

Reliable®

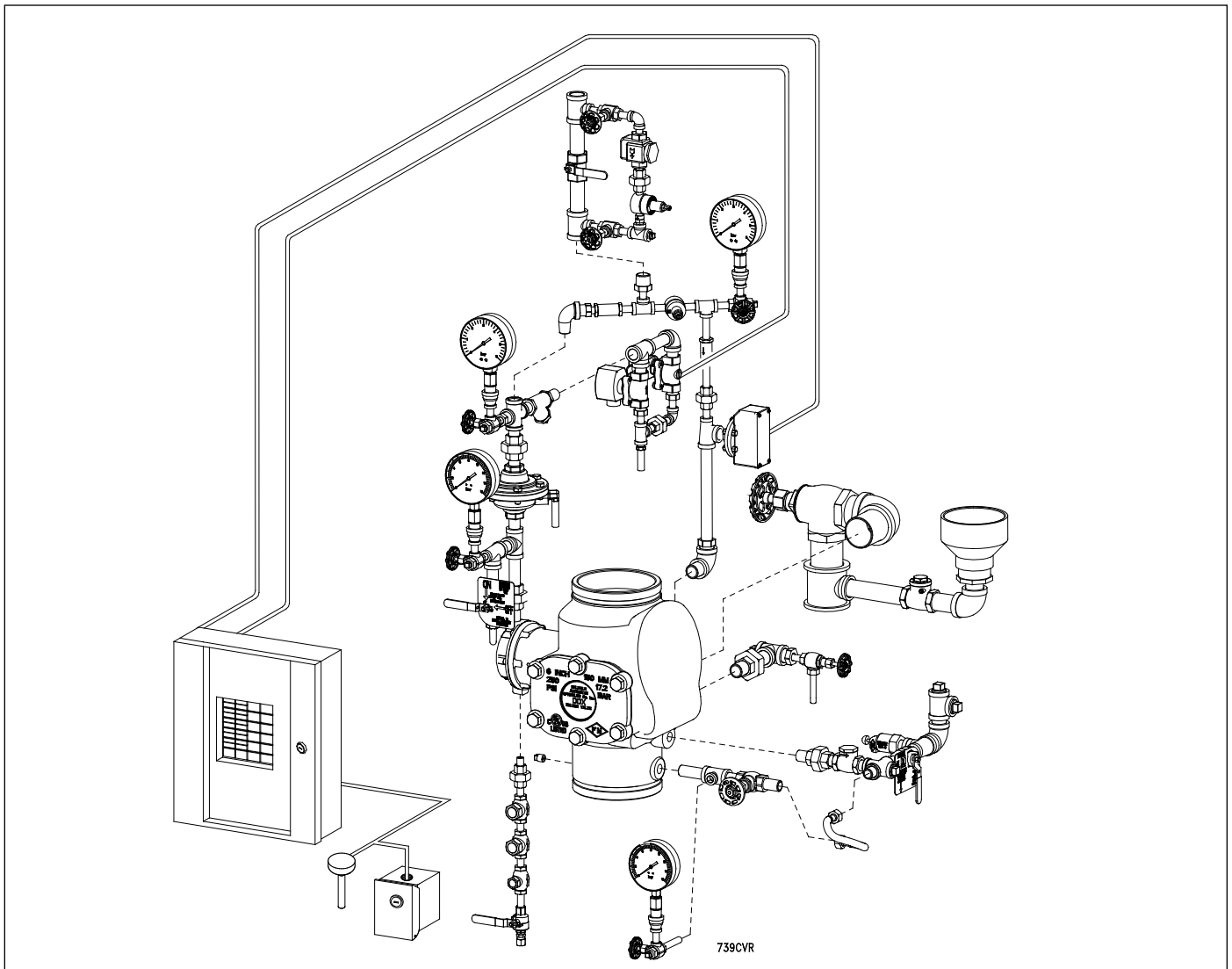
Single Interlock Preaction System

Instructions for Installation, Operation, Care and Maintenance

For Single Interlock Preaction Systems
With Dual Solenoid Actuation
Of Pneumatic Pilot Release

4"(100mm),
6"(150mm) & 165mm
Sizes with Trim

- LPCB Approved
- Redundant Solenoid Valve Release
- Rated to 175 psi (12.1 bar)
- Externally Resettable Clapper
- One Main Drain



General Description

Reliable Single Interlock Preaction Systems are designed for water-sensitive areas that require protection from inadvertent water flow into the sprinkler system piping.

Sprinkler piping in single interlock systems can effectively be supervised by means of a Reliable Model A-2 Pressure Maintenance Device and a tank-mounted air compressor. Loss of supervising pneumatic pressure, due to a damaged sprinkler or sprinkler pipe will not cause water to flow through the Model DDX Deluge Valve and into the system piping. A significant loss of pneumatic pressure will activate a trouble-annunciating device when the system pressure falls below a predetermined pressure level.

When one electrical detector senses the presence of fire, the electrical releasing control panel activates fire alarm devices and energizes the two redundant, normally-closed solenoid valves in the open position (**Note: Arranging detectors in a cross-zoned pattern will require operation of two detectors before the solenoid valves can open**). These solenoid valves, when closed, retain sufficient AIR pressure in the Model LP Pilot Line Actuator, which in turn preserves sufficient WATER pressure in the push rod chamber of the Model DDX Deluge Valve in order to maintain it closed.

Energizing the solenoid valves relieves the air pressure in the Model LP Dry Valve Actuator (see Fig. 8), thereby releasing the water pressure that it was retaining. This in turn relieves the pressure in the push rod chamber of the Model DDX Deluge Valve. Venting this push rod chamber will open the Model DDX Deluge Valve and allow water to flow into the sprinkler system.

To fully operate a cross-zoned single interlock system, two electrical detectors must activate and a sprinkler head must open. During the early stages of a fire, smoke or heat activates the first detector, which causes the control panel to produce a local alarm and an alarm at the main fire alarm panel. Electrical relays inside the releasing control panel can be used to shut down air-moving equipment or activate security doors and other electrical devices. Subsequent activation of a second, nearby or adjacent detector will cause the panel to energize the solenoid valves open and release water into the sprinkler system piping. Water flowing into the sprinkler system piping will simultaneously produce water pressure that causes the transfer of contacts in the pressure switch mounted in the trim. This pressure switch can electrically initiate the shutdown or startup of equipment, such as computers or other second alarm devices. This flow of water into the sprinkler system piping effectively converts the dry system into a wet pipe system. In the event that the fire subsequently produces sufficient heat to operate a sprinkler head, water will flow from that sprinkler, controlling or suppressing the fire.

The major benefits of a single interlock preaction system, when compared with a wet pipe (deluge) system are as follows:

A. A fire alarm sounds prior to the operation of a sprinkler head, which may enable extinguishing the fire by handheld means before the actual operation of any sprinklers and subsequent water damage.

B. A trouble annunciator signals whenever the integrity of the piping or sprinklers is accidentally or intentionally disturbed; however, no water flow or water damage will occur at that time.

C. Speedy detection and an early fire alarm are provided by fire detectors, without the delay associated with water delivery time in the event of a fire. **Note: with a wet pipe system, the fire alarm is delayed until after water has begun flowing from an operated sprinkler head.**

At the heart of Reliable's Single Interlock Preaction System is the Model DDX Deluge Valve. This Deluge Valve is a hydraulically operated, straight-through-design, differential-type valve (see Fig. 1). System maintenance is simplified since priming water is not required and the deluge valve can be reset externally without cover removal. This is accomplished by pushing in and turning the external reset knob at the rear of the deluge valve (see Fig. 1). This feature provides a significant system-restoration time advantage.

The Reliable Single Interlock Preaction System trim set (see Fig. 2) provides all of the necessary equipment for connections to the Model DDX Deluge Valve's pushrod chamber inlet and outlet ports, the 2" (50mm) main drain, alarm devices, air supply, water supply, and required pressure gauges. This trim set is available in individual parts, in time-saving, segmentally assembled kit forms, or fully assembled to the Model DDX Deluge Valve.

Listing & Approvals

The 4" (100mm), 6" (150mm) and 165mm Single Interlock Preaction Systems shown in this bulletin must only be used in the combination described herein to be Loss Prevention Certification Board (LPCB) approved. Installation of these systems must be according to the requirements of Technical Bulletin TB208.

The majority of the system's components are individually Listed by Underwriters Laboratories Inc. and Factory Mutual Approved.

Loss Prevention Certification Board (LPCB)

Installation Requirements of

Preaction systems Include:

1. Solenoid valves shall be installed in parallel.
2. Solenoid valves shall function in pneumatic conditions only, and be protected by a strainer.
3. LPCB Certified detectors compatible with the control and indicating equipment shall be used.
4. Suitable electrical detection, control and indicating equipment and pneumatic systems shall be used. The control and indicating equipment shall be LPCB approved / certified.
5. Connecting cables shall comply with BS 6387:1983, classification C, W, Z evidenced by LPCB certification.
6. Pre-action systems shall be electrically monitored to demonstrate that they are in a 'ready to operate' state at all times.
7. Clear dry air shall be used. Compressor tank must have provision for draining.
8. Pre-action system equipment shall be installed, operated and maintained as prescribed in the firm's installation, operating and maintenance manual.
9. Pre-action systems shall be configured in accordance with the manufacturer's defined specifications.
10. Pre-action systems shall comply with the details specified in the related LPC Technical Bulletin (Ref. TB21).

11. The firm responsible for the complete pre-action station, including electrics, shall be identified.
12. Normally un-energized solenoids may be used, provided that they are continuously monitored for 'open' and 'short circuit.'

System Operation

To fully operate a Reliable Single Interlock Preaction System, two independent events must coexist before water flow will occur. One electrical detector (two detectors in a cross-zoned system) must activate and a sprinkler head must open. Operation of either one of these items will only cause an alarm to annunciate, but will not cause water to discharge from the sprinkler system piping.

When set correctly for service, the Model DDX Deluge Valve is hydraulically established to withhold the supply water from the sprinkler system piping. The Reliable Model DDX Deluge Valve is shown in both closed and open positions in Fig.1. In the closed position, the supply pressure acts on the underside of the clapper and also on the push rod through the push rod chamber's inlet restriction. The resultant force due to the supply pressure acting on the push rod is multiplied by the mechanical advantage of the lever and is more than sufficient to hold the clapper closed against normal supply pressure surges.

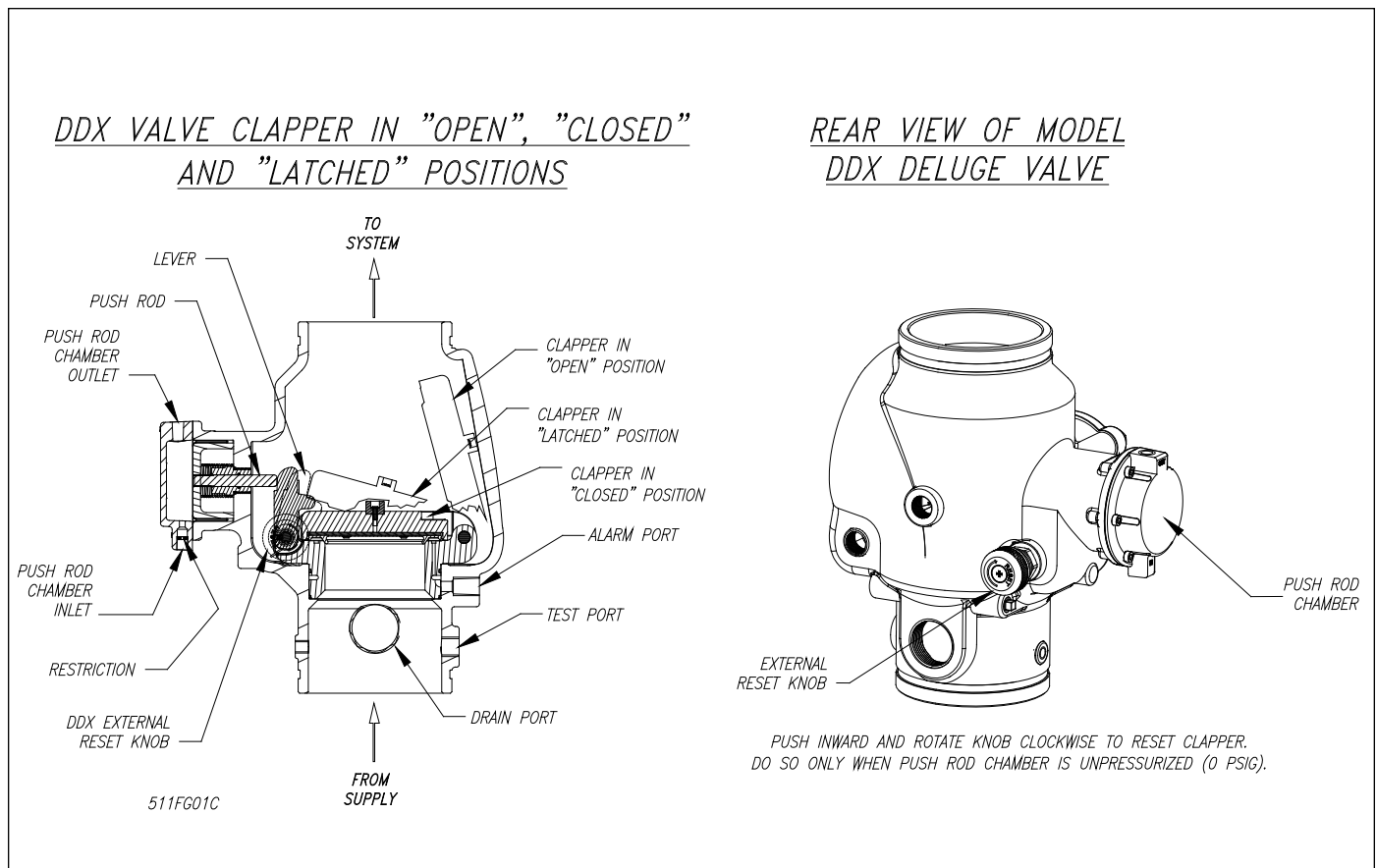


Fig. 1

SINGLE INTERLOCK PREACTION TRIM

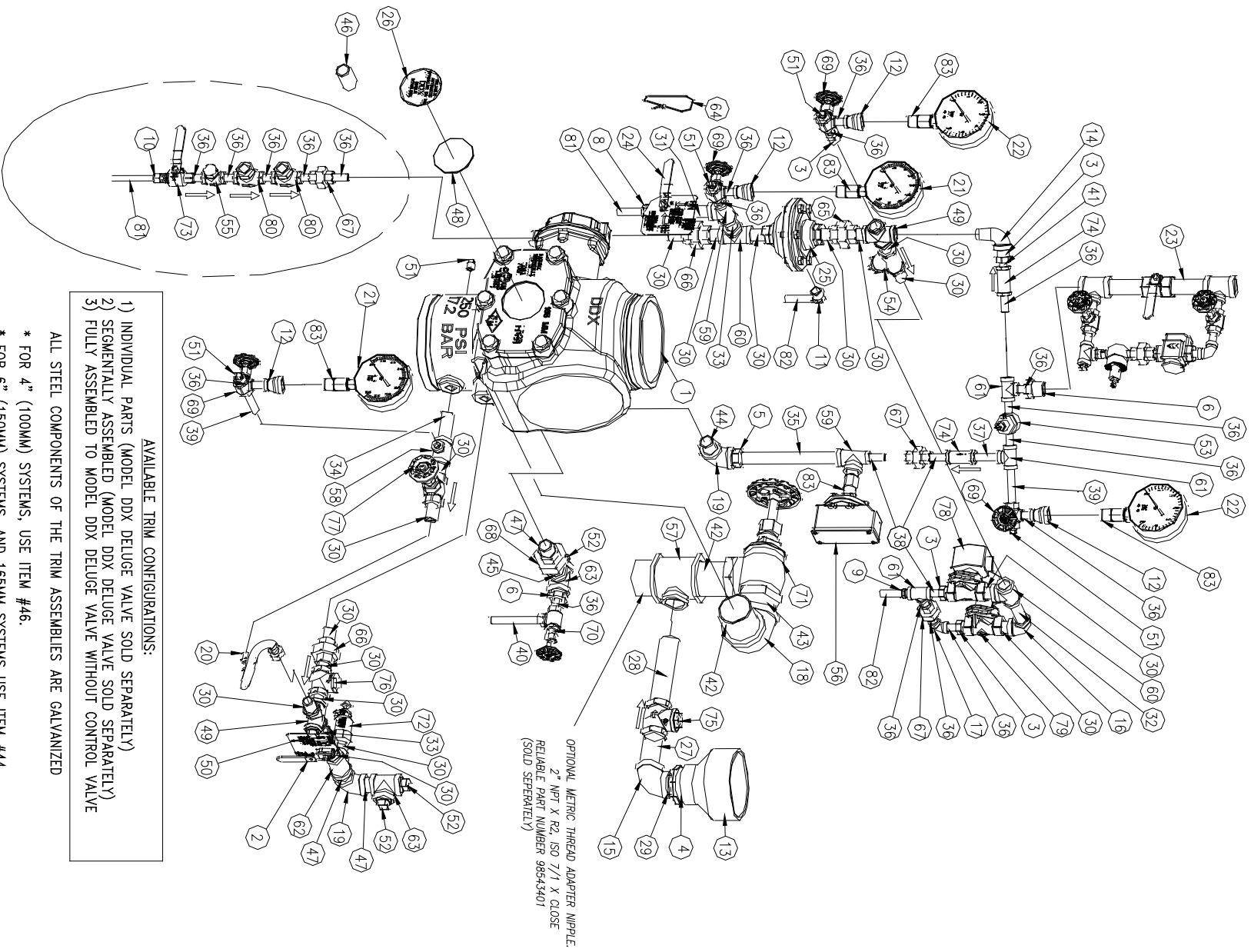


Fig. 2

SINGLE INTERLOCK PREACTION SYSTEM PARTS LIST (REFER TO FIG. 2)

ITEM NO.	PART NUMBER	DESCRIPTION	NO REQ'D
1	6103040026	MODEL DDX VALVE, ASSEMBLY, 4" (100MM)	1
1	6103060024	MODEL DDX VALVE, ASSEMBLY, 6" (150MM)	1
	6103060028	MODEL DDX VALVE, ASSEMBLY, 165 MM	
2	78653004	ASSEMBLY, VALVE CAUTION STATION, 1/2"	1
3	98048000	BUSHING, REDUCER, 1/2" x 1/4", GALV.	4
4	98048015	BUSHING, REDUCER, 2" SPIGOT x 1" NPTF, PVC	1
5	98048022	BUSHING, REDUCER, 3/4" X 1/2", GALV.	1
6	98048025	BUSHING, REDUCER, 3/4" X 1/4", GALV.	2
7	92056809	CONNECTOR ASSEMBLY, NO-LOSS, 3/8 x 1/2 NPT	1
8	92056810	CONNECTOR, 3/8" ID TUBE x 1/2" NPT	1
9	--	--	--
10	92056702	CONNECTOR, 3/8" TUBING x 1/4" NPT	1
11	92056704	CONNECTOR, ELBOW, 3/8" ID TUBE x 1/2" NPT	1
12	98085666	REDUCER, 1/2" x 1/4"	4
13	98050004	DRAIN CUP, PVC	1
14	98174400	ELBOW, STREET, 1/2"	1
15	98174403	ELL, 1"	1
16	98174401	ELL, 1/2"	1
17	98174404	ELL, 1/4"	1
18	98174405	ELL, 2"	1
19	98174402	ELL, 3/4"	2
20	96920912	FLEX LINE, 12"	1
21	98240006	GAUGE, WATER PRESSURE (16 BAR) W/ CONNECTOR	2
22	98240101	GAUGE, WATER PRESSURE (6 BAR) W/ CONNECTOR	2
23	6304000100	MOD. A-2 AUTO AIR MAINTENANCE DEVICE, 10PSI	1
24	78653000	MODEL B MANUAL EMERGENCY STATION	1
25	71030010	MODEL LP DRY VALVE ACTUATOR	1
26	94616917	NAMEPLATE, SINGLE INTERLOCK	1
27	98543222	NIPPLE, STEEL, 1" X 3-1/2"	1
28	98543266	NIPPLE, STEEL, 1" X 6"	1
29	98543213	NIPPLE, STEEL, 1" X CLOSE	1
30	98543223	NIPPLE, STEEL, 1/2" X 1-1/2"	17
31	98543210	NIPPLE, STEEL, 1/2" X 2-1/2"	1
32	98543216	NIPPLE, STEEL, 1/2" X 3-1/2"	1
33	98543209	NIPPLE, STEEL, 1/2" X 2"	2
34	98543230	NIPPLE, STEEL, 1/2" X 3"	1
35	98543211	NIPPLE, STEEL, 1/2" X 6-1/2"	1
36	98543226	NIPPLE, STEEL, 1/4" X 1-1/2"	19
37	98543225	NIPPLE, STEEL, 1/4" X 2-1/2"	1
38	98543244	NIPPLE, STEEL, 1/4" X 2"	3
39	98543220	NIPPLE, STEEL, 1/4" X 3"	2
40	98543243	NIPPLE, STEEL, 1/4" X 4"	1
41	98543227	NIPPLE, STEEL, 1/4" X CLOSE	1
42	98543208	NIPPLE, STEEL, 2" X 3"	2

ITEM NO.	PART NUMBER	DESCRIPTION	NO REQ'D
43	98543238	NIPPLE, STEEL, 2" X CLOSE	1
44	98543215	NIPPLE, STEEL, 3/4" X 1-1/2"	1
45	98543233	NIPPLE, STEEL, 3/4" X 2-1/2"	1
46	98543232	NIPPLE, STEEL, 3/4" X 2"	1
47	98543279	NIPPLE, STEEL, 3/4" X CLOSE	3
48	99080002	PAD-ADHESIVE	1
49	98750003	PIPE CROSS, 1/2"	2
50	98604406	PLUG, SQ. HD., 1/2"	1
51	98614403	PLUG, SQ. HD., 1/4"	5
52	98614401	PLUG, SQ. HD., 3/4"	3
53	98681630	REGULATOR, AIR LINE	1
54	78650201	STRAINER, 1/2" NPT	1
55	98727607	STRAINER, 1/4"	1
56	96556922	SWITCH, PRESSURE, BAILEY & MACKEY	1
57	96606627	TEE, GLVN, 2 X 2 X 1	1
58	96606607	TEE, GLVN., 1/2 X 1/2 X 1/4	1
59	98761649	TEE, GLVN., 1/2 X 1/4 X 1/2	2
60	98761651	TEE, GLVN., 1/2"	2
61	96606608	TEE, GLVN., 1/4 X 1/4 X 1/4	3
62	96606612	TEE, GLVN., 3/4 X 1/2 X 1/2	1
63	96606601	TEE, GLVN., 3/4"	2
64	89141112	TIE, RETAINING	3
65	98815204	UNION, "O" RING SEAL, 1/2"	1
66	98815200	UNION, 1/2", IRON, G.J., GALV.	2
67	98815201	UNION, 1/4", IRON, G.J., GALV.	3
68	98815202	UNION, 3/4", IRON, G.J., GALV.	1
69	98840160	VALVE, 3-WAY, 1/4"	4
70	98840101	VALVE, ANGLE, 1/4"	1
71	98840100	VALVE, ANGLE, 2"	1
72	78653100	VALVE, BALL DRIP, 1/2"	1
73	98840110	VALVE, BALL, 1/4"	1
74	98840144	VALVE, CHECK GAUGE	2
75	98840145	VALVE, CHECK, 1"	1
76	98840181	VALVE, CHECK, 1/2"	1
77	98840171	VALVE, GLOBE, 1/2"	1
78	6871020010	VALVE, SOLENOID ASCO	1
79	6871020000	VALVE, SOLENOID SKINNER	1
80	98840193	VALVE, SPRING CHECK, 1/4"	2
81	96686722	TUBING, COPPER, 3/8" O.D. X 2 FT	1
82	96686756	TUBING, PVC, 3/8" I.D. x 6 FT	1
83	92056809	CONNECTOR, NO-LOSS	4

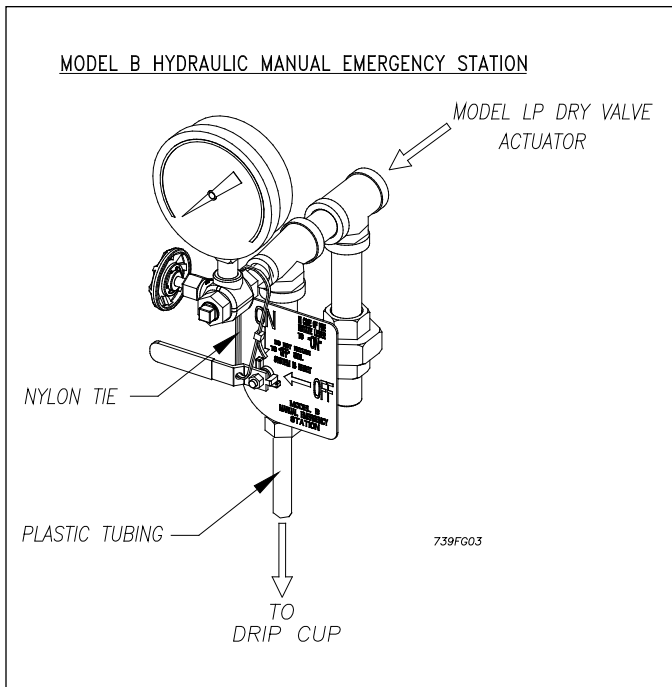


Fig. 3

When a fire is detected, the energized solenoid valves vent the air from the Model LP Dry Valve Actuator (see Fig. 8), which in turn vents the push rod chamber to atmosphere through the chamber's outlet. Since the pressure cannot be replenished through the inlet restriction as rapidly as it is vented, the pushrod chamber pressure falls instantaneously. When the pushrod chamber pressure approaches approximately one-third of the supply pressure, the upward force of the supply pressure acting beneath the clapper overcomes the lever-applied force thereby opening the clapper.

Once the clapper has opened, the lever acts as a latch, preventing the clapper from returning to the closed position. Water from the supply flows through the deluge valve into the system piping. Water also flows through the deluge valve alarm outlet to the alarm devices.

After system shutdown, resetting the Model DDX Deluge Valve is quite simple. Doing so only requires pushing in and turning the reset knob at the rear of the valve (see Fig.1). The external reset feature of the Model DDX Deluge Valve provides a means for simple, economical system testing, which is one essential facet of a good maintenance program.

The external reset feature does not, however, eliminate another important facet of good maintenance, namely, periodic cleaning and inspection of the internal valve parts. In the event that water builds up inside the valve due to condensate from the air supply system or water left inside from valve system testing, a drain is available for venting. After closing the main supply valve, a small valve over the drain cup can be opened slightly until the water inside the valve body and the main pipe column has drained. See the section titled "Draining Excess/Condensate Water From System" in this bulletin for the

detailed procedure.

The Model B Manual Emergency Station (see Fig. 3) is also included in the trim set. It consists of an aluminum nameplate mechanically attached to a ball valve. The valve handle in its OFF position is guarded against accidental turning to the ON position (and system discharge) by a nylon cable tie provided with each trim kit. The cable tie is inserted, as shown in Fig. 3, after the system has been restored for operation. The nylon cable tie is designed to allow, in case of an emergency, forceful turning of the valve handle to the ON position. As an alternative to the Model B Hydraulic Manual Emergency Station, the Model A Hydraulic Manual Emergency Pull Box (see Reliable Bulletin 506) is also available and can be provided as an option.

Whenever ambient temperature conditions are high, the water temperature in the Model DDX Deluge Valve's pushrod chamber could possibly increase, thereby increasing the pressure in the chamber to values exceeding the rated pressure of the system. In an indoor installation where standard room temperatures are exceeded, a pressure relief kit may be needed. Pressure relief kit, P/N 6503050001, can be installed into the pushrod chamber's releasing line to limit the pressure to 175 psi (12,1 bar).

Pressurizing Line Connection

The water supply for the push-rod chamber must be provided by connection of its inlet pressurizing line to the water supply piping. Pressurizing lines for multiple Model DDX Deluge Valve push-rod chambers must never be manifolded together, having only a single tap on the water supply piping. Each Model DDX Deluge Valve must have its own push-rod chamber pressurizing line connection. This connection must be made on the supply side of the main water supply control valve. This can be accomplished by:

- a. Using a tapped connection directly below or next to the main water supply control valve using a welded outlet or the appropriate mechanical fittings. A grooved-end outlet coupling is one way to achieve this.
- b. Using a water supply control valve that has an available threaded (NPT) supply-side tap design to allow for a direct water supply connection to the Model DDX Deluge Valve's push-rod chamber.

Caution: Reliable's Model DDX Deluge Valve is designed with an inlet restriction built into the pushrod chamber. It is important not to introduce additional restrictions into the direct water supply connection or the discharge from the pushrod chamber by installing additional valves or improperly installing the copper lines used in the trim of the valve.

System Design Considerations

The automatic sprinklers, air compressor, releasing devices, electric releasing control equipment, fire detection devices, manual pull stations, and signaling devices which are utilized with this Reliable Single Interlock Preaction System must be Loss Prevention Certification Board (LPCB) approved, as applicable.

The deluge valve and all interconnecting piping must be located in a readily visible and accessible location and in an area that can be maintained at a minimum temperature of 40°F (4°C). **Note:** Heat tracing is not permitted.

The redundant solenoid valves are operated and supervised by an electrical releasing/control panel. Details on the electrical connections and the Prescient Pre-Action Sprinkler Extinguishing Fire Alarm Panel can be found on Figure 5 of this bulletin.

System Air Pressure Requirements

When a Reliable Single Interlock Preaction System is utilized, the sprinkler system piping requires a minimum of 7 psi (0,5 bar) supervisory pneumatic pressure. The Model A-2 Pressure Maintenance Device, along with an additional air pressure regulator, are used to maintain the system's pneumatic pressure between 7 and 10 psi (0,5 and 0,7 bar) where a dry nitrogen gas supply or a clean, dependable, and continuous (24 hours per day, 7 days per week) compressed air source is available.

The sections of the preaction trim that contains the two redundant normally-closed solenoid valves, and the upper portion of the Model LP Dry Valve Actuator, require pneumatic pressure settings per Table A. When establishing the preaction system for service, refer to Table A of this bulletin for the correct pneumatic pressure settings for a corresponding water supply pressure. **Note:** During the initial system set-up, a higher pneumatic pressure may be required in order to properly seat the internal diaphragm of Model LP Dry Valve Actuator.

Refer to Reliable Bulletin 251 and/or Fig. 3 of this bulletin for instructions on how to modify these pressure settings.

System Electrical Requirements

All releasing, alarm and detection devices in this Reliable Single Interlock Preaction System are supervised by the Pre-Action Panel Series 1000 MK4. Connect these devices as shown in Fig. 5. The power supply, the stand-by emergency power supply, battery charger, and the rectifier circuitry are all contained within this panel. For additional and detailed wiring information, refer to the manufacturer's literature included with the Prescient Releasing Control Panel.

Note:

In order for the solenoid valve to maintain Reliable's warranty it must remain sealed as it came from the factory. If there are concerns about the valve's internal components, immediate replacement is recommended.

Technical Data

Reliable Single Interlock Preaction Systems, with associated trim, sizes 4" (100mm), 6" (150mm) and 165mm are rated for use at minimum water supply pressure of 20 psi (1,4 bar) and maximum supply pressure of 250 psi (17,2 bar). Water supplied to the inlet of the valve and to the pushrod chamber must be maintained between 40°F (4°C) and 140°F (60°C).

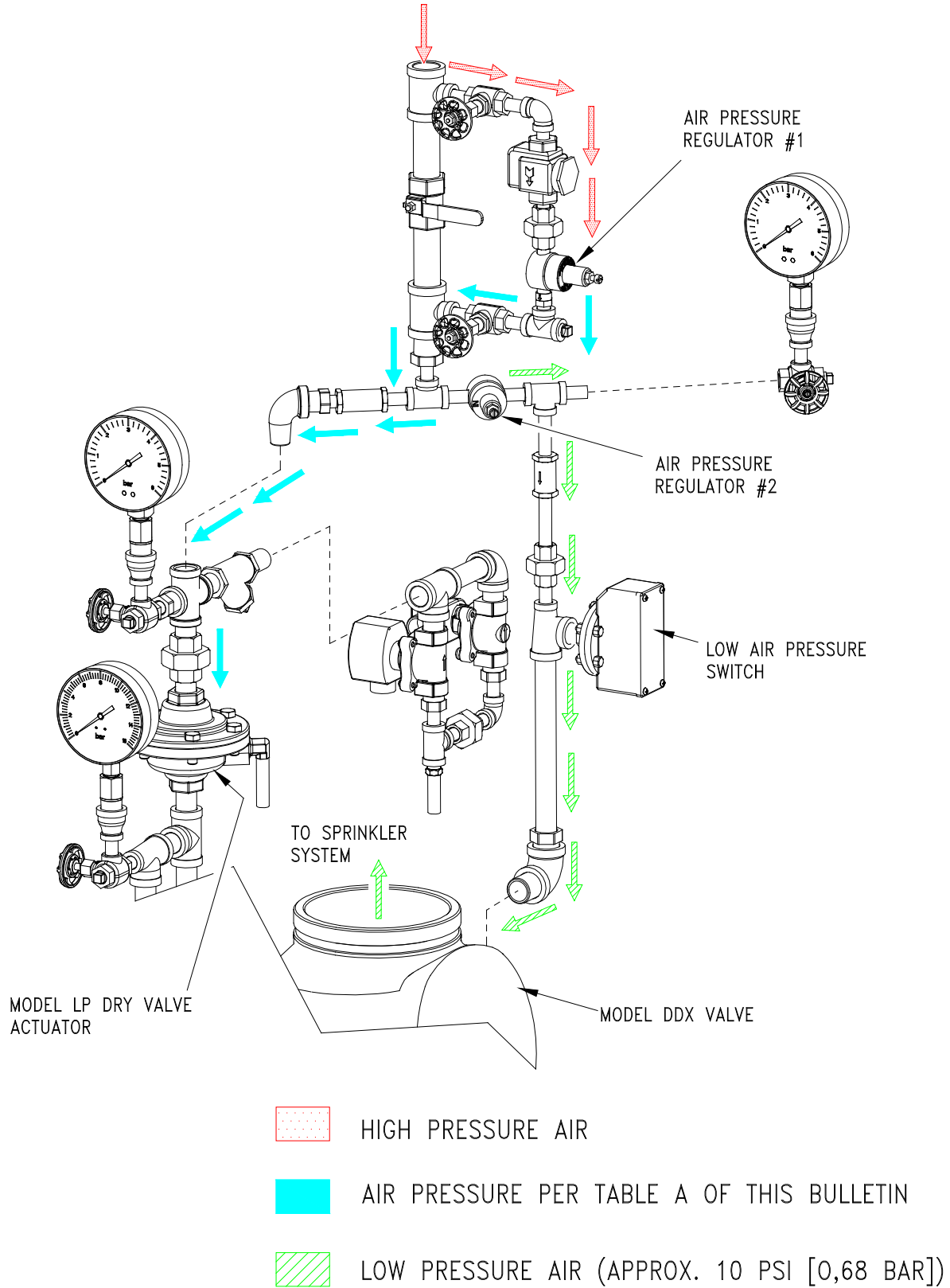
The following list of technical bulletins pertains to valves and devices that may be used in this preaction system:

Deluge Valve	Reliable 510/511
Hydraulic Emergency Station (Model A)	Reliable 506
Solenoid Valve	Reliable 718
Mechanical Sprinkler Alarm	Reliable 612/613
Pressure Maintenance Device	Reliable 252
Air Compressor	Reliable 700
Electric Emergency Station	Reliable 700
Thermal/Smoke Detectors	Reliable 722
Fire Alarm Devices	Reliable 700
Waterflow Pressure Alarm Switch	Bailey & Mackey Ltd. Model 1381V

Table A

Water Pressure psi (bar)	Pneumatic Pressure to be Pumped into Sprinkler System, psi (bar)	
	Not Less Than	Not More Than
Maximum		
20 (1,4)	10 (0,7)	14 (0,9)
50 (3,4)	12 (0,8)	16 (1,1)
75 (5,2)	13 (0,9)	17 (1,2)
100 (6,9)	15 (1,0)	19 (1,3)
125 (8,6)	16 (1,1)	20 (1,4)
150 (10,3)	17 (1,2)	21 (1,4)
175 (12,1)	18 (1,2)	22 (1,5)

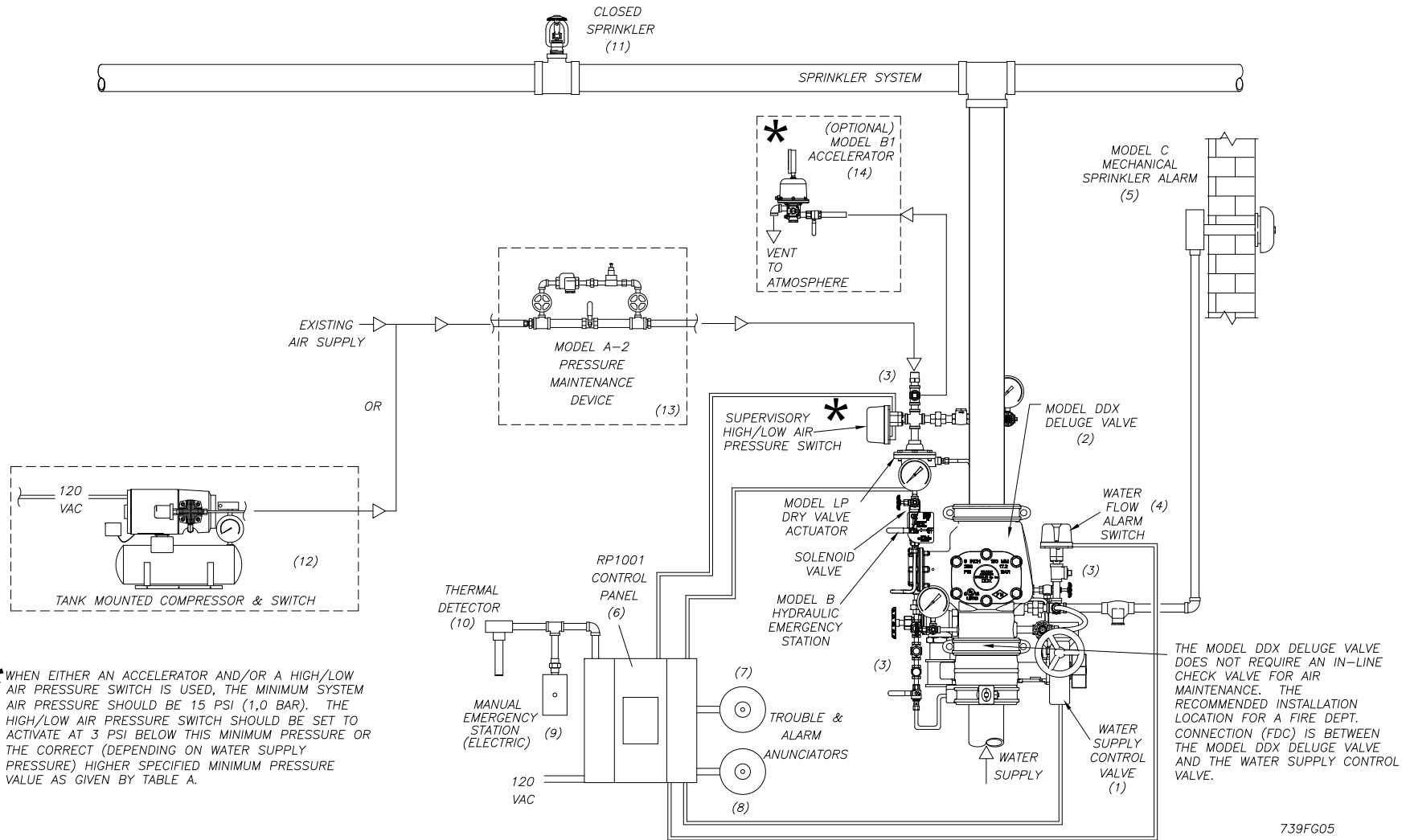
SINGLE INTERLOCK PREACTION SYSTEM AIR PRESSURE SETTINGS



739FG04A

Fig. 4

SINGLE INTERLOCK PREACTION SYSTEM COMPONENTS



* WHEN EITHER AN ACCELERATOR AND/OR A HIGH/LOW AIR PRESSURE SWITCH IS USED, THE MINIMUM SYSTEM AIR PRESSURE SHOULD BE 15 PSI (1,0 BAR). THE HIGH/LOW AIR PRESSURE SWITCH SHOULD BE SET TO ACTIVATE AT 3 PSI BELOW THIS MINIMUM PRESSURE OR THE CORRECT (DEPENDING ON WATER SUPPLY PRESSURE) HIGHER SPECIFIED MINIMUM PRESSURE VALUE AS GIVEN BY TABLE A.

THE MODEL DDX DELUGE VALVE DOES NOT REQUIRE AN IN-LINE CHECK VALVE FOR AIR MAINTENANCE. THE RECOMMENDED INSTALLATION LOCATION FOR A FIRE DEPT. CONNECTION (FDC) IS BETWEEN THE MODEL DDX DELUGE VALVE AND THE WATER SUPPLY CONTROL VALVE.

739FG05

Fig. 5

Valve Description

- Rated working pressure:
Valve & System - 175 psi (12,1 bar)
- Factory tested to a hydrostatic pressure of 500 psi (34,5 bar). (Valve only)
- End and trim connections:
 - ANSI/AWWA C606 grooved inlet and outlet

Groove Dimensions				
Valve Size	Outlet Diameter	Groove Diameter	Groove Width	Outlet Face to Groove
4" (100mm)	4.500" (114mm)	4.334" (110)	3/8" (10mm)	5/8" (16mm)
6" (150mm)	6.625" (168mm)	6.455" (164mm)		
165mm	6.500" (165mm)	6.330" (161mm)		

- Threaded openings Per ANSI B 2.1

Valve Size	Color
4" (100mm) 6" (150mm)	Black
165mm	Red

- Face to face dimensions:
 - 4" (100 mm) — 14" (355 mm)
 - 6" (150 mm) & 165 mm — 16" (406 mm)
- Shipping weight:

Valve Size	Weight
4" (100 mm) 6" (150 mm) & 165mm	64 lb. (29 kg) 95 lb. (43 kg)

- Friction loss (Expressed in equivalent length of Schedule 40 pipe, based on Hazen & Williams formula with C=120 and a flow velocity of 15ft/sec (4.6 m/sec)):

Valve Size	Equivalent Length
4" (100mm) 6" (150mm) & 165mm	14' (4.27 m) 29.4' (9 m)

- Installation position: Vertical

Maintenance

Reliable Single Interlock Preaction Systems 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.

Resetting the Single Interlock Preaction System

Refer to Figs. 2, 6, and 7.

- Close the main valve controlling water supply (Fig. 7) to the Deluge Valve and close off the air supply to the sprinkler system at the air supply's source.
- Close the pushrod chamber supply valve, valve A (Fig. 7).
- Open the main drain valve, valve B (Fig. 7), and drain sys-

tem.

- Open all drain valves and vents at low points throughout the system, closing them when flow of water has stopped. Open valve D (Fig. 7). **Note:** The above steps accomplish the relieving of pressure in the pushrod chamber of the Deluge Valve.
- With Valve F (Fig. 7) open, push in the plunger of ball drip valve, valve G (Fig. 7), to force the ball from its seat, and drain any water in the alarm line.
- With the Model B Manual Emergency Station, valve D (Fig. 7), open, push in and rotate the deluge valve's external reset knob (#38, Fig. 6) clockwise until you hear a distinct clicking noise, indicating that the clapper has closed. **Note:** The reset knob can be rotated only after pressure in the pushrod chamber has been reduced to atmospheric conditions (0 psig).
- Inspect and replace any portion of the sprinkler system subjected to fire conditions.
- Close valve F (Fig. 7). Activate a solenoid-release pull station (Or other means of electric detection.) to energize the solenoid valve(s). Silence any alarms or audible tones on the releasing/control panel. Open valve A (Fig. 7) to begin pressurizing the push-rod chamber and its associated piping, while simultaneously venting any entrapped air. **Note:** This venting of the air from the actuation piping is very important to ensure proper system operation and avoidance of falsely tripping the Deluge Valve.
- Upon seeing a solid flow of water from the drain tubing, and the cessation of the "gurgling" sound at the drip cup, H (Fig. 7), close valve D (Fig. 7) then rapidly apply compressed air or nitrogen into the to chamber of the Model LP Dry Valve Actuator until the pressure conforms to Table A levels as indicated on the air pressure gauge. The Model LP Dry Valve Actuator will close during this pressurizing process and the water will stop flowing into the drip cup. At this point, the pressure gauge which indicates push-rod chamber pressure (Fig. 7) will equalize to the available water supply pressure. **Note:** It may be necessary to isolate the various pressure gauges in the trim during system set-up by closing the 1/4" 3-way valves (#68 Fig. 2) that they are connected to. During set-up, pressure fluctuations may occur that can be potentially damaging to the gauges.
- De-energize the solenoid valve(s). This is accomplished by resetting the solenoid-release pull station and/or the detectors that were activated in Step #8 above. **Note:** All detection devices must be reset before the releasing/control panel can be reset.
- Open valve F (Fig. 7). Open slightly the main valve controlling water supply (Fig. 7) to the deluge valve, closing drain valve B (Fig. 7) when water flows. Observe if water leaks through the ball drip valve, valve G (Fig. 7), into the drip cup, H (Fig. 7). If no leak occurs, the seluge valve's clapper is sealed. Open slowly, and verify that the main valve controlling water supply is fully opened and properly monitored.
- Verify that valve A (Fig. 7) and valve F (Fig. 7) are open.
- Secure the handle of the Model B Manual Emergency Station, valve D (Fig. 7), in the OFF position with a nylon tie (#64, Fig. 2).

Inspection and Testing

Refer to Figs. 2, 6, and 7.

1. **Water supply** — be sure the valve(s) controlling water supply to the Deluge Valve are opened fully and properly monitored.
2. **Alarm line** — be sure that valve F (Fig. 7) is opened and remains in this position.
3. **Other trimming valves** — check that valve A (Fig. 7) is open as well as all of the pressure gauge's 1/4" 3-way valves. Valves C, D, and E (Fig. 7) should be closed.
4. **Ball drip valve, valve G (Fig. 7)** — make sure that valve F (Fig. 7) is open. Push in on the plunger to be sure the ball check is off its seat. If no water appears, the deluge valve's water seat is tight. Inspect the bleed hole (see Fig. 7) on the underside of the deluge valve's push rod chamber for leakage.
5. **System pneumatic pressure** — check the Model LP Dry Valve Actuator's air pressure gauge (Fig. 7) and water supply pressure gauge (Fig. 7) for conformance to Table A.
6. **Releasing device** — Model LP Dry Valve Actuator (Fig. 7). Verify that the outlet is not leaking water. Check the Model LP Dry Valve Actuator's air pressure gauge (Fig. 7) for proper pressure settings. Verify that the tubing line from the actuator is not pinched or crushed, which could prevent proper operation of the deluge valve.
7. **Testing alarms** — make sure that valve F (Fig. 7) is open. Open valve C (Fig. 7) permitting water from the supply to flow to alarm portion of the trim. Typical devices that are connected to this section of the trim are pressure switches and/or a mechanical sprinkler alarms (water motor). After testing has been completed, close this valve securely. Push in on the plunger of ball drip valve G (Fig. 7) until all of the water has drained from the alarm line.
8. **Operational test** — Open the Model B Manual Emergency Station, valve D (Fig. 7). **Note:** An operational test will cause the deluge valve to open and flow water into the sprinkler system.
9. Secure the Model B Manual Emergency Station, valve D (Fig. 7), in the OFF position with a nylon tie (#64, Fig. 2) after the deluge valve is reset.

Testing the Model DDX Deluge Valve without Flowing Water

Refer to Fig. 7

1. Close the valve controlling water supply to deluge valve and open the main drain valve B.
2. Verify that valve A is open, allowing water to enter the push rod chamber.
3. Operate detection system – energize the solenoid valve(s) by operating a detector or manual pull station.
4. Operation of the detection system will result in a sudden drop of water pressure in the push rod chamber.
5. Reset the detection system — reverse the operations performed in step three above and then proceed according to the directions listed in the "Resetting the Single Interlock Preaction System" section of this bulletin for resetting the Deluge Valve.

Draining Excess/Condensate Water from the System

Refer to Fig. 7

1. Close the main valve controlling water supply to deluge valve. Also, close valve A and open the main drain valve B.
2. Open the condensate drain valve E until all of the water has drained. Close valve E. **Note:** Be sure not to keep valve E open for an extended period of time because that will cause enough system air to bleed off, thereby causing an undesirable activation of a trouble/alarm-annunciating device.
3. Close the main drain valve B. If system contains pressurized air, allow the air pressure to come back up to specification. Open valve A first, and then open the main valve controlling the water supply to the deluge valve.

Maintenance Procedures - Model DDX Deluge Valve

Refer to Figs. 2, 6 & 7.

1. Mechanical sprinkler alarm (water motor-not shown) not operating:

This is most likely caused by a clogged screen in the strainer of the water motor. Proceed as follows: Remove plug from the strainer. Remove and clean the screen. Replace the screen and the plug, and then tighten securely (Ref. Bulletin 613).

2. Leakage out of the ball drip valve G (Fig. 7).

a. Water leakage due to a water column above the deluge valve's clapper:

This condition can be caused by leakage past the system side of the Model DDX Deluge Valve's seal faceplate subassembly (#5, Fig. 6). Be sure that this surface is free of any type of debris. To eliminate leakage due to a water column, refer to the section in this bulletin marked "Draining Excess/Condensate Water From System". If the problem continues proceed to the following section.

b. Leakage, air or water from the ball drip valve, G (Fig. 7):

If system air is leaking out the ball drip valve, the problem is either damage to the airside of the Model DDX Deluge Valve's seal faceplate subassembly (#5, Fig. 6), seat (#2, Fig. 6), or the upper seat O-ring (#11, Fig. 6).

If supply water is leaking out the ball drip valve, the problem could be caused by damage to the Model DDX Deluge Valve's seal faceplate subassembly (#5, Fig. 6), seat (#2, Fig. 6), or lower seat O-ring (#11, Fig. 6). The following section provides instructions to correct both conditions:

- A) Shut down the valve controlling the water supply to the Deluge Valve and open the main drain valve B (Fig. 7). Open the water column drain valve E (Fig. 7). Close the push rod chamber supply valve A (Fig. 7) and open the Model B Manual Emergency Station D (Fig. 7).

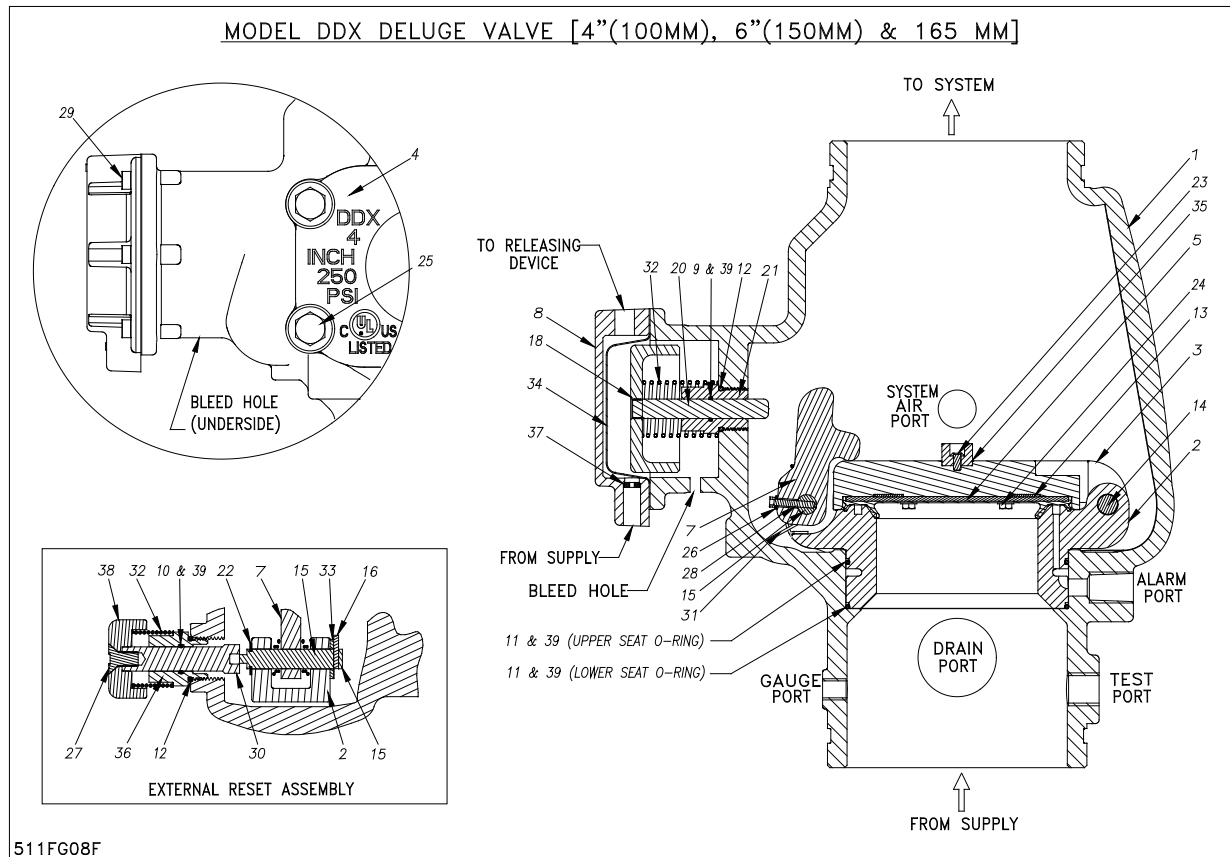


Fig. 6

Models DDX 4" (100mm), 6" (150mm) & 165mm Deluge Valve Parts List

Item. No	Part Number			Description	No Req'd
	4"(100mm) Valve	6"(150mm) Valve	165mm Valve		
1	91006005	91006007	91006027	Valve Body	1
2	96016004	96016006	96016006	Seat	1
3	91916004	91916006	91916006	Clapper	1
4	92116064	92116066	92116065	Cover	1
5	93416004	93416006	93416006	Seal Faceplate Subassembly	1
6	93706004	93706006	93706006	Gasket, Cover (Not Shown)	1
7	94506004	94506006	94506006	Lever	1
8		92126066		Cover, Pushrod	1
9		95406407		O-ring (014)	1
10		95406007		O-ring (114)	1
11	95406006	N/A		O-ring (156)	2
	N/A	95406016		O-ring (161)	1
12		95406024		O-ring (912)	2
13	93706001	N/A	N/A	Gasket, Clapper, 4"	1
	N/A	93706002	93706002	Gasket, Clapper, 6"	1
14		96216086		Hinge Pin, Clapper	1
15		96216046		Pin, Lever	1
16		95606131		Threaded Stud, #10-32 x 3/4"	1
17		96216066		Pin, Locking, Seat (Not Shown)	2
18		95106006		Piston	1
19		95200038		Plug, Socket, Ø 3/8"-18 NPT (Not Shown)	2
20		95506006		Pushrod	1
21		93916006		Pushrod Guide	1
22		95306267		Ring, Retaining (2 Assembled to Item No.14)	3
23		95606128		Screw, Button Head, #10-32 x 3/8"	1

Item. No	Part Number			Description	No Req'd
	4"(100mm) Valve	6"(150mm) Valve	165mm Valve		
24		95606129		Screw, Hex Washer Head, #10-32 x 3/8"	4
25	95606107	N/A	N/A	Screw, Hex Cap, Ø 1/2"-13 x 1 1/2"	6
25	N/A	91106006	91106006	Screw, Hex Cap, Ø 5/8"-11 x 1 3/4"	1
26		96906111		Spring Lock Washer, #10	1
27		95606127		Screw, C'sunk Cap Head, Ø 3/8"-16 x 3/4"	1
28		95606130		Screw, Socket Head, #10-32 x 1"	1
29		95606114		Screw, Socket Head, Ø 1/4"-20 x 5/8"	6
30		93916066		Shaft, Reset	1
31		96406004		Spring, Lever	1
32		96406906		Spring	2
33		96906904		Teflon Washer, Ø 1/2" (2 Assembled to Item No.14)	3
34		95276006		Diaphragm	1
35		92306006		Disc, Bumper	1
36		94106066		Housing, Reset	1
37		94206406		Inlet, Orifice	1
38		94356006		Knob, Reset	1
39		85000050		O-ring Grease, DuPont™ Krytox® GPL-201	A/R

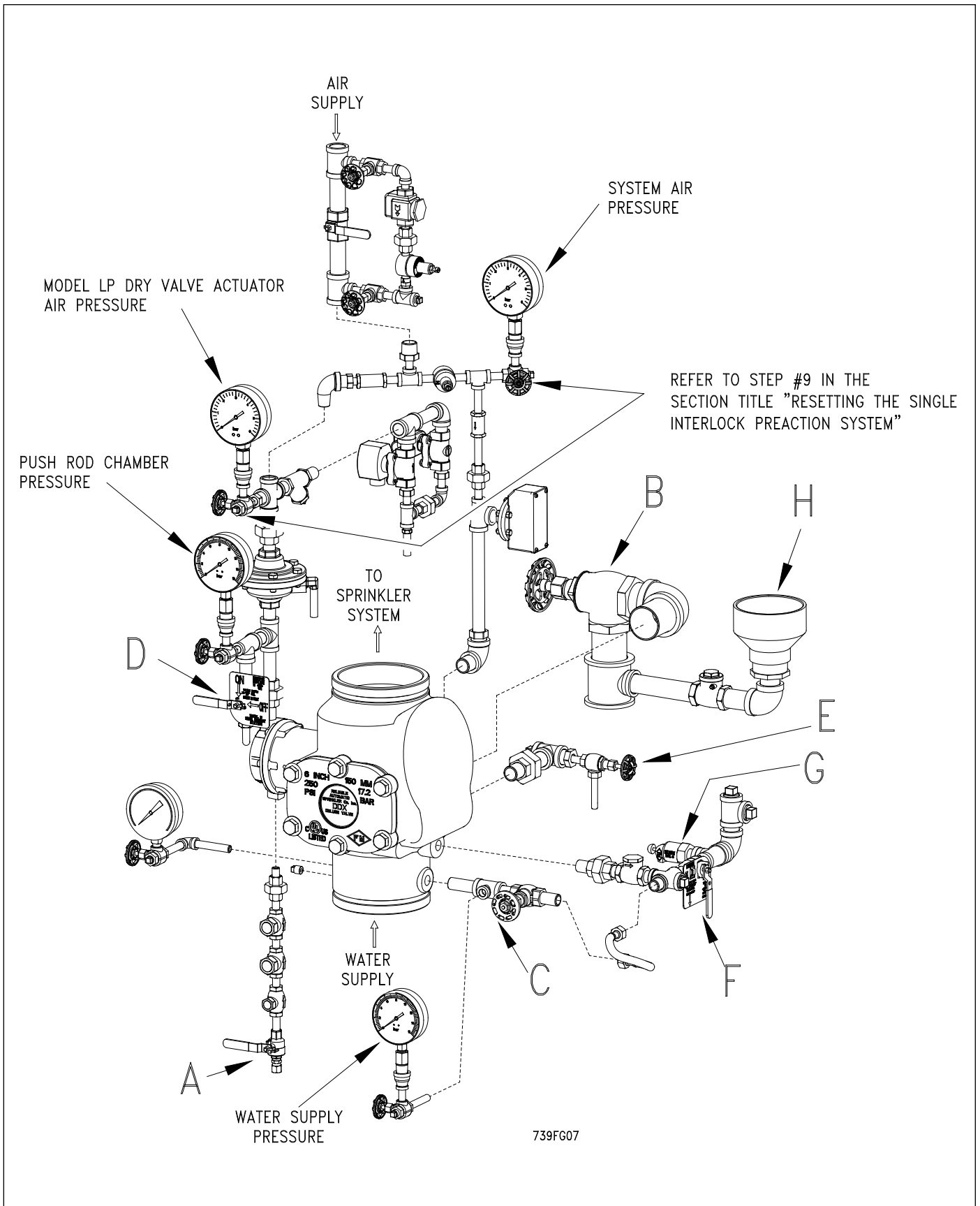


Fig. 7

- B) Remove the deluge valve's front (handhold) cover (#4, Fig. 6) and inspect the seat (#2, Fig. 6), clapper (#3, Fig. 6), and seal faceplate subassembly (#5, Fig. 6) for damage.

If inspection indicates damage to the clapper (#3, Fig. 6) or seal faceplate subassembly (#5, Fig. 6) only, then the clapper subassembly can be removed as follows:

At the rear of the deluge valve, disconnect the water column drain trim section at the 3/4" union (#68, Fig. 2). Remove the retaining ring (handhold cover side) from the clapper hinge pin (#14, Fig. 6) and push this pin through the water column drain line and remove the clapper subassembly. Remove the four retaining screws (#24, Fig. 6) holding the seal faceplate subassembly (#5, Fig. 6). Inspect the clapper (#3, Fig. 6) visually before re-installing. Apply a small amount of silicone-based lubricant to the four retaining screws. Install a new seal faceplate subassembly. Torque the retaining screws to approximately 40 inch-pounds and reassemble.

If the seat (#2, Fig. 6) is damaged or it is suspected that the leakage is through the lower O-ring (#11, Fig. 6), the seat-clapper subassembly is easily removed as a unit as follows:

Using a 5/16" Allen wrench, remove the two 3/8" NPT pipe plugs (#19 (not shown) Fig. 6) located on the side of the Model DDX Deluge Valve. The seat-clapper subassembly is retained by two locking pins (#17 (not shown) Fig. 6). The centers of these pins have a 1/4"-20 threaded hole. Remove the two locking pins by engaging them with a 1/4"-20 screw or threaded rod and pulling them out. **Note:** The two locking pins are not threaded, so turning them with the attached 1/4"-20 screw or threaded rod is not recommended. A proven method is to use 1/4"-20 threaded rod with a locknut on the un-inserted end. Grab hold of the locknut with pliers or vice-grips and tap the pliers or vice-grips in the direction moving away from the deluge valve. Doing so should pull the locking pins out of the deluge valve. With the clapper (#2, Fig. 6) in the closed position (not latched), dislodge the seat-clapper subassembly from the deluge valve's body by inserting two large flathead screw drivers under the lever and clapper mounting ears of the seat and pry up until the seat-clapper subassembly is free of its bore. Reach into the deluge valve and grasp the seat-clapper subassembly from the sides. Lift up and rotate the seat-clapper subassembly through 90 degrees about the main access of deluge valve so that the lever-side of the seat-clapper subassembly faces the outlet of the deluge valve. Rotate the seat-clapper subassembly around the centerline of the deluge valve until the top of the clapper faces the handhold opening and then pull it out clapper hinge-pin side first. Visually examine all of the components of the seat-clapper subassembly, replacing any component that appears damaged. New O-rings (#11,

Fig. 6) should always be used for reassembly.

Re-assembly:

It is likely that the lower seat O-ring (#11, Fig. 6) has remained at the bottom of the deluge valve body's bore. Discard this O-ring and clean the bore. Lubricate the bore with O-ring grease and place the lower seat O-ring on the step at the bottom of the bore, verifying that it is in full contact with the bore. Lubricate the bottom step and upper seat O-ring (#11, Fig. 6) of the refurbished seat-clapper subassembly. Insert the seat-clapper subassembly into the handhold opening of the deluge valve lever-first, rotating it until the lever side faces the outlet of the deluge valve. Rotate the seat-clapper subassembly until the lever (#7, Fig. 6) faces the push rod (#20, Fig. 6), then drop the seat-clapper subassembly into the deluge valve's bore. Verify that the seat-clapper subassembly is fully depressed in to the deluge valve's body. Check to see that the lever lines up with the push rod. Adjust if necessary. Clean and lubricate the two locking pins (#17 (not shown) Fig. 6) with O-ring lubricant and drive them into the deluge valve body. Reinstall the 3/8" NPT pipe plugs (#19 (not shown) Fig. 6). Reassemble the handhold cover and set up the Model DDX Deluge Valve as per the section of this bulletin entitled "Resetting the Single Interlock Preaction System".

3. Leakage out of the push rod chamber vent hole:

A small bleed hole is located on the underside of the push rod chamber (see Fig. 6). If there is air or water leakage coming out of this hole, do the following:

- A) Shut down the valve controlling water supply to the deluge valve. Relieve the inlet pressure by opening the main drain valve B (Fig. V). Close valve A (Fig. 7), the valve that supplies water to the push rod chamber, and open the Model B Manual Emergency Station, valve D (Fig. 7).
- B) Remove the trim at the unions nearest to the push rod chamber cover (#8, Fig. 6).
- C) Take the push rod chamber cover (#8, Fig. 6) off by removing the six retaining screws (#29, Fig. 6).

Condition #1: Water coming out of the bleed hole:

Water coming out of the bleed hole is caused by a leaking diaphragm (#34, Fig. 6). Visually inspect the push rod chamber cover (#8, Fig. 6) and piston (#18, Fig. 6) to determine what could have damaged the diaphragm and correct. Install a new diaphragm. **NOTE:** The diaphragm has two different surfaces, it is not bi-directional. It will fail if installed backwards! Roll the diaphragm so that the smooth surface (the pressure side) conforms to the inside of the push rod chamber cover and re-assemble the six retaining screws (#29, Fig. 6) with an installation torque of 15 foot-pounds. Set up the Model DDX Deluge Valve as per the section of this bulletin entitled "Resetting the Single Interlock Preaction System".

Condition #2: System Air coming out of the bleed hole:

System air coming out of the bleed hole is caused by a defective O-ring assembled to the push rod guide (#21, Fig.

6). Remove the piston-push rod subassembly, push rod spring (#32, Fig. 6), and push rod guide (#21, Fig. 6). Verify by hand turning, that the push rod cannot be unscrewed from the piston. Replace all of the O-rings and the push rod guide. The correct installation torque for the push rod guide is 35 inch-pounds. **CAUTION:** Do not over-tighten the push rod guide. Re assemble the components that were initially removed. Re-install the diaphragm (#34, Fig. 6) if it appears to be in good shape, otherwise, replace it also. **NOTE:** The diaphragm has two different surfaces, it is not bi-directional. It will fail if installed backwards! Roll the diaphragm so that the smooth surface (the pressure side) conforms to the inside of the push rod chamber cover and re-assemble the six retaining screws (#29, Fig. 6) with an installation torque of 15 foot-pounds. Set up the Model DDX Deluge Valve as per the section of this bulletin entitled "Resetting the Single Interlock Preaction System".

Model LP Dry Valve Actuator Parts List

P/N 71030010

Refer to Fig. 8

Item No.	Part No.	Description	Qty. Required
1	94106936	Lower Housing	1
2	94106935	Upper Housing	1
3	96006905	Seat	1
4	92206312	Diaphragm	1
5	95106911	Facing Plate Assembly	1
6	96906311	Diaphragm Washer	1
7	94906406	Facing Plate Nut	1
8	95406901	Seat O-Ring	1
9	95606305	Bolt	6
10	96406902	Compression Spring	1

Maintenance – Model LP Dry Valve Actuator

Refer to Figs. 7 and 8

1. If water constantly flows through the Model LP Dry Valve Actuator and into the drain, there is a leak in the seal of the Actuator's seat.
2. Close the main valve controlling water supply (Fig. 7) to the Deluge Valve and close off the air/nitrogen supply to the sprinkler system. Close valve A (Fig. 7).
3. Drop pressure in the system by opening the 1/4" angle valve, valve E (Fig. 7), and remove the Actuator from the system.
4. Remove all six bolts (#9, Fig. 8) holding the Actuator together. Clean or replace the facing plate assembly (#5, Fig. 8) and seat (#3, Fig. 8).

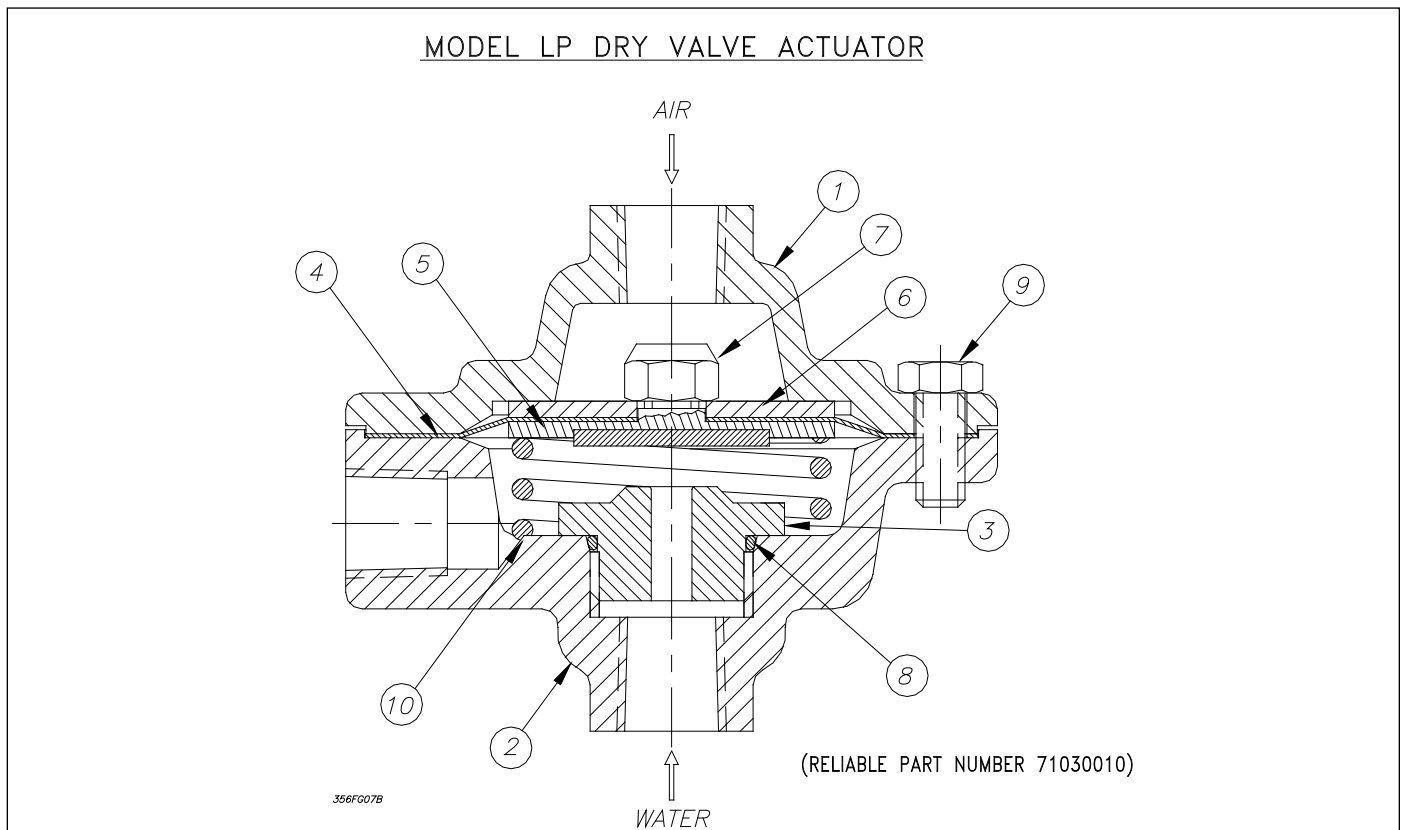


Fig. 8

- Reassemble the Actuator, using a torque of 8 ft-lbs on the facing plate nut (#7, Fig. 8) and 12 ft-lbs on the six bolts (#9, Fig. 8). Use a cross-tightening pattern. Reinstall the Actuator. Set up the Model DDX Deluge Valve as per the section of this bulletin entitled "Resetting the Single Interlock Preaction System."

Ordering Information

Specify

- Valve Model & Size — 4"(100mm) Model DDX Deluge Valve (P/N 6103040026), 6"(150mm) Model DDX Deluge Valve (P/N 6103060024), 165mm Model DDX Deluge Valve (P/N 6103060028).
- Trim — The trim set is available in individual parts, in time-saving segmentally assembled kit forms, or fully assembled to the Model DDX Deluge Valve.

Trim Configurations	Trim Part Numbers		
	4" (100mm) Valve	6" (150mm) Valve	165mm Valve
Fully Assembled to Model DDX Valve	6505040400	6505060400	6505065400
Segmentally Assembled (Model DDX Valve Sold Separately)	6502071710		
Individual Parts (Model DDX Valve Sold Separately)	6502071700		

Note: For metric installations, a 2" NPT x R2, ISO 7/1 x Close Nipple (Reliable P/N 98543401) is sold separately as an adapter for the single drain outlet of the trims.

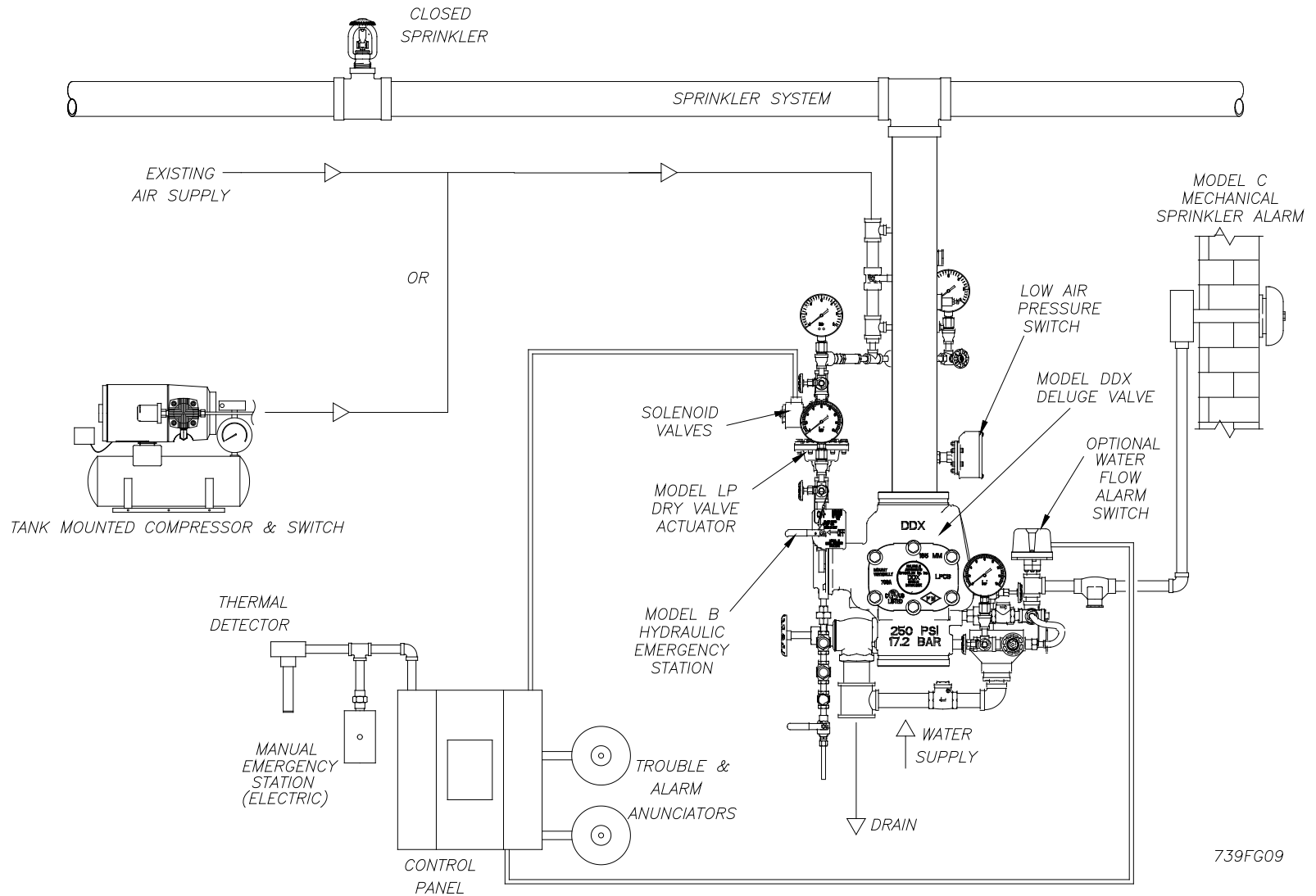
SOLENOID VALVE INSPECTIONS, TESTS AND MAINTENANCE

WARNING: 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 SYSTEM OUT OF SERVICE MAY ELIMINATE THE FIRE PROTECTION OF THAT SYSTEM. PRIOR TO PROCEEDING, NOTIFY ALL AUTHORITIES HAVING JURISDICTION. CONSIDERATION SHOULD BE GIVEN TO EMPLOYMENT OF A FIRE PATROL IN THE AFFECTED AREA.

WARNING: PRIOR TO OPERATING THE SOLENOID VALVE, BE SURE TO CLOSE THE SYSTEM CONTROL VALVE TO AVOID UNINTENTIONAL OPERATION OF THE DELUGE VALVE

- Inspections: It is imperative that the system be inspected and tested in accordance with NFPA 25 on a regular basis. The frequency of the inspections may vary due to contaminated water supplies, corrosive water supplies, or corrosive atmospheres. In addition, the alarm devices, detection systems, or other connected trim may require a more frequent schedule. Refer to the system description and applicable codes for minimum requirements.
- The valve must be inspected at least monthly for cracks, corrosion, leakage, etc., cleaned and replaced as necessary.
- If leakage is suspected through the solenoid valve, it should be replaced.

SINGLE INTERLOCK PREACTION SYSTEM COMPONENTS



739FG09

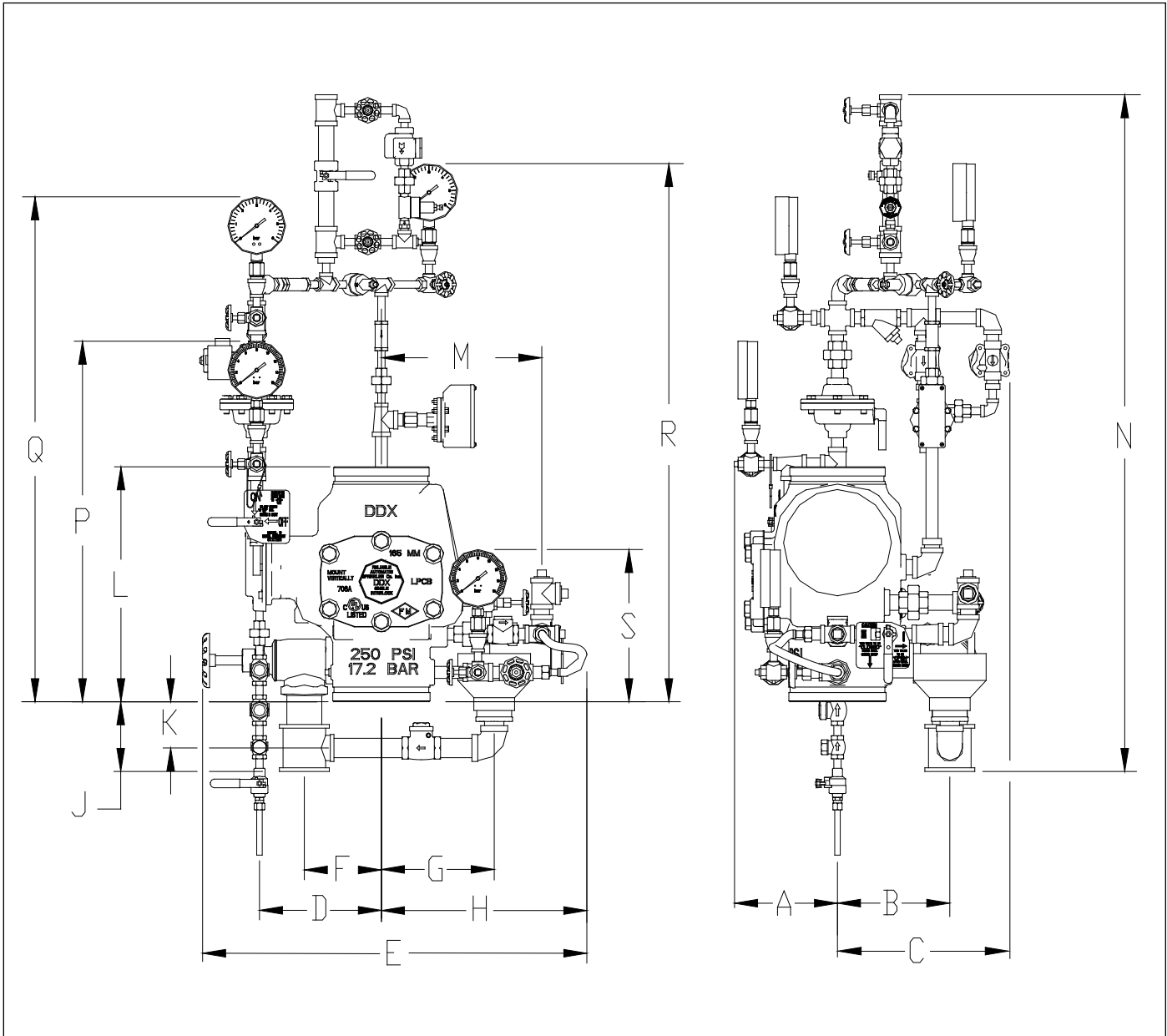
Fig. 9

Installation Dimensions in Inches (mm)

VALVE	A	B	C	D	E	F	G	H	J	K	*L	M	N	P	Q	R	S
4" (100mm)	5¼ (133)	6¾ (171)	13¼ (337)	7⅞ (200)	25¾ (654)	5½ (140)	8½ (216)	13½ (343)	6¼ (159)	5½ (140)	14 (356)	13½ (343)	49¼ (1251)	23 (584)	33¾ (857)	36 (914)	10¾ (273)
6" (150mm) & 165mm	6¼ (159)	7¾ (197)	13¼ (337)	7⅞ (200)	26¾ (679)	5½ (140)	8½ (216)	14½ (368)	8¾ (222)	3¼ (83)	16 (406)	13½ (343)	51¼ (1302)	25 (635)	35¾ (908)	38 (965)	10¾ (273)

*** Total take out dimension for Fully Assembled to DDX Valve w/Control Valve Configurations:**

4" - 20⁷/₁₆, 6" - 23³/₄", 165 mm - N/A.



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.

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