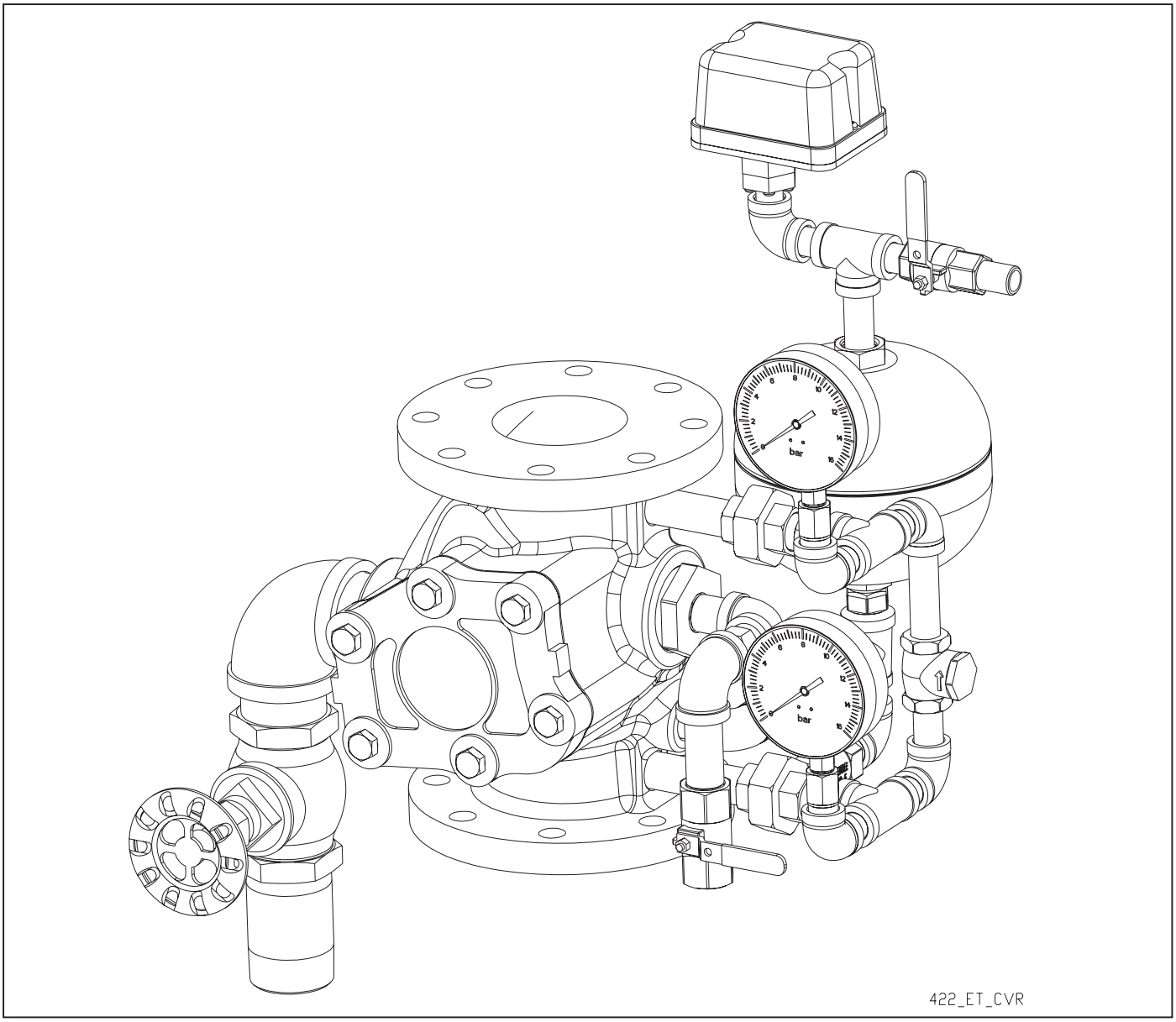
Bulletin 422

Reliable®

Model E
Alarm Check Valve

Instructions for Installation, Operation, Care and Maintenance

DN100, DN150, DN200 SIZE
Model E with E2 Euro Trim



The Reliable Automatic Sprinkler Co., Inc., 525 North MacQuesten Parkway, Mount Vernon, New York, 10552

General

Reliable Model E Alarm Valves are installed in the main supply to a wet pipe system. Variable pressure water supply requires the use of variable pressure trim and a Reliable E-1 Retarding Chamber. Constant pressure water supply requires the use of constant pressure trim only.

Valve Description

1. Rated working pressure 10,0 bar (175 psig)
2. Factory hydrostatic test pressure 24,2 bar (350 psig)
3. End and trim connections –
   A. Metric flanged inlet and outlet
   - 100 and 150 mm valve plain face flanges mate with DIN 2501 NF-E-29-282, ISO 2084 NP10 and NP16 and BS4504 NP16.
   - 200 mm valve raised flanges mate with DIN 2501, ISO 2084 NP16 and BS4504 NP16.
   - Threaded openings per BS21-1957, R2, ISO 7/1 drain, 20mm (¾") NPT alarm section connection.
   - Color – Red

Metric Flange Dimensions in Millimeters							
Valve Size	Bolt Circle Dia.	Bolt Hole Dia.	Raised Dia.	Face Ht.	Flange Outside Dia.	Flange Thickness	No. Bolts
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

   B. Metric flange inlet with US grooved outlet
   - 100 and 150 mm valve plain face flanges mate with DIN 2501 NF-E-29-282, ISO 2084 NP10 and NP16 and BS4504 NP16.
   - 200 mm valve raised flanges mate with DIN 2501, ISO 2084 NP16 and BS4504 NP16.
   - Threaded openings per BS21-1957, R2, ISO 7/1 drain, 20mm (3/4") NPT alarm section connection.
   - Outlet groove per ANSI/AWWA C606.

Grooved Dimensions									
Valve Size		Outlet Dia.		Groove Dia.		Groove Width		Face to Groove Dim.	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
4	100	4.500	114.0	4.334	110.1	3/8	9.5	5/8	16
6	150	6.625	168.0	6.455	164.0	3/8	9.5	5/8	16
8	200	8.625	219.0	8.441	214.0	7/16	11	3/4	19

   - Color– Red
4. Face to Face Dimension:
   - 100mm (4") – 299mm (11 ¾")
   - 150mm (6") – 343mm (13 ½")
   - 200mm (8") – 368mm (14 ½")
5. Friction loss – Expressed in Equivalent Length of Pipe, Based on Hazen & Williams formula with C = 120.

	Equivalent Length
• 100mm	5.18m (17')
• 150mm	8.23m (27')
• 200mm	8.84m (29')

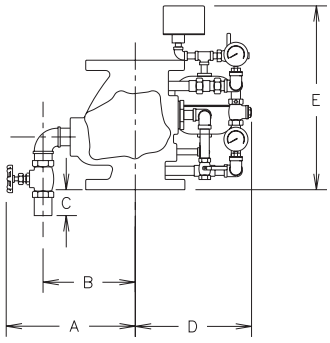
6. Installation measurements, Fig.1.

Trim Description

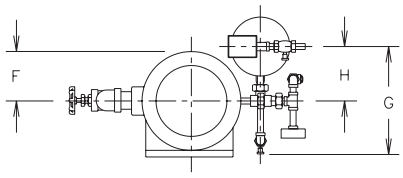
The Reliable Model E2 Euro Alarm Trim is shipped in five pre-assembled segments. These segments speed installation and make it virtually impossible to trim the valve incorrectly. This trim provides a R2, outlet for draining the sprinkler system, a VdS approved alarm pressure switch and a 20mm (¾" NPT) connection for a mechanical sprinkler alarm (the VdS approved Reliable Model C Mechanical Sprinkler Alarm is recommended for this application). The drain section has been fitted with a bypass that allows the testing of the Model E Valve and alarm system without operating the sprinkler system. This trim can be configured to meets the needs of the following applications:

- **Constant Pressure, Basic Trim**
  This trim set is used where the water supply pressure

Installation Measurements in Millimeter								
Valve	A	B	C	D	E	F	G	H
100 MM	394 MM	254 MM	102 MM	318 MM	546 MM	114 MM	343 MM	191 MM
150 MM	400 MM	269 MM	103 MM	343 MM	552 MM	140 MM	343 MM	191 MM
200 MM	413 MM	299 MM	113 MM	365 MM	565 MM	171 MM	343 MM	191 MM



Euro Trim – Front Elevation



Euro Trim – Top View

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Figure 1

does not vary. An elevated tank that supplies water is a suitable example of a constant pressure supply.

- **Variable Pressure, Optional Trims (Fig. 2A & 2B)** This trim is used where the water supply pressure varies. A Model E Retard Chamber, 2,5 mm orifice restriction and ½" x 2" (13mm x 50mm) long galvanized nipple replaces ½" x 10" (13m x 254mm) long galvanized nipple preceding the VdS approved pressure switch to minimize false alarms during supply pressure surges.

Ordering Information – Specify:

- Valve size - 100mm, 150mm or 200mm.
- Type of trim - Constant Pressure or Variable Pressure.
- Optional Equipment: Model C Mechanical Sprinkler Alarm.

Legend for Figure 2A & 2B

A Trial alarm stopcock
B Mechanical Alarm shutoff stopcock
C No Loss Connectors
D Drain valve
F Drip valve
G Alarm pressure switch
H Bypass check valve

Model E Alarm Valve Design

The normal positions of the Model E Alarm Valve parts are shown in (Fig. 3).

Flow of water in the system piping resulting from the discharge through one or more fused automatic sprinklers causes the Clapper (4) to rise off the Grooved Seat (3) and permits water from the supply piping to inter the system. The movement of Clapper (4) on Hinge Pin (8) uncovers the groove in Seat (3) and allows water to flow through the groove into the alarm line to the retard chamber. (Fig. 2)

Continual flow of water fills the retard chamber and flows to mechanical and/or electric alarms. (For details on mechanical and electric alarms refer to their individual instruction sheets.) A small amount of water will flow into the drain cup through the open orifice of the drip valve.

When the water ceases to flow through the alarm valve, Clapper (4) returns to its seat thus stopping the flow of water to the retard chamber. At the same time the restriction and drain orifices allow the retard chamber and alarm line to drain through the drip valve.

System Design Considerations

Virtually all sprinkler system piping contains confined air. When a water hammer or pressure surge occurs in the supply line this confined air is compressed. While the compressing is occurring, the clapper is lifted from the seat. Whenever the duration of a lifted clapper is a substantial, a false alarm condition can occur.

When designing a sprinkler system, the configuration of the piping network must not trap large pockets of air. (Note: however, that small pockets of air are beneficial as they minimize significant system pressure increases that would otherwise occur with no trapped air pockets when ambient temperature increases cause water in the system to expand.)

When a system design permits large pockets of air to exist, an intermittent alarm condition can occur when the inspector's test connection is opened. Initially, the water discharge from the open test connection is produced by the expanding pockets of compressed air in the system pushing out the water. Eventually, the system pressure drops below the supply pressure and the clapper opens (producing an alarm) allowing a surge of new water into the system. This surge increases system pressure while compressing again the air trapped in the pockets. When this surge of water ends, the clapper closes (stopping the alarm) even though water has continuously flowed from the inspector's test connection. This cycle will consistently repeat and produce intermittent alarms when air pockets are large.

Intermittent alarm conditions can usually be prevented by one or more of the following remedies:

1. Install a small air vent valve at/near the peak of each high elevation point in the sprinkler system. The

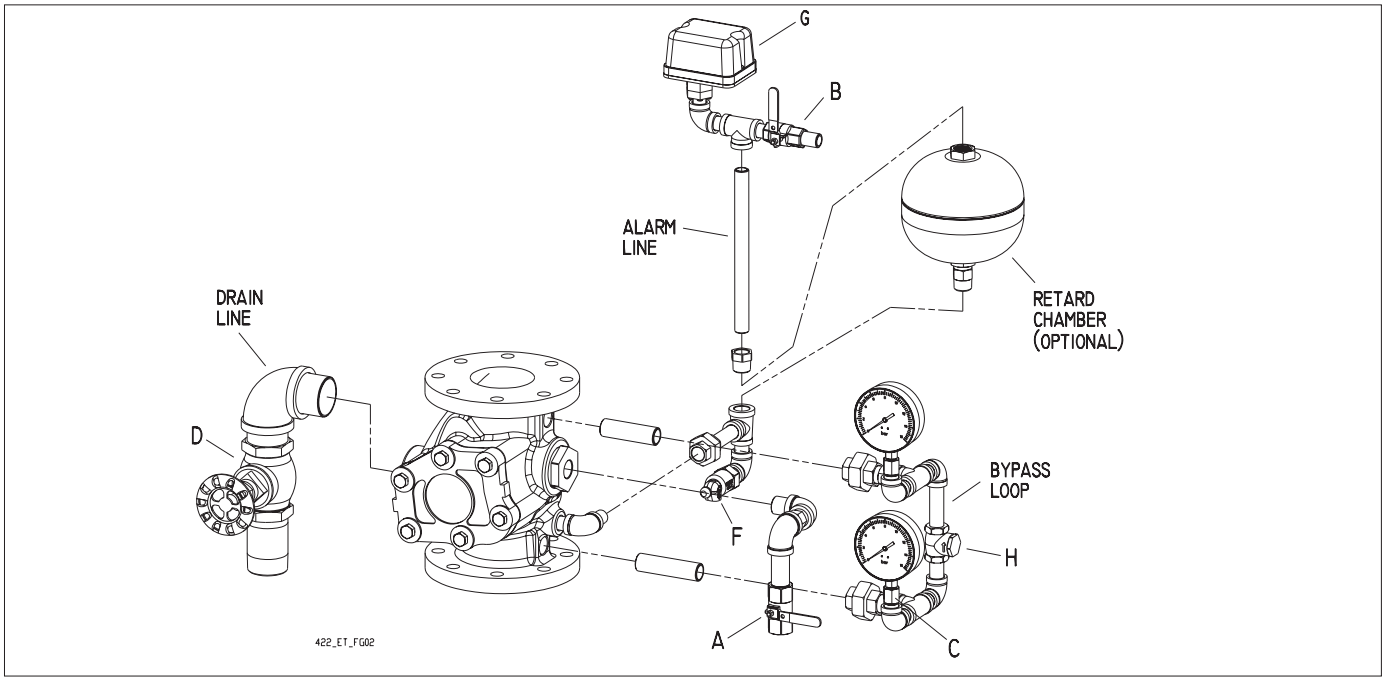

Figure 2A

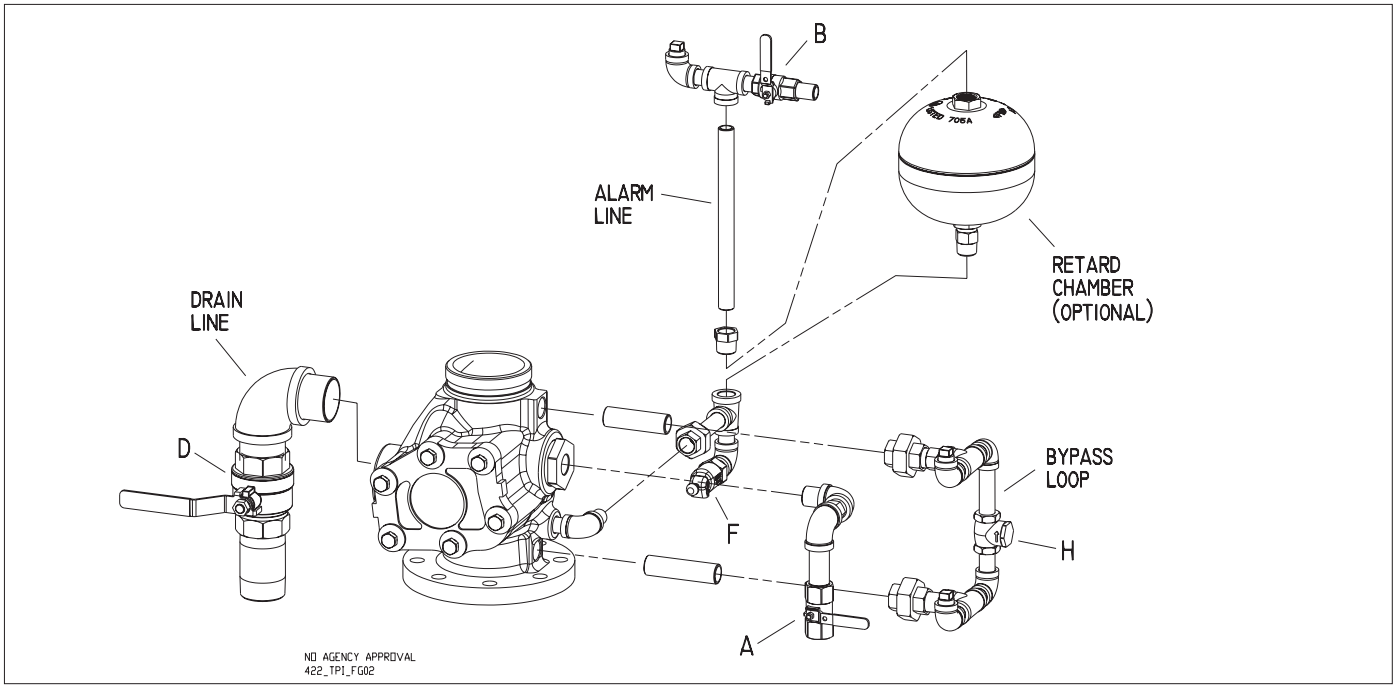

Figure 2B

inspector's test connection can be this air vent in some cases.

2. While filling the system piping, flow water into the system very slowly to allow water flowing into branch lines sufficient time to expel the air before water in main lines cover openings to branch lines.
3. Flow water into the system with the inspector's test connection and other vent valves in the full open position. After air is expelled from vent valves and they are closed, install a plug in each vent valve outlet to prevent an accidental discharge of water.

Variable Pressure Equipment

The Reliable Model E Alarm Valve with E2 Trim minimizes false alarms under these conditions by two features:

1. The bypass line (Fig. 2) with check valve allows surges to pass from the supply to the system side of the alarm valve clapper without lifting the clapper off its seat. Repeated surges build up an effective excess pressure in the system, which steadies the clapper and reduces false alarms. Should a heavy surge force the clapper off its seat and allow water to flow out the alarm line, then the retard chamber comes into action.
2. The retard chamber with restriction and drain orifice allow intermittent flows to be drained before they can fill the chamber and pass through to operate the electric and mechanical alarms.

Constant Pressure Equipment

The operation of this equipment is the same as described for the Variable Pressure Equipment, except that due to the water supply being constant, the retard chamber is not required. The water, on passing through the groove in the seat of the alarm valve flows directly to operate the electric and mechanical alarms.

Setting into Operation

Verify that all trim parts are installed according to Fig. 2 and that the pipe system does not leak. Close drain valve D, trial alarm stopcock A and alarm shutoff stopcock B. Slowly open main shutoff valve a few turns until water fills the sprinkler pipe system at a moderate speed. Check pipe system for leaks during and after the filling process. When both gauges indicate the preset operating pressure and the flow of water has stopped, fully open main shutoff valve and secure it in this position. After this the pipe system must be vented carefully. Open alarm shutoff valve B and drain any water present in the alarm line by opening the drip valve F.

The wet alarm valve station is operational when:

- Main shutoff valve and alarm shutoff stopcock B are open.
- Trial alarm stopcock A and drain valve D are closed.
- Both gauges indicate the preset operating pressure.
- Drip valve F does not leak.
- No alarm is present at the central fire alarm system.

Restoring Operational Readiness Following a Fire

After the authorized person has confirmed that the fire is extinguished and has given the instruction to shut off the sprinkler system, close main shutoff valve and drain pipe system by opening drain valve D. Shut off the sprinkler pump, if present, according to the instructions for use. Replace opened and damaged sprinklers with same type sprinklers from the spare stock (replenish spare stock). Reset alarm and restore operational readiness according to the Setting into Operation section.

Monitoring and Trials

The sprinkler system must be monitored by the prescribed checks according to VdS 2092.

Conducting the Weekly Trial Alarm

Disable electric alarm and/or inform the alarm receiver(s) of the trial alarm. After this trigger wet alarm valve station by opening the trial alarm stopcock A until the mechanical alarm sounds. After this close trial alarm stopcock A again and drain the alarm line by opening drain valve F. After this reset the electric alarm and enable

the fire alarm system again. Inform the alarm receiver(s) that operational readiness has been restored.

Maintenance

Perform maintenance on type "E" wet alarm valve stations at least annually. Worn or defective parts must be replaced. Usually any trouble will be shown by one or more of the following symptoms:

- Mechanical sprinkler alarm (water motor) not operating See Bulletin 613 for corrective measures.
- False Alarms; see page 6
- Intermittent Alarms; see System Design Considerations on page 3 & 5

Alarm Valve (Ref. Fig.3)

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

1. Seat Installation Wrench: 200mm Part Number 6881280000; 150mm Part Number 6881280000; 100mm Part Number 6881240000.
2. Clapper Rubber Facing: Item 5.
3. Seat "O" Rings: Items 9 and 10.
   a. Drain system by opening Drain Valve D (Fig.2).
   b. Remove Cover (2) Shaft Pipe Plug (14). Hinge Pin (8) and Clapper Assembly (4).
      Note: Hold down Spring (13) when removing Hinge Pin (8).
   c. Carefully inspect for the following:
      1. 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.)
      2. 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.
   d. To replace seat "O" rings
      1. Using the seat wrench, unscrew the seat. Use care to avoid damage to the seat surface.
      2. Remove "O" Rings, items 9 and 10, (Fig. 3) Thoroughly clean "O" ring grooves and sealing surfaces. Inspect for damage or foreign material.
      3. 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.
      4. After checking that "O" rings are correctly installed, carefully reinstall seat and tighten securely with wrench.
   e. To reassemble alarm valve
      1. Replace Clapper Assembly on seat. Insert Hinge Pin (8) in valve and pass it through one bearing of Clapper (4) Press and Hold Spring (13) securely in position between clapper arm bearings and push clapper arm shaft through spring coils to far side of valve - Replace Shaft Pipe Plug (14).
      2. Lift toe of clapper – verify proper seating, and no binding when clapper is lifted.
      3. Replace Cover (2) being sure Cover Gasket (11) is in position and bolts and nuts are securely tightened.
      4. Close Drain Valve D (Fig. 2) Slowly open and seal main control valve. Be sure Valve B is sealed in open position.

Contact the installing contractor or Reliable if any difficulties are experienced. Should replacement parts be needed, use only genuine Reliable made parts. When ordering, specify part number, name, size, model and serial number of the unit.

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 Setting into Operation). A visual indication of this condition is given by similar readings on the system and supply pressure gauges. One or more of the following will contribute to this loss of system pressure: leaking drain valves, leaking at the Alarm Valve Seat (3) (Fig. 3) leaking between the Clapper (4) and the Facing (5) or leaking at the bypass check valve (Fig. 2).

Corrective Steps:

I. Check system drain valves for tightness.
II. In order to find and correct a leak through the bypass check valve, proceed as follows:
   Refer to Fig. 2
   a. Close the main control valve. Cycle valve (A), to relieve pressure between main control valve and clapper of alarm valve, and return it to the open position when done. Open low union of the bypass and pull the lower part of the bypass away from the E valve. A steady leak at the union indicates the bypass check valve has foreign matter under the seat or the clapper rubber facing needs replacing.
   b. If bypass check valve is leaking, repair opening drain valve and draining system.
   c. Reconnect union, close valve (A) and (D) and then slowly open and seal main control valve.
III. If the retard and mechanical sprinkler alarm line does not drain completely, false alarms may result. In this case, check retard drain orifice and drip valve (Fig. 2) to ensure they are not plugged and are operating properly.

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 the air at all of the system's high points also including the sprinkler connections if necessary.

Contact the installing contractor or Reliable if any difficulties are experienced. Should replacement parts be needed, use only genuine Reliable made parts. When ordering, specify part number, name, size, model and serial number of the unit.

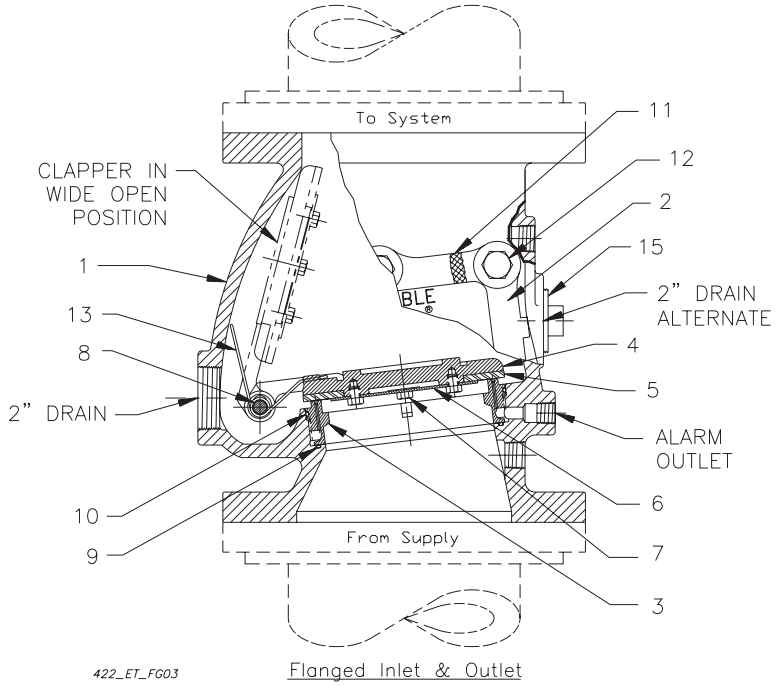

Figure 3

Item No.	Part Name	Part Number			Quantity		
		100mm	150mm	200mm	100mm	150mm	200mm
1	Body, Metric Flanged	91006130	91006131	91006132	1	1	1
	Body Metric FLG X Groove Outlet	91006154	91006186	91006188			
2	Cover	92116124	92116126	92116128	1	1	1
3	Seat	96016124	96016126	96016128	1	1	1
4	Clapper & Bushing Assembly	71020424	71020626	71020828	1	1	1
5	Clapper Rubber Facing & Clamping Ring Assembly	93416104	93416106	93416108	1	1	1
6	Clamping Ring	93406124	93406126	93406128	1	1	1
7	Clamping Ring Screws or Nut	94906124	95306126	95306126	1	4	5
8	Hinge Pin	94906124	95606126	95606126	1	1	1
9	Seat "O" Ring	95436124	95436126	95436128	1	1	1
10	Seat "O" Ring	95406124	95446126	95446128	1	1	1
11	Cover Gasket	93706124	93706126	93706128	1	1	1
12	Cover Bolts	91106124	91106126	91106128	1	1	1
13	Clapper Spring	96406124	96406124	96406124	6	6	6
14	Shaft Pipe Plug (Not Shown)	98604402	98604402	98604402	1	1	1
15	Drain Plug	95200020	95200020	95200020	1	1	1
–	Euro Retard Chamber Kit	6303000523	6303000523	6303000523	–	–	–

The Equipment presented in this bulletin is to be installed in accordance with the latest pertinent 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 80 years, and are installed and serviced by the most highly qualified and reputable sprinkler contractors located throughout the United States, Canada and foreign countries.

Manufactured by

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The Reliable Automatic Sprinkler Co., Inc
(800) 431-1588 Sales Offices
(800) 848-6051 Sales Fax
(914) 668-3470 Corporate Offices
www.reliablesprinkler.com Internet Address

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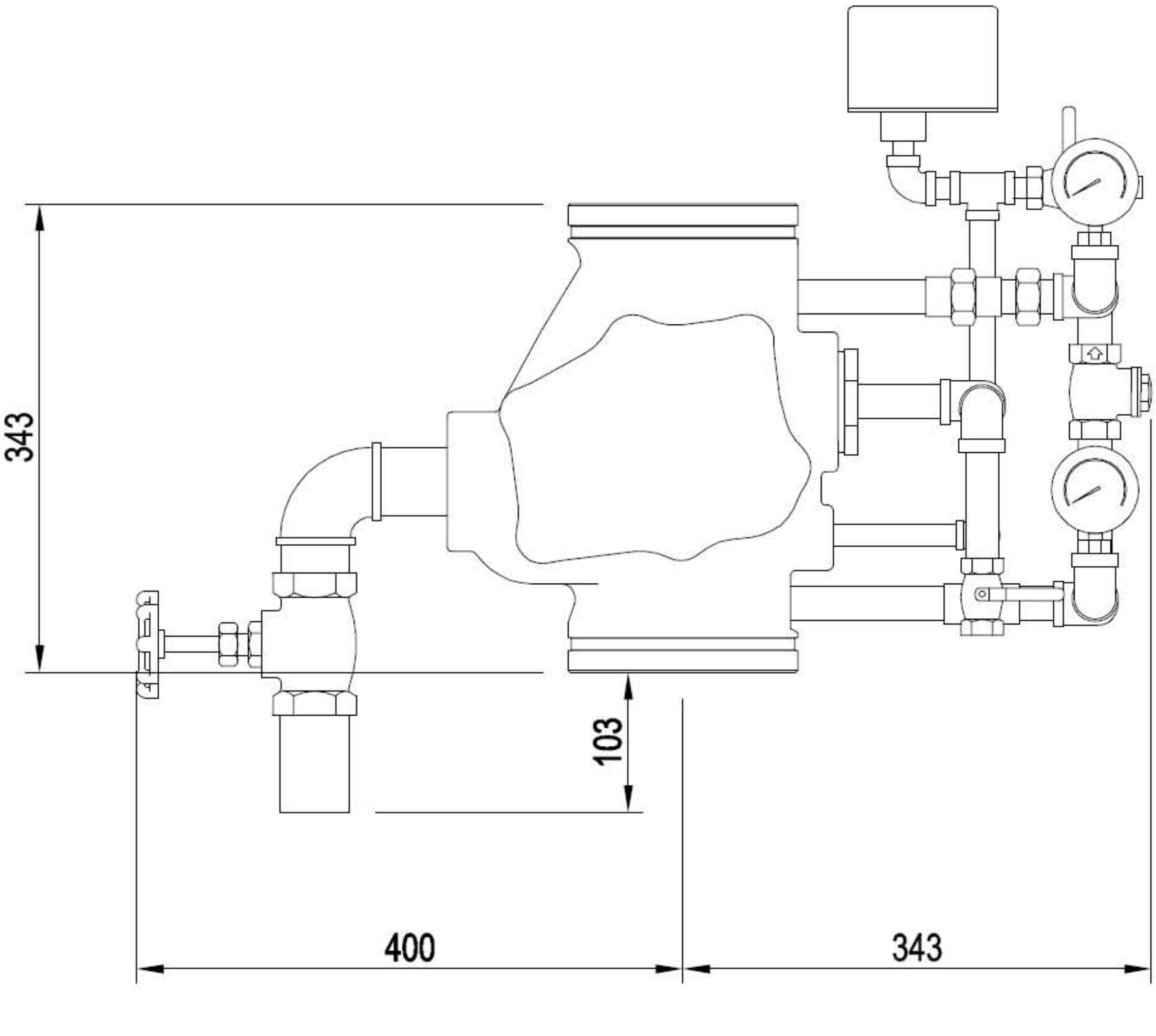
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