

Bermad Pressure-Reducing Pilot-Operated Pressure-Control Valve

Model: 42T



Installation Operation Maintenance Manual (IOM)

04.08.2019

REV 3B

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 42T is a pilot operated, diaphragm actuated straight through flow type with a low pressure-loss, pressure reducing valve.

It is an automatic pressure control valve that reduces a higher inlet pressure to a lower constant outlet pressure regardless of fluctuating flow-rates and/or varying inlet pressure.

2. Pressure and Flow Ratings

The Bermad 42T pressure-reducing control valves are rated for the following pressure and flow capacities detailed in table 1.

Table 1: Pressure and Flow Ratings

Valve Size in. (mm)	1.5" (40)	2" (50)	2.5" (65)	3" (80)	4" (100)	6" (150)	8" (200)	10" (250)	12" (300)	14" (350)	16" (400)
Max. Inlet pressure bar (psi)	27.5 (400) Note 3	27.5 (400) Note 3	27.5 (400) Note 3	25 (365)	25 (365)	25 (365)	25 (365)	25 (365)	21 (300)	21 (300)	21 (300)
Pressure setting range bar (psi)	4 – 15 (60-220)	4 – 15 (60-220)	4 – 15 (60-220)	4 – 12 (60-175)	4 – 12 (60-175)	4 – 12 (60-175)	4 – 12 (60-175)	4 – 12 (60-175)	4 – 12 (60-175)	4 – 12 (60-175)	4 – 12 (60-175)
Kv fully open valve (Cv)	68 (79)	80 (92)	105 (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 (14)	9.4 (30.8)	7 (23)	9 (30)	15 (49)	27 (89)	62 (203)	52 (171)	59 (194)	88 (289)
Max. recommended flow m ³ /h (gpm)	24 (106)	42 (187)	56 (247)	82 (360)	145 (640)	330 (1450)	580 (2570)	883 (3887)	1322 (5821)	1635 (7198)	2200 (9555)
Pilot Valve model	2PBL	2PBL	2PBL	2PBL	2PBL	2PBL	2PBL	2PBL	2-HC	2-HC	2-HC
Recommended Relief valve size, inch (mm)	3/4" (20)	3/4" (20)	3/4" (20)	3/4" (20)	2" (50)	3" (80)	3" (80)	4" (100)	2 x 4" (2x100)	2 x 4" (2x100)	2 x 4" (2x100)

Notes:

- 1) Valve Equivalent Length Value, for use in hydraulically calculated systems.
- 2) Consult Bermad for Maximum Recommended differential pressure, also refer to the 400Y cavitation Chart in Engineering Data shows in www.bermad.com
- 3) UL-US only, ULC and FM certification pressure rating is limited to 25bar/365psi.

2.1 Head Loss

- 2.1.1 The minimum ΔP across the valve is 0.4 bar (5.8 psi). In cases where the inlet pressure falls below or is equal to the set outlet pressure, the outlet pressure shall be determined according to the "Valve Outlet Pressure Fall-off Chart" in Appendix A.
- 2.1.2 In the case of zero (static) flow, the maximum increase in the downstream (outlet) pressure above the pressure setting of the valve, will not exceed 0.5 bar (7.2 psi). This is applicable only when an appropriate relief valve is installed.

3. Approvals

The Bermad 42T pressure reducing valve 1.5, 2, 2.5, 3, 4, 6, 8, 10, 12, 14 and 16 inch sizes are UL Listed and FM Approved when installed with specific system components as described in this installation manual. Consult Bermad for any component approval recently to appear in any equipment directory.

A Listed Pressure Relief Valve must be supplied for installation with every pressure reducing valve, see table 1 for Bermad recommended size.

4. Installation

- 4.1 Allow enough room around the Bermad 42T pressure reducing 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. Failure to do this might result in the valve being rendered inoperable.
 - 4.3 UL-listed and FM approved indicating isolation valves should be installed upstream and downstream of the Bermad 42T pressure-reducing valve to allow future maintenance, see fig. 1.
 - 4.4 Using the lifting eye provided on the main valve cover for lifting and lowering the valve. Install the valve in the pipeline with the valve flow arrow on the body casing in the proper direction.
- Note:** A small diameter bypass pressure-reducing valve may be required when large diameter pressure-reducing valve is used, to accommodate low flow conditions such as those created by the flow of a hose connection or a single sprinkler.
- 4.5 The Bermad 42T pressure-reducing valve is suitable for horizontal or vertical installation. Ensure that the valve is positioned so that the cover is facing upwards and can be easily removed for future maintenance.
 - 4.6 After installation, carefully inspect/correct any damaged accessories, piping, tubing, or fittings.
 - 4.7 A UL-listed and FM approved pressure relief valve with a proper size must be installed with every pressure control valve.
- Note:** The pressure relief valve shall be set to open at 0.5 – 1.0 bar (8 – 16 psi) above the 400Y pilot valve setting.
- 4.8 Install a listed pressure gauge on both the upstream & downstream of the Pressure Control Valve; see fig. 1 for indicated installation.
 - 4.9 Install the Bermad 42T pressure-reducing valve in accordance with the Standard for Installation of Fire Sprinkler Systems, NFPA 13, or the Standard for Installation of Standpipe and Hose System, NFPA 14, as appropriate. The Bermad 42T pressure-reducing valve is to be tested after installation in accordance with NFPA 13.
 - 4.10 The Bermad 42T pressure-reducing valve is to be inspected, tested and maintained in accordance with the Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, NFPA 25.

5. Factory Fitted Options

- 5.1 **Valve Position Indicator (code I):** This option provides the means for Visual indication of the Main Valve Position at all times
- 5.2 **Valve Position Limit Switch (code S or S9):** For Remote Indication of the Valve Position.
- 5.3 **Large Control Filter (code F):** Provides extra filtration capacity for the water supplied to the pilot system, it is recommended for cases where there is any doubt as to the level of particulate matter in the water.
- 5.4 **Valve Seat Ring (code T):** Corrosion Resistant Seat Ring Inserted to the main valve.
- 5.5 **Non Return Feature (code 20):** Allows the valve to prevent return flow by adding check valves to the 42T pilot system, see fig. 2B for operation principle and item 7 and 3B item 5 for specific arrangement.
- 5.6 **Closing Speed Control (code O1):** Allows valve reaction speed adjustment, see fig. 2A / 2B item 3.

Figure 1B: Single Line Installation

Sprinkler System Pressure Reduction

- Reduces a high, unstable pressure supply to a preset, stable system pressure
- Sets the sprinkler pressure to suit the system design
- For zonal pressure control

Hose System Pressure Reduction

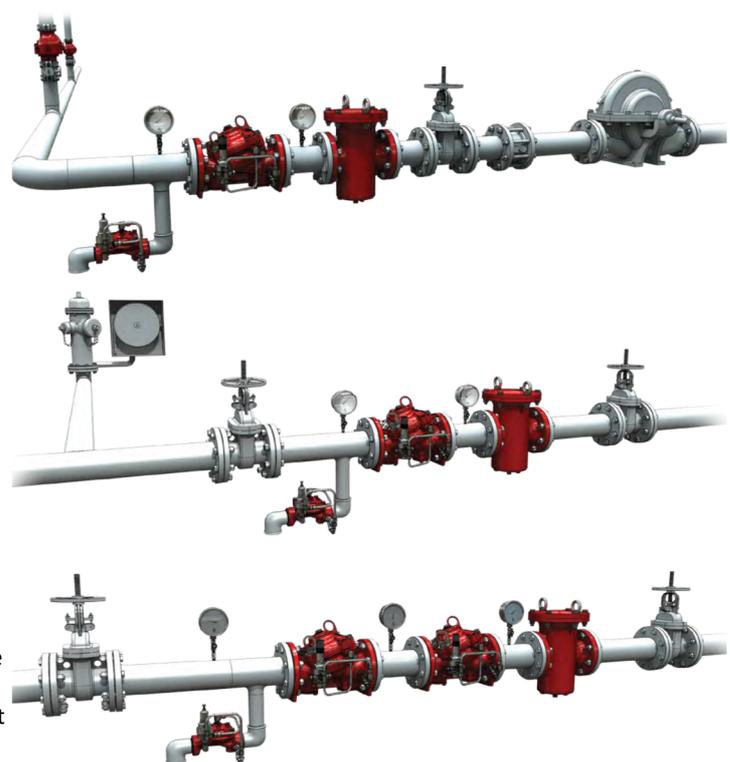
- Reduces a high/unstable pressure supply to suit fire hose pressure
- Limits fire hose pressure to 7 bar (100 psi) to meet NFPA 14 regulations for maximum allowable hose pressure supply

Two-Stage Pressure Reduction

- High pressure reduction ratio, when pressure differential is more than 12 bar/175 psi

Redundancy Backup Pressure Reducing

- Backup valve inline to a master valve to secure pressure rating at all times.
NFPA-14 requires that failure of a single device does not allow pressure increase above the pressure rating



(for Illustration Only)

Figure 1B: Parallel Installation

Bypass Backup Pressure Reducing Station

- High demanding system, parallel installation providing dual redundancy and no downtime during maintenance or inspection.

Redundancy Backup Pressure Reduction

- Low flow bypass for large size valves, allowing the larger size pressure reducing valve to open at high flow demands only.



6. Operation

The pressure-regulating pilot senses downstream pressure and modulates the upper control chamber causing the main valve to throttle, thus maintaining constant downstream pressure. When the downstream pressure falls below the pilot setting, the pilot opens, pressure in the upper control chamber decreases, and the main valve modulates open to increase downstream pressure and maintain pilot setting.

If the downstream pressure rises above the pilot setting, the pilot valve closes pressure in the upper chamber increases and the main valve throttles close to decrease downstream pressure to the pilot setting.

The pressure-reducing pilot valve is equipped with an adjusting screw to preset the desired downstream pressure and factory pre-set restrictor to control the closing speed.

6.1 Starting-up

When performing this procedure refer to fig. 2A / 2B.

- 6.1.1 Gradually open the upstream indicating isolation valve.
- 6.1.2 Open a hydrant, relief valve, drain valve, or other flow-consumer downstream of the Bermad 42T Pressure-Reducing Valve, creating a system demand.
- 6.1.3 Gradually open downstream indicating isolation valve to fully open, allowing flow through the Bermad 42T Pressure-Reducing Valve.
- 6.1.4 Wait for the downstream pressure to stabilize.
- 6.1.5 Slowly fully close the flow-consumer that was opened in step #1.
- 6.1.6 When there is no flow; the pressure on the downstream side of the system that is reflected through the pressure gauge. Should be according to the factory pre-set adjusted pressure plus up to an additional 10%.

6.2 Readjusting

The pilot valve is usually 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.

- 6.2.1 When readjusting the outlet pressure, the inlet pressure should be at least 20 psi (1.4 bar) higher than the set outlet pressure.
- 6.2.2 The flow rate during adjustment should be as close as is possible to the systems design flow rate. Where this is not possible at least a minimal flow is essential.
- 6.2.3 Free the tension between the adjusting screw on the pressure reducing pilot valve (item 4, fig. 2A/2B) and the fastening nut by turning the fastening nut counterclockwise.
- 6.2.4 By alternately turning the adjusting screw (5) on the pilot valve a half turn and then reading the downstream pressure (6), gradually adjust the pressure:
- 6.2.5 Counterclockwise to decrease (-) the downstream pressure, or Clockwise to increase (+) the downstream pressure.
- 6.2.6 Repeat the Starting-up procedure, steps 6.1.1-6.1.5.

Figure 2A: Operation Drawing; 42T Pressure Reducing Valve

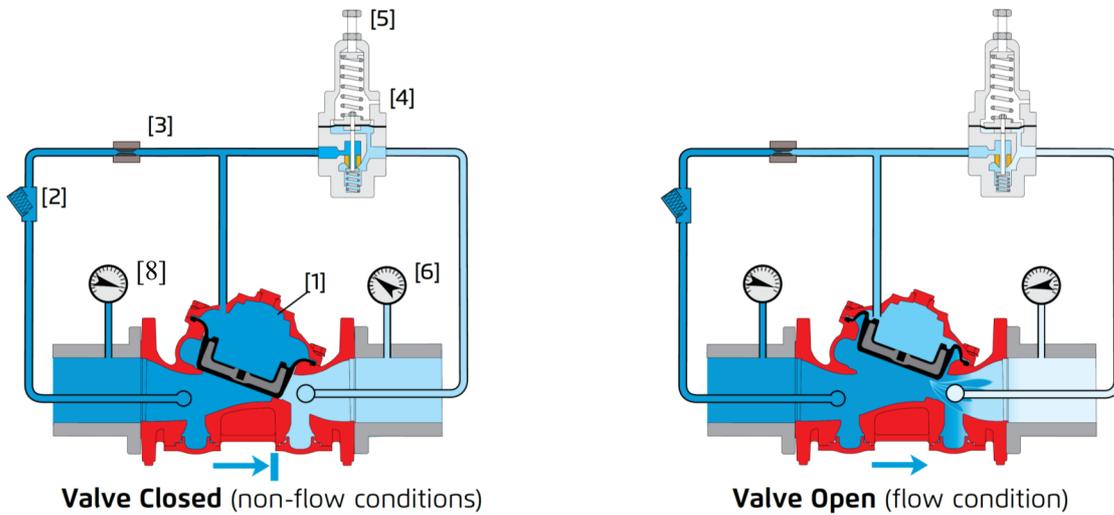
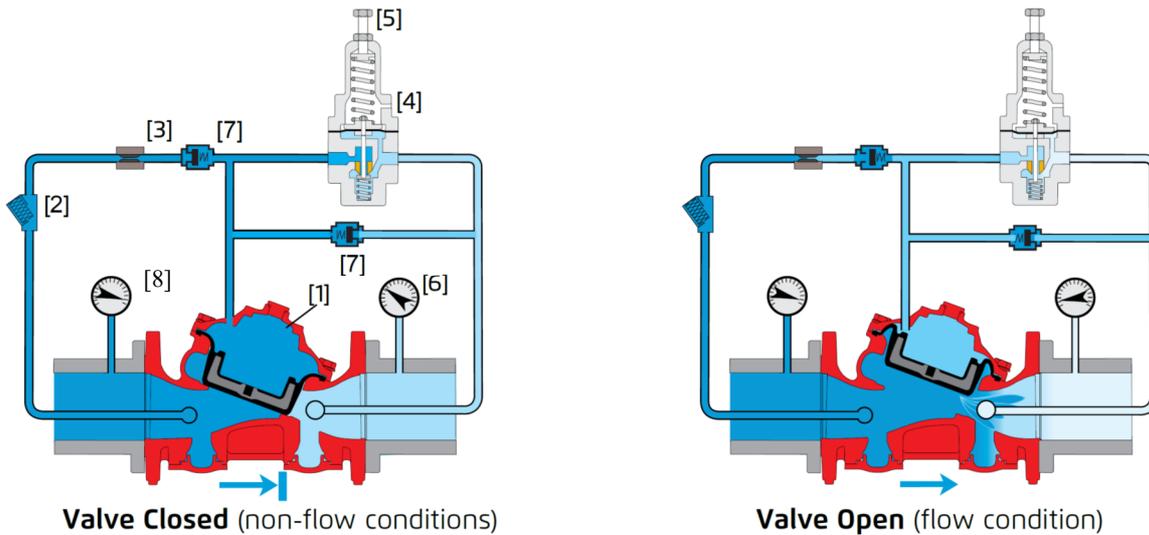


Figure 2B: Operation Drawing; 42T-20 Pressure Reducing valve with Non Return Feature



7. Maintenance and Inspection Test

Removing the System from Service

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.

Prior to turning off any valves or water supply, notify local site fire officials.

In any of the following inspections or testing procedures, if an abnormal condition exists, see Troubleshooting for possible cause and corrective action.

The Bermad 42T Pressure-Reducing Valve is to be inspected, tested and maintained in accordance with the Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, NFPA 25.

7.1 Normal Conditions

- 7.1.1 All main isolating valves should indicate a fully open position.
- 7.1.2 Upstream pressure gauge should (item 8, fig. 2) show the upstream pressure supplied to the valve.
- 7.1.3 Downstream pressure gauge (item 6, fig. 2) should show the downstream pressure according to the systems designed requirement.

7.2 Quarterly Inspection

- 7.2.1 The system should be checked for normal conditions.
- 7.2.2 Check that the main valve, pilot system, accessories, tubing & fittings, are all in good condition, damage free and not leaking.
- 7.2.3 The fastening nut of the pilot valve (item 4, fig. 2) adjusting screw should be fastened tightly.

7.3 Annual Inspection and Test

- 7.3.1 Complete Quarterly Inspection.
- 7.3.2 Conduct a flow test with the systems nominal flow. The downstream pressure gauge should show downstream pressure in accordance to the systems design requirement, this pressure should be stable. If readjustment is needed it should be according to section 6.2.

7.4 Five-Years Inspection and Test

- 2.1.3 Complete Weekly and Monthly inspections.
- 2.1.4 Place the system out of service (See "Removing the System from Service" above).
- 2.1.5 The interior of the Control Valve should be cleaned and inspected.
- 2.1.6 The Elastomeric Diaphragm Assembly shall be inspected for wear, it is recommended to be replaced with a new intact Diaphragm Assembly.
- 2.1.7 Place the system back in service. (See instructions "Starting-Up" section 6).
- 2.1.8 The valve and the pilot system must be activated at full flow.
- 2.1.9 Take all additional measures as required by NFPA-25 "Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems.

7.5 Abnormal Conditions

CAUTION: Any maintenance or cleaning will cause the valve to open fully. Close upstream and downstream isolation valves or omit the below activities or test if this may cause damage.

Symptom	Probable Cause	Remedy
Valve fails to regulate	Restrictor (item 3, fig. 2) is blocked	Clean and flush the restriction
	Filter (item 2, fig. 2) 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
	Pilot valve is adjusted to wrong value	Readjust according to section 6.2
Valve fails to open	Insufficient inlet pressure	Check/create inlet pressure
	No downstream demand	Create demand/flow
	Pilot valve is adjusted to low	Readjust according to section 6.2
	Isolation valves closed	Open isolation valves
Valve fails to seal properly	Filter (item 2, fig. 2) blocked	Remove the filter cap and screen to clean, see Note below
	Debris trapped in main valve	Remove the valve cover and diaphragm, clean the seat and the valve interior from debris
	Diaphragm in main valve is leaking	Remove the valve cover and Inspect the diaphragm and replace if damaged

Note: In cases where the filter screen frequently becomes blocked, it is recommended replacing the standard filter with Bermad Large Filter code "F" (see section 5.3).

7.6 Difficulty in Performance

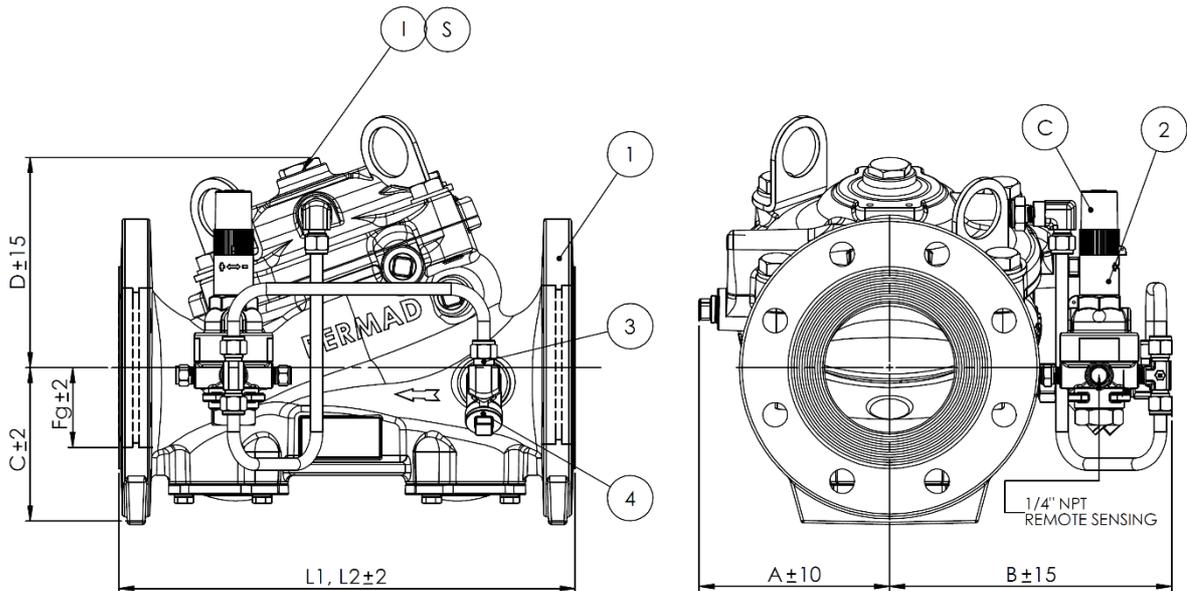
Where difficulty in performance is experienced, the manufacturer or his authorized representative should be contacted if any field adjustment is to be made.

**Figure 3A: Model 42T Pressure Reducing, General Arrangement
(GA) Drawing**



Item No.	Description	Qty
1	Main Valve BERMAD 400Y Series	1
2	Pressure Reducing Pilot Valve (4)	1
3	Restriction	1
4	Y Strainer	1

Optional Items		
I	Visual Position Indicator	1
S	Limit Switch Assembly	1
C	Tamper Proof Cup	1

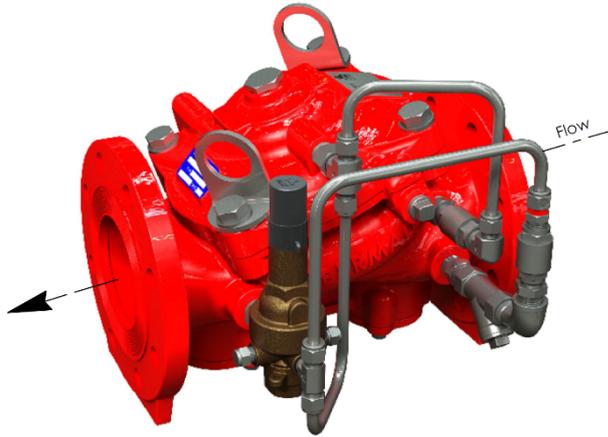


Valve Size	1½"		2"		3"		4"		6"		8"		10"		12"		14"		16"	
	DN40	DN50	DN80	DN100	DN150	DN200	DN250	DN300	DN350	DN400	mm	in	mm	in	mm	in	mm	in	mm	in
L ⁽¹⁾	230	9.1	230	9.1	310	12.2	350	13.8	480	18.9	600	23.6	730	28.7	850	33.5	980	38.6	1100	43.3
L ⁽²⁾	230	9.1	238	9.4	326	12.8	368	14.5	506	19.9	626	24.6	730	28.7	888	35	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

Notes:

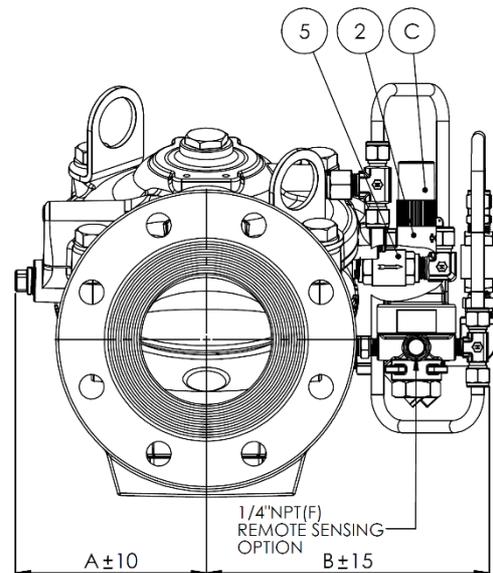
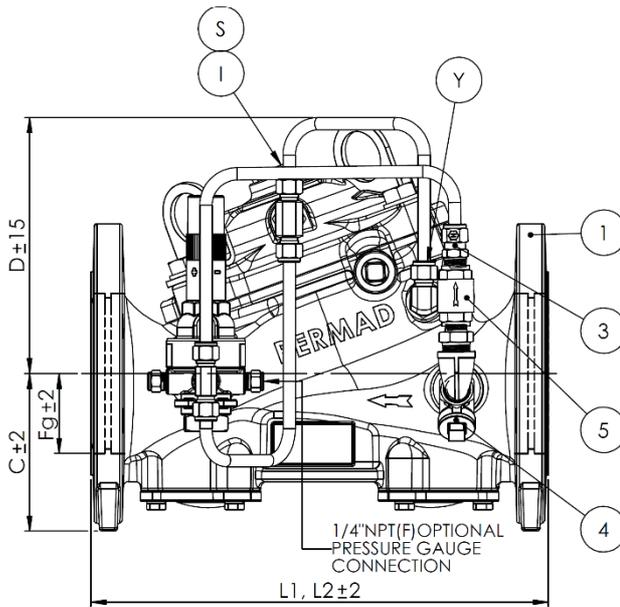
- (1) Refers to the length dimensions for Raised Face ANSI #150, ISO 16 Flanged, Threaded and Grooved valves
- (2) Refers to the length dimensions for Raised Face ANSI #300 and ISO 25 Flanged valves
- (3) Exact dimensions for the trim envelope may vary with specific component positioning
- (4) Pilot valve model #2PB/PBL for 1.5"-10", model #2HC for 12"-16" valve sizes
- (5) Provide ample clearance for future maintenance

Figure 3B: Model 42T Pressure Reducing with *Non-Return Feature*
GA Drawing



Item No.	Description	Qty
1	Main Valve BERMAD 400Y Series	1
2	Pressure Reducing Pilot Valve (4)	1
3	Restriction	1
4	Y Strainer	1
5	Check Valve	2

Optional Items		
I	Valve Visual Position Indicator	1
S	Enclosed Limit Switch Assembly	1
Y	Back Flow Y Strainer, for Dirty Water	1
C	Tamper Proof Cup	1



Valve Size	1½"		2"		3"		4"		6"		8"		10"		12"		14"		16"	
	DN40	DN50	DN50	DN80	DN100	DN150	DN200	DN250	DN300	DN350	DN400	mm	in	mm	in	mm	in	mm	in	mm
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	238	9.4	326	12.8	368	14.5	506	19.9	626	24.6	730	28.7	888	35	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

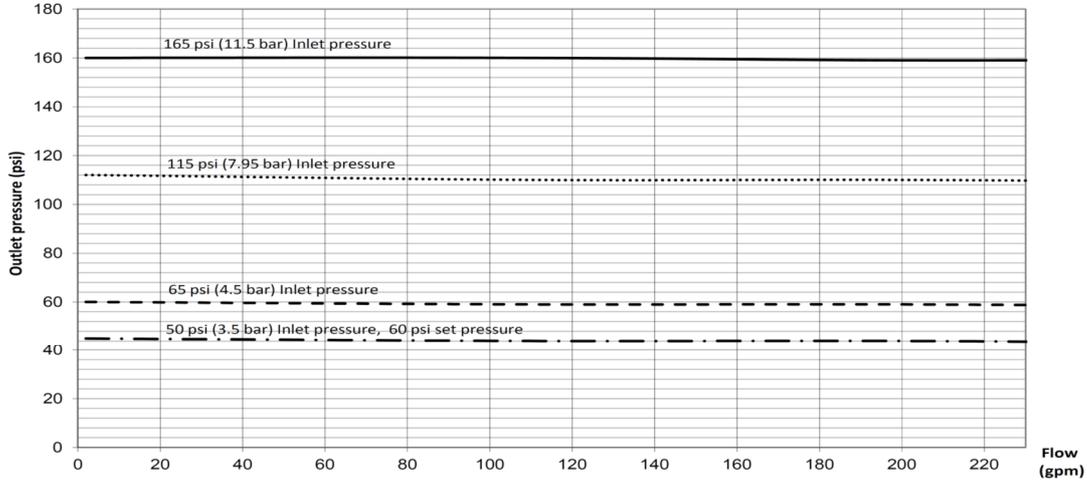
Notes:

- (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) Exact dimensions for the trim envelope may vary with specific component positioning
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- (5) Provide ample clearance for future maintenance

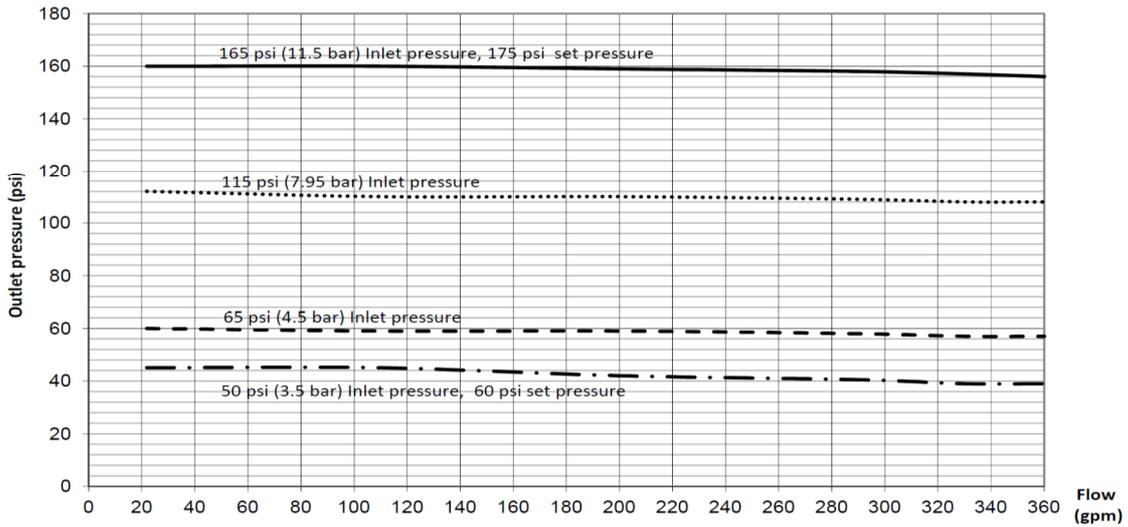
APPENDIX A: Fall-Off Charts

Bermad 42T Pressure Reducing Valve Outlet Pressure Verses Flow, Should inlet pressure fall below to the valve outlet set pressure:

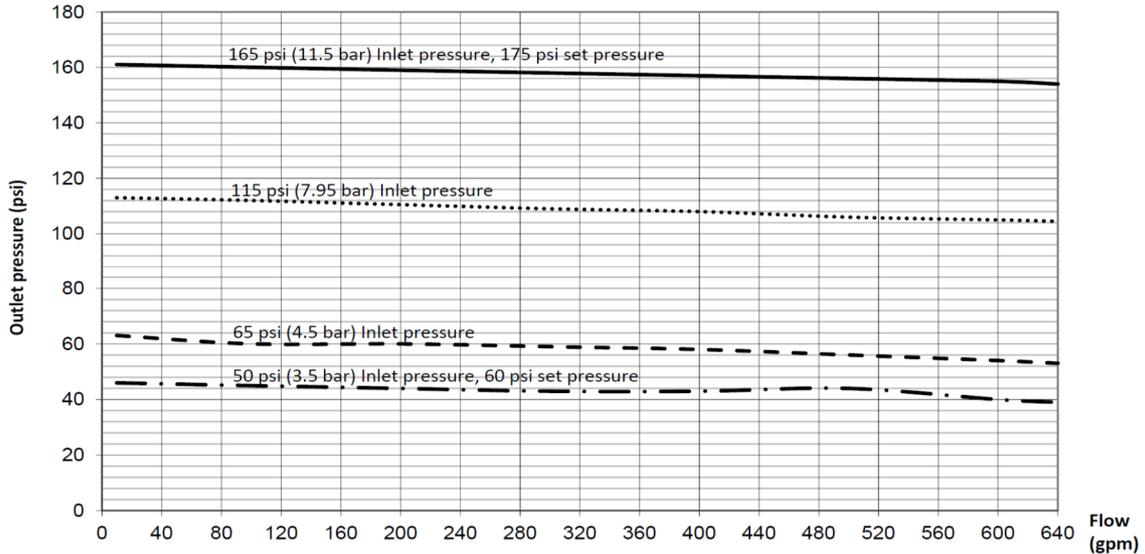
Bermad 42T, Size 1.5, 2 and 2.5"

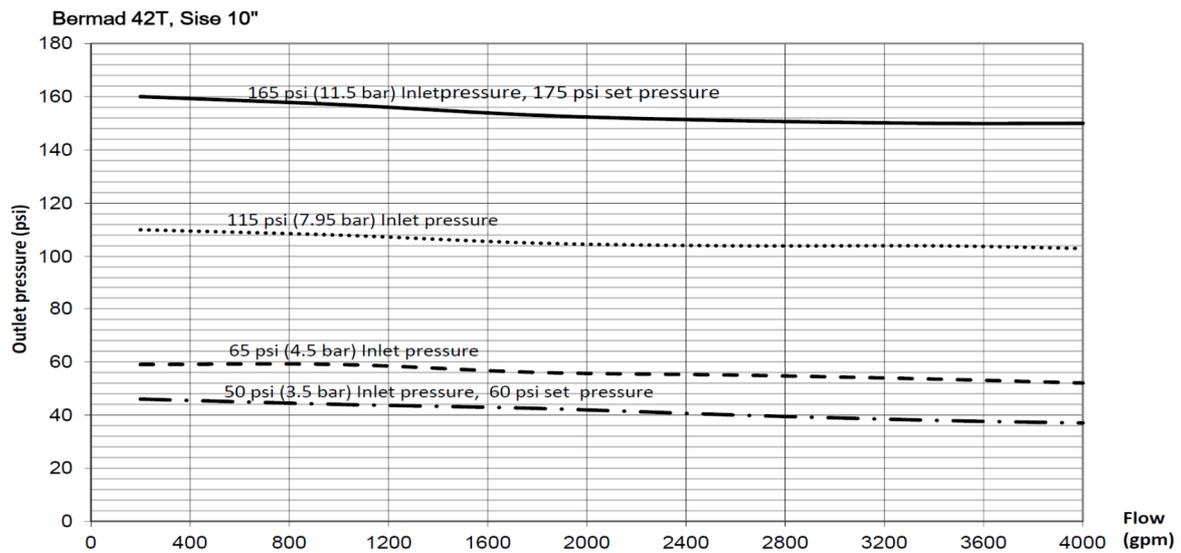
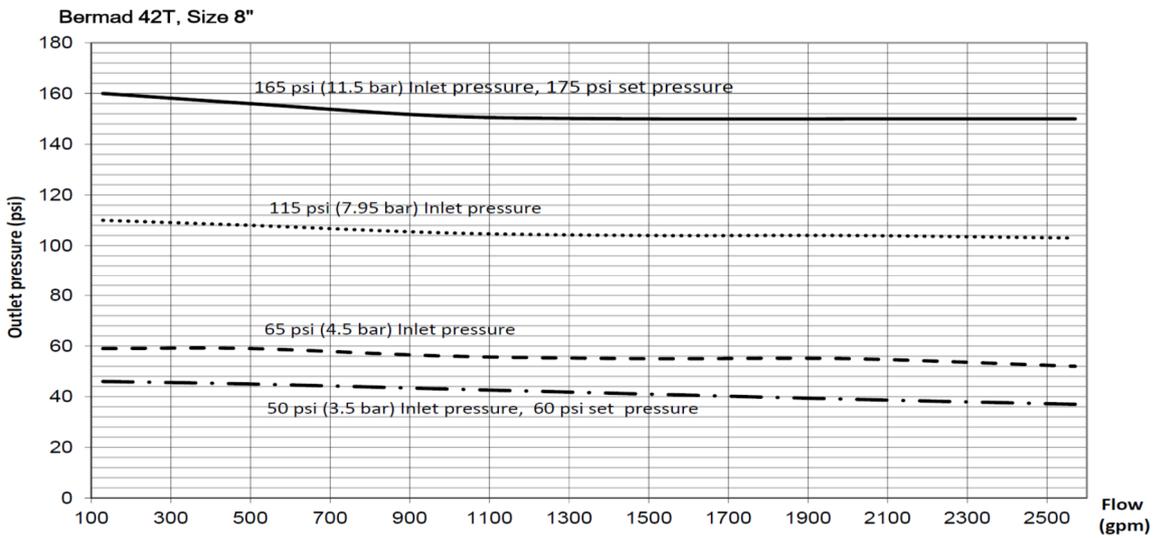
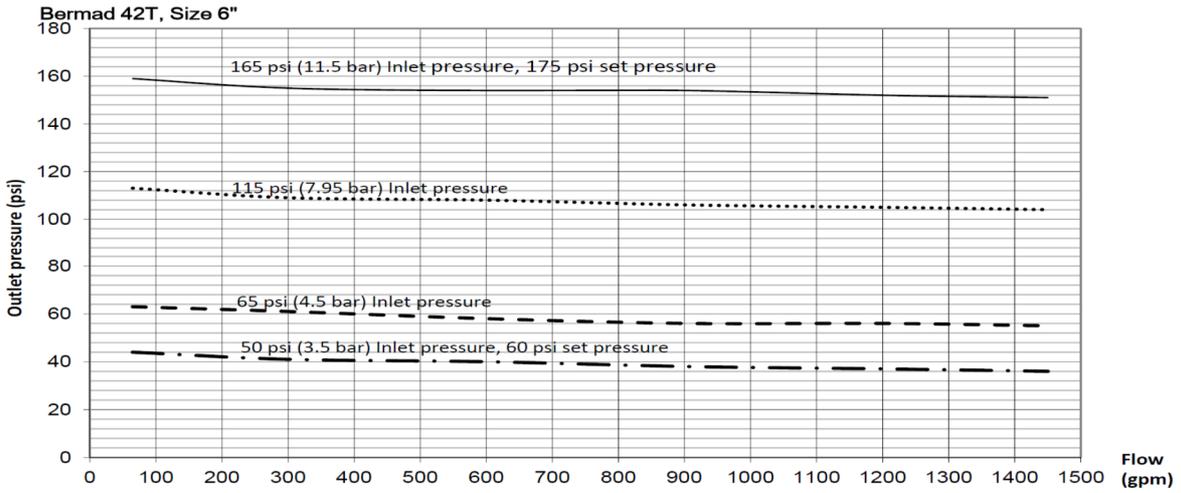


Bermad 42T, Size 3"

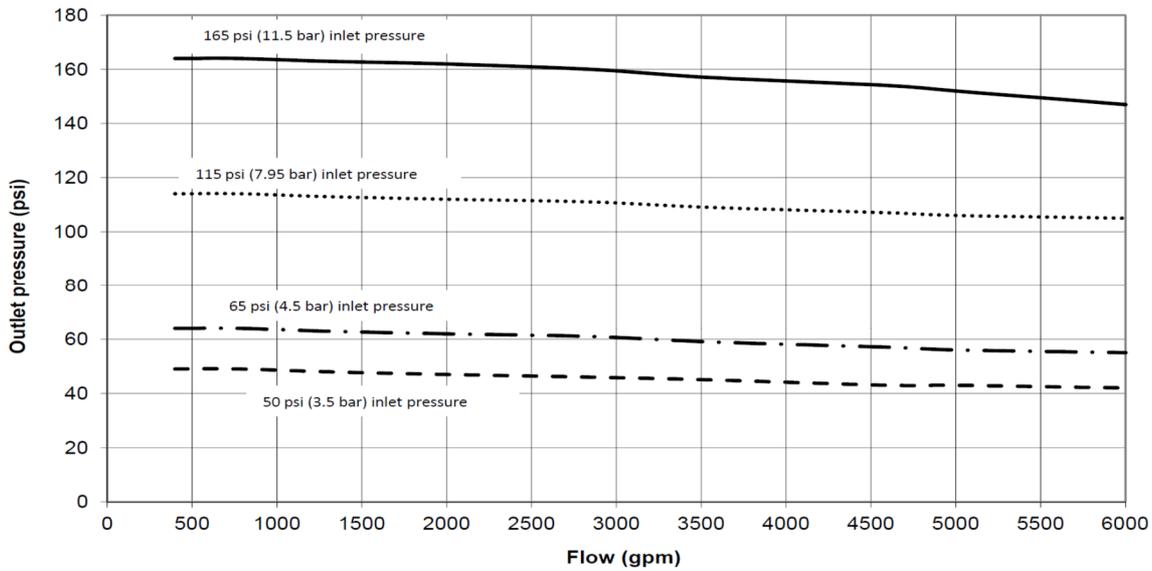


Bermad 42T, Size 4"

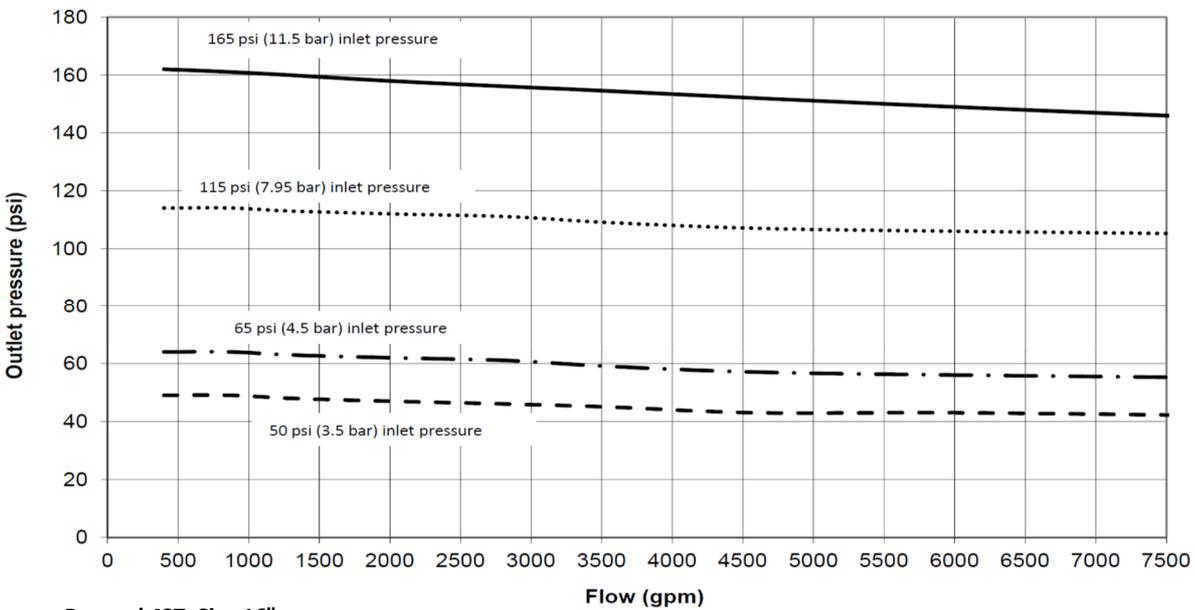




Bermad 42T, Size 12"



Bermad 42T, Size 14"



Bermad 42T, Size 16"

