Bermad Pressure Reducing Valve

Model: FP-420

INSTALLATION
OPERATION
MAINTENANCE

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

BERMAD's Model 420 Pressure-Reducing Valve is an automatic pressure control valve that reduces higher inlet pressure to lower constant outlet pressure, regardless of fluctuating flow-rates and/or varying inlet pressure. It is a pilot-operated, diaphragm-actuated, low pressure-loss valve. Valve differential pressure powers the diaphragm actuator open or closed. The double-chambered actuator design enables quick and smooth valve action. According to the downstream pressure, the pilot valve regulates main valve opening.

2.1 Models and Sizes

Models and Sizes covered by this document include the BERMAD Pressure-Reducing Valve 420, sizes 1½", 2", 2.5", 3", 4", 6", 8", 10" and 12". It is available in Globe pattern only for both horizontal and vertical installation.

2.2 Operating Pressure Rating

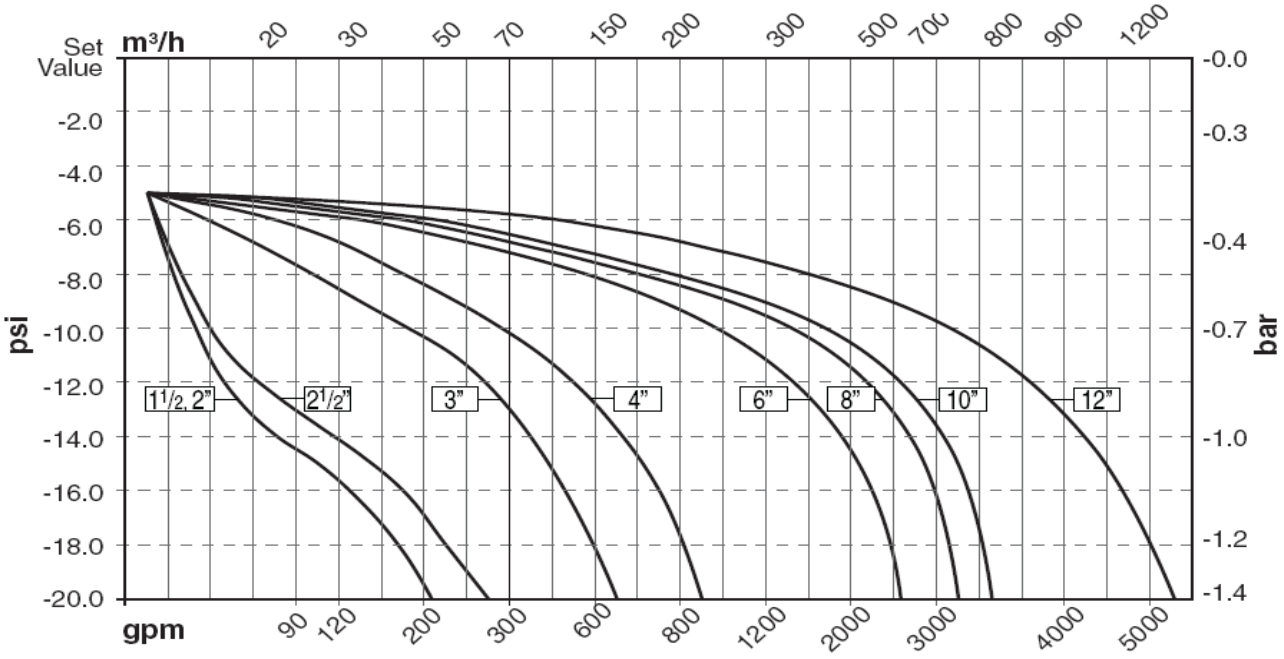
All sizes have a maximum rated inlet pressure of 235 psi (16 bar).
Outlet pressure setting for all sizes is 30-165 psi.
When setting the outlet pressure, the inlet pressure should be at least 15 psi (1 bar) higher than the set outlet pressure.
In cases where the inlet pressure falls below or is equal to the intended outlet pressure, the outlet pressure and flow will be as described in Tables 2 through 7.
In the case of zero (static) flow through the valve, the maximum increase in the downstream (outlet) pressure above the set pressure of the valve will not exceed 8 psi (0.5 bar).

Table 1: Flow Capacity

Valve Size, in (mm)]	1.5 - 2 (40 -50)	2.5 (65)	3 (80)	4 (100)	6 (150)	8 (200)	10 -12 (250-300)
Max. Inlet pressure, psi (bar)	250(17)	250(17)	250(17)	250(17)	250(17)	250(17)	250(17)
Outlet pressure adjustable range, psi (bar)	30-165 (2-11.5)	30-100 (0-6.9)	30-165 (2-11.5)	30-165 (2-12)	30-165 (2-11.5)	30-165 (2-11.5)	30-165 (2-11.5)
Maximum flow-rate, GPM (LPM)	150 (568)	300 (1140)	500 (1892)	800 (3028)	1800 (6813)	4000 (15140)	Consult Bermad
Minimum required flow rate for Pilot Setting, GPM (LPM)]*	75 (284)	150 (568)	250 (946)	400 (1514)	900 (3406)	2000 (7570)	2000 (7570)

*Required flows to be established through the valve to properly adjust the set pressure.

Table 2: Valve Outlet Pressure Fall-off Characteristics Below On Inlet Under Set Pressure:



3. Approvals

The BERMAD 420 Pressure reducing Control Valve is ABS and Lloyds approved when installed with specific components & accessories. Consult the manufacturer for any component approval recently to appear in the fire protection equipment directory.

4. Installation

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. Failure to do this might render the valve inoperable.

4.3 Listed indicating valves should be installed upstream and downstream of the BERMAD Model 420 valve to allow future maintenance. See figure 1.

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 The Model 420 is intended for horizontal installation only. 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, or fittings.

4.7 Install a pressure relief valve downstream of the Bermad valve.

4.8 Install a pressure gauge on both the upstream & downstream of the Pressure Reducing Control Valve. See installation drawing, figure 1, for indicated installation.

4.9 Install the Model 420 valve in accordance with the Standard for Installation of Standpipe and Hose Systems, NFPA 14, as appropriate. The Model 420 valve is to be tested after installation in accordance with owner regulations and the Authorities Having Jurisdiction.

4.10 The Model 420 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.

Figure 1: Installation Drawing

Typical Installations

Standard Pressure Reducing System

Parallel Pressure Reducing System

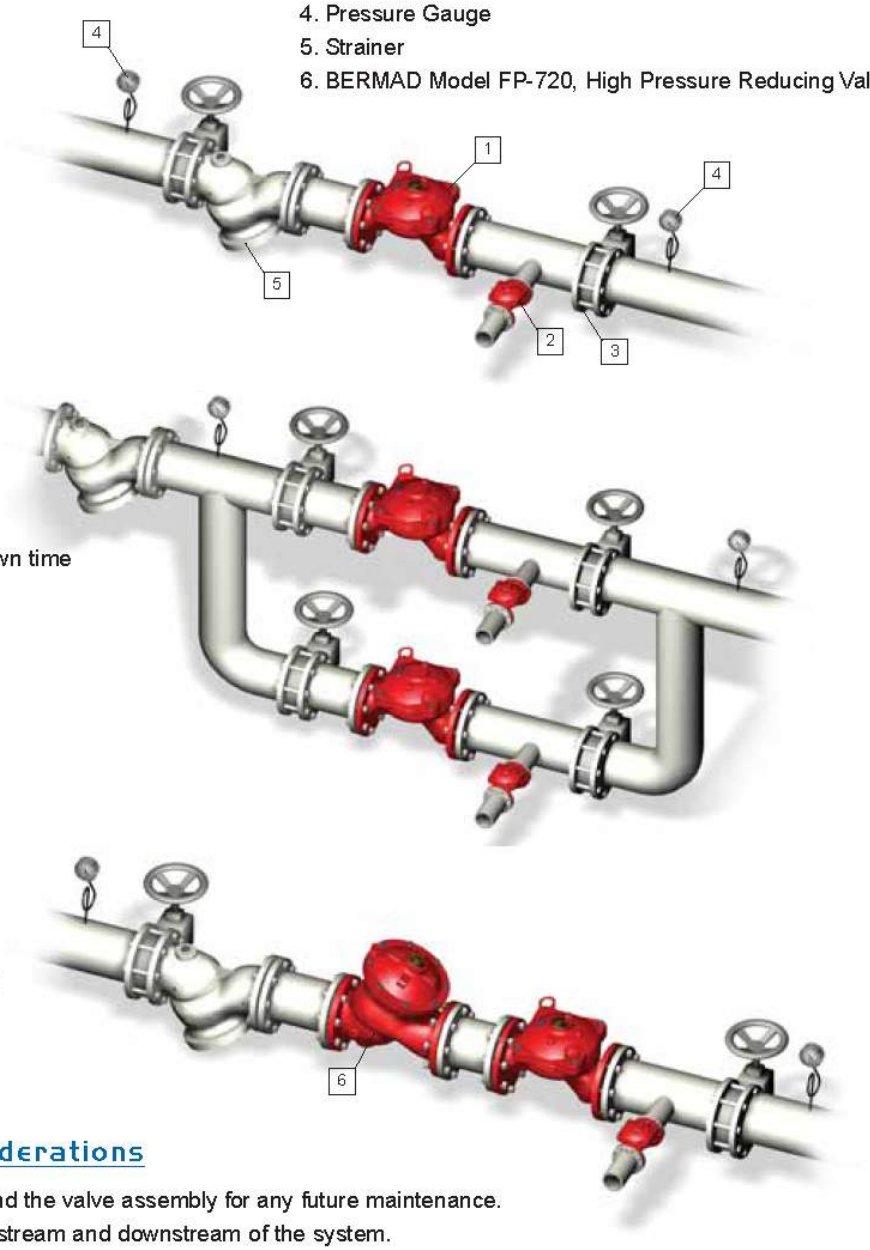
- Wide flow range
- Redundant safety
- Serviceable with zero down time

Two-Stage Pressure Reducing System

- High pressure differential
- Added reduced pressure zone protection

System Components

1. BERMAD Model FP-420-00
2. BERMAD Model FP-430 Pressure Relief Valve
3. Isolating Valve
4. Pressure Gauge
5. Strainer
6. BERMAD Model FP-720, High Pressure Reducing Valve



Installation Considerations

- Allow enough room around the valve assembly for any future maintenance.
- Install isolating valves upstream and downstream of the system.
- Install the valve horizontally with the cover up.
- Install a relief valve (recommended: BERMAD Model FP 430) of the appropriate size on the downstream side of the FP 420-00.
- Install a pressure gauge on both sides of the system.

5. 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 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 is equipped with an adjusting screw to preset the desired downstream pressure and an internal adjustable needle valve to control the closing speed.

Starting -up

When performing this procedure refer to figure 1.

5.1 Open a hydrant, relief valve, drain valve, or other flow-consumer downstream of the Model 720UL Pressure-Reducing Valve, creating a system demand.

5.2 Fully open upstream indicating valve (2a).

5.3 Gradually open downstream indicating valve (2b) to fully open, allowing flow through the Model 720UL Pressure-Reducing (1) Valve.

5.4 Wait for downstream pressure stability.

5.5 Slowly close the flow-consumer that was opened in step #1 above to fully close.
There is no flow; the pressure on the downstream side of the system that is reflected through the pressure gauge (3b) should be according to the factory pre-set adjusted pressure plus up to an additional 10%.

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.

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

5.7 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.

5.8 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
or
Clockwise to increase (+) the downstream pressure.

5.9 Repeat the Starting-up procedure, steps 5.1-5.5.

Caution: Small changes in the adjustment of the needle valve have great impact on the valve performance. The needle valve is factory set at one-half turn open to one and one-half turn open. The maximum number of turns is 3 from fully closed to fully open. More than 3 turns toward open might cause the valve to perform at less than optimal functioning. Perform step 5.5 with this in mind.

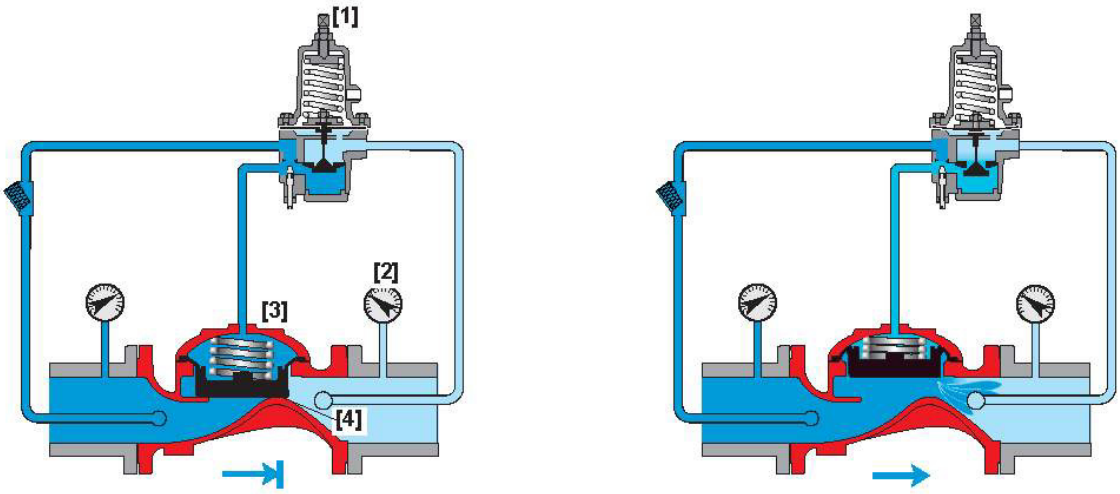
5.10 By turning the needle valve (in figure 2) on the pilot valve bottom adjust the valve response. Turn:

Clockwise to decrease (-) the closing speed of the main valve
or
Counterclockwise to increase (+) the closing speed of the main valve.

5.11 Repeat the Starting-up procedure, steps 5.1-5.5.

Note: Valve response adjustment affects pressure adjustment. Any adjustment to valve response requires rechecking pressure adjustment. See steps 5.1-5.6.

6. Figure 2: Operation Drawing



Valve Closed (static condition) **Valve Open** (flowing condition)

7. Maintenance and Inspection Test

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.

7.1 Prior to turning off any valves or, notify local security guards.

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

7.3 The Model 420 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.

Normal condition

7.4 All main isolating valves should indicate a fully open position.

7.5 Upstream pressure gauge (2 fig.2) should reflect the upstream pressure supplied to the valve.

7.6 Down stream pressure gauge (2 fig.2) should be according to the system design criteria.

8. Quarterly Inspection

8.1 The system should be checked for normal condition.

8.2 Check that the main valve, pilot system, accessories, tubing & fittings, are all in good condition, damage free and not leaking.

8.3 The fastening nut, of the pilot valve (2 figure 2) adjusting screw, should be fastened tightly.

9. Annual Inspection and Test

9.1 Complete Quarterly Inspection.

9.2 Conduct a flow test in systems nominal flow. The down stream pressure gauge should show the adjusted down stream pressure, and according to the system design criteria, this pressure should be stable.
If re-adjusting is needed it should be according to paragraph 5.

10. Abnormal Conditions - Troubleshooting

SYMPTOM	PROBABLE CAUSE	REMEDY
Valve fails to regulate	Needle valve (21) not properly adjusted.	Factory set at ½ or 1½ open. Adjust.
	Pulsates or hunts.	Slowly adjust needle valve (21) until pulsation stops.
	Air trapped in main valve cover.	Loosen cover tube fitting at the highest point, allow the air to escape and re-tighten.
	Filter screen (4) blocked.	Remove filters cap and screen to clean.
Valve fails to open	Insufficient inlet pressure.	Check/create inlet pressure.
	No downstream demand.	Create demand/flow.
Valve fails to hold set static outlet pressure	Insufficient pilot spring compression.	Turn adjusting screw CW on pilot (8).
	Debris trapped in main valve.	Remove and inspect actuator assembly. Check seat and disc seal. Check for foreign bodies. Rinse at high flow-rate.
	Diaphragm in main valve is leaking.	Open the valve cover, inspect diaphragm If damaged, replace.
	Diaphragm in pilot valve is leaking.	

11. 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.