

Booster Pump Control Valve Quick Active Check Valve

Model 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.



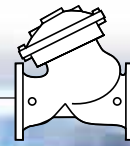
Features and Benefits

- **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.



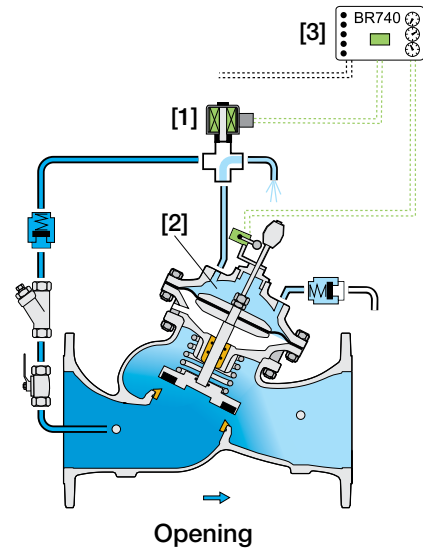
Sequence of Operation (Normally-Open Type)

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.

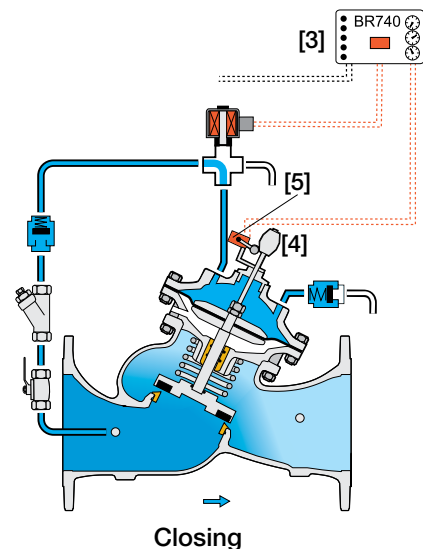
Pump Starting Procedure

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.



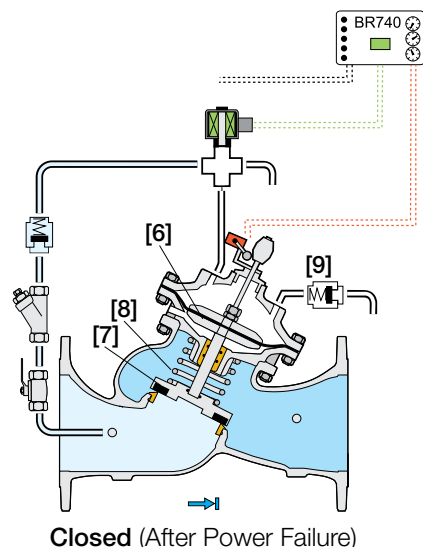
Pump Stopping Procedure

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 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. 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.



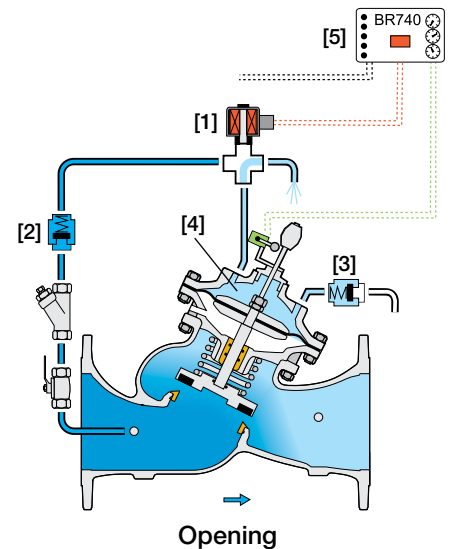
Sequence of Operation (Normally Closed Type)

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.

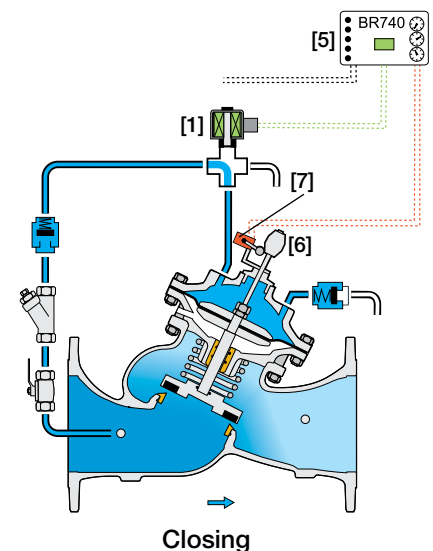
Pump Starting Procedure

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.



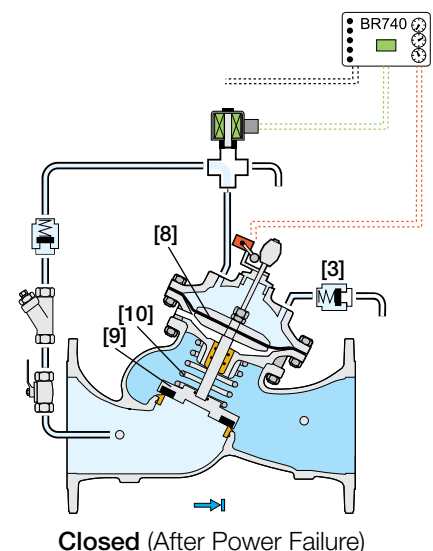
Pump Stopping Procedure

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.



Note:

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



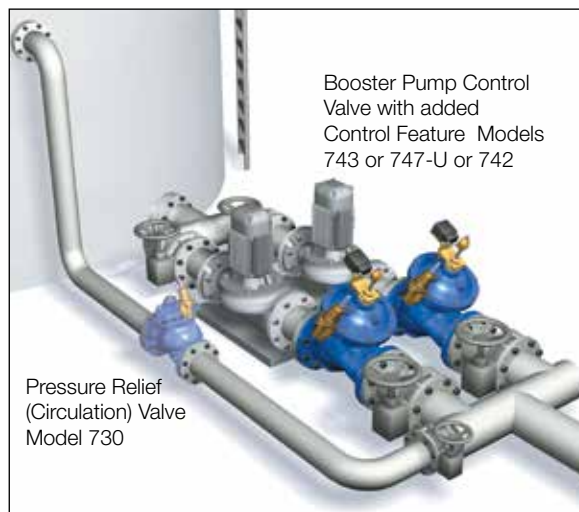
Additional Applications

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

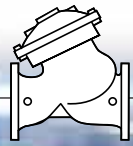
Electrical rating: 10A, type gl or gG

Operating temperature: Up to 85°C (185°F)

Enclosure rating: IP66

Notes:

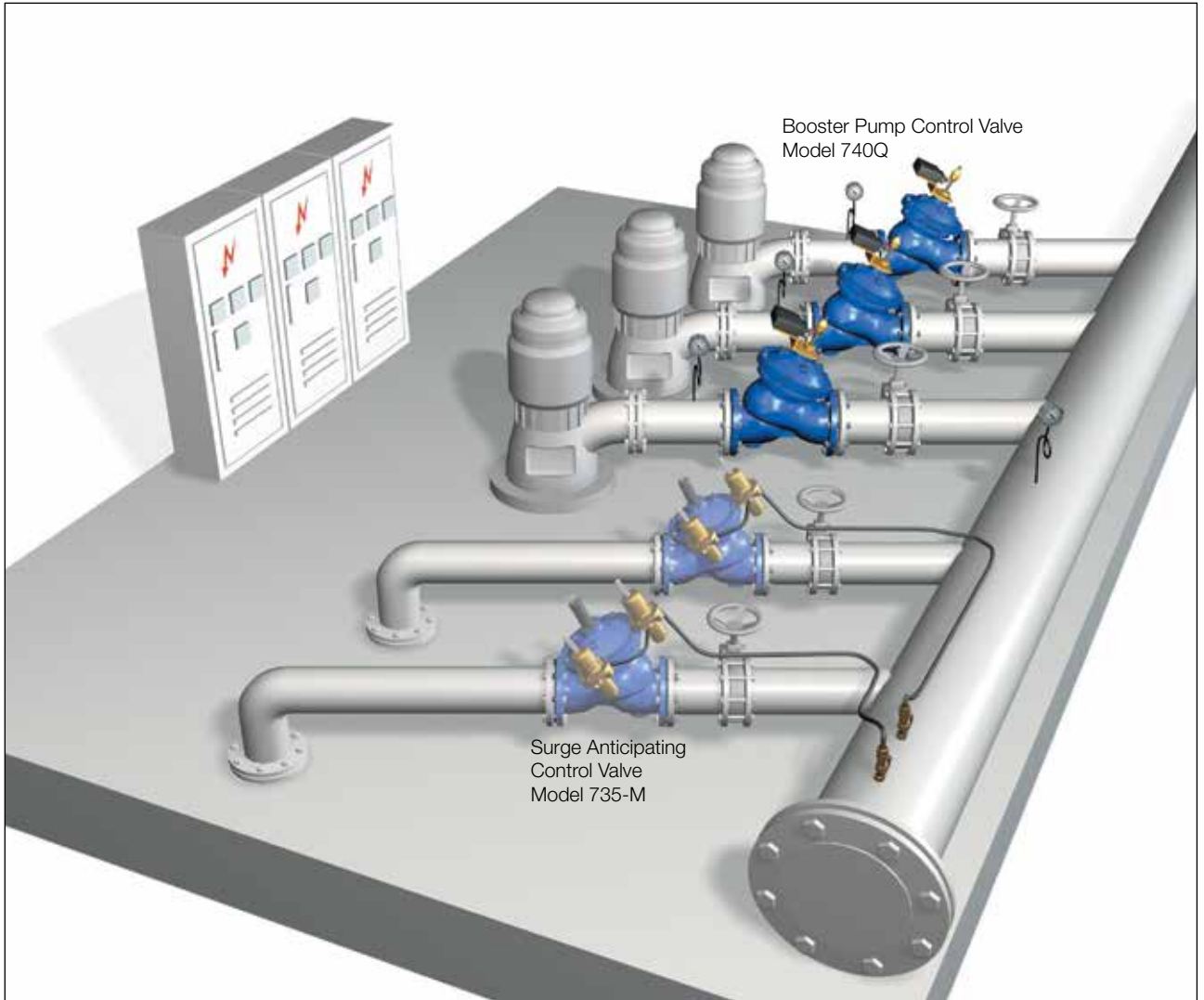
- Recommended continuous flow velocity: 0.1-6.0 m/sec ; 0.3-20 ft/sec
- Minimum operating pressure: 0.7 bar ; 10 psi. For lower pressure requirements consult factory



Typical Applications

In this system, a pump battery supplies the main line through a manifold. The Model 740Q, installed downstream from each pump:

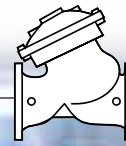
- Prevents surge generation rather than minimizing surge damage
- Provides surge free starting and stopping of supplementary pumps
- Allows surge free switching between “on-duty” pumps
- Delays reaction of variable speed primary pump to single speed supplementary pump going on line or off line.



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.





Technical Data

- Size Range:** DN40-900 ; 1 1/2-36"
- 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

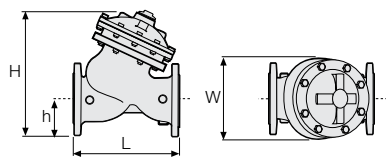
Differential Pressure Calculation

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

- ΔP = Differential Pressure for fully open valve (bar; psi)
- Q = Flow rate (m³/h; gpm)
- Kv = Metric system - valve flow coefficient (flow in m³/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	700ES	Kv / Cv - Flat	54	62	57	66	60	69	65	75	145	167	395	456	610	705	905	1,045	1,520	1,756	-	-	2,250	2,599	-	-	4,070	4,701							
	700EN	Kv / Cv - V-Port	46	53	48	56	51	59	55	64	123	142	336	388	519	599	769	888	1,292	1,492	-	-	1,913	2,209	-	-	3,460	3,996							
	700ES	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							
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	730	28.7	850	33.5	-	-	1,100	43.3	-	-	1,250	49.2							
		W (mm / inch)	150	5.9	165	6.5	185	7.3	200	7.9	235	9.3	300	11.8	360	14.2	425	16.7	530	20.9	-	-	626	24.6	-	-	838	33							
		h (mm / inch)	80	3.1	90	3.5	100	3.9	105	4.1	125	4.9	155	6.1	190	7.5	220	8.7	250	9.8	-	-	320	12.6	-	-	385	15.2							
700-EN	PN16; 25	L (mm / inch)	240	9.4	250	9.8	250	9.8	260	10.2	320	12.6	420	16.5	510	20.1	605	23.8	725	28.5	-	-	895	35.2	-	-	1,185	46.7							
		W (mm / inch)	10	22	10.8	23.8	13.2	29	15	33	26	57.2	55	121	95	209	148	326	255	561	-	-	437	960	-	-	1,061	2,334							
		h (mm / inch)	-	-	-	-	-	-	310	12.2	350	13.8	480	18.9	600	23.6	730	28.7	850	33.5	-	-	-	-	-	-	-	-							
700 Flanged	"Y" PN16 Class 150	L (mm / inch)	-	-	-	-	-	200	7.9	235	9.3	320	12.6	390	15.4	480	18.9	550	21.7	-	-	-	-	-	-	-	-								
		W (mm / inch)	-	-	-	-	-	100	3.9	118	4.6	150	5.9	180	7.1	213	8.4	243	9.6	-	-	-	-	-	-	-	-								
		h (mm / inch)	-	-	-	-	-	305	12	369	14.5	500	19.7	592	23.3	733	28.9	841	33.1	-	-	-	-	-	-	-	-								
700 Flanged	"Y" PN25 Class 300	L (mm / inch)	-	-	-	-	-	21	46.2	31	68.2	70	154	115	253	198	436	337	741	-	-	-	-	-	-	-									
		W (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	1,000	39.4	1,100	43.3							
		h (mm / inch)	155	6.1	165	6.5	178	7	200	7.9	223	8.8	320	12.6	390	15.4	480	18.9	550	21.7	550	21.7	740	29.1	740	29.1	740	29.1							
700 Threaded	"Y" PN16; 25 Class 150; 300	L (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	242	9.5	268	10.6	300	11.8	319	12.6	358	14.1							
		W (mm / inch)	239	9.4	244	9.6	257	10.1	305	12	366	14.4	492	19.4	584	23	724	28.5	840	33.1	866	34.1	1,108	43.6	1,127	44.4	1,167	45.9							
		h (mm / inch)	9.1	20	10.6	23	13	29	22	49	37	82	75	165	125	276	217	478	370	816	381	840	846	1,865	945	2,083	962	2,121							
700 Threaded	Angle PN16; 25 Class 150; 300	L (mm / inch)	205	8.1	210	8.3	222	8.7	264	10.4	335	13.2	433	17	524	20.6	637	25.1	762	30	767	30.2	1,024	40.3	1,030	40.6	1,136	44.7							
		W (mm / inch)	155	6.1	165	6.5	185	7.3	207	8.1	250	9.8	320	12.6	390	15.4	480	18.9	550	21.7	570	22.4	740	29.1	740	29.1	750	29.5							
		h (mm / inch)	78	3.1	83	3.3	95	3.7	105	4.1	127	5	159	6.3	191	7.5	223	8.8	261	10.3	295	11.6	325	12.8	357	14.1	389	15.3							
700 Threaded	"Y" PN16; 25 Class 150; 300	L (mm / inch)	239	9.4	244	9.6	257	10.1	314	12.4	378	14.9	508	20	602	23.7	742	29.2	859	33.8	893	35.2	1,133	44.6	1,165	45.9	1,197	47.1							
		W (mm / inch)	10	22	12.2	27	15	33	25	55	43	95	85	187	146	322	245	540	410	904	434	957	900	1984	967	2,132	986	2,174							
		h (mm / inch)	155	6.1	155	6.1	212	8.3	250	9.8	122	4.8	122	4.8	163	6.4	40	1.6	40	1.6	48	1.9	56	2.2	201	7.9	202	8	209	8.2	264	10.4			
700 Threaded	Angle PN16; 25 Class 150; 300	L (mm / inch)	5.5	12	5.5	12	8	18	17	37	43	95	85	187	146	322	245	540	410	904	434	957	900	1984	967	2,132	986	2,174							
		W (mm / inch)	-	-	121	4.8	140	5.5	159	6.3	-	-	122	4.8	163	6.4	-	-	40	1.6	40	1.6	48	1.9	56	2.2	201	7.9	202	8	209	8.2	264	10.4	
		h (mm / inch)	-	-	122	4.8	122	4.8	163	6.4	-	-	40	1.6	48	1.9	55	2.2	-	-	83	3.3	102	4	115	4.5	-	-	-	-	-	-	-		
700 Threaded	Angle PN16; 25 Class 150; 300	L (mm / inch)	-	-	83	3.3	102	4	115	4.5	-	-	225	8.9	242	9.5	294	11.6	-	-	-	-	-	-	-	-	-								
		W (mm / inch)	-	-	121	4.8	140	5.5	159	6.3	-	-	122	4.8	163	6.4	-	-	40	1.6	40	1.6	48	1.9	56	2.2	201	7.9	202	8	209	8.2	264	10.4	
		h (mm / inch)	-	-	83	3.3	102	4	115	4.5	-	-	225	8.9	242	9.5	294	11.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
700 Threaded	Angle PN16; 25 Class 150; 300	L (mm / inch)	-	-	5.5	12	7	15	15	33	-	-	15	15	33	-	-	43	95	85	187	146	322	245	540	410	904	434	957	900	1984	967	2,132	986	2,174



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

DN / Size		600	24"	700	28"	750	30"	800	32"	900	36"
Globe PN16 Class 150	L (mm / inch)	1,450	57.1	1,650	65	1,750	68.9	1,850	72.8	1,850	72.8
	W (mm / inch)	1,250	49.2	1,250	49.2	1,250	49.2	1,250	49.2	1,250	49.2
	h (mm / inch)	470	18.5	490	19.3	520	20.5	553	21.8	600	23.6
Globe PN25 Class 300	L (mm / inch)	1,965	77.4	1,985	78.1	2,015	79.3	2,048	80.6	2,095	82.5
	W (mm / inch)	3,250	128.0	3,700	145.7	3,900	153.5	4,100	161.4	4,250	167.3
	h (mm / inch)	470	18.5	490	19.3	520	20.5	553	21.8	600	23.6
Globe PN25 Class 300	L (mm / inch)	1,500	59.1	1,650	65	1,750	68.9	1,850	72.8	1,850	72.8
	W (mm / inch)	1,250	49.2	1,250	49.2	1,250	49.2	1,250	49.2	1,250	49.2
	h (mm / inch)	470	18.5	490	19.3	520	20.5	553	21.8	600	23.6
Globe PN25 Class 300	L (mm / inch)	1,965	77.4	1,985	78.1	2,015	79.3	2,048	80.6	2,095	82.5
	W (mm / inch)	3,500	137.8	3,700	145.7	3,900	153.5	4,100	161.4	4,250	167.3
	h (mm / inch)	470	18.5	490	19.3	520	20.5	553	21.8	600	23.6

