



TECHNICAL DATA

MODEL VXD SINGLE-INTERLOCKED PREACTION SYSTEM WITH PNEUMATIC RELEASE

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
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1. INTRODUCTION

Viking supervised VXD Single-Interlocked Preaction Systems utilize a Viking Model VXD Deluge Valve and a pneumatically pressurized automatic sprinkler system. This feature helps prevent undetected leaks. Single-Interlocked Preaction Systems are commonly used where the sprinkler system piping and/or sprinklers may be subject to damage. If the system piping or a sprinkler is damaged, supervisory pressure is reduced and a "low air" supervisory condition is activated.

The Pneumatically controlled preaction systems require a pneumatic release system, equipped with thermostatic (rate-of-rise) releases, fixed-temperature releases, and/or pilot sprinkler heads. Release trim for the pneumatically controlled deluge valve includes a pneumatic actuator normally held closed by the air/nitrogen pressure maintained in the pneumatic release system.

In fire conditions, operation of the pneumatic release system opens the deluge valve to fill the system with water. If any sprinklers have opened, water will flow from the system. If sprinklers have not opened, water will be in the sprinkler system piping when the sprinkler operates. A sprinkler must open before water flows from the system.

2. LISTINGS AND APPROVALS

cULus Listed - Categories VLFT and VLFT7

FM Approved

3. ORDERING INFORMATION

NOTE: Loose trim packages do NOT include deluge valve, coupling, or riser check valve. These items must be purchased separately. Refer to the applicable technical data sheets for available options.



WARNING: Cancer and Reproductive Harm-
www.P65Warnings.ca.gov

Table 1: Available Sizes for Model VXD Single-Interlock Preaction System with Pneumatic Release (Vertical)

Nominal Size	Part Number		
	Loose trim Galvanized	Loose trim Brass	Pre-trimmed ¹ Galvanized
1-½	23565-1	23565-2	23566
2	23586-1	23586-2	23587
2½	23607-1	23607-2	23608
3	23628-1	23628-2	23629
4	23650-1	23650-2	23651
6	23671-1	23671-2	23672
8	23692-1	23692-2	23693
10	23753-1	23753-2	23754

1. Pre-trimmed packages are only available with galvanized pipe and groove/groove valves.

Table 2: Additional System Component Information

Component	Scan, click or tap
Pressure Operated Relief Valve (PORV)	
Pneumatic actuator	



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4. SYSTEM COMPONENTS

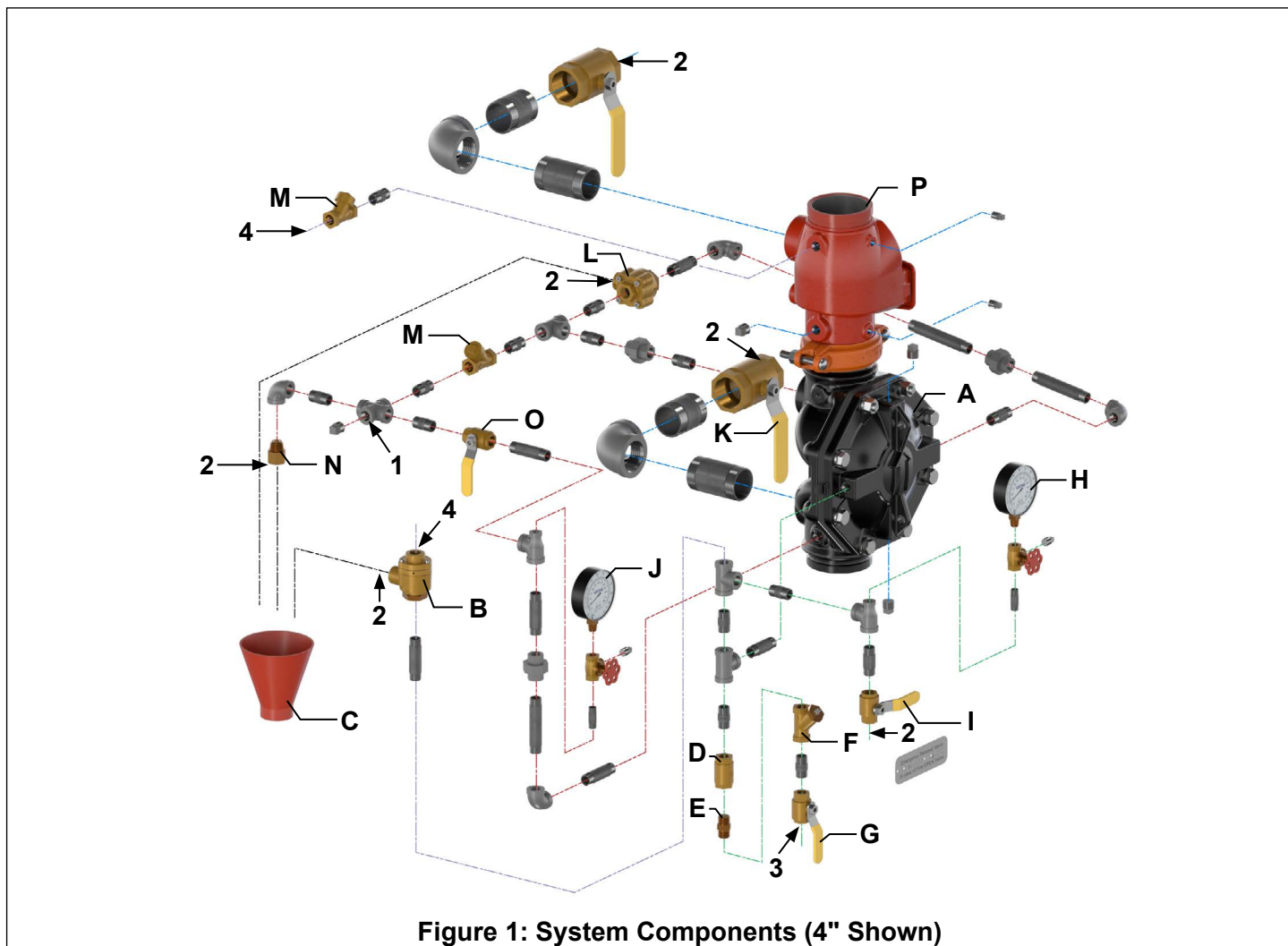


Figure 1: System Components (4" Shown)

Item	Description	Item	Description	Item	Description
A	Deluge valve	I	Emergency release valve (normally closed)	1	Water flow alarm (example: PS-10) connection point (device purchased separately)
B	Pneumatic actuator	J	Water supply pressure gauge		
C	Drain cup	K	Flow test valve (normally closed)	2	Drain connection point (piping not provided)
D	In-line check valve	L	Pressure Operated Relief Valve (P.O.R.V.)		
E	1/8" Restricted orifice	M	Swing check valve	3	Prime supply connection point (must be piped to upstream of main water supply valve; piping not provided)
F	Y-strainer	N	1/8" Restricted orifice		
G	Priming valve (normally open)	O	Alarm test valve (normally closed)		
H	Prime pressure gauge	P	Riser check valve (with drain trim)	4	Air supply or Low Air switch (example: PS-40) connection point (devices purchased separately)
NOTE: Piping shown for reference only.					



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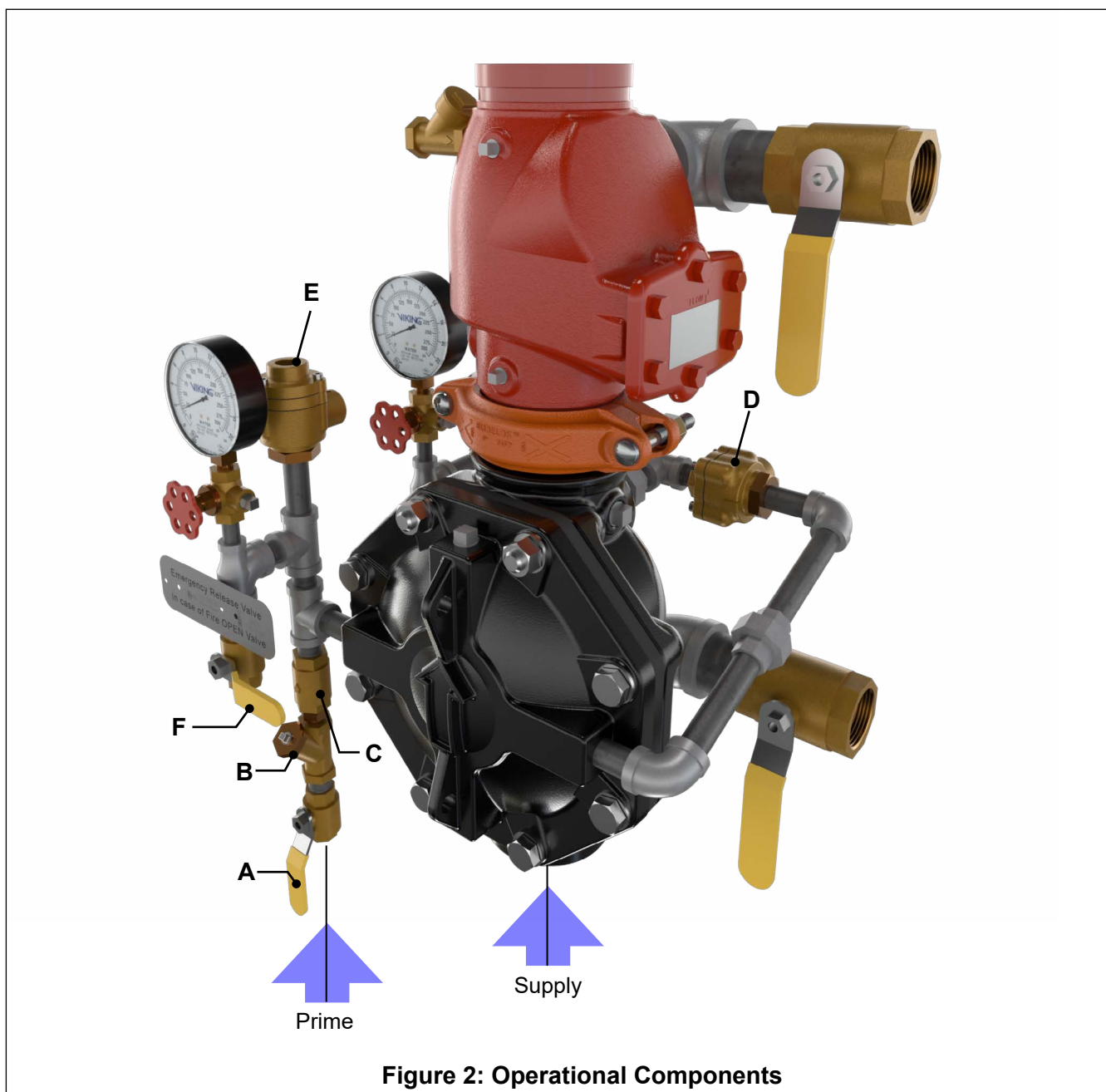
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5. SYSTEM OPERATION

5.1 In the SET condition:

System water supply pressure enters the priming chamber of the deluge valve through the priming line, which includes a normally open priming valve (A), strainer (B), restricted orifice (not shown), check valve (C) and also stops at the inlet of the normally closed PORV (D). In the SET condition, water supply pressure is trapped in the priming chamber by check valve (C), pneumatic actuator (E), and the emergency release (F). The pressure in the priming chamber holds the Deluge Valve diaphragm closed, keeping the outlet chamber and system piping dry.





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5.2 In fire conditions:

When a releasing device operates, pressure in the pneumatic release system escapes, causing alarms controlled by the air supervisory switch to activate and the pneumatic actuator (E) to open. Pressure is released from the priming chamber faster than it is supplied through the restricted orifice. The Deluge Valve diaphragm opens to allow water to flow into the system piping and alarm devices, causing the water motor alarm and/or water flow alarms connected to the alarm pressure switch (not shown) to activate. Water will flow from any open sprinklers and/or spray nozzles on the system. When the deluge valve operates, water is drained from the PORV inlet. When the 10:1 differential is overcome, the push rod opens, allowing the prime water to drain. If a release resets, priming water will continue to escape through the PORV, allowing the deluge valve to continue to operate until the system is reset. The Deluge Valve 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 de-pressurized and drained.

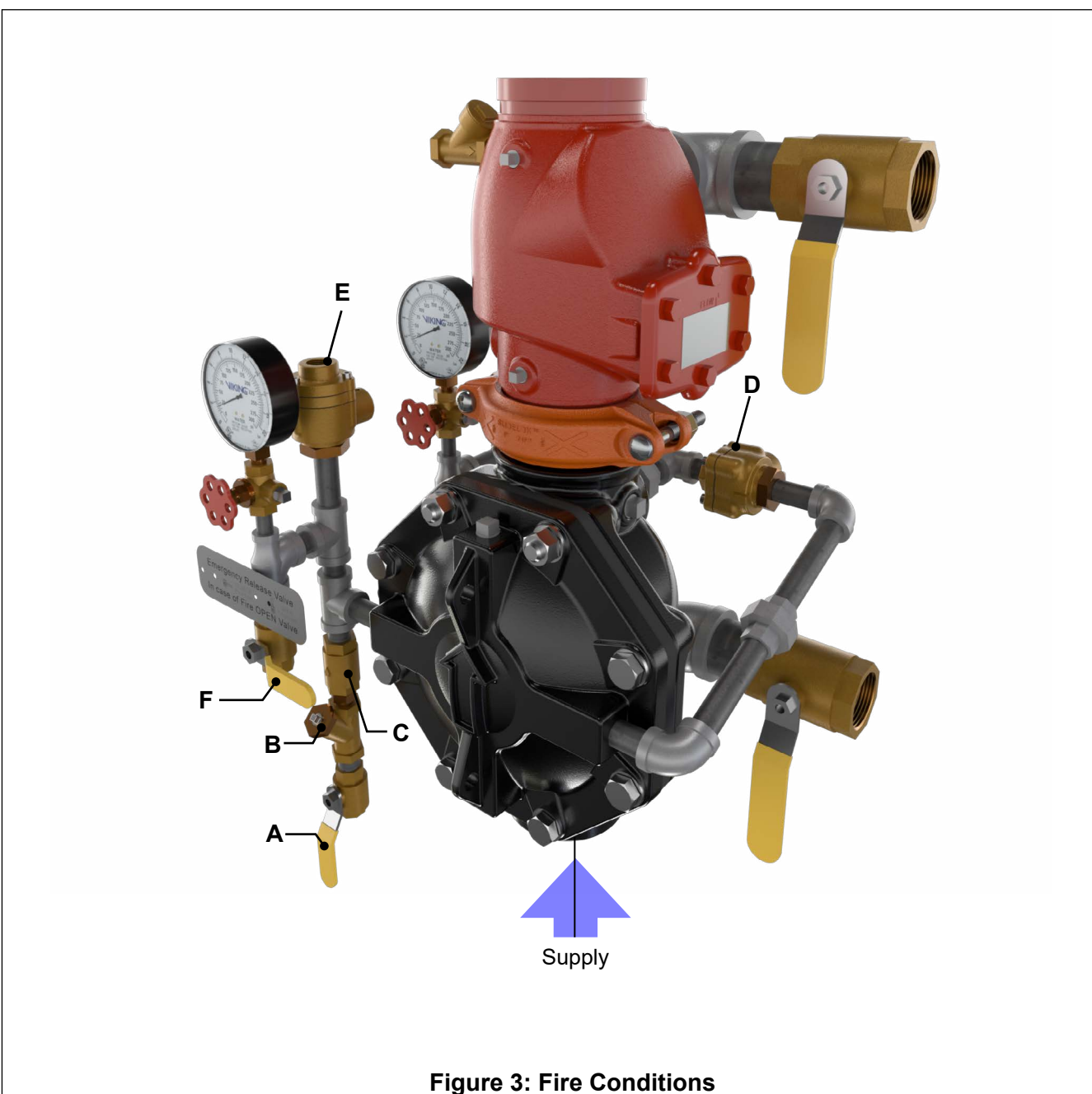


Figure 3: Fire Conditions



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5.3 In trouble conditions:

In the event of an air supply failure and slow leakage of air from the pneumatic release system, alarms connected to air supervisory switch (not shown) will signal a low air pressure condition. Failure to restore air supply to the pneumatic release system will result in operation of the pneumatic actuator (E) and the deluge valve will open. Similarly, if the release system operates due to mechanical damage or malfunction, the deluge valve will open. Water will flow from any open sprinklers and/or spray nozzles on the system. The water motor alarm (not shown) and/or alarms connected to alarm pressure switch will activate.

5.4 Manual operation:

Anytime the emergency release is pulled, pressure is released from the priming chamber and the deluge valve will open. Water will flow into the system piping and activate the alarm devices. Water will flow from any open sprinklers and/or spray nozzles on the system.

6. INSTALLATION

Refer to current Viking Technical Data describing individual components of the Viking VXD Deluge System. Also, refer to applicable installation standards, codes, and Authorities Having Jurisdiction.

6.1 Recommended Air Pressure Settings

NOTE: Installation Standards may allow supervisory pressures lower than those recommended above. When using supervisory pressures lower than the recommended setting noted above, verify that the air regulation equipment and air supervisory switches used are compatible with the supervisory pressure setting used.

TABLE 1: Recommended Air Pressure Settings		
Device	System Water Pressure	
	Up to 175 PSI (12 bar)	175 PSI (12 bar) to 250 PSI (17 bar)
	Set to Maintain:	
Air Compressor On/Off Switch	ON: 30 PSI (2 bar) OFF: 40 PSI (2.8 bar)	ON: 50 PSI (3.4 bar) OFF: 60 PSI (4.1 bar)
Air Maintenance Device (release system)	30 PSI (2 bar)	50 PSI (3.4 bar)
Air Maintenance Device (supervisory)	20 PSI (1.4 bar)	20 PSI (1.4 bar)
Air Pressure Supervisory Switch (release system)	25 PSI (1.7 bar)	45 PSI (3.1 bar)
Air Pressure Supervisory Switch (supervisory)	15 PSI (1 bar)	15 PSI (1 bar)
Alarm pressure switch	4 to 8 PSI (0.3 to 0.6 bar)	4 to 8 PSI (0.3 to 0.6 bar)

6.2 Air Supply Design

Air compressor size:

NFPA 13 requires that the air supply be capable of filling the entire sprinkler system to its required air pressure within 30 minutes. A common method of sizing an air compressor is to use the following formula:

Compressor Size (cfm) = $\frac{V \times P}{7.48 \times 14.7 \times T}$	Where: V = Volume P = Required Air Pressure T = Fill time (typically 30 min.) 7.48 = gal. / ft. ³ 14.7 = atmospheric pressure	Example: System volume as determined by table 1 = 750 gallons Required Air pressure = 30 psi $\text{Compressor Size (cfm)} = \frac{(750 \times 30)}{7.48 \times 14.7 \times 30} = 6.8 \text{ cfm}$
Therefore, the compressor shall be capable of providing 7 cfm.		

Viking recommends tank mounted air compressors for supplies on single Interlock pneumatic release preaction systems. The pneumatic actuator requires at least 30 psi (2 bar) of air pressure be established within the pneumatic release for systems with water pressure up to 175 psi (12.1 bar) and 50 psi (3.4 bar) of air pressure for systems with water pressures up to 250 psi (17.2 bar).



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Nitrogen Cylinder Gas Supply

Nitrogen may be used in place of air compressors. Nitrogen is supplied in pressurized cylinders in various sizes and pressures. Some of the most common are 122 Cu. Ft. at 1900 PSI (3455 Ltrs. at 13100 kPa), 225 Cu. Ft. at 2100 PSI (6372 Ltrs. at 14480 kPa), and 280 Cu. Ft. at 2300 PSI (7930 Ltrs. at 15859 bar).

When nitrogen cylinders are used as a primary air supply, spare cylinders should be furnished and located at same location of the valve. To determine the approximate amount of nitrogen to be furnished, the following formula may be used:

English Units		Metric Units	
$V_c = \frac{V_s \times P}{100}$	Where: V _c = Volume of Cylinder (ft ³) P = Required Nitrogen Pressure (psig) V = Volume of System (gal)	$V_c = \frac{V_s \times P}{108}$	Where: V _c = Volume of Cylinder (L) P = Required Nitrogen Pressure (kPa) V = Volume of System (L)

Special attention must be given to systems employing a bottled-gas supply. Because only a limited amount of gas is available, small leaks which normally would go unnoticed in systems being supplied by mechanical compressors, can become critical to the system's overall performance. If the system is to function at temperatures as low as -40 °F (-40 °C), and, if bottled nitrogen is the gas supply, the system is particularly susceptible to leakage, and special care should be taken to ensure against leaks throughout the entire system.

Air Supply Installation

1. Install the required air supply, using the properly sized compressor, producing the required cubic feet per minute in accordance with section 6.2. The air or nitrogen supply to the Preaction System must be clean, dry, and oil free.
2. Automatic air supplies must be regulated, restricted, and from a continuous source. A Viking Air Maintenance Device should be installed on each system equipped with a tank mounted compressor, plant air or nitrogen. For compressors with a capacity less than 5.5 ft³/min at 10 psig, NFPA 13 does not require an air maintenance device. The use of an air maintenance device with riser mounted compressors can lead to compressor "short cycling". Viking always recommends that a tank mounted compressor with air maintenance device be used.



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7. PLACING THE SYSTEM IN SERVICE

Placing the Valve in Service:

1. Verify the following:
 - The system main water supply control valve (not shown) is closed.
 - The system has been properly drained and main drain (J) is open.
 - The emergency release (F) is closed.
2. Close the system main drain (J).
3. Establish pneumatic pressure to the release system. Refer to section "6.1 Recommended Air Pressure Settings"
4. Restore pneumatic pressure to the release system. Maintain 30 PSI (2 bar) or 50 PSI (3.4 bar) as required by the pneumatic actuator.
5. Establish pneumatic supervisory pressure to the sprinkler piping. Refer to section "6.1 Recommended Air Pressure Settings". Verify that the 1/2" valve in the air maintenance device by-pass trim is closed and that both the 1/4" valves are open.
6. Open the priming valve (A).
7. Open flow test valve (G).
8. Slowly and partially open main water supply control valve (not shown).

NOTE: Opening the main water supply valve too quickly can create excessive pressure causing the valve to trip.
9. When full flow develops from the flow test valve (G), close the valve. Verify that there is no flow from the open orifice.
10. Fully open and secure the main water supply control valve.
11. Verify that all valves are in their normal operating position.
12. Verify that no water is discharging into the drain cup.
13. Check for and repair all leaks.
14. On new installations, those systems that have been placed out of service, or where new equipment has been installed, trip test the system to verify that all equipment functions properly. Refer to Annual Trip Tests, section 9.2.C.
15. After completing a trip test, perform semi-annual maintenance. Refer to section 9.3.B.

CAUTION

Performing a trip test results in operation of the Deluge Valve. Water will flow into the sprinkler piping. Take necessary precautions to prevent damage.

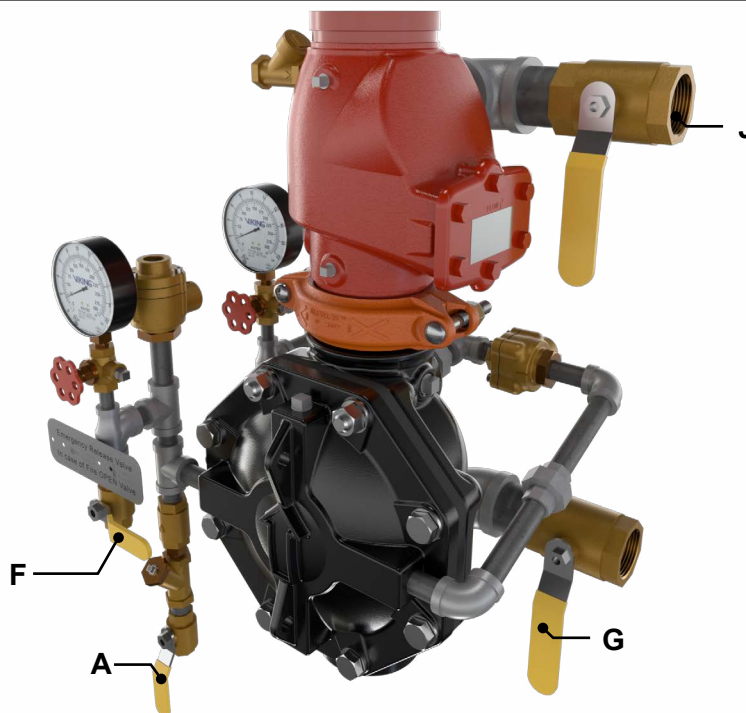


Figure 4: Placing the System in Service



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8. EMERGENCY INSTRUCTIONS

⚠ WARNING

WARNING: Placing a control valve or detection system out of service may eliminate the fire protection capabilities of the system. Prior to proceeding, notify all Authorities Having Jurisdiction (AHJ). Consideration should be given to employment of a fire patrol in the affected areas.

Refer to the appropriate technical data page and NFPA standards for complete care, handling, installation, and maintenance instructions. For additional product and system information, Viking data pages and installation instructions are available on the Viking Web site at www.vikinggroupinc.com.

After a fire, verify that the fire is OUT and that placing the system out of service has been authorized by the appropriate Authority Having Jurisdiction.

To take system out of service (Refer to Figure 4):

1. Close the water supply control valve (not shown).
NOTE: Sprinkler systems that have been subjected to a fire must be returned to service as soon as possible. The entire system must be inspected for damage, and repaired or replaced as necessary.
2. Open the system main drain.
3. Silence alarms (optional). Alarms controlled by the pressure switch and the water motor alarm can be silenced by closing the alarm test valve.
4. Shut off the air supply (optional).
5. Close the priming valve (A).
6. Replace any release devices, sprinklers and/or spray nozzles that have been damaged or have been exposed to fire conditions.
7. Perform all maintenance procedures recommended in Technical Data describing individual components of the system that have operated.
8. Return the system to service as soon as possible. Refer to section 7: Placing the System In Service.

9. INSPECTIONS, TESTS, AND MAINTENANCE

⚠ WARNING

Any system maintenance that involves placing a control valve or detection system out of service may eliminate the fire protection capabilities of that system. Prior to proceeding, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected areas.

NOTICE

The owner is responsible for maintaining the fire protection system and devices in proper operating condition.

It is imperative that the system be inspected and tested on a regular basis in accordance with NFPA 25. Refer to current Viking Technical Data describing individual components.

The frequency of the inspections may vary due to contaminated water supplies, corrosive water supplies, corrosive atmospheres, as well as the condition of the air supply to the system. For minimum maintenance and inspection requirements, refer to NFPA 25. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

9.1 Inspection

Weekly - Viking recommends a weekly visual inspection; check the following items.

- Verify that the main water supply control valve is open and that all other valves are in their normal operating position and appropriately secured.
- Check for signs of mechanical damage, leakage, and/or corrosive activity. If detected, perform maintenance as required. If necessary, replace the device.
- Verify that the valve and trim are adequately heated and protected from freezing and physical damage.

NOTE: For normal operating position, refer to Figure 1.



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9.2 Periodic System Tests

A. Quarterly Water Flow Alarm Test

3. Notify the Authority Having Jurisdiction and those in the area affected by the test.
4. To test the local electric alarm (if provided) and/or mechanical water motor alarm (if provided), OPEN the alarm test valve in the Deluge Valve trim.
 - a. Electric alarm pressure switches (if provided) should activate.
 - b. Electric local alarms should be audible.
 - c. The local water motor gong should be audible.
 - d. If equipped with remote station alarm signaling devices, verify that alarm signals were received.
5. When testing is complete, CLOSE the Alarm Test Valve.
6. Verify the following:
 - a. All local alarms stop sounding and alarm panels (if provided) reset.
 - b. All remote station alarms reset.
 - c. Supply piping to water motor alarm properly drains.
7. Verify that the Alarm Test Valve is CLOSED.
8. Verify that the outlet chamber is free of water. No water should flow from the alarm drain line.
9. Notify the Authority Having Jurisdiction and those in the affected area that testing is complete.

B. Quarterly Main Drain Test

1. Notify the Authority Having Jurisdiction and those in the area affected by the test.
2. Record pressure reading from the water supply pressure gauge.
3. Verify that the outlet chamber of the Deluge Valve is free of water. No water should flow from the alarm drain line.
4. Fully OPEN the Flow Test Valve.
5. When a full flow is developed from the Flow Test Valve, record the residual pressure from the water supply pressure gauge.
6. When the test is complete, SLOWLY CLOSE the Flow Test Valve.
7. Compare test results with previous flow information. If deterioration of the water supply is detected, take appropriate steps to restore adequate water supply.
8. Verify:
 - a. Normal water supply pressure has been restored to the inlet chamber, the priming chamber, and the release system. The pressure on the priming chamber water pressure gauge should equal the system water supply pressure.
 - b. All alarm devices and valves are secured in normal operating position (refer to Figure 1).
9. Notify the Authority Having Jurisdiction that the test is complete. Record and/or provide notification of test results as required by the Authority Having Jurisdiction.

C. Annual Trip Test

⚠ CAUTION

Performing this test results in operation of the Deluge Valve. Water will flow into the sprinkler piping and from any open sprinklers and/or nozzles. Take necessary precautions to prevent damage.

1. Notify the Authority Having Jurisdiction and those in the area affected by the test.
2. Fully open the Flow Test Valve to flush away any accumulation of foreign material.
3. Close the Flow Test Valve.
4. Trip the system by operating the release system. Allow a full flow to pass through the Deluge Valve. Water flow alarms should operate.
5. When test is complete:
 - a. Close the Main Water Supply Control Valve.
 - b. Close the Priming Valve.
 - c. Open all system main drains. Allow the system to drain completely.
6. Perform semi-annual maintenance. Refer to section 9.3.B: Semi-Annual Maintenance.
7. Place the system in service. Refer to section 7: Placing the System in Service.
8. Notify the Authority Having Jurisdiction that the test is complete. Record and/or provide notification of test results as required by the Authority Having Jurisdiction.



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D. "Low Air" Alarm Tests

1. Notify the Authority Having Jurisdiction and those in the area affected by the test.
2. Close the main water supply valve.

NOTE: Closing the main water supply valve prevents operation of the deluge valve during the test.

3. Fully OPEN the test valve to simulate operation of a releasing device.
4. Verify that the low air alarms operate within an acceptable time period and continue without interruption.
5. Close the test valve.
6. Close the priming valve.
7. Establish recommended pneumatic pressure to be maintained. Refer to section 6.1.
8. Open the priming valve.
9. Return the system to service. Refer to section 8 Placing the System in Service.
10. Continue to next section "Low Air Alarm Test" (supervisory) below.

E. "Low Air" Alarm Test (supervisory):

11. Repeat steps 3 (using the test valve on the supervisory system), 4, 5, 7, and 8 above.
12. Verify that the priming valve is open.

When testing is complete, return the system to service following the steps below:

CAUTION

This procedure applies only when done in conjunction with "Low Air" Alarm testing described above.

1. Verify that the pressure indicated on priming pressure water gauge indicates that the priming chamber is pressurized with system water supply pressure.
2. Open the flow test valve.
3. Partially open the main water supply control valve.
4. When full flow develops from the flow test valve, close the flow test valve.
5. Fully open and secure the main water supply control valve.
6. Verify that the alarm shut-off valve is open and that all other valves are in their normal operating position.

9.3 Maintenance

A. After Each Operation:

1. Sprinkler systems that have been subjected to a fire must be returned to service as soon as possible. The entire system must be inspected for damage, and repaired or replaced as necessary.
2. Deluge Valves and trim that have been subjected to brackish water, salt water, foam/water solution, or any other corrosive water supply, should be flushed with good quality fresh water before being returned to service.
3. Perform semi-annual maintenance after every operation.

B. Semi-Annually:

1. Remove the system from service.
2. Close the Main Water Supply Control Valve and Priming Valve.
3. Relieve pressure in the priming chamber by opening the emergency release Valve.
4. Inspect all trim for signs of corrosion and/or blockage. Clean and/or replace as required.
5. Clean and/or replace all strainer screens.
6. Refer to section 8: Placing the System in Service.

C. Every Fifth Year:

1. Internal inspection of Deluge Valves is recommended every five years unless inspections and tests indicate more frequent internal inspections are required. Refer to the Model VXD Valve Technical Data Page.
2. Internal inspection of strainers, and restricted orifices is recommended every five years unless inspections and tests indicate more frequent internal inspections are required.
3. Record and provide notification of inspection results as required by the Authority Having Jurisdiction.



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10. DIMENSIONS

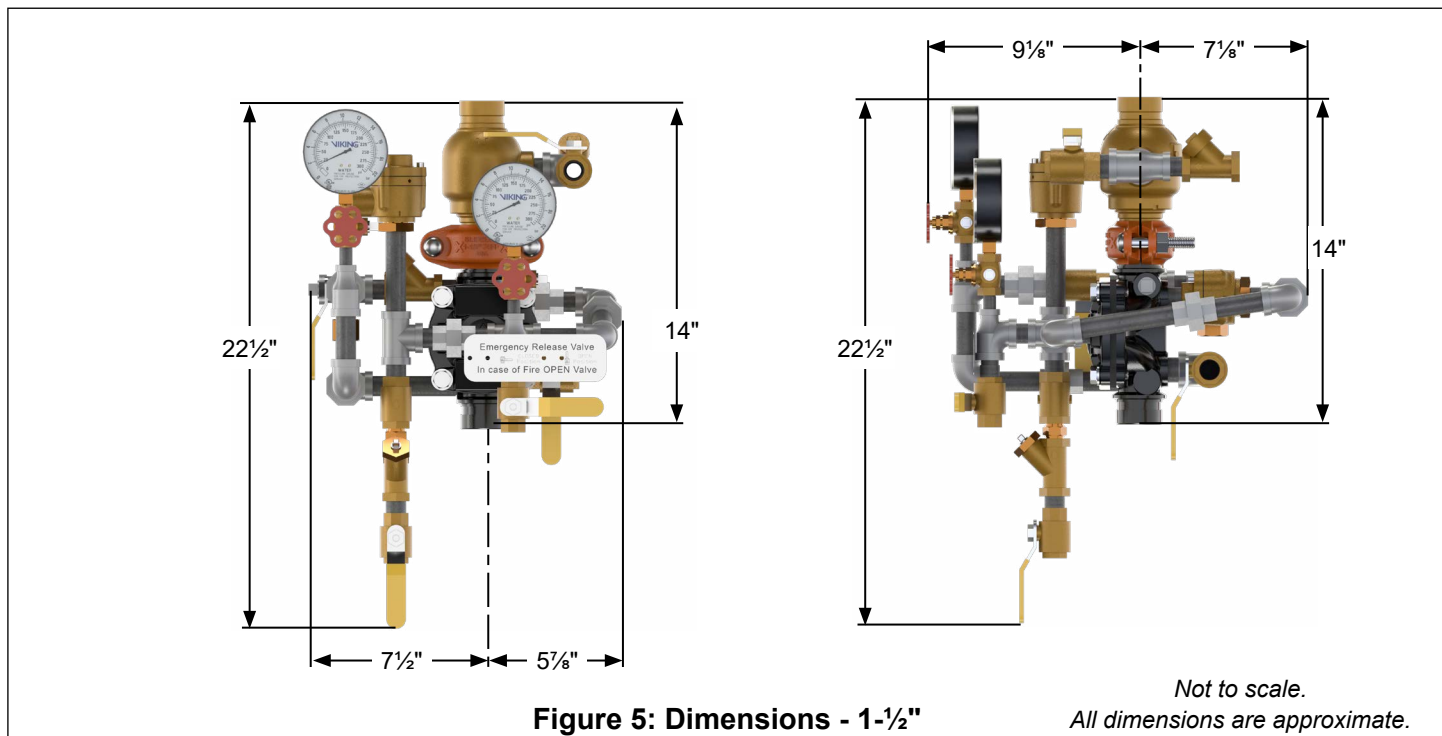


Figure 5: Dimensions - 1-1/2"

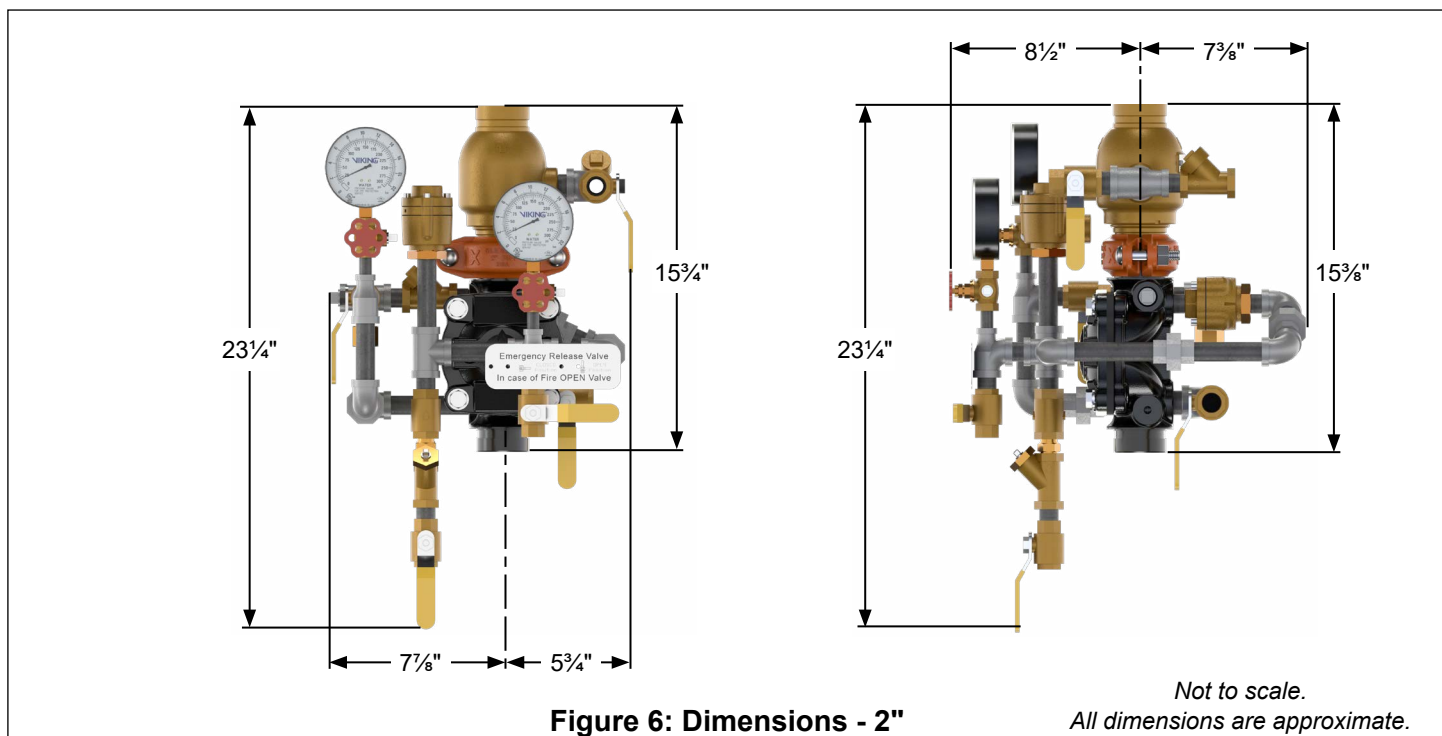


Figure 6: Dimensions - 2"



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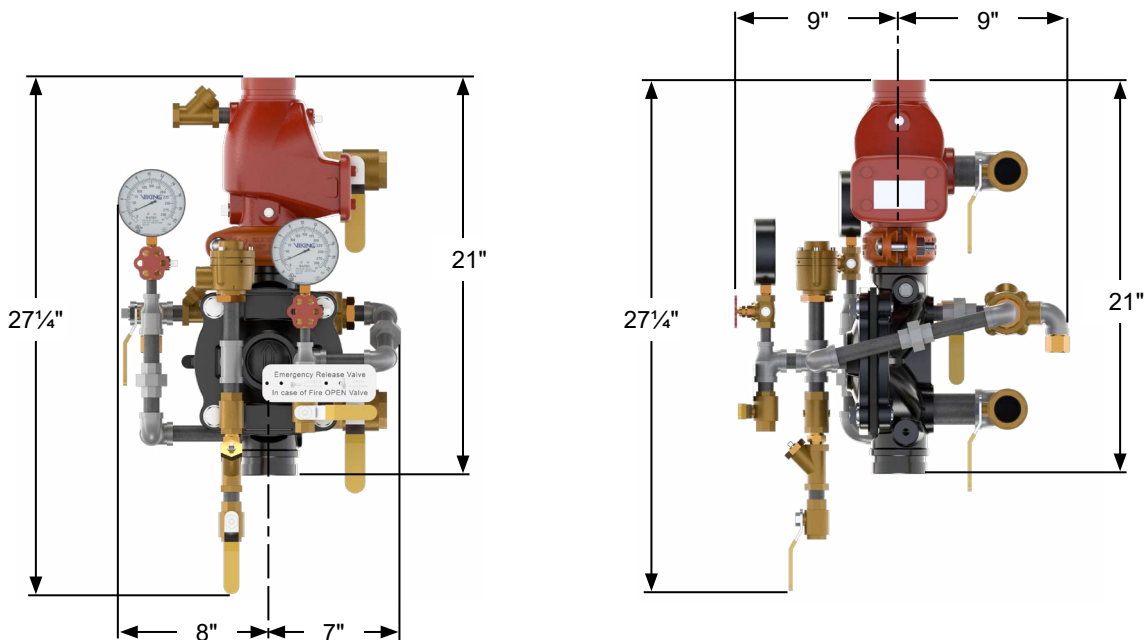


Figure 7: Dimensions - 2 1/2"

*Not to scale.
 All dimensions are approximate.*

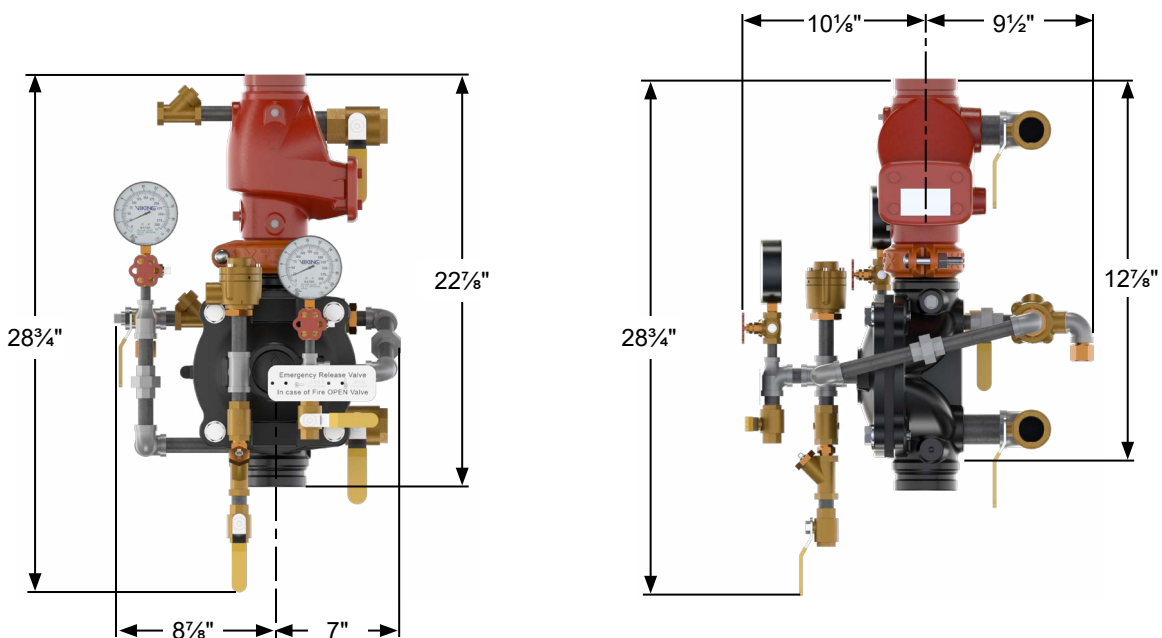


Figure 8: Dimensions - 3"

*Not to scale.
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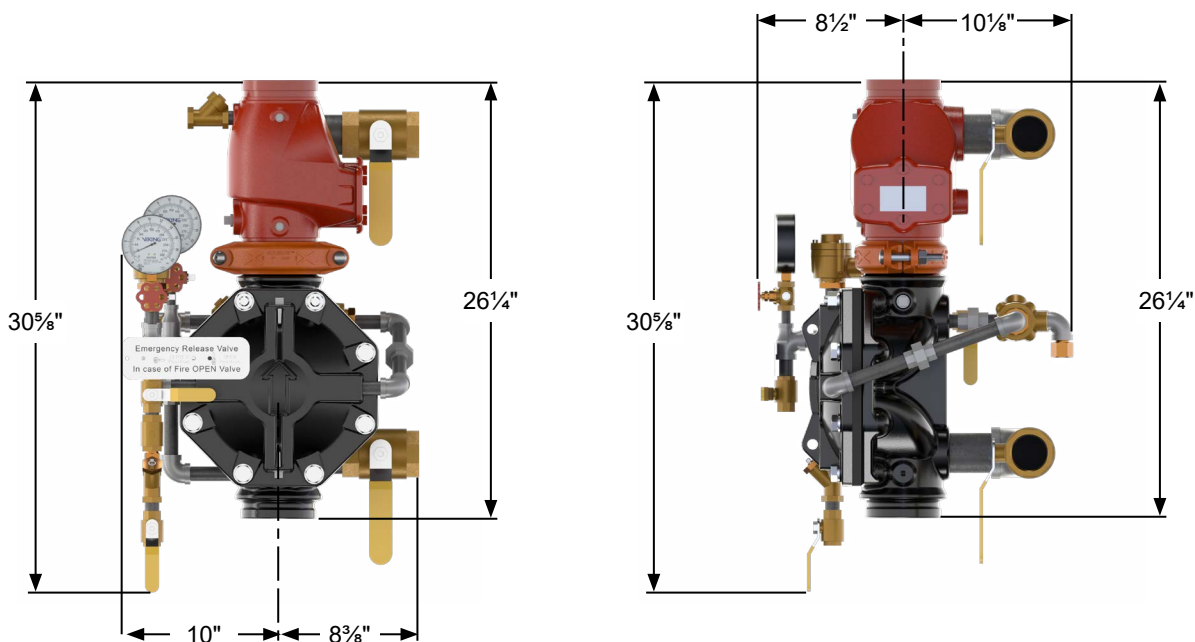


Figure 9: Dimensions - 4"

*Not to scale.
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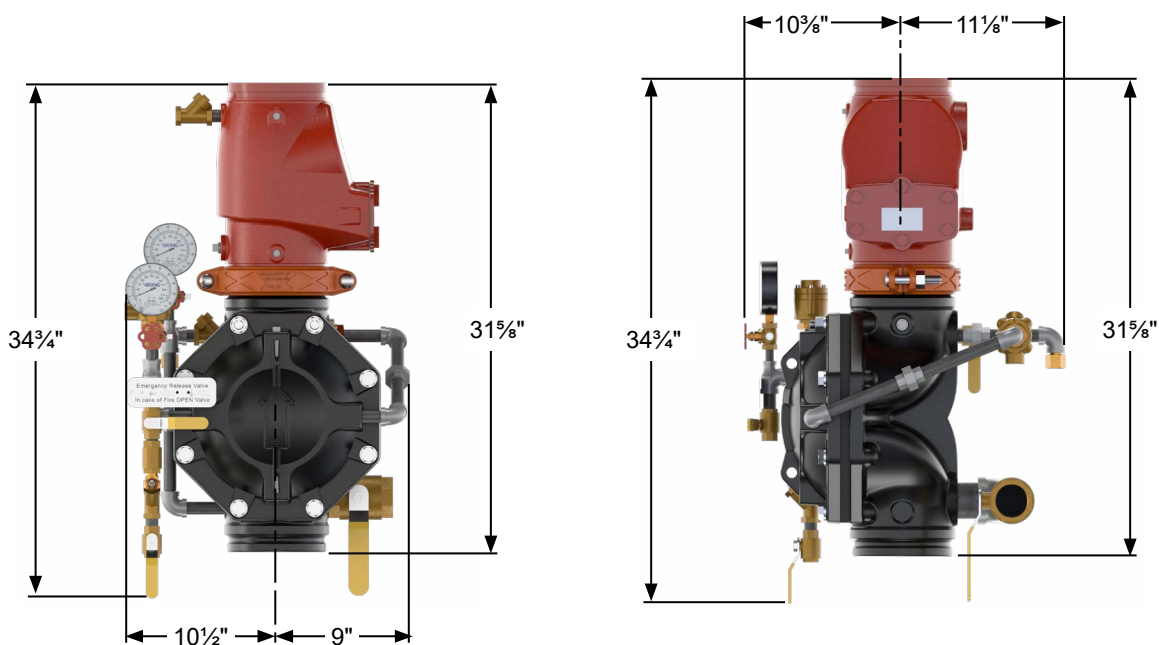


Figure 9: Dimensions - 6"

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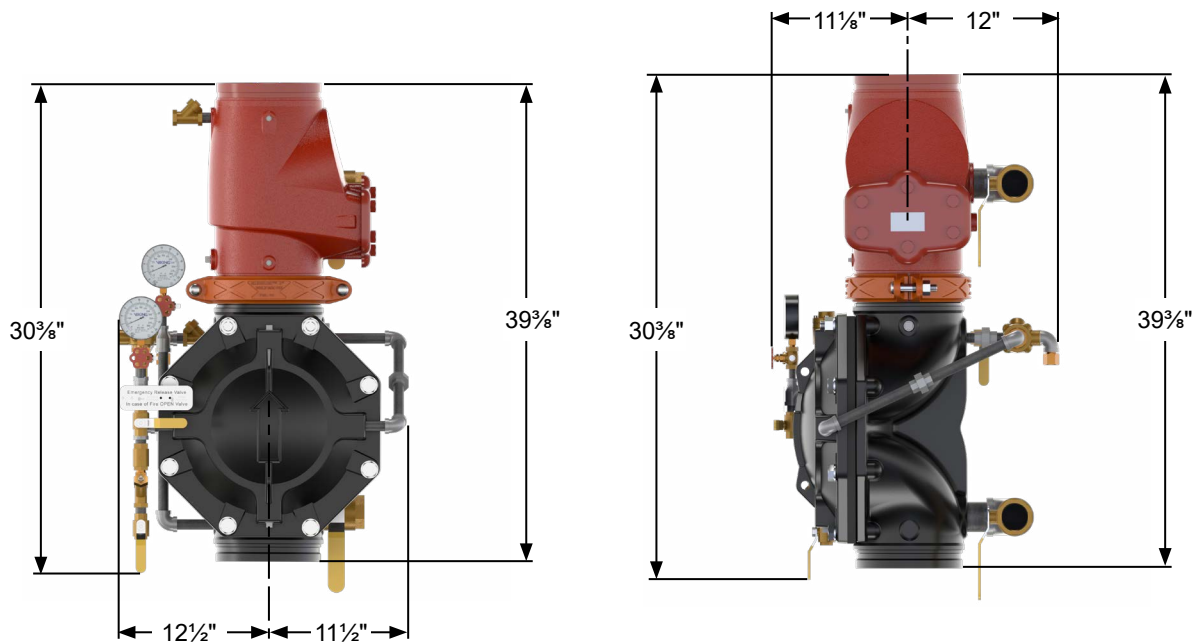


Figure 10: Dimensions - 8"

*Not to scale.
 All dimensions are approximate.*

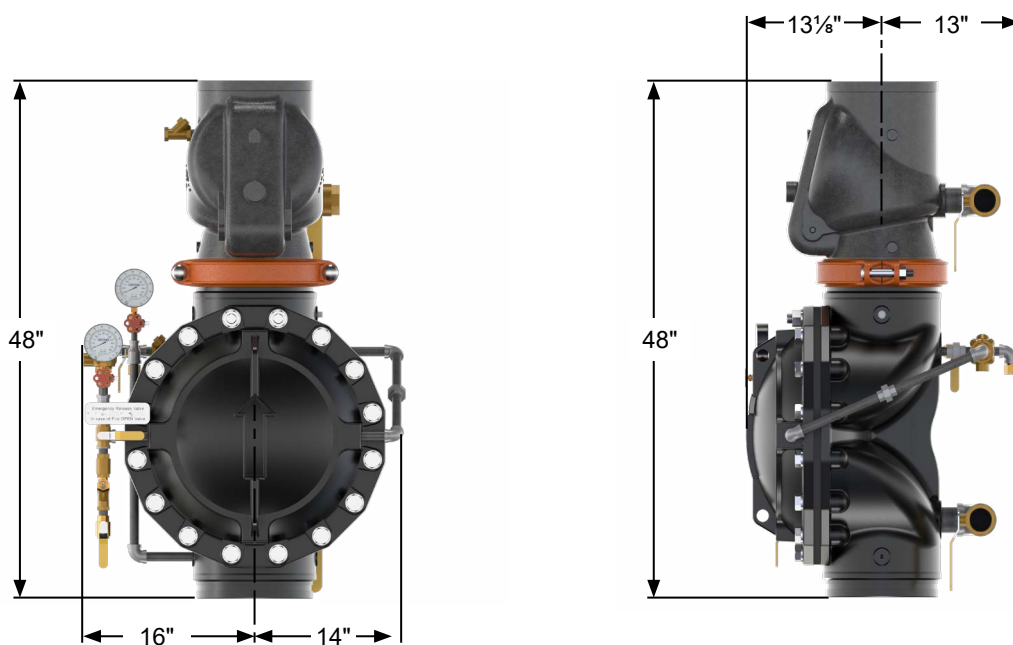


Figure 11: Dimensions - 10"

*Not to scale.
 All dimensions are approximate.*