

Model: 43T-06

**Bermad Pressure Differential
Sustaining Control Valve (PDSCV)**



**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. Description

Bermad 43T-06 Bermad PDSCV is a pilot-operated, diaphragm-actuated, straight-through flow type with low pressure-loss. It is an automatic pressure control high performance valve.

The 43T-06 is equipped with an adjustable differential pilot valve and is used to sustain the differential between two different points. When the differential between the two sensed pressures rises above the pre-set value the pilot valve opens the main valve regulating the pressure and keeping the differential at the pre-set maximum.

The 43T-06 is ideal for balanced foam proportioning systems, also as a safeguard for dosing pump flow overload.

2. Pressure and Flow ratings

2.1 Models and sizes covered by this document include the Bermad 43T-06 PDSCV, shows in table 1.

Table 1: PDSCV Sizes and capacity:

Sizing shall be not less than stated:

Valve Size in. (mm) Note 1	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 (400)	25 (400)	25 (365)	25 (365)	25 (365)	25 (365)	25 (365)	21 (300)	21 (300)	21 (300)
Pressure Deferential setting range bar (psi)	0.5-3 (7-43)	0.5-3 (7-43)	0.5-3 (7-43)	0.5-3 (7-43)	0.5-3 (7-43)	0.5-3 (7-43)	0.5-3 (7-43)	0.5-3 (7-43)	0.5-3 (7-43)	0.5-3 (7-43)
Kv (Cv) Note 2	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 2	2 (7)	4 (14)	7 (24)	8 (25)	8 (26)	13 (43)	27 (89)	55 (179)	38 (125)	66 (215)
Max. recommended flow m ³ /h (gpm)	24 (106)	56 (247)	82 (360)	145 (640)	330 (1450)	580 (2570)	910 (4000)	1360 (6000)	1635 (7198)	2170 (9555)

Note:

1. Minimum valve size
- 2, For fully open valve

2.2 Optional Features / Accessories

- 2.2.1 **Valve Position-Flow Indicator (code I):** provides the means for Visual Indicating of the Valve Position at all times, by detecting the motion of main the valve internal assembly. This feature must be ordered in advance and therefore not field retrofit-able.
- 2.2.2 **Valve Position Limit Switch (code S or SS):** provides Remote Valve Position Signaling, it shall be assembled and installed according to instructions within its package, consult Bermad if any field adjustment is to be made.
- 2.2.3 **Large Control Filter (code F):** provides extra capacity means for filtering of the water supplied to the water control pilot system to achieve the essential level of debris free water. It is recommended for those cases where there is any doubt as to the level of particulate matter in the water.
- 2.2.4 **Non-Return Feature (code 20):** additional feature allowing the valve to act also as hydraulic check valve.

3. Certification

The 43T-06 is ABS, Lloyd's Register and DNV approved.

Consult Bermad for any component approval recently to appear in any equipment directory.

4. Installation

A typical installation of the BERMAD model 43T-06 uses the automatic valve actuation via a pilot control to open the 43T-06 in response to an increase in differential pressure between two points. The 43T-06 is ideally suited for regulation in balanced pressure proportioning systems or foam dosing applications.

- 4.1 Before the valve is installed, flush the pipeline to remove any dirt, scale, debris, etc. Not flushing the line might result in the valve being rendered inoperable.
- 4.2 In cases where the valve is used for individual pump pressure-relief, locate the PDSCV between the pump and the pump discharge check valve. It should be attached in a way that it can be readily removed for repairs without disturbing the piping.
- 4.3 Allow enough room around the valve assembly for any adjustments and future maintenance/disassembly work.
- 4.4 Install the valve in the pipeline with the valve flow arrow on the body casting in the proper direction. Use the lifting eye provided on the main valve cover for lifting and lowering the valve.
- 4.5 For best performance, install the valve horizontally with the cover up. However, other positions are acceptable. Ensure that the valve is positioned so that the actuator can be easily removed for future maintenance.
- 4.6 After installation, carefully inspect/correct any damaged accessories, piping, tubing/fittings and ensure that there are no leaks.

Figure 1a: Foam Proportioning Pump, Typical Installation Drawings

The 43T 06 senses when the maximum allowable flow rate for the dosing pump has been reached and will open, diverting the excess flow through the bypass preventing dangerous pump overload.

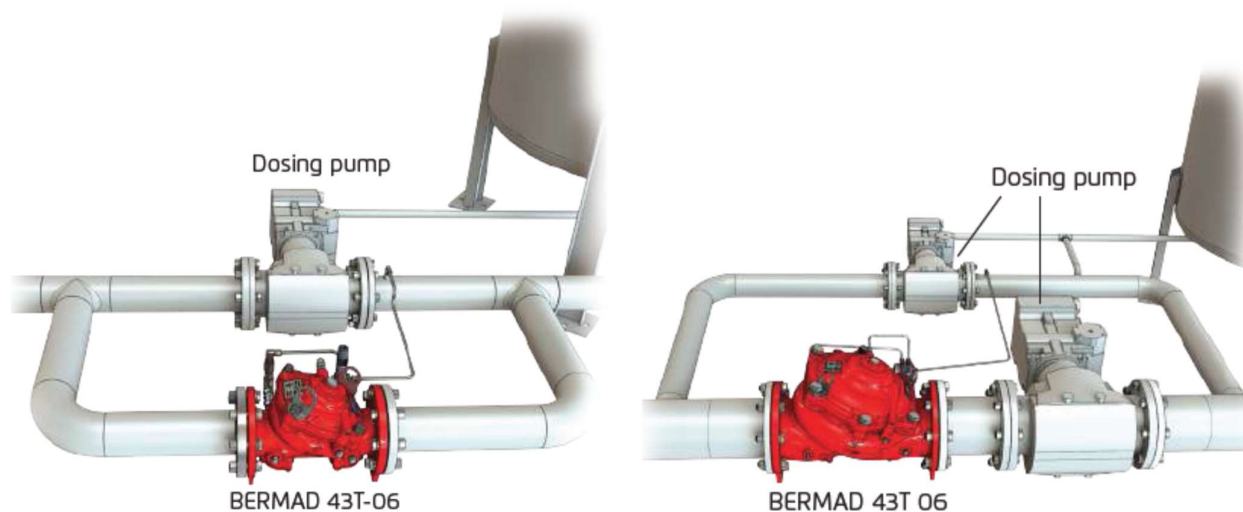
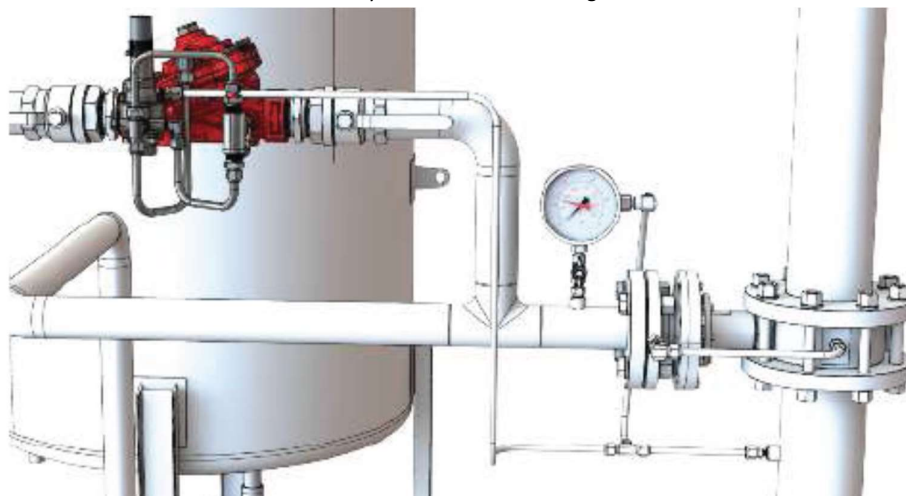


Figure 1b: Foam Balanced Pressure Proportioning System, Typical Installation Drawings

A typical installation is in a Balanced Pressure Proportioning System, where the BERMAD 43T-06 is installed on the foam concentrate return pipe and is used to maintain the correct pressure differential between the firewater system pressure and the foam supply pressure. This ensures an accurate and steady foam to water ratio regardless of fluctuations of service flow or pressure.



5. Operation

The BERMAD model 43T-06 is held closed by inlet pressure in the control chamber [1] supplied via the pilot line filter [2] and the restriction orifice [3]. To open the valve the pressure in the control chamber must be released by way of the pilot valve [4] opening and releasing pressure in the control chamber to the downstream of the valve.

The pilot valve senses two pressures, a higher pressure (+) and a lower pressure (-). Should the differential between these two pressures exceed the set maximum (determined by the pilot valve adjusting screw) the pilot valve will open, releasing pressure from the valve control chamber allowing the valve to open. This relieves the higher pressure in the pipeline maintaining the differential pressure below the set maximum.

Should the differential pressure fall below the set maximum the pilot valve will throttle or close; allowing pressure to accumulate in the valve control chamber, causing the main valve to throttle or close, sustaining differential pressure in the pipeline at or below the pilot valve setting.

Figure 2: Operation Drawing

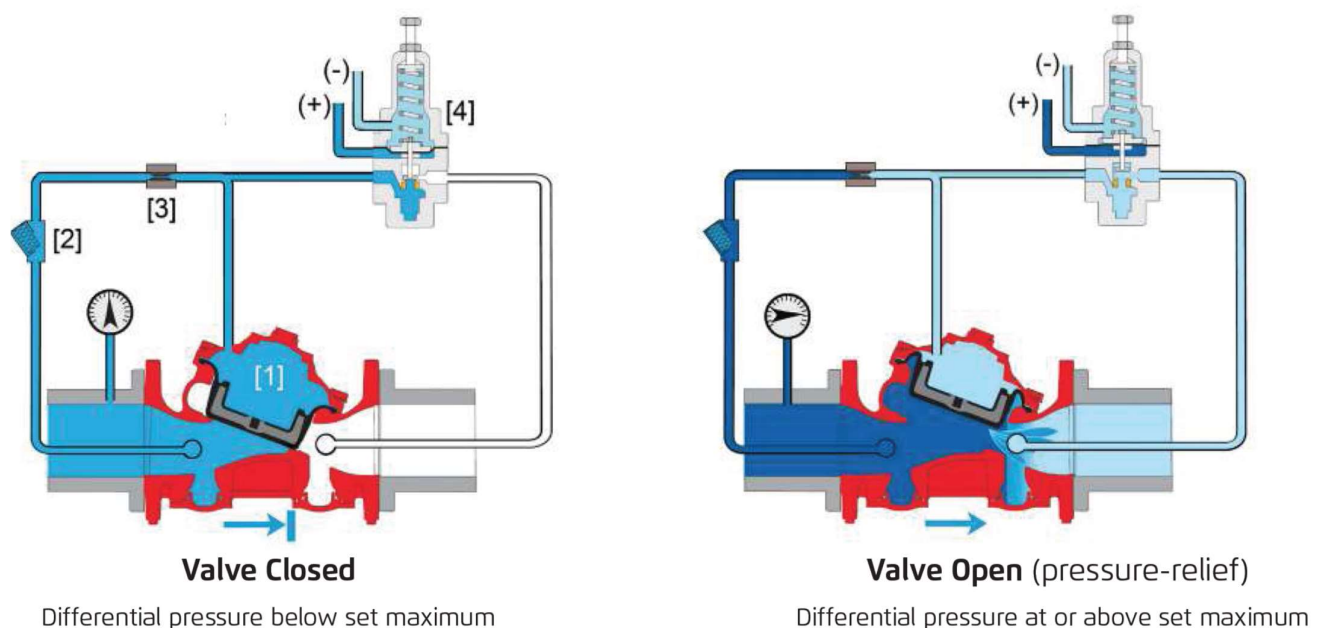
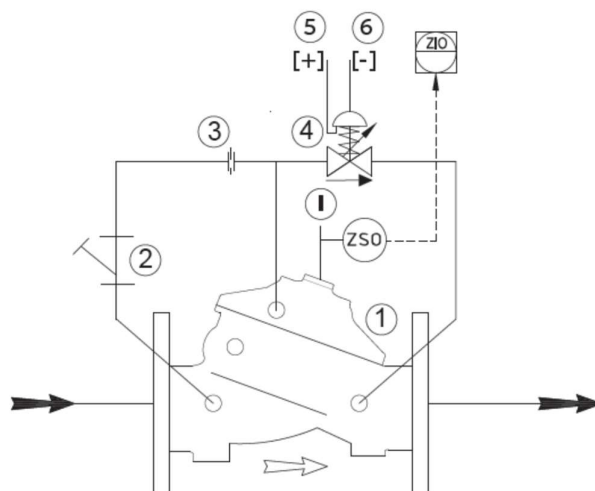


Figure 3: Valve P&ID



Components

- 1 BERMAD 400Y Main Valve
- 2 Priming strainer
- 3 Restriction orifice
- 4 Differential sustaining pilot valve
- 5 High pressure sensing
- 6 Low pressure sensing

Optional System Items

- I Visual valve status Indicator
- Z Limit switch assembly

5.1 Starting up

- 5.1.1 Provide pump shut-off pressure to the 43T-06 PDSCV inlet, allow no system demand.
- 5.1.2 Create sufficient pressure (higher than the valve set pressure) to allow flow through the PDSCV.
- 5.1.3 While PDSCV is operating, wait for the valve inlet pressure to stabilize.
The pressure on the inlet side of the PDSCV should be according to the factory pre-set adjusted pressure.
- 5.1.4 Slowly allow system flow so that system pressure falls below the relief-valve adjusted pressure.
The relief-valve should slowly shut to drip-tight.

5.2 Readjusting Procedure

Tools required:

- Flat head screwdriver
- Adjustable wrench

The pilot valve is factory pre-set, the setting is clearly indicated on the pilot valve data-plate.

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

- 5.2.1 Ensure that there is nominal flow through the relief-valve.
- 5.2.2 Release the tension between the adjusting screw on the pressure-relief pilot valve and the fastening nut by turning the fastening nut counterclockwise.
- 5.2.3 By alternately turning the adjusting screw (#4, fig.2) on the pilot valve a half turn and then reading the inlet pressure, gradually adjust the pressure: Counterclockwise to decrease (-) the inlet pressure or Clockwise to increase (+) the inlet pressure.

Note: Valve response adjustment affects pre-set pressure. Any adjustment to valve response requires checking pre-set pressure, see steps 5.1.1 – 5.1.4

- 5.2.4 Repeat the Starting-up procedure, sections 5.1.1 – 5.1.4

6. Maintenance and Inspection Test

Warning: Do not turn off the water supply, to make repairs, without notifying local security guards or firefighting officials.

- In any of the following inspections or testing procedures, if an abnormal condition exists, see Troubleshooting for possible cause and corrective action.
- The 43T-06 valve is to be inspected, tested and maintained in accordance with the Maintenance Instructions of the plant, this Maintenance Manual, as well as the Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, NFPA 25.

6.1 Weekly Inspection

- 6.1.1 The system should be inspected under flow conditions.
- 6.1.2 Check that the main valve, pilot system, accessories, tubing & fittings, are all in good condition, damage free and not leaking.
- 6.1.3 The fastening nut, of the pilot valve (#4 in fig.2) adjusting screw, should be fastened tightly.
- 6.1.4 For circulation type installations, verify that sufficient water flows through the valve when fire pump is operating at shut-off pressure (churn) to prevent the pump from overheating.
- 6.1.5 Verify that the pressure upstream of the PDSCV fittings in the fire pump discharge piping does not exceed the pressure for which the system components are rated.

6.2 Monthly Inspection and Test

- 6.2.1 Complete Weekly Inspection.
- 6.2.2 During the monthly fire pump flow test, verify that the PDSCV is correctly adjusted and set to relieve at the appropriate pressure and closes below the pressure setting.

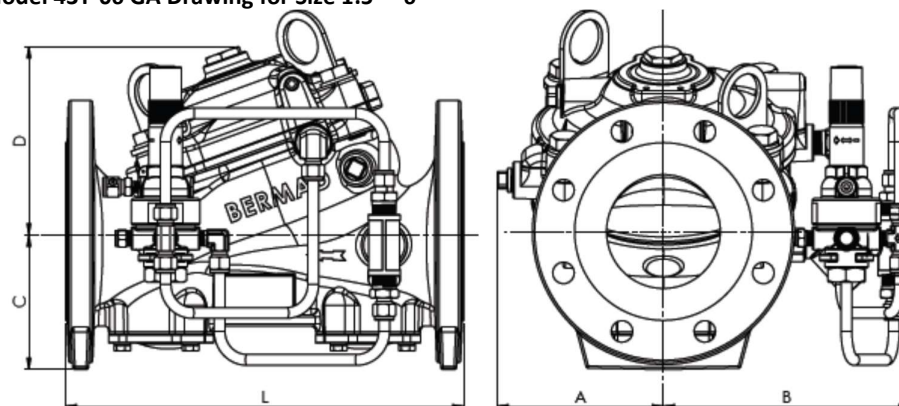
6.3 Five-Years Inspection and Test

- 6.3.1 Complete Weekly and Monthly inspections.
- 6.3.2 Place the system out of service (See "Removing the System from Service" above).
- 6.3.3 The interior of the Control Valve should be cleaned and inspected.
- 6.3.4 The Elastomeric Diaphragm Assembly shall be inspected for wear, and shall be replaced with a new Diaphragm.
- 6.3.5 Place the system back in service. (See instructions "Placing the System in Service").
- 6.3.6 The valve and the pilot system must be activated at full flow.
- 6.3.7 Take all additional measures as required by NFPA-25 "Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems."

7. Abnormal Conditions – Troubleshooting

Symptom	Probable cause	Remedy
Valve fails to regulate	Restrictor is blocked	Clean and flush the restriction
	Filter blocked	Remove filter cap and screen to clean
	Air trapped in main valve cover	Loosen cover tube fitting at the highest point, bleed air and re-tighten
Valve fails to open	Insufficient inlet pressure	Check/create inlet pressure
	Pilot valve is adjusted to high	Readjust according to paragraph 5.2
Valve fails to seal properly	Filter blocked	Remove filter cap and screen to clean, see Note below
	Debris trapped in main valve	Remove the valve cover, clean the seat and the interiors from debris
	Diaphragm in main valve is leaking	Inspect the diaphragm and replace if damaged

Figure 4: Model 43T-06 GA Drawing for Size 1.5" - 6"



Valve Size	1½"		2"		3"		4"		6"		8"		10"		12"		14"		16"	
	DN40		DN50		DN80		DN100		DN150		DN200		DN250		DN300		DN350		DN400	
Unit	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
L ⁽¹⁾	230	9.1	230	9.1	310	12.2	350	13.8	480	18.9	600	23.6	730	28.7	850	33.5	980	38.6	1100	43.3
L ⁽²⁾	230	9.1	235	9.3	326	12.8	368	14.5	506	19.9	626	24.6	730	28.7	850	33.5	980	38.6	1100	43.3
A	77.5	3	77.5	3	100	3.94	115	4.53	140	5.51	172	6.77	204	8	242	9.53	242	9.53	242	9.53
B	155	6.1	155	6.1	251	9.88	266	10.47	372	14.65	490	19.29	490	19.29	656	25.83	656	25.83	656	25.83
C	64	2.52	77	3.03	106	4.17	121	4.76	140	5.51	172	6.77	204	8.03	247	9.72	272	10.71	316	12.44
D	120	4.69	120	4.69	146	5.75	158	6.22	228	9	295	11.65	296	11.65	441	17.36	441	17.36	415	16.3
Kv / Cv ⁽⁴⁾	68 / 79		80 / 92		190 / 219		345 / 398		790 / 912		1160 / 1340		1355 / 1565		2370 / 2737		2850 / 3292		3254 / 3758	
Leq ⁽³⁾ m/ft	2 / 7		5 / 16		7 / 23		9 / 30		15 / 49		27 / 89		62 / 203		52 / 171		59 / 194		88 / 289	
Kg/lb flanged#150/ISO16	17.9 / 39.4		19.3 / 42.5		34 / 74.8		44 / 95.8		87.3 / 192		150 / 331		180 / 397		323 / 712		356 / 784		403 / 886	

Notes :

- (1) Refers to the length dimensions for Raised Face ANSI #150, ISO 16 Flanged, Threaded and Grooved valves
- (2) Refers to the length dimensions for Raised Face ANSI #300 and ISO 25 Flanged valves
- (3) Leq (Equivalent Pipe Length) refers to a fully opened valve with turbulent flow in new steel pipe schedule 40, values given for general consideration only
- (4) Kv/Cv values given for a fully opened valve
- (5) Exact dimensions for the trim envelope may vary with specific component positioning