

Reliable®

Model DDX-LP Low Pressure Dry Pipe Valve System

Features

- Low air or nitrogen pressure, 8 to 24 psi (0.6 to 1.7 bar)
- Lightweight ductile iron body with compact trim
- External reset reduces setup and commissioning time
- Does not require priming water
- Available fully assembled, with or without control valve

Product Description

The Reliable Model DDX-LP Dry Pipe Valve System is a hydraulically operated, mechanical latching clapper-type valve designed for use as a primary control valve in a dry pipe system. The pneumatic system pressure when using the Model DDX-LP valve can be set substantially less than conventional differential style dry valves. The following benefits are a direct result of lower pneumatic pressure:

- Smaller, less expensive pneumatic sources
- Improved water transit times following operation of valve, and in some cases, elimination of quick opening devices
- Low pressure makes the use of nitrogen more practical

In addition to these benefits, mechanical type dry pipe valves are less susceptible to accidental tripping than conventional differential dry pipe valves.

All sizes of the Model DDX-LP valve may be equipped with the Reliable Model B1 Accelerator (P/N 6501200019; ordered separately). The accelerator operates as an exhaustor to hasten the operation of the dry pipe valve. Please refer to Reliable Technical Bulletin 323 for further information.



Model DDX-LP Dry Pipe Valve System Listings and Approvals

Table A

Valve Size	End Connection*	Pressure Rating	Listings & Approvals
2" (50mm), 2-1/2" (65mm), & 3" (80mm)	Groove/Groove	250 psi (17,2 bar)	cULus, FM, CE, UKCA
	76mm	250 psi (17,2 bar)	cULus, FM, CE, UKCA
4" (100mm)	Groove/Groove	300 psi (20,7 bar)	cULus, FM, CE, LPCB, UKCA
	Flange/Groove		
	Flange/Flange		
6" (150mm)	Groove/Groove	300 psi (20,7 bar)	cULus, FM, CE, LPCB, UKCA
	Flange/Groove		
	Flange/Flange		
165mm	Groove/Groove	300 psi (20,7 bar)	cULus, FM, CE, LPCB, UKCA
8" (200mm)	Groove/Groove	250 psi (17,2 bar)	cULus, FM, CE, LPCB, UKCA
	Flange/Flange		

*Note: Grooved ends per ANSI/AWWA C606; flanged ends per ASME B16.5 Class 150 or ISO 7005-2 PN16 (specify).

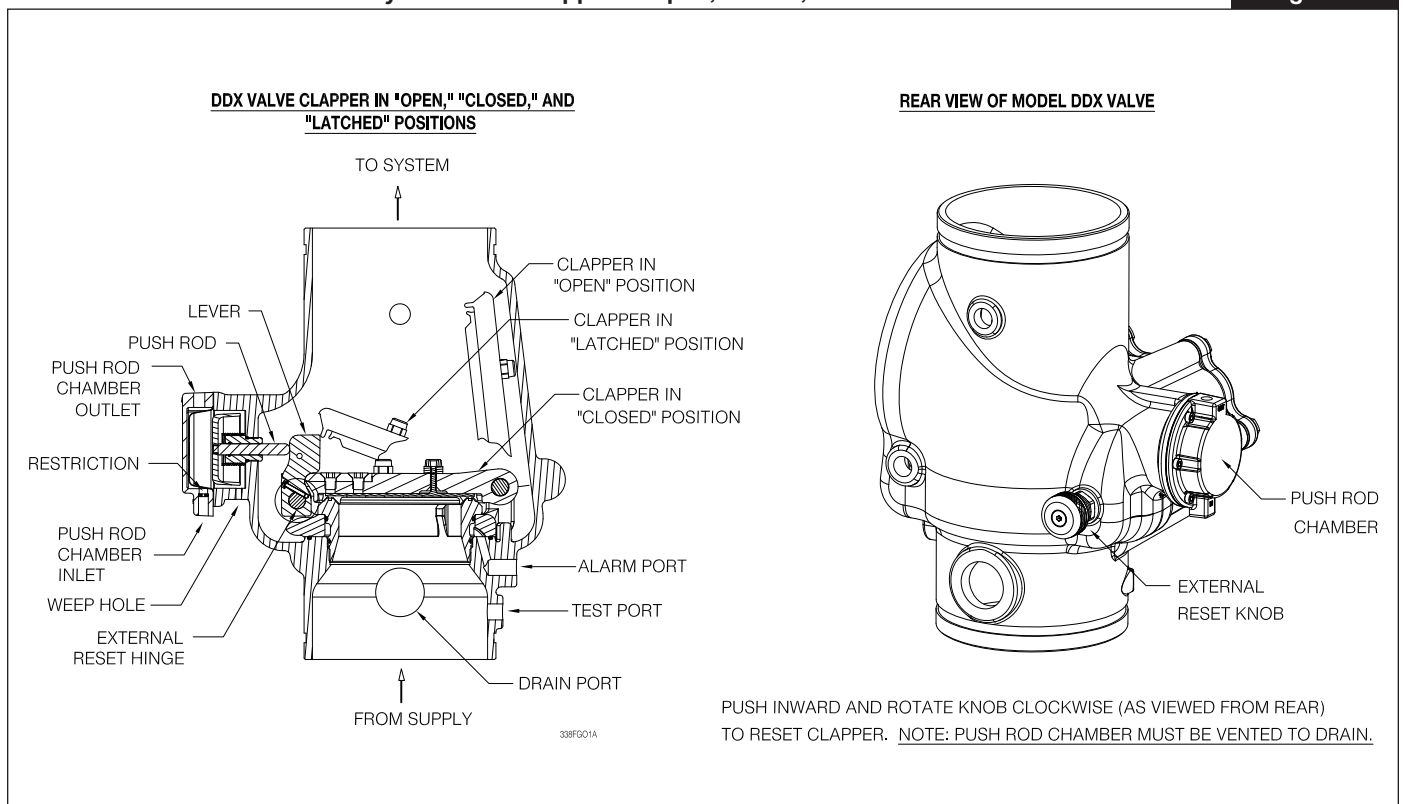
Operation

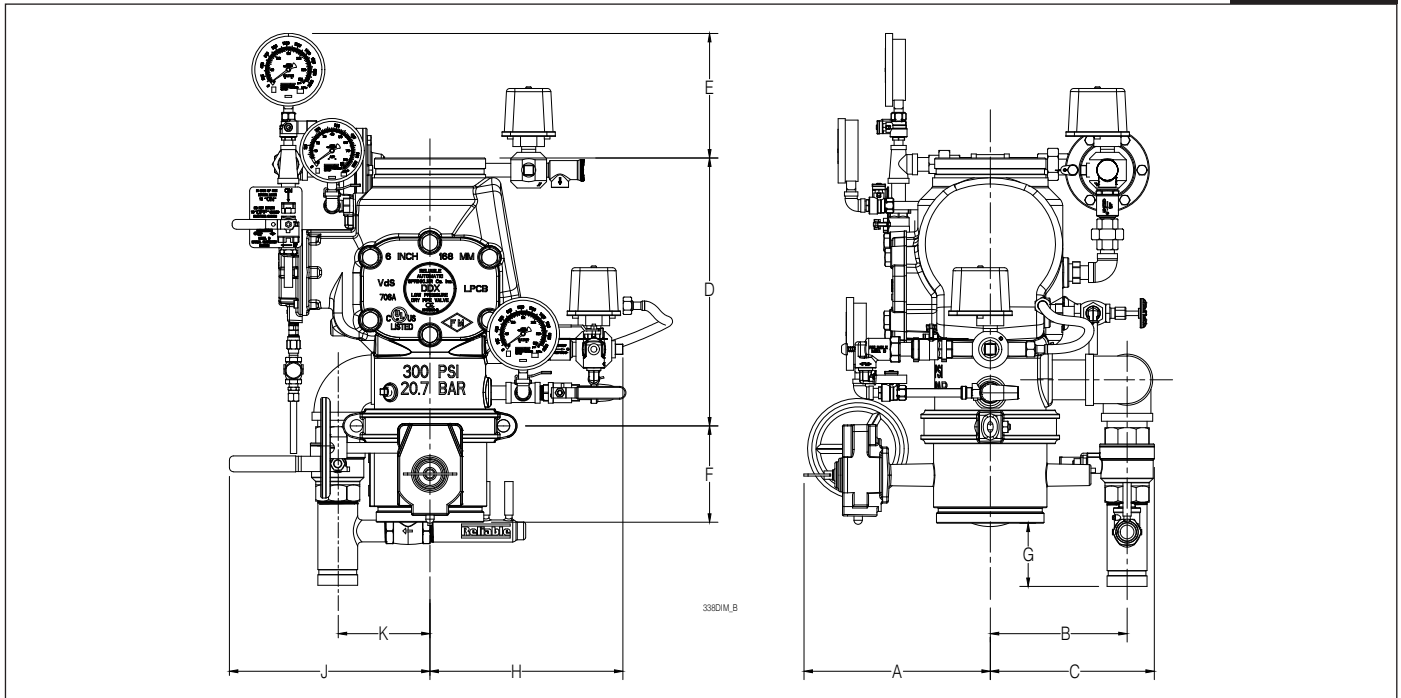
The Reliable Model DDX-LP Dry Pipe Valve System is shown in both the closed and open position in Figure 1. In the closed position, pneumatic pressure acts on the actuator preventing release of hydraulic pressure from the pushrod chamber. The supply water pressure acts simultaneously on the underside of the clapper and on the pushrod through the pushrod chamber restricted inlet. The resultant force on the pushrod is multiplied by the mechanical advantage of the lever and acts to hold the clapper closed against normal pressure surges in the water supply. When a sprinkler operates, the loss of pneumatic pressure in the sprinkler system causes the diaphragm and seal in the actuator to move away from the water seat allowing the release of water from the pushrod chamber. Since water 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 water pressure acting beneath the clapper overcomes the force applied to the lever, opening the clapper. Water then flows through the Model DDX-LP Dry Pipe Valve into the system piping and into the alarm outlet activating the alarm device(s). Once the clapper has opened, the lever acts as a latch preventing the clapper from returning to the closed position.

Section View of Model DDX-LP Dry Valve with Clapper in Open, Closed, and Latched Positions

Figure 1





Installation Dimensions in Inches (mm) (Refer to Figure 2)

Table B

Size	A	B	C	D ⁽¹⁾	D ⁽²⁾	E	F ⁽³⁾	G	H	J	K
2" (50 mm)	8-1/2 (216)	7-3/4 (197)	9-1/8 (232)	12-1/2 (318)	NA	8-3/8 (213)	3-7/8 (98)	1-1/2 (38)	10 (254)	9-1/2 (241)	4 (102)
2-1/2" (65 mm), 3" (80 mm) & 76 mm	8-1/2 (216)	7-3/4 (197)	9-1/8 (232)	12-1/2 (318)	NA	8-3/8 (213)	3-7/8 (98)	1-3/8 (35)	9-7/8 (251)	9-1/2 (241)	3-7/8 (98)
4" (100 mm)	9-3/4 (248)	7-5/8 (194)	9-1/4 (235)	14 (356)	16 (406)	7-1/4 (184)	4-9/16 (116)	5-1/4 (133)	11 (279)	11-7/8 (301)	5-1/2 (140)
6" (150 mm) & 165 mm	11-1/8 (283)	8-1/8 (206)	9-3/4 (206)	16 (406)	19 (483)	6-7/8 (175)	5-7/8 (149)	3-3/4 (95)	11 (279)	12 (305)	5-1/2 (140)
8" (200 mm)	12-5/8 (321)	9 (229)	10-5/8 (270)	19-3/8 (492)	21-1/4 (540)	9-7/8 (251)	5-1/4 (134)	4-1/8 (105)	12-5/8 (321)	12 (305)	5-1/2 (140)

Notes:

1. End to end take out of Model DDX valve with grooved inlet.
2. End to end take out of Model DDX valve with flanged inlet where available (see page 1, table A).
3. Not applicable to 76mm or 165mm systems, or systems using a flanged inlet Model DDX valve.

Valve Shipping Weight

Table C

Valve Size	End Connection	Weight
2" (50mm), 2½" (65mm), 76mm & 3" (80mm)	Groove/ Groove	34 lbs (15 kg)
4" (100mm)	Groove/ Groove	64 lbs (29 kg)
	Flange/ Groove	79 lbs (36 kg)
	Flange/ Flange	92 lbs (42 kg)
6" (150mm) & 165mm	Groove/ Groove	95 lbs (43 kg)
	Flange/ Groove	122 lbs (56 kg)
	Flange/ Flange	138 lbs (69 kg)
8" (200mm)	Groove/ Groove	148 lbs (67 kg)
	Flange/ Flange	197 lbs (90 kg)

Trim Shipping Weight

Table D

Valve Size	Weight
2" (50mm), 2½" (65mm), 76mm & 3" (80mm)	30 lbs (13.6 kg)
4" (100mm), 6" (150mm), 165mm & 8" (200mm)	34 lbs (15.5 kg)

Friction Loss

Table E

Valve Size	Equivalent Length		Cv
	C = 120	C = 100	
2" (50mm)	4.4 ft (1,3 m)	3.1 ft (1,0 m)	101
2½" (65mm)	6.0 ft (1,8 m)	4.3 ft (1,3 m)	236
76mm	7.7 ft (2,3 m)	5.5 ft (1,7 m)	241
3" (80mm)	12.6 ft (3,8 m)	9.0 ft (2,7 m)	254
4" (100mm)	14 ft (4,3 m)	10 ft (3,0 m)	469
165mm	29.4 ft (9,0 m)	20.9 ft (6,4 m)	886
6" (150mm)	29.4 ft (9,0 m)	20.9 ft (6,4 m)	886
8" (200mm)	53.5 ft (16,3 m)	38.1 ft (11,6 m)	1516

Valve Trip Time Information

The actuator that operates the Model DDX-LP Low-Pressure Dry System has a variable differential trip ratio that limits the supervisory air/nitrogen pressure needed as the water supply pressure increases. The differential trip ratio is the ratio of the water supply pressure to the supervisory air/nitrogen pressure when the actuator fully opens. (Note: The actuator may partially open prior to reaching the differential trip ratio which could trip the valve; therefore, always provide the minimum supervisory pressure indicated in Table F of this bulletin, which includes an appropriate safety factor.)

For a valve without an accelerator, use the following differential ratio for valve trip time calculations:

Static Water Supply Pressure in psi (bar)	Differential Trip Ratio
50 (3.5)	7
100 (6.9)	10
175 (12.1)	14
250 (17.2)	18
300 (20.7)	21

For other static water pressures, the differential trip ratio may be calculated using the following equations:

- [psi] Differential Trip Ratio = 0.056 x Static Water Supply Pressure in PSI + 4
- [bar] Differential Trip Ratio = 0.811 x Static Water Supply Pressure in BAR + 4

For a valve using the Model B1 mechanical accelerator, use a differential trip ratio of 0 and a time delay of 10 seconds for the valve to trip.

For a valve using the Model C electronic accelerator, use a differential trip ratio of 0 and a time delay of 3 seconds for the valve to trip.

Installation

The Model DDX-LP Dry Pipe Valve System shall be installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems," as well as the requirements of any authorities having jurisdiction. The direction of flow shall be up through the assembly. Failure to follow installation instructions may void the warranty and/or listing of the valve. Verify compatibility of the Model DDX-LP Dry Pipe Valve System materials with the water supply and the environment where the valve will be installed prior to installation.

The Model DDX-LP Dry Pipe Valve System must be installed in a readily visible and accessible location where a minimum temperature of 40°F (4°C) or above must be maintained. Heat tracing of the Model DDX-LP Dry Pipe Valve System and trim is not permitted. Heat tracing can result in the formation of hardened mineral deposits that can prevent proper operation of the dry pipe valve.

Whenever ambient temperature conditions are high, the water temperature in the Model DDX-LP Dry Pipe Valve System pushrod chamber may rise, thereby increasing the pressure in the chamber to values exceeding the rated pressure of the system. Where normal temperature and pressure is exceeded, a pressure relief kit (P/N 6503050003; ordered separately) can be installed into the pushrod chamber release line to limit the pressure to 250 psi (17.2 bar).

The valve and trim kit has been tested, approved, and listed in accordance with UL and FM standards. Hydrostatically testing the valve and trim to pressures higher than their rating is limited to the hydrostatic test as referenced by NFPA 13. The clapper can remain in the closed position and the trim kit need not be isolated.

Normal operation and hydrostatic testing does not address the occurrence of a water hammer which may damage the valve. A water hammer can create pressure greater than the rated pressure of the equipment and should be avoided by all necessary means. Water hammer may occur from (but is not limited to) improper fire pump settings, underground construction work, or improper venting of trapped air in piping.

DO NOT use bleeder valves for testing of the low-pressure switch on the trim. Release of pneumatic pressure from the actuator trim will result in operation of the system.

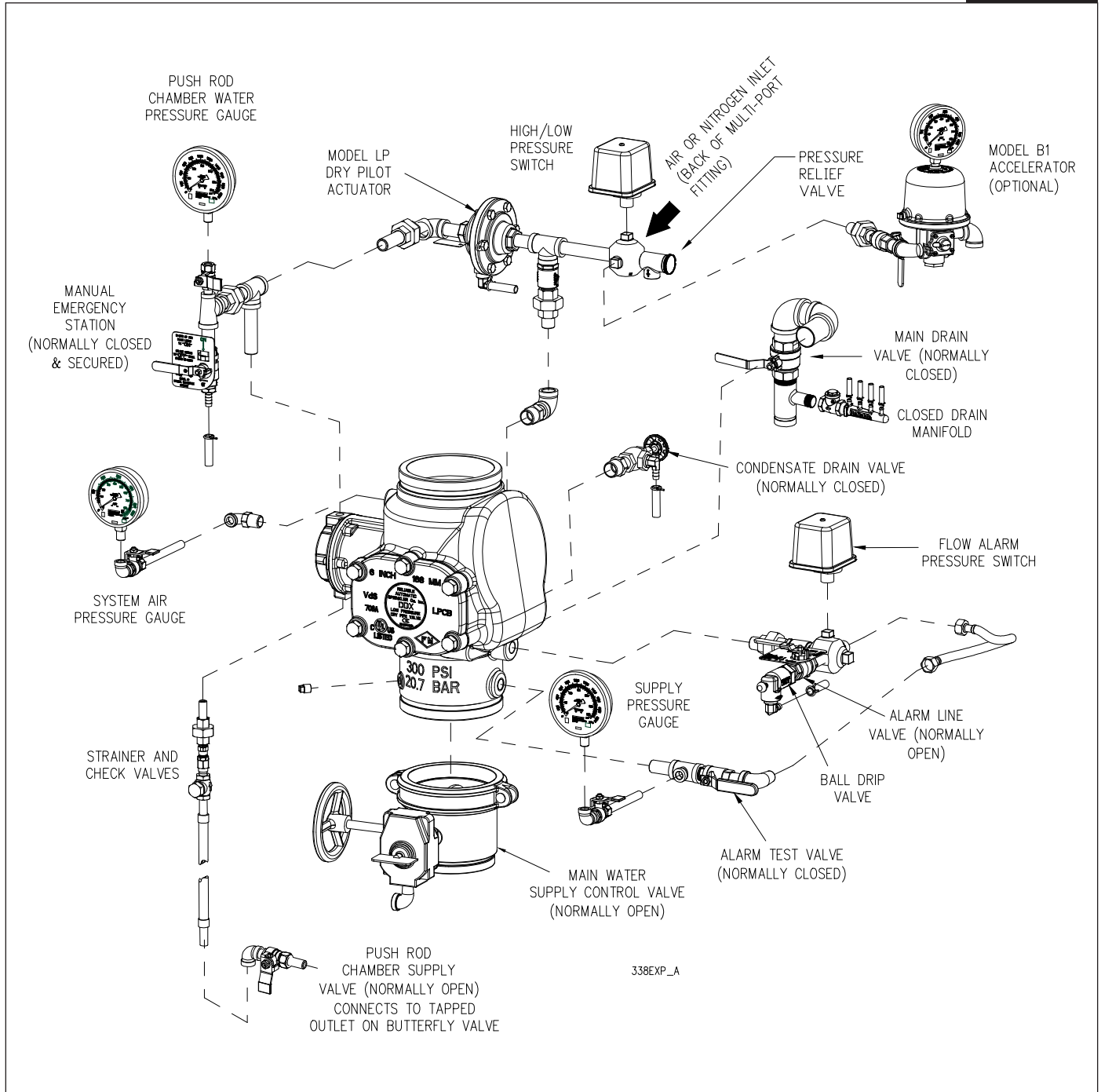
Air/Nitrogen Pressure Requirement

Table F

Water Pressure psi (bar)	System Air or Nitrogen Pressure psi (bar)
Maximum	Not Less Than
20 (1.4)	8 (0.6)
30 (2.1)	10 (0.7)
50 (3.4)	12 (.8)
75 (5.2)	13 (.9)
100 (6.9)	15 (1.)
125 (8.6)	16 (1.1)
150 (10.3)	17 (1.2)
175 (12.1)	18 (1.2)
200 (13.8)	19 (1.3)
225 (15.5)	21 (1.4)
250 (17.2)	22 (1.5)
275 (19.0)	23 (1.6)
300 (20.7)	24 (1.7)

Notes:

1. Supervisory air or nitrogen pressure should not exceed 30 psi (2.1 bar). Excess pressure may result in damage to the actuator.
2. Fastest valve operation is achieved with supervisory air or nitrogen pressure indicated; however, pressure must never be less than the minimum specified in the table above.
3. Air maintenance devices that maintain a constant pressure are recommended; however, if a tank-less compressor is used, the "compressor on" setting of the pressure switch must never be lower than the minimum pressure in the table above.



Valve Reset Procedure

1. Close the main water supply control valve to the DDX-LP valve.
2. Close the Pushrod Chamber Supply valve.
3. Close the valve(s) controlling air or nitrogen supply to the sprinkler system.
4. Open the Main Drain valve and allow system to fully drain. Leave Main Drain valve open.
5. Open all drain valves and vents at low points through-out the system, closing them when flow of water has stopped.
6. Inspect and replace any portion of the detection system and/or sprinkler system subjected to fire conditions.
7. Open the Model B Manual Emergency Station to relieve pressure in the pushrod chamber of the DDX-LP valve and leave open.
8. With the Alarm Line valve open, push in the plunger of Ball Drip valve, forcing the ball from its seat, and drain the alarm line. Close the Alarm Line valve.
9. Push in and rotate the external reset knob counterclockwise (when facing the valve) until you hear a distinct noise indicating that the clapper has reset. **Note:** The reset knob can be rotated only when pressure in the pushrod chamber is vented to atmospheric conditions (see step 7).
10. Open the Pushrod Chamber Supply valve and allow water to fill the pushrod chamber. Leave Pushrod Chamber Supply valve in the open position.
11. Close the Model B Manual Emergency Station valve when a steady stream of water is passing through the valve.
12. Allow water to flow through the Model LP Dry Pilot Actuator until all air is purged from the actuation piping.
13. Close the dry pilot actuator by opening the air or nitrogen supply quick fill valve. Allow the pressure to build to the level specified in Table F then set the pneumatic supply to automatic operation. **Note:** It may be necessary to temporarily close the main drain valve in order to build supervisory pressure to the recommended level.)
14. Open the Alarm Line valve and verify that the Main Drain valve is open. Slightly open the main valve controlling water supply to the Model DDX-LP Valve, closing the Main Drain valve fully when water flow is heard. Observe if air or water leaks through the Ball Drip valve. If no leak occurs, the DDX-LP clapper is sealed.
15. If there is an accelerator installed on the system, reset it now following the manufacturer's instructions. For the Reliable Model B1 Accelerator, please refer to Technical Bulletin 323. **Note:** The air or nitrogen system must be in automatic operation in order for the accelerator to set up properly.
16. Slowly open the main valve controlling water supply until fully opened, and verify that it is properly monitored.
17. Verify that the Pushrod Chamber Supply valve and Alarm Line valve are open. **Note:** The Pushrod Chamber supply valve must remain open to maintain hydraulic pressure in the pushrod chamber after the DDX-LP valve has been reset.
18. Verify that the Model B Manual Emergency Station is secured in the OFF position with the appropriate nylon tie.
19. Notify all concerned parties that the system has been placed into service.

Inspection, Testing, and Maintenance

1. Notify all concerned parties that testing will be performed on system.
2. Water supply — Confirm that valves controlling water supply to the Deluge Valve are opened fully and properly monitored.
3. Alarm line — Confirm that the alarm line valve is open and remains in this position.
4. Other trim valves — Confirm that the pushrod chamber supply valve is open, as well as all pressure gauge valves. The main drain valve, condensate drain valve, and alarm test valve should be closed.
5. Ball drip valve — Push in on the plunger to be sure ball check is off its seat. If no water appears, the Deluge Valve water seat is tight. Inspect the bleed hole on the underside of the pushrod chamber for leakage.
6. Inspect air pressure for conformance to Table A.
7. Releasing device — Check outlet of the releasing device (i.e., hydraulic manual emergency station) for leakage. Also verify that tubing drain lines from releasing devices are not pinched or crushed which could prevent proper releasing of the DDX-LP valve.
8. Testing water flow alarm — Open the alarm test valve permitting water from the supply to flow to the electric sprinkler alarm switch and to the mechanical sprinkler alarm (water motor) if installed. After testing, close this valve securely. Push in on the plunger of ball drip valve until all water has drained from the alarm line.
9. Testing of supervisory pressure switch — Close the main water supply control valve. Decrease pneumatic pressure from normal and verify operation of low pressure alarm. Increase pressure form normal and verify operation of high pressure alarm. Reset pneumatic pressure to normal.
10. Operational test — Open the Model B Manual Emergency Station. Alternatively, deplete pneumatic pressure from the sprinkler system. **Note:** AN OPERATIONAL TEST WILL CAUSE THE DELUGE VALVE TO OPEN AND FLOW WATER INTO THE SPRINKLER SYSTEM.
11. Secure the Model B Manual Emergency Station in the OFF position with nylon tie after Deluge Valve is reset.
12. Notify all concerned parties that testing is complete and system has been returned to service.

Testing System Without Operating Deluge Valve

1. Close the valve controlling water supply to the deluge valve and open the main drain valve.
2. Verify that valve supplying hydraulic pressure to the piston/pushrod chamber is open, allowing water to enter the pushrod chamber.
3. Deplete pneumatic pressure from the sprinkler system.
4. Loss of pneumatic pressure must result in a sudden drop of water pressure in the pushrod chamber, as indicated by the pressure gauge on the hydraulic release trim.
5. Reset the valve per the reset instructions.

Draining Excess/Condensate Water

1. Notify all concerned parties that maintenance is being performed on the system.
2. Close the Main Water Supply Control valve to the system.
3. Open the Main Drain valve.
4. Open the Condensate Drain valve until all water has drained.
5. Close Condensate Drain valve.
6. Allow supervisory pressure to return to normal.
7. Partially open the Main Water Supply Control valve.
8. Slowly close the Main Drain valve.
9. Fully open the Main Water Supply Control valve.
10. Notify all concerned parties that the system has been returned to service.

After fully resetting the Reliable Model DDX-LP Dry Pipe Valve System, confirm that all valves are in the correct position and properly monitored as required by NFPA 13:

- Main Water Control Valve: Open
- Push Rod Chamber Supply Valve: Open
- Accelerator Inlet Valve (if present): Open
- Air or Nitrogen Supply Valve: Open
- Alarm Line Valve: Open
- Alarm Test Valve: Closed
- Main Drain Valve: Closed
- Emergency Manual Release Valve: Closed (Secured)

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 Model DDX-LP 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. Replace any components found to be corroded, damaged, worn, or non-operable. Increase the frequency of inspections when the valve is exposed to corrosive conditions or chemicals that could impact materials or operation of the assembly.

If face plate is removed during maintenance, torque face plate bolts to the following values during re-installation:

- 35 ft-lbs. (47 N-m) for 2" through 4" valves
- 70 ft-lbs. (95 N-m) for 6"-8" valves

Guarantee

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

Listings & Approvals

Reliable Model DDX-LP Dry Pipe Valves with trim that includes a Model LP Dry Pilot Actuator, when used as a complete system are:

- Listed by Underwriters Laboratories, Inc. and UL certified for Canada (cULus).
- FM Approved
- LPCB: 4" (100mm), 165mm, 6" (150mm) & 8" (200mm) only
- CE
- UKCA: 0832-UKCA-S5044, -S5099, or -S5100

Ordering Information

Specify:

Valve Model DDX-LP Dry Pipe Valve System

Size (See Table A)

End Connections (See Table A)

Standard Trim

- Fully assembled with control valve
- Fully assembled without control valve
- Segmentally assembled trim
- Loose trim (**Note:** Loose trim does not include low pressure switch [P/N 6990019313] or alarm switch [P/N 6990006382]; order separately)

Options

- Model B1 Accelerator (P/N 6501200019)
- Pushrod Chamber Pressure Relief Kit (P/N 6503050001)

Service Kits

Service kits are available for routine servicing of the valve (reference Assembly Drawings on website). Service kits for the Model DDX Deluge Valve include the following components:

- Clapper Seal Assembly (item 8)
- Cover Gasket (item 9)
- Bumpstop(s) (item 10)
- Push rod chamber diaphragm (item 18)
- Grease (item 42)

2", 2-1/2", and 3" Model DDX Service Kit: PN 6501200R03

4" Model DDX Service Kit: PN 6501200R04

6" Model DDX Service Kit: PN 6501200R05

8" Model DDX Service Kit: PN 6501200R06

Note: Early generation 4" and 6" Model DDX valves utilize a drop-in brass clapper. Service kits for early Model DDX valves are as follows:

4" Early generation DDX Deluge Valve Service Kit: PN 6501200R07

6" Early generation DDX Deluge Valve Service Kit: PN 6501200R08