



Model E and E3 Alarm Check Valve with E4 Trim

Specifications, Installation, Operation, Care and Maintenance Bulletin

**4"(100 mm), 6"(150 mm),
165mm & 8"(200 mm) Sizes With
Model E4 International Trim**

UL Listed
FM Approved
LPCB Approved
UKCA: 0832-UKCA-CPR-S5042
VdS: G4060049, G4060050, G4060051



General

Reliable Models E and E3 Alarm Check Valves act as a water flow alarm device in wet pipe sprinkler systems. The design allows for installation under both variable and constant supply pressure conditions. When water flows into the sprinkler system due to the operation of one or more automatic fire sprinklers the alarm valve opens, allowing continuous flow of water into the system and transmission of an electrical or mechanical alarm. The valve may be installed in either the vertical or horizontal (clapper hinge on top) position.

The E4 Alarm Check Valve trim includes a 2" (50mm) Reliable Model TD Test and Drain Valve with an integral K2.8 (40 metric) test orifice.

Valve Description

1. Rated working pressure
 - Model E: 175 psi (12.1 bar)
 - Model E3: 300 psi (20.7 bar)
2. Model E end and trim connections -- Three valve connection styles are available.
 - a. US Standard Flanged Inlet and Outlet (see Table B)
 - Flanges mate with ANSI B 16.1 (125 lb.) Flange
 - Threaded openings per ANSI B 2.1
 - Standard E4 trim set is compatible with 4" (100mm), 6" (150mm), and 8" (200mm) US flanged valves
 - Color — Red

- b. US Standard Flanged Inlet and Grooved Outlet (see Tables B and C):
 - Inlet flange mates with ANSI B 16.1 (125 lb.) Flange.
 - Outlet groove dimensions per ANSI/AWWA C606.
 - Threaded openings per ANSI B 2.1.
 - Standard E4 trim set is compatible with 4" (100mm), 6" (150mm), and 8" (200mm) US flanged by grooved valves.
 - Color — Red
- c. Metric flanged inlet and outlet (see Table D)
 - Flanges are plain face for 100 mm and 150 mm and raised face for 200 mm. Flanges mate with PN16.
 - Threaded openings per ANSI B2.1.
 - Standard E4 trim set is compatible with 4" (100mm), 6" (150mm), and 8" (200mm) US flanged by grooved valves.
 - Color — Red
3. Model E3 (300 psi) end and trim configuration
 - a. Grooved Inlet and Outlet
 - Grooved dimensions per ANSI/AWWA C606 (See Table C).
 - Threaded openings per ANSI B 2.1
 - Standard E4 trim set is compatible with 4" (100mm), 6" (150mm), 165mm, and 8" (200mm) grooved by grooved valves.
4. Face to Face Dimension
 - 4"(100 mm) valve — 11¾" (299 mm)
 - 6"(150 mm & 165mm) valve — 13-1/2" (343 mm)
 - 8"(200 mm) valve — 14-1/2" (368 mm)
5. Shipping Weight: See Table D
6. Friction Loss — expressed in Equivalent Length of Pipe, Based on Hazen & Williams formula with C=120. See Table A.

Table A - Friction Loss

Size	Equiv. Length
4"(100 mm) valve	8.3m (27ft)
6"(150 mm) valve	11.1m (36ft)
8"(200 mm) valve	11.7m (37ft)

Trim Description

The E4 trim set for the Reliable Model E Alarm Valve (see Figures 2 & 3) is compact and arranged for rapid and easy attachment. The trim serves as the connection point for various alarm devices, and also facilitates testing the operation of alarm devices without causing the system to operate. Two basic Model E4 trim sets are available for use with the Model E3 Alarm Valve:

• Constant Pressure Closed Drain—

Retard chamber is not required. This trim set is used where water supply pressure does not vary. An automatic drain is provided to drain the alarm line. Connection of the automatic drain is made below to the 2" (50 mm) main drain below the Test and Drain valve.

• Variable Pressure with Closed Retard Chamber Drain

Model S1 Retard chamber is required. This trim set is used where water supply pressure is subject to fluctuations. An automatic drain is provided to drain the alarm line and retard chamber. Connection of the automatic drain is made below to the 2" (50 mm) main drain below the Test and Drain valve.

Note: Connection to drain (by customer) must allow safe discharge of water from main drain at full system pressure, and also allow gravity draining of the alarm line trim. Care shall be taken to prevent back pressurization of system main drain.

Alarm valves are listed and approved by Underwriters Laboratories, Inc., Factory Mutual Corp. LPCB, and VdS only when used with the valve manufacturer's trim sets.

Trim kits are galvanized and available in three trim styles:

- Individual Part Trim
- Pre-Assembled Trim
- Factory Trimmed Valve

Pressure Relief Trim Kits

All wet pipe systems being installed in accordance with the 2010 edition (or newer) of NFPA 13 are required to have a pressure relief valve. For convenience, an optional pressure relief valve kit is available (see Figure 1 and reference Reliable Bulletin 618).

Flow Alarm

Water flow may be annunciated by either (or both) a water motor alarm or electrical pressure switch. Please reference Reliable Bulletins 612 and 613 for the Model C Mechanical Alarm. For convenience, a silenceable and non-silenceable location is provided for installation of a pressure switch (see Figure 1). Pressure switches are not provided with the trim and must be ordered separately.

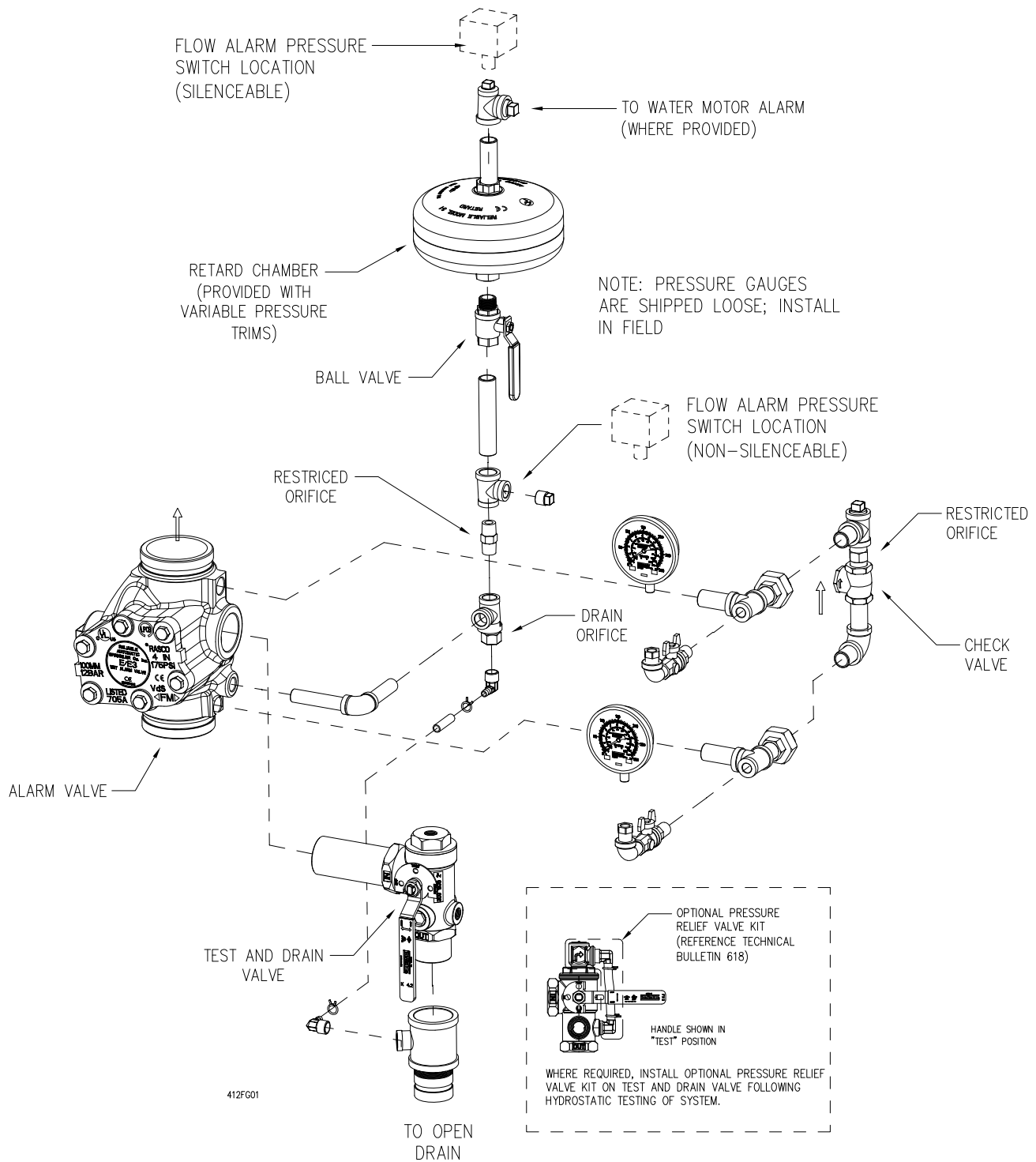


FIGURE 1 EXPLODED VIEW
(VERTICAL ORIENTATION SHOWN, HORIZONTAL TRIM SIMILAR)

Operation (Variable Pressure System)

Under normal conditions the clapper of the alarm valve is closed against the seat. Flow in the system resulting from the discharge of water through one or more fused automatic sprinklers causes the clapper to rise off the seat. Movement of the clapper uncovers the groove in the seat and allows water to flow into the alarm line. A continuous flow of water fills the retard chamber and acts to operate mechanical and/or electrical alarm devices. A small amount of water will simultaneously flow into the drain line.

When water ceases to flow through the alarm valve, the clapper returns to its seat thereby stopping the flow of water into the alarm line. Automatic drain orifices allow the retard chamber and the alarm line to empty through the main drain.

Almost all wet pipe sprinkler systems contain trapped air. If a water hammer or pressure surge occurs in the supply line, the increased pressure can compress the air causing the clapper to lift intermittently. Unless addressed, this can result in false alarms. The Model E Alarm Valve with E4 Trim helps minimize false alarms under these conditions with two features:

1. The clapper bypass line with check valve allows surges to pass from the supply side of the clapper to the system side without moving the clapper from the seat. Repeated surges build up effective excess pressure in the system which act to steady the clapper and prevent false alarms.
2. Should a heavy water surge force the clapper from its seat and allow water into the alarm line, the Model S1 Retard Chamber serves as a reservoir that must be filled before the water can act on the alarm devices. Short term intermittent flows are effectively drained through the automatic drain orifices.

Operation (Constant Pressure System)

The operation of the valve is the same as described for a variable pressure system, except that due to the water supply pressure being constant, a retard chamber is not required. Water passing through the intermediate chamber into the alarm line flows directly to the mechanical and/or electrical alarm devices.

Table B - U.S. Flange Dimensions in Inches (mm)

Valve Size	Bolt Circle Dia.	Bolt Hole Dia.	Flange Outside Dia.	Flange Thickness	No. Bolts
4" (100mm)	7-1/2	3/4	9-15/16	15/16	8
6" (150mm)	9-1/2	7/8	11	1	8
8" (200mm)	11-3/4	7/8	13-1/2	1-1/2	8

Table C - U.S. Groove Dimensions in Inches (mm)

Valve Size	Outlet Diameter	Groove Diameter	Groove Width	Outlet Face to Groove
4" (100mm)	4-1/2" (114 mm)	4-3/8" (110 mm)	3/8" (10 mm)	5/8" (16 mm)
6" (150mm & 165mm)	6-5/8" (168 mm)	6-1/2 (165 mm)	3/8" (10 mm)	5/8" (16 mm)
8" (200mm)	8-5/8" (219 mm)	8-7/16 (214 mm)	7/16" (11 mm)	3/4" (19 mm)

Table D - Metric Flange Dimensions in Millimeters

Valve Size	Bolt Circle Diameter	Bolt Hole Diameter	Raised Face		Flange Outside Diameter	Flange Thickness	Number of Bolts
			Diameter	Height			
100mm	180	18.3	--	--	229	23.8	8
150mm	241	22.2	--	--	279	25.4	8
200mm	295	22.2	268	3	343	28.6	12

Table E - Shipping Weight

Valve Size	Flanged Inlet and Outlet	Flanged Inlet and Grooved Outlet	Grooved Inlet and Outlet
4" (100mm)	80 lb. (36.3 kg)	70 lb. (31.8 kg)	60 lb. (27.2 kg)
6" (150mm & 165mm)	116 lb. (52.6 kg)	102 lb. (46.3 kg)	88 lb. (39.9 kg)
8" (200mm)	155 lb. (70.3 kg)	143 lb. (64.9 kg)	131 lb. (59.4 kg)

Note: 165mm valve is available as Model E3 grooved inlet by grooved outlet ONLY.

Tests

To test the readiness of the entire wet pipe system, open the inspector's test connection which should cause the mechanical and/or the electric alarms to sound. This test connection is usually located on the end or top line of the system and its opening is the equivalent to the fusing of one automatic sprinkler.

To test the operation of the alarm equipment only, move the handle of the Test and Drain valve to the "Test" position. Testing this way has the added benefit of exercising the clapper assembly. Should the mechanical sprinkler alarm (water motor) not operate, most likely the strainer is clogged. Remove the strainer cap and filter to clean. Be sure to replace the cleaned filter and tighten cap securely. Refer to Bulletin 613 for additional information.

To test supply piping for unobstructed flow, move the handle of the Test and Drain valve to the "Drain" position. When test is complete, move the handle to the "Closed" position.

For FM insured applications the Test and Drain valve does not replace the need for an inspector's test connection at the outer reaches of the sprinkler system. The drain valve shall not be used in lieu of the inspector's test connection for the testing of the entire wet pipe system. The drain valve shall only be used to exercise the clapper and test valve associated alarm devices. For all other applications please refer to NFPA 13 or to the authority having local jurisdiction.

Troubleshooting

A. Mechanical Sprinkler Alarm (Water Motor) Not Operating.

See **Tests** for corrective measures. (Also, reference Reliable Technical Bulletin 613).

B. Steady Water Flow Into Drain Line

Steps in the following sequence should be taken to correct steady water flow into the drain line:

1. Move the handle of the Test and Drain valve to the "Drain" position which should flush debris off the clapper seat. Close valve and observe if water flow ceases.
2. Close main control valve to determine if water flow is coming from above or below alarm valve clapper.
Note: Supply pressure gauge should read '0' psi when main control valve is closed tight and water pressure between this valve and the alarm valve is relieved. If necessary, pressure can be relieved through the lower gauge valve when the 1/4" NPT plug is removed.
 - a. If water flow is coming from below clapper, water will stop running to drain line.

- b. If water flow is coming from above clapper, water will continue to run to drain line.

Note: To minimize downtime, the following parts should be on hand before the valve is disassembled:

1. Seat installation Wrench:
 - 4" – Part No. 6881240000
 - 6"/165mm – Part No. 6881260000
 - 8" - Part No. 6881280000
2. Clapper Rubber Facing and Clamping Ring Assembly (see Table H).
3. Seat "O"-Rings (see Table H).
 - c. In either case (a or b above), drain the system. Remove cover, shaft pipe plug, hinge pin, and clapper assembly. **Note:** Hold down the hinge spring when removing the hinge pin
 - d. Carefully inspect for the following:
 - Damage to clapper rubber facing – Inspect surface for imbedded foreign matter. Replace facing if found damaged (be certain that clapper and clapper clamping ring surfaces are thoroughly cleaned before assembling with new facing.)
 - Damage to seat surface – Clean seat thoroughly. Inspect for any nicks in seat or stones or other foreign matter lodged in seat groove. If seat or other parts of valve are found to be severely damaged, an authorized Reliable distributor should be contacted.
 - e. To replace seat "O"-Rings:
 - Using the seat wrench, unscrew the seat. Use care to avoid damage to the seat surface.
 - Remove "O"-Rings. Thoroughly clean "O"-Ring grooves and sealing surfaces. Inspect for damage or foreign material.
 - Apply a light coat of lubricant to new "O"-Rings and install in the proper grooves. Use care to avoid stretching, twisting or other damage to "O"-Rings.
 - After checking that "O"-Rings are correctly installed, carefully reinstall seat and tighten securely with the seat wrench.
 - f. Reassemble the clapper assembly in the reverse order used for removal.
 - g. Move the handle of the Test and Drain valve to the "Closed" position.
 - h. Slowly open the main control valve. Ensure that the main control valve is properly supervised in the open position.

C. False Alarms

False alarms are generally caused by pressure surges in the water supply and can occur if the system loses its effective excess pressure (see "Operation"). Similar readings on the system and supply pressure gauges are a visual indication that the excess pressure condition has been lost. One or more of the following will contribute to this loss of pressure – Leaking system drain valves, leaking at the Alarm Valve Seat, leaking between the Clapper and the Facing, or leaking at the Bypass Check Valve.

Corrective Steps:

1. Check system drain valves for tightness.
2. In order to find and correct a leak at the alarm valve seat, proceed as outlined in B.1. through 2.
3. To correct a leak between the clapper and the clapper facing, proceed as outlined in B.2.c. and B.2.d.1.
4. In order to find and correct a leak through the bypass check valve, proceed as follows:
 - a. Close the main control valve and relieve pressure between main control valve and clapper of the alarm valve through the ¼" NPT lower gauge valve. Close this valve before removing the ¼" NPT plug, and open after the plug is removed to relieve pressure. If water continues to flow from this valve, the bypass Check Valve should be cleaned, repaired or replaced.
 - b. If bypass Check Valve is leaking, replace after draining the system completely.
 - c. Following all repairs, slowly open the main control valve, and supervise it appropriately.
5. If the retard and mechanical sprinkler alarm line does not drain completely, false alarms may result. In this case, check both drain orifices to ensure they are not plugged.

D. Intermittent Alarms

Intermittent alarms are the result of excessive confined air trapped in the sprinkler system piping. To correct this problem, fill the system slowly while venting air at all system openings. When the system is fully pressurized, vent air at all system high points including sprinkler connections if necessary.

Maintenance

The owner is responsible for maintaining the fire protection system in proper operating condition. Any system maintenance or testing that involves placing a control valve or detection/control system out of service may eliminate the fire protection that is provided by the fire protection system.

The Reliable Models E and E3 Alarm Valve and associated equipment shall periodically be given a thorough inspection and test. NFPA 25, "Inspection, Testing and Maintenance of Water Based Fire Protection Systems," provides minimum maintenance requirements. System components shall be tested, operated, cleaned, and inspected at least annually, and parts replaced as required.

Guarantee

For Reliable Automatic Sprinkler Co., Inc. guarantee, terms, and conditions, visit www.reliablesprinkler.com.

Ordering Information

Specify:

Model E or E3 Alarm Check Valve with E4 Trim

Size

- 4" (100mm)
- 6" (150mm)
- 165mm (Model E3 grooved ONLY)
- 8" (200mm)

Trim

- Variable Pressure Vertical
- Variable Pressure Horizontal
- Constant Pressure Vertical
- Constant Pressure Horizontal

End Connections

- US Flange x Flange (Model E)
- US Flange x Groove (Model E)
- Metric Flange x Flange (Model E)
- Metric Flange x Groove (Model E)
- Groove x Groove (Model E3)

Assembly

- Fully Assembled
- Segmented Trim
- Loose Trim

Optional Equipment

- PS10-2 Pressure Alarm Switch
- Relief Valve Kit (please specify pressure)

Table F - Vertical Installation Dimensions - in (mm)

Valve	A	B	C	D	E	F	G	H
4" (100mm)	11-3/4 (298)	3-1/2 (89)	28-1/4 (718)	7 (178)	10-3/4 (273)	7-1/2 (191)	6-1/2 (165)	9-3/4 (248)
6" (150mm) 165mm	13-1/2 (343)	3-1/2 (89)	28-1/4 (718)	7-1/2 (191)	11-3/8 (289)	7-1/2 (191)	6-1/2 (165)	9-3/4 (248)
8" (200mm)	14-1/2 (368)	3 (76)	28-1/4 (718)	9 (229)	12-1/8 (309)	7-1/2 (191)	8 (203)	9-3/4 (248)

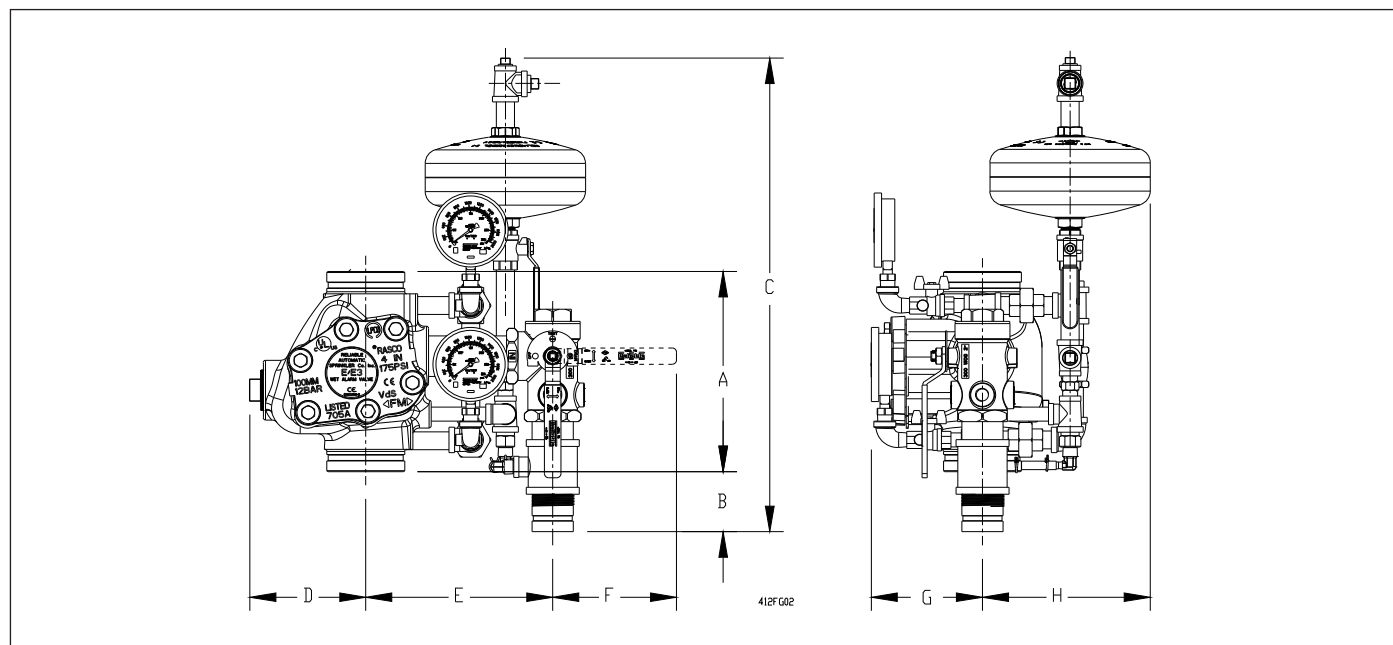


Fig. 2 - Vertical Installation Dimensions

Table G - Horizontal Installation Dimensions - in (mm)

Valve	A	B	C	D	E	F	G
4" (100mm)	11-3/4 (298)	13 (330)	7-1/2 (191)	13-1/8 (334)	20-1/2 (521)	8-1/2 (216)	12-1/4 (311)
6" (150mm) 165mm	13-1/2 (343)	13 (330)	7-1/2 (191)	12-3/8 (313)	22 (559)	10-1/2 (267)	12-1/4 (311)
8" (200mm)	14-1/2 (368)	13-1/2 (343)	7-1/2 (191)	17-1/8 (435)	23 (584)	11-1/2 (292)	12-1/4 (311)

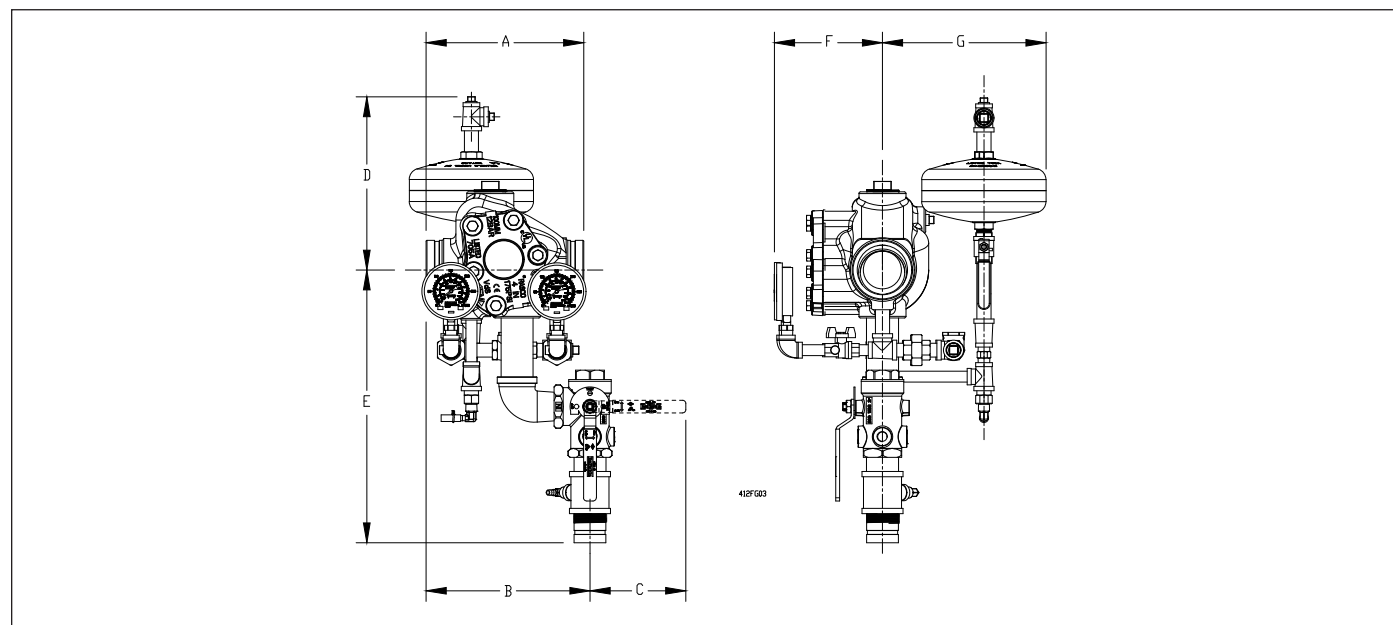


Fig. 3 - Horizontal Installation Dimensions

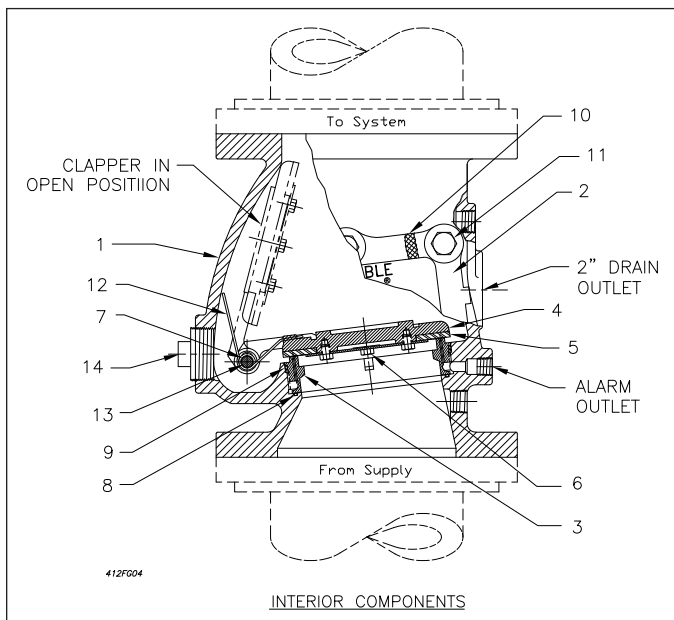


Fig. 4 - Interior Components

Service Kits

Service kits are available for routine servicing of the valve (reference Figure 4). Service kits for the Model E and E3 Alarm Check Valve include the following components:

- Clapper Rubber Facing and Clamping Ring Assembly (Item 5)
- Clamping Ring Screws (Item 6)
- Cover Gasket (Item 10)

4" Model E Service Kit: P/N 6501200R18

6" Model E Service Kit: P/N 6501200R19

8" Model E Service Kit: P/N 6501200R20

Table H - Parts List for Alarm Valves

Item No.	Part Name	Part Number				Material
		4"	6"	165mm	8"	
1	Flanged U.S. Standard Body	91006125	91006127	NA	91006129	4": Gray Cast Iron 6" & 8": Ductile Iron
	Flanged & Grooved U.S. Std. Body	91006154	91006156	NA	91006158	
	Metric Flanged Body	91006190	91006127	NA	91006192	
	Metric Flanged x Grooved Body	91006189	91006156	NA	91006191	
	Grooved Body	91006167	91006165	91006172	91006169	
2	Cover	92116124	92116126		92116128	Gray Cast Iron Class 30
3	Seat	96016124	96016126		96016128	Bronze UNS C 83600
4	Clapper & Bushing Assembly	71020424	71020626		71020828	Gray Cast Iron, Brass, EPDM, Stainless Steel
5	Clapper Rubber Facing and Clamping Ring	93416104	93416106		93416108	EPDM & Stainless Steel
6	Clamping Ring Screws or Nut (4" Qty 1) (6" Qty 4) (8" Qty 5)	94906124	95606126		95606126	Stainless Steel 18-8
7	Hinge Pin	95006124	95006126		95006128	Brass UNS C 36000
8	Lower Seat "O" Ring	95436124	95436126		95436128	Buna-N
9	Upper Seat "O" Ring	95446124	95446126		95446128	Buna-N
10	Cover Gasket	93706124	93706126		93706128	Neoprene or Buna-N
11	Cover Bolts (Qty 6)	91106124	91106126		91106126	Steel
12	Clapper Spring	96406124	96406124		96406124	Bronze UNS C 51-000
13	Shaft Pipe Plug	98604402	8604402		98604402	Steel
14	Drain Plug (Except Metric Valves)	95206104	95206104		95206104	Steel

The equipment presented in this bulletin is to be installed in accordance with the latest published Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable.

Products manufactured and distributed by Reliable have been protecting life and property for over 90 years.

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Reliable Automatic Sprinkler Co., Inc.

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(914) 829-2042

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