

## High Pressure, Booster Pump Control Valve Active Check Valve

### Model 840

- 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

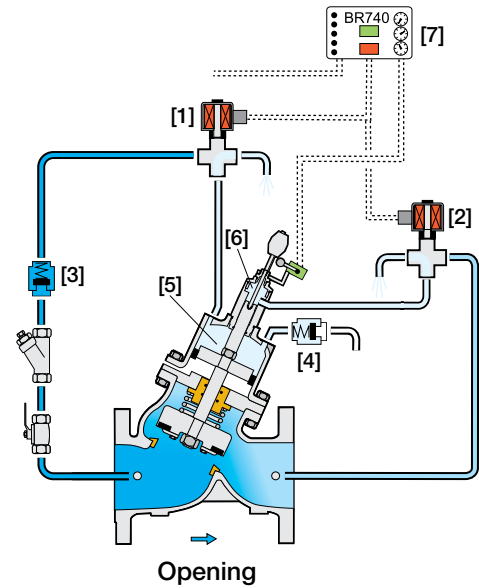
- Pressure sustaining – **843**
- Pressure reducing – **842**
- Flow control – **847-U**
- Pump circulation control – **848**
- Deep well pump electric control – **845**
- Full powered opening & closing – **840-B**
- Electronic control – **840-18**
- Pressure sustaining & Pressure reducing – **843-2Q**

## Sequence of Operation (Normally-Closed)

The Model 840 is a solenoid controlled valve equipped with a limit switch, two 3-Way solenoid pilots and check valves. Normally Open Type is also available.

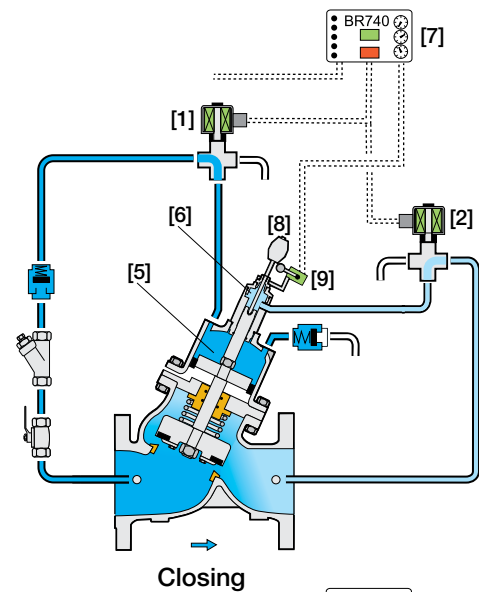
### Pump Starting Procedure

Prior to pump start, the valve is closed hydraulically and electrically. The de-energized solenoids [1] & [2] together with the inlet check valve [3] and the airflow check valve [4], trap the pressure in the upper control chamber [5] and in the shaft balancing piston [6]. Pump start command is issued to the controller [7], which simultaneously starts the pump and energizes the solenoids. 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 and the shaft balancing piston, allowing the main valve to open gradually.



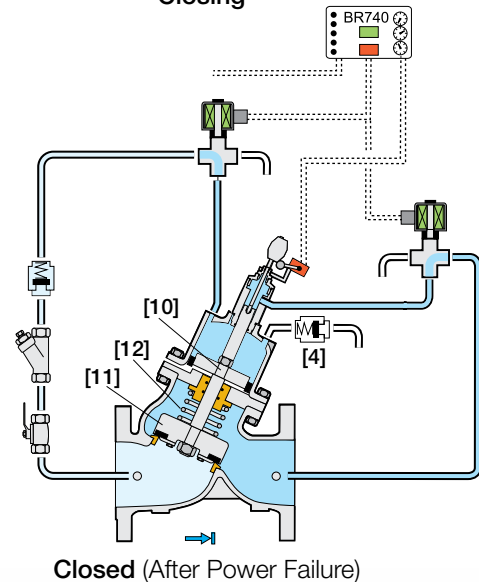
### Pump Stopping Procedure

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 BR740-E electronic controller [7], which de-energizes the solenoids [1] & [2]. The solenoid then applies pumped pressure to the upper control chamber and the shaft balancing piston, gradually closing the main valve, and isolating the running pump from the system. As the indicator collar [8] moves down, it activates the valve’s limit switch [9], 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.

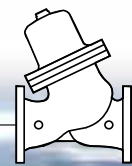


### Power Failure – Spring Loaded, Zero Velocity Non Return Valve

If electric power fails during pumping, the upstream pressure immediately drops causing the hydraulic forces acting on the piston assembly [10] and on the closure [11], to balance. The spring [12] then breaks this balance, closing the valve before the flow can change direction. Check valve [4] allows airflow into the upper control chamber to break possible vacuum and quicken the closing speed.



**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.



## Additional Applications

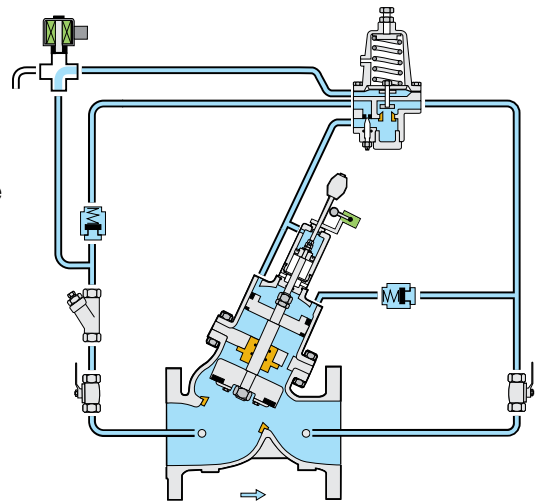
### High Pressure, Booster Pump Control & Pressure Sustaining Valve Model 843

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.

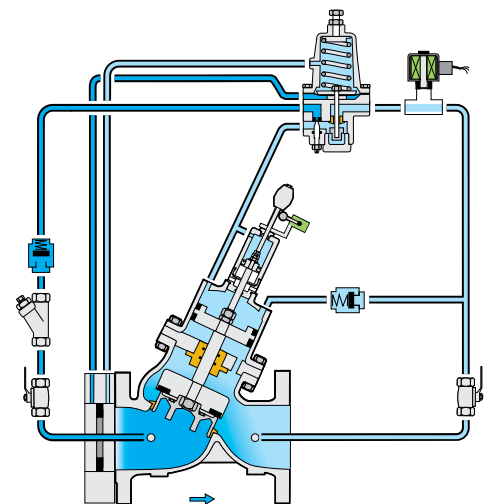


### High Pressure, Booster Pump Control & Flow Control Valve Model 847-U

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

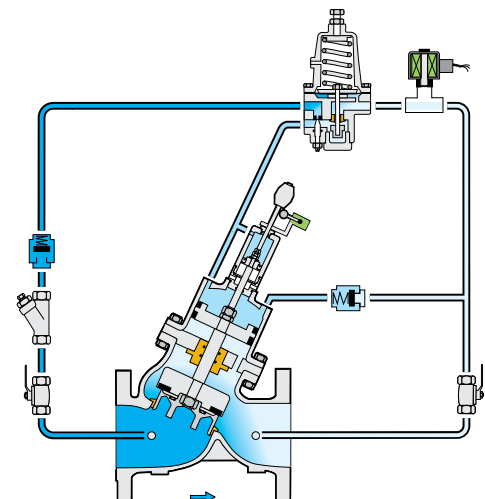
Standard pumps are specified to boost pressure by a constant differential. Excessive discharge pressure can be caused by increased suction pressure, as in:

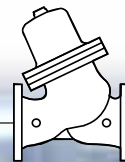
- Varying supply network pressure or supply from multiple sources
- Pumping from water towers with high level differential
- Deep well initial draw down

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.





## 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

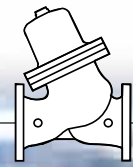
Electrical rating: 10A, type gI or gG

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

Enclosure rating: IP66

### Notes:

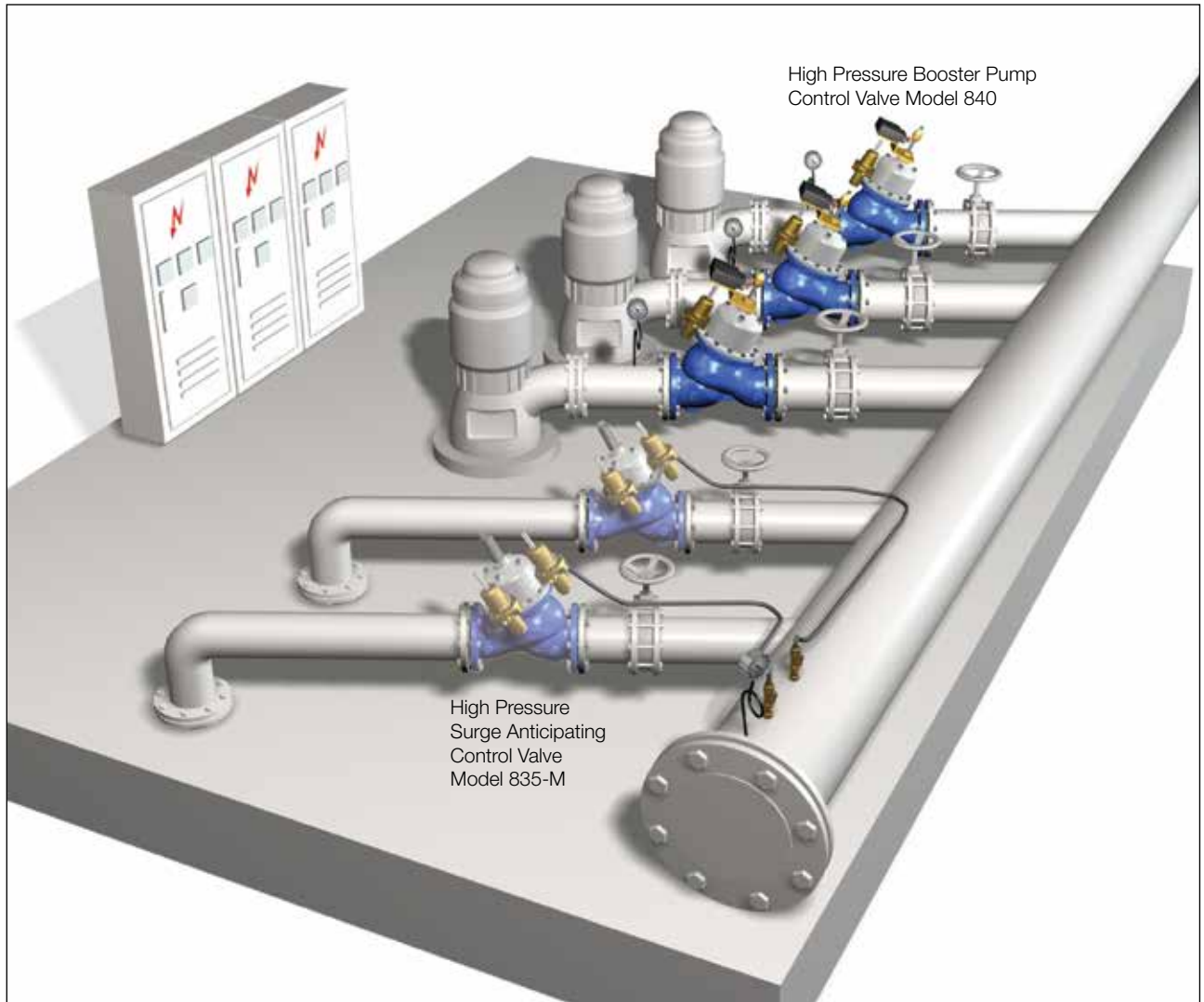
- Recommended continuous flow velocity:  
0.1-6.0 m/sec ; 0.3-20 ft/sec
- Minimum operating pressure: 2.0 bar ; 30 psi.  
For lower pressure requirements consult factory



## Typical Applications

In this system, a pump battery supplies the main line through a manifold. The Model 840, installed downstream from each pump:

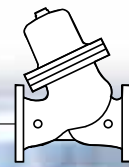
- Prevents surge generation rather than minimizing surge damage
- Provides surge free starting and stopping of supplementary pumps
- Allows surge free switching between “on-duty” pumps
- Delays reaction for variable speed primary pump to single speed supplementary pump going on line or off line.



## 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.





### 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

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

$\Delta P$  = 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  $\Delta P$  with 15°C water)

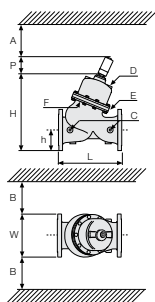
$Cv$  = US system - Valve flow coefficient  
(flow in gpm at 1 psi  $\Delta P$  with 60°F water)

$Cv = 1.155 Kv$

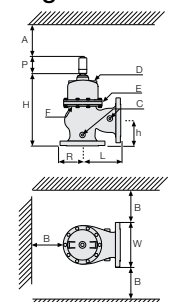
### Flow Data & Dimensions Table

	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	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 "Y" Flanged	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	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	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

