

700 Series

# Booster Pump Control Valve Quick Active Check Valve

#### Mod€l 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.





Model 740Q 700 Series

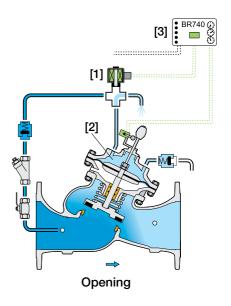
# Sequence of Operation (Normally-Open Type)

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.

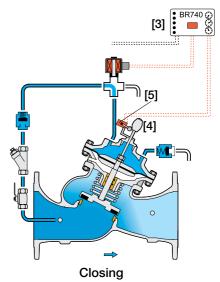
# Pump Starting Procedure

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 denergizes the solenoid and resets the limit switch command, allowing the pump to start when next signaled. The valve remains hydraulically closed and electrically open.

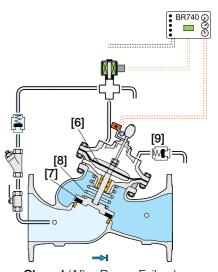


## Power Failure - Spring Loaded, Zero Velocity Non-Return Valve

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.









Model 7400 700 Series

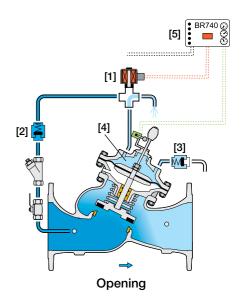
# Sequence of Operation (Normally Closed Type)

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.

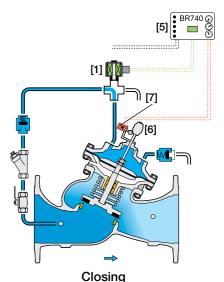
# Pump Starting Procedure

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.



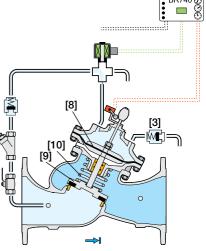
#### Pump Stopping Procedure

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.



Closed (After Power Failure)

#### Note:

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





Model 7400 700 Series

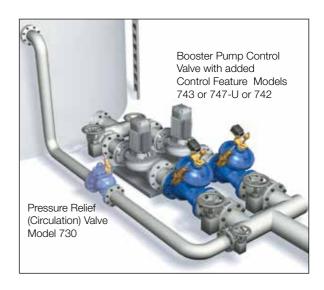
# **Additional Applications**

#### 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





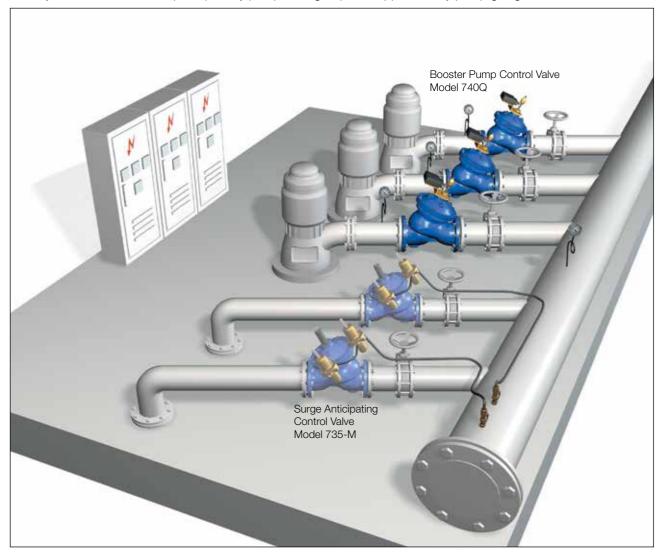
Model 7400 700 Series

# **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.







# 700 Series

18"

500 20"

4.070 4.701

3,460 3,996

3,018 3,490

1.250 49.2

1,185 46.7

1,061 2,334

838 33

385 15.2

1.100 43.3

358 14.1

962

740 29.1

1.167 45.9

750 29.5

2,121

#### **Technical Data**

Size Range: DN40-900; 11/2-36" End Connections (Pressure Ratings):

Flanged: ISO PN16, PN25 (ANSI Class 150, 300)

Threaded: BSP or NPT Others: Available on request

Valve Patterns: "Y" (globe) & angle, globe (DN600-900; 24"-36")

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

**Standard Materials:** 

Body & Actuator: Ductile Iron

Internals: Stainless Steel, Bronze & coated Steel Diaphragm: Synthetic Rubber Nylon fabric-reinforced

Seals: Synthetic Rubber

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

## Differential Pressure Calculation

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

 $\Delta P$  = Differential Pressure for fully open valve (bar; psi)

300 12" 350 14" 400 16"

1,063 1,230 1,573 1,820 1,692 1,950 2,814 3,250 2,916 3,370

733 28.9

550 21.7

570 22.4

295 11.6

840

268 10.6 300 11.8 319

381

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

2.250|2.599

1,913 2,209

1.100 43.3

626 24.6

895 35.2

320 12.6

437 960

990

767 30.2 1,024 40.3 1,030

859 33.8 893 35.2 1,133 44.6 1,165 45.9

245 540 410 904 434 957 900 1984 967 2,132 986 2,174

740 29.1

866 34.1 1.108 43.6 1.127 44.4

846 1,865

740 29.1

325 12.8

39 1.000 39.4

945

357 14.1 389 15.3 1,197 47.1

740 29.1

740 29.1

2,083

40.6 1.136 44.7

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

**Kv** = Metric system - valve flow coefficient (flow in m<sup>3</sup>/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

250 10"

730 28.7

605 23.8

326

28.7 850 33.5

148

198 436 337 741

217 478

480 18.9

480 18.9

724 28.5

742 29.2

905 1.045 1.520 1.756

769 888 1,292 1,492

850 33.5

530 20.9

725 28.5

841 33.1

550 21.7

840 33.1

550 21.7

725 28.5

370 816

255 561

11.8 360 142 425 16.7

6.1 190 7.5 220 8.7 250 9.8

12.6 390 15.4 480 18.9 550 21.7

5.9 180 7.1 213 8.4 243 9.6

19.7 592 23.3 733 28.9

5.6 172 6.8 204 8 242

17 524 20.6 637 25.1 762 30

6.3 191 7.5 223 8.8 261 10.3

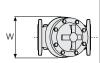
600 23.6 730

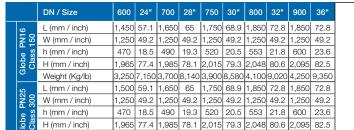
500 19.7 605 23.8

## Flow Data & Dimensions Table

		DN / Size	40	1.5"	50	2"	65	2.5"	80	3"	100	4"	150	6"	200	8"		
Flow Data	700ES	Kv / Cv - Flat	54	62	57	66	60	69	65	75	145	167	395	456	610	705	ĺ	
		Kv / Cv - V-Port	46	53	48	56	51	59	55	64	123	142	336	388	519	599	Ì	
	700 & 700EN	Kv / Cv - "Y" Flat	42	49	50	58	55	64	115	133	200	230	460	530	815	940	ŀ	
		Kv / Cv - "Y" V-Port	36	41	43	49	47	54	98	113	170	200	391	450	693	800	ŀ	
700-ES	PN16; 25	L (mm / inch)	230	9.1	230	9.1	290	11.4	310	12.2	350	13.8	480	18.9	600	23.6	Ī	
		W (mm / inch)	150	5.9	165	6.5	185	7.3	200	7.9	235	9.3	300	11.8	360	14.2	ľ	
		h (mm / inch)	80	3.1	90	3.5	100	3.9	105	4.1	125	4.9	155	6.1	190	7.5	Ī	
		H (mm / inch)	240	9.4	250	9.8	250	9.8	260	10.2	320	12.6	420	16.5	510	20.1	Ī	
		Weight (Kg/lb)	10	22	10.8	23.8	13.2	29	15	33	26	57.2	55	121	95	209		
700-EN	PN16; 25	L (mm / inch)	-	-	-	-	-	-	310	12.2	350	13.8	480	18.9	600	23.6	l	
		W (mm / inch)	-	-	-	-	-	-	200	7.9	235	9.3	320	12.6	390	15.4	l	
		h (mm / inch)	-	-	-	-	-	-	100	3.9	118	4.6	150	5.9	180	7.1		
		H (mm / inch)	-	-	-	-	-	-	305	12	369	14.5	500	19.7	592	23.3	ſ	
		Weight (Kg/lb)	-	-	-	-	-	-	21	46.2	31	68.2	70	154	115	253	ſ	
700 Flanged	"Y" PN16 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	ſ	
		W (mm / inch)	155	6.1	165	6.5	178	7	200	7.9	223	8.8	320	12.6	390	15.4	ſ	
		h (mm / inch)	78	3.1	83	3.3	95	3.7	100	3.9	115	4.5	143	5.6	172	6.8	ſ	
		H (mm / inch)	239	9.4	244	9.6	257	10.1	305	12	366	14.4	492	19.4	584	23	ſ	
		Weight (Kg/lb)	9.1	20	10.6	23	13	29	22	49	37	82	75	165	125	276		
		L (mm / inch)	205	8.1	210	8.3	222	8.7	264	10.4	335	13.2	433	17	524	20.6	ſ	
	300	W (mm / inch)	155	6.1	165	6.5	185	7.3	207	8.1	250	9.8	320	12.6	390	15.4	ſ	
	"Y" PN25 Class 300	h (mm / inch)	78	3.1	83	3.3	95	3.7	105	4.1	127	5	159	6.3	191	7.5		
		H (mm / inch)	239	9.4	244	9.6	257	10.1	314	12.4	378	14.9	508	20	602	23.7		
		Weight (Kg/lb)	10	22	12.2	27	15	33	25	55	43	95	85	187	146	322		
	"Y" PN16; 25 Class 150; 300	L (mm / inch)	155	6.1	155	6.1	212	8.3	250	9.8								
စ္		W (mm / inch)	122	4.8	122	4.8	122	4.8	163	6.4	₩		2	9				
		h (mm / inch)	40	1.6	40	1.6	48	1.9	56	2.2			200	Soll .				
		H (mm / inch)	201	7.9	202	8	209	8.2	264	10.4	н	ا الأرب ال						
		Weight (Kg/lb)	5.5	12	5.5	12	8	18	17	37	' '	- []		_	١, ١,	,		
	2	L (mm / inch)	-	-	121	4.8	140	5.5	159	6.3		h <sup>†</sup>	$^{\circ}$ $^{>}$	$\sim$ $^{\circ}$	v	'	-	
	300	W (mm / inch)	-	-	122	4.8	122	4.8	163	6.4	↓	::↓ Մ	_ ,	þ	ď,	↓		
	PN16; 25 150; 300	R (mm / inch)	-	-	40	1.6	48	1.9	55	2.2		l <sub>4</sub>			<b>~</b>			
	yle PI	h (mm / inch)	-	-	83	3.3	102	4	115	4.5								
											ı							







12 7 15

5.5

225 8.9 242 9.5 294 11.6

15 33





# 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



H (mm / inch)

Weight (Kg/lb)

Weight (Kg/lb)

3,500 7,700 3,700 8,140 3,900 8,580 4,100 9,020 4,250 9.370