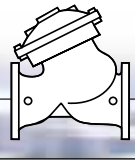


700 Series

Model 720

Pressure-Reducing Valve

- Flow and leakage reduction
- Cavitation damage protection
- Throttling noise reduction
- Burst protection
- System maintenance savings

The Model 720 Pressure-Reducing Valve is a hydraulically-operated, diaphragm-actuated, control valve that reduces higher upstream pressure to lower constant downstream pressure regardless of fluctuating demand or varying upstream pressure.

Features and Benefits

- **Line-pressure driven** – independent operation
- **In-line serviceable** – easy maintenance
- **Double chamber design**
  - Moderated valve reaction
  - Protected diaphragm
- **Flexible design** – easy addition of features
- **Variety of accessories** – perfect mission matching
- **"Y" or angle, wide body** – minimized pressure loss
- **Semi-straight flow** – non-turbulent flow
- **St. Steel raised seat** – cavitation damage resistant
- **Obstacle-free full-bore** – uncompromising reliability
- **V-Port Throttling Plug** – low-flow stability

Major Additional Features

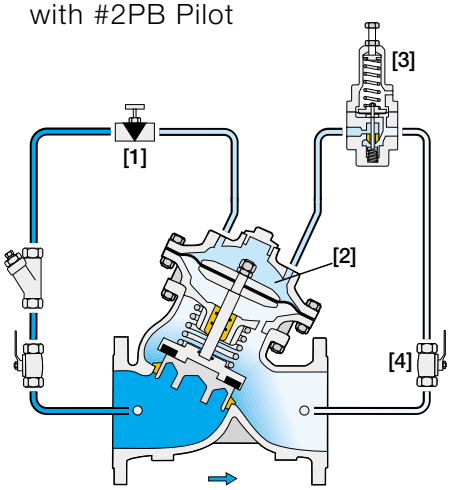
- UL Listed for fire protection – **FP-720-UL**
- Solenoid-control – **720-55**
- Check valve – **720-20**
- Solenoid-control & check valve – **720-25**
- Fixed proportion – **720-PD**
- High-sensitivity pilot – **720-12**
- Emergency pressure-reducing valve – **720-PD-59**
- Downstream over-pressure guard – **720-48**
- Electrically-selected multi-level setting – **720-45**
- Electronic multi-level setting, Type 4R – **720-4R**
- Electronic multi-level setting, Type 4T – **720-4T**
- Electronic pressure reducing valve – **728-03**

See relevant BERMAD publications

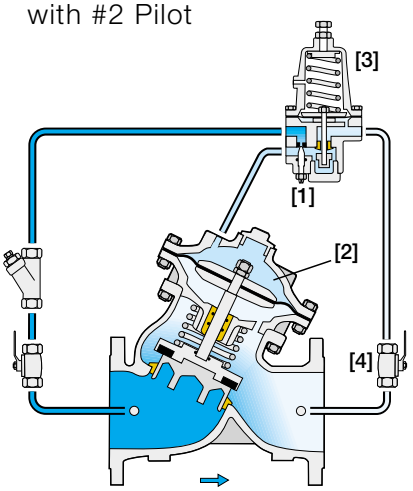
Operation

The Model 720 is a pilot-controlled valve equipped with an adjustable, 2-way, pressure-reducing pilot.
The needle valve **[1]** continuously allows flow from the valve inlet into the upper control-chamber **[2]**. The pilot **[3]** senses downstream pressure.
Should this pressure rise above pilot setting, the pilot throttles, enabling pressure in the upper control-chamber to accumulate, causing the main valve to throttle closed, decreasing downstream pressure to pilot setting.
Should downstream pressure fall below pilot setting, the pilot releases accumulated pressure, and the main valve modulates open.
The integral orifice between the lower control-chamber and valve outlet moderates valve reactions.
The needle valve controls the closing speed. The downstream cock valve **[4]** enables manual closing.

1½-4”
with #2PB Pilot



6-14”
with #2 Pilot



Tender Specifications

The Pressure-Reducing Valve shall reduce higher upstream pressure to lower preset downstream pressure regardless of fluctuating demand or varying upstream pressure.

Main Valve: The main valve shall be a center-guided, diaphragm-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. The body and cover shall be ductile iron. 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 an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. 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.

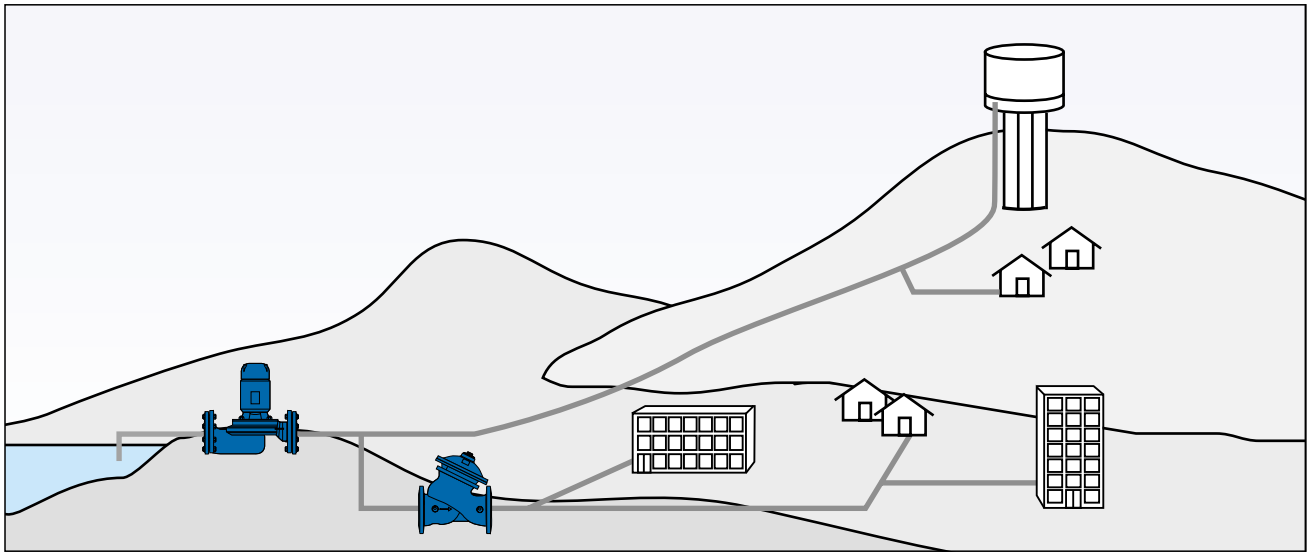
Control System: The control system shall consist of a 2-way adjustable, direct acting, pressure-reducing pilot valve, a needle valve, isolating cock valves, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer requirements.

Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

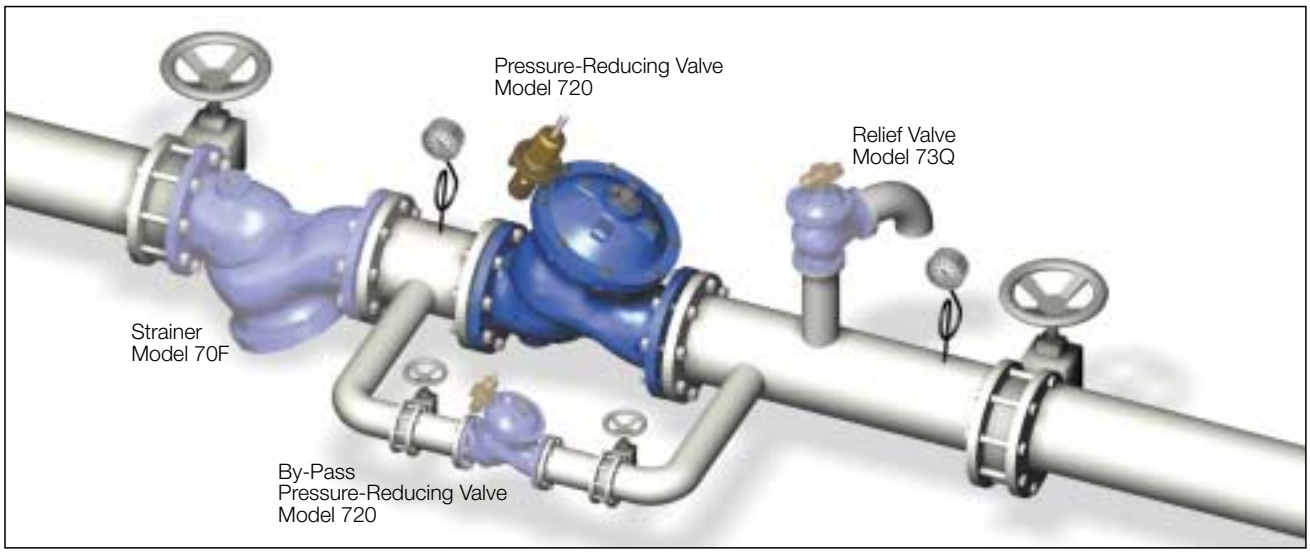
Pressure-Reducing System for Municipal Networks

Network design requires establishing various pressure zones due to topography, distances, demands, energy costs, reservoir availability, etc.



The pump supplies water to the network and to the reservoir. System pressure is too high for the residential neighborhood, requiring a pressure-reducing system.

Pressure-Reducing System – Typical Installation



In addition to the **Model 720 Pressure-Reducing Valve**, BERMAD recommends that the system also includes:

- **Strainer** Model 70F prevents debris from damaging valve operation
- **Relief Valve** Model 73Q provides:
  - Protection against momentary pressure peaks
  - Visual indication of need for maintenance
- **By-Pass Pressure-Reducing Valve** saves on maintenance costs. The larger (more costly to maintain) valve operates during peak demand. The smaller by-pass valve cuts operating hours of the larger valve, achieving greater return on investment.

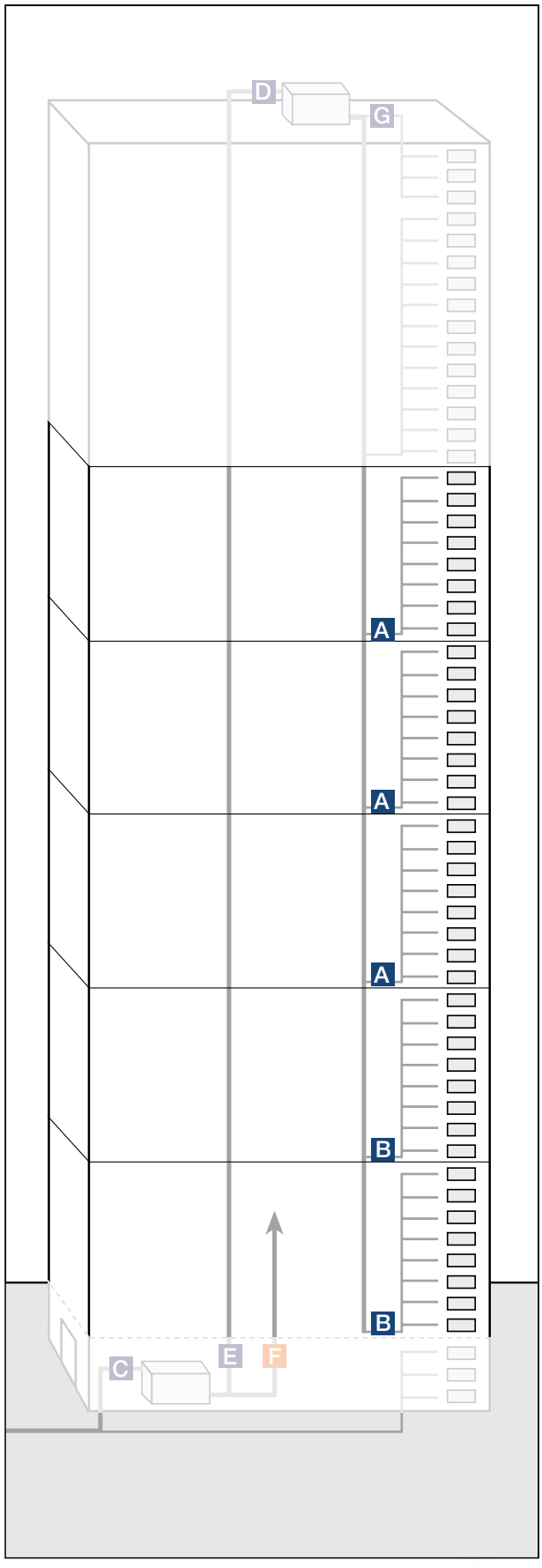
For high differential pressure systems, see BERMAD publication 720-PD Proportional Pressure-Reducing Valve
For high-pressure systems, see BERMAD publication 820 Piston Actuated Pressure-Reducing Valve

Pressure-Reducing Systems in Hi-Rise Buildings

Water supply system design requirements for hi-rise buildings present unique issues:

- Supply cut-off is unacceptable and single-source supply is common.
- Valves are located in areas where water damage can be extremely expensive.
- Pressure-reducing systems are often located next to prestigious residential and office space. Extraneous noise and maintenance activities are to be avoided.
- The main supply line of hi-rise buildings is exposed to greater head at lower zones while pressure for the consumer must be kept within recommended levels. As a result, lower zone pressure-reducing systems deal with greater differential pressure.

The **Model 720 Pressure-Reducing Valves** together with BERMAD'S accumulated experience address these issues and provide appropriate solutions.

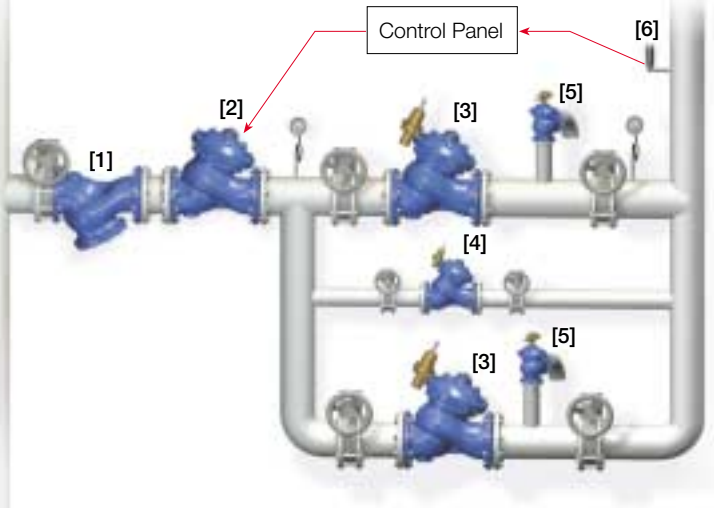


- A Higher-zone pressure reducing system installation
- B Lower-zone pressure reducing system (two-stage) installation
- C Bottom reservoir level control system
- D Roof reservoir level control system
- E Potable water pumping system
- F Fire protection pumping system
- G Upper floors pumping system

Higher-Zone Installation A

In addition to the municipal pressure-reducing system for a hi-rise building, BERMAD recommends the system also includes:

- **Parallel Redundant Branches** ensuring uninterrupted supply by enabling unskilled personnel to temporarily shut-off one of the branches
- **Emergency System** including a downstream pressure switch & an Emergency Valve Model 720-PD-59.
  - **Pressure Switch** [6] signals a control panel of excessive downstream pressure.
  - **Emergency Valve** [2] is fully open during normal operation. Triggered by the control panel, it becomes a proportional pressure-reducing valve.

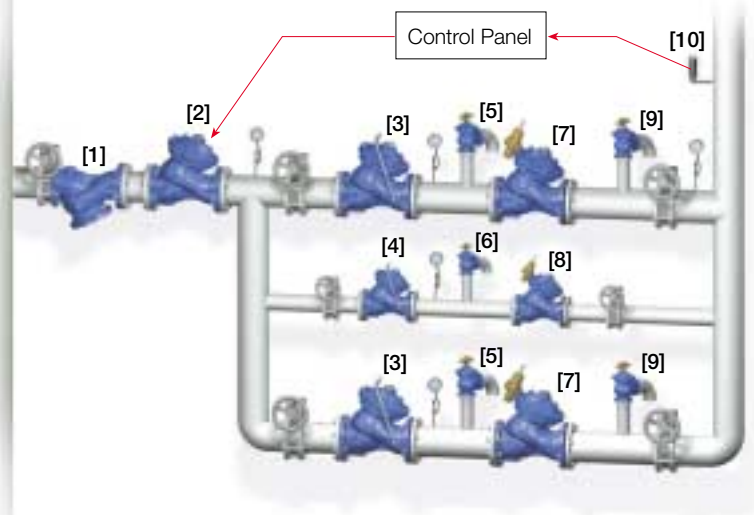


[1] Strainer Model 70F
[2] Emergency Pressure Reducing Valve Model 720-PD-59
[3] Pressure-Reducing Valve Model 720
[4] By-pass Pressure-Reducing Valve Model 720
[5] Relief Valve Model 73Q
[6] Pressure Switch

Lower-Zone (Two-Stage) Installation B

When dealing with high differential pressure systems in lower zones of a hi-rise building, BERMAD recommends a two-stage pressure-reducing system. In addition to the typical higher-zone installation, this high differential pressure system also includes:

- **Proportional Pressure-Reducing Valve** Model 720-PD, as the first pressure-reducing stage, absorbs part of the high-differential pressure. By spreading the load of pressure reducing onto two components, cavitation damage and noise are reduced.



[1] Strainer Model 70F
[2] Emergency Pressure-Reducing Valve Model 720-PD-59
[3] Proportional Pressure-Reducing Valve Model 720-PD
[4] By-pass Proportional Pressure Reducing Valve Model 720-PD
[5] Primary Relief Valve Model 73Q
[6] By-pass Relief Valve Model 73Q
[7] Pressure-Reducing Valve Model 720
[8] By-pass Pressure-Reducing Valve Model 720
[9] Relief Valve Model 73Q
[10] Pressure Switch

For high differential pressure systems, see BERMAD publication 720-PD Proportional Pressure-Reducing Valve
For high-pressure systems, see BERMAD publication 820 Piston Actuated Pressure-Reducing Valve

Quick Pressure-Relief Valve

- Eliminating momentary pressure peaks
- Visual indication of system failure
- Filtration system burst protection
- Thermal expansion over-pressure relief
- System maintenance savings

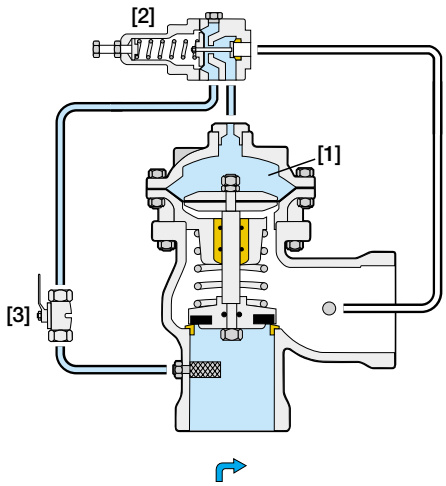
The Model 73Q Quick Pressure-Relief Valve is a hydraulically-operated, diaphragm-actuated, control valve that relieves excessive system pressure when this pressure rises above the pre-set value. It immediately, accurately, and with high repeatability responds to system pressure rise by fully opening. The Model 73Q provides smooth drip-tight closing.

Features and Benefits

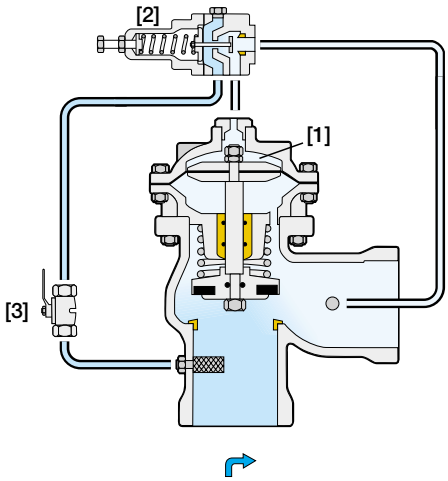
- **Hydraulic actuation**
  - Independent operation
  - Long-term drip-tight sealing
  - Long-term setting stability
  - Wide-setting range
  - Tight-setting window
  - Minimal hysteresis
- **Double chamber design**
  - Moderated valve closing (no surges)
  - Protected diaphragm
- **Obstacle-free full-bore** – uncompromising reliability
- **Balanced seal disk** – high relief-flow capacity
- **Manual test-valve** – no setting change required

Operation

The Model 73Q is a pilot-controlled valve equipped with an adjustable, 2-way, pressure-relief pilot.
The pilot internal restriction continuously allows flow from the main valve inlet into the upper control-chamber **[1]**. The pilot **[2]** senses upstream pressure.
Should this pressure abruptly rise above pilot setting, the pilot opens, pressure in the upper control-chamber is vented, causing the main valve to immediately open, relieving excessive system pressure.
When upstream pressure decreases to below pilot setting, the pilot closes, enabling pressure to accumulate in the upper control-chamber, causing the main valve to smoothly close. Vented cock valve **[3]** is used to perform manual operating test.
For sizes 6" – 14" use pilot #3HC



Valve Closed
(system pressure is below setting)



Valve Open

Tender Specifications

The Quick Pressure-Relief Valve shall relieve excessive system pressure when this pressure rises above pre-set value. It shall immediately, accurately, and with high repeatability respond to system pressure rise by fully opening as well as provide smooth drip-tight closing.

Main Valve: The main valve shall be a center-guided, diaphragm-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. The body and cover shall be ductile iron. 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.

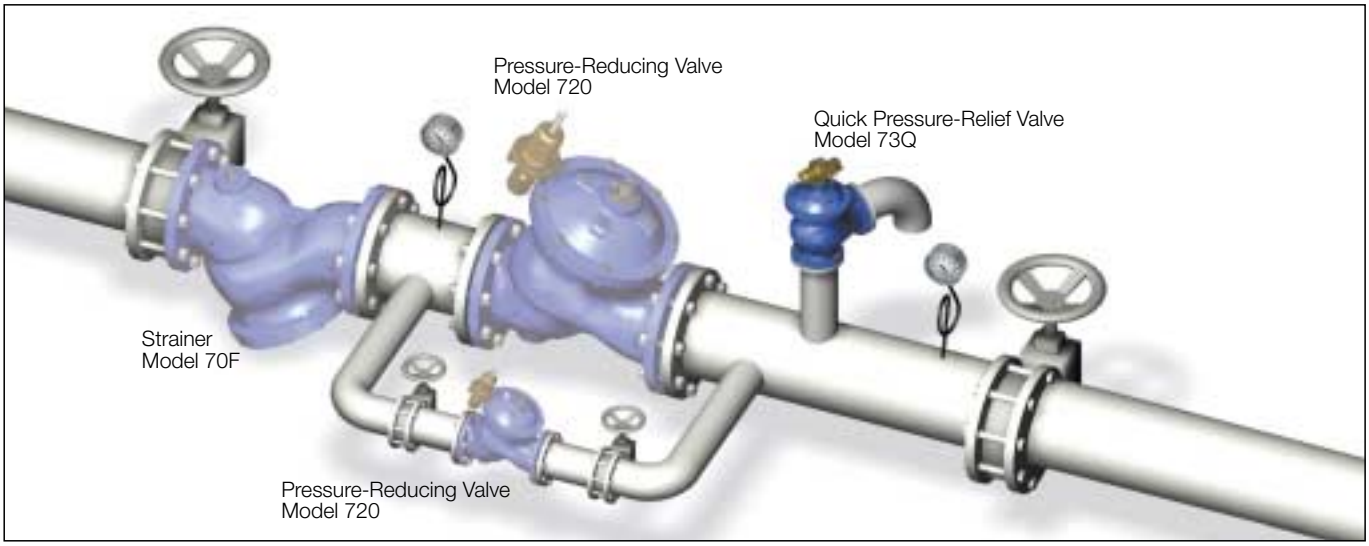
Actuator: The actuator assembly shall be double-chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve-shaft shall 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 a 2-way adjustable, direct-acting, quick pressure-relief pilot valve, a testing cock valve, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer requirements.

Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

Typical Applications

Reduced Pressure Zone Safety Relief



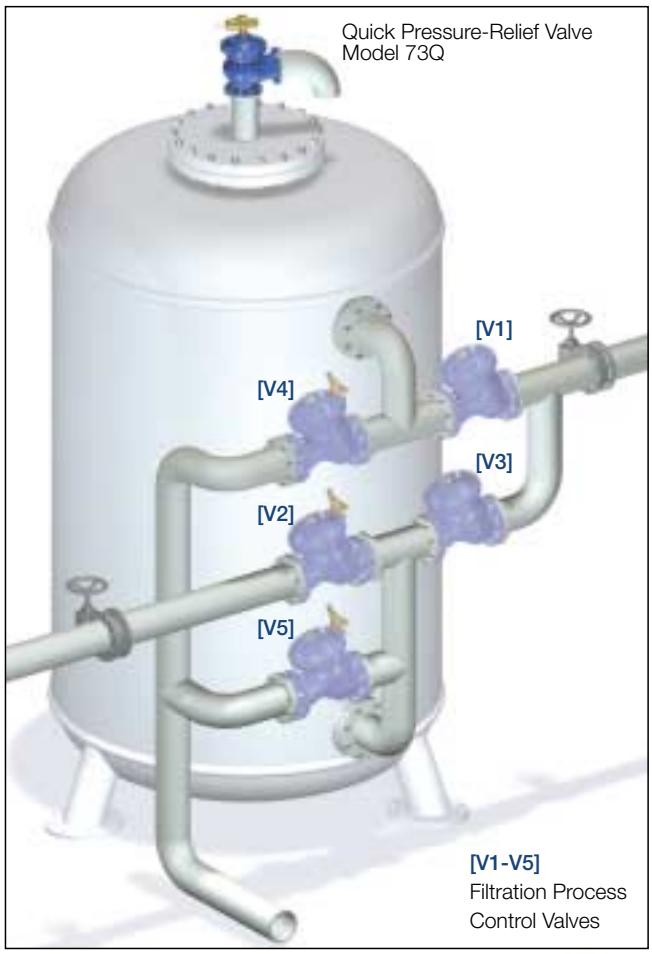
The Model 73Q Quick Pressure-Relief Valve protects against:

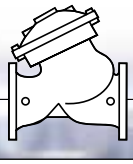
- Momentary high pressure peaks
- Excessive pressure from another source
- Failure of other system components
- Static condition leaking of pressure-reducing valves

Filtration System Safety Relief

Filter tanks, due to their large surface areas, are often the system components most vulnerable to abrupt pressure rise. The Model 73Q Quick Pressure-Relief Valve protects against:

- Pressure peak at end of filling process
- Sudden pressure rise due to drop in demand
- Increased pressure due to blocked filtration element
- Over-pressure due to flow direction switching during back-flushing





700 Series

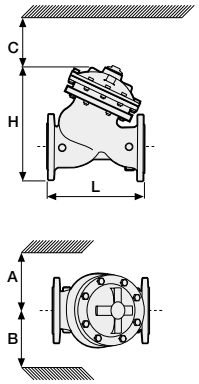
Model 73Q

Technical Data

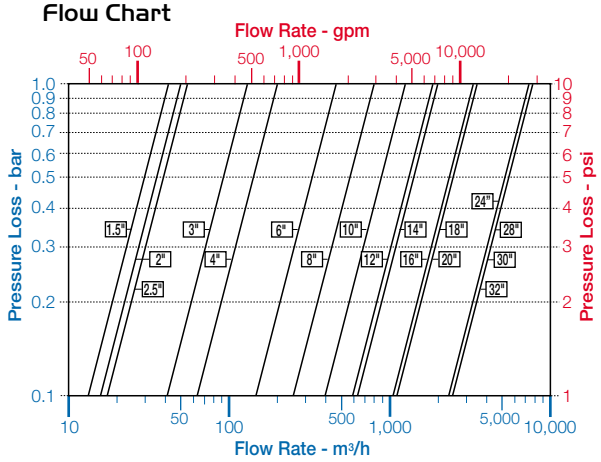
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	350	14	180	7	205	8.1	239	9.4	9.1	20
50	2	350	14	180	7	210	8.3	244	9.6	10.6	23
65	2½"	350	14	180	7	222	8.7	257	10.1	13	29
80	3"	370	15	230	9	250	9.8	305	12.0	22	49
100	4"	395	16	275	11	320	12.6	366	14.4	37	82
150	6"	430	17	385	15	415	16.3	492	19.4	75	165
200	8"	475	19	460	18	500	19.7	584	23.0	125	276
250	10"	520	21	580	23	605	23.8	724	28.5	217	478
300	12"	545	22	685	27	725	28.5	840	33.1	370	816
350	14"	545	22	685	27	733	28.9	866	34.1	381	840
400	16"	645	26	965	38	990	39.0	1108	43.6	846	1865
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2083
500	20"	645	26	965	38	1100	43.3	1167	45.9	962	2121

Data is for Y-pattern, flanged, PN16 valves
Weight is for PN16 basic valves
"C" enables removing the actuator in one unit
"L", ISO standard lengths available
For more dimensions and weights tables, refer to Engineering section



Flow Chart



Data is for Y-pattern, flat disc valves
For more flow charts, refer to Engineering section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1½–32" (40-800 mm)
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25
(ANSI Class 150, 300)
Threaded: BSP or NPT
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body & Actuator: Ductile iron
Internals:
Stainless steel, bronze & coated steel
Diaphragm:
NBR (Buna N) Nylon fabric-reinforced
Seals: NBR (Buna N)
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic
Polyester Powder, RAL 6017 (Green)

Control System

Standard Materials:
Accessories:
Bronze, brass, stainless steel & NBR (Buna N)
Tubing: Copper or stainless steel
Fittings: Forged brass or stainless steel
Pilot Standard Materials:
Body: Brass, bronze or stainless steel
Elastomers: NBR (Buna N)
Springs: Galvanized steel or stainless steel
Internals: Stainless steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		PC3Q	#3	#3HC
1½-4"	<12	■		
40-100 mm	>12		■ ●	
6-14"	<15			■
150-350 mm	>15			●
For 16-32" / 400-800 mm Consult factory				

■ Standard model ● with high pressure setting kit

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	3"	73Q	00	A	C	BP	EB	–	CB	

Sector: WW — Waterworks

Size: 1½ - 32"

Primary Feature: 73Q — Quick Pressure-Relief

Additional Feature: 00
- No Additional Feature — 00
- Multi-Setting Levels - Electrically Selected — 45
- Solenoid-Controlled — 55

Multiple choices permitted

Pattern: A
- Oblique (up to 20") — Y
- Angle (up to 18") — A
- Globe (24-32" only) — G

Body Material: C
- Ductile Iron Standard — C
- Cast Steel — S
- St. Steel 316 — N
- Nickel Alumin. Bronze — U

End Connections: BP
- BSP — BP
- NPT — NP
- ISO-16 — 16
- ISO-25 — 25
- ANSI-150 — A5
- ANSI-300 — A3
- JIS-16 — J6
- JIS-20 — J2

Coating: EB
- Polyester Green — PG
- Polyester Blue — PB
- Epoxy FB Blue — EB
- Uncoated — UC

Voltage & Position: –
- 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

Use when electric control additional feature is selected

Tubing & Fittings: CB
- Copper Tubing & Brass Fittings — CB
- Plastic Tubings & Brass Fittings — PB
- St. St. 316 Tubing & Fittings — NN

Additonal Attributes:
- Valve Position Indicator — I
- Large Control Filter — F
- Electric Limit-Switch — S
- 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

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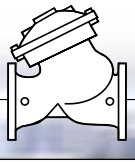
BERMAD Waterworks



700 Series

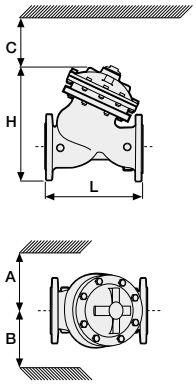
Model 720

Technical Data

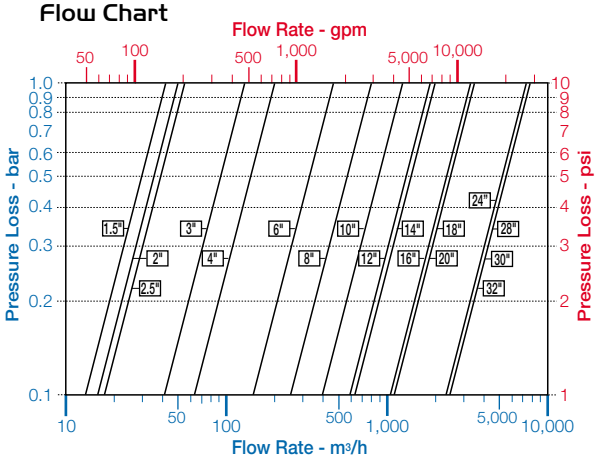
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	350	14	180	7	205	8.1	239	9.4	9.1	20
50	2	350	14	180	7	210	8.3	244	9.6	10.6	23
65	2½"	350	14	180	7	222	8.7	257	10.1	13	29
80	3"	370	15	230	9	250	9.8	305	12.0	22	49
100	4"	395	16	275	11	320	12.6	366	14.4	37	82
150	6"	430	17	385	15	415	16.3	492	19.4	75	165
200	8"	475	19	460	18	500	19.7	584	23.0	125	276
250	10"	520	21	580	23	605	23.8	724	28.5	217	478
300	12"	545	22	685	27	725	28.5	840	33.1	370	816
350	14"	545	22	685	27	733	28.9	866	34.1	381	840
400	16"	645	26	965	38	990	39.0	1108	43.6	846	1865
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2083
500	20"	645	26	965	38	1100	43.3	1167	45.9	962	2121

Data is for Y-pattern, flanged, PN16 valves
Weight is for PN16 basic valves
"C" enables removing the actuator in one unit
"L", ISO standard lengths available
For more dimensions and weights tables, refer to Engineering section



Flow Chart



Data is for Y-pattern, flat disc valves
For more flow charts, refer to Engineering section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1½–32" (40-800 mm)
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25
(ANSI Class 150, 300)
Threaded: BSP or NPT
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body & Actuator: Ductile iron
Internals:
Stainless steel, bronze & coated steel
Diaphragm:
NBR (Buna N) Nylon fabric-reinforced
Seals: NBR (Buna N)
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic
Polyester Powder, RAL 6017 (Green)

Control System

Standard Materials:
Accessories:
Bronze, brass, stainless steel & NBR (Buna N)
Tubing: Copper or stainless steel
Fittings: Forged brass or stainless steel
Pilot Standard Materials:
Body: Brass, bronze or stainless steel
Elastomers: NBR (Buna N)
Springs: Galvanized steel or stainless steel
Internals: Stainless steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#2PB	#2	#2HC
1½-4"	<15	■		
40-100 mm	>15		●	
6-14"	<15		■	
150-350 mm	>15		●	
16 -32"	<15			■
400-800 mm	>15			●

■ Standard model ● with high pressure setting kit

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"	720	00	Y	C	16	EB	–	CB	VI

Sector: WW — Waterworks

Size: 6" — 1½ - 32"

Primary Feature: 720 — Pressure Reducing

Additional Feature: 00
- No Additional Feature 00
- Closing and Opening Speed-Control 03
- Automatic Regulation Override 09
- High-sensitivity pilot 12
- Check Valve 20
- Solenoid-Controlled & Check Valve 25
- Multi-Setting Levels - Electrically Selected 45
- Downstream Over-Pressure Guard 48
- Hydraulic Remotely-Controlled 50
- Solenoid-Controlled 55
- Electric Override 59

Multiple choices permitted

Pattern: Y
- Oblique (up to 20") Y
- Angle (up to 18") A
- Globe (24-32" only) G

Body Material: C
- Ductile Iron Standard C
- Cast Steel S
- St. Steel 316 N
- Nickel Alumin. Bronze U

End Connections: 16
- ISO-16 16
- ISO-25 25
- ANSI-150 A5
- ANSI-300 A3
- JIS-16 J6
- JIS-20 J2

Coating: EB
- Polyester Green PG
- Polyester Blue PB
- Epoxy FB Blue EB
- Uncoated UC

Voltage & Position: –
- 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

Use when electric control additional feature is selected

Tubing & Fittings: CB
- Copper Tubing & Brass Fittings CB
- Plastic Tubings & Brass Fittings PB
- St. St. 316 Tubing & Fittings NN

Additonal Attributes: VI
- Valve Position Indicator I
- V-Port Throttling Plug V
- Large Control Filter F
- Electric Limit-Switch S
- 3-way Control Loop X
- Valve Position Transmitter Q
- 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

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Pressure-Relief/Sustaining Valve

- Prioritizing pressure zones
- Ensuring controlled pipeline fill-up
- Preventing pipeline emptying
- Pump overload & cavitation protection
- Safeguarding pump minimum flow
- Excessive line-pressure protection

The Model 730 Pressure-Relief/Sustaining Valve is a hydraulically-operated, diaphragm-actuated, control valve that can fulfill either of two separate functions. When installed in-line, it sustains minimum pre-set, upstream (back-) pressure regardless of fluctuating flow or varying downstream pressure.
When installed as a circulation valve, it relieves excessive line-pressure when above maximum pre-set.

Features and Benefits

- **Line-pressure driven** – independent operation
- **Balanced seal disk** – high relief-flow capacity
- **In-line serviceable** – easy maintenance
- **Double chamber design**
  - Moderated valve reaction
  - Protected diaphragm
- **Flexible design** – easy addition of features
- **Variety of accessories** – perfect mission matching
- **"Y" or angle, wide body** – minimized pressure loss
- **Semi-straight flow** – non-turbulent flow
- **St. Steel raised seat** – cavitation damage resistant
- **Obstacle-free full-bore** – uncompromising reliability
- **V-Port Throttling Plug** – low-flow stability

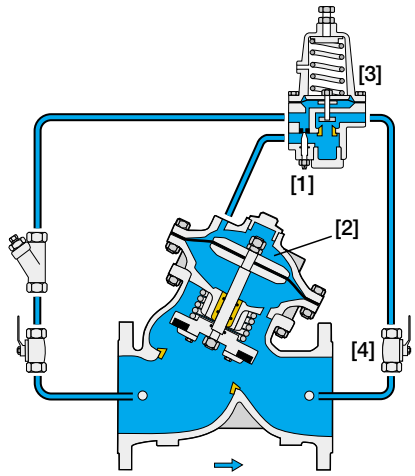
Major Additional Features

- UL-listed & FM-approved for fire protection – **FP-730-UL/FM**
- Solenoid-control – **730-55**
- Quick pressure-relief valve – **73Q**
- Pressure-sustaining & -reducing valve – **723**
- Check feature – **730-20**
- High-sensitivity pilot – **730-12**
- Level-control & pressure-sustaining valve – **753**
- Pump-control & pressure-sustaining valve – **743**
- Pump circulation & pressure-sustaining valve – **748**
- Electrically-selected multi-level settings – **730-45**
- High sensitivity hydraulic positioning – **730-85**
- Electronic pressure-sustaining valve – **738-03**

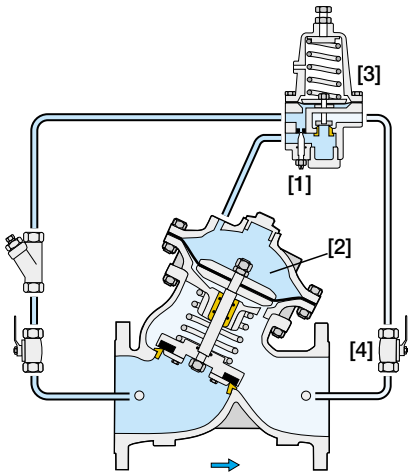
See relevant BERMAD publications

Operation - Pressure-Sustaining (in-line)

The Model 730 is a pilot-controlled valve equipped with an adjustable, 2-way, pressure-sustaining pilot.
The needle valve **[1]** continuously allows flow from the main valve inlet into the upper control-chamber **[2]**. The pilot **[3]** senses upstream pressure and should be set to minimum system pressure allowed.
Should upstream pressure tend to fall below pilot setting, the pilot throttles, enabling pressure to accumulate in the upper control-chamber, causing the main valve to throttle, sustaining upstream (back-) pressure at pilot setting. Should upstream pressure be below pilot setting, the pilot closes, causing the main valve to close drip-tight.
Should upstream pressure tend to rise above pilot setting, the pilot releases accumulated pressure causing the main valve to modulate open.
The needle valve controls the closing speed. The downstream cock valve **[4]** enables manual closing.
For sizes 1½ to 4", use pilot #3PB.



Valve Regulates

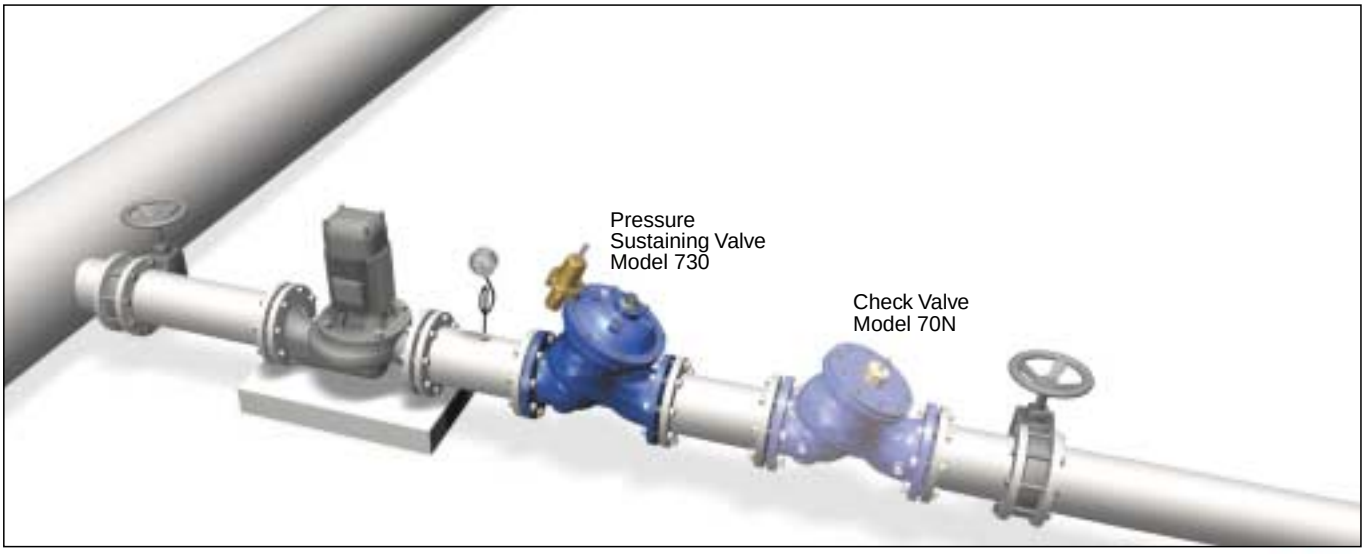


Valve Closed
(upstream pressure below pilot setting)

Typical Applications

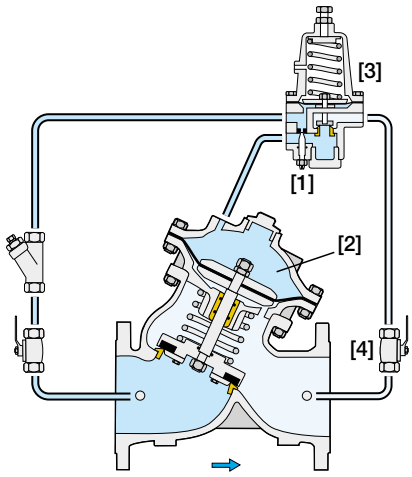
Pump Overload and Cavitation Protection

The Model 730 sustains pump discharge pressure, preventing pump overload and cavitation damage caused by excessive demand.
By connecting the pilot sensing line to pump suction, the Model 730 becomes Model 730R which sustains pump suction pressure.
Where suction pressure regimes vary, the Model 736 is needed to limit pump flow by sustaining pump differential pressure.

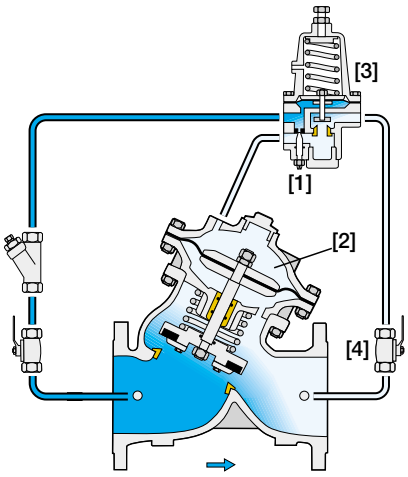


Operation - Pressure-Relief (circulation)

The Model 730 is a pilot-controlled valve equipped with an adjustable, 2-way, pressure-sustaining pilot.
The needle valve **[1]** continuously allows flow from the main valve inlet into the upper control-chamber **[2]**. The pilot **[3]** senses upstream pressure and should be set slightly above system working pressure.
Should upstream pressure rise above pilot setting, the pilot releases pressure from the upper control-chamber, causing the main valve to modulate open, relieving excessive upstream pressure.
Should upstream pressure fall, the pilot throttles, enabling pressure to accumulate in the upper control-chamber, causing the main valve to throttle closed, sustaining upstream (back-) pressure at the pilot setting. Should upstream pressure be below pilot setting, the pilot closes, causing the main valve to close drip-tight.
The needle valve controls the closing speed. The downstream cock valve **[4]** enables manual closing.
For sizes 1½ to 4", use pilot #3PB.



Valve Closed
(upstream pressure is below setting)

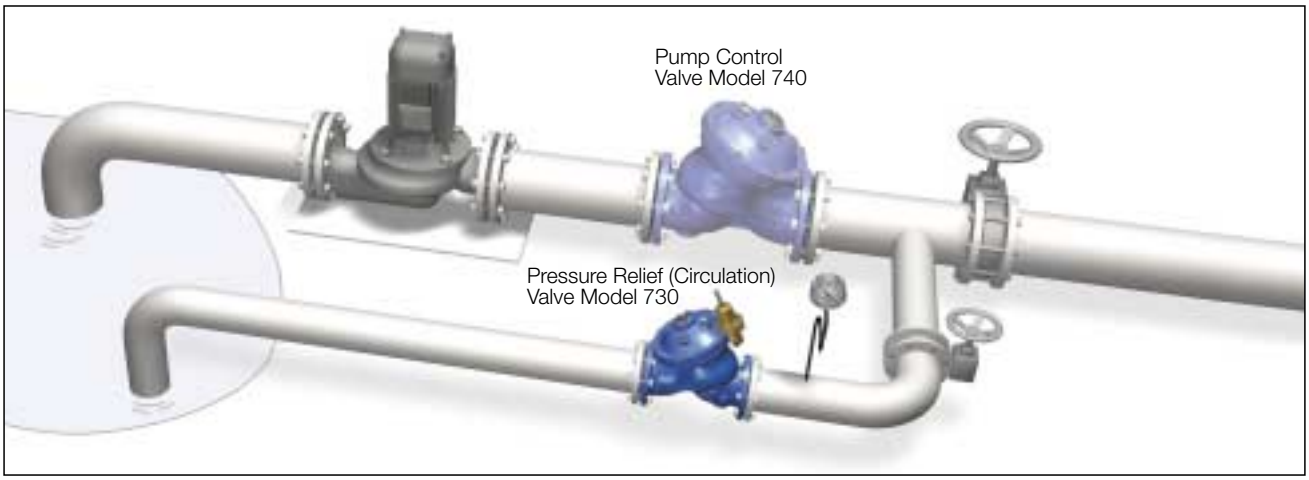


Valve Regulates

Typical Applications

Safeguarding Pump Minimum Flow

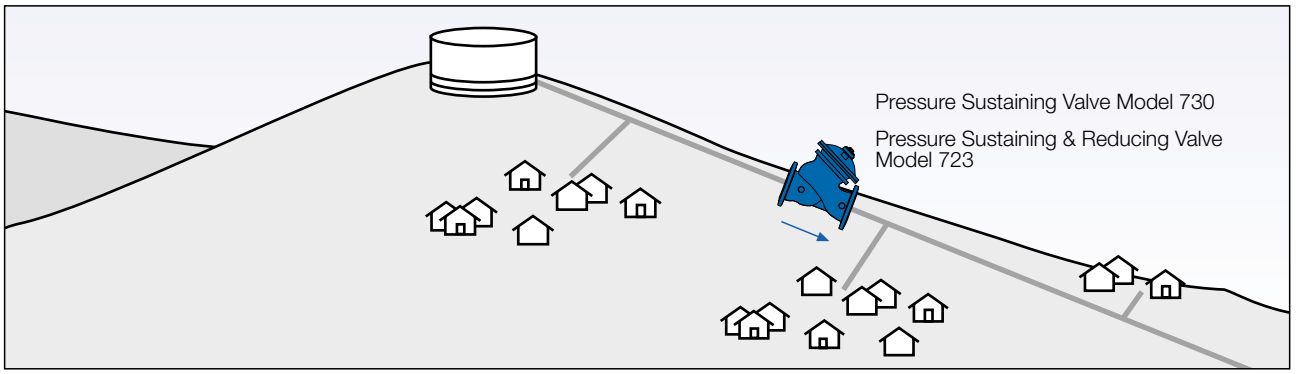
The Model 730 relieves over-pressure caused by excessive pump discharge during low demand. To keep a constant discharge pressure, the difference between pumped flow and consumer demand can be circulated back to pump suction.



Circulation valves are often exposed to severe cavitation beacuse valve ΔP and velocity are usually high while downstream pressure is very low. On the other hand, the valves operates under these conditions for relatively short periods. Increased valve durability, for applications require long operating periods, will be achieved by using cavitation resistant materials, adding a downstream orifice, installing an upstream pressure-reducing valve, increasing valve size, or any combination of these choices.

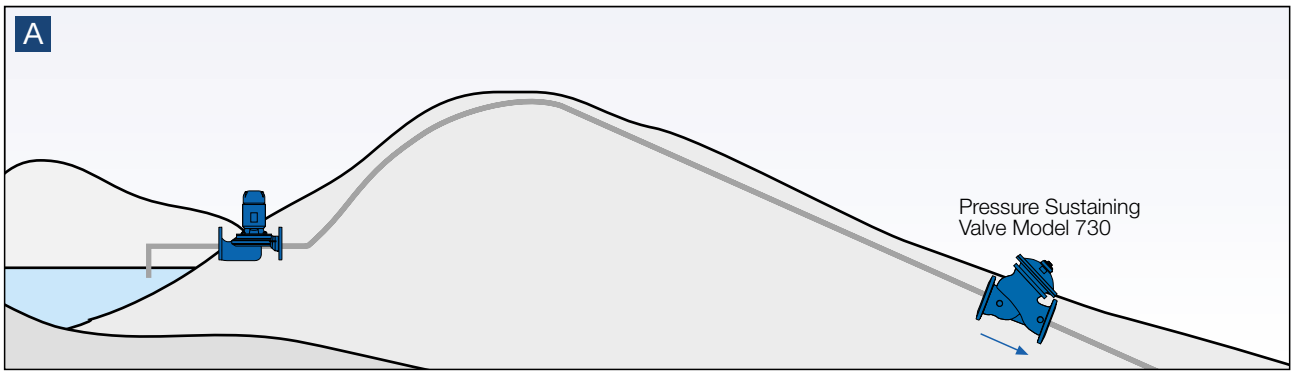
Prioritizing One Zone over Another

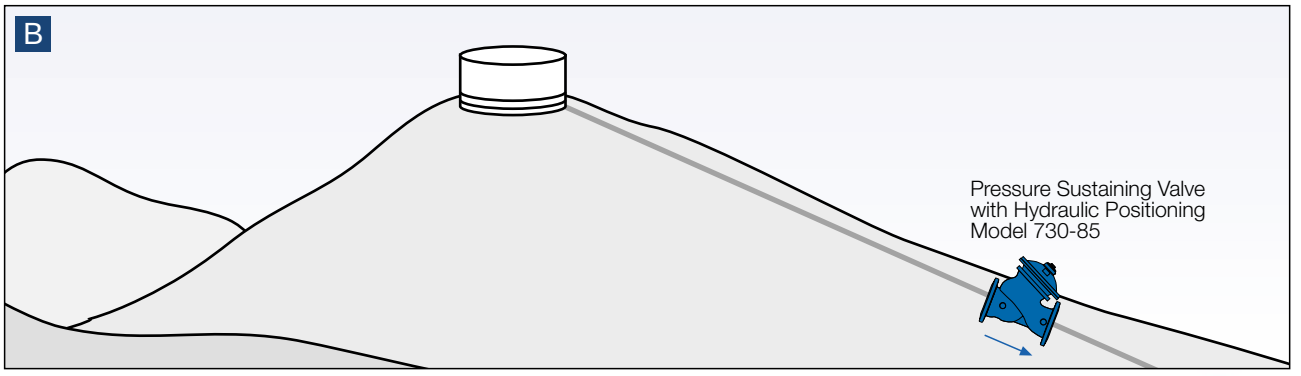
This application is usually found in gravity fed systems. The **Model 730** enables prioritizing the higher elevation zone over downhill consumers when they create excessive total demand.
By adding a pressure-reducing feature to the primary pressure-sustaining function, the Model 730 becomes a **Model 723** that also protects downhill consumers from over-pressure during low-demand.

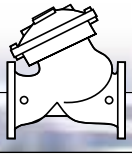


Preventing Line Emptying

Line emptying presents a serious problem in water distribution networks. Preventing it in downhill networks requires setting the pilot slightly above the elevation differential between the highest point of the line and the valve.
Where a **pump** provides pressure A, the relatively high pressure causes the **Model 730** to open wide. When the pump stops, pressure drops below pilot setting and the valve closes drip-tight preventing line emptying.
Where a **reservoir** provides pressure B, there is only a small potential for variation in pressure (the difference in high and low reservoir levels). The problem is made worse by having a significant part of that potential pressure lost on line-friction. The standard Model 730 might not be enough. The solution is to install a valve with very low head-loss, super-sensitivity, -accuracy and-repeatability.
Install the **Model 730-85** pressure sustaining with high sensitivity hydraulic positioning







Tender Specifications

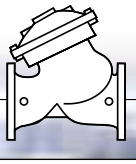
The Pressure-Relief/Sustaining Valve shall fulfill either of two separate functions.
When installed in-line, it shall sustain minimum pre-set, upstream (back-) pressure regardless of fluctuating flow or varying downstream pressure.
When installed as a circulation valve, it shall relieve excessive line pressure when above maximum pre-set.

Main Valve: The main valve shall be a center-guided, diaphragm-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. The body and cover shall be ductile iron. 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 an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. 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 a 2-way adjustable, direct-acting, pressure-sustaining pilot valve, a needle valve, isolating cock valves, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer requirements.

Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.



700 Series

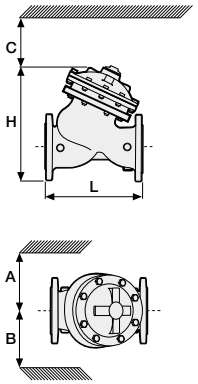
Model 730

Technical Data

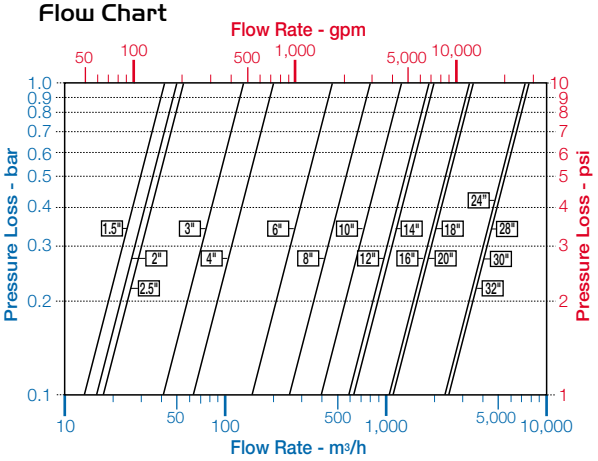
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	350	14	180	7	205	8.1	239	9.4	9.1	20
50	2	350	14	180	7	210	8.3	244	9.6	10.6	23
65	2½"	350	14	180	7	222	8.7	257	10.1	13	29
80	3"	370	15	230	9	250	9.8	305	12.0	22	49
100	4"	395	16	275	11	320	12.6	366	14.4	37	82
150	6"	430	17	385	15	415	16.3	492	19.4	75	165
200	8"	475	19	460	18	500	19.7	584	23.0	125	276
250	10"	520	21	580	23	605	23.8	724	28.5	217	478
300	12"	545	22	685	27	725	28.5	840	33.1	370	816
350	14"	545	22	685	27	733	28.9	866	34.1	381	840
400	16"	645	26	965	38	990	39.0	1108	43.6	846	1865
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2083
500	20"	645	26	965	38	1100	43.3	1167	45.9	962	2121

Data is for Y-pattern, flanged, PN16 valves
Weight is for PN16 basic valves
"C" enables removing the actuator in one unit
"L", ISO standard lengths available
For more dimensions and weights tables, refer to Engineering section



Flow Chart



Data is for Y-pattern, flat disc valves
For more flow charts, refer to Engineering section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1½–32" (40-800 mm)
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25 (ANSI Class 150, 300)
Threaded: BSP or NPT
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body & Actuator: Ductile iron
Internals:
Stainless steel, bronze & coated steel
Diaphragm:
NBR (Buna N) Nylon fabric-reinforced
Seals: NBR (Buna N)
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue) NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

Control System

Standard Materials:
Accessories:
Bronze, brass, stainless steel & NBR (Buna N)
Tubing: Copper or stainless steel
Fittings: Forged brass or stainless steel
Pilot Standard Materials:
Body: Brass, bronze or stainless steel
Elastomers: NBR (Buna N)
Springs: Galvanized steel or stainless steel
Internals: Stainless steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type		
		#3PB	#3	#3HC
1½-4"	<15	■		
40-100 mm	>15		●	
6-14"	<15		■	
150-350 mm	>15		●	
16 -32"	<15			■
400-800 mm	>15			●

■ Standard model ● with high pressure setting kit

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"	730	00	Y	C	16	EB	–	CB	I

Waterworks

1½ - 32"

Pressure-Relief/Sustaining

Oblique (up to 20")	Y
Angle (up to 18")	A
Globe (24-32" only)	G

Polyester Green	PG
Polyester Blue	PB
Epoxy FB Blue	EB
Uncoated	UC

Copper Tubing & Brass Fittings	CB
Plastic Tubings & Brass Fittings	PB
St. St. 316 Tubing & Fittings	NN

Valve Position Indicator	I
Large Control Filter	F
V-Port Throttling Plug	V
Electric Limit-Switch	S
3-way Control Loop	X
Valve Position Transmitter	Q
St. St. 316 Control Accessories	N
St. St. 316 Internal Trim (Closure & Seat)	T
St. St. 316 Actuator Internal Assembly	D
Delrin Bearing	R
Elastomers for Seals & Diaphragm	E
Pressure Gauge	6

Multiple choices permitted

No Additional Feature	00
High-sensitivity pilot	12
Check Valve	20
Solenoid-Controlled & Check Valve	25
Multi-Setting Levels - Electrically Selected	45
Closing Surge Prevention	49
Hydraulic Remotely-Controlled	50
Solenoid-Controlled	55
Electric Override	59
High sensitivity hydraulic positioning	85

Multiple choices permitted

Ductile Iron Standard	C
Cast Steel	S
St. Steel 316	N
Nickel Alumin. Bronze	U

ISO-16	16
ISO-25	25
ANSI-150	A5
ANSI-300	A3
JIS-16	J6
JIS-20	J2

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

Use when electric control additional feature is selected

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Level Control Valve

with Bi-Level Vertical Float

- Reservoir filling
  - ❑ Very low supply-pressure
  - ❑ Low noise generation
  - ❑ Energy cost-critical systems
  - ❑ Systems with poor water quality
- Reservoir outlet
  - ❑ Distribution routing
  - ❑ Sewerage “fill and flush” systems

The Model 750-66-B Level Control Valve with Bi-Level Vertical Float is a hydraulically-controlled, diaphragm-actuated, double-chambered control valve. The valve is hydraulically powered to fully open at pre-set reservoir low-level, and to shut-off at pre-set high level regardless of valve differential pressure.

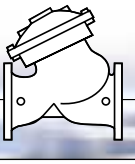
Features and Benefits

- **Line-pressure driven** – independent operation
- **Bi-level hydraulic float control**
  - ❑ On/Off service
  - ❑ Low cavitation damage
  - ❑ Suitable for low-quality water
  - ❑ Inherent reservoir refreshing
- **Double chamber**
  - ❑ Full-powered opening & closing
  - ❑ Decreased pressure loss
  - ❑ No throttling noise
  - ❑ Non-slam closing characteristic
  - ❑ Protected diaphragm
- **External installation**
  - ❑ Easy access to valve & float
  - ❑ Easy level setting
  - ❑ Less wear and tear
- **Balanced seal disk** – high flow capacity
- **In-line serviceable** – easy maintenance
- **Flexible design** – easy addition of features

Major Additional Features

- Pressure-sustaining – **753-66**
- Electric float backup – **750-66-65**
- Flow control – **757-66-U**
- Closing surge prevention – **750-66-49**
- Level sustaining – **75A-66**

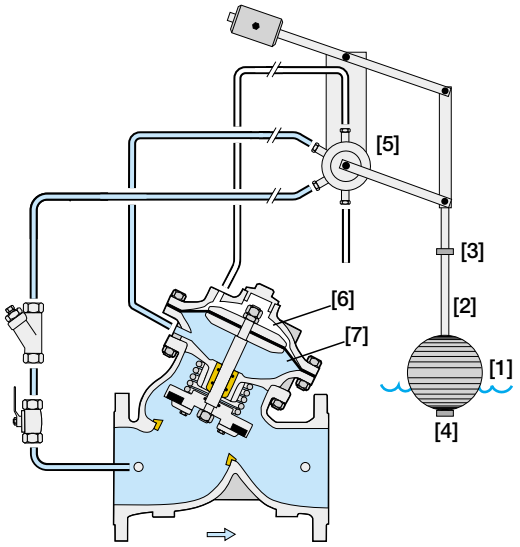
See relevant BERMAD publications



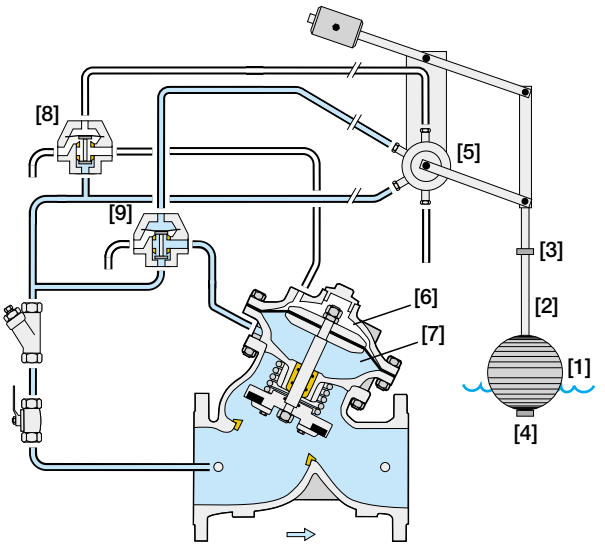
Operation

The Model 750-66-B is a float-controlled valve equipped with a 4-way, “last position”, bi-level float pilot assembly.
The float **[1]** slides along the rod **[2]**. When the float reaches either the adjustable high **[3]** or low **[4]** level stoppers, it either pulls the rod assembly down or pushes it up, switching the float pilot **[5]** position. When the float is between the adjustable stoppers, the main valve remains in its last position.
At high level, the float pilot applies pressure to the upper control-chamber **[6]**, and vents the lower control-chamber **[7]**, powerfully shutting off the main valve.
At low level, the float pilot applies pressure to the lower control-chamber, and vents the upper control chamber, powerfully opening the main valve.
For 10” valves and larger, two accelerators **[8 & 9]** quickens valve response.

Size range-1 1/2-8”



Size range-10-20”



Tender Specifications

The Level Control Valve shall be double-chambered to power fully open at pre-set low level, and to shut-off at pre-set high level regardless of valve differential pressure.

Main Valve: The main valve shall be a center-guided, diaphragm-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. The body and cover shall be ductile iron. 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 an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. 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 a 4-way, “last position”, adjustable bi-level, hydraulic float pilot assembly, an isolating cock valve, (for 10” valves and larger: two accelerators), 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. The valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards..

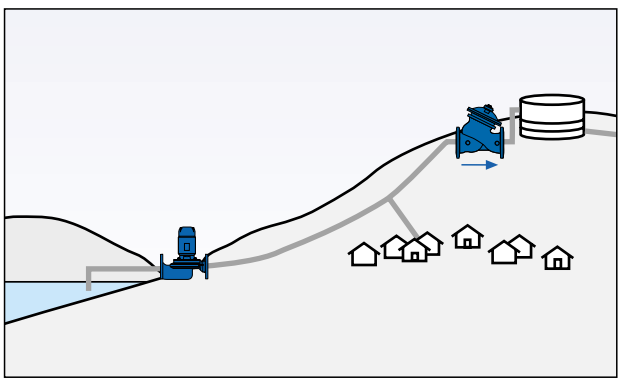
Typical Applications

Infrastructure Reservoirs

Optimal design of reservoir systems requires specifying a level control valve that reduces pumping costs by minimizing the extra pumping pressure required to operate standard valves.
Even at very low pressure, the Model 750-66-B ensures full opening, maximum flow capacity, and secure closing.
It should be included during the system design phase or with changing needs.

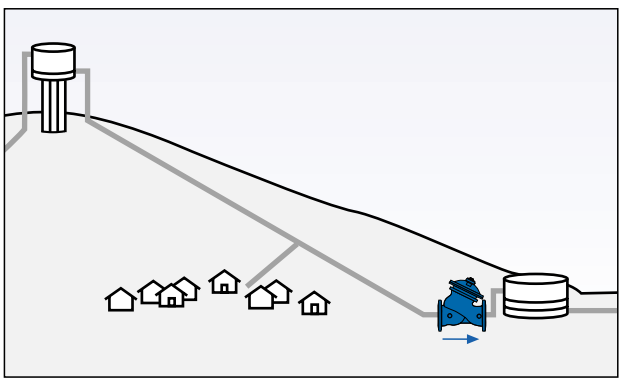
Pumping to Uphill Reservoir

In a reservoir system, where a **pump provides pressure**, consumers are prioritized over reservoir filling by installing the **Model 753-66** Level Control and Pressure-Sustaining Valve.



Gravity-Filling a Downhill Reservoir

Where a **reservoir provides pressure** to consumers and fills a low-lying reservoir, the consumers should be prioritized over filling the lower reservoir.
Defining the pressure set-point for the standard level control and pressure-sustaining valve is usually impossible, as there is only a very small potential differential pressure to operate the valve.
The solution: Rather than controlling the pressure during filling, control the filling flow ensuring sufficient pressure for consumers.
Install the **Model 757-66-U** Level and Flow Control Valve.

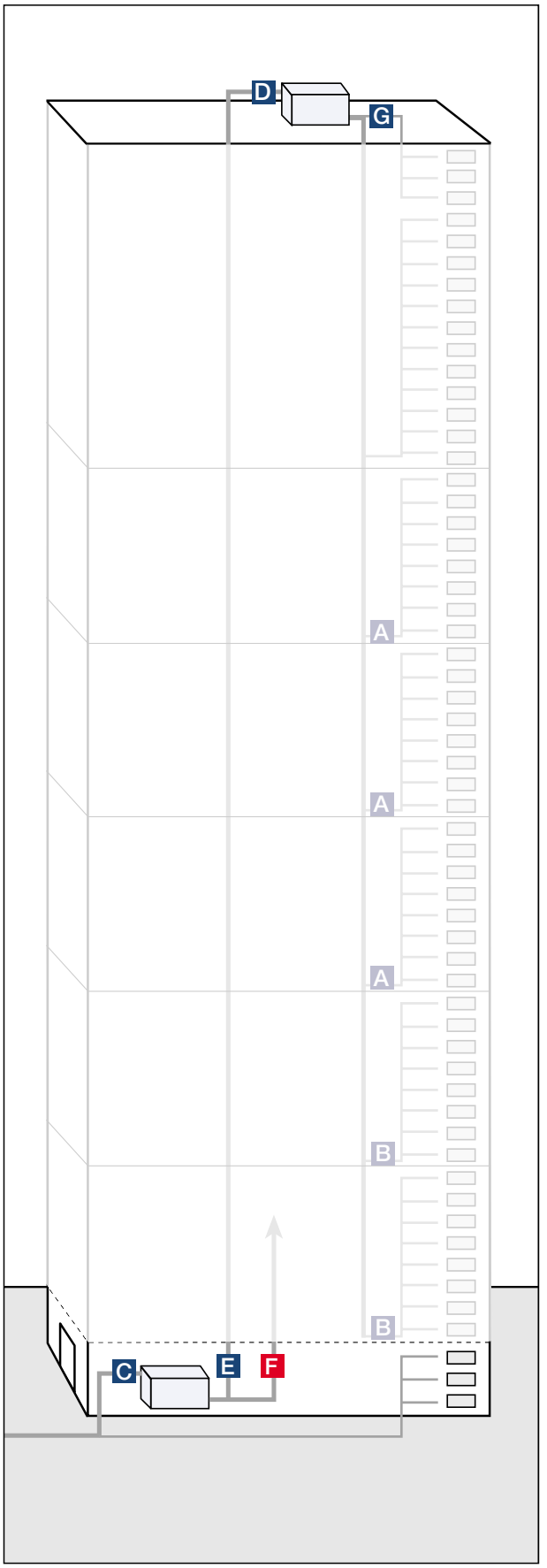


Typical Level Control Systems in Hi-Rise Buildings

Water supply system design requirements for hi-rise buildings present unique issues:

- Supply cut-off is unacceptable and single source supply is common.
- Reservoir overflow might be extremely expensive and even dangerous.
- Reservoirs are often located next to prestigious residential and office space. Extraneous noise and maintenance activities are to be avoided.
- Most of the occupants of hi-rise buildings are completely dependent on the reservoir system of the building for their water needs: potable water, firewater, air conditioning system, flushing, etc.
- Pressure for upper floors consumers and for fire-protection systems must be prioritized during reservoir filling.
- As reservoir systems are designed to meet maximum (emergency) consumption, although actual consumption is usually far less, there is a risk of stagnant reservoir water.

The Model 750-66-B together with BERMAD'S accumulated know-how addresses these issues and present appropriate solutions.



- A Higher-zone pressure reducing system installation
- B Lower-zone pressure reducing system (two-stage) installation
- C Bottom reservoir level control system
- D Roof reservoir level control system
- E Potable water pumping system
- F Fire protection pumping system
- G Upper floors pumping system

Rooftop Reservoirs

Rooftop reservoir level control is attained by electric control of the basement pumps according to reservoir level. As overflow of a rooftop reservoir can cause costly damage, hydraulic back-up protection is recommended.
The Model 750-66-B is suited to this function. When open, it presents minimal interference, but when needed, it shuts-off securely.
To prioritize pressure to upper floor consumers or fire protection system, install the Model 730 Pressure-Sustaining Valve upstream from the Model 750-66-B.

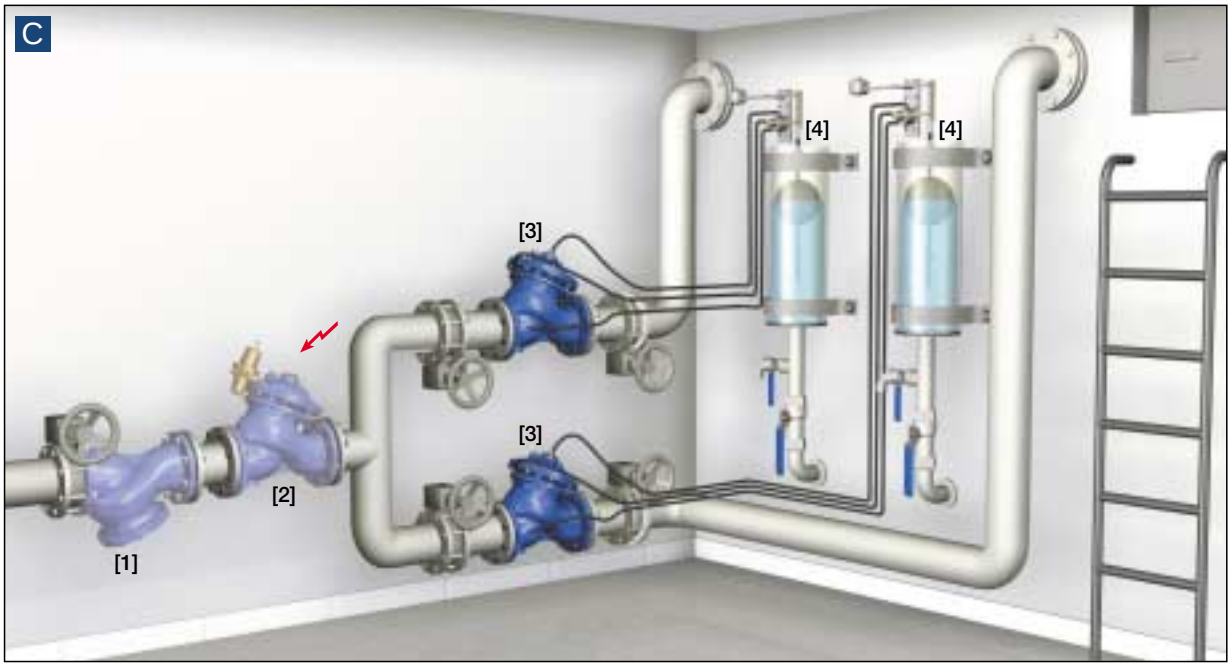
Basement Reservoirs

Basement reservoir design requires consideration of specific issues:

- Supply cut-off is unacceptable.
- Reservoir overflow might damage expensive equipment.
- Noise level* and duration should be limited.
- Municipal supply pressure might be low.

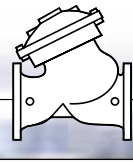
The Model 750-66-B, as part of the system shown, fulfills these requirements and more.

* For other measures that might be needed to further reduce system noise, see relevant BERMAD publications.



In addition to the Model 750-66-B, BERMAD recommends these systems include:
[1] Strainer Model 70F: prevents debris from damaging valve operation.
[2] Pressure-Sustaining Valve Model 730-65: ensures municipal supply to lower floors & provides electric back-up.
[3] Parallel Redundant Branch Model 750-66-B: ensures uninterrupted supply.
[4] Float Assembly: out-of-tank installation.

BERMAD Waterworks



700 Series

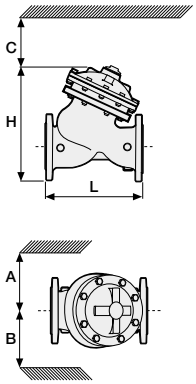
Model 750-66-B

Technical Data

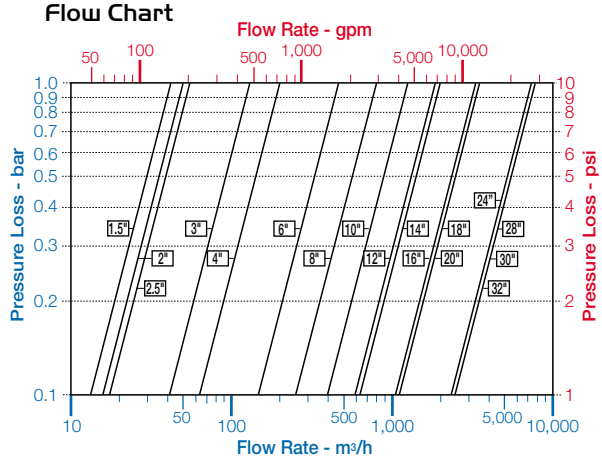
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	350	14	180	7	205	8.1	239	9.4	9.1	20
50	2	350	14	180	7	210	8.3	244	9.6	10.6	23
65	2½"	350	14	180	7	222	8.7	257	10.1	13	29
80	3"	370	15	230	9	250	9.8	305	12.0	22	49
100	4"	395	16	275	11	320	12.6	366	14.4	37	82
150	6"	430	17	385	15	415	16.3	492	19.4	75	165
200	8"	475	19	460	18	500	19.7	584	23.0	125	276
250	10"	520	21	580	23	605	23.8	724	28.5	217	478
300	12"	545	22	685	27	725	28.5	840	33.1	370	816
350	14"	545	22	685	27	733	28.9	866	34.1	381	840
400	16"	645	26	965	38	990	39.0	1108	43.6	846	1865
450	18"	645	26	965	38	1000	39.4	1127	44.4	945	2083
500	20"	645	26	965	38	1100	43.3	1167	45.9	962	2121

Data is for Y-pattern, flanged, PN16 valves
Weight is for PN16 basic valves
"C" enables removing the actuator in one unit
"L", ISO standard lengths available
For more dimensions and weights tables, refer to Engineering section



Flow Chart



Data is for Y-pattern, flat disc valves
For more flow charts, refer to Engineering section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1½–32" (40-800 mm)
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25 (ANSI Class 150, 300)
Threaded: BSP or NPT
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body & Actuator: Ductile iron
Internals:
Stainless steel, bronze & coated steel
Diaphragm:
NBR (Buna N) Nylon fabric-reinforced
Seals: NBR (Buna N)
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue) NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

Control System

Standard Materials:
Accessories:
Bronze, brass, stainless steel & NBR (Buna N)
Tubing: Copper or stainless steel
Fittings: Forged brass or stainless steel
Float Standard Materials
Pilot body: Brass
Seals: NBR (Buna N)
Internals: Stainless steel & Brass
Lever system: Brass
Float: Plastic
Float rod: Stainless steel
Base plate: Fusion bonded epoxy coated steel
Optional materials: Stainless steel metal parts and float, FPM (Viton®) seals

- Minimum level differential: 15 cm (6")
- Maximum level differential: 54 cm (21")
- Each extension rod adds 56 cm (22"), one extension rod supplied
- Extra counterweight required if second extension rod used
- See Bermad float installation recommendations
- If inlet pressure is below 0.7 bar (10 psi) or above 10 bar (150 psi), consult factory

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"	750	66	–	Y	C	16	EB	–	CB	BVI

Sector: Waterworks

Size: 1½ - 32"

Primary Feature: Level Control

Additional Feature:

Closing Surge Prevention	49
Modulating Horizontal Float	60
Bi-Level Electric Float	65
Bi-Level Vertical Float	66
Modulating Vertical Float	67
Altitude Pilot	80
Modulating Altitude Pilot	82
Sustaining Altitude Pilot	83
Bi-Level Altitude Control	86
2-14 meter Setting Altitude Pilot	M6
5-22 meter Setting Altitude Pilot	M5
15-35 meter Setting Altitude Pilot	M4
25-70 meter Setting Altitude Pilot	M8

Multiple choices permitted

Pattern:

Oblique (up to 20")	Y
Angle (up to 18")	A
Globe (24-32" only)	G

Body Material:

Ductile Iron Standard	C
Cast Steel	S
St. Steel 316	N
Nickel Alumin. Bronze	U

End Connections:

ISO-16	16
ISO-25	25
ANSI-150	A5
ANSI-300	A3
JIS-16	J6
JIS-20	J2

Coating:

Polyester Green	PG
Polyester Blue	PB
Epoxy FB Blue	EB
Uncoated	UC

Voltage & Position:

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

Use when electric control additional feature is selected

Tubing & Fittings:

Copper Tubing & Brass Fittings	CB
Plastic Tubings & Brass Fittings	PB
St. St. 316 Tubing & Fittings	NN

Additonal Attributes:

Double-Chambered	B
Valve Position Indicator	I
Large Control Filter	F
V-Port Throttling Plug	V
Orifice Assembly	U
Electric Limit-Switch	S
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

Multiple choices permitted

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Surge-Anticipating Control Valve

- Eliminates surge for all pumping systems:
  - Booster & deep well, single & variable speed
- Eliminates surge for all distribution networks:
  - Municipal, hi-rise buildings, sewage, HVAC, irrigation
  - Difficult to maintain, remote locations, older systems

The Model 735-M Surge-Anticipating Valve is an off-line, hydraulically-operated, diaphragm-actuated valve. The valve, sensing line pressure, opens in response to the pressure drop associated with abrupt pump stoppage. The pre-opened valve dissipates the returning high pressure wave, eliminating the surge.
The Model 735-M smoothly closes drip-tight as quickly as the relief feature allows, while preventing closing surge.
The valve also relieves excessive system pressure.

Features and Benefits

- **Replaces surge air vessels**
  - Relieves surge, fail-safe open
  - Minimal maintenance
  - Economy of space
  - Lower investment & maintenance costs
  - Especially economic for higher pressure ratings
- **Line-pressure driven**
  - Independent operation
  - No motor required
  - Long-term drip-tight sealing
  - Adjustable hydraulic actuation
- **Double chamber**
  - Moderated valve closing (no surges)
  - Protected diaphragm
- **In-line serviceable** – easy maintenance
- **Obstacle-free full-bore** – uncompromising reliability
- **Balanced seal disk** – high flow capacity

Major Additional Features

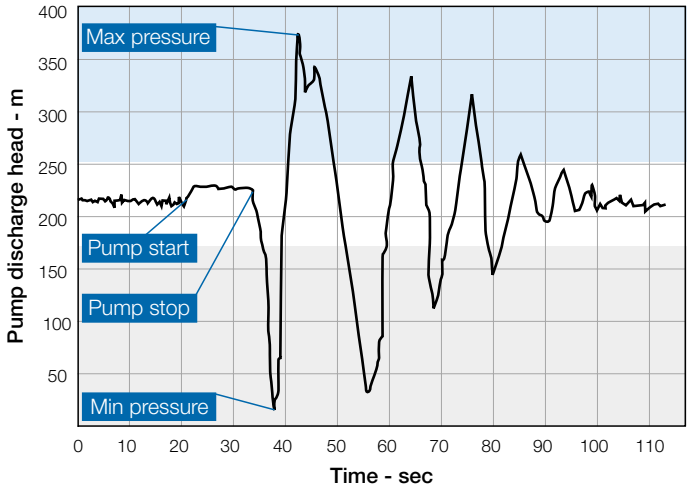
- Solenoid-control – **735-55-M**
- Sensing diaphragm (for sewage) – **735-Md**
- Electric override for fire protection – **FP-730-59**
- Quick pressure-relief valve – **73Q**

See relevant BERMAD publications

Operation

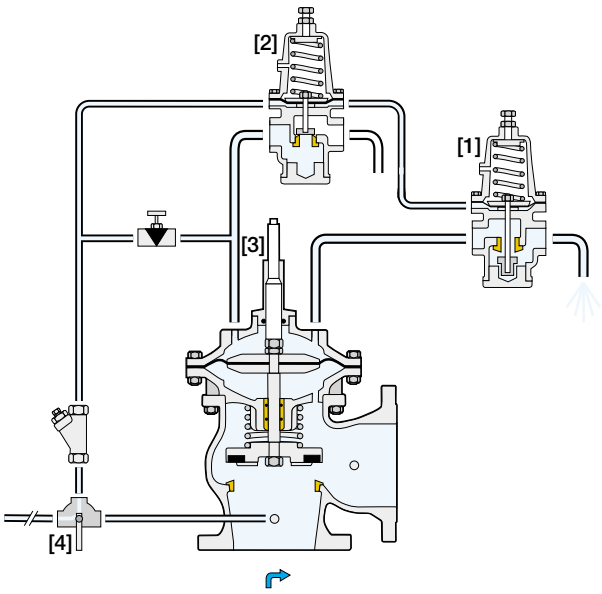
The abrupt stopping of a pump produces a pressure drop as the traveling column of water, with its inherent momentum, continues to travel along the line, generating severe low pressure.
When the traveling column of water loses its momentum, it travels back towards the pump. Should it hit the closed check valve, a very high pressure surge is created and travels throughout the system as a damaging wave at velocities of up to "Mach 4". No quick relief valve can react quickly enough to eliminate it.

Surge at Pump Station Without Protection

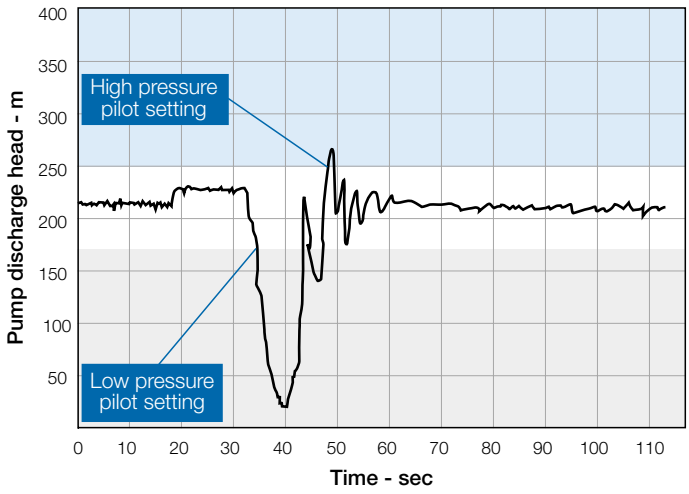


Eliminating surge requires anticipation and pre-action. The Model 735-M is well suited to this task.
The Low-Pressure (LP) pilot **[1]** senses the initial pressure drop and opens. This immediate reaction allows remaining line pressure to quickly open the main valve.
The already opened Model 735-M releases the returning colunm of water minimizing the line pressure rise. Should the relief rate be insufficient, and the pressure exceeds the High-Pressure (HP) pilot **[2]** setting, the pilot immediately opens, further opening the main valve.
As system pressure stabilizes again at static pressure, both pilots close and the main valve begins closing. Should line pressure rise during main valve closing, the HP pilot briefly stops the process, preventing the pressure from continuing to rise.
The flow stem **[3]** limits the relief flow to prevent column separation and preserve closing pressure.
Cock valve **[4]** serves for selecting operating and sensning source:

- Directly from main discharge line - Recommended (see “Typical Application”)
- From Model 735-M inlet



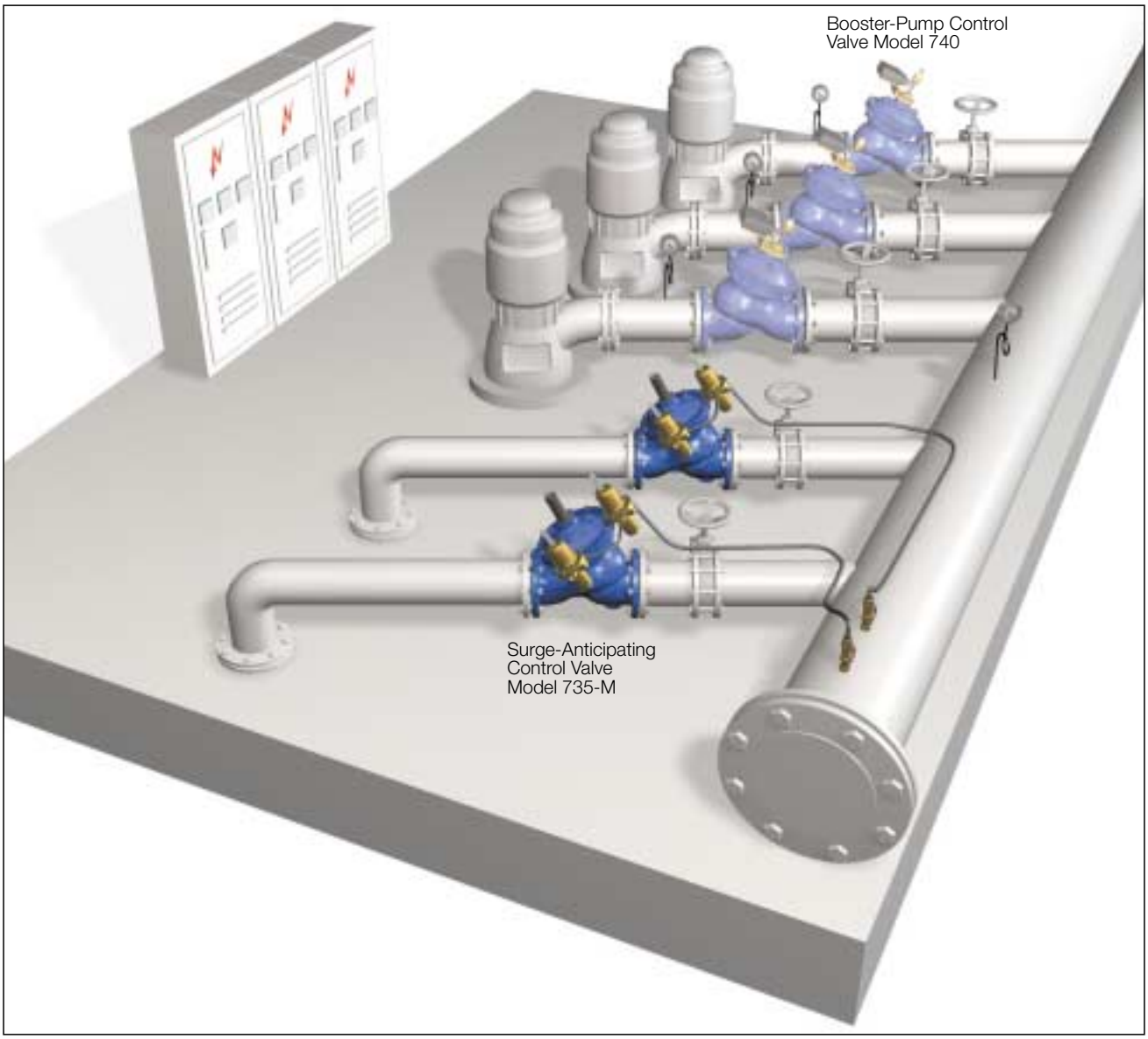
Pressure at Pump Station Protected by Model 735-M



Typical Applications

In this system, a pump battery supplies the main line through a manifold. The Model 735-M enables:

- Surge elemination on power failure
- Surge-free switching between “on-duty” pumps
- Smooth closing according to pilot setting



Bermad Surge Analysis Program – "BERSAP II"

Surge is the result of many factors: designed flow rate, pumping system, main line characteristics, etc. By using advanced mathematics computer software, Bermad's experienced engineers can perform the desired analysis.
For best analysis, all following data is required.

- Main Line
  - Line Profile (Chainage), elevations at accumulated length
  - Internal diameter
  - Length
  - Material
  - Wall thickness
- Pumps
  - Pump curve(s)
  - Max number of pumps in simultaneous operation
  - Type of non-return valve
- System
  - Max designed flow rate
  - Max & min levels at suction, and at delivery reservoirs

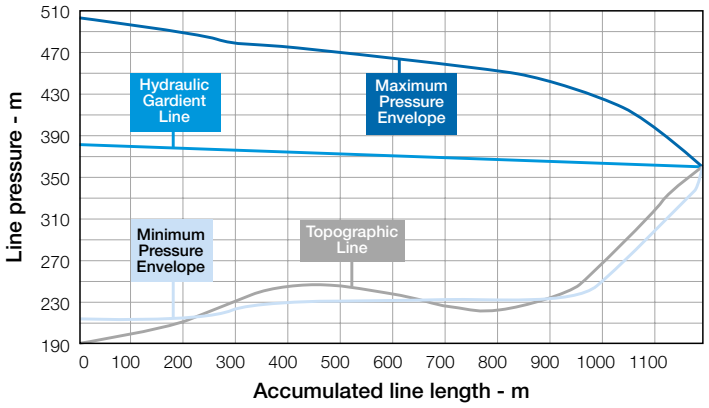
For systems with multiple pumping stations and/or multiple consumers along the supply line, the following data is also required:

- System layout including pumping station and consumer locations and characteristics
- Head Gradient Line (HGL) for each and every node based on "Network-Solver" analysis

This surge analysis indicates that without protection the system is exposed to:

- Pressure of ~50 bar (see max pressure envelope line)
- Vacuum conditions (see min pressure envelope line)

Line Hydraulic Behavior without Protection



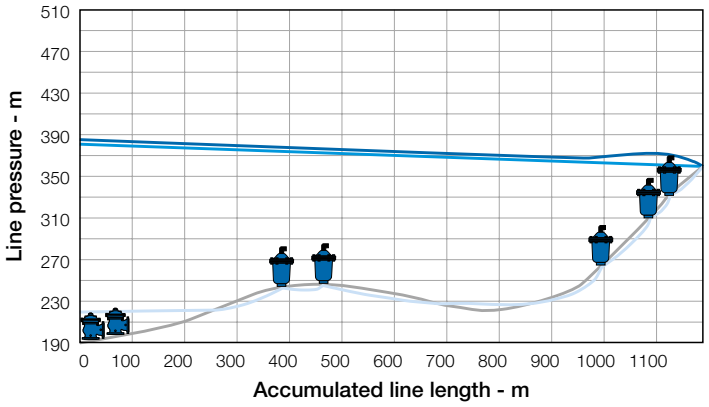
Simulated surge protection recommends:

- Two Model 735-M valves installed in parallel at the pumping station
- Five Non-Slam Air Valves installed along the line

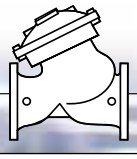
With full surge protection, the simulation shows no surge and minimal vacuum.

- Pressure at max of ~38 bar (see max pressure envelope line)
- No appreciable vacuum (see min pressure envelope line)

Line Hydraulic Behavior with Full Protection



Any pipelines design require air valves to admit air under vacuum conditions and to release air under pressure. The size, type and location of these air valves shoud consider surge protection requirements.



700 Series

Model 735-M

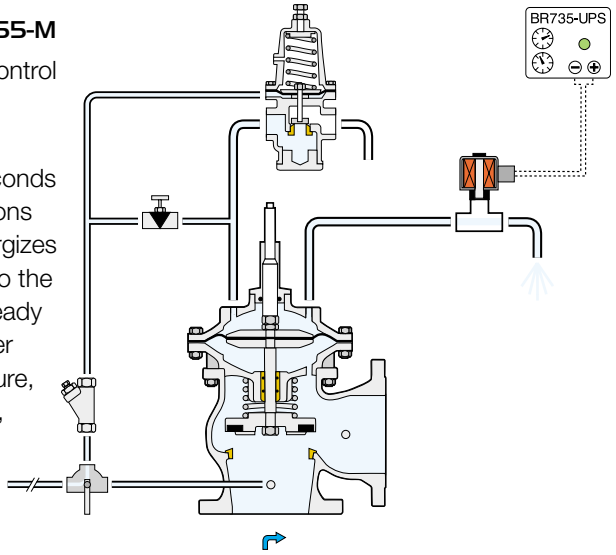
Additional Application

Surge-Anticipating Valve with Solenoid Control Model 735-55-M

The Model 735-55-M Surge-Anticipating Valve with Solenoid Control provides the appropriate solution to pumping systems when:

- Static pressure is lower than 3 bar (45 psi)
- Discharge line is short & wave critical time is less than 3 seconds
- Electric control is preferred due to maintenance considerations

Upon power failure, the BR 735-UPS Controller immediatlly energizes the Model 735-55-M, normaly closed DC solenoid, even prior to the pressure drop associated with abrupt pump stoppage. The already opened Model 735-55-M releases the returning colunm of water eliminating the surge. The Model 735-55-M, sensing line pressure, smoothly closes drip-tight as quickly as the relief feature allows, while preventing closing surge.
The valve also relieves excess system pressure.



BR-735-UPS Controller

As the Model 735-55-M Surge Anticipating Valve with Solenoid Control remains closed except in the event of power failure, it requires a normally open (N.O.) always energized solenoid, which is vulnerable to problems (coil heating, sticking problems, calcium build-up, etc.). The recommended alternative is using a combination of a normally closed (N.C.) de-energized solenoid, and an Un-interruptible Power Source (UPS).
The BR-735-UPS Controller, includes two re-chargeable lithium batteries and a settable timer for determining the period that the valve remains open. The Controller, as a part of the pump control panel, immediately energizes the N.C. solenoid to open the valve for a preset time after which it de-energizes the solenoid, allowing the Model 735-55-M to start closing.

Tender Specifications

The Surge-Anticipating Valve shall open in response to the pressure drop associated with abrupt pump stoppage to dissipate the returning high pressure wave, eliminating the surge. It shall smoothly close drip-tight as quickly as the relief feature allows, while preventing closing surge. The valve shall also relieve excessive system pressure.

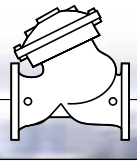
Main Valve: The main valve shall be a center-guided, diaphragm-actuated, globe valve of either oblique (Y) or angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow-path, with no stem guides, bearings, or supporting ribs. The body and cover shall be ductile iron. 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 an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. 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 adjustable 2-way pilots, a needle valve, a flow stem, a cock valve, 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. The valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

BERMAD Waterworks



700 Series

Model 735-M

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"	350	14	180	7	205	8.1	239	9.4	9.1	20
50	2	350	14	180	7	210	8.3	244	9.6	10.6	23
65	2½"	350	14	180	7	222	8.7	257	10.1	13	29
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Weight is for PN16 basic valves
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"L", ISO standard lengths available
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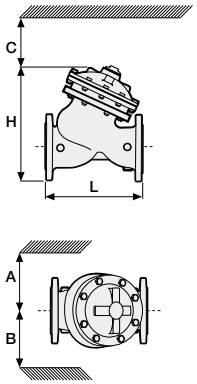
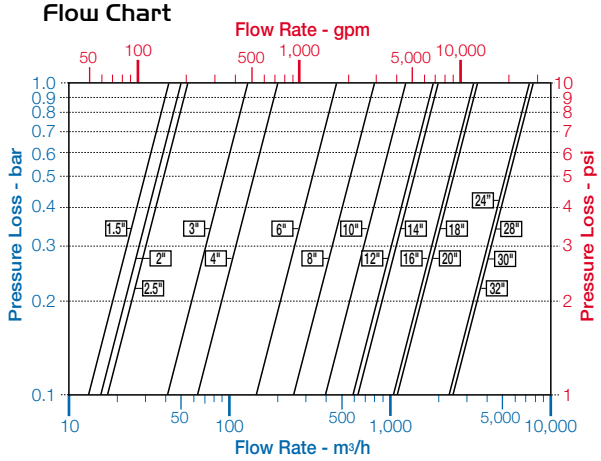


Flow Chart



Data is for Y-pattern, flat disc valves
For more flow charts, refer to Engineering section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1½–32" (40-800 mm)
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25 (ANSI Class 150, 300)
Threaded: BSP or NPT
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body & Actuator: Ductile iron
Internals:
Stainless steel, bronze & coated steel
Diaphragm:
NBR (Buna N) Nylon fabric-reinforced
Seals: NBR (Buna N)
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue)
NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

Control System

Standard Materials:
Accessories:
Bronze, brass, stainless steel & NBR (Buna N)
Tubing: Copper or stainless steel
Fittings: Forged brass or stainless steel
Pilot Standard Materials:
Body: Brass, bronze or stainless steel
Elastomers: NBR (Buna N)
Springs: Galvanized steel or stainless steel
Internals: Stainless steel

Pilot Valve Selection

Valve Size	Pilot Setting (bar)	Pilot Type #2 #3	Pilot Type #2HC #3HC	Pilot Type #2+Ac #3+Ac
1½ - 4"	<15	■		
40 -100 mm	>15	●		
6 -14"	<15		■	
150 - 350 mm	>15		●	
16 - 32"	<15			■
400-800 mm	>15			●

■ Standard model ● with high pressure setting kit
Ac-Accelerated Openig valve

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"	735	00	Y	C	16	EB	–	CB	FM

Sector: WW — Waterworks

Size: 6" — 1½ - 32"

Primary Feature: 735 — Surge-Anticipaiting Control

Additional Feature: 00

No Additional Feature	00
Solenoid-Controlled	55

Multiple choices permitted

Pattern: Y

Oblique	(up to 20")	Y
Angle	(up to 18")	A
Globe	(24-32" only)	G

Body Material: C

Ductile Iron Standard	C
Cast Steel	S
St. Steel 316	N
Nickel Alumin. Bronze	U

End Connections: 16

ISO-16	16
ISO-25	25
ANSI-150	A5
ANSI-300	A3
JIS-16	J6
JIS-20	J2

Coating: EB

Polyester Green	PG
Polyester Blue	PB
Epoxy FB Blue	EB
Uncoated	UC

Voltage & Position: –

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

Use when electric control additional feature is selected

Tubing & Fittings: CB

Copper Tubing & Brass Fittings	CB
Plastic Tubings & Brass Fittings	PB
St. St. 316 Tubing & Fittings	NN

Additonal Attributes: FM

Flow Stem	M
Large Control Filter	F
Sensing Diaphragm	d
V-Port Throttling Plug	V
Orifice Assembly	U
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

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