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**

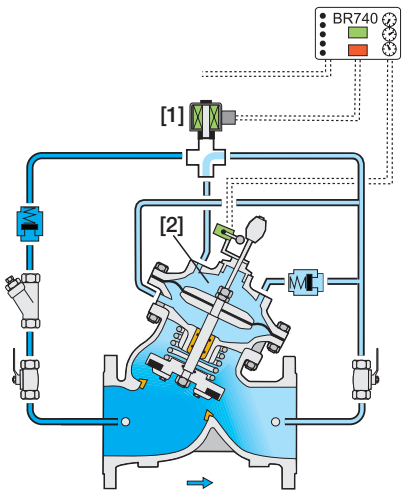
See relevant BERMAD publications.

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

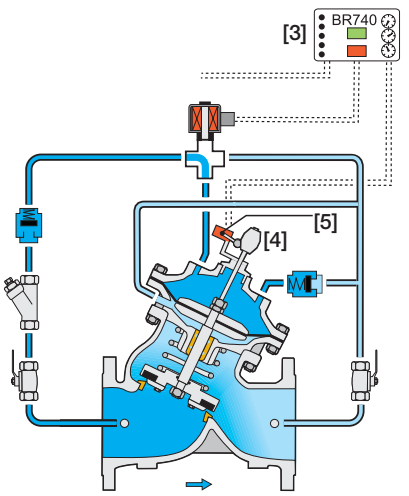
Prior to pump start, the valve is hydraulically closed although electrically open. The de-energized solenoid **[1]** connects the upper control chamber **[2]** to valve outlet introducing system static pressure.
As pump starts, valve upstream pressure builds and rises above the system static pressure, 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.



Opening

Pump Stopping Procedure

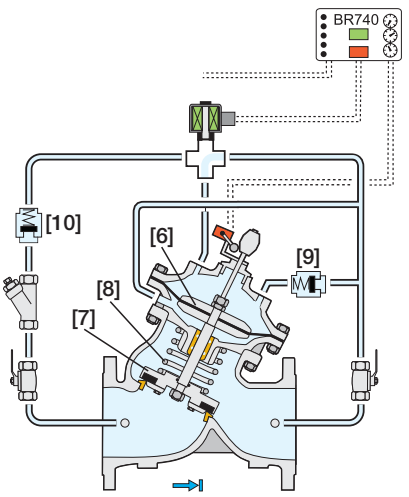
In pumping systems with standard check valves, the shut-down command is issued directly to the pump, abruptly shutting it down.
In systems with "active check valves", the shut-down command is issued to the BR740-E electronic controller **[3]** which energizes the solenoid. The solenoid then applies pumped pressure to the upper control chamber, gradually closing the main valve and isolating the runing 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.



Closing

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.

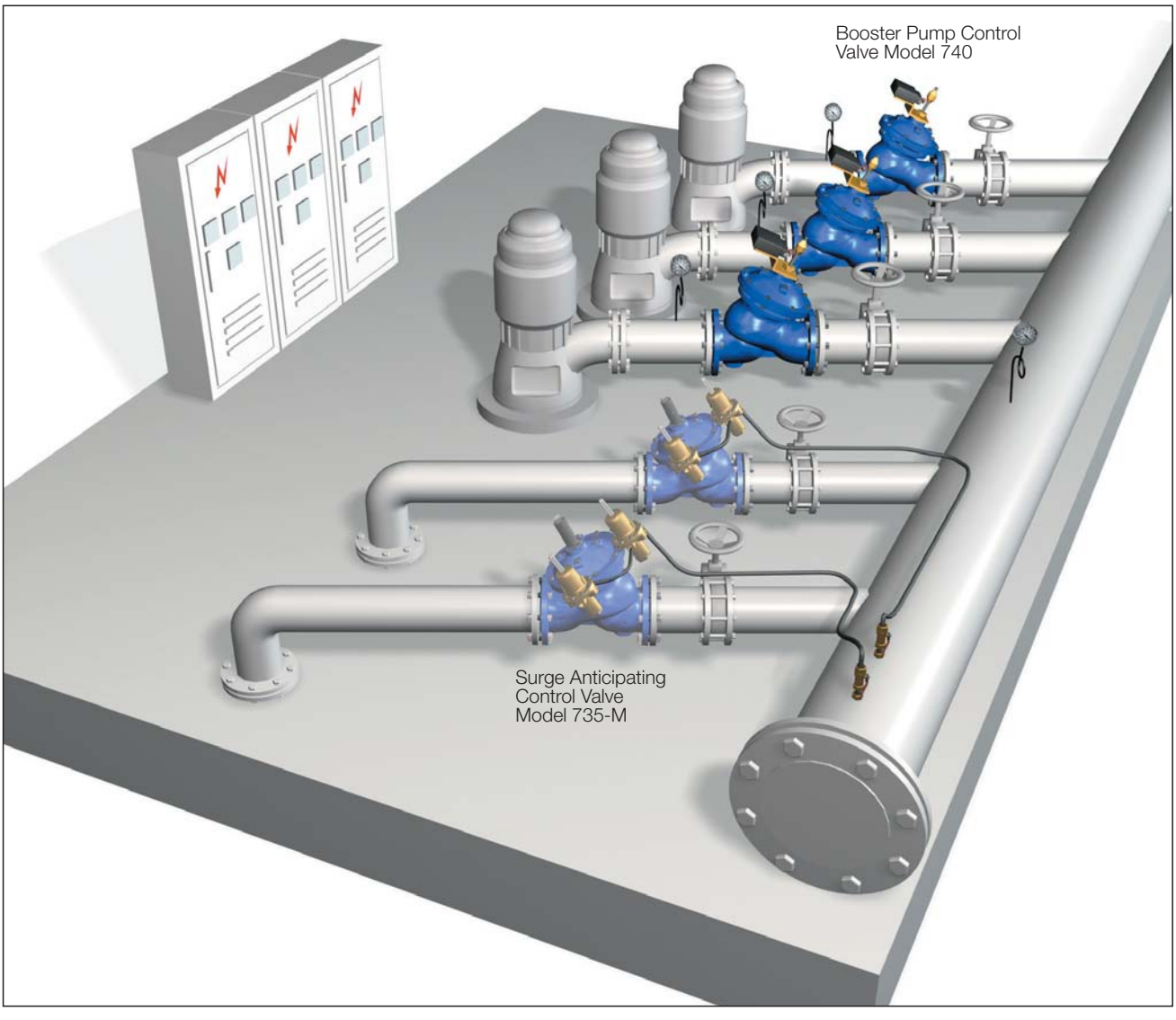


Closed (After Power Faiiure)

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

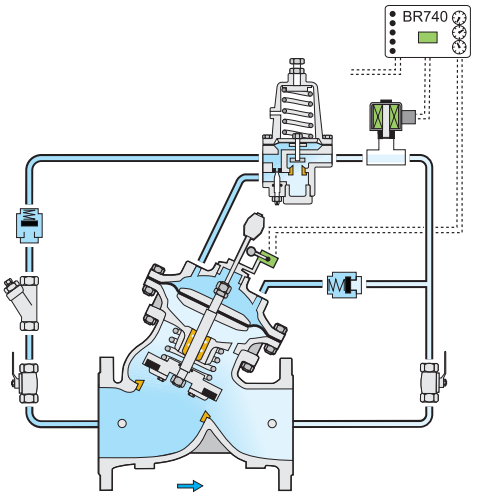
The BR 740-E coordinates between all system components to eliminate surges from the system. This controller provides built-in operating modes that can be selected on-site. These modes are based on accumulated know-how to prevent errors that might occur during on-site programming.

Additional Applications

Booster Pump Control & Pressure Sustaining Valve Model 743

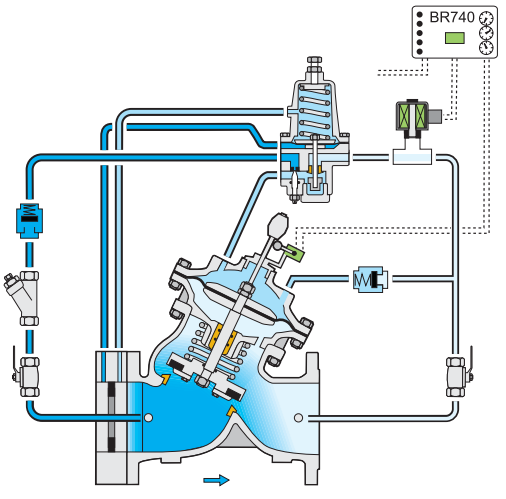
Network demand is greater than pump design specifications:
- During empty pipeline filling
- During over demand by consumers
- When the pump pressure specification is higher than system resistance

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

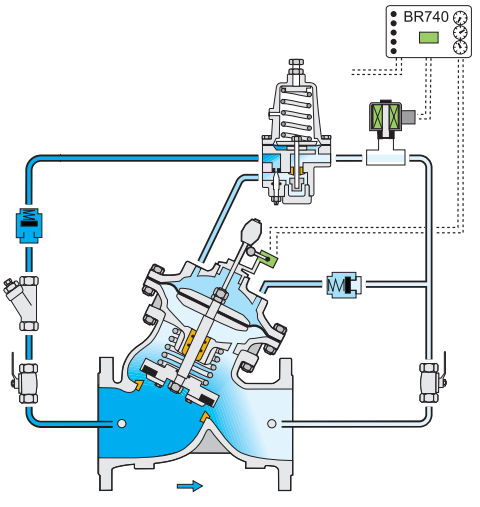
When network demand is greater than pump design specifications and the pump curve (Flow versus Pressure) is relatively steep, the Booster Pump Control & Pressure Sustaining Valve Model 743 is the most suitable for pump overload and cavitation protection.
However, when the pump curve is relatively flat,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

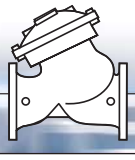


Booster Pump Control & Pressure Reducing Valve Model 742

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

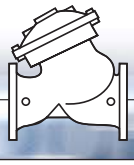
The Pump Control Valve shall open fully or shut off in response to electric signals. It shall isolate the pump from the system during pump starting and stopping to prevent pipeline surges.

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

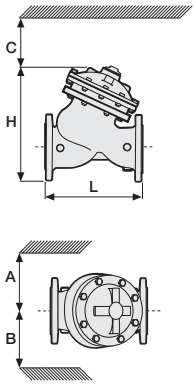
Model 740

Technical Data

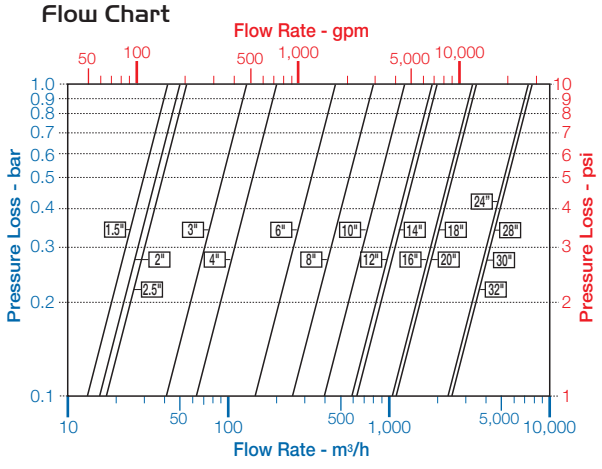
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	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	2½"	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: 1½–32" (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
1½-8"	■			
1½-6"		■		
10-20"	■		■	
8-20"		■	■	
24 -32"	■			■
24 -32"		■		■
PN 16			PN 25	

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 gI 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	Additonal Attributes
WW	6"	740	00	Y	C	16	EB	4AO	CB	S

Sector: WW — Waterworks

Size: 6" — 1½ - 32"

Primary Feature: 740 — Booster Pump Control

Additional Feature: 00

No Additional Feature	00
Closing and Opening Speed Control	03
Electronic Control	18

Multiple choices permitted

Pattern: Y

Oblique	(up to 20")	Y
Angle	(up to 18")	A
Globe	(24-32" only)	G

Body Material: C

Ductile Iron Standard	C
Cast Steel	S
St. Steel 316	N
Nickel Alumin. Bronze	U

End Connections: 16

ISO-16	16
ISO-25	25
ANSI-150	A5
ANSI-300	A3
JIS-16	J6
JIS-20	J2

Coating: EB

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
Uncoated	UC

Voltage & Position: 4AO

24VAC/50Hz - N.C.	4AC
24VAC/50Hz - N.O.	4AO
24VDC - N.C.	4DC
24VDC - N.O.	4DO
24VDC - L.P.	4DP
220VAC/50-60Hz N.C.	2AC
220VAC/50-60Hz N.O.	2AO

Tubing & Fittings: CB

Copper Tubing & Brass Fittings	CB
Plastic Tubing & Brass Fittings	PB
St. St. 316 Tubing & Fittings	NN

Additonal Attributes: S

Double Chamber	B
Large Control Filter	F
Electric Limit Switch	S
Valve Position Transmitter	Q
Flow Over the Seat	O
3-Way Control Loop	X
St. St. 316 Control Accessories	N
St. St. 316 Internal Trim (Closure & Seat)	T
St. St. 316 Actuator Internal Assembly	D
Delrin Bearing	R
Viton Elastomers for Seals & Diaphragm	E
Pressure Gauge	6

Multiple choices permitted

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