

Model: 400E-3DC

Bermad Electric Pressure Control On-Off Deluge Valve

Installation

Operation

Maintenance



Application Engineering

Bermad

1. Safety First

BERMAD believes that the safety of personnel working with and around our equipment is the most important consideration. Please read all safety information below and from any other relevant source before attempting to perform any maintenance function.

Comply with all approved and established precautions for working with your type of equipment and/or environment.

Authorized personnel should perform all maintenance tasks.

Prior to performing a procedure, read it through to the end and understand it. If anything is not clear, ask the appropriate authority.

When performing a procedure, follow the steps in succession without omission.

2. Description

The BERMAD Model 400E-3DC Pressure Control Deluge Valve is suitable for systems that include electric fire detection and a piping system with a wide variety of open nozzles. Combining a pressure control feature, the model 400E-3DC is recommended for a system that requires pressure control.

BERMAD 400E-3DC Deluge Valve with Pressure Reducing Trim controls water pressure and flow into the open nozzles system. The main valve must be installed with the #2-UL Pressure Reducing Pilot Valve (PRPV). The Deluge Valve with Pressure Reducing Trim is recommended where it is necessary to guard against over-pressure while maintaining a preset discharge pressure during system operation. This feature allows regulation of total system demand and can be used to limit excess flow from deluge systems with high-pressure water supply, or to reduce outlet pressure to a constant value according to the system component pressure rating and design, regardless of changes in the deluge valve inlet pressure.

This feature is also recommended where a reduction of pressure surges and/or water hammer is desired.

Deluge Systems are commonly used where it is desirable to simultaneously spray water from all open sprinklers and/or nozzles while the system is operating.

In fire conditions, the release device on the control trim releases the pressure from the upper chamber, allowing the Deluge Valve (1 fig.1) to modulate open allowing water to flow to the system at the preset pressure. Water flows from any open nozzles and to alarm devices.

In the SET position, the line pressure supplied to both the main valve's control chamber and to a Hydraulic Relay Valve (HRV) via the priming line, and through a Check Valve, an Accelerator with priming restriction, is trapped by the Check Valve, by the closed HRV, by a Solenoid Valve and by a closed Manual Emergency Release. The trapped pressure holds the main valve's diaphragm and plug against the valve seat, sealing it drip tight and keeping the system piping dry. Under FIRE condition, an electric signal triggers the Solenoid Valve to open, opening the HRV. Pressure is then released from the main valve's control chamber to the downstream, through the Pressure Reducing (PRPV) Pilot and the opened HRV. Should system pressure rise above PR pilot setting, the PR pilot throttles, thereby enabling pressure to accumulate in the valve control chamber. This causes the 400E-3DC to throttle closed, decreasing system pressure to PR pilot setting.

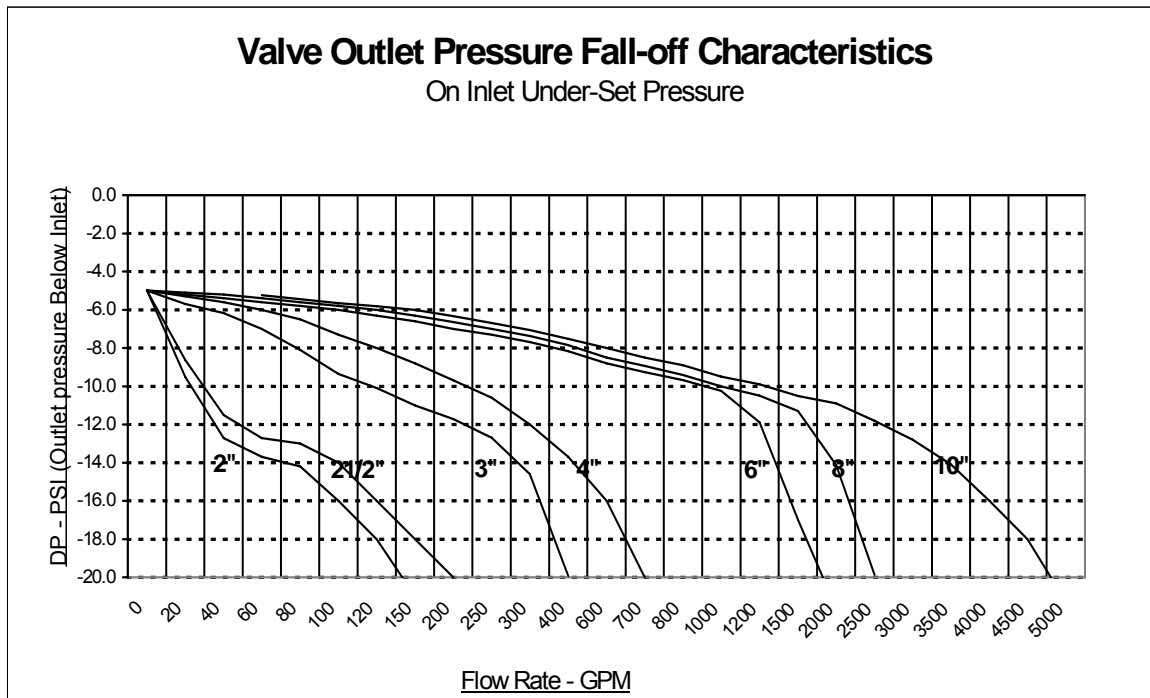
Flow and Pressure for Models 400E-2MC 2C, 3C, 3DC, 4C, 4DC, 5C, 5DC, 6C & 6DC

Valves sizes	2"	2½"	3"	4"	6"	8"	10"
Rated Inlet Pressure	250	250	250	250	250	250	250
Outlet Pressure Adjusting Range [psi (bar)]	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)
Minimum Flow-Rate [GPM (m³/hr)]	44 (10)	50 (11.5)	110 (25)	180 (401)	400 (91)	450 (102)	660 (150)
Maximum Flow-Rate [GPM (m³/hr)]	150 (34)	270 (61)	450 (102)	700 (159)	1600 (363)	3500 (795)	5000 (1136)



Attainable outlet pressure at inlet under-pressure

The following chart indicates the attainable outlet pressure available when the inlet pressure falls below the intended outlet pressure setting.



3. Australian Standard SSL

BERMAD Deluge Valve with Pressure Reducing Trim is Australian Standard SSL when installed with specific components & accessories.

4. Installation

NOTES:

1. Any deviation in trim size or arrangement may adversely affect the proper operation of the Deluge Valve.
2. All initiating devices (detectors), indicating appliances, releasing devices, wet pilot line actuation devices (such as thermostatic releases, and/or fixed temperature releases), as well as the system control panel, must be compatible for use with the particular Deluge System. Refer to NFPA 13 or the applicable installation standards, codes and authorities having jurisdiction.

WARNING: The Deluge Valve and trim must be installed only in areas where they will not be subjected to freezing temperatures.

Installation Instructions

- 4.1 Allow enough room around the valve assembly for any adjustments and future maintenance/disassembly work.
- 4.2 Before the valve is installed, flush the pipeline to remove any dirt, scale, debris, etc. Not flushing the line may render the valve inoperable.
- 4.3 Install the valve in the pipeline with the valve flow arrow on the body casting in the proper direction. Ensure that the valve is positioned so that the cover/actuator can be easily removed for future maintenance.
- 4.4 The water supply priming line must be connected to the upstream of the system control valve.
- 4.5 Subjected to all other instructions, drawings and technical specifications, which describe Bermad Deluge Valve, install in their proper positions the components comprising the Deluge Trim Package, according to the drawing relevant to the specific type, hereby enclosed.
- 4.6 Install also the additional accessories, which appear in the drawing and which must be installed as shown in the drawing, although they are not packed together with the Bermad Deluge Valve itself.
- 4.7 Design Considerations

Electrical & Solenoid Requirements

The Solenoid Valve shall be wired to the Releasing Control Panel according to information provided by the control panel manufacturer.

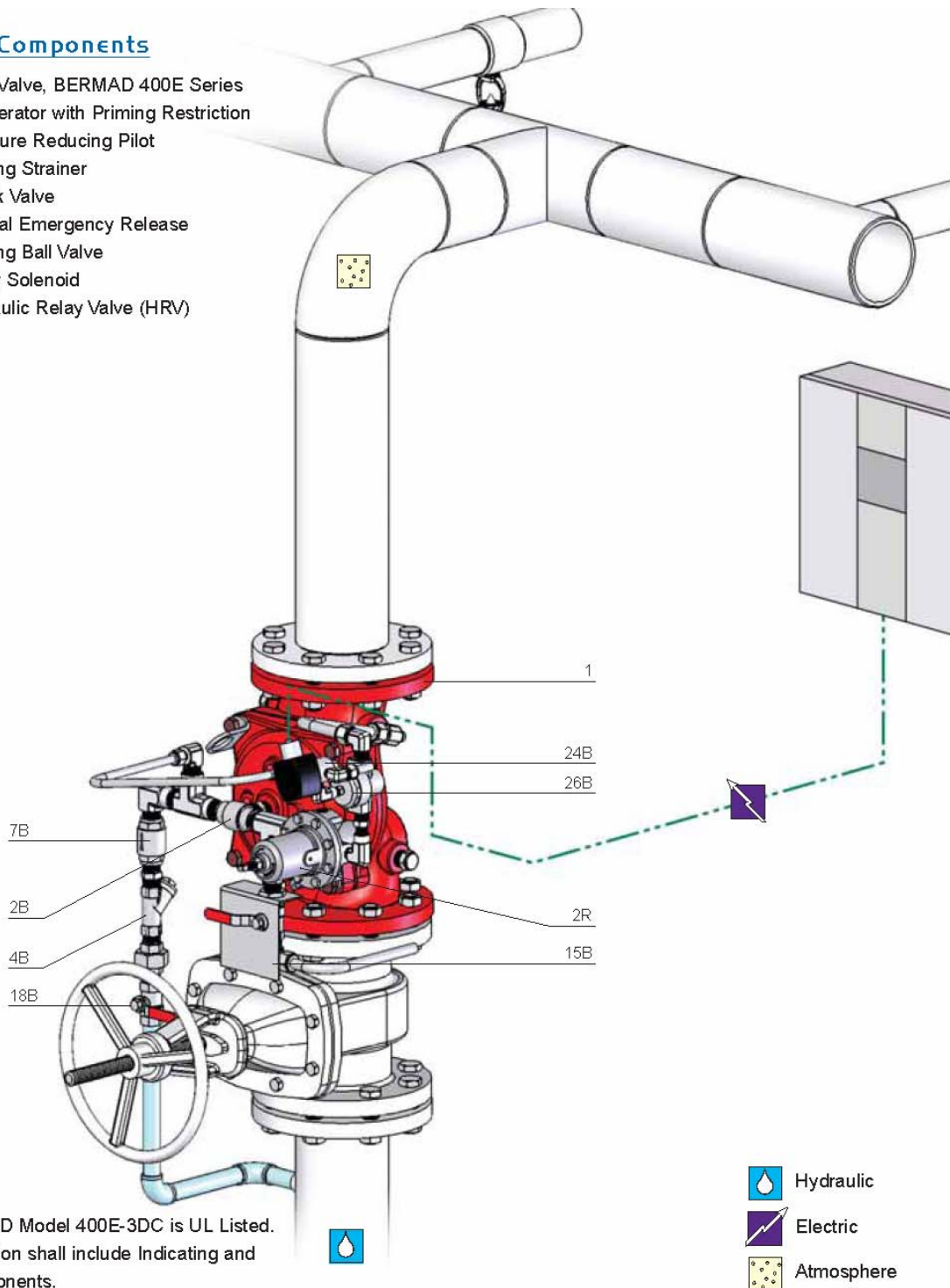
Standard Solenoid data (others are optional):

1. Voltage: 24VDC
2. Normally Position: NO
3. Enclosure Type: 1,2,3,3S, 4 and 4X/IP-65 (For Hazardous Locations enclosure, see catalog)
4. Electrical Rating: 8 Watt




Figure 1 – Installation Drawings

System Components

- 1 - Main Valve, BERMAD 400E Series
- 2B - Accelerator with Priming Restriction
- 2R - Pressure Reducing Pilot
- 4B - Priming Strainer
- 7B - Check Valve
- 15B - Manual Emergency Release
- 18B - Priming Ball Valve
- 24B - 3-way Solenoid
- 26B - Hydraulic Relay Valve (HRV)



Note
 The BERMAD Model 400E-3DC is UL Listed.
 The installation shall include Indicating and Drain Components.

-  Hydraulic
-  Electric
-  Atmosphere



5. Equivalent Length

Deluge Valve Equivalent Length Value (Steel Pipe), for use in hydraulically calculated systems

Valve Size	Equivalent Length Value Meter (Ft)
2"	9.1 (30) of 2" pipe
2½"	12.1 (40) of 2½" pipe
3"	13.7 (45) of 3" pipe
4"	14 (46) of 4" pipe
6"	27.4 (90) of 6" pipe
8"	45.7 (150) of 8" pipe

6. Optional Equipment

- 6.1 If required, provide an Alarm Pressure Switch, to either activate an electric alarm, or shut down desired equipment. Connect it according to manufacturer instructions.
- 6.2 If required, provide a Water Motor Alarm, it shall be assembled and installed according to instructions with in its package.
- 6.3 It is a recommended practice to provide an "Inspector's Test Connection" on the hydraulic release system. The inspector's Test Connection should be equipped with a ball valve (normally locked closed) capable of being opened to simulate the opening of a release.

7. Placing in Service/Resetting the System

- 7.1 Place the detector circuit in service.
- 7.2 Reset the Solenoid Valve (24B fig.1) by resetting the releasing control panel.
- 7.3 **Close** all emergency release valves.
- 7.4 Test supervisory circuits in releasing control panel.
- 7.5 **Open** the priming-line valve (18B fig.1). Check that there is no water flow from the Solenoid Valve.
- 7.6 When the control chamber pressure gauge indicates full upstream pressure and is no longer rising, the release system is reset.
- 7.7 Slowly **Open** the supply Isolating Valve and check that no water flows into the system.
- 7.8 **Depress** the Drip Check and drain any water from the system side of the Deluge Valve.

The system is now operational and in a standby mode.
Ensure that the following Set Conditions are met.

Set Conditions (Normal Conditions)

Item	Status
All Main Isolating Valves	OPEN and sealed with tamperproof seals
All Manual Releases	CLOSE position and sealed
Alarm Shut-Off Valve	OPEN position
Priming Ball Valve (18B fig.1)	OPEN
Control-Chamber Gauge	OPEN gauge valve, the Pressure Gauge indicates rate of pressure in Control-Chamber
Upstream Pressure Gauge	OPEN gauge valve, the Pressure Gauge indicates the upstream supply pressure to the Deluge Valve
Drip-Check Device	VENTED : Push the knob to confirm that there is no leakage.
Control Panel & Detections	Are in service and its stand-by position.
Releasing Devices	CLOSED with no leaking

8. Removing the System from Service

WARNING: When taking deluge system out of service, a fire patrol should be established in the system area. If automatic fire-alarm signaling equipment is utilized, the proper authority should be notified that the system is being removed from service. The insuring body and owner representative should also be notified when the system is being taken out of service.

9. Removing Instructions

- 9.1 Shut off the main supply-isolating valve.
- 9.2 Close the Priming line valve (18B fig.1) to Deluge Valve Control chamber.
- 9.3 Open all drain valves.
- 9.4 Release the water pressure from the control chamber of the Deluge Valve by pulling the Manual emergency release (15B fig.1).
- 9.5 If auxiliary power is used, disconnect the power supply and batteries.
- 9.6 Place "Fire Protection System out of Service" signs in the area protected by the system.

10. Operation

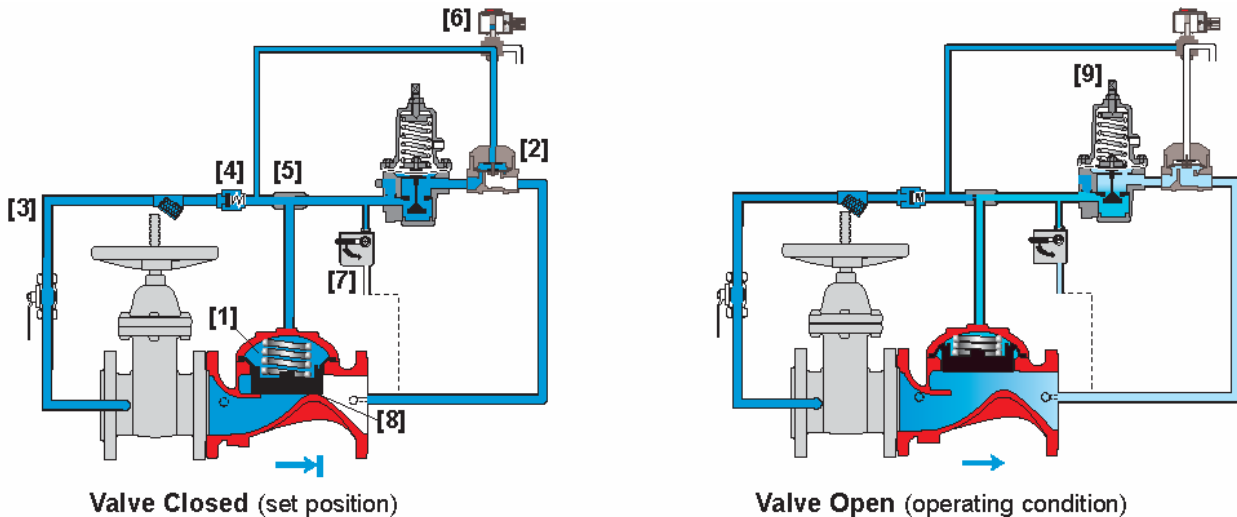
Refer to Operation Drawing in paragraph 11.

In the SET position, the line-pressure supplied to the main valve's control chamber via the priming line and through the Solenoid, is trapped in the HRV's (2 fig.2) upper chamber, by a opened 3-Way Solenoid Valve (6 fig.2), and by a closed Manual Emergency Release (7 fig.2). The trapped pressure holds the main valve's diaphragm and plug against the valve seat, sealing it drip-tight and keeping the system piping dry.

In FIRE or test conditions, an electric detection system, through a control panel, triggers the Solenoid Valve (6 fig.2) to open position; pressure is released from the control chamber by the opened HRV (2 fig.2) or the Manual Emergency Release. The main valve will open allowing water to flow into the system piping and to the alarm devices.



11. Figure 2: Operation Drawing



12. Maintenance and Inspection Test

- 12.1 **WARNING:** Do not turn off the water supply to make repairs without placing a roving fire patrol in the area covered by the system. The patrol should continue until the system is back in service.
- 12.2 Prior to turning off any valves or activating any alarms, notify local security guards and the central alarm station, if used, so that a false alarm will not be signaled.
- 12.3 In any of the following inspections or testing procedures, if an abnormal condition exists, see Abnormal Conditions for possible cause and corrective action.
- 12.4 See NFPA Pamphlet No. 25 and also relevant publications by authorities having jurisdiction.

Readjusting

The pilot valve is factory pre-set according to the stated demands of the customer. The pre-set is clearly indicated on the pilot valve tag.

If readjustment to either the pressure or valve response is required, follow the following steps.

Ensure that there is minimum flow through the main valve. (for Pilot setting flow rate see Table 1, item Minimum flow rate for pilot setting.)

Free the tension between the adjusting screw on the pressure reducing pilot valve (2 in figure 2) and the fastening nut by turning the fastening nut counterclockwise.

By alternately turning the adjusting screw on the pilot valve a half turn and then reading the downstream pressure, gradually adjust the pressure:

- Counterclockwise to decrease (-) the downstream pressure
- Clockwise to increase (+) the downstream pressure.

13. Weekly Inspection

- 13.1 The system should be checked for Set Condition. See above "Set Condition (Normal condition)".
- 13.2 Observe the upstream pressure gauge: it should indicate that the normal supply of water pressure to the Deluge Valve is maintained.

14. Monthly Inspection and Test

- 14.1 Complete Weekly Inspection.
- 14.2 Test the water-motor alarm and/or electric alarm, by turning the alarm test valve to the open position. The alarm should sound. Turn to close position.
- 14.3 Depress the Drip Check to release accumulated water and to check main valve leakage (Significant water accumulation on the system side may indicate a sealing problem).

15. Semi-annual Inspection

- 15.1 Complete Weekly and Monthly Inspection and Test.
- 15.2 Inspect the electric detection system and electric release control panel, as suggested by the release control panel manufacturer.

16. Annual Inspection and Test

- 16.1 Complete Weekly, Monthly and Semi-Annual inspections.
- 16.2 Place the system out of service (See "Removing The System From Service" above).
- 16.3 Trip the release-line system.
- 16.4 The interior of the Deluge Valve should be cleaned and inspected.
- 16.5 Place the system back in service. (See instructions "Placing the System in Service").
- 16.6 The Deluge Valve must be activated at full flow.
 - Note:** The system will be flooded! Take all necessary precautions to drain water and prevent damage in the area protected by the system.
- 16.7 Trip-test the deluge system with an electric release control panel. The release may be tripped by the method suggested by the release control panel manufacturer.
- 16.8 The manual emergency release handle (15B fig.1) is to be pulled. The Deluge Valve should open and discharge water. Observe upstream Pressure Gauge while full flow is on. Inspect all system nozzles.
- 16.9 Take all additional measures as required by NFPA-25 "Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems."
- 16.10 Clean the priming strainer (4B fig.1) prior to resetting the Deluge Valve.

17. Abnormal Conditions

17.1. Alarm Pressure Switch Fails to Sound

- A. Check for obstructions in the alarm test line.
- B. Clean the alarm-line strainer (if a water motor alarm is installed).
- C. Make certain the alarm is free to operate.
- D. Test the electrical circuit to the electric alarm (if utilized).

17.2. False Trip

- A. Check and test the electrical circuit to the Solenoid Valve (24B fig.1)

17.3. Leakage through Deluge Valve

- A. Check for clogged priming strainer (4B fig.1).
- B. Leaking control trim system
- C. Damaged deluge valve internal elastomer or seat.

17.4. Deluge valve Will Not Reset

- A. Check for clogged priming strainer (4B fig.1), the screen should be properly cleaned.
- B. Closed priming valve (18B fig.1).
- C. Check for Foreign object lodged between seal and valve seat.
- D. Control Panel is not reset. Check for Faulty circuits, using manufacturer instructions.

17.5. Difficulty in Performance

Where difficulty in performance is experienced, the manufacturer or his authorized representative should be contacted if any field adjustment is to be made.