High Pressure, 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 840 High Pressure, Booster Pump Control Valve is a hydraulically operated, piston 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
- **Balanced seal disk** – High flow capacity
- **Flexible design** – Easy addition of hydraulic features

Major Additional Features

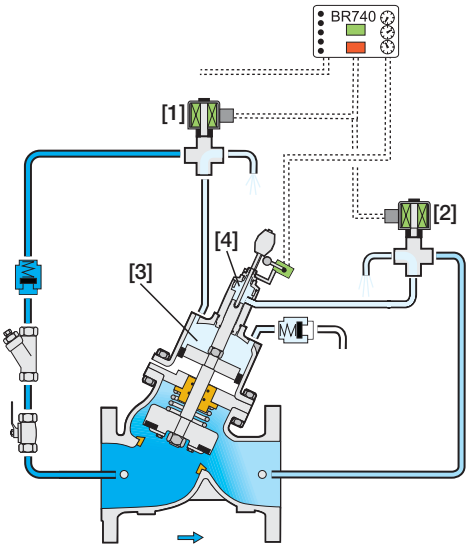
- Pressure sustaining – **843**
- Pressure reducing – **842**
- Flow control – **847-U**
- Pump circulation control – **848**
- Deep well pump electric control – **845**
- Full powered opening & closing – **840-B**
- Electronic control – **840-18**
- Pressure sustaining & Pressure reducing – **843-2Q**

Sequence of Operation (Normally-Open Type)

The Model 840 is a solenoid controlled valve equipped with a limit switch, two 3-Way solenoid pilots and check valves.
Normally Closed type is also available.
For large valves, an accelerator quickens valve response.

Pump Starting Procedure

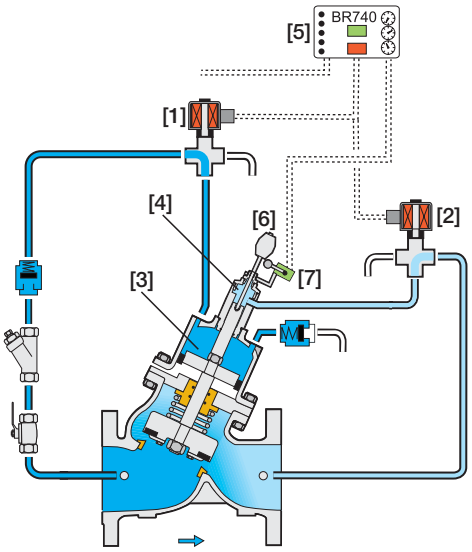
Prior to pump start, the valve is hydraulically closed although electrically open. Even though the de-energized solenoids **[1]** & **[2]** vent the upper control chamber **[3]** & the auxiliary closing piston **[4]** they remain full as no hydraulic forces are applied. As pump starts, valve upstream pressure builds and rises above the system static pressure, causing opening hydraulic forces to rise. Pressure from the upper control chamber and the auxiliary closing piston is then released through the solenoids, allowing the valve to open gradually.



Opening

Pump Stopping Procedure

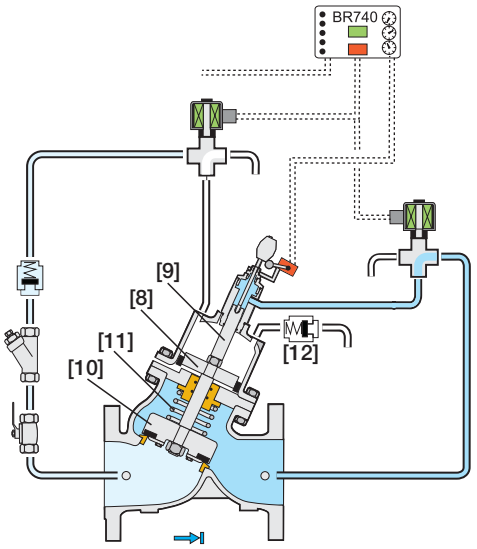
In pumping systems with standard check valves, the shut down command is issued directly to the pump, abruptly shutting it down. In systems with "active check valves", the shut down command is issued to the BR740-E electronic controller **[5]**, which energizes the solenoids. Solenoid **[1]** applies pumped pressure to the upper control chamber **[3]** while solenoid **[2]** applies system pressure to the auxiliary closing piston **[4]**, 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. After a preset time delay, the controller de-energizes the solenoids 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 piston assemblies **[8]** & **[9]** and on the closure **[10]**, to balance. The spring **[11]** then breaks this balance, closing the valve before the flow can change direction. Check valve **[12]** allows airflow into the upper control chamber to break possible vacuum and quicken the closing speed.



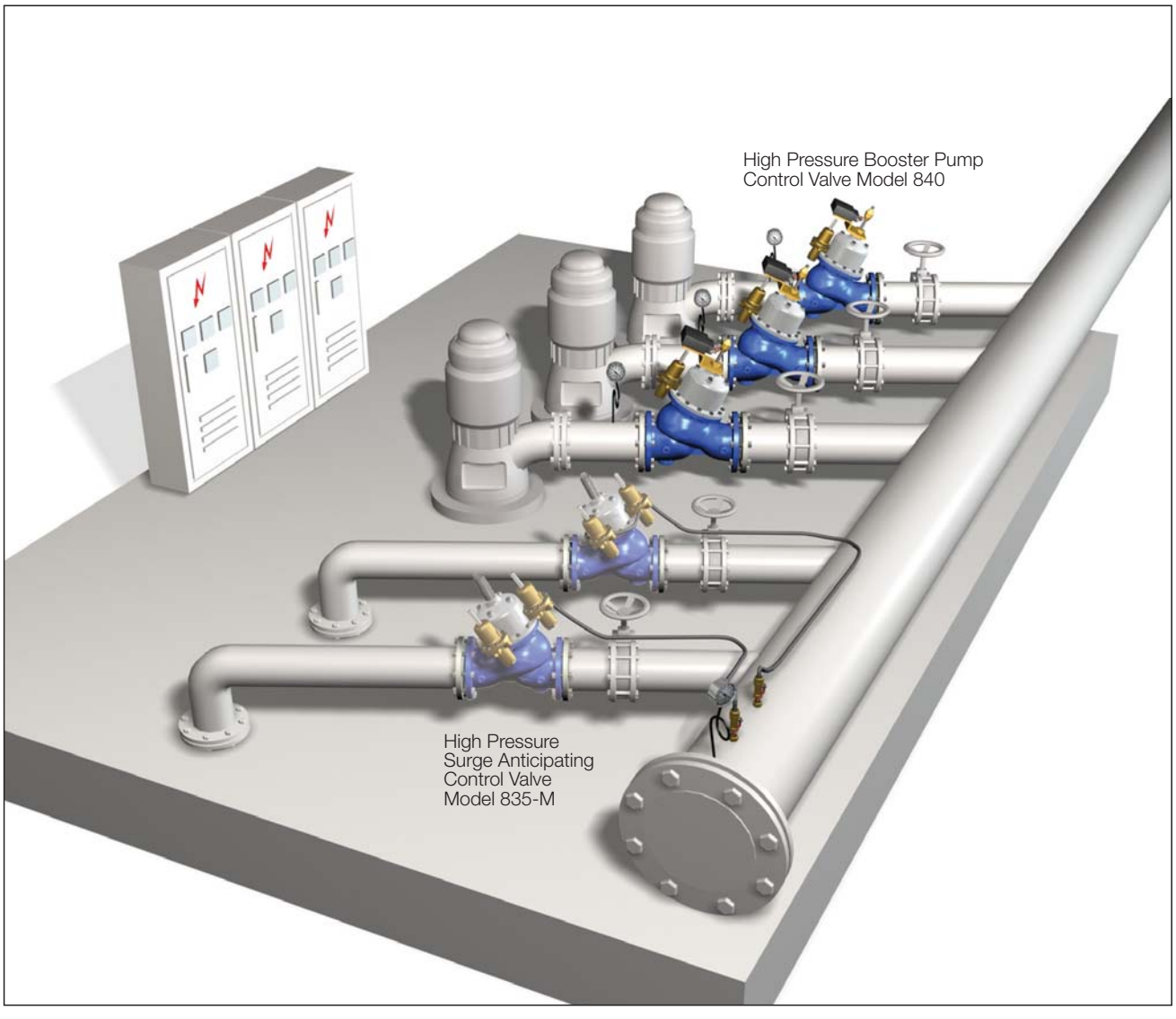
Closed (After Power Faiiure)

Notes:
(1) Consider installing a Flow or Pressure Switch as indication of pumping during low demand.
(2) Valve configuration and control circuit might vary for PN25, PN40 and/or large diameter valves.

Typical Installation

In this system, a pump battery supplies the main line through a manifold. The Model 840, 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 for 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

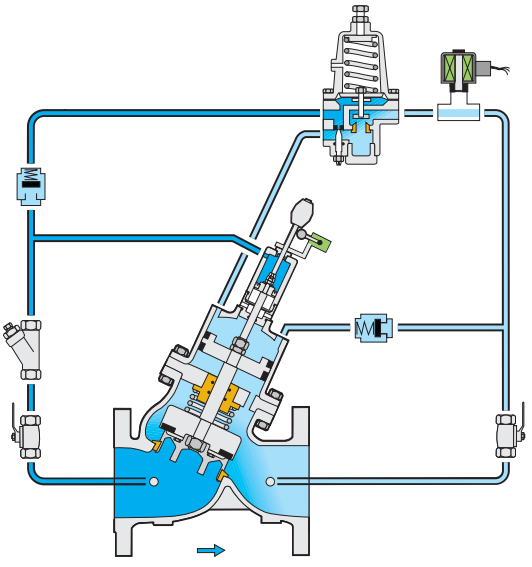
High Pressure, Booster Pump Control & Pressure Sustaining Valve Model 843

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 843 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 840.

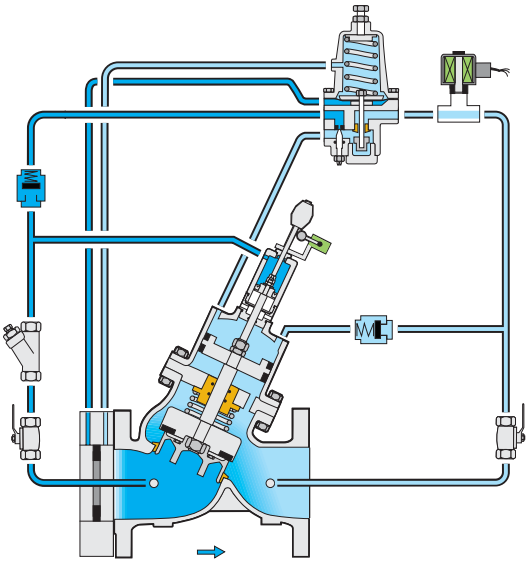


High Pressure, Booster Pump Control & Flow Control Valve Model 847-U

When network demand is greater than pump design specifications and the pump curve (Flow versus Pressure) is relatively steep, the High Pressure, Booster Pump Control & Pressure Sustaining Valve Model 843 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 847-U adds a flow limiting feature to the operation sequence of the standard Model 840.



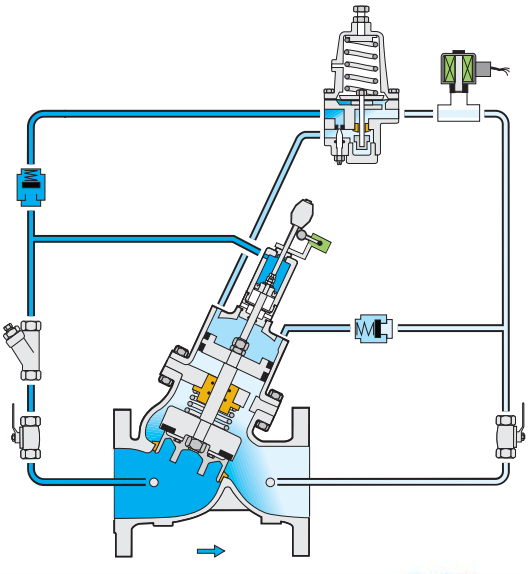
High Pressure Booster Pump Control & Pressure Reducing Valve Model 842

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 towers with high level differential
- Deep well initial draw down

When the pump curve (Flow versus Pressure) is relatively steep, the Pressure Relief (Circulation) Model 830 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 842 adds a pressure reducing feature while maintaining the operation sequence of the standard Model 840.



Engineer Specifications

The High Pressure, 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.

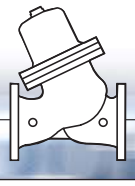
Main Valve: The main valve shall be a center guided, piston actuated, globe valve of either oblique (Y) or angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow path, with no stem guides, bearings, or supporting ribs. All 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 a sealed inherent separating partition between the lower surface of the piston and the main valve. 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 two 3-Way solenoid pilots (for 10” and larger valves , an accelerator shall be added), two check valves (for 12” and larger valves, additional check valves), a limit switch, 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.

BERMAD Waterworks



800 Series

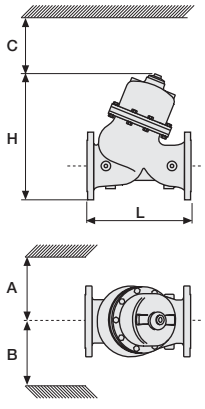
Model 840

Technical Data

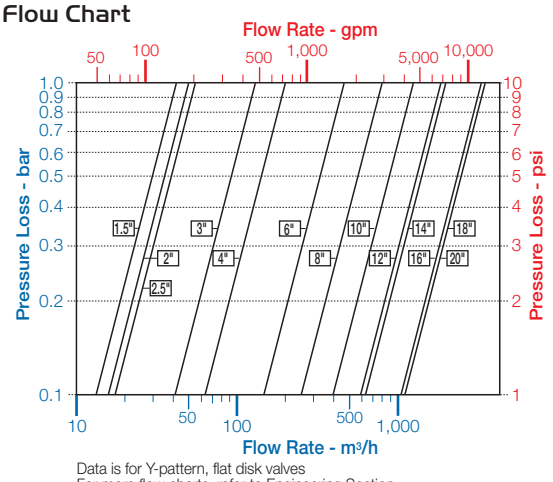
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	210	8	180	7	205	8.1	260	10.2	11.8	26
50	2	210	8	180	7	210	8.3	265	10.4	15	33
65	2½"	210	8	180	7	222	8.7	278	10.9	18.4	40
80	3"	230	9	230	9	264	10.4	332	13.1	32	70
100	4"	255	10	275	11	335	13.2	422	16.6	56	123
150	6"	290	11	385	15	433	17	542	21.3	106	233
200	8"	335	13	460	18	524	20.6	666	26.2	190	418
250	10"	380	15	580	23	637	25.1	783	30.8	307	675
300	12"	405	16	685	27	762	30	961	37.8	505	1111
350	14"	405	16	685	27	767	30.2	996	39.2	549	1208
400	16"	505	20	965	38	1024	40.3	1179	46.4	1070	2354
450	18"	505	20	965	38	1030	40.5	1208	47.6	1095	2409
500	20"	505	20	965	38	1136	44.7	1241	48.9	1129	2484

Data is for Y-pattern, PN25,40/ANSI300,400 valves
Weight is for basic valves
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: 1½–20" (40-500 mm)*
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25, PN40 (ANSI Class 150, 300, 400)
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body: Carbon Steel or Ductile Iron
Cover (piston cylinder):
Bronze or Stainless Steel
Internals:
Stainless Steel & Bronze
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue) NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

* 16-20" (400-500mm) valves are rated PN25 (Class 300)

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

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 85ºC (185ºF)
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"	840	PB	Y	S	40	EB	4AO	NN	S
Waterworks	1½ - 20"	Booster Pump Control	Double chambered PB No Additional Feature 00 Closing and Opening Speed Control 03 Electronic Control 18 Multiple choices permitted	Oblique (up to 20") Y Angle (up to 18") A	Ductile Iron Standard C Cast Steel S St. Steel 316 N Nickel Alumin. Bronze U	Epoxy FB Blue EB Polyester Green PG Polyester Blue PB Uncoated UC	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	Copper Tubing & Brass Fittings CB St. St. 316 Tubing & Fittings NN	Double Chamber B Large Control Filter F Electric Limit Switch S Valve Position Transmitter Q Flow Over the Seat O 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
				ISO-16 16 ISO-25 25 ISO-40 40 ANSI-150 A5 ANSI-300 A3 ANSI-400 A4 JIS-16 J6 JIS-20 J2 JIS-30 J3					

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