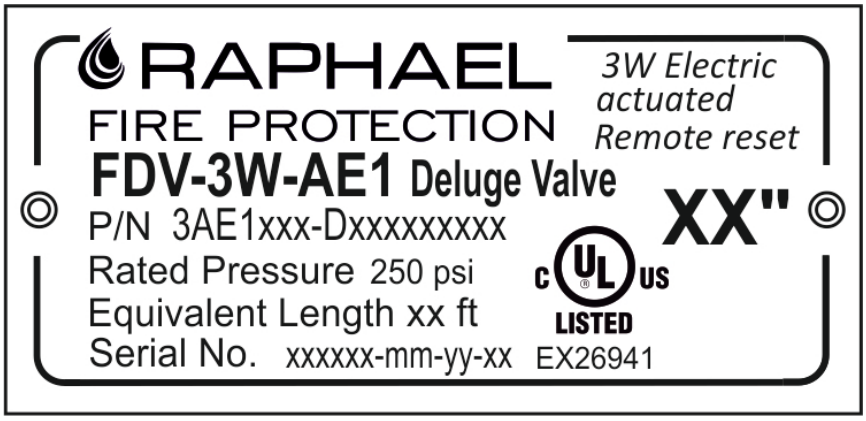
Valve size	1.5"	2"	2.5"	3"	4"	6"	8"	10"
Equivalent length value ft (m)	11 (3.6)	24 (7.3)	25 (7.6)	28 (8.5)	31 (9.4)	46 (14)	72 (21.9)	117 (35.6)

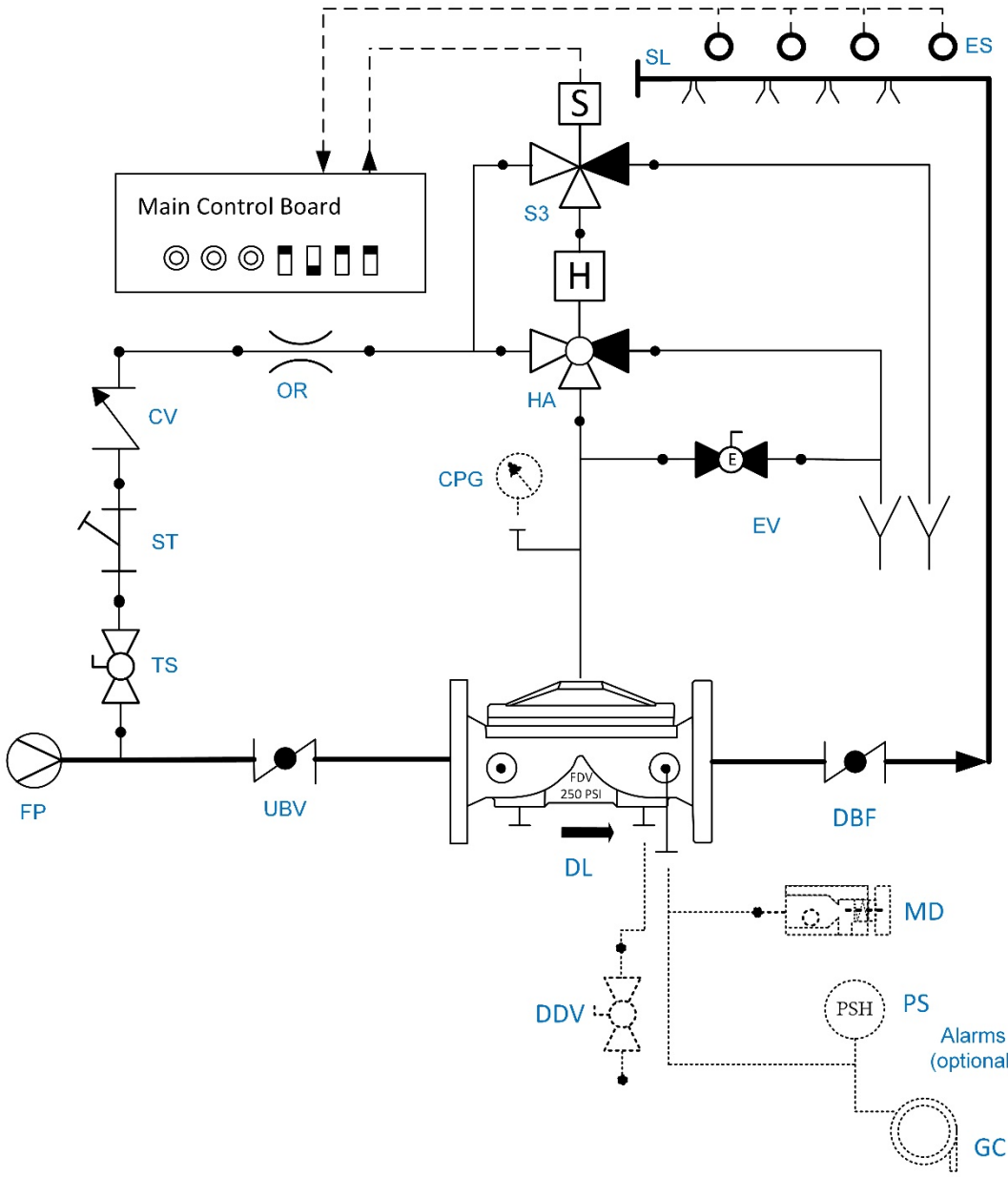
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MARKING

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-3W-AE1**, 3-way 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	FP -	Fire Pump		Water lines
ST -	Strainer	SL -	Sprinkles Line		Electrical line
HA -	HAV-3 3-way hydraulic actuator				Optional
CV -	Check Valve				
OR -	Orifice				
DL -	Deluge Valve				
EV -	Manual Emergency Valve	**Optional**			
S3 -	3-way Solenoid valve	CPG -	Control Chamber P. gauge		
ES -	Electric Sensors System	GC -	Gong connection		
UBV -	Upstream Butterfly Valve	PS -	Pressure Switch		
DBV -	Downstream Butterfly Valve	MD -	MADV – Manual / Automtic Drain Valve		

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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