



# Booster Pump Control Valve

## Active Check Valve

- 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 740 Booster Pump Control Valve is a 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

- 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.



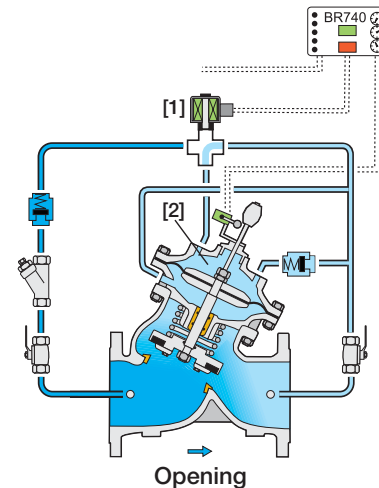
## 700 Series Model 740

### Sequence of Operation (Normally-Open Type)

The Model 740 is a solenoid controlled valve equipped with a limit switch, a 3-Way solenoid pilot and check valves. Normally Closed type is also available. For large valves, an accelerator quickens valve response.

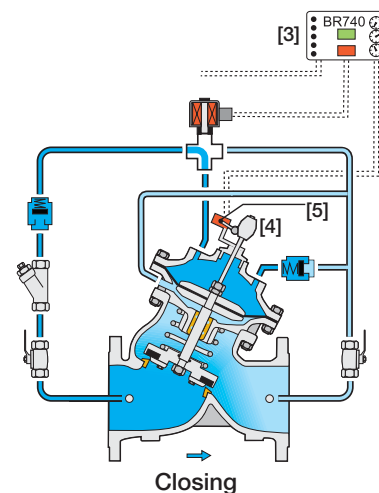
#### Pump Starting Procedure

Prior to pump start, the valve is hydraulically closed although electrically open. The de-energized solenoid [1] connects the upper control chamber [2] to valve outlet introducing system static pressure. As pump starts, valve upstream pressure builds and rises above the system static pressure, causing opening hydraulic forces to rise. The upper control chamber pressure is released to valve outlet through the solenoid, allowing the valve to gradually open.



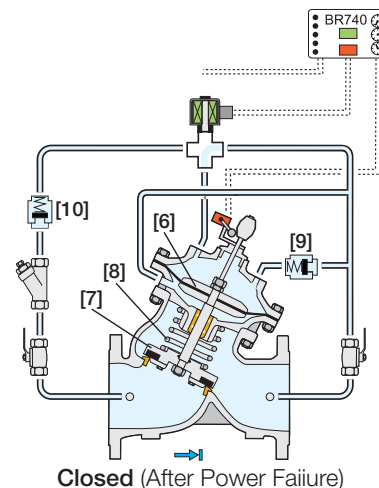
#### Pump Stopping Procedure

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 BR740-E electronic 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. Once the main valve has closed, the check valve [9] allows downstream pressure into the upper control chamber while the check valve [10] traps it, resetting the main valve for the next pump starting process.



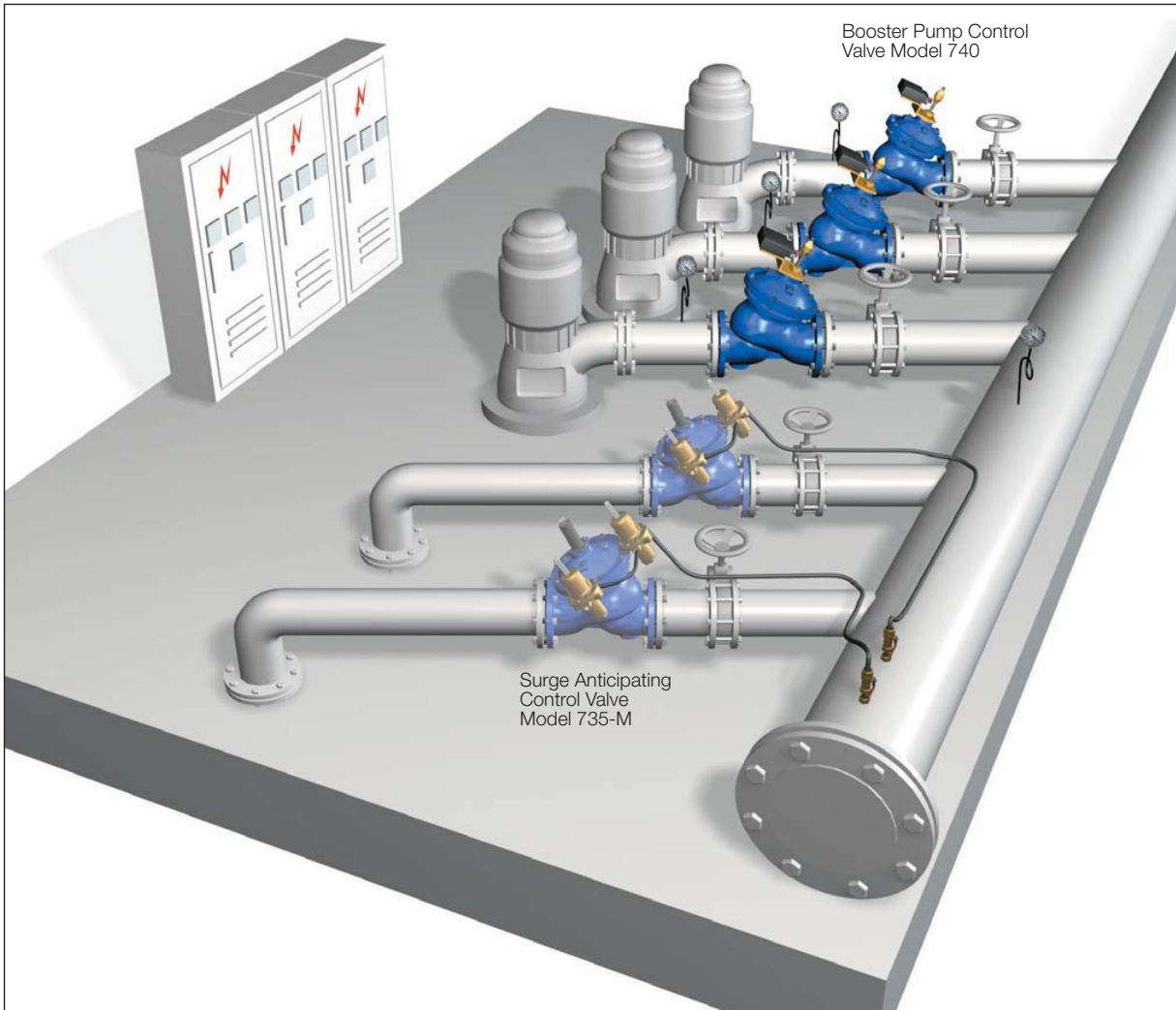


### Typical Installation

In this system, a pump battery supplies the main line through a manifold.

The Model 740, 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.





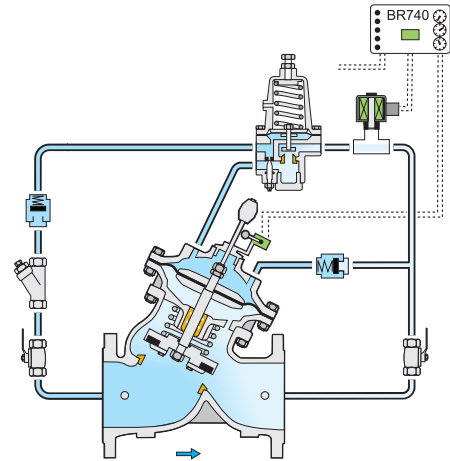
#### Additional Applications

##### **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 the pump pressure specification is higher than system resistance

Any of these factors might cause pump overload and 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 740.

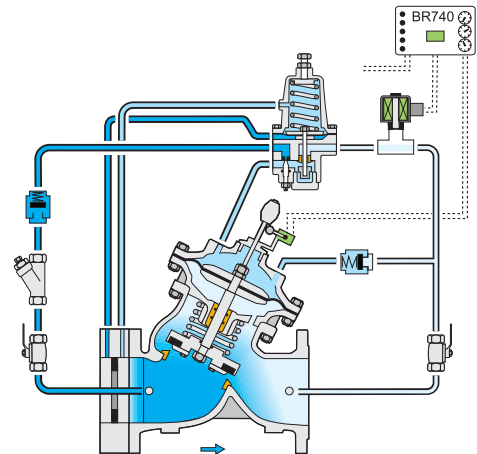


##### **Booster Pump Control & Flow Control Valve Model 747-U**

When network demand is greater than pump design specifications and the pump curve (Flow versus Pressure) is relatively steep, the Booster Pump Control & Pressure Sustaining Valve Model 743 is the most suitable for pump overload and cavitation protection.

However, when the pump curve 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 740.



##### **Booster Pump Control & Pressure Reducing Valve Model 742**

Standard pumps are specified to boost pressure by a constant differential. Excessive discharge pressure can be caused by increased suction pressure, as in:

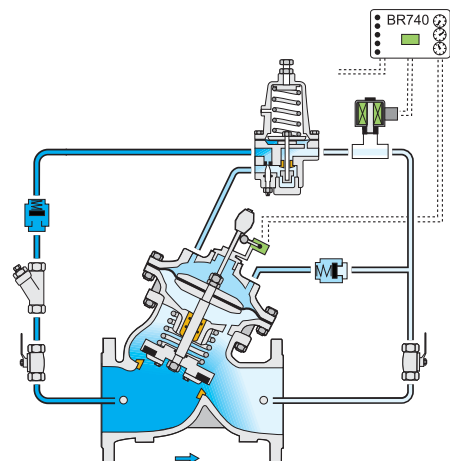
- Varying supply network pressure or supply from multiple sources
- Pumping from water tower with high level differential
- Deep well initial draw down

When the pump curve (Flow versus Pressure) is relatively steep, the Pressure Relief (Circulation) Model 730 is the most suitable.

However, when the pump curve is relatively flat, circulation is not sufficient, as the additional flow hardly effects the discharge pressure.

The most suitable solution is to reduce the discharge pressure to protect the consumers.

The Model 742 adds a pressure reducing feature while maintaining the operation sequence of the standard Model 740.





### Engineer Specifications

The Pump Control Valve shall open fully or shut off in response to electric signals. It shall isolate the pump from the system during pump starting and stopping to prevent pipeline surges.

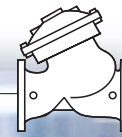
**Main Valve:** The main valve shall be a center guided, diaphragm actuated globe valve of either oblique (Y) or angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow path, with no stem guides, bearings, or supporting ribs. The body and cover shall be ductile iron. All external bolts, nuts, and studs shall be Duplex® coated. All valve components shall be accessible and serviceable without removing the valve from the pipeline.

**Actuator:** The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall be center guided by a bearing in the separating partition. The replaceable radial seal disk shall include a resilient seal and shall be capable of accepting a V-Port Throttling Plug by bolting.

**Control System:** The control system shall consist of a 3-Way solenoid pilot (for 8" and larger valves, an accelerator shall be added to the solenoid), two check valves (for 12" and larger valves, an additional check valve), a limit switch, two isolating cock valves, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested.

**Quality Assurance:** The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.



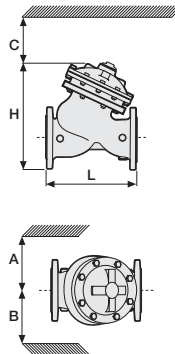


## 700 Series Model 740

### Technical Data

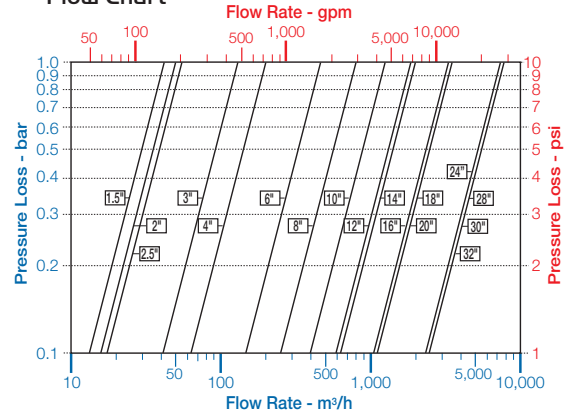
#### Dimensions and Weights

Size	A, B	C	L	H	Weight						
mm inch	mm inch	mm inch	mm inch	mm inch	kg lbs						
40	1 1/2"	350	14	180	7	205	8.1	239	9.4	9.1	20
50	2	350	14	180	7	210	8.3	244	9.6	10.6	23
65	2 1/2"	350	14	180	7	222	8.7	257	10.1	13	29
80	3"	370	15	230	9	250	9.8	305	12.0	22	49
100	4"	395	16	275	11	320	12.6	366	14.4	37	82
150	6"	430	17	385	15	415	16.3	492	19.4	75	165
200	8"	475	19	460	18	500	19.7	584	23.0	125	276
250	10"	520	21	580	23	605	23.8	724	28.5	217	478
300	12"	545	22	685	27	725	28.5	840	33.1	370	816
350	14"	545	22	685	27	733	28.9	866	34.1	381	840
400	16"	645	26	965	38	990	39.0	1108	43.6	846	1865
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2083
500	20"	645	26	965	38	1100	43.3	1167	45.9	962	2121



Data is for Y-pattern, flanged, PN16 valves  
 Weight is for PN16 basic valves  
 "C" enables removing the actuator in one unit  
 "L", ISO standard lengths available  
 For more dimensions and weights tables, refer to Engineering Section

#### Flow Chart



Data is for Y-pattern, flat disk valves  
 For more flow charts, refer to Engineering Section

#### Main Valve

**Valve Patterns:** "Y" (globe) & angle  
**Size Range:** 1 1/2"-32" (40-800 mm)  
**End Connections (Pressure Ratings):**  
**Flanged:** ISO PN16, PN25 (ANSI Class 150, 300)  
**Threaded:** BSP or NPT  
**Others:** Available on request  
**Working Temperature:**  
 Water up to 80°C (180°F)  
**Standard Materials:**  
**Body & Actuator:** Ductile Iron  
**Internals:**  
 Stainless Steel, Bronze & coated Steel  
**Diaphragm:**  
 NBR Nylon fabric-reinforced  
**Seals:** NBR  
**Coating:**  
 Fusion Bonded Epoxy, RAL 5005 (Blue)  
 NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

#### Control System

**Standard Materials:**  
**Accessories:**  
 Bronze, Brass, Stainless Steel & NBR  
**Tubing:** Copper or Stainless Steel  
**Fittings:** Forged Brass or Stainless Steel  
**Solenoid Standard Materials:**  
**Body:** Brass or Stainless Steel  
**Elastomers:** NBR or FPM  
**Enclosure:** Molded epoxy  
**Solenoid Electrical Data:**  
**Voltages:**  
 (ac): 24, 110-120, 220-240, (50-60 Hz)  
 (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  
**Accelerator Standard Materials:**  
**Body:** Brass or Stainless Steel  
**Internals:** Stainless Steel & Brass  
**Elastomers:** NBR or FPM

#### Solenoid Selection

Valve Size	Solenoid Model		Accelerator Model	
	330 (2.0 mm)	311 (1.0 mm)	54	58HC
1 1/2"-8"	■			
1 1/2"-6"		■		
10-20"	■		■	
8-20"		■	■	
24-32"	■			■
24-32"		■		■

**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

### How to Order

Please specify the requested valve in the following sequence: (for more options, refer to Ordering Guide)

Sector	Size	Primary Feature	Additional Feature	Pattern	Body Material	End Connections	Coating	Voltage & Position	Tubing & Fittings	Additional Attributes
WW	6"	740	00	Y	C	16	EB	4AO	CB	S
Waterworks	1 1/2 - 32"	Booster Pump Control		Oblique (up to 20") Angle (up to 18") Globe (24-32" only)	Y A G	Epoxy FB Blue Polyester Green Polyester Blue Uncoated	EB PG PB UC	Copper Tubing & Brass Fittings Plastic Tubing & Brass Fittings St. St. 316 Tubing & Fittings	CB PB NN	
				Ductile Iron Standard Cast Steel St. Steel 316 Nickel Alumin. Bronze	C S N U					
				ISO-16 ISO-25 ANSI-150 ANSI-300 JIS-16 JIS-20	16 25 A5 A3 J6 J2	24VAC/50Hz - N.C. 24VAC/50Hz - N.O. 24VDC - N.C. 24VDC - N.O. 24VDC - L.P. 220VAC/50-60Hz N.C. 220VAC/50-60Hz N.O.	4AC 4AO 4DC 4DO 4DP 2AC 2AO	Double Chamber Large Control Filter Electric Limit Switch Valve Position Transmitter Flow Over the Seat 3-Way Control Loop St. St. 316 Control Accessories St. St. 316 Internal Trim (Closure & Seat) St. St. 316 Actuator Internal Assembly Delrin Bearing Viton Elastomers for Seals & Diaphragm Pressure Gauge	B F S Q O X N T D R E 6	

Multiple choices permitted

