

### Pressure Reducing System with "Watchdog" Hydraulic Backup Valve & Low Flow By-Pass

#### Description

The Model BC-72S-H-P Pressure Reducing System maintains a constant downstream pressure regardless of demand or changing upstream pressure. Pressure reducing pilot #2PB/L senses downstream pressure, and modulates the main valve to maintain the set point. When downstream pressure falls below the setting of the pressure reducing pilot, the pilot opens allowing the main valve to open to increase pressure to the set point. When downstream pressure rises above the setting of the pressure reducing pilot #2PB/L, the pilot closes causing the main valve to throttle toward a closed position to maintain the set point.

The system also includes a "Watchdog" hydraulic backup valve. Should the pressure reducing valve fail to maintain the downstream pressure, the watch-dog begins to modulate at a slightly higher pressure setting via pilot #X, protecting the system from excessive pressure and ensuring continuous water supply.

#### Installation

1. Allow enough room around the valve assembly for making adjustments and for future maintenance and disassembly work
2. Thoroughly flush the pipeline to remove dirt, scale, and debris. Failure to perform this operation may render the valve inoperable.
3. It is recommended that isolation valves be installed upstream and downstream of the BERMAD pressure reducing system branch to allow for future maintenance operations. A strainer, such as the BERMAD Model BC-70F-P, is also recommended upstream of the pressure reducing system, to prevent debris from damaging the valves during operation.
4. Install the valve in the pipeline with the valve flow arrow on the body casting in the proper direction. For best performance, do not install the valve horizontally with the cover facing down, so that air can be easily purged from the upper control chamber. Make certain the valve is positioned so the actuator can be easily removed for future maintenance requirements.
5. If applicable, run the appropriate conduit and cables to wire a limit switch or position transmitter. See relevant accessories IOM for more information.
6. This valve/system vents water to atmosphere, ensure that there is a floor drain near the valve(s) or install a line to re-direct the vented water to an acceptable area.
7. It is recommended to install a pressure gauge downstream of the pressure reducing valve system.
8. After installation carefully inspect/correct any damaged accessories, piping, tubing, or fittings.

#### Commissioning & Calibration

**NOTE:** The 72S-2B-H is a system with two connected valves. This manual refers to the pressure reducing valve as the "720" and to the watchdog as the "WD". There must be sufficient flow through the valve and system to check and adjust the valve. Insure that a downstream demand is created. **Ball valves 1, 2, 3, 1A & 2A must be open at all times for automatic regulation mode.**

1. The 72S-H should be factory set according to the design pressure request. The downstream set pressure is marked on pilot #2PB/L's label, and the set pressure for the emergency backup is marked on pilot #X's label (15-20 psi higher than pilot #2PB/L setting). If there are no marking on the pilot labels or a set-point adjustment is needed proceed to step 5.
2. Fully open the upstream isolation valve and partially open the downstream isolation valve, to fill the consumer line downstream of the pressure reducing system, in a slow and controlled manner. Allow the downstream pressure to stabilize; it should be at the set pressure of the 720 as marked on pilot #2PB/L.
3. Confirm that the supply pressure and the flow through the system are typical. If necessary, create flow by opening a hydrant, or reduce the flow/pressure by adjusting the downstream/upstream isolation valves.
4. Vent air from the control loop by loosening a tube fitting at a highpoint near the 720 cover, allowing all air to bleed. Retighten the tube fitting. 2-3 bolts on the high side of the cover may be loosened to bleed air, if the valve is not installed upright.
5. If no set point is marked on the pilots, or system requirements are different than the current set-points:
  - 5.1. Close ball valves 1A & 2A.
  - 5.2. Loosen the pilot #2PB/L locknut (on the 720), and turn the adjusting screw out, CCW, to release all spring tension. The 72S should close.
  - 5.3. Loosen the pilot #X locknut (on the WD), and turn the adjusting screw in, CW, for maximum spring compression. The 72S will remain closed.
  - 5.4. Slowly turn the pilot #2PB/L adjusting screw in, CW; the 72S will open and downstream pressure will slowly increase. Set the pressure roughly 30 psi higher than the required set point. Allow the 72S to react and the pressure to stabilize.
  - 5.5. Slowly turn the pilot #X adjusting screw out, CCW, until downstream pressure begins to fall. Continue slowly turning the adjusting screw until the pressure 15 psi above the required set point. Allow the 72S to react and the pressure to stabilize. Tighten the pilot #X locknut.
  - 5.6. Slowly turn the pilot #2PB/L adjusting screw out, CCW, until downstream pressure begins to fall again. Continue slowly turning the adjusting screw until the downstream pressure reaches the required set point. Allow the 72S to react and the pressure to stabilize. Tighten the pilot #2PB/L locknut.
  - 5.7. Re-open ball valves 1A & 2A, and close the downstream isolating valve.
  - 5.8. Adjust the setpoint of the CAP2 using the operating knob on the upper part of the valve. The pressure reducing valves are factory set to a pressure of 45 psi.
 

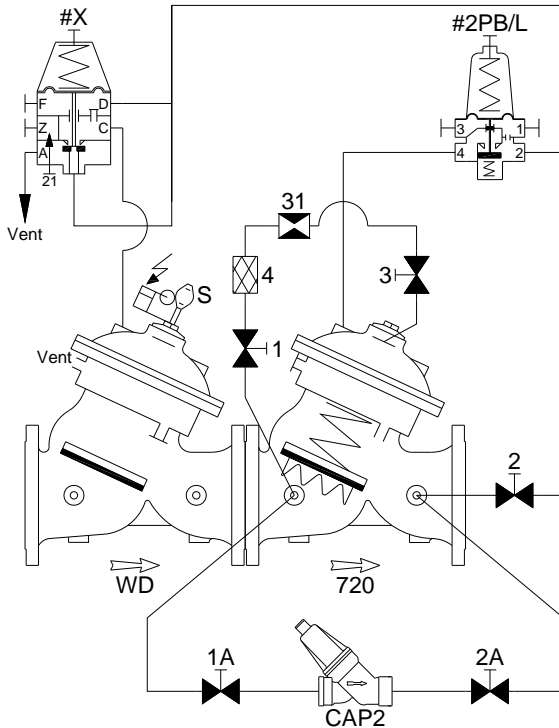
**NOTE:** Because the pre-adjustment dial displays in 15 psi increments, the optional downstream outlet pressure gauge can be used to show the exact outlet pressure, which is especially useful for applications requiring this precision.
  - 5.9. Fully open the downstream isolating valve.
6. For more information about the CAP2 low flow by-pass, please refer to IOM BC-CAP2-P.
7. Set the limit switch cam to barely touch the limit switch roller wheel. The switch should close the circuit as soon as the WD begins to regulate. The signal should trigger an alarm in the Building Management System



### Commissioning & Calibration (Continued)

8. Calibrating Pressure Reducing Systems that include parallel By-Pass PRVs, require calibrating each of the PRVs separately, while the parallel PRV system branches are closed. Calibration should refer to a shared pressure gauge, installed downstream from the system. For best & long-term performance, larger PRV set points should be 5-10 psi lower than smaller, low flow by-pass, CAP2 set points.

### Control Loop Diagram



#### PART LIST

1,1A	Inlet Ball Valve, Normally Open
2,2A	Outlet Ball Valve, Normally Open
3	Cover Ball Valve, Normally Open
4	Control Filter
31	Fixed Restriction Orifice
S	Limit Switch
#2PB/L	Pressure Reducing Pilot
#X	3-Way, Backup Pressure Reducing Pilot
CAP2	Low Flow By-Pass
720	Pressure Reducing Valve
WD	"Watchdog" Hydraulic Backup Valve

### Troubleshooting

#### Symptom

**Either Valve Fails to Open**

#### Possible Cause

- Insufficient inlet pressure.
- No downstream demand.
- Insufficient pilot #2PB/L (for the 720) or pilot #X (for the WD) spring compression.
- Ball valve 2 or 3 is closed.

#### Solution

- Check/create inlet pressure.
- Create demand/flow
- Readjust pilot #2PB/L & #X. See step 5 of the commissioning instructions.
- Open ball valve 2 & 3.

**Either Valve Fails to Close or Regulate**

- Filter 4 plugged/clogged.
- Excessive pilot #2PB/L (for the 720) or pilot #X (for the WD) spring compression.
- Ball valve 1 or 3 is closed.
- Regulated pressure pulsates or hunts.
- Debris trapped in main valve.

- Open filter 4 and clean screen.
- Readjust pilot #2PB/L & #X. See step 5 of the commissioning instructions.
- Open ball valves 1 & 3.
- Bleed air from valve cover. Ensure flow rate is above recommended minimum.
- Remove actuator assy. to inspect seat area/verify valve stroke/remove debris.
- \*After closing ball valves 1 & 2, remove small cover plug at valve cover. Continuous flow indicates diaphragm leakage. Inspect, tighten, and/or replace Diaphragm.

**\*CAUTION:** Valve will be fully open. Close the downstream isolation valve or omit this test if this condition may cause system damage.

- \*Diaphragm in main valve ruptured or diaphragm assembly loose.