Bermad 3D - 400Y Torrent Deluge Valve

(for Illustration only)

Installation Operation Maintenance Manual (IOM)

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 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.

1. General

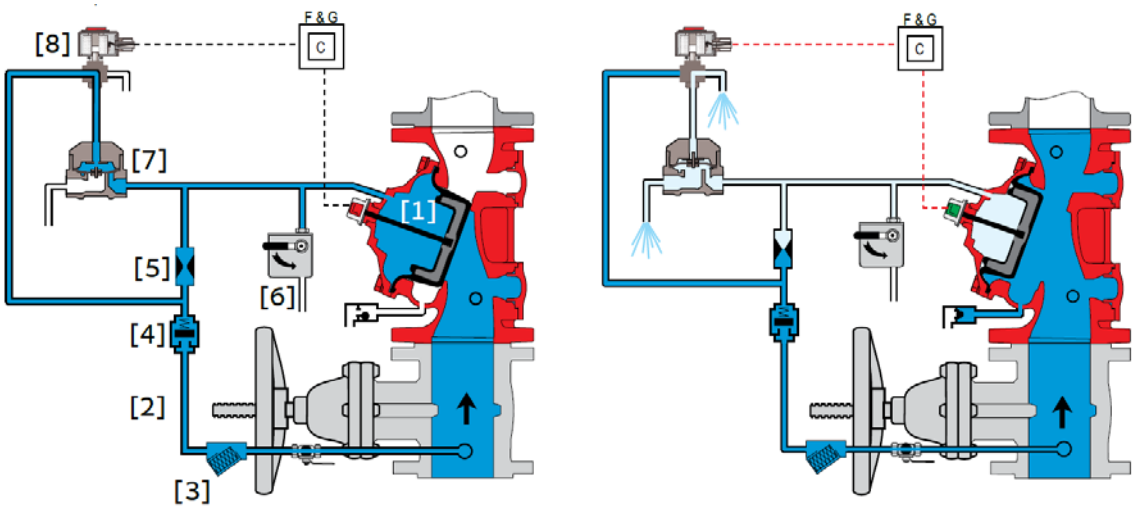
The BERMAD 400Y Water Control Valve designed for vertical or horizontal installation and is used for Deluge, Pressure Control Deluge and Pre-action in Firewater or Foam systems.
The 400Y straight-through design provides high flow capabilities with minimum head loss and the removable cover enables quick in-line service. The elastomeric assembly can be easily removed from the valve body with no need for disassembling of the valve from the line. Deluge systems are commonly used where, when the system operates, it is desirable to simultaneously spray water or foam from all open nozzles on the system.

1.1 Approvals

The Bermad 400Y Deluge Valve is UL Listed and FM Approved when installed with specific components & accessories. Refer to the current UL and/or FM fire protection equipment directory. Consult Bermad for any component approval recently to appear in any equipment directory.
All solenoid valves shall be UL Listed for compatible pressure ratings of the deluge valve for which it is intended to be used.

1.2 Principle Of Operation

The BERMAD model 400Y-3D is held closed by water pressure in the control chamber [1]. Upon release of pressure from the control chamber, the valve opens.
Under NORMAL conditions, water pressure is supplied to the control chamber via the priming line [2], restriction orifice [5] and strainer [3], and is then trapped in the control chamber by a check valve [4], manual emergency release [6], and a relay valve (HRV) [7] that is held closed by hydraulic pressure supplied through a three-way solenoid valve [8]. The water pressure trapped in the main valve control chamber holds the diaphragm against the valve seat, sealing it drip-tight and keeping the system pipes dry.
Under FIRE conditions, water pressure is released from the control chamber, either with the manual emergency release, or by the HRV opening in response to the solenoid valve being activated by the fire & gas control system [C]. This opens the 400Y-3D deluge valve, allowing water to flow into the system piping.



Valve Closed (normal conditions)

Valve Open (fire conditions)

Table 1: Pressure and Flow Settings

Valve Size in. (mm)	**1.5" (40)**	**2-2.5" (50-65)**	**3" (80)**	**4" (100)**	**6" (150)**	**8" (200)**	**10" (250)**	**12" (300)**	**14" (350)**	**16" (400)**
Max. Inlet pressure bar (psi)	25 (365)	25 (365)	25 (365)	25 (365)	25 (365)	25 (365)	25 (365)	21 (300)	21 (300)	21 (300)
Kv (Cv)	68 (79)	80-105 (92-121)	190 (219)	345 (398)	790 (912)	1160 (1340)	1355 (1652)	2370 (2737)	2850 (3292)	3254 (3758)
Leq m (ft) Note 1	2 (7)	4 - 7 (14-24)	8 (25)	8 (26)	13 (43)	27 (89)	55 (179)	38 (125)	66 (215)	115 (370)
Max. Recommended Flow-Rate m3/hr (GPM)	27 (119)	50 (300)	102 (450)	159 (700)	363 (1600)	644 (2836)	1006 (4431)	1450 (6380)	1972 (8684)	2400 (1052)

Notes:

1) Valve Equivalent Length Value (New Steel Pipe), for use in hydraulically calculated systems.

2. Installation

NOTES:

- Proper operation of the Bermad 400Y Deluge Valves depends upon their trim being installed.
- The 400Y valve shall be trimmed with specific trim components and accessories; it must be installed and maintained in compliance with the most recent Bermad publications.
- Any deviation in trim size or arrangement may adversely affect the proper operation of the deluge valve.

***Warning*:** The deluge valve and trim must be installed only in areas where they will not be subject to freezing.

2.1 Installation Instructions

2.1.1 Allow enough room around the valve assembly for any adjustments and future maintenance.

2.1.2 Before the valve is installed, flush the pipeline to remove any dirt, scale, debris, etc.

Warning: not flushing the line may result in the valve being rendered inoperable.

2.1.3 Install the valve on the pipeline with valve flow arrow designated on the body points in the desired direction.

2.1.4 Install a listed / approved indicating valve upstream of the system (supervised "open").

2.1.5 Ensure that all other components are positioned correctly as per the appropriate drawing.

2.1.6 The water supply priming line must be connected upstream of the system control valve.

2.1.7 For Hydraulic or Pneumatic trim: Install an "End of Line Release Valve" with maximum bore of 1/2", installed at the same level or higher than the highest fusible plug position and located at the remotest location on the system possible.

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

2.1.9 All additional accessories, although not packed together with the BERMAD Deluge Valve, must be installed as shown in the relevant drawing and other illustrations.

2.1.10 After installation in the main line, carefully inspect/correct any damaged accessories, piping, tubing and fittings, ensure that there are no leaks.

2.2 Optional Features

2.2.1 **Valve Position Indicator (code I)**: for Visual Indicating of the Valve Position.

2.2.2 **Valve Position Limit Switch (code S or S9)**: for Remote Indication of the Valve Position.

2.2.3 **Valve Seat Ring (code T)**: corrosion Resistance Seat Ring Inserted to the main valve.

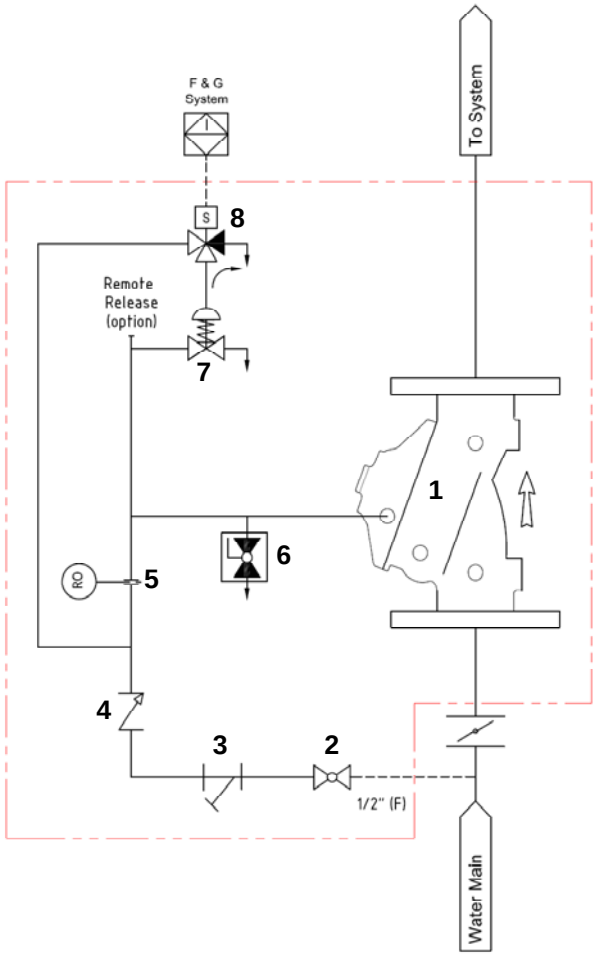
2.2.4 **Large Control Filter (code F)**: For extra capacity means for filtering of the water supplied to the pilot system.

2.2.5 **Opening and Closing Speed control Device** (code): Closing speed control (01), Opening speed control (02), Opening & Closing speed controls (03), refer to Appendix A for the Speed Controls installation data.

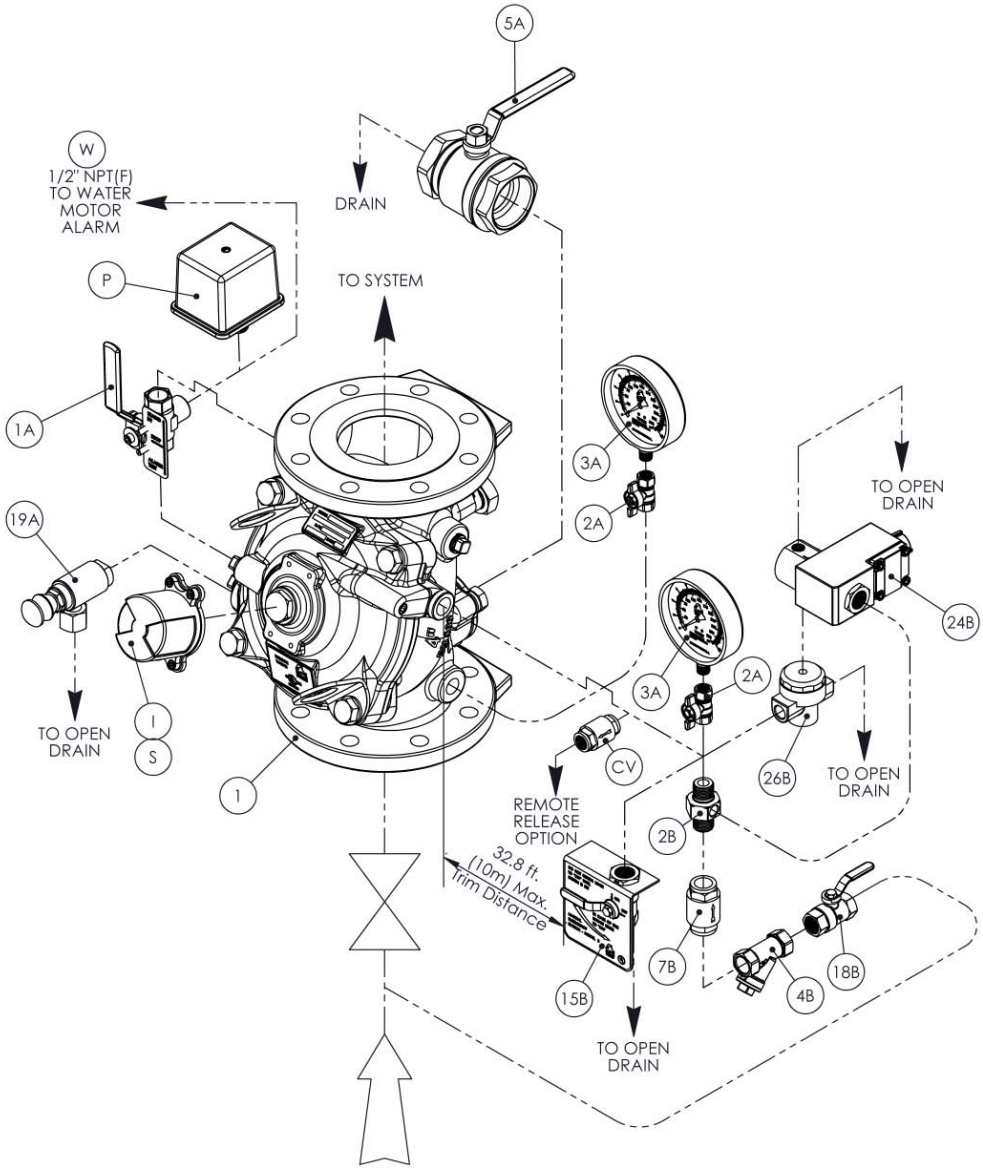
Fig 2: **Typical Installation 400Y-3D**

Typical P&ID

Components
1 BERMAD 400Y Deluge Valve
2 Priming Ball Valve
3 Priming Strainer
4 Check valve
5 Restriction Orifice
6 Manual Emergency Release
7 HRV-Hydraulic Relay Valve
8 3-Way NC Solenoid Valve



2.2.6 **Model 3D Trim Illustration: Electrically Controlled On-Off, 3- way solenoid valve**



Item	Description	Qty	Note
1	400Y Deluge Valve	1	5
1A	Alarm Test Valve 1/2"	1	8
2A	Gauge Valve 1/4"	2	8
2B	Restriction Orifice	1	8
3A	Pressure Gauge 4"	2	2, 8
4B	Priming Strainer 1/2"	1	8
5A	Drain Valve	1	1, 4, 8
7B	Priming Check valve 1/2"	1	
15B	Manual Emergency Release	1	1, 9
18B	Priming Valve 1/2" Ball Valve	1	
19A	Drip Check Device 1/2"	1	8
24B	Solenoid Valve 3-Way	1	5
26B	Hydraulic Relay Valve (HRV)	1	
F	Fittings and Tubing	Lot	6

Optional System Items:

P	Pressure Switch
I	Valve Visual Position Indicator
S	Valve Limit Switch
W	Water Motor Alarm
CV	Pilot Line Check Valve
01	Closing Speed Control (note 10)
02	Opening Speed Control (note 10)
03	Opening & Closing Speed Control (note 10)

Notes:

(1) Shall be UL Listed in accordance with UL 258
(2) Shall be UL Listed in accordance with UL 393
(3) Shall be UL Listed in accordance with UL 753
(4) For 1½ & 2": ¾" Drain Valve ; 2½ & 3": 1½" Drain Valve & 4" and larger: 2" Drain Valve
(5) Shall be UL Listed for fire protection service
(6) Construction material Brass/S.S 316 or corrosion resistant equivalent
(7) Items marked by 'B' standard Trim components provided in the Trim package
(8) Items marked by 'A' are required trim components for the proper installation and use of the deluge valve and are not provided in the Trim package.
(9) Manual Emergency Release may be Model B (open Bracket) or Model D (with box)
(10) See Appendix A for Speed Control Options.

3. Operation

3.1 Electrically Controlled System

The Bermad Electrically Controlled Deluge Valve is suitable for automatic water spray or foam systems that include electric detection and piping systems with open nozzles. The Deluge Valve is operated by an electric Solenoid Valve and requires a Listed/Approved control panel with a compatible electrical fire detection system.

In Fire conditions, activation of the detection system causes the System Control Panel to be activated.

This in turn opens the Solenoid Valve, causing the Bermad Deluge Valve to open, and thereby allowing water to enter the system piping.

4. Placing in Service/Resetting

The deluge valve and the control trim shall be placed in Service in accordance to the instructions below. After all relevant instructions are performed, slowly open the supply-isolating valve and check that no water flows into the system.

4.1 Electrical Detection System:

4.1.1 Place the detector circuit in service.

4.1.2 Reset the Solenoid Valve by resetting the releasing control panel.

4.1.3 Test supervisory circuits in releasing control panel.

4.2 Placing In Service

4.2.1 Close all emergency release valves.

4.2.2 Open the priming-line valve .Check that there is no water flow from the Solenoid Valve.

4.2.3 When the control chamber pressure gauge indicates full upstream pressure and is no longer rising, the release system is reset.

4.2.4 Slowly Open the supply Isolating Valve and check that no water flows into the system.

4.2.5 Depress the Drip Check and drain any water from the system side of the Deluge Valve.

Note: The system is now operational and in a standby mode, ensures that the following Set Conditions are met.

Table 3: 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 (1A section 2.2.6)	**OPEN** position
Priming Ball Valve (18B section 2.2.6)	**OPEN**
Control-Chamber Gauge	**OPEN** gauge valve, the gauge indicates control-chamber pressure
Upstream Pressure Gauge	**OPEN** gauge valve, the gauge indicates the supply pressure
Drip-Check Device (19B section 2.2.6)	**VENTED**: Push the knob to confirm that there is no seat leakage
Wet Pilot Line System	**IN SERVICE**: no leaks in the system
Control Panel & Detections	**IN SERVICE** and in there stand-by position.
Pneumatic Release System	**ON**, maintained to 2.4-2.6 bar (35-38 psi) and functioning properly
Releasing Devices	**CLOSED** with no leaks

Maintenance

Bermad Deluge Valves require no lubrication, packing or tightening and require minimum maintenance

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.

1) 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 raised.
2) In any of the following inspections or testing procedures, if an abnormal condition exists, see "Abnormal Conditions" for possible cause and corrective action.
3) See NFPA Pamphlet No. 25 and also relevant publications by authorities having jurisdiction.

4.3 Removing the System from Service

WARNING: When taking a 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's representative should also be notified when the system is being taken out of service.

4.3.1 Shut off the main supply-isolating valve.
4.3.2 Close the priming line valve to the deluge valve control chamber.
4.3.3 Open all drain valves to drain all the water from the system.
4.3.4 Release the water pressure from the control chamber of the deluge valve by pulling the manual emergency release, or by tripping the electrical circuit (de-energize the Solenoid Valve).
4.3.5 If auxiliary power is used, disconnect all power supply and batteries.
4.3.6 Place "Fire Protection System out of Service" signs in the area protected by the system.

4.4 Weekly Inspection

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

4.5 Monthly Inspection and Test

4.5.1 Complete Weekly Inspection.
4.5.2 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 closed position.
4.5.3 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).

4.6 Semi-Annual Inspection

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

4.7 Annual Inspection and Test

4.7.1 Complete Weekly, Monthly and Semi-Annual inspections.
4.7.2 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.

4.7.3 Trip-test the deluge system via the electric release control panel (if installed). The release may be tripped by the method suggested by the release control panel manufacturer.
4.7.4 Trip test the deluge system by decreasing pressure in the pneumatic release system (if installed).
4.7.5 The manual emergency release handle 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.
4.7.6 Take all additional measures as required by NFPA-25 "Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems".
4.7.7 Clean the priming strainer prior to resetting the Deluge Valve.
4.7.8 Place the system back in service. (See instructions "Placing in Service/Resetting ").

4.8 Five-Year Inspection and Test

4.8.1 Complete Weekly, Monthly, Semi-Annual and Annual inspections.
4.8.2 Place the system out of service (See “Removing the System from Service” above).
4.8.3 The interior of the Deluge Valve should be cleaned and inspected.
4.8.4 The Elastomeric Diaphragm Assembly shall be inspected for wear and replaced if necessary.
4.8.5 Place the system back in service. (See instructions "Placing in Service/Resetting ").
4.8.6 The valve and the pilot system must be activated at full flow.
4.8.7 Take all additional measures as required by NFPA-25 "Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems".

5. Abnormal Conditions

5.1 Alarm Pressure Switch Fails to Sound

5.1.1 Check for obstructions in the alarm test line.
5.1.2 Clean the alarm-line strainer (if a water motor alarm is installed).
5.1.3 Make certain the alarm is free to operate.
5.1.4 Test the electrical circuit to the electric alarm (if utilized).

5.2 False Trip

Check for any of the following possible causes:
5.2.1 Check and test the electrical circuit to the Solenoid Valve.
5.2.2 Check for Malfunctioning Manual Reset device.

5.3 Leakage through Deluge Valve

Check for any of the following possible causes:
5.3.1 Check for clogged priming strainer
5.3.2 Leaking control trim system.
5.3.3 Inadequate pneumatic pressure supply.
5.3.4 Leaking Dry Pilot release system.
5.3.5 Damaged deluge valve internal elastomer or seat.

5.4 Deluge Valve Will Not Reset

Check for any of the following possible causes:
5.4.1 The Pilot Valve is clogged or not reset properly
5.4.2 Inadequate Pneumatic Pressure supply.
5.4.3 Check for clogged priming strainer, the screen should be properly cleaned.
5.4.4 Closed priming valve.
5.4.5 Check for Foreign object lodged between seal and valve seat.
5.4.6 Control Panel is not reset. Check for Faulty circuits, using manufacturer instructions.
5.4.7 Leak in Dry Pilot Line release system.
5.4.8 Clogged orifice assy.

5.5 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.

APPENDIX A: Opening and Closing Speed Control Options

General

Water hammer which may result from quick opening or closing of a deluge valve can be reduced by adjusting opening and/or closing speed devices. The Bermad Speed Control options provide adjustment of the opening speed, closing speed and both opening and closing speed of Deluge Valves.

Note: The speed control needle stem has special shape to prevent complete closure, thus at fully closed position the speed control device will not prevent the Deluge Valve from operating.

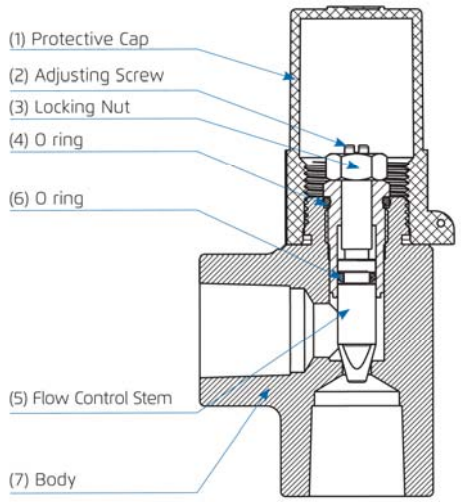
A.1. Closing Speed Control (CSCD), Code 01

The Bermad Closing Speed Control Device (CSCD) option is used to provide a preset flow rate to allow an adjustable valve closing time. The CSCD option can be used in all Bermad Deluge valve trims.

The CSDC initiate a Valve Closing Speed Control function by limiting the water-flow introduced to/or from the Bermad Deluge valve control chamber.

The CSCD is also used as a Closing Speed Control in the releasing line of the Universal Relay Valve (URV) when 3-way pilot system setup is provided.

Fig. A.1.a: CSCD Device



A.1.1. Principle of Operation

The water supply to the Bermad Deluge Valve control trim is restricted by the Flow Control Stem (5), enabling the adjustment of the water flow rate that is introduced to the Bermad Deluge valve control chamber upon a closing command. This allows the operator to either decrease or increase the closing speed of the Bermad Deluge valve.

A.1.2. Re-Adjustment

Open the protective cap (1) and loosen the locking nut (3). Turning the adjusting screw (2) clockwise decreases the flow, lengthening the main valve closing time. Turning the adjusting screw counter-clockwise increases the flow, shortening the closing time of the main valve.

When the desired flow rate has been established, re-tighten the locking nut and replace the tamper proof protective cap.

Caution: A CSCD supplied installed on a valve trim is factory adjusted for optimum performance. Any further adjustment may impair the functionality of the main valve.

Fig. A.1.b: CSCD Flow Coefficient (Kv) Vs. Opening Turns

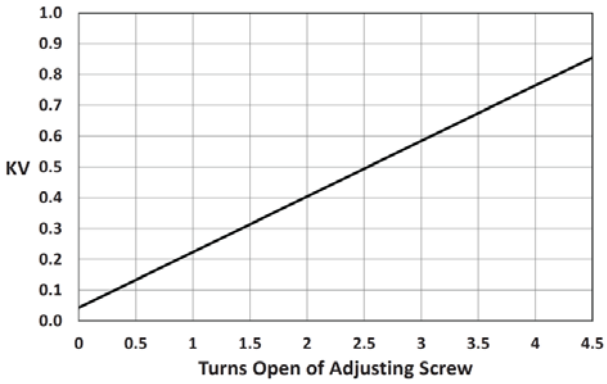
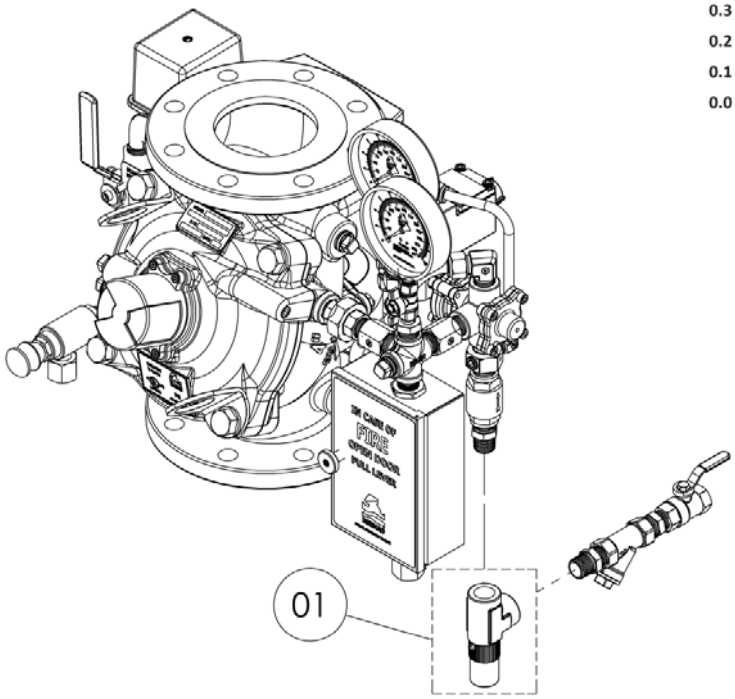


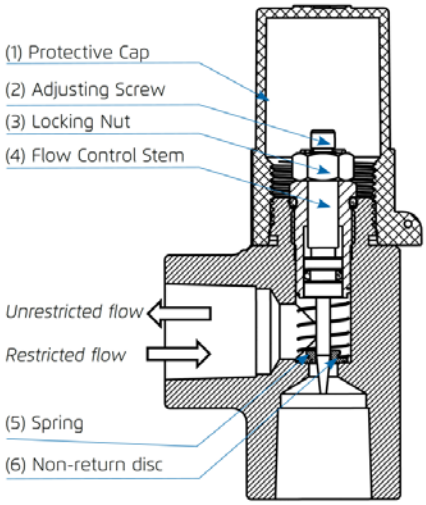
Fig. A.1.c: Closing Speed Control (Code 01) Trim Installation



A.2. Opening Speed Control (OSCD), Code 02

The Bermad Opening Speed Control Device (OSCD) is a valve control accessory that has an adjustable restricted flow in one flow direction and an unrestricted flow in the opposite direction.
The OSCD is designed to be installed on the control trim of Bermad valves, to reduce the opening speed and thus decrease or eliminate damaging water surge or water hammer.
Reduction of the main valve's opening speed is achieved by adjusting the OSCD to restrict the rate of water flow exiting the main valve's control chamber controlling the rate at which the main valve opens.
The closing speed remains unaffected as flow in the opposite direction, entering the control chamber to close the main valve remains unrestricted.

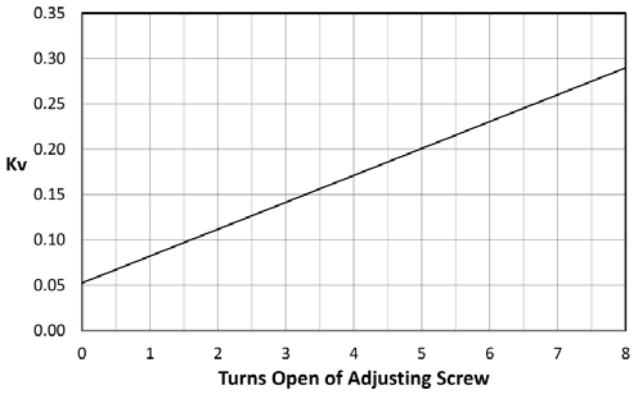
Fig. A.2.a: OSCD Device



A.2.1. Principle of Operation

The flow direction to fill the Bermad Deluge valve control chamber is in the "unrestricted flow", direction against the spring (5) and the flow control stem (4), the flow causes the non-return disc (6) to leave the seat presenting a relatively unrestricted flow path.
When water is relesed from the Bermad Deluge valve in the "restricted flow" direction to Open, the non return disc is held in place on the seat by the spring force and the flow, presenting a restricted flow path between the orifice in the non-return disc and the flow control stem.

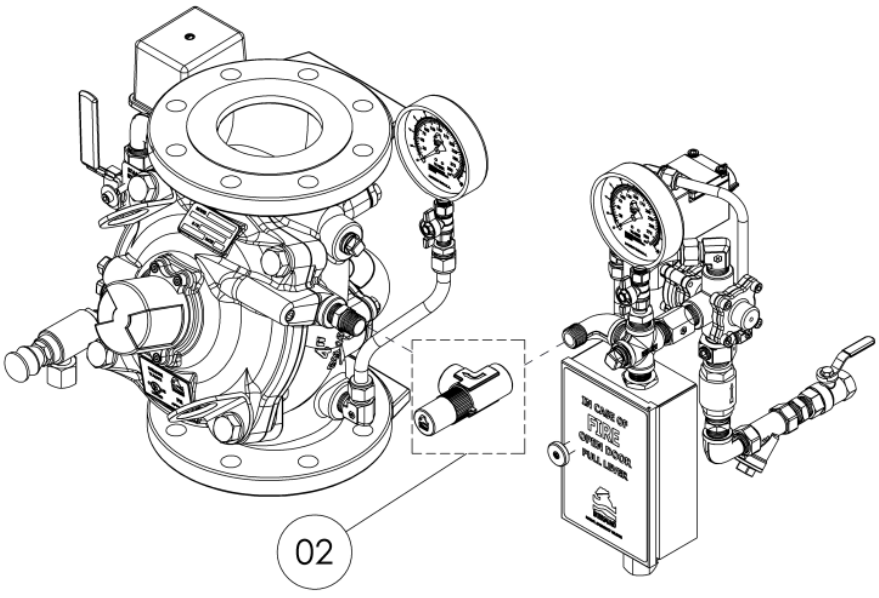
Fig. A.2.b: OSCD Flow Coefficient (Kv) Vs. Opening Turns



A.2.2. Re-Adjustment

Unscrew the protective cap (1) and loosen the locknut (3). Turning the adjusting screw (2) clockwise decreases the flow, and will slow the main valve opening. Turning the adjusting screw counter-clockwise increases the flow, and will quicken the main valve opening.
Caution: the OSCD supplied installed on a valve trim is factory adjusted for optimum performance and any further adjustment may impair the functionality of the deluge valve.

Fig. A2.c: Opening Speed Control (Code 01) Trim Installation



A.3. Opening & Closing Speed Controls, Code 03

The Bermad Opening & Closing Speed Controls arrangement applied both OSCD and CSCD in the Deluge valve control trim in order to accumulate Opening and Closing speed adjustment when necessary.

A.3.1. Principle of Operation

The water supply to the Bermad Deluge Valve control trim is restricted by the CSCD Flow Control Stem (5), enabling the adjustment of the water flow to the valve control chamber. When water is relesed in the “restricted flow” direction to open the deluge valve, the non return disc is held in place on the seat by the spring force and the flow, presenting a restricted flow path between the orifice in the non-return disc and the flow control stem.
This allows the operator to decrease or increase the opening and/or closing speed of the Bermad Deluge valve.

A.3.2. Re-Adjustment

See paragraph A.1.2 and A.2.2
Caution: the speed control devices supplied installed on the Bermad valve trim is factory adjusted for optimum performance and any further adjustment may impair the functionality of the valve.

Fig. A.3: Opening & Closing Speed Controls (Code 03) Trim Installation

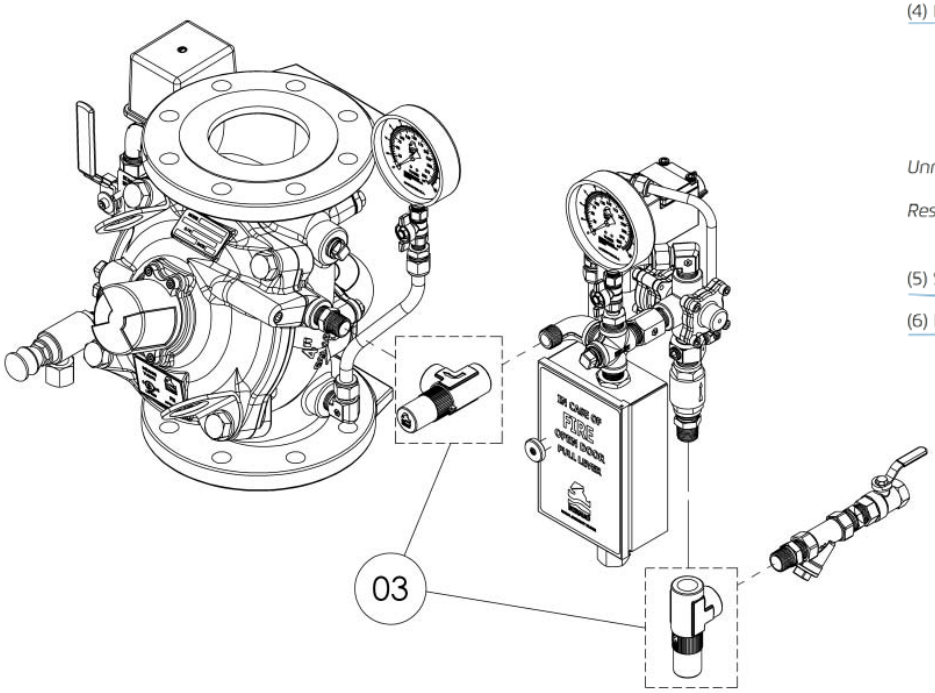


Fig. A.3.a: OSCD Device

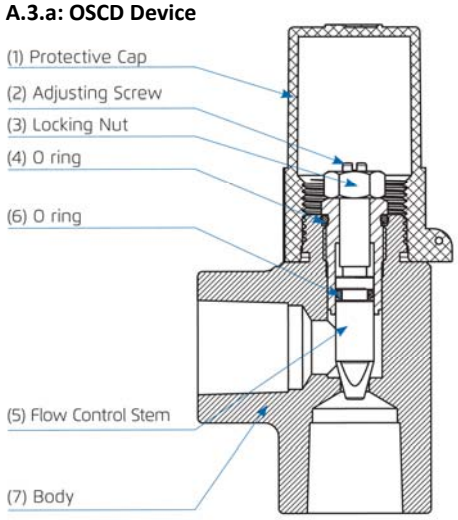
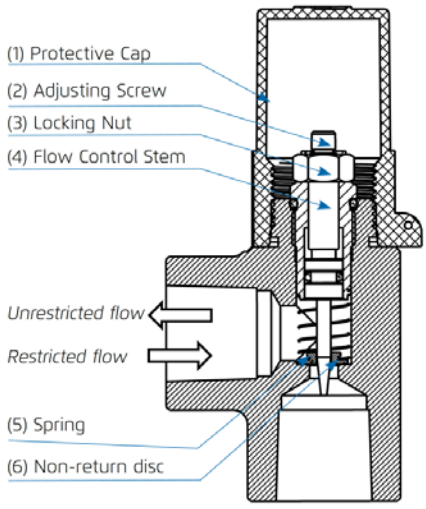


Fig. A.3.b: OSCD Device



A.4. Inspections, Tests, and Maintenance

After installation, the Speed Control devices are considered as a trim component of the Valve on which it is installed.
Refer to Maintenance instructions provided in Technical Data for the Valve used.
Observe and apply all notices, warnings, cautions, and recommended procedures pertaining to trim components for the Valve used.
Perform all recommended inspections, testing, and maintenance procedures on a regular basis, at least as often as the minimum frequencies recommended in Technical Data for the valve used.
NOTE: The property owner or designated representative should determined the frequency of inspection and cleaning of the speed control interiors considering the quality of the firewater in use, even so it is recommended that the needle assembly will be dismantled and cleaned at least annually in addition to after each operation or system flow test in order to prevent flow-path blockage.
Installation of a strainer upstream of the opening speed device is recommended when debris-ridden firewater is used.