

Booster Pump Control Valve Quick Active Check Valve

Model 740Q

- Isolates system from the effects of pump starts and stops for:
 - Solitary single speed pumps
 - Battery of single speed pumps (add & switch)
 - Battery of variable speed pumps (add)

The Model 740Q Booster Pump Control Valve is a double chambered, hydraulically operated, diaphragm actuated active check valve that opens fully or shuts off in response to electric signals. It isolates the pump from the system during pump starting and stopping, to prevent pipeline surges.



Features and Benefits

- **Line pressure driven**
 - Independent operation
 - No motor required
 - Long term drip tight sealing
- **Solenoid controlled**
 - Low cost wiring
 - Wide ranges of pressures and voltages
 - Normally Open or Normally Closed
- **Check feature (spring loaded type)**
 - Replaces line sized check valve
 - Fail-safe mechanical closure
- **In-line serviceable** – Easy maintenance
- **Double chamber**
 - Full powered opening (option “B”) and closing
 - Non-slam opening and closing characteristic
 - Protected diaphragm
- **Balanced seal disk** – High flow capacity
- **Flexible design** – Easy addition of hydraulic features

Major Additional Features

- Booster Pump Control Valve with Independent Lift Check – **740Q-2S**
- Pressure sustaining – **743**
- Pressure reducing – **742**
- Flow control – **747-U**
- Pump circulation control – **748**
- Deep well pump electric control – **745**
- Full powered opening & closing – **740-B**
- Electronic control – **740-18**
- Pressure sustaining & Pressure reducing – **743-2Q**

See relevant BERMAD publications.



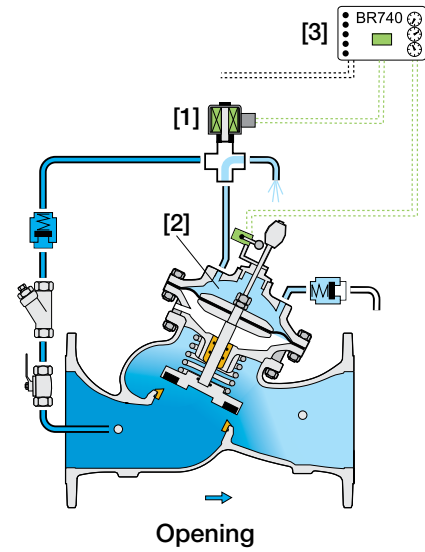
Sequence of Operation (Normally-Open Type)

The Model 740Q is a solenoid controlled valve equipped with a limit switch, a 3-Way solenoid pilot and check valves.

For large valves, an accelerator quickens valve response.

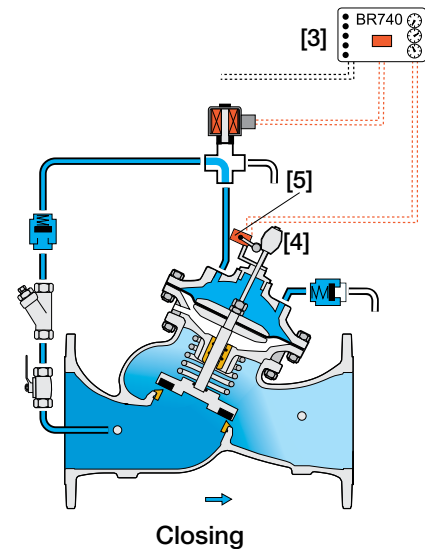
Pump Starting Procedure

Prior to pump start, the valve is hydraulically closed although electrically open. Even though the de-energized solenoid [1] vents the upper control chamber [2], it remains full as no opening hydraulic forces are applied. Pump start command is issued to the controller [3], which starts the pump. Valve upstream pressure builds and rises above the system static pressure, causing opening hydraulic forces to rise. Pressure is then released from the upper control chamber through the solenoid, allowing the valve to open gradually.



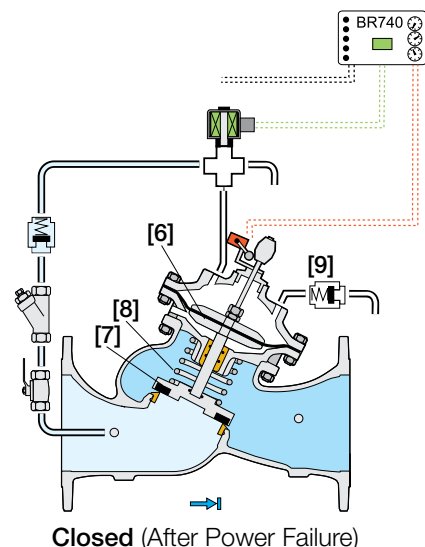
Pump Stopping Procedure

In pumping systems with standard check valves, the shut down command is issued directly to the pump, abruptly shutting it down. In systems with "active check valves," the shut down command is issued to the controller [3], which energizes the solenoid. The solenoid then applies pumped pressure to the upper control chamber, gradually closing the main valve, and isolating the running pump from the system. As the indicator collar [4] moves down, it activates the valve's limit switch [5], signaling the controller to shut down the pump. After a preset time delay, the controller de-energizes the solenoid and resets the limit switch command, allowing the pump to start when next signaled. The valve remains hydraulically closed and electrically open.



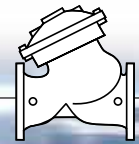
Power Failure – Spring Loaded, Zero Velocity Non-Return Valve

If electric power fails during pumping, the upstream pressure immediately drops causing the hydraulic forces acting on the diaphragm assembly [6] and closure [7], to balance. The spring [8] then breaks this balance, closing the valve before the flow can change direction. Check valve [9] allows air flow into the upper control chamber to brake possible vacuum and quicken the closing speed.



Note:

Valve configuration and control circuit might vary for PN 25 and/or large diameter valves.



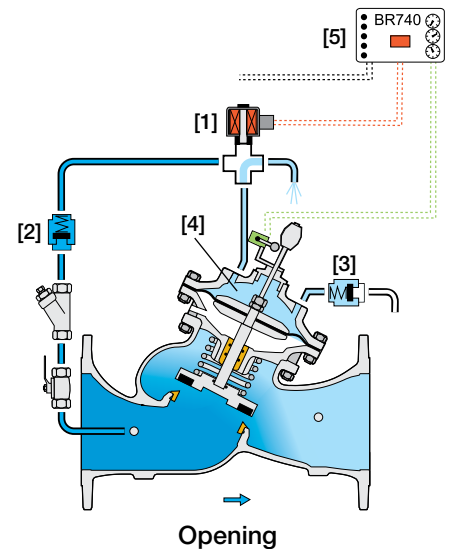
Sequence of Operation (Normally Closed Type)

The Model 740Q is a solenoid controlled valve equipped with a limit switch, a 3-Way solenoid pilot and check valves.

For larger valves, an accelerator quickens valve response.

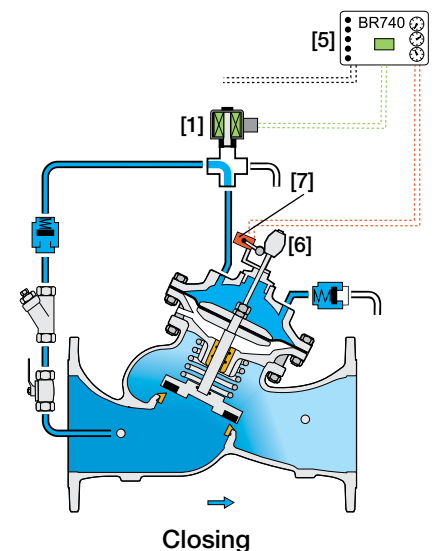
Pump Starting Procedure

Prior to pump start, the valve is closed hydraulically and electrically. The de-energized solenoid [1] together with the inlet check valve [2] and the airflow check valve [3], trap the pressure in the upper control chamber [4]. Pump start command is issued to the controller [5], which simultaneously starts the pump and energizes the solenoid. Valve upstream pressure builds and rises above the system static pressure, causing opening hydraulic forces to rise. The solenoid releases the pressure from the upper control chamber, allowing the main valve to open gradually.



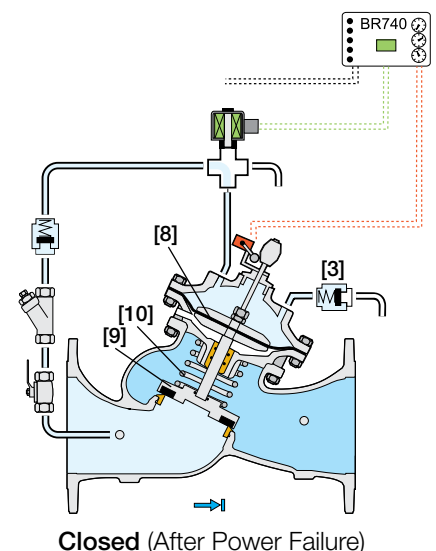
Pump Stopping Procedure

In pumping systems with standard check valves, the shut down command is issued directly to the pump, abruptly shutting it down. In systems with “active check valves”, the shut down command is issued to the controller [5], which de-energizes the solenoid [1]. The solenoid then applies pumped pressure to the upper control chamber, gradually closing the main valve, and isolating the running pump from the system. As the indicator collar [6] moves down, it activates the valve’s limit switch [7], signaling the controller to shut down the pump. The valve remains closed as the pumped pressure in the upper control chamber is trapped by the check valves and by the solenoid. After a preset time delay, the controller resets the limit switch command, allowing the pump to start when next signaled.



Power Failure – Spring Loaded, Zero Velocity Non Return Valve

If electric power fails during pumping, the upstream pressure immediately drops causing the hydraulic forces acting on the diaphragm assembly [8] and closure [9] to balance. The spring [10] then breaks this balance, closing the valve before the flow can change direction. Check valve [3] allows airflow into the upper control chamber to break possible vacuum and quicken the closing speed.



Note:

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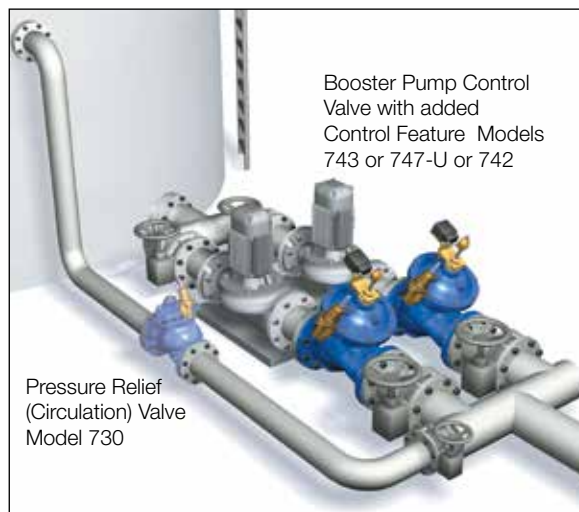
Additional Applications

Booster Pump Control & Pressure Sustaining Valve Model 743

Network demand is greater than pump design specifications:

- During empty pipeline filling
- During over demand by consumers
- When pump pressure specification is higher than system resistance

Any of these factors might cause pump overload & cavitation damage. The Model 743 adds a pressure sustaining feature to the Booster Pump Control Valve ensuring the pump operates within design specifications. This protects both the pump and the system while maintaining the operation sequence of the standard Model 740Q.



Booster Pump Control & Flow Control Valve Model 747-U

When the pump curve (Flow versus Pressure) is relatively flat, pump protection with respect to discharge pressure is not sufficient, and protection according to flow is recommended.

The Model 747-U, adds a flow limiting feature to the operation sequence of the standard Model 740Q.

Booster Pump Control & Pressure Reducing Valve Model 742

Standard pumps are specified to boost pressure by a constant differential. Increased suction pressure causes excessive discharge pressure, which requires reduction. When the pump curve (Flow versus Pressure) is relatively steep, circulation of the excessive pressure is most suitable. However, when the pump curve is relatively flat, the additional circulated flow hardly affects the discharge pressure. The most suitable solution is to reduce the discharge pressure.

The Model 742, adds a pressure reducing feature to the operation sequence of the standard Model 740Q.

Control System Specifications

Standard Materials:

Solenoid:

Body: Brass or Stainless Steel

Elastomers: NBR or FPM

Enclosure: Molded Epoxy

Tubing & Fittings:

Stainless Steel 316 or Copper & Brass

Accessories:

Stainless Steel 316, Brass and Synthetic

Rubber Elastomers

Solenoid Electrical Data:

Voltages:

(ac): 24, 110-120, 220-240, (50-60Hz)

(dc): 12, 24, 110, 220

Power Consumption:

(ac): 30 VA, inrush; 15 VA (8W), holding or

70 VA, inrush; 40 VA (17.1W), holding

(dc): 8-11.6W

Values might vary according to specific solenoid model

BR 740-E Controller

Supply voltage: 110, 230 V(ac) 50/60 Hz

Power consumption: <8 VA

Solenoid circuit fuse: 2A (Internal)

Pump control circuit fuse: 1A (Internal)

Dimensions: 96 x 96 x 166 mm (DIN), 0.75 kg

Housing material: NORYL (DIN 43700)

Limit Switch

Switch type: SPDT

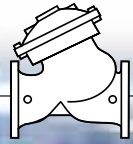
Electrical rating: 10A, type gl or gG

Operating temperature: Up to 85°C (185°F)

Enclosure rating: IP66

Notes:

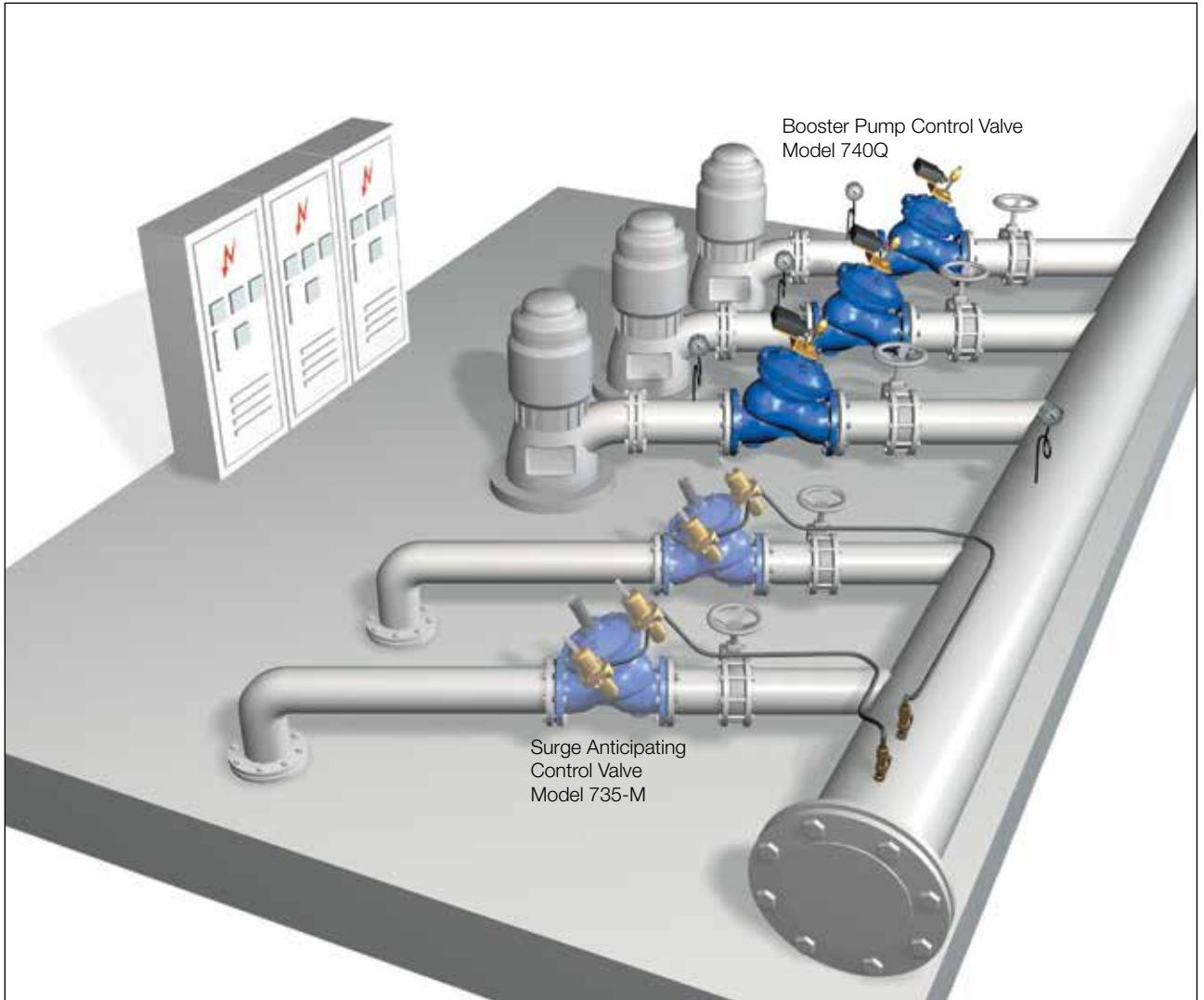
- Recommended continuous flow velocity: 0.1-6.0 m/sec ; 0.3-20 ft/sec
- Minimum operating pressure: 0.7 bar ; 10 psi. For lower pressure requirements consult factory



Typical Applications

In this system, a pump battery supplies the main line through a manifold. The Model 740Q, installed downstream from each pump:

- Prevents surge generation rather than minimizing surge damage
- Provides surge free starting and stopping of supplementary pumps
- Allows surge free switching between “on-duty” pumps
- Delays reaction of variable speed primary pump to single speed supplementary pump going on line or off line.



BR 740-E Electronic Controller

The BR 740-E coordinates between all system components to eliminate surges from the system. This controller provides built-in operating modes that can be selected on-site. These modes are based on accumulated know-how to prevent errors that might occur during on-site programming.



