Electro-Pneumatically Actuated, Remote Reset, Economic Deluge Valve

FDV-AC1

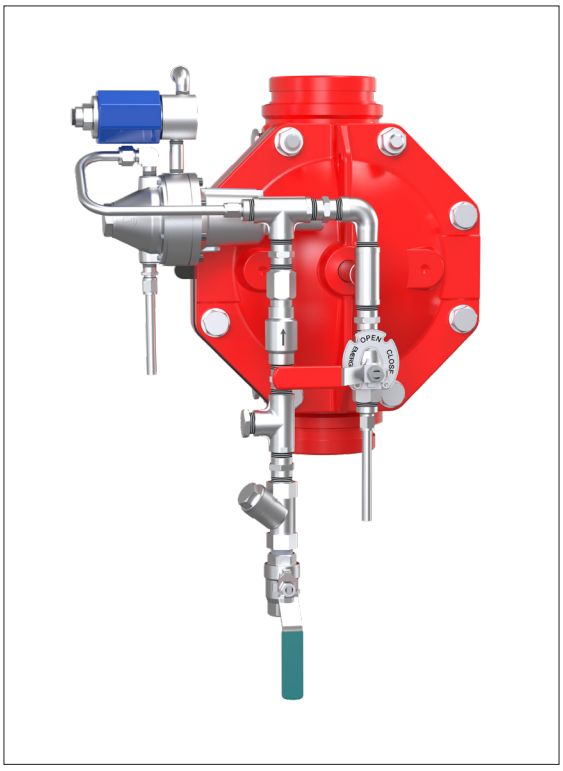
The FDV-AC1 fire protection system is based on Raphael's FDV deluge valve and is equipped with both pneumatically and electrically actuated control trim. The installed FDV valve is available in a variety of optional materials and coatings, making it suitable for installations in hazardous environments.

The FDV-AC1 deluge system is pneumatically actuated and supports remote resetting.

In the event of a fire, when the pneumatic dry pilot detection line is exposed to heat from flames, one or more of its automatic fire sprinklers shatter, venting air pressure from both the dry pilot line and the pneumatic actuator. This pressure drop activates the pneumatic actuator, causing the deluge valve to open.

Alternatively, if an electrical detection sensor signals the main control board, it activates a solenoid valve, which vents the dry pilot line, activates the pneumatic actuator, and opens the deluge valve.

The system includes an emergency valve that allows manual activation by bypassing both the fire detection systems and the solenoid valve. It is compatible with automatic sprinklers on the dry pilot line and open nozzles on the main spray pipelines.



MARKETS

Commercial · Industry · P.O.G. · Storage · Residential · Airport

TECHNICAL DATA

FLUID:
Water, Brackish water, Sea water, Foam

PNEUMATICS: Air, Nitrogen

SIZE RANGE:
40mm to 250mm (1½'' to 10")

AVAILABLE CONNECTIONS ENDS:
Flange*Flange, Groove*Groove, Flange*Groove, Groove*Flange, Thread*Thread

PRESSURE NOMINAL:
250 psi (17.2 bar)

MIN. PNEUMATIC PRESSURE:
29 psi (2 bar)

APPROVALS

ADVANTAGES

- Only three parts: body, diaphragm, and cover plate - with no wet metal spring inside the control chamber.
- Full-bore, unobstructed design.
- Simple valve reset to standby position without draining or opening the valve, and without closing the OS&Y or other system valves.
- Fail-safe open valve, maintained in a normally closed standby position.
- Low maintenance cost: the valve is serviced in-line, with only one replaceable part — the long-life elastomeric diaphragm.
- Conforms to the inspection, testing, and maintenance requirements of water-based fire protection systems (NFPA 25).

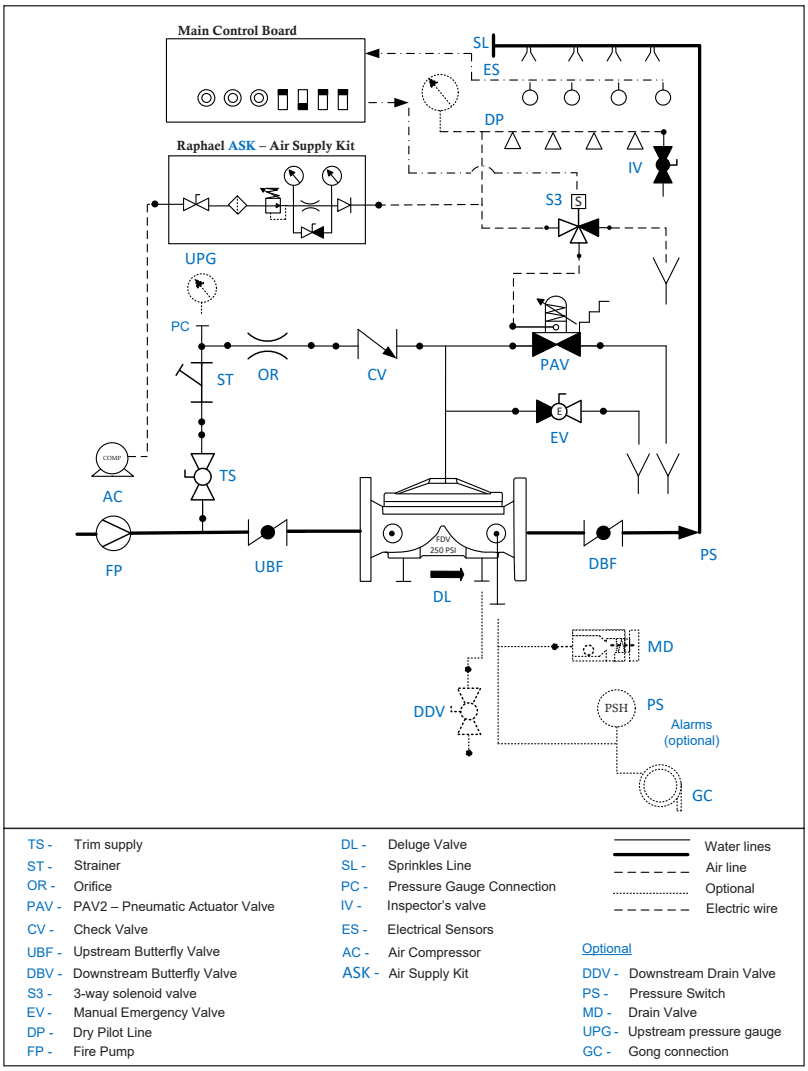
CHARACTERISTICS

- Hydro-dynamic pattern design ensures high flow rates with minimal head loss.
- The valve trips open automatically upon the gradual release of water pressure from its control chamber. The trip is actuated either by an electric signal sent to the valve's solenoid or by a pneumatic pressure drop in the dry pilot line caused by one or more open sprinklers.
- Soft closing, upon pressurization of the valve's control chamber by line pressure or an independent water source, prevents surges.

The FDV-AC1 resets to its standby closed position either by de-energizing the alarm system solenoid coil through the main control panel or by re-pressurizing the dry pilot line.

Schematic drawing:

Set position



TS -	Trim supply	DL -	Deluge Valve		Water lines
ST -	Strainer	SL -	Sprinkles Line		Air line
OR -	Orifice	PC -	Pressure Gauge Connection		Optional
PAV -	PAV2 – Pneumatic Actuator Valve	IV -	Inspector's valve		Electric wire
CV -	Check Valve	ES -	Electrical Sensors		
UBF -	Upstream Butterfly Valve	AC -	Air Compressor	Optional	
DBV -	Downstream Butterfly Valve	ASK -	Air Supply Kit	DDV -	Downstream Drain Valve
S3 -	3-way solenoid valve			PS -	Pressure Switch
EV -	Manual Emergency Valve			MD -	Drain Valve
DP -	Dry Pilot Line			UPG -	Upstream pressure gauge
FP -	Fire Pump			GC -	Gong connection

OPERATION

SET position

Pressurized water in the valve's control chamber is trapped by the check valve (CV), the closed pneumatic 2-way actuator (PAV), and the closed emergency valve (EV). Air pressure accumulated in the Dry Pilot detection line (DP) is conveyed to the actuator through the 3-way solenoid valve (S3), thereby keeping the Deluge valve (DL) closed.

FIRE situation

When some of the Dry Pilot detection line's (DP) automatic sprinklers are exposed to the heat of flames and shatter open, the pilot line depressurizes, releasing the actuator (PAV). Alternatively, an electric detection system senses the heat and triggers the main control board, which energizes the 3-way solenoid valve (S3). The solenoid valve bypasses the Dry Pilot detection line, depressurizes the actuator (PAV) control chamber, and opens it. The open actuator drains the FDV-DC1 control chamber, causing the Deluge valve (DL) to open.

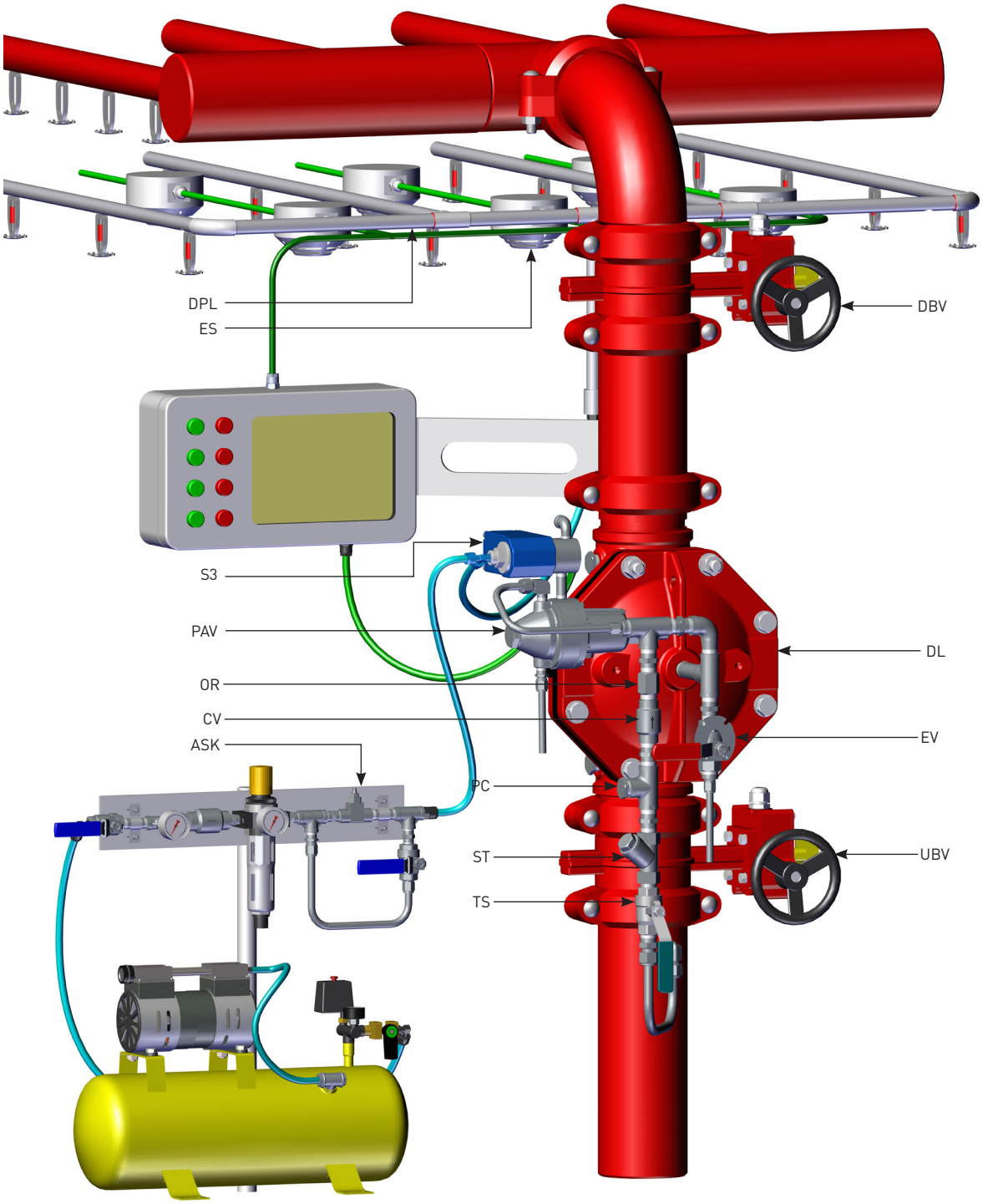
RESET position

The upstream butterfly valve must be closed. Resetting the system requires replacing all shattered fire sprinklers in the detection pilot line (DP). Alternatively, the electrical alarm system must be reset and the solenoid de-energized. After the Dry Pilot line is re-pressurized, thereby closing the pneumatic actuator, the upstream butterfly valve must be reopened. The Deluge control chamber is then pressurized by the constant upstream pressure, and the Deluge valve (DL) closes.

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FDV - AC1

Typical installation



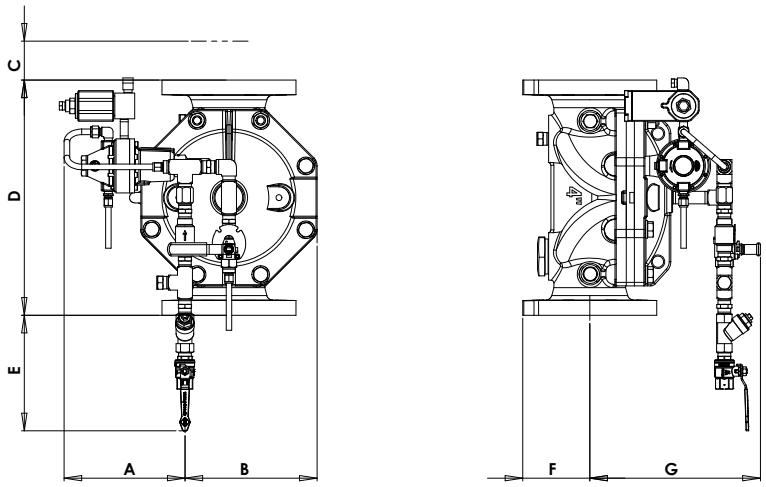
S3 - Solenoid 3 way
DL - FDV Deluge valve
TS - Trim supply valve
ST - Strainer
CV - Check valve

PA - PAV - Pneumatic Actuator
PC - Pressure gauge Connection
OR - Orifice
DBV - Downstream Butterfly Valve
UBV - Upstream Butterfly Valve

EV - Emergence Valve
ASK - Air Supply Unit
DPL – Dry Pilot Line
ES - Electric Sensors

Parametric drawing:

FDV-AC1



Dimensions Table

Size	1½"		2"		3"		4"		6"		8"		10"	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
A	200	7.8	200	7.8	232	9.1	280	11	253	9.9	306	12	324	12.7
B	62	2.4	62	2.4	116	4.6	150	5.9	177	6.7	231	9	308	12.1
C	94	3.7	140	5.5	70	2.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
D	220	8.6	220	8.6	324	12.7	400	15.7	464	18.2	570	22.4	766	30.1
E	295	10.1	285	11.2	243	9.6	196	7.7	164	6.5	110	4.3	N/A	N/A
F	51	2	58	2.2	100	3.9	114	4.5	141	5.5	172	6.7	203	8
G	223	8.8	245	9.6	252	9.9	292	11.5	360	1.4	394	15.5	484	97.8
Kg/lb	10	22	11.8	26	29.	64	44.8	98.7	56	123	101	222	230	507

Factory Standard

MAIN VALVE

BODY & COVER

- Ductile iron
- Cast Steel WCB
- Stainless Steel CF8
- Stainless Steel CF8M
- Nickel Aluminum Bronze

ELASTOMERS:

- NBR, 3-layered reinforced Natural Rubber
- EPDM, 3-layered reinforced

COATING:

- Base layer – high built Epoxy FBE
  Top layer – electrostatic Polyester powder RAL 3000
- Rilsan Polyamide based (Nylon 11)
- Internal – vitreous Enamel
  External – Epoxy/Polyester powder RAL 3000

TRIM

PIPING & TUBING:

- Stainless Steel 316
- Copper/Brass
- Cupro-Nickel
- Monel®

FITTINGS:

- Stainless Steel 316
- Brass
- Super Duplex
- Cupro-Nickel
- Monel®

ACCESSORIES:

- Brass Nickel plated
- Nickel Aluminum Bronze
- Stainless steel CF8M
- Monel®
- Cupro-Nickel

PLEASE SPECIFY

- Working Media
- Ambiental conditions
- Min/Max operating flow
- Min/Max operating pressure
- Pneumatic working pressure
- System installation orientation
- Deluge valve ends and standard
- Deluge valve material and coating
- Solenoid Voltage
- Solenoid Protection
- Trim materials
- Additional accessories needed:
  - Pressure gauge
  - Pressure switch
  - Drain valve (manual or automatic)
  - Gong

For more detailed technical information, please refer to chapter Engineering Data.

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