Model FSX-A Deluge Valve

For Preaction Systems

Product
Preaction valve sets are used for water/foam systems with automatic sprinklers. The are design to open only after the operation of the detection device only.

They can be activated by hydraulic, electrical or manual means.

After activation, an acoustic alarm is set off by hydraulically operated water alarm gong or an electric alarm is transmitted by pressure switch.

An additional alarm can be transferred to a permanently manned local.

Application
- Protection of machinery
- Industrial presses
- Transformer stations
- Tank system cooling
- Cable ducts
- Recycling systems
- Painting systems
- Theatre stages
- Petrochemical facilities
- Power plants
- Gas storage tanks
- Flammable materials storage
- Computer / server rooms
- Museums
- Archives
- Libraries
- Refrigerated spaces
- Data Centre

Features & Benefits
- Light weight
- Compact space saving design
- Corrosion resistant internal parts
- Max operating pressure 17.2bar / 250psi
- Low pressure loss
- No water hammer
- Ideal for high flow rates
- Field replaceable diaphragm and seal
- Factory functional and pressured tested
- Approvals

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Valve Technical Specifications

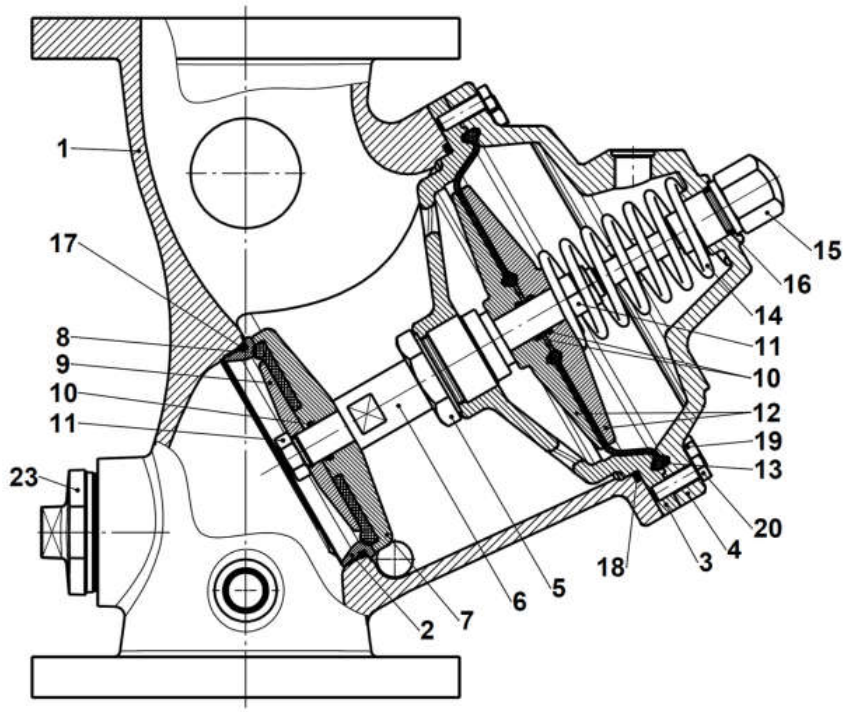
Valve Type	Hydraulically operated quick opening differential type
Nominal Diameter	2" / DN50 , 3" / DN80 , 4" / DN100 , 6" / DN150 , 8" / DN200
Flange Connection	ANSI B16.5 Class 150 / DIN ISO in accordance with DIN EN 1092
Grooved Connction	Metric, AWWA C606 Standard
Installation Position	Vertical
Medium	Fresh Water / Foam Water Mixture
Operating Temperature	4°C / 39°F - 60°C / 140°F
Alarm	Alarm pressure switch with changeover contact 1 normally open contact, 1 normally closed contact; see chapter 4.8.1 & 4.8.2
Automatic Drain Valve	K2 - K20
Actuating	Electric 24 VDC 2/2-way solenoid valve / hydraulic (sprinkler) activation / manually operated
Valve Approvals	*FM, cULus Listed

* Applicable to valve only

Valve Part Numbers

Valve Size	End Connection Type		Weight (Kg)
	Flange x Flange - B16.5 Class 150	Groove x Groove - Metric, AWWA C606 Standard	
2" / DN50	VKD050UL ANSI	VKD050UL GG	15.1
3" / DN80	VKD080UL ANSI	VKD080UL GG	23.0
4" / DN100	VKD100UL ANSI	VKD100ULGG	34.6
6" / DN150	VKD150UL ANSI	VKD150UL GG	60.7
6” / 165.0mm	-	VKD150-165ULI GG	60.7
8" / DN200	VKD200UL ANSI	VKD200UL GG	132.4

FSX-A Valve Parts



1. Housing
2. Valve seat
3. Guide bearing
4. Cover
5. Guide bush
6. Valve rod
7. Valve disc
8. Gasket
9. Holding disc
10. O-ring
11. Hexagon Nut
12. Supporting Disc
13. Diaphragm
14. Pressure spring
15. Guide plug
16. O-ring
17. O-ring
18. O-ring
19. Hexagon bolt
20. Hexagon bolt
21. Nameplate*
22. Grooved drive stud*
23. Threaded plug

* Not visible on illustration

Material Specifications

Valve Body	Ductile Iron
Valve Seat	Brass
Piston Rod	Stainless Steel
Valve Disc	Brass
Diaphragm	NBR fire reinforced
Gaskets NBR	4°C / 39°F - 60°C / 140°F
Finish	RAL 300 Primer & Clear Coat

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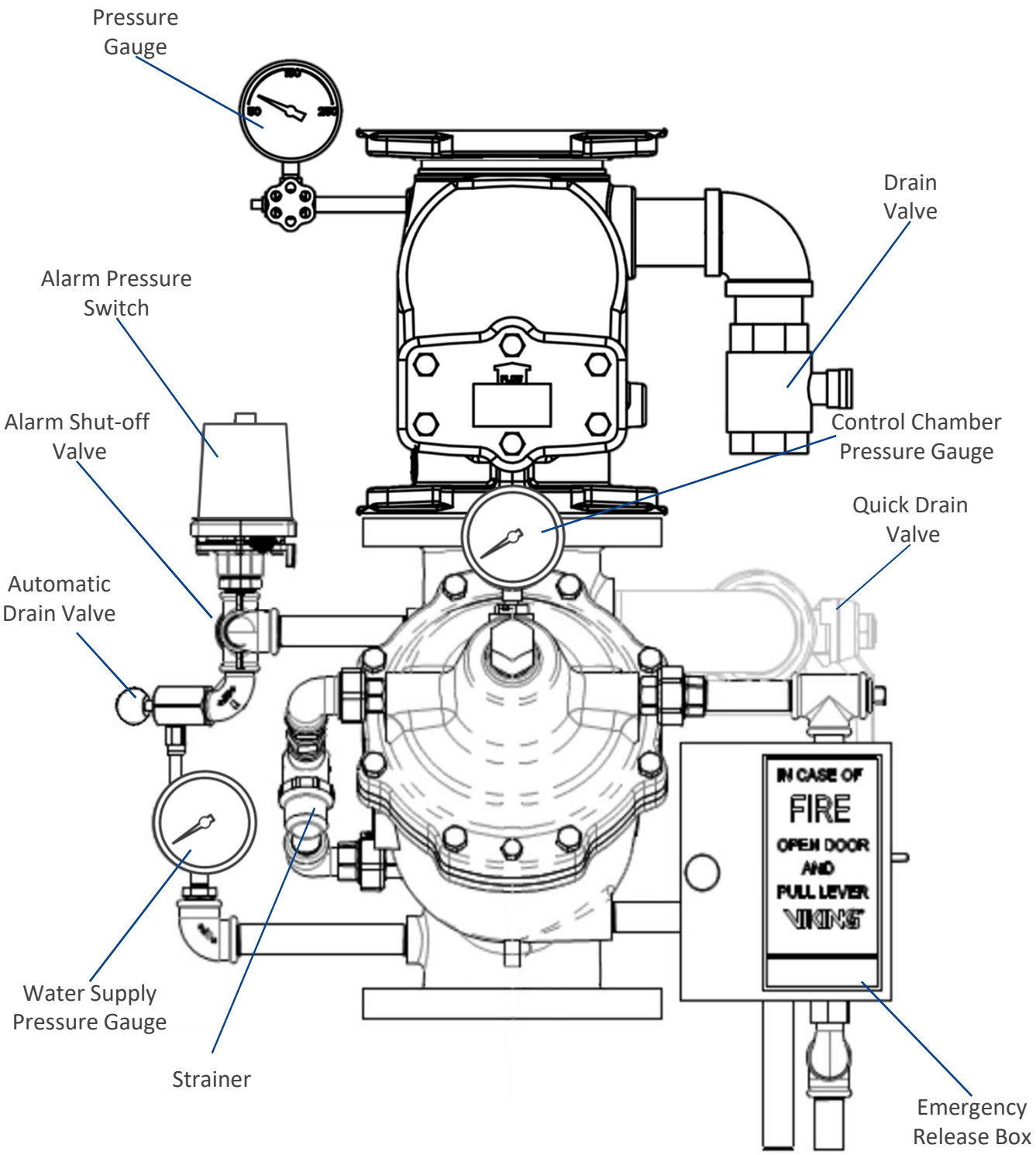
Valve Assembly Components – Preaction (UL)



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Ordering Information

	Part Number	Description	Electric Single Interlock & Electric/Electric Double Interlock & Pneu-Electric Double Interlock*(1)				
			2" DN50	3" DN80	4" DN100	6" DN150	8" DN200
		PREACTION VALVE (CHOOSE FLANGE OR GROOVED TYPE)					
Flange Connection	VKD080ULANSI	3" Deluge Valve Model FSX-A ANSI B16.5 Class 150 UL/FM		X			
	VKD100ULANSI	4" Deluge Valve Model FSX-A ANSI B16.5 Class 150 UL/FM			X		
	VKD150ULANSI	6" Deluge Valve Model FSX-A ANSI B16.5 Class 150 UL/FM				X	
	VKD200ULANSI	8" Deluge Valve Model FSX-A ANSI B16.5 Class 150 UL/FM					X
		OR					
Grooved Connection	VKD050GG060MM	2" Deluge Valve Model FSX-A Grooved 60mm UL/FM	X				
	VKD080GG089MM	3" Deluge Valve Model FSX-A Grooved" 89mm UL/FM		X			
	VKD100GG114MM	4" Deluge Valve Model FSX-A Grooved 114mm UL/FM			X		
	VKD150GG165MM OR VKD150GG168MM	6" Deluge Valve Model FSX-A Grooved 165mm UL/FM OR 6" Deluge Valve Model FSX-A Grooved 168mm UL/FM				X	
	VKD200GG219MM	8" Deluge Valve Model FSX-A Grooved 219mm UL/FM					X
		TRIM ASSEMBLY					
Hydraulic Actuation Trim	VKT050UL	2" Hydraulic Actuation Trim inclusive of PORV, Fast Drainage Set, Alarm test Set, Emergency Manual Release, Pressure Gauges	X				
	VKT080UL	3" Hydraulic Actuation Trim inclusive of PORV, Fast Drainage Set, Alarm test Set, Emergency Manual Release, Pressure Gauges		X			
	VKT100UL	4" Hydraulic Actuation Trim inclusive of PORV, Fast Drainage Set, Alarm test Set, Emergency Manual Release, Pressure Gauges			X		
	VKT150UL	6" Hydraulic Actuation Trim inclusive of PORV, Fast Drainage Set, Alarm test Set, Emergency Manual Release, Pressure Gauges				X	
	VKT200UL	8" Hydraulic Actuation Trim inclusive of PORV, Fast Drainage Set, Alarm test Set, Emergency Manual Release, Pressure Gauges					X
Electric Actuation Trim	VKSV050TA	2" Electrical Actuation Trim Set without Solenoid Valve	X				
	VKSV080TA	3" Electrical Actuation Trim Set without Solenoid Valve		X			
	VKSV100TA	4" Electrical Actuation Trim Set without Solenoid Valve			X		
	VKSV150TA	6" Electrical Actuation Trim Set without Solenoid Valve				X	
	VKSV200TA	8" Electrical Actuation Trim Set without Solenoid Valve					X
		TEST CONNECTION					
	VKTCS050	2" Test Connection Set	X				
	VKTCS080	3" Test Connection Set		X			
	VKTCS100-200	4", 6", 8" Test Connection Set			X	X	X
		CHECK VALVE (CHOOSE FLANGE OR GROOVED TYPE ACCORDING TO DELUGE VALVE)					
Flange Connection	08505C	3" Check Valve F-1 Flg UL/FM		X			
	08508C	4" Check Valve F-1 Flg UL/FM			X		
	08511C	6" Check Valve F-1 Flg UL/FM				X	
	14023C	8" Check Valve F-1 Flg UL/FM					X
		OR					
Grooved Connection	11059	2" Check Valve F-1 Grv 60mmUL/FM	X				
	08507C	3" Check Valve F-1 Grv 89mmUL/FM		X			
	08510C	4"Check Valve F-1 Grv 114mm UL/FM			X		
	12356C OR 08513C	6" Check Valve F-1 Grv 165mm UL/FM OR 6" Check Valve F-1 Grv 168mm UL/FM				X	
	08516C	8" Check Valve F-1 Grv 219mm UL/FM					X
		PREACTION TRIM ASSEMBLY					
	12960	2" Preaction System Trim Package	X				
	13776	3" Preaction System Trim Package		X			
	13777	4", 6", 8" Preaction System Trim Package			X	X	X
		OTHERS					
	1340101	PS101A Alarm Pressure Switch, UL/FM	X	X	X	X	X
	1340401 OR 1340402	PS401A Low Air Pressure Switch (single contact), UL/FM# OR PS402A Low Air Pressure Switch (dual contact), UL/FM	X	X	X	X	X
	912434	Solenoid Valve NC 24V including Plug	X	X	X	X	X
	07862	Water Motor Alarm Gong	X	X	X	X	X
		AIR MAINTENANCE DEVICE (CHOOSE 1 ONLY)					
	07459	VIKING Model D-2 Air Maintenance Device					
	AMD-1	GENERAL AIR Model AMD-1 Air Maintenance Device					
	AMD-2	GENERAL AIR Model AMD-2 Air Maintenance Device@					
		COMPRESSOR					
		Refer to the air compressor datasheets					
		SPARE PARTS					
	VKATS050-200	2", 3", 4", 6", 8" Alarm Test Set					
	16970	Pressure Operated Relief Valve (PORV) D3					
	01553C	Emergency Manual Release Box Model C1					
	911692	Pressure Gauge 300PSI-1 / 4BSP- Type 711					

* Single Electric, Double Electric & Double Pneu-Electric Interlocks to achieve by the programming of the Fire Extingusihing Panel.

For dual contact requirements, please use PS402A

@ For compressor or tank without an integrated pressure switch

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Preaction System – electric, hydraulic and PORV actuation (UL)

Description

Viking FSX-A Preaction Systems utilizes a Viking deluge valve, pneumatic supervision of the automatic sprinkler system, and an electric detection system. The deluge valve release trim utilizes a normally closed electric solenoid valve controlled by an approved release control panel with two initiating circuits configured for “cross-zoned” operation. One initiating circuit is connected to the electric detection system; the other to a “low-air” supervisory switch.

BOTH the electric detection system must activate AND supervisory air pressure must be relieved from the sprinkler system before the deluge valve will open to fill the sprinkler system with water. If the electric detection system (alone) operates, an alarm will activate but the deluge valve will NOT open. If the sprinkler piping is damaged or a sprinkler is broken or fused, but the detection system has not activated, an alarm will activate, but the deluge valve will NOT open.

In fire conditions, after both the detection system and a sprinkler operate, the deluge valve opens, allowing water to enter the system. Preaction Systems are commonly used as refrigerated area systems. They are also commonly used where flooding of the sprinkler system piping can have serious consequences and where it is important to control accidental water discharge due to damaged sprinkler piping

System Operation

A. In the Set Condition

System water supply pressure enters the priming chamber of the deluge valve through the priming line, which includes a strainer, restricted orifice, and check valve. In the SET condition, water supply pressure is trapped in the priming chamber by the check valve and normally closed solenoid valve. The water supply pressure trapped in the priming chamber holds the deluge valve clapper closed, keeping the outlet chamber and system piping dry.

B. In Fire Conditions

In a fire condition, operation of the detection system activates the first initiating circuit in the system control panel, causing an alarm to activate. When a sprinkler operates, air pressure escapes from the sprinkler piping. The air supervisory switch activates the second initiating circuit in system control panel.

When BOTH initiating circuits have been activated, the system control panel energizes the solenoid valve open. Pressure is released from the priming chamber to the open drain cup faster than it is supplied through the restricted orifice. The deluge valve clapper opens to allow water to flow into the system piping and alarm opens to allow water to flow into the system piping and alarm devices, causing the water motor alarm and water flow alarms connected to the alarm pressure switch to activate.

When the deluge valve operates, the sensing end of the PORV is pressurized, causing the PORV to operate. When the PORV operates, it continually vents the priming chamber to prevent the deluge valve from resetting even it continually vents the priming chamber to prevent the deluge valve from resetting even if the solenoid valve closes. The deluge valve can only be reset after the system is taken out of service, and the outlet can only be reset after the system is taken out of service, and the outlet chamber of the deluge valve and associated trim piping are depressurized and drained.

C. Trouble Conditions

If a sprinkler opens prior to operation of the detection system, or any time supervisory pressure in the sprinkler piping is lost, alarms connected to air supervisory switch will signal a low-air pressure condition, but the deluge valve will NOT open. If the electric detection system (alone) operates due to damage or malfunction, alarms connected to the system control panel will activate, but the deluge valve will NOT open.

D. Manual Operation

Any time the handle inside the emergency release is pulled, pressure is released from the priming chamber; the deluge valve will open. Water will flow into the system piping and alarm devices. If a sprinkler head opens, water will flow from the system.

Preaction System – electric, hydraulic and PORV actuation (UL)

Important Settings

TABLE 1: IMPORTANT SETTINGS		
Device	Recommended Pneumatic Supervisory Pressures and Settings	
	For Supervisory Pressure of 30 PSI (2 bar) Set to Maintain	For Supervisory Pressure of 10 PSI (0.7 bar) Set to Maintain
Tank Mounted Air Compressor On/Off Switch	40 PSI (2.8 bar)	12.5 PSI (0.9 bar) Minimum
Air Maintenance Device	30 PSI (2.1 bar)	10 PSI (0.7 bar)
Low-Air Alarm Contact Setting on Release System Pressure Supervisory Switch	25 PSI (1.7 bar) On Pressure Drop (use Viking Switch Part Number 09473 or equal)	7.5 PSI (0.52 bar) On Pressure Drop (use Viking Switch Part Number 09471 or equal)
Setting for Contacts on Release System Pressure Supervisory Switch to activate Release Control Panel Initiating Circuit	20 PSI (1.4 bar) on Pressure Drop (use Viking Switch Part Number 09473 or equal)	5 PSI (0.34 bar) on Pressure Drop (use Viking Switch Part Number 09471 or equal)

1. Recommended pneumatic supervisory pressure in the closed sprinkler piping is 30 PSI (2.1 bar). The air supervisory switch should be equipped with two sets of independently adjustable contacts. Use Potter PS40 Supervisory Switch as the air supervisory switch.
   For 30 psi (2.1 bar) supervisory pressure:
   - Adjust one set of contacts of air supervisory switch to activate at 25 PSI (1.7 bar) on pressure drop. These contacts should be wired to activate a “Low-Air” supervisory alarm.
   - The other set of contacts in the air supervisory switch should activate at 20 PSI (1.4 bar) on pressure drop. Wire these contacts to activate the remaining initiating circuit of the system control panel configured for “cross-zoned” operation. For the VFR-400 Release Control Panel, refer to the appropriate wiring diagram packed with the panel. Activation of an alarm to signal a high-pressure condition may be required. Refer to applicable installation standards and the Authority Having Jurisdiction

2. Installation Standards may allow supervisory pressures lower than those recommended above. For pneumatic supervisory pressure of 10 PSI (0.7 bar), use Potter PS40 Supervisory Switch as the air supervisory switch.
   For 10 psi (0.7 bar) supervisory pressure:
   - Adjust one set of contacts of air supervisory switch to activate at 7.5 PSI (0.52 bar) on pressure drop. These contacts should be wired to activate a “Low-Air” supervisory alarm.
   - The other set of contacts in the air supervisory switch should activate at 5 PSI (0.34 bar) on pressure drop. Wire these contacts to activate the remaining initiating circuit of the system control panel configured for “cross-zoned” operation. Refer to the appropriate wiring diagram packed with the panel. Activation of an alarm to signal a high-pressure condition may be required. Refer to applicable installation standards and the Authority Having Jurisdiction

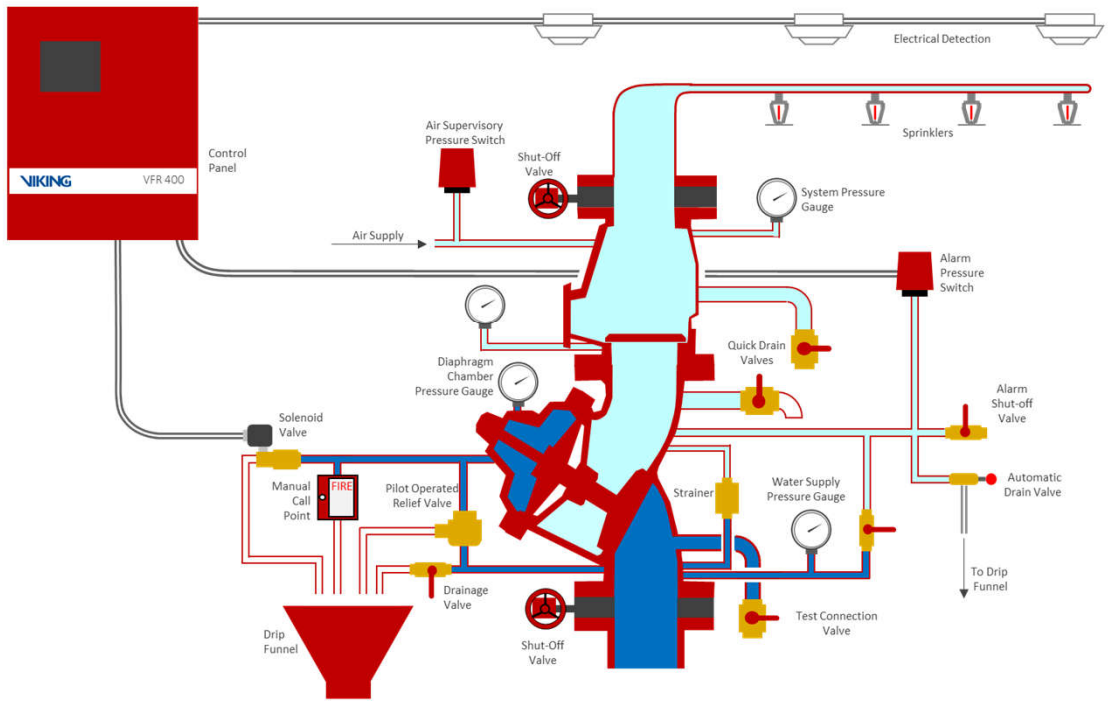
Note: when using supervisory pressures, settings, or equipment other than those recommended above, verify that the air regulation equipment and air supervisory switches used are compatible with the supervisory pressure setting used. supervisory pressures other than the recommended settings noted above may affect operation of the system.

3. The alarm pressure switch should activate when pressurized to 4 to 8 PSI (0.3 to 0.6 bar) on pressure rise and should be wired to activate the water flow alarm.

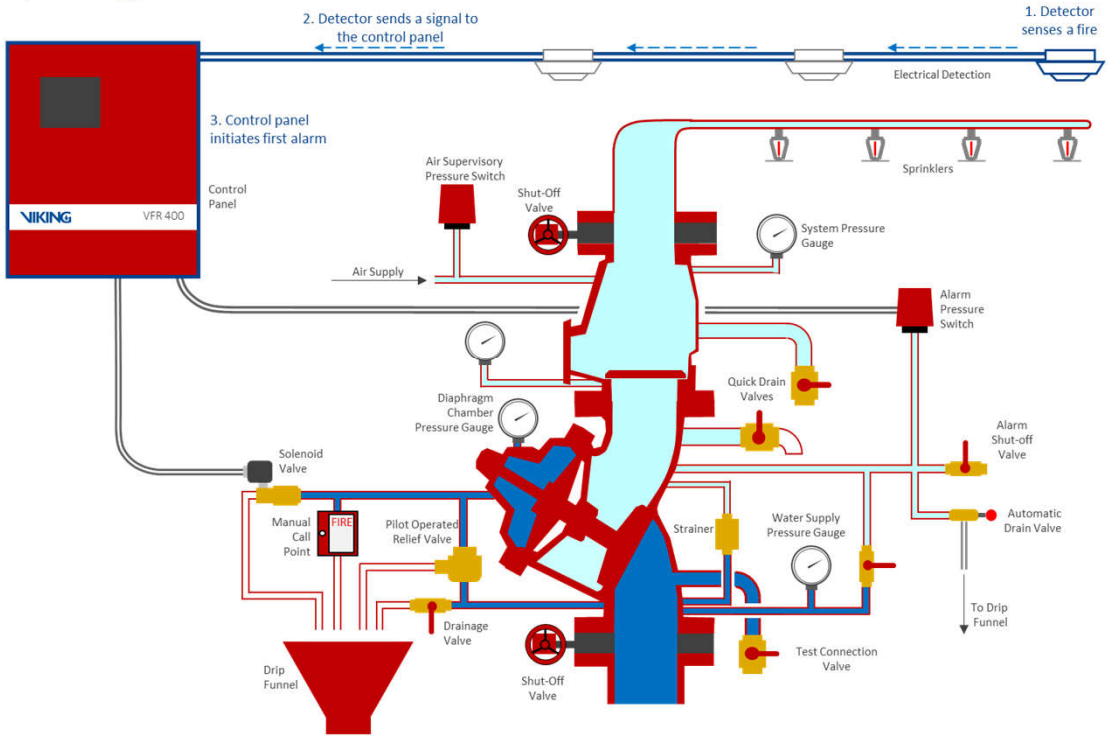
Preaction System – electric, hydraulic and PORV actuation (UL)

Operation Sequence

1. System in service



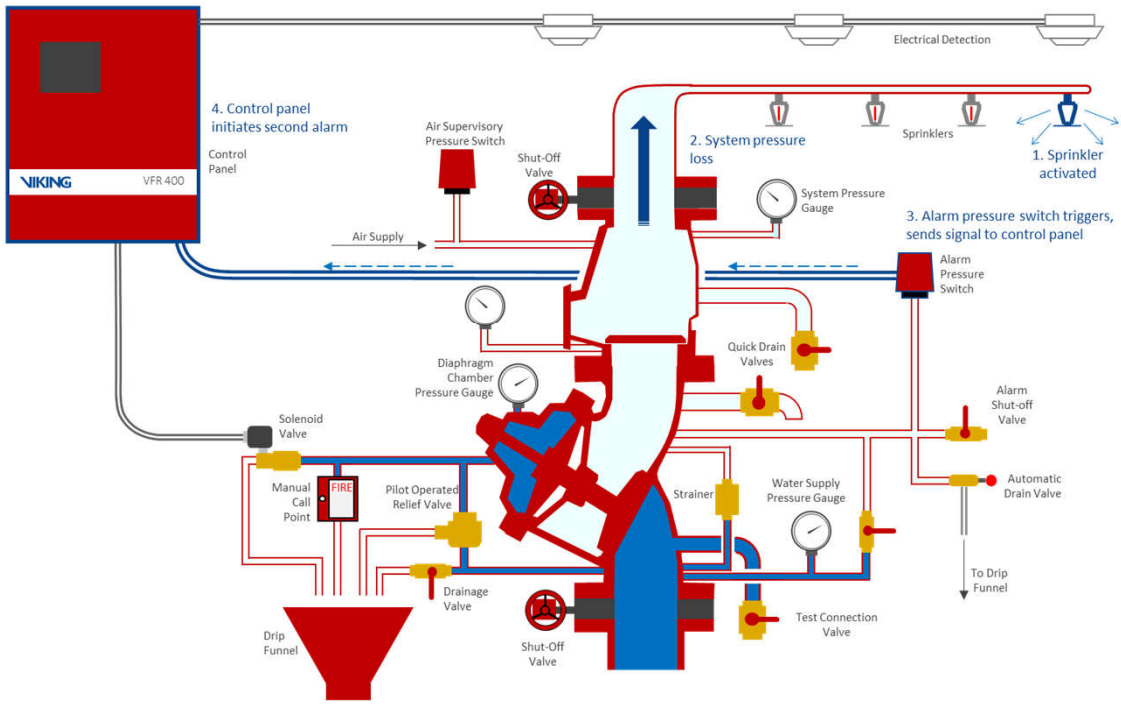
2. Detection system triggered



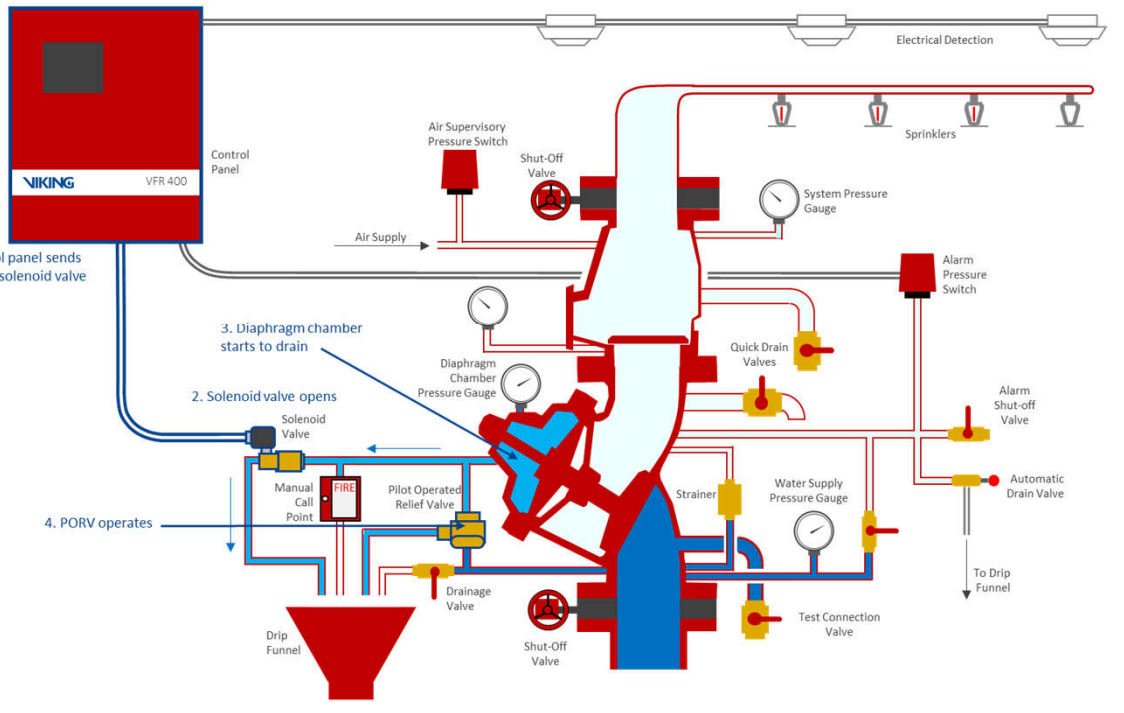
Preaction System – electric, hydraulic and PORV actuation (UL)

Operation Sequence

3. Sprinkler (Wet) system triggered



4. Solenoid valve triggered



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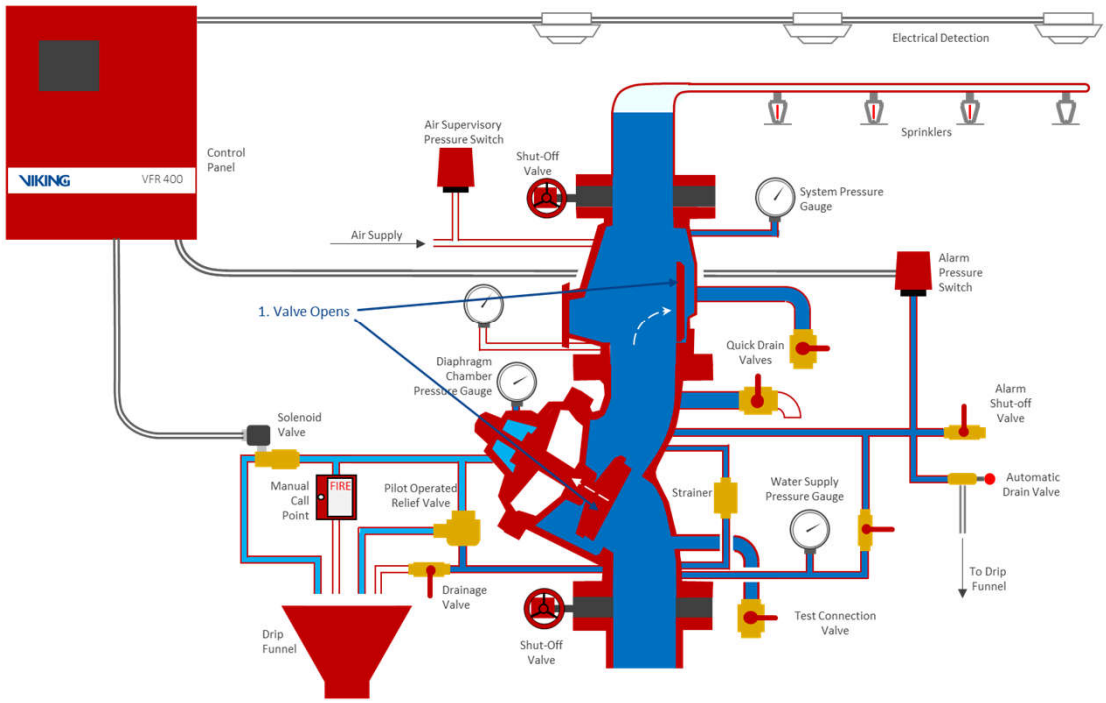
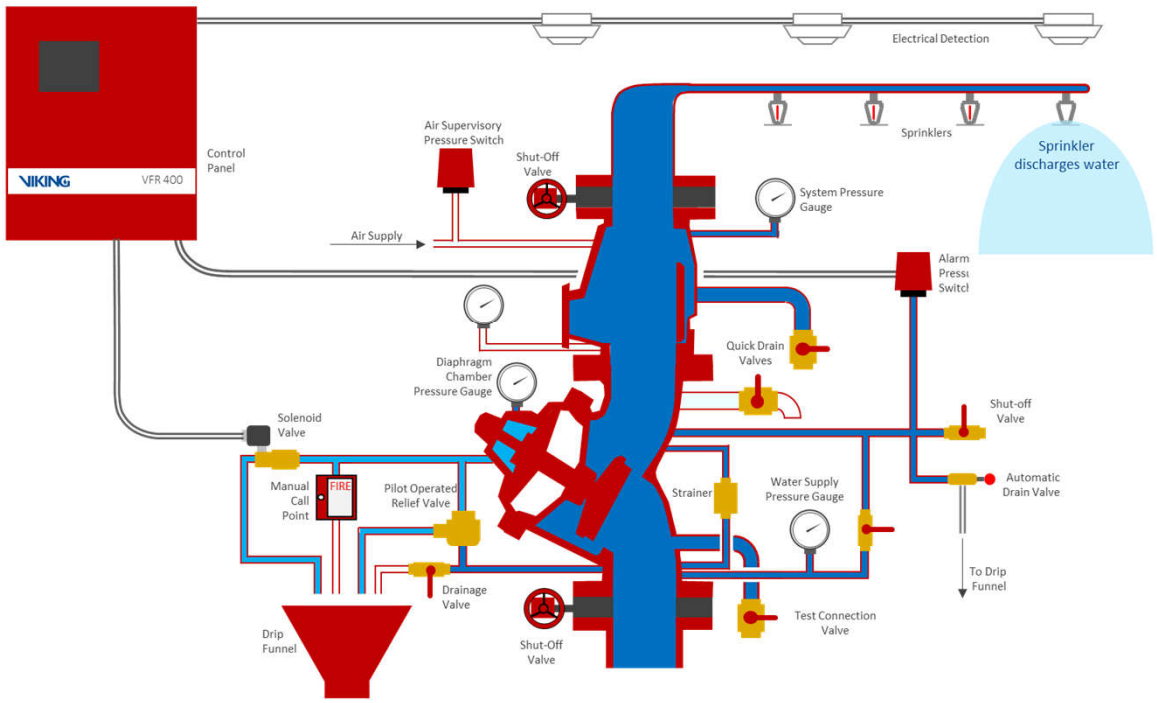
Preaction System – electric, hydraulic and PORV actuation (UL)

Operation Sequence

5. Valve open

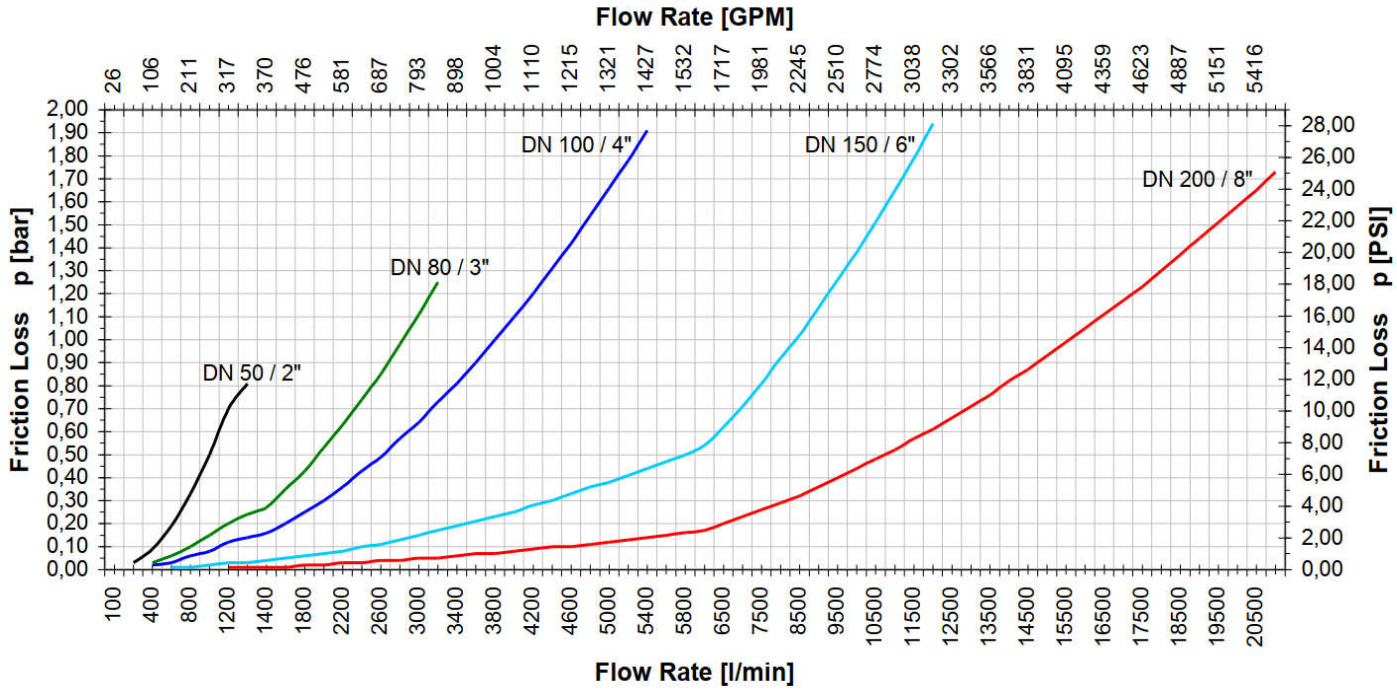


6. Preaction system discharge



FSX-A Valve Technical Specifications

Friction Loss Chart



Friction Loss – Equivalent Lengths

Valve Size		DIN EN 10220	Equivalent Length		Δp		Q	
Inch	DN	mm	m	ft	bar	psi	ltr/min	gpm
2	50	60.3 x 2.6	4.65	15.26	0.18	2.63	594	157
3	80	88.9 x 2.9	10.63	34.87	0.24	3.54	1,310	346
4	100	114.3 x 3.2	21.96	72.05	0.38	5.44	2,256	596
6	150	168.3 x 4.0	34.96	114.70	0.40	5.85	5,114	1,351
8	200	219.1 x 4.5	41.38	135.76	0.35	4.99	8,854	2,339

Valve Size		Schedule 40	Equivalent Length		Δp		Q	
Inch	DN	mm	m	ft	bar	psi	ltr/min	gpm
2	50	60.3 x 3.91	3.67	12.04	0.18	2.63	594	157
3	80	88.9 x 5.49	7.77	25.49	0.24	3.54	1,310	346
4	100	114.3 x 6.02	16.91	55.48	0.38	5.44	2,256	596
6	150	168.3 x 7.11	28.83	94.59	0.40	5.85	5,114	1,351
8	200	219.1 x 8.18	34.78	114.11	0.35	4.99	8,854	2,339

FSX-A Valve Technical Specifications

Flowrate & Velocity

Valve Size		DIN EN 10220	V		Q	
Inch	DN	mm	m/s	ft/s	ltr/min	gpm
2	50	60.3 x 2.6	10	32.8	1,340	354
3	80	88.9 x 2.9	10	32.8	3,195	844
4	100	114.3 x 3.2	10	32.8	5,427	1,434
6	150	168.3 x 4.0	10	32.80	12,050	3,184
8	200	219.1 x 4.5	10	32.8	20,742	5,480

Valve Size		Schedule 40	Equivalent Length		Q	
Inch	DN	mm	m/s	ft/s	ltr/min	gpm
2	50	60.3 x 3.91	10	32.8	1,240	328
3	80	88.9 x 5.49	10	32.8	2,802	740
4	100	114.3 x 6.02	10	32.8	4,869	1,286
6	150	168.3 x 7.11	10	32.80	11,128	2,940
8	200	219.1 x 8.18	10	32.8	19,340	5,110

Water Supply Pressures

Pressure		Flow Velocity	
Bar	PSI	m/sec	ft/sec
2.0	29.0	5	16.4
2.5	36.0	7	23.0
3.0	43.5	8	26.2
3.8	55.0	10	32.8