

## Booster Pump Control & Pressure Sustaining Valve, Quick Active Check Valve

(Sizes 1½-14"; DN40-350)

### Description

The Model 743 Booster Pump Control & Pressure Sustaining Valve is a hydraulically operated, diaphragm actuated, active check valve that opens or shuts off in response to electric signals. It isolates the pump from the system during pump starting and stopping, to prevent pipeline surges. While open, it sustains minimum, pre-set discharge pressure regardless of fluctuating demand. In case of power failure, it immediately closes as a spring loaded, zero velocity non return valve.

### Installation

1. Ensure enough space around the 743 for future maintenance. install Isolation gate valves upstream & downstream from the 743.
2. Prior to valve installation, flush the pipeline to insure flow of clean fluid through the valve.
3. Install the valve in the pipeline with the valve flow direction arrow in the actual flow direction. Use the lifting ring provided on the valve.
4. For best performance, it is recommended to install the valve horizontally and upright. For different valve positions – consult Bermad.
5. System power connections, control cabinet, controller, sensors & wiring must be carried out by authorized electrical engineer / electrician and comply with Electrical and Instrumentation Codes.
6. If the 743 is ordered & supplied with Bermad BR 740-E controller, forward in advance the schematic diagram of the system with the BR 740-E controller, to the system electrical engineer.
7. Cross-Check solenoid & Limit Switch specifications with design requirements and solenoid/coil label.
8. Pull and connect 3-wired cables, to the solenoid and the limit switch, according to electric diagram. Ensure approved cables protection. Confirm that the wires data meet specifications.

**Note:** Energizing the solenoid coil when it is not fixed in its place, is dangerous and might burn the coil.

### Commissioning & Calibration

1. Confirm that cock valves [1], [2] and [3] are open (handle parallel to cock-valve body).
2. Confirm that the 743 is signaled open: N.O.: Solenoid is de-energized; N.C.: Solenoid is energized or disconnect cover tube fitting.
3. Start the pump and fill-up, in a slow and controlled manner, the discharge line downstream from the system.  
**Note:** When pump discharge pressure is below the 743 setting, the valve is closed.
4. Open the downstream isolating and confirm that the discharge pressure and the flow through the system are typical.
5. Vent air from the valve's control loop by loosening cover tube fitting, allowing all air to bleed. Retighten the tube fitting eyebolt.
6. The Model 743 is factory set according to design definitions. The set pressure is marked on the pilot's label. To confirm and/or to change the 743 setting, follow the steps described below:
  - 6.1. According to pump curve, create increased system flow to reduce pump discharge pressure. Ensure that the 743 sustains pump discharge pressure, preventing it from decreasing below setting, even at very high flow.
  - 6.2. Unlock the pilot locking nut and slowly turn the pilot adjusting screw Clock-Wise to increase set pressure and Counter-Clock-Wise to decrease it. Lock the pilot locking nut and return the system to typical flow conditions.
7. All system constrains, timing & alerts are controlled by the PLC and/or by Bermad BR 740-E controller, which receives the inputs from the system (pump temp., pump power consumption, power supply, main contactors, limit switch position, reservoir level & etc.) and controls the pump & valve accordingly.
8. Three timers need to be programmed:
  - 8.1. td1 = pumps turn-off override command, if valve fails to open. [timer recommended range = 10-180 seconds]
  - 8.2. td2 = delays pump turn-off from limit switch opening (742 close). [timer recommended range = 1-10 seconds]
  - 8.3. td3 = pumps turn-off override command, if valve failed to close. [timer recommended range = 30-240 seconds]
9. The PLC should operate as follow:

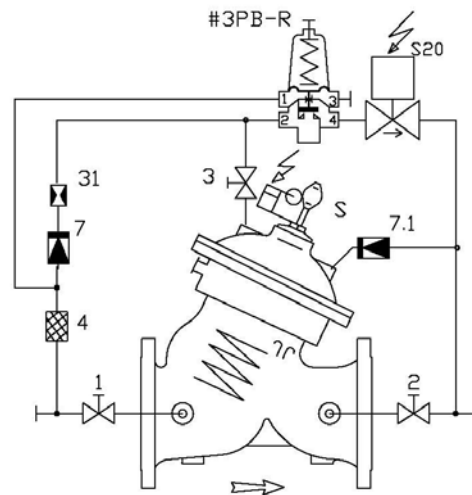
Process Stage	N.O. 742 - Energizing Sol. closes the 742	N.C. 742 - Energizing Sol. opens the 742
Pump turn on	td1 start counting	solenoid energizes, td1 start counting
Valve start open	limit switch closes contact, td1 stop counting	limit switch closes contact, td1 stop counting
Turn-of procedure	solenoid energizes, td3 start counting	solenoid de-energizes, td3 start counting
Valve almost closed	limit switch opens contact, td2 start counting	limit switch opens contact, td2 start counting
td2 finishes counting	pump turns of, td3 stops counting, solenoid de-energizes	pump turns of, td3 stops counting

10. Switch the pump off and confirm the 742 closes immediately due to its spring loaded check valve function.
11. Check limit switch (S) adjustment. When the valve is closed the limit switch should open the circuit contact. Use a 3/16" Allen-Key to adjust the limit switch collar as necessary, lowering it to promote pump turn off signal.
12. Switch the pump on. The main valve should start opening.
13. Switch the pump off. The main valve should start closing while the pump is still running. When the valve is fully closed, the collar should push the limit switch to the open contact position, switching the pump off.
14. **Note:** This test may create negative & positive surge waves along the system, confirm sufficient system surge protection. Simulate a power failure by switching off main power supply. The main valve should immediately close.

## Control Drawing

### PARTS LIST

1	2W Cock Valve
2	2W Cock Valve
3	2W Cock Valve
4	Control Filter
7	Check Valve
7.1	Check Valve
31	Restriction Orifice
#3PB-R	2W PB PS Pilot R Sensing
S20	2-Way Solenoid
S	Electric Limit Switch



## Trouble-Shooting

- Valve fails to Open:** Check pump for sufficient inlet pressure, confirm solenoid is not jammed closed, confirm power supply to solenoid & confirm solenoid coil is not burned (N.C. valves), confirm pilot setting & check cock valve (2) status.
- Valve fails to Close:** Confirm pilot setting & check cock valves status, confirm power supply to solenoid & confirm solenoid coil is not burned (N.O. valves), confirm solenoid is not jammed open, clean control filter & detect for clogged ports or fittings, check if any debris trapped in the main valve, confirm diaphragm is not leaking.
- Valve fails to Regulate:** Confirm pilot setting, release air trapped in the control chamber & check cock valves status.

## Preventative Maintenance

- System operating conditions that effect on the valve should be checked periodically to determent the required preventative maintenance schedule.
- Maintenance instructions:
  - Tools required:
    - Metric and imperial wrenches
    - Anti seize grease
  - Visual inspection to locate leaks and external damages
  - Functional inspection including: closing, opening and regulation.
  - Close upstream and downstream isolating valves (and external operating pressure when used).
  - Once the valve is fully isolated vent pressure by loosening a plug or a fitting.
  - Open the stud nuts and remove the actuator as one unit from the valve body. Disassemble necessary control tubs.
  - It is highly recommended to stock a reserve actuator assembly for each size. This allows minimum system field work and system down time.
  - Disassemble the actuator and examine its parts carefully for signs of wear, corrosion, or any other abnormal conditions.
  - Replace worn parts and all the Elastomers. Lubricate the bolts and studs threads with Anti seize grease.

## Spare parts

Bermad has a convenient and easy to use ordering guide for valve spare-parts and control system components. For solenoid valves refer to model and S/N on solenoid tags.

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