High Pressure, Booster Pump Control and Pressure Sustaining Valve

Active Check Valve

Model 843

- Isolates system from the effects of pump starts and stops for:
  - Solitary single speed pumps
  - Battery of single speed pumps (add & switch)
- Pump overload and cavitation protection
- Controlled pipeline fill-up

The Model 843 High Pressure, Booster Pump Control & Pressure Sustaining Valve is a hydraulically operated, piston 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 discharge pressure or pump differential pressure regardless of fluctuating flow.

Features and Benefits

- **Line pressure driven**
  - Independent operation
  - No motor required
  - Long term drip tight sealing
- **Solenoid controlled**
  - Low power consumption
  - Low cost wiring
  - Wide ranges of pressures and voltages
  - Normally Open or Normally Closed
- **Check feature**
  - Replaces line sized check valve
  - Fail-safe mechanical closure
- **In-line serviceable –** Easy maintenance
- **Flexible design –** Easy addition of hydraulic features

Major Additional Features

- Pump differential pressure sustaining – **843-06**
- Pressure sustaining & Pressure reducing – **843-2Q**
- Electronic control – **843-18**

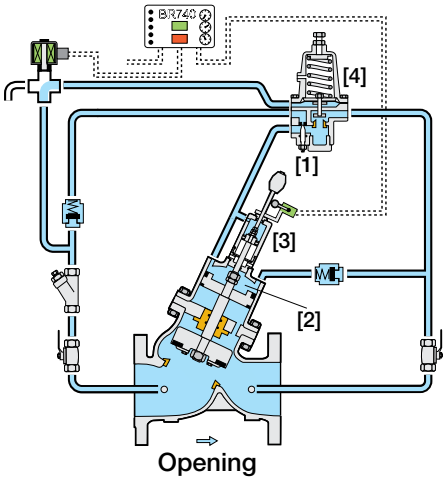
See relevant BERMAD publications.

Sequence of Operation (Normally Open Type)

The Model 843 is a pilot controlled valve equipped with an adjustable, 2-Way, pressure sustaining pilot (optional with sealed spring cell), a 3-Way solenoid pilot, a limit switch and check valves.
Normally Closed version is available.

Pump Starting Procedure

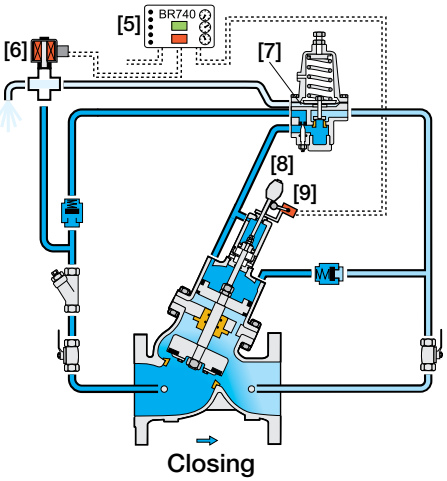
The needle valve **[1]** continuously allows flow from the valve inlet into the upper control chamber **[2]** and the auxiliary closing piston **[3]**. Prior to pump start, the valve is hydraulically closed although electrically open. As pump starts, valve upstream pressure builds and rises above the system static pressure, causing opening hydraulic forces to rise. The upper control chamber and the auxiliary closing piston pressure is released to valve outlet through the pressure sustaining pilot **[4]**, allowing the valve to gradually open. If as a result of valve opening, the discharge pressure drops to pilot setting, the pressure sustaining pilot throttles causing the main valve to throttle, and sustaining upstream pressure at pilot setting.



Opening

Pump Stopping Procedure

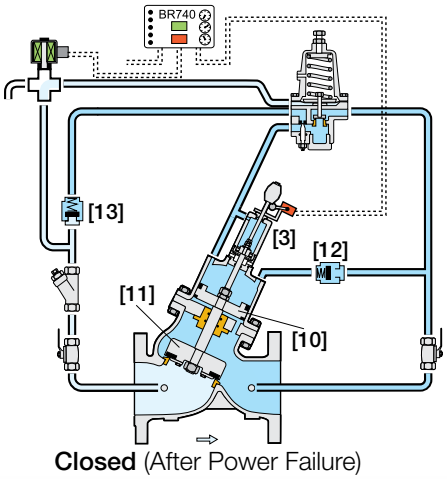
In pumping systems with standard check valves, the shut-down command is issued directly to the pump, abruptly shutting it down. In systems with “active check valves,” the shut-down command is issued to the BR740-E electronic controller **[5]** which energizes the solenoid **[6]**. The solenoid then vents the pilot sensing chamber **[7]**. As a result the pressure sustaining pilot closes, stopping release of pressure from the upper control chamber, gradually closing the main valve. As the indictor collar **[8]** moves down, it activates the limit switch **[9]**, 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 - Zero Velocity Non-Return Valve

If electric power fails during pumping, the upstream pressure immediately drops causing the hydraulic forces acting on the piston **[10]**, and the closure **[11]** to balance. the auxiliary closing piston **[3]** then breaks this balance, closing the valve before the flow can change direction. Once the main valve has closed, the check valve **[12]** allows downstream pressure into the upper control chamber while the check valve **[13]** traps it, resetting the main valve for the next pump starting process.



Closed (After Power Failure)

Typical Application

Network Over Demand

Network demand is greater than pump design specifications:

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

Any of these factors might cause pump overload and cavitation damage.

The Model 843, by adding a pressure sustaining feature to the Booster Pump Control Valve, ensures that the pump operates within design specifications protecting both the pump and the system.

When pump upstream pressure varies use the model WW-843-06 with differential pressure sensing

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

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

Pilot System Specifications

Standard Materials:

Pilot

Body: Brass or Stainless Steel 316

Elastomers: Synthetic Rubber

Spring: Stainless Steel

Internal parts: Stainless Steel

Accessories:

Stainless Steel 316, Brass and Synthetic Rubber Elastomers

Tubing & Fittings:

Stainless Steel 316 or Copper & Brass

Pilot Adjustment Range:

2 to 30 bar; 30 to 430 psi *

2 to 45 bar; 30 to 650 psi *

* with high pressure kit

Solenoid Standard Materials:

Body: Stainless Steel or Brass

Elastomers: Synthetic Rubber

Enclosure: Molded epoxy

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 85ºC (185ºF)

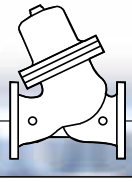
Enclosure rating: IP66

Notes:

- Recommended continuous flow velocity: 0.3-6.0 m/sec ; 1-20 ft/sec
- Minimum operating pressure: 2.0 bar; 30 psi
- The model 843 is equipped with either an auxiliary closing spring (11/2-4"; 40-100mm) or an auxiliary closing piston (6-20"; 150-500mm) thus causing an additional head loss of:

Valve Size	Additional Head Loss
1½-4" (40-100mm)	1.0 bar
6" (150mm)	12% of upstream pressure
8" (200mm)	6.5% of upstream pressure
10" (250mm)	10% of upstream pressure
12-14" (300-350mm)	7% of upstream pressure
16-20" (400-500mm)	4% of upstream pressure

BERMAD Waterworks



800 Series

Technical Data

Size Range: DN40-500 ; 1½–20”

End Connections (Pressure Ratings):

Flanged: ISO PN16, PN25, PN40 ; ANSI Class 150, 300, 400

Threaded: BSP or NPT

Others: Available on request

Valve Patterns: “Y” (globe) & angle

Working Temperature: Water up to 80°C ; 180°F

Standard Materials:

Body: Cast Carbon Steel; Ductile Iron; Stainless Steel 316

Cover: Stainless Steel 316; Bronze

Internals: Stainless Steel & Bronze

Seals: Synthetic Rubber

Coating: Fusion Bonded Epoxy, RAL 5005 (Blue) approved for drinking water or Electrostatic Polyester Powder

Differential Pressure Calculation

$$\Delta P = \left(\frac{Q}{(Kv;Cv)}\right)^2$$

ΔP = Differential Pressure for fully open valve (bar; psi)

Q = Flow rate (m^3/h; gpm)

Kv = Metric system - valve flow coefficient (flow in m^3/h at 1 bar ΔP with 15°C water)

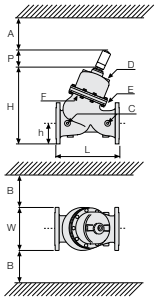
Cv = US system - Valve flow coefficient (flow in gpm at 1 psi ΔP with 60°F water)

Cv = 1.155 Kv

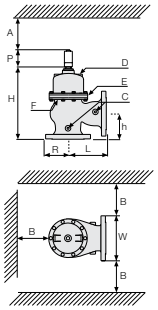
Flow Data & Dimensions Table

		DN / Size	40	1.5"	50	2"	65	2.5"	80	3"	100	4"	150	6"	200	8"	250	10"	300	12"	350	14"	400	16"	450	18"	500	20"
Flow Data	800 "Y"	Kv / Cv - "Y" Flat	42	49	50	58	55	64	115	133	200	230	460	530	815	940	1,250	1,440	1,850	2,140	1,990	2,300	3,310	3,820	3,430	3,960	3,550	4,100
		Kv / Cv - "Y" V-Port	36	41	43	49	47	54	98	113	170	200	391	450	693	800	1,063	1,230	1,573	1,820	1,692	1,950	2,814	3,250	2,916	3,370	3,018	3,490
	800 Angle	Kv / Cv - "A" Flat	46	53	55	64	61	70	127	146	220	250	506	580	897	1,040	1,375	1,590	2,035	2,350	2,189	2,530	3,641	4,210	3,773	4,360	-	-
		Kv / Cv - "A" V-Port	39	45	47	54	51	59	108	124	187	220	430	500	762	880	1,169	1,350	1,730	2,000	1,861	2,150	3,095	3,580	3,207	3,710	-	-
800 "Y" Flanged	PN10; 16 Class 150	L (mm / inch)	205	8.1	210	8.3	222	8.7	250	9.8	320	12.6	415	16.3	500	19.7	605	23.8	725	28.5	733	28.9	990	39.0	1,000	39.4	1,100	43.3
		W (mm / inch)	156	6.1	166	6.5	190	7.5	200	7.9	229	9.0	286	11.3	344	13.5	408	16.1	484	19.1	536	21.1	600	23.6	638	25.1	716	28.2
		h (mm / inch)	78	3.1	83	3.3	95	3.7	100	3.9	115	4.5	143	5.6	172	6.8	204	8.0	242	9.5	268	10.6	300	11.8	319	12.6	358	14.1
		H (mm / inch)	260	10.2	265	10.4	278	10.9	327	12.9	409	16.1	526	20.7	650	25.6	763	30.0	942	37.1	969	38.1	1,154	45.4	1,173	46.2	1,211	47.7
		P (mm / inch)	-	-	-	-	-	-	-	-	-	-	135	5.3	135	5.3	142	5.6	154	6.1	154	6.1	191	7.5	191	7.5	191	7.5
		Weight (Kg/lb)	10.7	24	13	29	16	35	28	62	48	106	94	207	162	356	272	598	455	1,001	482	1,060	1,000	2,200	1,074	2,363	1,096	2,411
	PN25; 40 Class 300	L (mm / inch)	205	8.1	210	8.3	222	8.7	264	10.4	335	13.2	433	17.0	524	20.6	637	25.1	762	30.0	767	30.2	1,024	40.3	1,030	40.6	1,136	44.7
		W (mm / inch)	156	6.1	166	6.5	190	7.5	210	8.3	254	10.0	318	12.5	382	15.0	446	17.6	522	20.6	590	23.2	650	25.6	714	28.1	778	30.6
		h (mm / inch)	78	3.1	83	3.3	95	3.7	105	4.1	127	5.0	159	6.3	191	7.5	223	8.8	261	10.3	295	11.6	325	12.8	357	14.1	389	15.3
		H (mm / inch)	260	10.2	265	10.4	278	10.9	332	13.1	422	16.6	542	21.3	666	26.2	783	30.8	961	37.8	996	39.2	1,179	46.4	1,208	47.6	1,241	48.9
		P (mm / inch)	-	-	-	-	-	-	-	-	-	-	135	5.3	135	5.3	142	5.6	154	6.1	154	6.1	191	7.5	191	7.5	191	7.5
		Weight (Kg/lb)	11.8	26	15	33	18.4	40	32	70	56	123	106	233	190	418	307	675	505	1,111	549	1,208	1,070	2,354	1,095	2,409	1,129	2,484
800 Angle, Flanged	PN10; 16 Class 150	L (mm / inch)	124	4.9	124	4.9	149	5.9	152	6.0	190	7.5	225	8.9	265	10.4	320	12.6	396	15.6	400	15.7	450	17.7	450	17.7	-	-
		W (mm / inch)	156	6.1	166	6.5	190	7.5	200	7.9	229	9.0	285	11.2	344	13.5	408	16.1	496	19.5	528	20.8	598	23.5	640	25.2	-	-
		R (mm / inch)	78	3.1	83	3.3	95	3.7	100	3.9	115	4.5	143	5.6	172	6.8	204	8.0	248	9.8	264	10.4	299	11.8	320	12.6	-	-
		h (mm / inch)	85	3.3	85	3.3	109	4.3	102	4.0	127	5.0	152	6.0	203	8.0	219	8.6	273	10.7	279	11.0	369	14.5	370	14.6	-	-
		H (mm / inch)	252	9.9	252	9.9	271	10.7	308	12.1	390	15.4	476	18.7	619	24.4	717	28.2	911	35.9	915	36.0	1,144	45.0	1,144	45.0	-	-
		P (mm / inch)	-	-	-	-	-	-	-	-	-	-	141	5.6	141	5.6	156	6.1	156	6.1	156	6.1	195	7.7	195	7.7	-	-
		Weight (Kg/lb)	10.7	24.0	13	29.0	16	35.0	26	57.0	46	101	90	198	153	337	259	570	433	953	459	1,010	950	2,090	1,020	2,244	-	-
	PN25: 40 Class 300	L (mm / inch)	124	4.9	124	4.9	149	5.9	159	6.3	200	7.9	234	9.2	277	10.9	336	13.2	415	16.3	419	16.5	467	18.4	467	18.4	-	-
		W (mm / inch)	150	5.9	155	6.1	190	7.5	200	7.9	254	10.0	318	12.5	381	15.0	446	17.6	522	20.6	586	23.1	650	25.6	716	28.2	-	-
		R (mm / inch)	78	3.1	85	3.3	95	3.7	105	4.1	127	5.0	159	6.3	191	7.5	223	8.8	261	10.3	293	11.5	325	12.8	358	14.1	-	-
		h (mm / inch)	85	3.3	85	3.3	109	4.3	109	4.3	135	5.3	165	6.5	216	8.5	236	9.3	294	11.6	299	11.8	386	15.2	386	15.2	-	-
		H (mm / inch)	252	9.9	264	10.4	271	10.7	315	12.4	398	15.7	491	19.3	632	24.9	733	28.9	930	36.6	935	36.8	1,160	45.7	1,160	45.7	-	-
		P (mm / inch)	-	-	-	-	-	-	-	-	-	-	141	5.6	141	5.6	156	6.1	156	6.1	156	6.1	195	7.7	195	7.7	-	-
		Weight (Kg/lb)	11.8	26	15	33	18.4	40	30	66	54	119	101	222	179	394	292	642	481	1,058	523	1,151	1,017	2,237	1,051	2,312	-	-

“Y” Pattern



Angle Pattern



Specify when ordering:

- Size
- Main model
- Additional features
- Pattern
- Body material
- End connection
- Coating
- Voltage & main valve position
- Tubing & Fittings materials
- Operational data (according to model)
- Pressure data
- Flow data
- Reservoir level data
- Settings

* Use Bermad’s Waterworks Ordering Guide

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